MELSEC System Q

Programmable Logic Controllers

User's Manual

AS-i Master Module
QJ71AS92
GX Configurator-AS

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

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

The instructions given in this manual are concerned with this product. For the safety instructions of the PLC system, please read the User's Manual for the CPU module to use.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

| ◇ DANGER | 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 medium or slight personal injury or physical damage. |

Note that the △CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please store this manual in a safe place and make it accessible when required. Always forward it to the end user.

[DESIGN PRECAUTION]

◇ DANGER

- If a communication error occurs in the AS-i system, the input will turn OFF from the slave having the communication error.
  Output to the slave having the communication error will be held or cleared depending on the slave specifications.

  The AS-i system communication error can be confirmed with the buffer memory's List of Active Slaves (LAS) (15H to 18H) and with the input signal Configuration error (X4).

  Using the above information, configure an interlock circuit on the sequence program so that the system activates safely.

  There is a risk of accidents caused by incorrect outputs or operations.

- Depending on the module fault, the input/output could enter ON or OFF status.
  Provide an external monitoring circuit for I/O signals that could lead to major accidents.

△ CAUTION

- Do not bundle AS-i cable together with main circuit or power lines, or lay them close to these lines.
  As a guide, separate these lines by a distance of at least 100 mm, otherwise misoperations may occur due to noise.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications in CPU module User's Manual.
  Using the PLC in the environments outside the ranges stated in the general specifications will cause electric shock, fire, misoperation, or damage to/deterioration of the product.

- When mounting a module, be sure to securely insert the fixing latches on the bottom of the module into the fixing holes on the base unit, and tighten the module fixing screws within the specified torque.
  Failure to observe this could result in damage to the screws or module, module falling, short or misoperation.

- Always shut off all phases of the PLC power supply and AS-i power supply externally before mounting or removing the module.
  Failure to shut off all phases could lead to product damage.

- Do not touch conductive parts or electronic components of the module with your bare hands.
  This could cause misoperation or failure of the module.

[WIRING PRECAUTIONS]

◇ DANGER

- Switch off all phases of the PLC power supply and AS-i power supply outside the PLC before starting installing or wiring work.
  If all phases are not switched off, electric shock will occur or the product will be damaged.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Always confirm the products terminal layout before wiring to the module.
  Miswiring could lead to fires or faults.

- Tighten terminal screws within the specified torque.
  Failure to observe this could result in damage to the screws or module, short or misoperation.

- Make sure that no foreign matter such as chips or wire offcuts gets inside the module.
  It will cause fire, failure, or misoperation.

- A label is installed at the upper part of a module to prevent the entry of foreign matters. Do not remove the label during wiring. However, be sure to remove it for heat dissipation during system operation.

- To connect the AS-i cable to the module, the cable must be securely fixed. Please be sure to run it in a duct, or clamp it.
  Failure to observe this could cause the unstable cable connection, resulting in damage to the cable or module by carelessly pulling the cable, or the system malfunction due to poor cable connection.

[WIRING PRECAUTIONS]

⚠ CAUTION
• When removing the AS-i cable from a module, do not pull it out by hand. Always be sure to unscrew the module mounting screws in advance. If the cable is pulled while being connected to the module, it could cause damage to the cable or module, or the system malfunction due to poor cable connection.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION
• Do not touch terminals while the power is ON. This could cause misoperations. • Do not disassemble or modify any module. This could cause failure, misoperation, injuries, or fire. • When cleaning a module or retightening terminal screws, always be sure to externally switch off all the phases of the PLC power supply and AS-i power supply in advance. Failure to observe this could result in module failure or misoperation. Loose or excessive tightening could cause damage to the module or screws, module falling, short or misoperation. • When mounting or removing a module, always be sure to externally switch off all the phases of the PLC power supply and AS-i power supply in advance. Failure to observe this could result in module failure or misoperation. • Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module. Failure to do so may cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION
• When disposing of this product, treat it as industrial waste.

REVISIONS

INTRODUCTION

Thank you for purchasing the MELSEC-Q Series PLC.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q Series PLC you have purchased, so as to ensure correct use.

CONTENTS

5 UTILITY PACKAGE (GX Configurator-AS)	5- 1 to 5- 42

Compliance with the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC compatible with the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the PLC CPU to use.

Generic Terms and Abbreviations

Unless otherwise specified, the following generic terms and abbreviations are used to explain the QJ71AS92 type AS-i master module in this manual.

Abbreviation/general terms	Description of the abbreviation/general terms
QJ71AS92	Abbreviation of QJ71AS92.
QCPU (Q mode)	Generic term for, Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU and Q25PHCPU.
Main base unit	Generic term for Q33B, Q35B, Q38B and Q312B main base unit.
Extension base unit	Generic term for Q52B, Q55B, Q63B, Q65B, Q68B and Q612B extension base unit.
Extension cable	Generic term for QC05B, QC06B, QC12B, QC30B, QC100B extension cable.
GX Configurator-AS	Generic term for QJ71AS92 master module setting and monitor tool GX Configurator-AS (SW1D5C-QASU-E)
LAS	Abbreviation for List of Active Slaves.
LDS	Abbreviation for List of Detected Slaves.
LPF	Abbreviation for List of Peripheral Fault.
LPS	Abbreviation for List of Projected Slaves.
EC flag	Abbreviation for Execution Control flag.

Product Structure

The follow table shows the product stricture.

Type	Product	Quantity
QJ71AS92	QJ71AS92 type AS-i master module	1
Manual	QJ71AS92 type AS-i Master Module User's Manual (Hardware)	1

1

1 OVERVIEW

This manual explains the specifications, procedures for operation and troubleshooting of the QJ71AS92 type AS-i master module (hereinafter, QJ71AS92).

The AS-i is the abbreviation of the Actuator-Sensor-Interface, and is a network system specified by the IEC Standards: IEC-62026-2.
The QJ71AS92 is compatible with the AS-Interface Specification Version 2.11, and can be used as the master module of the AS-i system.

> Refer to IEC 62026-2 for details on the specifications related to the AS-i system described in this manual.
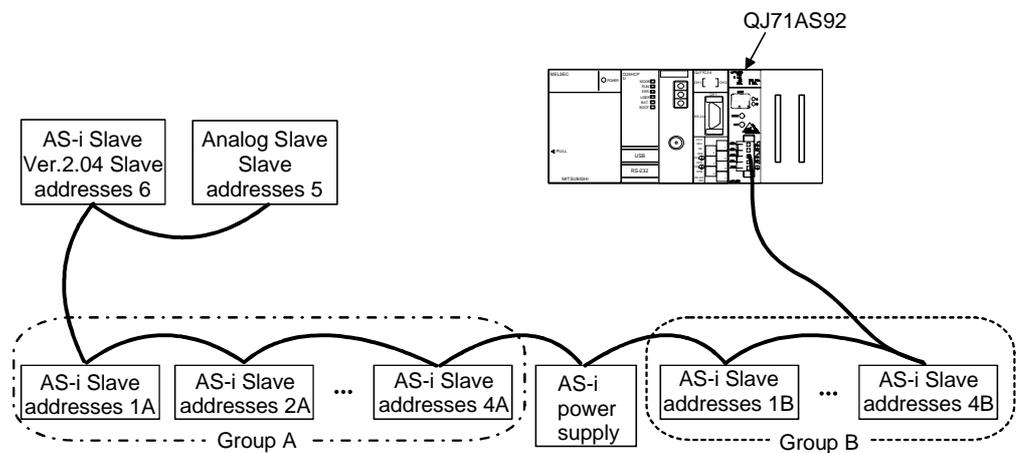
Use the AS-i cables, AS-i power supply and slaves that are compatible with AS-i Ver. 2.11 or AS-i Ver. 2.04.

The CPU module communicates the I/O data of the slaves via the QJ71AS92 buffer memory according to instructions.
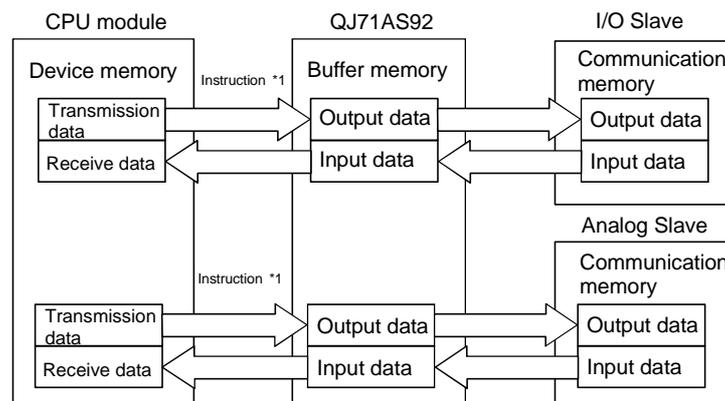
*1: Use of GX Configurator-AS enables automatic refresh without programs. See Chapter 5 for details.

1.1 Features

1

The QJ71AS92 has the following features.

(1) Maximum number of connected slaves
As the AS-i master, the QJ71AS92 can control a maximum of 62 slaves by splitting the slave addresses into two groups (A and B).

(2) Communication with analog slaves
Provided that one channel is equal to 16 bits, the QJ71AS92 can communicate with AS-i analog input or output slaves of one to four channels.

(3) Overall distance
The overall distance is 100m.
Note that the overall distance can be extended to up to 300m by using two repeaters.

(4) Automatic slave address assignment function (Automatic address assignment function)
The QJ71AS92 can automatically assign the same address to the new slave (same type of product), whose slave address is 0, when changing a slave.

(5) Easy setting by using utility package (Sold separately)
GX Configurator-AS is available as an utility package (Sold separately).
Although not necessarily required, GX Configurator-AS enables the automatic refresh to be set from within the software, resulting in easy sequence programming, slave address setting, and monitoring of the setting and operation statuses.

2 SYSTEM CONFIGURATION

This chapter describes the system configuration for the QJ71AS92 and the compatible modules.

2.1 Applicable Systems

This section describes the system configuration for the QJ71AS92.

(1) Applicable module and the number of mountable modules
The followings are the CPU modules in which the QJ71AS92 can be mounted and the number of mountable modules.

Applicable module		Number of mountable modules
CPU module	Q00JCPU	No restriction (∗1)
	Q00CPU Q01CPU	
	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	
	Q12PHCPU Q25PHCPU	

∗1 The QJ71AS92 can be used within the maximum number of I/O point range of the CPU module in use.

(2) Base Unit in which the QJ71AS92 can be mounted
The QJ71AS92 can be mounted in any I/O slot of the base unit. However, a power shortage may occur depending on the combination with other mounted modules and the number of modules used, so always be sure to check the power supply capacity when installing modules.

(3) Software packages supported
The following table shows systems which use QJ71AS92 and the corresponding software packages are as shown below.
The GX Developer is necessary when using a QJ71AS92.

	Software Version	
	GX Developer	GX Configurator-AS
If mounted in the Q00J/Q00/Q01CPU	Version 7 or later	Version 1.13P or later
If mounted in the Q02/Q02H/Q06H/Q12H/Q25HCPU	Version 4 or later	
If mounted in the Q12PH/Q25PHCPU	Version 7.10L or later	

2

2.2 How to Check the Function Version and Software Version

This section describes how to check the function version of the QJ71AS92 and the GX Configuration-AS software version.

(1) How to check the function version of the QJ71AS92

(a) The version can be checked the "SERIAL section of the rating plate" that is located on the side of the module
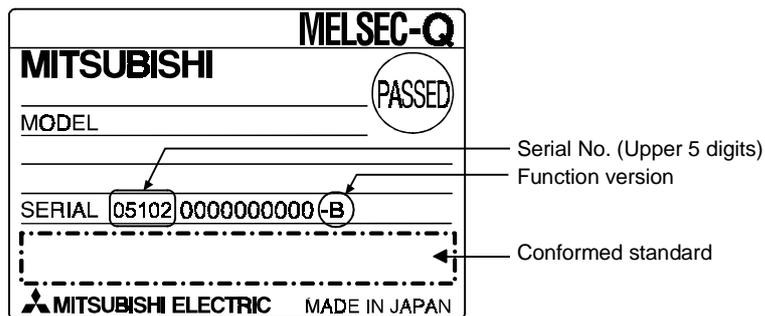
(b) For version check using the GX Developer
See Section 8.3 of this manual.

(2) How to check the GX Configuration-AS software version
The GX Configuration-AS software version can be checked on GX Developer's "Product information" screen.
[Startup procedure]
    GX Developer → "Help" → │ Product information │
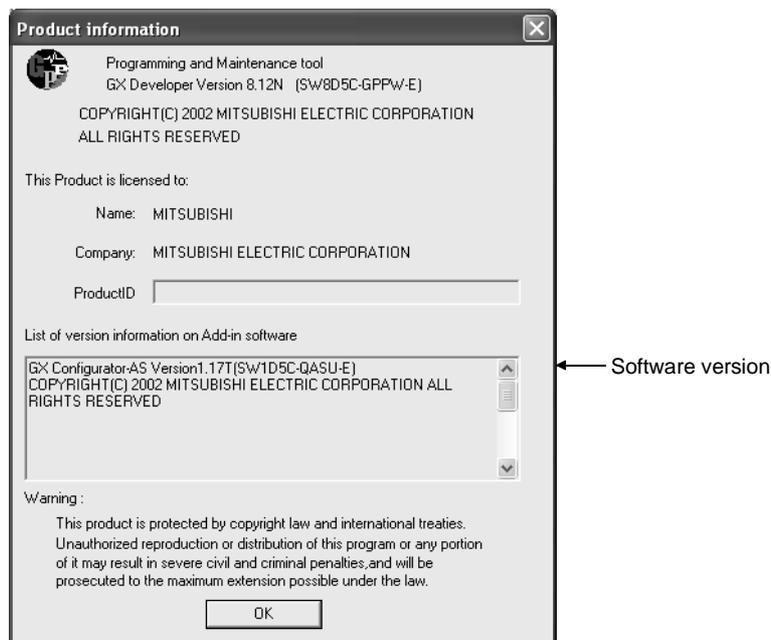
(In the case of GX Developer Version 7)

2.3 AS-i System Connection Methods

The following methods can be used to connect the AS-i system.

(1) The star method, line method, tree method or ring method can be used to connect the AS-i system.

(2) The AS-i system does not require a terminator. The overall distance is 100m when a repeater is not used, and 300m when two repeaters are used.

(3) One AS-i power supply unit is connected to the AS-i system. The power supply can be connected at any place on the AS-i system. When using a repeater, connect an AS-i power supply unit after the repeater is connected.

Examples of the connection method are shown below.

(a) Star method

(b) Line method

(c) Tree method

(d) Ring method

QJ71AS92

AS-i power supply

S : slave

(Note)
The system cannot be branched to a tree connection, etc., from the ring connection. Apartial loop cannot be formed. A repeater cannot be used.
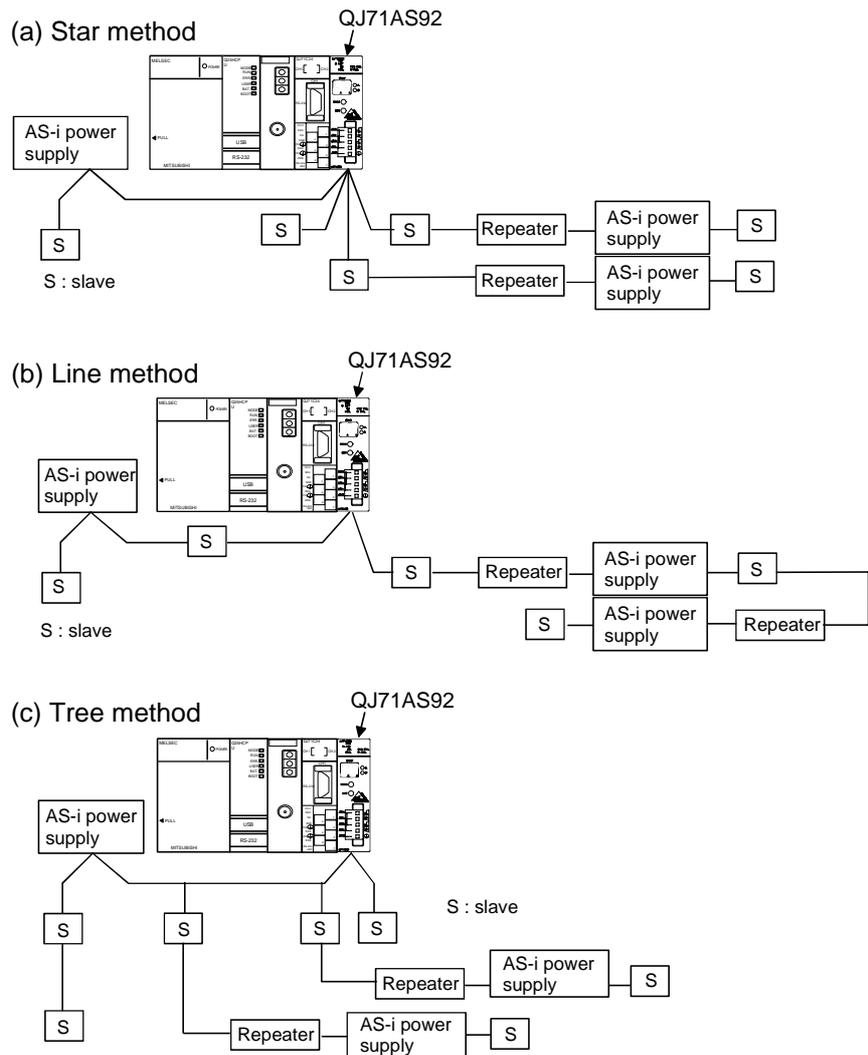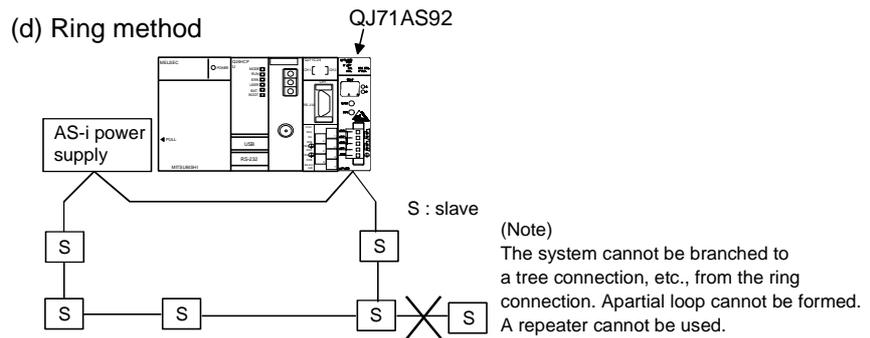
2.4 Precautions for System Configuration

(1) The QJ71AS92 can be mounted in any slot of the base unit.
If the QJ71AS92 is mounted on an extension base unit (Q52B, Q55B) to which the power supply module cannot be mounted, the power supply capacity may be insufficient.

(2) The QJ71AS92 cannot be mounted on a remote I/O station in a MELSECNET/H network system.

(3) The QJ71AS92 can use the slave addresses assigned to AS-i Ver. 2.11-compatible slaves by grouping them into A and B. [1]
The other slaves [2] than the AS-i Ver. 2.11-compatible I/O slaves cannot be grouped into A and B because of the AS-i specifications. Assign them to the slave addresses other than those used for group A and B.

*1: Check whether the slaves can be grouped or not by reference to the manuals of the slaves used.
*2: Analog slave, AS-i Ver. 2.04-compatible slave, etc.

3 SPECIFICATIONS

3.1 Performance Specifications

The following are the performance specifications of the QJ71AS92.

3.1.1 Performance specification list

Item		Specifications
Max. number of AS-i slaves *1		62 (Group A: 31, Group B: 31)
Max. number of I/O points *2	Input	248 points
(1 point = 1 bit)	Output	248 points
Max. address of analog I/O points	Input	124 points
(1 point = 16 bits)	Output	124 points
I/O refresh time		Approx. 5ms (without I/O slave grouping)
		Approx. 10ms (with I/O slave grouping)
		Approx. 35ms (per analog slave channel)
Communication speed		167kbps
Transmission distance		Max. 100m (max. 300m with two repeaters)
Connection type		Bus network type (star, line, tree and ring)
Communication method		APM modulation method (Alternating Pulse Modulation)
Error control method		Parity check
Internal memory		EEPROM (for parameter registration), number of writes: 100,000 times
Number of occupied I/O points		32 points (I/O assignment: 32 intelligent points)
Cable type		Use dedicated AS-i cable.
External supply power	Voltage	TYP. 30.5VDC (supplied by AS-i power supply)
	Current consumption	46mA (TYP 30.5VDC)
5VDC internal current consumption		0.40A
Weight		0.12kg

*1: This is the max. number of Ver. 2.11-compatible I/O slave stations (can be grouped) configured in the same system. If Ver.2.11-compatible I/O slaves that cannot be grouped, analog slaves, and Ver. 2.04-compatible slaves are used together in the same system, calculate the max. number of slaves using the following expression.

$(N_{IO-A} + N_{IO-B}) + 2 \times (N_A + N_{IO}) \leq 62$ (Group A 31, Group B 31)
Number of Group A Ver. 2.11-compatible slaves: N_{IO-A} Number of Group B Ver. 2.11-compatible slaves: N_{IO-B}
Number of analog slaves: N_A Number of Ver. 2.04-compatible slaves: N_{IO}

Slave Type	Grouping
AS-i Ver. 2.11-compatible I/O slave	Please confirm with the manufacturer of the I/O slave unit whether the unit can be grouped.
AS-i Ver. 2.04-compatible I/O slave	Disabled
AS-i Ver. 2.11-compatible analog slave	

*2: One slave uses four inputs and four outputs.
One analog slave also uses four inputs and four outputs.
For the noise immunity, withstand voltage, insulation resistance and others in the PLC system using this module, See the power supply module specifications given in the used CPU module User's Manual.
For the general specifications of the QJ71AS92, Refer to the User's Manual of the used CPU module.

3.2 Functions

The following table lists the QJ71AS92 functions.

Item	Description
AS-i slave communication function	Communicates with AS-i slaves.
Utility-based automatic refresh function	Automatically refreshes the QJ71AS92 I/O data transferred to/from the CPU module's device memory using the utility package (GX Configurator-AS).
Automatic slave address assignment function	Assigns the some address to the new slave (same type of product) whose slave address is 0, when changing a slave.
Parameter setting function	Sets the slave address and QJ71AS92 parameters using the utility package, module's front panel CODE LED and switches or sequence program.

3.2.1 Function for communication with AS-i slaves

The QJ71AS92 complies with AS-i Ver. 2.11 and can communicate with AS-i slaves.
The QJ71AS92 can be connected with the following slaves.

• AS-i Ver. 2.11-compatible I/O slave
• AS-i Ver. 2.04-compatible I/O slave
• AS-i Ver. 2.11-compatible analog slave
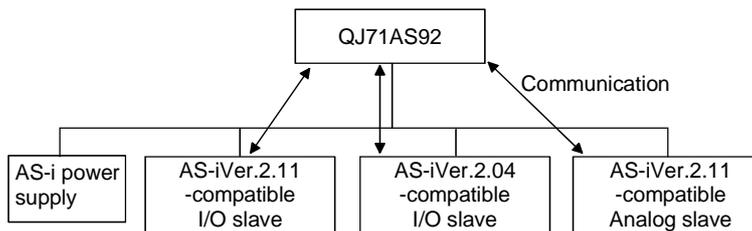
3.2.2 Utility-based automatic refresh function

Use of the GX Configurator-AS utility package (option) updates I/O data transferred to/from the CPU device memory without creating any programs programs.
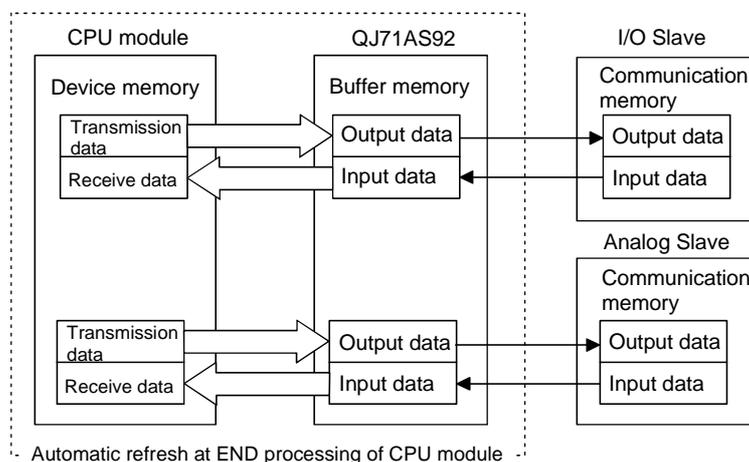
3.2.3 Automatic slave address assignment function

This function automatically sets the slave address of the old slave to the new slave of the same product having slave No. 0 at the time of slave replacement.
See Section 4.5.4 for details.

3.2.4 Parameter setting function

You can set the slave addresses and parameters in any of the following three methods.

(1)   Using the utility package (GX Configurator-AS)
       (See "Chapter 5 UTILITY PACKAGE (GX Configurator-AS)".)

(2)   Using the CODE LED and switches
       (See "Section 4.5 Start-Up".)

(3)   Using the sequence program
       (See "Section 3.4.2 (15) Command buffer <request>".)

3.3 I/O Signals for CPU Module

3.3.1 I/O signal list

Table 3.3 lists QJ71AS92 I/O signals.
The I/O signals are assigned as the table shows when the QJ71AS92 is mounted in slot 0 of the main base unit.

Table 3.3 List of I/O signals

Signal Direction: PLC CPU ← QJ71AS92		Signal Direction: PLC CPU → QJ71AS92	
Input Signal	Signal name	Output Signal	Signal name
X0	Unit Ready	Y0	Not used
X1	Not used	Y1	
X2	Command Completed	Y2	
X3	Configuration Registration Completed	Y3	
X4	Configuration Error	Y4	
X5	AS-i Power Fail	Y5	
X6	Normal Operation Confirmation	Y6	
X7	Configuration Mode	Y7	
X8	Not used	Y8	
X9		Y9	
XA		YA	
XB		YB	
XC		YC	
XD		YD	
XE		YE	
XF		YF	
X10	Not used	Y10	Not used
X11		Y11	
X12		Y12	Command Request
X13		Y13	Configuration Registration Completed
X14		Y14	Off-line Phase
X15		Y15	Auto Slave Address Allocation Function
X16		Y16	Configuration Mode
X17		Y17	Protected Operation Mode
X18		Y18	Not used
X19		Y19	
X1A		Y1A	
X1B		Y1B	
X1C		Y1C	EEPROM Write
X1D		Y1D	Refresh Instruction
X1E		Y1E	Not used
X1F		Y1F	

> **TIP**
>
> The signals indicated as "Not used" in Table 3.3 are used by the system and cannot be used by the user.
> If they are turned ON/OFF by the sequence program, correct operation of the module cannot be guaranteed.

3.3.2 Details of I/O signals

This section describes the details of the QJ71AS92 I/O signals.

(1) 0: Unit Ready
This signal turns ON when the QJ71AS92 enters the operation enabled status after the power is turned ON or the CPU module is reset.

OFF : Operation disabled
ON : Operation enabled
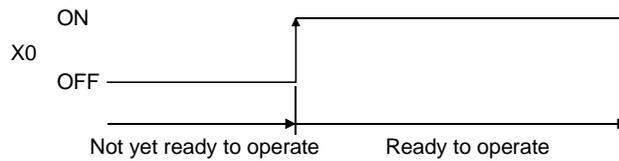
(2) X2: Command Completion, Y12: Command Request
A request to execute the command specified for Command Buffer Request of the buffer memory is made when Y12 turns ON. The command requested when Y12 turned ON is executed, and X2 turns ON at completion of that command. (See Section 3.4.2)

Y12 ON : Command requested
X2 ON : Command completed
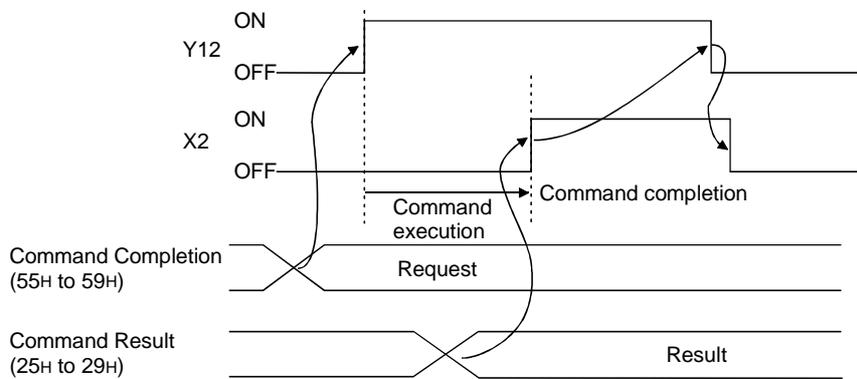
*: Do not turn Y12 OFF until X2 turns ON during command execution.

