

SHARP®

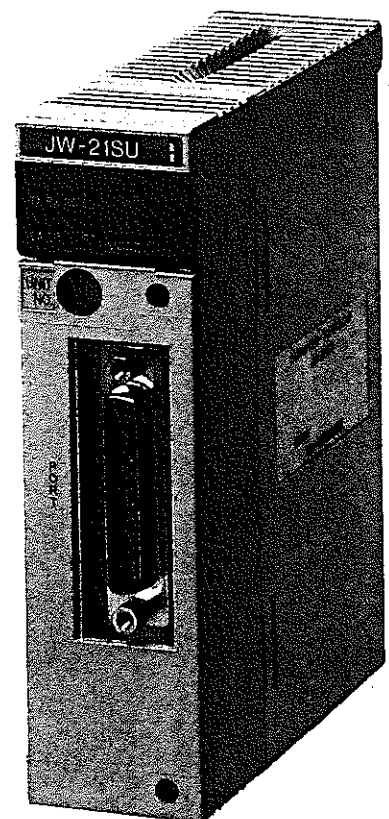
Version 2.0
Produced in Dec. 1998

Sharp Programmable Controller
New Satellite JW20H/30H

Model name

Serial interface module ***JW-21SU***

User's Manual



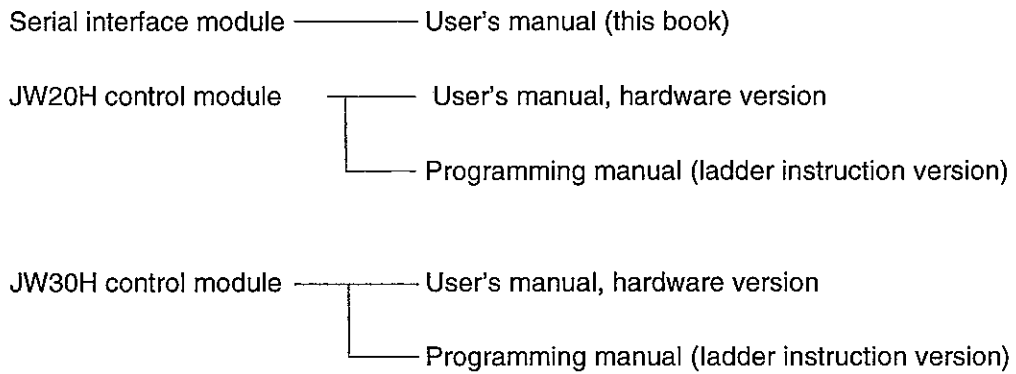
We thank you for your purchase of the serial interface module: JW-21SU for the Sharp programmable controller new satellite JW20H or JW30H.

This manual describes functions and usages of serial interface module.

Familiarize yourself with the module by reading this user's manual thoroughly.

Keep this manual with you as well as the instruction manuals attached to control module of PC. We are sure that these booklets will be helpful whenever you face a problem.


Besides this manual, the following manuals are provided further useful information.





- Should you have any questions and inquiries, feel free to contact our dealer's shop.
- Whole or partial photocopy of this booklet is prohibited.
- The contents of this booklet may be revised for improvement without notice.

Safety Precautions

Read this user's 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 user's 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 |
|--|
| <ul style="list-style-type: none">• Use in the environments specified in the catalog and user's 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 instruction manual and user's 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 |
|--|
| <ul style="list-style-type: none">• Be sure to ground. Unless grounded, electric shock or malfunction may be caused. |

|  Caution |
|---|
| <ul style="list-style-type: none">• Wiring should be done by qualified electrician. Wrong wiring may lead to fire, trouble or electric shock. |

3) Use

|  Danger |
|--|
| <ul style="list-style-type: none">• Assemble the emergency stop circuit and interlock circuit outside of the programmable controller. Otherwise the machine breakdown or accident may be caused by the trouble of the programmable controller. |

|  Caution |
|--|
| <ul style="list-style-type: none">• Manipulation for program change, forced output, RUN or STOP during operation should be done with particular care by confirming safety. Misoperation may lead to machine trouble or accident. |

4) Maintenance



Prohibit

- Don't disassemble or modify.
Or fire, trouble or malfunction may be caused.



Caution

- Turn OFF the power source before detaching or attaching the module.
Or electric shock, malfunction or trouble may be caused.

Serial interface module : JW-21SU

- User's Manual -

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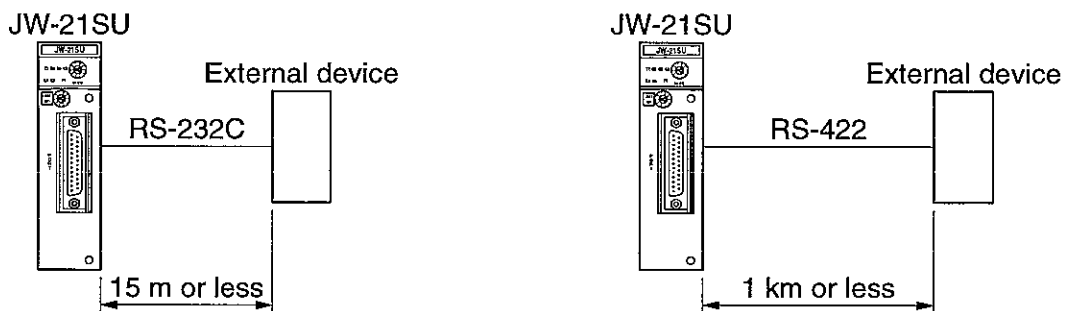
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Chapter 1. Overview

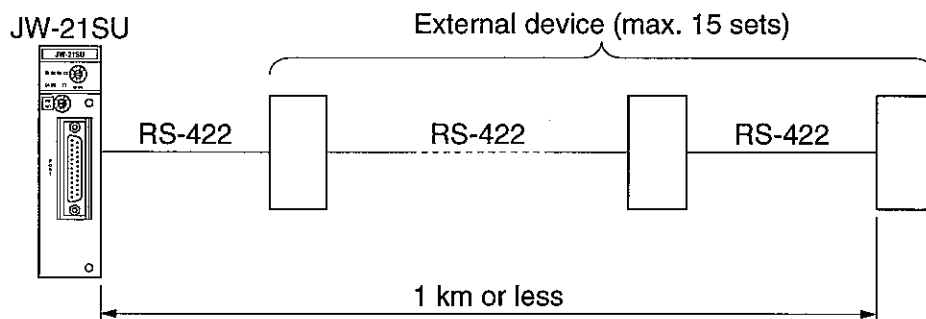
This module (JW-21SU) is a serial interface module for the programmable controller JW20H/30H and used to exchange data with the external device having RS-232C/422 interface such as host computer, satellite monitor etc.

Features and functions

(1) Either RS-232C or RS-422 is selectable as communication mode.



(2) When RS-422 is applied, max. 15 sets of external devices are connectable.



(3) Up to 8 sets in JW20H and 32 sets in JW30H for special I/O module including the others, are installable into a basic/expansion rack panel of JW20H/30H.

(4) Applicable to various data formats for exchanging data with external device.

(5) Max. 512 bytes of data sending/receiving is possible.

(6) Outputs error information by error codes.

Chapter 2. Handling Precautions

Follow the cautions below to operate and store the the module: JW-21SU.

■ Installation and storage condition

Do not install the JW-21SU in the following conditions.

- Direct sunlight, ambient temperatures below 0 °C and over +55 °C (at storage: -20 °C to +70 °C).
- Relative humidity which exceeds 35 to 90 %. Condensation due to rapid temperature variation.
- Corrosive and flammable gases.
- Vibration and shock producing and being transferred positions.

■ Combination and mounting

- In case of JW20H, make a configuration not to exceed 8 sets of modules including other special I/O module on a basic/expansion rack panel of JW20H. When more than 8 sets are installed, the JW20H will not operate.
- In case of JW30H, up to 32 sets of special I/O module including the others, are installable into only the rack No. 0 to 3 of JW30H basic/expansion rack panel. Not installable into rack No. 4 to 7.
- Unlike other special I/O module, the JW-21SU cannot be installed on a remote I/O slave station.
- Be sure to tighten retention screws of the module.

■ Wiring

- Do not run communication cables parallel or close to high voltage lines and power lines.

■ Operation

- **After install the module, be sure to execute "I/O registration" using a support tool. To operate without "I/O registration" may cause an error, and the JW20H/30H and this module don't work.**
- **In case of JW30H, if a preset scanning time is too short (less than 2 ms), JW-21SU may not function normally. To avoid this malfunction, set a longer scanning time using a constant scanning (set 3 mm or more on the system memory #226) or other functions.**
- **When setting the JW-21SU parameters, make sure to set parameter address 000 = 22_(H) and 001 = 01_(H). Without setting these addresses to these values, the JW-21SU will not be able to operate as error may occur, and the JW20H/30H and this module don't work. (See page 15 and 33.)**
- Prior to change switches inside the module, turn "OFF" power of the JW20H/30H. Switching at power "ON" may cause malfunction.
- The outside case of the module has a ventilation hole so as to prevent the inside temperature from rising. Do not block this hole or prevent ventilation.
- Be careful not to immerse in fluid such as water and chemicals or put metals such as copper wire pieces inside the module, as this is very dangerous and may cause malfunction.
- When the module is out of order or in abnormal condition (overheating, emitting a bad smell, or smoking), stop operation and contact our dealer or service center.

■ Static electricity

Excessive static electricity may be generated on the human body in extremely dry conditions. Prior to touching the module, discharge static electricity by touching grounded metals.

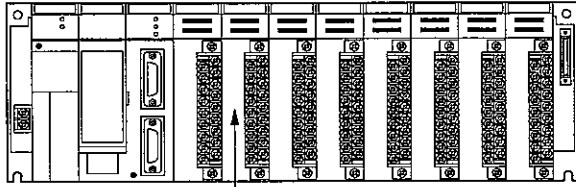
■ Cleaning

Use dry and soft cloths for cleaning. Organic solvents such as alcohol, paint thinner, and wet cloths may cause deformation or color change.

Chapter 3. System Configuration

System configuration

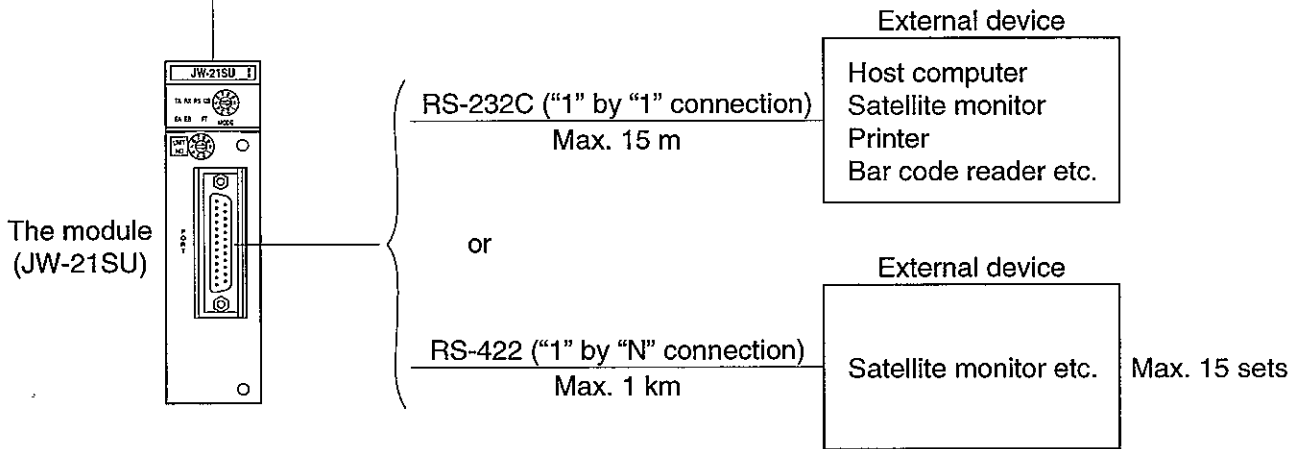
JW20H/30H



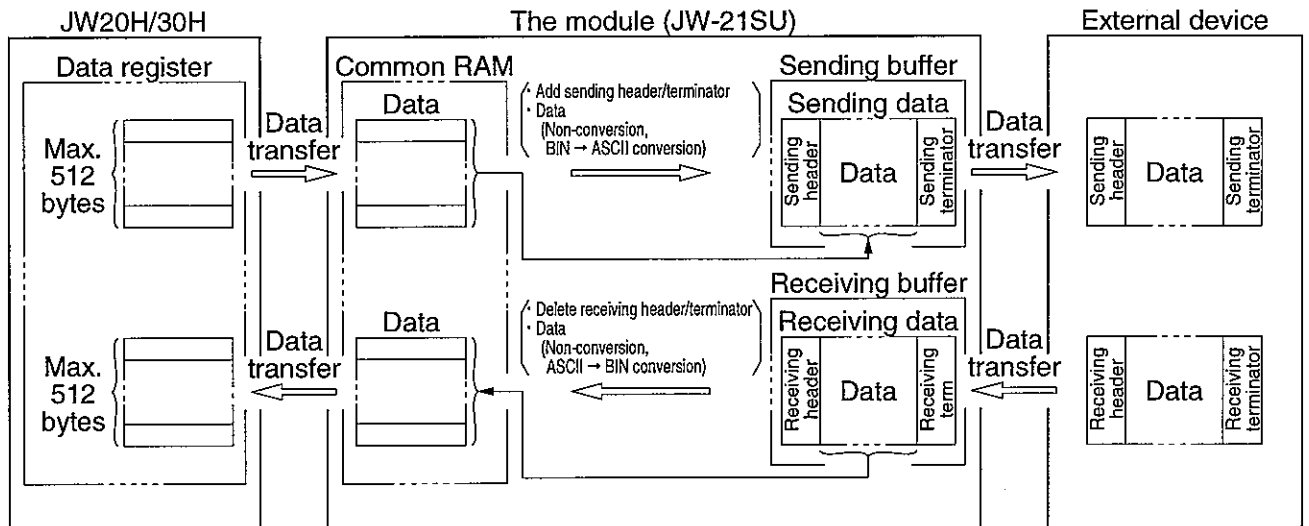
Max. no. of installed sets

| | |
|-------|---|
| JW20H | 8 modules, including other special I/O modules, per basic/expansion rack panel. |
| JW30H | 32 modules, including other special I/O modules, per basic/expansion rack panel (racks 0 to 3). · Cannot be installed in racks 4 to 7. |

