

Asi Master Module

IM 34M06H33-01E

vigilantplant.[®]

Applicable Modules:

Model Code	Model Name
F3LA01-0N	ASi Master Module

Applicable Product

● Range-free Multi-controller FA-M3

- Model: F3LA01-0N
- Name: ASi Master Module

The document number and document model code for this manual are given below.

Refer to the document number in all communications; also refer to the document number or the document model code when purchasing additional copies of this manual.

Document No. : IM 34M06H33-01E
Document Model Code : DOCIM

Important

■ About This Manual

- This Manual should be passed on to the end user.
- Before using the controller, read this manual thoroughly to have a clear understanding of the controller.
- This manual explains the functions of this product, but there is no guarantee that they will suit the particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. However, should any errors or omissions come to the attention of the user, please contact the nearest Yokogawa Electric representative or sales office.

■ Safety Precautions when Using/Maintaining the Product

- The following safety symbols are used on the product as well as in this manual.



Danger. This symbol on the product indicates that the operator must follow the instructions laid out in this instruction manual to avoid the risk of personnel injuries, fatalities, or damage to the instrument. The manual describes what special care the operator must exercise to prevent electrical shock or other dangers that may result in injury or the loss of life.



Protective Ground Terminal. Before using the instrument, be sure to ground this terminal.



Function Ground Terminal. Before using the instrument, be sure to ground this terminal.



Alternating current. Indicates alternating current.



Direct current. Indicates direct current.

The following symbols are used only in the instruction manual.



WARNING

- Indicates a “Warning”.
- Draws attention to information essential to prevent hardware damage, software damage or system failure.



CAUTION

- Indicates a “Caution”
- Draws attention to information essential to the understanding of operation and functions.

TIP

- Indicates a “TIP”
- Gives information that complements the present topic.

SEE ALSO

- Indicates a “SEE ALSO” reference.
- Identifies a source to which to refer.
- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety stated in this manual whenever handling the product. Take special note that if you handle the product in a manner other than prescribed in these instructions, the protection feature of the product may be damaged or impaired. In such cases, Yokogawa cannot guarantee the quality, performance, function and safety of the product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system as well as designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of processes and lines using the product and the system controlled by it, the user should implement it using devices and equipment, additional to this product.
- If component parts or consumable are to be replaced, be sure to use parts specified by the company.
- This product is not designed or manufactured to be used in critical applications which directly affect or threaten human lives and safety — such as nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities or medical equipment. If so used, it is the user’s responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not attempt to modify the product.

■ Exemption from Responsibility

- Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa Electric) makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- Yokogawa Electric assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

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- Store the original media, such as floppy disks, that contain the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- No portion of the software supplied by Yokogawa Electric may be transferred, exchanged, or sublet or leased for use by any third party without prior permission by Yokogawa Electric.

■ General Requirements for Using the FA-M3 Controller

● Avoid installing the FA-M3 controller in the following locations:

- Where the instrument will be exposed to direct sunlight, or where the operating temperature exceeds the range 0°C to 55°C (32°F to 131°F).
- Where the relative humidity is outside the range 10 to 90%, or where sudden temperature changes may occur and cause condensation.
- Where corrosive or flammable gases are present.
- Where the instrument will be exposed to direct mechanical vibration or shock.
- Where the instrument may be exposed to extreme levels of radioactivity.

● Select an appropriate field wiring material:

- USE COPPER CONDUCTORS ONLY.
Use copper conductors having temperature rating of minimum 75°C for the field wiring.

● Securely tighten screws:

- Securely tighten module mounting screws and terminal screws to avoid problems such as faulty operation.
- Tighten terminal block screws with the correct tightening torque as given in this manual.

● Securely lock connecting cables:

- Securely lock the connectors of cables, and check them thoroughly before turning on the power.

● Interlock with emergency-stop circuitry using external relays:

- Equipment incorporating the FA-M3 controller must be furnished with emergency-stop circuitry that uses external relays. This circuitry should be set up to interlock correctly with controller status (stop/run).

● Ground for low impedance:

- For safety reasons, connect the [FG] grounding terminal to a Japanese Industrial Standards (JIS) Class D (earlier called Class 3) Ground^{*1}. For compliance to CE Marking, use braided or other wires that can ensure low impedance even at high frequencies for grounding.

^{*1} Japanese Industrial Standard (JIS) Class D Ground means grounding resistance of 100 Ω max.

● Configure and route cables with noise control considerations:

- Perform installation and wiring that segregates system parts that may likely become noise sources and system parts that are susceptible to noise. Segregation can be achieved by measures such as segregating by distance, installing a filter or segregating the grounding system.

● Configure for CE Marking Conformance:

- For compliance to CE Marking, perform installation and cable routing according to the description on compliance to CE Marking in the "Hardware Manual" (IM34M06C11-01E).

● Keep spare parts on hand:

- Stock up on maintenance parts including spare modules, in advance.
- Preventive maintenance (replacement of the module or its battery) is required for using the module beyond 10 years. For enquiries on battery replacement service, contact your nearest Yokogawa Electric representative or sales office. (The module has a built-in lithium battery. Lithium batteries may exhibit decreased voltage, and in rare cases, leakage problems after ten years.)

● Discharge static electricity before operating the system:

- Because static charge can accumulate in dry conditions, first touch grounded metal to discharge any static electricity before touching the system.

● Never use solvents such as paint thinner for cleaning:

- Gently clean the surfaces of the FA-M3 controller with a cloth that has been soaked in water or a neutral detergent and wringed.
- Do not use volatile solvents such as benzine or paint thinner or chemicals for cleaning, as they may cause deformity, discoloration, or malfunctioning.

● Avoid storing the FA-M3 controller in places with high temperature or humidity:

- Since the CPU module has a built-in battery, avoid storage in places with high temperature or humidity.
- Since the service life of the battery is drastically reduced by exposure to high temperatures, take special care (storage temperature should be from -20°C to 75°C).
- There is a built-in lithium battery in a CPU module and temperature control module which serves as backup power supply for programs, device information and configuration information. The service life of this battery is more than 10 years in standby mode at room temperature. Take note that the service life of the battery may be shortened when installed or stored at locations of extreme low or high temperatures. Therefore, we recommend that modules with built-in batteries be stored at room temperature.

● Always turn off the power before installing or removing modules:

- Failing to turn off the power supply when installing or removing modules, may result in damage.

● Do not touch components in the module:

- In some modules you can remove the right-side cover and install ROM packs or change switch settings. While doing this, do not touch any components on the printed-circuit board, otherwise components may be damaged and modules may fail to work.

● Do not wire unused terminals:

- Do not connect wires to unused terminals on a terminal block or in a connector. Doing so may adversely affect the functions of the module.

■ Waste Electrical and Electronic Equipment



Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC

(This directive is only valid in the EU.)



This product complies with the WEEE Directive (2002/96/EC) marking requirement. The following marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste.

When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

■ How to Dispose of the Battery Used in This Product

The following description about the new Battery Directive 2006/66/EC is only valid in the EU.

This product uses an embedded battery, which cannot be removed by a customer and should be disposed of together with the product.

Do not dispose in domestic household waste.

When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

Battery category: Lithium battery



Note: With reference to Annex II of the new Battery Directive 2006/66/EC, the above symbol indicates obligatory separate collection.

Introduction

■ Overview of the Manual

This manual describes the specifications, use and communications protocol of the ASi Master Module.

■ Related Manuals

The manuals to be read depend on the sequence CPU module to be used.

F3SP71
F3SP76

● For information on functions, refer to:

- Sequence CPU – Functions Instruction Manual (for F3SP71-4N, F3SP76-7N) (IM34M06P15-01E-T01)
- Sequence CPU – Network Functions Instruction Manual (for F3SP71-4N, F3SP76-7N) (IM34M06P15-03E-T01)

● When creating programs using ladder language, refer to:

- FA-M3 Programming Tool WideField2 User's Manual (IM34M06Q15-21E)

F3SP66
F3SP67

● For information on functions, refer to:

- Sequence CPU – Functions Instruction Manual (for F3SP66-4S, F3SP67-6S) (IM34M06P14-01E)
- Sequence CPU – Network Functions Instruction Manual (for F3SP66-4S, F3SP67-6S) (IM34M06P14-02E)

● When creating programs using ladder language, refer to:

- FA-M3 Programming Tool WideField2 User's Manual (IM34M06Q15-21E)

F3SP22
F3SP28
F3SP38

F3SP53
F3SP58
F3SP59

● For information on functions, refer to:

- Sequence CPU – Functions Instruction Manual (for F3SP28-3N/3S, F3SP38-6N/6S, F3SP53-4H/4S, F3SP58-6H/6S, F3SP59-7S) (IM34M06P13-01E)

● When creating programs using ladder language, refer to:

- FA-M3 Programming Tool WideField2 User's Manual (IM34M06Q15-21E)

F3SP05
F3SP08F3SP21
F3SP25
F3SP35

- **For information on functions, refer to:**
 - Sequence CPU – Functions User's Manual (for F3SP21, F3SP25, and F3SP35) (IM34M06P12-02E)
- **When creating programs using ladder language, refer to:**
 - FA-M3 Programming Tool WideField2 User's Manual (IM34M06Q15-21E)

F3BP20
F3BP30

- **For information on functions, refer to:**
 - BASIC CPU Modules and YM-BASIC/FA Programming Language User's Manual (IM34M06Q22-01E)
- **When creating programs using BASIC language, refer to:**
 - BASIC Programming Tool M3 for Windows User's Manual (IM34M06Q22-02E)

Refer to the following user's manuals as required.

- **For information common to all sequence CPU modules on the specifications*, configuration*, installation, wiring, trial operation, maintenance and inspection of the FA-M3, or system-wide limitation of module installation, refer to:**

Hardware Manual (IM34M06C11-01E)

*: For information on the specifications of products other than power supply modules, base modules, I/O modules, cables and terminal block units, refer to their respective user's manuals.

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FA-M3

ASi Master Module

IM 34M06H33-01E 2nd Edition

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1. Overview

The ASi Master Module is an ASi communications module to be installed in the base module of an FA-M3 system. Its ASi (Actuator Sensor interface) provides the following functions:

- AS-interface V2.1 compliant (including V2.0)
- Bit-level open bus system
- Uses the same cable for power supply and communications
- Simple connection using a special ASi 2-wire cable (without requiring terminating resistors)
- Connects up to 62 slaves for V2.1 and up to 31 slaves for V2.0
- Allows up to 4 inputs per slave, and up to 3 outputs for each V2.1-compatible slave and 4 outputs for each V2.0-compatible slave
- Analog input/output function (for V2.1 only)
- Automatic address assignment function
If a blank slave is connected to replace a defective slave, this function will automatically program the blank slave to the original address of the slave that had failed.

TIP

- A "blank slave" is a slave with address set to "00".
- Duplicate slave addresses within the same ASi line are not allowed. Addresses can be in any physical order.

● System Configuration Example

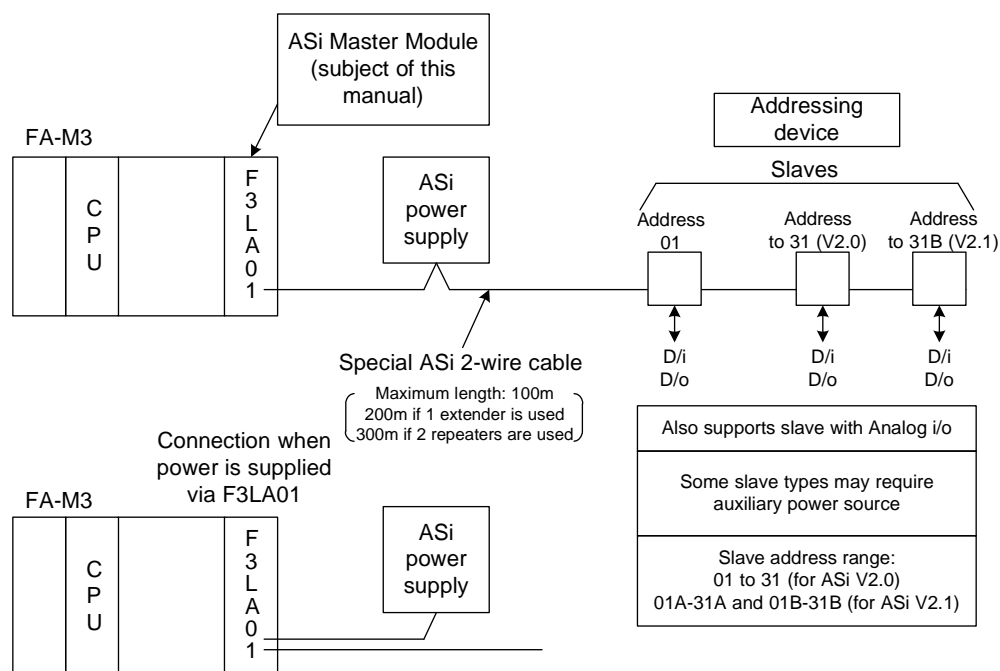


Figure 1.1 System Configuration Example

- **How to Read This Manual**

We recommend reading this manual in the following sequence:

Chapter 2	Specifications
Chapter 3	Function Overview
Chapter 10	Cabling Guidelines
Chapter 4	Registers
Chapter 5	Input/output Relays
Chapter 6	Startup Preparation
Section 8.1	Programming
Section 8.2	Sample Circuits

The other chapters can then be read as required.

For information on individual ASi slaves, refer to documentation provided by their respective manufacturers.

2. Specifications

2.1 General Specifications

Table 2.1 General Specifications

Item	Specifications
Ambient temperature	0°C to +45°C
Storage temperature	-20°C to +75°C
Operating temperature range	10% to 90% RH (with no condensation)
Ambient atmosphere	No presence of corrosive gases or flammable gases
Number of slots	1 slot
Internal current consumption	330 mA
Weight	170 g

2.2 AS-interface Communications Specifications

Table 2.2 AS-interface Communications Specifications

Item	Specifications
Maximum number of nodes	1 ASi master (Master Module) Up to 62 ASi slaves for V2.1; Up to 31 slaves for V2.0 1 ASi-dedicated power supply
Number of I/O points	For V2.1, 434 max. (248 inputs and 186 outputs) For V2.0, 248 max. (124 inputs and 124 outputs)
Transmission path topology	Multidrop (star, line, tree, ring)
Transmission protocol	AS-interface V2.1 compliant
Transmission rate	167Kbps with cycle time on ASi line of 10 ms (with 62 slaves connected) or 5 ms (with 31 slaves connected)
Maximum transmission distance	Total length: up to 100m - Up to 200 m when one extender is used. - Up to 300 m when two repeaters are used.
Communications Function	Contact inputs: 248 max., 4 max. per slave
	Contact outputs: 186 max., up to 3 outputs per slave for V2.1; up to 4 outputs per slave for V2.0
	Read list of projected slaves (LPS)
	Read list of active (communicating) slaves (LAS)
	Read list of detected slaves (LDS)
	Read list of peripheral faults (LPF) (for V2.1 only)
	Read slave status
	Read slave I/O code, ID code or parameters
Transmission cable	Uses special ASi cable (2-wire cable)
Power supply	Uses ASi-dedicated power supply (current consumption of module over ASi line: 200mA)
Auxiliary power supply for slave	Required for some slave types

2.3 Operating Environment

This module is compatible with all CPU modules.
It can be installed in any slot of a base module.