(3)   X3: Configuration Registration Completion, Y13: Configuration
     Registration Request
     A request to register the projected slave list (LPS) of the buffer memory is made
     when Y13 turns ON.
     The QJ71AS92 turns X3 ON after registration is completed.
     Y13 is valid only when the QJ71AS92 is in the configuration mode (X7 is ON).
     If Y13 is turned ON when the QJ71AS92 is not in the configuration mode (X7 is
     OFF), X3 turns ON but the list is not registered.

Buffer memory address	Details
49H to 4AH	(Group A) Projected Slave List (LPS (For Write))
4BH to 4CH	(Group B) Projected Slave List (LPS (For Write))

Y13 ON: Configuration registration requested
X3 ON: Configuration registration completed
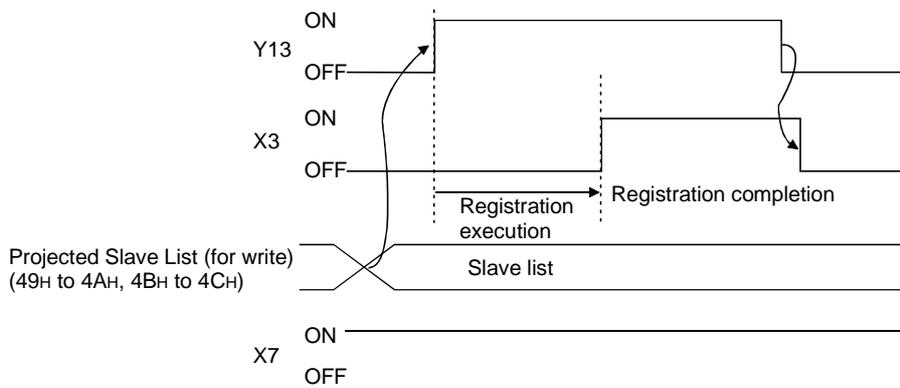
*: Do not turn Y13 OFF until X3 turns ON during registration request.
   See Section 4.5 for details of configuration mode.

(4) X4: Configuration Error

This signal checks for a configuration error.

A configuration error occurs if the projected slave list (LPS) and detected slave list (LDS) are different in the configuration contents.

On detection of a configuration error in the AS-i system, the QJ71AS92 turns ON the corresponding bit of the slave list (addresses: 1DH to 20H) that differs from the settings and turns X4 ON.

X4 automatically turns OFF when the configuration error is all resolved.

When this signal is ON, check whether the projected slave list (LPS) is the same as the detected slave list (LDS), for example.

OFF : No configuration error
ON : Configuration error detected
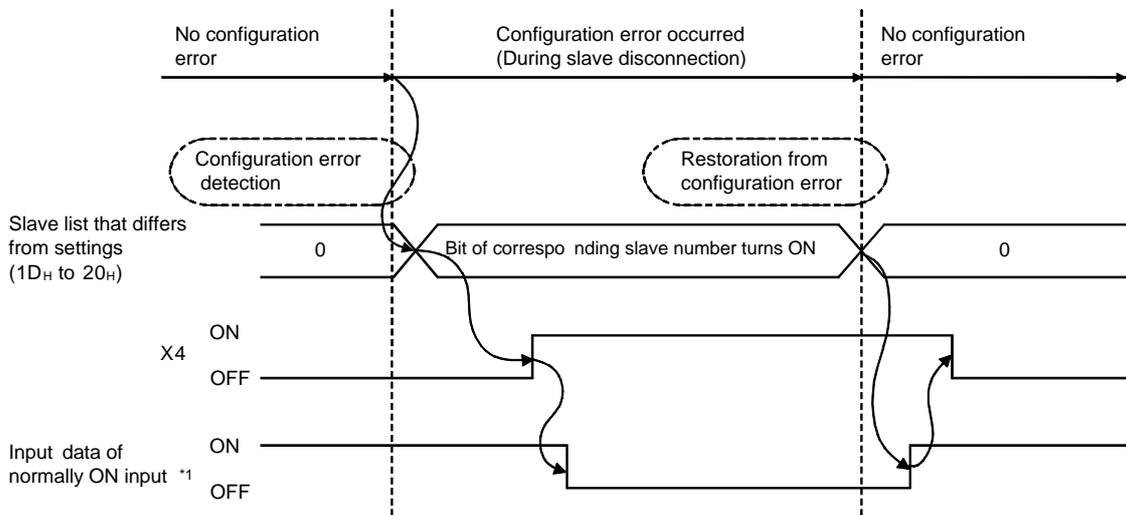
*1: Shows the timing with the input data when the normally-ON input slave is disconnected.

(5) X5: AS-i Power Fail

This signal checks the AS-i power supply status.

The QJ71AS92 turns this signal ON when the voltage supplied by the AS-i power supply is insufficient. It turns OFF automatically when the supplied voltage is restored.

When this signal is ON, check the rated current value of the AS-i power supply, the wiring, and the overall distance of the system.

OFF : AS-i power supply normal
ON : AS-i power supply abnormal
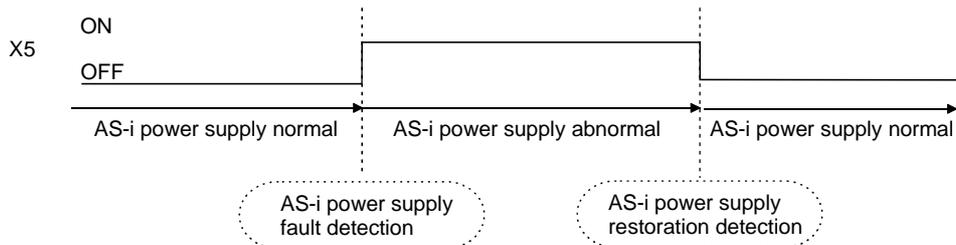
For details of the AS-i power supply specifications, contact the manufacture of the AS-i power supply used.

(6) X6: Normal Operation Check

This signal checks the operation status.
This signal turns ON when the QJ71AS92 is not in the normal operation status.
(See section 4.5)

OFF : Normal operation
ON : Phase other than normal operation

(7) X7: Configuration Mode

This signal checks the configuration mode.
This signal turns ON when the QJ71AS92 is in the configuration mode.
This signal turns OFF when the QJ71AS92 is in other mode. (See section 4.5)

OFF : Mode other than configuration mode
ON : Configuration mode

Relationships between QJ71AS92 Operating Status and X6/X7

Signal name		X7	
		ON	OFF
X6	ON	Off-line Phase, Detection Phase, Activation Phase	
	OFF	Configuration mode	Protected operation mode

(8) Y14: Off-line Phase

This signal is initialises AS-i communication.

OFF → ON: The QJ71AS92 is set in the off-line phase.
ON → OFF: The QJ71AS92 changes to normal operation from the off-line phase.
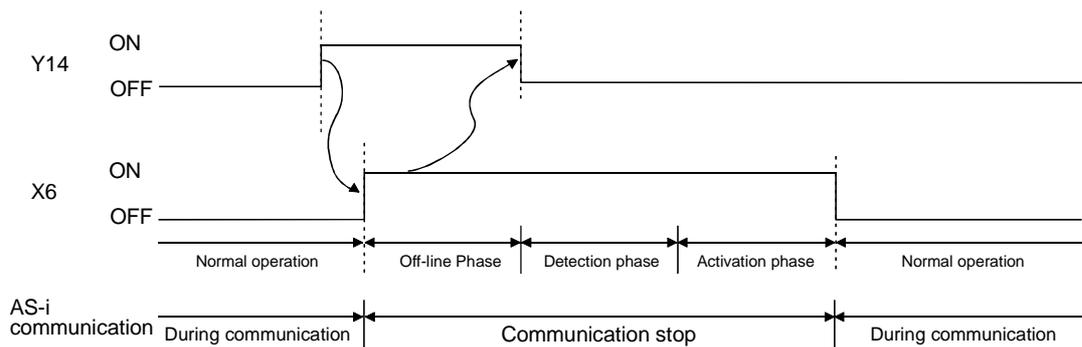
(9) Y15: Automatic Slave Address Assignment Function Valid/Invalid
Sets the automatic slave address assignment function valid or invalid.

OFF : Automatic slave address assignment function is valid
ON : Automatic slave address assignment function is invalid

(10) Y16: Configuration Mode
OFF → ON: The QJ71AS92 is set in the configuration mode.
ON → OFF: The QJ71AS92 operation mode does not change.

Y16   ON / OFF

X7   ON / OFF

Protected opration mode   Configuration mode

X6   ON / OFF
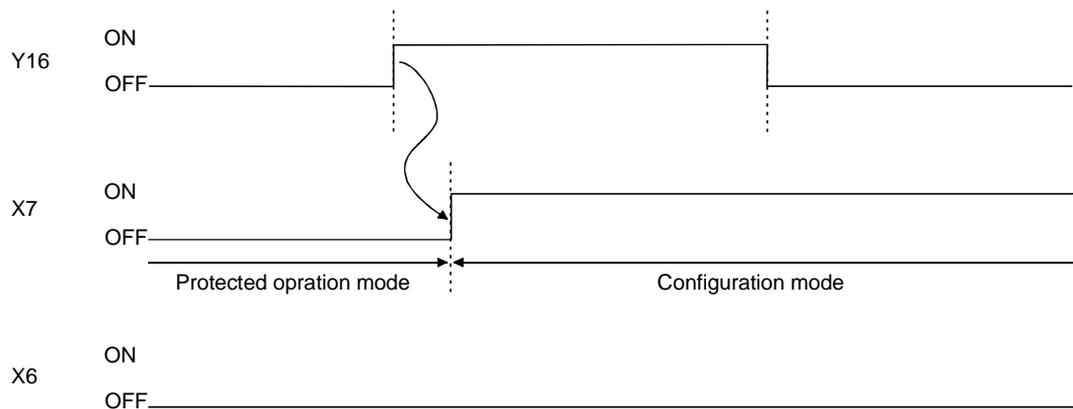
(11) Y17: Protected Operation Mode
OFF → ON: The QJ71AS92 is set in the protected operation mode.
ON → OFF: The QJ71AS92 operation mode does not change.

Y17   ON / OFF

X7   ON / OFF

Configuration mode   Protected opration mode

X6   ON / OFF
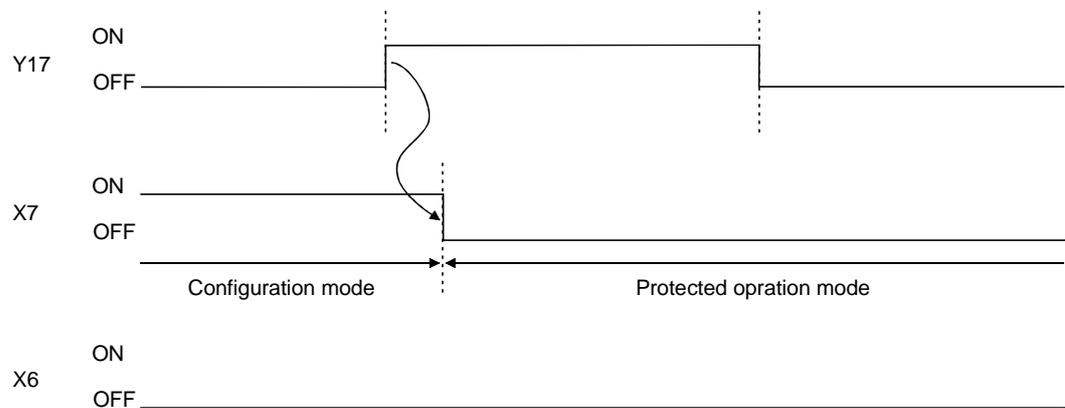
*: When the QJ71AS92 has recognized the slave address 0, it cannot terminate
   the configuration mode.
   In this case, note that X7 remains ON.

(12) Y1C: EEPROM write

Turning this signal ON writes the configuration data to the EEPROM.

"Write to EEPROM" can be operated in either the protected operation mode or configuration mode.

From the next time on, the QJ71AS92 will start in the operation mode used when write to EEPROM was performed.

After write is completed, the phase remains in normal operation.


```
                    ON
              Y1C
                    OFF

EEPROM write              0          1       2,3            0
status (C6H)

                    Not yet executed   During write   Write completion   Not yet executed
                                                      2: Normal completion
                                                      3: Abnormal completion
```

TIP

(1) The address of writes to the EEPROM is 100,000 times.

If the address of writes exceeds 100,000 times, the error code "F70" is written to the QJ71AS92 buffer memory (address: C0H).

This means that the hardware is faulty. Please consult your local Mitsubishi serves center or representative, explaining a detailed description of the problem.

(2) If write to EEPROM is executed 1000 or more times during continuous operation of the CPU module, the error code "F74" is written to the QJ71AS92 buffer memory (address: C0H).

If "F74" is written, examine the sequence program again, make sure that write processing has not been performed many times, and restart the CPU module.

(3) The configuration data written to the EEPROM are the operation mode, protected slave list (LPS), permanent configuration and permanent parameters.

---

(13) Y1D: Refresh instruction

This signal determines whether the contents of the "data output to slave" in buffer memory are valid.

  OFF: Invalid (Only OFF data is transmitted to slave)

  ON: Valid (The "output data to slave" in buffer memory are transmitted.)

3.4 Buffer Memory

3.4.1 Buffer Memory List

Table 3.4 lists the QJ71AS92 buffer memories.

Table 3.4 Buffer memory list

Address		Details	Read/write from CPU module
Hexadecimal	Decimal		
0H	0	(A System) Input Data From Slave Address 1A-3A and part of EC Flag	Reading enabled
1H	1	(A System) Input Data From Slave Address 4A-7A	
2H	2	(A System) Input Data From Slave Address 8A-11A	
3H	3	(A System) Input Data From Slave Address 12A-15A	
4H	4	(A System) Input Data From Slave Address 16A-19A	
5H	5	(A System) Input Data From Slave Address 20A-23A	
6H	6	(A System) Input Data From Slave Address 24A-27A	
7H	7	(A System) Input Data From Slave Address 28A-31A	
8H	8	(B System) Input Data From Slave Address 1B-3B	
90H	9	(B System) Input Data From Slave Address 4B-7B	
AH	10	(B System) Input Data From Slave Address 8B-11B	
BH	11	(B System) Input Data From Slave Address 12B-15B	
CH	12	(B System) Input Data From Slave Address 16B-19B	
DH	13	(B System) Input Data From Slave Address 20B-23B	
EH	14	(B System) Input Data From Slave Address 24B-27B	
FH	15	(B System) Input Data From Slave Address 28B-31B	
10H	16	EC Flags	
11H to 12H	17 to 18	(A System) Detection Slave List(LDS)	
13H to 14H	19 to 20	(B System) Detection Slave List(LDS)	
15H to 16H	21 to 22	(A System) Active Slave List(LAS)	
17H to 18H	23 to 24	(B System) Active Slave List(LAS)	
19H to 1AH	25 to 26	(A System) Projected Slave List (LPS (For Read))	
1BH to 1CH	27 to 28	(B System) Projected Slave List (LPS (For Read))	
1DH to 1EH	29 to 30	(A System) List of slaves that differ from settings	
1FH to 24H	31 to 36	(B System) List of slaves that differ from settings	
25H to 29H	37 to 41	Command Buffer <Result>	
2AH to 2FH	42 to 47	Not used	

TIP

The slaves other than the AS-i Ver. 2.11-compatible slaves assigned to group B use the buffer memory addresses of group A.

Address		Details	Read/write from CPU module
Hexadecimal	Decimal		
30H	48	(A System) Output Data From Slave Address 1A-3A	Writing enabled
31H	49	(A System) Output Data From Slave Address 4A-7A	
32H	50	(A System) Output Data From Slave Address 8A-11A	
33H	51	(A System) Output Data From Slave Address 12A-15A	
34H	52	(A System) Output Data From Slave Address 16A-19A	
35H	53	(A System) Output Data From Slave Address 20A-23A	
36H	54	(A System) Output Data From Slave Address 24A-27A	
37H	55	(A System) Output Data From Slave Address 28A-31A	
38H	56	(B System) Output Data From Slave Address 1B-3B	
39H	57	(B System) Output Data From Slave Address 4B-7B	
3AH	58	(B System) Output Data From Slave Address 8B-11B	
3BH	59	(B System) Output Data From Slave Address 12B-15B	
3CH	60	(B System) Output Data From Slave Address 16B-19B	
3DH	61	(B System) Output Data From Slave Address 20B-23B	
3EH	62	(B System) Output Data From Slave Address 24B-27B	
3FH	63	(B System) Output Data From Slave Address 28B-31B	
40H to 48H	64 to 72	Not used	—
49H to 4AH	73 to 74	(A System) Projected Slave List (LPS (For Write))	Writing enabled
4BH to 4CH	75 to 76	(B System) Projected Slave List (LPS (For Write))	
4DH to 54H	77 to 84	Not used	—
55H	85	Command Buffer: <Request (Command)>	Writing enabled
56H to 59H	86 to 89	Command Buffer: <Request (data word 0 to 3(Command))>	
5AH to BFH	90 to 191	Not used	—
C0H to C5H	192 to 197	Current Error Code, Error Code History 1-5	Reading enabled
C6H	198	EEPROM Write Status	
C7H to CFH	199 to 207	Not used	—
D0H to D1H	208 to 209	(A System) Peripheral Fault Slave List(LPF)	Reading enabled
D2H to D3H	210 to 211	(B System) Peripheral Fault Slave List(LPF)	
D4H to DFH	212 to 223	Not used	—
E0H to 15FH	224 to 351	Analog Input Data	Reading enabled
160H to 1DFH	352 to 479	Analog Output Data	
1EFH to 1FFH	480 to 511	(A System) No. of Input Output Channels	
200H to 21FH	512 to 543	(B System) No. of Input Output Channels	
220H to 2FFH	544 to 767	Not used	—
300H to 36DH	768 to 877	Extended Command Buffer <Result>	Reading enabled
36EH to 3FFH	878 to 1023	Not used	—
400H to 46DH	1024 to 1133	Extended Command Buffer <Request(Data)>	Writing enabled
46EH to 7FFH	1134 to 2047	Not used	—

3.4.2 Details of Buffer Memory

This section describes the details of each item in the buffer memory, shown in Table 3.4 of section 3.4.1.

(1) Input data from slave address 1A to 3A, and some EC flags (Buffer memory address 0H: Un\G0)

The input data from the AS-i Ver. 2.11-compatible (Group A) and AS-i Ver. 2.04-compatible slaves and part of the EC flag of the QJ71AS92 are stored.

Example: Buffer memory address Un\G0

```
Bit  15 14 13 12 11 10 9  8  7  6  5  4  3  2  1  0
```

Bit 0: Configuration Error
  0: No configuration error
  1: Configuration error occurs

Bit 1: AS-i Power Fail (APF)
  0: AS-i Power On (APO)
  1: AS-i Power Fail (APF)

Bit 2: Normal Operation Active
  0: Normal operation
  1: Not normal operation

Bit 3: Configuration Active
  0: Not configuration mode
  1: Configuration mode

Bit 4 to 7 : Input from slave address 1A
Bit 8 to 11 : Input from slave address 2A
Bit 12 to 15 : Input from slave address 3A
  0: OFF
  1: ON

(a) Bit 0: Configuration Error

This bit checks for a configuration error.

A configuration error occurs if the projected slave list (LPS (for read)) and detected slave list (LDS) are different in the configuration contents.

On detection of a configuration error in the AS-i system, the QJ71AS92 turns ON the corresponding bit of the slave list (addresses: 1DH to 20H) that differs from the settings and turns X4 ON.

X4 automatically turns OFF when the configuration error is all resolved.

When this bit is ON, check whether the wiring is proper and the projected slave list (LPS (for read)) is the same as the detected slave list (LDS), for example. (This bit corresponds to the input signal X4. The timing is the same as that of the input signal X4. Refer to Section 3.3.2 (4).)

(b) Bit 1: AS-i Power Fail (APF)

This bit checks the AS-i power supply status.

The QJ71AS92 turns this bit ON when the voltage supplied by the AS-i power supply is insufficient. It turns OFF automatically when the supplied voltage is restored.

When this bit is ON, check the rated current value of the AS-i power supply, the wiring, and the overall distance of the system. (This bit corresponds to the input signal X5.)

(c) Bit 2: Normal Operation Check

This bit checks the operating status.

This bit turns OFF when the QJ71AS92 is in the normal operation status after Unit READY (X0) has turned ON. (This bit corresponds to the input signal X6.)

(d) Bit 3: Configuration Mode

This bit checks the operation mode.

This bit turns ON when the QJ71AS92 is in the configuration mode. This bit turns OFF when the QJ71AS92 is in the other mode. (This bit corresponds to the input signal X7.)

(e) Bit 4 to 7　　: Input from slave address 1A

(f) Bit 8 to 11　: Input from slave address 2A

(g) Bit 12 to 15 : Input from slave address 3A

TIP

• 0 is stored as the input from a non-connected slave.

• As the input from the slave address corresponding to the analog slave, the data used for communication is stored.

---

(2) Input data from slave address 4A to 31A (Buffer memory address 1H to 7H : Un\G1 to Un\G7)

The input data from the AS-i Ver. 2.11-compatible (Group A) and AS-i Ver. 2.04-compatible slaves are stored.

Bit	15 to 12	11 to 8	7 to 4	3 to 0
1H	7A	6A	5A	4A
2H	11A	10A	9A	8A
3H	15A	14A	13A	12A
4H	19A	18A	17A	16A
5H	23A	22A	21A	20A
6H	27A	26A	25A	24A
7H	31A	30A	29A	28A

ON : 1, OFF : 0

Example:

Bit	15	to	12	11	to	8	7	to	4	3	to	0
1H	I3	I2	I1	I0								

Slave address 7A

I3	I2	I1	I0

I0 = ON
I1 = OFF
I2 = ON
I3 = ON

When

b	15	14	13	12
1H	1	1	0	1

TIP

• 0 is stored as the input from a non-connected slave.

• As the input from the slave address corresponding to the analog slave, the data used for communication is stored.

---

(3)   Input data from slave address 1B to 31B (Buffer memory address
8H to FH : Un\G8 to Un\G15)
The input data from the AS-i Ver. 2.11-compatible (Group B) slaves are stored.

Bit	15	to	12 11	to	8 7	to	4 3	to	0
8H		3B		2B		1B		—	
9H		7B		6B		5B		4B	
AH		11B		10B		9B		8B	
BH		15B		14B		13B		12B	
CH		19B		18B		17B		16B	
DH		23B		22B		21B		20B	
EH		27B		26B		25B		24B	
FH		31B		30B		29B		28B	

— : Not used (0 fixed)
ON : 1, OFF : 0

Example:

Bit	15	to	12 11	to	8 7	to	4 3	to	0
8H	I3	I2	I1	I0					

Slave address 3A

I3	I2	I1	I0

I0 = ON
I1 = OFF
I2 = ON
I3 = ON

When

b	15	14	13	12
8H	1	1	0	1
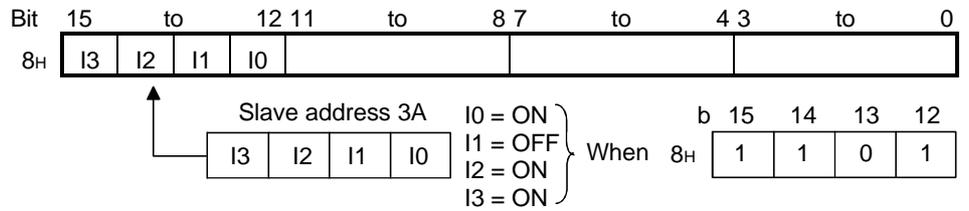
TIP	
• 0 is stored as the input from a non-connected slave.	

(4) EC flag (Buffer memory address 10H : Un\G16)

Example: Buffer memory address Un\G16

Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Bit 0: Configuration Error
  0: No configuration error
  1: Configuration error occurs

Bit 1: LDS_0 (Detection of slave addres 0)
  0: Slave of address 0 is not in list of detected slaves
  1: Slave of address 0 is in list of detected slaves

Bit 2: Auto Address Assignment Function Valid/Invalid
  0: Automatic address assignment is invalid.
  1: Automatic address assignment is valid.

Bit 3: Auto Address Assignment Function
  0: Automatic address assignment cannot be done.
  1: Automatic address assignment can be done.

Bit 4: Configuration Mode
  0: Not configuration mode
  1: Configuration moe

Bit 5: Normal Operation
  0: Normal operation
  1: Other than normal operation

Bit 6: AS-i Power Fail (APF)
  0: AS-i Power On (APO)
  1: AS-i Power Fail (APF)

Bit 7: Off-line Ready
  0: Not off-line phase
  1: Off-line phase

Bit 8: Peripheral Fault
  0: No Peripheral Fault
  1: Peripheral Fault occurs

Bit 9 to 15: Use prohibited

(a) Bit 0: Configuration Error
  See "Section 3.4.2 (1) (a)".

(b) Bit 1: LDS_0 (Detection of slave address 0)
  This bit checks whether the AS-i system has a slave of slave address 0 or not. This bit turns ON when the QJ71AS92 detects slave 0.

(c) Bit 2: Automatic Address Assignment Function Valid/Invalid
  This bit checks whether the automatic slave address assignment function is valid or invalid. This bit turns ON when the automatic slave address assignment function is enabled in the protected operation mode. (Related item: Section 3.3.2 (9))

(d) Bit 3: Auto Address Assignment Function Condition
  This bit checks the operation conditions of the automatic slave address assignment function. This bit turns ON when the automatic slave address assignment function is enabled and only one of the set slaves is not recognised in the protected operation mode. (See Section 4.5.4)

(e) Bit 4: Configuration Mode
See "Section 3.4.2 (1) (d)".

(f) Bit 5: Normal Operation
See "Section 3.4.2 (1) (c)".

(g) Bit 6: AS-i Power Fail (APF)
See "Section 3.4.2 (1) (b)".

(h) Bit 7: Off-line Ready
This bit checks whether the QJ71AS92 is in the offline phase or not.
This bit turns ON when the QJ71AS92 is in the offline phase.

(i) Bit 8: Peripheral Fault
This bit detects the peripheral fault of the slave. This bit turns ON when the QJ71AS92 detects the peripheral fault of the slave.
Check the detection conditions of a peripheral fault in the manual of the slave.
This bit turns ON when the QJ71AS92 is in the phase other than the normal operation mode.

(5) List of Detected Slave (LDS) (Buffer memory address 11_H to 12_H, 13_H to 14_H: Un\G17 to Un\G18, Un\G19 to Un\G20)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
11_H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	0
12_H	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
13_H	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
14_H	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

The bits corresponding to the slave addresses detected at startup of the QJ71AS92 turn ON.
When the bit is ON, the slave corresponding to that bit is in the AS-i system.
When the bit is OFF, the slave corresponding to that bit is not in the AS-i system.

(6) List of Active Slave (LAS) (Buffer memory address 15H to 16H, 17H to 18H: Un\G21 to Un\G22, Un\G23 to Un\G24)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	—
16H	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
17H	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
18H	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

The bits corresponding to the slave addresses ready for communication turn ON.
When the bit is ON, the slave corresponding to that bit is ready for communication in the AS-i system.
When the bit is OFF, the slave corresponding to that bit is not ready for communication in the AS-i system.
The active slave list (LAS) is made up as described below.

(a) In the configuration mode
The active slave list (LAS) has the same contents as the detected slave list (LDS). Namely, the detected slaves are always ready for communication.

(b) In the protected operating mode
The active slave list (LAS) consists of the slaves that are ON in both the detected slave list (LDS) and projected slave list (LPS (for read)). Namely, only the slaves already registered to the projected slave list (LPS (for read)) from among the detected slaves (slaves that are ON in the detected slave list (LDS)) are ready for communication.
(Related items: Section 3.4.2 (5), Section 3.4.2 (7))

(7) List of Projected Slave (LPS) (Buffer memory address 19H to 1AH, 1BH to 1CH: Un\G25 to Un\G26, Un\G27 to Un\G28)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
19H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	—
1AH	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
1BH	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
1CH	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

The bits corresponding to the registered slave addresses as the projected slaves in the QJ71AS92 turn on.
When the bit is ON, the slave corresponding to that bit is ready for communication in the AS-i system in the projected operation mode.
When the bit is OFF, the slave corresponding to that bit is not ready for communication in the AS-i system in the projected operation mode.
At power-on of the PROGRAMMABLE LOGIC CONTROLLER, the data Stored on the EEPROM in the QJ71AS92 are used to make initialization.