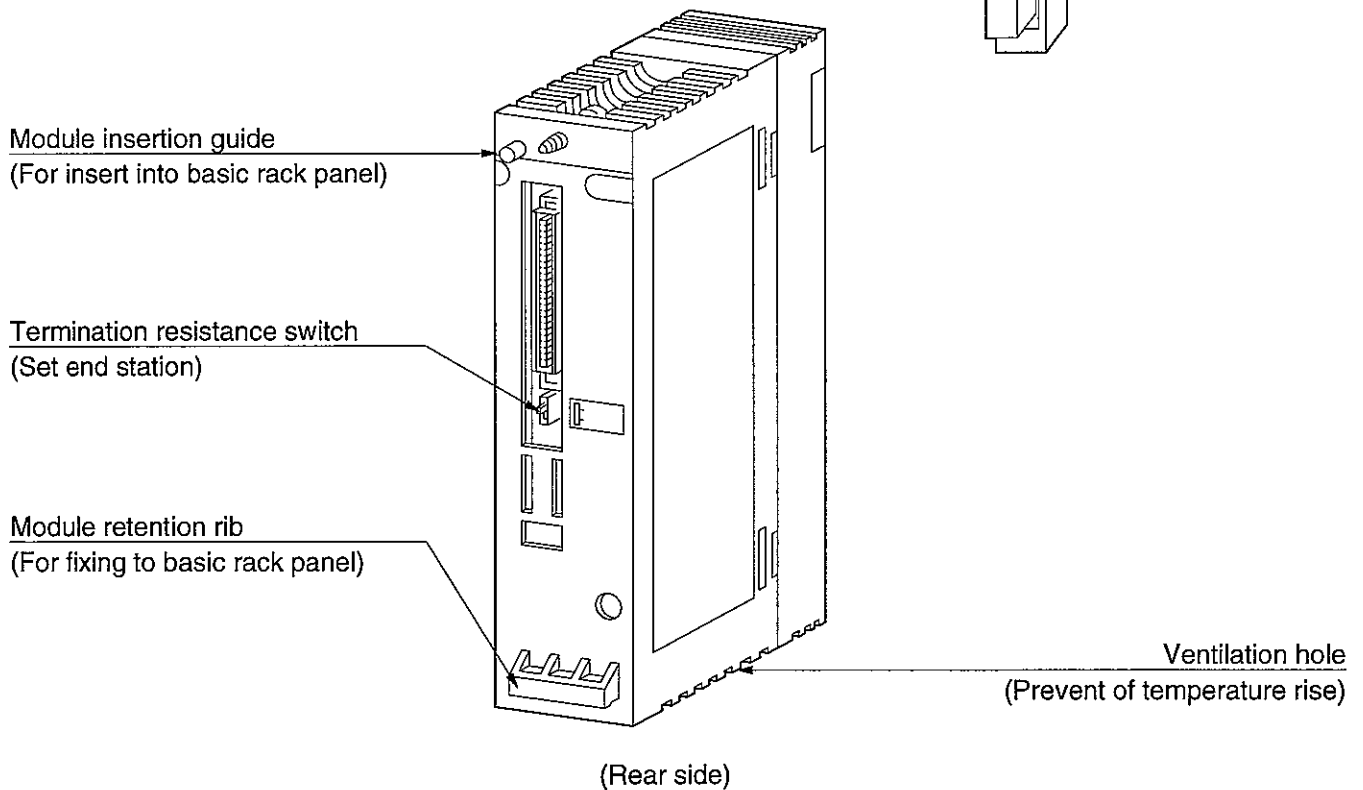
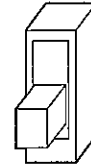
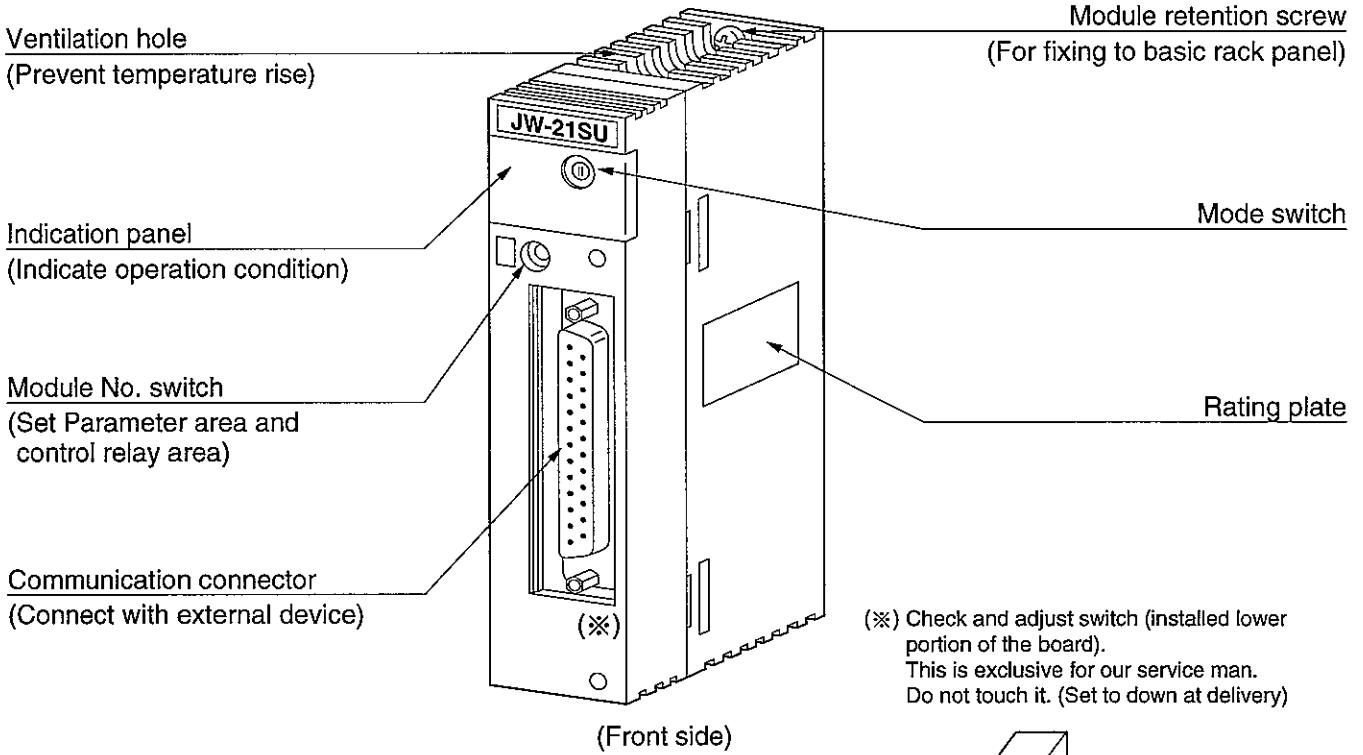
* When a JW-21SU is not installed in a remote I/O slave station (JW-21RS).



Data flow chart



Chapter 4. Name and Function of Each Part



Chapter 5. Installation

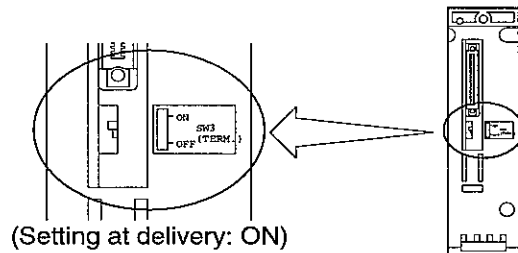
Installation procedure

(1) Turn "OFF" the power to JW20H/30H.

(2) Set the termination resistance switch [SW3 (TERM.)].

When communication mode is RS-422 (2-wire system, 4-wire system), set termination resistance.
At RS-232C, this setting is not required

| Setting | Condition of the module |
|---------|--------------------------------------|
| ON | Insert termination resistance |
| OFF | Do not insert termination resistance |

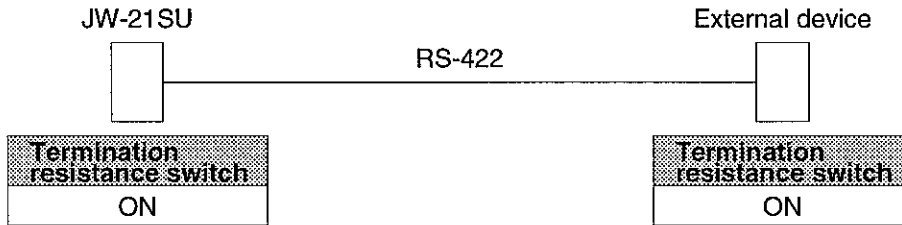


(Setting at delivery: ON)

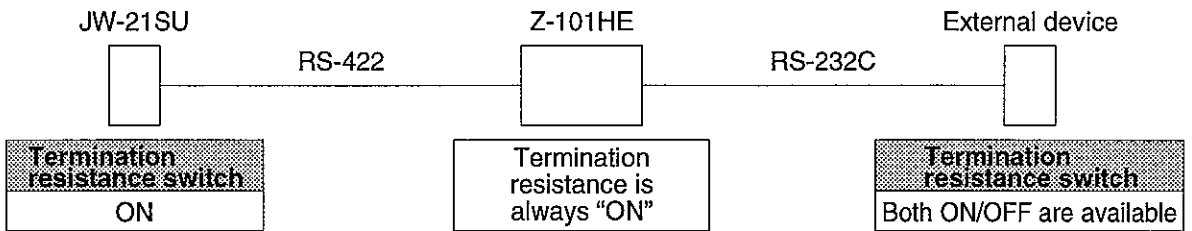
(Rear view of the module)

("1" by "1" connection)

- Turn "ON" the switch on both of the module and external device.

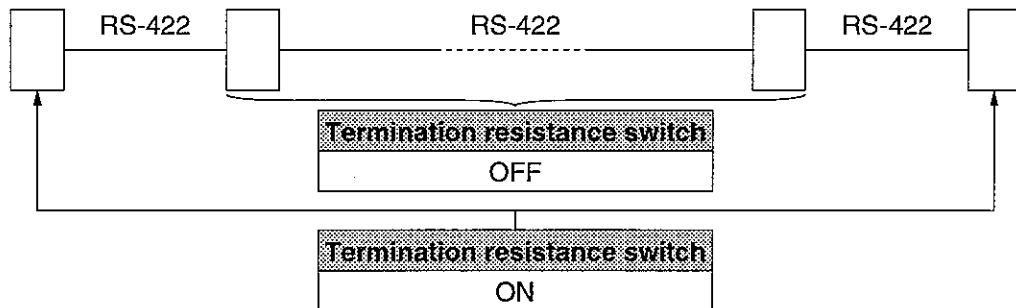


- When Z-101HE (RS-232C/RS-422 convertor) is using, termination resistance of Z-101HE is always "ON."



("1" by "N" connection)

- Turn "ON" both of end stations, turn "OFF" intermediate stations.

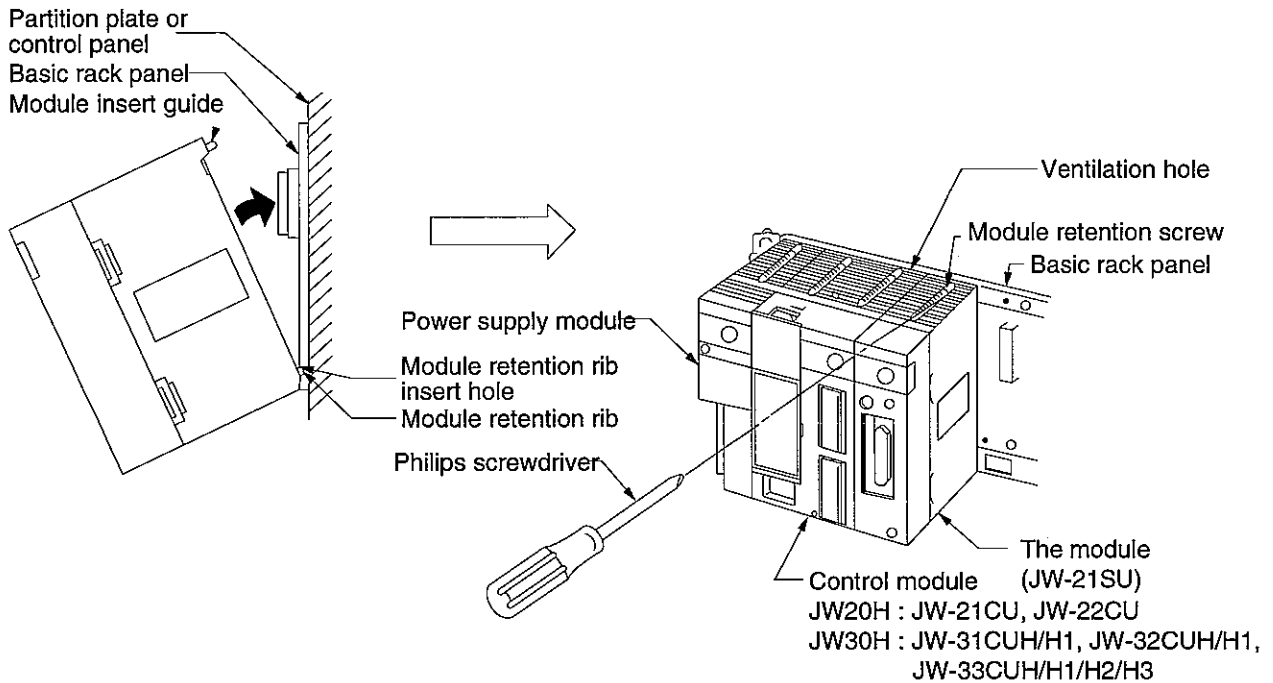


The module need not necessarily be end station.

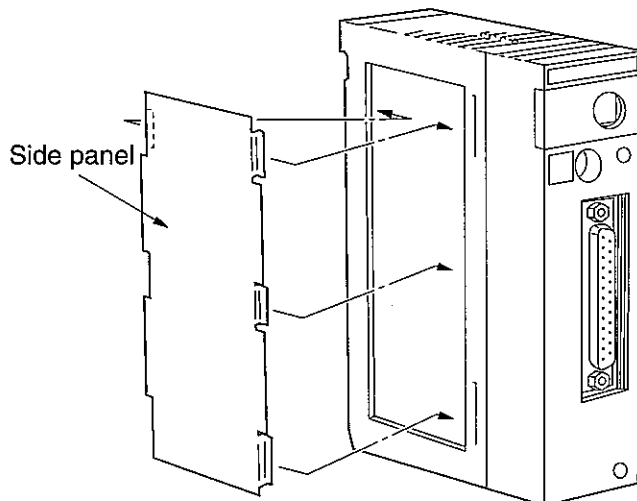
(To next page)

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(3) Push the module keeping the module fixing rib hanging the insert hole on the basic rack panel.
Tighten the module retention screw at the upper side of the module using a philips screwdriver.



- Follow the same procedure to install the module on an expansion rack panel.
- Prior to install the module at left end of an expansion rack panel, be sure to fix a side plate supplied with the expansion rack panel in order to prevent dust intrusion.



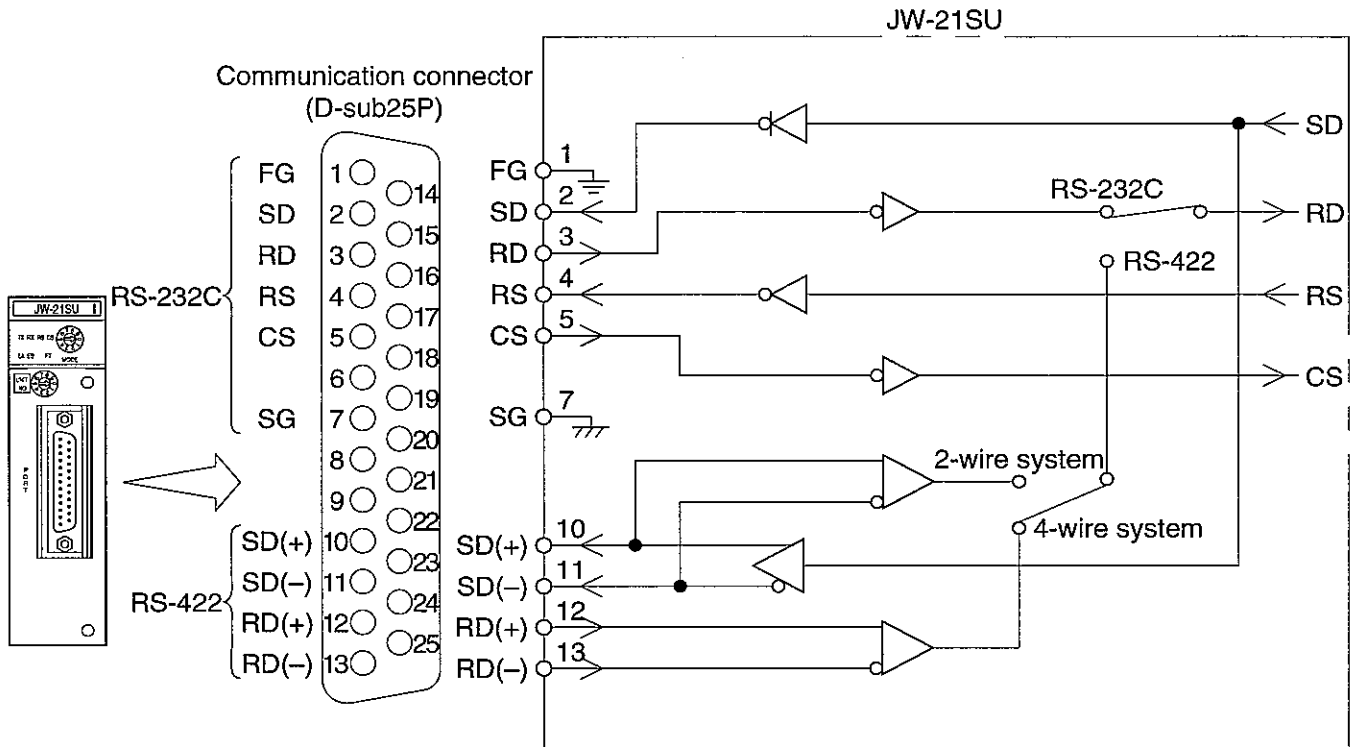
Notes

- ★ In case of JW20H, make a configuration not to exceed 8 sets of modules including other special I/O module on a basic/expansion rack panel of JW20H. In case of JW30H, up to 32 sets of special I/O module including the others, are installable into only the rack No. 0 to 3 of JW30H basic/expansion rack panel. Not installable into rack No. 4 to 7.
- ★ You can not install in remote I/O slave station of JW20H/30H.
- ★ Be sure to tighten the module retention screw. Looseness of screw may cause malfunction.

Chapter 6. Wiring

This module can connect both interface of RS-232C and RS-422 (2-wire system, 4-wire system) through a communication connector.

