SHARP

Version 1.0
Produced in Feb. 2003

Sharp Programmable Controller
New Satellite JW30H

Model name

Control module

JW-32CUM1

User's Manual

Thank you for purchasing our JW-32CUM1 control module for the JW30H series programmable controller.
This manual describes the system configuration of the JW-32CUM1, and gives instructions for using it.
Before using it, read this manual thoroughly to become familiar with functions of the JW-32CUM1.
The following other manuals are also available for the JW30H series (JW-32CUM1). We recommend reading these together with this manual. (The items below are not described in this manual. Therefore, please refer to the respective manual for details about the following topics.)

Manual name	Details that affect the use of the JW-32CUM1
JW30H User's Manual, Hardware Version	The descriptions in the items below give methods for operating the JW30H (JW-32CUM1) and they are the same for other control modules (such as JW-33CUH1). - System design procedures and precautions. - Use and wiring methods for the power supply module, I/O modules, expansion rack panels, and I/O bus expansion adapters. - Precautions for using I/O modules. - I/O module specifications. - ROM operation. - Trial operation.
JW30H Programming Manual, Ladder Instruction Version	Software descriptions concerning the data memory, program memory, system memory, and commands for the JW-32CUM1 (control section). References to the "JW-32CUH1" in this manual should be read as "JW-32CUM1".
JW-21CM User's Manual	When the JW-32CUM1 is used for communicating with a personal computer through the JW-32CUM1's communication port. The descriptions for computer link commands referring to the "JW-32CUH1" apply equally to the "JW-32CUM1."

- Beside the manuals above, also refer to each of the manuals for JW30H option modules, special I/O modules, and support tools (JW-14PG etc.).

Notes

- Should you have any questions and inquiries, please feel free to contact our dealers.

- Contents of this booklet may be revised for improvement without notice.

Safety Precautions

Read this manual and attached documents carefully before installation, operation, maintenance and checking in order to use the machine correctly. Understand all of the machine knowledge, safety information, and cautions before starting to use. In this instruction manual, safety precautions are ranked into "danger" and "caution" as follows.

Danger : Wrong handling may possibly lead to death or heavy injury.

Caution : Wrong handling may possibly lead to medium or light injury.

Even in the case of Caution, a serious result may be experienced depending on the circumstances. Anyway, important points are mentioned. Be sure to observe them strictly.

The picture signs of Prohibit and Compel are explained below.

: It means don’ts. For example, prohibition of disassembly is indicated as ( ).

: It means a must. For example, obligation of grounding is indicated as ( ).

(1) Installation

Caution

- Use in the environments specified in the catalog and instruction manual.
  Electric shock, fire or malfunction may be caused when used in the environments of high temperature, high humidity, dusty or corrosive atmosphere, vibration or impact.
- Install according to the manual.
  Wrong installation may cause drop, trouble or malfunction.
- Never admit wire chips or foreign matter
  Or fire, trouble or malfunction may be caused.

(2) Wiring

Compel

- Be sure to ground.
  Unless grounded, electric shock or malfunction may be caused.

Caution

- Connect the rated power source.
  Connection of a wrong power source may cause a fire.
- Wiring should be done by qualified electrician.
  Wrong wiring may lead to fire, trouble or electric shock.

(3) Use

Danger

- Don’t touch the terminal while the power is being supplied or you may have on electric shock.
- Assemble the emergency stop circuit and interlock circuit outside of the programmable controller. Otherwise breakdown or accident damage of the machine may be caused by the trouble of the programmable controller.

Caution

- "Run" or "stop" during operation should be done with particular care by confirming safety.
  Misoperation may lead to damage or accident of the machine.
- Turn ON the power source in the specified sequence. Turn ON with wrong sequence may lead to machine breakdown or accident.

(4) Maintenance

Danger

- Never connect battery in wrong polarity, or charge, disassemble, heat, throw into fire, or short-circuit. Or it may be broken or ignited.
- Do not subject the battery to impact of any kind. Do not pull on the lead wires of the battery, or liquid leakage accident may occur.

Prohibit

- Don’t disassemble or modify the modules.
  Or fire, breakdown or malfunction may be caused.

Caution

- Turn OFF the power source before detaching or attaching the module.
  Or electric shock, malfunction or breakdown may be caused.
- Replace with the fuses in specified ratings only.
  Or electric shock, malfunction may be caused.

Table of contents

Chapter 1: Outline

The JW-32CUM1 is a control module for the JW30H programmable controller. It has a built in communication function. Its control section is completely compatible with all JW30H series modules (equivalent to JW-32CUH1). It occupies two slots (the same as the JW-32CUH1) on a basic rack panel. Just install it on the proprietary JW-34KBM basic rack panel and the compactly designed JW-32CUM1 will provide you with communication. By installing a JW-32CUM1, the system does not need a network module, which saves space and cuts cost.

[1] DeviceNet master function (full time use is possible)

The JW-32CUM1 can connect to slave stations that conform to DeviceNet specifications (common throughout North America). This is a useful function for common use in facilities both inside and outside Japan.

- The JW-32CUM1 employs a multi-drop system that can connect between nodes using a single proprietary cable, significantly reducing electrical wiring labor and material costs. The system also can contain branches by using a T-branch tap.
- The communication time can be reduced by dividing a system into groups.
- The scan list editing function affords easy I/O allocation of slave stations, so there is no need for a configurator to make programs.

[2] Select any one of four communication functions with switches

Communication with SHARP programmable controllers is possible by using a twisted-pair cable. Select any one of four master station functions: Remote I/O, data link DL1/DL9, and M-net.

(1) Remote I/O master station function

Using the JW-32CUM1 as master station, you can configure a remote I/O system as slave station using I/O modules (such as the slave module JW-21RS) for the JW20H/30H.

(2) Data link DL1 master station function (N: M method)

Making effective use of memory, the JW-32CUM1 provides interlocks between each process step and a distributed control operation.

(3) Data link DL9 master station function (1: N method)

This function does not support communication between slave stations. Each slave station must communicate with a master station. Use this function to construct a system with lots of link points and hierarchic control.

(4) M-net (master station) function

Construct a network with link modules mounted SHARP programmable controllers, other manufacturers' programmable controllers, measuring instruments, and industrial robots that are M-net compatible.

[3] Computer link (equipped with 2 ports)

The JW-32CUM1 is equipped with two communication ports for RS-232C and RS-422A communications (the COMM2 port is for RS-232C use only). Using these ports, the JW-32CUM1 can communicate with a personal computer or a programmer, etc.

Chapter 2: Precautions for Use

When using the JW-32CUM1 (JW-34KBM), pay attention to the following points (1) to (6) that describe differences from other control modules for the JW30H series (such as the JW-32CUH1).

(1) Installation

The JW-32CUM1 can be installed on a JW-34KBM basic rack panel. It cannot be installed on other basic rack panels (such as the JW-34KB).

Other control modules, such as JW-32CUH1, cannot be installed on the JW-34KBM basic rack panel.

(2) Allocation of relay numbers

With a JW30H system that is constructed using the JW-32CUM1 (JW-34KBM), the first rack number 0 address must be ⊐0004 (relay number 00040). Slot numbers for installing I/O, special I/O, I/O link, and other option modules must start with the number "2."

(3) DeviceNet communications for the JW-32CUM1

- The node address is fixed to "0: Master."
- The data memory area used for the DeviceNet is fixed. (The Module No. switch is fixed to 0.)

(4) General-purpose communications with the JW-32CUM1 (remote I/O, data link DL1/DL9, and M-net)

- The station number is fixed to "0: Master station."
- The data memory area for general-purpose communications is fixed. (The Module No. switch is fixed to 0.)
- When using the JW-32CUM1 with remote I/O, a JW-21CM cannot be used as a remote I/O master station on the same JW-34KBM basic rack panel.

(5) Option modules

Up to four option modules (e.g. the JW-22CM) can be installed on the JW-34KBM (JW-32CUM1). Set the module No. switch on option modules to some number other than 0.

(The general-purpose communication section of the JW-32CUM1 uses the 0 area.)

(6) I/O link master modules and DeviceNet master modules

- Only one JW-23LMH can be installed on a JW-34KBM (JW-32CUM1). Only operation modes 7 and 8 can be used.

  (The DeviceNet section of the JW-32CUM1 uses the areas for operation modes 1 to 6.)
- Up to three JW-20DNs can be installed on the JW-34KBM (JW-32CUM1). Set the module No. switch to some number other than 0.

  (The DeviceNet section of the JW-32CUM1 uses the 0 area.)

The precautions below apply to the JW30H (with a JW-32CUM1) and are the same as for other control modules (JW-32CUH1 etc.).

(7) Installation

Avoid keeping the JW30H in the following conditions:

- Direct sunlight.
- Relative humidity which exceeds 35 to 90 %. No condensation due to rapid temperature variation.
- Corrosive and flammable gases.

(8) Operation

- Prepare an emergency stop circuit at the external relay circuit, and connect the halt output from the JW30H. (The halt output is installed in the power supply module.)
- Don't handle switches and connectors excessively by force.

(9) Grounding

Prepare a class-3 grounding of the JW30H separately. Never co-ground with high power equipment grounding lines.

(10) Installation

- Securely fasten the retaining screws in each module, and confirm again that it is fastened prior to supply power. Looseness of screws may cause malfunction.
- Firmly connect cable (I/O expansion cable), connecting to the basic/expansion rack panel. Confirm connectors are fastened prior to supplying power. Looseness may cause malfunction.
- Each module has a ventilation hole to allow for cooling. Do not block the holes.
- Install the JW30H horizontally against a control panel (parallel, wall-mount installation), otherwise (vertical, wall-mount installation) temperature increase may occur.

(11) Wiring

- Be aware not to cross the connection polarity of 5 VDC on the expansion rack panel. Otherwise, rack panel and I/O module etc. may be damaged.
- Keep the input/output lines away from high voltage or strong current lines such as power lines.

(12) Cautions for static electricity

Significant volume of static electricity may build up on the human body in extremely dry conditions. Prior to touching the JW30H, discharge the static electricity by touching grounded metals.

(13) Cleaning

Use the soft cloths for cleaning. Volatile solvents (alcohol, paint thinner, freon etc.) and wet rags may cause deformation or change of color.

(14) Storage

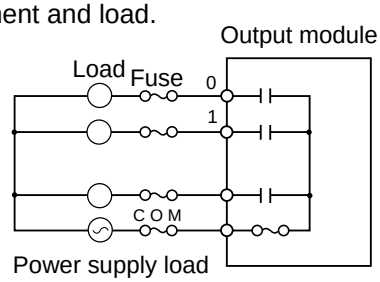
Keep the JW30H in cool and dry conditions as it equipped with a battery for memory backup. High ambient temperature may shorten its battery life.
Do not put other objects on the JW30H.

(15) Short circuit protection

If the load connected to the output terminal shorts circuits, the output device or the printed circuit board may burn. Insert a protective fuse in the output lines.
We recommend that you install protective fuses in each line, even if the external devices have fuses for each common unit. These common line fuses are to protect the device against burnout caused by overload, and do not protect against overcurrent of output element and load.

- **Precautions when using a rated voltage power source**

  When you use a power supply for loads that have a current limiting circuit, provide fuses that match the load rating of each output module. If the load is shorted, and the current limiting circuit functions, the short-circuit current will flow at current level lower than needed to blow the fuse.



(16) Insulation transformer

Choose isolation transformer with a capacity 20% or more higher than the rated load. When a transformer of the same capacity as that of the rated load is used, the primary input voltage might exceed the rated transformer capacity.

Power supply module	Power consumption*	Transformer capacity
JW-21PU	60 VA or less	72 VA or more
JW-22PU		
JW-31PU		
JW-33PU	70 VA or less	85 VA or more

* Maximum load capacity when one power supply module is used.

(17) Max. No. of I/O points

Each control module has a maximum number of input and output points, but the number of relay points affecting the maximum number of input and output points varies with the type of the module. It must be noted that it is different from the number of relay assignments.

Kinds of module	Allocation No. of points	The number of relay points affecting the maximum number of I/O points
8 points input/output	16	16
16 points input/output	16	16
32 points input/output / I/O	32	32
Special I/O (64 points input/output)	16	64
Special I/O (except for 64 points input/output)	16	0
Option	16	0
I/O link, DeviceNet	16	0
Vacant slot	16	0

Max No. of I/O points	In case of all 16 points module	In case of all 32 points module	In case of all 64 points module
1024 points	16 points x 60 sets = 960 points	32 points x 32 sets = 1024 points	64 points x 16 sets = 1024 points

(18) Notes for using communication module, support tool

When you use a JW30H communication module or support tool, check the version you are using carefully. Depending on the version, some limitation on the use may be involved, or it may not be possible to use it.

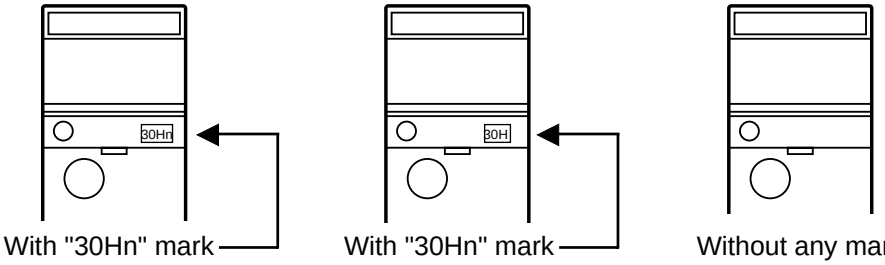
1. Communication modules

The following communication modules may be compatible with or not compatible at all with JW30H depending on their version.

- **Modules mounted on the JW30H:** JW-21CM, JW-22CM, JW-21MN, JW-23LM, and JW-23LMH
- **Modules communicating with JW30H:** JW-20CM, JW-20RS, JW-20MN, ZW-98CM, ZW-20AX, JW-98MN, JW-90MN, Z-313J, Z-331J, Z-332J, Z-333J, Z-334J, Z-335J

① A "30Hn" mark is put on modules which are compatible with the JW30H control modules JW-32CUM1 and JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3 (current models).
② A "30H" mark is put on modules which are compatible with the JW30H control modules, including JW-31CUH/32CUH/33CUH (conventional models).
③ Neither the "30Hn" nor "30H" mark is put on a module that is not compatible with the JW30H. (Compatible with the JW20H only.)

-In case of JW-21CM



After installing a JW-32CUM1, the range of use for the JW30H shall be as follows.

		Compatibility of modules mounted on the JW30H	Communication with the JW30H
①	With "30Hn" mark	All functions available with all JW30H (JW-32CUM1) models	Available communication with all the JW30H (JW-32CUM1) modules.
②	With "30H" mark	Available within the functional range of conventional JW30H modules	Communication available taking for granted that the current JW30H (JW-32CUM1) modules function in the same way as a conventional JW30H module.
③	Without "30Hn" or "30H" marks	All functions are unavailable when mounded in the JW30H (JW-32CUM1) modules (They do not function)	Communication available taking for granted that the JW30H (JW-32CUM1) modules function in the same way as a conventional JW20H or either of JW50H/70H/100H module. *

*: A decision taking for granted that a JW30H (JW-32CUM1) as whether a JW20H or either of JW50H/70H/100H is subject to the settings of JW30H system memory #260. (# 260 = 50_{HEX}: JW50H/70H/100H, and other than #260 = 50_{HEX}: JW20H)

2. Support tool

The following support tools may be compatible with or not compatible at all with JW30H (JW-32CUM1) depending on their versions.
- Hand-held programmer: JW-13PG
- Multi-purpose programmer: JW-50PG
- Ladder software: JW-50SP

See page 7-30 in details about support tool.

(19) Special I/O modules

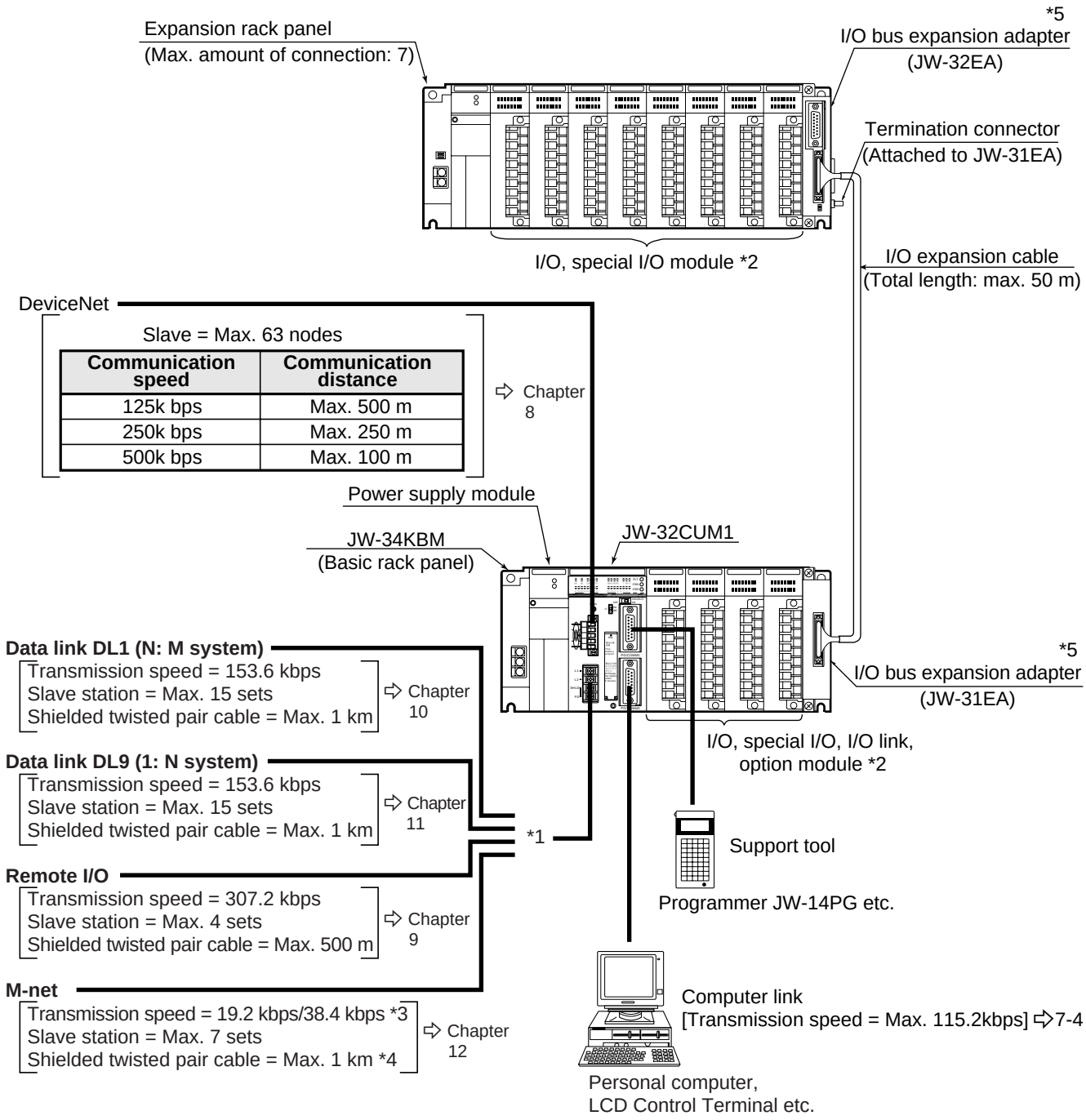
If a preset scanning time is too short (less than 2 ms), the special I/O module such as JW-21SU may not function normally.

To avoid this malfunction, set a longer scanning time using a constant scanning (set 3 ms or more on the system memory #226) or other functions.

(20) Insulation resistance and dielectric strength tests of the power supply module

When testing insulation resistance or dielectric strength of the JW-21PU/31PU power supply modules, be sure to remove the short bar connected between the SHORT terminal and the GND terminal. If a test is carried out without removing the short bar, internal elements of the module may be damaged.

Chapter 3: System Configuration



*1: Select any one of the four communication functions (master station) using the switches on the JW-32CUM1.

*2: All the modules in the JW30H series, such as I/O, special I/O, I/O link, and option module, can be used like other control modules (JW-33CUH1 etc.). => See page 3-4.

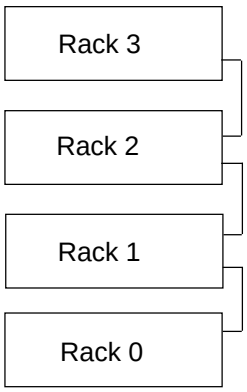
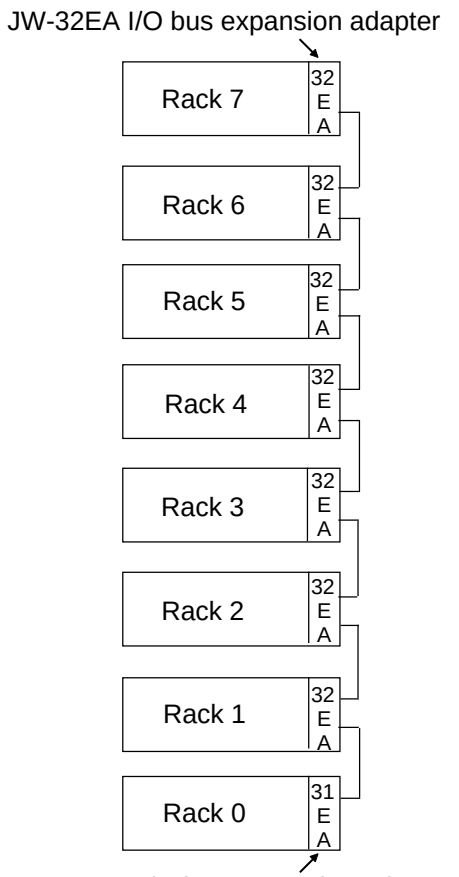
*3: The transfer speed of 38.4 kbps is a unique function of SHARP modules. When connecting modules from other manufacturers, use the JW-32CUM1 set to a transfer speed of 19.2 kbps (standard M-net specification).

*4: The total cable length of 1 km is only supported when using SHARP modules exclusively. When connecting modules from other manufacturers, use the shortest total cable length specified for the modules connected. The total cable length specified for the M-net is 100 m.

*5: A system that does not use an I/O bus expansion adapter is also possible. => See the next page.

For details about DeviceNet, data link DL1/DL9, remote I/O, and M-net, see Chapters 8 to 12.

■ The difference between using I/O bus expansion adapter and not using it

	When not using I/O bus expansion adapter	When using I/O bus expansion adapter
System configuration		
Basic rack panel	JW-34KBM	JW-34KBM
Expansion rack panel	JW-34ZB/36ZB/38ZB	JW-34ZB/36ZB/38ZB
I/O bus expansion adapter	–	JW-31EA (Install in basic rack panel) JW-32EA (Install in all expansion rack panel)
I/O expansion cable	JW-203EC/207EC/22EC/25EC/210EC	JW-05EC/1EC/3EC/10EC/20EC/30EC/50EC
No. of racks	4 racks max.	8 racks max.
Cable total length distance	14 m max. (Max. 10 m between rack panels)	50 m max. (Max. 50 m between rack panels)
No. of I/O modules	Max. 28 sets for basic/expansion rack panel (racks 0 to 3)	Max. 60 sets for basic/expansion rack panel (racks 0 to 7)
No. of special I/O modules	Max. 28 sets for basic/expansion rack panel (racks 0 to 3)	Max. 28 sets for basic/expansion rack panel (racks 0 to 3)
No. of option modules	Max. 4 sets for basic rack panel (rack 0)	Max. 4 sets for basic rack panel (rack 0)
No. of I/O link modules	Max. 1 sets for basic rack panel (rack 0) *1	Max. 1 sets for basic rack panel (rack 0) *1
No. of DeviceNet modules	Max. 3 sets for basic rack panel (rack 0) *2	Max. 3 sets for basic rack panel (rack 0) *2
Connection support tool with expansion rack panel	Unavailable	Available for connected I/O bus expansion adapter JW-32EA

*1: Maximum of one JW-23LMH module (operation modes 7/8 only).
*2: Maximum of three JW-20DN modules.

(1) Control module

Model name	No. of In/Out	Program size	File register	Clock feature, communication port
JW-32CUM1	1024 points	15.5K words	80K bytes	Yes
		31.5K words	48K bytes	

Set program capacity and file register capacity of the JW-32CUM1 using the internal switch (SW2) of the module.

(2) Power supply module

Model name	Specification	Approved UL/CSA	Approved CE
JW-21PU	85 to 264 VAC. Power capacity: 5 VDC 3.5 A		
JW-22PU	20.4 to 32 VAC. Power capacity: 5 VDC 3.5 A		
JW-31PU	85 to 132 VAC. Power capacity: 5 VDC 3.5 A	O	
JW-33PU	85 to 264 VAC. Power capacity: 5 VDC 4.5 A	O	O

(3) Basic rack panel

Model name	No. of slots			I/O bus expansion adapter (Installation of JW-31EA)
	For power supply module	For control module	For I/O module	
JW-34KBM	1	1	4	Available

The slot for I/O module is a slot mounting I/O, special I/O, I/O link, and option module.

(4) Expansion rack panel

Model name	No. of slots		I/O bus expansion adapter (Installation of JW-32EA)
	For power supply module	For I/O module	
JW-34ZB	1	4	Available
JW-36ZB	1	6	
JW-38ZB	1	8	

The slot for I/O module is a slot mounting I/O, special I/O module.

(5) I/O bus expansion adapter

Model name	Specifications
JW-31EA	Mounting to basic rack panel (JW-34KB/36KB/38KB)
JW-32EA	Mounting to expansion rack panel (JW-34ZB/36ZB/38ZB), with PG port

Use an I/O bus expansion adapter when more than 5 racks (max. 8 racks) on the rack panel are used, or when total length of I/O expansion cables is longer than 15 meters (max. 50 meters).

(6) I/O, special I/O, option, I/O link, DeviceNet module

	Model name	Specifications
I/O	JW-201N	8 points input, 100/120 VAC
	JW-202N	8 points input, 12/24 VDC
	JW-203N	8 points input, 200/240 VAC
	JW-211NA	16 points input, 100/120 VAC
	JW-212NA	16 points input, 12/24 VDC
	JW-214NA	16 points input, 12/24 VDC (high speed type)
	JW-234N	32 points input, 12/24 VDC (high speed type, connector connection)
	JW-202S	8 points output, 5/12/24 VDC, 1A, transistor output (sink output)
	JW-203S	8 points output, 100/200 VAC, 1A, triac output
	JW-204S	8 points output, 250 VAC/30 VDC, 2A, relay output (separated common)
	JW-212SA	16 points output, 5/12/24 VDC, 0.5A, transistor output (sink output)
	JW-213SA	16 points output, 100/200 VAC, 1A triac output
	JW-214SA	16 points output, 250 VAC/30 VDC, 2A, relay output
	JW-232S	32 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
	JW-232M	16 points input, 12/24 VDC 16 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
Special I/O	JW-264N	64 points input, 24 VDC (high speed type, connector connection)
	JW-262S	64 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
	JW-21HC	High speed counter: 100 kHz 1ch
	JW-22HC	High speed counter: 100 kHz/200 kHz 2ch
	JW-24AD	Analog input: 4 points 13 bits
	JW-22DA	Analog output: 2 points 16 bits
	JW-22DU	ID control: Microwave system
	JW-21SU	Serial interface 1ch RS-232C/422A
	JW-21PS	Pulse output, number of control axis: 1. Max speed: 250 kpps.
* Option	JW-21CM	Select from computer link / data link / remote I/O functions by switching.
	JW-22CM	Net work module
	JW-21MN	ME-NET module
	JW-25CM	JW10 link module
	JW-255CM	Ethernet module
	JW-20FL5	FL-net module
	JW-20FLT	
* I/O link	JW-23LMH	I/O link master station, up to 32 slave stations, max. 504 points, 345.6 kbits/s / 172.8 kbits/s
DeviceNet	JW-20DN	DeviceNet master module
JW-21RS		Remote I/O slave module

*: Make sure to use the JW30H series applicable products for the JW-23LMH, JW-21CM, JW-22CM, and JW-21MN. Items applicable with the JW30H series are stuck [30Hn] mark in front of the modules. => See page 2-3.

(7) Support tools

Model name		Outline	Remarks
Hand-held programmer	JW-14PG	LCD dot matrix display	----------
	JW-13PG		See the table in the next page for versions
	JW-12PG		Usable within the functions of the JW20H or JW50H/70H/100H.*2
	JW-2PG*1		Usable within the functions of the JW20H.*2
Multi-purpose programmer	JW-50PG	LCD display (640 x 480 dot) Built-in 1 set of 3.5" floppy disk drive Built-in 1 set of 2.5" hard disk (256MB)	See the table in the next page for versions.
Ladder processor II	Z-100LP2S + Z-3LP2ES (Expansion module)	EL display Horizontal: 11 relay contacts plus 1 coil Vertical: 11 relay lines plus 2 message lines Built in 1 set of 3.5" floppy disk drive.	Usable within the functions of the JW20H or JW50H/70H/100H when Z-3LP2ES is installed. (Ver 5.2 or more)
Ladder software	JW-92SP	Ladder software for PC-98 series, Japanese display	See the table in the next page for versions
	JW-52SP	Ladder software for DOS/V personal computer, Japanese display	See the table in the next page for JW30H applied versions.
	JW-50SP	Ladder software for IBM-PC	See the table in the next page for JW30H applied versions.
	JW-100SP	Ladder logic programming software	----------

*1 When JW-2PG is used by JW30H, be sure to set 02_{HEX} on the system memory #136 of JW30H.
*2: Forced set/reset, data transfer using a ROM writer, and data transfer using cassette tapes are not available.
Note: Do not connect to the programmer ZW-101PG1, or malfunction may be caused.

Description of software version approved to JW30H (JW-32CUM1)

The following support tools may, or may not be compatible with JW30H (JW-32CUM1) depending on their versions.

Items	Model names	Versions	Available functions when used with JW30H
Hand-held programmer	JW-13PG	With "B" mark	All functions are available with all JW30H (JW-32CUM1) modules.
		With "A", or without marks	Usable within the function range of the conventional JW30H modules.
Multi-purpose programmer	JW-50PG	Ver5.5 or later	All functions are available with all JW30H (JW-32CUM1) modules
		Ver5.0 to 5.3A	Usable within the functional range of the conventional JW30H modules
		Ver4.0A or earlier	Usable but it operates taking for granted that the JW30H is a JW20H, or either of JW50H/70H/100H. (*3)
Ladder software	JW-52SP	Ver5.5 or later	All functions are available with all JW30H (JW-32CUM1) modules
		Ver5.0 to 5.3A	Usable within the functional range of the conventional JW30H modules.
	JW-92SP	Ver5.5 or later	All functions are available with all JW30H (JW-32CUM1) modules.
		Ver5.0 to 5.3A	Usable with the functional range of the conventional JW30H modules.
		Ver4.0A or earlier	Usable but it operates taking for granted that the JW30H as a JW20H, or either of JW50H/70H/100H. (*3)
	JW-50SP	Ver5.5I or later	All functions are available with all JW30H (JW-32CUM1) modules
		Ver5.0I to 5.3AI	Usable with the functional range of the conventional JW30H modules.
		Ver3.0I	Usable taking for granted that the JW30H as a JW20H, or either of JW50H/70H/100H. (*3)

*3: A decision taking for granted that a JW30H (JW-32CUM1) as whether a JW20H or either of JW50H/70H/100H is subject to the settings of JW30H system memory #260. (# 260 = 50_{HEX}: JW50H/70H/100H, and other than #260 = 50_{HEX}: JW20H)
This version cannot perform forced set/reset of relays and sampling trace.

- The JW-14PG and JW-100SP can use their all functions with all JW30H (JW-32CUM1) series models.
- A JW30H conventional model refers the JW30H system using a JW-31CUH/32CUH/33CUH as a control module.

(8) I/O expansion cable

Model name	Specifications		Accessories
JW-203EC	Connection cables between a basic rack panel and an expansion rack panel, or between expansion rack panels.	30 cm	5 V DC cable (30 cm)
JW-207EC		70 cm	5 V DC cable (70 cm)
JW-22EC		2 m	5 V DC cable (2 m) Short connector
JW-25EC		5 m	Short connector
JW-210EC		10 m	Short connector
JW-05EC	Connection cables between a JW-31EA and a JW-32EA, or between a JW-32EA and a JW-32EA.	50 cm	5 V DC cable (50 cm)
JW-1EC		1 m	5 V DC cable (1 m)
JW-3EC		3 m	None
JW-10EC		10 m	None
JW-20EC		20 m	None
JW-30EC		30 m	None
JW-50EC		50 m	None

(9) PG connection cable

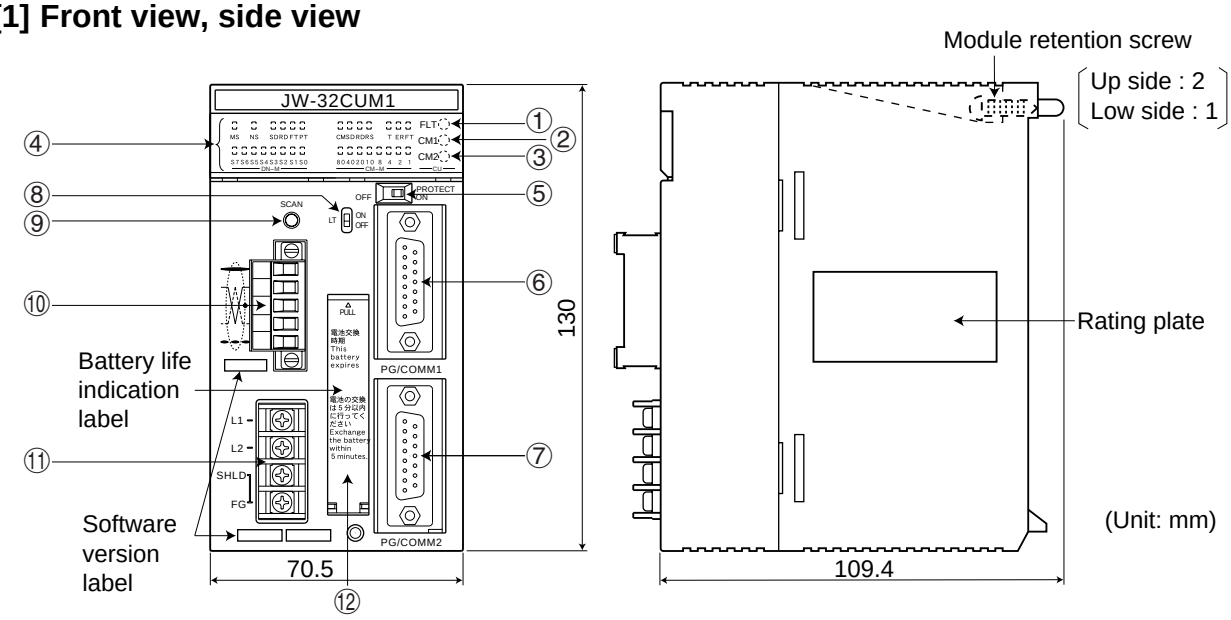
Model name	Specifications
JW-22KC	Connection cable between a support tool and the JW30H. 2 m
JW-24KC	Connection cable between a support tool and the JW30H. 4 m *

* JW-24KC cannot be used with JW-2PG.

Chapter 4: Name and Function of Each Part

4-1 JW-32CUM1 (Control module)

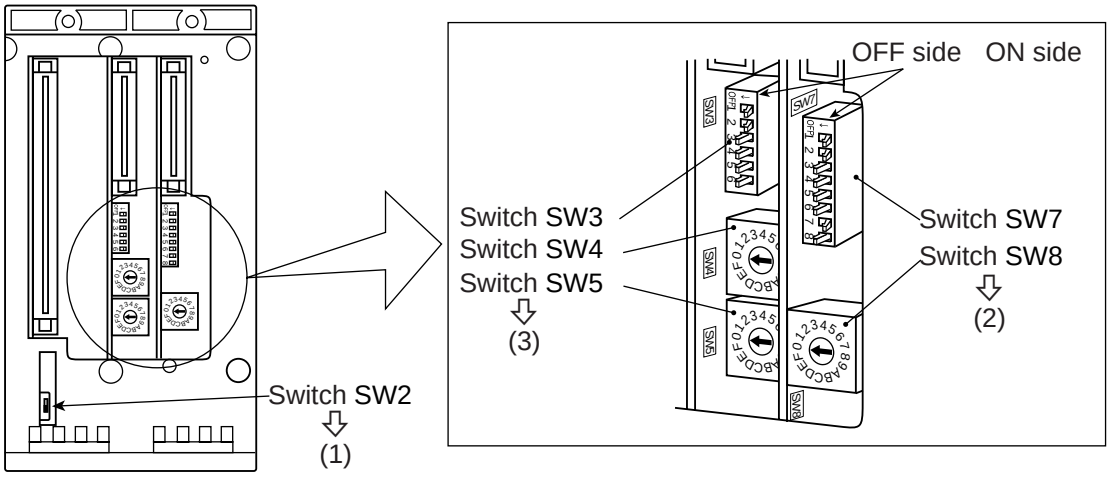
[1] Front view, side view



	Name	Function
①	FAULT lamp (red)	Lights when detecting errors by self-diagnosis. PC stops its operations. (However, it operates even when battery is error.)
②	COMM1 lamp	Lights when communicating with personal computer or the like, by using PG/COMM1 port. Lights up in monitoring state by connecting support tool.
③	COMM2 lamp	Lights when communicating with personal computer or the like, by using PG/COMM2 port. Lights up in monitoring state by connecting support tool.
④	Display panel	Displays the operating status of the DeviceNet communications, and general-purpose communications*. Details: DeviceNet ⇨ Page 8-27, Remote I/O ⇨ Page 9-11, Data link DL1 ⇨ Page 10-14, Data link DL9 ⇨ Page 11-16, M-net ⇨ Page 12-14.
⑤	PROTECT switch	Set prohibit (ON), enable (OFF) about writing to program memory and system memory.
⑥	PG/COMM1 port (with cover)	A connector for connecting with support tool. A connector for connecting with device having serial I/O port such as personal computer.
⑦	PG/COMM2 port (with cover)	A connector for connecting with device having serial I/O port such as personal computer. (Also possible to connect with support tool.)
⑧	Termination resistance switch LT	Specifies whether this module is a termination station (ON) or an intermediate station (OFF) in the general-purpose communication circuit*.
⑨	SCAN switch	With the DeviceNet function, keep pressing this switch longer than three seconds and operate "Reloading switch and system memory settings, etc." ⇨Page 8-11.
⑩	DeviceNet communication port	Connect a DeviceNet communication cable.
⑪	General-purpose communication terminal block	Connect cables for general-purpose communications*.
⑫	Battery cover	A battery module for memory backup is provided inside; opened and closed when replacing battery.

* Select one of the four master station functions for general-purpose communications: Remote I/O, data link DL1/DL9, or M-net.

[2] Rear view



(1) Switch SW2

Set the program capacity and register capacity of file 2.

SW2	Program capacity	File 2 capacity	Set at delivery
	31.5K words	32K bytes	
	15.5K words	64K bytes	○

Note: Changing settings of the SW2 will erase program contents that have been set before the change, as well as a part of file 2 data. We recommend that you back-up programs and data by using a support tool, such as the JW-100SP, as you may need to use the same data after the change. After setting changes of the SW2 are completed, be sure to initialize all memory using a support tool such as the JW-14PG.

(2) Switch SW7, 8

These switches are used to specify the DeviceNet communication details. Details ⇨ Page 8, 9 to 10

(3) Switch SW3 to 5

Use these switches to specify the details for general-purpose communications (remote I/O, data link DL1/DL9, and M-net).

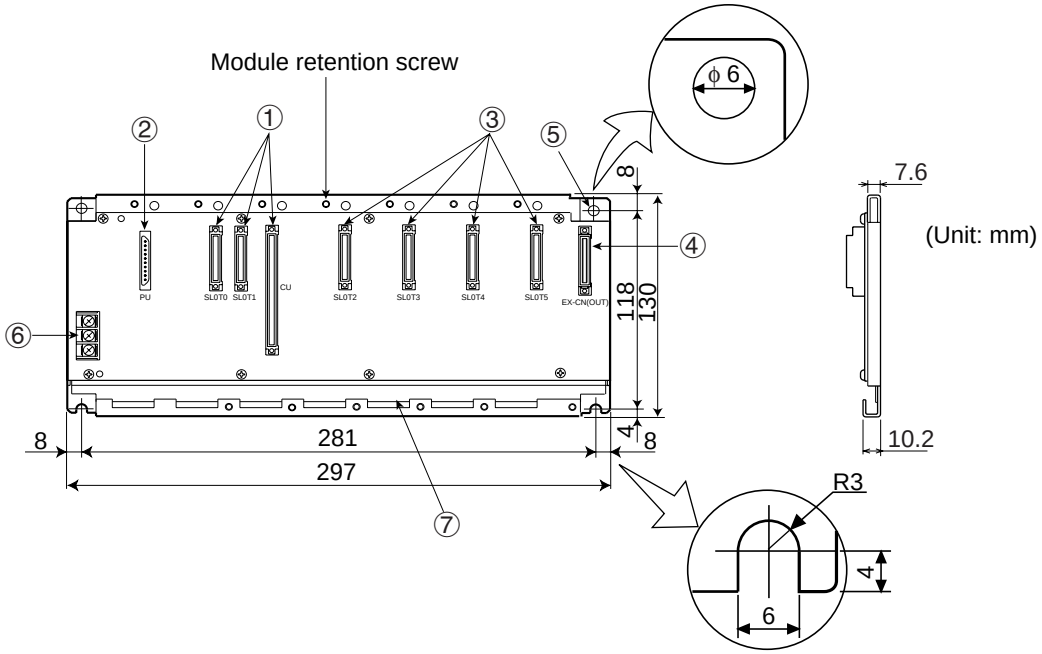
		Remote I/O			Data link DL1	Data link DL9			M-net	
Switch SW5		1			2	3			7	
Switch SW3		Operating mode			———	Total number of bytes			Operating mode	
		Mode 0	Mode 1	Mode 2		64	128	256	All stations stop	Error stations stop
	3	OFF	ON	OFF	Normal OFF	OFF	ON	OFF	OFF	OFF
	4	OFF	OFF	ON	Normal OFF	OFF	OFF	ON	OFF	ON
	5	OFF	OFF	OFF	Normal OFF	OFF	OFF	OFF	OFF	OFF
	6	OFF	OFF	OFF	Normal OFF	OFF	OFF	OFF	OFF	OFF
Switch SW4		Number of slave stations connected 1 to 4			Number of slave stations connected 1 to 9, A: 10, B: 11 C: 12, D: 13, E: 14, F: 15				Transfer speed 0: 19.2kbps 7: 38.4kbps	

- Switches SW3-1 and 3-2 are not used. (Set to ON as the default setting.)
- Switches SW3-3 to 3-6 are set to OFF when delivered.
- Switches SW4 and SW5 are set to "0" when delivered.

For details about the settings, see "Switch settings" in Chapters 9 to 12.

4-2 JW-34KBM (Basic rack panel)

The JW-34KBM shall be used as a basic rack panel when the JW-32CUM1 is used as a control module.



	Name		Function
①	Control module slot (CU, SLOT 0/1)		Install the JW-32CUM1 here.
②	Power supply module slot (PU)		Install a power supply module here.
③	I/O module slot (SLOT2 to 5)		Install I/O, special I/O, I/O link, or option modules. - Slot numbers: 2 to 5.
④	I/O extension connector (EX-CN (OUT))		Connect an I/O extension cable or a JW-31EA I/O bus extension adapter.
⑤	Mounting holes (4 positions)		Install the JW-34KBM on a control panel wall. (Minimum wall thickness: 1.6 mm)
⑥	5 V (FG) terminal block	5 VDC (+, -)	Connect this block to the next expansion rack panel and supply 5 VDC.
		FG	Connect a class 3 or better ground.
⑦	Module fixing rib insert hole		Insert the module fixing ribs here when installing a power supply, I/O, special I/O, I/O link, or option module.

Chapter 5: Installation

[1] Installation of the JW-34KBM

Drill M5 tapped installation holes on the control panel wall and secure the JW-34KBM basic rack panel to the panel wall using M5 screws.

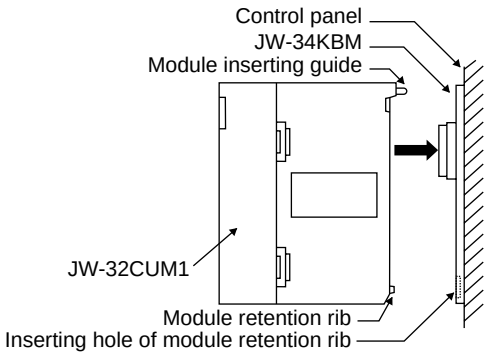
- For installation dimension details regarding the JW-34KBM, see Section 4-2.
- Allow 50 to 150 mm distance between each rack panel. Allow 50 mm or more between the left and right walls, or a wiring duct. Allow 30 mm or more between a wiring duct above or below the basic and expansion rack panels. => See Section 6-4.

[2] Installation of the JW-32CUM1

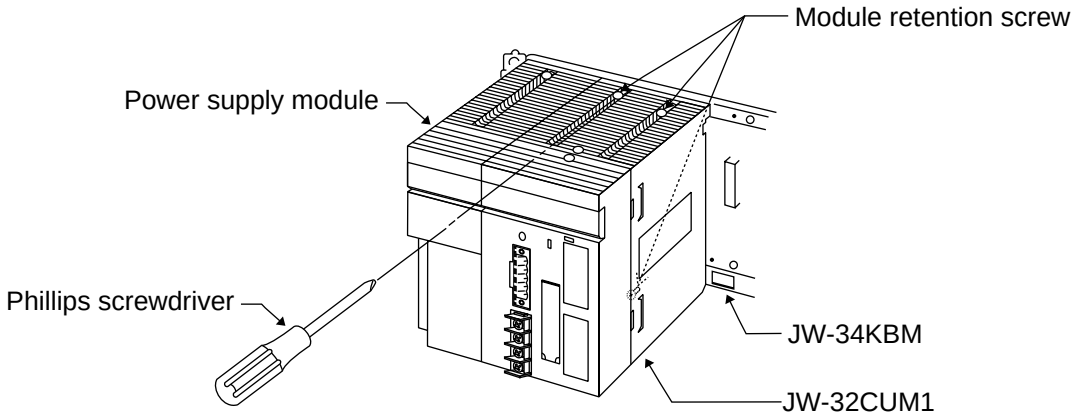
Install the JW-32CUM1 control module at the JW34KBM basic rack panel (the power supply module on the right.)

① Set the switches on the back of the JW-32CUM1 (SW2 to 5, 7, and 8).
For details, see "Switch settings" in Chapters 8 to 12.

② Insert the connector on the JW-32CUM1 into the control module slot on the JW-34KBM.



③ Screw in the module securing screws (2 at the top and 1 at the bottom) for the JW-32CUM1, using a Philips screwdriver.



Chapter 6: Connection (Wiring) Method

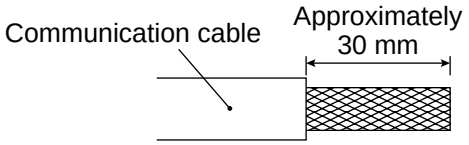
6-1 Connection to a DeviceNet communication connector

[1] Preparing a communication cable

Below describes how to install a connector to the DeviceNet communication cable.
Prepare the communication cable by following the steps below to attach the connector.

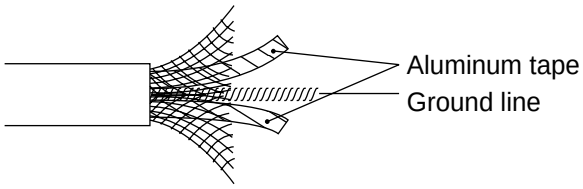
① Remove approximately 30 mm of insulation from the communication cable

- Remove the insulation without damaging the coaxial shield around the cable.
  Do not remove more insulation than necessary, as it may cause a short-circuit.



② Unwrap the wires in the coaxial shield carefully

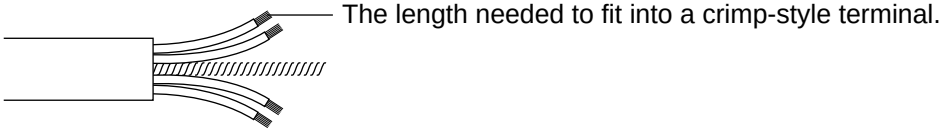
- Under the coaxial shield there is one signal line, one power line, and one ground line. The signal line and power lines are wrapped in aluminum tape.



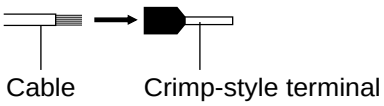
③ Cut off the excess coaxial shield and peel back the aluminum tape on the signal line and power line.

④ Remove the insulation from the signal and power lines until enough bare wire is exposed to fit into a crimp-style terminal.

- Twist the strands of wire in the signal and power lines tightly, in order to slide them into a terminal.



⑤ Crimp a terminal on each of the individual lines and then insulate it using vinyl tape or shrink tubing.



- Shown below are the recommended crimp-style terminals

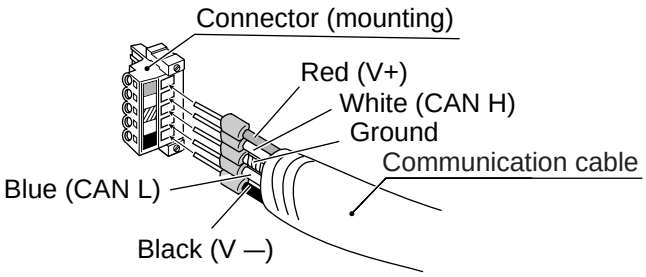
Recommended crimp-style terminals	Special tool
AI series made by Phoenix Contact	ZA3 made by Phoenix Contact
TC series made by Nichifu - For thin wire : TME TC-0.5 - For thick wire : TME TC-2-11 (power line) TME TC-1.25-11 (communication line)	NH-32

To the next page

From the previous page

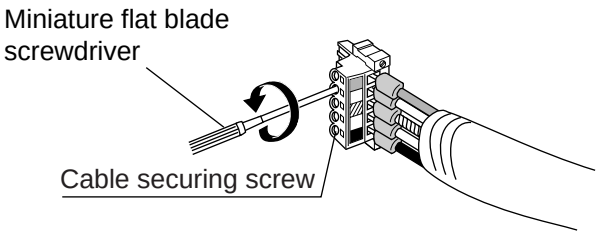
⑥ Insert the signal line, power line, and the ground line into the appropriate connector holes.

- Insert the wires from the top down, in the following order: red, white, ground , blue, and black. Pay strict attention to the connector orientation.
- Before inserting the wires, loosen the screws on the connector enough to insert the wires easily.
- The JW-32CUM1 is supplied with one set of MSTB2.5/5-STF-5.08AU (With a screw to secure the connector: Phoenix Contact).



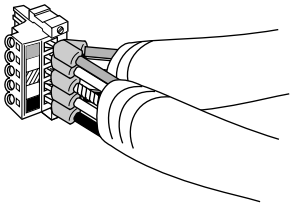
⑦ Secure each wire tightly using the wire retention screws of the connector.

- Use a miniature flat blade screwdriver which has the same diameter from the neck all the way to the end. Tighten the screws using 0.5 N-m of force.



■ **When connecting two thin cables in a multi-drop system**

Insert the wires from each cable with the same color insulation into the same hole.



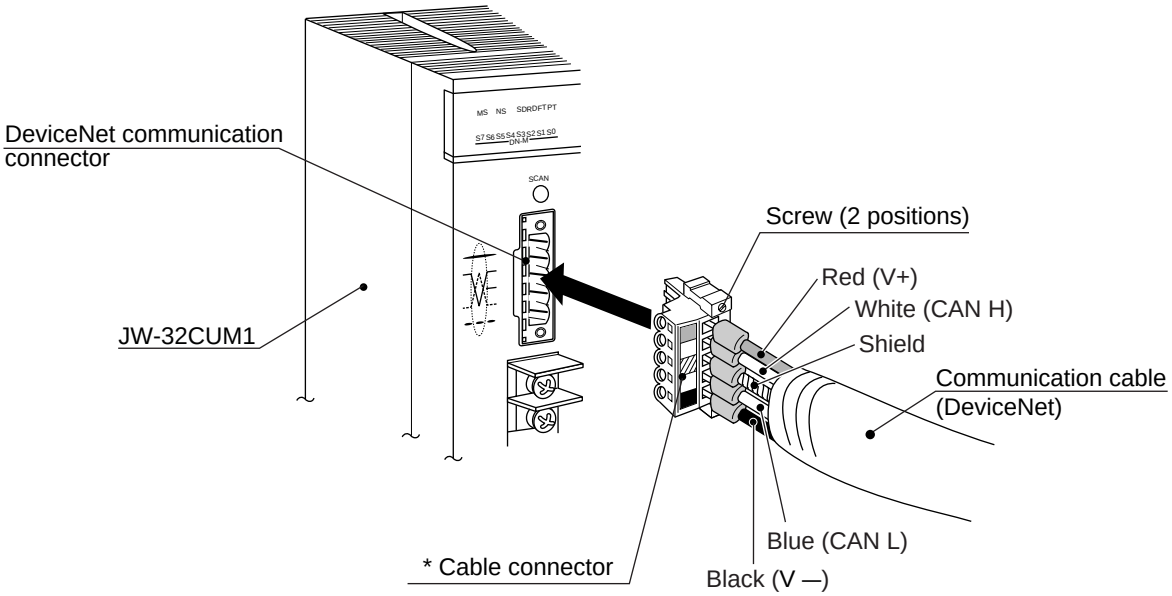
- Crimp a terminal to the tip of the two wires.

Remarks

- Before connecting the communication cable, make sure to turn OFF the power to the JW30H, all slave stations, and the communication power supply.
- Do not pull hard on the communication cable since the connector can be pulled off or disconnected easily.

[2] Connecting a communication cable

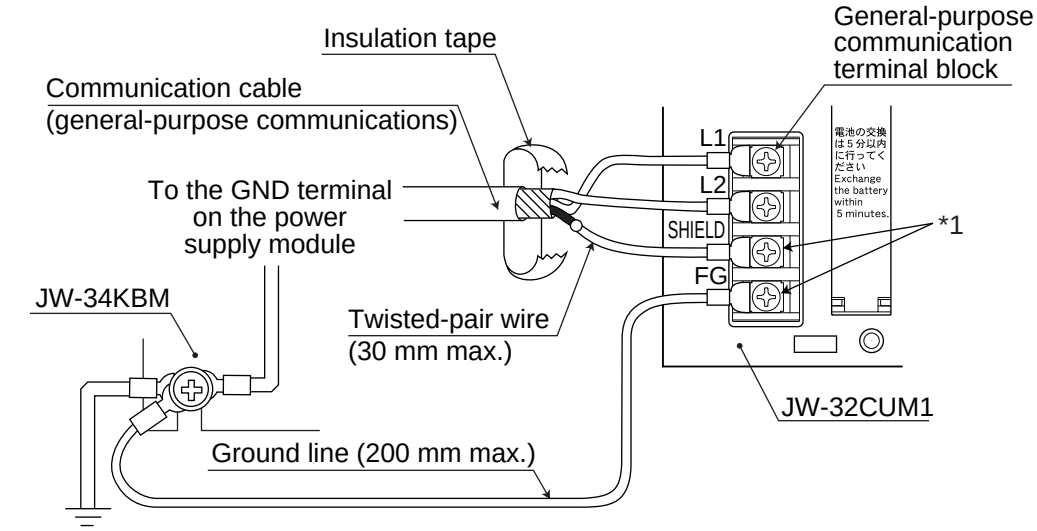
Match the orientation of the connector on the communication cable (DeviceNet) with the DeviceNet communication connector on the JW-32CUM1 and insert as far as it will go. After inserting it all the way, tighten the screws on the connector. The appropriate tightening torque is 0.3 N-m of force.



* One male connector is supplied with the JW-32CUM1.
- Model name: MSTB2.5/5-STF-5.08AU (made by Phoenix Contact)

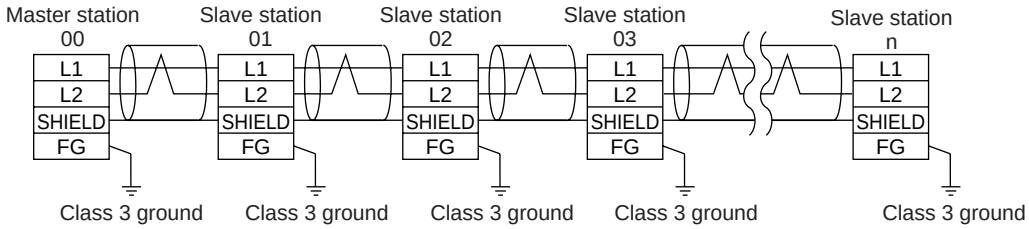
6-2 Wiring to the general-purpose communication terminal block

Connect the communication cable for general-purpose communications to the general-purpose communication terminal block on the JW-32CUM1, as shown below, using a two-wire system. For general-purpose communications, select one of the four master station functions: Remote I/O, data link DL1/DL9, and M-net.



*1: The SHIELD terminal and FG (frame ground) are connected to each other internally.

Slave station connection diagram



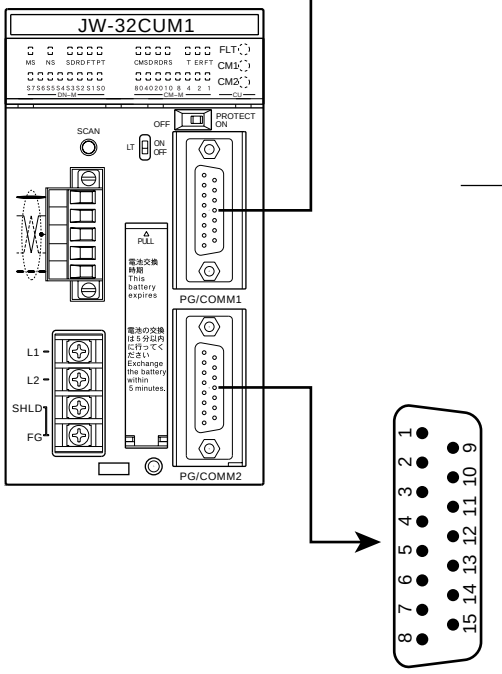
	Remote I/O master station	Data link DL1 master station	Data link DL9 master station	M-net master station
Total length of cable	500 m max.	1 km max.	1 km max.	1 km max. *2
Max. number of slave stations that can be connected	4	15	15	7

*2: When connecting modules from other manufacturers, create a system within the shortest total cable length specified by any of the modules.

- Use shielded, twisted-pair cable as the communication cable you connect to the L1, L2, and SHIELD terminals.
- Make sure to use one of the following communication cables.
  - Hitachi Cable: S-IREV-SW2*0.5, S-IREV-SB2*0.5
  - Fujikura: RG-22B/U
- Make sure to provide a class 3 ground for the FG (GND) terminals of the master and slave stations. Without a class 3 ground, a communication error may occur due to electrical nose.
- Connect separate wires between each terminal. Do not use one wire for two or more lines, or for links to one point.
- Do not lay the communication cables parallel to or too close to high voltage or power lines.