> TIP
> • If the LPS has been set, communication cannot be made when the permanent configuration differs from the actual configuration. (Related item: Section 3.5.1)
> • To read/write the configuration, use the command buffer <request> (buffer memory addresses: 101H to 13FH/141H to 17FH).
>   See Section 3.5.1 for command details. (Related item: Section 4.5 (2))

(8) List of slaves that differ from the setting (Buffer memory address 1DH to 1EH, 1FH to 20H: Un\G29 to Un\G30, Un\G31 to Un\G32)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1DH	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	0
1EH	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
1FH	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
20H	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

A configuration error occurs if the projected slave list (LPS (for read)) and detected slave list (LDS) are different in the configuration contents.
The logical operation OR on the detected slave list (LDS) and projected slave list (LPS (for read)) are performed. Then, the logical operation exclusive OR on the result of the logical operation OR and the active slave list (LAS) is performed.
Conclusively, the result of the logical operation exclusive OR is stored.
The slave list that differs from the settings can be used to check the slave for a configuration error occurrence.

11H(LDS)	1	1	1	1
15H(LAS)	0	1	0	1
19H(LPS)	1	1	0	0
1DH	1	0	1	0

On when the operation results are mismatched
0: OFF
1: ON
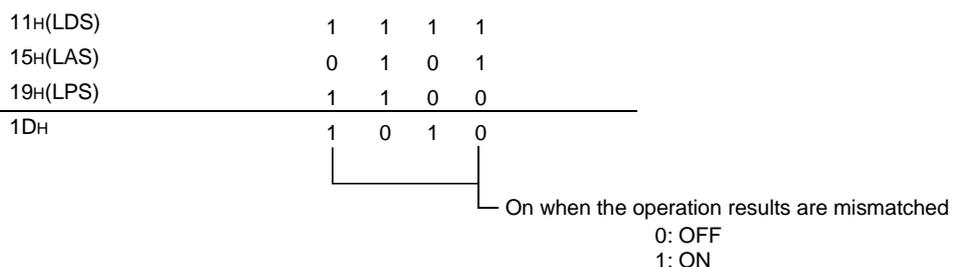
(9) List of Error slaves (Buffer memory address 21H to 22H, 23H to 24H: Un\G33 to Un\G34, Un\G35 to Un\G36)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
21H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	—
22H	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
23H	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
24H	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

The error slave list can be used to check the slave for a communication error occurrence in the projected operation mode.
The result of Logical AND on the reverse active slave list (LAS) and the projected slave list (LPS (for read)) is stored.

Example:

15H(LAS)	0	1	0	1
$\overline{\text{LAS}}$	1	0	1	0
19H(LPS)	1	1	0	0
21H(Error slave list)	1	0	0	0

(10) Output data to slave addresses 1A to 3A (Buffer memory address 30H: Un\G48)
The output data from the AS-i Ver. 2.11-compatible (System A) and AS-i Ver. 2.04-compatible slaves are stored.
The values stored in the areas corresponding to the analog, non-connected and non-detected slaves are invalid (ignored).

Bit	15 to 12	11 to 8	7 to 4	3 to 0
1H	3A	2A	1A	(0000 fixed)

ON : 1, OFF : 0

Example:

Bit	15 to 12	11 to 8	7 to 4	3 to 0
30H	O3 O2 O1 O0			

Slave address 3A

O3	O2	O1	O0

O0 = ON
O1 = OFF
O2 = ON
O3 = ON

When

b	15	14	13	12
30H	1	1	0	1
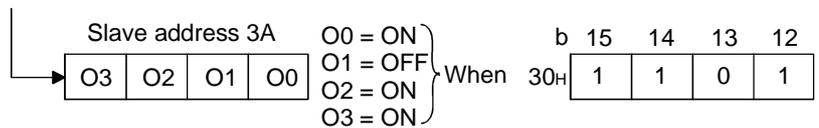
(11) Output data to slave address 4A to 31A (Buffer memory address 31H to 37H : Un\G49 to Un\G55)

Bit	15 to 12	11 to 8	7 to 4	3 to 0
31H	7A	6A	5A	4A
32H	11A	10A	9A	8A
33H	15A	14A	13A	12A
34H	19A	18A	17A	16A
35H	23A	22A	21A	20A
36H	27A	26A	25A	24A
37H	31A	30A	29A	28A

ON : 1, OFF : 0

Example:

Bit	15 to 12	11 to 8	7 to 4	3 to 0
31H	O3 O2 O1 O0			

Slave address 7A | O3 O2 O1 O0

O0 = ON
O1 = OFF
O2 = ON
O3 = ON

When 31H

b	15	14	13	12
	1	1	0	1
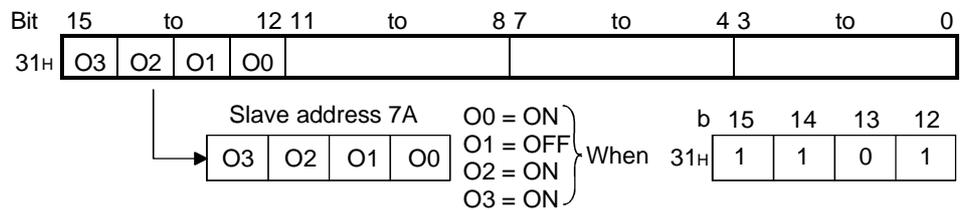
(12) Output data to slave address 1B to 3B (Buffer memory address 38H: Un\G56)

The output data to the AS-i Ver. 2.11-compatible (System B) slaves are stored.
The values stored in the areas corresponding to the non-connected and non-detected slaves are invalid (ignored).

Bit	15 to 12	11 to 8	7 to 4	3 to 0
38H	3B	2B	1B	(0000 fixed)

ON : 1, OFF : 0

Example:

Bit	15 to 12	11 to 8	7 to 4	3 to 0
38H	O3 O2 O1 O0			

Slave address 3A | O3 O2 O1 O0

O0 = ON
O1 = OFF
O2 = ON
O3 = ON

When 38H

b	15	14	13	12
	1	1	0	1
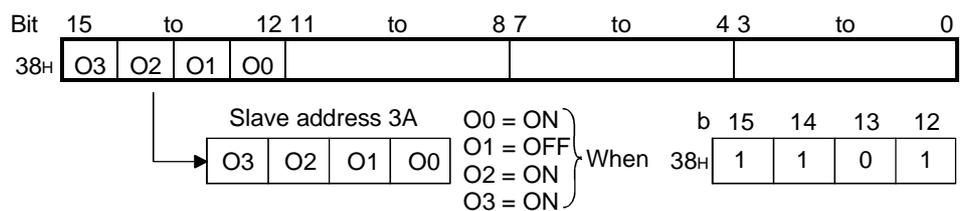
(13) Output data to slave addresses 4B to 31B (Buffer memory address 39H to 3FH : Un\G57 to Un\G63)

The output data of the AS-i Ver. 2.11-compatible (System B) slaves are stored. The values stored into the areas corresponding to the non-connected and non-detected slaves are invalid (ignored).

Bit	15 to 12	11 to 8	7 to 4	3 to 0
39H	7B	6B	5B	4B
3AH	11B	10B	9B	8B
3BH	15B	14B	13B	12B
3CH	19B	18B	17B	16B
3DH	23B	22B	21B	20B
3EH	27B	26B	25B	24B
3FH	31B	30B	29B	28B

ON : 1, OFF : 0

Example:

Bit	15 to 12	11 to 8	7 to 4	3 to 0
39H	O3 O2 O1 O0			

Slave address 7A

O3	O2	O1	O0

O0 = ON
O1 = OFF
O2 = ON When
O3 = ON
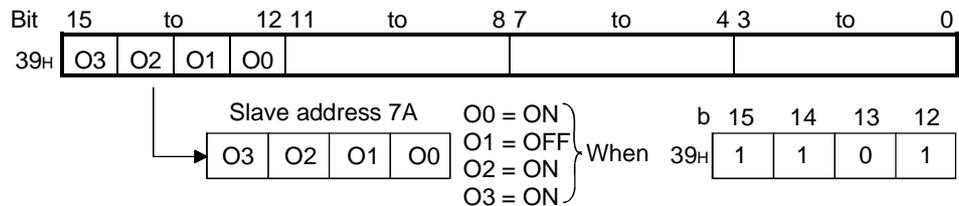
b	15	14	13	12
39H	1	1	0	1

(14) List of Projected Slave (LPS (for write)) (Buffer memory address 49H to 4AH, 4BH to 4CH: Un\G73 to Un\G74, Un\G75 to Un\G76)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
49H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	—
4AH	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
4BH	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
4CH	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

By turning ON the bit corresponding to the slave address to be communicated with and turning ON Y13, the contents of this buffer memory are registered to the QJ71AS92 and reflected on the projected slave list (LPS (for read)) (buffer memory addresses: 19H to 1CH).
(Related item: Section 4.5 (2))

TIP
• The projected slave list (LPS (for write)) is handled as a 64-bit length in the QJ71AS92. Therefore, if data is written to only the buffer memory address 49H, the contents of the buffer memory address 4AH to 4CH are also made valid as data.
• When communicating with the slave that has been judged as ready for communication in the active slave list (LAS) (buffer memory addresses: 15H to 18H), easy registration of the projected slave list (LPS (for read)) and configuration are enabled by using the command buffer <request> 201H.

(15) Command buffer <request>
(Buffer memory address 55H to 59H: Un\G85 to Un\G89)

Buffer memory address	Item
55H (85)	AS-i command buffer <request>
56H (86)	AS-i command buffer <data word 0>
57H (87)	AS-i command buffer <data word 1>
58H (88)	AS-i command buffer <data word 2>
59H (89)	AS-i command buffer <data word 3>

(a) After data is written to the command buffer <request> and <data words 0 to 3> and, Y12 is turned ON.

(b) The QJ71AS92 executes the command buffer <request> when Y12 turns ON. At this time, "08" (request code in execution) is stored into the command buffer <result>.
  * If necessary, the QJ71AS92 reads the command buffer <data words 0 to 3>.

(c) After the command execution is completed, the QJ71AS92 stores the result into the command buffer <result> and turns ON X2.
  * When the results are added with data, the data is stored into the data word for command buffer <result>.
  (Related item: Section 3.4.2 (22))

TIP	
See Section 3.5.1 for the command buffer <request> list.	

(16) Command buffer <result>
(Buffer memory address 25H to 29H: Un\G37 to Un\G41)

Buffer memory address	Item
25H (37)	AS-i command buffer <result>
26H (38)	AS-i command buffer <data word 0>
27H (39)	AS-i command buffer <data word 1>
28H (40)	AS-i command buffer <data word 2>
29H (41)	AS-i command buffer <data word 3>

The QJ71AS92 stores the result of executing the command buffer <request>.
(Related item: Section 3.4.2 (21))

TIP	
See Section 3.5.1 for the command buffer <request> list.	

(17) Current Error Code, Error Code History 1-5
(Buffer memory address C0H to C5H: Un\G192 to Un\G197)

The error code currently detected by the QJ71AS92 and the history of maximum five error codes are stored.

Buffer memory address	Item
C0H (192)	Current Error Code
C1H (193)	Error Code History 1
C2H (194)	Error Code History 2
C3H (195)	Error Code History 3
C4H (196)	Error Code History 4
C5H (197)	Error Code History 5

C0H and C1H store the latest error code. When the error is reset, C0H stores "0". In C1H, the error code remains as-is.

Example) When an error occurs, the error codes are stored as indicated below.

C1H (193)	→	Latest Error Code History
C2H (194)	→	Error Code History 1
C3H (195)	→	Error Code History 2
C4H (196)	→	Error Code History 3
C5H (197)	→	Error Code History 4

Shift
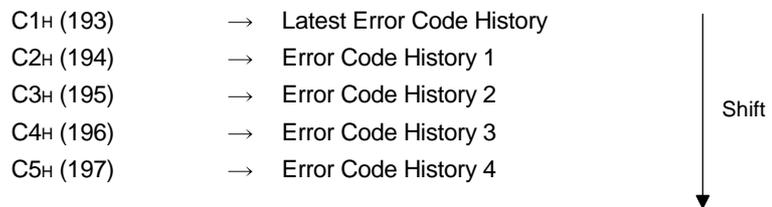
TIP	
See Section 8.3.1 for error codes.	

(18) List of Peripheral Fault Slave (LPF) (Buffer memory address D0H to D1H, D2H to D3H: Un\G208 to Un\G209, Un\G210 to Un\G211)

Each bit of this list corresponds to the peripheral fault occurrence status of the corresponding slave address (1A to 31A, 1B to 31B).

When the bit is ON, it indicates that a peripheral fault has occurred in the slave corresponding to that bit. (When any of the bits is ON, the peripheral fault bit of the EC flag (buffer memory address: 10H) turns ON.)

When the bit is OFF, it indicates that a peripheral fault has not occurred in the slave corresponding to that bit.

The peripheral fault slave list is a function compatible with AS-i Ver. 2.11.

For the peripheral fault detection conditions, refer to the manual of the slave used.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
D0H	15A	14A	13A	12A	11A	10A	9A	8A	7A	6A	5A	4A	3A	2A	1A	—
D1H	31A	30A	29A	28A	27A	26A	25A	24A	23A	22A	21A	20A	19A	18A	17A	16A
D2H	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	—
D3H	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

— : Not used (0 fixed)

(19) Analog input data, Analog output data (Buffer memory address E0H to 15FH, 160H to 1DFH: Un\G224 to Un\G351, Un\G352 to Un\G479)

Address		Details	Address		Details
Hexadecimal	Decimal		Hexadecimal	Decimal	
E0H to E3H	224 to 227	Invalid (0 fixed)	160H to 163H	352 to 355	Invalid (0 fixed)
E4H to E7H	228 to 231	Slave address 1	164H to 167H	356 to 359	Slave address 1
E8H to EBH	232 to 235	Slave address 2	168H to 16BH	360 to 363	Slave address 2
ECH to EFH	236 to 239	Slave address 3	16CH to 16FH	364 to 367	Slave address 3
F0H to F3H	240 to 243	Slave address 4	170H to 173H	368 to 371	Slave address 4
F4H to F7H	244 to 247	Slave address 5	174H to 177H	372 to 375	Slave address 5
F8H to FBH	248 to 251	Slave address 6	178H to 17BH	376 to 379	Slave address 6
FCH to FFH	252 to 255	Slave address 7	17CH to 17FH	380 to 383	Slave address 7
100H to 103H	256 to 259	Slave address 8	180H to 183H	384 to 387	Slave address 8
104H to 107H	260 to 263	Slave address 9	184H to 187H	388 to 391	Slave address 9
108H to 10BH	264 to 267	Slave address 10	188H to 18BH	392 to 395	Slave address 10
10CH to 10FH	268 to 271	Slave address 11	18CH to 18FH	376 to 399	Slave address 11
110H to 113H	272 to 275	Slave address 12	190H to 193H	400 to 403	Slave address 12
114H to 117H	276 to 279	Slave address 13	194H to 197H	404 to 407	Slave address 13
118H to 11BH	280 to 283	Slave address 14	198H to 19BH	408 to 411	Slave address 14
11CH to 11FH	284 to 287	Slave address 15	19CH to 19FH	412 to 415	Slave address 15
120H to 123H	288 to 291	Slave address 16	1A0H to 1A3H	416 to 419	Slave address 16
124H to 127H	292 to 295	Slave address 17	1A4H to 1A7H	420 to 423	Slave address 17
128H to 12BH	2396 to 299	Slave address 18	1A8H to 1ABH	424 to 427	Slave address 18
12CH to 12FH	300 to 303	Slave address 19	1ACH to 1AFH	428 to 431	Slave address 19
130H to 133H	304 to 307	Slave address 20	1B0H to 1B3H	432 to 435	Slave address 20
134H to 137H	308 to 311	Slave address 21	1B4H to 1B7H	436 to 439	Slave address 21
138H to 13BH	312 to 315	Slave address 22	1B8H to 1BBH	440 to 443	Slave address 22
13CH to 13FH	316 to 319	Slave address 23	1BCH to 1BFH	424 to 447	Slave address 23
140H to 143H	320 to 323	Slave address 24	1C0H to 1C3H	448 to 451	Slave address 24
144H to 147H	324 to 327	Slave address 25	1C4H to 1C7H	452 to 455	Slave address 25
148H to 14BH	328 to 331	Slave address 26	1C8H to 1CBH	456 to 459	Slave address 26
14CH to 14FH	332 to 335	Slave address 27	1CCH to 1CFH	460 to 463	Slave address 27
150H to 153H	336 to 339	Slave address 28	1D0H to 1D3H	464 to 467	Slave address 28
154H to 157H	340 to 343	Slave address 29	1D4H to 1D7H	468 to 471	Slave address 29
158H to 15BH	344 to 347	Slave address 30	1D8H to 1DBH	472 to 475	Slave address 30
15CH to 15FH	348 to 351	Slave address 31	1DCH to 1DFH	476 to 479	Slave address 31

Note: Column labeled "Analog input data *1" spans Slave address 1 to 31 in the left block. Column labeled "Analog output data" spans Slave address 1 to 31 in the right block.

*1: "7FFFH" is stored when no communication is made.

Example: Buffer memory address: Un\G228 to Un\G231

Buffer memory address	Item
E4H (228)	Analog input data of slave address 1 (Channel 1)
E5H (229)	Analog input data of slave address 1 (Channel 2)
E6H (230)	Analog input data of slave address 1 (Channel 3)
E7H (231)	Analog input data of slave address 1 (Channel 4)

Example: Buffer memory address: Un\G356 to Un\G359

Buffer memory address	Item
164H (356)	Analog output data of slave address 1 (Channel 1)
165H (357)	Analog output data of slave address 1 (Channel 2)
166H (358)	Analog output data of slave address 1 (Channel 3)
167H (359)	Analog output data of slave address 1 (Channel 4)

REMARK

For the range of analog output data, refer to the manual of each analog slave.

(20) Number of I/O Points (Buffer memory address 1E0H to 1FFH, 200H to 21FH: Un\G480 to Un\G511, Un\G512 to Un\G543)

The following table lists the numbers of I/O points and analog I/O points of the slaves in the configuration are displayed.

Address		Details		Address		Details	
Hexadecimal	Decimal			Hexadecimal	Decimal		
1E0H	480	Invalid (0 fixed)		200H	512	Invalid (0 fixed)	
1E1H	481	Slave address 1A		201H	513	Slave address 1B	
1E2H	482	Slave address 2A		202H	514	Slave address 2B	
1E3H	483	Slave address 3A		203H	515	Slave address 3B	
1E4H	484	Slave address 4A		204H	516	Slave address 4B	
1E5H	485	Slave address 5A		205H	5157	Slave address 5B	
1E6H	486	Slave address 6A		206H	518	Slave address 6B	
1E7H	487	Slave address 7A		207H	519	Slave address 7B	
1E8H	488	Slave address 8A		208H	520	Slave address 8B	
1E9H	489	Slave address 9A		209H	521	Slave address 9B	
1EAH	490	Slave address 10A		20AH	522	Slave address 10B	
1EBH	491	Slave address 11A		20BH	523	Slave address 11B	
1ECH	492	Slave address 12A		20CH	524	Slave address 12B	
1EDH	493	Slave address 13A		20DH	525	Slave address 13B	
1EEH	494	Slave address 14A		20EH	526	Slave address 14B	
1EFH	495	Slave address 15A		20FH	527	Slave address 15B	
1F0H	496	Slave address 16A	I/O data	210H	528	Slave address 16B	I/O data
1F1H	497	Slave address 17A		211H	529	Slave address 17B	
1F2H	498	Slave address 18A		212H	530	Slave address 18B	
1F3H	499	Slave address 19A		213H	531	Slave address 19B	
1F4H	500	Slave address 20A		214H	532	Slave address 20B	
1F5H	501	Slave address 21A		215H	533	Slave address 21B	
1F6H	502	Slave address 22A		216H	534	Slave address 22B	
1F7H	503	Slave address 23A		217H	535	Slave address 23B	
1F8H	504	Slave address 24A		218H	536	Slave address 24B	
1F9H	505	Slave address 25A		219H	537	Slave address 25B	
1FAH	506	Slave address 26A		21AH	538	Slave address 26B	
1FBH	507	Slave address 27A		21BH	539	Slave address 27B	
1FCH	508	Slave address 28A		21CH	540	Slave address 28B	
1FDH	509	Slave address 29A		21DH	541	Slave address 29B	
1FEH	510	Slave address 30A		21EH	542	Slave address 30B	
1FFH	511	Slave address 31A		21FH	543	Slave address 31B	

Example: Buffer memory address Un\G481

Bit   15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Bits 0 to 3: Input points of slave address 1A (unit: bit)
Bits 4 to 7: Output points of slave address 1A (unit: bit)
Bits 8 to 11: Analog input points of slave address 1A (unit: word)
Bits 12 to 15: Analog output points of slave address 1A (unit: word)
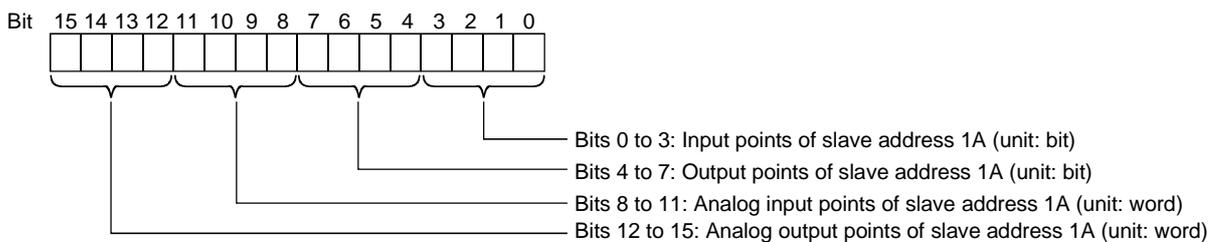
(21) Extended Command Buffer <Result>
    (Buffer memory address 300H to 36DH: Un\G768 to Un\G877)
    The result of executing any of the following commands with the command buffer
    <request> (buffer memory address: 55H) is stored.
    • Slave ID read command (command: 301H) *1
    • Slave diagnostic information read command (command: 303H) *1
    • Slave parameter read command (command: 305H) *1

    *1: See Section 3.5.1 for command details.

Buffer memory address	Item
300H (768)	Extended Command Buffer <Result data word 0>
301H (769)	Extended Command Buffer <Result data word 1>
• • •	• • •
36CH (876)	Extended Command Buffer <Result data word 108>
36DH (877)	Extended Command Buffer <Result data word 109>

(22) Extended Command Buffer <Request(Data)>
    (Buffer memory address 400H to 46DH: Un\G1024 to Un\G1133)
    Used when the following command is executed with the command buffer
    <request> (buffer memory address: 55H).
    • Slave parameter write command (command: 307H) *1

    *1: See Section 3.5.1 for command details.

Buffer memory address	Item
400H (1024)	Extended Command Buffer <Request data word 0>
401H (1025)	Extended Command Buffer <Request data word 1>
• • •	• • •
46CH (1132)	Extended Command Buffer <Request data word 108>
46DH (1133)	Extended Command Buffer <Request data word 109>

3.5 Command List

This section provides the command buffer <request>/<result>.

3.5.1 Command Buffer <Request> List

The command buffer <request> lists are indicated below.

A: AS-i Ver. 2.11-compatible Group A I/O slave, Analog slave,
  AS-i Ver. 2.04-compatible I/O slave
B: AS-i Ver. 2.11-compatible Group B I/O slave
1): Off-line phase
2): Configuration mode
3): Protected operation mode

○ : Enabled, － : Disabled

Command code	Details	Target Slave		Operating Status		
		A	B	1)	2)	3)
01H to 1FH	Writes the value of the command buffer <request (data word 0)> to the actual parameter [1] of the slave address n (n = request code). The result is written to the command buffer <result (data word 0)>.	○	－	－	○	○
21H to 3FH	Writes the value of the command buffer <request (data word 0)> to the actual parameter [1] of the slave address n (n = request code - 20H). The result is written to the command buffer <result (data word 0)>.	－	○			
41H to 5FH	Reads the actual parameter [1] of the slave address n (n = request code - 40H). The result is written to the command buffer <result (data word 0)>.	○	－	○	○	○
61H to 7FH	Reads the actual parameter [1] of the slave address n (n = request code - 60H). The result is written to the command buffer <result (data word 0)>.	－	○			
81H to 9FH	Writes the value of the command buffer <request (data word 0)> to the permanent parameter [1] of the slave address n (n = request code - 80H). The result is written to the command buffer <result (data word 0)>.	○	－			
A1H to BFH	Writes the value of the command buffer <request (data word 0)> to the permanent parameter [1] of the slave address n (n = request code - A0H). The result is written to the command buffer <result (data word 0)>.	－	○			
C1H to DFH	Reads the permanent parameter [1] of the slave address n (n = request code - C0H). The result is written to the command buffer <result (data word 0)>.	○	－			
E1H to FFH	Reads the permanent parameter [1] of the slave address n (n = request code - E0H). The result is written to the command buffer <result (data word 0)>.	－	○			

○ : Enabled, — : Disabled

Command code	Details	Target Slave		Operating Status		
		A	B	1)	2)	3)
101H to 11FH	Reads the actual configuration [*2] of the slave address n (n = request code - 100H). The result is written to the command buffer <result (data word 0)>.	○	—	○	○	○
121H to 13FH	Reads the actual configuration [*2] of the slave address n (n = request code - 120H). The result is written to the command buffer <result (data word 0)>.	—	○			
141H to 15FH	Writes the value of the command buffer <request (data word 0)> to the permanent configuration [*2] of the slave address n (n = request code - 140H).	○	—	—	○	—
161H to 17FH	Writes the value of the command buffer <request (data word 0)> to the permanent configuration [*2] of the slave address n (n = request code - 160H).	—	○			
181H to 19FH	Reads the permanent configuration [*2] of the slave address n (n = request code - 180H). The result is written to the command buffer <result (data word 0)>.	○	—	○	○	○
1A1H to 1BFH	Reads the permanent configuration [*2] of the slave address n (n = request code - 1A0H). The result is written to the command buffer <result (data word 0)>.	—	○			
1C0H	Reads the number of AS-i power fail times to the data word 0, and resets it.	—	○	—	○	○
1C1H to 1DFH	Reads the number of wrong response times of the slave address n (n = request code - 1C0H) to the data word 0, and clears it.	○	—	—	○	○
1E1H to 1FFH	Reads the number of wrong response times of the slave address n (n = request code - 1E0H) to the data word 0, and clears it.	—	○			
200H	Changes the slave address n (n = data word 0) into m (m = data word 1). n, m = set in 01H to 1FH.	○	—	○	○	○
	Changes the slave address n (n = data word 0) into m (m = data word 1). n, m = set in 21H to 3FH (slave address + 20H).	—	○			
201H	Stores the actual configuration of AS-i. (Copies the active slave list (LAS) to the projected slave list (LPS (for read)) and copies the actual configuration to the permanent configuration.)	○	○	—	○	—
202H	Stores the actual parameters of AS-i to the permanent parameters.	○	○	○	○	○
203H	Sets the SET and MODE switches to Invalid/Valid. Command buffer <request (data word 0)> 0: Valid (default), 1: Invalid	○	○	—	○	○
204H	Reads and clears the illegal slave list. The result is written to the command buffer <result (data words 0, 1)>.					
300H [*3]	Writes the value of the command buffer <request (data word 0)> to the extension ID code 1 of the slave address 0.					

: Enabled, − : Disabled

Command code	Details	Target Slave		Operating Status		
		A	B	1)	2)	3)
301H [*3]	Reads the ID of the slave address n (n = data word 0). The Execution result is stored as follows. Command buffer <request (data word 0)> (Buffer memory address: 56H): Stores the slave address. Command buffer <result> (Buffer memory address: 25H): Stores the Execution result. Command buffer <result (data word 0)> (Buffer memory address: 26H): Stores the size of the read data. Extension command buffer <result> (Buffer memory address: 300H): Stores the read data. *The read data is up to 220 bytes.					
303H [*3]	Reads the diagnostic information of the slave address n (n = data word 0). The Execution result is stored as follows. Command buffer <request (data word 0)> (Buffer memory address: 56H): Stores the slave address. Command buffer <result> (Buffer memory address: 25H): Stores the Execution result. Command buffer <result (data word 0)> (Buffer memory address: 26H): Stores the size of the read data. Extension command buffer <result> (Buffer memory address: 300H): Stores the read data. *The read data is up to 220 bytes.	○	○	−	○	○
305H [*3]	Reads the parameters of the slave address n (n = data word 0). The Execution result is stored as follows. Command buffer <request (data word 0)> (Buffer memory address: 56H): Stores the slave address. Command buffer <result> (Buffer memory address: 25H): Stores the Execution result. Command buffer <result (data word 0)> (Buffer memory address: 26H): Stores the size of the read data. Extension command buffer <result> (Buffer memory address: 300H): Stores the read data. *The read data is up to 220 bytes.					
307H [*3]	Writes the parameters to the slave address n (n = data word 0). The Execution result is stored as follows. Command buffer <request (data word 0)> (Buffer memory address: 56H): Stores the slave address. Command buffer <request (data word 1)> (Buffer memory address: 26H): Stores the size of the written data. Extension command buffer <request (data)> (Buffer memory address: 400H): Sets the written data. Extension command buffer <result> (Buffer memory address: 300H): Stores the written data. *The read data is up to 220 bytes.					