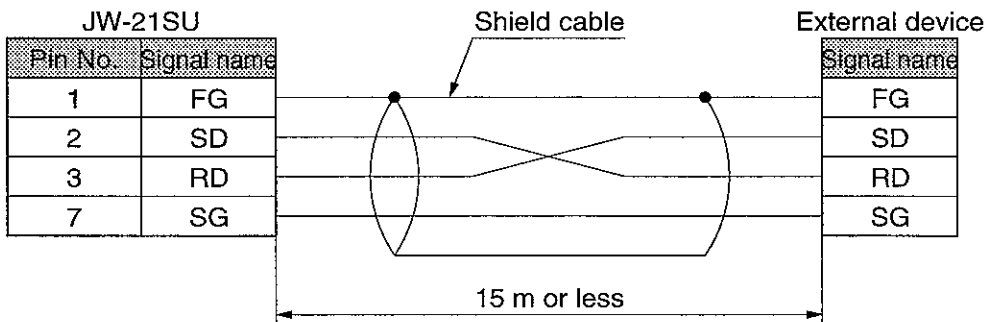
[1] Pin arrangement of communication connector



| Std. | Pin No. | Signal name | Function | Signal direction |
|---------|----------|-------------|------------------|---------------------------|
| RS-232C | 1 | FG | Frame ground | — |
| | 2 | SD | Sending data | JW-21SU → External device |
| | 3 | RD | Receiving data | JW-21SU ← External device |
| | 4 | RS | Request to send | JW-21SU → External device |
| | 5 | CS | Ready to send | JW-21SU ← External device |
| | 6 | — | Not used | — |
| | 7 | SG | Signal ground | — |
| — | 8, 9 | — | Not used | — |
| RS-422 | 10 | SD (+) | Sending signal | JW-21SU → External device |
| | 11 | SD (-) | | |
| | 12 | RD (+) | Receiving signal | JW-21SU ← External device |
| | 13 | RD (-) | | |
| — | 14 to 25 | — | Not used | — |

[2] Connection example

(1) RS-232C (In case of control signal: absent, XON/XOFF manual, or XON/XOFF automatic)

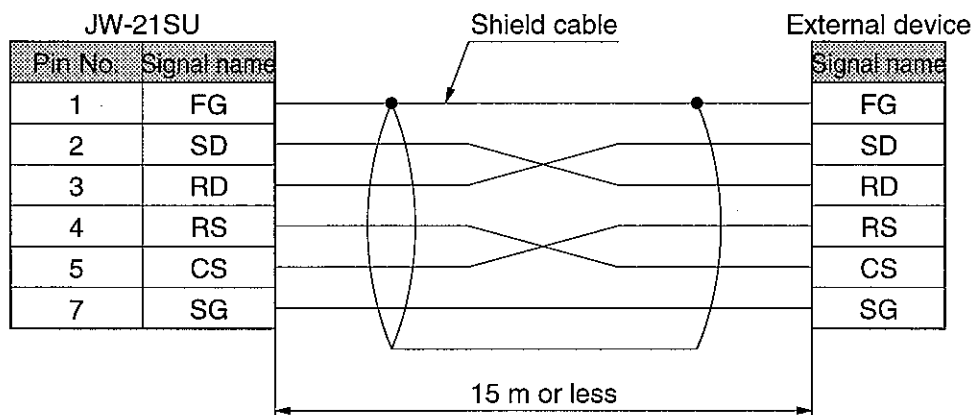


RS and CS of external device might be shorted in accordance with specification (available operation at RS, CS are "ON") of its external device.

Some external device cannot communicate unless DCD (carrier detection) is "ON".

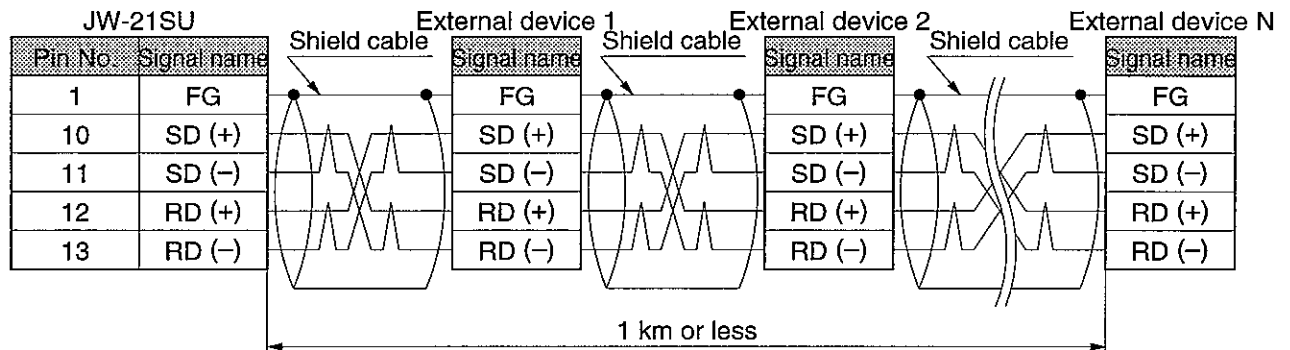
In this case, latch DCD terminal signal at the external device side or loop back "ON" voltage signal.

(2) RS-232C (In case of control signal: RS/CS manual, or RS/CS automatic)



(3) RS-422 (4-wire system)

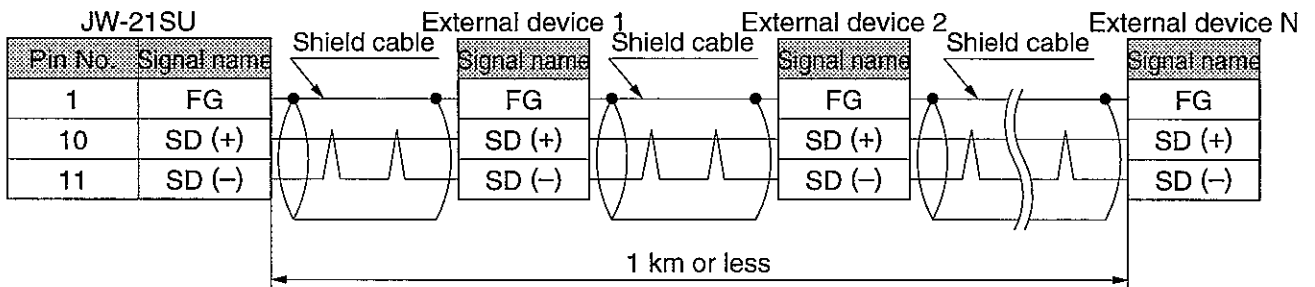
"1" by "N" connection is available. (Max. 15 sets for N)



The module need not necessarily be end station.

(4) RS-422 (2-wire system)

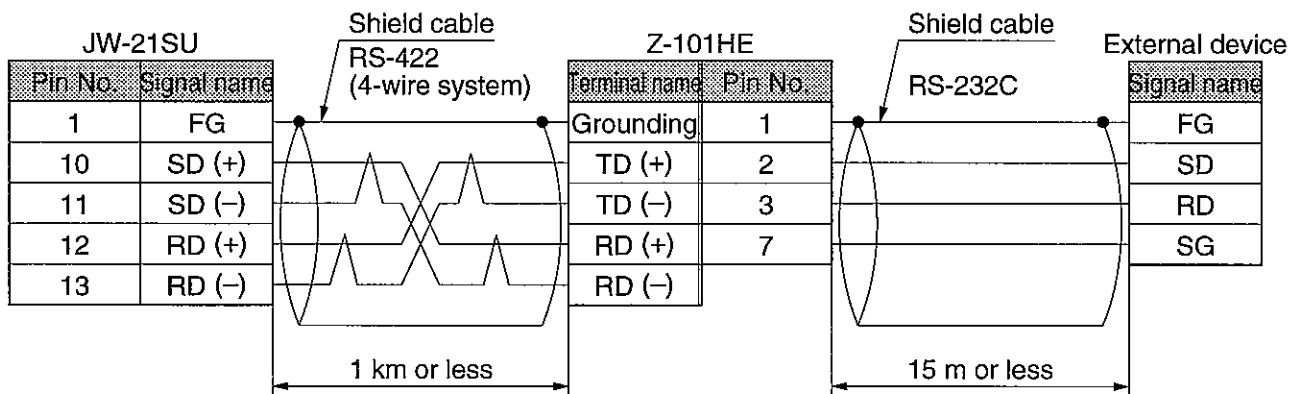
"1" by "N" connection is available. (Max. 15 sets for N)



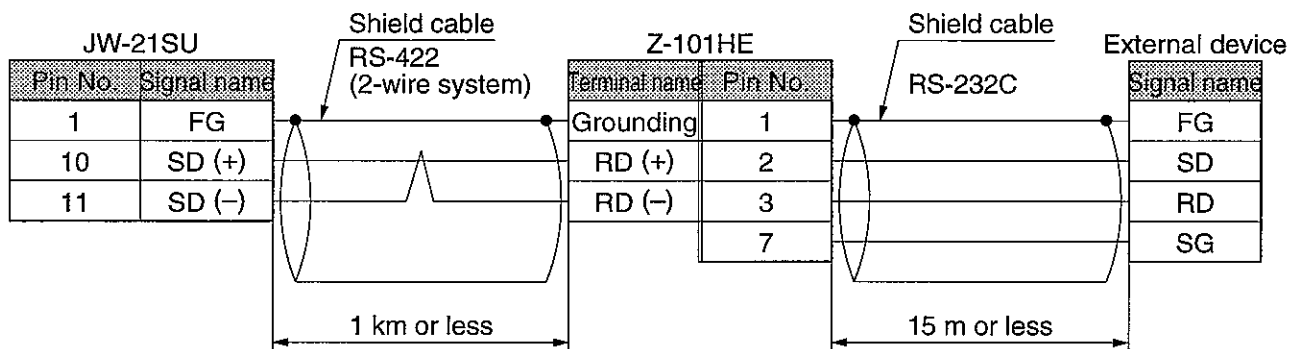
The module is not necessary to be end station.

(5) In case of using Z-101HE (RS-232C/RS-422 convertor)

1) 4-wire system



2) 2-wire system automatic



- RS and CS of external device might be shorted in accordance with specification (available operation at RS, CS are "ON") of its external device.
Some external device cannot communicate unless DCD (carrier detection) is "ON".
In this case, latch DCD terminal signal at the external device side or loop back "ON" voltage signal.
- When Z-101HE automatic mode is applied, set transfer rate 2400 bits/s or up.

Notes

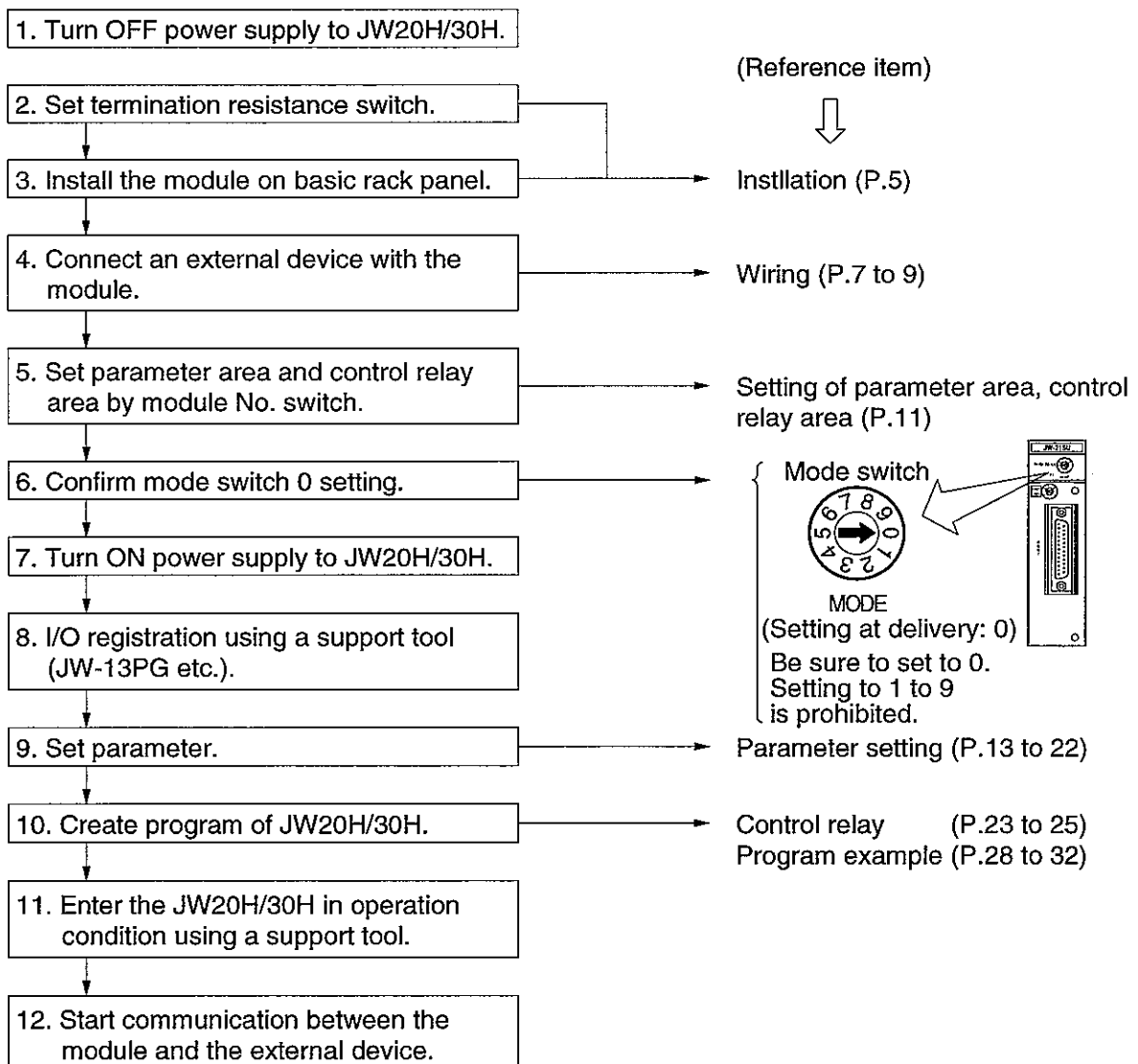
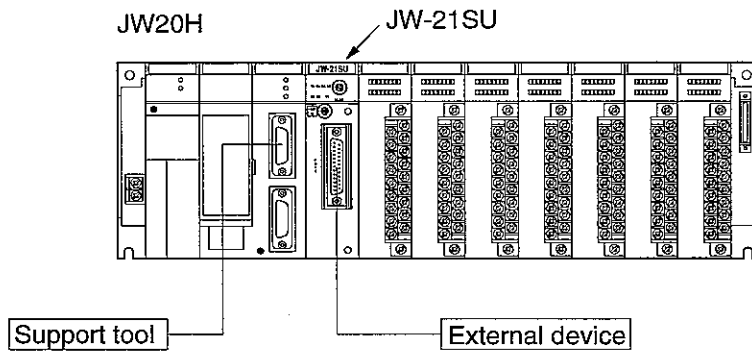
★ Be sure to use the following shielded twisted pair cables.

| Manufacturer | RS-232C, RS-422 (4-wire system) | RS-422 (2-wire system) |
|--------------------|---------------------------------|------------------------|
| HITACHI CABLE LTD. | CO-SPEV-SB0.5 | S-IREV-SW2*0.5 |

★ Wire the communication cable as far apart as possible from power lines or high voltage lines, so as not to run close parallel to them.