6-3 Wiring to the communication port

[1] Communication port pin arrangement of PG/COMM1 port, PG/COMM2 port



● **PG/COMM1 port**

Pin No.	Signal name	Contents	Signal
1	FG	Outside body grounding	---
2	—	*1	
3	SD(+)	Sending data (PC to personal computer)	RS-422A
4	—	*1	---
5	RTS(–)		RS-422A
6	SG	Signal grounding	---
7	SG	Signal grounding	
8	—	*1	
9	RD(+)	Receiving data (Personal computer to PC)	RS-422A
10	RD(–)	Receiving data (Personal computer to PC)	
11	SD(–)	Sending data (PC to personal computer)	
12	—	*1	---
13	RTS(+)		RS-422A
14	+5 V		---
15	+5 V		

*1: Not connected with pin No. 2, 4, 8, and 12.

● **PG/COMM2 port**

Pin No.	Signal name	Contents	Signal
1	FG	Outside body grounding	—
2	SD	Sending data (PC to personal computer)	RS-232C
3	SD(+)	Sending data (PC to personal computer)	RS-422A
4	RD	Receiving data (Personal computer to PC)	RS-232C
5	RTS(–)		RS-422A
6	SG	Signal grounding	—
7	SG	Signal grounding	
8	RTS	ON while PC is supplied power source *2	RS-232C
9	RD(+)	Receiving data (Personal computer to PC)	RS-422A
10	RD(–)	Receiving data (Personal computer to PC)	
11	SD(–)	Sending data (PC to personal computer)	
12	CTS	ON: Available sending, OFF: Ban sending	RS-232C
13	RTS(+)		RS-422A
14	+5 V		---
15	+5 V		

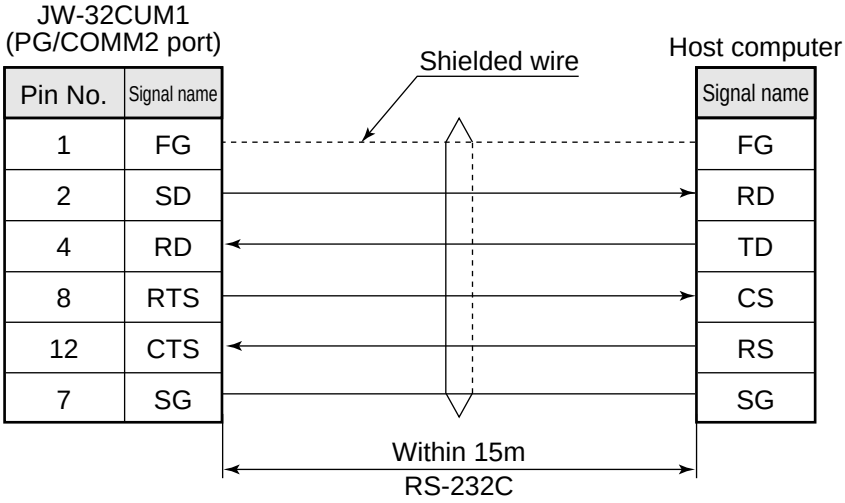
*2: When system memory #222 in the JW-32CUM1 control module is 00_{HEX} (default value), RTS signal will be turned ON while the PC is turned ON power. When it is set to 02_{HEX}, the RTS will be OFF while sending data, and OFF while other than sending data.

- Connector type that can be connected to the communication port (PG/COMM1 port, PG/COMM2 port) is 17JE-23150-02 (D8A) made by DDK.

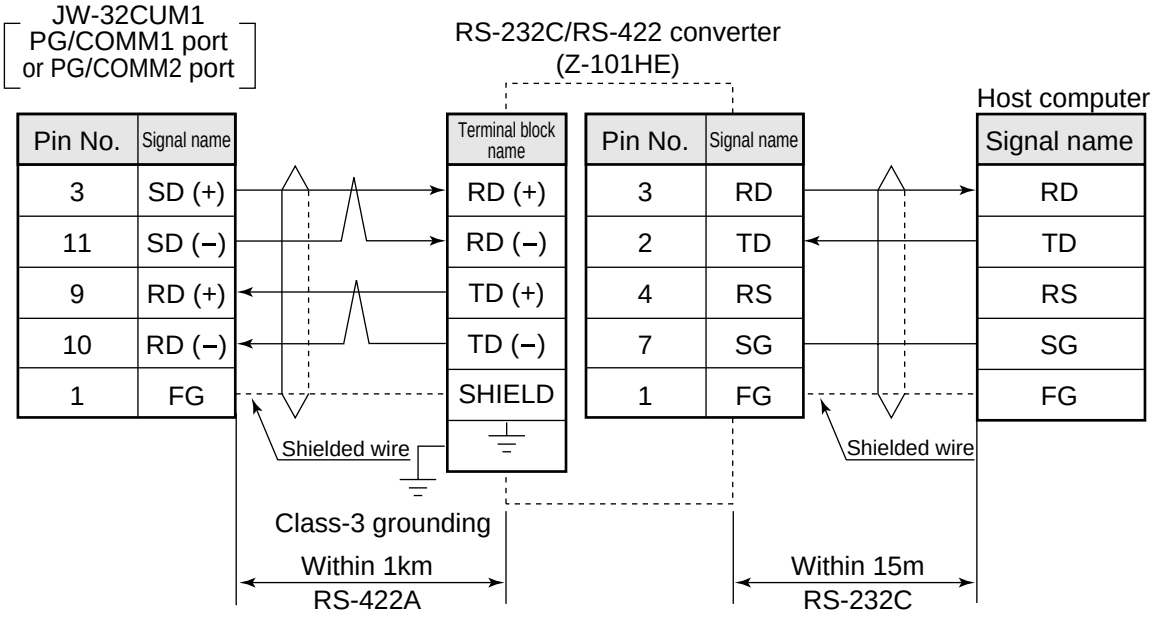
[2] Wiring figure

(1) When using RS-232C for communication method of host computer side.

Be within 15m for the total length of a communication cable.

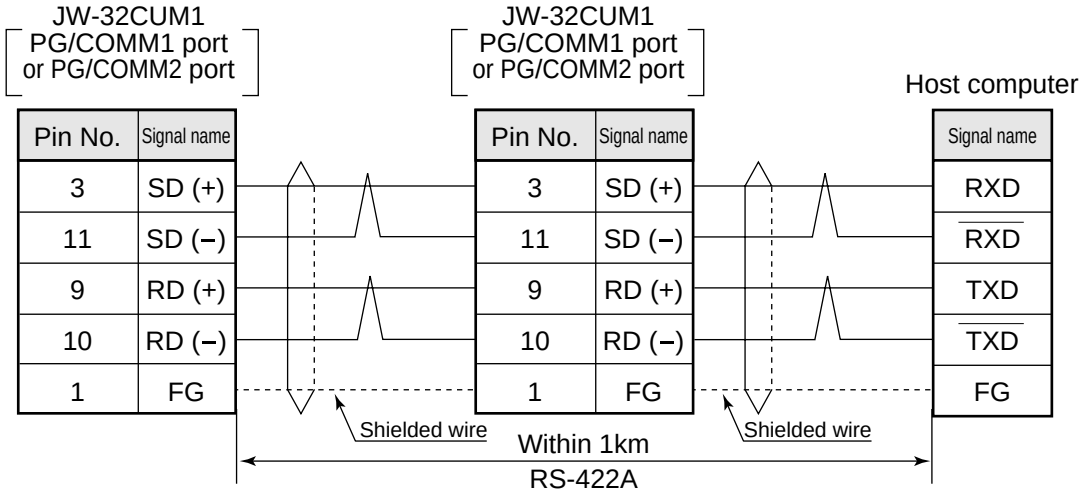


Use the RS-232C/RS-422 converter, such as Z-101HE, when the total length of the communication cable is over 15m.



(2) When using RS-422A for communication method.

Be within 1km for the total length of a communication cable.

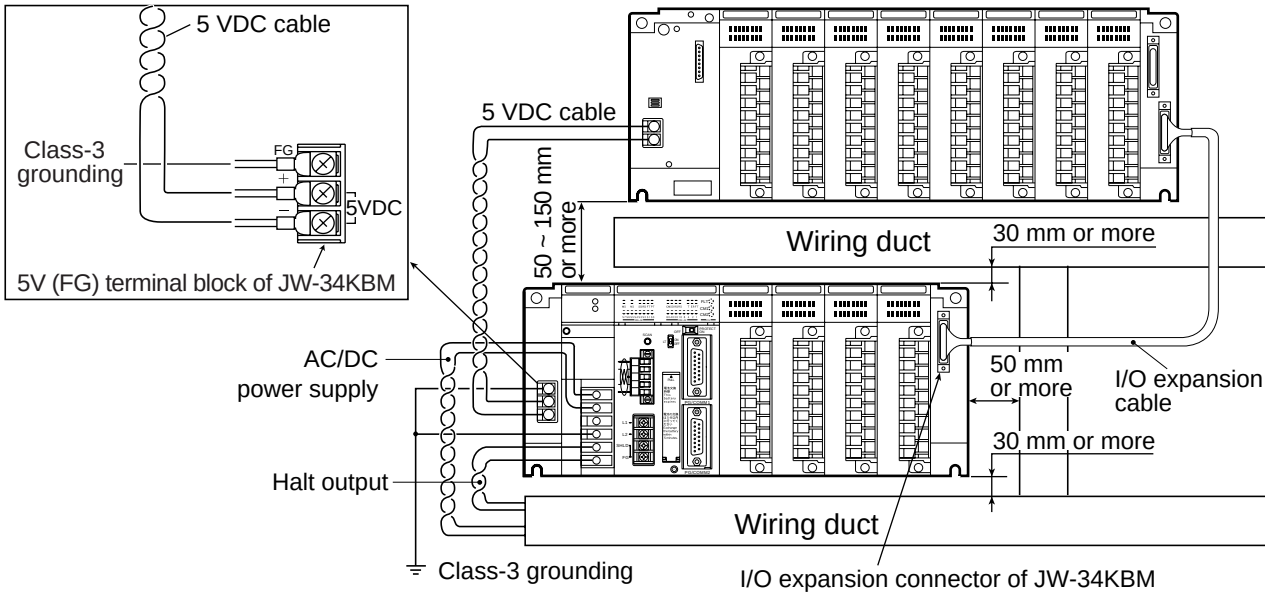


6-4 Wiring JW-34KBM

Wire the 5V and (FG) terminals and the I/O expansion connector on the JW-34KBM basic rack panel.

- Be sure to supply 5 VDC to the expansion rack panel without power supply module, through the 5 VDC terminal block of the JW-34KBM or expansion rack panel with power supply module.
  Do not reverse the polarities (+ and -) when wiring the 5 VDC terminal. Incorrect (reversed) wiring may damage the modules or cause a fire.
- Make sure to provide a class 3 ground for FG terminal on the JW-34KBM.
- Do not place the I/O expansion cable and the 5 VDC cable in the same duct or pipe as the I/O lines and the power lines of the JW30H.

An example of wiring



6

Chapter 7: Directions for Use

7-1 Current consumption of module

Each module in the JW30H (JW-32CUM1) operates by 5 VDC output current supplied by the power supply module: JW-21PU/22PU/31PU/33PU. The make up the system configuration plan is such that the total current consumption of each module does not exceed the current capacity of the power supply module. When the total current consumption of each module exceeds the supply capacity, the JW30H (JW-32CUM1) stops operation by the current limit function of the power supply module.
The current consumption in each module can be found using the following two methods:

1. Total numbers of a current consumption indication marks which are shown on stickers next to model indication label in each module.
2. Calculate the total current consumption.

- **Output current of 5 VDC power supply**

Model name	Output voltage	Output current
JW-21PU	5 VDC	3.5 A
JW-22PU		
JW-31PU		
JW-33PU		4.5 A

(1) Current consumption of each module

① Control module, basic rack panel

Model name	Current consumption: mA	No. of current consumption mark
JW-32CUM1 (Control module)	950 *	—

* Total value after adding the value of the JW-34KBM basic rack panel.

② Support tools

Model name	Current consumption: mA	No. of current consumption mark
JW-14PG (Hand-held programmer)	200	------
JW-13PG (Hand-held programmer)	200	
JW-12PG (Hand-held programmer)	200	
JW-2PG (Hand-held programmer)	200	

③ I/O bus expansion adapter

Model name	Current consumption: mA	No. of current consumption mark
JW-31EA (I/O bus expansion adapter)	600	------
JW-32EA (I/O bus expansion adapter)	450	

④ I/O, special I/O, option, I/O link, and DeviceNet module

	Model name	Current consumption : mA (when all points ON)	No. of current consumption mark
I/O	JW-201N (100/120 VAC input)	40	1
	JW-202N (12/24 VAC input)	40	1
	JW-203N (200/240 VAC input)	40	1
	JW-211N (100/120 VAC input)	60	1
	JW-211NA (100/120 VAC input)	60	1
	JW-212N (12/24 VDC input)	60	1
	JW-212NA (100/120 VAC input)	60	1
	JW-214N (12/24 VDC input)	60	1
	JW-214NA (12/24 VDC input)	60	1
	JW-234N (12/24 VDC input)	80	1
	JW-202S (5/12/24 VDC output)	190	2
	JW-203S (100/240 VAC output)	130	2
	JW-204S (Relay output)	380	4
	JW-212S (5/12/24 VDC output)	60	1
	JW-212SA (5/12/24 VDC output)	60	1
	JW-213S (100/240 VAC output)	260	3
	JW-213SA (100/240 VAC output)	260	3
	JW-214S (Relay output)	550	5
	JW-214SA (Relay output)	550	5
	JW-232S (5/12/24 VDC output)	320	3
	JW-232M (12/24 VDC input, 5/12/24 VDC output)	200	2
Special I/O	JW-264N (24 VDC input)	60	1
	JW-262S (5/12/24 VDC output)	300	3
	JW-21HC (High speed counter)	120	2
	JW-22HC (High speed counter)	100	1
	JW-24AD (Analog input)	90	1
	JW-22DA (Analog output)	75	1
	JW-21DU (ID control module)	400	4
	JW-22DU (ID control module)	400	4
	JW-21SU (Serial interface module)	170	2
	JW-21PS (Pulse output module)	150	2
Option	JW-21CM (Link module)	125	2
	JW-22CM (Network module)	360	4
	JW-21MN (ME-NET module)	360	4
	JW-25CM (JW10 link module)	130	2
	JW-255CM (Ethernet module)	370	4
	JW-20FL5 (FL-net module)	350	4
	JW-20FLT (FL-net module)		
I/O link	JW-23LMH (I/O link master module)	120	2
DeviceNet	JW-20DN (DeviceNet master module)	200	2
JW-21RS (remote I/O slave station)		140	2

(2) Calculation of current consumption (by current consumption mark).

Add up the total numbers of the current consumption mark on stickers next to the model name label.
One mark of current consumption means approx.100 mA.
Constitute a system in order to follow the below conditions:

The total marked current consumption must be less than 35 for modules that supply power when using a JW-21PU/22PU/31PU, and less than 45 when using a JW-33PU.
The example below is calculated on the conditions that 10 JW-32CUM1 control modules (basic rack panel: JW-34KBM), 2 support tools, 6 I/O bus expansion adapters JW-31EA, and 5 JW-32EA are used.

[Example] Calculation of the total current consumption in the system configuration below:

Power supply module:	JW-21PU	
Control module (basic rack panel):	JW-32CUM1 (JW-34KBM)	
Hand-held programmer:	JW-14PG	
100/120 VAC input module:	JW-201N	8 sets
	JW-211NA	8 sets
100/240 VAC output module:	JW-203S	8 sets
	JW-212SA	8 sets

No. of marks

JW-32CUM1
JW-34KBM 12
JW-14PG
JW-201N 8
JW-211NA 8
JW-203S 16
JW-212SA 8
Total 52

The total marked current consumption equals 52. Since this exceeds 35, which is the limit when using JW-21PU, another power supply module is required in order to install these modules on the expansion rack panel.

(3) Calculation of current consumption (by calculating current consumption)

As the calculation example, calculate current consumption taking the system configuration in the example of (2).

JW-32CUM1 (JW-34KBM) ... 0.95 A
JW-14PG ..... 0.2 A
JW-201N ..... 0.04 x 8 = 0.32 A
JW-211NA ..... 0.06 x 8 = 0.48 A
JW-203S ..... 0.13 x 8 = 1.04 A
JW-212SA ..... 0.06 x 8 = 0.48 A
Total 3.47 A

The total current consumption is 3.47A. This value is less than the output current of 3.5 A from the JW-21PU. Therefore, there is no need to install power supply module in an expansion rack panel.

As indicated above, the total current consumption calculation method requires no more power supply module, but the current consumption mark method requires another power supply module. Therefore, get total current consumption using calculation method for determine system configuration. The mark counting method gives only a rough estimate.

7-2 Allocation of the relay number

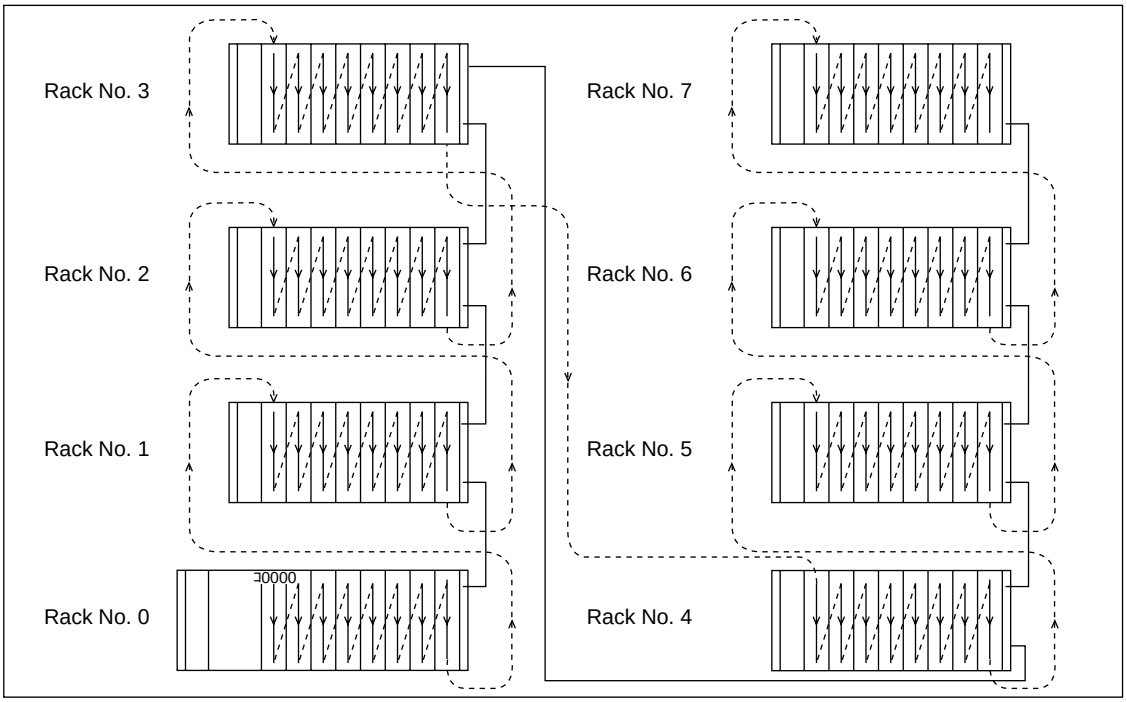
Relay numbers of input, output, special, and option module are assigned by automatic registration when the power source is turned ON (protect switch: OFF), or by I/O registration (automatic registration/table creation) of the support tool (corresponding to JW-32CUM1).
As the assignment, relay points are registered in the control module of JW-32CUM1, by the type of the mounting module, in every rack and slot number of the basic and expansion rack panel.
When the protect switch of the control module is OFF and the system memory #247 = 0, the relay numbers are assigned automatically when the power source is turned ON. After automatic registration, prohibit automatic registration during operation by turning ON the protect switch or writing #247 = 03_{HEX}.
The registered relay number is verified by self-diagnosis when changing the mode of JW30H (JW-32CUM1) (starting operation from stopped state). As a result of verification, if different from the mounted module, the FLT lamp of the JW-32CUM1 control module lights, and the JW30H (JW-32CUM1) stops operation. At the same time, the error code 60 (table verify error) is stored in the system memory #160.

[1] Kinds of I/O registration

I/O registration of JW30H (JW-32CUM1) have "Auto registration" and "Table creation."

(1) Auto registration

Top addresses of rack numbers 0 to 7 are set automatically in the continuous address from ⊐0004.



- **Max. number of I/O points and I/O relay area.**

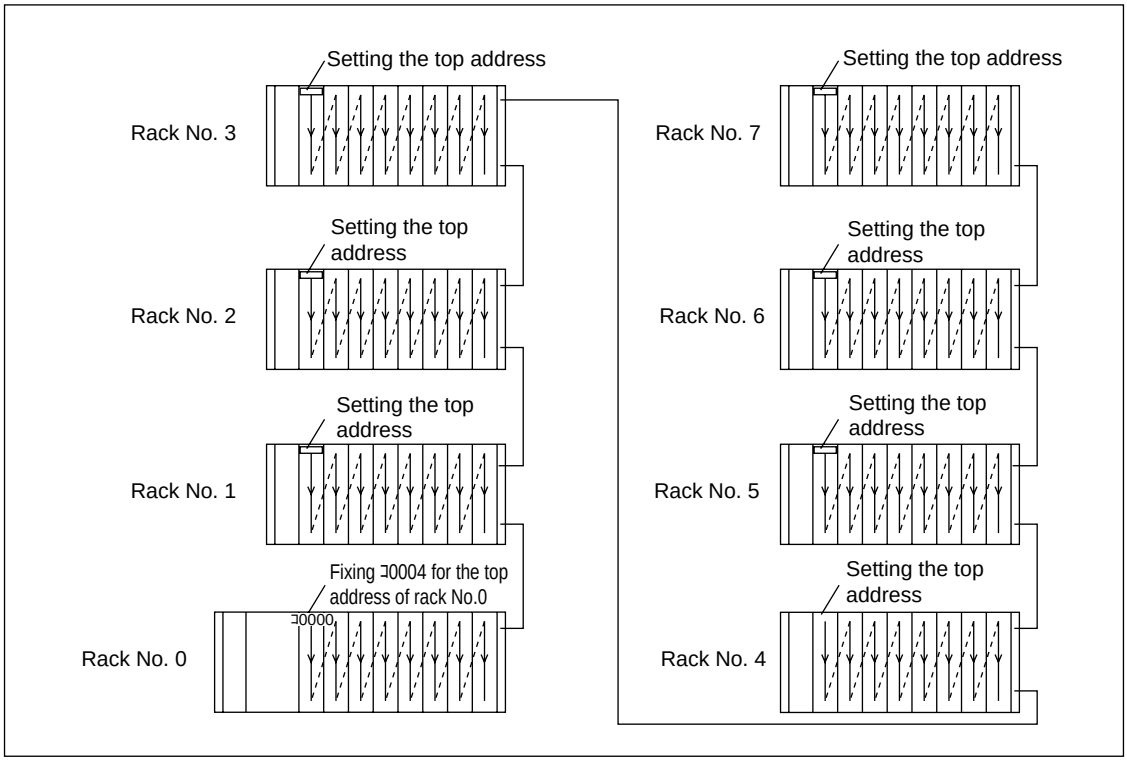
Max. No. of I/O points	I/O relay area
1024 point	⊐0004 to ⊐0277

Note 1: When some other control module in the JW30H series is used (such as the JW-33CUH1), the first rack number address must be "⊐0000" and the others are numbered sequentially.

Note 2: The I/O mounted on the remote I/O slave station JW-21RS is not registered automatically.
- When the JW-32CUM1 remote I/O master station function is used, and a JW-21RS is used as a slave station, register the slave station I/O as a remote I/O parameter on the JW-32CUM1.
- When the master station is JW-21CM and the slave station is JW-21RS, the I/O registration of slave station is registered in the parameter of JW-21CM.

(2) Table creation

In the expansion rack panel (rack numbers 1 to 7), the top address of relay number is set in even address (within area of ⊐0004 to ⊐1577).



- **Max. number of I/O points and I/O relay area.**

Max. No. of I/O points	I/O relay area
1024 point	⊐0004 to ⊐1577

Note 1: Don't allow duplicate numbers in the relay number of previous rack and relay number of next rack.

Note 2: When some other control module in the JW30H series is used (such as JW-33CUH1), the top address used on the expansion rack panel must be "⊐0000 to ⊐1577."

[2] I/O relays allocated to each module

Relay numbers in each rack panel are automatically allocated in series following each rack top address set by I/O register. Number of points and contents of relays allocated varies with kinds of module.

Kinds of module	Allocation No. of points	Contents of allocated relay No.
8 points input/output	16	Instead of 8 points, 16 points are assigned. - The first half 8 points is acceptable for input/output and the second half 8 points is unacceptable area for this module.
16 points input/output	16	Acceptable for 16 points as I/O module.
32 points input/output, I/O	32	Acceptable for 32 points as input, output, and I/O module.
Special I/O (64 points input/output)	16	Although 16 points are assigned, this is a dummy area not used in this module. - In the 64 points I/O module, the relay area for special I/O module can be used as I/O module.
Special I/O (except for 64 points)	16	Although 16 points are assigned, this is a dummy area not used in this module.
Option		
I/O link		
DeviceNet		
Vacant slot	16	Allocation for 16 points.

7

[3] Maximum number of input/output points and allocation of input/output relays

Each control module has own maximum number of control input/output points. However, number of relay points that affect maximum number of control input/output points varies with each model. Be careful that these are different from number of relay allocation points.

- **Maximum number of JW-32CUM1 control input/output points**

Maximum number of control I/O points	Maximum number of I/O relay allocation points	I/O relay area	
		Automatic registration	Create table
1024 points	1504 points	ㅋ0004 to ㅋ0277	ㅋ0004 to ㅋ1577

- **Number of relay points and number of installable modules on each module**

Module type		Number of relay points that affect maximum number of control I/O points	Number of allocation points of I/O relays	Maximum number of installed modules	Racks that can install
8 point input/output modules		16 points	16 points	60 modules	Rack 0 to 7
16 point input/output modules		16 points	16 points	60 modules	Rack 0 to 7
32 point input/output/ I/O modules		32 points	32 points	60 modules	Rack 0 to 7
Special I/O module	64 point input/outut	64 points*	16 points	32 modules	Rack 0 to 3
	Other than 64 point input/output	0	16 points		
Option module		0	16 points	4 modules	Rack 0
I/O link master module		0	16 points	*2	Rack 0
DeviceNet master module		0	16 points	*3	Rack 0
Vacant slot		0	16 points	---	Rack 0 to 7

*1: The 64-point input/output module uses special I/O relay area (ㅋ3000 to ㅋ3777) for its control relay.
*2: Maximum of one JW-23LMH module (operation modes 7 or 8 only).
*3: Maximum of three JW-20DN modules.

● **Module installation examples**

Control module model name	Maximum number of modules installed				Number of control I/O points	Number of I/O relay allocation points
	8-point, 16-point input/output modules	32-point input/output/ I/O modules	Special I/O module (64-point input/output)	Number modules can be installed other than the left (including vacant slots) Numbers in [ ] are special I/O modules		
JW-32CUM1	60 modules	0	0	0	960 points (16 points x 60)	960 points (16 p x 60)
	0	32 modules	0	28 modules [0 modules]	1024 points (32 points x 32)	1472 points (32 p x 32 + 16 p x 28)
	0	0	16 modules	44 modules [16 modules]	1024 points (64 points x 16)	960 points (16 p x 16 + 16 p x 44)

Numbers above are true when one JW-34KBM basic rack panel (4 slots) and 7 sets of JW-38ZB expansion rack panels (8 slots) are used. (Total: "4 slots x 1 racks" + "8 slots x 7 racks" = 60 modules)

[4] Operation method of I/O module registration using support tool.

Using next support tool (correspond to JW30H), I/O module registration is possible by menu operation. See instruction manual of respective model for operation method.

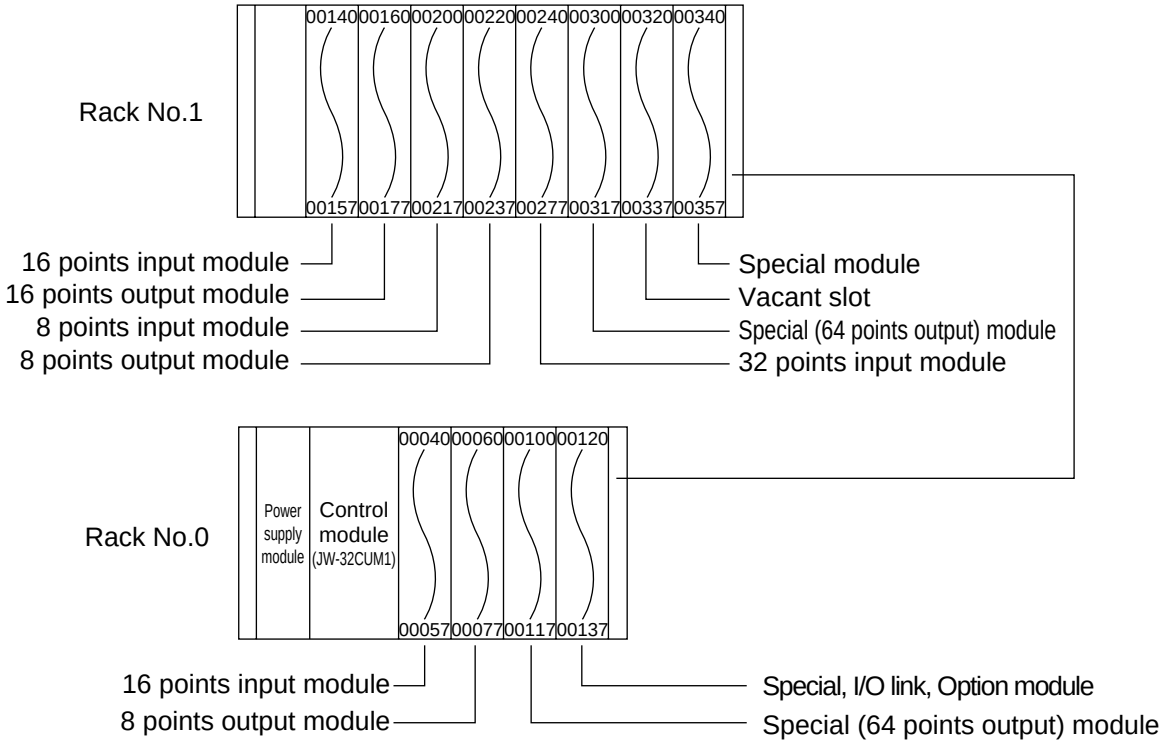
● **Support tool correspond to the JW30H**

- JW-14PG
- JW-13PG (with B mark)
- JW-50PG (Ver. 5.5 or more)
- JW-100SP
- JW-50SP (Ver. 5.5I or more)
- JW-92SP (Ver. 5.5 or more)
- JW-52SP (Ver. 5.5 or more)

[5] Allocation example of relay number

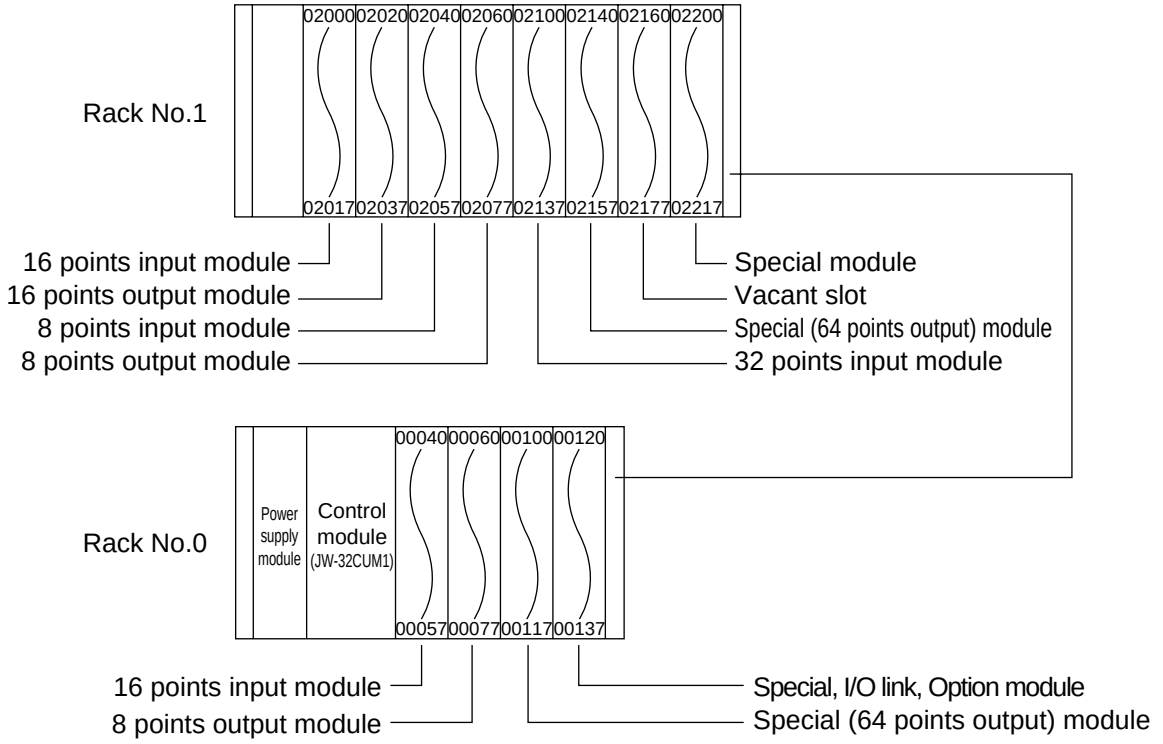
(1) Example of auto registration

This is to show the relay numbers in the following system configuration.



(2) Example of table creation

This is to show the relay numbers when the top address of rack number 1 is set at ⊐0200 in the following system configuration.



7-3 Data memory for special I/O, option, I/O link, and DeviceNet

Data memory for special I/O option module is set by module No. switch of module face as follows.
The number of modules that can be installed, as shown below, is correct when a JW-32CUM1 is used as the control module.

	Module name	Model name	Module No. switch	Byte address	Flag area	No. of installation
Special I/O module	64 points input	JW-264N	Refer to the next page			Max. 28 sets in one system (one JW-32CUM1 control module). Note: Further 8 sets can be extended by using remote I/O slave station.
	64 points output	JW-262S				
	Analog input	JW-24AD				
	Analog output	JW-22DA				
	High speed counter	JW-21HC/22HC				
	Serial interface	JW-21SU				
	ID control	JW-21DU/22DU				
	Pulse output	JW-21PS				
Option module	Link	JW-21CM	SW1	ㅋ1100 to ㅋ1177	ㅋ1510 to ㅋ1517	Max. 4 sets only on JW-34KBM.
			SW2	ㅋ1200 to ㅋ1277	ㅋ1520 to ㅋ1527	
			SW3	ㅋ1300 to ㅋ1377	ㅋ1530 to ㅋ1537	
			SW4	ㅋ1400 to ㅋ1477	ㅋ1540 to ㅋ1547	
			SW5	89000 to 89777	ㅋ1550 to ㅋ1557	
			SW6	–	ㅋ1560 to ㅋ1567	
	JW10 link	JW-25CM	SW1	ㅋ1300 to ㅋ1477	ㅋ1510 to ㅋ1511	
			SW2	59000 to 69757	ㅋ1520 to ㅋ1527	
			SW3	69000 to 79757	ㅋ1530 to ㅋ1537	
			SW4	79000 to 89757	ㅋ1540 to ㅋ1547	
			SW5	89000 to 99757	ㅋ1550 to ㅋ1557	
			SW6	ㅋ2000 to ㅋ3757	ㅋ1560 to ㅋ1567	
	Net work	JW-22CM	The area set by module No. switch differs the standard function from memory-saving function.			
	ME-NET	JW-21MN				
	Ethernet	JW-255CM	---			
	FL-net	JW-20FL5	Assign option parameter use area (SW0 to SW6) using module No. switch setting.			
		JW-20FLT				
I/O link	I/O link master station	JW-23LMH	SW0	ㅋ0100 to ㅋ0177	ㅋ1570 to ㅋ1571	Max. 1 sets only on JW-34KBM. (operation mode 7/8 only)
Device Net	DeviceNet master	JW-20DN	Assign I/O data, diagnostic data, and host Explicit message data using module No. switch setting.			Max. 3 sets only on JW-34KBM.

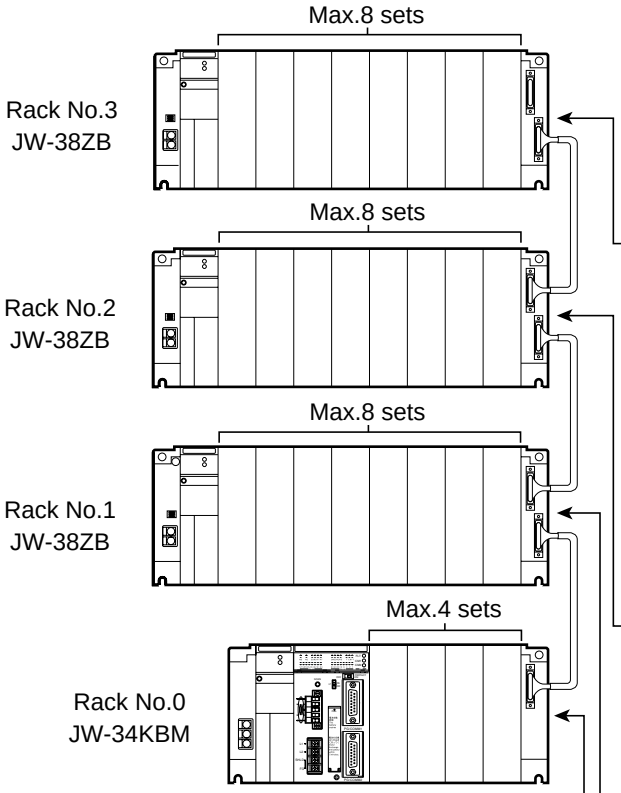
- Set the module No. switch to 0 on option modules or DeviceNet master modules installed on the JW-34KBM (JW-32CUM1). The JW-32CUM1 communication section uses the "0" data area.
- Special I/O module can only be mounted on racks 0 to 3. (It can not be mounted on racks 4 to 7.)
  When using the 64 points I/O module, the number of mountable sets varies with the model of the control module.

Total amount of 64 points module	Max. No. of I/O points
Max. 16 sets	1024 points

■ Data memory for special I/O module

(1) In case of basic system

Data memory is setting by module No. switch in each rack.



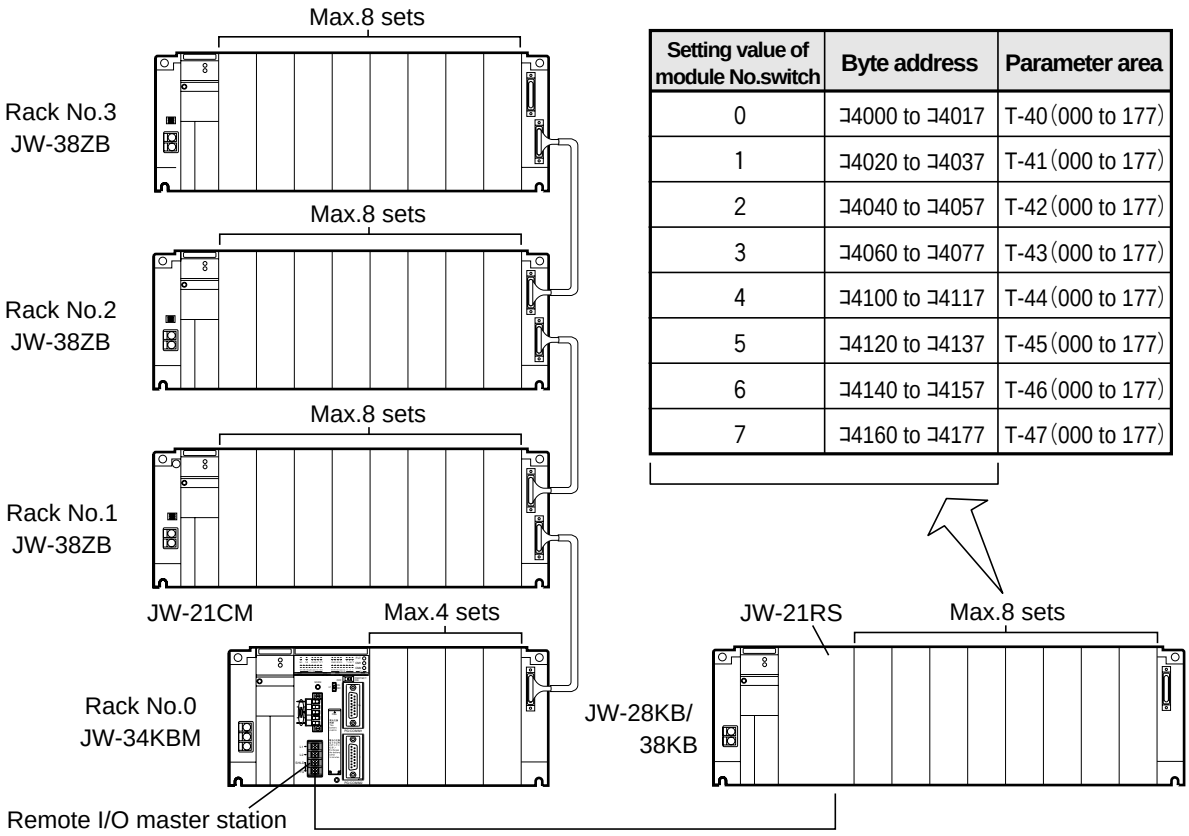
Setting value of module No.switch		Byte address	Parameter area
Rack 3	0	⊐3600 to ⊐3617	T-30(000 to 177)
	1	⊐3620 to ⊐3637	T-31(000 to 177)
	2	⊐3640 to ⊐3657	T-32(000 to 177)
	3	⊐3660 to ⊐3677	T-33(000 to 177)
	4	⊐3700 to ⊐3717	T-34(000 to 177)
	5	⊐3720 to ⊐3737	T-35(000 to 177)
	6	⊐3740 to ⊐3757	T-36(000 to 177)
	7	⊐3760 to ⊐3777	T-37(000 to 177)
Rack 2	0	⊐3400 to ⊐3417	T-20(000 to 177)
	1	⊐3420 to ⊐3437	T-21(000 to 177)
	2	⊐3440 to ⊐3457	T-22(000 to 177)
	3	⊐3460 to ⊐3477	T-23(000 to 177)
	4	⊐3500 to ⊐3517	T-24(000 to 177)
	5	⊐3520 to ⊐3537	T-25(000 to 177)
	6	⊐3540 to ⊐3557	T-26(000 to 177)
	7	⊐3560 to ⊐3577	T-27(000 to 177)
Rack 1	0	⊐3200 to ⊐3217	T-10(000 to 177)
	1	⊐3220 to ⊐3237	T-11(000 to 177)
	2	⊐3240 to ⊐3257	T-12(000 to 177)
	3	⊐3260 to ⊐3277	T-13(000 to 177)
	4	⊐3300 to ⊐3317	T-14(000 to 177)
	5	⊐3320 to ⊐3337	T-15(000 to 177)
	6	⊐3340 to ⊐3357	T-16(000 to 177)
	7	⊐3360 to ⊐3377	T-17(000 to 177)
Rack 0	0	⊐3000 to ⊐3017	T-00(000 to 177)
	1	⊐3020 to ⊐3037	T-01(000 to 177)
	2	⊐3040 to ⊐3057	T-02(000 to 177)
	3	⊐3060 to ⊐3077	T-03(000 to 177)
	4	⊐3100 to ⊐3117	T-04(000 to 177)
	5	⊐3120 to ⊐3137	T-05(000 to 177)
	6	⊐3140 to ⊐3157	T-06(000 to 177)
	7	⊐3160 to ⊐3177	T-07(000 to 177)

- Do not use the second half 8 bytes of byte address for JW-264N/262S(For example, ⊐3610 to ⊐3617)in 64 points input/output. This area can use as auxiliary relay.

- Do not use parameter for JW-264N/262S, and JW-21DU/22DU.

(2) In case of basic system plus remote I/O system

Up to 8 sets are set in the remote I/O slave station by module No. switch.

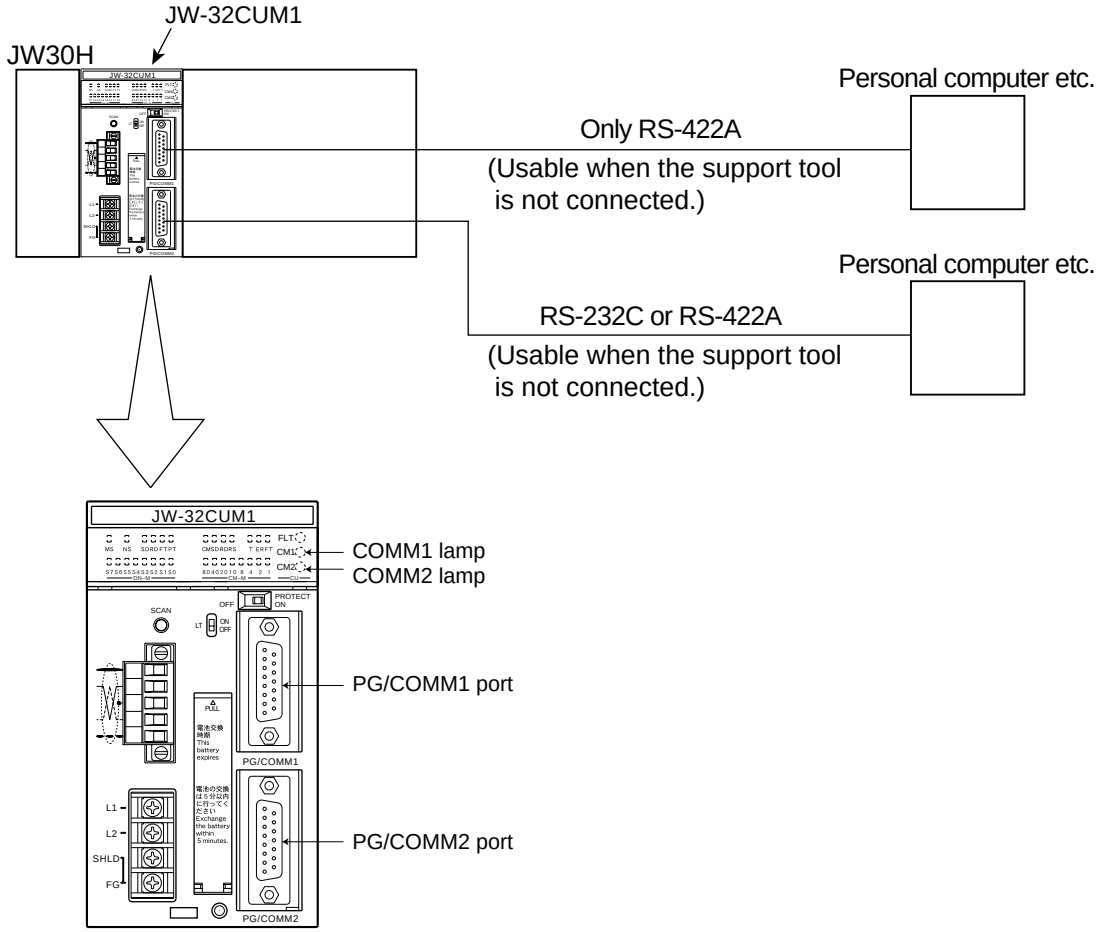


Setting value of module No.switch	Byte address	Parameter area
0	∃4000 to ∃4017	T-40(000 to 177)
1	∃4020 to ∃4037	T-41(000 to 177)
2	∃4040 to ∃4057	T-42(000 to 177)
3	∃4060 to ∃4077	T-43(000 to 177)
4	∃4100 to ∃4117	T-44(000 to 177)
5	∃4120 to ∃4137	T-45(000 to 177)
6	∃4140 to ∃4157	T-46(000 to 177)
7	∃4160 to ∃4177	T-47(000 to 177)

- The data memory/parameter area of racks 0 to 3 is same as in the basic system (previous page).
- When the JW-32CUM1 and JW-21CM are the remote I/O master stations, up to 4 sets of JW-21RS can be connected, but special I/O module can be connected by 8 sets at maximum in the total of slave station, and if the slave station are different, duplicate module No. switches are not permitted.
- The serial interface module JW-21SU cannot be used in the remote I/O slave station. Meanwhile, if the ID control module JW-21DU/22DU or pulse output module JW-21PS is used in the remote I/O slave station, the method of use is limited partly. (The F-85 and F-86 instructions cannot be used.)

7-4 Communication port

The JW-32CUM1 control module has communication ports (PG/COMM1, PG/COMM2).
The communication port can communicate with connected device having the I/O port of RS-232C/422A of host computer, such as personal computer.
Available for same function as SHARP's computer link.
When the support tool is not used, one set of JW-32CUM1control module can have two channels of communication port, and two systems such as personal computer and LCD control terminal can be connected.



Name	Function
COMM1 lamp (yellow)	• Flickers during communication by connecting PG/COMM1 port and personal computer, etc.
COMM2 lamp (yellow)	• Flickers during communication by connecting PG/COMM2 port and personal computer, etc.
PG/COMM1 port (Only the RS-422A)	• Connect support tool. Usable as communication port (RS-422A only) when the support tool is not used.
PG/COMM2 port (RS-232C/422A)	• Connect support tool. Usable as communication port (RS-232C/422A) when the support tool is not used.

[1] Set system memory of JW-32CUM1

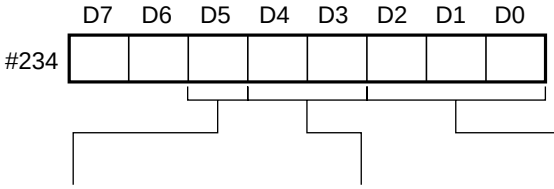
Set system memory #234/#235 (communication port 1) and #236/#237 (communication port 2) for communication conditions when communicating with a personal computer.

System memory number	Contents	
#234	Transfer rate, parity, stop bit	Set communication port 1 (PG/COMM1 port)
#235	Station No. 001 to 037 $_{OCT}$	
#236	Transfer rate, parity, stop bit	Set communication port 2 (PG/COMM2 port)
#237	Station No. 001 to 037 $_{OCT}$	

(1) Set communication port 1 (PG/COMM1 port)

① Set system memory #234

For transfer rate, parity, and stop bit, set ON (1) / OFF(0) of D0 to D5.



Stop bit

D5	Stop bit
0	1 bit
1	2 bits

Parity

D4	D3	Parity
0	0	None
0	1	Odd
1	0	Even
1	1	——

Transfer rate

D2	D1	D0	Transfer rate (bits/s)
0	0	0	19200
0	0	1	9600
0	1	0	4800
0	1	1	2400
1	0	0	1200
1	0	1	115200
1	1	0	57600
1	1	1	38400

Data is 7 bits fixed.

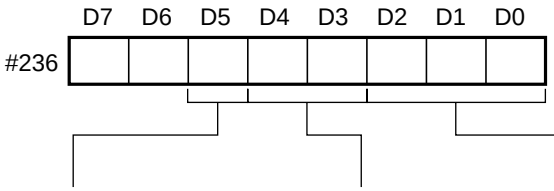
② Set system memory #235

Set station No., 001 to 037$_{OCT}$ for communicating.

(2) Set communication port 2 (PG/COMM2 port)

① Setting system memory #236

For transfer rate, parity, and stop bit, set ON (1) / OFF(0) of bits D0 to D5.



Stop bit

D5	Stop bit
0	1 bit
1	2 bits

Parity

D4	D3	Parity
0	0	None
0	1	Odd
1	0	Even
1	1	——

Transfer rate

D2	D1	D0	Transfer rate (bits/s)
0	0	0	19200
0	0	1	9600
0	1	0	4800
0	1	1	2400
1	0	0	1200
1	0	1	115200
1	1	0	57600
1	1	1	38400

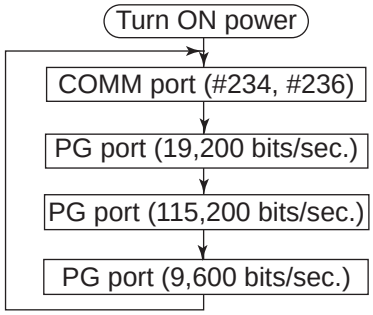
Data is 7 bits fixed.

② Set system memory #237

Set station No., 001 to 037$_{OCT}$ for communicating.

Remarks

- Change of the communication setting for the communication ports (#234, #236) is effective while turned ON the power.
- However, as the JW30H (JW-32CUM1) automatically changes the communication setting as shown below, it will take few number of retries until establishment of communication after changed settings.



- As shown above, the JW-32CUM1 needs four times of retry to re-establish communication after changed setting, on the condition that the communication port successfully established communication just before changing the settings.

[2] Communicate with a personal computer

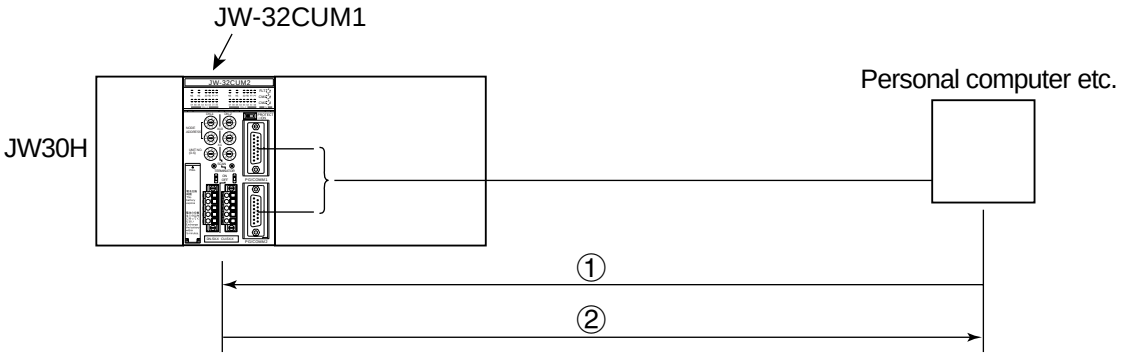
The following instructions are available for communicating between the JW30H (Control module: JW-32CUM1) and a personal computer. There are three type of command; read out command, write command and control command.

Command	Contents
Read out command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.
Write command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.
Control command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.

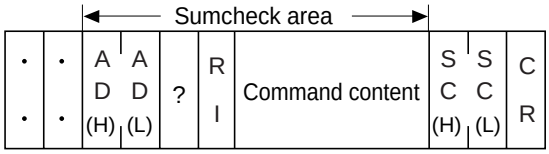
As for the detail of each command, see "List of commands" on pages 7-19, and "Computer link" section of user's manual of link module JW-21CM.

(1) Communication format

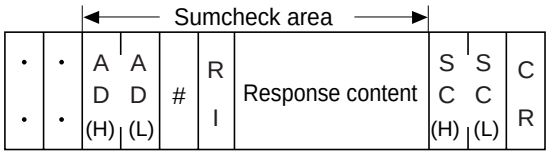
When a command from a personal computer is received, the communication port of JW-32CUM1 operates according to the received command, and sends the response. When an error occurs while processing, it returns error response.



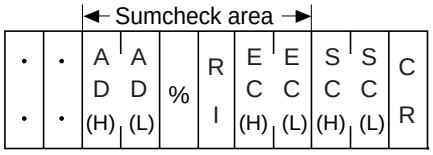
① Communication format of command (personal computer to JW30H)



② Communication format of response (JW30H to personal computer)



Error response where an error occurs



■ Contents of communication format

	Data	Using code (ASCII character)	Contents
*	AD (H) AD (L)	00 to 37 $_{OCT}$	Station No. • In command, the station No. to be received command. • In response, the station No. to send response.
	RI	0 to F $_{HEX}$	Response time (Set the time from receiving a command to responding. See page 7-18.)
*	SC (H) SC (L)	00 to FF $_{HEX}$	Sumcheck code (Search the mistake of transfer data. Refer to next page.)
*	EC (H) EC (L)	01 to 1B $_{HEX}$	Error code (Indicate error content. Refer to as follows.)

Identification symbol	ASCII code	Contents
: (colon)	3A $_{HEX}$	Hedder (Indicates beginning of command and response.)
? (question)	3F $_{HEX}$	Indicates command.
# (number mark)	23 $_{HEX}$	Indicates response (at normal).
% (percent)	25 $_{HEX}$	Indicates response (at error).
CR (carriage return)	0D $_{HEX}$	Terminal mark (Indicates termination of a command and response.)

*: (H) indicates upper digit, (L) indicates lower digit.

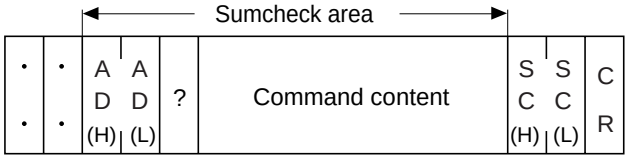
7

● Contents of error code

Error code (EC (H), EC (L))	Contents
01	Format error
02	Designated address is not TMR/CNT setting value
05	Number of transfer bytes is not correct
06	PC does not stop by HLT (stop PC processing)
07	Writing to PC memory is not executed correctly
08	Memory capacity, file capacity is full
0A	Parity error
0B	Framing error
0C	Overrun error
0D	Sumcheck error
0E	Prohibit program memory write (memory protection switch "ON")
0F	Other CPU is accessing memory
10	Not match write mode
11	Not match write mode
12	Tried to write in ROM
1B	System memory error
30	Password is not yet registered.
31	The secret function is not released.
32	Password error (tried to enter other than alphabetical and numeric letters)
33	The secret function is not released.

● **Sumcheck code SC (H), SC (L)**
The communication port detects error using sumcheck as well as party check in order to increase the reliability.

① **Sumcheck area** (See page 7-15)
[Example] Command



② **Check method**
1. Add data from station No. to the last data of the command contents or response contents (just before sumcheck code) that are summed up in ASCII code.
2. Convert the sumcheck code (2 digits hexadecimal) to 8 bits data and add ① to the result. When the grand total is "0" (disregarded figure up), the message is regarded as correct, when the grand total is not "0," the message is regarded as an error.

③ **Produce method**
1. Add data from station No. to the last data of the command contents or response contents (just before sumcheck code) that are summed up in ASCII code.
2. Operate complement number of 2 of the result of 1.
   Complement number of 2: Turn over all the bits indicated by the binary system (0 to 1, 1 to 0) and add 1.

[Example] The complement number of 2 of $4E_{HEX}$ is $B2_{HEX}$
$4E_{HEX} \rightarrow 01001110$
$\downarrow$ invert each bit
10110001
$\downarrow$ add 1
$10110010 \rightarrow B2_{HEX}$

3. Divide upper 4 bits and lower 4 bits and convert them to ASCII code.

When sumcheck is not necessary, setting @ in the command line.

● **Response time RI**

When a personal computer is interpreter system, it executes programs one by one while interpreting. This personal computer may not have finished its process before receiving the response from the JW30H (JW-32CUM1). As a countermeasure, setting the response time RI in command (max. 600ms).

$RI_{(HEX)}$	Response time (ms)	$RI_{(HEX)}$	Response time (ms)
0	0	8	80
1	10	9	90
2	20	A	100
3	30	B	200
4	40	C	300
5	50	D	400
6	60	E	500
7	70	F	600

As the JW30H (JW-32CUM1) accesses memories after one operation cycle, the actual response time is the total of setting value of RI in command and the waiting time of one operation cycle.

[Reference] Setting response time RI

It is difficult to recommend the optimum response time, as the optimum response time is varied depending on the model of personal computer, the programming language and the system program. First, set a fairly long time, then, shorten gradually.