*1

Name	Description
Actual parameter	Parameter that the target slave has
Permanent parameter	Slave parameter that the QJ71AS92 has

For the actual parameters, refer to the manual of the slave used.

*2: Consists of the I/O code and ID code of the slave. The data of the inactive slave are default values (FFH).

When communicating in the projected operation mode, the permanent configuration of the slave whose bit in the LPS (for read) (buffer memory addresses: 19H to 1CH) is ON must match the actual configuration of the corresponding slave connected.

Name	Description
Actual configuration	I/O code and ID code that the slave holds. (Extension ID code 1, 2 ••• Added to AS-i Ver. 2.11.)
Permanent configuration	I/O code and ID code that the QJ71AS92 holds. (Extension ID code 1, 2 ••• Added to AS-i Ver. 2.11.)

Configuration data structure of AS-i Ver. 2.11-compatible slave

8 higher-order bits		8 lower-order bits	
4 higher-order bits	4 lower-order bits	4 higher-order bits	4 lower-order bits
Extension ID code 2	Extension ID code 1	ID code	I/O code
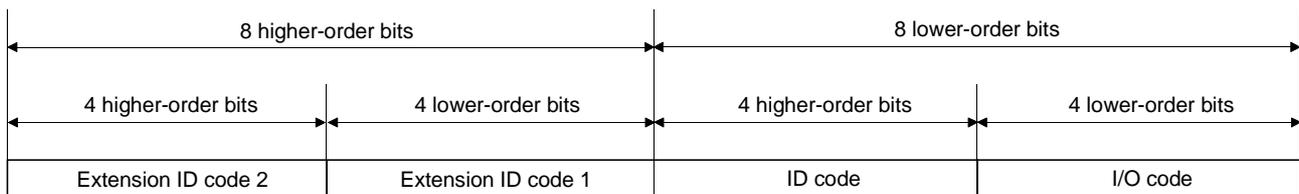
Configuration data structure of AS-i Ver. 2.04-compatible slave

	Last 8 bits	
First 8 bits	First 4 bits	Last 4 bits
Not used (fixed to FFH)	ID code	I/O code
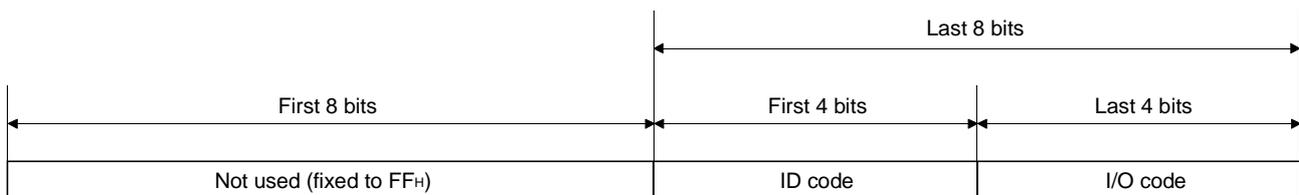
For the I/O and ID codes, refer to the manual of the slave used.
This data can be stored on the EEPROM of the QJ71AS92. For how to store the data to the EEPROM, See Section 3.3.2 (12) or Section 4.5.1.

*3 This command can be used with the slave compatible with the slave profile S-7.4.
For the profile of the slave used, refer to the manual of the slave.

3.5.2 Command Buffer <Result> List

The following table lists the command buffer <result>.

Result Value	Description
00H	The command was not executed.
01H	The request code was executed.
02H	The target slave address does not exist.
03H	The slave of slave address 0 exists.
04H	The target slave address is used by another slave.
05H	The target slave address cannot be erased.
06H	The target slave address cannot be set.
07H	The slave address cannot be written to the nonvolatile memory of the slave.
08H	The request code is in execution.
09H	The request code is wrong.
0AH	The data word value is outside the setting range.
0BH	The extension ID code 1 was not stored correctly.
0CH	The extension ID code 1 could not be read correctly.

4 SETTINGS AND PROCEDURES FOR OPERATION

This section explains the procedures, name of each part, installation, connection to the AS-i system and settings for using the QJ71AS92 in the AS-i system.

4.1 Outline Procedures for Operation

The following chart shows the procedures for using the QJ71AS92 in the AS-i system.

```
              ( Start )
                 │
                 ▼
        ┌─────────────────────┐
        │  Wire the AS-i cable │ ·········· See section 4.4
        └─────────────────────┘
                 │
                 ▼
        ┌─────────────────────────┐
        │ Turn the AS-i power supply ON │
        └─────────────────────────┘
                 │
                 ▼
        ┌───────────────────────────────┐
        │ Turn the PLC system power supply ON │
        └───────────────────────────────┘
                 │
                 ▼
        ┌─────────────────────┐
        │  Set the slave address │ ·········· See Section 4.5
        └─────────────────────┘
                 │
                 ▼
        ┌─────────────────────┐
        │  Create the program  │ ·········· See Chapter 7
        └─────────────────────┘
                 │
                 ▼
        ┌─────────────────────┐
        │  Run the QJ71AS92    │
        └─────────────────────┘
                 │
                 ▼
              ( End )
```

4.2 Part Names

No.	Name	Details
1)	"CODE" LED	Shows the slave address or error code of the QJ71AS92. **Number** / **Alphabet**: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, p, g, d *O I 2 3 4 5 6 7 8 9 P g d*
2)	LED Display	Turned on/off to indicate the operating statuses of the QJ71AS92. (See Section 4.2.1)
3)	"A" LED	When the slave address 0 to 31 are displayed on "Code", the slave types are also displayed.
4)	"B" LED	

A LED	B LED	Details
OFF	OFF	AS-i Ver. 2.04-compatible I/O slave, Analog slave, Ver. 2.11 non-grouped slave
ON	OFF	AS-i Ver. 2.11-compatible Group A I/O slave
OFF	ON	AS-i Ver. 2.11-compatible Group B I/O slave
ON	ON	- (for future use)

No.	Name	Details
5)	MODE Switch	Used to change between the protected operation mode and configuration mode. (See Section 4.5)
6)	SET Switch	Used to set the address to the slave or set parameters to the QJ71AS92. (See Section 4.5)
7)	Connector	Connected to the AS-i system using the AS-i cable. (See Section 4.4.2)

4.2.1 LED Display

The QJ71AS92 LEDs display the following details.

```
QJ71AS92
     RUN
 U ASI
      CM      PRG ENA.
    ERR.      S ERR.
```
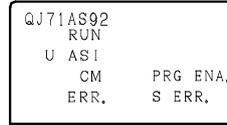
LED name	Cooler	Details
RUN	green	Lit when the module is normally operating. 　On = Normal operation 　Off = Hardware error detected or power not supplied.
U ASI	green	Lit when AS-i power is supplied. 　On = Power is supplied from AS-i bus. 　Off = Power is not supplied from AS-i bus.
CM	yellow	Lit when the module is operating in configuration mode. 　On = Configuration mode or parameters being stored. 　Off = Protected operation mode
ERR.	red	Lit when an error occurs. 　On = Alarm detected. 　Example) Slave address alarm, parameter error and so forth. 　Off = Alarm not detected.
PRG ENA.	yellow	Lit when automatic slave address assignment function is ready. (See Section 4.5.4) 　On = Ready. 　Off = Not ready
S ERR.	red	- (for future use)

4.3 Mounting and Installation

This section describes the precautions to be observed when handling the QJ71AS92 from unpacking to installation, and the installation environment. are explained in this section.

4.3.1 Precautions for Handling

⚠ **CAUTION**
• Use the PLC in an environment that meets the general specifications in CPU module User's Manual. Using the PLC in the environments outside the ranges stated in the general specifications will cause electric shock, fire, misoperation, or damage to/deterioration of the product.
• When mounting a module, be sure to securely insert the fixing latches on the bottom of the module into the fixing holes on the base unit, and tighten the module fixing screws within the specified torque. Failure to observe this could result in damage to the screws or module, module falling, short or misoperation.
• Always shut off all phases of the PLC power supply and AS-i power supply externally before mounting or removing the module. Failure to shut off all phases could lead to product damage.
• Do not touch conductive parts or electronic components of the module with your bare hands. This could cause Misoperation or failure of the module

(1) The module case and communication connector are made of resin, so take care not to drop or apply strong impacts.

(2) Tighten the module mounting screws, communication connector mounting screws and communication connector wiring mounting screws within the following ranges.

Screw position	Tightening torque range
Module mounting screw (M4)	78 to 118 N·cm
Communication connector mounting screw	40 to 50 N·cm
Communication connector wiring mounting screw	50 to 60 N·cm

4.3.2 Installation Environment

Refer to the User's Manual of the CPU module being used for details on the installation environment.

4.4 Connection to AS-i System

This section describes the precautions to observe when connecting the QJ71AS92 to the AS-i system, and the wiring methods.

4.4.1 Precautions for wiring

◇ DANGER
• Switch off all phases of the PLC power supply and AS-i power supply outside the PLC before starting installing or wiring work. If all phases are not switched off, electric shock will occur or the product will be damaged. • Be sure to install the terminal covers included with the product, when turning on the power or operating the product after installation and wiring is completed. Failure to install the terminal cover could lead to electric shocks.

⚠ CAUTION
• Always confirm the products terminal layout before wiring to the module. Miswiring could lead to fires or faults. • Tighten terminal screws within the specified torque. Failure to observe this could result in damage to the screws or module, short or misoperation. • Make sure that no foreign matter such as chips or wire offcuts gets inside the module. It will cause fire, failure, or misoperation. • A label is installed at the upper part of a module to prevent the entry of foreign matters. Do not remove the label during wiring. However, be sure to remove it for heat dissipation during system operation. • To connect the AS-i cable to the module, the cable must be securely fixed. Please be sure to run it in a duct, or clamp it. Failure to observe this could cause the unstable cable connection, resulting in damage to the cable or module by carelessly pulling the cable, or the system malfunction due to poor cable connection. • Do not bundle AS-i cable together with main circuit or power lines, or lay them close to these lines. As a guide, separate these lines by a distance of at least 100 mm, otherwise misoperations may occur due to noise. • When removing the AS-i cable from a module, do not pull it out by hand. Always be sure to unscrew the module mounting screws in advance. If the cable is pulled while being connected to the module, it could cause damage to the cable or module, or the system malfunction due to poor cable connection.

(1) The overall distance is up to 100m.
The distance can be increased 100m by use of one repeater.
Since up to two repeaters can be used in series, the overall distance can be increased up to 300m.

4.4.2 Wiring

Be sure connect the QJ71AS92 to the AS-i system with the AS-i cable.

An example of wiring to the QJ71AS92 is shown below.
(Confirm each module being used for the AS-i power supply and slave terminal layout.)
Strip the AS-i cable by about 7mm and plug it to the connector.
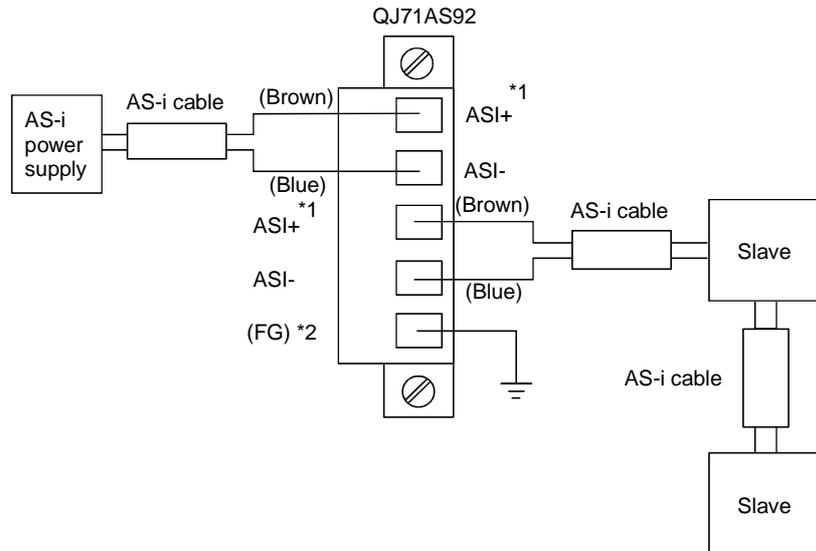
*1: The ASI+ and ASI- terminals are connected within the module, respectively.
*2: Always ground the FG terminal to the protective ground conductor.

4.5 Start-Up

After powering on the PLC, the QJ71AS92 is placed in the normal operation status (ready to communicate data with the slaves) via the following communication phases.

Off-line phase

> In this phase, the QJ71AS92 is initialized. Communication in the AS-i system is not started. If sufficient power is not supplied from the AS-i power supply to the AS-i system, the QJ71AS92 remains in the offline phase. (The "U ASI" LED is not lit.)
> When AS-i power is supplied, the QJ71AS92 switches to the detection phase.

Detection phase

> In this phase, the QJ71AS92 checks for the slaves that are ready for communication in the AS-i system. It remains in the detection phase until it finds at least one slave.

Activation phase

> In this phase, the slaves found by the QJ71AS92 in the detection phase become ready to communicate.

Normal operation

> In the normal operation status, the QJ71AS92 can communicate data with all the slaves that are ready for communication. The QJ71AS92 sends a management message to check for a newly connected slave, and if it exists, makes it ready for communication.

The normal operation phase has the configuration mode and protected operation mode. The QJ71AS92 is put in either mode that has been registered to the EEPROM after powering on.

The configuration mode and protected operation mode can be switched between each other by writing an instruction (command) from the CPU module.

(a) Configuration mode

In this mode, the QJ71AS92 communicates with all detected slaves. (However, output data is not output to the slave of slave address 0.) This mode is used to set the slave address.

(b) Protected operation mode

In this mode, the QJ71AS92 communicates with all registered slaves. Normally, this mode is used to make communication.
To use this mode, the configuration data of the slave must be registered. If a slave not registered as configuration data is detected at start of communication, a configuration error will occur.

(1)   Method of setting the slave address
There are two methods of setting the slave address.
Select either of the followings as necessary.

(a)   Using the switches (on the QJ71AS92 front panel):
Setting can be made without a peripheral device.

(b)   Using the command (for the QJ71AS92):
Setting can be made in the environment where the module cannot be
operated (the module is installed in the inaccessible place far end of an
operator panel).

The following chart shows the operation sequence of each method.

Slave address setting *1

Using the switches

Using the command
(Program or GX Configurator-AS *2)

<Select the configuration mode>
If the CM LED is not ON, press the MODE switch until the
CM LED is lit to select the configuration mode.

<Send the command>
1) Set 200H in the command buffer <request>
   (buffer memory address 55H).
2) Set the current slave address in the command buffer
   <request (data word 0)> (buffer memory address 56H). *3
3) Set a new slave address in the command buffer
   <request (data word 1)> (buffer memory address 57H). *3
4) Turn Y12 ON (command request).
5) Turn Y12 OFF after making sure that X12
   (command completion) has turned ON.
6) Check the result of the command buffer <result>
   (buffer memory address 25H).

<Method of erasing the slave address (set the slave
address to 0)>
When the slave address you want to erase is displayed on
the CODE LED, press the SET switch for more than
5 seconds. (See Section 4.5.3)

<Method of setting the slave address to the slave of slave
address 0> (See Section 4.5.2)
1) Press the SET switch to display the address you want to
   set on the CODE LED.
2) Hold down the SET switch until the address displayed on
   the CODE LED flickers.
3) After it has flickered, press the SET switch again.
   This sets the slave address displayed on the CODE LED
   to the slave of slave address 0.

*2: See Section 5.6 for the operation of GX Configurator-AS.
*3: See Section 3.5.1 for the values to be set to the command
    data.

*1: The slave address can be set to only the slave that has
    been set to address 0.

For details of the method of using the switches, See
Section 4.5.1 and later.

(2) Method of registering the configuration data to the QJ71AS92

Before starting operation in the protected operation mode, the configuration data of the slave that is ready for communication must be registered to the QJ71AS92.

There are two methods of registering the configuration date just as 4.5.(1) "Method of setting the slave address". Register the configuration data by using the switches or by using the command.

The following chart shows the operation sequence of each method.

```
                  ┌──────────────────────────────────────┐
                  │ Configuration data registration method │
                  └──────────────────────────────────────┘
                            │
          ┌─────────────────┴─────────────────┐
          │                                   │
┌──────────────────────┐          ┌─────────────────────────┐
│  Using the switches   │          │   Using the commands     │
│                       │          │ (Program or GX           │
│                       │          │  Configurator-AS *5)     │
└──────────────────────┘          └─────────────────────────┘
```

Using the switches

<Select the configuration mode>
If the CM LED is not ON, press the MODE switch until the CM LED is lit to select the configuration mode.

<Method of registering the configuration data>
Press the MODE switch until the CM LED turns off. This registers the configuration data and switches to the protected operation mode. *4

<Method of saving the configuration data to the EEPROM>
Until "gd" appears on the CM LED, press the MODE and SET switches simultaneously to save the above registered configuration data onto the EEPROM.

*4: It should be noted that resetting the CPU module will change (erase) the above registered data into the configuration data that were previously saved on the EEPROM.

For details of the method of using the switches, See Section 4.5.1 and later.

Using the commands (Program or GX Configurator-AS *5)

<Select the configuration mode>
If the CM LED is not ON, turn Y16 (configuration mode) from OFF to ON to OFF to select the configuration mode.

<Method of registration after clearing the previous configuration data>
1) Set 201_H in the command buffer <request> (buffer memory address 55_H).
2) Turn Y12 ON (command request).
3) Turn Y12 OFF after making sure that X12 (command completion) has turned ON.
4) Check the result of the command buffer <result> (buffer memory address 25_H).

<Method of addition/deletion to the previous configuration data>
1) Set the LPS (for write) (buffer memory addresses 49_H to $4C_H$) and turn Y13 ON (configuration registration request).
2) Turn Y13 OFF after confirming that X3 (configuration registration completion) has turned ON.
3) Set the permanent configuration setting command: 141_H to $17F_H$ in the command buffer <request> (buffer memory addresses: 55_H to 56_H). *6
4) Turn Y12 ON (command request).
5) Turn Y12 OFF after making sure that X12 (command completion) has turned ON.
6) Check the result of the command buffer <result> (buffer memory address 25_H).
   Repeat the steps 3) to 6) by the number of times equivalent to the address of slaves to be set.

<Select the protected operation mode>
Turn Y17 (protected operation mode) from OFF to ON to OFF to select the protected operation mode.

<Save the configuration data onto the EEPROM>
Turn Y1C (EEPROM write) from OFF to ON to OFF *7 to save the configuration data onto the EEPROM.

*5: See Sections 5.6 and 5.7 for the operation of GX Configurator-AS.
*6: See Section 3.5.1 for the values to be set to the command data.
*7: See Section 3.3.2 (12) for the timing of turning Y1C from OFF to ON to OFF.

4.5.1 Slave registration

The configuration data of the slaves must be registered to the QJ71AS92 before it is operated in the protected operation mode.
Slave registration to the QJ71AS92 can be performed by the switch operation in the following (1) and (2).
However, the data registered to the QJ71AS92 are lost when the PLC is powered on or the CPU module is reset. To store the registered data, perform operation up to (3). The data are written to the EEPROM of the QJ71AS92.

(1) **Put the QJ71AS92 in the configuration mode and assign addresses to the slaves.**
If the CM LED is off, press the MODE switch until the CM LED is lit. Alternatively, turn Y16 ON.
In this mode, assign any slave address to the slave of slave address 0. (See "Section 4.5.2 Slave address assignment".)
When the QJ71AS92 recognises the slaves to which slave addresses have already been assigned, it displays all the recognised slave addresses on the CODE LED in order.

> **TIP**
>
> When assigning the slave address with the QJ71AS92 connected to the slave of slave address 0, please make sure that only one slave of slave address 0 is connected to it.
> The QJ71AS92 will not perform slave address assignment when being connected with more than two slaves of slave address 0

(2) **Put the QJ71AS92 in the protected operation mode and register the configuration data of the slaves.**
Press the MODE switch until the CM LED is off. Alternatively, turn Y17 ON.
Normally, set this mode when operating the AS-i system.
If the MODE switch is pressed for a short time, normal configuration registration cannot be performed. If the ERR. LED is lit, restart operation from (1).

(3) **Press the MODE and SET switches simultaneously until "gd" appears on the CODE LED. Alternatively, turn Y1C ON. (The configuration data are written to the EEPROM.)**
When the PLC is powered on or the CPU module is reset next time, communication is performed using the data stored on the EEPROM.
Since the data were stored onto the EEPROM in the protected operation mode in the above procedure, the QJ71AS92 will start in the protected operation mode at the next startup. When data were stored onto the EEPROM in the configuration mode, the QJ71AS92 will start in the configuration mode at the next startup. Normally, store the data onto the EEPROM in the protected operation mode.
(Related item: Section 4.5 (2))

> **TIP**
>
> The number of writes to the EEPROM is 100,000 times.
> If the number of writes exceeds 100,000 times, "F70" is written to the "error code" of the QJ71AS92 buffer memory.
> "F70" indicates a hardware fault. Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

4.5.2 Slave address assignment

This section describes how to assign any slave address to the slave of slave address 0 by using the switches on the front of the QJ71AS92 panel.

(1)   Put the QJ71AS92 in the configuration mode by reference to Section 4.5.1 (1).

(2)   The QJ71AS92 displays all the slave addresses of the recognised slaves in order on the CODE LED. "0" is displayed if the slave of slave address 0 is connected. If the recognised slave is the Ver. 2.11-compatible grouped slave, the QJ71AS92 lights up the "A"/"B" LED on the right of the CODE LED to indicate that the slave is in group A or B.

(3)   Press the SET switch to display the usable slave addresses. The usable slave address is displayed in order every time the SET switch is pressed.
For the Ver. 2.11-compatible grouped slaves, the QJ71AS92 lights up the "A" LED on the right of the CODE LED and displays the slaves in group A. After that, the slave addresses of group B appear consecutively.
If the SET or MODE switch is not operated for longer than 10 seconds, the QJ71AS92 returns to the display status in (1).

(4)   When the slave address to be set has appeared, press the SET switch until the indicated slave address flickers. This selects the target slave address.

(5)   When the SET switch is pressed again, the flickering slave address is set to the slave of slave address 0. (It is stored into the nonvolatile memory of the slave.)

(6)   The slave address of the slave recognized again appears on the CODE LED. (Related item: Section 4.5 (1))

TIP
When changing the slave address of the slave by using the switches on the front of the panel, the QJ71AS92 assigns the target slave address after assigning the slave address 0 to the slave once. See Section 4.5.3 for the method to set the slave address to 0.

4.5.3 Slave address erasure

This section describes the procedure of assigning the slave address 0 to the target slave.

(1)   Put the QJ71AS92 in the configuration mode, by reference Section 4.5.1 (1). All the slave addresses recognized in the AS-i system are displayed on the CODE LED in order.

(2)   When the target slave address is displayed, press the SET switch for more than five seconds. This sets the slave address 0 to that slave. ("0" is stored into the nonvolatile memory of the slave.) At the same time, "00" appears on the CODE LED of the QJ71AS92.

(3)   When you release the SET switch, the CODE LED displays the slave address of the slave that has been recognized again.

4.5.4 Automatic slave address assignment function

The automatic slave address automatically assigns the same address to the new slave (same type of product) whose slave address is 0, when changing a slave.
The following conditions must be satisfied to function the automatic slave address assignment.

(1)   The QJ71AS92 is in the protected operation mode.

(2)   The automatic slave address assignment function is valid.
(See Section 3.3.2 (9))

(3)   Only one of the slaves in the configuration is not recognized.

When these conditions are satisfied, the slave address of the slave that is not recognized any more is automatically assigned to the new slave of the slave address 0.
Whether the conditions are satisfied or not can be checked using the PRG ENA. LED or EC flag (buffer memory address: 10$_H$).

```
                    ┌──────────────┐
                    │   QJ71AS92   │
                    └──────┬───────┘
        ┌────────────┬─────┴──────┬────────────┐
  ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐
  │ AS-i power│ │ Company A │ │ Company B │ │ Company C │
  │ supply    │ │ slave     │ │ slave     │ │ slave     │
  │           │ │ address 1 │ │ address 2 │ │ address 3 │
  └──────────┘ └──────────┘ └──────────┘ └──────────┘
```

Failure   Replacement

Connecting the slave of the same product set to the slave address 0 writes the slave address of the old slave automatically.

Company B slave address 0
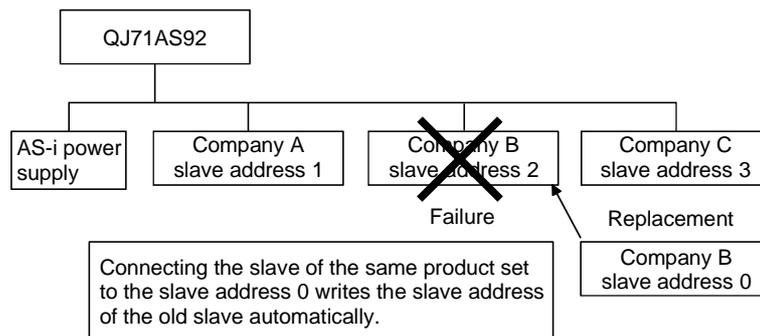
TIP
If the slave address is not assigned automatically, performs the slave address assignment according to the method given in Section 4.5.2. If two slaves are different products, the automatic slave address assignment function is not available.

5 UTILITY PACKAGE (GX Configurator-AS)

5.1 Utility Package Functions

Table 5.1 shows a list of the utility package functions.

Table 5.1 Utility Package (GX Configurator-AS) Function List

Function	Description	Reference section
Automatic refresh	Set the I/O data of the AS-i module to be automatically refreshed.	Section 5.4
Monitor/test	• X/Y monitor/test	Section 5.5
	• Configuration data registration/EEPROM Storage	Section 5.6
	• Command request	Section 5.7

TIP	
*1 When auto refresh setting is made, a maximum of 24 bytes of intelligent function module parameters are required per module.	

5

5.2 Installing and Uninstalling the Utility Package

See "Method of installing the MELSOFT Series" attached with the utility package regarding the install and uninstall operation for the utility package.

5.2.1 User precautions

The following provides the precautions on using the GX Configurator-AS:

(1) **Important safety information**
Since GX Configurator-AS is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures in GX Developer Operating Manual.

(2) **About installation**
The GX Configurator-AS is an add-in package for GX Developer Version 4 or later. Therefore, install GX Configurator-AS into the personal computer where the GX Developer Version 4 or later product has already been installed.

(3) **About display-screen errors while using the intelligent function module utility**
There may be cases in which the screen will not properly display while the intelligent function module utility is being used, due to a lack of system resources. If this occurs, close the intelligent function module utility first and then GX Developer (program, comments, etc.) and other applications. Next, restart GX Developer and the intelligent function module utility.

(4) **To start the intelligent function module utility**

(a) In GX Developer, select "QCPU (Q mode)" for the PROGRAMMABLE LOGIC CONTROLLER series and specify the project.
If something other than "QCPU (Q mode)" is selected for the PROGRAMMABLE LOGIC CONTROLLER series, or if the project is not specified, the intelligent function module utility will not start.

(b) Multiple intelligent function module utilities can be started.
However, the [Open file]/[Storage file] intelligent function module's parameter operations can only be performed by a single intelligent function module utility. Other intelligent function module utilities can perform the [Monitor/test] operation only.

(5) **How to switch screens when two or more intelligent function module utilities are started**
When two or more intelligent function module utility screens cannot be displayed side by side, use the task bar to change the intelligent function module utility screen so that it is displayed on top of other screens.

(6) About the number of parameters that can be set in GX Configurator-AS

The CPU module has a limit on the number of parameters that can be set using GX Configurator for the mounted intelligent function modules.

Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Auto refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256

For example, when multiple intelligent function modules are mounted to the Q25HCPU, set GX Configurator so that the total number of set parameters of all intelligent function modules does not exceed the maximum number of set parameters of the Q25HCPU. Calculate the total number of set parameters separately for initial setting and auto refresh setting.

The number of parameters that can be set per module using GX Configurator-AS is as follows.

Object Module	Initial setting	Auto refresh setting
QJ71AS92	0 (Not used)	30 (Maximum number of settings)

Example) Counting the number of parameter settings in the auto refresh setting
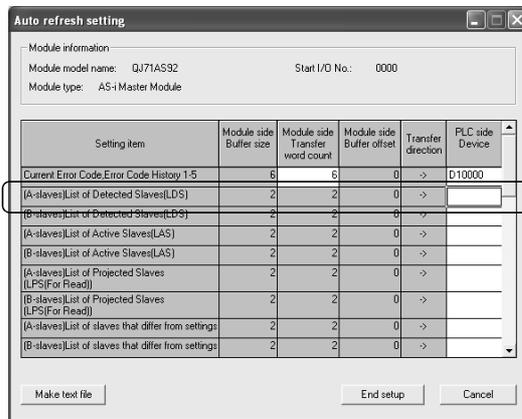
The number of settings in this one line is counted as one setting.
The number of settings is not counted by columns.
Add up all the setting items in this setting screen, then add them to the total for the other intelligent function modules to get a grand total.

5.2.2 Operating environment

The operating environment of the personal computer where the GX Configurator-AS is used is explained.

Item		Peripheral devices
Installation (Add-in) destination [1]		Add-in to GX Developer Version 4 (English version) or later [2]
Computer main unit		Personal computer on which Windows® operates.
	CPU	Refer to the following table "Used operating system and performance required for personal computer".
	Required memory	
Hard disk free space	For installation	65 MB or more
	For operation	10 MB or more
Display		800 × 600 dot or more resolution [3]
Operating system		Microsoft® Windows® 95 Operating System (English version)
		Microsoft® Windows® 98 Operating System (English version)
		Microsoft® Windows® Millennium Edition Operating System (English version)
		Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version)
		Microsoft® Windows® 2000 Professional Operating System (English version)
		Microsoft® Windows® XP Professional Operating System (English version)
		Microsoft® Windows® XP Home Edition Operating System (English version)

[1]: Install the GX Configurator-AS in GX Developer Version 4 or higher in the same language. GX Developer (English version) and GX Configurator-AS (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-AS (English version) cannot be used in configuration.

[2]: GX Configurator-AS cannot be used as an add-in with GX Developer Version 3 or earlier versions.

[3]: Setting fonts Size of Windows® for "Large Fonts" may cause the text to extend off screen. Therefore, choose "Small Fonts".

Used operating system and performance required for personal computer

Operating system		Performance Required for Personal Computer	
		CPU	Required memory
Windows® 95		Pentium® 133MHz or more	32MB or more
Windows® 98		Pentium® 133MHz or more	32MB or more
Windows® Me		Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0		Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional		Pentium® 133MHz or more	64MB or more
Windows® XP Professional	"XP compatibility mode" and "Fast User Switching" are not supported.	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition		Pentium® 300MHz or more	128MB or more

5.3 Explanation of Utility Package Operation

5.3.1 How to perform common utility package operations

(1) Available control keys
Special keys that can be used during operation of the utility package and their applications are shown in the table below.

Name of key	Application
Esc	Cancels a newly entered value when entering data in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in conjunction with the mouse when multiple cells are selected in the selection test.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents.
Back Space	Deletes the character where the cursor is positioned.
↑ ↓ ← →	Moves the cursor.
Page Up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Confirms the value entered in the cell.

(2) Operation Command Buttons

Current value display : Displays the current value of the selected item.

Make text file : Creates a text file (TXT format) under the specified file name and Storages to it the contents currently displayed on the screen.

Start monitor : Starts monitoring of the current value field.

Stop monitor : Stops monitoring of the current value field.

Execute test : Registers the setting data of the selected item in the QJ71AS92.
To apply Execute test to multiple items simultaneously, set the data for the corresponding items, select the multiple items while pressing down Ctrl , then click Execute test .

Close : Closes the currently displayed screen and returns to the previously displayed screen.

(3)   Data to be created with the utility package
The data and files shown below that are created with the utility package are also
processed using GX Developer operation. Figure 5.1 shows which operation
processes which data or file.

<Intelligent function module parameters>

(a) This data is created with the auto refresh setting, and stored in the intelligent
function module parameter file of the project to be created using GX
Developer.

```
Project
        ├──Program
        ├──Parameter
                    ├──PLC Parameter
                    ├──Network Parameter
                    └──Intelligent Function Module Parameter
```
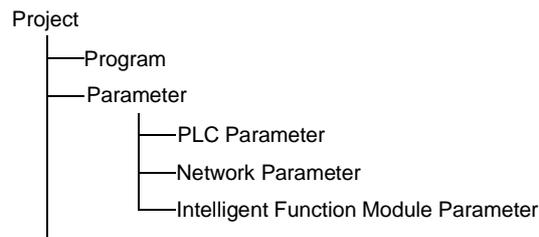
(b) Steps 1) to 3) shown in Figure 5.1 are performed using the following
operations.

1) Operating from GX Developer.
   [Project] → [Open existing project] / [Storage project] / [Storage project
   as]
2) Operating from the utility parameter setting module selection screen.
   [File] → [Open file] / [Storage file]
3) Operating from GX Developer.
   [Online] → [Read from PROGRAMMABLE LOGIC CONTROLLER] /
   [Write to PROGRAMMABLE LOGIC CONTROLLER] → "Intelligent
   function module parameters"
   Or, operate from the utility parameter setting module selection screen.
   [Online] → [Read from PROGRAMMABLE LOGIC CONTROLLER] /
   [Write to PROGRAMMABLE LOGIC CONTROLLER]

<Text file>

      (a) A text file is created by performing the initial setting or auto refresh setting, or selecting ‖ text file creation ‖ in the monitor/test screen. The text files can be utilized to create user documents.
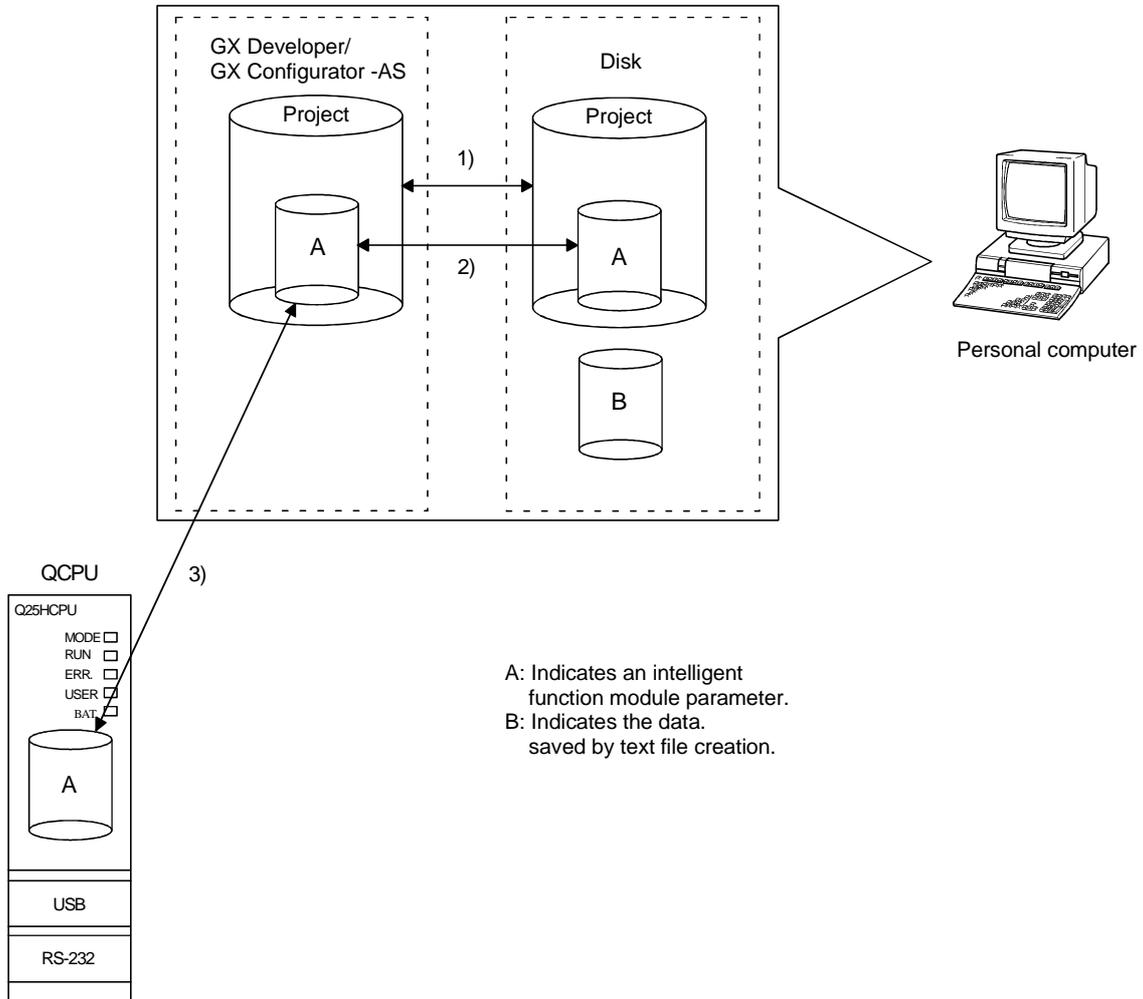
Figure 5.1 Correlation chart for data created using the utility package

5.3.2 Operation overview

e - [LD(Edit mode)   MAIN   35 Step]

Tools Window Help

Check program ...
Merge data ...
Check parameter ...
Transfer ROM   ▶
Delete unused comments
Clear all parameters ...
IC memory card   ▶

Start ladder logic test

Set TEL data   ▶

Intelligent function utility   ▶   Utility list ...
                                            Start

Customize keys ...
Change display color ...
Options ...

Create start-up setting file ...

[Tools] – [Intelligent function utility] – [Start]

Intelligent Function Module
Select Parameter Setting Module screen

Intelligent function Module utility C:\MELSEC\sam...

File Online Tools Help

Intelligent function module parameter setting module select
Start I/O No.: 0000
Package name: AS-i Master Module
Module model name: QJ71AS92

Intelligent function module parameter setting module

Start I/O No.	Module model name	Initial setting	Auto refresh

Initial setting | Auto refresh | Delete | Exit

See Screen 5.3.3

When used via online operation

Select [Online] – [Monitor/test] from the menu bar.

Select monitor/test module screen

Select monitor/test module

Select monitor/test module
Start I/O No.: 0000
Package name: AS-i Master Module
Module model name: QJ71AS92

Module implementation status

Start I/O No.	Module model name
0000	QJ71AS92

Monitor/test | Exit

Auto refresh

Enter "Start I/O No.," then select
"Package name" and "Module model name."
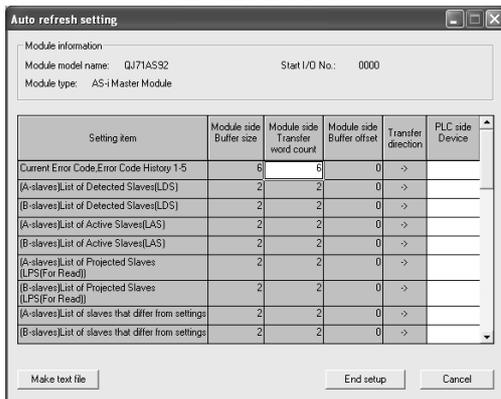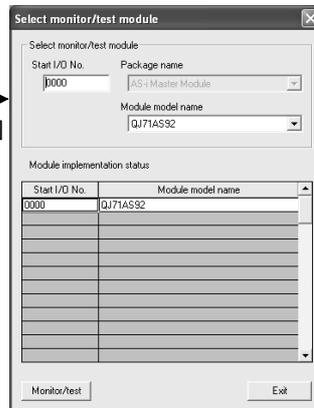
Monitor/test

Select the parameter setting module for monitor/test.

Auto refresh screen

Auto refresh setting

Module information
Module model name: QJ71AS92   Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
Current Error Code,Error Code History 1-5	6	6	0	->	
(A-slaves)List of Detected Slaves(LDS)	2	2	0	->	
(B-slaves)List of Detected Slaves(LDS)	2	2	0	->	
(A-slaves)List of Active Slaves(LAS)	2	2	0	->	
(B-slaves)List of Active Slaves(LAS)	2	2	0	->	
(A-slaves)List of Projected Slaves (LPS[For Read])	2	2	0	->	
(B-slaves)List of Projected Slaves (LPS[For Read])	2	2	0	->	
(A-slaves)List of slaves that differ from settings	2	2	0	->	
(B-slaves)List of slaves that differ from settings	2	2	0	->	

Make text file | End setup | Cancel

See Screen 5.4

Monitor/test screen

Monitor/Test

Module information
Module model name: QJ71AS92   Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Current value	Setting value
Configuration Error	Configuration Error	
LDS_0(Detection of Slave Addr. 0)	Not Detected	
Automatic Address Assignment Function	Disabled	
Automatic Address Assignment Available	Not Available	
Configuration Mode Active	Not in Config Mode	
Normal Operation Active	Some Other Phase	
AS-i Power Fail	AS-i Power Fail	
Offline Phase Active	Offline Phase	
Peripheral Faults	Peripheral Faults	
Current Error Code	0040	
Error Code History1	0040	

Flash ROM setting
Write to module | File save | Current value display
Read from module | File read | Make text file

Details
Cannot execute test   Monitoring

Start monitor | Stop monitor | Execute test | Close

See Screen 5.5

5.3.3 Starting the intelligent function module utility

[Purpose of setting]
Start the intelligent function module utility from GX Developer, and display the module selection screen for the intelligent function module utility parameter setting. The screens for performing initial setting, auto refresh setting and monitor/test module selection (selecting the module for which monitoring/testing is to be performed) can be started from this screen.

[Startup procedure]
[Tools] → [Intelligent function utility] → [Start]

[Setting screen]
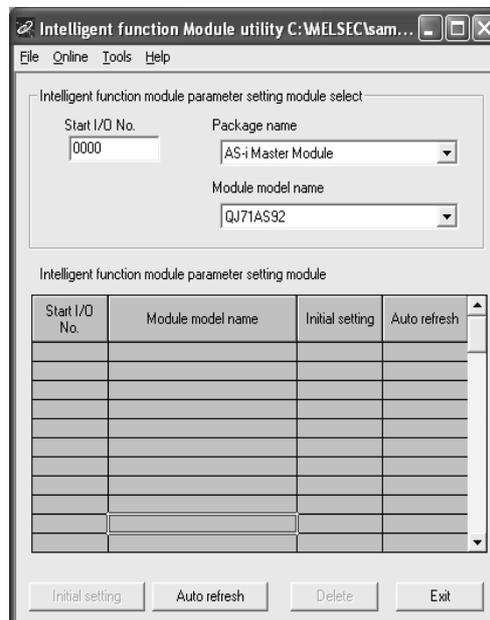
[Explanation of items]
(1) How to start each screen

(a) Starting auto refresh setting
"Start I/O No.✻" → "Package name" → "Module model name" → Auto refresh

(b) Monitor/test module selection screen
Online → Monitor/test

✻ Enter the start I/O No. in hexadecimal.

(2) Explanation of screen command buttons

Initial settings	Cannot be selected.
Auto refresh	Starts the auto refresh setting screen.
Delete	Deletes the initial setting and auto refresh setting for the selected module.
Exit	Ends the Intelligent function module utility.

(3) Menu bar

(a) File items
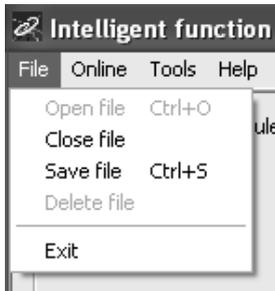
With file operation, the intelligent function module parameters for the project opened by GX Developer can be processed.

[Open file]   : Reads the parameter file.
[Close file]   : Closes the parameter file. If revisions were made, the dialog box asking whether to Storage the file appears.
[Storage file]   : Storages the parameter file.
[Delete file]   : Deletes the parameter file.
[Exit]   : Ends the intelligent function module utility.

(b) Online items
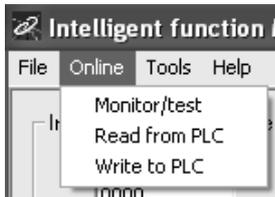
[Monitor/test]   : Starts the monitor/test module selection screen.
[Read from PLC] : Reads the intelligent function module parameters from the CPU module.
[Write to PLC]   : Writes the intelligent function module parameters to the CPU module.

┌───┐
│ TIP   │
│   │
│ (1) Saving the intelligent function module parameter files   │
│   Since files cannot be Storaged using the GX Developer project Storage │
│   operation, Storage the files using the module selection screen for intelligent │
│   function module parameter setting described above.   │
│   │
│ (2) Reading from and writing to PLC operations for the intelligent function module │
│   parameters using GX Developer   │
│   │
│   (a) After the intelligent function module parameters are Storaged in a file, they │
│   can be read from and written into the PLC.   │
│   │
│   (b) Set the target CPU module using GX Developer [Online] → [Transfer │
│   setup].   │
│   │
│ (3) Checking for the required utility   │
│   The head I/O is displayed in the Intelligent function module utility setting │
│   screen, but a "＊" may be displayed for the model name.   │
│   This means that either the required utility is not installed or that the utility │
│   cannot be started from the GX Developer.   │
│   Check for the required utility in [Tools] - [Intelligent function utility] - [Utility │
│   list...] in GX Developer, and set it.   │
└───┘

5.4 Auto refresh setting

[Purpose of setting]
Sets the buffer memory for the QJ71AS92 to be automatically refreshed.

[Startup procedure]
"Start I/O No.✳" → "Package name" → "Module model name" → ⎢ Auto refresh ⎢

✳ Enter the start I/O No. in hexadecimal.

[Setting screen]

[Explanation of items]
(1) Contents of the screen display

Model side Buffer size	: Displays the size of the buffer memory for the setting item that can be transferred (fixed at one word).
Model side Transfer word count	: Displays the number of words to transfer the CPU device from the head device (fixed at one word).
Model side buffer offset	: The buffer memory addresses are offset on a one word basis.
Transfer direction	: "←" indicates that data is written from the device to the buffer memory. "→" indicates that data is read from the buffer memory to the device.
PLC side Device	: Enter the device at the CPU module to be automatically refreshed. The devices that can be used are X, Y, M, L, B, T, C, ST, D, W, R, ZR. When using bit devices, X, Y, M, L or B, set a number that can be divided by 16 points (examples: X10, Y120, M16). Also, buffer memory data is stored in 16 point blocks starting from the device number that was set. For example, if X10 is set, data will be stored from X10 to X1F.

(2)   Explanation of command buttons

Make text file   A file containing the screen contents is created in text file format.

End setup   Confirms the setting data and ends the operation.

Cancel   Cancels the setting data and ends the operation.

[Explanation of items]

Setting item	Reference section
Current Error Code, Error Code History 1-5	Section 3.4.2 (17)
(A-slaves) List of Detected Slaves (LDS)	Section 3.4.2 (5)
(B-slaves) List of Detected Slaves (LDS)	
(A-slaves) List of Active/Slaves (LAS)	Section 3.4.2 (6)
(B-slaves) List of Active/Slaves (LAS)	
(A-slaves) List of Projected Slaves (LPS (For Read))	Section 3.4.2 (7)
(B-slaves) List of Projected Slaves (LPS (For Read))	
(A-slaves) List of slaves that differ from settings	Section 3.4.2 (8)
(B-slaves) List of slaves that differ from settings	
(A-slaves) Error Slave List	Section 3.4.2 (9)
(B-slaves) Error Slave List	
(A-slaves) List of Peripheral Faults (LPF)	Section 3.4.2 (18)
(B-slaves) List of Peripheral Faults (LPF)	
(A-slaves) Number of I/O Points	Section 3.4.2 (20)
(B-slaves) Number of I/O Points	
EC Flags	Section 3.4.2 (4)
(A-slaves) Input Data of Slave Addr. From 1A-3A and part of EC Flag	Section 3.4.2 (1)
(A-slaves) Input Data of Slave Addr. From 1A-31A	Section 3.4.2 (2)
(B-slaves) Input Data of Slave Addr. From 1B-31B	Section 3.4.2 (3)
(A-slaves) Output Data of Slave Addr. From 1A-31A	Section 3.4.2 (10), (11)
(B-slaves) Output Data of Slave Addr. From 1B-31B	Section 3.4.2 (12), (13)
Analog Input Data(Slave addr. 1-31)	Section 3.4.2 (19)
Analog Output Data(Slave addr. 1-31)	
Command Buffer <Request(Command)>	Section 3.4.2 (15)
Command Buffer <Request (Data Word 0-3 (Command Argument))>	
Extended Command Buffer <Request(Data)>	Section 3.4.2 (22)
Command Buffer <Result>	Section 3.4.2 (16)
Extended Command Buffer <Result>	Section 3.4.2 (21)
(A-slaves) Projected Slave List (LPS (For Write))	Section 3.4.2 (14)
(B-slaves) Projected Slave List (LPS (For Write))	

TIP

The auto refresh settings are stored in the intelligent function module parameters. After the auto refresh settings are written to the CPU module, they are validated by performing STOP → RUN → STOP → RUN operations for the CPU module, turning the power OFF and then ON, or resetting the CPU module.

The auto refresh settings cannot be changed from the sequencer program. However, it is possible to add a process similar to automatic refresh by using the FROM/TO instructions of the sequence program.

5.5 Monitor/Test

[Purpose of setting]

Used to monitor the EC flag, error code and error history and to perform configuration registration/EEPROM Storage operation.

[Startup procedure]

Monitor/test module selection screen → "Start I/O No.✳" → "Package name" →

"Module model name" → ⌷ Monitor/test ⌷

✳   Enter the start I/O No. in hexadecimal.

The screen can also be started from the GX Developer Version 6 or later system monitor.
See GX Developer Operating Manual for details.

[Setting screen]

Select monitor/test module screen
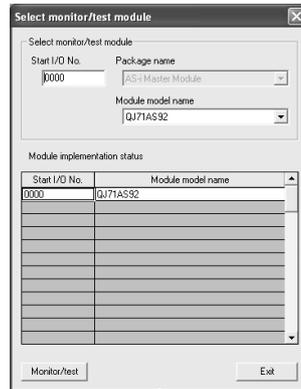
Monitor/test screen
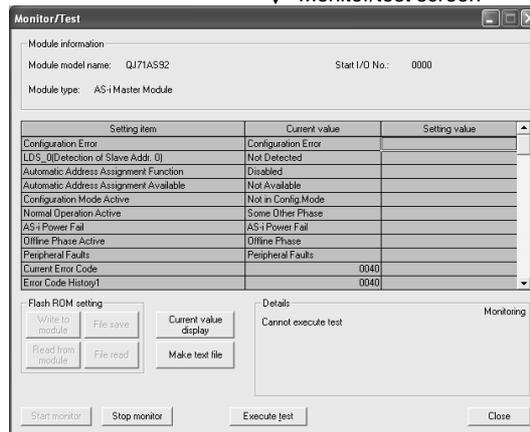
[Explanation of items]
(1)   Contents of screen display

Setting item   : The I/O signal or buffer memory names are displayed.

Current value   : The I/O signal status or current value of buffer memory are monitored.

Setting value   : Select or enter the data to be written during test operation.

(2)   Explanation of the command buttons

Current value display	The current value of the selected item is displayed. (This is used to check text that cannot be displayed in the current value field. However, in this utility package, all items can be displayed in the display fields).
Make text file	Creates a file consisting of the screen contents in text file format.
Start monitor / Stop monitor	Selects whether or not the current value fields are monitored.
Execute test	Performs a test of the selected item. To select more than one item, select multiple items while holding down the Ctrl key.
Close	Closes the screen currently displayed and returns to the previously displayed screen.

The following monitor/test selection menu is displayed.

Setting item	Reference section
Configuration Error	Section 3.4.2 (4)
LDS_0 (Detection of slave address 0)	
Auto Slave Address Allocation Function	
Auto Slave Address Allocation Condition	
Configuration Mode	
Normal Operation	
AS-i Power Fail	
Offline Phase Confirmation	
Peripheral Fault	
Latest Error Code Number	Section 3.4.2 (17)
Error Code History 1	
Error Code History 2	
Error Code History 3	
Error Code History 4	
Error Code History 5	
X/Y monitor/test	Section 5.5.1
(A System) Detection Slave List(LDS)	Section 5.5.2
(B System) Detection Slave List(LDS)	Section 5.5.3
(A System) Active Slave List(LAS)	Section 5.5.4
(B System) Active Slave List(LAS)	Section 5.5.5
(A System) Projected Slave List (LPS (For Read))	Section 5.5.6
(B System) Projected Slave List (LPS (For Read))	Section 5.5.7
(A System) List of slaves that differ from settings	Section 5.5.8
(B System) List of slaves that differ from settings	Section 5.5.9
(A System) Error Slave List	Section 5.5.10
(B System) Error Slave List	Section 5.5.11
(A System) Peripheral Fault Slave List(LPF)	Section 5.5.12
(B System) Peripheral Fault Slave List(LPF)	Section 5.5.13

Setting item	Reference section
(A System) No. of Input Output Channels	Section 5.5.14
(B System) No. of Input Output Channels	Section 5.5.15
(A System) Input Data of Slave Addr. From 1A-31A	Section 5.5.16
(B System) Input Data of Slave Addr. From 1B-31B	Section 5.5.17
(A System) Output Data of Slave Addr. From 1A-31A	Section 5.5.18
(B System) Output Data of Slave Addr. From 1B-31B	Section 5.5.19
Analog Input Data	Section 5.5.20
Analog Output Data	Section 5.5.21
Comment Request	Section 5.6
1. Set request code in the Command buffer	
AS-i Command Buffer <Request(Command)>	
AS-i Command Buffer <Data Word 0>	
AS-i Command Buffer <Data Word 1>	
AS-i Command Buffer <Data Word 2>	
AS-i Command Buffer <Data Word 3>	
Extended Command Buffer <Request(Data)>	
2. Execute Command	
Command Request	
3. Check the Command execution result.	
AS-i Command Buffer <Result>	
AS-i Command Buffer <Data Word 0>	
AS-i Command Buffer <Data Word 1>	
AS-i Command Buffer <Data Word 2>	
AS-i Command Buffer <Data Word 3>	
Extended Command Buffer <Result>	

Setting item	Reference section
Configuration Data Registration/EEPROM Storage	Section 5.7
1. Change to Configuration Mode Change to Configuration Mode when [Mode Status] is not in "Configuration Mode".	
Mode Status	
Configuration Mode Change Request	
2. Set Configuration Data	
(A System) Projected Slave List (LPS (For Write))	
(B System) Projected Slave List (LPS (For Write))	
Configuration Register Request	
3. Register Permanent Configuration from Command	
AS-i Command Buffer <Request(Command)>	
AS-i Command Buffer <Data Word 0>	
Command Request	
AS-i Command Buffer <Result>	
AS-i Command Buffer <Data Word 0>	
4. Change to Protected Operation Mode	
Protected Operation Mode Change Request	
5. Storage the Configuration Data in EEPROM Execute only in case of saving in EEPROM	
EEPROM Write Request	
6. Check the finishing of EEPROM Write	
EEPROM Write Status	
Write Request Result (Latest Error Code Number)	
Note: Please do the corrective actions by referring the manual, if there is any error occurred in step 3, 6	

5.5.1 X/Y monitor/test

[Purpose of setting]

Used to monitor the I/O signals or test the output signals.