Chapter 7. How to Use

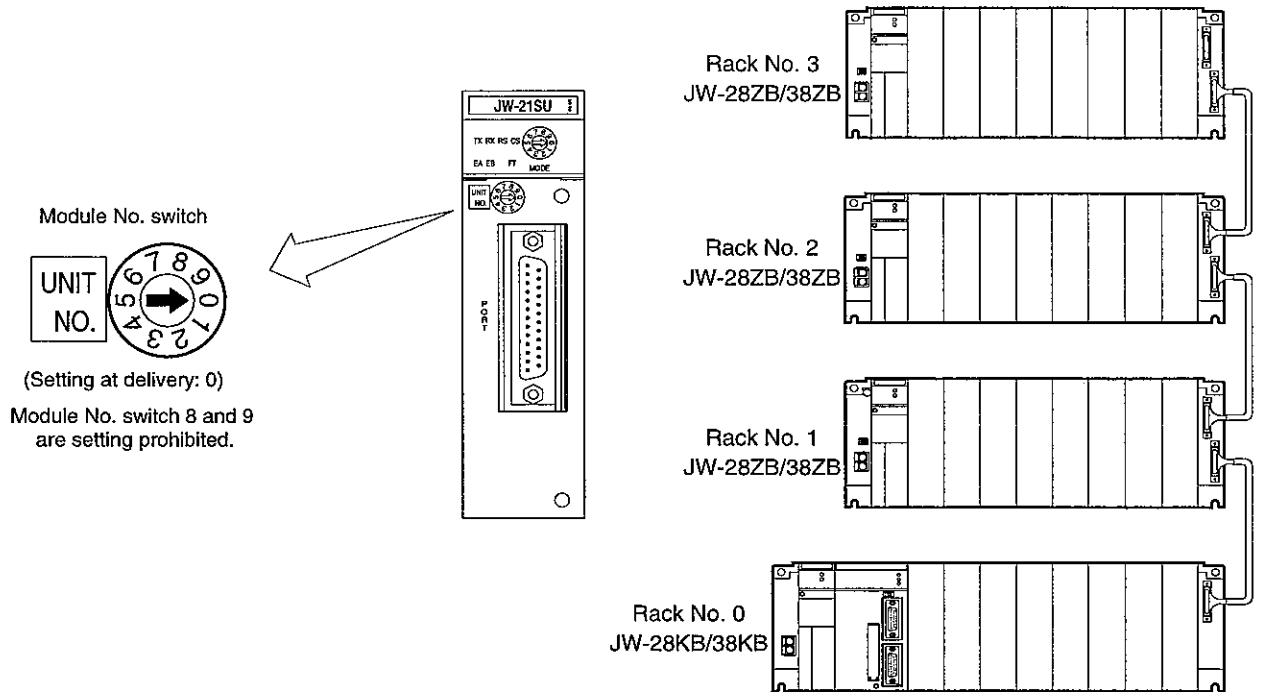
Standard operation flow is shown below. Refer to this for use.
 (Example of system configuration)



[1] Settings of parameter area, control relay area

Set parameter area to designate communication mode, transfer rate etc., and control relay area required for data sending/receiving programs using a module No. switch.

Be sure not to set same number with other special I/O module.



Note

★ Set switch when power to JW20H/30H is "OFF."

◆ In case of JW20H

The parameter area and control relay area can be set by using module No. switch of each rack.

| Module No. switch setting value | Parameter area | | Control relay area (byte address) | |
|------------------------------------|-------------------|----------------------------|--------------------------------------|----------------|
| | Parameter address | Register address of file 1 | | |
| 0 | T-0 | 000 to 177 | 000000 to 000177 |]0200 to]0217 |
| 1 | T-1 | 000 to 177 | 000200 to 000377 |]0220 to]0237 |
| 2 | T-2 | 000 to 177 | 000400 to 000577 |]0240 to]0257 |
| 3 | T-3 | 000 to 177 | 000600 to 000777 |]0260 to]0277 |
| 4 | T-4 | 000 to 177 | 001000 to 001177 |]0300 to]0317 |
| 5 | T-5 | 000 to 177 | 001200 to 001377 |]0320 to]0337 |
| 6 | T-6 | 000 to 177 | 001400 to 001577 |]0340 to]0357 |
| 7 | T-7 | 000 to 177 | 001600 to 001777 |]0360 to]0377 |

◆ In case of JW30H

The parameter area and control relay area can be set by using module No. switch of each rack.

| Module No. switch setting value | Parameter area | | | Control relay area (byte address) | |
|---------------------------------|-------------------|----------------------------|------------|-----------------------------------|----------------|
| | Parameter address | Register address of file 1 | | | |
| Rack No.0 | 0 | T-0 | 000 to 177 | 000000 to 000177 |]3000 to]3017 |
| | 1 | T-1 | 000 to 177 | 000200 to 000377 |]3020 to]3037 |
| | 2 | T-2 | 000 to 177 | 000400 to 000577 |]3040 to]3057 |
| | 3 | T-3 | 000 to 177 | 000600 to 000777 |]3060 to]3077 |
| | 4 | T-4 | 000 to 177 | 001000 to 001177 |]3100 to]3117 |
| | 5 | T-5 | 000 to 177 | 001200 to 001377 |]3120 to]3137 |
| | 6 | T-6 | 000 to 177 | 001400 to 001577 |]3140 to]3157 |
| | 7 | T-7 | 000 to 177 | 001600 to 001777 |]3160 to]3177 |
| Rack No.1 | 0 | T-0 | 000 to 177 | 002000 to 002177 |]3200 to]3217 |
| | 1 | T-1 | 000 to 177 | 002200 to 002377 |]3220 to]3237 |
| | 2 | T-2 | 000 to 177 | 002400 to 002577 |]3240 to]3257 |
| | 3 | T-3 | 000 to 177 | 002600 to 002777 |]3260 to]3277 |
| | 4 | T-4 | 000 to 177 | 003000 to 003177 |]3300 to]3317 |
| | 5 | T-5 | 000 to 177 | 003200 to 003377 |]3320 to]3337 |
| | 6 | T-6 | 000 to 177 | 003400 to 003577 |]3340 to]3357 |
| | 7 | T-7 | 000 to 177 | 003600 to 003777 |]3360 to]3377 |
| Rack No.2 | 0 | T-0 | 000 to 177 | 004000 to 004177 |]3400 to]3417 |
| | 1 | T-1 | 000 to 177 | 004200 to 004377 |]3420 to]3437 |
| | 2 | T-2 | 000 to 177 | 004400 to 004577 |]3440 to]3457 |
| | 3 | T-3 | 000 to 177 | 004600 to 004777 |]3460 to]3477 |
| | 4 | T-4 | 000 to 177 | 005000 to 005177 |]3500 to]3517 |
| | 5 | T-5 | 000 to 177 | 005200 to 005377 |]3520 to]3537 |
| | 6 | T-6 | 000 to 177 | 005400 to 005577 |]3540 to]3557 |
| | 7 | T-7 | 000 to 177 | 005600 to 005777 |]3560 to]3577 |
| Rack No.3 | 0 | T-0 | 000 to 177 | 006000 to 006177 |]3600 to]3617 |
| | 1 | T-1 | 000 to 177 | 006200 to 006377 |]3620 to]3637 |
| | 2 | T-2 | 000 to 177 | 006400 to 006577 |]3640 to]3657 |
| | 3 | T-3 | 000 to 177 | 006600 to 006777 |]3660 to]3677 |
| | 4 | T-4 | 000 to 177 | 007000 to 007177 |]3700 to]3717 |
| | 5 | T-5 | 000 to 177 | 007200 to 007377 |]3720 to]3737 |
| | 6 | T-6 | 000 to 177 | 007400 to 007577 |]3740 to]3757 |
| | 7 | T-7 | 000 to 177 | 007600 to 007777 |]3760 to]3777 |

[2] Parameter setting

- Set the operating conditions for the JW-21SU into the JW20H/30H's parameter area.
- The support tools given below can be used to set the parameters.

| Model name | | Setting mode | |
|-------------------------|--------------|------------------------|--|
| | | When the JW20H is used | When the JW30H is used |
| JW-2PG | | Set to parameters | Set to parameters (rack 0 only) Note 1 |
| JW-10PG | | Set in file 1 | |
| JW-11PG | | Set to parameters | — |
| JW-12PG | | Set to parameters | Set to parameters (rack 0 only) Note 2 Set to file E Note 3 |
| JW-13PG | | Set to parameters | Set to parameters |
| JW-50PG | Below V4.0A | Set to parameters | Set to parameters (rack 0 only) Note 2 Set to file E Note 3 |
| | V5.0 or up | Set to parameters | Set to parameters |
| Z-100LP2S + Z-3LP2EM | V5.1 or up | Set to parameters | Set to parameters (rack 0 only) Note 2 Set to file E Note 3 |
| JW-50SP | Below V4.0AI | Set to parameters | Set to parameters (rack 0 only) Note 2 Set to file E Note 3 |
| | V5.0I or up | Set to parameters | Set to parameters |
| JW-100SP | | Set to parameters | Set to parameters |

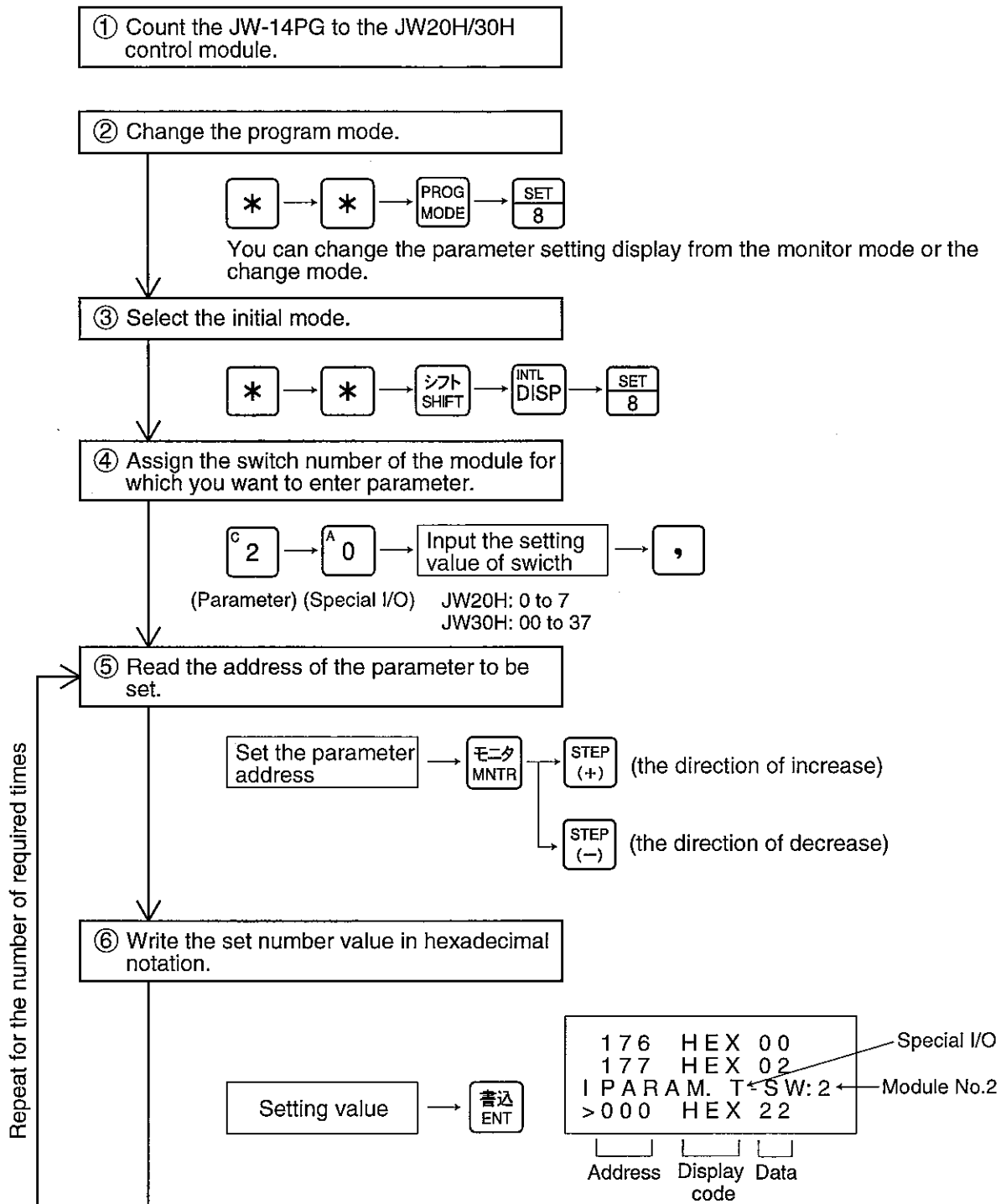
Note 1: When the JW-2PG is used with the JW30H, set the JW30H's system memory #136 = 02_(H).

Note 2: If a support tool not designed to be used with the JW30H is used, and if the JW20H specification mode is selected with the JW30H, you have to enter a different number than 50_(H) at JW30H system memory #260.

Note3: If a support tool not designed to be used with the JW30H is used, and the JW50H/70H/100H specification mode is selected with the JW30H, enter 50_(H) at JW30H system memory #260.

(1) Parameter setting procedure

- Check the installation for the JW-21SU and the settings of the module No. switch and mode select switch before the parameter area set.
- Before entering parameters, make sure the JW-21SU is in the stop (program) mode.
- These pages describe how to set parameters on an assumption that the hand-held programmer JW-14PG programmer is being used.



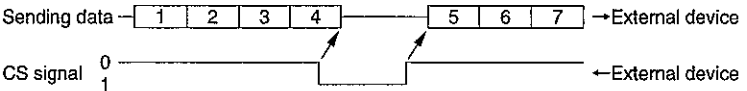
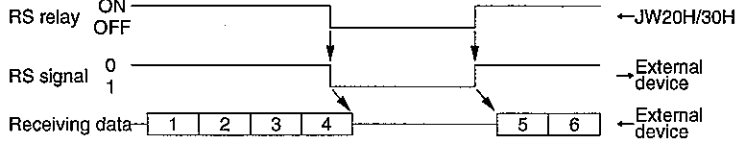
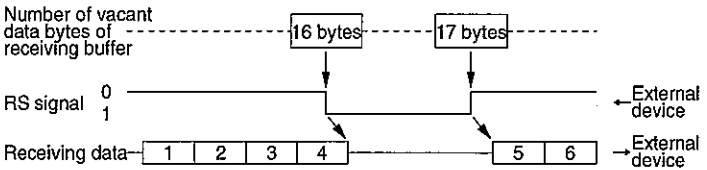
Note: Make sure to enter 22(H) and 01(H) for the parameters at address 000 and 001, respectively.

(2) Parameter setting contents

The address shown below is parameter address. In case of register address of file 1, refer to appendix 1 (P.37 to 41).

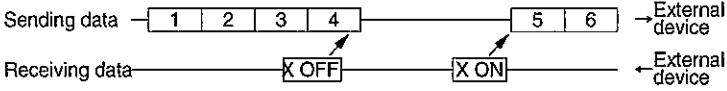
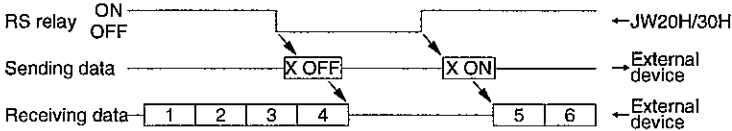
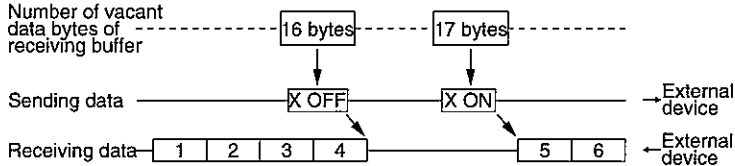
| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents | |
|-----------------------|----------------------------|--------------------------------|---|--|
| 000 | Parameter transfer | 22 (Initial value: 00) | Execution of parameter transfer <ul style="list-style-type: none"> When the JW20H/30H changes from "stop mode (program mode)" to "operation mode" or it turns from OFF to ON, transfer parameter from JW20H/30H memory to the module. Other than 22_{HEX} is treated as parameter transfer error. | |
| 001 | BCC calculation | 00 (Initial value) | Completion of BCC calculation | |
| | | 001 | Execution of BCC calculation <ul style="list-style-type: none"> At changing parameter, set to 01_{HEX}. When the JW20H/30H changes from "stop mode (program mode)" to "operation mode" or it turns from OFF to ON, it calculates BCC codes of parameter setting contents and stores in parameter address 177. When the calculation is completed, set to 00_{HEX}. | |
| 002 | Communi- cation mode | 00 (Initial value) | RS-232C <ul style="list-style-type: none"> Transfer mode is fixed to full-duplex. | |
| | | 01 | RS-422 (4-wire system) <ul style="list-style-type: none"> Either full-duplex or half duplex is selectable as transfer mode. | |
| | | 02 | RS-422 (2-wire system) <ul style="list-style-type: none"> Transfer mode is fixed to half-duplex. | |
| 003 | Transfer mode | 00 (Initial value) | Full-duplex <ul style="list-style-type: none"> Both sending and receiving data at the same time is possible. In case of RS-422 (2-wire system), it is fixed to half-duplex so that this setting is invalid. | |
| | | 01 | Half-duplex <ul style="list-style-type: none"> Execute sending and receiving alternately. In case of RS-232C, it is fixed to full-duplex so that this setting is invalid. | |
| 004 | Transfer speed | 00 (Initial value) | 19200 bits/s | <ul style="list-style-type: none"> Select to match the external device's specifications |
| | | 01 | 9600 bits/s | |
| | | 02 | 4800 bits/s | |
| | | 03 | 2400 bits/s | |
| | | 04 | 1200 bits/s | |
| | | 05 | 600 bits/s | |