Remarks

- There are some limits for handling bit numbers by commands and for the communication buffer of personal computers. Be careful for handling bit numbers and communication buffers.

(2) Write mode

Write mode of PCs are "mode 0" (write prohibited for all memories) at power ON. Prior to writing program from the personal computer, change write mode to "mode 1" or "mode 2" using EWR command (setting of write mode). SWE command read out current status of writing mode.
Set write mode to "mode 0" as much as possible, except when writing date into PC. Each mode has restrictions as follow:

Mode 0	Write prohibited for all memories
Mode 1	Write enable only for data memory
Mode 2	Write enable for all memories

Remarks

- Turn OFF JW-32CUM1 control module protect switch (write allowed) before executing write commands and change to write mode 2 using EWR command.

Each command can be executed in the write mode or when the JW30H (JW-32CUM1) is in the following state.

O: Executable x: Non-executable

Function		Command name	Write mode			JW30H status	
			0	1	2	Stopped by HLT command	Run
Read-out command	Relay monitor	MRL	O	O	O	O	O
	Current value monitor of timer/counter/MD	MTC	O	O	O	O	O
	Register current value monitor	MRG	O	O	O	O	O
	Read out register of file 1	RFL	O	O	O	O	O
	Read out register of file 0 to 3	RFLF	O	O	O	O	O
	Read out parameter of special I/O module	RPSR	O	O	O	O	O
		RPS	O	O	O	O	O
	Read out parameter of option module	RPO	O	O	O	O	O
	Read out system memory	RSM	O	O	O	O	O
	Read out program memory	RPM	O	O	O	O	O
	Read out date	MDY	O	O	O	O	O
	Read out time	MTM	O	O	O	O	O
Write command	Set/reset relay	SRR	x	O	O	O	O
	Set/reset timer/counter	SRT	x	O	O	x	O
	Write in register	WRG	x	O	O	O	O
	Write the same data in register	FRG	x	O	O	O	O
	Write in register of file 1	WFL	x	O	O	O	O
	Write in register of file 0 to 3	WFLF	x	O	O	O	O
	Write in parameter of special I/O module	WPSR	x	x	O	O	x
		WPS	x	x	O	O	x
	Write in parameter of option module	WPO	x	x	O	O	x
	Write in system memory	WSM	x	x	O	O	x
	Write in program memory	WPM	x	x	O	O	x
	Change setting value of timer/counter	CTC	x	x	O	O	O
	Set date	SDY	x	O	O	O	O
	Set time	STM	x	O	O	O	O
	Set time revision	ACL	x	O	O	O	O
Control command	Stop operation	HLT	O	O	O	O	O
	Restart operation	RUN	O	O	O	O	O
	Monitor operation conditions	MPC	O	O	O	O	O
	Read memory capacity	VLM	O	O	O	O	O
	Read out write mode status	SWE	O	O	O	O	O
	Set write mode	EWR	O	O	O	O	O
	Turn back the message	TST	O	O	O	O	O
	Release secret/password registration	PAS	*1	*1	O	O	*1
	Set secret function	SES	*2	*2	O	O	*2
	Check secret function	SEI	O	O	O	O	O

*1: When data of command = 0 O
= 1 or 2 x
*2: When data of command = 0 O
= F x

(3) Address expression system

In each command, the setting value in the following table is set in the address module of communication format.

		Address (octal)	Setting value (octal)	Using command
Relay number		00000 to 15777	00000 to 15777	MRL, SRR
		20000 to 75777	20000 to 75777	
Timer/counter point of contact number		T0000 to T1777 C0000 to C1777	T0000 to T1777	MRL
Timer/counter number		0000 to 1777	0000 to 1777	MTC, SRT
MD number		000 to 777	0000 to 1777	MTC
Register address		⊐0000 to ⊐1577	A0000 to A1577	MRG, WRG, FRG
		⊐2000 to ⊐7577	A2000 to A7577	
		b0000 to b1777	B0000 to B1777	
		b2000 to b3777	B2000 to B3777	
		09000 to 09777	09000 to 09777	
		19000 to 19777	19000 to 19777	
		29000 to 29777	29000 to 29777	
		39000 to 39777	39000 to 39777	
		49000 to 49777	49000 to 49777	
		59000 to 59777	59000 to 59777	
		69000 to 69777	69000 to 69777	
		79000 to 79777	79000 to 79777	
		89000 to 89777	89000 to 89777	
		99000 to 99777	99000 to 99777	
		E0000 to E7777	E0000 to E7777	
File register address	File 0	000000 to 035777	000000 to 035777	RFL, RFLF, RFLE WFL, WFLF, WFLE
	File 1	000000 to 037777	000000 to 037777	
	File 2	000000 to 177777	000000 to 177777	
Special I/O module parameter address		000 to 177	0000 to 0177	RPSR, RPS WPSR, WPS
Option module parameter address		00 to 77	0000 to 0077	RPO, WPO
System memory address		#0000 to #2177	0000 to 2177	RSM, WSM
Program address	JW-32CUM1 (15.5K words)	00000 to 36777	000000 to 036777	RPM, WPM, CTC
	JW-32CUM1 (31.5K words)	00000 to 76777	000000 to 076777	

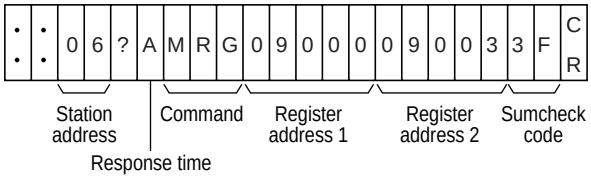
(4) Data expression system

Data are expressed by hexadecimal. Program contents are also expressed by hexadecimal based on machine language. Contents of bit configuration of program memory is not available.

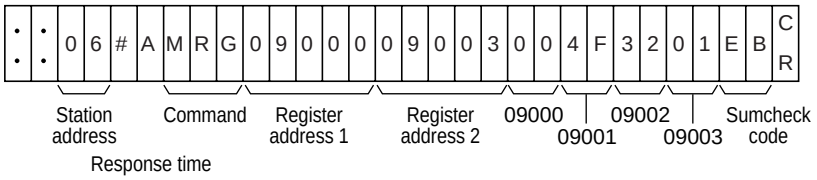
(5) Example of communication (monitor current value of register)

Monitor from 09000 to 09003 of PC06. (Response time : 100ms)

■ Command



■ Response

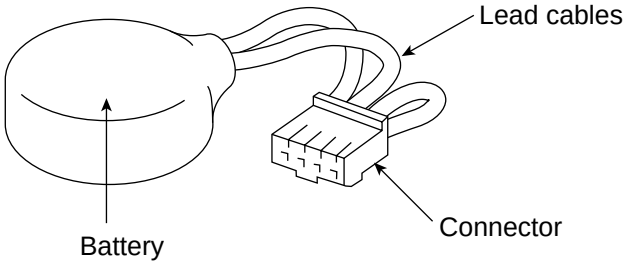


7-5 Exchange method of batteries

Exchange battery for memory back-up in JW-32CUM1 control module within its validity.
Battery module can be replaced while supplying power to the JW30H.

■ Model name of battery module

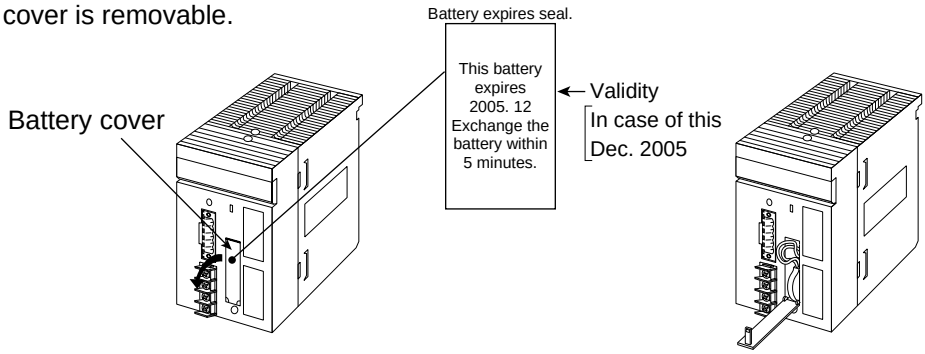
UBATN5005NCZZ



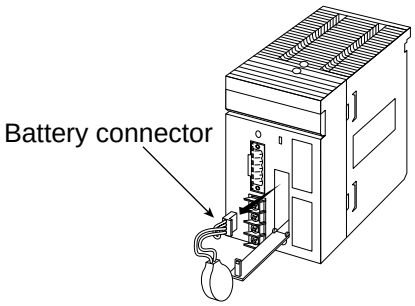
■ Battery exchange procedure

① Prepare a new battery module for exchange.

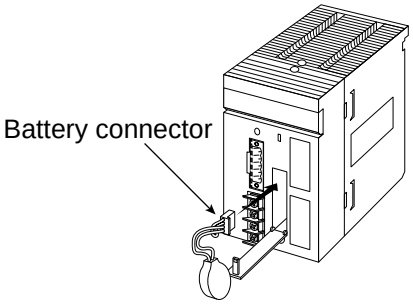
② Open the battery cover.
Battery cover is removable.



③ Disconnect the battery module connector from the JW-32CUM1 battery connector.



④ Insert a new battery module connector in the battery connector of the JW-32CUM1.
The battery change must completed within 5 minutes. Otherwise, the memory may be erased.



⑤ Put battery into the JW-32CUM1, and close battery cover.
Note: Do not subject the battery to impact of any kind. Do not pull on the lead wires of the battery, or liquid leakage accident may occur.

7-6 Self-diagnosis function

By the self-diagnostic function, the system is running while checking if its own hardware is normal or not. As a result of self-diagnosis, if abnormality is detected, the stop output is turned OFF (opened), and the fault lamp lights up to stop operation.

Self-diagnosis is executed in every scan, and when recovered to normal state, the stop output is automatically turned ON (closed), and the operation is resumed. (By the infinite loop of user program or the like, when the watchdog timer is actuated, the operation is stopped by the program mode, and the stop output is opened.)

[1] Abnormality not detected by self-diagnostic function

1. Abnormality directly affecting the self-diagnostic function itself of the JW-32CUM1 control module (such as hardware abnormality of JW-32CUM1 control module).
2. Abnormality in the outer side circuit module of input and output module (abnormality not affecting the I/O bus port).
   Examples:
   - When the load cannot be driven due to abnormality of output transistor of output module.
   - When input signal cannot be taken in due to abnormality of photo coupler of input circuit of input module.
3. Communication abnormality in data link
   Communication abnormality can be confirmed by the LED of option module or communication flag.
   * For details see "user's manual" of option module.

[2] Self-diagnosis function (Error code table)

Item			Contents	PC operating condition	Halt output	JW-32C-UM1	Indication lamp of power supply module		Special relay *3	Error code (BCD)	
										Special register	System memory
						FLT (error)	POWER	RUN		ↄ0734	#160 to 167
Self-diagnosis	Memory error		Check instruction code	Stop	Open	Light ON	Light ON	Light OFF	07370	20	24
			Check system memory setting								23
			Check program ROM								25
			Check program sum								26
			Check I/O module registration table								28
	CPU error		Watch dog timer	Stop	Open	Light OFF	Light ON	Blinking	---	00	31
			RAM check (R/W)	Stop	Open	Light ON	Light ON	Light OFF	07371	30	32
			Hardware check								35
	I/O error	At refreshing	I/O data bus						07373	40	44
			Output data check								42
			Installed module check								40
			I/O rack panel error								48
		At table verifying	Table verify error							60	60
			Switch verify error								61
		At table registration	Table registration error							70	70
			No module error								71
			I/O points over								72
			Switch setting error								73
	Special I/O error		Hardware error						07375	40	46
			Parameter error								47
			*1 *2 Fuse blow of JW-262S	Operation	Close	Light OFF	Light ON	Light ON	07363		49
				Stop	Open	Light ON	Light ON	Light OFF			
	Option error		*1 Hardware error	Operation	Close	Light OFF	Light ON	Light ON	07374	50	53
				Stop	Open	Light ON	Light ON	Light OFF			
	Power supply error		Power failure/low voltage	Stop	Open	Light OFF	Light OFF	Light OFF	07377	10	13 *4
	Expansion power supply error		Power failure/low voltage			Light ON	Light ON		07376	40	43
	Battery error		Battery low voltage/ No installation of battery	Operation	Close			Light ON	07372	20	22
Halt output			Relay output, 100/200 VAC, 30 VDC, 1A, ON while PC operation (close)								

*1 The upper or lower state of each item may occur when the fuse is melted down in the system memory #206 or #207, or by the setting in the case of option abnormality.

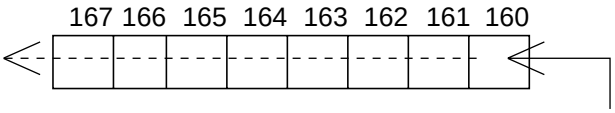
*2 When eternal power is not supplied to the JW-262S, a fuse failure will also occur.
A special attention must be paid when #206 is set to operation stoppage.

(Setting)		(State)
Continue operation	→	Upper column
Halt	→	Lower column

*3 The special relay: 7370 to 7377 are special relay which are turned ON when detected in self-diagnosis. In the event of abnormality, the kind of trouble is known by monitoring the special relay through support tool, host communication, or data link. (The special relay is turned ON in the event of abnormality, but I/O processing is not executed in the event of abnormality, and hence it cannot be taken out of the output.)
*4 The power source error is stored when the power source is turned ON even in normal state.

Error code storage area #160 to 167

The system memory in which the error code is stored are #160 to 167 are in stack structure, and the latest error code is stored in #160.



The newest error code
(The content in #160 is transferred to #161 when next failure occurs.)

7-7 Troubleshooting

In the event of abnormality on the JW30H (JW-32CUM1), check the LED (RUN, FAULT) of the power supply module and the JW-32CUM1 (⇨[1]), and remedy according to the check flow depending on the state.

As for errors concerning the communication functions (such as the DeviceNet) of the JW-32CUM1, see "Errors and treatment" of each function.

DeviceNet ⇨8-27, Remote I/O (master station) ⇨9-11
Data link DL1 (master station) ⇨10-14, Data link DL9 (master station) ⇨11-16,
M-net (master station) ⇨12-14.

[1] State of LED

RUN (Power supply module)	Fault (JW-32CUM1)	Remarks	
OFF ○	ON ●	Detectable error for self-diagnosis	Check flow1
OFF ○	OFF ○	Power supply OFF	Check flow2
Blink ◎	OFF ○	Halt mode	Check flow3
ON ●	OFF ○	Disable detection error by self-diagnosis (input relation)	Check flow4
		Disable detection error by self-diagnosis (output relation)	Check flow5
ON ●	ON ●	Others	Check flow1

[2] Precondition of check flow

This check flow describes the countermeasure method (replacement of defective module and subsequent restoring method) in the event the system running normally so far suddenly breaks down. Therefore, the following cases are excluded.

1. Trouble due to error in initial setting when starting up the system (system memory, parameter, setting switch, etc.).
2. Momentary failure due to transient abnormality due to noise or other effect (irreproducible trouble).
3. Trouble due to effect of ladder program (customer's application).

[3] Prepare for causing trouble

1. **Be sure to keep back-up for program memory and system memory**
   When the JW-32CUM1 control module is abnormal, the current program memory and the like may not be saved by the support tool, or the saved data may be incorrect. Therefore, store the latest program memory and back-up of system memory always in the floppy disk (FD).
   In the case of ROM operation, store the back-up in the FD, too.
2. **Prepare for support tool at hand**
   Prepare the support tool that can load/save of hand-held programmer or program.
3. **Prepare for spare parts**
   Prepare always a spare of each module to be ready for abnormality.
4. **Prepare for "setting SW, setting system memory, I/O relay allocation table" of each module**
   For prompt troubleshooting, prepare the "switch setting table and I/O relay allocation table" of each module.
   *Prepare also the "parameter setting table" in the module which requires setting of parameter aside from switches, such as special I/O module and option module.

[4] Check flow

(1) Check flow 1

Monitor system memory #160 using a hand-held programmer.

↓

Contents of #160 (HEX)	Countermeasure
32, 35	Replace the JW-32CUM1
23, 24, 26	Under RAM operation: Clear the memory, and then re-load the program. If this error still occurs, replace the JW-32CUM1. Under ROM operation: Turn ON the power from OFF. If this error still occurs, replace the JW-32CUM1.
25	Program re-loading. If this error still occurs, re-write the ROM program. If this error still occurs, replace the JW-32CUM1.
44	Replace the JW-32CUM1. If this error still occurs, replace I/O modules one after the other from the first module. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
40, 42, 48	Monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
60, 70	Check the rack No. switches on the expansion rack panel and the I/O bus expansion adapter (JW-32EA). If this error still occurs, monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
61, 73	Check if there are any doubling settings among module No. switches for the special I/O module, the I/O link master module, or the option module. If this error still occurs, replace the special I/O module, I/O link master module, and option module, one after the other.
71	Check that an I/O module is installed. If this error still occurs, replace the JW-32CUM1. If this error still occurs, replace the basic rack panel.
72	Install an I/O module within the max. number of I/O points. If this error still occurs, replace the JW-32CUM1. If this error still occurs, replace the control module. If this error still occurs, replace I/O modules one after the other from the first module. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
46, 47	Monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
53	Replace the I/O link master module, DeviceNet module (can be monitored on #051), and option module (can be monitored on #50) that FT lamp lights.
22	Exchange battery. If this error still occurs, replace the JW-32CUM1.
43	Make sure power is supplied to the expansion power supply. If this error still occurs, replace the expansion power supply. If this error still occurs, replace the expansion cable. If this error still occurs, replace the JW-32CUM1. If this error still occurs, replace the rack panel.
Can't monitor in programmer	Replace the JW-32CUM1.

- Monitor operation of system memory #160

Clear → System → 1 → 6 → 0 → Monitor

- Monitor operation of system memory #046

Clear → System → 4 → 6 → Monitor

Monitor in HEX

*	*

*, * is error code

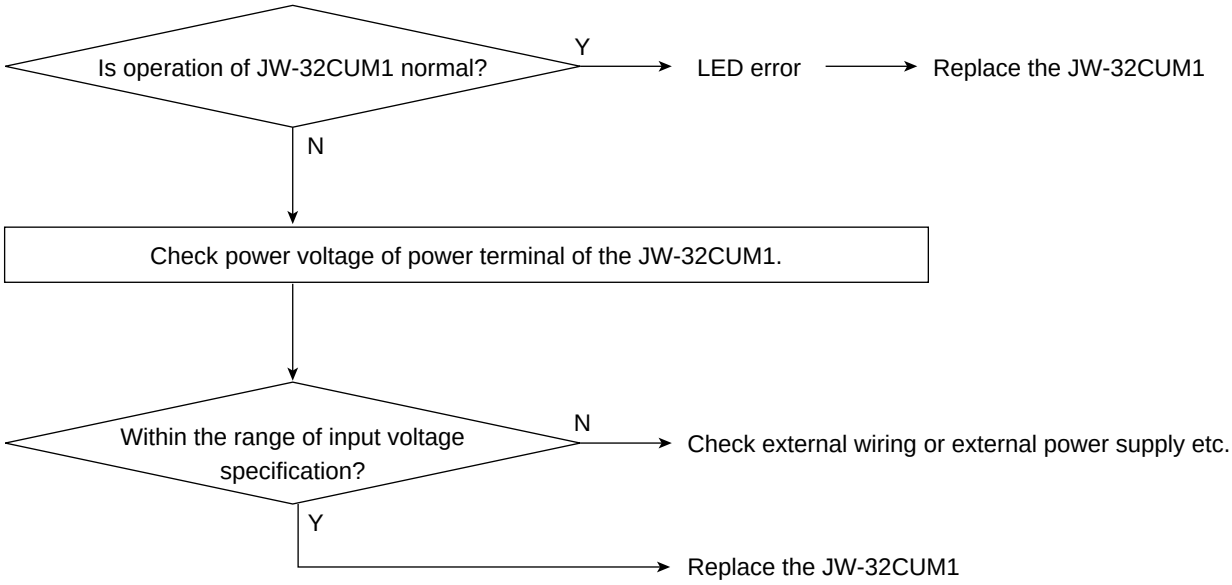
Monitor in HEX

R	S

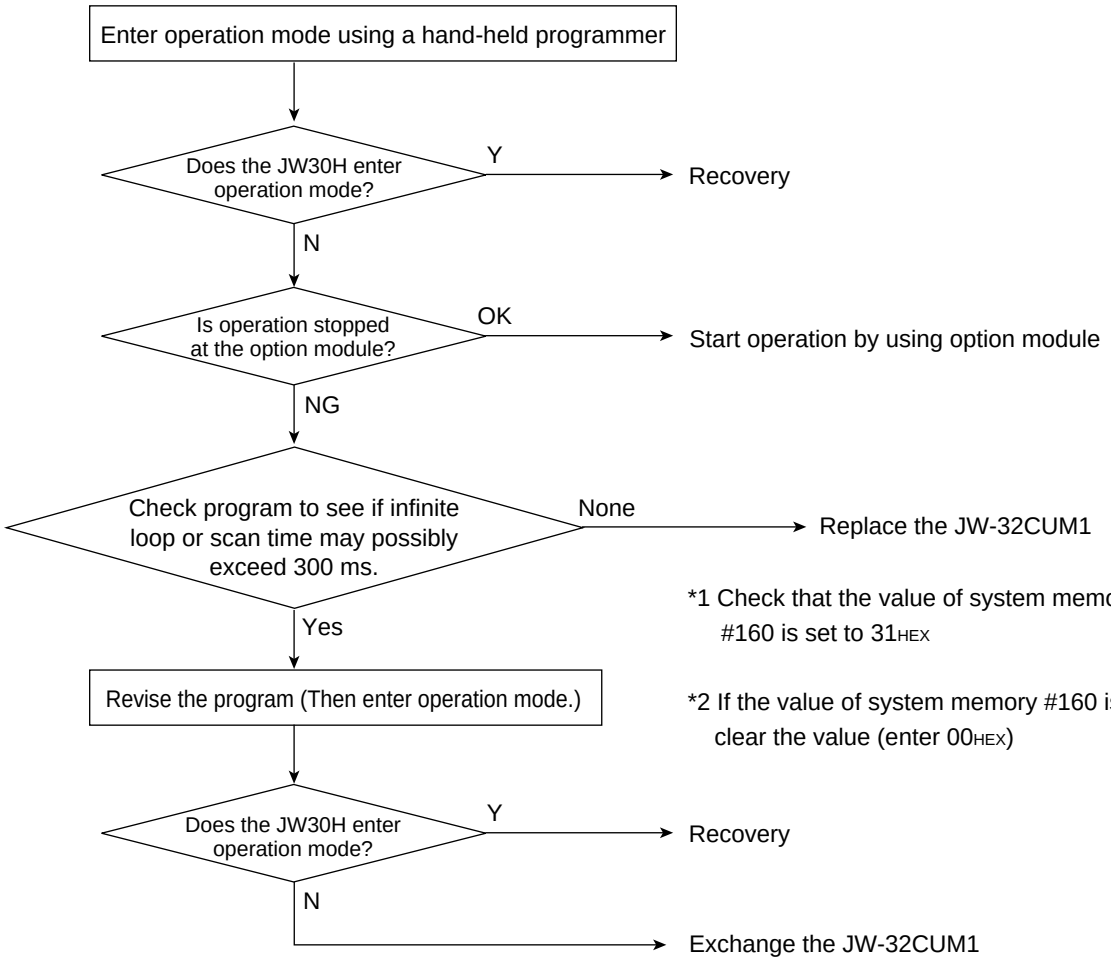
Slot No. (0 to 7)

Rack No. (0 to 3)

(2) Check flow 2



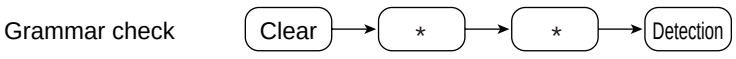
(3) Check flow 3



*1 Check that the value of system memory #160 is set to 31_{HEX}

*2 If the value of system memory #160 is set to 31_{HEX}, clear the value (enter 00_{HEX})

- Operation of program check



(4) Check flow 4

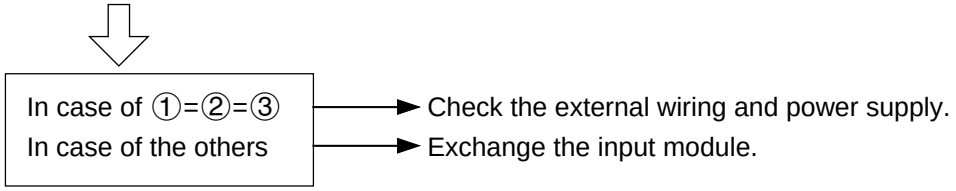
This flow shows the checking procedure in the event of abnormality of input signal not detected by the self-diagnosis of the JW-32CUM1.

Example of the error

- All inputs of specific input module fail to be turned ON.
- Specific input fails to be turned ON (OFF).
- Among input signals of a same input module, operation of a certain input signal affects other input signal.

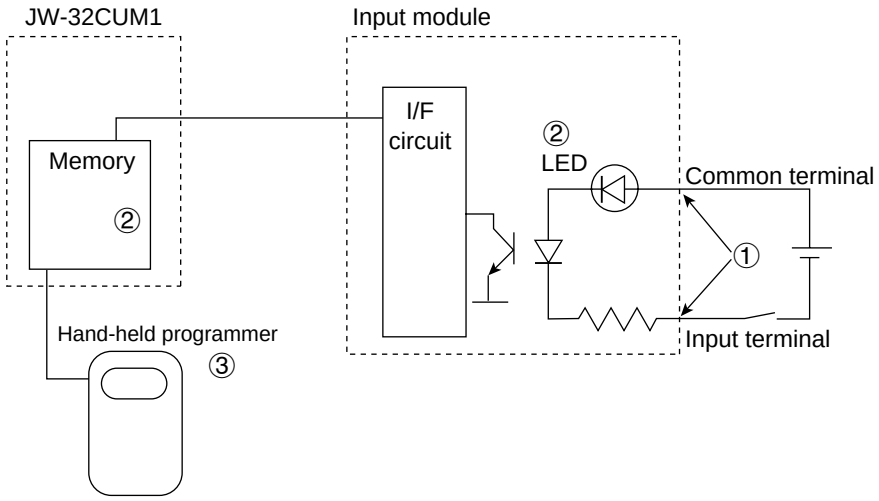
Countermeasure: Error input signal

① Measure the voltage between the corresponding input terminal of the input module and the common terminal using a tester.
If supply voltage is applied between terminals: ON
If supply voltage is not applied between terminals: OFF
② Check the state of LED of input module.
③ Connect hand-held programmer, and check ON/OFF by monitoring the data memory (input relay) corresponding to the abnormal input.



7

- **The flow of input signal**



(5) Check flow 5

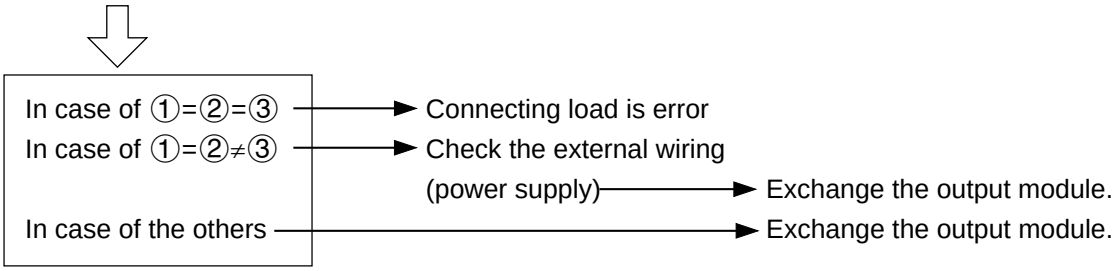
This flow shows the checking procedure in the event of abnormality of output signal not detected by the self-diagnosis of the JW-32CUM1.

Example of the error

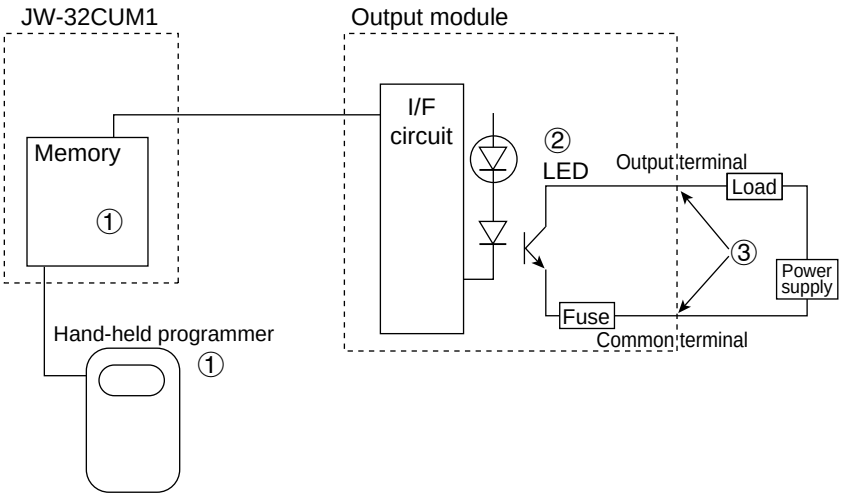
- This flow shows the checking procedure in the event of abnormality of output signal not detected by the self-diagnosis of the control module.
- Specific output fails to be turned ON (OFF).
- Among output signals of a same output module, operation of a certain output signal affects other output signal.

Countermeasure: Error output signal

① Connect hand-held programmer, and check ON/OFF by monitoring the data memory (output relay) corresponding to the abnormal output.
② Check the state of LED of output module.
③ Measure the voltage between the corresponding output terminal of the output module and the common terminal using a tester.
When the inter-terminal voltage is output ON voltage (about 1 V or less): ON
When the inter-terminal voltage is load supply voltage: OFF
Note: When the load power source is OFF and wiring to the load is disconnected, it is abnormal if the output is normal.



● **The flow of output signal**



7-8 Support tool

[1] Kinds of support tool

The support tool that can be used in the JW30H (JW-32CUM1) are classified into models that can use all functions of the JW30H (JW30H applicable support tool) and models that can be used only in the functional range of the conventional models (JW20H, JW50H/70H/100H) (JW30H non-applicable support tool).
Also, functions of some JW30H compatible support tools may be limited to those of conventional models (JW-31CUH/32CUH/33CUH), depending on the versions.
Refer to each instruction manual about operation in detail.

(1) JW30H applicable support tool

Module name	Model name	Version	Available function using JW30H (JW-32CUM1)
Hand-held programmer	JW-14PG	----	All function of JW30H (JW-32CUM1)
	JW-13PG	B mark	
		A mark No mark	Within the function of JW31CUH/32CUH/33CUH
Multipurpose programmer	JW-50PG	5.0 or more	All function of JW30H (JW-32CUM1)
		5.0 to 5.3 A	Within the function of JW-31CUH/32CUH/33CUH
Ladder software	JW-100SP	---	All function of JW30H (JW-32CUM1)
	JW-92SP JW-52SP	5.5 or more	
		5.0 to 5.3 A	Within the function of JW-31CUH/32CUH/33CUH
	JW-50SP	5.5I or more	All function of JW30H (JW-32CUM1)
		5.0 to 5.3 AI	Within the function of JW-31CUH/32CUH/33CUH

(2) JW30H non-applicable support tool

Module name	Model name	Version	Available function using JW30H (JW-32CUM1)
Hand-held programmer	JW-2PG	---	Within the function of JW20H
	JW-12PG	---	Within the function of JW20H, JW50H/70H/100H
Multipurpose programmer	JW-50PG	4.0A or less	
Ladder processor Ⅱ	Z-100LP2S + Z-3LP2ES	Z-3LP2ES 5.2 or more	
Ladder software	JW-92SP	4.0 A or less	
	JW-50SP	3.0I	

Note: The JW-2PG and JW-12PG cannot forcibly set/reset relays, transfer data using a ROM writer or transfer data to a cassette tape.
Further, the JW-50PG (less than 4.0 A), JW-92SP (less than 4.0 A), or JW-50SP (3.0I) cannot forcibly set/reset relays, nor do sampling trace.

[2] Directions of use JW30H non-applicable support tool

This section explains the manner of manipulating the JW30H by using the JW30H non-applicable support tool.

(1) Mode

Set in the system memory #260 (PC model mode) of the JW30H to determine as what model the JW30H non-applicable support tool recognizes the JW30H.

Setting value of #260	Contents
50_{HEX}	JW50H/70H/100H mode · The JW30H is recognized as JW50H/70H/100H. · Operating within the function of JW50H/70H/100H is possible.
Except for 50_{HEX}	JW20H mode (initial mode) · The JW30H is recognized as JW20H. · Operating within the function of JW20H is possible.

Note: In case of JW-2PG using in JW30H, set 02_{HEX} in the system memory #136 of JW30H.

(2) Limit items

The following limit items are applied in each mode.

① In case of JW20H mode

- Access to the file register is impossible.
- Set parameter of special I/O is Max. 8.

② In case of JW50H/70H/100H mode

- Application instructions involved in I/O is unacceptable.
- Option, parameter of special I/O treat as file E.

In both modes, the program memory, data memory, system memory, and application instructions are in the scope of each mode model. The relay and register extended in the JW30H and additional application instructions cannot be used.

(3) Mode changing method

The following limit items are applied in each mode.

① In case of hand-held programmer

1. Change setting value of system memory #260.
2. Power supply of hand-held programmer is OFF. (ON/OFF of power source, plugging/ unplugging of connector)

② In case of model having self power supply; Z-100LP2S, etc.

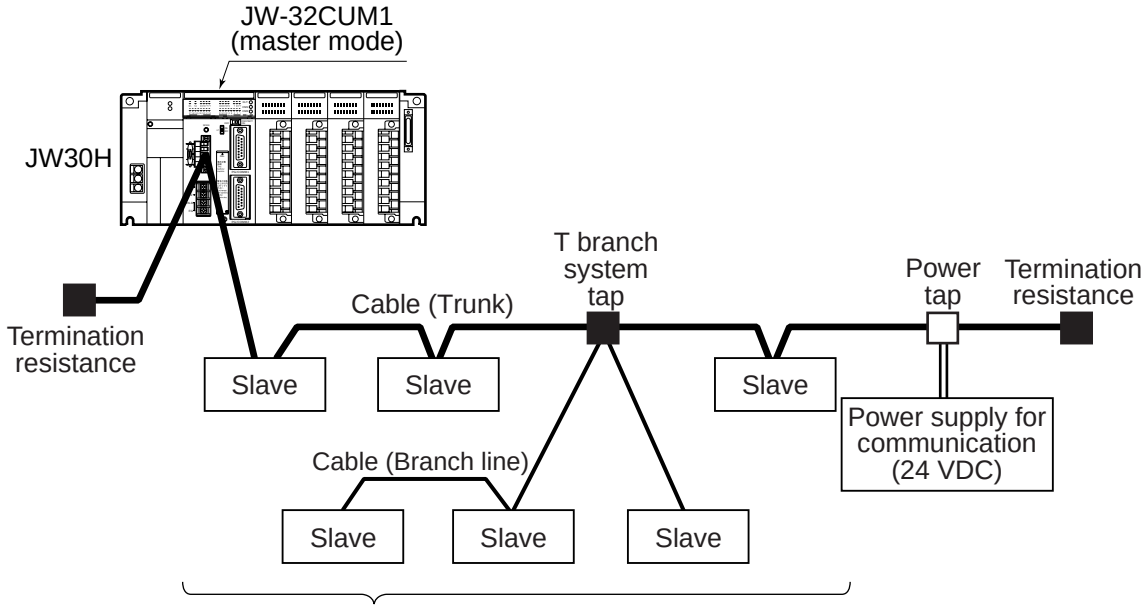
1. If impossible to communicate due to different models, change the models. (If the mode model of support tool is JW20H, change to JW50H/70H/100H; if JW50H/70H/100H, change to JW20H.)
2. When communication is enabled, change the setting value in the system memory #260.
3. The model is changed to the new setting mode.

Chapter 8: DeviceNet (Master Station) Function

8-1 DeviceNet

The JW-32CUM1 can be used to communicate as a master or slave module in a DeviceNet.

● **Connection example**



- Select the basic operation mode (master/slave) using the SW7-8 switch on the JW-32CUM1.
  ⇨ Page 8-9.
- Supply master modules, slave modules, cables, T branch taps, power taps, and termination resistances that are compatible with the DeviceNet, for use in a system containing a JW-32CUM1.

● **SHARP's modules applied for the DeviceNet (master/slave)**

Model name	Master	Slave	PLC to install
JW-50DN	○	○	JW50H, JW70H, JW100H
JW-20DN	○	○ (V 2.1 or more)	JW20H, JW30H
JW-32CUM1	○	○ (V 2.1 or more)	JW30H
JW-32CUM2	○	○	JW30H
JW-32CV3	○	○	VME built-in controller
Z-337J	○	○ (V 2.1 or more)	J-board (Z300/Z500 series)
Z-338J	○	○ (V 2.1 or more)	
JW-D164N	—	○	———
JW-D162S	—	○	
JW-D162M	—	○	

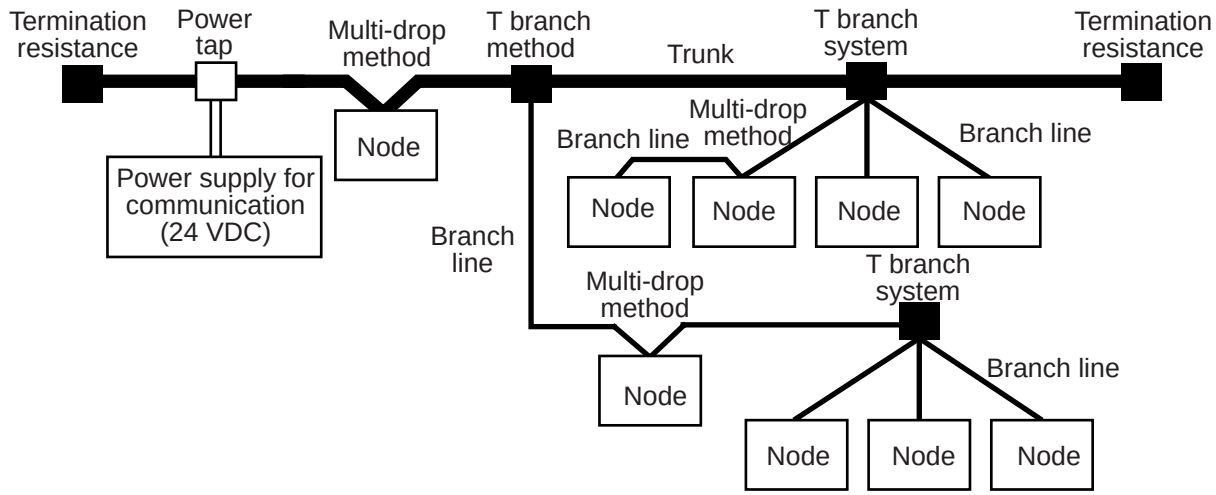
○: Usable, Inside parentheses: Software version

8

[1] Network names and functions

This section lists the device names and functions used in DeviceNet networks.

- **A example of network**



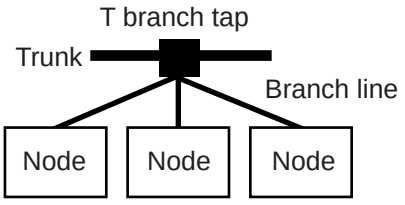
Names	Functions
Node	Master and slave nodes are available on the DeviceNet. ┌ Master: Integrates external I/Os from each slave. └ Slave: Provides connections for external I/Os. - Since there are no restrictions in allocating a master and slaves, you can arrange nodes at any location shown above.
Trunk	Cable with a termination resistance at both ends. - Normally, the cable connecting the terminals the furthest distance apart will be a trunk cable. - Use a five conductor cable (2 signal wires, 2 power wires, 1 shield). - The trunk length is not always equal to the maximum length of the network.
Branch line	A cable branching off the trunk. - You can add new branch lines to the trunk - Use a five conductor cable (2 signal wires, 2 power wires, 1 shield).
Connection method	There are two methods for connecting nodes: T branch and Multi-drop. ┌ T branch method: Uses T branch taps for up to three separate branch lines. └ Multi-drop method: Connects a node directly to a trunk or to a branch line. - Both the T branch method and the Multi-drop method can be used in the same network.
Termination resistance	Install a termination resistance (121 ohms) on both ends of the trunk, in order to reduce signal reflection and stabilize the communication.
Power supply for communication	Communication power should be supplied to the communication connector on each node through the five conductor cable. - Use only a power supply dedicated exclusively to communications. Do not share this power supply with other devices.

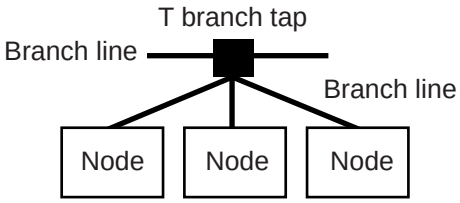
[2] Connection method

There are two methods for connecting nodes: T branch and Multi-drop.

(1) T branch method

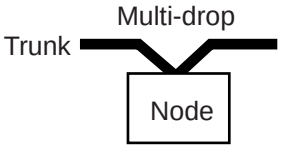
You can make up to three branch lines away from a trunk or a branch line. Use a T branch tap to branch off.

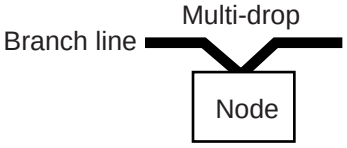




(2) Multi-drop method

Connect a node directly to a trunk or a branch line.





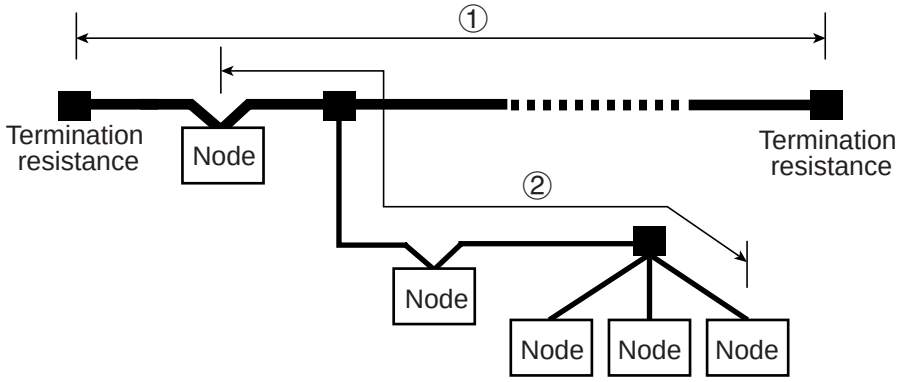
[3] Cable length

(1) Maximum network length

The maximum network length will be the longest of the following:

1. The distance between the two termination resistances.
2. The distance between the two nodes in the network that are the farthest apart.

- **Ex.**



The maximum network length possible will vary, depending on the type of cable used.

	Cable type	Maximum network length
①	Thick cable: 5 conductors	500 m
	Thin cable: 5 conductors	100 m
②	Thin cable: 5 conductors	100 m

- The maximum network length is also limited by the communication speed. See section (3) below.
- When thick and thin cables are mixed in the same network, the following conditions must be met.

Communication speed	Maximum network length
500 k bits/s	(A + B) is less than 100 m
250 k bits/s	(A + 2.5 x B) is less than 250 m
125 k bits/s	(A + 5 x B) is less than 500 m

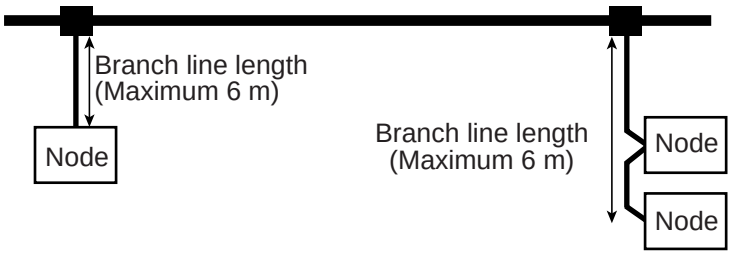
A: Thick cable length
B: Thin cable length

(2) Maximum branch line length

The maximum branch line length is 6 m.

- You can make a new branch line from a branch line.
  However, the maximum distance between the branch point on the trunk and the end of the most distant branch line should not be more than 6 m.

- **Ex.**



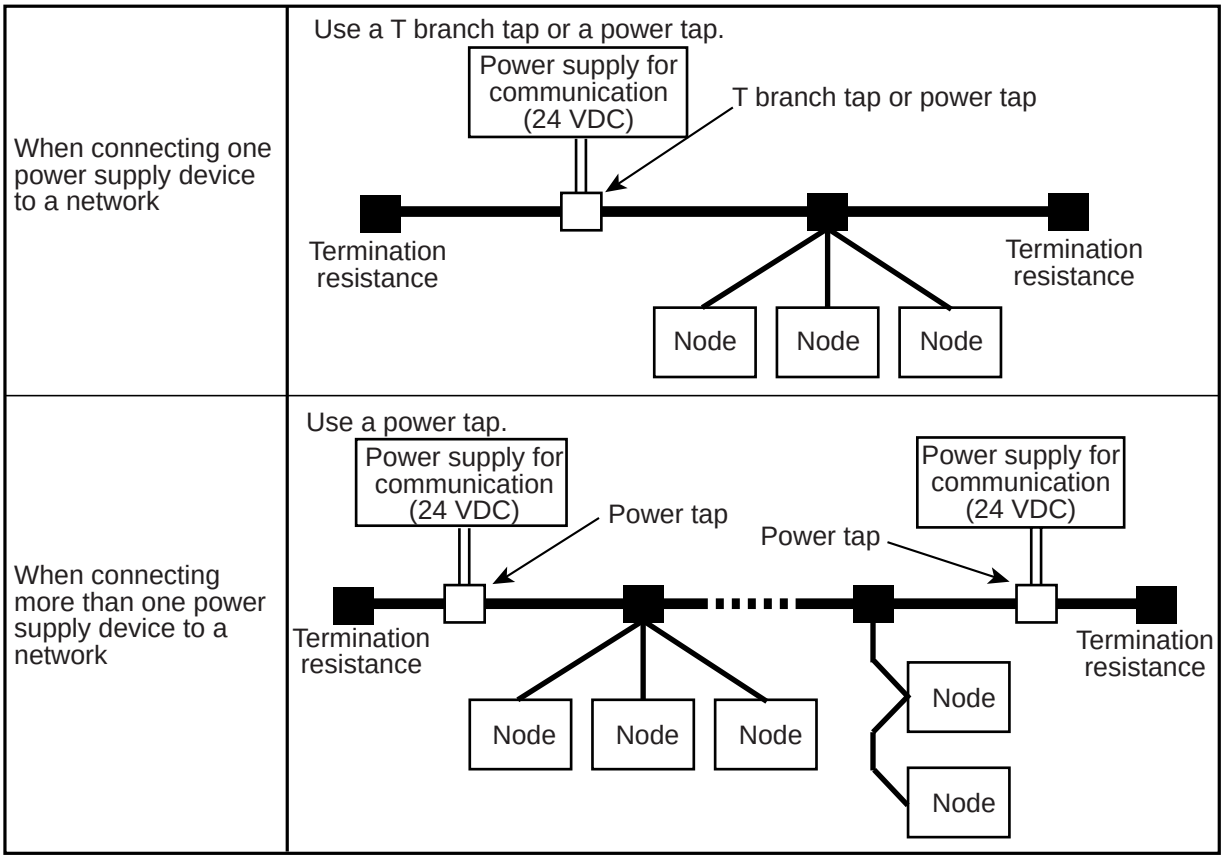
(3) Communication speed and communication distance

The communication distance will vary, depending on the communication speed.

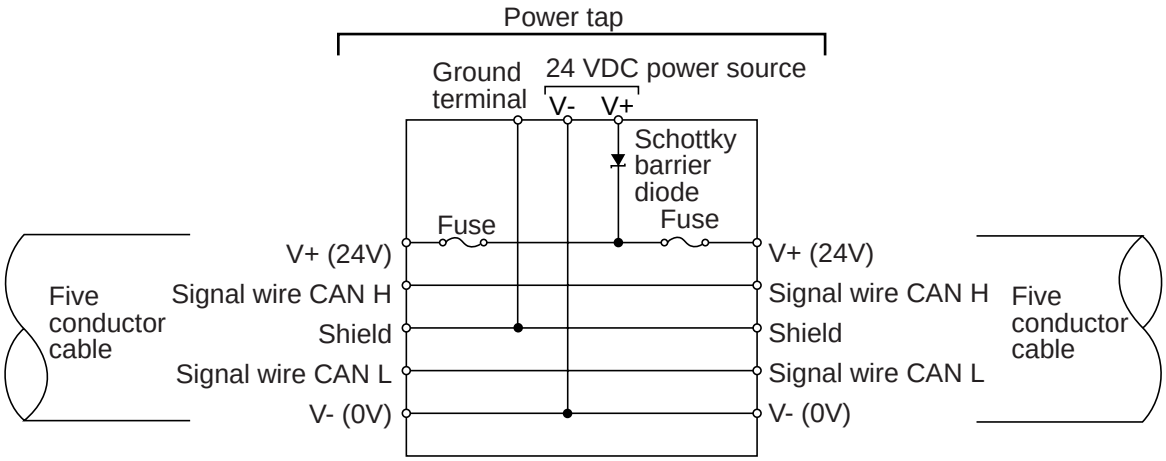
Communic-ation speed	Maximum network length		Branch line length	Total length of branch lines
	Thick cable	Thin cable		
500 k bits/s	100 m or less	100 m or less	6 m or less	39 m or less
250 k bits/s	250 m or less			78 m or less
125 k bits/s	500 m or less			156 m or less

[4] Power supply

Connect the communication power supply to the trunk.
Two of the five conductors in the cable used for trunk and branch lines are assigned to carry power for communication (24 VDC).
The following methods can be used to connect a communication power source to the trunk.



● **Configuration of a power tap**



Remarks

- Do not share the communication power source with other devices.

8

[5] Communication related devices

In addition to master and slave nodes, the following devices can be used in this system: cables, T branch taps, power taps, communication connectors, termination connectors, and communication power supplies. Listed below are the models (manufacturers) of devices currently available.

(1) Cable

Thick or thin five conductor cable is available.

Number of conductors	Manufacturers	Type	Model	Outside diameter (mm)	Main use
Five Signal lines: 2 Power source lines: 2 Shield: 1	Allen-Bradley	Thick	1485C-P1-A50	11.6 to 12.1	Trunk
		Thin	1485C-P1-C150	6.9	Branch line or trunk *
	Omron	Thick	DCA2-5C10	11.6 to 12.1	Trunk
		Thin	DCA1-5C10	6.9	Branch line or trunk *
	Nihon Electric wire & cable	Thick	DVN18	12	Trunk
		Thin	DVN24	7	Branch line or trunk *

* When using a thin cable for a trunk, make sure that the trunk is not more than 100 m long.

(2) T branch tap

You can connect up to three new branch lines off a single existing branch line.

Manufacturer	Model	Number of connectors	Remarks
Omron	DCN1-1C	Three (this tap is used to connect one new branch line)	- Has three connectors for connecting up to three new lines - Connects to a termination resistance
	DCN1-3C	Five (this tap is used to connect three new branch lines)	- Has five connectors for connecting up to five new lines - Connects to a termination resistance

(3) Power tap

This tap is used to supply power to the five conductor cable when connecting more than one communication power supply to a single network.

Manufacturer	Model	Specifications
Allen-Bradley	1485T-P2T5-T5	Power tap With a reverse current prevention function and ground terminal
Omron	DCN1-1P	

- This tap can be used to connect a single communication power supply to a network.
  In this case, you can also use a T branch tap (above), in addition to the power tap.

(4) Communication connector

This module contains one MSTB 2.5/5-STF-5.08AU (with a screw for securing the connector: made by Phoenix contact).

(5) Termination resistance

Manufacturer	Model	Remarks
Omron	DRS1-T	Terminal block type termination resistance (121 ohms)
	----	Termination resistance attached to the T branch tap (121 ohms)

(6) Communication power supply

Make sure to use a power supply device for communication that conform to the specifications below.

Item	Specifications
Output voltage	24VDC ± 1%
Output current	16A constant, maximum
Input variation	0.3% max.
Load variation	0.3% max.
Influence of ambient temperature	0.03%/ ° C max.
Output ripple	250 mVp-p
Load capacitance	7000 µF max.
Ambient temperature	Operation: 0 to 60° C, Storage: -40 to 85° C
Instantaneous maximum output current	65A or less (peak)
Overvoltage protection	Provided
Overcurrent protection	Provided (Max. current: 125%)
Start up time	250 ms until 5% value of final output current
Overshoot while starting up	0.2% max.
Insulation	Between output - AC power, and output - frame ground
Conformity	Essential: UL Recommend: FCC Class B, CSA, TUV, VDE
Ambient humidity	30 to 90% (without dewing)
Surge current capacity	Up to 10 %

8-2 Setting method

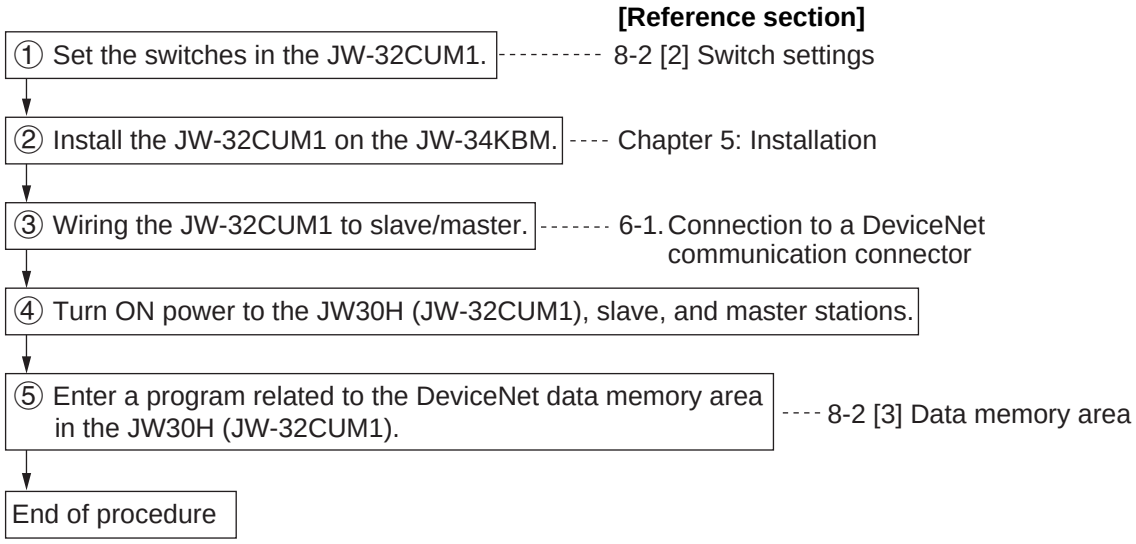
When the JW-32CUM1 is used with the DeviceNet function, items that must be set for the DeviceNet are as follows.

Item	Setting method	Details (section number in this chapter)
CU operating status, etc. when a communication error occurs	Select the following items using switches SW7-1 to 7-8. - CU operating status when a communication error occurs (SW7-1) - Synchronous/asynchronous calculation (SW7-2) - Input/output data allocation method (SW7-3, 7-4) - Data length when editing a scan list (SW7-5, 7-6) - Request "explicit" messages (SW7-7) - Basic operation mode (SW7-8)	8-2-[2]
Baud rate, etc.	Select the following using switch SW8 - Baud rate (125/250/500 kbps) - Protected (yes/no) - Communication monitor time (long/short)	
Node address	No need to set since it is fixed to "0."	-----
Data memory area	When the fixed allocation is selected, the JW-32CUM1 (control section) uses the following areas - Input/output data: ㅋ2000 to ㅋ2777 (512 bytes) - Diagnostic data: 39000 to 39377 (256 bytes) - Host "explicit" message data (request): 39400 to 39565 (118 bytes) - Host "explicit" message data (response): 39600 to 39765 (118 bytes) - Scan list data: E0000 to E0777 (512 bytes) When free allocation is selected, specify the first address of each table in the system memory.	8-2-[3]

8

[1] Setup procedure

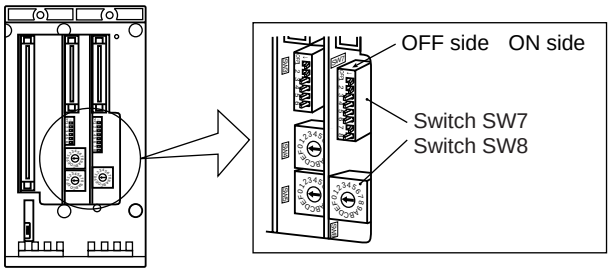
The setup procedure for the DeviceNet function on the JW-32CUM1 is described below.



[2] Switch settings (operation)

Set SW7 and SW8 and operate the SCAN switch on the JW-32CUM1.

(Rear side of JW-32CUM1)



(1) Switch SW7

Select a basic operation mode (master/slave) for DeviceNet communication, and an input/output data allocation system when editing the scan list.

<table>
<tr><th colspan="2">Basic operation mode</th><th rowspan="2">Switch No.</th><th rowspan="2">Set details</th></tr>
<tr><th>Master</th><th>Slave</th></tr>
<tr><td rowspan="4">O</td><td rowspan="4">—</td><td>SW7-1</td><td>CU operation when a communication error occurs
- Select whether or not to continue operation of JW30H (JW-32CUM1) control section when a communication error occurs while communicating with a slave station.
<table><tr><td>OFF</td><td>The JW30H continues operation when a communication error occurs.</td></tr><tr><td>ON</td><td>The JW30H stops operation (set to program mode) when a communication error occurs. (Default setting)</td></tr></table>- When the slave mode is selected, this item will always be "continuous processing," regardless of the setting.</td></tr>
<tr><td>SW7-2</td><td>Synchronous/asynchronous CU operation
- Select whether or not to synchronize the one cycle of communication with the JW30H (JW-32CUM1 control section).
<table><tr><td>OFF</td><td>Not synchronized.</td></tr><tr><td>ON</td><td>Synchronized. (default setting)</td></tr></table>- When the slave mode is selected, this item will always be "asynchronous processing," regardless of the setting.</td></tr>
<tr><td>SW7-3, 4</td><td>I/O data allocation method
- I/O data table allocation method set by editing the scan list.
<table><tr><th>SW7-4</th><th>SW7-3</th><th>Details</th></tr><tr><td>OFF</td><td>OFF</td><td>Address order allocation (default setting)</td></tr><tr><td>OFF</td><td>ON</td><td>Even number allocation</td></tr><tr><td>ON</td><td>OFF</td><td>Allocation in the order in which vacant nodes are occupied</td></tr><tr><td>ON</td><td>ON</td><td>Allocation prohibited</td></tr></table>- Details of allocation method ⇨ See page 8-21</td></tr>
<tr><td>SW7-5, 6</td><td>Data length while editing the scan list (for each node)
- Select the data length for each node when "even allocation" is selected, and select the vacant node data length when "sequential allocation to empty nodes" has been selected.
<table><tr><th>SW7-6</th><th>SW7-5</th><th>Details</th></tr><tr><td>OFF</td><td>OFF</td><td>1 byte (default setting)</td></tr><tr><td>OFF</td><td>ON</td><td>2 bytes</td></tr><tr><td>ON</td><td>OFF</td><td>4 bytes</td></tr><tr><td>ON</td><td>ON</td><td>8 bytes</td></tr></table>- Enabled when system memory #321= 0.
⇨ See page 8-14.</td></tr>
<tr><td>SW7-7</td><td>Request "explicit" message
- Select whether or not to use the "explicit" message.
<table><tr><td>OFF</td><td>Do not us the "explicit" message.</td></tr><tr><td>ON</td><td>Use the "explicit" message. (default setting)</td></tr></table></td></tr>
<tr><td>O</td><td>O</td><td>SW7-8</td><td>Basic operation mode
- Select basic operation mode (master/slave) of the JW-32CUM1 (DeviceNet section).
<table><tr><td>OFF</td><td>Master (default setting)</td></tr><tr><td>ON</td><td>Slave</td></tr></table></td></tr>
</table>

(O: Valid setting —: Invalid setting)

(2) Switch SW8

Set the communication speed, protected (yes/no), and the communication monitor time for DeviceNet communication using the JW-32CUM1.