2.4 Model and Suffix Codes

Model	Suffix Code	Style Code	Option Code	Remarks
F3LA01	-0N	—	—	AS-interface V2.1, 1 port

2.5 Components and Functions

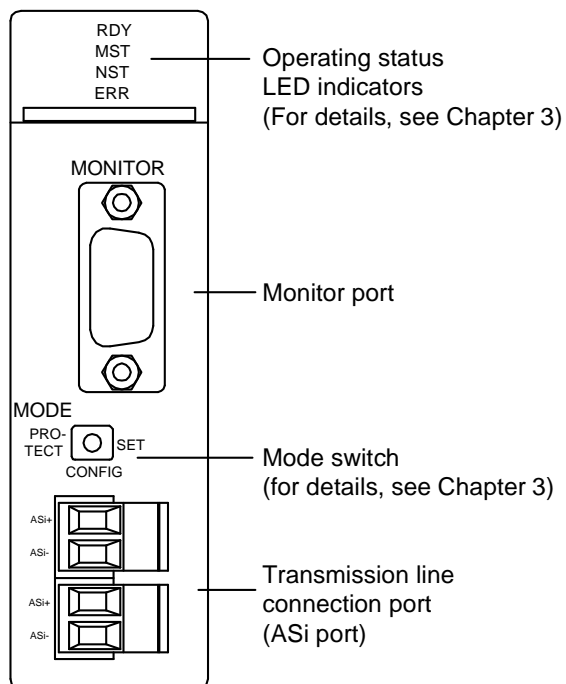


Figure 2.1 Front View

2.6 External Dimensions

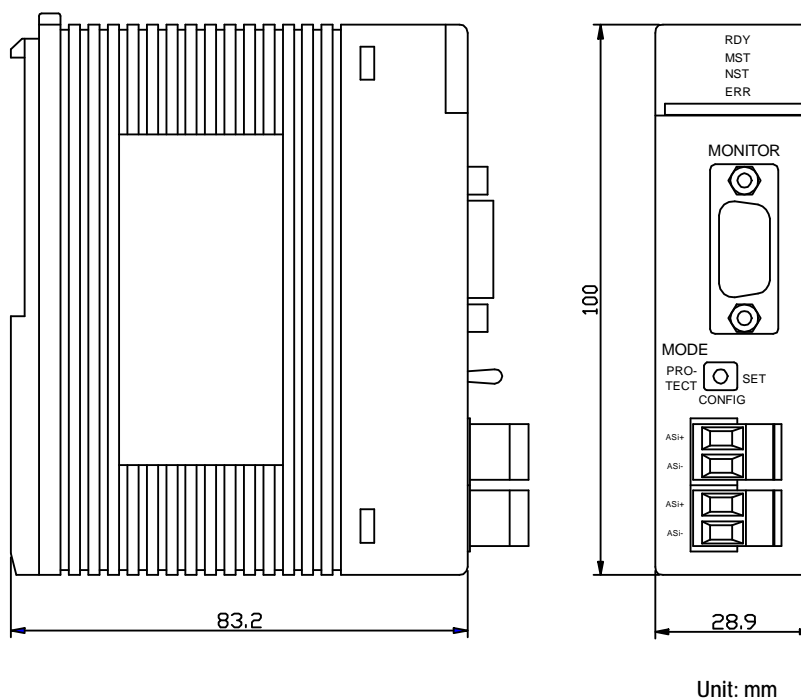


Figure 2.2 External View

2.7 External Connections

● ASi Ports

Two ASi ports with connectors that allow easy cable attachment and detachment are provided.

Terminals with identical marking (ASi+ or ASi-) are connected internally.

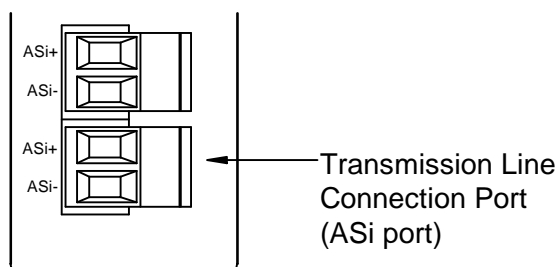


Figure 2.3 ASi Port Diagram

ASi + Connects to transmission cable (+, brown) or ASi power supply (+, brown).

ASi - Connects to transmission cable (-, blue) or ASi power supply (-, blue).

Terminal screws of the ASi connectors should be tightened with torque of 0.5 to 0.6 N•m.

The basic connections are shown in the figure below.

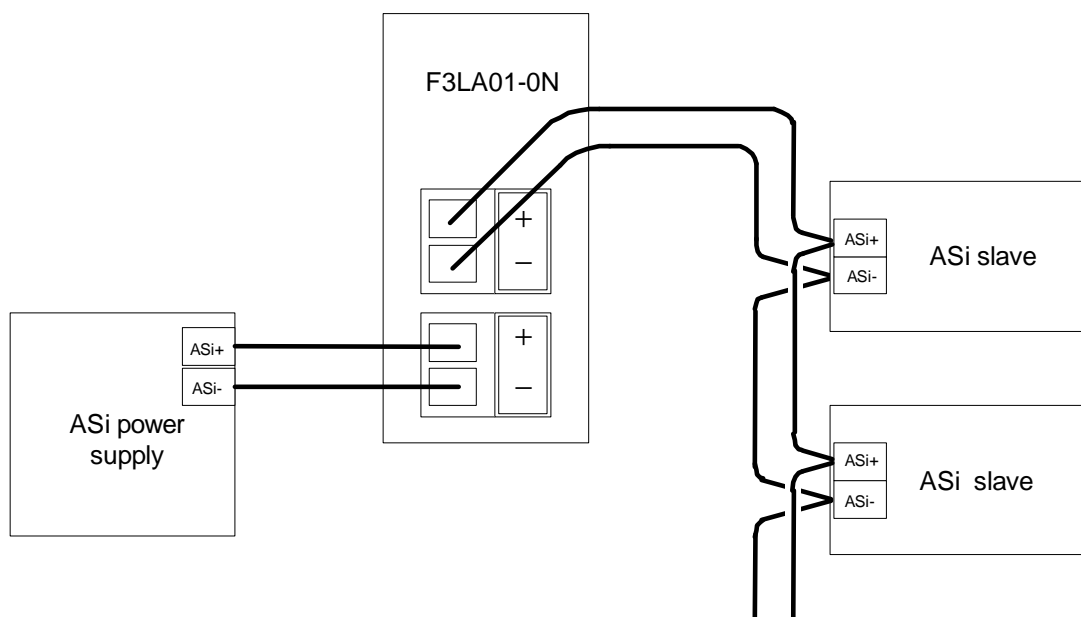


Figure 2.4 ASi Basic Connection Diagram



CAUTION

You should connect the ASi port to a power supply dedicated for ASi, and not to any ordinary power supply.

- **Monitor Port (for display purposes)**

The monitor port of this module can be connected to a PC using an RS-232C cable for display purposes to perform mode changes, listing of slaves, registration, etc.

For details, see Chapter 9.

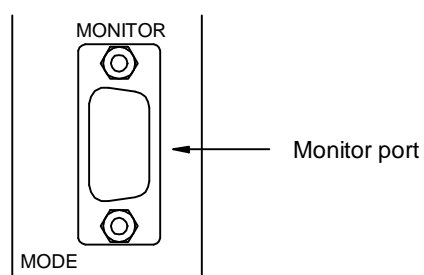


Figure 2.5 Monitor Port



CAUTION

Do not connect to the monitor port during production operation as this will affect normal module operation.

2.8 Attaching/Detaching the Module

■ Attaching a Module

Figure 2.6 shows how to attach this module to the base module. First hook the anchor slot at the bottom of the module to be attached onto the anchor pin on the bottom of the base module. Push the top of the module toward the base module until the anchor/release button clicks into place.



CAUTION

Always switch off the power before attaching or detaching a module.

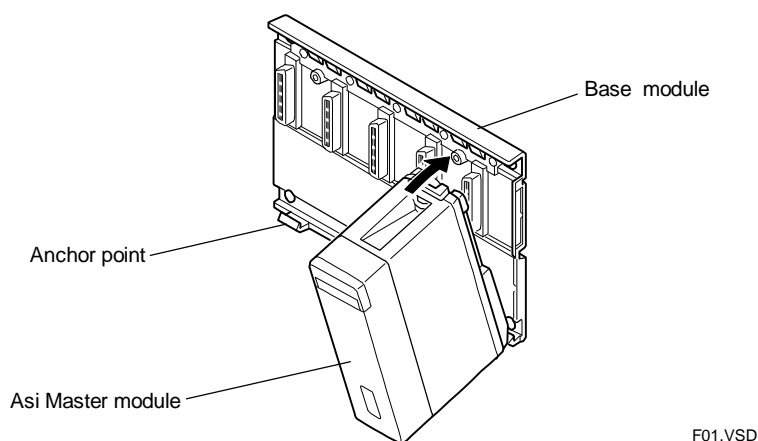


Figure 2.6 Attaching/Detaching a Module



CAUTION

DO NOT bend the connector on the rear of the module by force during the above operation. If the module is pushed with excessive force, the connector pins may bend, causing in an error.

■ Detaching a Module

To remove the module from the base module, reverse the above operation. Press the anchor/release button on the top of the module to unlock it, and tilt the module away from the base module.

■ Attaching Modules in Intense Vibration Environments

If the module is used in intense vibration environments, fasten the module with a screw. Use screws of type listed in the table below. Insert these screws into the screw holes on top of the module and tighten them with a Phillips screwdriver.

Screw Required
M4-size Binder screw 12 to 15 mm long (or 14 to 15 mm if fitted with a washer)

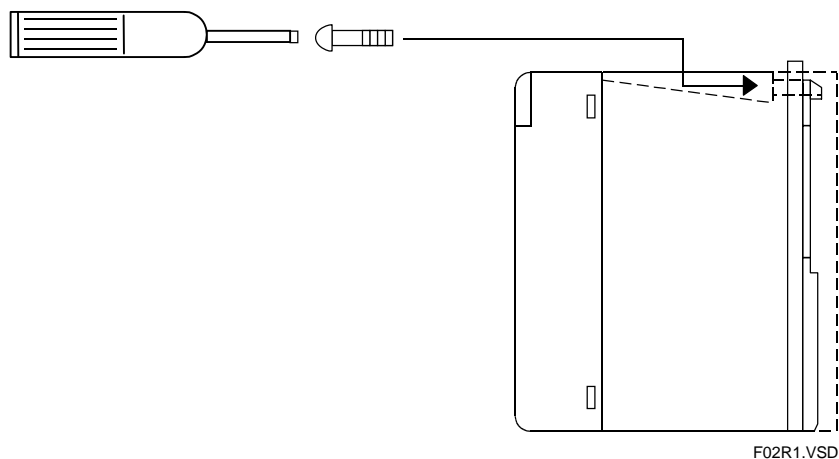


Figure 2.7 Securing the Module with a Screw

3. Functional Overview

3.1 Functions

The ASi Master Module is compliant to AS-interface V2.1 (including V2.0). It allows the use of V2.1 functions shown in Table 3.1, provided the connected slaves are AS-interface V2.1-compliant and support the respective functions. If V2.0-compliant slaves are connected, only V2.0 functions are available.

The following table shows the differences between AS-interface V2.0 and V2.1. Intermixing of V2.0-compliant and V2.1-compliant slaves will be discussed later in this chapter.

Table 3.1 Differences between ASi V2.0 and V2.1

	Address Expansion Function			Analog Input/Output Function	Peripheral Fault Messaging Function
	Maximum No. of Slaves	Number of Contact Inputs per Slave	Number of Contact Outputs per Slave		
V2.0	31	4	4	–	–
V2.1	62	4	3	✓	✓

- **Contact Input/Output Access Function**

Contact inputs of slaves are read into registers of the ASi Master Module, and can then be read from the Contact Input Data area using a user program.

Contact outputs of slaves can be set by writing to the Contact Output Data area using a user program. Details of registers are described in the next chapter.

- **Analog Input/output Access Function (for V2.1 only)**

AS-interface V2.1 allows analog input/output slaves to be connected. Analog data can then be received and transmitted using commands.

- **Peripheral Fault Messaging Function (for V2.1 only)**

AS-interface V2.1 supports detection of slave peripheral faults (such as slave auxiliary power failure, overloading, etc.) by the ASi master. This function allows better system safety design. The ASi Master Module indicates peripheral faults in its LPF (List of Peripheral Faults).

- **I/O Code and I/D Code**

Each ASi slave has an I/O code and an ID code, which together identifies the slave type.

An I/O code is 4-bit data defining the IN/OUT direction of the four ports of a slave. For example, I/O code \$0 defines a slave with all four ports used for input.

An I/D code is 4-bit data defining the profile of a slave.

ID codes and I/O codes are defined by the AS-International Association.

TIP

In AS-interface V2.1, a slave with ID code \$A uses one of its bits as a selector bit for slave A or slave B so as to double the maximum allowable number of connected slaves. With the use of this selector bit, two slaves can share the same address (e.g. 5A and 5B).

- **Intermixing V2.0-compliant And V2.1-compliant Slaves**

The ASi Master module allows intermixing of ASi V2.0-compliant and V2.1-compliant slaves, with restrictions on some functions. Any V2.0-compliant slave and any slave whose ID code is not equal to \$A is known as a standard slave. The table below shows function restrictions when V2.0-compliant and V2.1-compliant slaves are intermixed.

Table 3.2 Intermixing V2.0-compliant And V2.1-compliant Slaves

	Standard Slave		V2.1-compliant Slave		Standard Slave and V2.1-compliant Slave	
V2.1 Master	○	Only V2.0 functions are supported.	⊙	All functions can be used	○	Slave B (e.g. slave 4B) cannot be defined at an address defined for a standard slave.

3.2 Operating Mode

The F3LA01-0N module has 2 operating modes: Configuration mode and Protected mode. Starting in Configuration mode, configuration of slaves on the ASi line are registered to the List of Projected Slaves (LPS)^{*1}. After registration completes, the module is switched to Protected mode for normal operation. Any mismatch between the registered LPS and actual slave configuration detected on the ASi line generates an error.

*1 For details on LPS, see Subsection 4.1.1.

● Operating Status LED Indicators

Table 3.3 Operating Status LED Indicators (1/2)

Name of LED	State	ERR (red)	Description
Green RDY (Ready)	Off		Power off or not initialized
	Lit ^{*1}		Internal circuitry of the module is operating normally.
Green MST (Module Status)	Off	Off	Power off or initializing
		Fast blinking	ASi power supply error
	Blinking		Configuration mode
Green NST (Network Status)	Off	Lit ^{*1}	Protected mode
		Off	Power off or initializing
		Lit	Offline mode ^{*2}
	Blinking		Presence of blank slave
Blinking ^{*1}			List of detected slaves (LDS) and registered list of projected slaves (LPS) are consistent.
	Lit		Mismatch between list of detected slaves (LDS) and list of projected slaves (LPS).

*1: Indicates that the module is operating normally in Protected mode.

*2: The ASi Master Module should normally be in online mode. If it stays in offline mode for whatever reason, please contact Yokogawa.

The following table shows the LED display for each mode.

Table 3.4 Operating Status LED Indicators (2/2)

Operating Mode		RDY	MST	NST	ERR
Protected Mode	Normal operation	●	●	☼	○
	Configuration mismatch (presence of unconnected or unregistered slave(s))	●	●	●	○
	Offline mode	●	●	○	●
	(Locked mode) Improper switch position ^{*1}	●	☼☼	☼☼	○
Configuration Mode	Normal operation	●	☼	☼	○
	Configuration mismatch (presence of unconnected or unregistered slave(s))	●	☼	●	○
	Presence of blank slave	●	☼	○	☼
	Offline mode	●	☼	○	●
	Presence of blank slave. Improper switch position ^{*2}	●	☼☼	☼☼	☼
	Registration to LPS received.	●	○	○	○
ASi Power Supply Error		●	○	—	☼☼

○: Off ●: Lit ☼: Blinking at 1.2Hz ☼☼: Fast blinking at 4.8 Hz

*1: The mode switch was turned from PROTECT position to CONFIG position. In this case, the module remains in Protected mode, without transiting to Configuration mode. To switch to Configuration mode, turn the switch to the SET position for more than 3 seconds.

*2: This indicates that an attempt to transit from Configuration mode to Protected mode has failed due to presence of a blank slave. Although the switch is in the PROTECT position, the module remains in Configuration mode.