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents | |
|-----------------------|-------------------|--------------------------------|--|--|
| 005 | Data length | 00 (Initial value) | 8 bits <ul style="list-style-type: none"> Data to be subject to JIS code, binary data, special character. | |
| | | 01 | 7 bits <ul style="list-style-type: none"> Data to be subject to ASCII code only. At communication with an external device the data length of which is fixed to 7 bits. | |
| 006 | Stop bit | 00 (Initial value) | 2 bits | <ul style="list-style-type: none"> Select to match the external device's specifications |
| | | 01 | 1 bit | |
| 007 | Parity | 00 (Initial value) | Even <ul style="list-style-type: none"> Set and check that length of total amount of bits of data D₀ to D₇ (D₀ to D₆ at 7 bits data length) and "ON" bit of parity bit becomes even. | |
| | | 01 | Odd <ul style="list-style-type: none"> Set and check that length of total amount of bits of data D₀ to D₇ (D₀ to D₆ at 7 bits data length) and "ON" bit of parity bit becomes odd. | |
| | | 02 | Absent <ul style="list-style-type: none"> Don't set and check above parity bit. | |

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents |
|-----------------------|-------------------|--------------------------------|---|
| 010 | Control signal | 00 (Initial value) | <p>Absent</p> <ul style="list-style-type: none"> No check concerning communication. RS relay is normally ON. |
| | | 01 | <p>RS/CS manual</p> <ul style="list-style-type: none"> Communication mode: Valid at RS-232C. Control sending data by CS signal from external device. <ol style="list-style-type: none"> When CS signal is 0, ready for data sending When CS signal is 1, stop data sending.  <p>Sending data: 1 2 3 4 5 6 7 → External device CS signal: 0 1 ← External device</p> <ul style="list-style-type: none"> Control receiving data by RS relay. <ol style="list-style-type: none"> When RS relay is OFF, RS signal becomes "1" and requests to stop data sending to an external device. When RS relay is "ON", RS signal becomes "0" and requests to send data to an external device. Receiving data time over error due to switch "OFF" RS relay does not occur.  <p>RS relay: ON OFF ← JW20H/30H RS signal: 0 1 ← External device Receiving data: 1 2 3 4 5 6 ← External device</p> |
| | | 02 | <p>RS/CS automatic</p> <ul style="list-style-type: none"> Communication mode: Valid at RS-232C Control sending data by CS signal from external device. Contents is the same as RS/CS manual operation. Control receiving data by number of vacant data bytes of receiving buffer. <ol style="list-style-type: none"> When number of vacant data bytes becomes less than 16 bytes, RS signal turns to "1" and requests to stop sending data to an external device. When number of vacant data bytes becomes more than 17 bytes, RS signal turns to "0" and requests to send data to an external device.  <p>Number of vacant data bytes of receiving buffer: 16 bytes 17 bytes RS signal: 0 1 ← External device Receiving data: 1 2 3 4 5 6 ← External device</p> |

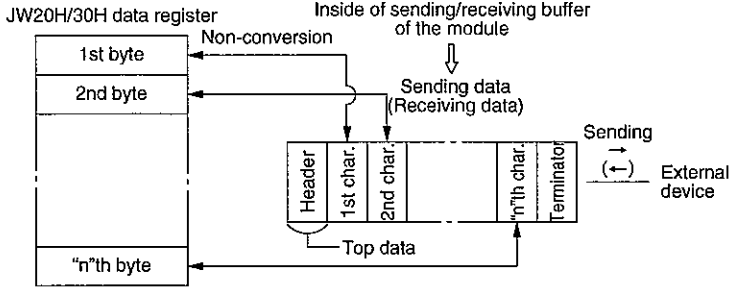
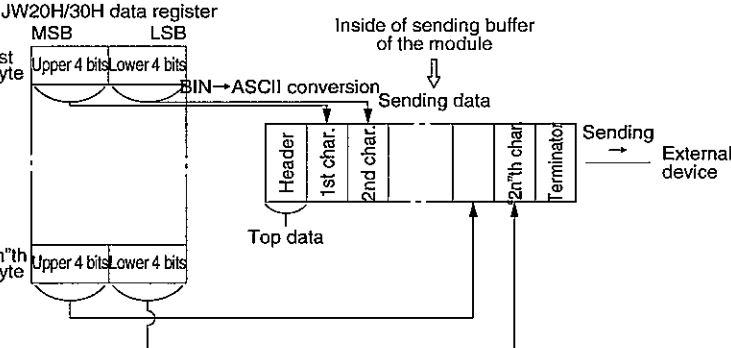
Note

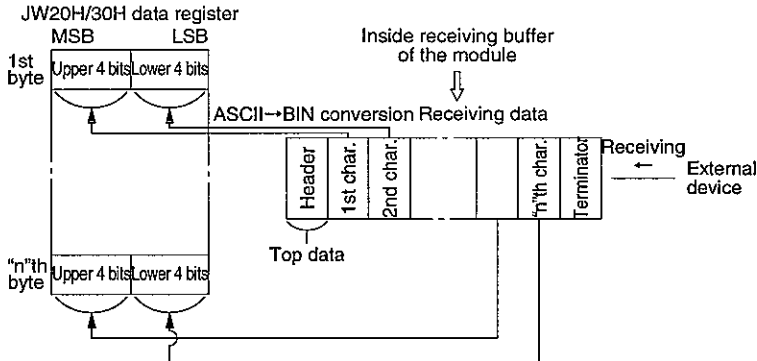
★ Match setting of control signal at external device side to the module settings.

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents |
|-----------------------|-------------------|--------------------------------|--|
| 010 | Control signal | 03 | <p>XON/XOFF manual</p> <ul style="list-style-type: none"> • Transfer mode: Valid at full-duplex. • Control sending data by XON, XOFF codes from an external device. <ol style="list-style-type: none"> 1. Possible data sending by receiving XON [11_{HEX}]. 2. Data stops sending by receiving XOFF [13_{HEX}].  <ul style="list-style-type: none"> • Control receiving data by RS relay. <ol style="list-style-type: none"> 1. The module automatically sends XOFF [13_{HEX}] by turning RS relay from "ON" to "OFF", and requests to stop sending data to an external device. 2. The module automatically sends XON [11_{HEX}] by turning RS relay from "OFF" to "ON", and requests to send data to an external device. 3. Receiving data time over error by turning OFF RS relay does not occurs.  |
| | | 04 | <p>XON/XOFF automatic</p> <ul style="list-style-type: none"> • Transfer mode: Valid at full-duplex. • Control sending data by XON, XOFF codes from external device. <p>Contents is as same as XON/XOFF manual operation.</p> • Control receiving data by number of vacant data bytes of receiving buffer. <ol style="list-style-type: none"> 1. When number of vacant data bytes is less than 16 bytes, the module automatically sends XOFF [13_{HEX}] and requests to stop sending data to an external device. 2. When number of vacant data bytes is more than 17 bytes, the module automatically sends XON [11_{HEX}] and requests to send data to an external device.  |

Note

★ Match setting of control signal at external device side to the Module settings.

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents |
|-----------------------|--------------------------------|--------------------------------|---|
| 011 | Transfer code conversion | 00 (Initial value) | <p>Sending: Non-conversion Receiving: Non-conversion</p> <ul style="list-style-type: none"> • Send JW20H/30H's data without conversion. • Send data from an external device without conversion. • JIS codes, binary data are usable (data length: 8 bits).  <p>※ Max. value of n (2 points) is 512. ※ Values in () means conditions at receiving.</p> |
| 011 | Transfer code conversion | 01 | <p>Sending: BIN → ASCII conversion Receiving: Non-conversion</p> <ul style="list-style-type: none"> • Send data after convert BIN data of JW20H/30H to ASCII form. (Sending header/terminators are sent without conversion.) • Receive data from an external device without conversion. <p>(At sending)</p>  <p>※ Max. value of n (2 points) is 512.</p> <p>(At receiving) Same as receiving of setting value 00_{HEX}.</p> |

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents |
|-----------------------|--------------------------------|--------------------------------|---|
| 011 | Transfer code conversion | 02 | <p>Sending: Non-conversion Receiving: ASCII → BIN conversion</p> <ul style="list-style-type: none"> • Send JW20H/30H's data without conversion. • After converting data from an external device as ASCII to BIN, take as JW20H/30H's data. • Only 0 to 9, A to F, ASCII characters are usable for receiving data (except receiving header, terminator). <p>(At sending) Same as sending of setting value 00_{HEX}. (See previous page)</p> <p>(At receiving)</p>  <p>※ Max. value of n (2 points) is 512. ※ Be sure to set number of receiving characters to even by an external device.</p> |
| | | 03 | <p>Sending: BIN → ASCII conversion Receiving: ASCII → BIN conversion</p> <ul style="list-style-type: none"> • Send data after convert JW20H/30H's data as BIN to ASCII. (Sending header/terminators are received without conversion.) • After converting data from an external device as ASCII to BIN, take as JW20H/30H's data. • Only 0 to 9, A to F, ASCII characters are usable for receiving data (except receiving header, terminator). <p>(At sending) Same as sending of setting value 01_{HEX}. (See previous page)</p> <p>(At receiving) Same as receiving setting value 02_{HEX}.</p> |

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents |
|-----------------------|------------------------------------|--------------------------------|----------|
| 012 | Sending time over interval | 00 (Initial value) | 0 ms |
| | | 01 | 100 ms |
| | | 02 | 200 ms |
| | | 03 | 300 ms |
| | | 04 | 400 ms |
| | | 05 | 500 ms |
| | | 06 | 600 ms |
| | | 07 | 700 ms |
| | | 08 | 800 ms |
| | | 09 | 900 ms |
| | | 0A | 1000 ms |
| | | 0B | 1100 ms |
| | | 0C | 1200 ms |
| | | 0D | 1300 ms |
| | | 0E | 1400 ms |
| | | 0F | 1500 ms |
| | | 10 | 1600 ms |
| 11 | 1700 ms | | |
| 12 | 1800 ms | | |
| 13 | 1900 ms | | |
| 14 | 2000 ms | | |
| | Other than above | Setting prohibited | |
| 013 | Receiving time over interval | 00 (Initial value) | 0 ms |
| | | 01 | 100 ms |
| | | 02 | 200 ms |
| | | 03 | 300 ms |
| | | 04 | 400 ms |
| | | 05 | 500 ms |
| | | 06 | 600 ms |
| | | 07 | 700 ms |
| | | 08 | 800 ms |
| | | 09 | 900 ms |
| | | 0A | 1000 ms |
| | | 0B | 1100 ms |
| | | 0C | 1200 ms |
| | | 0D | 1300 ms |
| | | 0E | 1400 ms |
| | | 0F | 1500 ms |
| | | 10 | 1600 ms |
| 11 | 1700 ms | | |
| 12 | 1800 ms | | |
| 13 | 1900 ms | | |
| 14 | 2000 ms | | |
| | Other than above | Setting prohibited | |

- While sending data, when data stops at a middle of 1 data frame (see page 26), the timer starts.
- When the module does not send next data until the sending time over interval, sending time out error occurs. When the module sends next data, it resets the timer and continues sending.
- Allowance of setting time is 0 to +100 ms.
(Example)
At 00_{HEX} setting: 0 ms to 100 ms
At 01_{HEX} setting: 100 ms to 200 ms

- While receiving data, when data stops at a middle of 1 data frame (see page 27), the timer starts.
- When the module does not receive next data until the receiving time over interval, receiving time out error occurs. When the module receives next data, it resets the timer and continues sending.
- Allowance of setting time is same as sending time out interval.
- When the control signal is RS/CS manual operation or XON/XOFF manual operation, and RS relay is "OFF," receiving time error does not occur.

| Address T - 0 to 7 | Parameter name | Setting value (Hexadecimal) | Contents | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-----------------|-----------------------------|---|---------|---------------|-----------|-----|-------|---|-----|-------|---|-----|-------|-----|-----|-------|-----|-----|-------|---|-----|-------|-----|
| 014 015 016 017 | EXP1 header | (Initial value: 00) | <ul style="list-style-type: none"> When EXP1 header, EXP1 terminator are set at sending header/terminator or receiving header/terminator of a control relay (see page 24), the set code in this parameter is valid as control code. When NUL code [00_{HEX}] is set, thereafter set code becomes invalid so that header can use 1 to 4 characters and terminator can use 1 to 2 characters. When NUL code is set at each top address 014, 020, it becomes header: absent, terminator: absent, conditions. <p>(Setting example)</p> | | | | | | | | | | | | | | | | | | | | | |
| 020 021 | EXP1 terminator | (Initial value: 00) | <table border="1"> <thead> <tr> <th>Address</th> <th>Setting value</th> <th>Character</th> </tr> </thead> <tbody> <tr> <td>014</td> <td>3A(H)</td> <td>:</td> </tr> <tr> <td>015</td> <td>3F(H)</td> <td>?</td> </tr> <tr> <td>016</td> <td>00(H)</td> <td>NUL</td> </tr> <tr> <td>017</td> <td>00(H)</td> <td>NUL</td> </tr> <tr> <td>020</td> <td>40(H)</td> <td>@</td> </tr> <tr> <td>021</td> <td>00(H)</td> <td>NUL</td> </tr> </tbody> </table> <p>Invalid ←</p> | Address | Setting value | Character | 014 | 3A(H) | : | 015 | 3F(H) | ? | 016 | 00(H) | NUL | 017 | 00(H) | NUL | 020 | 40(H) | @ | 021 | 00(H) | NUL |
| Address | Setting value | Character | | | | | | | | | | | | | | | | | | | | | | |
| 014 | 3A(H) | : | | | | | | | | | | | | | | | | | | | | | | |
| 015 | 3F(H) | ? | | | | | | | | | | | | | | | | | | | | | | |
| 016 | 00(H) | NUL | | | | | | | | | | | | | | | | | | | | | | |
| 017 | 00(H) | NUL | | | | | | | | | | | | | | | | | | | | | | |
| 020 | 40(H) | @ | | | | | | | | | | | | | | | | | | | | | | |
| 021 | 00(H) | NUL | | | | | | | | | | | | | | | | | | | | | | |
| 022 023 024 025 | EXP2 header | (Initial value: 00) | <ul style="list-style-type: none"> When EXP2 header, EXP2 terminator are set at sending header/terminator or receiving header/terminator of a control relay (see page 24), the set code in this parameter is valid as control code. | | | | | | | | | | | | | | | | | | | | | |
| 026 027 | EXP2 terminator | (Initial value: 00) | <ul style="list-style-type: none"> Setting contents is as same as EXP1 header, EXP1 terminator. | | | | | | | | | | | | | | | | | | | | | |
| 030 to 176 | Not used | (Initial value: 00) | _____ | | | | | | | | | | | | | | | | | | | | | |
| 177 | BCC code | _____ | <ul style="list-style-type: none"> Setting is not required. (Setting by support tool is invalid). Store check code of parameter. (The module checks parameter setting values from JW20H/30H with this code.) | | | | | | | | | | | | | | | | | | | | | |

[3] Control relay

Control relays are used for a program to send and receive data.

As for programming, refer to “Basic program” on Chapter 8 “Program Example” (P. 28).