[Startup procedure]

Monitor/test screen → | X/Y monitor/test |

[Setting screen]
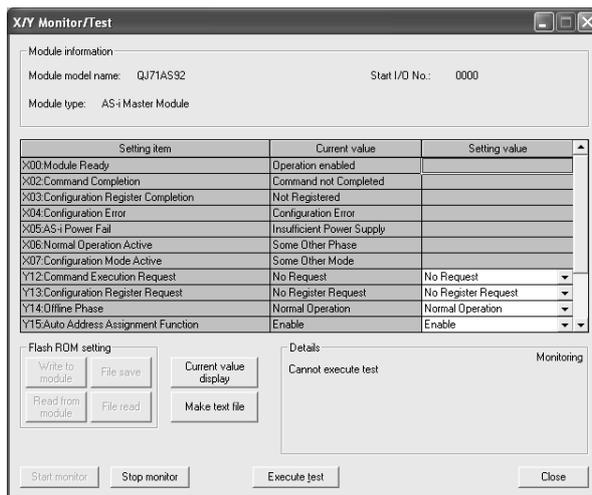
[Setting item]

Setting item	Reference section
X00: Module Ready	Section 3.3.2 (1)
X02: Command Completion	Section 3.3.2 (2)
X03: Configuration Register Completion	Section 3.3.2 (3)
X04: Configuration Error	Section 3.3.2 (4)
X05: AS-i Power Fail	Section 3.3.2 (5)
X06: Normal Operation Active	Section 3.3.2 (6)
X07: Configuration Mode Active	Section 3.3.2 (7)
Y12: Command Execution Request	Section 3.3.2 (2)
Y13: Configuration Register Request	Section 3.3.2 (3)
Y14: Offline Phase	Section 3.3.2 (10)
Y15: Auto Address Allocation Function	Section 3.3.2 (11)
Y16: Configuration Mode	Section 3.3.2 (12)
Y17: Protected operation mode	Section 3.3.2 (13)
Y1C: EEPROM write	Section 3.3.2 (14)
Y1D: Refresh Instruction	Section 3.3.2 (15)

5.5.2 (A-slaves) List of Detected Slaves (LDS)

[Purpose of setting]
Used to monitor the detection status of each (A-slaves) slave number.

[Startup procedure]
Monitor/test screen → (A-slaves) Detection Slave List
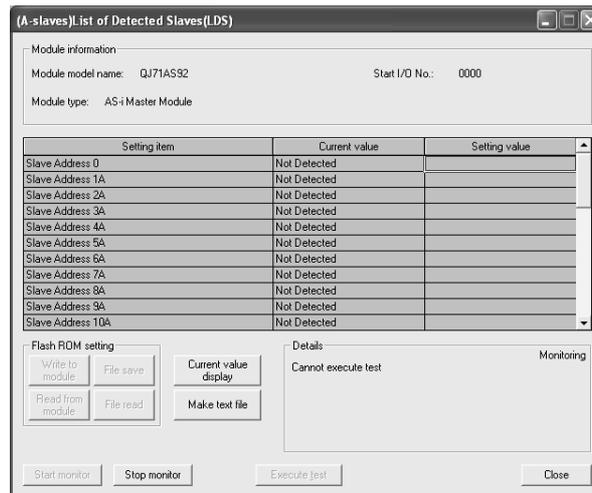
[Setting screen]

REMARK

Refer to Section 3.4.2 (5) for details of the setting items.

5.5.3 (B-slaves) List of Detected Slaves (LDS)

[Purpose of setting]
Used to monitor the detection status of each (B-slaves) slave number.

[Startup procedure]
Monitor/test screen → (B-slaves) Detection Slave List
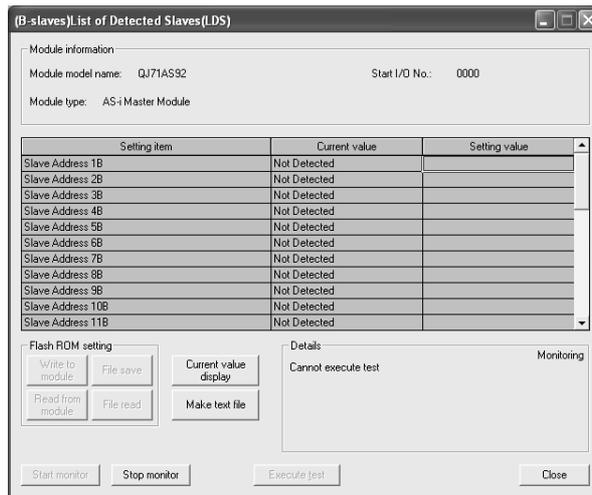
[Setting screen]

REMARK

Refer to Section 3.4.2 (5) for details of the setting items.

5.5.4 (A-slaves) List of Active Slaves (LAS)

[Purpose of setting]

Used to monitor the communication status of each (A-slaves) slave number.

[Startup procedure]

Monitor/test screen → (A-slaves) Active Slave List

[Setting screen]

REMARK

Refer to Section 3.4.2 (6) for details of the setting items.

5.5.5 (B-slaves) List of Active Slaves (LAS)

[Purpose of setting]
Used to monitor the communication status of each (B-slaves) slave number.

[Startup procedure]
Monitor/test screen → (B-slaves) Active Slave List

[Setting screen]

REMARK

Refer to Section 3.4.2 (5) for details of the setting items.

5.5.6 (A-slaves) List of Projected Slaves (LPS (For Read))

[Purpose of setting]
Used to monitor the parameter registration status of each (A-slaves) slave number.

[Startup procedure]
Monitor/test screen → (A-slaves) LPS (For Read)

[Setting screen]
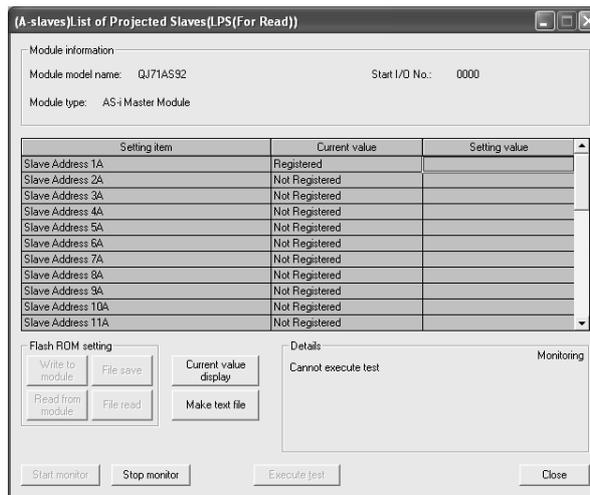
REMARK

Refer to Section 3.4.2 (7) for details of the setting items.

5.5.7 (B-slaves) List of Projected Slaves (LPS (For Read))

[Purpose of setting]
Used to monitor the parameter registration status of each (B-slaves) slave number.

[Startup procedure]
Monitor/test screen → (B-slaves) LPS (For Read)

[Setting screen]
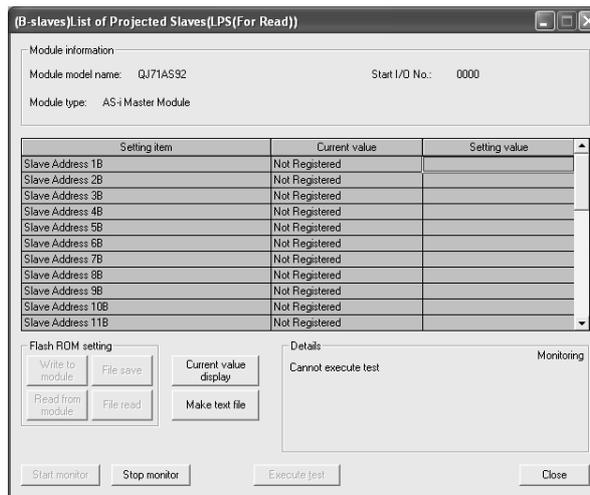
REMARK

Refer to Section 3.4.2 (7) for details of the setting items.

5.5.8 (A-slaves) List of slaves that differ from settings

[Purpose of setting]

The result of EXCLUSIVE ORing the result of ORing the (A-slaves) detected slave list (LDS) and projected slave list (LPS) and the active slave list (LAS) is stored. The result of (detected slave list (LDS) | projected slave list (LPS)) ^ active slave list (LAS) is displayed.

[Startup procedure]

Monitor/test screen → (A-slaves) Slave List

[Setting screen]
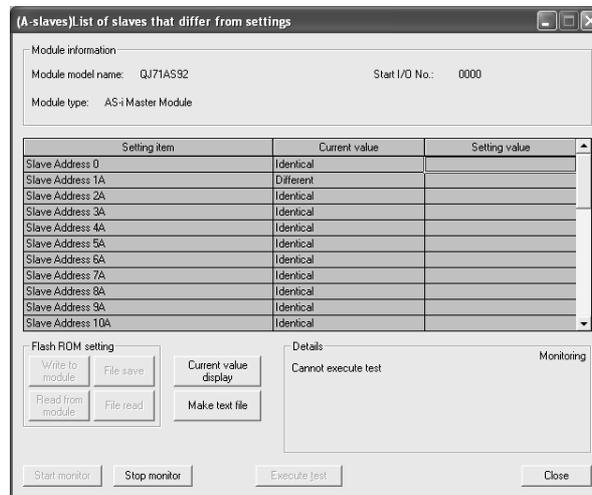
REMARK

Refer to Section 3.4.2 (8) for details of the setting items.

5.5.9 (B-slaves) List of slaves that differ from settings

[Purpose of setting]

The result of EXCLUSIVE ORing the result of ORing the (B-slaves) detected slave list (LDS) and projected slave list (LPS) and the active slave list (LAS) is stored.
The result of (detected slave list (LDS) | projected slave list (LPS)) ^ active slave list (LAS) is displayed.

[Startup procedure]

Monitor/test screen → | (B-slaves) Slave List |
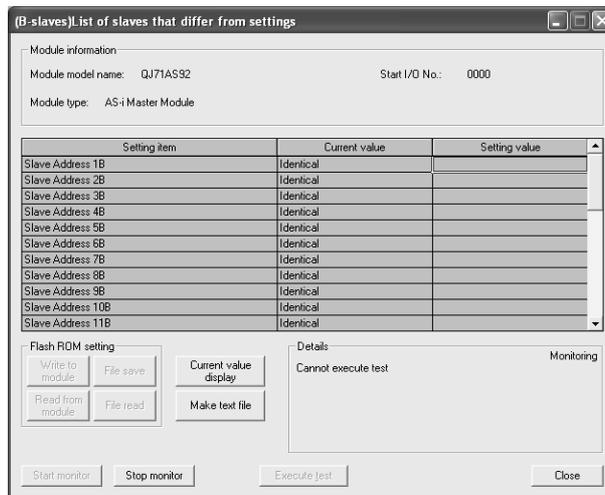
[Setting screen]

| REMARK |

Refer to Section 3.4.2 (8) for details of the setting items.

5.5.10 (A-slaves) Error Slave List

[Purpose of setting]

Used to monitor whether each (A-slaves) slave number is active or inactive.

[Startup procedure]

Monitor/test screen → (A-slaves) Error Slave List
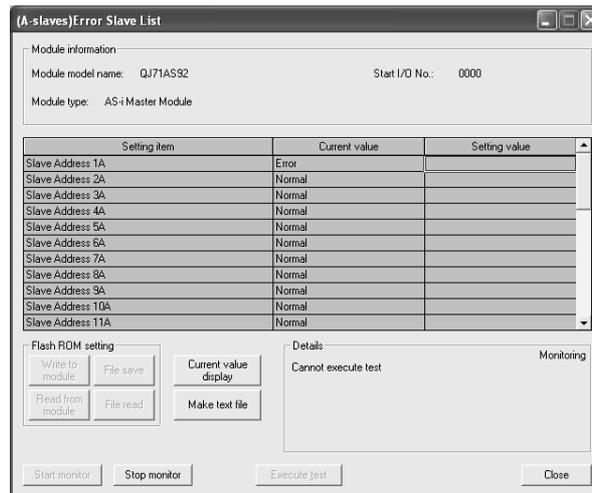
[Setting screen]

REMARK

Refer to Section 3.4.2 (9) for details of the setting items.

5.5.11 (B-slaves) Error Slave List

[Purpose of setting]

Used to monitor whether each (B-slaves) slave number is active or inactive.

[Startup procedure]

Monitor/test screen → (B-slaves) Error Slave List
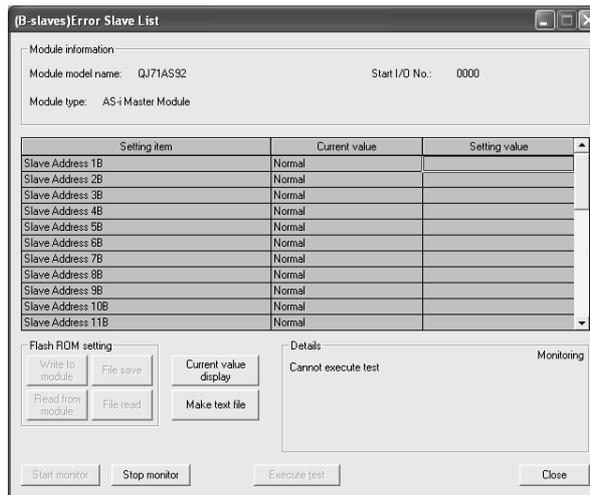
[Setting screen]

REMARK

Refer to Section 3.4.2 (9) for details of the setting items.

5.5.12 (A-slaves) List of Peripheral Faults (LPF)

[Purpose of setting]

Used to monitor the peripheral fault occurrence status of each (A-slaves) slave.

[Startup procedure]

Monitor/test screen → (A-slaves) Peripheral Fault

[Setting screen]
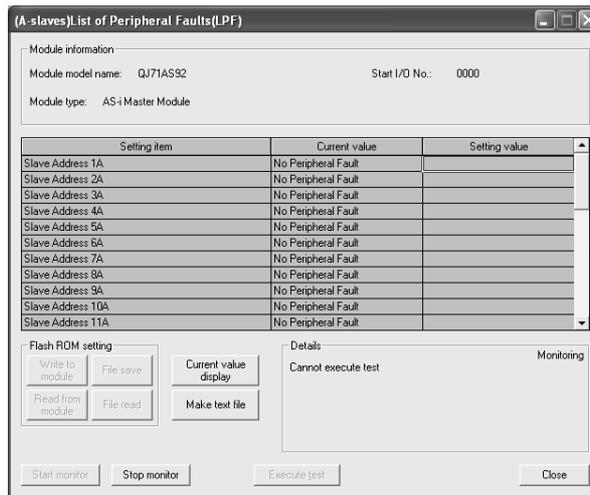
REMARK

Refer to Section 3.4.2 (18) for details of the setting items.

5.5.13 (B-slaves) List of Peripheral Faults (LPF)

[Purpose of setting]

Used to monitor the peripheral fault occurrence status of each (B-slaves) slave.

[Startup procedure]

Monitor/test screen → (B-slaves) Peripheral Fault

[Setting screen]
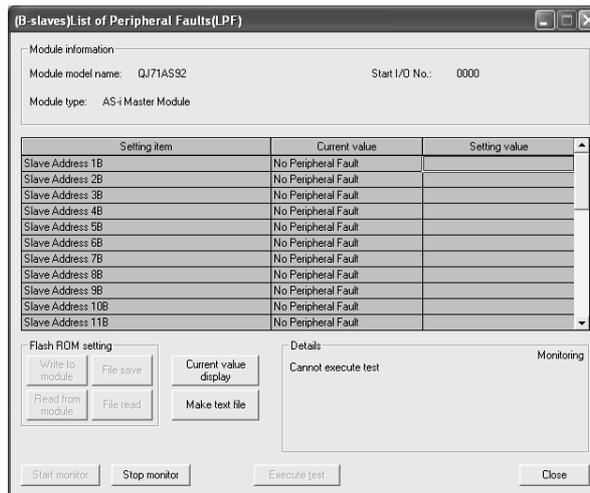
REMARK

Refer to Section 3.4.2 (18) for details of the setting items.

5.5.14 (A-slaves) Number of I/O Points

[Purpose of setting]
Used to monitor the I/O input and output points and analog input and output points of each (A-slaves) slave number.

[Startup procedure]
Monitor/test screen → (A-slaves) No. of Input Output Channels

[Setting screen]

REMARK

Refer to Section 3.4.2 (20) for details of the setting items.

5.5.15 (B-slaves) Number of I/O Points

[Purpose of setting]

Used to monitor the I/O input and output points and analog input and output points of each (B-slaves) slave number.

[Startup procedure]

Monitor/test screen → (B-slaves) No. of Input Output Channels

[Setting screen]

REMARK

Refer to Section 3.4.2 (20) for details of the setting items.

5.5.16 (A-slaves) Input Data of Slave Addr. From 1A-31A

[Purpose of setting]

Used to monitor the input data of each (A-slaves) slave.

[Startup procedure]

Monitor/test screen → (A-slaves) Slave Addr. From 1A-31A
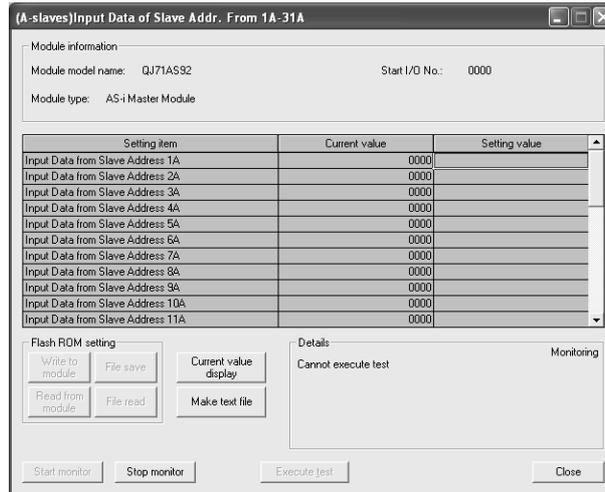
[Setting screen]

REMARK

Refer to Section 3.4.2 (1), (2) for details of the setting items.

5.5.17 (B-slaves) Input Data of Slave Addr. From 1B-31B

[Purpose of setting]

Used to monitor the input data of each (B-slaves) slave.

[Startup procedure]

Monitor/test screen → (B-slaves) Slave Addr. From 1B-31B
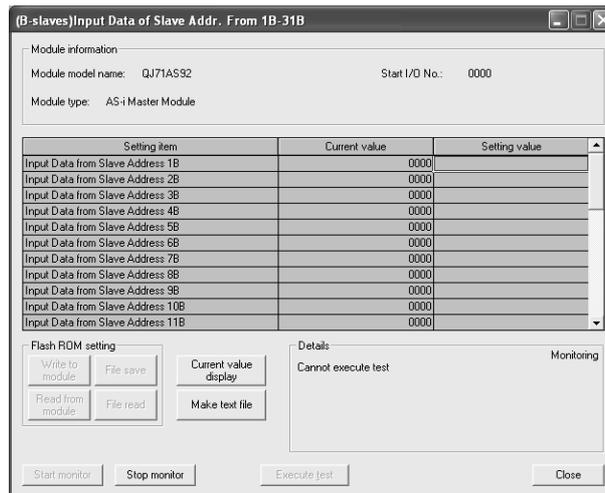
[Setting screen]

REMARK

Refer to Section 3.4.2 (3) for details of the setting items.

5.5.18 (A-slaves) Output Data of Slave Addr. From 1A-31A

[Purpose of setting]

Used to monitor the output data of each (A-slaves) slave.

[Startup procedure]

Monitor/test screen → (A-slaves) Slave Addr. From 1A-31A
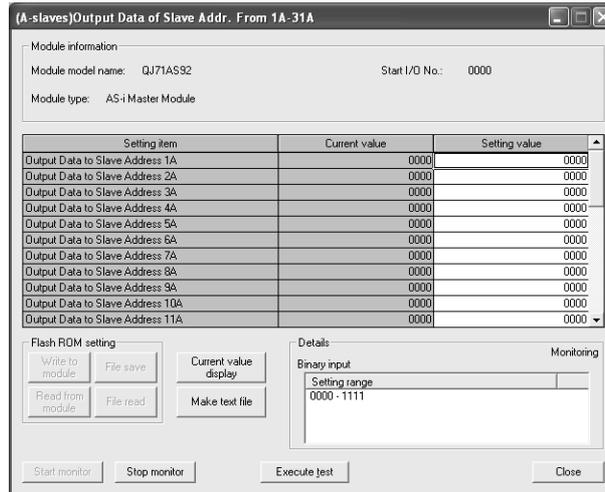
[Setting screen]

REMARK

Refer to Section 3.4.2 (10), (11) for details of the setting items.

5.5.19 (B-slaves) Output Data of Slave Addr. From 1B-31B

[Purpose of setting]

Used to monitor the output data of each (B-slaves) slave.

[Startup procedure]

Monitor/test screen → (B-slaves) Slave Addr. From 1B-31B
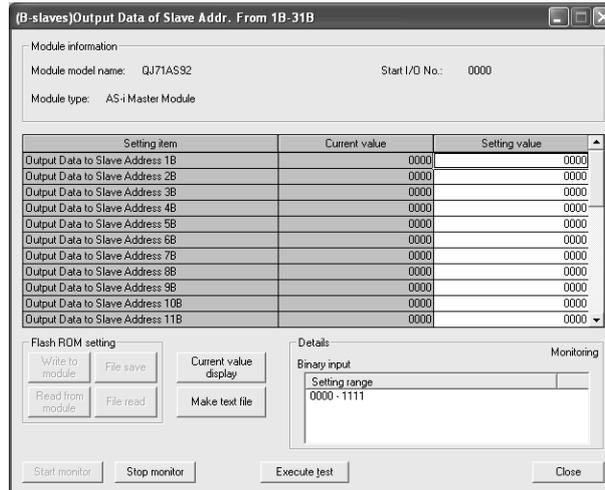
[Setting screen]

REMARK

Refer to Section 3.4.2 (12), (13) for details of the setting items.

5.5.20 Analog Input Data

[Purpose of setting]

Used to monitor the analog input data of channels 1 to 4 of each slave number.

[Startup procedure]

Monitor/test screen → | Analog Input Data |

[Setting screen]
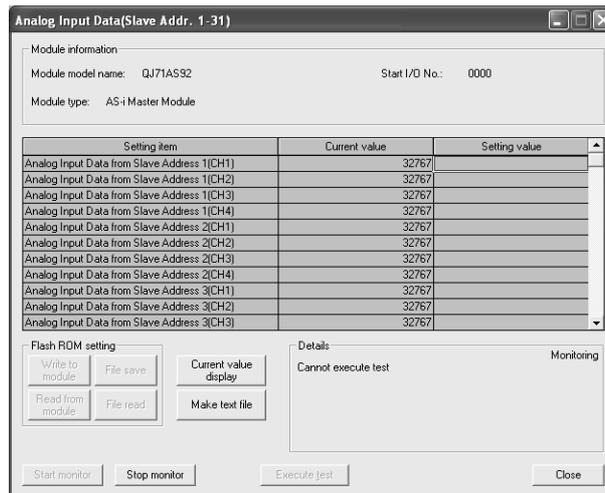
REMARK

Refer to Section 3.4.2 (19) for details of the setting items.

5.5.21 Analog Output Data

[Purpose of setting]
Used to monitor the analog output data of channels 1 to 4 of each slave number.

[Startup procedure]
Monitor/test screen → | Analog Output Data |

[Setting screen]
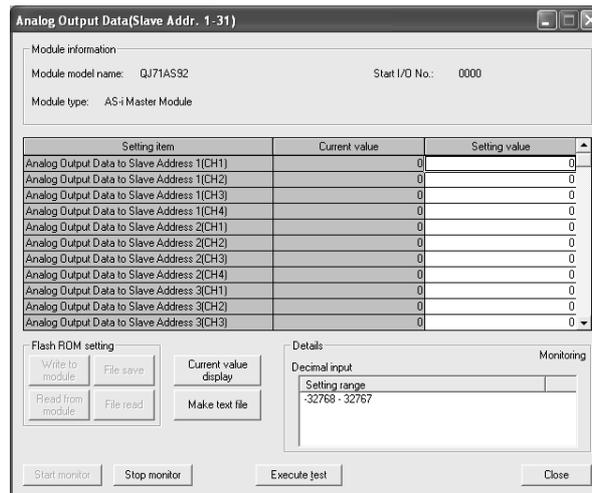
REMARK

Refer to Section 3.4.2 (19) for details of the setting items.

5.6 Command Request / Command Result

[Purpose of setting]

Used to request a command from the QJ71AS92.

[Startup procedure]

Monitor/test screen → | Extended Command Buffer <Request(Data)> |

[Setting screen]
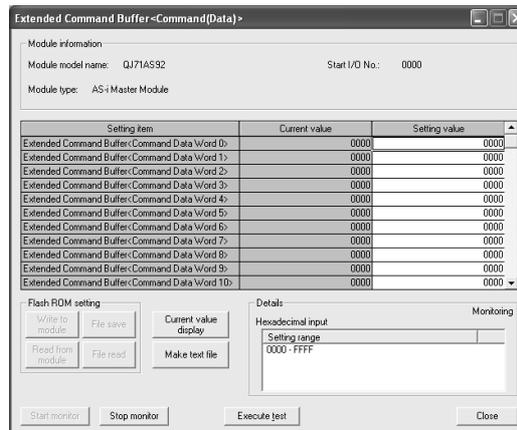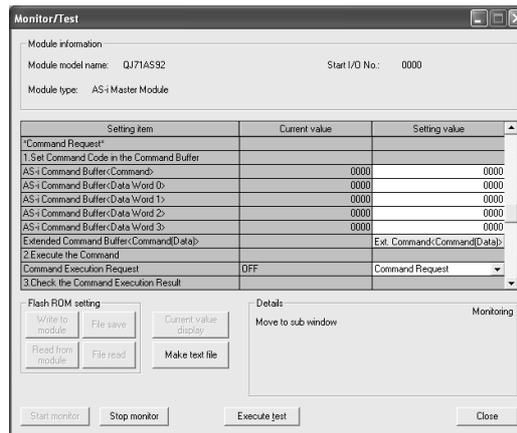
[Operation procedure]

(1) Set the request code to the command buffer

Set the request code in the setting value field of "AS-i Command Buffer <Request(Command)>". Also make settings in the data words 0 to 3 according to the request code.

Perform a selection test to write the set values to the buffer.

* For the slave parameter write command, open the "Extended Command Buffer <Request(Data)>" sub screen and set the data to be written.

(2) Execute the command

Choose "Command Request" in the setting value field of "Command Request" and perform a selection test to execute the command.

Command execution is completed on completion of the selection test.

[Purpose of setting]
Used to display the result in response to the command request.

[Startup procedure]
Monitor/test screen → | Command Buffer <Result> |

[Setting screen]
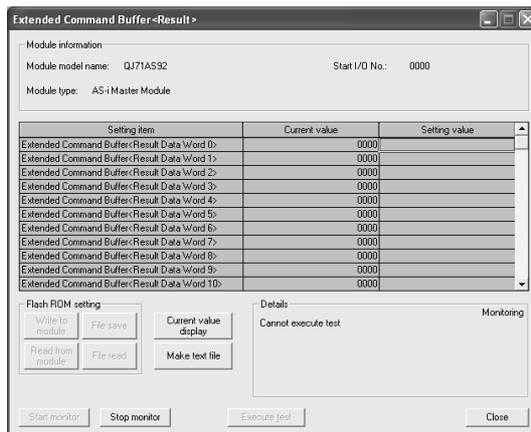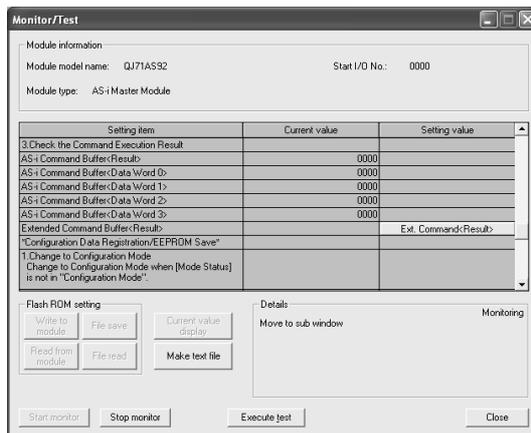
[Operation procedure]

(1) Check the command execution result.
Check the execution result in the setting value fields of AS-i Command Buffer <Result> and <Data Word 0 to 3>.
* For the slave parameter read command, open the "Extended Command Buffer <Request(Data)>" sub screen and check the read data.

5.7 Configuration Data Registration/EEPROM Storage

[Purpose of setting]

Used to register the configuration and Storage the data onto the EEPROM.

[Startup procedure]

Monitor/test screen → Configuration Data Registration/EEPROM Storage

[Setting screen]
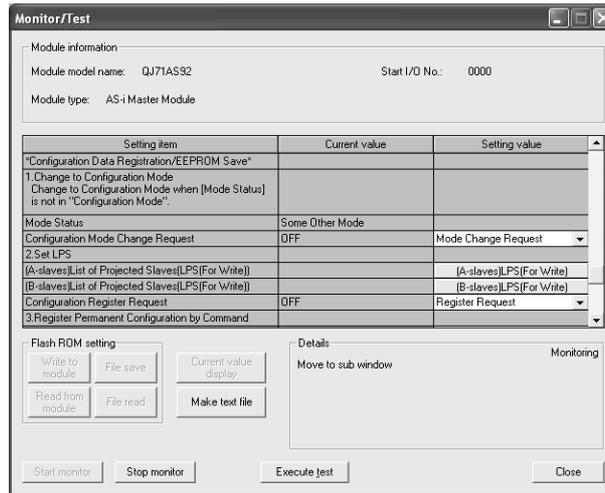
[Operation procedure]

(1)   Switch to the configuration mode.
Choose "Mode Change Request" in the setting value field of "Configuration Mode Change Request" and execute a selection test to switch to the configuration mode.