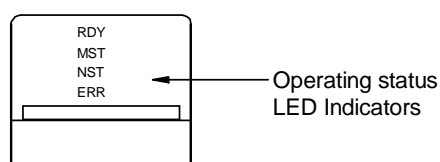


Figure 3.1 Operating Status LED Indicators

● Configuration Mode (MST LED blinks)

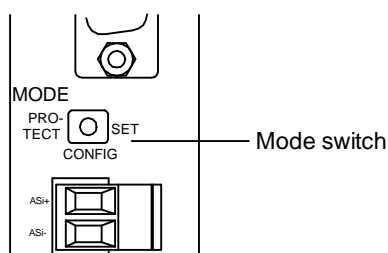


Figure 3.2 Mode Selector Switch

The Configuration mode is used during startup preparation, when slave information (address, I/O code, ID code) are read over the ASi line, and registered to the list of projected slaves in the F3LA01-0N module. Turning the Mode switch from the CONFIG position to the SET position for more than 3 seconds switches the module to Configuration mode. (See description on "Lock Function" below).

In Configuration mode, the module communicates with all detected slaves on the ASi line. However, if there is any mismatch between data registered in the LPS and slaves detected on the ASi line, the NST LED lights up, and the CONFIG_OK input relay of the ASi Master Module turns off.

- Registering Slave Configuration to the LPS

You can register the list of detected slaves (LDS)^{*2} to the LPS in Configuration mode. To perform registration, turn the MODE switch to the SET position for more than 3 seconds in Configuration mode.

(This is the alternative action described in the subsequent paragraph on "Lock Function")

*2: For details on LDS, see Subsection 4.1.3.

The automatic address assignment function is disabled in Configuration mode.

The module will not exit from Configuration mode if a blank slave is connected. Turning the MODE switch to the PROTECT position when a blank slave is present will cause the MST and NST lamps to enter fast-blinking state and the ERR lamp to enter blinking state.

To properly switch to Protected mode, return the MODE switch to the CONFIG position, remove the blank slave, and then again move the MODE switch to the PROTECT position.

TIP

- A blank slave refers to a slave with address set to "00".
- The "MST", "NST" and "ERR" lamps are known as the operating status LED indicators.

● Protected Mode (MST LED lights up)

Protected mode is the normal operating mode. After registering the configuration of slaves on the ASi line to the LPS in Configuration mode, turn the MODE switch to the PROTECT position. The module will enter Protected mode, and operation begins.

In Protected mode, the module communicates only with detected slaves on the ASi line, whose configuration matches the data registered in the LPS of the module.

● Lock Function

The Lock function is used to prevent inadvertent switching from Protected mode to Configuration mode. If the MODE switch is accidentally turned from the PROTECT position to the CONFIG position in locked state, the module remains in Protected mode. At the same time, both the MST and NST lamps enter fast-blinking state (4.8Hz) to indicate an invalid switch position.

- Unlock Function (Switching to Configuration Mode)

To release the module from a locked state, turn the MODE switch from the CONFIG position to the SET position for more than 3 seconds. At about 3 seconds, the fast-blinking MST and NST LED indicators stop blinking. If you then release the switch, the module enters Configuration mode.

After switching to Configuration mode, if the MODE switch is then turned to the SET position for more than 3 seconds, the module performs the alternative action of registering the LDS to the LPS.



WARNING

Never touch the MODE switch when it is charged. Otherwise, static electricity may damage the module.



CAUTION

Switching between Protected mode and Configuration mode using the MODE switch during operation will cause slaves to go offline (this can be verified by checking the OFFLINE_READY* (X □□□17) input relay) for about one second with reading of inputs suspended and outputs turned off.

*: For details, see Table 5.1, "Input Relays".



CAUTION

Registering slave configuration to the LPS using the MODE switch during operation will suspend reading of slave inputs and turn off slave outputs temporarily.

● Automatic Address Assignment Function

By default, the automatic address assignment function is enabled on this module. For details on how to disable the automatic address assignment function, see Chapter 7.

When a slave that has failed due to hardware fault or some other reason is replaced with a blank slave of the same type, the automatic address assignment function automatically programs the blank slave with the address of the original slave that had failed. Two slaves are considered to be of the same type if they have the same ID code and I/O code.

When the module detects a failed slave in Protected mode, its NST indicator changes from blinking to lit. If the automatic address assignment function is enabled, the module

scans the ASi line to find blank slaves, and read their types.

When the module finds a slave whose type is the same as that of the failed slave as per its registration in the LPS on the module, it writes the address of the failed slave to the blank slave. Communication then begins and the NST indicator returns to blinking state.

If the module is switched from Protected mode to Configuration mode when a failed slave is present, automatic programming is suspended. However, when the module is subsequently returned to Protected mode, automatic programming continues if failed slave is still present.

4. Registers

4.1 Register List

Table 4.1 Register List

Data Position Number		For details, see:	
1	Command response area	Section 7.3	
6			
7			LPS area
10			
11			
14			LAS area
15	LDS area	Subsection 4.1.3	
18	LPF area	Subsection 4.1.4	
19			
22	NODE STATUS area	Subsection 4.1.5	
23			
38	NODE I/O CONFIG CODE area	Subsection 4.1.6	
39			
54	NODE ID CODE area	Subsection 4.1.7	
55			
70	NODE PARAMETER area	Subsection 4.1.8	
71			
86	Contact input data area	Subsection 4.1.9	
87			
102			
103			
118	Contact output data area	Subsection 4.1.10	
119			
124	Command setup area	Sections 7.1, 7.2	

Note: Data position numbers 1-102 are intended for reading by a user program.

The above table lists all the registers of the ASi Master module that a user can access by referring to the given data position number in a ladder or BASIC program.

The following data position numbers are normally accessed:

Contact input/output of slaves: corresponding to data position numbers 87-102, 103-118

Analog input/output of slaves: corresponding to data position numbers 1-6, 119-124

The LPS, LDS and LPF areas provide information on slave errors.

The other registers may be accessed as required.

You can create a user program to access the input relays and output relays described in Chapter 5. For details on programming, read Chapter 7 and Chapter 8.

4.1.1 LPS (List of Projected Slaves)

The LPS contains information on slaves registered to the module in Configuration mode. It is stored on the internal EEPROM of the module.

Table 4.2 LPS Area

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

4.1.2 LAS (List of Active Slaves)

The LAS contains information on available slaves for data exchange.

Table 4.3 LAS Area

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

4.1.3 LDS (List of Detected Slaves)

The LDS contains information on slaves that are detected over the ASi line, regardless of whether they are registered in the LPS.

Table 4.4 LDS Area

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

4.1.4 LPF (List of Peripheral Faults) (for v2.1)

The LPF contains information on the occurrence of peripheral faults such as auxiliary power supply error on active slaves.

Table 4.5 LPF Area

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

TIP

- Data in the above tables map to slaves with addresses 1A-31A and 1B-31B. A '–' character indicates no mapping.
- Each bit position in Tables 4.2-4.5 is either '1' or '0', depending on the state of its corresponding slave. A bit in the LPS, LAS, LDS and LPF is '1' if the corresponding slave is present, active, detected or experiencing peripheral fault respectively.
- All areas in Tables 4.2-4.5 are read-only areas accessible by a program.

4.1.5 NODE STATUS

The NODE STATUS area stores information on individual slaves on the ASi line.

Table 4.6 NODE STATUS Area

Bits	Description
0, 4, 8, 12	Slave is registered in the module (in LPS)
1, 5, 9, 13	Slave is available for data exchange (in LAS)
2, 6, 10, 14	Slave is detected (in LDS)

	Data Position Number	Bit Number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
NODE STATUS	23	3A				2A				1A				–			
	24	7A				6A				5A				4A			
	25	11A				10A				9A				8A			
	26	15A				14A				13A				12A			
	27	19A				18A				17A				16A			
	28	23A				22A				21A				20A			
	29	27A				26A				25A				24A			
	30	31A				30A				29A				28A			
	31	3B				2B				1B				–			
	32	7B				6B				5B				4B			
	33	11B				10B				9B				8B			
	34	15B				14B				13B				12B			
	35	19B				18B				17B				16B			
	36	23B				22B				21B				20B			
	37	27B				26B				25B				24B			
	38	31B				30B				29B				28B			

TIP

Access the information in the above area as required.

All registers in the above table are read-only areas accessible by a user program.

4.1.6 NODE I/O CONFIG CODE

The NODE I/O CONFIG CODE area stores the I/O Code of each slave on the ASi line. I/O codes are set by individual slave manufacturers.

Table 4.7 NODE I/O CONFIG CODE Area

	Data Position Number	Bit Number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
NODE I/O CONFIG	39	3A				2A				1A				–			
	40	7A				6A				5A				4A			
	41	11A				10A				9A				8A			
	42	15A				14A				13A				12A			
	43	19A				18A				17A				16A			
	44	23A				22A				21A				20A			
	45	27A				26A				25A				24A			
	46	31A				30A				29A				28A			
	47	3B				2B				1B				–			
	48	7B				6B				5B				4B			
	49	11B				10B				9B				8B			
	50	15B				14B				13B				12B			
	51	19B				18B				17B				16B			
	52	23B				22B				21B				20B			
	53	27B				26B				25B				24B			
	54	31B				30B				29B				28B			

TIP

Access the information in the above area as required.

All registers in the above table are read-only areas accessible by a user program.

4.1.7 NODE ID CODE

The NODE ID CODE area stores the ID code of individual slaves on the ASi line. ID codes are set by individual slave manufacturers.

Table 4.8 NODE ID CODE Area

	Data Position Number	Bit Number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
NODE ID CODE	55	3A				2A				1A				–			
	56	7A				6A				5A				4A			
	57	11A				10A				9A				8A			
	58	15A				14A				13A				12A			
	59	19A				18A				17A				16A			
	60	23A				22A				21A				20A			
	61	27A				26A				25A				24A			
	62	31A				30A				29A				28A			
	63	3B				2B				1B				–			
	64	7B				6B				5B				4B			
	65	11B				10B				9B				8B			
	66	15B				14B				13B				12B			
	67	19B				18B				17B				16B			
	68	23B				22B				21B				20B			
69	27B				26B				25B				24B				
70	31B				30B				29B				28B				

TIP

Access the information in the above area as required.

All registers in the above table are read-only areas accessible by a user program.

4.1.8 NODE PARAMETER

The NODE PARAMETER area stores parameter data of each slave on the ASi line. Node parameters are set by individual slave manufacturers.

Table 4.9 NODE PARAMETER Area

	Data Position Number	Bit Number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
NODE PARA- METER	71	3A				2A				1A				–			
	72	7A				6A				5A				4A			
	73	11A				10A				9A				8A			
	74	15A				14A				13A				12A			
	75	19A				18A				17A				16A			
	76	23A				22A				21A				20A			
	77	27A				26A				25A				24A			
	78	31A				30A				29A				28A			
	79	3B				2B				1B				–			
	80	7B				6B				5B				4B			
	81	11B				10B				9B				8B			
	82	15B				14B				13B				12B			
	83	19B				18B				17B				16B			
	84	23B				22B				21B				20B			
	85	27B				26B				25B				24B			
	86	31B				30B				29B				28B			

TIP

Access the information in the above area as required.

All registers in the above table are read-only areas accessible by a user program.

4.1.9 Contact Input Data

The following table shows the mapping of slave addresses to the contact input data area.

Table 4.10 Contact Input Data Area

Data Position Number	Bit Number															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
87	Slave 3A				Slave 2A				Slave 1A				—			
	3	2	1	0	3	2	1	0	3	2	1	0				
88	Slave 7A				Slave 6A				Slave 5A				Slave 4A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
89	Slave 11A				Slave 10A				Slave 9A				Slave 8A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
90	Slave 15A				Slave 14A				Slave 13A				Slave 12A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
91	Slave 19A				Slave 18A				Slave 17A				Slave 16A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
92	Slave 23A				Slave 22A				Slave 21A				Slave 20A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
93	Slave 27A				Slave 26A				Slave 25A				Slave 24A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
94	Slave 31A				Slave 30A				Slave 29A				Slave 28A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
95	Slave 3B				Slave 2B				Slave 1B				—			
	3	2	1	0	3	2	1	0	3	2	1	0				
96	Slave 7B				Slave 6B				Slave 5B				Slave 4B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
97	Slave 11B				Slave 10B				Slave 9B				Slave 8B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
98	Slave 15B				Slave 14B				Slave 13B				Slave 12B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
99	Slave 19B				Slave 18B				Slave 17B				Slave 16B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
100	Slave 23B				Slave 22B				Slave 21B				Slave 20B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
101	Slave 27B				Slave 26B				Slave 25B				Slave 24B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
102	Slave 31B				Slave 30B				Slave 29B				Slave 28B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0

For a slave that has outputs, the inputs of I/O numbers assigned for output contain inverted output data.

TIP

- Data in the above table maps to slaves with addresses 1A-31A and 1B-31B. A '—' character indicates no mapping to any slave.
- Each bit position in the above table maps to a contact input with I/O number between 0 to 3 on a slave. A bit is 1 if its corresponding contact input is on and 0 if its corresponding contact input is off. Up to 4 contact inputs (4 bits) are represented for each slave.
- All registers in the above table are read-only areas accessible by a user program.

4.1.10 Contact Output Data

The following table shows the mapping of slave addresses to the contact output data area.

Table 4.11 Contact Output Data Area

Data Position Number	Bit Number															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
103	Slave 3A				Slave 2A				Slave 1A				—			
	3	2	1	0	3	2	1	0	3	2	1	0				
104	Slave 7A				Slave 6A				Slave 5A				Slave 4A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
105	Slave 11A				Slave 10A				Slave 9A				Slave 8A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
106	Slave 15A				Slave 14A				Slave 13A				Slave 12A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
107	Slave 19A				Slave 18A				Slave 17A				Slave 16A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
108	Slave 23A				Slave 22A				Slave 21A				Slave 20A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
109	Slave 27A				Slave 26A				Slave 25A				Slave 24A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
110	Slave 31A				Slave 30A				Slave 29A				Slave 28A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
111	Slave 3B				Slave 2B				Slave 1B				—			
	3	2	1	0	3	2	1	0	3	2	1	0				
112	Slave 7B				Slave 6B				Slave 5B				Slave 4B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
113	Slave 11B				Slave 10B				Slave 9B				Slave 8B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
114	Slave 15B				Slave 14B				Slave 13B				Slave 12B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
115	Slave 19B				Slave 18B				Slave 17B				Slave 16B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
116	Slave 23B				Slave 22B				Slave 21B				Slave 20B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
117	Slave 27B				Slave 26B				Slave 25B				Slave 24B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
118	Slave 31B				Slave 30B				Slave 29B				Slave 28B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0

Note: For V2.1 slaves, I/O number for output 3 cannot be used because it is used internally by the system for selecting a B slave.

TIP

- Data in the above table maps to slaves with addresses 1A-31A and 1B-31B. A '—' character indicates no mapping to slave.
- Each bit position in the above table maps to a contact output with I/O number between 0 to 3 on a slave. A bit is 1 if its corresponding contact output is to be turned on and 0 if its corresponding contact output is to be turned off.
- Up to 4 contact outputs (4 bits) are represented for each V2.0 slave. Up to 3 contact outputs (3 bits) are represented for each V2.1 slave.

5. Input/output Relays

5.1 Input Relays

Table 5.1 Input Relays

	Relay Number X□□□**	Description	
Input Relays for Command Execution (See Chapter 7)	X□□□01	Executing command	Turns on during command execution. Turns off when command execution completes.
	X□□□02	Reserved	
	X□□□03		
	X□□□04	Command error	Turns on when command execution ends with error. Turning off Y□□□33 also turns off this relay.
	X□□□05	Reserved	
	X□□□06		
	X□□□07	Reserved	
	X□□□08		
	X□□□09	Reserved	
	X□□□16		
ASi Status (See Chapter 8)	X□□□17	OFFLINE_READY	ON : online OFF : offline
	X□□□18	POWER_FAIL	ON : ASi power supply error OFF : ASi power supply normal
	X□□□19	NORMAL_OPERATION	ON : operating normally OFF : communications not allowed (e.g. during initialization)
	X□□□20	OPERATION_MODE	ON : Configuration mode OFF : Protected mode
	X□□□21	AUTO_PROG_AVIL	ON : Automatic programming available. Module is in Protected mode; AUTO_ADDRESS_ENABLE=1 and there is only one failed slave. OFF : Automatic address assignment function is disabled, or function is enabled but there is no failed slave.
	X□□□22	Reserved	
	X□□□23	LDS_0	ON : A blank slave (slave with address 0) is present. OFF : No blank slave (slave with address 0) is present.
	X□□□24	CONFIG_OK	ON : List of detected slaves (LDS) matches list of projected slaves (LPS) OFF : List of detected slaves (LDS) is different from list of projected slaves (LPS)
	X□□□25	OFFLINE	ON : Offline mode OFF : Online
	X□□□26	Reserved	
	X□□□27	EEPROM_OK	ON : EEPROM is normal OFF : EEPROM error
	X□□□28	AUTO_ADDRESS_ENABLE	ON : Automatic address assignment is enabled OFF : Automatic address assignment is disabled (by command execution)
	X□□□29	PERIPHERAL_FAULT (V2.1)	ON : Slave peripheral fault has occurred ^{*2} OFF : No slave peripheral fault
	X□□□30	Reserved	
	X□□□31		
X□□□32	MONITOR_PORT_IN_USE	ON : in use OFF : not used	

*1: "□□□" in a relay number denotes the slot number where the ASi Master module is installed.