(1) Control relay contents

Addresses show when the module No. switch setting is “0.” At settings of other numbers, refer to appendix 2 (P.42 to 46).

| Address | | Name of control relay | Contents |
|-------------------|----------------|--|---|
|]0200 [Output] | D ₁ | T _{RDY} (Ready sending operation) | <ul style="list-style-type: none"> Turn “ON” when data sending to an external device is available. When T_{RDY} relay turns from “OFF” to “ON”, the module clears error codes of control relay and recovers from error condition. |
| | D ₃ | R _{REQ} (Request to transfer receiving data) | <ul style="list-style-type: none"> Turn “ON” when JW20H requests to send receiving data to the module. While R_{REQ} relay turns from “OFF” to “ON”, when the module has received data, it turns “ON” R_{ACK} relay. (It also clears error codes.) |
| | D ₅ | RS (Request to send) | <ul style="list-style-type: none"> Control RS (control signal of RS-232C) from JW20H, this signal turns “ON” when requesting to send data to an external device. (RS signal voltage is +10 V.) Valid when parameter setting of control signal (P.19, P.20) is “RS/CS manual” and “XON, XOFF manual.” |
|]0201 [Input] | D ₁ | T _{REQ} (Request to transfer sending data) | <ul style="list-style-type: none"> Turn “ON” when there is no data in sending buffer of the module. |
| | D ₃ | R _{RDY} (Ready to transfer receiving data) | <ul style="list-style-type: none"> Turn “ON” when the module has receiving data, and ready to transfer to JW20H. |
| | D ₄ | R _{ACK} (Ready to transfer receiving data) | <ul style="list-style-type: none"> Turn “ON” when the module has receiving data while R_{REQ} turns from “OFF” to “ON”. The module transfer receiving data to JW20H by F-85 instruction while R_{ACK} turns from “OFF” to “ON”, and turns “OFF” after completion of transfer. |
| | D ₅ | CS (Ready sending) | <ul style="list-style-type: none"> Monitor CS (control signal of RS-232C) at JW20H, and turns “ON” when an external device is ready to receive data. (CS signal voltage is +3 to +15 V.) |
| | D ₇ | U _{RDY} (Available operation of the module) | <ul style="list-style-type: none"> The module turns “ON” this signal when it ready to operate, and keeps “ON” condition with both of the below conditions. <ol style="list-style-type: none"> Completion of transfer parameter from JW20H to the module. Mode switch setting is “0.” |
|]0202 [Input] | | Error code (See page 33, 34.) | <ul style="list-style-type: none"> The module converts errors which occurred inside to error code, and outputs to this address. Error code becomes 00_{HEX} (normal operation) at following conditions. <ol style="list-style-type: none"> When T_{RDY} relay turns from “OFF” to “ON”. JW20H starts operation. When more than one errors occurs, the module outputs priority error code. |

| Address | | Name of control relay | Setting value or output value | Contents | | |
|-------------------|--|---------------------------------|-------------------------------|---|----------------------|-------------------------|
|]0203 [Output] | D ₀ to D ₃ | Receiving header/ terminator | | Receiving header | Receiving terminator | <p>(Receiving data)</p> |
| | | | 0 _{HEX} | Absent | Absent | |
| | | | 1 _{HEX} *1 | EXP1 header | EXP1 terminator | |
| | | | 2 _{HEX} *1 | EXP2 header | EXP2 terminator | |
| | | | 3 _{HEX} | Absent | CR | |
| | | | 4 _{HEX} | Absent | LF | |
| | | | 5 _{HEX} | Absent | CR • LF | |
| | | | 6 _{HEX} | STX | ETX | |
| | | | 7 _{HEX} *2 | STX | ETX + BCC (1 byte) | |
| | | | Other than above | Setting prohibited | | |
|]0203 [Output] | D ₄ to D ₇ | Sending header/ terminator | | Receiving header | Receiving terminator | <p>(Receiving data)</p> |
| | | | 0 _{HEX} | Absent | Absent | |
| | | | 1 _{HEX} *1 | EXP1 header | EXP1 terminator | |
| | | | 2 _{HEX} *1 | EXP2 header | EXP2 terminator | |
| | | | 3 _{HEX} | Absent | CR | |
| | | | 4 _{HEX} | Absent | LF | |
| | | | 5 _{HEX} | Absent | CR • LF | |
| | | | 6 _{HEX} | STX | ETX | |
| | | | 7 _{HEX} *2 | STX | ETX + BCC (1 byte) | |
| | | | Other than above | Setting prohibited | | |
|]0204 (Lower) | No. of sending bytes | 0000 _{HEX} | Variable data length | <ul style="list-style-type: none"> • Set number of byte of sending data to external device. • When number of byte is set to "variable data length," the module is unable to send at sending terminator being "absent," and automatically calculates number of sending bytes at sending terminator being "present." • As for relationship with other settings, see next page. | | |
|]0205 (Upper) | | 0001 _{HEX} | 1 byte | | | |
| [Output] | | to | to | | | |
| | | 0200 _{HEX} | 512 bytes | | | |
| | | Other than above | Setting prohibited | | | |
|]0206 (Lower) | No. of transfer bytes | 0000 _{HEX} | 0 byte | <ul style="list-style-type: none"> • Setting is not required. • After calculating number of receiving data bytes from an external device (except receiving header/terminator), the module outputs the result to this address. • As for relationship with other settings, see page 27. | | |
|]0207 (Upper) | | to | to | | | |
| [Input] | | 0200 _{HEX} | 512 bytes | | | |
|]0210 (Lower) | No. of receiving bytes | 0000 _{HEX} | 0 byte | <ul style="list-style-type: none"> • Set number of byte of receiving data to external device. • This setting is valid only when both receiving header/terminator are "absent." • As for relationship with other settings, see page 27. | | |
|]0211 (Upper) | | to | to | | | |
| [Output] | | 0200 _{HEX} | 512 bytes | | | |
| | | Other than above | Setting prohibited | | | |

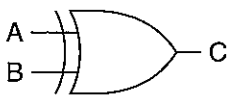
*1 (4 points) – Become parameter setted code (see page 22.)

*2 (2 points) – How to make the BCC code

BCC check is made based on the calculation of the range from STX onward up to ETX. The calculations are all performed in bit patterns of ASCII 7 bits codes.

1) Operate XOR of the first character and the second character of the communication data.

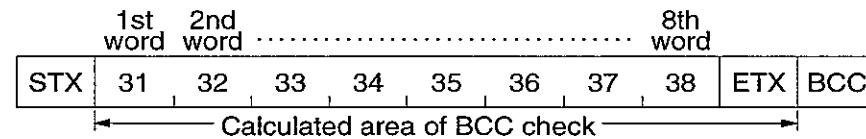
Truth table of eXclusive OR

| Symbol | A | B | C |
|---|---|---|---|
|  | 0 | 0 | 0 |
| | 1 | 0 | 1 |
| | 0 | 1 | 1 |
| | 1 | 1 | 0 |

2) Operate XOR of the result of that operation and the third character.

3) Determine the result of operation sequentially and, lastly, operate XOR of ETX to take it as BCC code.

(Example)



| ASCII | Binary value | | XOR value |
|---------|--------------|---|-----------------------|
| 31 | 110001 | | |
| 32 | 110010 | ⊕ | 110001=Result (1) |
| 33 | 110011 | ⊕ | 000011= |
| 34 | 110100 | ⊕ | 110000= |
| 35 | 110101 | ⊕ | 000100= |
| 36 | 110110 | ⊕ | 110001= |
| 37 | 110111 | ⊕ | 000111= |
| 38 | 111000 | ⊕ | 110000= |
| ETX(03) | 000011 | ⊕ | 001000= |
| | | | 001011 BCC code |

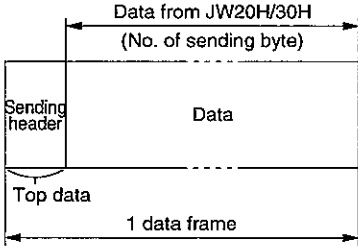
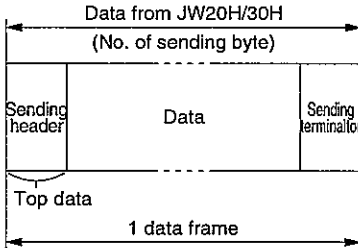
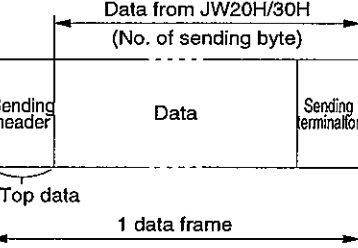
Note

★ Number of transfer bytes and receiving bytes are values after converting transfer code at data receiving. Therefore, when the module receives after conversion as ASCII to BIN (P.20), number of data bytes at an external device is 1024 bytes at max.

| Number of transfer bytes. number of receiving bytes | Number of data bytes at the external device | |
|--|---|-----------------------------------|
| | Receiving: non-conversion | Receiving: ASCII → BIN conversion |
| 1 | 1 | 2 |
| 2 | 2 | 4 |
| to | to | to |
| 511 | 511 | 1022 |
| 512 | 512 | 1024 |

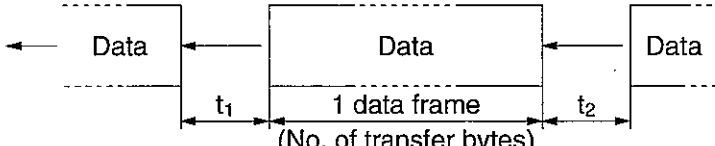
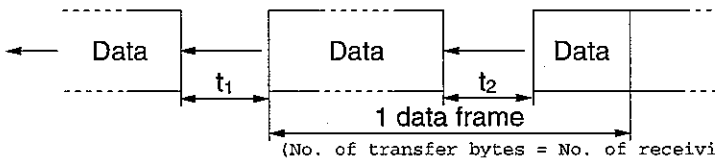
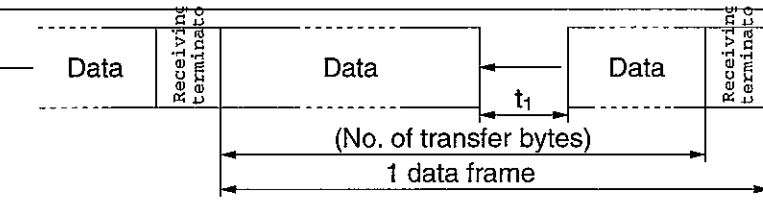
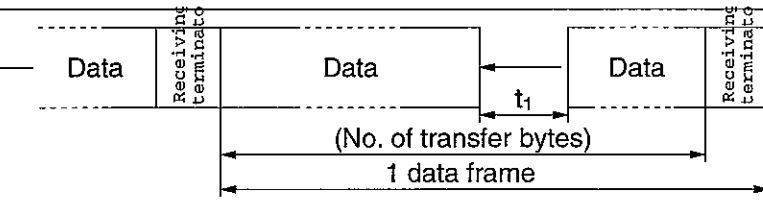
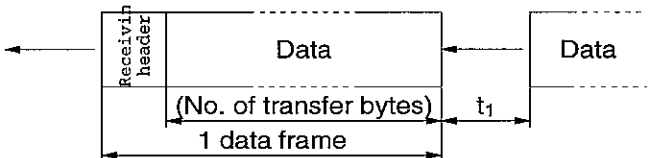
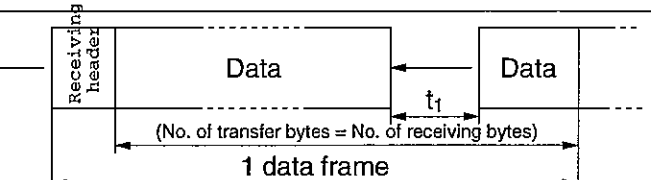
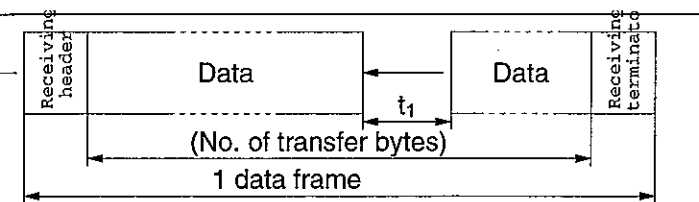
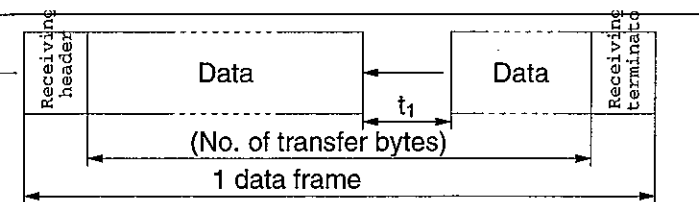
[4] Sending data

Relations between sending header/terminator , number of sending bytes (P.24) and 1 data frame of sending data are as follows:

| Sending terminator [Control relay setting value] | Number of sending byte [Control relay setting value] | Sending data |
|--|---|--|
| <p style="text-align: center;">Absent 0_{HEX}</p> <p style="text-align: center;">(Including setting EXP1 terminator or EXP2 terminator of Parameter to "absent" at 1_{HEX}, 2_{HEX} settings.)</p> | Variable data length [0000 _{HEX}] | <ul style="list-style-type: none"> Unable sending (Number of sending bytes uncertain error) |
| | 1 to 512 bytes [0001 _{HEX} to 0200 _{HEX}] |  <p style="text-align: center;">Data from JW20H/30H (No. of sending byte)</p> <p style="text-align: center;">Sending header Data</p> <p style="text-align: center;">Top data</p> <p style="text-align: center;">1 data frame</p> <ul style="list-style-type: none"> Add sending header set by control relay automatically. |
| Present [1 _{HEX} to 7 _{HEX}] | Variable data length [0000 _{HEX}] |  <p style="text-align: center;">Data from JW20H/30H (No. of sending byte)</p> <p style="text-align: center;">Sending header Data Sending terminator</p> <p style="text-align: center;">Top data</p> <p style="text-align: center;">1 data frame</p> <ul style="list-style-type: none"> Calculate the number of sending bytes automatically. Setting sending header/terminator set in the JW20H/30H data with control relay is required. |
| | 1 to 512 bytes [000 _{HEX} to 0200 _{HEX}] |  <p style="text-align: center;">Data from JW20H/30H (No. of sending byte)</p> <p style="text-align: center;">Sending header Data Sending terminator</p> <p style="text-align: center;">Top data</p> <p style="text-align: center;">1 data frame</p> <ul style="list-style-type: none"> Add sending header/terminator set by control relay automatically. |

[5] Receiving data

Relationship between receiving header/terminator, number of receiving bytes (P.24), receiving time out interval (P.21), number of transfer bytes (P.24) with 1 data frame of receiving data are as follows:
(t_1 , t_2 are intervals between each receiving data, "T" as receiving time out interval.)

| Receiving header/terminator [Control relay setting value] | Number of receiving byte [Control relay setting value] | Receiving data |
|--|--|--|
| Receiving header: absent Receiving terminator: absent | 0 byte [0000 _{HEX}] |  <ul style="list-style-type: none"> When both t_1 and t_2 are longer than "T," an interval length between each start point of t_1 and t_2 becomes 1 data frame. |
| 0_{HEX} (Including above conditions at 1_{HEX} , 2_{HEX} Parameter setting.) | 1 ~ 512 bytes [0001 _{HEX} to 0200 _{HEX}] |  <ul style="list-style-type: none"> When t_1 is longer than "T," an interval of number of receiving bytes becomes 1 data frame. When t_2 becomes passed "T" set time, the Module treats it as receiving time out error and rejects received data. |
| Receiving header: absent Receiving terminator: present | Setting value: Invalid |  <ul style="list-style-type: none"> An interval after receipt of terminator to receipt of next terminator becomes 1 data frame. * |
| 3_{HEX} to 5_{HEX} (Including above conditions at 1_{HEX} , 2_{HEX} Parameter setting.) | Setting value: Invalid |  <ul style="list-style-type: none"> An interval after receipt of terminator to receipt of next terminator becomes 1 data frame. * |
| Receiving header: present Receiving terminator: absent | 0 byte [0000 _{HEX}] |  <ul style="list-style-type: none"> An interval from header to "T" time out of t_1 becomes 1 data frame. |
| Above case only with 1_{HEX} , 2_{HEX} parameter settings. | 1 to 512 bytes [001 _{HEX} to 0200 _{HEX}] |  <ul style="list-style-type: none"> An interval from header to number of receiving bytes becomes 1 data frame. * |
| Receiving header: present Receiving terminator: present | Setting value: Invalid |  <ul style="list-style-type: none"> An interval from header to terminator becomes 1 data frame. * |
| 1_{HEX} , 2_{HEX} 6_{HEX} , 7_{HEX} | Setting value: Invalid |  <ul style="list-style-type: none"> An interval from header to terminator becomes 1 data frame. * |

* (3 places) When t_1 exceeds T, it becomes receiving time out error and rejects received data.

Note

★ When number of transfer bytes exceeds 512, it becomes overflow error and rejects received data.

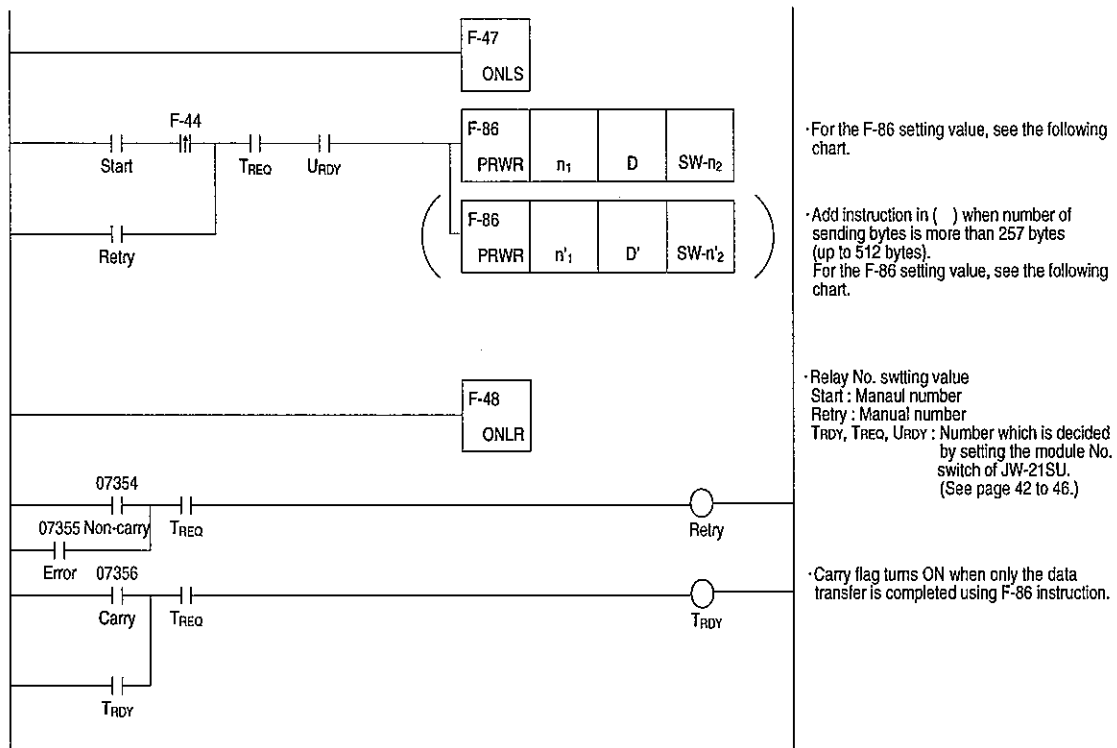
Chapter 8. Program Example

This chapter describes basic program of data sending and data receiving, and its application examples. Use this basic program for programming.