Setting for SW8		Communication speed (kbps)	Protected (yes/no)	Communication monitor time
0 (Default setting)		125	Not protected	Long mode
1		250		
2		500		
4		125	Protected	
5		250		
6		500		
8		125	Not protected	Normal mode
9		250		
A		500		
C		125	Protected	
D		250		
E		500		
Basic operation mode	Master	O	O	O
	Slave	O	O	—

(O: Valid setting —: Invalid setting)

Note: Do not set switch SW8 to "3, 7, B, or F." Otherwise, a malfunction may occur.

① Communication speed

Select 125, 250, or 500 kbps.

② Protect (yes/no)

Select "Protected" or "Not protected"

Not protected	When the JW-32CUM1 (control section) is stopped, hold down the SCAN switch for 3 seconds and it will enter the scan list edit mode. - The scan list is created by collecting slave data from the slave stations. - Change the JW-32CUM1 (control section) to operating status and it will start I/O message operation.
Protected	The SCAN switch will not function. - This mode is selected to prevent I/O message operation from being stopped by mistaken operation of the SCAN switch.

- Regardless of protected mode is selected (yes/no) or the JW-32CUM1 (control section) status (operating/stopped), when a "Bus off" error occurs (F1: Page 8-38), hold down the SCAN switch for 3 seconds. The JW-32CUM1 will disconnect the network and restart the connection.

③ Communication monitor time

The communication monitor time (ISD, EPR) refers to the time out time for communication. Select "Normal mode" or "Long mode."

Number of slave modules	Communication monitor time (ms)			
	Normal mode		Long mode	
	ISD	EPR	ISD	EPR
1 to 15	40	1000	80	1500
16 to 31	60		120	
32 to 47	80		160	
48 to 63	100		200	

- When "fixed allocation" is selected, the communication monitor time will be as shown above, according to the number of slave modules.
- When "free allocation" is selected, ISD/EPR in the system memory can be set to any value (2ms to 65534ms / 4ms to 65532ms). => See page 8-15.
- The communication time can be measured using a DeviceNet analyzer, which is commercially available.

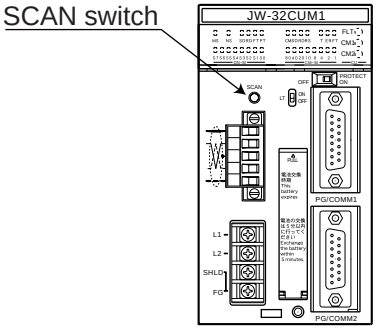
- **ISD (InterScan Delay)**
  The ISD is the communication monitor time allowed after the master module sends a request to a slave module until it receives a response from the last slave module.
  When the time allowed for the ISD has elapsed without a response from the last slave, the JW-32CUM1 advances to the next communication cycle.
- **EPR (Expected Packet Rate)**
  The EPR is the communication monitor time allowed after a master module sends a request to a slave module until it receives a response from all of the slave modules.
  If one or more of the slave modules fails to return a response within the time allowed, a communication error occurs.

④ SCAN switch

When the switch SW8 is set to "not protected" or a "Busoff" error occurs, keep press the SCAN switch for three seconds, the JW-32CUM1 executes the following procedures.

When used in the master mode	When used in the slave mode
Re-reading settings of the switches and system memory ↓ (If there is no error) Edit the scan list	Re-reading settings of the switches and system memory

- When the "Busoff" error occurs (error code F1 displays) on the JW-32CUM1, there is a fault on the communication. In this case, turn OFF/ON the PLC power or keep pressing the SCAN switch for longer than three seconds regardless of the settings of the protect, the JW-32CUM1 is shut off connection, and is issued connection again. If there is no problem on the communication, the JW-32CUM1 can communicate normally.



- For details about editing the scan list, see page 8-28.

[3] Setting the data memory area and system memory

The settings for the data memory area and system memory on the JW-32CUM1 (control section) are shown below.

Basic operation mode		Data table allocation system	Fixed	Free	(See page)
Master	Slave	Setting item			⇨As follows
O	—	Input/output table (Top address when "free" allocation is selected)	⊐2000 to ⊐2777	#300 to #303	⇨8-13, 8-21
O	O	Diagnostic table (Top address when "free" allocation is selected)	39000 to 39377	#304 to #307	⇨8-13, 8-40
O	—	"Explicit" message table: Request (Top address when "free" allocation is selected)	39400 to 39565	#310 to #313	⇨8-3, 8-30
O	—	"Explicit" message table: Response (Top address when "free" allocation is selected)	39600 to 39765		
O	—	Scan list table (Top address when "free" allocation is selected)	E0000 to E0777	#314 to #317	⇨8-14, 8-29
O	—	Data length when editing the scan list	#321		⇨8-14
O	—	ISD (communication monitor time)	#324 #325		⇨8-15
O	—	EPR (communication monitor time)	#326 #327		
O	—	Output status to slave stations when the control section is stopped.	#330		
—	O	Top address of the input/output table (slave)	⊐2000	#360 to #363	⇨8-16
—	O	Number of input/output bytes (slave)	#364 to #367		
—	O	Latch/clear the slave area when a communication error occurs. (slave)	#370		
—	O	Response time to the master station (slave)	#371 #372		

O: Valid setting —: Invalid setting

● **Data table allocation system**

- In the data table allocation column, "fixed" refers to the fixed allocation scheme and "free" refers to the free allocation scheme.
  1. "Fixed allocation" means that each table area is allocated in advance.
  2. "Free allocation" means that you must specify the first address of each table that is required in system memory.
- To select "fixed" or "free," set bit 7 ON or OFF in the specified system memory location (4th byte) of each table. ⇨ See pages 8-13 and 8-14.

Remarks

- When setting an option module (such as the JW-22CM) is installed on the JW-34KBM basic rack panel (and the JW-32CUM1 is installed on the same rack panel), be careful that the data memory area does not overlap the DeviceNet area previously assigned.

The settings in system memory related to DeviceNet communication in the JW-32CUM1 are described below.

(1) Top address of the I/O table (When master mode and free allocation are selected)
When the JW-32CUM1 is in master mode and input/output tables that are used for the I/O message function are freely allocated, this system memory location is used to specify the first address of the input/output table (maximum of 512 bytes).

System memory	Bit number							
	D7	D6	D5	D4	D3	D2	D1	D0
#300	File address 000000 to 177777(OCT)							
#301								
#302	File number (00 (HEX) fixed)							
#303	●	0 (OFF) fixed						

- ● Bit ⇨ See * below.

(2) Top address of the diagnostic table (When free allocation is selected)
This is a system memory location used to specify the first address of the diagnostic table (master mode: 256 bytes, slave mode: 128 bytes). When the JW-32CUM1 is in master or slave mode, and the diagnostic table is freely allocated (see page 8-40), it can be used to check the communication status of the nodes (master and slaves).

System memory	Bit number							
	D7	D6	D5	D4	D3	D2	D1	D0
#304	File address 000000 to 177777(OCT)							
#305								
#306	File number (00 to 2C (HEX) : Depends on the control module model)							
#307	●	0 (OFF) fixed						▲

- ● Bit ⇨ See * below.
- ▲ When this bit is ON, both "free allocation" and "fixed allocation" are disabled, and the diagnostic table area does not exist.

(3) Top address of the Explicit message table (When master mode and free allocation are selected)
This is a system memory location used to specify the first address of the "explicit" message table (256 bytes). When the JW-32CUM1 is in master mode, and the "explicit" message table is freely allocated (see page 8-30) it can be used for the "explicit" message function.

System memory	Bit number							
	D7	D6	D5	D4	D3	D2	D1	D0
#310	File address 000000 to 177777(OCT)							
#311								
#312	File number (00 to 2C (HEX) : Depends on the control module model)							
#313	●	0 (OFF) fixed						

- ● Bit ⇨ See * below.
- Input/output tables while in the slave mode are allocated in the following order: input and output start from the first address.

***● When this bit is OFF, "fixed allocation" is enabled.**
● When this bit is ON, "free allocation" is enabled. The file addresses specified in system memory (starting from location #300) will be the first address of each table. (Addresses in "fixed allocation" mode are not allowed.)
● When this bit is ON and the top address (starting from location #300) is not specified (left as 00(HEX)), the top address will be "∃0000." Be careful because this may duplicate an address allocated to an I/O module on the same basic rack panel.

(4) Top address in the scan list table (when master mode and free allocation are selected)

This is a system memory location used to specify the top address of the scan list table (512 bytes). When the JW-32CUM1 is in master mode and the scan list tables used for editing the scan list are freely allocated (page 8-29).

System memory	Bit number							
	D7	D6	D5	D4	D3	D2	D1	D0
#314	File address 000000 to 177777(OCT)							
#315								
#316	File number (00 to 2C (HEX) : Depends on the control module model)							
#317	●	0 (OFF) fixed						▲

- ● When this bit is ON. ⇨ See the previous page*.
- ▲ When this bit is ON, both "free allocation" and "fixed allocation" are disabled, and the scan list table area does not exist.

(5) Data length when editing the scan list (when master mode is selected)

When the JW-32CUM1 is in master mode, this system memory location is used to specify the data length when editing a scan list. It can be set anywhere between 1 and 64 bytes.

System memory	Set details
#321	Data length: 1 to 64 bytes (1 to 100 (OCT)) - When 0 is specified, the settings on switch SW7-5 and 7-6 will be enabled. ⇨ See page 8-9. - When the input/output data allocation system for editing the scan list is "allocation in order," the setting for this system memory location is ignored.

8

(6) Communication monitor time (ISD, EPR)

System memory	Set details	
#324	ISD (Inter Scan Delay) 2 to 65534 ms (2 to 65534(DCM)) - Specify in units of 2 ms.	- When set to 0, these values will be changed to their initial settings (see the table below).
#325		
#326	EPR (Expected Packet Rate) 4 to 65532 ms (4 to 65532(DCM)) - Specify in units of 4 ms.	
#327		

● **Initial value of ISD, EPR (when set to 0)**

Number of slave modules	Communication monitor time (ms)			
	Normal mode (when SW8 is 8 to A, C to E)		Long mode (when SW8 is 0 to 2, 4 to 6)	
	ISD	EPR	ISD	EPR
1 to 15	40	1000	80	1500
16 to 31	60		120	
32 to 47	80		160	
48 to 63	100		200	

- The initial values of ISD and EPR are determined by the number of slave stations and the settings on switch SW8.
- For details about switch SW8, ISD, EPR, see pages 8-10 and 8-11.

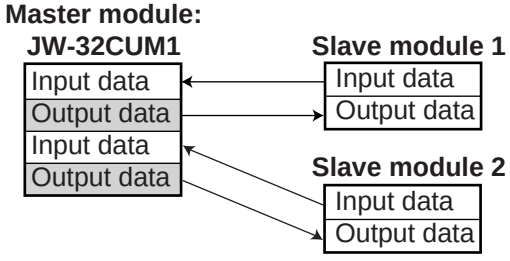
(7) Output status of the slave station when the control section stops operation (master mode)

When the JW-32CUM1 is used in the master mode, this system memory location is used to select the data sent to the slave modules if a JW-32CUM1 (control section) stops operation (enters the program mode). ⇨ See page 8-50.

System memory	Set details
#330	00(HEX): Send idle data. * 01(HEX): Clear

* For details about slave station operation when a slave station receives idle data, see the instruction manual for each slave station.

The areas shown in gray in the figure below can be set to "send/clear idle data" when the control sectionº stops operation.



(8) Top address of the I/O table (when in the slave mode)
This system memory location is used to store the top address of the I/O table when the JW-32CUM1 is in the slave mode.

System memory	Bit number							
	D7	D6	D5	D4	D3	D2	D1	D0
#360	File address 000000 to 177777(OCT)							
#361								
#362	File number (00 (HEX) fixed)							
#363	●	0 (OFF) fixed						

- ● When this bit is OFF (#363 = 00(HEX)), fixed allocation is enabled.
  [Ex.] The top address of the input/output table is "Ⅎ2000."
- ● When this bit is ON (#363 = 80(HEX)), "free allocation" is enabled, and the file addresses specified in system memory (locations #360 to #362) are the top address of each table.
  (When "fixed allocation " is selected, these addresses are ignored.)

Note: ● When this bit is ON and the top address (specified in locations #360 to #362) is not specified (left as 00(HEX)), the top address will be "Ⅎ0000." Be careful because this may duplicate an address allocated to an I/O module on the same basic rack panel.

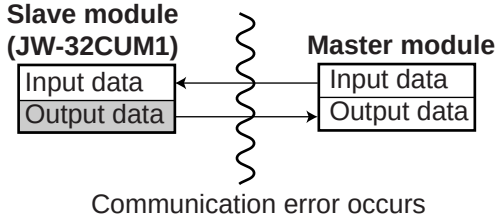
(9) Number of I/O bytes (when in the slave mode)
This system memory location is used to store the number of input bytes (0 to 127 bytes) and output bytes (0 to 127) when the JW-32CUM1 is in the slave mode.

System memory	Set details
#364	Number of input (sending) bytes: 0 to 127 bytes (0 to 177(OCT))
#365	00(HEX): Fixed
#366	Number of output (receiving) bytes: 0 to 127 bytes (0 to 177(OCT))
#367	00(HEX): Fixed

- The specified number of bytes are allocated from the top address in the I/O table (when used in the slave mode) with input bytes being allocated first, followed by the area for the output bytes.

(10) Restore/clear the slave area when a communication error occurs (when used in the slave mode)
When the JW-32CUM1 is in slave mode, this system memory location is used to set the JW-32CUM1 status when a communication error occurs (select whether to latch or clear the contents of the box marked in gray in the figure below). - See page 8-50.

System memory	Set details
#370	00(HEX): Latch 01(HEX): Clear



(11) Response time to the master station (when slave mode is selected)
When the JW-32CUM1 is in slave mode, this system memory location is used to specify a response time (0 to 655528 ms) to the master station.

System memory	Set details
#371	Response time to the master station - Specify 0 to 65528 ms (0 to 65528(DCM)) in units of 8 ms. - When set to 1 to 7 ms, it will be changed to 8 ms. Figures less a value evenly divisible by 8 will be rounded off. (Ex.: When 15 ms is specified, this value is rounded off to 8 ms.)
#372	

- Normally set to 0 ms.

[4] Table of switches, data memory, and system memory settings

(1) When the JW-32CUM1 is used in the master mode

■ **Switch settings** (master mode)

Switch name		Setting details		Set value
---		Input/output table	⊐2000 to ⊐2777	---
		Diagnostic table	39000 to 39377	
		"Explicit" message table	39400 to 39565	
			39600 to 39765	
		Scan list table	E0000 to E0777	
		* Free allocation of each table and system memory settings such as ISD. ⇨ See the next page.		
SW7	1	Select CU operation status when an communication error occurs.	OFF: Continue operation ON: Stop operation	
	2	Select synchronize/asynchronize between the communication cycle and CU operation	OFF: Asynchronous calculation ON: Synchronous calculation	
	3	Input/output data allocation method when editing the scan list	4: OFF, 3: OFF = In order of allocation.	
			4: OFF, 3: ON = Even allocation.	
	4		4: ON, 3: OFF = Allocated in the order of empty node areas.	
	5	Data length when editing the scan list (Enabled when system memory #321 = 0)	6: OFF, 5: OFF = 1 byte	
			6: OFF, 5: ON = 2 bytes	
	6		6: ON, 5: OFF = 4 bytes	
			6: ON, 5: ON = 8 bytes	
	7	Request "explicit" message	ON = Used OFF = Not used	
	8	Basic operation mode	Set to OFF (master mode)	OFF
SW8		- Communication speed (kbps) - Protected (yes/no) - Communication monitor time (long/normal)	0 = 125, no, long	
			1 = 250, no, long	
			2 = 500, no, long	
			4 = 125, yes, long	
			5 = 250, yes, long	
			6 = 500, yes, long	
			8 = 125, no, normal	
			9 = 250, no, normal	
			A = 500, no, normal	
			C = 125, yes, normal	
			D = 250, yes, normal	
			E = 500, yes, normal	

■ **System memory settings** (master mode)

	Set details				Set value
	Item			Set range, etc.	
#300 #301	Top address of I/O table (occupy max. 512 bytes)	File address		000000 to 177777(OCT) (Set with octal and word)	
#302		File number		Fix to 00(HEX)	00
#303		*1		00, 80(HEX)	
#304 #305	Top address of diagnosis table (occupy 256 bytes)	File address		000000 to 177777(OCT) (Set with octal and word)	
#306		File number		00 to 2C(HEX)	
#307		*2		00, 01, 80(HEX)	
#310 #311	Top address of Explicit message table (occupy 256 bytes)	File address		000000 to 177777(OCT) (Set with octal and word)	
#312		File number		00 to 2C(HEX)	
#313		*1		00, 80(HEX)	
#314 #315	Top address of scan list table (occupy 512 bytes)	File address		000000 to 177777(OCT) (Set with octal and word)	
#316		File number		00 to 2C(HEX)	
#317		*2		00, 01, 80(HEX)	
#320	Not used	---		Set to 00(HEX)	00
#321	Data length when editing scan list	1 to 64 bytes (When set to 0, switches SW7-5 and 7-6 will be enabled.)		001 to 100(OCT) (set with octal)	
#322 #323	Not used	---		Fix to 00(HEX)	00
#324 #325	ISD (communication monitor time)	2 to 65534 ms (in units of 2 ms)	- A setting of "0" enables the reading of the setting on SW8.	00002 to 65534(DCM) (Set with decimal and word)	
#326 #327	EPR (communication monitor time)	4 to 65532 ms (in units of 4 ms)		00004 to 65532(DCM) (Set with decimal and word)	
#330	Slave output status when the control section is stopped operation	00(HEX): Send idling data 01(HEX): Clear		00, 01(HEX)	
#331 to #377	Not used	---		Set to 00(HEX)	00

*1: When this value is 00(HEX), "fixed allocation" will be enabled.
When this value is 80(HEX), "free allocation" will be enabled and file addresses specified in system memory (locations #300 to 302 and #310 to 312) will contain the top address of each table.
(Address settings in "fixed allocation" operation are not allowed.)

*2: When this value is 00(HEX), "fixed allocation" will be enabled.
When this value is 80(HEX), "free allocation" will be enabled and the file addresses specified in system memory (locations #304 to 306 and #314 to 316) will contain the top address of each table.
(Address settings in "fixed allocation" operation are not allowed.)
When this value is 01(HEX), both "free allocation" and "fixed allocation" are disabled, and the diagnostic table and scan list table area do not exist.

(2) When the JW-32CUM1 is used in the slave mode

■ **Switch settings** (slave mode)

Switch name		Setting details		Set value
---		Diagnostic table	39000 to 39377	---
		System memory settings, such as free allocation of the diagnostic table. ⇨ See the next page.		
SW7	1	Select CU operation status when an communication error occurs.	*1	---
	2	Select synchronize/asynchronize between the communication cycle and CU operation	*2	---
	3	Input/output data allocation method when editing the scan list	*3	---
	4			
	5	Data length when editing the scan list		
	6			
	7	Request "explicit" message		
	8	Basic operation mode	Set to ON (slave mode)	ON
SW8		- Communication speed (kbps) - Protected (yes/no) - Communication monitor time (long/normal mode) *4	0 = 125, no, long	
			1 = 250, no, long	
			2 = 500, no, long	
			4 = 125, yes, long	
			5 = 250, yes, long	
			6 = 500, yes, long	
			8 = 125, no, normal	
			9 = 250, no, normal	
			A = 500, no, normal	
			C = 125, yes, normal	
			D = 250, yes, normal	
			E = 500, yes, normal	

*1: The control section continues operation when a communication error occurs, regardless of the settings.
*2: Calculations between the communication cycle and the control section will be "asynchronous", regardless of the settings.
*3: Settings for input/output data allocation are not allowed.
*4: Settings for the communication monitor time are invalid.

■ **System memory settings** (slave mode)

	Set details			Set value
	Item		Set range	
#300 to #303	Not used	---	Fix to $00_{(HEX)}$	00
#304 #305	Top address of diagnostic table (occupy max. 256 bytes)	File address	000000 to $177777_{(OCT)}$ (Set with octal and word)	
#306		File number	00 to $2C_{(HEX)}$	
#307		*1	00, 01, $80_{(HEX)}$	
#310 to #357	Not used	---	Fix to $00_{(HEX)}$	00
#360 #361	Top address of I/O table (occupy 254 bytes)	File address	000000 to $177777_{(OCT)}$ (Set with octal and word)	
#362		File number	Fix to $00_{(HEX)}$	00
#363		*2	00, $80_{(HEX)}$	
#364	Number of input bytes	0 to 127 bytes	000 to $177_{(OCT)}$ (Set with octal)	
#365	Not used	---	Set to $00_{(HEX)}$	00
#366	Number of output bytes	0 to 127 bytes	000 to $177_{(OCT)}$ (Set with octal)	
#367	Not used	---	Set to $00_{(HEX)}$	00
#370	Preserve or clear the slave area when a communication error occurs.	$00_{(HEX)}$: Preserve $01_{(HEX)}$: Clear	00, $01_{(HEX)}$	
#371 #372	Response time to master station	0 to 65528 ms (in units of 8 ms) - Normally set to 0 ms.	00000 to $65528_{(DCM)}$ (Specify in decimal notation or units of words	00
#373 to #377	Not used	---	Set to $00_{(HEX)}$	00

*1: When this value is $00_{(HEX)}$, "fixed allocation" will be enabled.
When this value is $80_{(HEX)}$, "free allocation" will be enabled and file addresses specified in system memory (locations #304 to 306) will contain the top address of each table.
(Address settings in "fixed allocation" operation are not allowed.)
When this value is $01_{(HEX)}$, both "free allocation" and "fixed allocation" are disabled, and the diagnostic table and scan list table area do not exist.

*2: When this value is $00_{(HEX)}$, "fixed allocation" will be enabled.
When this value is $80_{(HEX)}$, "free allocation" will be enabled and the file addresses specified in system memory (locations #360 to 362) will contain the top address of each table.
(Address settings in "fixed allocation" operation are not allowed.)

8-3 I/O message function

Among I/O messages of the DeviceNet, the JW-32CUM1 (DeviceNet) supports Polling I/O function and Bit Strobe function. JW-32CUM1 (master mode) can communicate messages with slave modules having either of these two functions.

- The Polling I/O is a method that a master module sends a command (point to point) to each slave module and receive messages, if any.
- Bit Strobe is a message that multiple slave modules receive one command and respond using broadcasting function. This is convenient for collecting small data such as multiple slaves devices are arranged like sensors. Use the JW-32CUM1 with master mode, when creating a scan list, it establishes connection with the Bit Strobe for slave modules having Bit Strobe function.

When the master mode is selected and the I/O message function in the JW-32CUM1 is used, the input/output table addresses will be as follows.

- **Input/output data table addresses**

Basic operation mode		No. of bytes	Fixed	Free
Master	Slave			
O	—	512	⊐2000 to ⊐2777	#300 to #303 *

(O: Enable, —: Disable) * Specify top address and select enabled or disabled.

8-3-1 Input/output table allocation

The JW-32CUM1 (master mode) can select from several allocation methods for the slave station input/output data table. For selection, set system memory of the JW-32CUM1. The choices are "allocation in address order," "even number allocation," and "allocation in the order in which vacant nodes are occupied." To set the selection, use switches SW7-3 and 7-4 on the JW-32CUM1. ⇨See page 8-9.

Allocation method	Input/output data table allocation details	Details
Address order allocation	1. Assign data lengths (number of bytes) in node address order for slave stations. 2. Enter the number of bytes required by each slave station. 3. A slave station that does not have a I/O message function is not assigned a data length. 4. Any slave station number (node address), that does not have hardware connected is not assigned a data length.	Page 8-22
Even number allocation	1. Assign data lengths (number of bytes) in node address order for slave stations. 2. Enter the number of bytes required by each slave station. For any slave station that needs more data than the default data length, increase the size in multiples of the default number of bytes. 3. A slave station that does not have a I/O message function is not assigned a data length. 4. Any slave station number (node address), that does not have hardware connected is not assigned a data length.	Page 8-24
Allocation in the order in which vacant nodes are occupied	1. Assign data lengths (number of bytes) in node address order for slave stations. 2. Enter the number of bytes required by each slave station with a I/O message function. 3. A slave station that does not have a I/O message function is not assigned a data length. 4. Any slave station number (node address), that does not have hardware connected, is assigned the default data length.	Page 8-26

- No matter which allocation method is selected, you have to start the master module JW-32CUM1 in the scan list edit mode, collect the data from slave stations, and create a scan list. The scan list classifies slave station inputs and outputs, data lengths, and addresses. Therefore, a separate configuration program is not needed for the input/output data table allocation. See page 8-28 to 8-29.
- Set the default data length used in the "Even number allocation" and "Allocation in the order in which vacant nodes are occupied" modes to 1 to 64 bytes. To set the selection, use switches SW7-5 and 7-6 and the system memory in the JW-32CUM1. ⇨ See page 8-9, 8-14.

Remarks

- Number of I/O points with the JW-32CUM1 is maximum 4096 (512 bytes).
  When editing the scan list while the total number of I/O points of slave modules connected exceeds 4096, node addresses exceeding 4096 will be ignored.

Three allocation examples are shown below.

- Node address 0 : The JW-32CUM1 (master)
- Node address 1 : Slave station — Polling I/O input data = 1 byte; Polling I/O output data = 1 byte
- Node address 2 : Not connected
- Node address 3 : Slave station — Polling I/O input data = 3 bytes; Polling I/O output data = 3 bytes
- Node address 4 : Slave station — (No I/O message function)
- Node address 5 : Slave station — Polling I/O input data = 3 bytes; Polling I/O output data = 0 byte

(1) Address order allocation

Assign the number of bytes of data in the input/output data table (data length) in the same order as the node addresses are assigned to the slave stations.

1. Assign the number of bytes required by each slave station.
2. A slave station that does not have I/O message function is not assigned a data length.
3. Any slave station number (node address), that does not have hardware connected, is not assigned a data length.

■ Allocation example

The allocation results from assigning data lengths "in the order in which vacant nodes are occupied" are as follows:

Address *	Input/output data table	
1st byte (Ⅎ2000)	Node address 1 (slave station)	Input
2nd byte (Ⅎ2001)		Output
3rd byte (Ⅎ2002)	Node address 3 (slave station)	Input
4th byte (Ⅎ2003)		
5th byte (Ⅎ2004)		
6th byte (Ⅎ2005)		Output
7th byte (Ⅎ2006)		
8th byte (Ⅎ2007)		
9th byte (Ⅎ2010)	Node address 5 (slave station)	Input
10th byte (Ⅎ2011)		
11th byte (Ⅎ2012)		
12th byte (Ⅎ2013)	Not used	
to		
512th byte (Ⅎ2777)		

* Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

Node address	Required data length (bytes)	I/O message function	Assigned data length (bytes)
1	2 (1 input, 1 output)	Yes	2 (1 input, 1 output)
2	Not connected	-	0
3	6 (3 input, 3 output)	Yes	6 (3 input, 3 output)
4	0	No	0
5	3 (3 input, 0 output)	Yes	3 (3 input)

- The required number of bytes are assigned to the slaves at nodes 1, 3, and 5.
- Slave 2 (nothing connected) and slave 4 (doesn't have a I/O message function) are not assigned any data length.

The scan list data table (⇨ 8-29) for this example will be as follows:

Address *	Value (hexadecimal): Details	
1st byte (E0000)	FF: This JW-32CUM1 station (master)	Node address 0
2nd byte (E0001)	All zeroes	
3rd byte (E0002)		
4th byte (E0003)		
5th byte (E0004)		
6th byte (E0005)		
7th byte (E0006)		
8th byte (E0007)		
9th byte (E0010)	02: A slave station with a Polling I/O function	Node address 1
10th byte (E0011)	00: Not used	
11th byte (E0012)	01: 1 byte (input data length)	
12th byte (E0013)	01: 1 byte (output data length)	
13th byte (E0014)	00: 1st byte	
14th byte (E0015)	00: (input data offset)	
15th byte (E0016)	01: 2nd byte	
16th byte (E0017)	00: (output data offset)	
17th byte (E0020)	00: Not connected	Node address 2
18th byte (E0021)	All zeroes	
19th byte (E0022)		
20th byte (E0023)		
21st byte (E0024)		
22nd byte (E0025)		
23rd byte (E0026)		
24th byte (E0027)		
25th byte (E0030)	02: A slave station with a Polling I/O function	Node address 3
26th byte (E0031)	00: Not used	
27th byte (E0032)	03: 3 bytes (input data length)	
28th byte (E0033)	03: 3 bytes (output data length)	
29th byte (E0034)	02: 3rd byte	
30th byte (E0035)	00: (input data offset)	
31st byte (E0036)	05: 6th byte	
32nd byte (E0037)	00: (output data offset)	
33rd byte (E0040)	01: A slave station without a Polling I/O function	Node address 4
34th byte (E0041)	All zeroes	
35th byte (E0042)		
36th byte (E0043)		
37th byte (E0044)		
38th byte (E0045)		
39th byte (E0046)		
40th byte (E0047)		
41st byte (E0050)	02: A slave station with a Polling I/O function	Node address 5
42nd byte (E0051)	00: Not used	
43rd byte (E0052)	03: 3 bytes (input data length)	
44th byte (E0053)	00: 0 byte (output data length)	
45th byte (E0054)	08: 9th byte	
46th byte (E0055)	00: (input data offset)	
47th byte (E0056)	0B: 12th byte	
48th byte (E0057)	00 (output data offset)	

Address *	$Value_{(HEX)}$: Details	
49th byte (E0060)	All zeroes	Node address 6
50th byte (E0061)		
51st byte (E0062)		
52nd byte (E0063)		
53rd byte (E0064)		
54th byte (E0065)		
55th byte (E0066)		
56th byte (E0067)		
to	to	to
505th byte (E0770)	All zeroes	Node address 63
506th byte (E0771)		
507th byte (E0772)		
508th byte (E0773)		
509th byte (E0774)		
510th byte (E0775)		
511th byte (E0776)		
512th byte (E0777)		

* Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

(2) Even number allocation

Assign the number of bytes of data in the input/output data table (data length) in the order that the node addresses were assigned to each slave station.

1. Set the predetermined data length for slave stations to an even number of bytes.
   If an individual slave station needs more than the default amount of data, the JW-32CUM1 can be used to assign a different data length in terms of multiples of the default data length.
2. The JW-32CUM1 assigns the default data length to slave stations that do not have a I/O message function.
3. The JW-32CUM1 also assigns the default data length to slave station numbers (node addresses) that do not have any hardware connected to them.

Enter the data length between 1 and 3 on the system memory of the JW-32CUM1. ⇨See page 8-9.

■ Allocation example

Allocation results of page 8-22 (top part) are as follows.
Data lengths below are true when 2 bytes is specified.

Address *	Input/output data table	
1st byte (Ⅎ2000)	Node address 1 (slave station)	Input
2nd byte (Ⅎ2001)		Output
3rd byte (Ⅎ2002)	Node address 2 (not connected)	Not used
4th byte (Ⅎ2003)	Node address 3 (slave station)	Input
5th byte (Ⅎ2004)		
6th byte (Ⅎ2005)		
7th byte (Ⅎ2006)		Output
8th byte (Ⅎ2007)		
9th byte (Ⅎ2010)		
10th byte (Ⅎ2011)		
11th byte (Ⅎ2012)	Node address 4 (slave station)	Not used
12th byte (Ⅎ2013)	Node address 5 (slave station)	Input
13th byte (Ⅎ2014)		
14th byte (Ⅎ2015)		Not used
15th byte (Ⅎ2016)		
16th byte (Ⅎ2017)		

* Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

17th byte (Ⅎ2020)	Node address 6 (not connected)	Not used
18th byte (Ⅎ2021)		
to	≀	
131st byte (Ⅎ2202)	Node address 63 (not connected)	Not used
132nd byte (Ⅎ2203)		
133rd byte (Ⅎ2204)	Not used	
to		
512th byte (Ⅎ2777)		

Node address	Required data length (bytes)	I/O message function	Assigned data length (bytes)
1	2 (1 input, 1 output)	Yes	2 (1 input, 1 output)
2	Not connected	-	2
3	6 (3 input, 3 output)	Yes	6 (3 input, 3 output)
4	0	No	2
5	3 (3 input, 0 output)	Yes	4 (3 input, 1 not used)

- The needed data length (2 bytes) is assigned to slave station 1.
- Slave station 2 (not connected) and slave station 4 (does not have a I/O message function) are assigned the default data length (2 bytes).
- Slave stations 3 and 5 need a larger number of bytes than the default data length. (2 bytes).
  Therefore, in these cases, a different data length is assigned which is a multiple of the default data length (2 bytes).
  ⇨ Slave station 3 needs 6 bytes and is assigned 6 bytes (2 x 3).
  ⇨ Slave station 5 needs 3 bytes and is assigned 4 bytes (2 x 2).

The scan list data table (⇨ 8-29) for this example will be as follows:

Address * 1	Value (hexadecimal): Details	
1st byte (E0000)	FF: This JW-32CUM1 station (master)	Node address 0
2nd byte (E0001)	All zeroes	
3rd byte (E0002)		
4th byte (E0003)		
5th byte (E0004)		
6th byte (E0005)		
7th byte (E0006)		
8th byte (E0007)		
9th byte (E0010)	02: A slave station with a Polling I/O function	Node address 1
10th byte (E0011)	00: Not used	
11th byte (E0012)	01: 1 byte (input data length)	
12th byte (E0013)	01: 1 byte (output data length)	
13th byte (E0014)	00: 1st byte	
14th byte (E0015)	00: (input data offset)	
15th byte (E0016)	01: 2nd byte	
16th byte (E0017)	00: (output data offset)	
17th byte (E0020)	00: Not connected	Node address 2
18th byte (E0021)	00: Not used	
19th byte (E0022)	00: 0 byte (input data length)	
20th byte (E0023)	00: 0 byte (output data length)	
21st byte (E0024)	02: 3rd byte	
22nd byte (E0025)	00: (input data offset)	
23rd byte (E0026)	02: 3rd byte	
24th byte (E0027)	00: (output data offset)	
25th byte (E0030)	02: A slave station with a Polling I/O function	Node address 3
26th byte (E0031)	00: Not used	
27th byte (E0032)	03: 3 bytes (input data length)	
28th byte (E0033)	03: 3 bytes (output data length)	
29th byte (E0034)	04: 5th byte	
30th byte (E0035)	00: (input data offset)	
31st byte (E0036)	07: 8th byte	
32nd byte (E0037)	00: (output data offset)	
33rd byte (E0040)	01: A slave station without a I/O message function	Node address 4
34th byte (E0041)	00: Not used	
35th byte (E0042)	00: 0 byte (input data length)	
36th byte (E0043)	00: 0 byte (output data length)	
37th byte (E0044)	0A: 11th byte	
38th byte (E0045)	00: (input data offset)	
39th byte (E0046)	0A: 11th byte	
40th byte (E0047)	00: (output data offset)	
41st byte (E0050)	02: A slave station with a Polling I/O function	Node address 5
42nd byte (E0051)	00: Not used	
43rd byte (E0052)	03: 3 bytes (input data length)	
44th byte (E0053)	00: 0 byte (output data length)	
45th byte (E0054)	0C: 13th byte	
46th byte (E0055)	00: (input data offset)	
47th byte (E0056)	0F: 16th byte	
48th byte (E0057)	00: (output data offset)	

Address * 1	$Value_{(HEX)}$: Details	
49th byte (E0060)	00	Node address 6
50th byte (E0061)	00	
51st byte (E0062)	00	
52nd byte (E0063)	00	
53rd byte (E0064)	11 * 2	
54th byte (E0065)	00	
55th byte (E0066)	11 * 2	
56th byte (E0067)	00	
to	to	to
505th byte (E0770)	00	Node address 63
506th byte (E0771)	00	
507th byte (E0772)	00	
508th byte (E0773)	00	
509th byte (E0774)	83 * 2	
510th byte (E0775)	00	
511th byte (E0776)	83 * 2	
512th byte (E0777)	00	

*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."
*2: Offset value is added by 2 bytes (set data length) for each node address.

(3) Allocation in the order in which vacant nodes are occupied

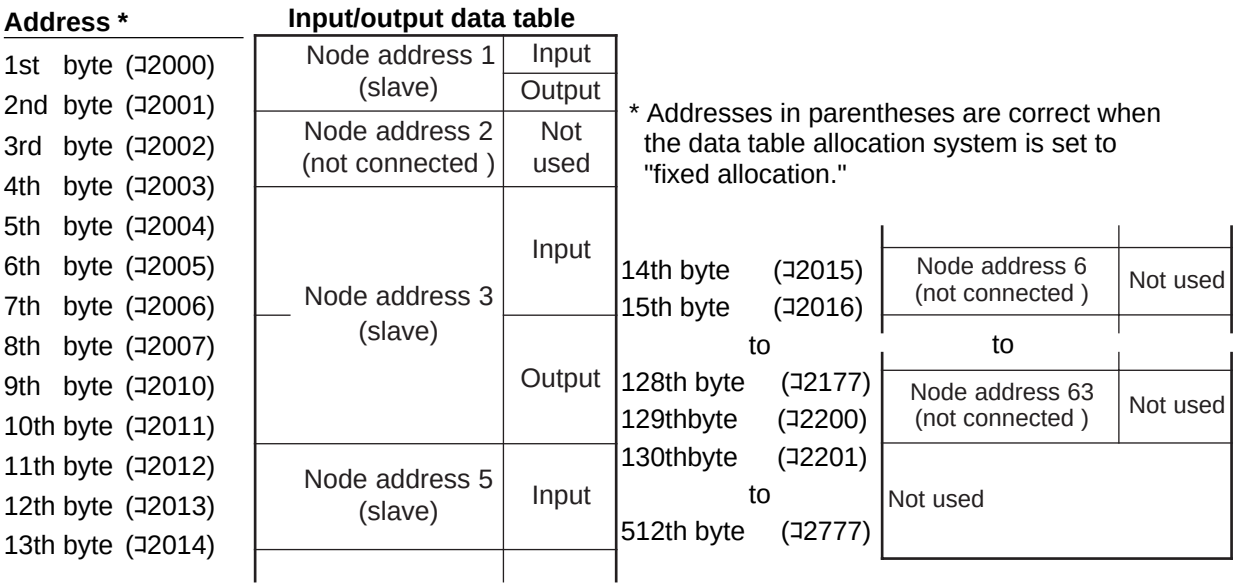
Assign the data length (number of bytes of data) in the input/output data table in the order that the node addresses were assigned to each slave station.

1. Assign the required data length to slave stations using the I/O message function.
2. The JW-32CUM1 does not allocate any data length for slave stations that do not have a I/O message function.
3. The JW-32CUM1 will allocate the default data length to any slave station number (node address) that does not actually have hardware connected.
   Enter the switches SW7-5, SW7-6, and system memory of the JW-32CUM1. ⇨See page 8-9.

■ Allocation example

The results of "allocation in the order in which vacant nodes are occupied, "for the example shown on page 8-22, are as follows.

- The default data length was set to 2 bytes.



(When the default data length is set to 2 bytes)

Node address	Required data length (bytes)	I/O message function	Assigned data length (bytes)
1	2 (1 input, 1 output)	Yes	2 (1 input, 1 output)
2	Not connected	-	2
3	6 (3 input, 3 output)	Yes	6 (3 input, 3 output)
4	0	No	0
5	3 (3 input, 0 output)	Yes	3 (3 input)

- The default data length is assigned to slave stations 1, 3, and 5.
- Slave station 2 (no hardware connected) is assigned the default data length (2 bytes).
- Slave station 4 (without a I/O message function) is not allocated any data length.

The scan list data table (⇨ 8-29) for this example will be as follows:

Address * 1	Value (hexadecimal): Details	
1st byte (E0000)	FF: This JW-32CUM1 station (master)	Node address 0
2nd byte (E0001)	All zeroes	
3rd byte (E0002)		
4th byte (E0003)		
5th byte (E0004)		
6th byte (E0005)		
7th byte (E0006)		
8th byte (E0007)		
9th byte (E0010)	02: A slave station with a Polling I/O function	Node address 1
10th byte (E0011)	00: Not used	
11th byte (E0012)	00: 1 byte (input data length)	
12th byte (E0013)	01: 1 byte (output data length)	
13th byte (E0014)	00: 1st byte	
14th byte (E0015)	00: (input data offset)	
15th byte (E0016)	01: 2nd byte	
16th byte (E0017)	00: (output data offset)	
17th byte (E0020)	00: Not connected	Node address 2
18th byte (E0021)	00: Not used	
19th byte (E0022)	00: 0 byte (input data length)	
20th byte (E0023)	00: 0 byte (output data length)	
21st byte (E0024)	02: 3rd byte	
22nd byte (E0025)	00: (input data offset)	
23rd byte (E0026)	02: 3rd byte	
24th byte (E0027)	00: (output data offset)	
25th byte (E0030)	02: A slave station with a Polling I/O function	Node address 3
26th byte (E0031)	00: Not used	
27th byte (E0032)	03: 3 bytes (input data length)	
28th byte (E0033)	03: 3 bytes (output data length)	
29th byte (E0034)	04: 5th byte	
30th byte (E0035)	00: (input data offset)	
31st byte (E0036)	07: 8th byte	
32nd byte (E0037)	00: (output data offset)	
33rd byte (E0040)	01: A slave station without a I/O message function	Node address 4
34th byte (E0041)	All zeroes	
35th byte (E0042)		
36th byte (E0043)		
37th byte (E0044)		
38th byte (E0045)		
39th byte (E0046)		
40th byte (E0047)		
41st byte (E0050)	02: A slave station with a Polling I/O function	Node address 5
42nd byte (E0051)	00: Not used	
43rd byte (E0052)	03: 3 bytes (input data length)	
44th byte (E0053)	00: 0 byte (output data length)	
45th byte (E0054)	0A: 11th byte	
46th byte (E0055)	00: (input data offset)	
47th byte (E0056)	0D: 14th byte	
48th byte (E0057)	00: (output data offset)	

Address * 1	$Value_H$: Details	
49th byte (E0060)	00	Node address 6
50th byte (E0061)	00	
51st byte (E0062)	00	
52nd byte (E0063)	00	
53rd byte (E0064)	0F * 2	
54th byte (E0065)	00	
55th byte (E0066)	0F * 2	
56th byte (E0067)	00	
to	to	to
505th byte (E0770)	00	Node address 63
506th byte (E0771)	00	
507th byte (E0772)	00	
508th byte (E0773)	00	
509th byte (E0774)	81 * 2	
510th byte (E0775)	00	
511th byte (E0776)	81 * 2	
512th byte (E0777)	00	

*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."
*2: Offset value is added by 2 bytes (set data length) for each node address.

8-3-2 Editing the scan list

Before using the DevceNet function of the JW-32CUM1 for the first time, you will have to edit the scan list (to allocate I/O data).

[1] Editing procedure

Shown below are the procedures used to edit the scan list.

① Switch the JW30H (JW-32CUM1) control module to the "program mode."

↓

② Turn OFF the power to the JW30H and remove the JW-32CUM1.

↓

③ Change switch SW8 on the JW-32CUM1 to "Not protected." ⇨ See page 8-10.

- If switch SW8 is set to the "protected," the procedures below will not work.

↓

④ Install the JW-32CUM1 in the JW30H. ⇨ See chapter 5.

↓

⑤ Connect any slave stations.

- Make sure to start all the slave stations. When creating a scan list without some slave stations being turned on, the input/out allocation may be incorrect. ⇨ See *1 below.

↓

⑥ Turn ON the power to the JW30H.

↓

⑦ Press and hold the SCAN switch on the JW-32CUM1 for at least 3 seconds.

- The JW-32CUM1 will edit the scan list. ⇨See * 2 below.

↓

⑧ After the editing process is complete, turn OFF the power to the JW30H.

↓

⑨ Remove the JW-32CUM1 from the JW30H.

↓

⑩ Set switch SW8 on the JW-32CUM1 to the "protected."

↓

⑪ Reinstall the JW-32CUM1 in the JW30H.

↓

⑫ Turn ON the power to the JW30H.

↓

⑬ Put the JW30H (JW-32CUM1) control module in the operation mode.

*1: Connecting the slave stations mentioned in step ⑤ above

- When "even number allocation" or "allocation in order of securing empty nodes" is selected for the I/O data allocation method, and some node addresses are not occupied by slave stations, those node address will be assigned the default number of bytes. This will make operation possible with only the connected slave stations.
  When a slave station is connected at a vacant address, and if this station needs more than the default number of bytes for I/O, the I/O addresses thereafter can be incremented by editing the next time a scan list is created.

*2: Scan list editing procedure mentioned in step ⑦

- When the JW-32CUM1 is in the "not protected" and you change the JW30H to the "operation mode," the JW-32CUM1 will start I/O communication. However, when you press the SCAN switch immediately after communication is started, the JW-32CUM1 will start editing the scan list. This may cause a malfunction. Therefore, we recommend that you change to the "protected" as described in step ⑧ above.

[2] Scan list table

The scan list table (512 bytes) addresses and details are shown below.

● **Addresses in the scan list table**

Basic operation mode		No. of bytes	Fixed	Free
Master	Slave			
O	—	512	E0000 to E0777	#314 to #317 *

(O: Enable, —: Disable) * Specify the top address and select enabled or disabled.

● **Details of the scan list table**

Address * 1	Details		
1st byte (E0000)	Slave information flag * 2		Node address 0 information
2nd byte (E0001)	Not used		
3rd byte (E0002)	Input data length	- Data length for the data which slave stations will send and receive in I/O messages.	
4th byte (E0003)	Output data length		
5th byte (E0004)	Input data offset	- These indicate the byte mappings in the I/O data table (page 8-21) that data will be sent from or received into using I/O messages. *3.	
6th byte (E0005)			
7th byte (E0006)	Output data offset		
8th byte (E0007)			
9th byte (E0010) to 16th byte (E0017)	Node address 1 information (same as node address 0)		
17th byte (E0020) to 24th byte (E0027)	Node address 2 information (same as node address 0)		
⋮ ⋮	⋮		
505th byte (E0770) to 512th byte (E0777)	Node address 63 information (same as node address 0)		

*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

*2: Slave information flag

Value(HEX)	Details
00	Node not connected
01	Node connected, does not have a I/O message function
02	Node connected with a Polling I/O function
04	Node connected with a Bit Strobe.
FF	JW-32CUM1's node address

*3: The position of an address from the top byte is expressed by a byte + 1.
(Ex.: When the value is 0, it is the 1st byte. When the value is 2, it is the 3rd byte.)

8-4 Explicit message function

When using only the I/O message function, there is no need to use the "explicit" message function.
The JW-32CUM1 can send a request for service to any device made by another manufacturer that uses the Explicit message function defined in the DeviceNet specifications.
(Switch SW7-7 = ON ⇨ See page 8-9.)
This function uses the Explicit message data table (118 bytes each for request and response) in the JW-32CUM1 (control section).
- An Explicit message data table request issues an Explicit message defined by DeviceNet, and asks any corresponding device to provide service.
- The Explicit message data table response stores the service data details from the slave station.

Set the top address of the Explicit message table to the following point in system memory.

● **Addresses of the Explicit message table areas (requests and responses)**

Basic operation mode		Table	No. of bytes	Fixed	Free
Master	Slave				
O	—	Requests	118	39400 to 39565	#310 to #313 *1
		Responses	118	39600 to 39765	

(O: Enable, -: Disable) *1: Specify the top address and select enabled or disabled.

(1) Details of the Explicit message table (requests)

JW-32CUM1 DeviceNet section reading flag, control section writing flag, and other parameters are described.

Address *	Parameter name	Details
1st byte (39400)	DeviceNet section reading flag	When the DeviceNet section of the JW-32CUM1 has finished reading the contents being sent, the data in this address is automatically inverted. (Inverting data changes $00_{(H)}$ to $01_{(H)}$, and vise-versa.)
2nd byte (39401)	Control section writing flag	When the data has been inverted, the host (control section to DeviceNet section) will send a request message to the slave station.
3rd byte (39402)	Status	The device status and response information are stored.
4th byte (39403)	TXID (transaction ID)	Assign an ID when creating a request.
5th byte (39404)	Size	Set the request data length.
6th byte (39405)	Reserved area	Use prohibited.
7th byte (39406)	MAC ID	Set a node address for the transaction object.
8th byte (39407)	Service code	Service code for the DeviceNet request.
9th byte (39410) 10th byte (39411)	Class ID	Assign a class ID to the Explicit message sending target.
11th byte (39412) 12th byte (39413)	Instance ID	Assign an instance ID to the Explicit message sending target.
13th byte (39414) to 118th byte (39565)	Service data (106 bytes)	Assign data that is defined by a service code.

*2: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

- For details about the Explicit message parameters, see the "DeviceNet specifications." To obtain a copy of "DeviceNet specifications," contact an ODVA branch office in your country.

(2) Details of the Explicit message table (responses)

Control section reading flag, DeviceNet section writing flag etc. are provided for parameters.

Address *	Parameter name	Details
1st byte (39600)	Control section reading flag	When reading the received data, the data same as DeviceNet section writing flag is written to the control section of the JW-32CUM1.
2nd byte (39601)	DeviceNet section writing flag	When the DeviceNet section receives a response from a slave station, this address inverts the data. (Inverting data changes $00_{(H)}$ to $01_{(H)}$, and vise-versa.)
3rd byte (39602)	Status	The device status and response information are stored.
4th byte (39603)	TXID (transaction ID)	Transaction ID of the response data.
5th byte (39604)	Size	Response data length.
6th byte (39605)	Reserved area	Use prohibited.
7th byte (39606)	MAC ID	Node address that will be the target for the transaction.
8th byte (39607)	Service code	Service code for the DeviceNet response.
9th byte (39610) to 118th byte (39765)	Response data (110 bytes)	A received data message, as defined by the service code, is returned.

* Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

- For details about the Explicit message parameters, see the "DeviceNet specifications." To obtain a copy of "DeviceNet specifications," contact an ODVA branch office in your country.

(3) Parameter addresses for the Explicit message table (requests, responses)

Shown below are the parameter addresses.

Allocation method	Fixed	Free	Parameter name
Address	39400	*1	DeviceNet section reading flag
	39401		Control section writing flag
	39402		Status
	39403		TXID (transaction ID)
	39404		Size
	39405		Reserved area
	39406		MAC ID
	39407		Service code
	39410, 39411		Class ID
	39412, 39413		Instance ID
	39414 to 39565		Service data (106 bytes)
	39600	*2	Control section reading flag
	39601		DeviceNet writing flag
	39602		Status
	39603		TXID (transaction ID)
	39604		Size
	39605		Reserved area
	39606		MAC ID
	39607		Service code
	39610 to 39765		Response data (110 bytes)

*1: Enter top address to system memory #310 to #313. ⇨ See page 8-12, 8-30

*2: "*1+128th byte" address.

(4) Example

Shown below is an example of reading the vendor ID of the identified object in a slave station (node address 1.)

[Data table allocation method: Fixed allocation]

Explicit message data table (requests)

Address	Parameter name	Value(HEX)	
39400	DeviceNet section reading flag	00(01)	③④
39401	Control section writing flag	00(01)	②
39402	Status	00	
39403	TXID	00	
39404	Size	06	
39405	Reserved area	00	
39406	MAC ID	00	
39407	Service code	00	
39410	Class ID	01	①
39411		00	
39412	Instant ID	01	
39413		00	
39414	Service data	01	
39415		00	

Explicit message data table (responses)

Address	Parameter name	Value(HEX)	
39600	Control section reading flag	00(01)	⑦
39601	DeviceNet section writing flag	00(01)	⑥
39602	Status	01	
39603	TXID	00	
39604	Size	02	
39605	Reserved area	00	⑤
39606	MAC ID	01	
39607	Service code	8E	
39610	Response data	68	
39611		00	

When Sharp's vendor ID is returned:
104 (decimal) = 68 (hex.)

● **Request table**

① Enter the values above in the request table (39402 to 39415).
② Reverse the write flag (39401) . (00 ⇨ 01:*)
③ When the write flag (39401) and read flag (39400) are not the same, the JW-32CUM1 (DeviceNet section) starts reading the details of the transaction.
④ When the read process is complete, the JW-32CUM1 (DeviceNet section) automatically reverses the read flag (39400) (00 ⇨ 01:*), so that the read flag will be same value as the write flag (39401).
⇨ The JW-32CUM1 (DeviceNet section) sends a request message to a slave station.

● **Response table**

⑤ When the JW-32CUM1 (DeviceNet section) receives a response corresponding to the request above from a slave station, or if a time out occurs, the JW-32CUM1 (DeviceNet section) writes data to the transaction block in the response table.
- The JW-32CUM1 (DeviceNet section) stores the response data from a slave station in the transaction block, starting at address 39602. In practice, the slave station vender ID104(DCM) for MAC ID01 is stored with the service data.

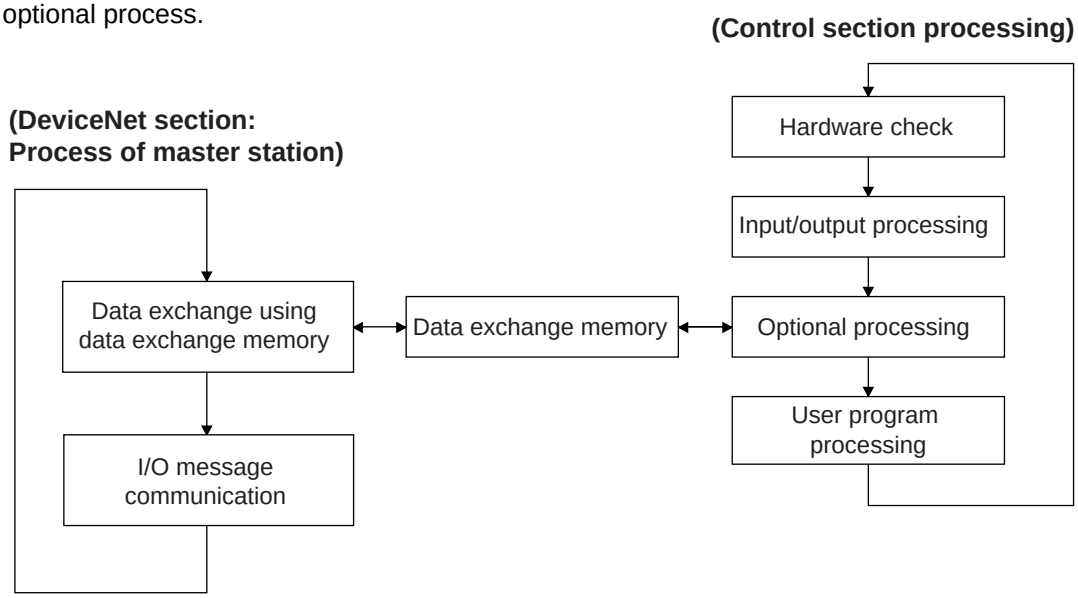
⑥ The values of the write flag (39601) in the response is reversed.
⑦ Until the write flag (39600) (00 ⇨ 01:*) is reversed, the details of the transaction block are not allowed to change. To issue messages consecutively, the [read/write/reverse] flag should be reversed.

*** Reverse**
The initial status of each flag is 00. When receiving a response after sending a request, the flag changes to 01. Then the flag changes back to 00 again, and so on.

8-5 Communication timing

This chapter describes DeviceNet section the communication between the JW-32CUM1 (control section), the JW-32CUM1 (DeviceNet section: master), and the slave stations when using the JW-32CUM1 as the master mode.

To exchange data between the DeviceNet section and the control section, the control section executes as optional process.



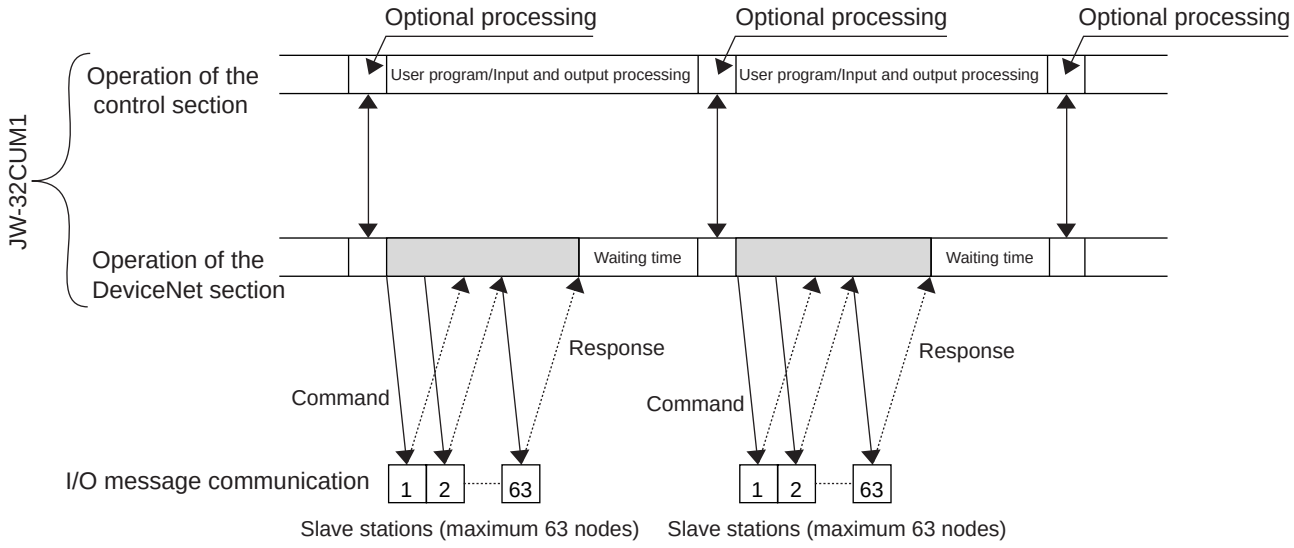
The DeviceNet section receives responses from all slave stations. If not, after a communication time out, it will complete one I/O message communication cycle, and exchange data with the control section.

- The time-out time is the normal time required after the DeviceNet section completes sending commands to all of the slave stations, until it receives responses from all of the slave stations. The actual communication time-out period is determined by the setting of Switch SW8 (selection of communication monitor time) on the JW-32CUM1 and the number of slave stations connected. ⇨ See page 8-11.

The division of the communication timing between the I/O message communication time and the operation time of the JW-32CUM1 (control section) is as follows.