*2: To identify the slaves experiencing faults, check the LPF.

5.2 Output Relays

Table 5.2 Output Relays

	Output Relay Number	Name	Description
Command execution	Y□□□33	Start Command	Turn on this relay to request for command execution. During execution of the requested command, relay X□□□01 turns on. When execution ends, relay X□□□08 turns on. If execution ends with error, X□□□04 also turns on.
	Y□□□34 to Y□□□64	Reserved	

"□□□" in a relay number denotes the slot number where the ASi Master module is installed.

- **Slot Number**

The slot number denotes the slot position where the module is installed.

It is defined as a 3-digit integer as follows:

Slot Number : □□□

└─┬ The physical slot position where this module is installed (01 to 16)
└─┬ Unit number (0: main unit, 1-7: subunit)

6. Startup Preparation

● Startup

The following flowchart shows the procedure for startup preparation.

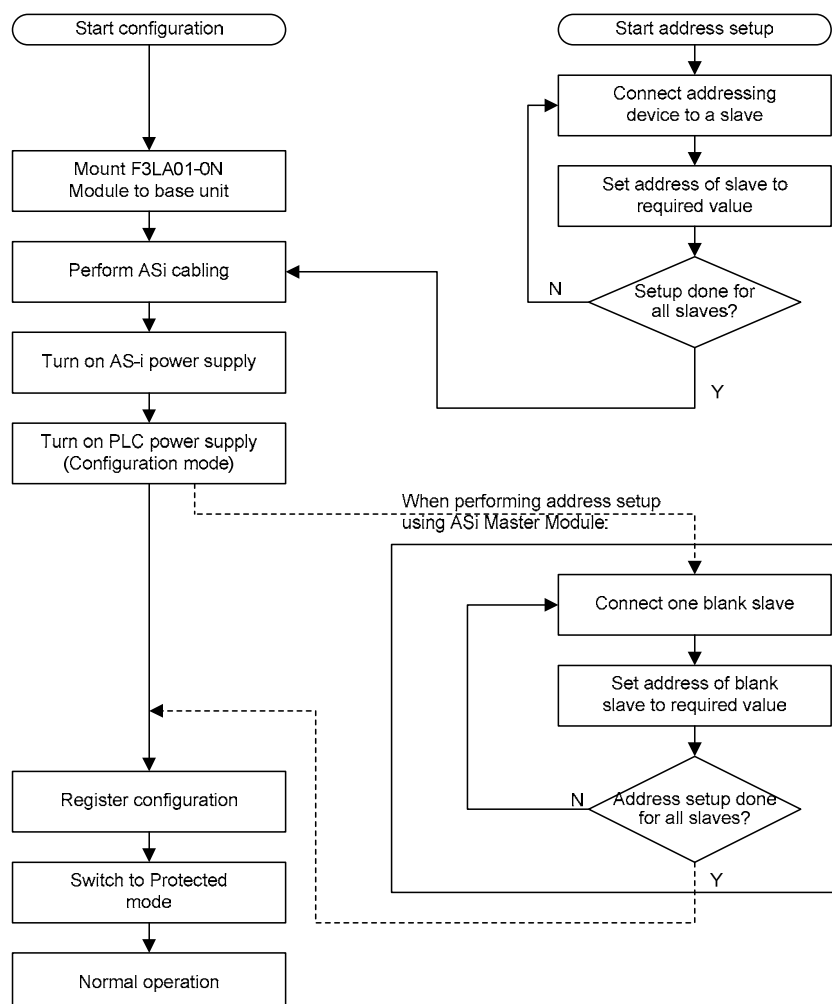


Figure 6.1 Startup Preparation Procedure

TIP

Three methods are available for setting slave addresses:

(1) using an addressing device; (2) by executing a command on the ASi master module (see Chapter 7); and (3) via the monitor port of the ASi master module (see Chapter 9).

We recommend using method (1) for the following reasons:

Method (1) requires an addressing device but is superior in terms of operability and maintenance;

Method (2) requires creation of a user program for address setup, which can only be executed before starting operation and hence is inferior in terms of operability and maintenance.

Method (3) can be used to perform address setup by only before starting operation and hence is inferior in terms of operability and maintenance.

TIP

To change the address of a slave other than a blank slave, set the address to 0 temporarily before setting it to the new address.

Blank Page

7. Command Execution

The ASi Master module provides commands to support the following functions:

- Enable/disable the automatic address assignment function
- Set slave address
- Receive analog data
- Send analog data

7.1 How to Execute a Command

- **Command Setup Area**

The Command Setup Area is used to store a command to be executed for performing ASi master operations.

Table 7.1 Command Setup Area

	Data Position Number	Bit Number															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command setup area	119	Command setting															
	120	Data setting 2								Data setting 1							
	121	Data setting 4								Data setting 3							
	122	Data setting 6								Data setting 5							
	123	Data setting 8								Data setting 7							
	124	Data setting 10								Data setting 9							

- **Available Commands**

The following commands are available.

- Enable/disable automatic address assignment function command
Enables or disables the automatic address assignment function in Protected mode. Automatic address assignment is enabled immediately after powering on, and can be disabled using a user program.
- Set slave address command
Changes a specified slave address to another address. Changing to an existing address is not allowed. Changing to address 00 transforms a slave to a blank slave.
- Receive analog data command (for v2.1 only)
Receives data of slaves with analog input function.
- Send analog data command (for v2.1 only)
Sends data to slaves with analog output function.

7.2 Command Setup

● Command Setting

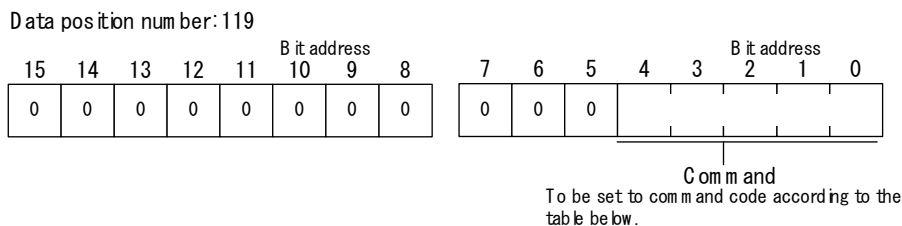


Figure 7.2 Command Setting

Table 7.2 Command Codes

Command	Code
Enable/disable automatic address assignment function	\$0005
Set slave address	\$000B
Receive analog data (for v2.1 only)	\$0018
Send analog data (for v2.1 only)	\$0019

* Do not set the command code to any value not listed in the above table.

● Data Settings 1-10

Set data settings 1-10 as required by the command type.

- Enable/disable Automatic Address Assignment Function command (command code: \$0005)

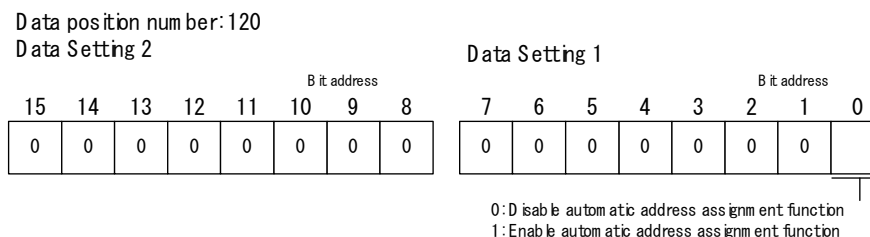
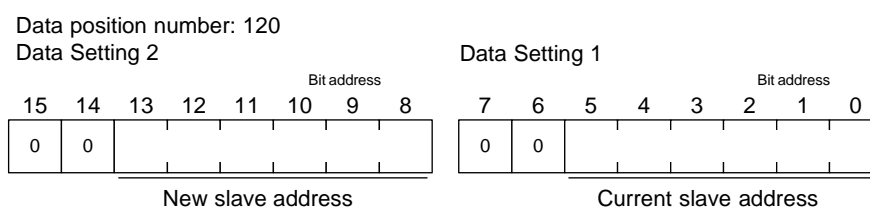


Figure 7.3 Enable/disable Automatic Address Assignment Function

- Set Slave Address command (command code: \$000B)



Address range: 00-31 (for standard slave); 00-31, 32-63 (for V2.1-compatible A/B slave)

Figure 7.4 Set Slave Address

- Receive Analog Data command (command code: \$0018)

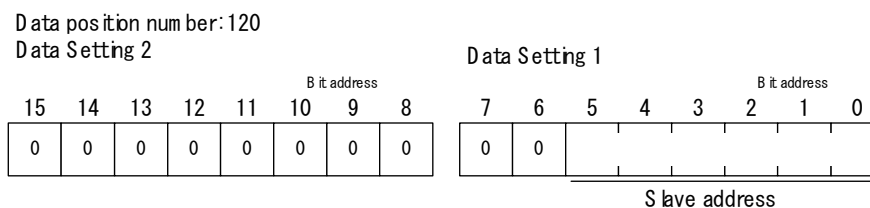


Figure 7.5 Receive Analog Data

The received analog data will be stored in the Command Response Area described in Section 7.3. When reading from the command response area, take into consideration ASi communications delay (10 ms for 62 slaves).

- Send Analog Data command (command code: \$0019)

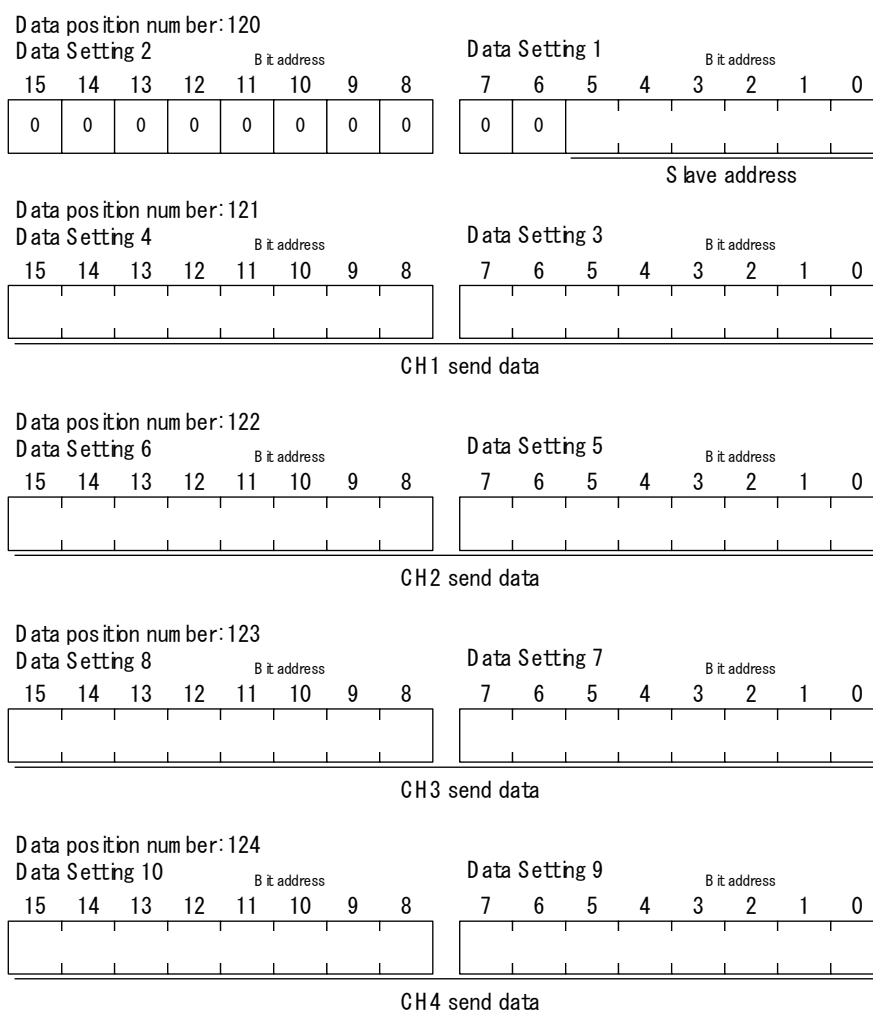


Figure 7.6 Send Analog Data

TIP

- Refer to the table below when setting the slave address.
- The mapping between analog values and digital values depend on the specifications of a slave.

Table 7.3 Slave Address in Hexadecimal and Decimal Representation

Slave Address	Decimal Representation	Hexadecimal Representation	Slave Address	Decimal Representation	Hexadecimal Representation
–	0	\$00	–	32	\$20
1A	1	\$01	1B	33	\$21
2A	2	\$02	2B	34	\$22
:	:	:	:	:	:
31A	31	\$1F	31B	63	\$3F

**CAUTION**

In firmware REV02 or earlier, disabling or enabling automatic address assignment during operation will cause slaves to go offline temporarily (this can be verified by checking the OFFLINE_READY* (X □□□17) input relay) with reading of inputs suspended and outputs turned off.

In firmware REV03 or later, however, operation continues without going offline.

*: For details, see Table 5.1, "Input Relays".

7.3 Command Response

The command response area stores the response returned by a command execution.

Table 7.4 Command Response Area

	Data Position Number	Bit Number													
		15	14	13	12	11	10	9	8	7	6	5	4	3	2
Command Response Area	1	Returned Command													
	2	Response 2							Response 1						
	3	Response 4							Response 3						
	4	Response 6							Response 5						
	5	Response 8							Response 7						
	6	Response 10							Response 9						

- **Returned Command**

The Returned Command area stores the original Command Setting command specified in the Command Setup Area. The data is stored when a user turns on the Start Command output relay.

- **Responses 1-10**

This area stores the response data from a slave after executing the command specified in the Command Setup Area.

- Receive Analog Data command (command code: \$0018)

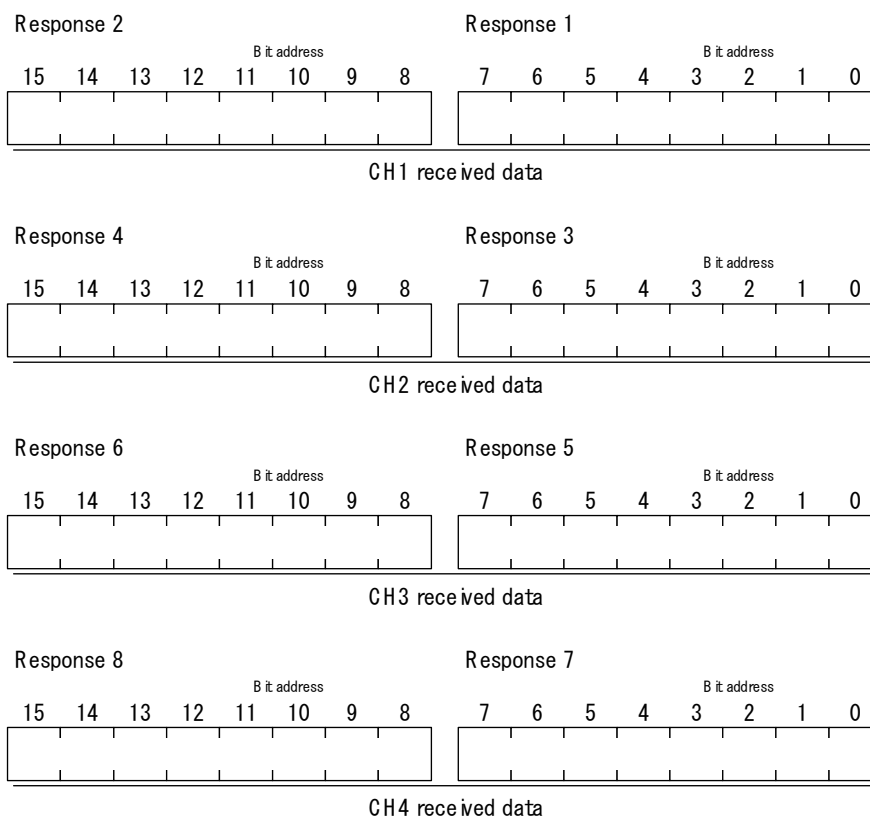


Figure 7.7 Receive Analog Data

TIP

The mapping between analog values and received digital data values depend on the specifications of a slave.