[1] Basic program

(1) Data sending

When the start relay turns from "OFF" to "ON" while there is no sending data in the module sending buffer, the module transfers JW20H/30H's data to the module's sending buffer by F-86 instruction, and starts data send to an external device. The retry relay function is capable of re-transferring data which was not executed data transfer by F-86 instruction. (As for functions of each control relay, see page 23.)

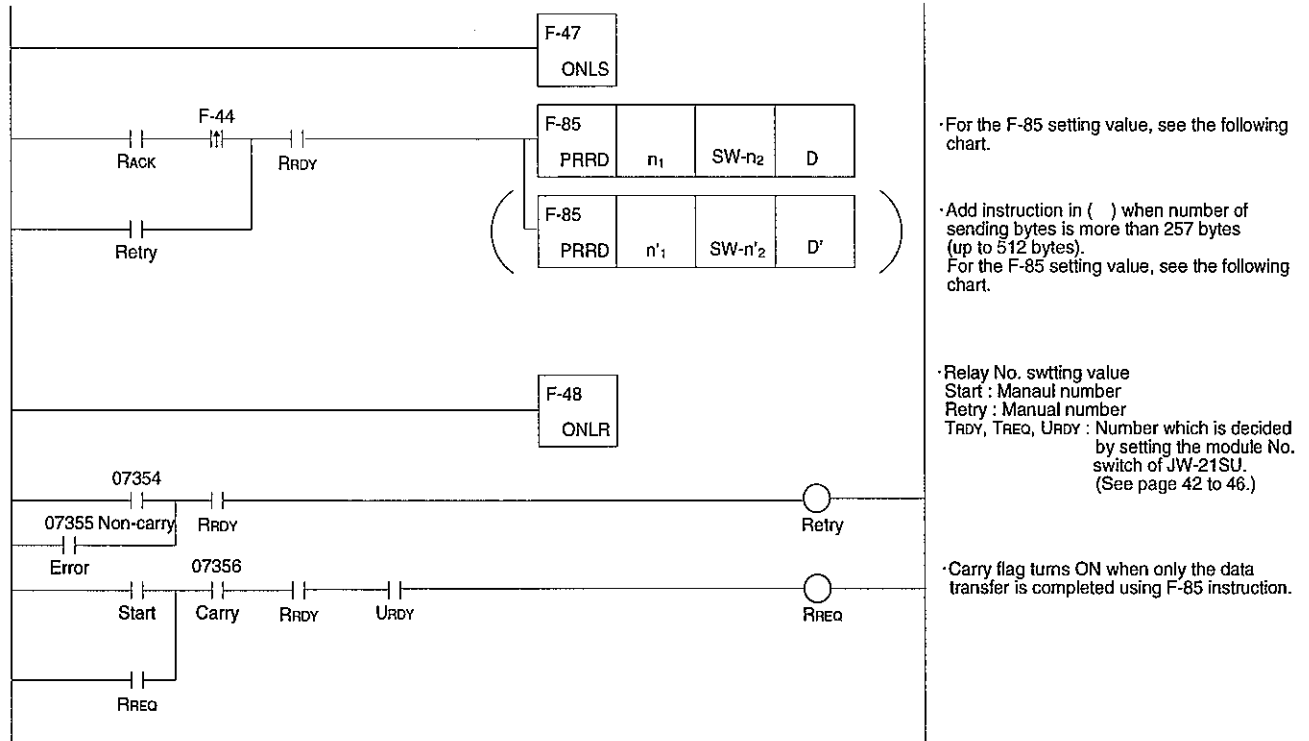


Setting value of F-86 instruction

| | Number of sending bytes | |
|--|---|------------|
| | 1 to 256 | 257 to 512 |
| n₁ (transfer bytes) | Set 001oct to 377oct for 257 to 511, and 000oct for 256 of number of sending bytes. | 000oct |
| D (top address) | Set the top address of sending data JW20H :]0000 to]1577, b0000 to b1777, 09000 to 99777, E0000 to E1777 JW30H : 09000 to 99777, E0000 to E7777, file 1 000000 to 037777 @]0000 to @]1574, @[2000 to @[7574, @b0000 to @b1774, @b2000 to @b3774, @09000 to @99774, @E0000 to @E7774, file 1 @000000 to @037774 | |
| SW (switch setting) | JW20H : 0 to 7 <module No. switch (0 to 7)> JW30H : 00 to 37 <upper digit : rack No. (0 to 3)> lower digit : module No. switch (0 to 7)> | |
| n₂ (transfer data) | 0 | 0 |
| n₁' (number of transfer bytes) | Set 001oct to 377oct for 257 to 511, and 000oct for 512 of number of transfer bytes. | |
| D' (top address) | Set the 257th byte address counting from address D. | |
| n₂' (transfer area) | 1 | |

(2) Data receiving

When start relay turns from "OFF" to "ON" while there is data from an external device in the module sending buffer, the module transfers data in receiving buffer to data register of JW20H/30H by F-85 instruction. The retry relay function is capable of re-transferring data which was not executed data transfer by F-85 instruction. (As for functions of each control relay, see page 23.)



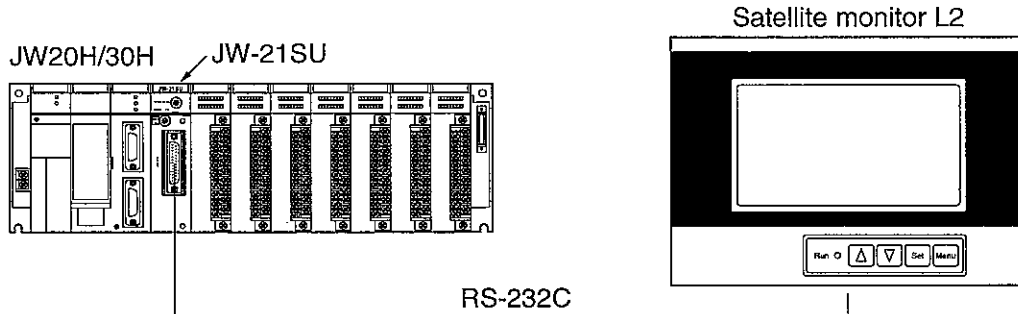
Setting value of F-85 instruction

| | Number of sending bytes | |
|--|---|--------------------|
| | 1 to 256 | 257 to 512 |
| n₁ (transfer bytes) | Set 001 _{oct} to 377 _{oct} for 257 to 511, and 000 _{oct} for 256 of number of receiving bytes. | 000 _{oct} |
| D (top address) | Set the top address which transfer the receiving data JW20H :]0000 to]1577, b0000 to b1777, 09000 to 99777, E0000 to E1777 JW30H : 09000 to 99777, E0000 to E7777, file 1 000000 to 037777 @]0000 to @]1574, @]2000 to @]7574, @b0000 to @b1774, @b2000 to @b3774, @09000 to @99774, @E0000 to @E7774, file 1 @000000 to @037774 | |
| SW (switch setting) | JW20H : 0 to 7 <module No. switch (0 to 7)> JW30H : 00 to 37 <upper digit : rack No. (0 to 3)> lower digit : module No. switch (0 to 7)> | |
| n₂ (transfer data) | 2 | 2 |
| n'₁ (number of transfer bytes) | Set 001 _{oct} to 377 _{oct} for 257 to 511, and 000 _{oct} for 512 of number of transfer bytes. | |
| D' (top address) | Set the 257th byte address counting from address D. | |
| n'₂ (transfer area) | 3 | |

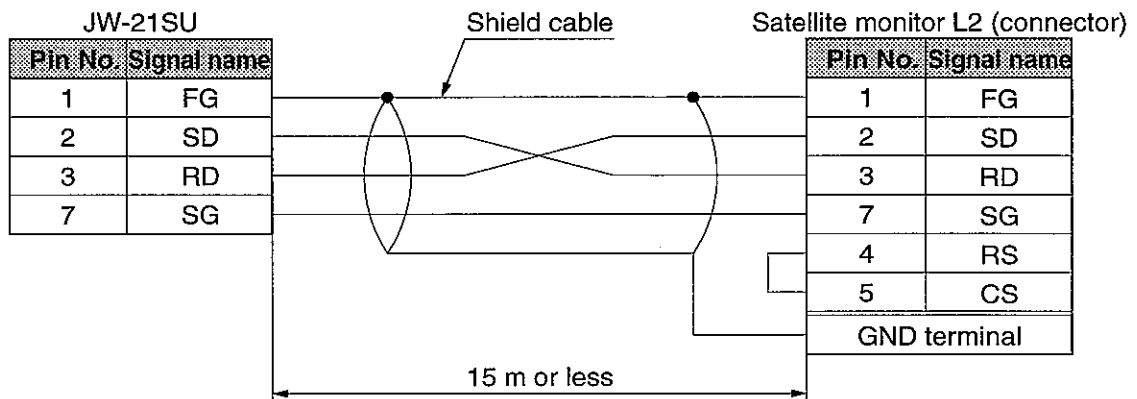
[2] Example of applied program

The example below shows how to connect satellite monitor L2 (Z-SM10) and to check screen number on L2 by JW20H.

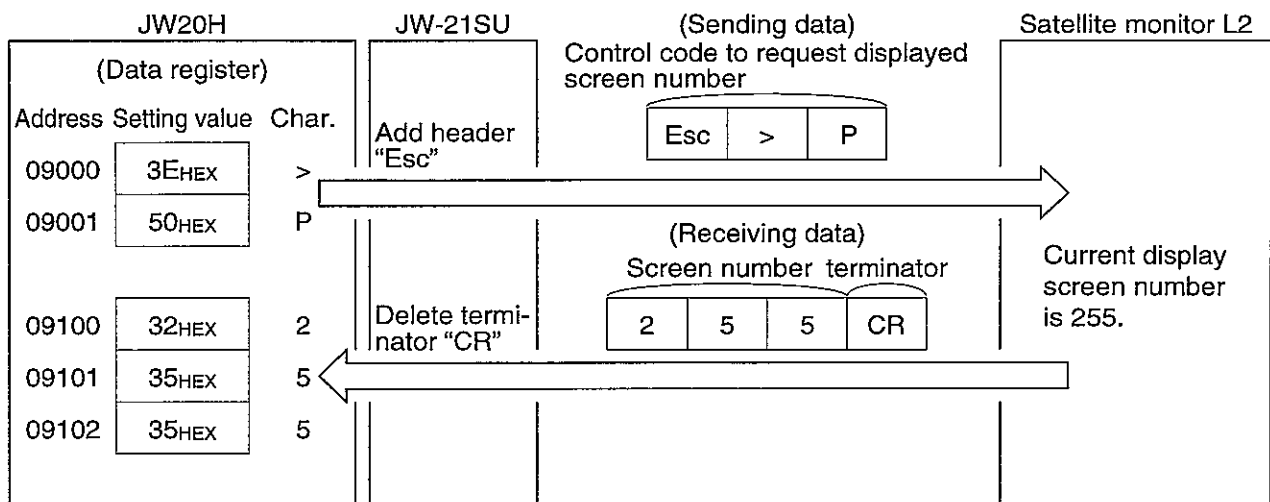
(1) System configuration



(2) Connection



(3) Data flow chart



(4) Settings of JW-21SU and JW20H

1. Parameter address and control relay address

Set module number switch as "0." With this setting, each address will be fixed. (See page 37 and 42.)

Other relay allocation

| Relay name | Relay number |
|------------|-----------------------|
| Start | 04000 (for sending) |
| | 04100 (for receiving) |
| Retry | 04001 (for sending) |
| | 04101 (for receiving) |

2. Sending, receiving header/terminator setting

- Sending header: Esc, Sending terminator: absent
- Receiving header: absent, Receiving terminator: CR

| Control relay setting (see page 24.) | |
|--|-------------------|
| Address J0203 : | 13 _{HEX} |
| [Sending header : EXP1 header] | |
| [Sending terminator : EXP1 terminator] | |
| [Receiving header : Absent] | |
| [Receiving terminator : CR] | |

Set by program

| Parameter setting (see page 22.) | | | |
|----------------------------------|-----------------|-------------------|-------|
| | Address (T - 0) | Setting value | Char. |
| EXP1 header | 014 | 1B _{HEX} | Esc |
| | 015 | 00 _{HEX} | NUL |
| | 016 | 00 _{HEX} | NUL |
| EXP1 terminator | 017 | 00 _{HEX} | NUL |
| | 020 | 00 _{HEX} | NUL |
| | 021 | 00 _{HEX} | NUL |

Set by support tool

3. Number of sending bytes

Set 2 bytes of character ">" and "P" by program. (For details, see page 24.)

| Control relay setting | |
|-----------------------|---|
| Address J0204 : | 02 _{HEX} (Number of byte at lower digit) |
| Address J0205 : | 00 _{HEX} (Number of byte at upper digit) |

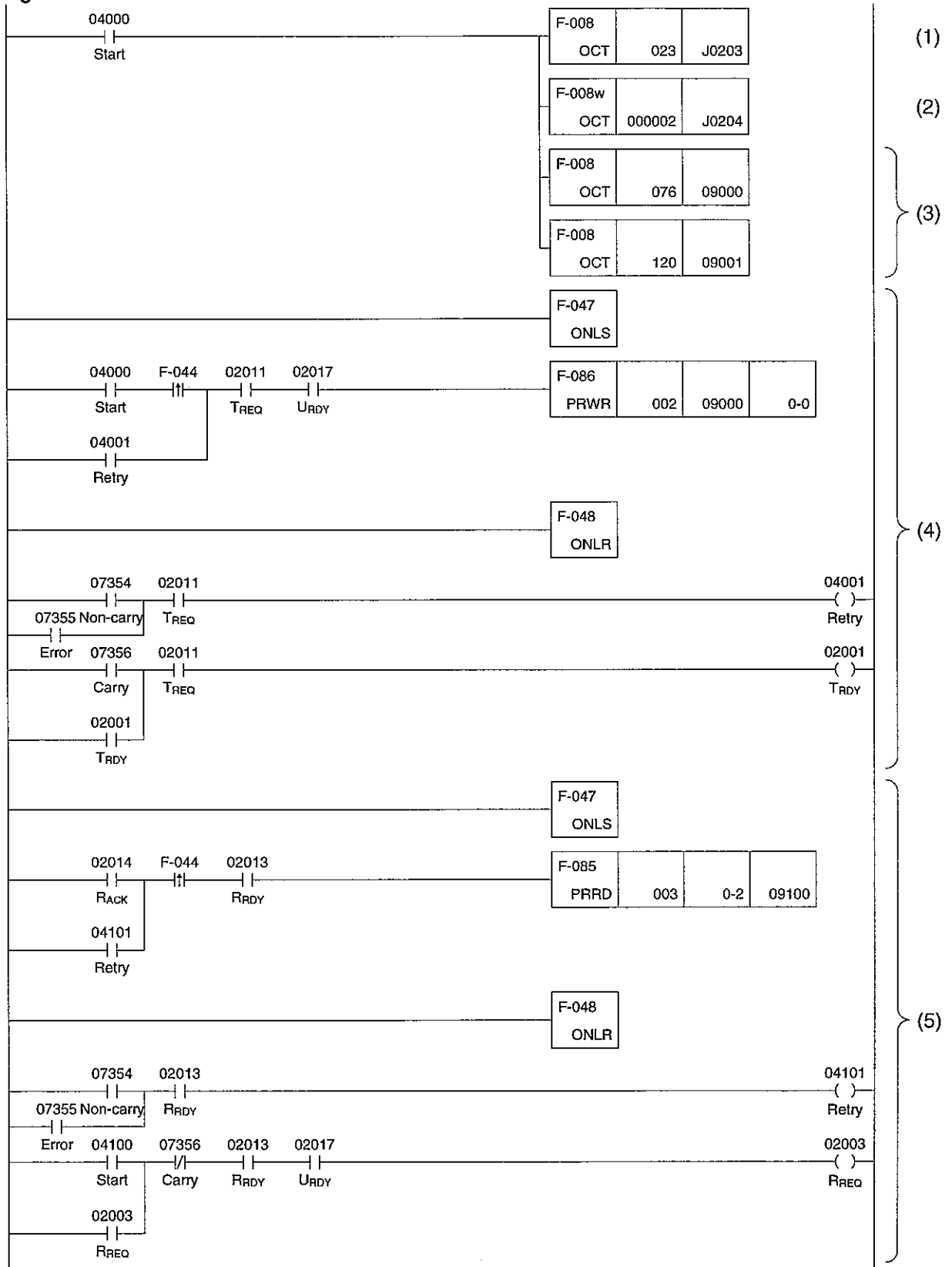
4. Number of receiving bytes

Setting is not required, because receiving header: absent, receiving terminator: present. (For details, see page 27.)