(2)   Set the LPS.
Open the "(A System) Projected Slave List (LPS (For Write))" or "(B System) Projected Slave List (LPS (For Write))" sub screen and make settings. (Refer to Section 3.4.2 (14).)
Choose "Register Request " in the setting value field of "Configuration Register Request" and execute a selection test.

(3)   Register the permanent configuration using the commands
The minimum configuration to execute the commands for registering the permanent configuration is provided.
(Since the data word to be used is only 0, there are no data word 1 to 3 items.)
<Used request codes>
201H: For batch-registration of whole configuration, 141H to 17FH: For partial registration.
Check the command execution result in "AS-i Command Buffer <Result>". If any error is found, take corrective action in accordance with the error code.
Refer to "Section 3.5.1 Command Buffer <Request> List" for command details.

(4)   Switch to the protected operation mode.
        Perform operation to return from the configuration mode selected in (1) to the
        protected operation mode. Choose "Mode Change Request" in the setting value
        field of "Protected Operation Mode Change Request" and execute a selection
        test to return to the protected operation mode.
        Check the mode change request result in "Mode Change Request Result
        (Current Error Code)". If any error is found, take corrective action in accordance
        with the error code.

(5) Storage the configuration data onto the EEPROM.

   1)   Choose "Write Request" in the setting value field of "Turn OFF the
          EEPROM Write Request" and execute a selection test to make a EEPROM
          write request.
   2)   Confirm that EEPROM write is complete.
          Making a write request changes the indication in the setting value field of
          "EEPROM Write Request " as indicated below.
          At normal completion: "Not yet written" → "Writing" → "Write completed"
          At abnormal completion: "Not yet written" → "Writing" → "Write Failed"
          *If the write time is short, "Writing" does not appear.
          If "Write Failed" has occurred, scroll the screen, check the error codes in
          "Current Error Code" and "Error Code History 1-5", and take corrective
          action according to the error codes.
   3)   Choose "OFF" in the setting value field of "Turn OFF the EEPROM Write
          Request" and execute a selection test to turn OFF the EEPROM write
          request.

5.7.1 Setting the Configuration Data (LPS)

[Purpose of setting]

Used to make the following setting when performing configuration registration and Storage onto EEPROM.
- (A-slaves) List of Projected Slaves(LPS (For Write))
- (B-slaves) List of Projected Slaves(LPS (For Write))

[Startup procedure]

Monitor/test screen → (A-slaves) LPS (For Write) / (B-slaves) LPS (For Write)

[Setting screen]

[Operation procedure]

(1)   Set the (A-slaves) protected slave list (LPS (for write)).
      Set/monitor the slave numbers you want to register in the (A-slaves) LPS.

(2)   Set the (B-slaves) protected slave list (LPS (for write)).
      Set/monitor the slave numbers you want to register in the (B-slaves) LPS.

REMARK

Refer to Section 3.4.2 (14) for details of the setting items.

6 TRANSMISSION DELAY TIME

This chapter describes the transmission delay times of the QJ71AS92.

6.1 AS-i cycle time

(1) AS-i Ver. 2.04-compatible I/O slaves
AS-i cycle time = 171μs x (number of communicating slaves + 2)

(2) AS-i Ver. 2.11-compatible I/O slaves
(a) Cycle time for the slaves that use the same address in group A and B
AS-i cycle time = {171μs x (number of communicating slaves + 2)} x 2
(b) Cycle time for the slaves that use different addresses in group A and B is the same as described in (1).

(3) Analog slaves
AS-i cycle time = {171μs x (number of communicating slaves + 2)} x 7 x (number of channels)

TIP

Count the number of communicating slaves as described below.
AS-i Ver. 2.04-compatible I/O slaves and analog slaves:
• Count the number of connected slaves.
AS-i Ver. 2.11-compatible I/O slaves:
• When the slaves in group A and B use the same slave address, count the slaves of the same slave address as 1.
• When the slaves in group A and B use different slave addresses, count the number of connected slaves.

Example) When slaves are connected as shown below

6.2 Input Transmission Delay

(1) When importing the input signal by using the FROM/MOV instruction or the auto refresh setting of the utility package

Normal value =
(AS-i cycle time x 1) + (sequence scan x 0.5) + slave input delay

Maximum value =
(AS-i cycle time x 2) + (sequence scan x 1) + slave input delay

6.3 Output Transmission Delay

(1) When sending the output signal by using the TO/MOV instruction

Normal value = (AS-i cycle time x 1) + slave output delay

Maximum value = (AS-i cycle time x 2) + slave output delay

(2) When using the auto refresh setting of the utility package

Normal value =
(AS-i cycle time x 1) + (sequence scan x 0.5) + slave output delay

Maximum value =
(AS-i cycle time x 2) + (sequence scan x 1) + slave output delay

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7 PROGRAMMING

7.1 I/O Slave

This section explains the programs for I/O data communication between the QJ71AS92 and I/O slaves.
The system configuration example in (1) shows how the programs perform when the utility package is used and when it is not used.

(1) System Configuration

The QJ71AS92 is mounted on slot 0 of the main base unit.

Power supply	QCPU	QJ71 AS92 X/Y 0 to 1F	to	Input module X 50 to 5F	to	Output module Y 90 to 9F

AS-i cable

AS-i power supply

Slave addresses 4

Slave addresses 5

Slave addresses 4   CPU module   Slave addresses 5   CPU module
Output 4 points   ← X50 to X53   Output 4 points   → Y94 to Y97
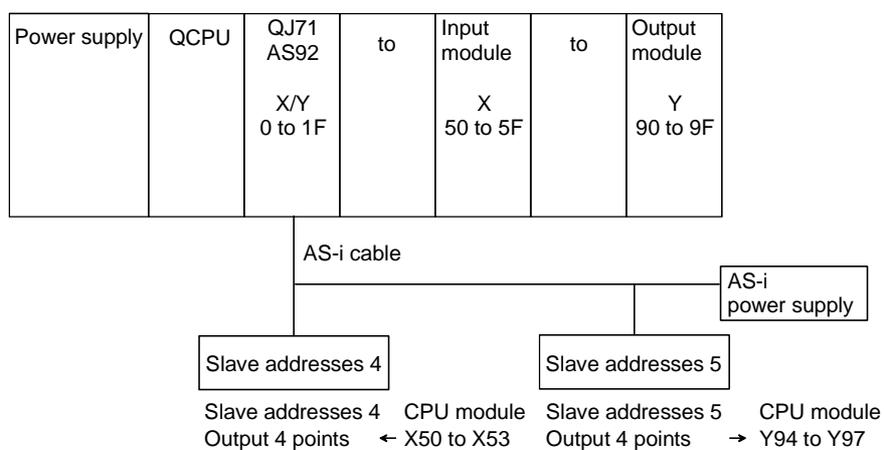
(2) Operations

The following operations are performed in the above system.
(a)   The inputs X50 to X53 of the CPU module are output to the output data of the slave address 4.
(b)   The input data of the slave address 5 is output to the outputs Y94 to Y97 of the CPU module.

REMARK

If a configuration error occurs, I/O control is executed for the slaves are ready for communication.

7.1.1 Program example when utility package is used

(1) Operation of utility package

    (a) Auto refresh setting (See Section 5.4)

        Set the (A-slaves) active slave list, the input data from (A-slaves) slave address 4A to 31A, and the output data to (A-slaves) slave address 4A to 31A.

Auto refresh setting

Module information
Module model name: QJ71AS92 Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
Current Error Code,Error Code History 1-5	6	6	0	->	
[A-slaves]List of Detected Slaves(LDS)	2	2	0	->	
[B-slaves]List of Detected Slaves(LDS)	2	2	0	->	
[A-slaves]List of Active Slaves(LAS)	2	2	0	->	D100
[B-slaves]List of Active Slaves(LAS)	2	2	0	->	
[A-slaves]List of Projected Slaves (LPS(For Read))	2	2	0	->	
[B-slaves]List of Projected Slaves (LPS(For Read))	2	2	0	->	
[A-slaves]List of slaves that differ from settings	2	2	0	->	
[B-slaves]List of slaves that differ from settings	2	2	0	->	

Make text file   End setup   Cancel

(a)-1
• The (A-slaves) active slave list (LAS) is transferred to D100 and D101 of the CPU module.

Auto refresh setting

Module information
Module model name: QJ71AS92 Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
[A-slaves]Input Data of Slave Addr. From 1A-3A and a part of EC Flag	1	1	0	->	M0
[A-slaves]Input Data of Slave Addr. From 4A-31A	7	1	0	->	D200
[B-slaves]Input Data of Slave Addr. From 1B-31B	8	8	0	->	
[A-slaves]Output Data of Slave Addr. From 1A-31A	8	1	1	<-	D300
[B-slaves]Output Data of Slave Addr. From 1B-31B	8	8	0	<-	
Analog Input Data(Slave Addr. 1-31)	124	124	0	->	
Analog Output Data(Slave Addr. 1-31)	124	124	0	<-	
Command Buffer<Command>	1	1	0	<-	

Make text file   End setup   Cancel

(a)-2
• The input data from (A-slaves) slave address 4A - 7A are transferred to D200 of the CPU module.
• D300 of the CPU module is transferred to the output data to (A-slaves) slave address 4A - 7A.
(To transfer the output data of the slave address 5, one word of the module side buffer memory addresses are offset by module side buffer offset.)

    (b) Write of intelligent function module parameters (See section 5.3.3)

        Write the intelligent function module parameters to the CPU module.

        Perform this operation on the parameter setting module screen.

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(2) Program Examples

```
   X0                                                      (Y1D  )    Turns ON refresh command.
   ┤├

   X0   X5   X6   X7   M0                          [MOV  D200  K2Y90 ]   Outputs input data of slave No. 5
   ┤├   ┤/├  ┤/├  ┤/├  ┤/├                                               to Y94 to Y97.

   X0   X5   X6   X7   M0                          [MOV  K1X50  D300 ]   Outputs X50 to X53 to slave No. 4.
   ┤├   ┤/├  ┤/├  ┤/├  ┤/├

   X0   X5   X6   X7   M0                          [MOV  K0    D300 ]   Stops output to slave if slave No. 4
   ┤├   ┤/├  ┤/├  ┤/├  ┤├                                               cannot communicate.
```
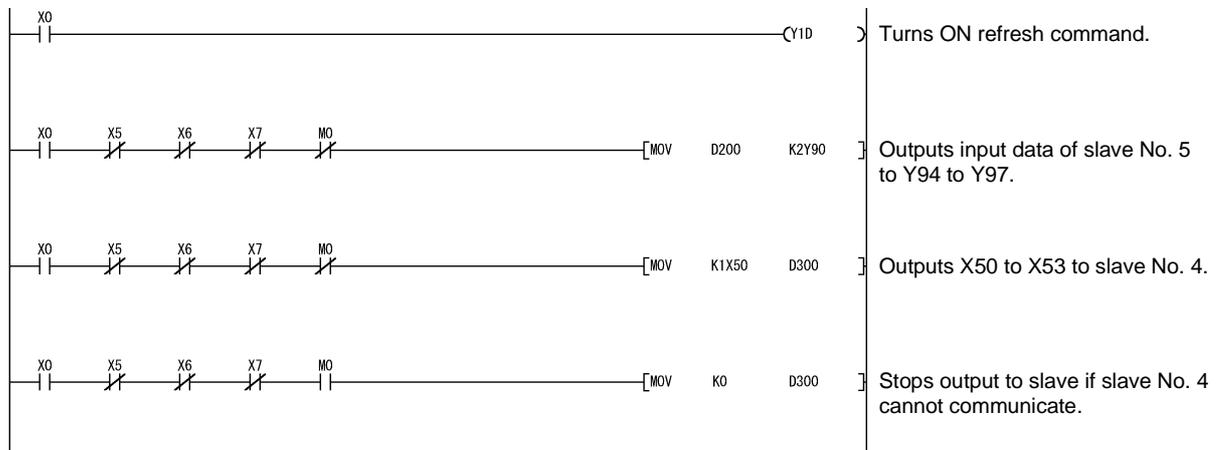
Explanation of devices

X0	: Unit READY (ON when normal)
X5	: AS-i power failure (OFF when normal)
X6	: Normal operation check (OFF when in normal operation)
X7	: Configuration mode (OFF except when in configuration mode)
D200	: Input data from slave address 4 to 7 (Input data of slave address 4 is in bits 0 to 3)
D300	: Output data to slave address 4 to 7 (Output data of slave address 5 is in bits 4 to 7)
M0	: Configuration error flag

7.1.2 Program example when utility package is not used
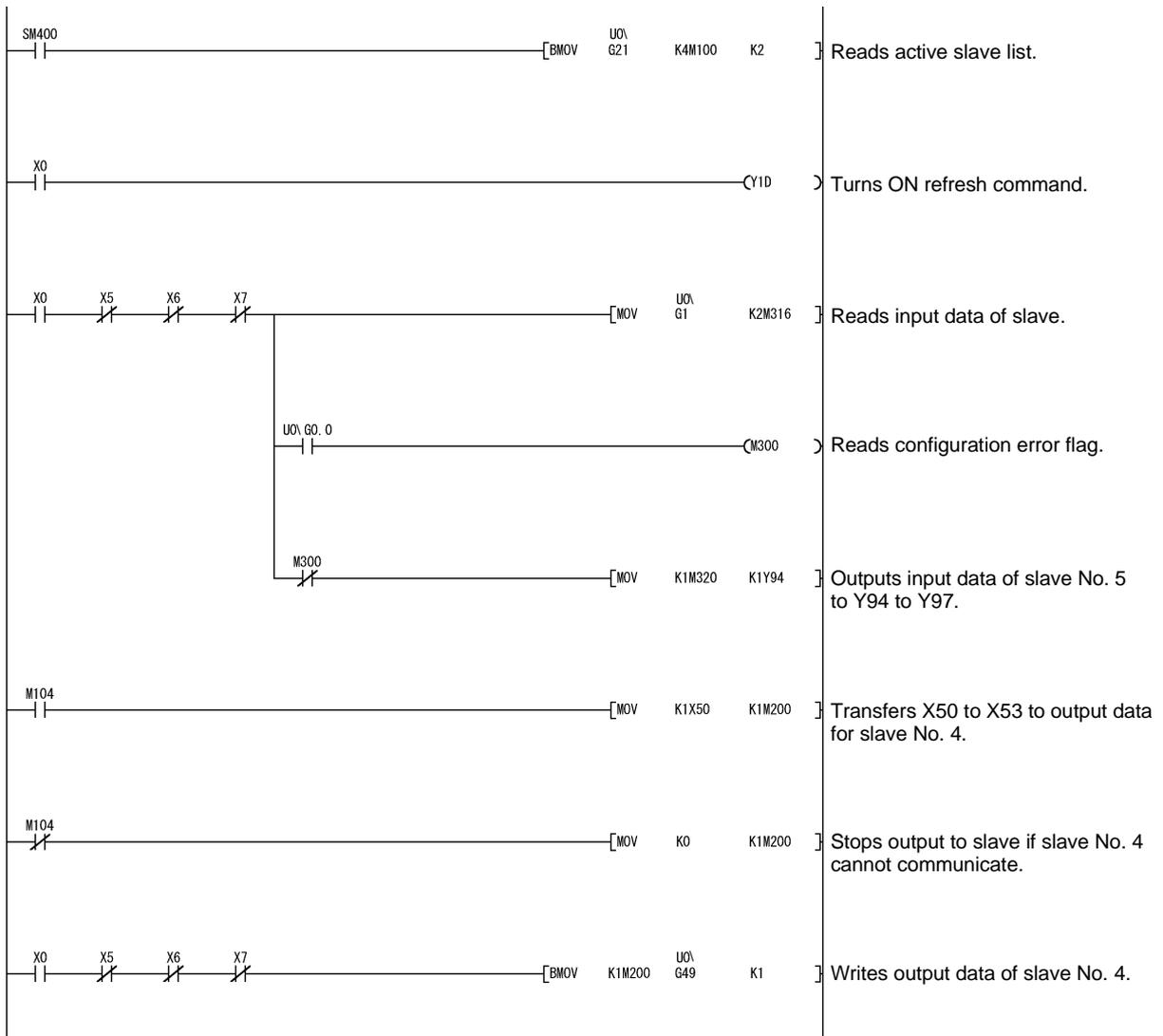
(1) Program Examples

```
SM400                                          U0\
 |├|——————————————————————————————[BMOV  G21    K4M100   K2 ]    Reads active slave list.


X0
 |├|———————————————————————————————————————————————( Y1D )       Turns ON refresh command.


X0    X5    X6    X7                            U0\
 |├|——|/|——|/|——|/|—┬—————————————————————[MOV   G1     K2M316 ]  Reads input data of slave.
                    │
                    │   U0\G0.0
                    ├——|├|——————————————————————————————( M300 )  Reads configuration error flag.
                    │
                    │   M300
                    └——|/|———————————————————[MOV   K1M320   K1Y94 ]  Outputs input data of slave No. 5
                                                                      to Y94 to Y97.

M104
 |├|——————————————————————————————————————[MOV   K1X50    K1M200 ]  Transfers X50 to X53 to output data
                                                                    for slave No. 4.

M104
 |/|——————————————————————————————————————[MOV   K0       K1M200 ]  Stops output to slave if slave No. 4
                                                                    cannot communicate.

X0    X5    X6    X7                                        U0\
 |├|——|/|——|/|——|/|———————————————————————[BMOV  K1M200   G49     K1 ]  Writes output data of slave No. 4.
```

Explanation of devices

X0	: Unit READY (ON when normal)
X5	: AS-i power failure (OFF when normal)
X6	: Normal operation check (OFF when in normal operation)
X7	: Configuration mode (OFF except when in configuration mode)
M104	: ON when slave address 4 is ready for communication
M200 to M203	: Output data to slave address 4
M300	: Configuration error flag
M320 to M323	: Input data from slave address 5

7.2 Analog Slave

This section explains the programs for I/O data communication between the QJ71AS92 and I/O slaves.

The system configuration example in (1) shows how the programs perform when the utility package is used and when it is not used.

(1) System Configuration

The QJ71AS92 is mounted on slot 0 of the main base unit.

Power supply	QCPU	QJ71 AS92 X/Y 0 to 1F	

AS-i cable

AS-i power supply

Slave addresses 1

Slave addresses 2

Slave addresses 1   CPU module   Slave addresses 2   CPU module
Output 2 points   → D200, D201   Output 2 points   ← D0, D1
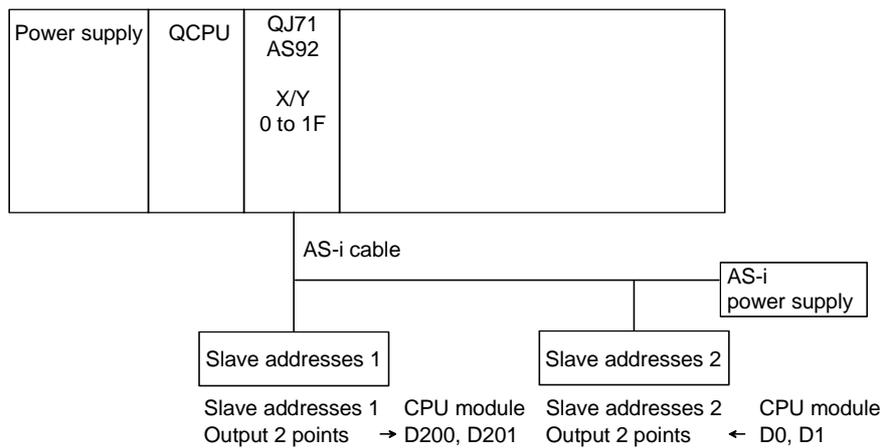
(2) Operations

The following operations are performed in the above system.

(a)   D400 and D401 of the CPU module are output to the analog output data of the slave address 2.

(b)   The analog input data of the slave address 1 is stored into D200 and D201 of the CPU module.

REMARK

If a configuration error occurs, I/O control is executed for the slaves that are ready for communication.

7.2.1 Program example when utility package is used

(1) Operation of utility package

(a) Auto refresh setting (See Section 5.4)

Set the (A-slaves) active slave list, the number of (A-slaves) I/O channels, the analog input data, and the analog output data.

Auto refresh setting

Module information
Module model name: QJ71AS92 Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
Current Error Code,Error Code History 1-5	6	6	0	->	
[A-slaves]List of Detected Slaves(LDS)	2	2	0	->	
[B-slaves]List of Detected Slaves(LDS)	2	2	0	->	
[A-slaves]List of Active Slaves(LAS)	2	2	0	->	D300
[B-slaves]List of Active Slaves(LAS)	2	2	0	->	
[A-slaves]List of Projected Slaves (LPS(For Read))	2	2	0	->	
[B-slaves]List of Projected Slaves (LPS(For Read))	2	2	0	->	
[A-slaves]List of slaves that differ from settings	2	2	0	->	
[B-slaves]List of slaves that differ from settings	2	2	0	->	

Make text file   End setup   Cancel

(a)-1
• The (A-slaves) active slave list (LAS) is transferred to D300 and D301 of the CPU module.

Auto refresh setting

Module information
Module model name: QJ71AS92 Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
[A-slaves]Error Slave List	2	2	0	->	
[B-slaves]Error Slave List	2	2	0	->	
[A-slaves]List of Peripheral Faults(LPF)	2	2	0	->	
[B-slaves]List of Peripheral Faults(LPF)	2	2	0	->	
[A-slaves]Number of I/O Points (Slave Addr. 1A-31A)	31	2	0	->	D100
[B-slaves]Number of I/O Points (Slave Addr. 1B-31B)	31	31	0	->	
EC Flag	1	1	0	->	
[A-slaves]Input Data of Slave Addr. From 1A-3A and a part of EC Flag	1	1	0	->	
[A-slaves]Input Data of Slave Addr. From	7	7	0	->	

Make text file   End setup   Cancel

(a)-2
• The number of (A-slaves) I/O points is transferred to D100 and D101 of the CPU module.

Auto refresh setting

Module information
Module model name: QJ71AS92 Start I/O No.: 0000
Module type: AS-i Master Module

Setting item	Module side Buffer size	Module side Transfer word count	Module side Buffer offset	Transfer direction	PLC side Device
[A-slaves]Output Data of Slave Addr. From 1A-31A	8	8	0	<-	
[B-slaves]Output Data of Slave Addr. From 1B-31B	8	8	0	<-	
Analog Input Data(Slave Addr. 1-31)	124	2	0	->	D200
Analog Output Data(Slave Addr. 1-31)	124	2	0	<-	D4
Command Buffer<Command>	1	1	0	<-	
Command Buffer <Request(Data Word 0-3 (Command Argument)]>	4	4	0	<-	
Extended Command Buffer<Command|Data>	110	110	0	<-	
Command Buffer<Result>	5	5	0	->	

Make text file   End setup   Cancel

(a)-3
• The analog input data is transferred to D200 and D201 of the CPU module.
• D4 and D5 of the CPU module are transferred to the analog output data. (To transfer the analog output data of the slave address 2, four words of the module side buffer memory addresses are offset by module side buffer offset.)

(b) Write of intelligent function module parameters (See Section 5.3.3)

Write the intelligent function module parameters to the CPU module.

Perform this operation on the parameter setting module screen.

(2)　Program Examples
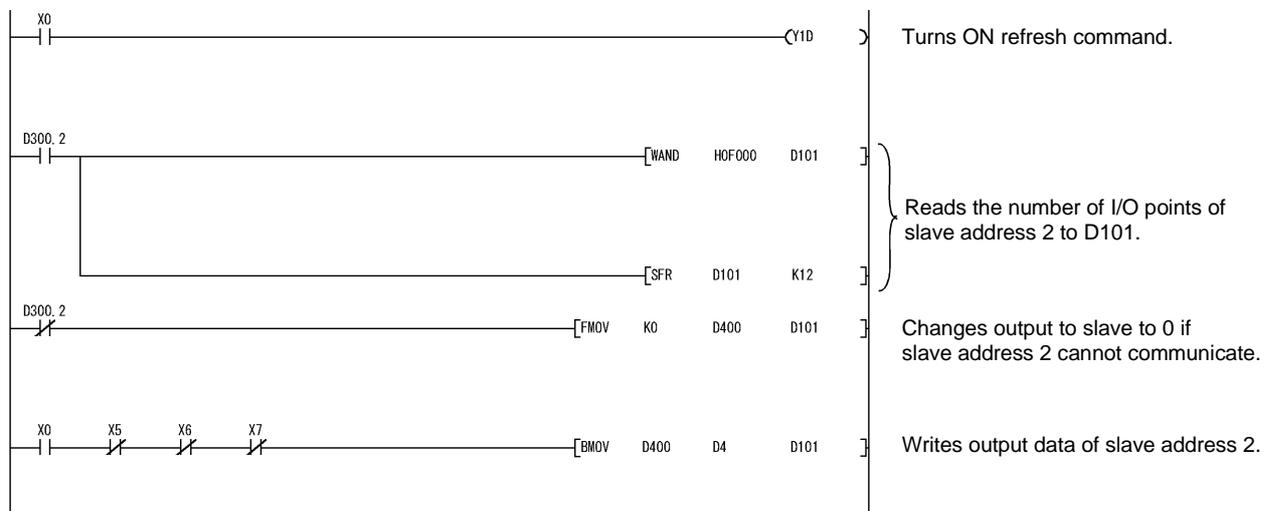
```
  X0
──┤├──────────────────────────────────────────────────────────────(Y1D  )      Turns ON refresh command.


  D300.2
──┤├───┬──────────────────────────────────[WAND   H0F000   D101 ]  ⎫
       │                                                            ⎪   Reads the number of I/O points of
       │                                                            ⎬   slave address 2 to D101.
       └──────────────────────────────────[SFR    D101     K12  ]  ⎭

  D300.2
──┤╱├──────────────────────────────────────[FMOV   K0       D400    D101 ]   Changes output to slave to 0 if
                                                                             slave address 2 cannot communicate.

  X0    X5    X6    X7
──┤├──┤╱├──┤╱├──┤╱├─────────────────────────[BMOV   D400     D4      D101 ]   Writes output data of slave address 2.
```

Explanation of devices

X0	: Unit READY (ON when normal)
X5	: AS-i power failure (OFF when normal)
X6	: Normal operation check (OFF when in normal operation)
X7	: Configuration mode (OFF except when in configuration mode)
D101	: Number of analog output points from slave address 2
D302.2	: ON when slave address 2 is ready for communication
D400, D401	: Data output to slave address 2
D4, D5	: Output of slave address 2 and automatically refreshed data

7.2.2 Program example when utility package is not used
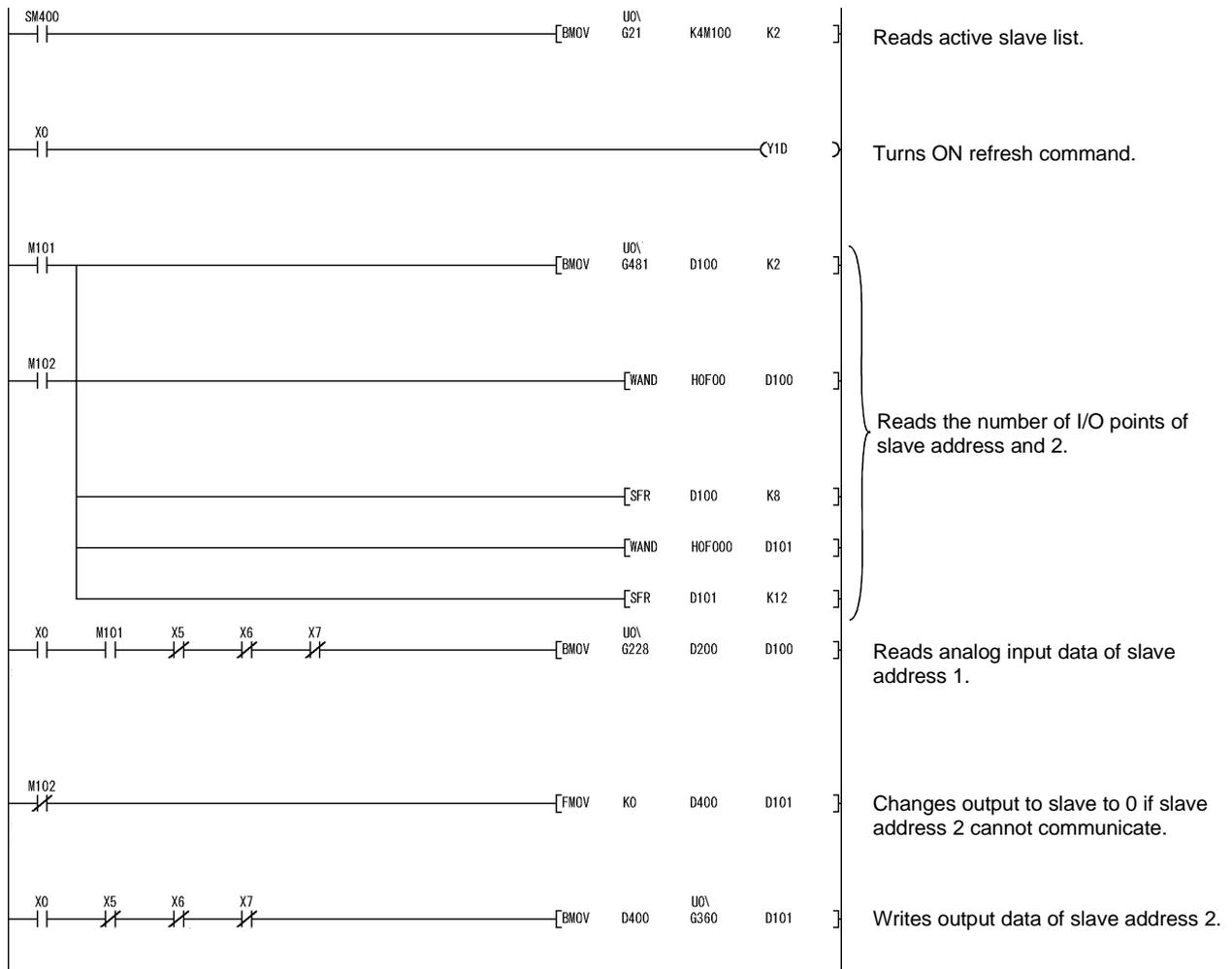
(1) Program Examples

Rung	Comment
SM400 —[BMOV U0\G21 K4M100 K2]	Reads active slave list.
X0 —(Y1D)	Turns ON refresh command.
M101 —[BMOV U0\G481 D100 K2]	Reads the number of I/O points of slave address and 2.
M102 —[WAND H0F00 D100]	
—[SFR D100 K8]	
—[WAND H0F000 D101]	
—[SFR D101 K12]	
X0 M101 X5 X6 X7 —[BMOV U0\G228 D200 D100]	Reads analog input data of slave address 1.
M102 —[FMOV K0 D400 D101]	Changes output to slave to 0 if slave address 2 cannot communicate.
X0 X5 X6 X7 —[BMOV D400 U0\G360 D101]	Writes output data of slave address 2.