8. Programming

After performing address setup for a slave, and registering the address to the LPS (List of Projected Slaves), the contact input/outputs of the slave then become addressable by a user program.

8.1 Programming

- **ASi Statuses**

You may check the following ASi statuses from a user program.

Table 8.1 ASi Statuses

Input Relay X□□□**	Name	Description
X□□□17	OFFLINE_READY	ON : online OFF : offline
X□□□18	POWER_FAIL	ON : ASi power supply error OFF : ASi power supply normal
X□□□19	NORMAL_OPERATION	ON : operating normally OFF : communications not allowed (e.g. during initialization)
X□□□20	OPERATION_MODE	ON : Configuration mode OFF : Protected mode
X□□□21	AUTO_PROG_AVIL	ON : Automatic programming available. Module is in Protected mode; AUTO_ADDRESS_ENABLE=1 and there is only one failed slave. OFF : Automatic address assignment function is disabled, or function is enabled but there is no failed slave.
X□□□22	Reserved	
X□□□23	LDS_0	ON : A blank slave (slave with address 0) is present. OFF : No blank slave (slave with address 0) is present.
X□□□24	CONFIG_OK	ON : List of detected slaves (LDS) matches list of projected slaves (LPS) OFF : List of detected slaves (LDS) is different from list of projected slaves (LPS)
X□□□25	OFFLINE	ON : Offline mode OFF : Online
X□□□26	Reserved	
X□□□27	EEPROM_OK	ON : EEPROM is normal OFF : EEPROM error
X□□□28	AUTO_ADDRESS_ENABLE	ON : Automatic address assignment is enabled OFF : Automatic address assignment is disabled (by command execution)
X□□□29	PERIPHERAL_FAULT(V2.1)	ON : Slave peripheral fault has occurred ² OFF : No slave peripheral fault
X□□□30	Reserved	
X□□□31		
X□□□32	Monitor Port in Use	ON : in use OFF : not used

"□□□" in a relay number denotes the slot number where the ASi Master module is installed.

In general, you should always check that both NORMAL_OPERATION and CONFIG_OK are on during module operation.

(Note that even if CONFIG_OK turns off, NORMAL_OPERATION may not turn off).

As a minimal prerequisite, you should not start operation until NORMAL_OPERATION turns on. The other statuses should also be in appropriate states depending on the required operating conditions.

TIP

Although the ASi Master module supports both BASIC programs and ladder programs, ladder programs are more commonly used. Hence, subsequent descriptions and explanations will be based on ladder programs.

When writing BASIC programs, use the data position numbers given in this manual.

● Reading Contact Input of Slaves

To read contact inputs of a slave, use a READ instruction in a user program to access registers of the ASi Master module. Data is read in word (16-bit) units.

Special Module Read

READ	sl	n1	d	k
------	----	----	---	---

Sl : Slot number where F3LA01-0N is installed.

n1 : First data position number for reading data (n1=87-102)

d : First device number for storing slave contact input value that is read.

k : Transfer size in words (number of word (16-bit) units to be transferred)

The table below shows the mapping between slave addresses and contact input data.

Table 8.2 Contact Input Data

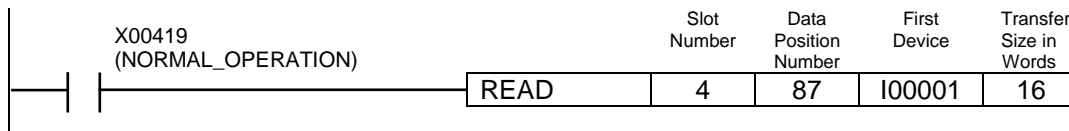
Data Position Number	Bit Number															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
87	Slave 3A				Slave 2A				Slave 1A				—			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
88	Slave 7A				Slave 6A				Slave 5A				Slave 4A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
89	Slave 11A				Slave 10A				Slave 9A				Slave 8A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
90	Slave 15A				Slave 14A				Slave 13A				Slave 12A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
91	Slave 19A				Slave 18A				Slave 17A				Slave 16A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
92	Slave 23A				Slave 22A				Slave 21A				Slave 20A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
93	Slave 27A				Slave 26A				Slave 25A				Slave 24A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
94	Slave 31A				Slave 30A				Slave 29A				Slave 28A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
95	Slave 3B				Slave 2B				Slave 1B				—			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
96	Slave 7B				Slave 6B				Slave 5B				Slave 4B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
97	Slave 11B				Slave 10B				Slave 9B				Slave 8B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
98	Slave 15B				Slave 14B				Slave 13B				Slave 12B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
99	Slave 19B				Slave 18B				Slave 17B				Slave 16B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
100	Slave 23B				Slave 22B				Slave 21B				Slave 20B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
101	Slave 27B				Slave 26B				Slave 25B				Slave 24B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
102	Slave 31B				Slave 30B				Slave 29B				Slave 28B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0

TIP

- Data in the above table maps to slaves with addresses 1A-31A and 1B-31B. A '—' character indicates no mapping to any slave.
- Each bit position in the above table maps to a contact input with I/O number between 0 to 3 on a slave. A bit is 1 if its corresponding contact input is on and 0 if its corresponding contact input is off.
- Up to 4 contact inputs (4 bits) are represented for each slave.

By storing slave contact input data into internal relays as shown below, we can then use the internal relays as substitutes for the slave contact input relays.

The following program stores slave contact input data into internal relays of the ASi Master module installed in slot 4.



Internal Relay (Location for storing read data)	Slave Address	I/O Number
I00005 to I00008	1A	0 - 3
I00009 to I00012	2A	0 - 3
:	:	:
I00249 to I00252	30B	0 - 3
I00253 to I00256	31B	0 - 3

After execution of the READ instruction, we can use internal relays I00005 - I00256 as substitutes for the slave contact input relays. (Although the first device is specified as I00001, positions I00001-I00004 and I00129-I00132 contain invalid bits since they map to no slaves.)

● Writing to Contact Outputs of Slaves

To output to slave contacts, use a WRITE instruction (Special Module Write). Data is written in (16-bit) word units.

Special Module Write

WRITE	s	sl	n2	k
-------	---	----	----	---

- s : First device number storing data to be written to slave contact outputs.
 sl : Slot number where F3LA01-0N is installed.
 n2 : First data position number for writing (n2=103 - 118)
 k : Transfer size in words (number of word (16-bit) units to be transferred)

The table below shows the mapping between slave addresses and contact output data.

Table 8.3 Contact Output Data

Data Position Number	Bit Number															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
103	Slave 3A				Slave 2A				Slave 1A				-			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
104	Slave 7A				Slave 6A				Slave 5A				Slave 4A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
105	Slave 11A				Slave 10A				Slave 9A				Slave 8A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
106	Slave 15A				Slave 14A				Slave 13A				Slave 12A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
107	Slave 19A				Slave 18A				Slave 17A				Slave 16A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
108	Slave 23A				Slave 22A				Slave 21A				Slave 20A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
109	Slave 27A				Slave 26A				Slave 25A				Slave 24A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
110	Slave 31A				Slave 30A				Slave 29A				Slave 28A			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
111	Slave 3B				Slave 2B				Slave 1B				-			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
112	Slave 7B				Slave 6B				Slave 5B				Slave 4B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
113	Slave 11B				Slave 10B				Slave 9B				Slave 8B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
114	Slave 15B				Slave 14B				Slave 13B				Slave 12B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
115	Slave 19B				Slave 18B				Slave 17B				Slave 16B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
116	Slave 23B				Slave 22B				Slave 21B				Slave 20B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
117	Slave 27B				Slave 26B				Slave 25B				Slave 24B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
118	Slave 31B				Slave 30B				Slave 29B				Slave 28B			
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0

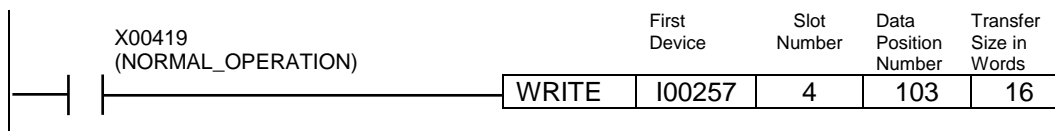
Note: I/O number for output 3 cannot be used for a V2.1-compatible slave because output 3 is used by the system for selecting Slave B. (any data written to output 3 is ignored).

TIP

- Data in the above table maps to slaves with addresses 1A-31A and 1B-31B. A '-' character indicates no mapping to any slave.
- Each bit position in the above table maps to a contact output with I/O number between 0 and 3 on a slave. A bit is 1 if its corresponding contact output is to be turned on and 0 if its corresponding contact output is to be turned off.
- Up to 4 contact outputs (4 bits) are represented for each V2.0 slave. Up to 3 contact outputs (3 bits) are represented for each V2.1 slave.

By writing to slave contact output data from internal relays as shown below, we can use the internal relays as substitutes for the slave contact output relays.

The following program outputs to slave contacts using internal relays of the ASi Master module installed in slot 4.



Internal Relays (Location for storing output data)	Slave Address	I/O Number
I00261 to I00264	1A	0 to 3
I00265 to I00268	2A	0 to 3
:	:	:
I00505 to I00508	30B	0 to 3
I00509 to I00512	31B	0 to 3

Internal relays I00005 - I00256 are used as substitutes for the slave contact output relays. (Although the first device is specified as I00257, bits in positions I00257-I00260 and I00385-I00388 are ignored since they map to no slaves.)

For V2.1 slaves, I/O number for output 3 cannot be used because it is used internally by the system for selecting a B slave (any data written to output 3 will be ignored).

8.2 Sample Circuits

This section describes four sample circuits:

- Sample circuit for accessing slave contact inputs and outputs;
- Sample circuit for disabling automatic address assignment function;
- Sample circuit for detecting invalid slaves and checking ASi system error alarms;
- Sample circuit for changing slave address

The sample programs assume that the ASi Master module is mounted in slot 4, and 62 slaves are connected. Modify the sample program as required to suit your application before use

Table 8.4 Block Signal Definitions

Signal Name	Address	I/O Comment
Input Relays		
ComdAct	X00401	Executing Command
ComdErr	X00404	Command Error
ComdEnd	X00408	Command Completed
PwFail	X00418	1=ASi Power Supply Error
NORope	X00419	1=Normal Operation Mode
OpeMode	X00420	1=Configuration Mode
ConfOk	X00424	1=Configuration OK
Output Relays		
ComdStrt	Y00433	Start Command
Internal Relays		
AS-Di	I00001	Substitute for slave input relay
	:	:
	I00256	Substitute for slave input relay
AS-Do	I00257	Substitute for slave input relay
	:	:
	I00512	Substitute for slave output relay
AdrsMode	I00513	Automatic address assignment function setting
Alarm	I00514	Alarm indicator
AdrsSet	I00515	Address setting
AdrsSet2	I00516	Address setting

Signal Name	Address	I/O Comment
Special Relays		
NORon	M00033	Always on
ONEpls	M00035	On for one scan after powering on
Data Registers		
ASslot	D00033	LA01 slot position
LPS1	D00034	List of projected slaves
LPS2	D00035	List of projected slaves
LPS3	D00036	List of projected slaves
LPS4	D00037	List of projected slaves
LDS1	D00038	List of detected slaves
LDS2	D00039	List of detected slaves
LDS3	D00040	List of detected slaves
LDS4	D00041	List of projected slaves
AlmSlv1	D00042	List of slaves with alarms
AlmSlv2	D00043	List of slaves with alarms
AlmSlv3	D00044	List of slaves with alarms
AlmSlv4	D00045	List of slaves with alarms

TIP

Signal names have been assigned to devices and coded in the given sample programs but you could also write a program using just device names. Using signal names however improves readability and maintainability.

● Sample Circuit for Accessing Slave Contact Inputs and Outputs

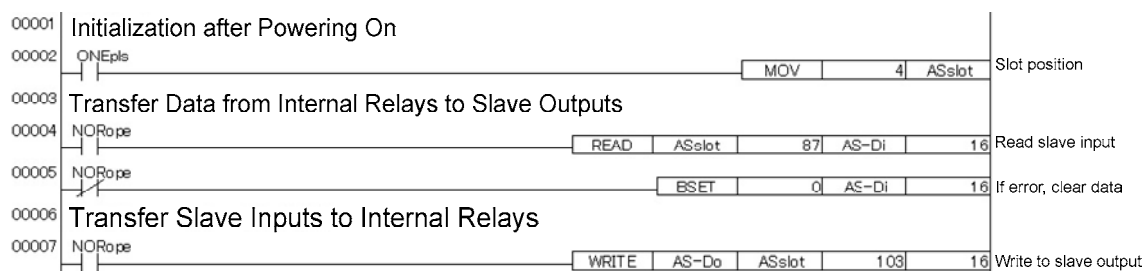


Figure 8.1 Sample Circuit for Accessing Slave Contact Inputs and Outputs

TIP

Internal relays that map to no devices contain invalid bits.

See also Section 8.1.

● Sample Circuit for Disabling Automatic Address Assignment Function

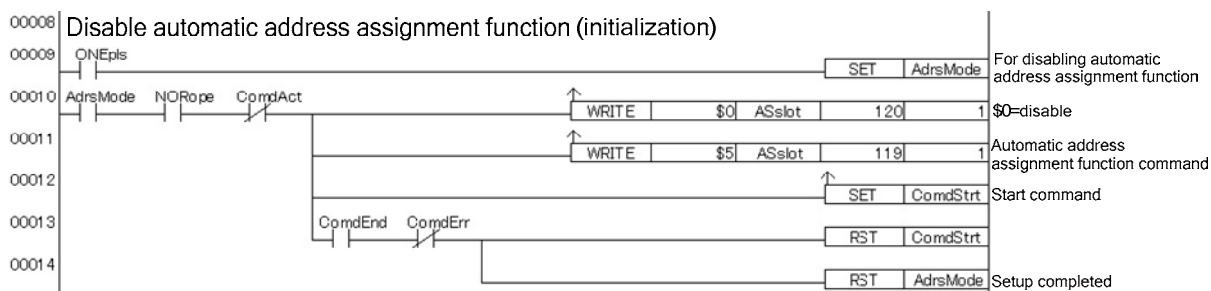


Figure 8.2 Sample Circuit for Disabling Automatic Address Assignment Function

TIP

By default, the automatic address assignment function is enabled. Therefore, the above circuit is not required if the function is to be enabled. After executing the disable command, monitor input relay X□□□28 (AUTO_ADDRESS_ENABLE). When the function has been successfully disabled, the relay resets to 0.