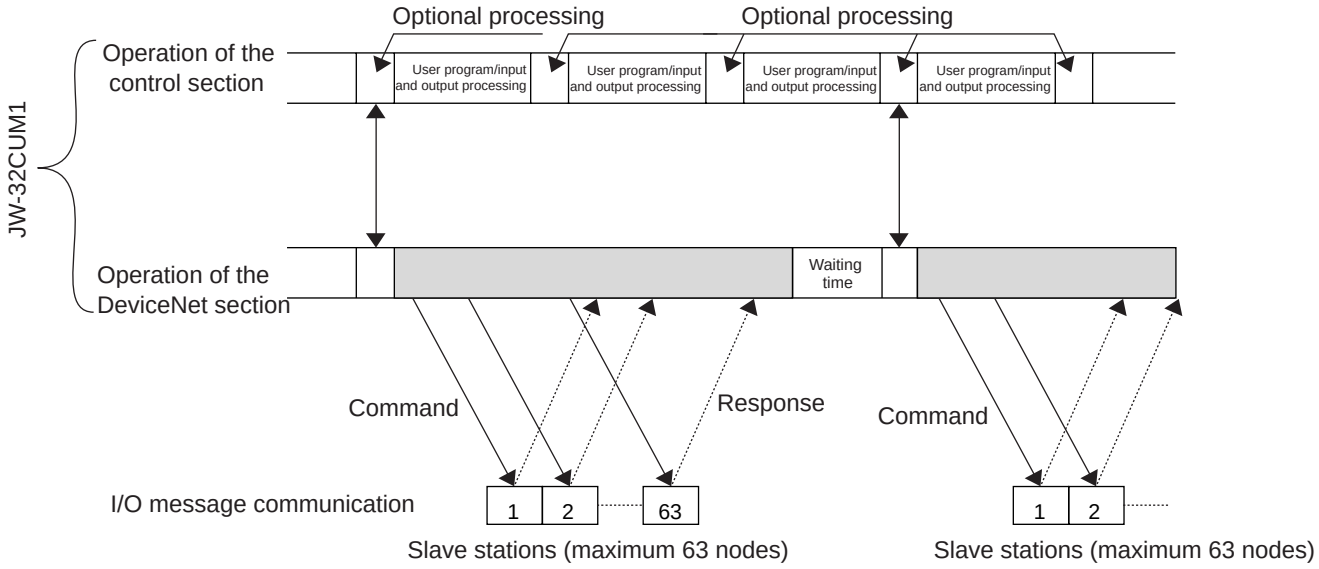
[1] When the I/O message communication time is shorter than the JW-32CUM1 (control section) cycle operation time

■ Communication cycle: Asynchronous/synchronous

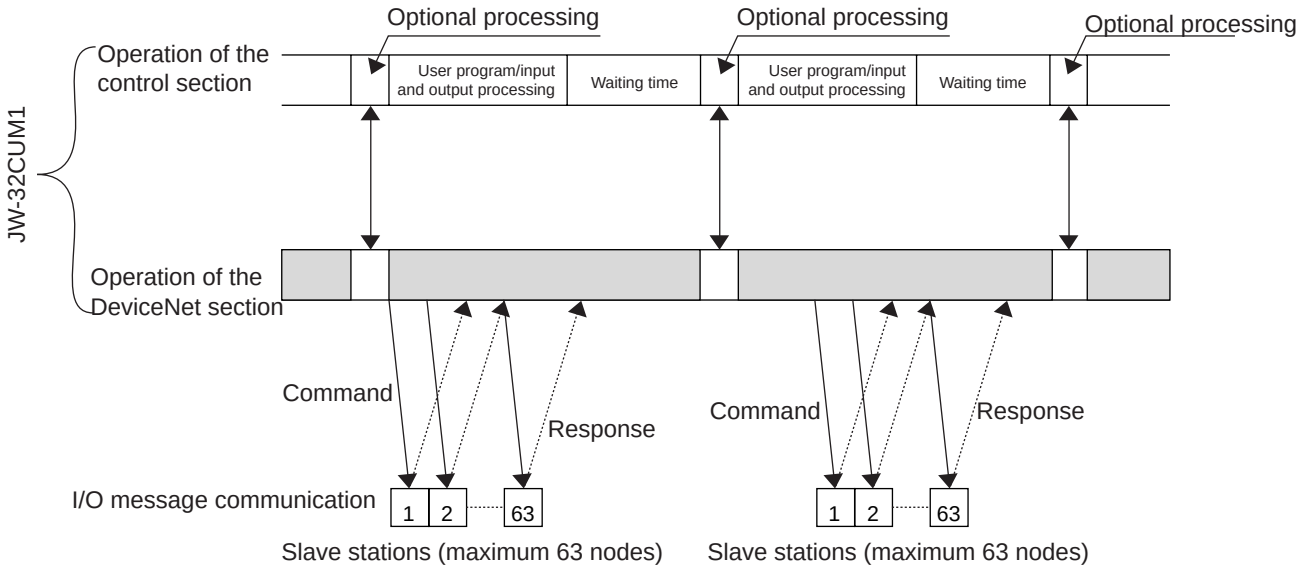


[2] When the I/O message communication time is longer than the JW-32CUM1 (control section) cycle operation time

(1) Communication cycle: Asynchronous



(2) Communication cycle: Synchronous



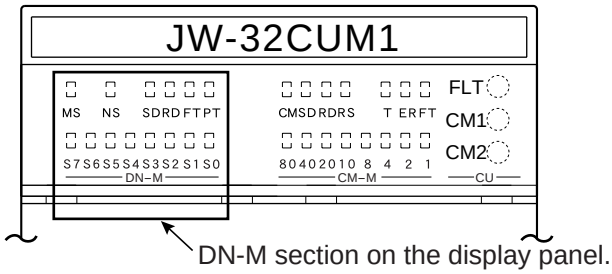
Note: The synchronous calculation operation is only possible with one module, including other communication modules (JW-20DN, JW-21CM, JW-23LMH, JW-25CM). Therefore, be careful because using multiple modules in the synchronous mode may not permit synchronous operation.

8-6 Error handling

When an error occurs during communication with the JW-32CUM1 DeviceNet communication, check the error details by referring to the display lamps and the diagnostic data table. Then take the appropriate action.

8-6-1 Display lamp

The operation details for DeviceNet communication are shown by the lamps on the JW-32CUM1, which will light, blink, or go out (see the DN-M section on the display panel).



Lamp name	Operation details
MS	Module status. For details, see the table below.
NS	Network status.
SD	Lights when sending data.
RD	Lights when receiving data.
FT	Lights when a hardware error occurs on the JW-32CUM1 (DeviceNet communication).
PT	Lights when the protected mode is selected.
S7 to S0	Displays the error code and error node address when the DeviceNet communication system has an error.

For details, ⇨ see the table below.

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- **Module and network status details**

Lamp name	Color	Status		Details
MS (Module Status)	Green	Lit	Normal	The JW-32CUM1 (DeviceNet section) is normal.
		Blinking	Status not set yet	Reading switch setting.
	Red	Lit	Hardware error	The JW-32CUM1 (DeviceNet section) has a hardware error.
		Blinking	Setting error	Wrong switch setting.
	---	OFF	No power supply.	- Hardware error of the JW-32CUM1 (DeviceNet section). - No power supplied to the JW-32CUM1 (DeviceNet section) - Resetting - Waiting to start initial processing.
NS (Network Status)	Green	Lit	Online/communication connection complete	The DeviceNet network is normal (communication is established)
		Blinking	Online/No communication	The DeviceNet network is normal, but communication is not established yet.
	Red	Lit	Communication error 1	- Communication error (an error was detected because network communication was not established) - Duplicate node address - "Busoff" detected.
		Blinking	Communication error 2	Communication error in one or more slaves.
	---	OFF	Offline/power OFF status.	There is no node other than the JW-32CUM1.

When an error occurs on a node (master and slave station), the error code and the node address will be displayed on the JW-32CUM1 display panel (S0 to S7).

[1] Error code

(1) Error code display

The JW-32CUM1 displays error codes using lights S0 to S7 on the display panel.

S0 to S7 lamp status (● : Lit, ○ : Off)								Error code (HEX)
S7	S6	S5	S4	S3	S2	S1	S0	
●	●	○	●	○	○	●	○	D2
●	●	○	●	○	●	○	●	D5
●	●	○	●	○	●	●	○	D6
●	●	○	●	●	○	○	●	D9
●	●	●	○	○	○	○	○	E0
●	●	●	●	○	○	○	○	F0
●	●	●	●	○	○	○	●	F1
●	●	●	●	○	○	●	○	F2
●	●	●	●	○	○	●	●	F3
●	●	●	●	○	●	○	○	F4
●	●	●	●	○	●	○	●	F5
●	●	●	●	○	●	●	●	F7
●	●	●	●	●	○	○	○	F8
●	●	●	●	●	○	○	●	F9
●	●	●	●	●	○	●	○	FA
●	●	●	●	●	○	●	●	FB

(2) Error details

The error code details and actions are as follows.

Indication lamp		Error details		Communication operation	Master status *1	Treatment
MS/NS/FT	S0 to S7 (error code)					
MS: Keeps the current status NS: Red lamp blinks	D2	Configuration error	The I/O area of one slave station exceeds input 127 bytes, output 127 bytes	- Dose not retry connection for error slave station. - Dose not communicate with all the slave station.	D4 turns ON * 2	Reset the slave node addresses.
	D5	Verification error	- There is no slave data table at all. - The slave does not exist.		D16 and D3 turn ON * 2	- Check whether the slaves are properly connected. - Recreate the scan list after checking the slave connections and node assignments.
	D6		The slave's I/O data size does not match the scan list register details.	- Retry connection for error slave station. - Communicate with normal slave station.		After checking the number of I/O bytes used by the slaves, recreate the scan list.
	D9	Communicati-on error	- A slave time out ha occurred 6 times in a row while waiting for a response. - A fragmentation protocol error has occurred 3 times.		D16 and D2 turn ON * 2	Check the following: - Make sure the communication speed of the master station and slave stations are the same. - Make sure there are no disconnected or loose cables. - Make sure there is not too much electrical noise. - Make sure the cable lengths (trunk and branches) are appropriate. - Make sure the terminating resistances are connected to both ends and only to the ends.
MS: Green lamp blinks NS: Goes OFF	E0	Network power source error (Sending error)	Communication power dose not supply normally.	Waiting power supply from network power supply.	D16 and D5 turn ON	Check wiring of network power supply and network cable.

To the next page

* 1: Master status ⇨ See page 8-44.
* 2: D17 will turn ON when the JW-32CUM1 is connected to more than 1 slave station. (If the master station detects a problem or is unable to establish connection with all slave stations, D17 will turn OFF.)

Display lamp		Error details		Communication operation	Master status *	Treatment
MS/NS/FT	S7 to S0 (error node)					
MS: Keeps the current status NS: Red lamp lights	F0	A node address has been used twice	The master station node address has been assigned to another node.	Operation stopped	D16 and D1 turn ON.	Check the other node addresses. Eliminate the duplicated node address and restart the master module .
	F1	Detected a Bus OFF	The JW-32CUM1 Bus OFF status is active (communication was stopped due to frequent data errors).			Check the following: - Make sure the communication speed of the master station and slave stations are the same. - Make sure there are no disconnected or loose cables. - Make sure there is not too much electrical noise. - Make sure the cable lengths (trunk and branches) are appropriate. - Make sure the terminating resistances are connected both ends and only to the ends.
MS: Red lamp blinks NS: Goes OFF	F2	Node address error	Some of the switches on the JW-32CUM1 are set incorrectly.		D16 and D0 turn ON.	Check the node address switch.
	F3	Communication speed error				Check the SW8 switch settings.
	F4	Module No. error				Check the Module No. switch settings.
	F5	Other switch setting errors	Other than "F2, F3, or F4"			Check the set values of the system memory.
	F6	System memory setting error	Some settings in the JW-32CUM1 system memory are out of the specified range.			
MS: Red lamp lights NS: Goes OFF	F7	Scan list data error	The EEPROM has a memory error. - Unable to read or write the scan list parameters since no data table exists on the master module.			Recreate the scan list and recreate the data table in the master module (JW-32CUM1). Or, replace the JW-32CUM1.
	F8	Serial No. error				
	F9	RAM error	An error occurred during a RAM check of the JW-32CUM1.		—	
	FA	ROMSUM error	An error occurred during a ROM check of the JW-32CUM1.			
	FB	DPRAM error	An error occurred during a common RAM check of the JW-32CUM1.			
MS: Keeps the current status NS: Keeps the current status	—	Watchdog timer error	A watchdog timer error occurred on the JW-32CUM1.	Operation stopped	—	Replace the JW-32CUM1.
FT: Lights	—	Watchdog timer error on the JW-32CUM1 (Hardware error on the JW-32CUM1).		Operation stopped	—	

* Master status ⇨ See page 8-44.

Error codes are stored in system memory, starting at location #170 in the JW30H (JW-32CUM1).

Remarks

- The error codes stored in system memory start at location #170 and the location is incremented up to location #177, each time a new error code occurs. Up to 8 error codes can be stored in memory. These codes will not disappear during RAM operation of the programmable controller, even if the power to the PLC is turned OFF. System memory locations #170 to #177 will retain the error codes stored in them, even after a recovery.
- When an error occurs in the JW-32CUM1 (DeviceNet section), error code $53_{(H)}$ (optional error) will be stored at system memory location #160.
- When an optional error $53_{(H)}$ occurs, if you monitor system memory location #051, bits indicating the faulty I/O link master module or DeviceNet master module will be ON (the module number switch setting value). When an error occurs in the DeviceNet section of the JW-32CUM1, bit 0 (the module number 0 error) will be turned ON.

[2] Display of node addresses

The JW-32CUM1 displays node addresses using the S0 to S7 lamps on the display panel.

S0 to S7 lamp status (●: Lit, ○: Off)								Node address (DCM)
S7	S6	S5	S4	S3	S2	S1	S0	
○	○	○	○	○	○	○	○	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

S0 to S7 lamp status (●: Lit, ○: Off)								Node address (DCM)
S7	S6	S5	S4	S3	S2	S1	S0	
○	●	○	○	○	●	●	○	46
○	●	○	○	○	●	●	●	47
○	●	○	○	●	○	○	○	48
○	●	○	○	●	○	○	●	49
○	●	○	●	○	○	○	○	50
○	●	○	●	○	○	○	●	51
○	●	○	●	○	○	●	○	52
○	●	○	●	○	○	●	●	53
○	●	○	●	○	●	○	○	54
○	●	○	●	○	●	○	●	55
○	●	○	●	○	●	●	○	56
○	●	○	●	○	●	●	●	57
○	●	○	●	●	○	○	○	58
○	●	○	●	●	○	○	●	59
○	●	●	○	○	○	○	○	60
○	●	●	○	○	○	○	●	61
○	●	●	○	○	○	●	○	62
○	●	●	○	○	○	●	●	63

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8-6-2 Diagnostic table

The diagnostic table that was specified in the JW-32CUM1 (control section) can be used to check the communication status of the nodes (master and slave stations). The addresses of the diagnostic tables (master mode: 256 bytes, slave mode: 128 bytes) are shown below.

● **Diagnostic data table addresses**

Basic operation mode		No. of bytes	Fixed	Free
Master	Slave			
O	O	Master: 256 Slave: 128	39000 to 39377	#304 to #307 *1

(O: Enable) *1: Specify the top address and select enabled or disabled.

[1] When JW-32CUM1 is master mode

The diagnostic table contains a communication monitor table, an operating status monitor table, a device status table, master status, and vender information.

Diagnostic data (256 bytes)

Address *2	D7	D6	D5	D4	D3	D2	D1	D0
	← Bit number							
1st byte (39000)	7	6	5	4	3	2	1	0
2nd byte (39001)	15	14	13	12	11	10	9	8
3rd byte (39002)	23	22	21	20	19	18	17	16
4th byte (39003)	31	30	29	28	27	26	25	24
5th byte (39004)	39	38	37	36	35	34	33	32
6th byte (39005)	47	46	45	44	43	42	41	40
7th byte (39006)	55	54	53	52	51	50	49	48
8th byte (39007)	63	62	61	60	59	58	57	56
9th byte (39010)	Reserved area *3							
32nd byte (39037)	D7	D6	D5	D4	D3	D2	D1	D0
33rd byte (39040)	7	6	5	4	3	2	1	0
34th byte (39041)	15	14	13	12	11	10	9	8
35th byte (39042)	23	22	21	20	19	18	17	16
36th byte (39043)	31	30	29	28	27	26	25	24
37th byte (39044)	39	38	37	36	35	34	33	32
38th byte (39045)	47	46	45	44	43	42	41	40
39th byte (39046)	55	54	53	52	51	50	49	48
40th byte (39047)	63	62	61	60	59	58	57	56
41st byte (39050)	Reserved area *3							
64th byte (39077)								
65th byte (39100)	Node 0							
66th byte (39101)	Node 1							
127th byte (39176)	Node 62							
128th byte (39177)	Node 63							
129th byte (39200)	D7	D6	D5	D4	D3	D2	D1	D0
130th byte (39201)	D17	D16	D15	D14	D13	D12	D11	D10
131st byte (39202)	Reserved area *3							
210th byte (39321)								
211th byte (39322)	Vender information (46 bytes) ⇨ Page 8-45.							
256th byte (39377)								

Communication monitor table (8 bytes)
- The node addresses are numbered 0 to 63. The communication status of each node is indicated by turning the bits ON or OFF.
  - ON: Normal
  - OFF: Abnormal

⇨ See the next page.

- A bit representing the master station status will turn OFF when any of the slave stations is abnormal.

Operating status monitor table (8 bytes)
- The node addresses are numbered 0 to 63. The operating status of each node is indicated by turning the bits ON or OFF.
  - ON: The slave station is operating
  - OFF: The slave station is idle.

⇨ See the 8-41.

- For details about the operating status of slave stations, see the specifications for each slave station.

Device status table (64 bytes)
- The status of the slave station devices can be monitored by keeping track of the device status codes assigned to each node address. $00_{(H)}$ is normal.

⇨ See page 8-42, 43.

Master status (2 bytes)
- The error information and operating status of the master station is indicated by turning bits ON or OFF.

⇨ See page 8-44.

*2: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

*3: Do not change any values in the reserved area. If you do, the JW-32CUM1 will malfunction.

Shown below are the addresses of the diagnostic table (communication monitor table, etc.)

(1) Address of the communication monitor table (master mode)

The communication monitor table shows the communication status of each node using the following bits (ON/OFF) in node addresses 0 to 63.

(ON: Normal, OFF: Abnormal)

Allocation system	Fixed	Free	Node address (Bit)							
			D7	D6	D5	D4	D3	D2	D1	D0
Address	39000	*1	7	6	5	4	3	2	1	0
	39001		15	14	13	12	11	10	9	8
	39002		23	22	21	20	19	18	17	16
	39003		31	30	29	28	27	26	25	24
	39004		39	38	37	36	35	34	33	32
	39005		47	46	45	44	43	42	41	40
	39006		55	54	53	52	51	50	49	48
	39007		63	62	61	60	59	58	57	56

*1: Enter top address to system memory #304 to #307. ⇨ Page 8-12, 8-40

- The master node turns ON when it can communicate normally with all the slave stations on the scan list table.
- Even the "even number allocation" and "allocation in order of securing empty nodes" are selected, bits corresponding to node addresses of "not connected slave module" and "slaves without I/O message" are always OFF.

(2) Operating status monitor table addresses (master mode)

The operation status monitor table shows the operating status of each slave station using the following bits (ON/OFF) in node addresses 0 to 63.

(ON: Slave station is operating, OFF: Slave station is idle)

Allocation system	Fixed	Free	Node address (Bit)							
			D7	D6	D5	D4	D3	D2	D1	D0
Address	39040	*2	7	6	5	4	3	2	1	0
	39041		15	14	13	12	11	10	9	8
	39042		23	22	21	20	19	18	17	16
	39043		31	30	29	28	27	26	25	24
	39044		39	38	37	36	35	34	33	32
	39045		47	46	45	44	43	42	41	40
	39046		55	54	53	52	51	50	49	48
	39047		63	62	61	60	59	58	57	56

*2: "*1 + 32th byte" address. (*1: ⇨ previous page)

- The master node turns ON when it can communicate normally with all the slave station on the scan list table.
- Even the “even number allocation" and " allocation in order of securing empty nodes" are selected, bits corresponding to node addresses of "not connected slave module" and "slaves without I/O message" are always OFF.

(3) Device status table addresses (master mode)

When an error occurs on a slave station device, a device status code (next page) will be stored at the following addresses. (When the communication is normal, $00_{(HEX)}$ will be stored.)

Allocation system	Fixed	Free	Node address
Address	39100	*3	0
	39101		1
	39102		2
	39103		3
	39104		4
	39105		5
	39106		6
	39107		7
	39110		8
	39111		9
	39112		10
	39113		11
	39114		12
	39115		13
	39116		14
	39117		15
	39120		16
	39121		17
	39122		18
	39123		19
	39124		20
	39125		21
	39126		22
	39127		23
	39130		24
	39131		25
	39132		26
	39133		27
	39134		28
	39135		29
	39136		30
	39137		31
	39140		32
	39141		33
	39142		34
	39143		35
	39144		36
	39145		37
	39146		38
	39147		39
	39150		40
	39151		41
	39152		42
	39153		43
	39154		44
	39155		45
	39156		46
	39157		47
	39160		48
	39161		49
	39162		50
	39163		51
	39164		52

*3: "*1 + 64th byte" address.(*1: ⇨ previous page)

To the next page

Allocation system	Fixed	Free	Node address
Address	39165	*4	53
	39166		54
	39167		55
	39170		56
	39171		57
	39172		58
	39173		59
	39174		60
	39175		61
	39176		62
	39177		63

*4: "*3 + 53th byte" address. (*3: ⇨ previous page)

● **Device status code** (master mode)

Device status code		Master mode
Decimal	Hexadecimal	
$0_{(DCM)}$	$0_{(HEX)}$	The slave station is normal or it is not in the scan list.
72	48	The slave station device has stopped communication.
75	4B	"Bus off" or a network power supply error has occurred, or there is no other device on the network.
77	4D	Identification of the slave station device does not match the value in the scan list.
78	4E	After being connected, there is no response from the device.
83	53	After being connected, the JW-32CUM1 received an error.
84	54	After being connected, a response time out occurred.
86	56	The slave station device is idle.

(4) Master status address (master mode)

Displays error information and operation status by turning bits ON and OFF.

Allocation system	Fixed	Free	Diagnostic details
Address	39200	*5	Error information (D0 to D7)
	39201		Operation status (D10 to D17)

*6

*5: "*1 +128th byte" address.(*1: ⇨ See page 8-41.)

*6: Details of the D0 to D7, and D10 to D17 bits.

Error information	D0	Incorrect switch settings, EEPROM error
	D1	Duplicated assignment of a node address. Bus OFF is detected.
	D2	Communication error
	D3	Verification error
	D4	Configuration error
	D5	Sending error
	D6	Reserved area
	D7	
Operation status	D10	Currently creating scan list
	D11	Currently writing serial numbers
	D12	Reserved area
	D13	
	D14	Disabled scan list (protected mode)
	D15	Message communication enable flag
	D16	Error is currently occurring
	D17	Currently performing I/O message communication. - Turns ON when communicating with "any of slaves" on the scan list table.

(5) Vender information address (master mode)

The vender information is used when SHARP provides services to JW-32CUM1 (DeviceNet) users. Do not use the vender information in your applications.

Address (*1)	Vender information	Storage value (data details)	
211th byte (39322) 212th byte (39323)	Vender ID (2 byte)	$104_{(DCM)}$ $000_{(DCM)}$	Vender ID code (Sharp = 104)
213th byte (39324) 214th byte (39345)	Device Type (2 byte)	$012_{(DCM)}$ $000_{(DCM)}$	Device type (communication adapter = 012)
215th byte (39326) 216th byte (39327)	Product Code (2 byte)	$001_{(DCM)}$ $000_{(DCM)}$	Product code (JW-32CUM1 = JW-20DN = 001)
217th byte (39330) 218th byte (39331)	Revision (2 byte)	$02_{(HEX)}$ $04_{(HEX)}$	Software version (The values left is when version 2.4).
219th byte (39332) 220th byte (39333) 221st byte (39334) 222nd byte (39335)	Serial Number (4 byte)	Serial No.: □□△△11○○○○ $_{(DCM)}$*2 (Written when manufacturing the JW-32CUM1)	
223rd byte (39336)	Product Name (32 byte)	$4A_{(HEX)}$: J	"JW-20DN" of ASCII code.
224th byte (39337)		$57_{(HEX)}$: W	
225th byte (39340)		$32_{(HEX)}$: 2	
226th byte (39341)		$30_{(HEX)}$: 0	
227th byte (39342)		$44_{(HEX)}$: D	
228th byte (39343)		$4E_{(HEX)}$: N	
229th byte (39344)		$00_{(HEX)}$	All $00_{(HEX)}$
: :		: :	
254th byte (39375)		$00_{(HEX)}$	
255th byte (39376)	Scan list establishing flag	When scan list is established, $01_{(HEX)}$ (if not $00_{(HEX)}$).	
256th byte (39377)	Serial No. establishing flag	When serial No. is established, $01_{(HEX)}$ (if not $00_{(HEX)}$).	

*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

*2: Serial number. (□□△△11○○○○ $_{(DCM)}$)

- □□: Year manufactured (lower two digits of Western year: "03" for 2003
- △△: Month manufactured ("01" for January, ---, "12" for December)
- 11 : Model code (JW-32CUM1, JW-32CUM2, JW-20DN is "11")
- ○○○○ : Serial number (reset each month)

Ex.: A unit first manufactured in Nov 2003: $0311110001_{(DCM)}$

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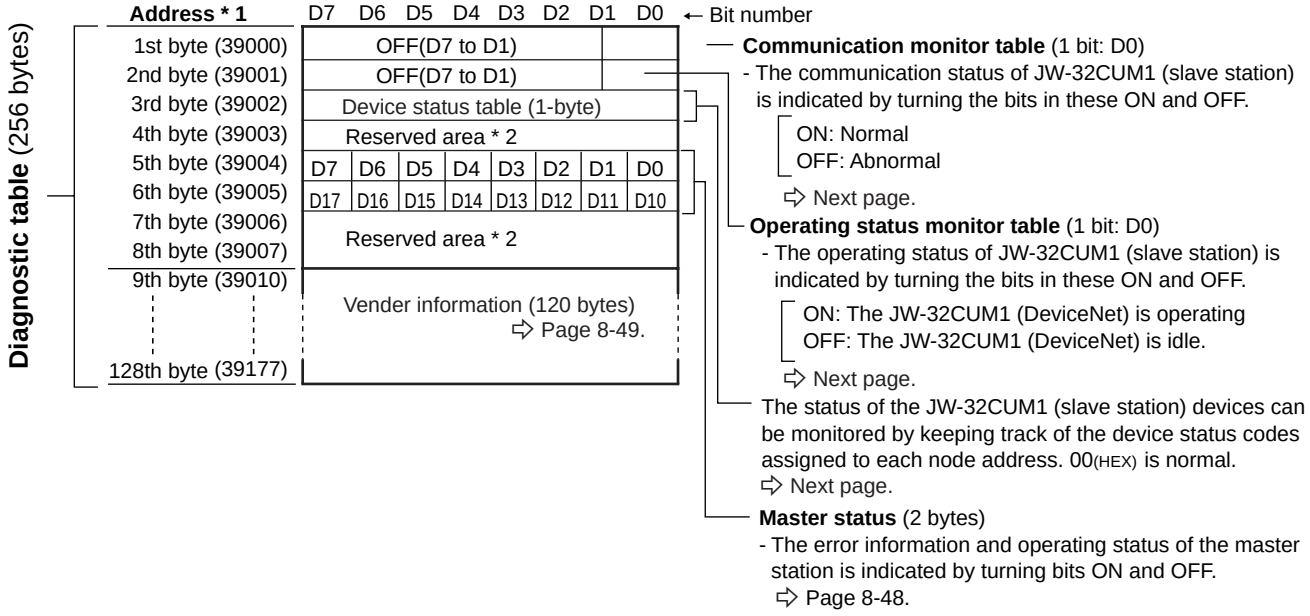
[2] When JW-32CUM1 is used in the slave mode

The diagnostic tables contain a communications monitor table, an operating status monitor table, a device status table, a master status, and vender information.



*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation." ⇨ Page 8-40.

*2: Do not modify the numbers in the reserved areas. That may cause the machine to malfunction.

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Below shows addresses of the diagnostic table (communication monitor table, etc.)

(1) Address of the communication monitor table (slave mode)
The communication status of the JW-32CUM1 (slave) is shown using bit D0 (ON/OFF) at the following addresses.

(ON: Normal, OFF: Abnormal)

Allocation system	Fixed	Free	Bit							
			D7	D6	D5	D4	D3	D2	D1	D0
Address	39000	*1	OFF (D7 to D1)							Bit D0(ON/OFF)

*1: Enter top address to system memory #304 to #307. ⇨ Page 8-12, 8-40

(2) Operating status monitor table addresses (slave mode)
The operating status of the JW-32CUM1 (slave) is shown using bit D0 (ON/OFF) at the following addresses.

(ON: Normal, OFF: Abnormal)

Allocation system	Fixed	Free	Bit							
			D7	D6	D5	D4	D3	D2	D1	D0
Address	39001	*2	OFF (D7 to D1)							Bit D0(ON/OFF)

*2: "*1 + 1th byte" address. (*1: ⇨ Above)

(3) Device status table addresses (slave mode)
When the JW-32CUM1 (slave) has a device error, the following addresses will show the device status using a device status code.

Allocation system	Fixed	Free
Address	39002	*3

*3: "*1 + 2th byte" address. (*1: ⇨ Above)

● **Device status code** (slave mode)

Device status code		Slave mode
Decimal	Hexadecimal	
$0_{(DCM)}$	$0_{(HEX)}$	The node status is normal.
72	48	The slave station device has stopped communication.
86	56	The node status is normal (online or the master station is idle.)
90	5A	Duplicated MAC ID error, Bus off error, network power error, or there is no other device on the network.

(4) Master status address (slave mode)

Displays error information and operation status by turning bits ON and OFF.

Allocation system	Fixed	Free	Diagnostic details
Address	39004	*4	Error information (D0 to D7)
	39005		Operation status (D10 to D17)

*4: "*1 +4th byte" address. (*1: ⇨ Previous page.)
*5: Details of the D0 to D7, and D10 to D17 bits.

Error information	D0	Incorrect switch settings, EEPROM error
	D1	Duplicated assignment of a node address. Bus OFF is detected.
	D2	Communication error
	D3	Verification error
	D4	Configuration error
	D5	Sending error
	D6	Reserved area
	D7	
Operation status	D10	Reserved area
	D11	Currently writing serial numbers
	D12	Reserved area
	D13	
	D14	
	D15	Message communication enable flag
	D16	An error is occurred, and the I/O message stops communication.
	D17	Currently performing I/O message communication.

(5) Vender information address (slave mode)

The vender information is used when SHARP provides services to JW-32CUM1 (DeviceNet) users. Do not use the vender information in your applications.

Address (*1)	Vender information	Storage value (data details)	
9th byte (39010) 10th byte (39011)	Vender ID (2 byte)	$104_{(DCM)}$ $000_{(DCM)}$	Vender ID code (Sharp = 104)
11th byte (39012) 12th byte (39013)	Device Type (2 byte)	$012_{(DCM)}$ $000_{(DCM)}$	Device type (communication adapter = 012)
13th byte (39014) 14th byte (39015	Product Code (2 byte)	$001_{(DCM)}$ $000_{(DCM)}$	Product code (JW-32CUM1 = JW-20DN = 001)
15th byte (39016) 16th byte (39017)	Revision (2 byte)	$02_{(HEX)}$ $04_{(HEX)}$	Software version (The values left is when version 2.4).
17th byte (39020) 18th byte (39021) 19th byte (39022) 20th byte (39023)	Serial Number (4 byte)	Serial No.: □□△△11○○○○ $_{(DCM)}$*2 (Written when manufacturing the JW-32CUM1)	
21st byte (39024)	Product Name (32 byte)	$4A_{(HEX)}$: J	"JW-20DN" of ASCII code.
22nd byte (39025)		$57_{(HEX)}$: W	
23rd byte (39026)		$32_{(HEX)}$: 2	
24th byte (39027)		$30_{(HEX)}$: 0	
25th byte (39030)		$44_{(HEX)}$: D	
26th byte (39031)		$4E_{(HEX)}$: N	
27th byte (39032)		$00_{(HEX)}$	All $00_{(HEX)}$
: : : :		:	
52nd byte (39063)		$00_{(HEX)}$	
53rd byte (39064) : : 126th byte (39175)	Reserved area	- Do not change the numeric values. Otherwise, malfunction will occur.	
127th byte (39176)	Scan list establishing flag	When scan list is established, $01_{(HEX)}$ (if not $00_{(HEX)}$).	
128th byte (39177)	Serial No. establishing flag	When serial No. is established, $01_{(HEX)}$ (if not $00_{(HEX)}$).	

*1: Addresses in parentheses are correct when the data table allocation system is set to "fixed allocation."

*2: Serial number. □□△△11○○○○ $_{(DCM)}$

- □□ : Year manufactured (lower two digits of Western year: "03" for 2003)
- △△ : Month manufactured ("01" for January, ---, "12" for December)
- 11 : Model code (JW-32CUM1, JW-32CUM2, JW-20DN is "11")
- ○○○○ : Serial number (reset each month)

Ex.: A unit first manufactured in Nov 2003: $0311110001_{(DCM)}$

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8-7 DeviceNet section communication operation when the control section has stopped operation or error has occurred

When the JW-32CUM1 (control section) is stopped operation or error is occurred, the JW-32CUM1 (DeviceNet section) communication operation is as follows. (The display lamps and master status are the same as normal communication.)

		Communication operation
When used in the master mode	Input data	Transfer data received from an input slave station to the control section.
	Output data	The data sent to an output slave station depends on the system memory settings. *
When used in the slave mode	Input data	Always sends idle data to the master station.
	Output data	Transfer data received from the master station to the control section.

* Output to slave station (when the control section is stopped) is determined by the value (00, $01_{(HEX)}$) in system memory addresses #330.
  - $00_{(HEX)}$: Restore (master station sends idle data)
  - $01_{(HEX)}$: Clear (master station sends $00_{(HEX)}$ data)

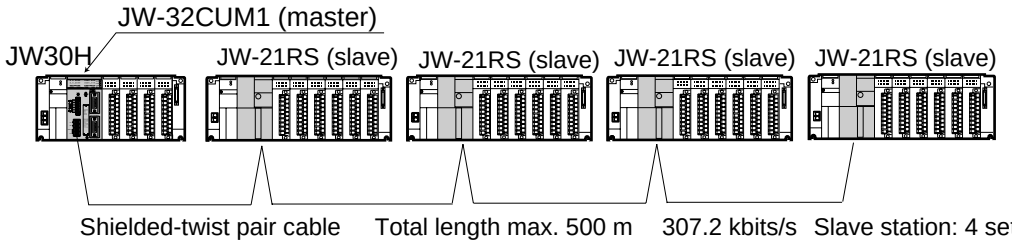
● **When receiving idle data**

When the JW-32CUM1 (DeviceNet section) receives idle data, the data sent to the control section is always the same.

Chapter 9: Remote I/O (Master Station) Function

9-1 Remote I/O (master station) function

When the general purpose communication section in the JW-32CUM1 is used for remote I/O (as a master station), it can communicate with remote I/O slave stations of JW and W series PLC.



Item	Specifications
Model name of the slave station	JW-21RS (JW20H/JW30H), ZW-501RS1 (W51), ZW-160RS1 (W16), ZW-10RS1 (W10)
Number of connectable slave stations	Max. 4 stations
Number of remote I/O points	Total 512 points (64 bytes)
Number of I/O points per station	128 points (16 bytes)

- This function reduces wiring to a PC to a large extent.
- This function enables setting a master station away from a slave station. One signal cable between the master station and the slave station enables communication of ON and OFF conditions of I/O by serial communication. No program for controlling the communication is necessary because both the remote master station and the slave module control the communication.
- Input/output modules that are installed on the remote I/O slave modules can be used as input/output modules by the JW30H (JW-32CUM1), so that the number of input/output points can be increased.
- The remote I/O operation will start at the same time power is input to the programmable controller. (There is no link start switch.)
- A maximum of 28 special I/O modules for the JW20H/30H can be installed in the master station (JW-32CUM1) and a maximum of 8 modules (a total of 4 stave stations) in each slave station (JW-21RS).

Remarks

- The data memory area for remote I/O in the JW-32CUM1 (as a master station) is fixed (module No. switch = 0). ⇨ See pages 9-2 and 9-4.
  Therefore, set the module No. switch on the option modules (such as JW-22CM) that are installed on the JW-34KBM (JW-32CUM1) to a number other than "0."
- When using the general purpose communication section of the JW-32CUM1 (as a master station) for remote I/O, the JW-21CM cannot be installed as a remote I/O (master station) on the same JW-34KBM basic rack panel.
- The ROM version of the slave module installed on for ZW-501RS1, ZW-160RS1, and ZW-10RS1 should be version 3.0 or later (applicable to the manual allocation), otherwise they do not operate.
- The following orders are not usable to I/O module installed to the remote I/O slave station.
  F-80: I/O refresh, F-82: Refresh for special I/O
  F-85: Read out from special I/O, F-86: Write into special I/O
  So, you should note some types of special I/O module are not available to install to the slave station, or have a restriction though able to install.

Special I/O module	Model name	Availability
Analog input module	JW-24AD	O
Analog output module	JW-22DA	O
High-speed counter module	JW-21HC	O
ID control module	JW-21DU/22DU	△
Pulse output module	JW-21PS	△
Serial interface module	JW-21SU	x
DC input module	JW-264N	O
Transistor output module	JW-262S	O

O: Available
△: Have a restriction
x: Not available

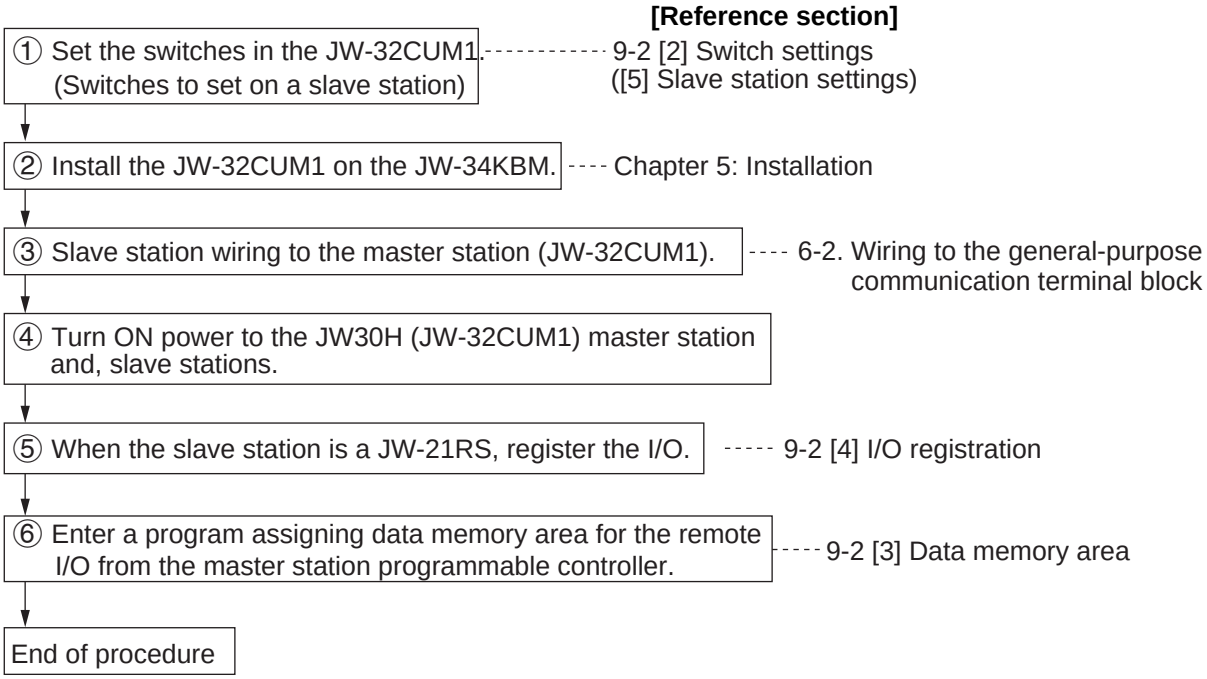
9-2 Setting method

When the remote I/O (master station) of the JW-32CUM1 is used, items that must be set for the remote I/O are as follows.

Item	Setting method	Details (section number in this chapter)
Communication function	Select the remote I/O function using switch SW5.	9-2-[2]
Operation mode	Select mode 1 to 3 using switch SW3.	
Number of slave stations	Select 1 to 4 slaves using switch SW4.	
Termination resistance	Select terminating station or intermediate station using the LT switch.	
Station number	Doesn't need to be set since the station number is fixed at "0", as master station.	---
Data memory area	No need to set the following areas since they are fixed. - Remote I/O area:Ⅎ1000 to Ⅎ1077 - Remote I/O operation flag: 15000 - Individual flag: 15001 to 15004	9-2-[3]
I/O registration	Register when using a JW-21RS as a slave station.	9-2-[4]
Slave station	Specify the station number and termination resistance using switches.	9-2-[5]

[1] Setup procedure

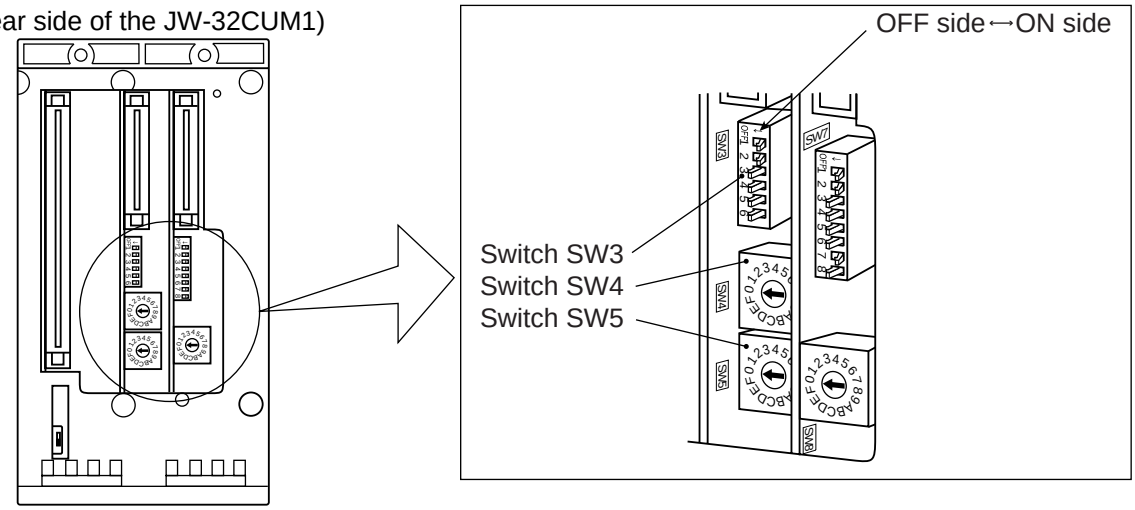
The setup procedure for the remote I/O (master station) function on the JW-32CUM1 is described below.



[2] Switch settings

Set switches SW5 (communication function), SW3 (operation mode), SW4 (number of slave stations), and LT (termination resistance) on the JW-32CUM1.

(Rear side of the JW-32CUM1)



(1) Switch SW5

Specify the communication function.

⇨ "1" when selecting remote I/O function.

(2) Switch SW3

Specify an operation mode (0 to 2) for use when an error occurs using SW3-3 and SW3-4.

SW3-3	SW3-4	Operation mode	Operation status
OFF	OFF	Mode 0	When a parameter is miss set or an error occurs in a slave station, stops remote I/O operation and stops operation of the JW-32CUM1 (control section).
OFF	ON	Mode 1	When an error occurs in even one slave station, remote I/O operation stops. However, the JW-32CUM1 (control section) does not stop operation.
ON	OFF	Mode 2	When an error occurs in a slave station, the system continues communicating with the other normal slave stations and the JW-32CUM1 (control section) continues operation.

- In all modes, when the slave station recovers from an error, communication is restored automatically.
- Select mode 1 and 2 for the following cases:
  a) Not directly related to an important sequence operation, such as when using the remote I/O merely to provide output to a monitor board.
  b) Stop only the remote slave station, such as in a trial operation

  Since a remote I/O error is a type of system I/O error, normally you should select mode 0.
- Switches 3-1, 3-2, 3-5, and 3-6 are not used. (The settings are fixed when delivered.
  ⇨ See page 4-3.)

(3) Switch SW4

Specify the number of slave stations that will be connected (1 to 4).

SW4 setting value	0	1	2	3	4	5 to 9, A to F
Number of slave stations	Prohibited setting	1	2	3	4	Prohibited setting

(4) Switch LT

Specify whether JW-32CUM1 is a termination station (ON) or an intermediate station (OFF) in the remote I/O communication circuit. ⇨ See page 4-1.

[3] Data memory area

When using the remote I/O function (as a master station), the data memory in the JW-32CUM1 (control section) allocates the remote I/O area, remote I/O operation flag, and individual flag as follows.

Remote I/O area	Remote I/O operation flag	Individual flag (Mode 2)
ㅋ1000 to ㅋ1077 (64 bytes) Slave station 1: ㅋ1000 to ㅋ1017 (16 bytes) Slave station 2: ㅋ1020 to ㅋ1037 (16 bytes) Slave station 3: ㅋ1040 to ㅋ1057 (16 bytes) Slave station 4: ㅋ1060 to ㅋ1077 (16 bytes)	15000	15001 to 15004

(1) Remote I/O area

The remote I/O area is allocated in groups of 16 bytes for each from slave station 1 to 4 (128 points), as shown above.

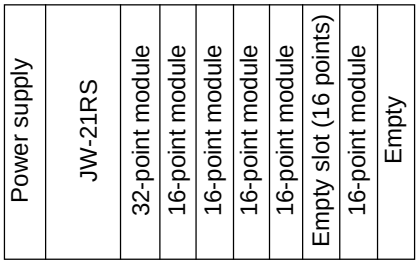
When a ZW-10RS1 is the only type of slave station, 14 bytes are allocated for each station (112 points).

1. Any number of input/output module points (up to 128) can be specified on a slave station.
   - In the example below, two JW-212NA input modules and one JW-212SA output module are installed on slave station 1 (JW-21RS)

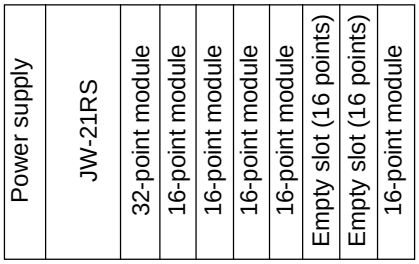
Module installed	Relay number assignment	Number of points occupied (number of bytes)
JW-212NA	10000 to 10017	48 points (6 bytes)
JW-212NA	10020 to 10037	
JW-212SA	10040 to 10057	
Empty slot	Not used	80 points (10 bytes)

   - Relay numbers 10000 to 10177 (128 points) are assigned for the remote I/O area of slave station 1. The example above only uses relay numbers 10000 to 10057 (48 points), as input/output relays. In this case, the remaining relay numbers, 10060 to 10177 (80 points), can be used as auxiliary relays.

2. When a JW-21RS is used as a slave station, 16 points are used for each empty slot.
3. When using 32-point modules, be careful not to create an error by using too many points (128 points maximum).
   - An example using one 32-point module and five 16-point modules.



← OK, since the total is 128 points.



← The total is 144 points. Since the number of I/O points exceeds the maximum allowed (128), an error occurs.

4. When you want to install a special I/O module on a JW-21RS slave station, use a special I/O relay as the data area. To specify the area, use the module No. switch on the special I/O module.

Special I/O relay	**Setting for the module No. switch** / **Byte address** 0 / ⊐4000 to ⊐4017 1 / ⊐4020 to ⊐4037 to / to 7 / ⊐4160 to ⊐4177
The number of special I/O modules installed on a remote I/O slave station	A maximum of 8 modules can be installed (total for 4 slave stations)
Remarks	- Do not duplicate a module No. switch setting on a special I/O module that is already installed on a slave station (max. 4 modules). If the module number is duplicated, a setting error will occur and the system will not function.

(2) Remote I/O operation flag, individual flag (Mode 2)

The communication status of all the slave stations and each slave station can be monitored individually using these flags.

Remote I/O operation flag	Individual flag (Mode 2)
15000	15001 to 15004

Relay number	Description
15000	Turns ON when communication with all slave stations is normal.
15001	Turns ON when communication with slave station 1 is normal
15002	Turns ON when communication with slave station 2 is normal
15003	Turns ON when communication with slave station 3 is normal
15004	Turns ON when communication with slave station 4 is normal

- Individual flags for slave stations 1 to 4 are only functional when the operation mode is "Mode 2."
⇨ See page 9-3.

[4] I/O registration

When using the JW-21RS as a slave station, make sure to execute an "I/O registration" operation using the following procedures.

① Install I/O modules in all of the slave stations.
② Connect between the master station and the slave stations.
Use the recommended cables for these connections.
③ Turn ON power to all of the slave stations.
④ Turn ON power to the JW-32CUM1 master station
At this point, the I/O table for the remote I/O slave stations has not been registered, the JW-32CUM1 master station will show a "table error" and the slave stations will show an "installed module check error."
⑤ Select the program mode using the programmable controller.
Connect the JW-14PG or similar device and do the following.

[*] [*] [PROG MODE] [SET 8]

⑥ Register the I/O table for slave stations
Use the following operations.

- **Operation example using the JW-14PG**

- [*] [*] [シフト SHIFT] [INTL DISP] [SET 8]

```
I  INTL
 0) I/O
 1) CLOCK
 2) PARM.
```

(Display the initial menu)

- [C 2] (Select the parameter setting)

```
I  PARM.
 0) SPCL. I/O
 1) OPTION
```

- [8 1] (Select an option)

```
I  PARM.      O - SW: 0
```

- [A 0] [,] [A 0] [モニタ MNTR]

```
  76          HEX  00
  77          HEX  00
I  PARM.      O - SW: 0
 >00          HEX  00
```

(Monitor the first line in the parameter area)

Specify SW = 0.

- [変換 CONV] Press the key and change the display to decimal notation (DCM).

- Enter a value of "111."

[B 1] [B 1] [B 1] [書込]

- After writing the value, the display will automatically change to "000."

Remarks

- When an error occurs while writing, "255" will be displayed.
- If an error occurs, check the following.
  1. Wrong switch setting. 2. Communication error with slave stations.
- When all of the slave stations are other than JW-21RS, the "I/O register" table procedure is not needed.

[5] Slave station settings

On slave modules (such as the JW-21RS), specify a slave station number and the termination resistance using the switches.

(1) Station number switch

Specify sequential station numbers for each slave station, starting from "1."

- Station numbers for missing stations or duplicate slave station numbers will cause a remote I/O error.
- Do not specify "0" or "5" to "9."

(2) Termination resistance switch

Turn ON this switch for a slave module that is at the end of a link circuit. Slave stations in the middle of the circuit should have this switch turned OFF.

ON	Enable termination resistance.
OFF	Disable termination resistance.

For details about the slave modules, see the JW-21CM User's Manual (Slave module for remote I/O).

9-3 Required transfer time and its timing

[1] Required transfer time

● **Time necessary to communicate with all the slave stations (T1)**

$$T1 = \frac{N}{153.6} + \frac{200U}{153.6} + 2.3P + 0.8 \text{ (ms)}$$

N: Total number of I/O module points of all the slave stations. (The value is the numbers of I/O bytes x 8 points.)
P: Numbers of slave stations. (Setting value of SW4)
U: The numbers of special I/O module for JW20H/JW30H installed on the slave stations.

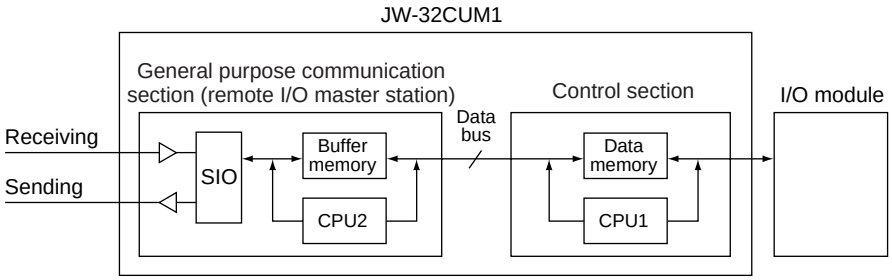
● **Set time when the number of slave station is 1 (T1)**

$$T1 = \frac{N}{153.6} + \frac{200U}{153.6} + 2.3 + 0.8 + 2.2 \text{ (ms)}$$

[2] PC process and communication timing

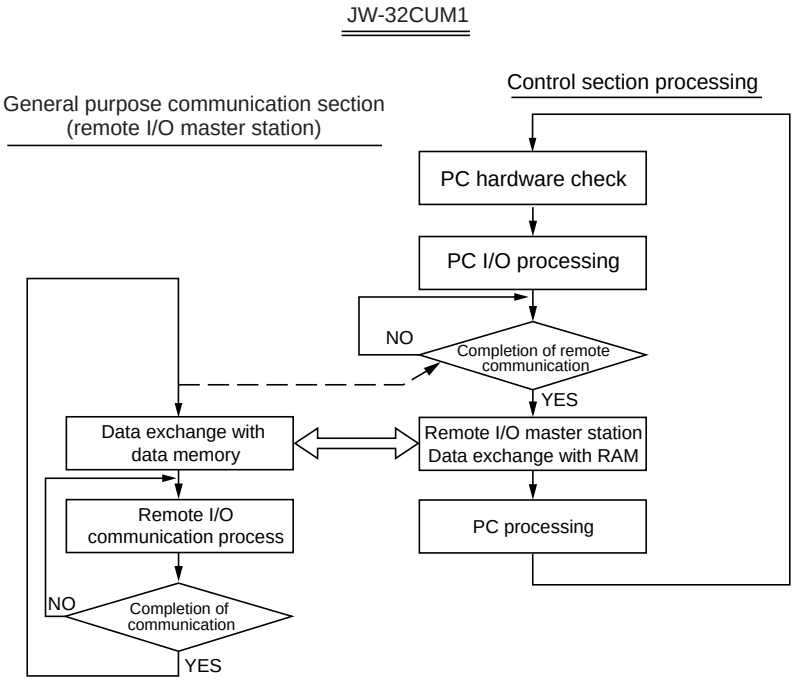
Communication by the JW-32CUM1 (general purpose communication section) is synchronized with the processing of the JW-32CUM1 (control section). For this, the remote I/O executes processing as follows:

(1) Configuration of remote I/O master station (JW-32CUM1)



Buffer memory: Stores output data to the remote I/O slave stations and inputs data from the remote I/O slave stations.
CPU2: This is a CPU of the remote I/O, and controls the data exchange between the buffer memory and the data memory of the PC, as well as SIO control.
SIO: This is a control circuit for serial communication.
Data memory: Data memory of the PC.
CPU1: Exchanges data with the remote I/O master station, executes the I/O processing and PC processing.

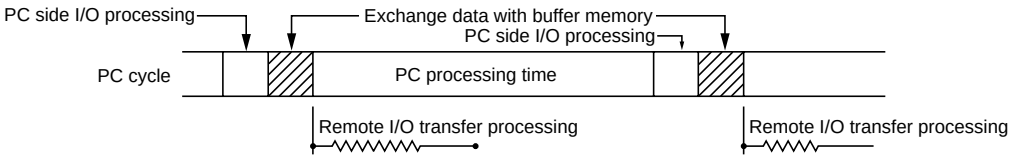
(2) 1 cycle operation of the PC



Remarks

- The JW-32CUM1 communicates with the remote slave station during PC processing.

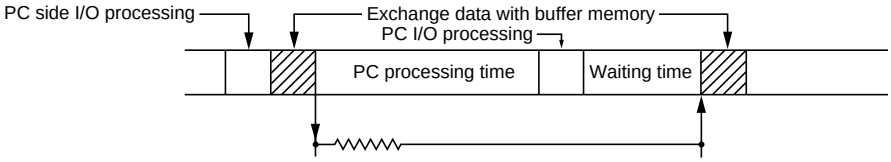
(3) Timing in the case of 1 cycle time of the PC is longer than required transfer time.



Remarks

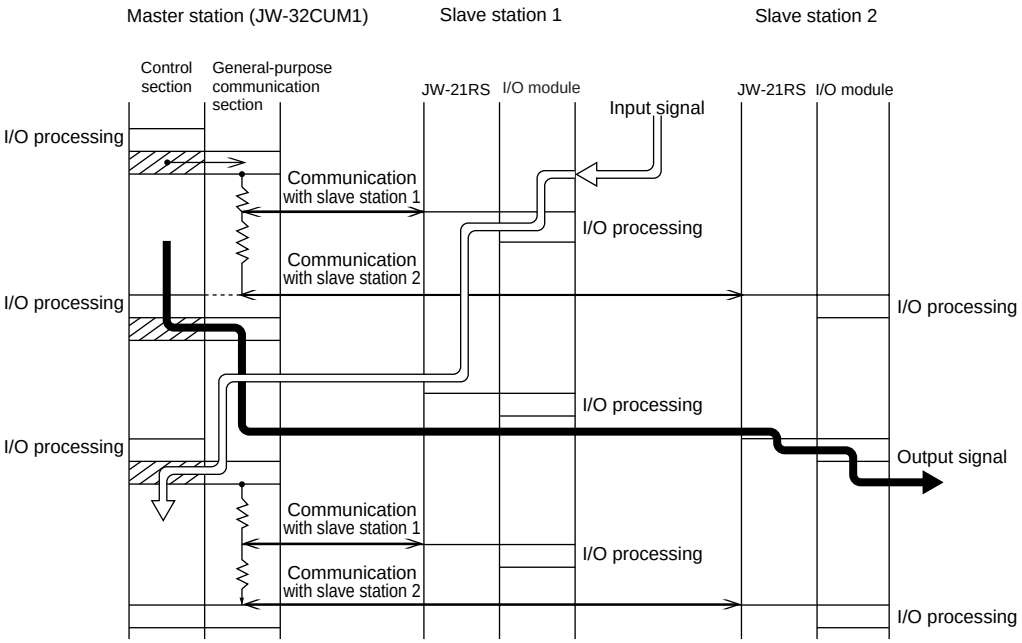
- The time required to exchange data with the buffer memory is approximately 0.2 ms, maximum.

(4) Timing in the case of 1 cycle time of the PC is shorter than required transfer processing time.



When transfer processing time is relatively long, set the waiting time after completion of the PC processing to synchronize the timing of the remote I/O processing and PC cycle.

(5) Data flow between the master station and the slave station.
[Ex.]



(⇨ Input signal data, ➡ Output signal data)

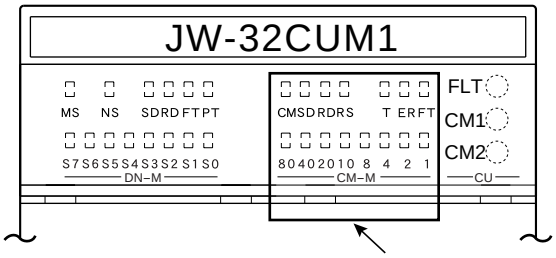
Remarks

- The JW-32CUM1 executes the I/O processing of the remote slave module after completion of communication with the master station.
- Note that I/O processing varies between the master station (JW-32CUM1) and the slave module.