Explanation of devices

Device	Description
X0	: Unit READY (ON when normal)
X5	: AS-i power failure (OFF when normal)
X6	: Normal operation check (OFF when in normal operation)
X7	: Configuration mode (OFF except when in configuration mode)
M101	: ON when slave address 1 is ready for communication
M102	: ON when slave address 2 is ready for communication
D100	: Number of analog input points from slave address 1
D101	: Number of analog output points from slave address 2
D200, D201	: Analog input data from slave address 1
D400, D401	: Analog output data to slave address 2

8 TROUBLESHOOTING

The chapter describes the troubleshooting methods to be taken when a fault occurs in the QJ71AS92.

8.1 Checking Items at Error Occurrence

First check the QJ71AS92 as follows.

(1)   Check "RUN" and "U ASI" LED.
  • If "RUN" LED of QJ71AS92 is off, check whether the power supply is supplied to PLC.
  • If "U ASI" LED is off, check the current rating of AS-i power supply, wiring.

(2)   Check "ERR." LED.
  • If the "ERR." LED of the QJ71AS92 is on, check the slave status and wiring.
  • Check the error code at the buffer memory address C0H and take corrective action.
    See Section 8.3 for the error codes.

(3)   Check the External power supply for slave.
  If this power supply capacity is not enough or miss-wiring is, the slave will not normally operate.

(4)   Check total slave number of slaves.
  • The total number of slaves should be calculated according to the expression in Section 3.1.
  • Check for overlapping slave addresses.

(5)   Check whether slaves are configured as intended.
  • Check whether the slave are correctly connected.
  • Check the slave list that differs from the settings (buffer memory addresses: 1DH to 20H) and reexamine the corresponding slave.

(6)   Check total extension distance
  • The total extension distance must not exceed 100m. However, when the repeater is used, it is possible to extend the distance by 100m per repeater. A maximum of two repeaters can be used in series.

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8.2 Error Checking

Check the following items, if QJ71AS92 does not seem to operate normally.

8.2.1 LED check

Check LED statuses of the QJ71AS92 as follows.

(1) Check the status of the "RUN" LED status

Status	Details
Lit.	The power supply of PLC is on.
Off	Check whether the power supply of PLC is on. Check that the RESET switch of the CPU module is not in the RESET position.

(2) Check the status of the "U SAI" LED.

Status	Details
Lit.	AS-i power supply is normal.
Off	Check the wiring and capacity about AS-i power supply.

(3) Check the status of the "ERR." LED.

Status	Details
Lit.	Existing slave was lost or response was lost from slave, so that the mismatch occurred in LPS and LDS. Check the following points.
Off	Slave configuration is normal.

- Check the error code (buffer memory address: C0H or "CODE" LED situated at the front panel of the QJ71AS92) and the slave list that differs from the settings(buffer memory addresses: 1DH to 20H), and reexamine the corresponding slave.
- Check the slave status. See the slave manual for the method to check the status. If the slave is damaged, change that slave.
- Check the slave wiring. If the wiring is broken, replace the cable.
- Check whether the new slave is the same product that as the slave that has failed. If the slave is a different product, replace it with the same product. To use the different product, register the slave again.
- Check the slave address of the slave. If the same slave address is already used, all the slaves of that slave address cannot be recognized. Change the slave address into an unused slave address.
- Check that the AS-i power supply located behind the repeater has not failed. Refer to the AS-i power supply manual for the checking method. Replace the AS-i power supply if it has failed.
- Check that the repeater has not failed. See the repeater manual for the checking method. Change the repeater if it has failed.

> **TIP**
>
> If there are two slaves that have the same I/O and ID codes and the same slave address, both slaves will operate with the same slave address or both will become faulty.

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8.3 Error Code List

When an error is detected, the QJ71AS92 turns the ERR. LED on and displays the status on the CODE LED with any of the following numbers.
At error occurrence, the error code is also stored into "Error Code, Error History" (buffer memory addresses C0H to C5H: Un\G192 to Un\G197) of the buffer memory.

Number			Detail
Error Code	"CODE" LED		
39H	39		A configuration error has not occurred.
40H	40		The QJ71AS92 is in the offline phase.
41H	41		The QJ71AS92 is in the detection phase.
42H	42		The QJ71AS92 is in the activation phase.
43H	(0 to 31) *1		A configuration data mismatch occurs in the configuration mode.
A00H to A1FH	0 to 31 *2	A LED ON	Communication with the slave of the corresponding slave address in group A cannot be performed in the protected operation mode.
B00H to B1FH		B LED ON	Communication with the slave of the corresponding slave address in group B cannot be made in the protected operation mode.
C00H to C1FH		A/B LED ON or OFF	Communication with the non-grouped slave of the corresponding slave address cannot be performed in the protected operation mode. (AS-i Ver. 2.04-compatible slave, analog slave)
E51H	51		Internal error: Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
E52H	52		
E53H	53		
E80H	80		The slave address 0 was recognized. The QJ71AS92 cannot end the configuration mode.
E81H	81		A general error occurred during a slave address change.
E82H	82		The QJ71AS92 has been set in the switch operation disabled status from the CPU module.
E90H	90		An error occurred during slave address change. The slave of the slave address 0 does not exist.
E91H	91		An error occurred during slave address change. The assigned slave address has already been used.
E92H	92		An error occurred during slave address change. A new slave address cannot be set.
E93H	93		An error occurred during slave address change. The new slave address can be stored into only the nonvolatile memory of the slave.
E94H	94		An error occurred during slave address change in the protected operation mode. The configuration information of the slave is in error.
E95H	95		An error occurred during slave address change in the protected operation mode. The slave address that caused the setting error is the slave used instead of the old slave.
F50H	50		Hardware error: Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
F70H	70		Hardware error: EEPROM write error. Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
F72H	72		Hardware error: Please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.
F73H	73		
F74H	74		EEPROM write error: The processing of write to the EEPROM is performed more than 1000 times during continuous CPU module operation.
-	pg		EEPROM write in execution. (This is rarely displayed since write is completed in a short time.)
-	gd		EEPROM write completed.

*1: Any of No. 0 to 31 is displayed.
*2: Slave address detected in the configuration mode. The error code is not stored.

8.4 Checking the QJ71AS92 status using GX Developer system monitor

By selecting the detailed information of the QJ71AS92 in the system monitor of GX Developer, the error code and LED ON/OFF statuses can be checked.

(1) When using GX Developer Version 7.12N or later
(a) Setting procedure
[Diagnostics] → [System monitor] "Select module"
"Module Detailed Information" → "H/W information"
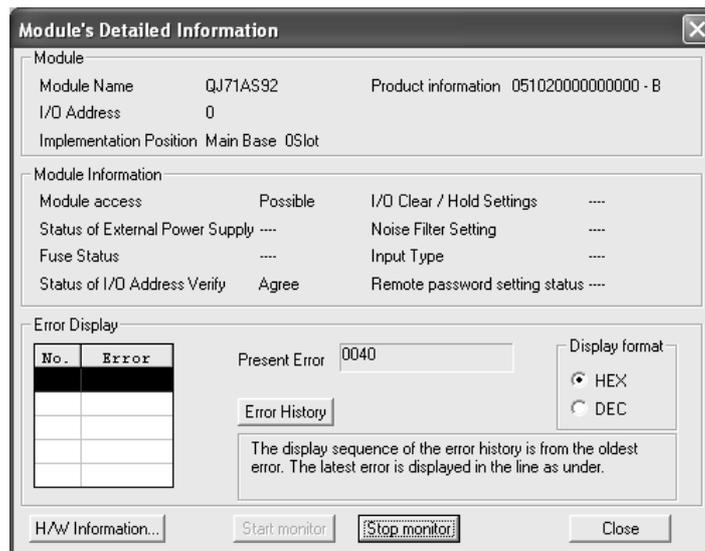
(b) Product information

Function version is displayed as follows:

051020000000000-B

Function version B
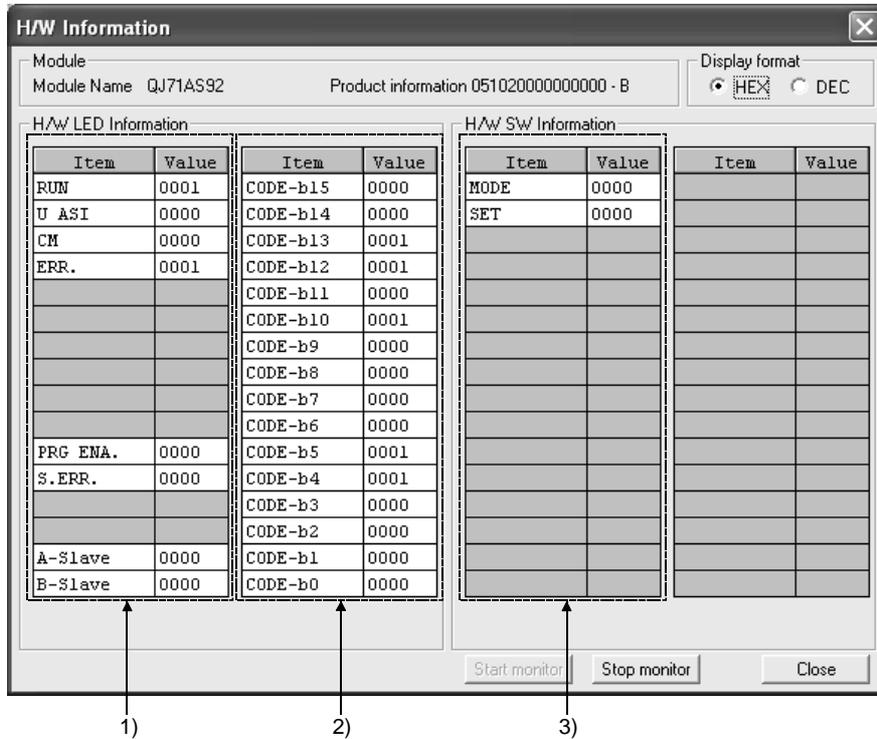
1) H/W LED Information (Left side)

The followings are displayed as H/W LED information.

Item	Details	Status
RUN	ON/OFF status of "RUN" LED	
U ASI	ON/OFF status of "U ASI" LED	
CM	ON/OFF status of "CM" LED	
ERR.	ON/OFF status of "ERR." LED	0: OFF
PRG EMA.	ON/OFF status of "PRG ENA." LED	1: ON
S ERR.	ON/OFF status of "S ERR." LED	
A-Slave	ON/OFF status of "A" LED	
B-Slave	ON/OFF status of "B" LED	

2) H/W LED Information (Right side)

Item	Details		Status
CODE-b15	ON/OFF status of second digit of "CODE" LED	Shows the first 4 bits of the value converted into ASCII character code.	―
CODE-b14			
CODE-b13			
CODE-b12			
CODE-b11		Shows the last 4 bits of the value converted into ASCII character code.	
CODE-b10			
CODE-b9			
CODE-b8			
CODE-b7	ON/OFF status of first digit of "CODE" LED	Shows the first 4 bits of the value converted into ASCII character code.	
CODE-b6			
CODE-b5			
CODE-b4			
CODE-b3		Shows the last 4 bits of the value converted into ASCII character code.	
CODE-b2			
CODE-b1			
CODE-b0			

Display Example:

When [40] appears on the "CODE" LED:

Second digit = [4] = 34H (ASCII character code) = 0011 0100 (bit indication)

First digit = [0] = 30H (ASCII character code) = 0011 0000 (bit indication)

They are displayed as follows.

CODE-b15 to b0 = [40] = (34H) (30H) = 0011 0100 0011 0000

3) H/W SW Information (Left side)

Item	Details	Status
MODE	Position of "MODE" switch	―
SET	Position of "SET" switch	

APPENDIX

Appendix 1 External Dimensions

Unit: mm (in.)

App.
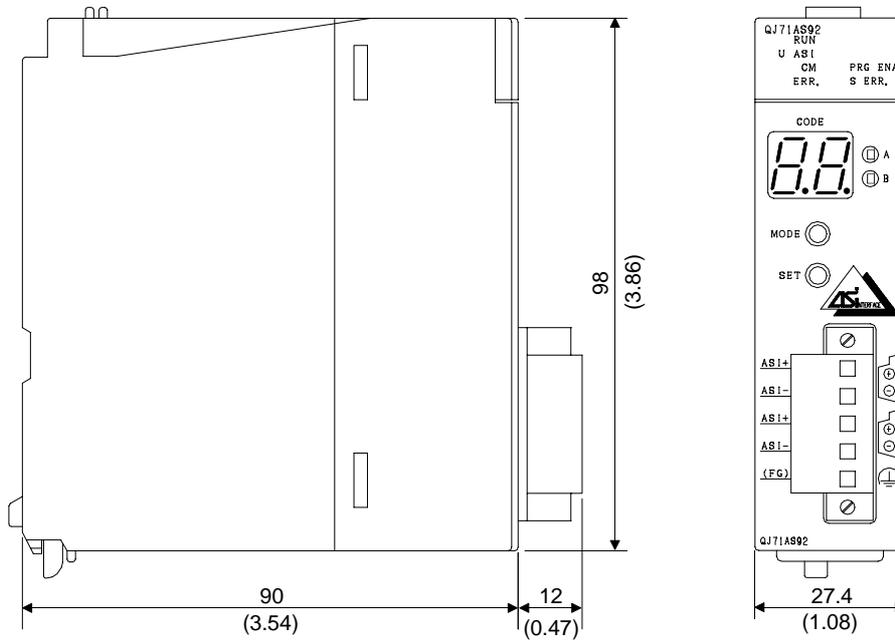
Appendix 2 AS-i Protocol Implementation Conformance Statement (PICS)

List of implemented functions:

No.	List of implemented functions		Mark /Profile	Remark /implemented by
A	Functions or calls at host interface			
1	Image, Status =	Read_IDI()	x	BFM
2	Status =	Write_OD(Image)	x	BFM
3	Status =	Set_Permanent_Parameter(S_Addr, S_Param)	x	CMD
4	S_Param, Status =	Get_Permanent_Parameter(S_Addr)	x	CMD
5	Status, RS_Param =	Write_Parameter(S_Addr, S_Param)	x	CMD
6	Status, S_Param =	Read_Parameter(S_Addr)	x	CMD
7	Status =	Store_Actual_Parameters()	x	CMD
8	Status =	Set_Permanent_Configuration(S_Addr, S_Config)	x	CMD
9	Status, S_Config =	Get_Permanent_Configuration(S_Addr)	x	CMD
10	Status =	Store_Actual_Configuration()	x	CMD
11	Status, S_Config =	Read_Actual_Configuration(S_Addr)	x	CMD
12	Status =	Set_LPS(S_List)	x	BFM
13	Status, S_List=	Get_LPS()	x	BFM
14	Status, S_List=	Get_LAS()	x	BFM
15	Status, S_List=	Get_LDS()	x	BFM
16.0	Status, Flags =	Get_Flags()	x	BFM
16.1	Status, Flag =	Get_Flag_Config_OK()	x	I/O and BFM
16.2	Status, Flag =	Get_Flag_LDS.0()	x	BFM
16.3	Status, Flag =	Get_Flag_Auto_Address_Assign()	x	BFM
16.4	Status, Flag =	Get_Flag_Auto_Prog_Available()	x	BFM
16.5	Status, Flag =	Get_Flag_Configuration_Active()	x	I/O and BFM
16.6	Status, Flag =	Get_Flag_Normal_Operation_Active()	x	I/O and BFM
16.7	Status, Flag =	Get_Flag_APF()	x	I/O and BFM
16.8	Status, Flag =	Get_Flag_Offline_Ready()	x	BFM
16.9	Status, Flag =	Get_Flag_Periphery_OK()	x	BFM
17	Status =	Set_Operation_Mode(Mode)	x	I/O
18	Status =	Set_Offline_Mode(Mode)	x	I/O
19	Status =	Activate_Data_Exchange(Mode)	-	-
20	Status =	Change_Slave_Address(S_Addr1,S_Addr2)	x	CMD
21.1	Status =	Set_Auto_Address_Enable(Mode)	x	I/O
21.2	Mode =	Get_Auto_Address_Enable()	x	I/O
22.1	Status, Resp =	Cmd_Reset_AS-i_Slave(S_Addr, RESET)	-	-
22.2	Status, Resp =	Cmd_Read_IO_Configuration(S_Addr, CONF)	-	-
22.3	Status, Resp =	Cmd_Read_Identification_Code(S_Addr, IDCOD)	-	-
22.4	Status, Resp =	Cmd_Read_Status(S_Addr, STAT)	-	-
22.5	Status, Resp =	Cmd_Read_Reset_Status(S_Addr,STATRES)	-	-
22.6	Status, Resp =	Cmd_Read_Ext_ID-Code_1(S_Addr, IDCOD1)	-	-
22.7	Status, Resp =	Cmd_Read_Ext_ID-Code_2(S_Addr, IDCOD2)	-	-
23	Status, S_List =	Get_List_of_Periphery_Faults()	x	BFM
24	Status =	Write_Extended_ID-Code_1(S_Ext_ID-Code_1)	x	CMD

No.	List of implemented functions	Mark /Profile	Remark /implemented by
B	Integrated support of slave profiles		
1	Analog slave profile S7.3 support integrated	x	BFM
2	Analog slave profile S7.4 support integrated	x	CMD

Key to the symbols for column 3:

sign	meaning
x	implemented
-	not available

Key to the symbols for column 4:

sign	meaning
BFM	implemented by Buffer Memory
CMD	implemented by Command request
I/O	implemented by I/O signal
-	not available

Appendix 3 Differences between QJ71AS92 and A1SJ71AS92

    (1)   The following table indicates the differences in specifications between the QJ71AS92 and A1SJ71AS92.

Item		Specifications	
		QJ71AS92	A1SJ71AS92
AS-i Standard		Ver. 2.11	Ver. 2.04
Max. number of AS-i system slaves		62 (Group A: 31 + Group B: 31)	31 (non- grouped) x 2 systems
Connectable slave type	Ver. 2.04-compatible I/O slave	Connectable	Connectable
	Ver. 2.11-compatible I/O slave	Connectable	N/A
	Analog slave	Connectable	N/A
I/O refresh time	When slaves are not grouped into A and B • Ver. 2.04-compatible I/O slave • Analog slave • Ver. 2.11-compatible I/O slave (When not grouped)	Approx. 5ms	Approx. 5ms
	When slaves are grouped into A and B • Ver. 2.11-compatible I/O slave (When grouped)	Approx. 10ms	N/A
	Analog slave	Approx. 35ms (channel 1) Approx. 70ms (channel 2) Approx. 105ms (channel 3) Approx. 140ms (channel 4)	N/A
Internal memory		EEPROM (for registration of slave configuration) Number of writes: 100,000 times max.	Flash ROM (for registration of slave configuration) Number of writes: 10,000 times max.
Number of occupied I/O points		32 points (I/O assignment: 32 intelligent points)	32 points (I/O assignment: 32 special points)

    (2)   Precautions for diverting the system
        The following table indicates the precautions for diverting the A1SJ71AS92 system.

No.	Item	QJ71AS92	A1SJ71AS92
1	System	1 system	2 systems
2	Grouping	Allowed (compatible with AS-i Ver. 2.11)	Not allowed
3	Connectable slave	AS-i Ver. 2.04-compatible I/O slave AS-i Ver. 2.11-compatible I/O slave Analog slave AS-i Ver. 2.04-compatible I/O slave	AS-i Ver. 2.04-compatible I/O slave

Example: When two systems are controlled by the A1SJ71AS92

```
┌──────────────┐
│  A1SJ71AS92  │
└──────────────┘
```

| Slave address 1 | Slave address 2 | Slave address 3 | | Slave address 2 | Slave address 3 | Slave address 4 |
| Group 1 | | | | Group 2 | | |
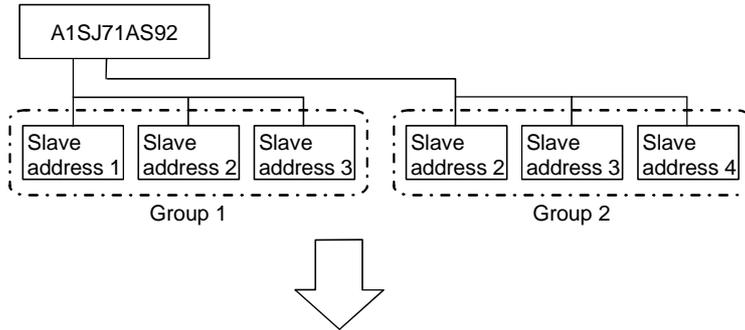
The A1SJ71AS92 system can be diverted to the QJ71AS92 system in any of the following three methods.

┌───┐
│ TIP   │
├───┤
│ In any of the three methods, the program for the second system slaves must be │
│ modified.   │
└───┘

1) Change the slave addresses of the second system into the slave addresses not used in the first system, and connect the second system to the first system.

```
┌──────────────┐
│   QJ71AS92   │
└──────────────┘
```

| Slave address 1 | Slave address 2 | Slave address 3 | Slave address 2 | Slave address 3 | Slave address 4 |

Slave address change

| Slave address 5 | Slave address 6 |
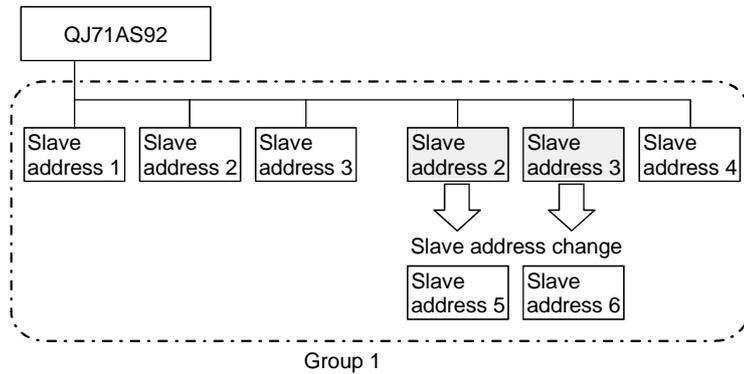
Group 1

2) Change the slaves whose slave addresses overlap in the first and second systems into the AS-i Ver. 2.11-compatible slaves. Then split the slaves into two groups (A and B) and assign different slave addresses to group A and B, and connect the second system to the first system

```
┌──────────────┐
│   QJ71AS92   │
└──────────────┘
```

| Slave address 1 | Slave address 2 | Slave address 3 | Slave address 2 | Slave address 3 | Slave address 4 |

Slaves are changed into Ver. 2.11-compatible products.

| Slave address 2A | Slave address 3A | Slave address 2B | Slave address 3B |

Group 1
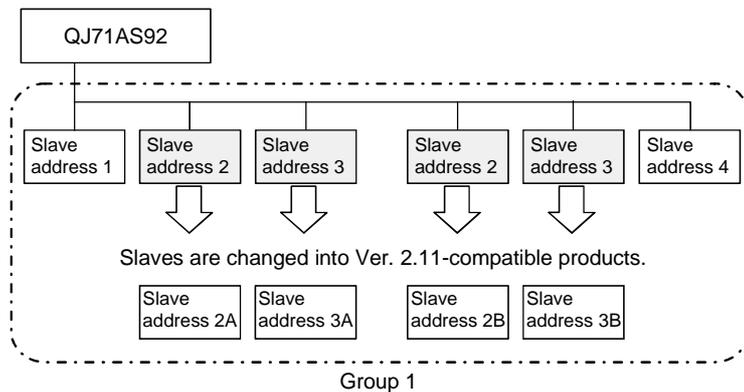
3) Prepare two QJ71AS92 modules. Then connect the slaves of the first
and second systems to the respective modules.

Group 1 of the first module   Group 1 of the second module
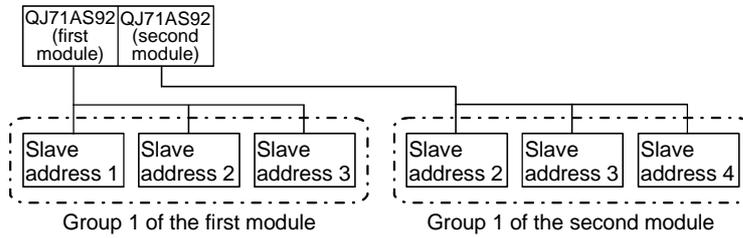
(3) Precautions for program utilization

No.	Item	QJ71AS92	A1SJ71AS92
1	Unit READY signal	X0	X1
2	Watchdog timer error signal	X0 (Also used as Unit READY signal) • ON: Normal • OFF: Watchdog timer error occurred	X0 • ON: Normal • OFF: Watchdog timer error occurred
3	Configuration Registration Request/completed	1) When values are set in the projected slave list (LPS (for write)) (buffer memory addresses: 49H to 4CH) and Configuration Registration Request (Y13) is turned ON, they are registered. 2) The registration result is reflected on the projected slave list (LPS (for read)) (buffer memory addresses: 19H to 1CH), and Configuration Registration Completed (X3) is turned ON.	1) When values are set in the projected slave list (LPS (for write)) (buffer memory addresses: 49H to 4AH, A9H to AAH), they are registered automatically. 2) The registration result is reflected on the projected slave list (LPS (for read)) (buffer memory addresses: 19H to 1AH, 79H to 7AH).
4	Command Request/completed	1) When a command is written to the command buffer <request> (buffer memory addresses: 55H to 59H) and Command Request (Y12) is turned ON, the command is executed. 2) The execution result is stored into the command buffer <request> (buffer memory addresses: 25H to 29H) and Command Completed (X2) is turned ON.	1) When a command is written to the command buffer <request> (buffer memory addresses: 55H to 59H, B5H to B9H), the command is executed automatically. 2) The execution result is stored into the command buffer <result> (buffer memory addresses: 25H to 29H, 85H to 89H).

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MEMO

WARRANTY

Please confirm the following product warranty details before starting use.

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 dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

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

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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