● Sample Circuit for Detecting Invalid Slaves and Checking ASi System Error Alarms

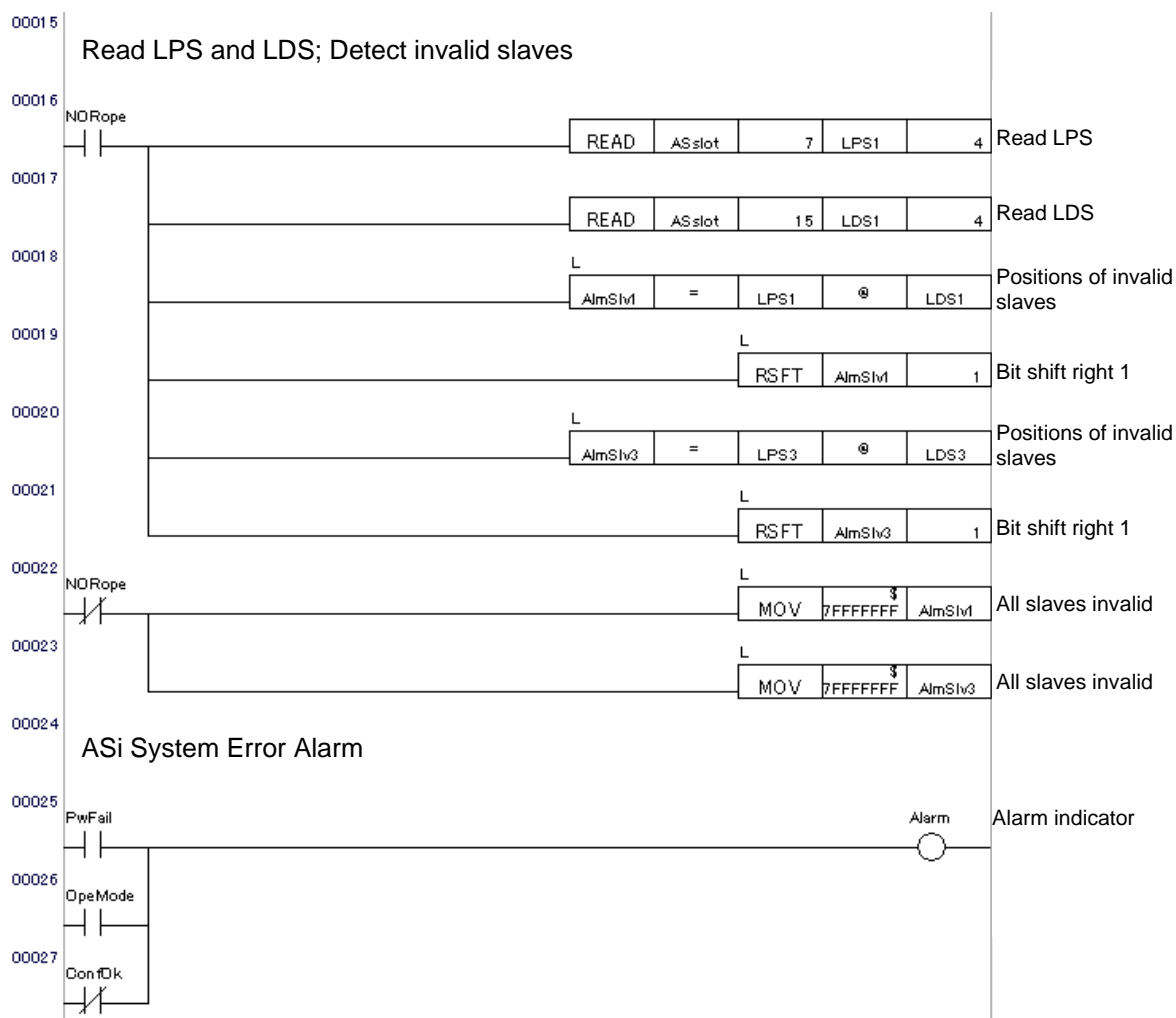


Figure 8.3 Sample Circuit for Detecting Invalid Slaves and Checking ASi System Error Alarms

TIP

- The above circuit uses XOR between LPS and LDS to detect both failed slaves, as well as detected slaves that are not registered in the LPS. AlmSlv1 and AlmSlv2 store the error statuses of slaves 01A to 31A, and AlmSlv3 and AlmSlv4 store the error statuses of slaves 01B to 31B, starting from the least significant bit. A '1' bit indicates an invalid slave and a '0' bit indicates a valid slave. The ASi Master module sets all slaves to invalid status during initialization.
- ASi system error alarm indicates any one of three errors: ASi power supply error, not in protected mode and configuration mismatch.
- Additional circuits are required to detect slave peripheral faults (for V2.1 only).
- See also subsections 4.1.1, 4.1.3 and section 8.1.

● Sample Circuit for Changing Slave Address

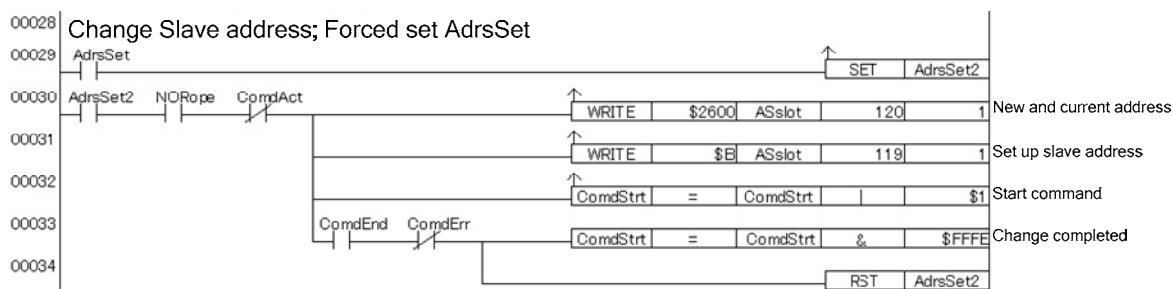


Figure 8.4 Sample Circuit for Changing Slave Address

TIP

- Although the above circuit can be used to set slave addresses, we recommend using an addressing device to set or change slave addresses instead for improved ease of use and maintainability
- The above sample circuit sets the slave address of a blank slave (\$00) to 6B (\$26). For details, see the table below.
- To change the address of a slave other than a blank slave using the above circuit, set the address to 0 temporarily before setting it to the new address.
- After performing forced set on AdrSet, the program resets AdrsSet2 if the slave address update is successful. You can refer to the LDS to check the slave address before and after the update.
- See also Section 7.2.

Table 8.5 Slave Address in Decimal and Hexadecimal Representations

Slave Address	Decimal Representation	Hexadecimal Representation	Slave Address	Decimal Representation	Hexadecimal Representation
–	0	\$00	–	32	\$20
1A	1	\$01	1B	33	\$21
2A	2	\$02	2B	34	\$22
:	:	:	:	:	:
31A	31	\$1F	31B	63	\$3F

Blank Page

9. Monitor Port Function

9.1 Monitor Port

Connecting the monitor port on the ASi Master module to a PC using an RS-232C cable allows a user to change the operating mode of the module, as well as to display and register slaves to the list of projected list stored in the module.

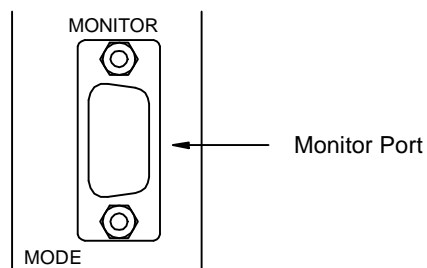


Figure 9.1 Monitor Port



CAUTION

Do not connect to the monitor port during production operation, as this will affect normal module operation.

A monitoring and configuration program runs in the module and allows operations to be performed from a terminal emulator such as a PC.

Use a RS-232C cross cable (with a D-SUB 9-pin connector at the F3LA01-0N end) to connect to the monitor port.

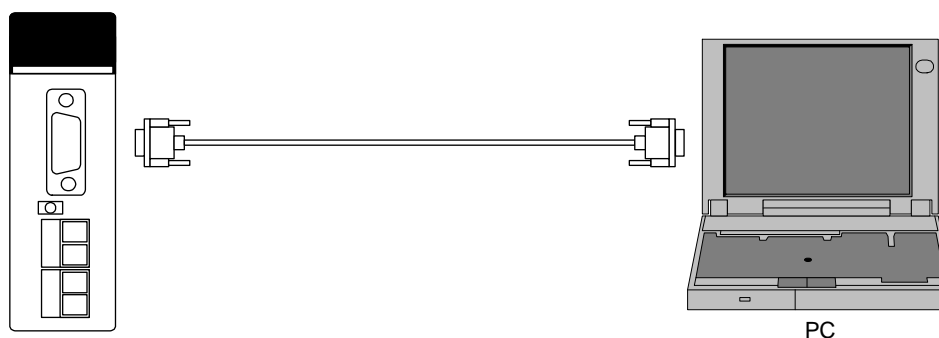


Figure 9.2 Connecting the ASi Master Module to a PC

Start a terminal emulator software application on the PC.

Set the parameters of the terminal emulator software as shown below.

Setup Item	Setup Value
Connection method	Direct connection to Com1
Bits per second	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None

9.2 Monitoring Function

9.2.1 Monitoring Function (of Firmware REV02 or Earlier)

After connecting the cable, power on the module. The following message will be displayed.

```

-----
Enable terminal interface menu
-----
Yes - Enter
-----

```

If you have connected the cable with the module already powered on, then press the <ESC> key.

Press <Enter>. The main menu is displayed.

```

-----
AnyBus M ASI Main Menu
-----
1 - View scan-lists
2 - View all nodes
3 - View all detected nodes
4 - View single node
5 - Toggle Protected/Configuration
6 - Toggle online/offline
7 - Toggle auto addr. ON/OFF
8 - Save configuration
-----
ASi master status:
Offline phase active:  False
Power fail:           False
Normal operation:     True
Slave 0 exist:        False
Configuration match:  True
Periphery fault:      False
Mode:                 Configuration
Autoprogramming:      Not possible
Bus status:           Online
EEPROM status:        Ok
Auto addressing:      Enabled
>

```



CAUTION

When the monitor enters connected state, input relay X□□□32 turns on, and input/output update from user programs is suspended.

When the monitor is disconnected, normal operation resumes. For information on how to disconnect, read the documentation of the terminal emulator software.

The following commands are available for selection from the main menu.

Command Name	Description
1 - View scan-lists	<p>Display all ASi lists.</p> <pre> ----- AnyBus M ASi Scanlists ----- Detected Nodes 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - - - - - x - x - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - Configured Nodes 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - - - - - x - x - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - Activated Nodes 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - - - - - x - x - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - List of periphery faulted nodes 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - - - - - - - - - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - > </pre>
2 - View all nodes	<p>Display all slaves detected on the ASi line, together with the actual configuration information of each slave.</p> <pre> ----- AnyBus M ASi All Nodes ----- Select node to view Back - Esc ----- Node 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 I/O - - - - - 0 - 3 - - - - - - - - ID - - - - - 0 - 0 - - - - - - - - Param - - - - - f - f - - - - - - - - Node 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - Node 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - Node 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - > </pre>

Command Name	Description
3 - View all detected nodes	<p>Display and change information of all detected slaves.</p> <pre> ----- AnyBus M ASI Detected Nodes ----- Select node to view Back - Esc ----- Node 5 7 I/O 0 3 ID 0 0 Param f f ></pre>
4 - View single node	<p>Display and change information of a specified slave. Specify the slave to be changed by entering its address and pressing <Enter>.</p> <pre> ----- AnyBus M ASI View single node ----- Select node ----- 7<Enter> ----- Select value to change ----- 1 - Change Parameter 2 - Change NV Parameter 3 - Change NV I/O 4 - Change NV ID 5 - Change NV Ext ID1 6 - Change NV Ext ID2 7 - Change Node address ----- Values for node number: 7 I/O 3 NV I/O 3 ID 0 NV ID 0 ID1 f NV ID1 f ID2 f NV ID2 f Param f NV Param f ></pre>

Command Name	Description
5- Toggle Protected/Configuration	<p>Display and change operating mode.</p> <pre> ----- AnyBus M ASI Toggle mode ----- 1 - Configuration 2 - Protected ----- Module in configuration mode 1 or 2<Enter> </pre>
6 - Toggle online/offline	<p>Specify online or offline.</p> <pre> ----- AnyBus M ASI Online/Offline mode ----- 1 - Offline 2 - Online ----- ASi bus online 1 or 2<Enter> </pre>
7 - Toggle auto addr. ON/OFF	<p>Disables or enables automatic address assignment.</p> <pre> ----- AnyBus M ASI Auto address mode ----- 1 - Auto address on 2 - Auto address off ----- Auto addressing disabled 1 or 2<Enter> </pre>

**CAUTION**

Switching between Protected mode and Configuration mode using the monitor port during operation will cause slaves to go offline (this can be verified by checking the OFFLINE_READY* (X 17) input relay) for about one second with reading of inputs suspended and outputs turned off.

**CAUTION**

Disabling or enabling the automatic address assignment function during operation will cause slaves to go offline temporarily (this can be verified by checking the OFFLINE_READY* (X 17) input relay) with reading of inputs suspended and outputs turned off.

*: For details, see Table 5.1, "Input Relays".

9.2.2 Monitoring Function (of Firmware REV03 or Later)

After connecting the cable, power on the module. The following message will be displayed.

```

-----
Press Enter for configuration menu
-----
NOTE: I/O exchange will be halted
-----

```

Press <Enter>. The main menu is displayed.

```

-----
AnyBus M AS-i Main Menu
-----
1 - View scan-lists
2 - View all nodes
3 - View all detected nodes
4 - View single node
5 - Toggle Protected/Configuration
6 - Toggle online/offline
7 - Toggle auto addressing On/Off
8 - Save configuration
-----
Offline phase active:  False   Power fail:           False
Normal operation:     True    Slave 0 exists:       False
Configuration match:  True    Periphery fault:     False
Address collision:    False   EEPROM status:       OK
Auto address enable:  On      Auto address assign:  False
Offline mode:         Online
Autoprogramming:     Not possible
Operation mode:       Configuration
>

```



CAUTION

When the monitor enters connected state, input relay X□□□32 turns on, and input/output update from user programs is suspended.

When the monitor is disconnected, normal operation resumes. For information on how to disconnect, read the documentation of the terminal emulator software.



CAUTION

Periphery fault as reported by the monitoring function differs from the operation of the PERIPHERAL_FAULT(V2.1) input relay (X□□□29). The monitoring function also displays “Periphery fault” as True when in offline state or when ASi power failure is detected.



CAUTION

Ignore the “Address collision” and “Auto address assign” values reported by the monitoring function.

The following commands are available for selection from the main menu.

Command Name	Description
1 - View scan-lists	<p>Display all ASi lists.</p> <pre> ----- AnyBus M ASi Scanlists ----- Detected Slaves 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - X X - - - - - - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - Configured Slaves 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - X X - - - - - - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - Activated Slaves 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - X X - - - - - - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - List of periphery faulted slaves 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 - - - - - - - - - - - - - - - - 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 - - - - - - - - - - - - - - - - 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 - - - - - - - - - - - - - - - - 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 - - - - - - - - - - - - - - - - > </pre>
2 - View all slaves	<p>Display all slaves detected on the ASi line, together with the actual configuration information of each slave.</p> <pre> ----- Anybus-M AS-i View All Slaves ----- Select slave to view (dec) Back - Esc ----- Slave 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 I/O - 7 3 - - - - - - - - - - - - - ID - f f - - - - - - - - - - - - - Param - f f - - - - - - - - - - - - - Slave 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - Slave 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - Slave 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 I/O - - - - - - - - - - - - - - - - ID - - - - - - - - - - - - - - - - Param - - - - - - - - - - - - - - - - > </pre>

Command Name	Description
3 - View all detected slaves	<p>Display and change information of all detected slaves.</p> <pre> Anybus-M AS-i View All Detected Slaves ----- Select slave to view (dec) Back - Esc ----- Slave ID I/O ID1 ID2 Param 1 f 7 f f f 2 f 3 f f f > </pre>
4 - View single slave	<p>Display and change information of a specified slave. Specify the slave to be changed by entering its address and pressing <Enter>.</p> <pre> Anybus-M AS-i View single slave ----- Enter slave number (dec) ----- 1<Enter> ----- Anybus-M AS-i Slave settings ----- 1 - Change Parameter 2 - Change NV Parameter 3 - Change NV I/O 4 - Change NV ID 5 - Change NV Ext ID1 6 - Change NV Ext ID2 7 - Change Slave address ----- Values for slave number: 1 ----- Config I/O ID ID1 ID2 Param Current 7 f f f f NV 7 f f f f ----- 4bit I/O Channel0 Channel1 Channel2 Channel3 AIDI Valid IDI/AIDI 0 0x0000 0x0000 0x0000 0x0000 ODI/AODI 0 0x0000 0x0000 0x0000 0x0000 > </pre>

Command Name	Description
5- Toggle Protected/Configuration	<p>Display and change operating mode.</p> <pre>----- Anybus-M AS-i Toggle Protected/Configuration ----- 1 - Configuration 2 - Protected ----- Module in protected mode 1 or 2<Enter></pre>
6 - Toggle Online/Offline	<p>Specify online or offline mode.</p> <pre>----- Anybus-M AS-i Toggle Online/Offline ----- 1 - Offline 2 - Online ----- AS-i bus online 1 or 2<Enter></pre>
7 - Toggle auto addr. On/Off	<p>Disables or enables automatic address assignment.</p> <pre>----- Anybus-M AS-i Toggle Auto address On/Off ----- 1 - Auto addressing On 2 - Auto addressing Off ----- Auto addressing enabled 1 or 2<Enter></pre>



CAUTION

- Switching from Configuration mode to Protected mode using the monitor port during operation will cause slaves to go offline (this can be verified by checking the OFFLINE_READY* (X 17) input relay) for about one second with reading of inputs suspended and outputs turned off.
- Switching from Protected mode to Configuration mode using the monitor port during operation will neither cause slaves to go offline nor interrupt I/O operation.
- Disabling or enabling automatic address assignment during operation will neither cause slaves to go offline nor interrupt I/O operation.