9-4 Errors and treatment

[1] Indicators

Lamps on the JW-32CUM1 (the CM-M section on the display panel) turn ON and OFF with remote I/O operation.



CM-M section on the display panel

Lamp name	Display condition	Recovery
CM	Lights at normal communication with all slave stations	———
SD	Blinks when master station is sending data	
RD	Blinks when master station is receiving data.	
RS	Blinks when master station is requesting to send data.	
T	Lights at trial operation.	
ER	Lights when an error occurs. 80 to 1 lamps display error code.	Check signal cable, switch settings, and power of slave station.
FT	Lights at time up of watchdog timer	Replace JW-32CUM1.

Lamps 1 to 80 show the error codes when errors occur.

Lamp name								Error code	Contents
80	40	20	10	8	4	2	1		
●	○	○	○	○	○	○	○	80(H)	Switch setting error of master station (JW-32CUM1)
●	○	○	○	○	○	○	●	81(H)	Slave station 1 communication error
●	○	○	○	○	○	●	○	82(H)	Slave station 2 communication error
●	○	○	○	○	○	●	●	83(H)	Slave station 3 communication error
●	○	○	○	○	●	○	●	84(H)	Slave station 4 communication error
●	○	○	○	●	○	○	○	88(H)	Table verify error
●	○	○	○	●	○	○	●	89(H)	Slave station 1 I/O error
●	○	○	○	●	○	●	○	8A(H)	Slave station 2 I/O error
●	○	○	○	●	○	●	●	8B(H)	Slave station 3 I/O error
●	○	○	○	●	●	○	○	8C(H)	Slave station 4 I/O error
●	○	○	○	●	●	○	●	8D(H)	Switch setting error on a special I/O module installed in a slave station.

"●" means light ON, "○" as light OFF.

[2] Operation in error conditions

The communication status of the master and slave stations when run, stop, error, or a power disconnection occurs in the JW30H (control section of the JW-32CUM1) and when there are errors in the master station (remote I/O section of the JW-32CUM1) are as follows.

"●" means light ON. "⊗" means blinks. No condition means light OFF.

JW30H (JW-32CUM1) operation condition	Halt output	Remote I/O operation flag 15000	Indication lamp of power supply module		JW-32CUM1 Indication lamp								
					CU	CM-M							
			POWER	RUN	FLT	CM	SD	RD	RS	ER	T	FT	1 to 80
Operate normal	Close	ON	●	●		●	⊗	⊗	⊗				
Stop normally	Open	ON	●	⊗		●	⊗	⊗	⊗				
Error	Open	ON	●		●	●	⊗	⊗	⊗				
Remote I/O master station error	Open	Not fixed	●			●	⊗	⊗	⊗	●			81 to 84*
	Open	Not fixed	●		●							●	

These blinks are quick blinking.

* Displayed when the slave station is ZW-501RS1 or ZW-160RS1.

JW30H (JW-32CUM1) operation condition	Slave station output condition	Power supply module of slave station			JW-21RS Indication lamp							
		Halt output	Indication lamp		CM	SD	RD	RS	ER	T	FT	1 to 80
			POWER	RUN								
Operate normal	---	Close	●	●	●	⊗	⊗	⊗				
Stop normally	Holding	Open	●	⊗		⊗	⊗	⊗			●	
Error	Holding	Open	●		●	⊗	⊗	⊗	●			95
Remote I/O master station error	Holding	Open	●								●	
JW30H (JW-32CUM1) power OFF	Holding	Open	●								●	

These blinks are quick blinking.

Remarks

- The operation lamp lights (● mark) when the JW30H (JW-32CUM1) is "at operation."
- There is no halt output in the slave module, ZW-10RS1 for W10.
- By receiving halt output of ZW-501RS1/160RS1, the JW-32CUM1 repeats "open" and "close" at error, remote master station error, and the PC power failure every 450 ms. Make a holding circuit externally.
- When the master station (JW30H) is error condition in systems connecting ZW-501RS1 or ZW-160RS1 as slave station, "ERROR lamp" and "1 to 80" flicker. This is not the error condition of slave station.
- Available to connect ZW-10RS1, ZW-501RS1/160RS1 and JW-21RS as slave stations. See each instruction manual for error conditions.

The operation condition of the JW30H (JW-32CUM1) and the slave module (when JW-21RS is used) in abnormal conditions of remote I/O becomes as follows depending on the operation mode (page 9-3) of remote I/O.

"●" means light on. "⊗" means blinks. "△" means blinks or light off. No condition means light off.

Mode	Error contents	Halt output	Remote I/O operation flag 15000	System memory #170	Indication lamp of power supply module		JW-32CUM1 Indication lamp								
					POWER	RUN	FLT	CM	SD	RD	RS	ER	T	FT	1 to 80
0	Remote master station setting error	Open	OFF	80	●	⊗						●			80
	Communication error	Open	OFF	81 to 84	●	⊗			⊗	△	⊗	●			81 to 84
	Slave module error or power OFF	Open	OFF	81 to 84	●	⊗			⊗	△	⊗	●			81 to 84
	Slave station I/O error	Open	OFF	81 to 84 *1 88 to 8C *2	●	⊗			⊗	⊗	⊗	●			81 to 84 *1 88 to 8C *2
1	Remote master station setting error	Close	OFF	80	●	●						●			80
	Communication error	Close	OFF	81 to 84	●	●			⊗	△	⊗	●			81 to 84
	Slave module error or power OFF	Close	OFF	81 to 84	●	●			⊗	△	⊗	●			81 to 84
	Slave station I/O error	Close	OFF	81 to 84 *1 88 to 8C *2	●	●			⊗	⊗	⊗	●			81 to 84 *1 88 to 8C *2
2	Remote master station setting error	Close	OFF	80	●	●						●			80
	Communication error	Close	OFF	81 to 84	●	●		●	⊗	△	⊗	●			81 to 84
	Slave module error or power OFF	Close	OFF	81 to 84	●	●		●	⊗	△	⊗	●			81 to 84
	Slave station I/O error	Close	OFF	81 to 84 *1 88 to 8C *2	●	●		●	⊗	△	⊗	●			81 to 84 *1 88 to 8C *2

These blinks are quick blinking.

*1: When the respective slave stations are other than JW-21RS.
*2: When the respective slave stations are JW-21RS.

Mode	Error contents	Output condition	Power supply module of slave station			Slave module							
			Halt output	Indication lamp		CM	SD	RD	RS	ER	T	FT	1 to 80
				POWER	RUN								
0 to 2	Remote master station setting error	Holding	Open	●								●	
	Communication error	Holding	Open	●				△				●	
	Slave module error		Open	●				△				●	
	Slave station I/O error	Holding	Open	●			△	△	△	●			40 to 73

For details about the operating status in modes 0 to 2, see page 9-3.

Remarks

- The halt output of ZW-501RS1/160RS1 "opens" only slave module having hardware error, and "open" and "close" other slave modules alternatively each 450 ms.

[3] Error code

When an error occurs in remote I/O operation, the error code is stored in system memory location #170 in the JW-32CUM1. For details about responding to errors, see page 9-18.

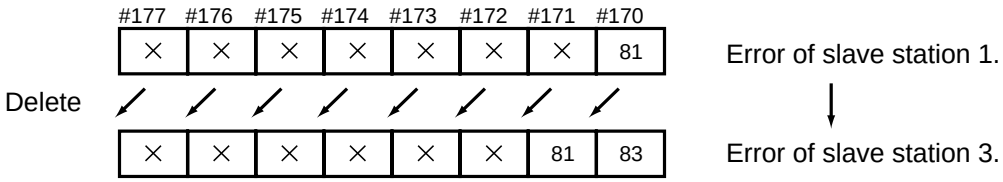
(1) Errors on master and slave stations

- **Errors on master station (JW-32CUM1)**

Error code	Contents
$80_{(H)}$	Master station setting error - Check the switch settings in the JW-32CUM1.
$81_{(H)}$	Error at communication with slave station 1.
$82_{(H)}$	Error at communication with slave station 2.
$83_{(H)}$	Error at communication with slave station 3.
$84_{(H)}$	Error at communication with slave station 4.
$88_{(H)}$	Table verify error of a slave station.
$89_{(H)}$	Slave station 1 I/O error.
$8A_{(H)}$	Slave station 2 I/O error.
$8B_{(H)}$	Slave station 3 I/O error.
$8C_{(H)}$	Slave station 4 I/O error.
$8D_{(H)}$	Special I/O Module switch setting error of slave station.

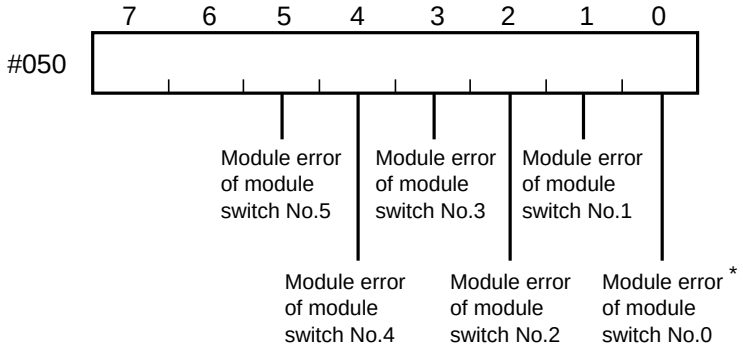
Remarks

- The error code stored in the system memory #170 shifts from #170 to #177 one by one each new error code occurrence, and stores the error conditions up to 8 causes. When the JW30H is in RAM operation, the error code memory does not disappear even if the power to the JW30H is turned off. The system memory #170 to 177 keeps its contents after recovering from the error condition.



- When the JW-32CUM1 (general purpose communication section) becomes error, it stores error code "53" (option error) in the system memory #160.

- In the case of an option error "$53_{(H)}$," when you monitor system memory #050, the bit (module No. swith setting value) of error option module switches ON. When more than 1 bit is error, these bits switch ON. The each ON bit becomes OFF by recovering from the error condition. But the last ON bit does not become OFF even if the error condition recovers.



* When an error occurs in the JW-32CUM1 (general purpose communication section), the "module No. error" will be displayed.

● **Errors on slave station**

Error code	Contents	Errors on master station
$40_{(H)}$	Installed module check error	Table verify error ($88_{(H)}$) Slave station I/O error ($89_{(H)}$ to $8D_{(H)}$)
$42_{(H)}$	Output data check error	
$44_{(H)}$	I/O data bus error	
$46_{(H)}$	Special I/O hardware error	
$47_{(H)}$	Special I/O parameter error	
$48_{(H)}$	I/O rack panel error	
$60_{(H)}$	Table verify error	
$70_{(H)}$	Table registration error	
$71_{(H)}$	No module error	
$72_{(H)}$	No. of I/O points over error	
$73_{(H)}$	Switch setting error	
$95_{(H)}$	Master station PC error (A master station JW-32CUM1 stops operation by error)	———
$A0_{(H)}$	Mismatch communication (When the connected master station does not work)	Communication error ($81_{(H)}$ to $84_{(H)}$)

* On the master station, "installed module check error" ($40_{(H)}$) while turning on the power will become "I/O table or special module switch verify error" of slave station.

Remarks

- When errors (error code $40_{(H)}$ to $73_{(H)}$) occur in series on the slave station, the JW-32CUM1 indicates the detected error rack/slot number and the error code in every 2 seconds alternatively by the indication lamps.

(2) Store error history in the master station

When the error (error code $80_{(H)}$ to $8D_{(H)}$) occurs in a master station (JW-32CUM1), the master station stores error history in the JW-32CUM1 register E7400 to E7577.
Besides, the JW-32CUM1 must set system memory address #210 to $002_{(8)}$.

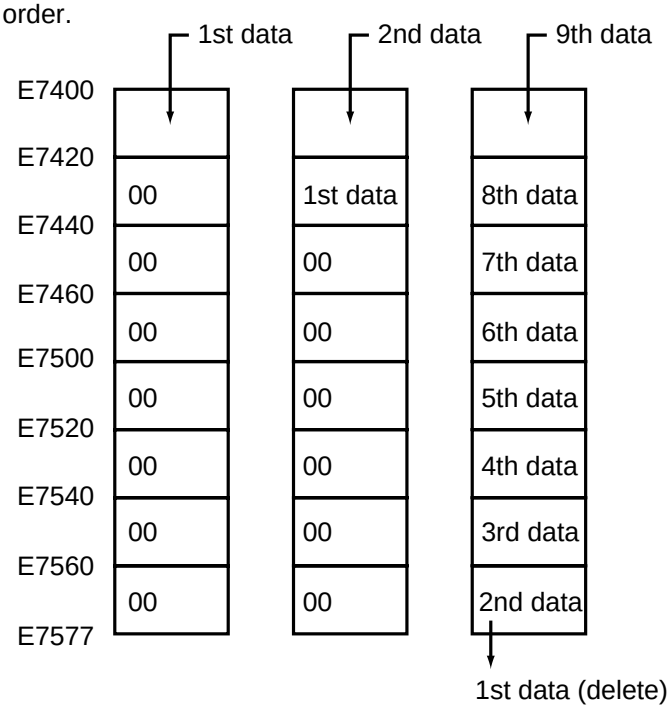
● **Error data to be stored**

Error data consists of 16 bytes per data.

Address	Contents		Remarks
n+0	Second	Store occurred date and time.	———
n+1	Minute		
n+2	Hour		
n+3	Date		
n+4	Month		
n+5	Year		
n+6	Day of week		
n+7	Error code	Error code on master station	- Store error codes $80_{(H)}$ to $8D_{(H)}$.
n+10	Rack/slot of error occurrence on slave station.	When error code on master station is $88_{(H)}$ to $8D_{(H)}$.	- Store rack number and slot number in upper 4 bits and lower 4 bits respectively.
n+11	No. of occurrence	000 to 377 OCT	- Same error data are counted up to 377 OCT. Thereafter stays 377 OCT. (Date and time of occurrence is the first error.)
n+12	Error code	Error code on slave station (When master station error code is $88_{(H)}$ to $8D_{(H)}$.)	- Store error code $40_{(H)}$ to $73_{(H)}$.
n+13	———	———	———
n+14			
n+15			

● **Storing of error data**

The allocated register area (E7400 to E7577) stores the error data up to 8 cases in the order of occurrence. The JW-32CUM1 stores 8th and more error data deleting the 1st and up data in order.



[4] Check flow

When a communication operation on the remote I/O produces an error, check the following.

(1) When the FAULT lamp (CU section of the display panel) on the JW-32CUM1 lights.

Respond according to the light ON/OFF indicators on the JW-32CUM1 FT display (CM-M section on the display panel).

FT lamp of JW-32CUM1	Status	Countermeasure
Light ON	Turn ON special relay 07374 (option error).	Find error module by system memory #050.
		See "7-7. Troubleshooting."
		Replace the JW-32CUM1.
Light OFF	Turns ON special relay 07373 (I/O error).	- See "7-7. Troubleshooting." - Find error module by system memory #050. - Replace the JW-32CUM1.
	Store error code $60_{(H)}$ (table verify error) in system memory #160.	
	Store error code $61_{(H)}$ (switch verify error) in system memory #160.	
	Store error code $73_{(H)}$ (switch setting error) in system memory #160.	

Reference

- Operation at error code $8D_{(H)}$ occurs

The remote I/O stops operation regardless of error operation mode (page 9-3).

- Switch setting error detection area

1. Doubled setting of module no. switch in the same slave station.
   - Display error code $73_{(H)}$ in the relative slave station.
2. Doubled setting of module no. switch in more than 1 slave station.
   - Display error code $8D_{(H)}$ in the master station.
3. Doubled setting of module no. switch in a master station and slave station.
   - No error detection. (In case of JW30H, setting can be doubled.)

- Switch verification concerning special I/O module installed on the remote I/O slave station (JW-21RS).

The JW-32CUM1 does not verify special I/O module installed on the JW-21RS remote I/O slave station as "module no. switch" verification at power ON. Be careful that it runs with switch setting at power ON.

(2) FAULT lamp of the JW-32CUM1 lights OFF

Respond according to the error code shown by the "ER, 1 to 80" lamps on the JW-32CUM1.

Indication lamp of JW-32CUM1		Error contents	Countermeasure
ER	1 to 80		
Light ON	80(H)	Mis-setting switch - Slave station is set to other than 1 to 4 in switch SW4.	Recheck the switch.
	81(H) to 84(H)	Slave station communication error.	- Check operation mode setting switch SW3. - Check for whether there is disconnection, mis-wiring, or branched wiring. - Check that termination resistance switch LT is ON at only both ends. - Check that FG terminal is connected to a rack panel. - Check that total communication cable length is less than 500 m. - Check that communication cable is not close to or crossed with high voltage and power lines. - Check that recommended communication cable type is used. - Check that the installed control panel is grounded. - Check slave station switch settings. - Check that slave station power is ON. - Replace slave module.
	88(H) (Master station)	Table verify error - Store station numbers, rack and slot numbers into the E register. ⇨ See page 9-16.	- Register I/Os. - Check the I/O module that is mounted on the rack or slot of the error station number. - Turn OFF the power of the error station and reinput. - Replace the error I/O module. - Replace the rack panel of the error station.
	89(H) to 8C(H)	Slave station I/O error	Check slave station.
	8D(H) (Master station)	Switch setting error	- Check that there is no doubled setting of module no. switch on installed special I/O module on the slave station. - When setting is doubled, reset and turn OFF and on power to the master station and slave station.
	00(H)	- Set switch SW5 to some number other than "1, 3 or 7."	Recheck the switch.

(3) Wiring check

Check the wiring according to the following procedures, as error wiring may cause unstable operation condition:

① Switches OFF power and termination resistance switches of all stations

② Check resistance between each terminal

Between L1 and L2	1 K ohms or up
Between L1 and SHIELD	
Between L2 and SHIELD	

- Connect the terminal L1 and L2 of the terminal station and check L1 and L2 termination resistance of the other terminal stations.

Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less

- Make short L1 and the SHIELD at the terminal station and check the resistance between L1 and the SHIELD of the other terminal stations.

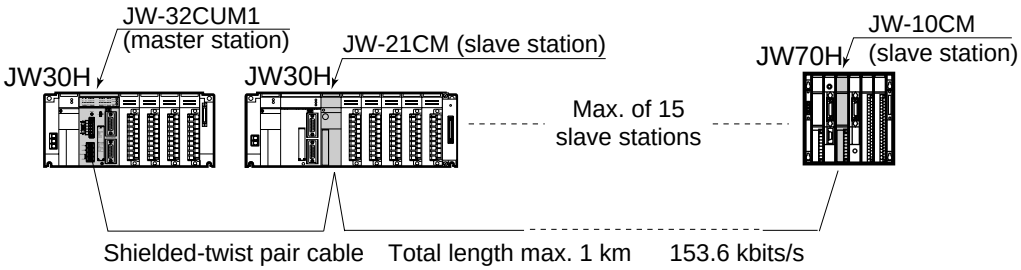
Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less

After checking, remove the short wiring and switch ON the termination resistance switch at both terminal stations.

Chapter 10: Data link DL1 (Master Station) Function

10-1 Data link DL1 (master station) function

When the general purpose communication section in the JW-32CUM1 is used for data link DL1 (master station), it can communicate with slave stations of JW and W series PLC.



Item	Specifications
Model name of slave stations	JW-21CM (JW20H/JW30H) JW-10CM (JW50H/70H/100H, JW50/70/100, W70H/100H) ZW-10CM (JW50/70/100, W70H/100H), Z-331J/332J (J-board), ZW-501DL1 (W51), ZW-160DL1 (W16)
Number of connectable slave stations	Max. 15 stations
Number of link bytes	Total 64 bytes (512 points)
Number of link bytes per station	Divide evenly by the number of slave stations (1 station: 32 bytes, 2 to 3 stations: 16 bytes, 4 to 7 stations: 8 bytes, 8 to 15 stations: 4 bytes)

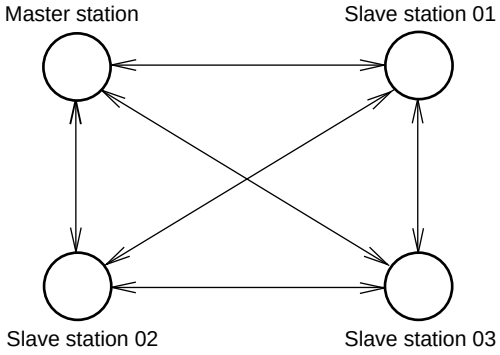
- This link offers communication between a master and a slave station, or between 2 slave stations. (N:M method)
- You can transfer ON and OFF signals and send or receive data between 16 programmable controllers (15 slave stations max.) without using input/output modules.
- The number of link byte is 64 bytes in total.
- Setting a master station and a slave station at a far distance is available. A one signal cable communicates data with serial transfer system. A special program is not necessary for PC as the data link module controls (general purpose communication section when using a JW-32CUM1) the communication.
- Total length of the signal cable is up to 1 km.

Remarks

- The data memory area for data link DL1 in the JW-32CUM1 (as a master station) is fixed (module No. switch = 0). ⇨ See pages 10-4 and 10-6.
  Therefore, set the module No. switch on the option modules (such as JW-22CM) that are installed on the JW-34KBM (JW-32CUM1) to a number other than "0."
- You cannot specify a specific station to receive data. All of the stations will receive the same data from any other station.

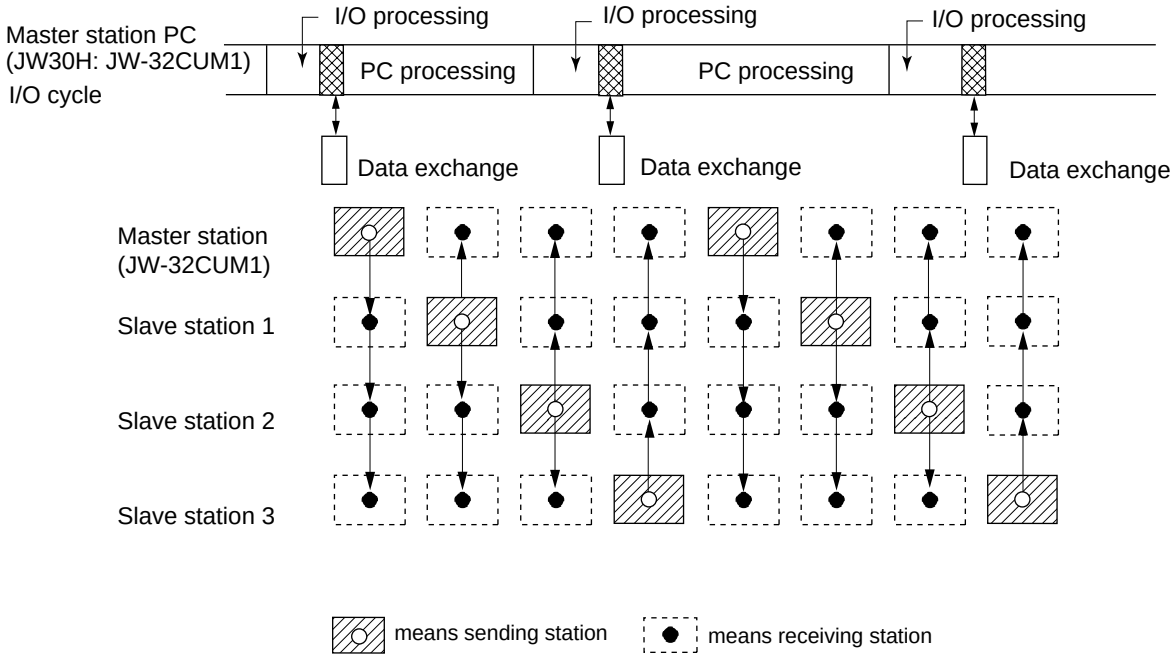
[1] Communication method of the data link DL1

The data link DL1 communicates between a master station and a slave station or slave stations, by sending and receiving the data.



As the data link DL1 executes communication using single twisted pair cable, it is not possible to communicate with all the connected stations at the same time. It communicates with the connecting stations by allocating time from the master station to the each station, in order. Stations not sending are receiving data.

[Example] In case of 3 sets of slave stations:



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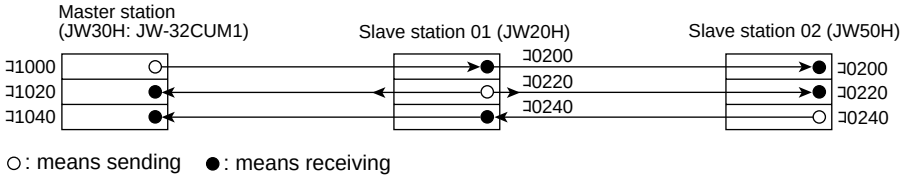
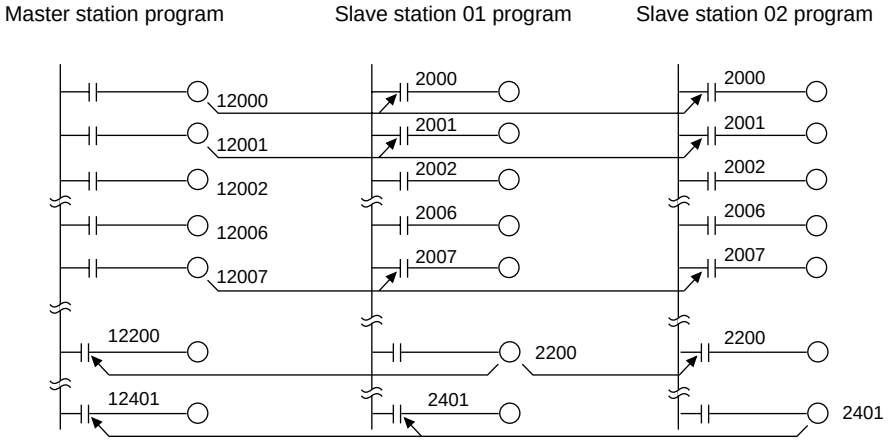
[2] Communication contents of data link DL1

The data link DL1 function is available to communicate the data memory contents of a PC through data link area.

- **When the master station (JW-32CUM1), slave station 01 and a slave station 02 each send 16 bytes of data:**
  - Master station data link area: ⊐1000 to ⊐1077 (Fixed areas in the JW-32CUM1)
  - Slave station 01 data link area: ⊐0200 to ⊐0277
  - Slave station 02 data link area: ⊐0200 to ⊐0277

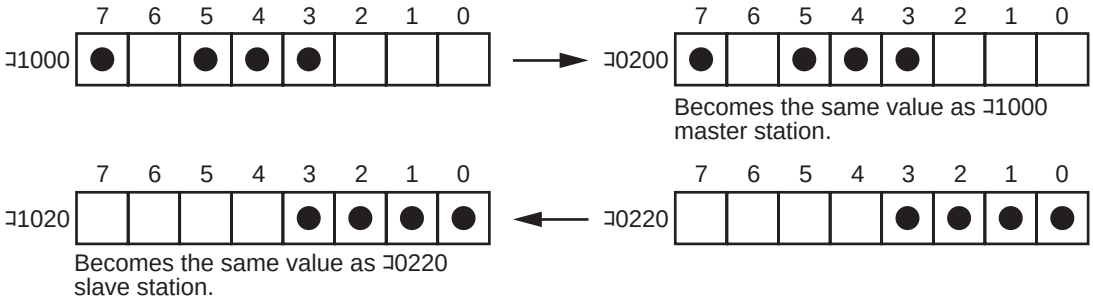


○: means sending ●: means receiving



Remarks

- You cannot specify a specific station to receive data. All of the stations will receive the same data from any other station.
- Write the link relay of the sending station as an OUT instruction in PC program. The link relay of the sending station is usable as a D (destination) side of the application instruction.
- Write the link relay of the receiving station as an input signal in PC program. The link relay is usable as the S (source) side of the application instruction.
- Sending data and receiving data correspond to 1 point unit bit.



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10-2 Setting method

When the JW-32CUM1 in used with data link DL1 (master station) function, items that must be set for the data link DL1 are as follows.

Item	Setting method	Details (section number in this chapter)
Communication function	Select the "data link DL1 function" using switch SW5.	10-2-[2]
Number of slave stations	Select 1 to 15 using switch SW4.	
Termination resistance	Select terminating station or intermediate station using the LT switch.	
Station number	Doesn't need to be set since the station number is fixed at "00," as master station.	---
Data memory area	No need to set the following areas since they are fixed. - Data link area: ㅋ1000 to ㅋ1077 - Communication monitor flag: 15000 to 15017	10-2-[3]

[1] Setup procedure

The setup procedure for the data link DL1 (master station) function on the JW-32CUM1 is described below.

[Reference section]

① Set the switches in the JW-32CUM1. ---------- 10-2 [2] Switch settings

↓

② Install the JW-32CUM1 on the JW-34KBM. ---- Chapter 5: Installation

↓

③ Slave station wiring to the master station (JW-32CUM1). ---- 6-2. Wiring to the general-purpose communication terminal block

↓

④ Turn ON power to the JW30H (JW-32CUM1) master station and slave stations.

↓

⑤ Enter a program related to the data memory of the data link DL1 into the master and slave station PCs. ----- 10-2 [3] Data memory area

↓

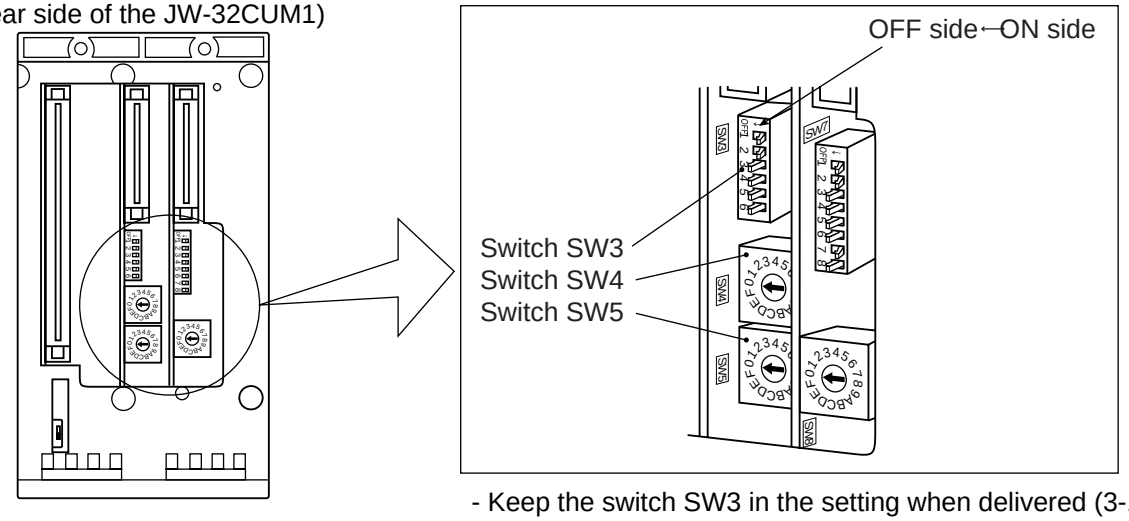
End of procedure

10

[2] Switch settings

Set the SW5 (communication function), SW4 (number of slave stations), and LT (termination resistance) switches in the JW-32CUM1.

(Rear side of the JW-32CUM1)



- Keep the switch SW3 in the setting when delivered (3-1 and 3-2: ON, 3-3 to 3-6: OFF).

(1) Switch SW5

Specify the communication function.

⇨ "2" when selecting data link DL1 function.

(2) Switch SW4

Specify the number of slave stations you will connect (1 to 15).

Setting for SW4	Number of slave stations
0	Prohibited setting
1	1
2	2
3	3
4	4
5	5
6	6
7	7

Setting for SW4	Number of slave stations
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

(3) Switch LT

Specify whether the JW-32CUM1 is a termination station (ON) or an intermediate station (OFF) in the data link DL1 circuit. ⇨ See page 4-1.

[3] Data memory area

The data link area and communication monitor flags are allocated in the JW-32CUM1 (control section) data memory for the data link DL1 (master station) function.

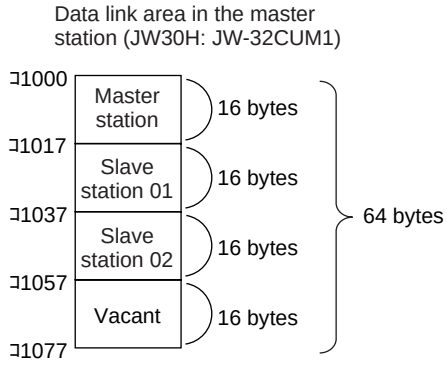
Data link area	Communication monitor flag
⊐1000 to ⊐1077 (64 bytes)	15000 to 15017

(1) Data link area

The number of link bytes for each slave station varies with the number of slave stations (setting on switch SW4).

Number of slave stations	Number of link bytes
1	32
2 to 3	16
4 to 7	8
8 to 15	4

[Ex.] When the number of slave stations is 2.



- The number of link bytes per station is the total number of link bytes divided evenly by the number of stations.
- The empty area can be used for auxiliary relays.

10

(2) Communication monitor flag

The communication operation of the data link DL1 can be monitored using communication monitor flag (15000 to 15017).

Communication monitor flag
15000 to 15017

Relay number	Detail
15000	Operation of master station
15001	Operation of slave station 01
15002	Operation of slave station 02
to	to
15016	Operation of slave station 16
15017	Operation of slave station 17

① Communication monitor flag for the master station (JW-32CUM1)

While the JW-32CUM1 (as a master station) is communicating with slave stations, the communication monitor flag (15000) in the master station is ON. The operation of the communication monitor flag for the master station is as follows.

Communication monitor flag	Operation condition	Operation
15000	The master station is operating normally.	ON
	Link operation stopped.	OFF
	Hardware error in the JW-32CUM1.	

Remarks

- The communication monitor flag is used to show the operation of master station. Even if a slave station has an error, this flag will remain ON as long as the master station is still normal.
- If the master station cannot communicate with a certain slave station, the master station will execute a recovery operation for the slave station in error once every three cycles of the data link operation. When the error slave station returns to normal operation, the master station will stop sending recovery signals to the slave station.

② Communication monitor flag for slave stations 01 to 17(8)

While the JW-32CUM1 (as a master station) is communicating with slave stations, the communication monitor flags (15001 to 15017) for each of the slave stations will be ON. The operation of the communication monitor flag for the slave stations is shown below.

Communication monitor flag	Operation condition	Operation	
Slave station 01 --- 15001 Slave station 02 --- 15002 to Slave station 17 --- 15017	Communicating normally with each slave station while the master station flag (15000) is ON.	ON	Individual slave stations
	Link operation stopped due to an error in the slave station programmable controller.	OFF	
	Hardware error in the JW-32CUM1.		
	Switch setting error in the JW-32CUM1.		
	Slave station programmable controller stopped.		
	Not connected.		
	Master station flag is OFF.	OFF	All slave stations

10-3 Required transfer time and its timing

[1] Required transfer time

Necessary time (T) to complete transfer from the master station of data link DL1 to the last station number, in order.

- **At number of connected stations ≤ 6 (Number of slave stations ≤ 5)**

$$T = \frac{N}{153.6} + (1.7P \text{ to } 3.4P) \text{ (ms)}$$

- **At number of connected stations ≥ 7 (Number of slave stations ≥ 6)**

$$T = \frac{N}{153.6} + (2.9P \text{ to } 4.6P) \text{ (ms)}$$

When an abnormal station (no response within the rated interval or a station to receiving error message) exists, the master station (PC00) executes recovery every 3 cycle. Required time to recovery is as follows:

$T_{ER} = 0.16PP' + 3.68P'$ (ms)

P: Number of set stations

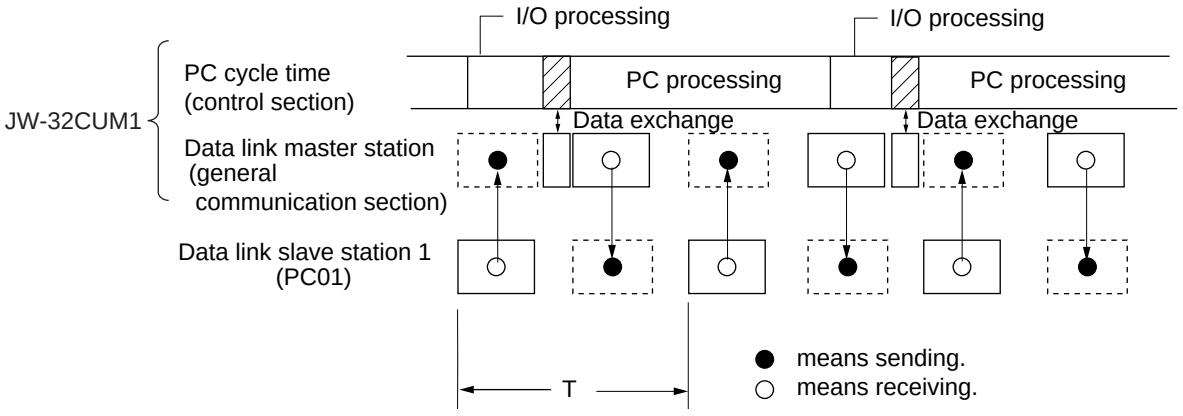
P': Number of abnormal stations

Be careful that data sample interval may become longer than normal case due to recovery operation.

N: Total amount of link points
(get the value by multiple number of data link byte with 8 points)

P: Number of connected stations (master and slave stations)

[Example] In case of number of connected stations is 2: (Total amount of link points 64 x 8 = 512 points)



$$T = \frac{512}{153.6} + (1.7 \times 2 \text{ to } 3.4 \times 2) = 6.7 \text{ to } 10.1 \text{ (ms)}$$

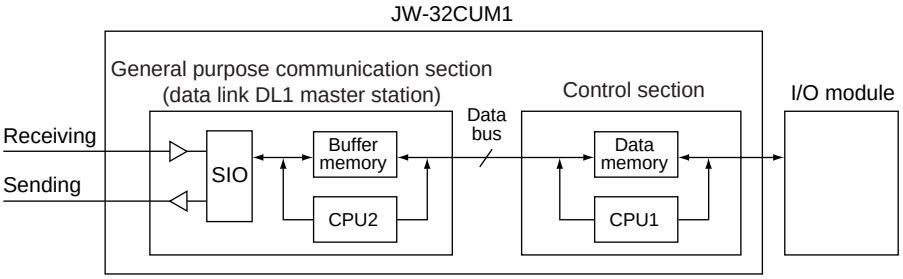
Remarks

The time required to exchange data between the JW-32CUM1 control section and the general purpose communication section is approximately 0.2 ms, maximum.

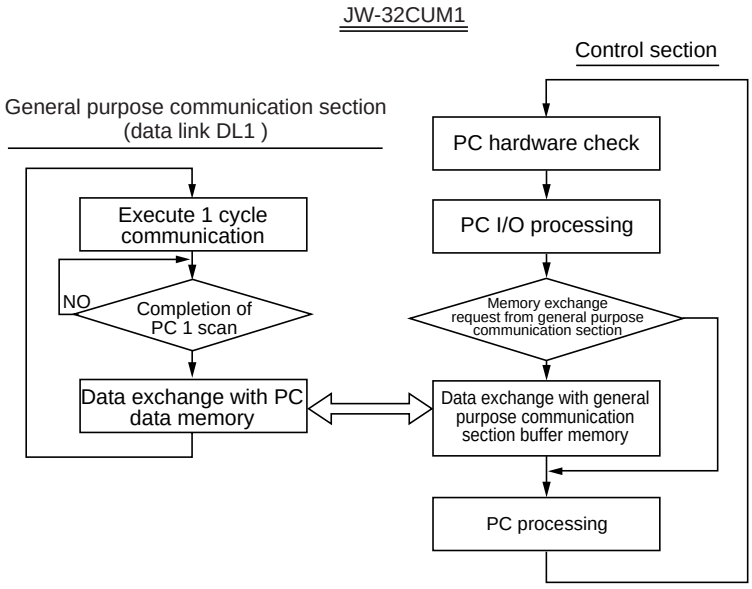
[2] PC process and communication timing

The data link DL1 communicates asynchronize with master station PC (JW-32CUM1) and slave station PC. To exchange data between DL1 buffer memory and each of PC data memory, synchronize with the PC process.

● **Configuration of data link DL1 master station (JW-32CUM1)**



Buffer memory: Stores output data and input data from general communication section.
CPU2: This is a CPU of the link module, and controls the data exchange between the buffer memory and the data memory of the control section, as well as SIO control.
SIO: This is a control circuit for serial communication.
Data memory: Data memory of the control section.
CPU1: Exchanges data with the general purpose communication section, executes the I/O module processing and control section processing. Timing of communication and control section is as follows:



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Remarks

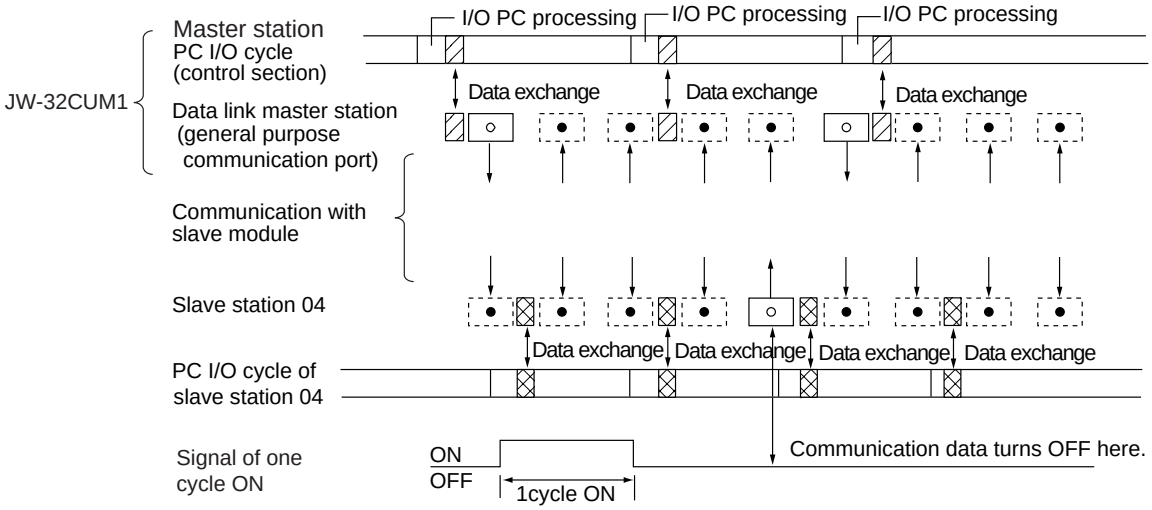
- The processing flow of a slave station is the same as those of a master station.
- Data exchange time between a PC and a module in general is shown in the below.
  These time may vary with module of PC connecting to the link module (data link DL1).

PC model		Data exchange time
JW30H	JW-32CUM1	Approx. 0.2 ms
	JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3	Approx. 0.2 ms *
	JW-31CUH/32CUH/33CUH	Approx. 1 ms
JW20/20H		Approx. 6 ms
W70H/100H		Approx. 0.1 ms
JW50/70/100		
JW50H/70H/100H		

*: In case of using JW-34KB/36KB/38KB basic rack panel.
If a JW-24KB, JW-26KB or JW-28KB is used, the data exchange time will be approximately 1 ms.

- Buffer memory of the data link DL1 is renewed in each processing cycle of the PC.
  A contact which turns ON by 1 cycle of PC may not be transferred.

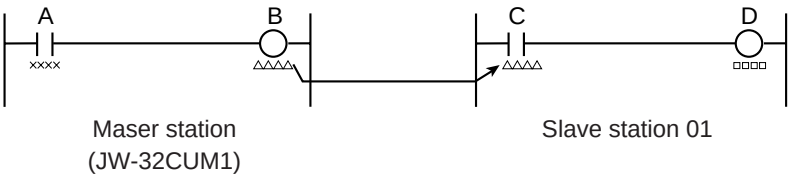
[Example]

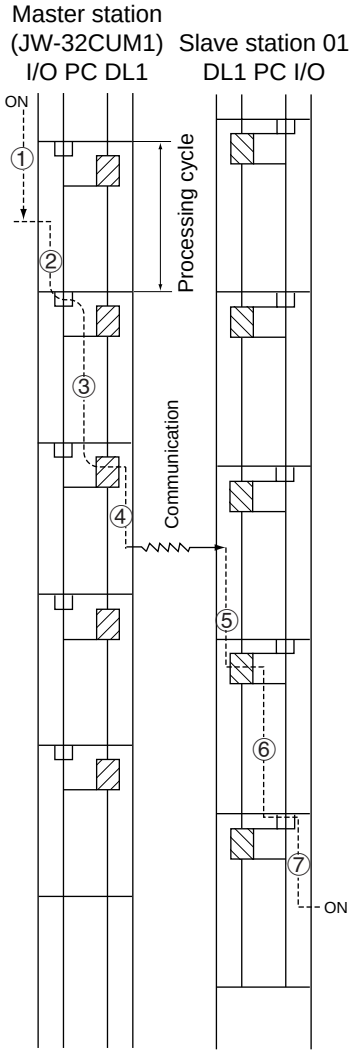


[3] Communicate delay time

The following flow delay occurs when the JW-32CUM1 receives data as data link DL1 function.

- **Data transfer from a master station to a slave station**





Actual delay times is given by total of the following items.

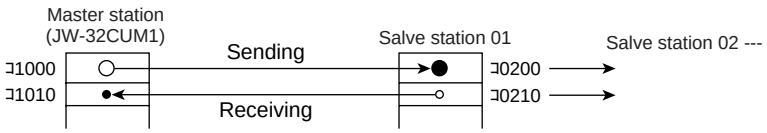
① Delay of input module ..... T_{D1}
② PC delay time to detect input condition .... T_{D2}
(Max. 1 processing cycle)
③ Sending side PC processing time..... T_{D3}
(1 processing cycle)
④ Time to send processed result ..... T_{D4}
(Max. 1 communication cycle)
⑤ Receiving side PC delay time to write the receiving data to data memory ..... T_{D5}
(Max. 1 processing cycle)
⑥ Processing time of the receiving side PC . T_{D6}
(1 processing cycle)
⑦ Delay of output module..... T_{D7}

Total delay time $T_D = T_{D1}+T_{D2}+T_{D3}+T_{D4}+T_{D5}+T_{D6}+T_{D7}$

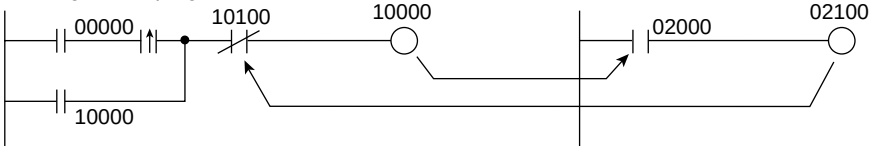
[4] How to make synchronize

In order to securely transfer data between a master station and a slave station, we recommend to synchronous these stations.

(1) Synchronous with OUT instruction



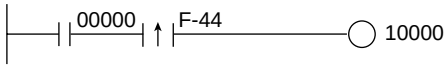
Sending station program



- Turn ON 00000 at the sending station. OUT 10000 shall be self latch circuit.
- When 02000 of the receiving station turns ON, it turns ON OUT 02100. Return this signal to the sending station.

Remarks

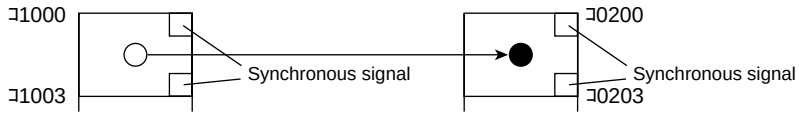
As shown in the figure below, a signal which turns ON shorter time for the communication cycle may not be transferred.

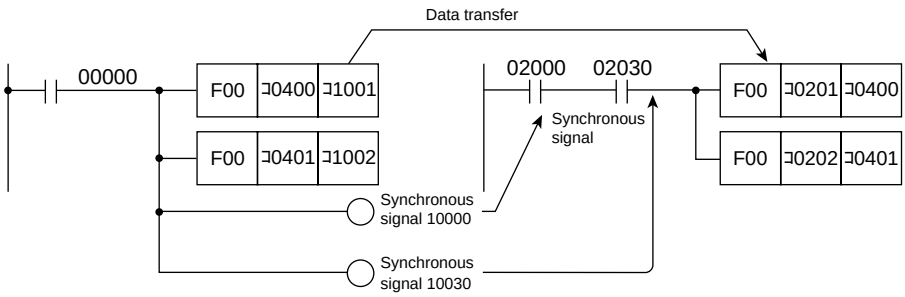


(2) n byte transfer

To make synchronous for all the data, add the synchronous signal at the head and the end of data area.

[Example] To transfer Ⅎ1001 to Ⅎ1002, add 10000 and 10030 as synchronous signal.





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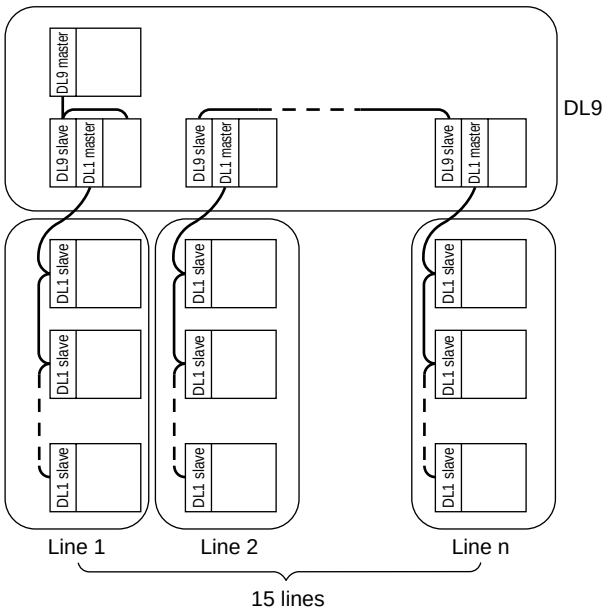
[5] Hierarchy link

Creation of hierarchy link installing DL9 slave station and DL1 master station in a PC is available as shown below.



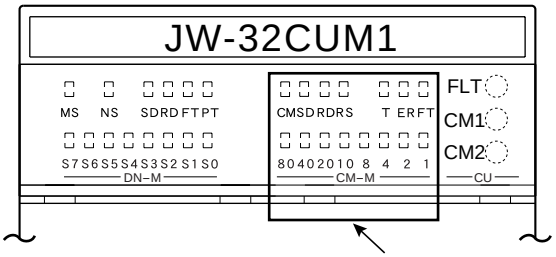
Remarks

- The PC should have more than two spare optional slot in order to install 2 sets of DL1.
- Any combination of DL1 module and DL9 module is available to install these 2 sets in the PC optional slot.
- Amount of link points should be within the specifications of DL9 and DL1.
- The hierarchic construction takes much time to communicate from the top master station to the bottom slave station.

10-4 Errors and treatment

[1] Indicators

Lamps on the JW-32CUM1 (the CM-M section on the display panel) turn ON and OFF with data link DL1.



CM-M section on the display panel

Lamp name	Display condition	Recovery
CM	Light at link operation (communication)	———
SD	Blinks at link operation (sending)	
RD	Blinks at receiving data	
RS	Blinks at link operation (request to send)	
T	Lights at trial operation	
ER	Light at switch setting error	Confirmation of switch setting contents.
FT	Light at time up of the watchdog timer	Exchange JW-32CUM1

Lamps 1 to 80 show the error codes when errors occur.

Lamp name								Error code	Contents
80	40	20	10	8	4	2	1		
O	●	●	O	O	O	O	O	$60_{(H)}$	Switch setting error

"●"means light ON, "O" as light OFF.

[2] Operation in error conditions

The communication status of the master and slave stations when run, stop, error, or a power disconnection occurs in the JW30H (control section of the JW-32CUM1) and when there are errors in the master station (data link DL1 section of the JW-32CUM1) are as follows.

JW30H (JW-32CUM1) operation condition	Halt output	Indication lamp of power supply module		JW-32CUM1 Indication lamp								
				CU	CM-M							
		POWER	RUN	FLT	CM	SD	RD	RS	ER	T	FT	1 to 80
Operate normal	Close	●	●		●	⊗	⊗	⊗				
Stop normally	Open	●	⊗		●	⊗	⊗	⊗				
Error	Open	●		●	●	⊗	⊗	⊗				
Data link DL1 master station error	Open	●		●							●	

"●" means light ON. "⊗" means blinks. No condition means light OFF.

- The operation lamp lights (● mark) when the JW30H (JW-32CUM1) is "at operation."

[3] Error code

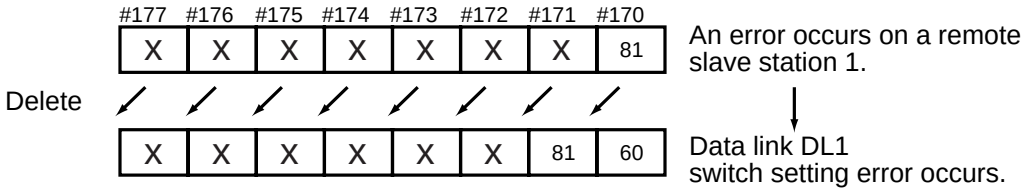
While in the data link DL1 process, when master station (JW-32CUM1) has an error, the JW-32CUM1 stores its error code in the JW30H (JW-32CUM1) system memory #170.

Error code	Causes
$60_{(H)}$	Switch setting error

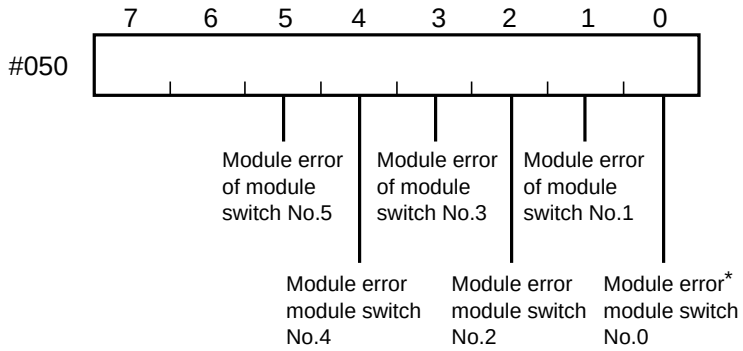
- In case of switch setting error of slave station, the slave station PC stores error code in system memory #170.

Remarks

- The error code stored in the system memory #170 shifts from #170 to #177 one by one each new error code occurrence, and stores the error conditions up to 8 causes. When the PC is in RAM operation, the error code memory does not disappear even if the power to the PC is turned off. The contents of the system memory #170 to #177 keep in storage after recovering from the error condition.



- When the JW-32CUM1 (general purpose communication section) becomes error, it stores error code "$53_{(H)}$" (option error) in the system memory #160.
- In the case of an option error "$53_{(H)}$," when you monitor system memory #050, the bit (module No. switch set value) of error option module ON. When more than one bit is error, these bits switch ON. The each ON bit becomes OFF by recovering from the error condition. But the last ON bit does not become OFF even if the error condition recovers.



* When an error occurs in the JW-32CUM1 (general purpose communication section), the "module No. error" will be displayed.

10

- **Store error history**
  When the error (error code $60_{(H)}$) occurs, stores error history in the JW-32CUM1 register E7400 to E7577.
  Setting system memory address #210 to $002_{(8)}$ is required.

- **Error data to be stored**
  Error data consists of 16 bytes per data.

Address	Contents		Remarks
n + 0	Second	Store occurred data and time	———
n + 1	Minute		
n + 2	Hour		
n + 3	Data		
n + 4	Month		
n + 5	Year		
n + 6	Day of week		
n + 7	Error code	$60_{(H)}$	Switch setting error
n + 10	———	———	———
n + 11	No. of occurrence	000 to $377_{(8)}$	- If error data occurs more than once, the JW-32CUM1 will add the number of occurrences up to a total of $377_{(8)}$. Thereafter stays $377_{(8)}$. (Data and time of occurrence in the first error.)
n + 12	———	———	———
n + 13			
n + 14			
n + 15			

[4] Check flow

When a communication operation on the data link DL1 produces has an error, check the following.

(1) When the FAULT lamp (CU section of the display panel) on the JW-32CUM1 lights.

Respond according to the light ON/OFF indicators on the JW-32CUM1 FT display (CM-M section on the display panel).

FT lamp of JW-32CUM1	Conditions	Countermeasure
Light ON	Special relay 07374 (option error) is ON.	Find error module by system memory #050.
		Save program and data in floppy diskette, then check referring the "7-7. Troubleshooting."
		Replace JW-32CUM1.
Light OFF	Special relay 07373 (I/O error) is ON.	- Save program and data in floppy diskette, then check referring the "7-7. Troubleshooting." - Find error module by system memory #050. - Replace JW-32CUM1.
	Store error code $60_{(H)}$ (table verify error) in system memory #160.	
	Store error code $61_{(H)}$ (switch verify error) in system memory #160.	
	Store error code $73_{(H)}$ (switch setting error) in system memory #160.	

(2) FAULT lamp of the JW-32CUM1 lights OFF

Measures can be taken according to the status indicated by the "ER, 1 to 80" lamps on the JW-32CUM1.

Indication lamp of JW-32CUM1		Error contents	Countermeasure
ER	1 to 80		
Light ON	$60_{(H)}$	Mis-set switch (SW3, 4)	Recheck the switch.
Light OFF		Communication monitoring flag is turned "OFF". (turned "OFF" sometime)	- Check operation mode setting switch SW3. - Check whether there is disconnection, mis-wiring, or branched wiring. - Check that termination resistance switch (LT) is ON at only both ends. - Check that FG terminal is connected to the rack panel. - Check that communication cable total length is less than 500 m. - Check that communication cable does not close or crossed with high voltage and power lines. - Check that the recommended communication cable type is used. - Check that the installed control panel is grounded. - Check slave station switch settings. - Check that slave station power is ON. - Replace slave module.
Light ON	$00_{(H)}$	Set switch SW5 other than "1 to 3 and 7"	Recheck the switch.

(3) Wiring check

Check the wiring according to the following procedures, as error wiring may cause unstable operation condition:

① Switches OFF power and termination resistance switches of all stations.

② Check resistance between each terminal.

Between L1 and L2	1 K ohms or up
Between L1 and SHIELD	
Between L2 and SHIELD	

- Connect the terminal L1 and L2 of the terminal station and check L1 and L2 termination resistance of the other terminal stations.

Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less
1 km	100 ohms or less	60 ohms or less

- Make short L1 and the SHIELD at the terminal station and check the resistance between L1 and the SHIELD of the other terminal stations.

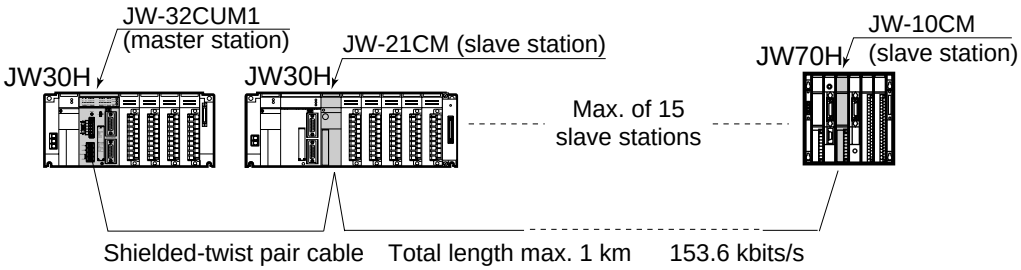
Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less
1 km	100 ohms or less	60 ohms or less

After checking, remove the short wiring and switch ON the termination resistance switch at both terminal stations.