*: For details, see Table 5.1, "Input Relays".

9.3 Setup Function

9.3.1 Setup Function (of Firmware REV02 or Earlier)

Slave address setup and configuration registration can be performed via the monitor port. Connect the monitor port of the module to the serial port of a PC using an RS-232C cross cable.

- **Slave Address Setup**

You can perform slave address setup without using an addressing device, but you can only proceed with one slave at a time in Configuration mode by connecting one blank slave (slave with address 0), and changing its address from 0 to the required address.

```

-----
AnyBus M ASI Main Menu
-----
1 - View scan-lists
2 - View all nodes
3 - View all detected nodes
4 - View single node
5 - Toggle Protected/Configuration
6 - Toggle online/offline
7 - Toggle auto addr. ON/OFF
8 - Save configuration
-----

ASi master status:
Offline phase active:  False
Power fail            False
Normal operation:     True
Slave 0 exist:        False
Configuration match:  True
Periphery Fault:     False
Mode:                 Configuration
Autoprogramming:     Not possible
Bus status:           Ok
Auto addressing:      Enabled
>4<ENTER>
-----
AnyBus M ASI View single node
-----
Select node
-----
0<ENTER>

```

Select "4 – View single node" from the main menu.

Enter 0 and press <Enter>.

TIP

To change the address of a slave other than a blank slave, set the address to 0 temporarily before setting it to the new address.



CAUTION

- You cannot connect two or more blank slaves concurrently.
- Always perform slave address modification in Configuration mode. When the module is in Protected mode with automatic address assignment enabled, setting to address 0 is not allowed.

```
-----
Select value to change
-----
1 - Change Parameter
2 - Change NV Parameter
3 - Change NV I/O
4 - Change NV ID
5 - Change NV Ext ID1
6 - Change NV Ext ID2
7 - Change Node address
-----

Values for node number: 0

I/O      0      NV I/O    0
ID       A      NV ID     0
ID1      0      NV ID1    0
ID2      0      NV ID2    0
Param    0      NV Param  0
>7<ENTER>
-----
Change node address
-----
New node address
Back - Esc
-----

Old node address:      0
>New address<ENTER>
```

Select "7 – Change Node address".

Enter the new address number and press
<Enter>.

● Save Configuration

This function saves into EEPROM the slave configuration detected when the module is put into Configuration mode. The saved configuration replaces the current list of projected slaves (LPS).

```

-----
AnyBus M ASI Main Menu
-----
1 - View scan-lists
2 - View all nodes
3 - View all detected nodes
4 - View single node
5 - Toggle Protected/Configuration
6 - Toggle online/offline
7 - Toggle auto addr. ON/OFF
8 - Save configuration
-----

ASi master status:
Offline phase active:      False
Power fail:                False
Normal operation:         True
Slave 0 exist:            False
Configuration match:      True
Periphery fault:          False
Mode:                      Configuration
Autoprogramming:          Not possible
Bus status:                Online
EEPROM status:             Ok
Auto addressing:           Enabled
>8<ENTER>

-----
AnyBus M ASI Save configuration
-----
Enter to save configuration
-----
<ENTER>

```

Select "8 – Save configuration" from the main menu.

Press <ENTER>.

Before saving the configuration, check the configuration by selecting "1 – View scan-lists" from the main menu.

You can also save the detected configuration by turning the MODE switch on the module front panel to the SET position for more than 3 seconds.



CAUTION

Registering slave configuration to the LPS using the MODE switch during operation will suspend reading of slave inputs and turn off slave outputs temporarily.

9.3.2 Setup Function (of Firmware REV03 or Later)

Slave address setup and configuration registration can be performed via the monitor port. Connect the monitor port of the module to the serial port of a PC using an RS-232C cross cable.

● Slave Address Setup

You can perform slave address setup without using an addressing device, but you can only proceed with one slave at a time in Configuration mode by connecting one blank slave (slave with address 0), and changing its address from 0 to the required address.

```

-----
Anybus-M AS-i Main Menu
-----
1 - View scan-lists
2 - View all slaves
3 - View all detected slaves
4 - View single slave
5 - Toggle Protected/Configuration
6 - Toggle Online/Offline
7 - Toggle auto addressing On/Off
8 - Save configuration
-----
Offline phase active:False   Power fail:           False
Normal operation:      True    Slave 0 exists:      False
Configuration match:  True    Periphery fault:    False
Address collision:    False   EEPROM status:      OK
Auto address enable:  On      Auto address assign:True
Offline mode:         Online
Autoprogramming:     Not possible
Operation mode:      Protected
>4<ENTER>
-----
Anybus-M AS-i View single slave
-----
Enter slave number (dec)
-----
0<ENTER>

```

Select "4 – View single slave" from the main menu.

Enter 0 and press <Enter>.

TIP

To change the address of a slave other than a blank slave, set the address to 0 temporarily before setting it to the new address.



CAUTION

- You cannot connect two or more blank slaves concurrently.
- Always perform slave address modification in Configuration mode. When the module is in Protected mode with automatic address assignment enabled, setting to address 0 is not allowed.

```

-----
Anybus-M AS-i Slave settings
-----
1 - Change Parameter
2 - Change NV Parameter
3 - Change NV I/O
4 - Change NV ID
5 - Change NV Ext ID1
6 - Change NV Ext ID2
7 - Change Slave address
-----
Values for slave number: 0

Config  I/O  ID  ID1  ID2  Param
Current 7   f   f   f   f
NV      f   f   f   f   f

          4bit I/O  Channel0  Channel1
AIDI Valid          -           -
IDI/AIDI           0           0x0000   0x0000
ODI/AODI           0           0x0000   0x0000
>7<ENTER>
-----
Change slave address
-----
New slave address
Back - Esc
-----

Old slave address:      0
>new address<ENTER>

```

Select "7 – Change Slave address".

Enter the new address number and press <Enter>.

● Save Configuration

This function saves into EEPROM the slave configuration detected when the module is put into Configuration mode. The saved configuration replaces the current list of projected slaves (LPS).

```

-----
Anybus-M AS-i Main Menu
-----
1 - View scan-lists
2 - View all slaves
3 - View all detected slaves
4 - View single slave
5 - Toggle Protected/Configuration
6 - Toggle Online/Offline
7 - Toggle auto addressing On/Off
8 - Save configuration
-----
Offline phase active:False      Power fail:          False
Normal operation:    True       Slave 0 exists:     False
Configuration match: True       Periphery fault:    False
Address collision:   False      EEPROM status:      OK
Auto address enable: On        Auto address assign:True
Offline mode:        Online
Autoprogramming:    Not possible
Operation mode:      Protected
>8<ENTER>
-----
Anybus-M AS-i Save configuration
-----
Press Enter to save configuration
-----
<ENTER>

```

Select "8 – Save configuration" from the main menu.

Press <Enter>.

Before saving the configuration, check the configuration by selecting "1 – View scan-lists" from the main menu.

You can also save the detected configuration by turning the MODE switch on the module front panel to the SET position for more than 3 seconds.



CAUTION

Registering slave configuration to the LPS using the MODE switch during operation will neither turn off slave outputs nor interrupt operation.

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10. Cabling Guidelines (IMPORTANT)

This chapter describes cabling precautions for ensuring proper operation of the FA-M3 ASi Master Module.

When connecting slaves to the FA-M3 ASi Master Module (F3LA01), observe the recommended conditions on cable length and connection mode, as well as precautions described in this chapter.



CAUTION

Recommended Conditions When Not Using An Extender:

- Keep the total cable length within 100 m. This cable length includes the length of the ASi power supply cable.
- Install the ASi power supply beside the ASi master (F3LA01), no further than 3 m away.

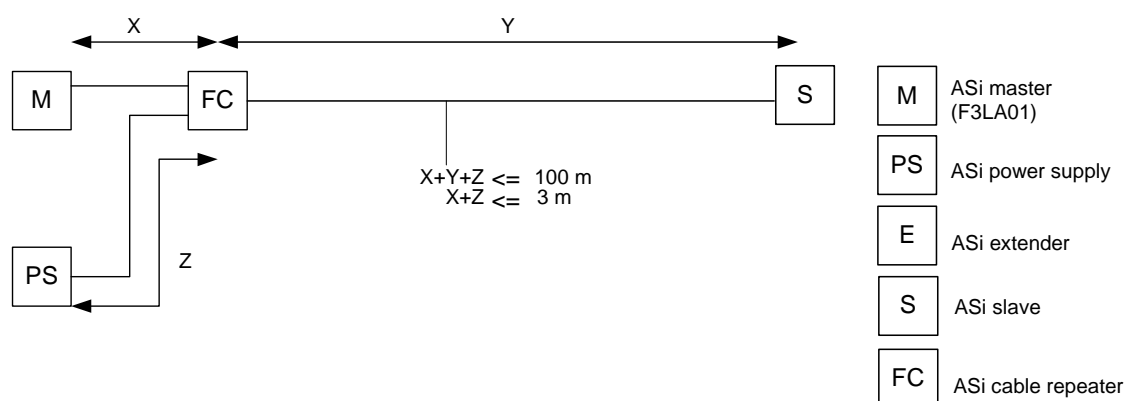


Figure 10.1 When Not Using An Extender

Recommended Conditions When Using An Extender

- Keep the total cable length between the ASi master (F3LA01) and the extender within 100 m.
- Install the ASi power supply on the secondary side of the extender, no further than 3 m away.
- Keep the total cable length on the secondary side of the extender within 100 m. If 2 extenders are used, keep the total cable length within 300 m.

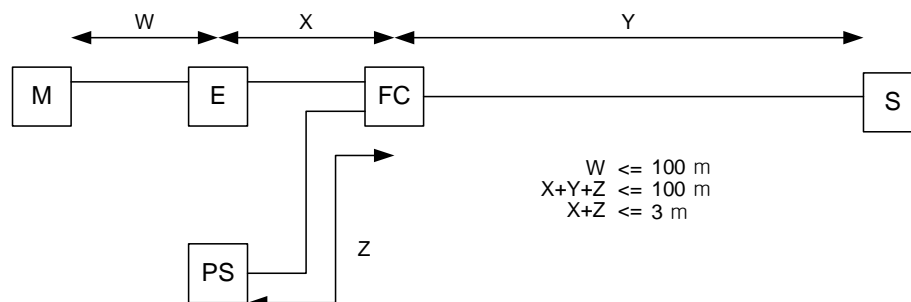


Figure 10.2 When Using An Extender

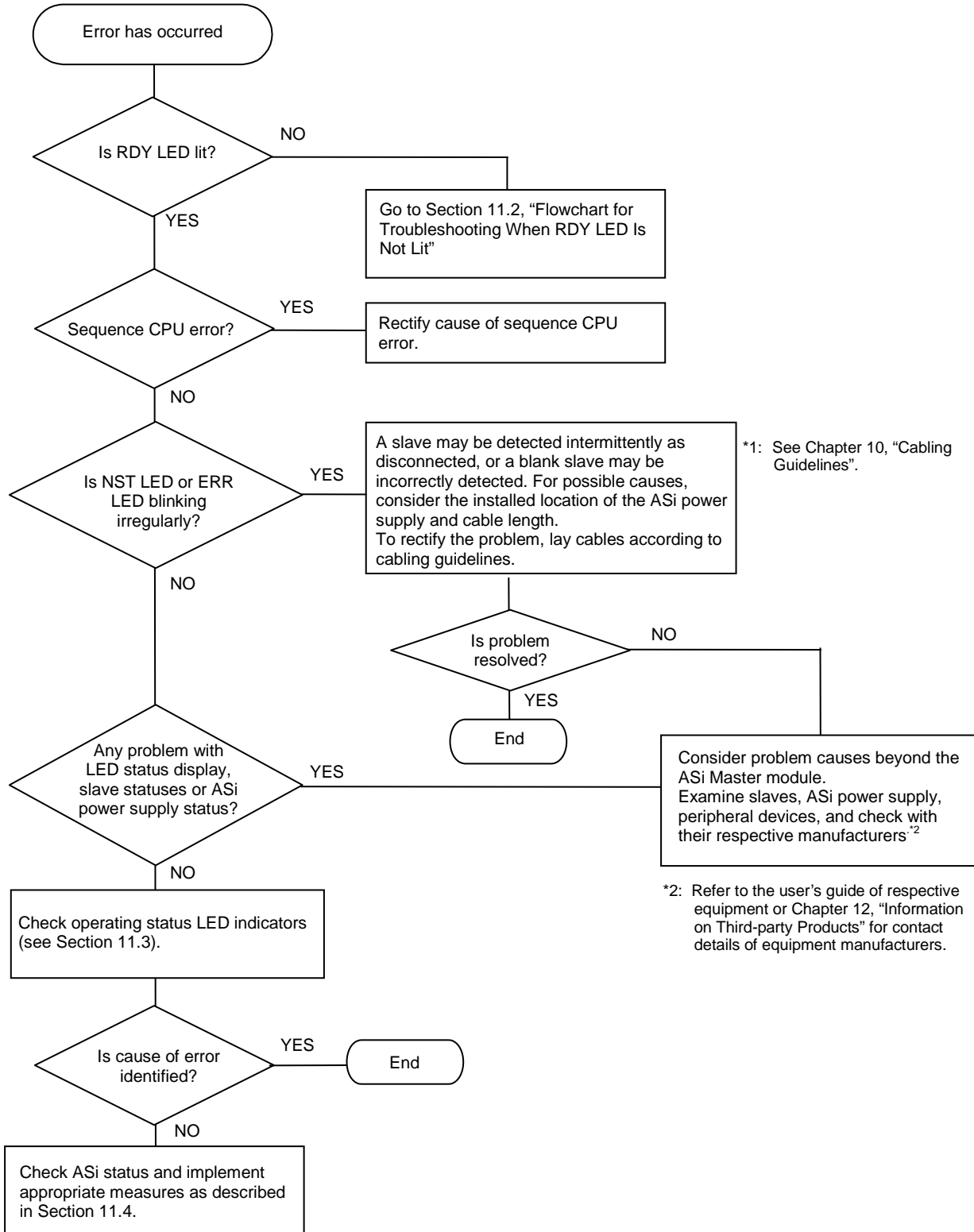
- When using FCs (ASi cable repeaters) to perform branching, minimize branch locations as far as possible.