Chapter 11: Data link DL9 (Master Station) Function

11-1 Data link DL9 (master station) function

When the general purpose communication section in the JW-32CUM1 is used for data link DL9 (master station), it can communicate with slave stations of JW and W series PLC.



Item	Specifications
Model name of slave stations	JW-21CM (JW20H/JW30H) JW-10CM (JW50H/70H/100H, JW50/70/100, W70H/100H) ZW-10CM (JW50/70/100, W70H/100H), Z-331J/332J (J-board), ZW-1K0DL9 (W100), ZW-501DL9 (W51), ZW-160DL9 (W16)
Number of connectable slave stations	Max. 15 stations
Number of link bytes (total)	Select the number of bytes: 64, 128, or 256
No. of link bytes per station	Divide evenly from the number of slave stations (1 station: Max. 128 bytes, 2 stations: Max. 64 bytes, 3 to 4 stations: Max. 32 bytes, 5 to 8 stations: Max. 16 bytes, 9 to 15 stations: Max. 8 bytes)

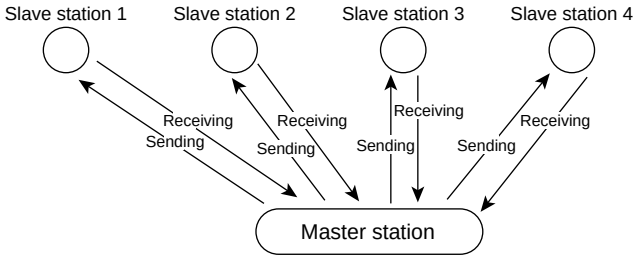
- This link offers communication between a master and a slave station. It cannot perform communication between 2 slave stations (1:N method).
- The possible number of connectable slave stations is 15 at max.
- Total length of the signal cable is up to 1 km.
- Select the number of link bytes: 64, 128, or 256 (total for the system).

Remarks

- The data memory area for data link DL9 in the JW-32CUM1 (as a master station) is fixed (module No. switch = 0). ⇨ See pages 11-4 and 11-6.
  Therefore, set the module No. switch on the option modules (such as JW-22CM) that are installed on the JW-34KBM (JW-32CUM1) to a number other than "0."
- Number of link bytes per station varies depending on the combination of number of total bytes and the number of stations. ⇨ See pages 11-6.
- When you specify the total number of link bytes as 128 or 256, some module numbers cannot be used.
  [Ex.] When the total number of link bytes is specified as 256;
  The data link area will be ㅋ1000 to ㅋ1377, and the module number switches on option modules cannot be set to numbers "1 to 3."

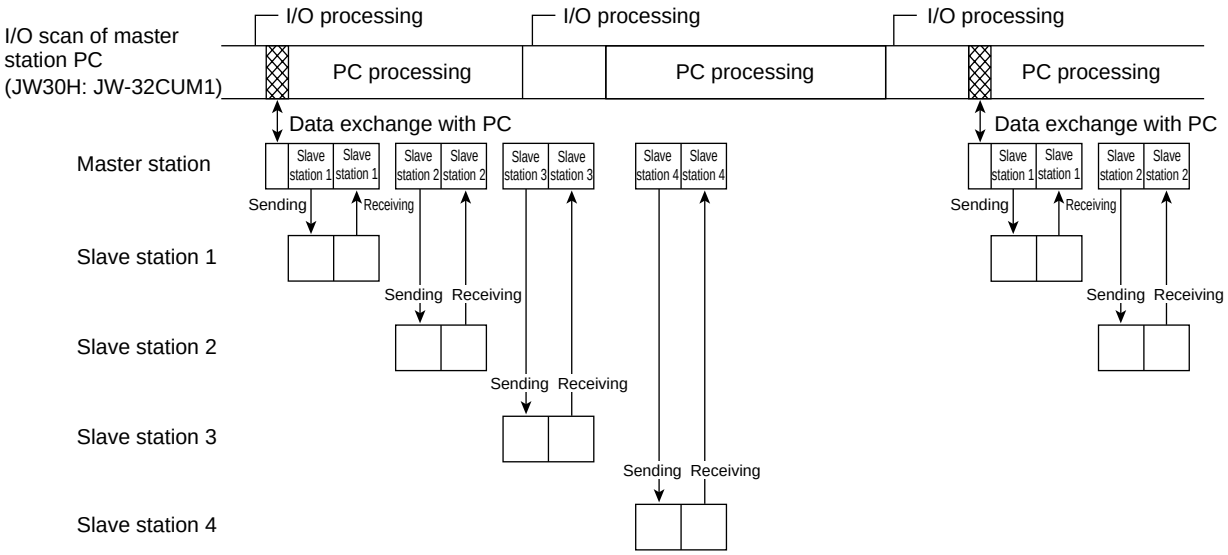
[1] Communication method of the data link DL9

The data link DL9 controls to send data from a master station (JW-32CUM1) to each slave station and to receive data from each slave station to a master station. Communication between slave stations is not available.



As the data link DL9 communicates through one line of twisted pair shield cable, it is unable to communicate with all the stations at the same time. The data link DL9 communicates from the No.1 slave station in order, sharing the time.

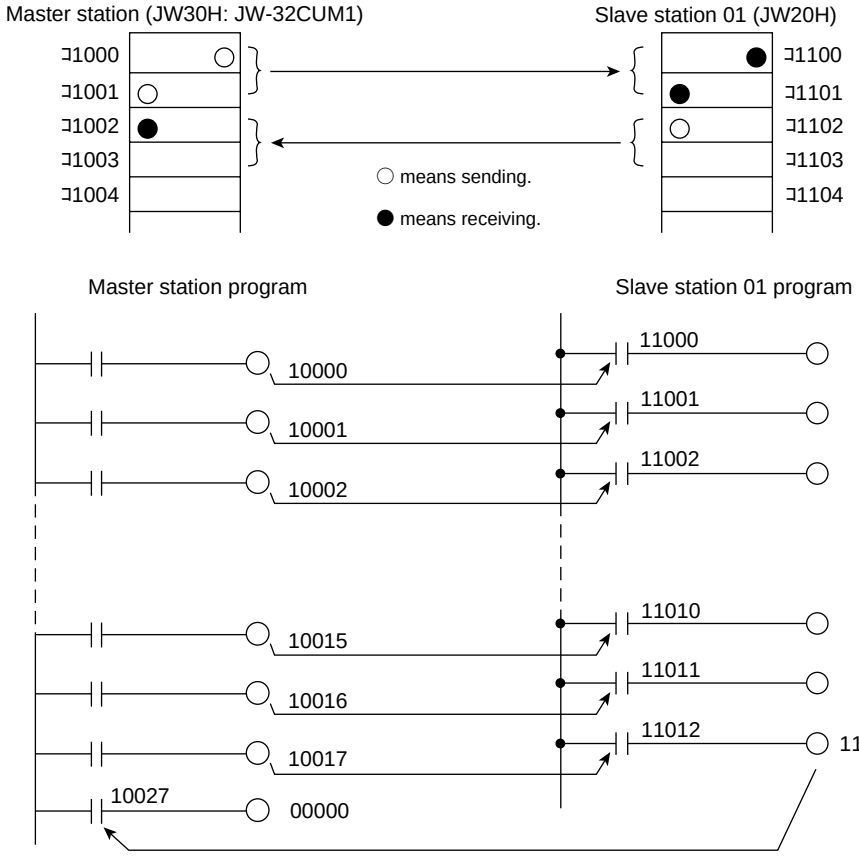
[Example] In case of 4 sets of slave stations:



[2] Communication contents of data link DL9

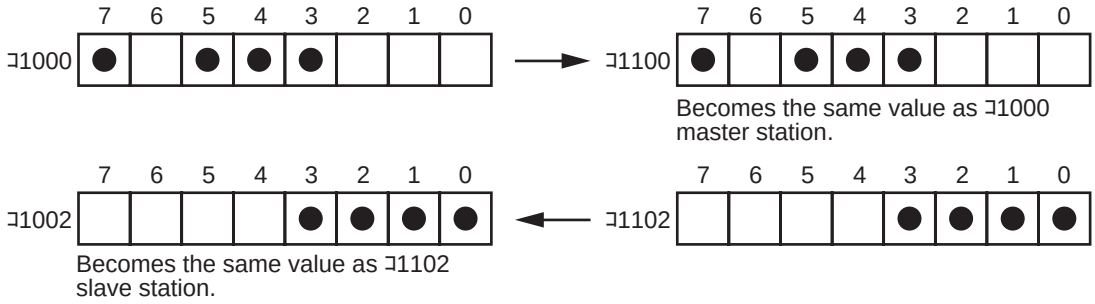
The JW-32CUM1 can transfer 2 to 128 bytes of data memory content of PC from a master (JW-32CUM1) to a slave station or a slave to a master station.

[Example] When a master station (JW-32CUM1) sends 2 bytes of data memory ㅋ1000 to ㅋ1001 to a ㅋ1100 to ㅋ1101 of a slave station, the slave station PC can use the 2 bytes of data memory at ㅋ1100 to ㅋ1101 as an input signal.



Remarks

- Write the link relay of the sending station as an OUT instruction in PC program. The link relay of the sending station is usable as a D (destination) side of the application instruction.
- Write the link relay of the receiving station as an input signal in PC program. The link relay is usable as the S (source) side of the application instruction.
- Sending data and receiving data correspond to 1 point unit bit.



- For details about the number of link bytes and the link area for each station, see page 11-6.

11-2 Setting method

When the JW-32CUM1 in used with data link DL9 (master station) function, items that must be set for the data link DL9 are as follows.

Item	Setting method	Details (section number in this chapter)
Communication function	Select the "data link DL9 function" using switch SW5.	11-2-[2]
Number of slave stations	Select 1 to 15 using switch SW4.	
Number of link bytes (total)	Select 64, 128, or 256 bytes using switch SW3.	
Termination resistance	Select terminating station or intermediate station using the LT switch.	
Station number	Doesn't need to be set since the station number is fixed at "00," as master station.	---
Data memory area	No need to set the following areas since they are fixed. - Data link area: From ㅋ1000 - Communication monitor flag (slave station): 15000 - Initial sequence completion flag (master station) : 15001 - Link operation flag (master station) : 15003 - Individual monitor flag (master station) : 15020 to 15077	11-2-[3]

[1] Setup procedure

The setup procedure for the data link DL9 (master station) function on the JW-32CUM1 is described below.

[Reference section]

① Set the switches in the JW-32CUM1. ---------- 11-2 [2] Switch settings

↓

② Install the JW-32CUM1 on the JW-34KBM. ---- Chapter 5: Installation

↓

③ Slave station wiring to the master station (JW-32CUM1.) ---- 6-2. Wiring to the general-purpose communication terminal block

↓

④ Turn ON power to the JW30H (JW-32CUM1) master station and slave stations.

↓

⑤ Enter a program related to the data memory of the data link DL9 into the master and slave station PCs. ----- 11-2 [3] Data memory area

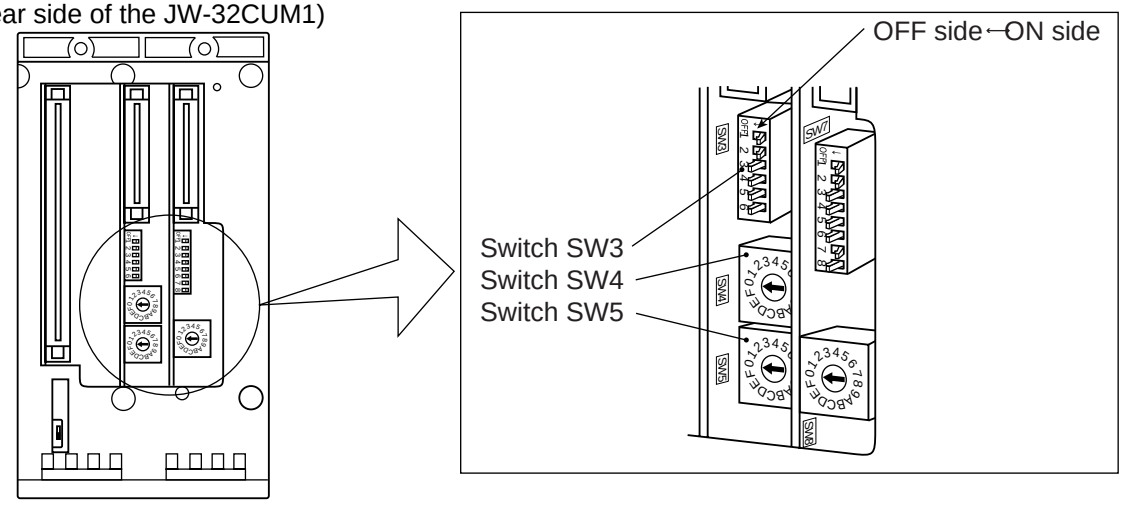
↓

End of procedure

[2] Switch settings

Specify the settings with switches SW5 (communication function), SW3 (total number of link bytes), SW4 (number of slave stations), and LT (termination resistance) in the JW-32CUM1.

(Rear side of the JW-32CUM1)



(1) Switch SW5

Specify the communication function.

⇨ "3" when selecting data link DL9 function.

(2) Switch SW3

Set the total number of link bytes to 64, 128, or 256 using SW3-3 and 3-4.

SW3-3	SW3-4	Total number of link bytes
OFF	ON	256
ON	OFF	128
OFF	OFF	64

SW3-1, 3-2, 3-5, and 3-6 are not used. (Keep the settings when delivered. ⇨ See page 4-3.)

(2) Switch SW4

Specify the number of slave stations you will connect (1 to 15).

Setting for SW4	Number of slave stations
0	Prohibited setting
1	1
2	2
3	3
4	4
5	5
6	6
7	7

Setting for SW4	Number of slave stations
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

(3) Switch LT

Specify whether the JW-32CUM1 is a termination station (ON) or an intermediate station (OFF) in the data link DL9 circuit. ⇨ See page 4-1.

[3] Data memory area

The data link area and communication monitor flags are allocated in the JW-32CUM1 (control section) data memory for the data link DL9 (master station) function.

Data link area	Initial sequence completion flag	Link operation flag	Individual monitor flag
From ㅋ1000	15001	15003	15020 to 15077

(1) Data link area

The combination of the total number of link bytes and the number of slave stations is used to set the number of link bytes and the link area for one station as follows.

		Number of slave stations				
		1	2	3 to 4	5 to 8	9 to 15
Number of link bytes (total)	256	128 *	64	32	16	8
		128 *	64	32	16	8
	128	64	32	16	8	4
		64	32	16	8	4
	64	32	16	8	4	2
		32	16	8	4	2

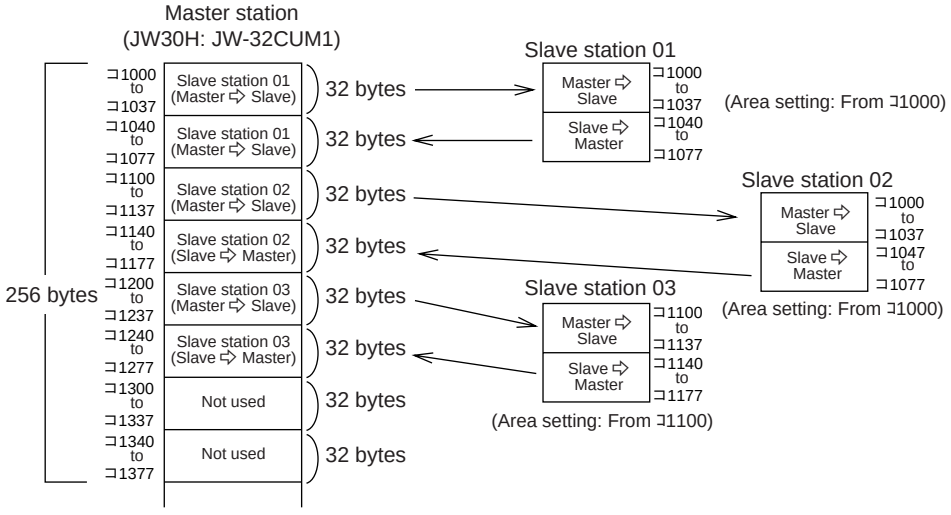
Upper line: Number of sending bytes Lower line: Number of receiving bytes

- When connecting a slave station other than a JW-21CM (such as JW-10CM), the number of sending and receiving bytes will decrease to 64 bytes or less. Therefore, settings marked with an asterisk (*) in the table above cannot be used.
- Specify the total number of link bytes using SW3, and the number of slave stations using switch SW4, on the JW-32CUM1.

When the JW-32CUM1 is a master station, the link area for slave stations will be determined by number of link bytes per station.

Number of bytes per station	Slave station area		
	JW-21CM	JW-10CM ZW-10CM ZW-1K0DL9	ZW-501DL9 ZW-160DL9
128+128	From ㅋ1000, from ㅋ1100, or only from 89000.	---	---
64+64	From ㅋ1000, from ㅋ1100, from ㅋ1200, from ㅋ 1300, or from 89000.	From 19000	From 9000
32+32	From ㅋ1000, from ㅋ1100, from ㅋ1200, from ㅋ1300, from ㅋ1400 or from 89000.		
16+16			
8+8			
4+4			
2+2			

- A data link example when the total number of link bytes is 256 and there are three slave stations.



(2) Data link DL9 operation flag

The data link DL9 link operation of the JW-32CUM1 (master station) is available to monitor by the option flag of data memory (JW-32CUM1).

Initial sequence completion flag	Link operation flag	Individual monitor flag
15001	15003	15020 to 15077

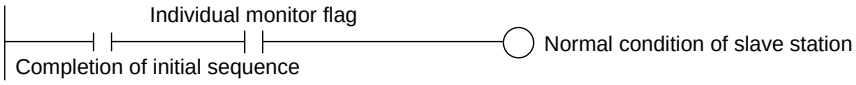
① Initial sequence completion flag

- The initial sequence completion flag works when the link parameters set in a master station JW-32CUM1 have been sent to all the slave station.
- The initial sequence flag becomes available when the power of master station is switched on after setting switches on the master station.
- The communication time is about 1 second (total time of 15 sets of slave stations.)
- The operation conditions of initial sequence completion flag are as follows:

Initial sequence completion flag	Operation conditions	Operation
15001	Initial sequence is completed.	ON
	While the initial sequence is operating.	OFF
	Link parameter is error setting.	

Remarks

- When the initial sequence completion flag is OFF, the individual monitoring flag does not vary.
- In the case of using the individual monitoring flag, also use the initial sequence completion flag.



② Link operation flag

The operation conditions of link operation flag are as follows:

Link operation flag	Operation conditions	Operation
15003	The PC in slave station is operating and JW-32CUM1 is communicating with all the slave stations in normal condition.	ON
	The initial sequence completion flag is OFF.	OFF
	The PC in slave stations stops or a communication error occurs in a slave station.	

- When the master station can not send data normally to slave stations within 3 trials including re-sending data, it turns OFF as a communication error.
- Communication with the normal slave station is available even if a specific slave station is error.

③ Individual monitoring flag

The individual monitoring flags are divided into 3 function flags: 1; Communication monitoring flag, 2; PC operation condition monitoring flag (I) and 3; PC operation condition monitoring flag (II), and each flag is available to monitor slave stations 01 to 17_{OCT}.
The configuration of the individual monitoring flags are as follows:

	7	6	5	4	3	2	1	0	
⊐1502	07	06	05	04	03	02	01		1. Communication monitoring flag
⊐1503	17	16	15	14	13	12	11	10	
⊐1504	07	06	05	04	03	02	01		2. PC operating condition monitoring flag (I)
⊐1505	17	16	15	14	13	12	11	10	
⊐1506	07	06	05	04	03	02	01		3. PC operating condition monitoring flag (II)
⊐1507	17	16	15	14	13	12	11	10	

1. Communication monitoring flag

This is a flag to monitor communication condition with each slave station.
The operation conditions are as follows:

Flag	Operation conditions	Operation
15020 to 15037	Normally communicating	ON (all slave station)
	While the master station (JW-32CUM1) is stopping	Invalid (all slave station)
	The initial sequence completion flag is OFF.	
	Communication error with designated slave station	OFF (designated station)

2. PC operation condition monitoring flag (I)

This is a flag to monitor the slave station side PC operation conditions, while normally communicating with each slave station.
The operation conditions are as follows:

Flag	Operation conditions	Operation	
15040 to 15057	While slave station PC is operating.	ON	Specific slave station
	While slave station PC is stopping. (program mode)	OFF	
	Slave station of which communication monitoring flag is OFF.	Invalid	
	While master station (JW-32CUM1) is stopping.		All slave station
	The initial sequence completion flag is OFF.		

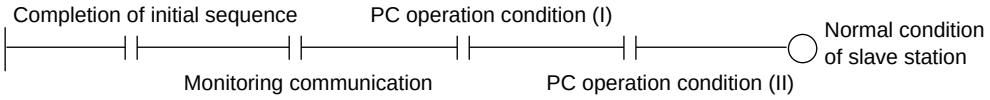
3. PC operation condition monitoring flag (II)

This is a flag to monitor error stops of the slave station side PC, while normally communicating with each slave station.
The operation conditions are as follows:

Flag	Operation conditions	Operation	
15060 to 15077	While slave station PC is operating.	ON	Specific slave station
	While slave station PC is stopping.	OFF	
	Slave station of which communication monitoring flag is OFF.	Invalid	
	While master station (JW-32CUM1) is stopping.		All slave station
	The initial sequence completion flag is OFF.		

Remarks

- "Invalid" means that each flag condition does not change.
- Each flag condition of unconnected stations is as follows:
  ① Communication monitoring flag ... No change
  ② PC operation condition monitoring flag (I) ... OFF
  ③ PC operation condition monitoring flag (II) ... OFF
- When the master station can not communicate with a specified slave station, the master station will execute a recovery process for the error slave station in every 3 cycle data link operation. When the error station becomes normal, the master station stops the recovery process for the data link.
- Programming in a master station (JW-32CUM1) to monitor the PC of each slave station is available.



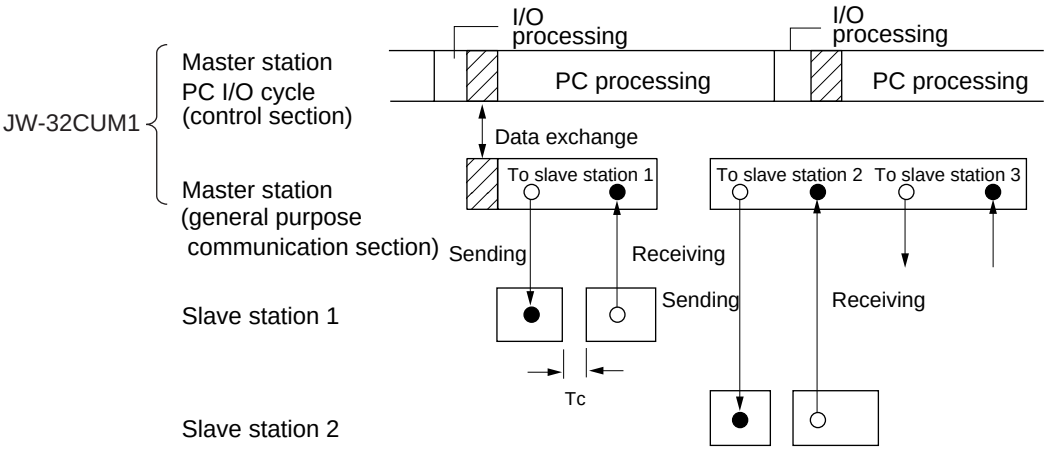
11-3 Required transfer time and its timing

[1] Required transfer time

Required time (T) for the data link DL9 master station to communicate with all slave stations.

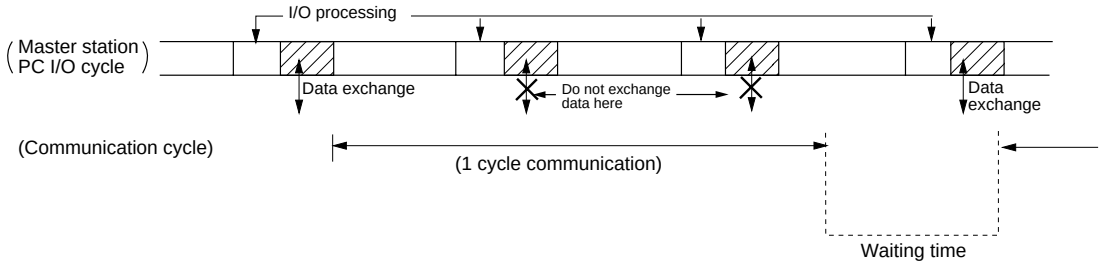
$$T = \frac{N}{153.6} + 1.5P + \quad (ms)$$

N: Total amount of link points
(get the value by multiple number of data link bytes with 8 points)
P: Number of connected slave stations
α: Data exchange time between the JW-32CUM1 general purpose communication section (data link DL9 master station) and the control section: (about 6 ms in max).



Remarks

- When the JW-32CUM1 (master station) is a master station, the data exchange with the JW-32CUM1 control section is once per communication cycle.



- Communication cycle starts from data exchange with the control section. Thus, waiting time occurs in each communication cycle.
- When a slave station has an error, the JW-32CUM1 (master station) operates an error recovery procedure in every 3 communication cycles. In this case, error recovery time T_{ER} becomes longer.
  T_{ER} = 4P' ms [P': Number of error slave stations]

11

[2] PC process and communication timing

The data link DL9 communicates asynchronize with master station PC and slave station PC. To exchange data between DL9 buffer memory and each of PC data memory, synchronize with the PC process.
The configuration of the data link DL9 in the JW-32CUM1 is the same as the data link DL1. ⇨ See page 10-9.

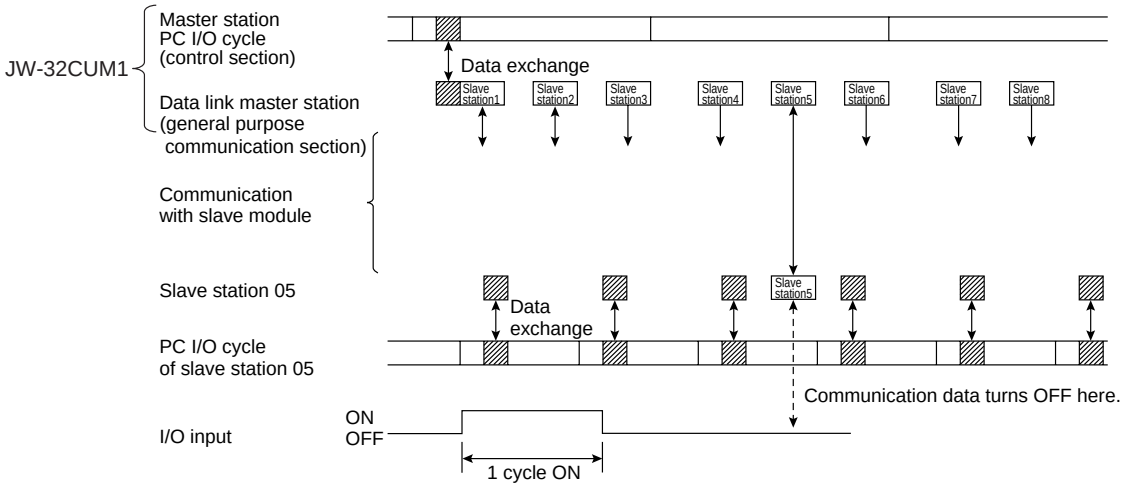
Remarks

- The processing flow of a slave station is the same as those of a master station. The master station alters slave station numbers to communicate.
- Data exchange time between a PC and a link module (data link DL9) in general is shown in the below.
  Scanning time of the PC master station and the PC slave station becomes long only for this time.

PC model		Data exchange time
JW30H	JW-32CUM1	Approx. 0.5 ms
	JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3	Approx. 0.5 ms *
	JW-31CUH/32CUH/33CUH	Approx. 2 ms
JW20/20H		Approx. 6 ms
W70H/100H		Approx. 0.1 ms
JW50/70/100		
JW50H/70H/100H		

*: In case of using basic rack panel, JW-34KB/36KB/38KB.
If a JW-24KB, JW-26KB or JW-28KB is used, the data exchange time will be approximately 2 ms.

- Buffer memory of the data link DL9 is renewed in each processing cycle of the PC. Accordingly, the ON signal shorter than a communication cycle may not be sent.

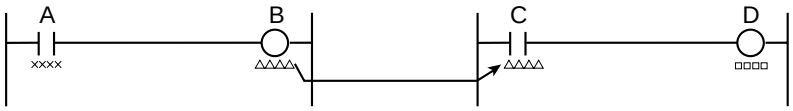


11

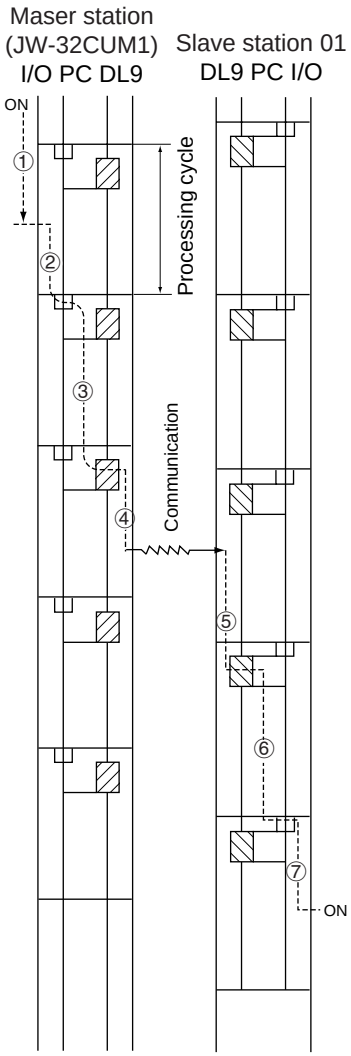
[3] Communicate delay time

The following delay occurs when the JW-32CUM1 exchanges data as DL9 function.

(1) Data transfer from a master station to a slave station



Maser station (JW-32CUM1) Slave station 01



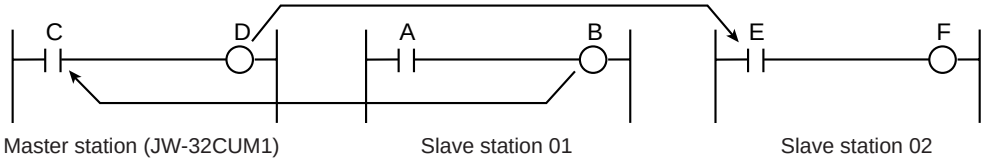
Actual delay times is given by total of the following items.

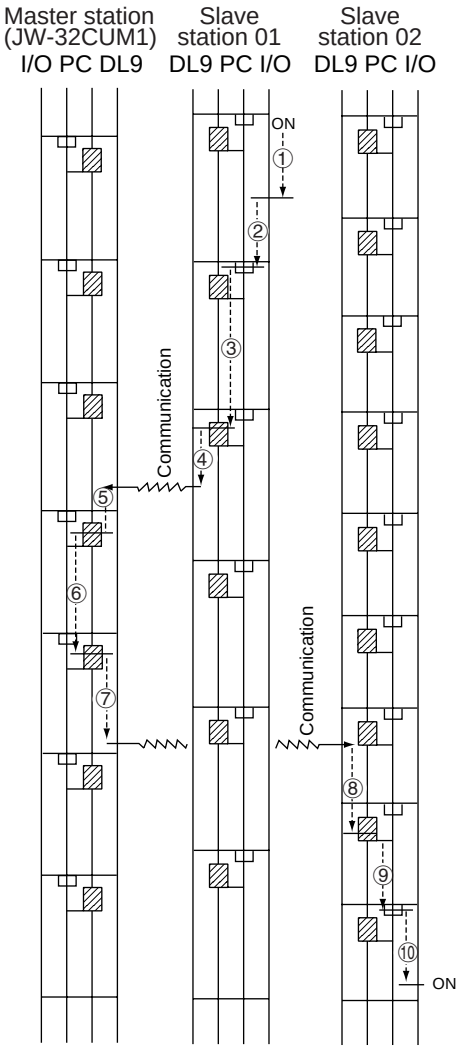
① Delay of input module ..... T_{D1}
② PC delay time to detect input condition .... T_{D2}
(Max. 1 processing cycle)
③ Sending side PC processing time ..... T_{D3}
(1 processing cycle)
④ Time to send processed result ..... T_{D4}
(Max. 1 communication cycle)
⑤ Receiving side PC delay time to write the receiving data to data memory ..... T_{D5}
(Max. 1 processing cycle)
⑥ Processing time of the receiving side PC . T_{D6}
(1 processing cycle)
⑦ Delay of output module ..... T_{D7}

Total delay time $T_D = T_{D1}+T_{D2}+T_{D3}+T_{D4}+T_{D5}+T_{D6}+T_{D7}$

11

(2) Communication from slave station to slave station (from slave station to master station then to slave station)





Actual delay times T_D is given by total of the following items.

① Delay of input module ..... T_{D1}
② PC delay time to detect input condition .... T_{D2}
(Max. 1 processing cycle)
③ PC01 processing time ..... T_{D3}
(1 operation cycle)
④ Time to send processed result ..... T_{D4}
(Max. 1 communication cycle)
⑤ Time that the master station writes received data at the PC data memory ..... T_{D5}
(Max. 1 processing cycle)
⑥ Master station processing time ..... T_{D6}
(1 processing cycle)
⑦ Time that master station completes sending the processing results ..... T_{D7}
(Max. 1 communication cycle)
⑧ Time that master station writes received data in the PC data memory ..... T_{D8}
(Max. 1 processing cycle)
⑨ Slave station 02 processing time ..... T_{D9}
(1 processing cycle)
⑩ Delay of output module ..... T_{D10}

Total delay time $T_D=T_{D1}+T_{D2}+T_{D3}+T_{D4}+T_{D5}+T_{D6}+T_{D7}+T_{D8}+T_{D9}+T_{D10}$

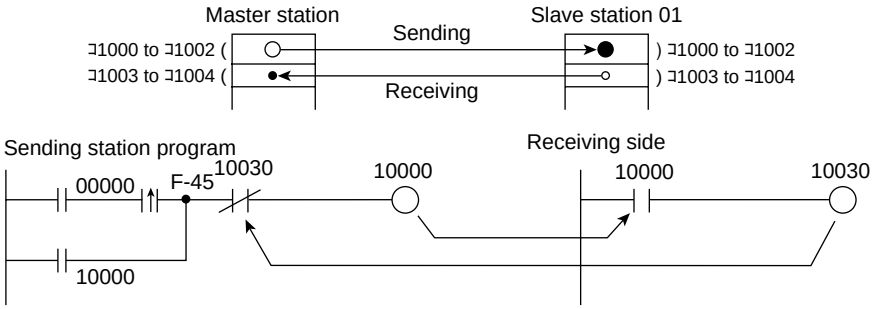
At system design, the above delay time should be fully taken into account.

We recommend to construct a part of the system taking 1 PC where accurate timing is required, and other part of the system transfers at link system where accurate timing is not required.

[4] How to make synchronize

In order to securely execute data transfer between a master station (JW-32CUM1) and a slave station, we recommend to synchronous these stations.

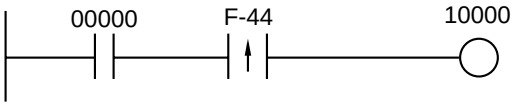
(1) Synchronous with OUT instruction



- Turn ON 10000 at the sending station. OUT 10000 shall be self latch circuit.
- When 10000 of the receiving station turns ON, it turns ON OUT 10030. Return this signal to the sending station.

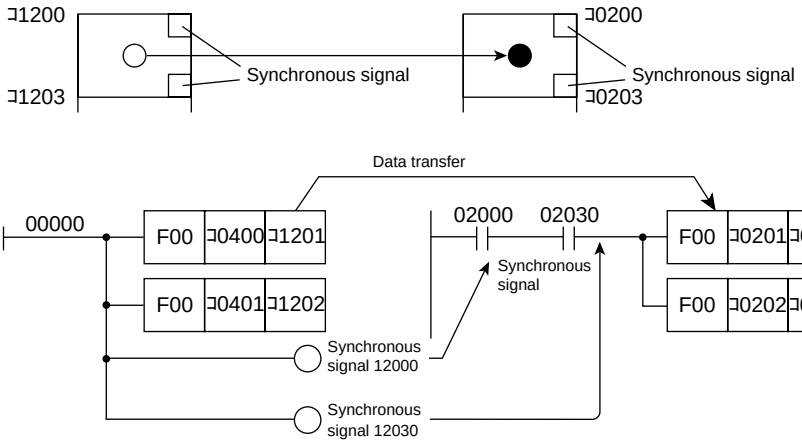
Remarks

As shown in the figure below, module may not able to receive signal of one scanning interval of the PC.



(2) n byte transfer

To make synchronous for all the data, add the synchronous signal at the head and the end of data area.



11

[5] Hierarchy link

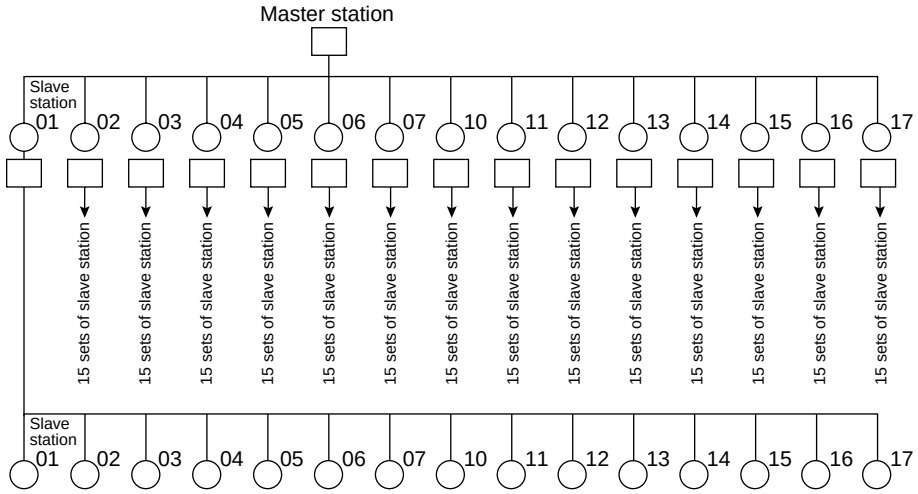
(1) Hierarchy link combining DL1 and DL9

Creation of hierarchy link installing DL9 slave station and DL1 master station in a PC is available as shown below.

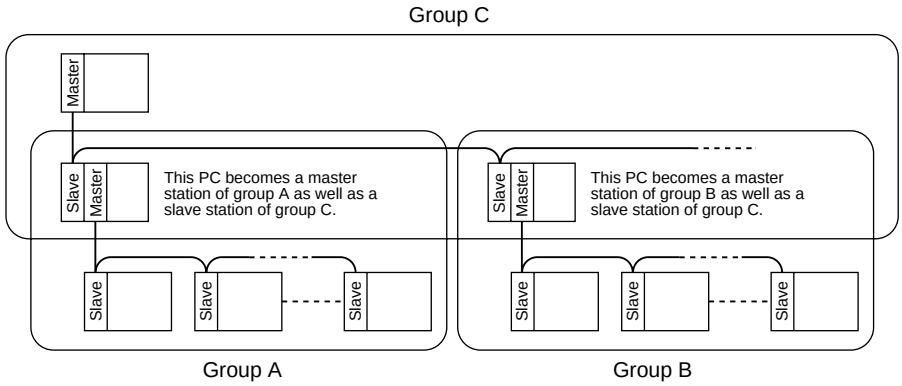
For details, see the data link DL1 description on page 10-13.

(2) Expansion of the communicating station in data link DL9

The data link DL9 can communicate only up to 16 sets consisting 1 set of master station and 15 sets of slave stations. However, slave station PCs have a multi-option slot, so that hierarchy link communication is available using 2 sets of data link DL9 module.



"□"means master station. "○"means slave station.

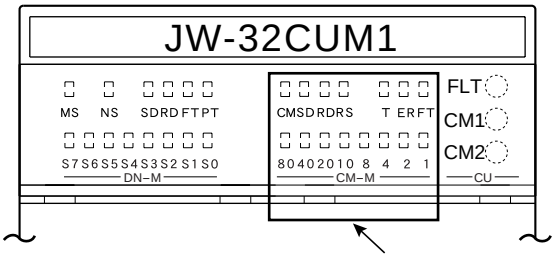


As above, control multiple data link systems using other link system are available. In a hierarchy link having more than 2 classes communication between the top and the lowest slave station takes much time, and is not practical.

11-4 Errors and treatment

[1] Indicators

Lamps on the JW-32CUM1 (the CM-M section on the display panel) turn ON and OFF with data link DL9.



CM-M section on the display panel

Lamp name	Display condition	Recovery
CM	Light at link operation (communication)	———
SD	Blinks at link operation (sending)	
RD	Blinks at receiving data	
RS	Blinks at link operation (request to send)	
T	Lights at trial operation	
ER	Light at switch setting error	Confirmation of switch setting contents.
FT	Light at time up of the watchdog timer	Exchange JW-32CUM1

Lamps 1 to 80 show the error codes when errors occur.

Lamp name								Error code	Contents
80	40	20	10	8	4	2	1		
O	●	●	●	O	O	O	O	$70_{(H)}$	Switch setting error

"●"means light ON, "O" as light OFF.

[2] Operation in error conditions

The communication status of the master and slave stations when run, stop, error, or a power disconnection occurs in the JW30H (JW-32CUM1 control section) and when there are errors in the master station (data link DL9 section of the JW-32CUM1) are as follows.

JW30H (JW-32CUM1) operation condition	Halt output	Indication lamp of power supply module		JW-32CUM1 Indication lamp								
				CU	CM-M							
		POWER	RUN	FLT	CM	SD	RD	RS	ER	T	FT	1 to 80
Operate normal	Close	●	●		●	⊗	⊗	⊗				
Stop normally	Open	●	⊗		●	⊗	⊗	⊗				
Error	Open	●		●	●	⊗	⊗	⊗				
Data link DL9 master station error	Open	●		●							●	

"●" means light ON. "⊗" means blinks. No condition means light OFF.

- The operation lamp lights (● mark) when the JW30H (JW-32CUM1) is "at operation."

[3] Error code

When there is a switch setting error in the data link DL9 function, the JW-32CUM1 stores its error code ($70_{(H)}$) in the JW30H (JW-32CUM1) system memory #170.

- The error code stored in the system memory #170 shifts from #170 to #177 one by one each new error code occurrence, and stores the error conditions up to 8 cases. ⇨ Same as page 10-15.

- **Store error history**
  When the error (error code $70_{(H)}$) occurs, stores error history in the register E7400 to E7577. However, setting system memory #210 = $002_{(8)}$ is required.

- **Error data to be stored**
  Error data consists of 16 bytes per data.

Address	Contents		Remarks
n + 0	Second	Store occurred data and time	———
n + 1	Minute		
n + 2	Hour		
n + 3	Data		
n + 4	Month		
n + 5	Year		
n + 6	Day of week		
n + 7	Error code	$70_{(H)}$	Switch setting error
n + 10	———	———	———
n + 11	No. of occurrence	000 to $377_{(8)}$	- If error data occurs more than once, the JW-32CUM1 will add the number of occurrences, up to a total of $377_{(8)}$. Thereafter stays $377_{(8)}$. (Data and time of occurrence in the first error.)
n + 12	———	———	———
n + 13			
n + 14			
n + 15			

[4] Check flow

When a communication operation on the data link DL9 produces an error, check the following.

(1) When the FAULT lamp (CU section of the display panel) on the JW-32CUM1 lights.

Respond according to the light ON/OFF indicators on the JW-32CUM1 FT display (CM-M section on the display panel).

FT lamp of JW-32CUM1	Conditions	Countermeasure
Light ON	Special relay 07374 (option error) is ON.	Find error module by system memory #050.
		Save program and data in floppy diskette, then check referring the "7-7. Troubleshooting."
		Replace JW-32CUM1.
Light OFF	Special relay 07373 (I/O error) is ON.	- Save program and data in floppy diskette, then check referring the "7-7. Troubleshooting." - Find error module by system memory #050. - Replace JW-32CUM1.
	Store error code $60_{(H)}$ (table verify error) in system memory #160.	
	Store error code $61_{(H)}$ (switch verify error) in system memory #160.	
	Store error code $73_{(H)}$ (switch setting error) in system memory #160.	

(2) FAULT lamp of the JW-32CUM1 lights OFF

Measures can be taken according to the status indicated by the "ER, 1 to 80" lamps on the JW-32CUM1.

Indication lamp of JW-32CUM1		Error contents	Countermeasure
ER	1 to 80		
Light ON	$70_{(H)}$	Mis-set switch (SW3, 4)	Recheck the switch.
Light OFF		Communication monitoring flag is turned "OFF". (turned "OFF" sometime)	- Check operation mode setting switch SW3. - Check whether there is disconnection, mis-wiring, or branched wiring. - Check that termination resistance switch (LT) is ON at only both ends. - Check that FG terminal is connected to the rack panel. - Check that communication cable total length is less than 1 km. - Check that communication cable does not close or crossed with high voltage and power lines. - Check that the recommended communication cable type is used. - Check that the installed control panel is grounded. - Check slave station switch settings. - Check that slave station power is ON. - Replace slave module.
Light ON	$00_{(H)}$	Set switch SW5 other than "1 to 3 and 7"	Recheck the switch.

(3) Wiring check

Check the wiring according to the following procedures, as error wiring may cause unstable operation condition:

① Switches OFF power and termination resistance switches of all stations.

② Check resistance between each terminal.

Between L1 and L2	1 K ohms or up
Between L1 and SHIELD	
Between L2 and SHIELD	

- Connect the terminal L1 and L2 of the terminal station and check L1 and L2 termination resistance of the other terminal stations.

Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less
1 km	100 ohms or less	60 ohms or less

- Make short L1 and the SHIELD at the terminal station and check the resistance between L1 and the SHIELD of the other terminal stations.

Cable total length	Cable type	
	HITACHI CABLE LTD.	FUJIKURA LTD.
100 m	15 ohms or less	10 ohms or less
500 m	50 ohms or less	30 ohms or less
1 km	100 ohms or less	60 ohms or less

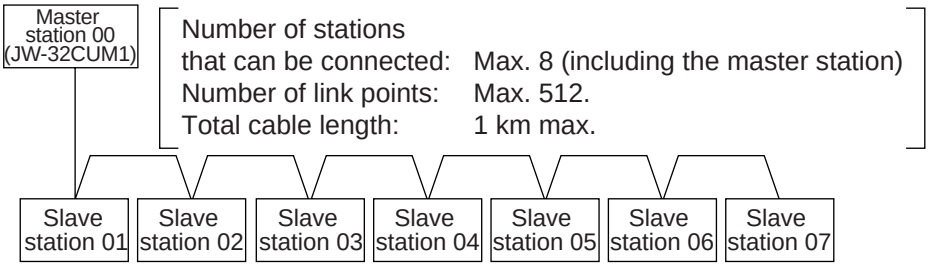
After checking, remove the short wiring and switch ON the termination resistance switch at both terminal stations.

Chapter 12: M-net (Master Station) Function

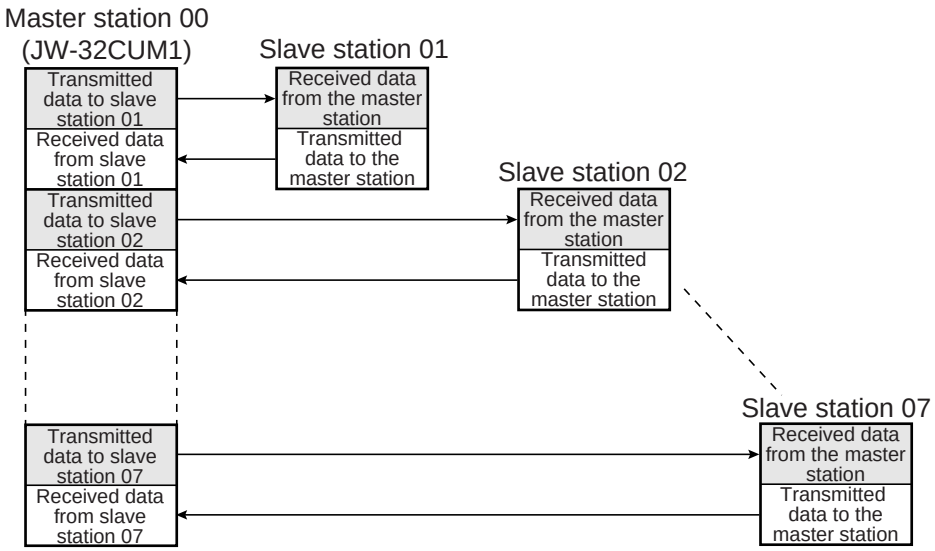
12-1 M-net (master station) function

M-net (interface between modules) is a communication system which makes data exchange possible between each type of equipment (such as programmable controllers, robot controllers, positioners, measuring equipment, etc.) while also reducing installation materials and labor costs. The M-net facilitates the construction of an automatic control facility for production.

When using the JW-32CUM1, use it as a master station $00_{(8)}$ in the M-net. The JW-32CUM1 sends and receives data to slave stations 01 to $07_{(8)}$. The slave stations do not communicate with each other.



● **Data communication system**



Items	Sharp specifications for M-net	M-net standard specifications (reference)
Number of stations that can be connected	Eight stations (one master station and seven slave stations)	Same as on the left
Number of link points	Up to 512 points (a total of 64 bytes can be used for transmission and reception from one station) *1	Up to 256 points (32 bytes)
Communication protocol	EIA RS485 or equivalent	Same as on the left
Data transmission speed	19.2 k bits/s, 38.4 k bits/s *2	19.2 k bits/s
Transmission specifications	Equivalent to the M-net specifications	------
Bit configuration	One start bit, seven data bits, one even parity bit, and one stop bit	Same as on the left
Data verification method	Transmission data uses even parity	Same as on the left
Synchronization system	Asynchronous system (Data is transmitted starting from the LSB.)	Same as on the left
Communication system	Half duplex system	Same as on the left
Transmission circuit	Maximum 1 km in cable total length	Maximum 100 m in cable total length
Others	Communications for PC operation are asynchronous	-----

*1 When a JW-32CUM1 is used as the master station, up to 512 link points can be used. However, when communicating with slave modules manufactured by other companies, be sure to check the number of link points these stations can handle.

*2 Normally, transmit data at a speed of 19.2 k bits/s. When you want to transmit data at 38.4 k bits/s, you must set every module in the network to 38.4 k bits/s.

The followings are the Sharp PC modules that can be used as master stations and slave stations in the M-net system.

● **PC modules that can be used only as master stations.**

Model	Compatible PC models
JW-32CUM1	JW30H

As slave station for the JW-32CUM1, all of the following modules can be used.

● **PC modules that can be used as master stations and slave stations**

Model	Compatible PC models	Number of modules that can be installed to one PC that has the M-net function
JW-10CM	W70H/100H, JW50/70/100 JW50H/70H/100H	Up to six modules
JW-21CM *	JW20, JW20H, JW30H	Up to six modules
JW-32CV2	VME built-in controller	One module
Z-331J	J-board	Up to two modules
Z-332J	J-board	Up to two modules
Z-313J	J-board	One module (Up to two Z-331J/ Z-332J modules can be installed.)
Z-511J	J-board	One module (Up to two Z-331J/ Z-332J modules can be installed.)

* The JW-21CM, version 1.1 or later, comes with the M-net function.
A maximum of 4 modules can be installed in the JW30H (with a JW-34KBM basic rack panel) and a JW-32CUM1. In this case, set the module No. switch on the JW-21CM to a number other than "0," since the JW-32CUM1 general purpose communication section uses the "0" area.

● **PC slave modules that can be used only as slave stations.**

Model	Input/output specifications	Number of input/output points (Connection method)
ZW-82N	12/24 VDC input	8 points (terminal block)
ZW-82S	Transistor output	
ZW-161N	100 VAC input	16 points (terminal block)
ZW-162N	12/24 VDC input	
ZW-161S	Triac output	
ZW-162S	Transistor output	
ZW-164S	Relay output	
ZW-162M	8 points: 12/24 VDC input	
	8 points: Transistor output	
ZW-164NH	24 VDC input	16 points (detachable terminal block)
ZW-162SH	Transistor output	
ZW-162MH	8 points: 24 VDC input	
	8 points: Transistor output	
ZW-324NH	24 VDC input	32 points (terminal block)
ZW-322SH	Transistor output	
ZW-322MH	16 points: 24 VDC input	
	16 points: Transistor output	
ZW-82NC	24 VDC input	8 points (sensor connector system)
ZW-162MC	8 points: 24 VDC input	16 points (sensor connector system)
	8 points: Transistor output	

12-2 Settings

When the JW-32CUM1 is used with the M-net function (master station), the items that must be set for the M-net are as follows.

Item	Setting method	Details (section number in this chapter)
Communication function	Select the "M-net function" using switch SW5.	12-2-[3]
Mode	Select the communication operation when an error occurs using switches SW3.	
Transfer speed	Select 19.2 kbps or 38.4 kbps using switch SW4.	
Termination resistance	Set the module as a termination station or an intermediate station using the LT switch.	
Station number	No need to set the number since it is fixed at "00."	---
Data memory area	No need to set the memory area since it is fixed to the following areas. - Data memory Top address: Ⅎ1000 Area: Ⅎ1000 to Ⅎ1077 (64 bytes) - Parameter storage area: O –0 000 to 017 - Communication selection register: Ⅎ1500 - Error flag: 15010	12-2-[2] 12-2-[4] 12-2-[5]

The description below assumes that the JW-32CUM1 is a master module in the M-net and that SHARP programmable controllers (JW-10CM, JW-21CM, and Z-331J/332J) are used as slave modules.

12-2-1 How to set (initialize) the M-net system

① Turn OFF the power to the master station PC (JW30H: JW-32CUM1) and slave station PC modules.

② Set the switches on the master (JW-32CUM1) and slave modules. ---- (Reference section) 12-2-3 Switch settings

Setting the switches	Master station	Slave station
1. Function selection (M-net function)	◯	◯
2. Station number (master station: 00, slave stations: 01 to 07)	◯	◯
3. Data memory top address (top address of the data range to be transmitted and received)	—	◯
4. Parameter storage area (setting the number of bytes of data to be transmitted and received)	—	◯
5. Communication selection register (controls the relay number for the M-net communications)	—	—
6. Error flag (relay number used to send the M-net communication error to the PLC module)	—	◯
7. Transfer speed	◯	◯
8. Mode (communication when an error occurs)	◯	◯
9. Termination resistance	◯	◯

◯: Required setting
— : Does not required setting

③ Install the master and slave modules. ---------- Follow the installation procedures described in the instruction manual and the user's manual for each module.

④ Wire the master and slave modules . ---------- Chapter 6: Wiring

⑤ Turn ON the power to the master and slave station PC modules.

⑥ Set the parameters on the master and slave station PC modules. ---------- 12-2-4 Parameter setting

Set the number of bytes of data to be transmitted and received in the parameter storage area.

⑦ Enter a communication program for use by the master and slave station PC modules. ------- 12-2-5 Communication program

Communication program	Master station	Slave station
1. Program to start communication and select the communication mode	◯	—
2. Monitoring program for the communication error relay	◯	◯

◯: Can be created
—: Cannot be created

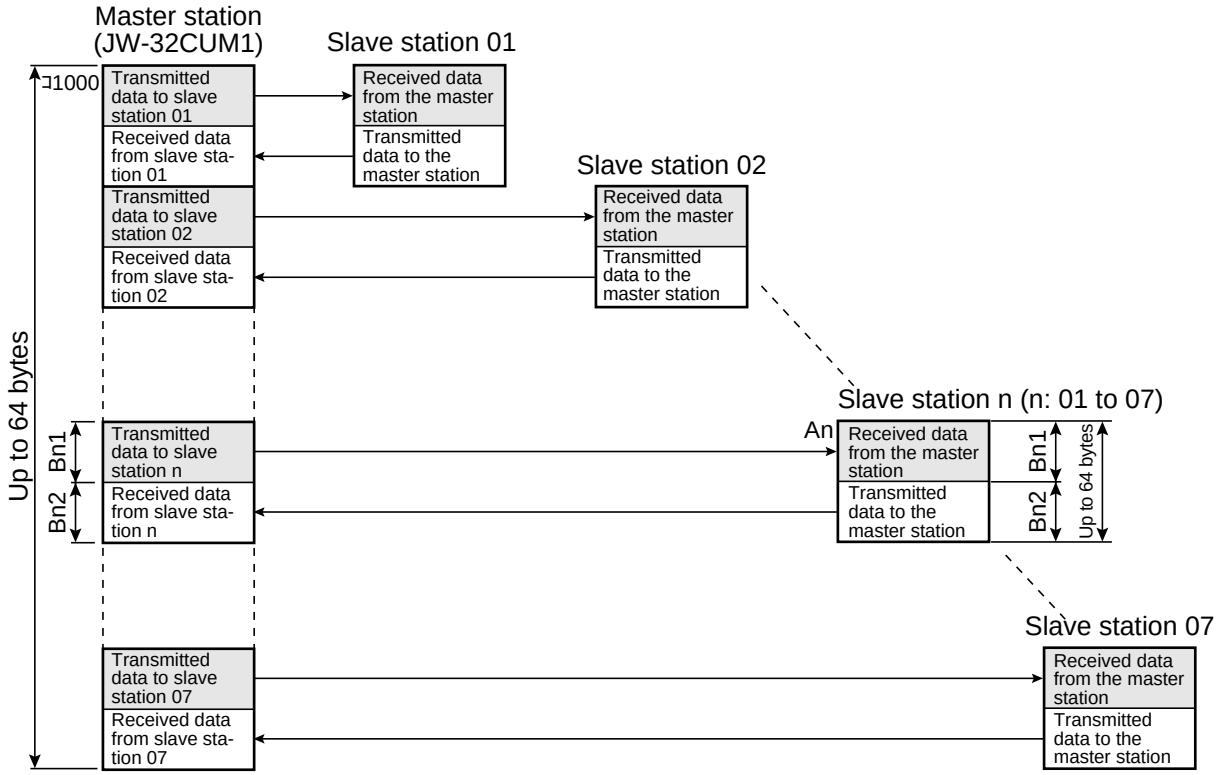
End of settings

Remarks

The switch setting contents of the master/slave modules are read into each module, when the PC power is turned OFF and ON again. Changing the switch settings after turning the PC power ON may cause a system error.

12-2-2 M-net data link area

This section describes the setting details for data transmission and reception between the master station (JW-32CUM1) and the slave stations 01 to 07(8).



- The first address for the master station (JW-32CUM1) is "Ǝ1000."
- The data area (for transmission and reception) between the master station and each slave station n (01 to 07) can be up to 64 bytes in size.

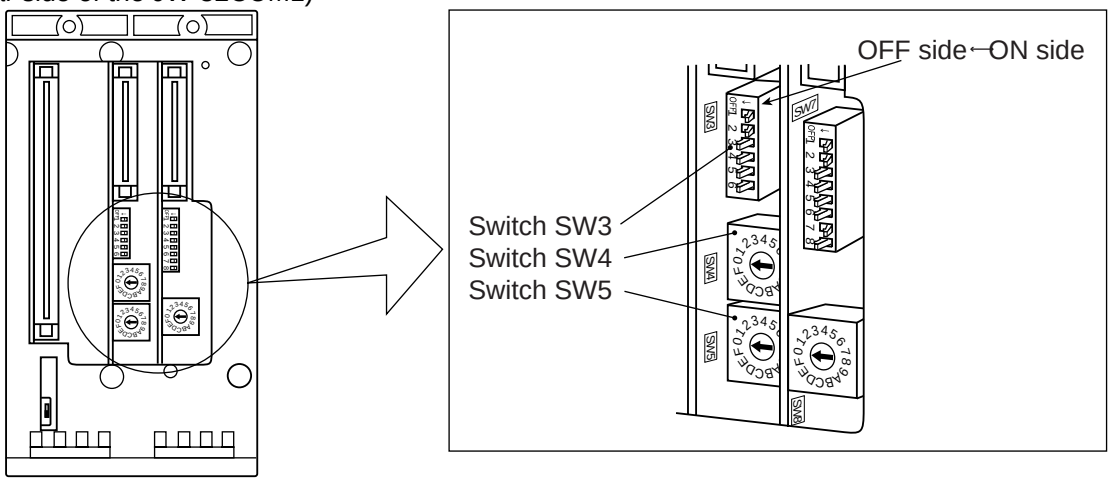
Setting items	Master station	Slave station n	Setting procedures
Top address for data memory	Ǝ1000	An	Switch for each module ⇨ See section 12-2-3 "Switch setting." *
Number of bytes to be transmitted from the master station (00) to slave station n	Bn1		Set the parameter storage area, and then the number of bytes to be transmitted from the data area using the switches on each module. ⇨ See section 12-2-4 "Parameter setting." *
Number of bytes to be transmitted from slave station n to the master station	Bn2		

* For details about the JW-10CM and other modules that are used as slave module, see the "M-net User's Manual."

12-2-3 Switch settings

Specify the settings with switches SW5 (communication function), SW3 (mode), SW4 (transfer speed), and LT (termination resistance) in the JW-32CUM1.

(Rear side of the JW-32CUM1)



(1) Switch SW5

Specify the communication function.

⇨ "7" when selecting the M-net function.

(2) Switch SW3

Select the communication operation when an error occurs using SW3-4.

SW3-4	ON: When an error occurs, the JW-32CUM1 will only communicate with stations operating normally. OFF: When an error occurs, the JW-32CUM1 will stop communication with all stations. ⇨ See page 12-15

- SW3-1, 3-2, 3-3, 3-5, and 3-6 are not used. (Keep the same settings as when delivered. => See page 4-3.)

(3) Switch SW4

Specify the data transfer speed.

0	19.2 kbps
7	38.4 kbps

- Normally select "19.2 kbps." If you select "38.4 kbps," you must set all of the modules to "38.4 kbps."
- Do not set to any number other than 0 or 7.

(4) Switch LT

Specify whether JW-32CUM1 is a termination station (ON) or an intermediate station (OFF) in the M-net communication circuit. ⇨ See page 4-1.

12-2-4 Parameter setting

Set the number of bytes of data to be transmitted or received between the master and slave stations using the M-net data link.
Enter the setting in the parameter storage area.

(1) Parameter storage area

The parameter storage area in the JW-32CUM1 (master station) is "O-0 000 to 017: 16 bytes."

(2) Parameter setting details

Parameter storage area	Setting details
O-0 000	Number of bytes transmitted from the master station (00) to slave station 01
O-0 001	Number of bytes transmitted from slave station 01 to the master station (00)
O-0 002	Number of bytes transmitted from the master station (00) to slave station 02
O-0 003	Number of bytes transmitted from slave station 02 to the master station (00)
O-0 004	Number of bytes transmitted from the master station (00) to slave station 03
O-0 005	Number of bytes transmitted from slave station 03 to the master station (00)
O-0 006	Number of bytes transmitted from the master station (00) to slave station 04
O-0 007	Number of bytes transmitted from slave station 04 to the master station (00)
O-0 010	Number of bytes transmitted from the master station (00) to slave station 05
O-0 011	Number of bytes transmitted from slave station 05 to the master station (00)
O-0 012	Number of bytes transmitted from the master station (00) to slave station 06
O-0 013	Number of bytes transmitted from slave station 06 to the master station (00)
O-0 014	Number of bytes transmitted from the master station (00) to slave station 07
O-0 015	Number of bytes transmitted from slave station 07 to the master station (00)
O-0 016	Number of slave stations connected *
O-0 017	00 (No setting)

* Enter the total number of slave stations that are connected, regardless of whether the communication selection relay is ON or OFF.

12-2-5 Communication program

Create an M net communication program and download it the master station PC (JW-32CUM1) and slave station PC.

Communication program to be created	Master station PC	Slave station PC
[1] Program to start communication and select the communication mode: Master station PC	◯	—
[2] Monitoring program for the communication error relay: Master station PC and slave station PC	◯	◯

◯: Can be created
—: Cannot be created

This section describes the master station programmable controller (JW-32CUM1).

[1] Program to start communication and select the communication mode

Specify the slave station numbers for the M-net communications, and whether a station should start or stop communication by creating programs.
Use the communication selection register (1 byte) for creating the programs.

(1) Address setting for the communication selection register

The communication selection register address is "∃1500" when the JW-32CUM1 is used as a master station.

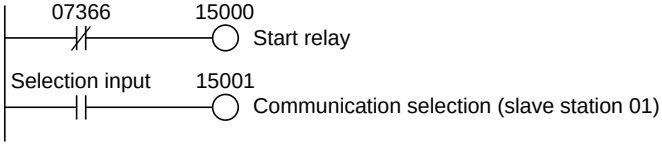
(2) Allocation in the communication control relay and details

Allocated in the communication selection register (1 byte) to communication control relay (8 points: start relay and communication selection relay).

Bit No.	7	6	5	4	3	2	1	0
Communication selection register (∃1500)	Slave station 07 (15007)	Slave station 06 (15006)	Slave station 05 (15005)	Slave station 04 (15004)	Slave station 03 (15003)	Slave station 02 (15002)	Slave station 01 (15001)	Slave station 01 Start (15000)
	Communication selection relay							

Relay name (bit assignments)	Details	
	When the relay is OFF	When the relay is ON
Start relay (bit: 0)	- The M net communication will stop. - The error flag will turn OFF when the connected PC or the communication sequence is abnormal.	- The M net communication will start. (Note: See page 12-15.) - The error flags are latched ON.
Communication selection relay (bits: 1 to 7)	- Communicate the slave station with the M-net. (Bits 1 to 7 correspond to slave stations 01 to 07.)	- Do not communicate the slave stations with the M-net. - This setting is used to disable a faulty station on the M-net.

(3) A program example



- Keep the start relay ON while communicating.
- Normally, the communication selection relay bits are always left OFF.

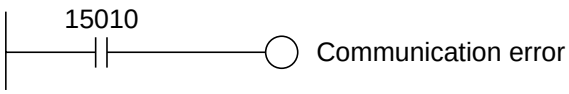
[2] Monitoring program for the communication error relay

A program for monitoring communication errors can be created using error flags.
The error flags are relays used to send an M-net communication error to the PC.

(1) Relay number for the error flag

The error flag (1 point) relay number is "15010" when the JW-32CUM1 is used as a master station.

(2) Program examples

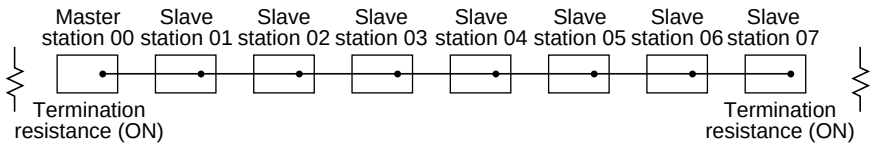


12-2-6 Setting example

This section describes some setting examples when using JW-10CMs for slave stations 01 to 03(8), and JW-21CMs for slave stations 04 to 07(8).

[1] System example

- **Setting the communication station numbers**



- **Switch setting**

- JW-32CUM1 (master station), JW-21CM (slave stations 04 to 07: The settings for switch number 8 are all 0.)

	Data memory range	Parameter storage area	Communication selection register	Error flag relay
Setting details	ↄ1000 to ↄ1077	O—0 000 to 017	ↄ1500	15010

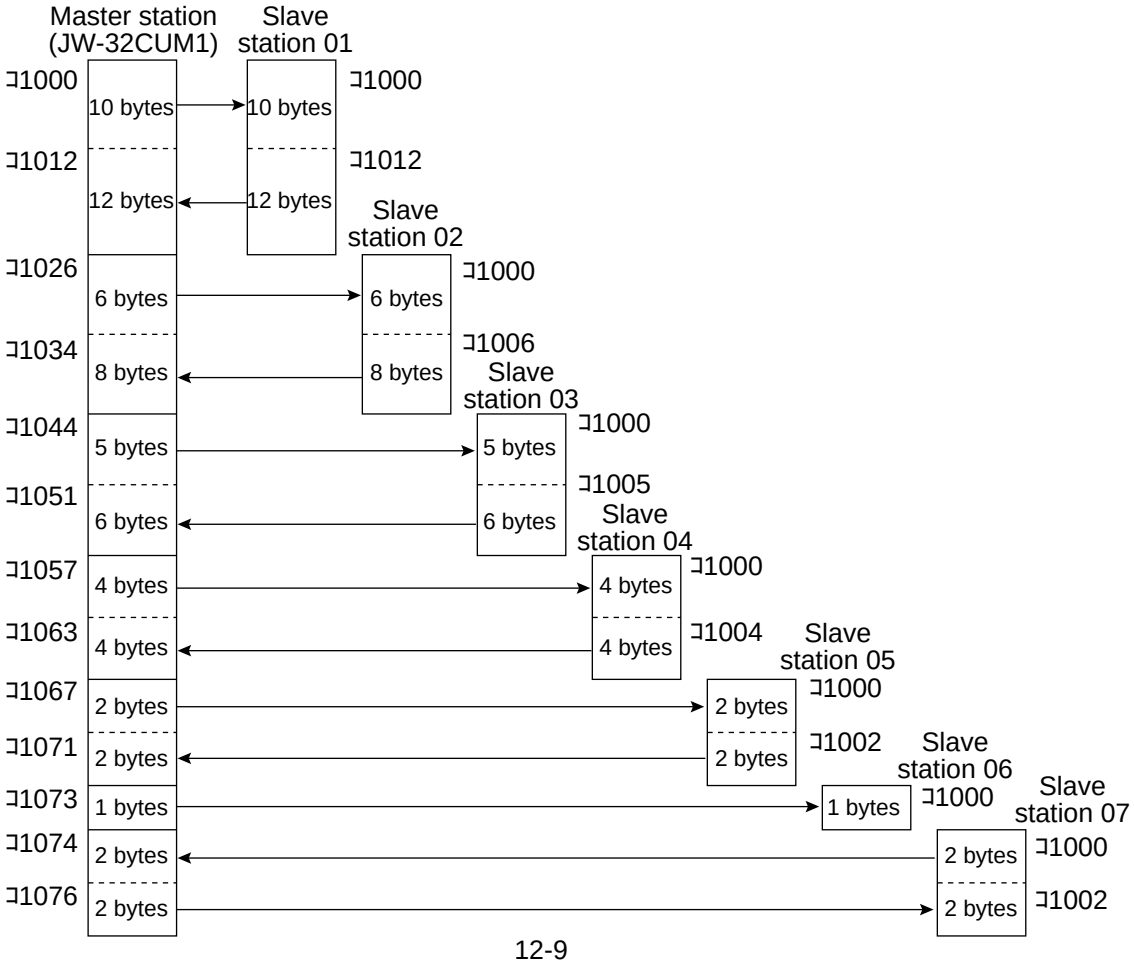
- JW-10CM (slave stations 01 to 03)

	Data memory range	Parameter storage area	Communication selection register	Error flag relay
Switch setting	SW1 = 0	SW4 and SW3-1 = 0	SW4 = 0	SW4 = 0
Setting details	ↄ1000 to	#260 to	ↄ0720	07310

- **Number of bytes of communication data**

Station number(8)	00	01	02	03	04	05	06	07
Number of bytes transmitted from the master station	—	10	6	5	4	2	1	2
Number of bytes transmitted from the slave station	—	12	8	6	4	2	0	2

[Data communication address in the master and slave stations]



[2] Setting procedure example

[1] This section describes examples of the setting procedures for the system.

Turn OFF the PC power in the master and slave stations.

↓

Set the switches on the master station (JW-32CUM1).

- SW5 ..... 7: M-net function
- SW3 ..... Mode
  - SW3-4 ..... OFF: Communication with all stations stops when a communication
  - SW3-1, 2 ..... ON: Always ON
  - SW3-1, 5, 6 ..... OFF: Always OFF
- LT ..... ON: The termination resistance is ON since this station is as terminal station.

↓

Switch settings for slave stations 01 to 03$_{(8)}$ (JW-10CM)

- SW0 ..... 7: M net function
- SW2 ..... 1 to 3: Set the station number for each slave station.
- SW1 ..... 0: Top address of data memory ⊐1000
- SW4 0
  - Parameter storage area: ..... System memory #260, #261
  - Error flag: ..... Relay 07310
- SW3 ..... Mode
  - SW3-4 ..... OFF: OFF: 19.2 k bits/s communication speed
  - SW3-3 ..... OFF: Communication with all stations stops when a communication
  - SW3-2 ..... OFF: Always OFF
  - SW3-1 ..... OFF: Set the parameter storage area by combining the setting with switch number 4.
- SW7 ..... Termination resistance
  - Slave stations 01 to 03: ..... OFF

↓

Switch settings for slave stations 04 to 07$_{(8)}$ (JW-21CM)

- SW0 ..... 7: M net function
- SW2 0
- SW1 ..... 4 to 7: Set the station number for each slave station.
- SW8 0
  - PData memory top address ..... ⊐1000
  - Parameter storage area ..... O-0 000 to 001
  - Error flag ..... Relay 15010
- SW3 ..... Mode
  - SW3-3 ..... OFF: Communication with all stations stops when a communication
  - SW3-1, 2, 4 ..... OFF: Always OFF
- SW4 ..... 0: Communication speed; 19.2 k bits/s
- SW7 ..... Termination resistance
  - Slave stations 04 to 06 ... OFF
  - Slave station 07 ..... ON

↓

To the next page.

Remarks

- The switch settings are read into the JW-32CUM1, JW-10CM, and JW-21CM, when the PC power is turned OFF and then ON again. Changing the switch settings after turning the PC power ON may cause a system error.

Continued from the previous page.

Turn ON the PC power to the master station.

Set the parameters for the master station (JW-32CUM1)

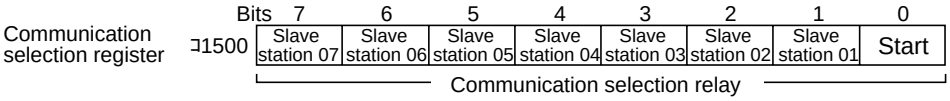
System memory No.	Setting (decimal notation)	Details (Up to 64 bytes can be allocated.)
O-0 000	10	Number of bytes transmitted from the master station (00) to slave station 01
O-0 001	12	Number of bytes transmitted from slave station 01 to the master station (00)
O-0 002	6	Number of bytes transmitted from the master station (00) to slave station 02
O-0 003	8	Number of bytes transmitted from slave station 02 to the master station (00)
O-0 004	5	Number of bytes transmitted from the master station (00) to slave station 03
O-0 005	6	Number of bytes transmitted from slave station 03 to the master station (00)
O-0 006	4	Number of bytes transmitted from the master station (00) to slave station 04
O-0 007	4	Number of bytes transmitted from slave station 04 to the master station (00)
O-0 010	2	Number of bytes transmitted from the master station (00) to slave station 05
O-0 011	2	Number of bytes transmitted from slave station 05 to the master station (00)
O-0 012	1	Number of bytes transmitted from the master station (00) to slave station 06
O-0 013	0	Number of bytes transmitted from slave station 06 to the master station (00)
O-0 014	2	Number of bytes transmitted from the master station (00) to slave station 07
O-0 015	2	Number of bytes transmitted from slave station 07 to the master station (00)
O-0 016	7	Number of slave stations connected
O-0 017	0	(No setting)

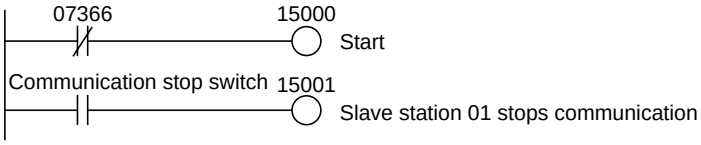
Enter the master station (JW-32CUM1) program

Enter the communication program to the master station PC.

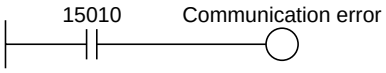
① Enter the program used to transmit and receive data.
The top address in data memory is " ㅋ1000."

② Enter the program to start and select communication.
The communication selection register address is " ㅋ1500".





③ Enter the monitor program for the communication error relay.
The error flag is "15010."



To the next page.

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Continued from the previous page.

Turn ON the power to the slave stations.

Set the parameters for slave stations 01 to 07$_{(8)}$.

Setting the station number	System memory/ parameter number	Setting (decimal notation)	Details
Slave station 01	#260	10	Number of bytes transmitted from the master station (00) to slave station 01
	#261	12	Number of bytes transmitted from slave station 01 to the master station (00)
Slave station 02	#260	6	Number of bytes transmitted from the master station (00) to slave station 02
	#261	8	Number of bytes transmitted from slave station 02 to the master station (00)
Slave station 03	#260	5	Number of bytes transmitted from the master station (00) to slave station 03
	#261	6	Number of bytes transmitted from slave station 03 to the master station (00)
Slave station 04	O-0 000	4	Number of bytes transmitted from the master station (00) to slave station 04
	O-0 001	4	Number of bytes transmitted from slave station 04 to the master station (00)
Slave station 05	O-0 000	2	Number of bytes transmitted from the master station (00) to slave station 05
	O-0 001	2	Number of bytes transmitted from slave station 05 to the master station (00)
Slave station 06	O-0 000	1	Number of bytes transmitted from the master station (00) to slave station 06
	O-0 001	0	Number of bytes transmitted from slave station 06 to the master station (00)
Slave station 07	O-0 000	2	Number of bytes transmitted from the master station (00) to slave station 07
	O-0 001	2	Number of bytes transmitted from slave station 07 to the master station (00)

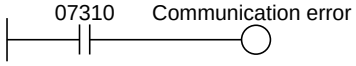
- For details about how to set the system memory and parameters, see the instruction manual for the support tools (JW-14PG, JW-100SP, etc.).

Enter the program for slave stations 01 to 07$_{(8)}$.

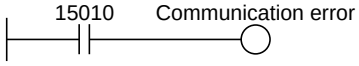
Enter the program to enable communication with the slave station PC.

① Enter the program to transmit the send and receive data.
The top address for data memory is "1000," since SW1 (JW-10CM) and SW8 (JW-21CM) are set to "0."

② Enter the monitor program for the communication error relay.
The error flag address is "07310," since the switches in number 4 are set to "0" on slave stations 01 to 03$_{(8)}$.



The error flag address is "15010," since the switches in number 8 are set to "0" on slave stations 04 to 07$_{(8)}$.



End of settings

12-3 Communication time and communication timing

(1) Time required for transmission

This section shows how to calculate the time required for one cycle of data transmission. One cycle of data transmission means the time required for the M-net to communicate between the master station and all slave stations.

$$\text{One cycle time for transmission } T = \frac{20N+60P}{19.2} + 15P + \alpha \text{ (unit: ms)}$$

N: Total number of bytes communicated (unit: byte)
P: Number of slave stations connected (do not count the master station)
a: Time required for the master station to exchange data with a PC (⇨ See section (3) below.)
19.2: Transfer speed (38.4 when the transfer speed is set to 38.4 k bits/s)

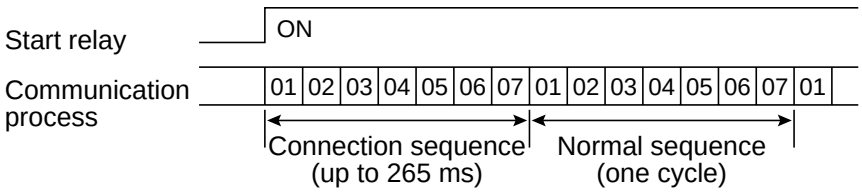
[EX] When a JW30H (JW-32CUM1) is used as a master station, there are 7 slave stations, and 64 bytes are communicated in one cycle.

$$T = \frac{20x64+60x7}{19.2} + 15x7+0.2=193.7 \text{ (ms)}$$

(2) Connection sequence time

The connection sequence is a test communication to check whether the master station can communicate correctly with the slave stations.

- If you turn ON the start relay in the PC program, the test communication will start.
- Up to 265 ms are required to execute the connection sequence. (Even if only one slave station is connected, the connection sequence will test the communication with all seven slave stations.)
- When designing a PC program, take the connection sequence time into account.



(3) Time for data exchange with a PC

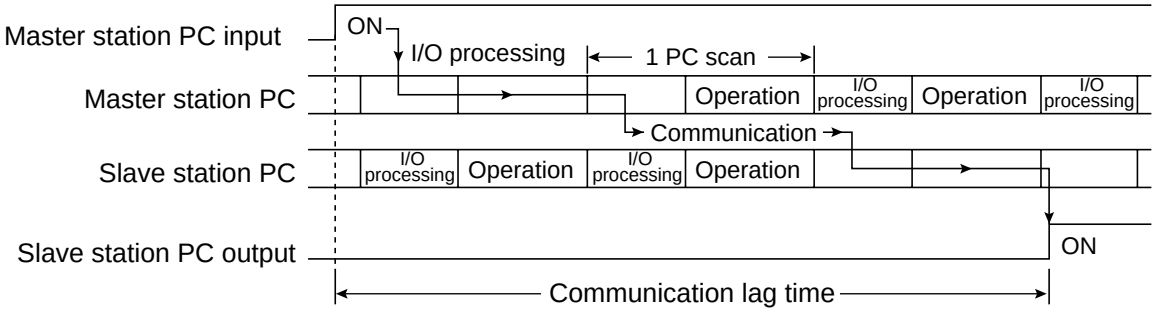
Shown below are the times required for data exchange between a PC and various modules. The PC scan time for the master and slave stations will get longer as the data exchange time becomes longer.

PC model		Data exchange time (when 64 bytes are transmitted)
JW30H	JW-32CUM1	Approx. 0.2 ms
	JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3	Approx. 0.2 ms *
	JW-31CUH/32CUH/33CUH	Approx. 1 ms
JW20/20H		Approx. 6 ms
W70H/100H		Approx. 0.1 ms
JW50/70/100		
JW50H/70H/100H		
J-board (Z-311J/312J)		Approx. 6 ms
J-board (Z-511J/512J)		Approx. 0.2 ms

* This is the time when the JW-34KB/36KB/38KB is used as the basic rack panel. When using the JW-24KB/26KB/28KB, the data exchange time will be approx. 1 ms.

(4) Communication lag time

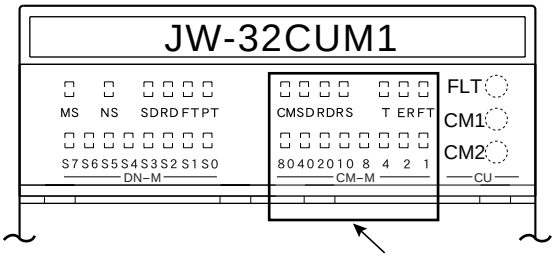
The following time lag occurs when receiving data over the M-net communication.



12-4 Errors and treatment

12-4-1 Indicators

The lamps on the master station (JW-32CUM1) light according to the operating conditions of the M-net.



CM-M section on the display panel

Lamp name	Details	Condition when lit	Response
CM	Actively communicating	This lamp is lit during communication.	-----
SD	Transmitting data	This lamp flashes when transmitting data.	
RD	Receiving data	This lamp flashes when receiving data.	
RS	Request to send	This lamp flashes during communication.	
T	Testing	This lamp is lit during testing (used for inspection before delivery).	
ER	Error	This lamp will light when a communication error occurs. (The error codes are displayed as 80 to 1.)	- Check for a disconnected communication cable or bad wiring. - Check the switch settings on the master and slave stations. - Check the system memory settings on the master and slave stations. - Check the power supply voltage to the slave stations. - Replace the JW-32CUM1 or slave modules.
FT	Fault	This lamp will light if the watchdog timer times out.	- Set switch number SW5 to "7: M-net." - Replace this JW-32CUM1. - Replace the rack panel.
80 to 1	Error code	When an error lamp lights, the error code will be displayed.	For details about the error codes, see page 12-16.

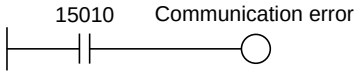
12-4-2 Error flag

[1] Error flag details

The error flags are relays that are turned ON when the M-net is not able to communicate normally. When using the JW-32CUM1, the details of the error are displayed on the indicator lamps (CM-M section) as error codes.

- Set the relay number for the error flag using the switches on the communication selection register address is "15010" when the JW-32CUM1 is used as a master station.
- When an error flag is programmed as an input signal, communication errors can be monitored.

[EX]



- When the start relay (page 12-8) is turned ON after a connection sequence error or a communication sequence error has occurred, the error flag will be turned OFF.

[2] Relationship between communication errors and switch settings

The method for handling communication errors varies with each switch (SW3-4) setting on the master module (JW-32CUM1).

Switch setting	OFF	ON
When an error occurs	The M-net communication will stop. (Communication with all stations stops.)	Communication only continues with normal stations.
Error display	- The error flag turns ON. - The error code is displayed and the error code is stored in system memory.	Same as on the left.
Recovery process for a faulty station	Faulty stations are not restored automatically. (The following procedures are required to restore a station.) **1. When applying the power to the PC** - When the start relay is set to "always ON," first turn ON the power to the slave station PCs, and then provide power to the master station PC. - After checking that all of the communication station PCs are ON, turn ON the start relay. **2. Communication recovery process when a slave station is faulty** After repairing and restarting the faulty station, turn the start relay OFF and ON again. The communication process will be restarted from the connection sequence. **3. If you must remove a faulty station** Turn ON the communication selection and turn the start relay OFF and ON again to remove the registration of the faulty slave station from the M net. The communication process will be restarted from the connection sequence.	The faulty station will recover automatically. [The master station periodically executes a communication recovery process to restore faulty stations.]

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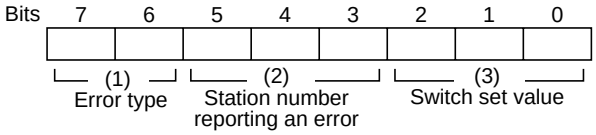
12-4-3 Error code

When an error occurs on the master station during M-net communications, the error code is stored in system memory #170 on the master station PC (JW-32CUM1). When a JW-32CUM1 is being used, the error code will be displayed by the indicator lamps (80 to 1)on the module.

[1] Error code details

The error code contains three kinds of information in eight bits.



- Bits 0 to 7 of the error code correspond to the indicator lamps E0 to E7 on the JW-32CUM1, and the indicator lamps 1 to 80 on the module.

(1) Error type

Bit (error code)	7	6	Details	Cause of error	Treatment
Indicator lamp	80	40			
	○	○	Normal	———	———
	○	●	Parameter error	- Wrong switch setting on the master station - Wrong parameter setting	- Check the switch settings. - Check the parameter settings. (Number of communication bytes, number of slave stations, number of communication bytes on the slave stations)
	●	○	Connection sequence error *	- No response from the slave stations - Different parameter settings in the master and slave stations - More slave stations connected than specified in the parameter setting	- Check the power and communication cables on the slave station (disconnected or termination resistance turned OFF). If there is a problem, replace the slave station. - Check both the master and slave station parameters. - Check the master station parameters, number of slave stations, data transfer speed, and the number of communication bytes on the slave stations.
	●	●	Normal sequence error	No response from a specific slave station	Check the power and communication cables on the slave station (disconnected or termination resistance turned OFF). If there is a problem, replace the slave station.

Status

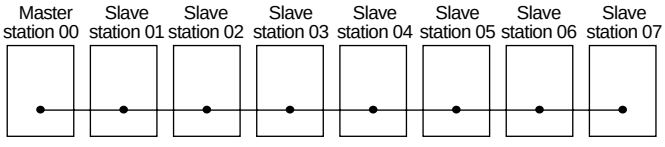
	Bit	Lamp
●	ON	Lights ON
○	OFF	Goes OFF

* When connecting modules manufactured by other companies, make sure that the number of link points and transmission speed are within the standard specifications for these modules.

(2) Station number reporting an error

Bit (error code)	5	4	3	Details
Indicator lamp	20	10	8	
	○	○	●	Slave station 01
	○	●	○	Slave station 02
	○	●	●	Slave station 03
	●	○	○	Slave station 04
	●	○	●	Slave station 05
	●	●	○	Slave station 06
	●	●	●	Slave station 07

When a connection sequence error or normal sequence error occurs, this function indicates the number of the slave station that has a communication error.



Status

	Bit	Lamp
●	ON	Lights ON
○	OFF	Goes OFF

(3) Setting value of switches

Bit (error code)	2	1	0	Details
Indicator lamp	4	2	1	
	○	○	○	Slot number 0
	○	○	●	Slot number 1
	○	●	○	Slot number 2
	○	●	●	Slot number 3
	●	○	○	Slot number 4
	●	○	●	Slot number 5

Shows the module No. switch setting values for the master modules (JW-32CUM1, JW-21CM) on which a "parameter error," "connection sequence error," or "normal sequence error" has occurred. (The JW-32CUM is fixed to "0.")

Status

	Bit	Lamp
●	ON	Lights ON
○	OFF	Goes OFF

[2] Error code table

Bit	Error code (display) 7	6	5	4	3	2	1	0	Hex-adecimal	Details (See page 12-16.) Error type	Error station number	Setting value for the switches
Indicator lamp	80	40	20	10	8	4	2	1				
	○	○	○	○	○	○	○	○	00	In normal operation	—	—
	○	●	○	○	○	○	○	○	40	Parameter error	—	0
	○	●	○	○	○	○	○	●	41	〃	—	1
	○	●	○	○	○	○	●	○	42	〃	—	2
	○	●	○	○	○	○	●	●	43	〃	—	3
	○	●	○	○	○	●	○	○	44	〃	—	4
	○	●	○	○	○	●	○	●	45	〃	—	5
	●	○	○	○	●	○	○	○	88	Connection sequence error	1	0
	●	○	○	○	●	○	○	●	89	〃	1	1
	●	○	○	○	●	○	●	○	8A	〃	1	2
	●	○	○	○	●	○	●	●	8B	〃	1	3
	●	○	○	○	●	●	○	○	8C	〃	1	4
	●	○	○	○	●	●	○	●	8D	〃	1	5
	●	○	○	●	○	○	○	○	90	〃	2	0
	●	○	○	●	○	○	○	●	91	〃	2	1
	●	○	○	●	○	○	●	○	92	〃	2	2
	●	○	○	●	○	○	●	●	93	〃	2	3
	●	○	○	●	○	●	○	○	94	〃	2	4
	●	○	○	●	○	●	○	●	95	〃	2	5
	●	○	○	●	●	○	○	○	98	〃	3	0
	●	○	○	●	●	○	○	●	99	〃	3	1
	●	○	○	●	●	○	●	○	9A	〃	3	2
	●	○	○	●	●	○	●	●	9B	〃	3	3
	●	○	○	●	●	●	○	○	9C	〃	3	4
	●	○	○	●	●	●	○	●	9D	〃	3	5
	●	○	●	○	○	○	○	○	A0	〃	4	0
	●	○	●	○	○	○	○	●	A1	〃	4	1
	●	○	●	○	○	○	●	○	A2	〃	4	2
	●	○	●	○	○	○	●	●	A3	〃	4	3
	●	○	●	○	○	●	○	○	A4	〃	4	4
	●	○	●	○	○	●	○	●	A5	〃	4	5
	●	○	●	○	●	○	○	○	A8	〃	5	0
	●	○	●	○	●	○	○	●	A9	〃	5	1
	●	○	●	○	●	○	●	○	AA	〃	5	2
	●	○	●	○	●	○	●	●	AB	〃	5	3
	●	○	●	○	●	●	○	○	AC	〃	5	4
	●	○	●	○	●	●	○	●	AD	〃	5	5
	●	○	●	●	○	○	○	○	B0	〃	6	0
	●	○	●	●	○	○	○	●	B1	〃	6	1
	●	○	●	●	○	○	●	○	B2	〃	6	2
	●	○	●	●	○	○	●	●	B3	〃	6	3
	●	○	●	●	○	●	○	○	B4	〃	6	4
	●	○	●	●	○	●	○	●	B5	〃	6	5
	●	○	●	●	●	○	○	○	B8	〃	7	0
	●	○	●	●	●	○	○	●	B9	〃	7	1
	●	○	●	●	●	○	●	○	BA	〃	7	2
	●	○	●	●	●	○	●	●	BB	〃	7	3
	●	○	●	●	●	●	○	○	BC	〃	7	4
	●	○	●	●	●	●	○	●	BD	〃	7	5
	●	●	○	○	●	○	○	○	C8	Communication sequence error	1	0
	●	●	○	○	●	○	○	●	C9	〃	1	1
	●	●	○	○	●	○	●	○	CA	〃	1	2
	●	●	○	○	●	○	●	●	CB	〃	1	3
	●	●	○	○	●	●	○	○	CC	〃	1	4
	●	●	○	○	●	●	○	●	CD	〃	1	5

Status

	Bit	Lamp
●	ON	Lights ON
○	OFF	Goes OFF

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Bit	Error code (display) 7	6	5	4	3	2	1	0	Hexadecimal	Details (See page 12-16.) Error type	Error station number	Setting value for the switches
Indicator lamp	80	40	20	10	8	4	2	1				
	●	●	○	●	○	○	○	○	D0	Communication sequence error	2	0
	●	●	○	●	○	○	○	●	D1	〃	2	1
	●	●	○	●	○	○	●	○	D2	〃	2	2
	●	●	○	●	○	○	●	●	D3	〃	2	3
	●	●	○	●	○	●	○	○	D4	〃	2	4
	●	●	○	●	○	●	○	●	D5	〃	2	5
	●	●	○	●	●	○	○	○	D8	〃	3	0
	●	●	○	●	●	○	○	●	D9	〃	3	1
	●	●	○	●	●	○	●	○	DA	〃	3	2
	●	●	○	●	●	○	●	●	DB	〃	3	3
	●	●	○	●	●	●	○	○	DC	〃	3	4
	●	●	○	●	●	●	○	●	DD	〃	3	5
	●	●	●	○	○	○	○	○	E0	〃	4	0
	●	●	●	○	○	○	○	●	E1	〃	4	1
	●	●	●	○	○	○	●	○	E2	〃	4	2
	●	●	●	○	○	○	●	●	E3	〃	4	3
	●	●	●	○	○	●	○	○	E4	〃	4	4
	●	●	●	○	○	●	○	●	E5	〃	4	5
	●	●	●	○	●	○	○	○	E8	〃	5	0
	●	●	●	○	●	○	○	●	E9	〃	5	1
	●	●	●	○	●	○	●	○	EA	〃	5	2
	●	●	●	○	●	○	●	●	EB	〃	5	3
	●	●	●	○	●	●	○	○	EC	〃	5	4
	●	●	●	○	●	●	○	●	ED	〃	5	5
	●	●	●	●	○	○	○	○	F0	〃	6	0
	●	●	●	●	○	○	○	●	F1	〃	6	1
	●	●	●	●	○	○	●	○	F2	〃	6	2
	●	●	●	●	○	○	●	●	F3	〃	6	3
	●	●	●	●	○	●	○	○	F4	〃	6	4
	●	●	●	●	○	●	○	●	F5	〃	6	5
	●	●	●	●	●	○	○	○	F8	〃	7	0
	●	●	●	●	●	○	○	●	F9	〃	7	1
	●	●	●	●	●	○	●	○	FA	〃	7	2
	●	●	●	●	●	○	●	●	FB	〃	7	3
	●	●	●	●	●	●	○	○	FC	〃	7	4
	●	●	●	●	●	●	○	●	FD	〃	7	5

Status

	Bit	Lamp
●	ON	Lights ON
○	OFF	Goes OFF

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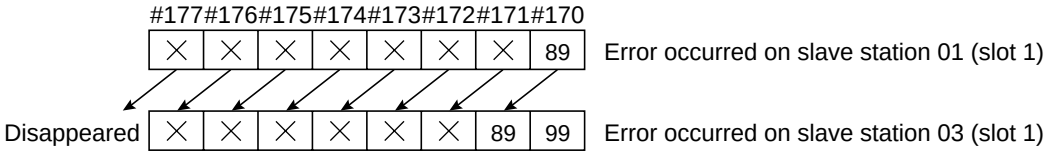
[3] Storing an error code in the system memory

When an M-net communication error occurs in the master station PC (JW-32CUM1), the following error codes are stored in system memory locations starting at #170 and at #160 in the JW-32CUM1.

(1) Storing an error code in system memory address #170

When an error occurs in an M-net function, the error code (See pages 12-17 to 12-18) is stored in system memory address #170 on the master station PC.

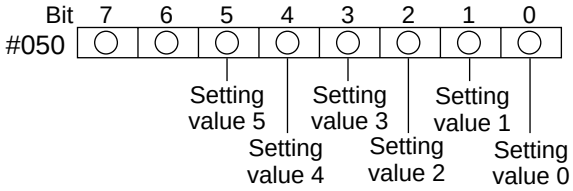
The error code which was stored in system memory address #170 is shifted up by one address location, from #170 to #177, each time another error occurs. Up to 8 error codes can be recorded.



(2) Storing an error code in system memory address #160

When an error occurs in a master or slave modules, error code $53_{(H)}$ (optional error) is stored in system memory address #160.

When option error $53_{(H)}$ occurs, the corresponding bit for the module No. switch setting on the error module turns ON in system memory location #050. The each ON bit becomes OFF by recovering from the abnormal condition. But the last ON bit does not become OFF even if the abnormal condition recovers.



- When an error occurs in the JW-32CUM1 (M-net section), bit 0 (set value: 0) turns ON.
- Bits 1 to 5 correspond to the values set with the JW-21CM module No. switch.

Chapter 13: Specifications

13-1 JW30H (JW-32CUM1) general specifications

Shown below are the general specifications when using the JW-32CUM1 as a control module and a JW-34KBM as a basic rack panel.

Items	Specifications			
	Using JW-21PU	**Using JW-22PU**	**Using JW-31PU (UL/CSA approved)**	**Using JW-33PU (UL/CSA/CE approved)**
Power voltage	85 to 264 VAC, 47 to 63 Hz	20.4 to 32.0 VDC*1	85 to 132 VAC, 47 to 63 Hz	85 to 264 VAC, 47 to 63 Hz
Guaranteed voltage interruption time	Available voltage interruption time of 10 ms max.			
Insulation resistance	10 M ohm min. at 500 VDC megger			
	(Between AC external terminal and rack panel)	(Between DC external terminal and rack panel)	(Between AC external terminal and rack panel)	
Dielectrical strength	1500 VAC, 50/60 Hz for 1 minute (between AC external terminal and rack panel)	1000 VAC, 50/60 Hz for 1 minute (between DC external terminal and rack panel)	1500 VAC, 50/60 Hz for 1 minite (between AC external terminal and rack panel)	
Noise immunity	1000 Vp-p 1 μs width impulse (by noise simulator between the power line and rack panel)			
Storage temperature	– 20 to 70° C			
Ambient operation temperature	0 to 55° C			
Ambient operation humidity	35 to 90% RH (non-condensing)			
Atmosphere	Free from corrosive gas			
Vibration resistance	JIS C 0911 or equivalent - Multiple vibration width: 0.15 mm (10 to 57 Hz), 9.8 m/s^2 (57 to 150 Hz), Number of sweep: 10 (1 octave/minute), three directions (X, Y, and Z)			
Shock resistance	JIS C 0912 or equivalent, 147 m/s^2 (3 times in each X, Y and Z axis)			
Power consumption	60 VA max *2			70 VA max *2
Internal current consumption (5 VDC)	Maximum 950 mA (total of the JW-32CUM1 and JW-34KBM)			
Weight	Approx. 3.6 kg	When one power supply module, one JW-32CUM1, one memory module, and four I/O modules installed in JW-34KBM		
Grounding	Class-3 grounding			

*1: As for DC input power source, use power source of 20.4 to 32 VDC (ripple rate 20% or less; however, ripple upper limit: 32 V or less, lower limit: 20.4 V or more).

*2: This value is at max. load state of single power supply module.

13-2 JW30H (JW-32CUM1) system specifications

Shown below are the system specifications when using the JW-32CUM1 as a control module and a JW-34KBM as the basic rack panel.

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Number of rack panel connected</td><td>Max. 8 sets in total of 1 basic rack panel (JW-34KBM) and 7 expansion rack panel.*1</td></tr>
<tr><td>Total length of expansion cable</td><td>Max. 50 m *1</td></tr>
<tr><td>Number of I/O points</td><td>Max. 1024 points</td></tr>
<tr><td>Number of mounting I/O module, special I/O module, and option module, etc.</td><td>Total of 60 sets can be mounted *2
- Max. of 60 I/O modules can be mounted including on both the basic and the expansion rack panels (racks 0 to 7).
- Max. 28 special I/O modules can be mounted including on both the basic and the expansion rack panels (racks 0 to 3).
- Max. of 4 option modules can be mounted on the basic rack panel.
- Max. of 1 I/O link master module (JW-23LMH) can be mounted on the basic rack panel. (Operation mode 7/8 only.)
- Max. of 3 DeviceNet master modules (JW-20DN) can be mounted on the basic rack panel.</td></tr>
<tr><td>Number of I/O relay occupied points of I/O module, special I/O module, option module. (Allocation of relay address)</td><td>
<table>
<tr><th>Module Item</th><th>Number of I/O relay area occupied points</th></tr>
<tr><td>8 points input/output module</td><td>16 points</td></tr>
<tr><td>16 points input/output module</td><td>16 points</td></tr>
<tr><td>32 points input/output module</td><td>32 points</td></tr>
<tr><td>Special I/O module</td><td>16 points</td></tr>
<tr><td>Option module</td><td>16 points</td></tr>
<tr><td>I/O link master module
DeviceNet master module</td><td>16 points</td></tr>
<tr><td>Not installed (Vacant slot)</td><td>16 points</td></tr>
</table>
Option, I/O link and special I/O module is execlusive use relay area except for I/O relay area.</td></tr>
<tr><td>Program memory</td><td>The JW30H has a memory section for storing the user program as standard. (Fixed capacity).
The program can be stored in the built-in flash ROM.</td></tr>
</table>

*1: When using a JW-31EA/32EA I/O bus expansion adapter.
*2: When using JW-38ZB expansion rack panels (7 modules).

13-3 JW-32CUM1 performance specifications and communication specifications

Shown below are the performance specifications and communication specifications for the JW-32CUM1 control module.

[1] Performance specification

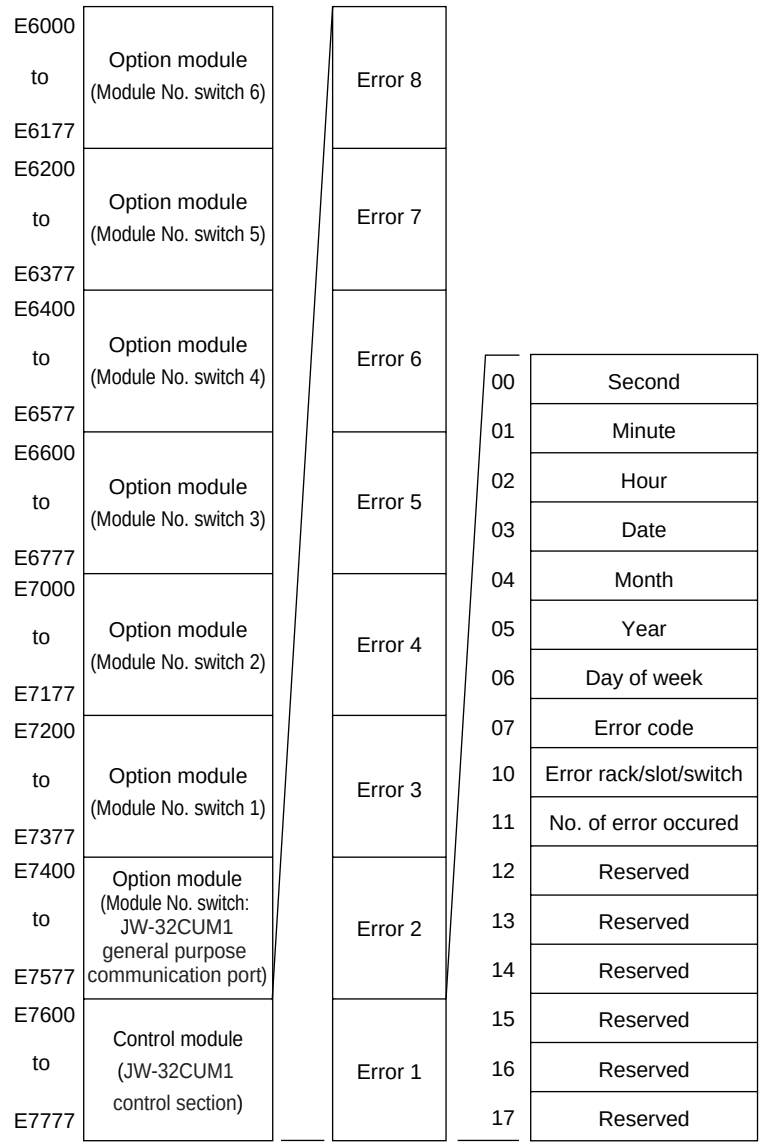
Shown below are the performance specifications for the JW-32CUM1.

Items		Specifications
Program system		Stored program system
Control system		Compatible cyclic calculation and interrupt dealing system
Processing speed		Basic instruction (except OUT, TMR, CNT, MD) : 0.038 μs/instruction. OUT instruction : 0.076 μs/instruction Application instructions, TMR, CNT, MD instructions : average number μ to several tens μs/instruction
Type and numbers of instruction		Basic instruction : 20 Application instruction : 177
Program size		15.5K words/31.5K words (switchover)
Memory back-up		By built-in lithium battery. (Available for ROM operation using integrated flash ROM.)
I/O control system		Both block refresh system and refresh system by instruction are applied.
Max. numbers of I/O points		Max.1024 points
		Max. rack panels : 8 rack panels *1
Data memory	Relay	30720 points (00000 to 15777, 20000 to 75777) [⊐0000 to ⊐1577, ⊐2000 to ⊐7577]
	Relay for option module	2560 points (10000 to 14777) [⊐1000 to ⊐1477]
	Flag for option module	448 points (15000 to 15677) [⊐1500 to ⊐1567]
	Flag for I/O link	64 points (15700 to 15777) [⊐1570 to ⊐1577]
	Relay for I/O link	2048 points (20000 to 23777) [⊐2000 to ⊐2377] *2
	Relay for special I/O module (basic system)	4096 points (30000 to 37777) [⊐3000 to ⊐3777]
	Relay for special I/O module (Remote I/O slave station)	1024 points (40000 to 41777) [⊐4000 to ⊐4177]
	Special relay	64 points (07300 to 07377) 07300 to 07337 : Reserved area 07340 to 07347 : Error code strage 07354 : Non-carry flag 07355 : Error flag 07356 : Carry flag 07357 : Zero flag 07360 : 0.1 second clock 07362 : Initialize pulse 07363 : Fuse blown 07364 : 1.0 second clock 07365 : Setting value change switch 07366 : Normally OFF contact 07370 : Memory error 07371: CPU error 07372 : Battery error 07373 : I/O error 07374 : Option error 07375 : Special I/O error 07376 : Expansion power supply error 07377 : Power supply error

*1 In case of using I/O bus expansion adapter JW-31EA/32EA.

*2 Each relay is setted by module No. switch on the face of special, I/O link, and option module.

Items		Specifications
Data memory	Timer/counter/MD	Total 1024 points (000 to 1777 : common for both timer and counter) - Timer set time 100 ms timer (TMR0000 to 1777) 0.1 sec. to 199.9 sec. 0.1 sec. to 3276.7 sec. (BIN) 0.1 sec. to 799.9 sec. (BCD) 10 ms timer (TMR 0400 to 0777) 0.01 sec. to 19.99 sec. (BCD) TMR 0400 to 0777 is selectable timer feature of 100 ms unit and 10 ms unit. - Counter setting value 1 to 1999 1 to 32767 (BIN) 1 to 7999 (BCD) - MD setting value 0 to 999 The current value of the counter and MD are stored at power OFF. The timer is selectable between kept or reset after power OFF. Assignable timer/counter setting value into registers. (Refer to application instructions F-260, Fc260, F-261 and Fc261 of the JW30H programming manual.)
	Register	9216 bytes (kept after power OFF) 09000 to 09777, 19000 to 19777, 29000 to 29777, 39000 to 39777, 49000 to 49777, 59000 to 59777, 69000 to 69777, 79000 to 79777, 89000 to 89777, 99000 to 99777, E0000 to E7777.
	Current timer storage register	Second : 99770 Minute : 99771 Hour : 99772 Day : 99773 Month : 99774 Year : 99775 The day of the week : 99776 Control code : 99777

Items		Specifications
Data memory	Error history storage register	This register can store the last 8 error codes of the control module (JW-32CUM1) and option module including the error occurrence time and the number. Total : 1K bytes (E6000 to E7777)  The error occurrence time is stored by 24 hour indication.
	File register	File 1 (16K bytes) File 2 (Switchover between 32 K and 64 K bytes) Total 48K/80K bytes

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Items	Specifications

System memory

Number (OCT)	Contents	
#010 to 017	Monitor the timer.	
#030	Monitor the minimum scanning time.	(lower digit BCD)
#031	Ditto	(upper digit BCD)
#032	Monitor the current scanning time.	(lower digit BCD)
#033	Ditto	(upper digit BCD)
#034	Monitor the maximum scanning time.	(lower digit BCD)
#035	Ditto	(upper digit BCD)
#046	Monitor the error detected I/O rack panel and slot No. (OCT)	
#050	Monitor the error switch No.	(Option module)
#051	Ditto	(I/O link master module)
#052	Monitor the error address on user's program.	(lower digit)
#053	Ditto	(upper digit)
#114	Select notation from octal/decimal/hexadecimal in the address/relay/register/label/application instructions.	
#115		
#136	Set the tool model.	
#160 to 167	Store the error code of self-diagnosis.	
#170 to 177	Store the error code on option module.	
#201	Set the resetting conditions of TMR.	
#202	Set the resetting conditions of CNT.	
#206	Set the operation continue/stop at fuse blown detection.	
#207	Set the operation continue/stop at option error.	
#210	Selecting error history strage range.	
#211	Set the operation continue/stop at I/O link master module error.	
#220	Set file top address for comment memory.	
#222	Communication system of PG/COMM 2 port.	
#223	Select the clock feature.	
#224	Set comment memory using area.	
#225		
#226	Set fixed scan time.	
#227	Selecting the 10 ms timer function.	
#230	Set the a latched relay area.	(lower digit)
#231	Ditto	(upper ditig)
#232	Set output hold address.	(lower digit)
#233	Ditto	(upper digit)
#234	Set the communication port 1.	
#235		
#236	Set the communication port 2.	
#237		
#240 to 243	Set interrupt processing.	
#246	Set extend for allowable voltage interruption time.	
#247	Selecting the rack top address.	
#250	Set latched relay area of expansion relay area.	(lower digit)
#251	Ditto	(upper digit)
#252	Set output hold address of expansion relay area.	(upper digit)
#253	Ditto	(lower digit)
#255	Set ROM operation mode.	
#256	Set ROM contents.	
#257	BCC check code	
#260	Model mode	

Items		Specifications
Parameter memory		Parameter for special I/O module : 128 bytes x 32 modules Parameter for special I/O module (Install in the remote I/O slave station) : 128 bytes x 8 modules Parameter for option module : 64 bytes x 7 modules
Interrupt program		There are two types of interruption program, one is input interruption and the other is timer interruption. Both types can be set independently of interruption permission/prohibition. If interruption prohibition is set, you can use the interruption label as the conventional label. Input interruption : 16 points (LB1360 to LB1377) Timer interruption : 1, 2, 5, 10, 20 ms in each (LB1353 to LB 1357)
Debugging function	Sampling trace	At normal [Using the 2 K bytes of internal work area] : Data can be traced for (relay 15 points + register 6 bytes) × 256 times, or relay 15 points × 1024 times at an arbitrate period. (10 ms units) At expansion [Using the 64 K bytes of file register] : Data can be traced for (relay 15 points + register 6 bytes) × 8192 times, or relay 15 points × 32768 times at an arbitrate period. (10 ms units)
	Break function	Available setting any program address as a break point.
	Step operation	Can execute program in one instructions unit.
	N scan operation	Execute operation each time the specified number of scans (1 to 9999).
	Available forced ON/OFF I/O relay	Available switch ON/OFF for I/O relay regardless of the input signal or operation result.

[2] Communication specifications

Shown below are the specifications for the communication port, DeviceNet communication port, and general purpose communication port on the JW-32CUM1.

(1) Communication port

Use the PG/COMM1 port or the PG/COMM2 port on the JW-32CUM1.

Item	Specification
Communication standards	RS-232C/RS422A/ (Only the PG/COMM2 port for the RS-232C)
Transfer speed	115200/57600/38400/19200/9600/4800/2400/1200 bps
Data length	7 bits
Parity bit	Odd, even, none
Stop bits	1, 2 bits
Connection protocol	1: 1 (RS-232C), 1: N (RS-422A)
Communication format	Conforms to the computer link
Connector	D-sub15-pin
Number of stations that can be connected	31 max.

Note: When "RS-422A" is selected; only the 4-wire system (full duplex) can be used.

(2) DeviceNet communication port

Use of the DeviceNet communication port on the JW-32CUM1.

Item	Specification			
Communication protocol	Conforms to the DeviceNet protocol			
Basic operation mode	Master mode, slave mode.			
Number of nodes connectable	Maximum of 63 nodes (slave station) for one master station.			
Number of I/O points	4,096 points (max. 512 bytes: No. of total I/O points of I/O messages).			
Communication speed	125 kbps, 250 kbps, or 500 kbps.			
Communication distance (max.)	**Communication speeds**	**125 k bit/s**	**250 k bit/s**	**500 k bit/s**
	Trunk length using a thick cable	500m	250m	100m
	Trunk length using a thin cable	100m	100m	100m
	Maximum branch length	6m	6m	6m
	Total branch length	156m	78m	39m
Communication services	I/O message function (Polling I/O function, Bit Strobe function) and Explicit message function			
Communication carrier	Dedicated cable (5 lines: 2 signal lines, 2 power lines, 1 shield line) - Thick cable: For trunk lines - Thin cable: For trunk or branch lines			
Data table allocation method when the master mode is selected	Select the method used for I/O data mapping in the scan list edit mode from "allocation in address order," "even number allocation," or "allocation in the order in which vacant nodes are occupied."			
Specify the number of input/output bytes when slave mode is selected.	Number of input bytes: 0 to 127 bytes Number of output bytes: 0 to 127 bytes			

(3) General purpose communication port

Use of the general purpose communication terminal block on the JW-32CUM1.

Item		Specification
Communication mode	Remote I/O (master station)	Number of slave stations: Max. 4 Number of remote I/O points: 128 per station, 512 points in total, fixed allocation
	Data link DL1 (master station)	Number of slave stations: Max. 15 Number of link bytes: 64 in total
	Data link DL9 (master station)	Number of slave stations: Max. 15 Number of link bytes: Select 64, 128, or 256
	M net (master station)	Number of slave stations: Max. 7 Transfer speed: Select 19.2 kbps or 38.4 kbps.
Allocation of CU data memory		Fixed: module No. switch set to "0" and station number set to "0."
Wiring method		2-wire system

- Selectable any method for the communication mode.
- Each communication mode setting can be changed using internal switches in the JW-32CUM1.

13-4 JW-34KBM

Shown below are the specifications for the JW-34KBM basic rack panel.

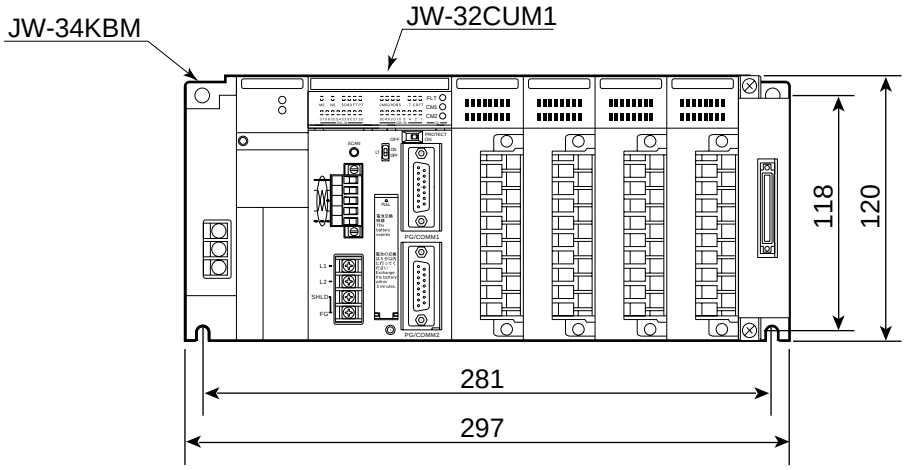
Item	Specification
Number of slots	Slots for a power supply module: 1 Slots for a control module: 1 Slots for I/O modules: 4
Number of ports	I/O extension port: 1
Number of terminals	One set of 5 V power terminals (and a FG terminal)

13-5 External dimension drawings

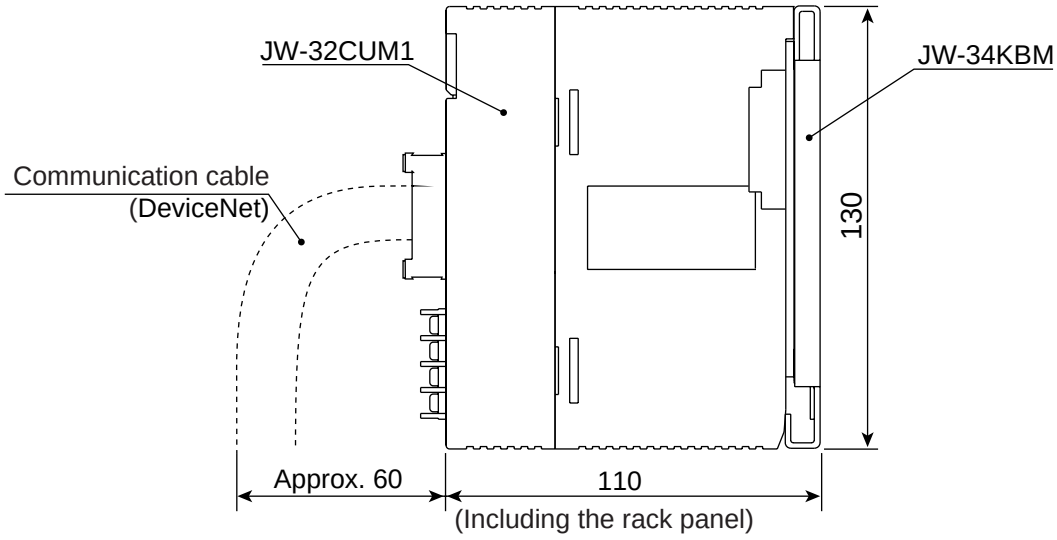
Shown below are the drawings used to install the JW-32CUM1 in the JW-34KBM.

(Unit: mm)

● **Front view**



● **Side view**



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