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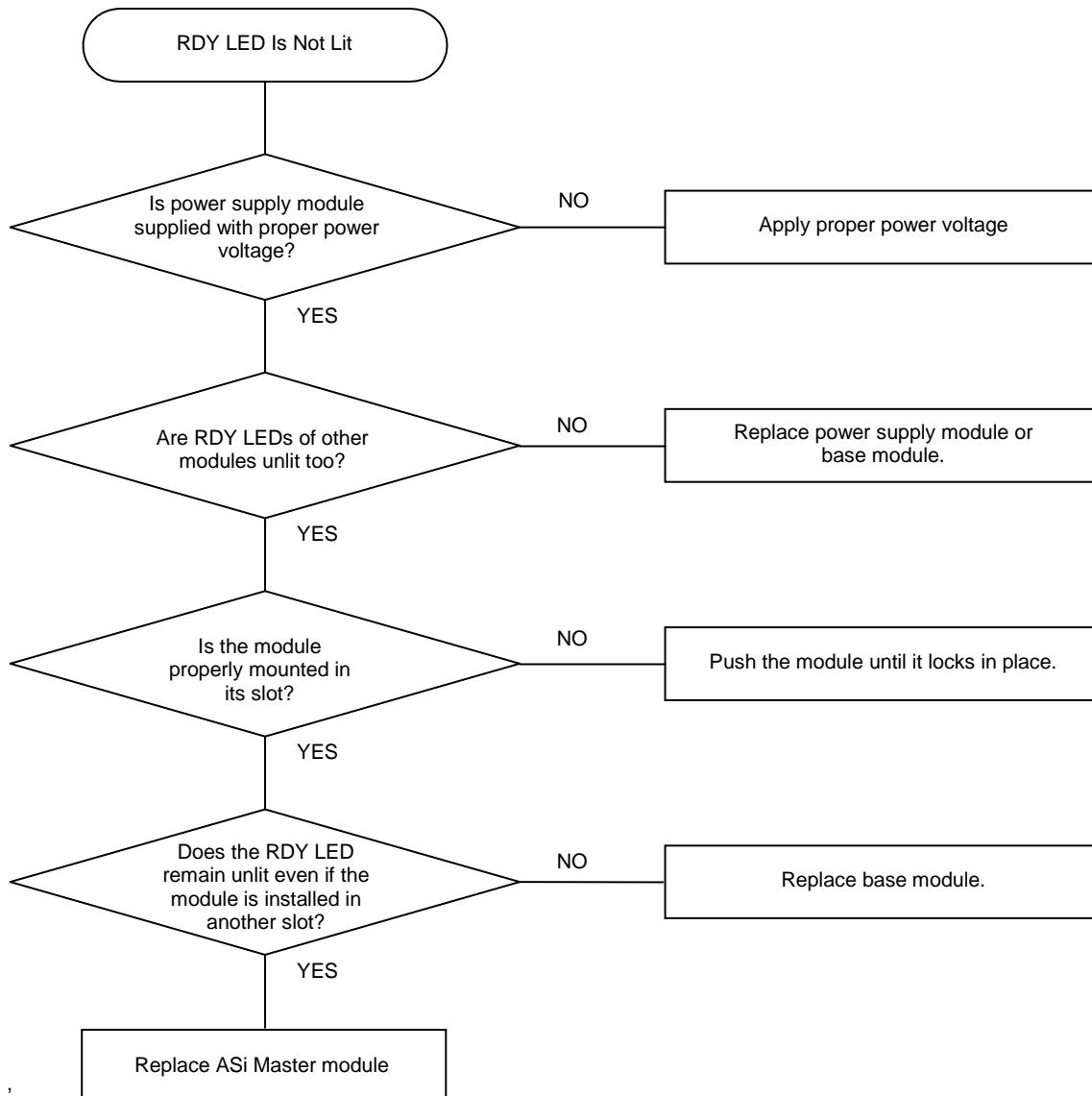
11. Troubleshooting

11.1 Troubleshooting Flowchart

This chapter provides information and flowchart for troubleshooting purposes when using the ASi Master Module.



11.2 Flowchart for Troubleshooting When RDY LED Is Not LIT



11.3 Checking Operating Status LED Indicators

Table 11.1 Checking Operating Status LED Indicators

Status		RDY	MST	NST	ERR	Trouble-shooting Number
Protected mode	Operating normally	●	●	☼	○	11.1-1
	Configuration mismatch (presence of unconnected or unregistered slaves)	●	●	●	○	11.1-2
	In offline mode	●	●	○	●	11.1-3
	(Locked) Invalid switch position	●	☼☼	☼☼	○	11.1-4
Configuration mode	Operating normally	●	☼	☼	○	11.1-5
	Configuration mismatch (presence of unconnected or unregistered slaves)	●	☼	●	○	11.1-6
	Blank slave present.	●	☼	○	☼	11.1-7
	In offline mode	●	☼	○	●	11.1-8
	Blank slave present. Invalid switch position. ^{*2}	●	☼☼	☼☼	☼	11.1-9
	Registration to LPS received	●	○	○	○	11.1-10
ASi power supply error		●	○	—	☼☼	11.1-11
RDY is lit but module is in a state other than those listed above.		●				11.1-12

○: Off ●: Lit ☼: blinking at 1.2Hz ☼☼: Fast blinking at 4.8Hz

Table 11.2 Troubleshooting According to State of Operating Status LED Indicators

Troubleshooting Number	Problem or Status Description	Rectification
11.1-1	Module is operating normally in Protected mode.	—
11.1-2	The list of slaves detected over the ASi line (LDS) is not the same as the list of registered slaves (LPS). Some slave registered in the LPS has failed or some slave on the ASi line is not registered. *: For details on LDS and LPS, see Section 4.1.	Compare the LPS and LDS to determine the addresses of failed slave(s) or unregistered slave(s). ● If a failed slave is found, check the cable connection and status of the slave ^{*1} ● If an unregistered slave is found, disconnect the slave from the ASi line.
11.1-3	The ASi Master module is normally in online mode. If for some reason it remains in offline mode, contact Yokogawa.	Contact and check with Yokogawa.
11.1-4	The mode switch was turned from PROTECT position to CONFIG position. In this case, the module remains in Protected mode, without transiting to Configuration mode. To switch to Configuration mode, turn the switch to the SET position for more than 3 seconds.	—
11.1-5	Module is operating normally in Configuration mode.	—
11.1-6	The list of slaves detected over the ASi line (LDS) is not the same as the list of registered slaves (LPS). Some slave in the LPS has failed or some slave on the ASi line is not registered. *: For details on LDS and LPS, see Section 4.1.	If registration to LPS has not been done, do it. If registration has been completed, check the LPS and LDS against the expected slave configuration. Perform address setup and LPS registration again according to the expected slave configuration ^{*2}
11.1-7	A blank slave (slave with address 0) is present on the ASi line.	If you are in the process of address setup, complete the setup. If not, check the LPS and LDS against the expected slave configuration. Perform address setup and LPS registration again according to the intended slave configuration ^{*2}
11.1-8	The ASi Master module is normally in online mode. If it is in offline mode for whatever reason, contact Yokogawa.	Contact and check with Yokogawa.
11.1-9	The module failed to switch from Configuration mode to Protected mode because a blank slave was present. In this case, the module remains in Configuration mode even if the mode switch is in the PROTECT position.	—
11.1-10	Receiving a registration to the LPS.	—
11.1-11	An ASi power supply error has occurred, or the ASi power supply is not connected.	Check the cable connection of the ASi power supply. ^{*1}
11.1-12		Contact Yokogawa.

*1: Contact the respective manufacturers of individual slaves and the ASi power supply for details. Refer to the user's guide of respective equipment or Chapter 12, "Information on Third-party Products" for contact details of equipment manufacturers.

*2: See Chapter 6, "Startup Preparation".

11.4 Checking ASi Status

Table 11.3 Checking ASi Status

Relay Number X□□□**	Description		Trouble- shooting Number
X□□□17	OFFLINE_READY	ON : offline OFF : online	11.3-1
X□□□18	POWER_FAIL	ON : ASi power supply error OFF : ASi power supply normal	11.3-2
X□□□19	NORMAL_OPERATION	ON : operating normally OFF : communications not allowed (e.g. during initialization)	11.3-3
X□□□20	OPERATION_MODE	ON : Configuration mode OFF : Protected mode	11.3-4
X□□□21	AUTO_PROG_AVIL	ON : Automatic programming available. Module is in Protected mode; AUTO_ADDRESS_ENABLE=1 and there is only one failed slave. OFF : Automatic address assignment function is disabled, or function is enabled but there is no failed slave.	11.3-5
X□□□22	Reserved		
X□□□23	LDS_0	ON : A blank slave (slave with address 0) is present. OFF : No blank slave (slave with address 0) is present.	11.3-6
X□□□24	CONFIG_OK	ON : List of detected slaves (LDS) matches list of projected slaves (LPS) OFF : List of detected slaves (LDS) is different from list of projected slaves (LPS)	11.3-7
X□□□25	OFFLINE	ON : Offline mode OFF : Online	11.3-8
X□□□26	Reserved		
X□□□27	EEPROM_OK	ON : EEPROM is normal OFF : EEPROM error	11.3-9
X□□□28	AUTO_ADDRESS_ENABLE	ON : Automatic address assignment is enabled OFF : Automatic address assignment is disabled (by command execution)	11.3-10
X□□□29	PERIPHERAL_FAULT (V2.1)	ON : Slave peripheral fault has occurred ² OFF : No slave peripheral fault	11.3-11
X□□□30	Reserved		
X□□□31			
X□□□32	MONITOR_PORT_IN_USE	ON : in use OFF : not used	11.3-12

"□□□" in a relay number denotes the slot number where the ASi Master module is installed.

For details on ASi statuses, see Chapters 4 and 8

Table 11.4 Troubleshooting According to ASi Status

Troubleshooting Number	Problem or Status Description	Rectification
11.3-1	This is not an error state. Switching between Protected mode and Configuration mode using the MODE switch during operation will cause slaves to go <u>offline</u> for about one second with reading of inputs suspended and outputs turned off. For a module installed with firmware REV02 or earlier, switching from Protected mode to Configuration mode, as well as disabling or enabling the automatic address assignment function using the monitor port during operation will cause slaves to go <u>offline</u> temporarily with reading of inputs suspended and outputs turned off.	–
11.3-2	If the POWER_FAIL relay is on, either an error has occurred in the ASi power supply, or the ASi power supply is not connected.	Check the cable connection of the ASi power supply. ¹
11.3-3	If the NORMAL_OPERATION is off, the module is performing initialization or communications is not allowed.	Check other errors to identify possible causes and rectify the problem.
11.3-4	This is not an error state.	–
11.3-5	This is not an error state.	–

Troubleshooting Number	Problem or Status Description	Rectification
11.3-6	If the LDS_0 relay is on, a blank slave (slave with address 0) is present on the ASi line.	If you are in the process of address setup, complete the setup. If not, check the LPS and LDS against the expected slave configuration. Perform address setup and LPS registration again according to the intended slave configuration ^{*2}
11.3-7	If the CONFIG_OK relay is off, it means that: The list of slaves detected over the ASi line (LDS) is not the same as the list of registered slaves (LPS). Some slave in the LPS has failed or some slave on the ASi line is not registered. *: For details on LDS and LPS, see Section 4.1.	If the module is in Configuration mode, refer to troubleshooting number 11.1-6 in Table 11.2, "Troubleshooting According to State of Operating Status LED Indicators". If the module is in Protected mode, refer to troubleshooting number 11.1-2 in Table 11.2, "Troubleshooting According to State of Operating Status LED Indicators".
11.3-8	If the OFFLINE relay is on, the module is in offline mode. The ASi Master module is normally in online mode. If it is in offline mode for whatever reason, contact Yokogawa.	Contact Yokogawa.
11.3-9	If the EEPROM_OK relay is off, an error has occurred in the internal EEPROM.	Replace the module.
11.3-10	This is not an error state.	
11.3-11	If PERIPHERAL_FAULT relay is on, a peripheral fault has occurred on a slave. Possible causes may be auxiliary power supply error, address setup not done, and so on, depending on individual slave types.	Identify the slave experiencing peripheral fault using the LPF, and check its status. *: For details on LPF, see Subsection 4.1.4.
11.3-12	If the MONITOR_PORT_IN_USE relay is on, The monitor port is in use. Input/output update using user programs is not allowed.	If you no longer need to use the monitor port function, exit from the monitor port function, and remove the cable from the monitor port.

*1: Contact the respective manufacturers of individual slaves and the ASi power supply for details. Refer to the user's guide of respective equipment or Chapter 12, "Information on Third-party Products" for contact details of equipment manufacturers.

*2: See Chapter 6, "Startup Preparation".

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12. Information on Third-party Products

■ Obtaining Information on Third-party Products

The AS-interface is an open, multi-vendor network. AS-interface compatible slave equipment, power supplies, addressing devices and cables are available from many vendors.

Enquiries about AS-interface compatible equipment can be directed to the AS-International Association. Information is also available from its website indicated below.

URL for AS-International Association: <http://www.as-interface.net/>

TIP

The above website addresses may be subject to change without prior notice.

13. Differences of Firmware REV03 or Later from REV02 or Earlier

This chapter describes the differences between firmware REV02 or earlier and firmware REV03 or later for the F3LA01-0N.

13.1 System Behavior When Unlocking (Switching from Protected to Configuration Mode)

System behavior when unlocking (switching from protected mode to configuration mode) varies with the firmware revision.

	Firmware REV02 or Earlier	Firmware REV03 or Later
Executed using MODE switch	Slaves go offline for about one second with reading of inputs suspended and outputs turned off.	Slaves go offline for about one second with reading of inputs suspended and outputs turned off.
Executed using monitor port function	Slaves go offline for about one second with reading of inputs suspended and outputs turned off.	Operation continues without going offline.

SEE ALSO

For details on the unlock function (switching from protected mode to configuration mode), see Section 3.2, "Operating Mode," Subsection 9.2.1, "Monitoring Function (of Firmware REV02 or Earlier)" and Subsection 9.2.2, "Monitoring Function (of Firmware REV03 or Later)."

13.2 System Behavior When Registering Slave Configuration to LPS

System behavior when registering slave configuration to the LPS varies with the firmware revision.

	Firmware REV02 or Earlier	Firmware REV03 or Later
Executed using MODE switch	Reading of slave inputs is suspended and slave outputs are turned off temporarily.	Reading of slave inputs is suspended and slave outputs are turned off temporarily.
Executed using monitor port function	Reading of slave inputs is suspended and slave outputs are turned off temporarily.	Operation continues without interruption.

SEE ALSO

For details on registration of slave configuration to LPS, see Section 3.2, "Operating Mode," Subsection 9.3.1, "Setup Function (of Firmware REV02 or Earlier)" and Subsection 9.3.2, "Setup Function (of Firmware REV03 or Later)."

13.3 System Behavior When Disabling or Enabling Automatic Address Assignment

System behavior when disabling or enabling automatic address assignment varies with the firmware revision.

	Firmware REV02 or Earlier	Firmware REV03 or Later
Executed using MODE switch	Slaves go offline temporarily with reading of inputs suspended and outputs turned off.	Operation continues without going offline.
Executed using monitor port function	Slaves go offline temporarily with reading of inputs suspended and outputs turned off.	Operation continues without going offline.

SEE ALSO

For details on how to disable or enable automatic address assignment, see Section 7.2, "Command Setup", Subsection 9.2.1, "Monitoring Function (of Firmware REV02 or Earlier)" and Subsection 9.2.2, "Monitoring Function (of Firmware REV03 or Later)."

13.4 Monitor Port Function Display

The terminal emulator display varies with the firmware revision when it is connected to the monitor port of the module.

SEE ALSO

For details on the Monitor port function, see Subsection 9.2.1, "Monitoring Function (of Firmware REV02 or Earlier)," Subsection 9.2.2, "Monitoring Function (of Firmware REV03 or Later)," Subsection 9.3.1, "Setup Function (of Firmware REV02 or Earlier)" and Subsection 9.3.2, "Setup Function (of Firmware REV03 or Later)."

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Revision Information

Document Name : ASi Master Module

Document No. : IM 34M06H33-01E

Edition	Date	Revised Item
1st	July 2004	New publication
2nd	Oct 2011	Module revision for component improvement or obsolescence

Written by PLC Solution Department
IA Systems Business Headquarters
Yokogawa Electric Corporation

Published by Yokogawa Electric Corporation
2-9-32 Nakacho, Musashino-shi, Tokyo, 180-8750, JAPAN

Printed by Kohoku Publishing & Printing Inc.