*With above, settings concerning this program has completed. Other settings are omitted.

As for satellite monitor L2 settings, see instruction manual (Chapter 12. Serial Communication mode) supplied with L2.

(5) Program



Explanation

- (1) Set sending, receiving header/terminator. [023_{OCT} = 13_{HEX}]
- (2) Set the number of sending bytes to 2 bytes. [000002_{OCT} = 0002_{HEX}]
- (3) Set character ">," "P" to register 09000, 09001 of JW20H. [076_{OCT} = 3E_{HEX}, 120_{OCT} = 50_{HEX}]
- (4) With turning start relay 04000 from "OFF" to "ON", the module sends request to display screen number to the satellite monitor L2.
- (5) With turning start relay 04100 from "OFF" to "ON", the module stores screen number received from the Satellite monitor L2 to register 09100 to 09102 of JW20H.

Chapter 9. Error and Treatment

When the module is abnormal, EA, EB, or FT on indication panel lights (see page 35), and stores error code in control relay area. (see page 23.)

The stored address is fixed by module No. switch setting of the module.

| Module No. switch setting value | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| JW20H | | J0202 | J0222 | J0242 | J0262 | J0302 | J0322 | J0342 | J0362 |
| JW30H | Rack No. 0 | J3002 | J3022 | J3042 | J3062 | J3102 | J3122 | J3142 | J3162 |
| | Rack No. 1 | J3202 | J3222 | J3242 | J3262 | J3302 | J3322 | J3342 | J3362 |
| | Rack No. 2 | J3402 | J3422 | J3442 | J3462 | J3502 | J3522 | J3542 | J3562 |
| | Rack No. 3 | J3602 | J3622 | J3642 | J3662 | J3702 | J3722 | J3742 | J3762 |

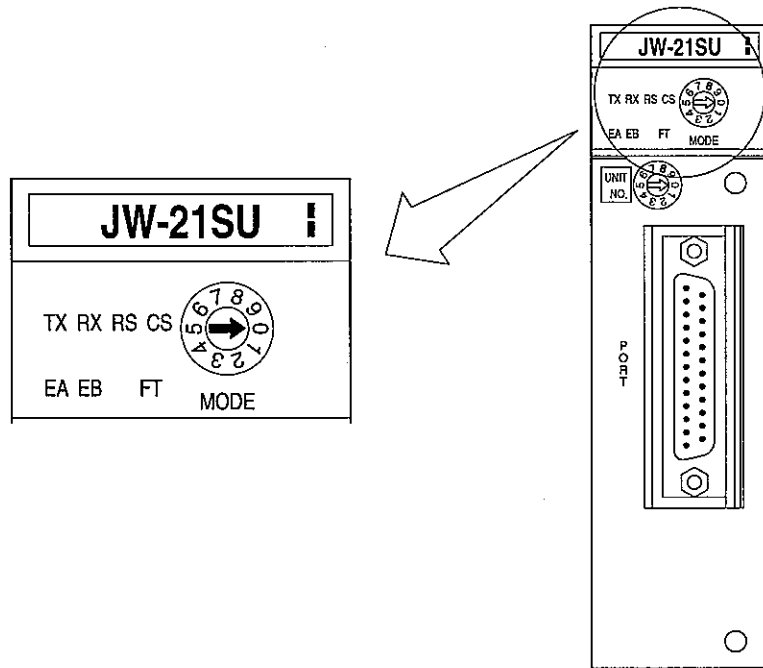
[1] Causes and treatments for errors

| Error code (Hexadecimal) | Name | Cause | Treatment [() means page to refer.] | Priority | Lighting LED | |
|--------------------------|------------------|------------------------------------|---|---|--------------|----|
| 00 | Normal operation | ————— | ————— | — | — | |
| Parameter setting error | 80 | Parameter transfer error | Set other than 22 _{HEX} in parameter transfer. | Check setting value of parameter transfer (P.15) | 2 | EA |
| | 81 | BCC calculation error | Setting value of BCC calculation is incorrect. | Check setting value of BCC value. (P.15) | 13 | |
| | 82 | Communication mode error | Setting value of communication mode is outside the range. | Check setting value of communication mode (P.15) | 3 | |
| | 83 | Transfer mode error | Setting value of transfer mode is outside the range. | Check setting value of transfer mode. (P.15) | 4 | |
| | 84 | Transfer rate error | Setting value of transfer rate is outside the range. | Check setting value of transfer rate. (P.15) | 5 | |
| | 85 | Data length error | Setting value of data length is outside the range. | Check setting value of data length. (P.16) | 6 | |
| | 86 | Stop bit error | Setting value of stop bit is outside the range. | Check setting value of stop bit. (P.16) | 7 | |
| | 87 | Parity error | Setting value of parity is outside the range. | Check setting value of parity. (P.16) | 8 | |
| | 88 | Control signal error | Setting value of control signal is outside the range. | Check setting value of control signal. (P.17, 18) | 9 | |
| | 89 | Transfer code conversion error | Setting value of transfer code conversion is outside the range. | Check setting value of transfer code conversion. (P.19, 20) | 10 | |
| | 8A | Sending time over interval error | Setting value of sending time over interval is outside the range. | Check setting value of sending time over interval. (P.21) | 11 | |
| | 8B | Receiving time over interval error | Setting value of receiving time over interval is outside the range. | Check setting value of receiving time over interval. (P.21) | 12 | |

| | Error code (Hexadecimal) | Name | Cause | Treatment | Priority | Lighting LED |
|-----------------------------|--------------------------|--|--|--|----------|--------------|
| Control relay setting error | 90 | Sending, receiving header/terminator error | Setting value of sending, receiving header/terminator is outside the range. | Check control relay settings of sending, receiving header/terminator. (P.24) | 14 | EA |
| | 91 | Number of sending bytes error | <ul style="list-style-type: none"> Setting value of the number of sending bytes is outside the range. Set sending header/terminator to "absent," and number of sending byte setting is "variable data length." | Check number of sending byte setting control relay, sending header/terminator setting control relay. (P.24) | 15 | |
| | 92 | Number of sending bytes undefined error | While number of sending bytes being "variable data length," there is no sending terminator in sending data. | Check sending data, sending header/terminator setting control relay, number of sending byte setting control relay, sending header/terminator setting parameter. (P.22, 24) | 17 | |
| | 93 | Number of receiving bytes error | Setting value of number of receiving byte is outside the range. | Check number of receiving byte setting control relay. (P.24) | 16 | |
| Communication error | A0 | Parity error | Error occurs by parity check during receiving data. | <ul style="list-style-type: none"> Check communication setting with external device. Check external device, communication cable. | 19 | EB |
| | A1 | Framing error | Receiving data is abnormal. | <ul style="list-style-type: none"> Check communication setting with external device. Check external device, communication cable. | 20 | |
| | A2 | Overrun error | Receiving data exceeds receiving buffer capacity. | Check number of sending data of external device. | 21 | |
| | A3 | Overflow error | Number of receiving bytes exceeds 512 bytes which is a limit to transfer to JW20H/30H. | Check number of sending data of external device. | 22 | |
| | A4 | Data conversion error | Receive unable to convert code by ASCII → BIN conversion of receiving data. | Check sending data of external device. | 23 | |
| | A5 | BCC check error | When receiving header/terminator is set to STX-ETX + BCC, BCC code calculated by receiving data differs from received BCC codes. | Check sending data of external device. | 24 | |
| | A6 | Sending time over error | Prohibition to receive of an external device continued longer than sending time out interval set in parameter. | Check external device, communication cable. | 26 | |
| | A7 | Receiving time over error | Data stopped condition while data receiving continued longer than receiving time out interval set in parameter. | Check external device, communication cable. | 25 | |
| Hardware error | C0 | Hardware error | Error occurs by ROM sumcheck, RAM read/write check inside the module. | Replace the module. | 1 | EA |
| Communication error | C1 | Data collision error | When the transfer mode is half-duplex, both the module and an external device send data, or communication cable is shorted. | <ul style="list-style-type: none"> Check sending, receiving timing with external device. Check communication cable. | 18 | EB |
| | — | Module error | Watchdog timer timed over. | Replace the module. | — | FT |
| | — | Mode switch error | Mode switch is set to other than 0. | Set mode switch to 0. | — | EA EB |

[2] Indication panel

This panel indicates operation condition of the module by LED ON/OFF.

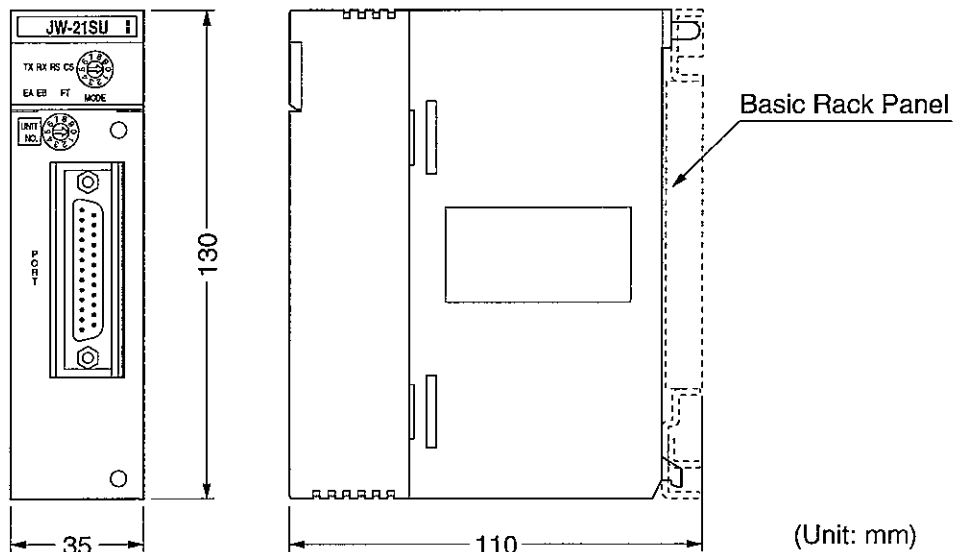


| LED indication | Contents |
|----------------|--|
| TX | Lights while sending data (JW-21SU → external device) |
| RX | Lights while receiving data (JW-21SU ← external device) |
| RS | Lights when requesting to send data to the module from an external device. |
| CS | Lights when ready to send data to external device from the module. |
| EA | <ul style="list-style-type: none"> • Lights when parameter setting is outside the setting range. • Lights when control relay setting is outside the setting range. |
| EB | Lights at communication error such as parity error and time over etc. |
| FT | Lights at hardware error of the module. |

Chapter 10. Specifications

| Items | Specifications |
|-----------------------------------|---|
| Applicable PC | New satellite JW20H (JW21CU/22CU) JW30H (JW-31CUH/H1, JW-32CUH/H1, JW-33CUH/H1/H2/H3) |
| Installable slot | JW20H basic/expansion rack panel (Max. number of installed module: 8) JW30H basic/expansion rack panel (Max. number of installed module: 32) |
| Number of occupied I/O points | I/O relay: 16 points (dummy) Control relay: 128 points (use 8 bytes out of 16 bytes) Parameter setting: 128 bytes |
| Communication procedure | No protocol |
| Number of connectable modules | RS-232C: 1 set, RS-422: Max. 15 sets |
| Data transfer standard | EIA RS-232C/RS-422 (2-wire system, 4-wire system) |
| Transfer rate | 600, 1200, 2400, 4800, 9600, 19200 bits/sec. |
| Synchronous mode | Start-stop system |
| Transfer mode | Full-duplex/half-duplex |
| Circuit configuration | 1:1/1:N |
| Control signal | Absent, RS/CS manual, RS/CS automatic, XON/XOFF manual, XON/XOFF automatic |
| Data length | 7/8 bits |
| Parity | Absent, odd, even |
| Stop bit | 1/2 bits |
| Control character | Absent, EXP1, EXP2, CR, LF, CR • LF, STX, ETX, ETX+BCC |
| Transfer code | Non-conversion, BIN ↔ ASCII conversion |
| Number of sending/receiving bytes | Individual setting for sending/receiving (1 to 512 bytes) |
| Communication line | Shielded twisted pair cable Cable total length: Max. 15 m (RS-232C) Max. 1 km (RS-422) |
| Internal current consumption | 170 mA (5 VDC) |
| Storage temperature | -20 to +70°C |
| Ambient operation temperature | 0 to +55°C |
| Ambient humidity | 35 to 90% (without dew condensation) |
| Vibration resistance | JIS C0911 or equivalent (same condition as JW20H/30H) |
| Shock resistance | JIS C0912 or equivalent (same condition as JW20H/30H) |
| Noise immunity | 1000 Vp-p, 1μs by noise simulator |
| Weight | Approx. 200 g |
| Accessories | One instruction manual, 1 pc. of D-sub 25P connector |

[Outside dimensions]



(Unit: mm)

Appendix

Appendix 1. Parameter address and parameter name

The below table shows the relation between address of parameter area and name of parameter set by module No. switches.

[1] JW20H

| Parameter address | Parameter area | | | | | | | | Parameter name |
|-------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------------|
| | Register address of file 1 (Setting value of module No. switch) | | | | | | | | |
| | T-0 to 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| 000 | 000000 | 000200 | 000400 | 000600 | 001000 | 001200 | 001400 | 001600 | Parameter transfer |
| 001 | 000001 | 000201 | 000401 | 000601 | 001001 | 001201 | 001401 | 001601 | BCC calculation |
| 002 | 000002 | 000202 | 000402 | 000602 | 001002 | 001202 | 001402 | 001602 | Communication mode |
| 003 | 000003 | 000203 | 000403 | 000603 | 001003 | 001203 | 001403 | 001603 | Transfer mode |
| 004 | 000004 | 000204 | 000404 | 000604 | 001004 | 001204 | 001404 | 001604 | Transfer rate |
| 005 | 000005 | 000205 | 000405 | 000605 | 001005 | 001205 | 001405 | 001605 | Data length |
| 006 | 000006 | 000206 | 000406 | 000606 | 001006 | 001206 | 001406 | 001606 | Stop bit |
| 007 | 000007 | 000207 | 000407 | 000607 | 001007 | 001207 | 001407 | 001607 | Parity |
| 010 | 000010 | 000210 | 000410 | 000610 | 001010 | 001210 | 001410 | 001610 | Control signal |
| 011 | 000011 | 000211 | 000411 | 000611 | 001011 | 001211 | 001411 | 001611 | Transfer code conversion |
| 012 | 000012 | 000212 | 000412 | 000612 | 001012 | 001212 | 01412 | 001612 | Sending time over interval |
| 013 | 000013 | 000213 | 000413 | 000613 | 001013 | 001213 | 001413 | 001613 | Receiving time over interval |
| 014 | 000014 | 000214 | 000414 | 000614 | 001014 | 001214 | 001414 | 001614 | EXP1 header |
| 015 | 000015 | 000215 | 000415 | 000615 | 001015 | 001215 | 001415 | 001615 | |
| 016 | 000016 | 000216 | 000416 | 000616 | 001016 | 001216 | 001416 | 001616 | |
| 017 | 000017 | 000217 | 000417 | 000617 | 001017 | 001217 | 001417 | 001617 | EXP1 terminator |
| 020 | 000020 | 000220 | 000420 | 000620 | 001020 | 001220 | 001420 | 001620 | |
| 021 | 000021 | 000221 | 000421 | 000621 | 001021 | 001221 | 001421 | 001621 | EXP2 header |
| 022 | 000022 | 000222 | 000422 | 000622 | 001022 | 001222 | 001422 | 001622 | |
| 023 | 000023 | 000223 | 000423 | 000623 | 001023 | 001223 | 001423 | 001623 | |
| 024 | 000024 | 000224 | 000424 | 000624 | 001024 | 001224 | 001424 | 001624 | EXP2 terminator |
| 025 | 000025 | 000225 | 000425 | 000625 | 001025 | 001225 | 001425 | 001625 | |
| 026 | 000026 | 000226 | 000426 | 000626 | 001026 | 001226 | 001426 | 001626 | Not used |
| 027 | 000027 | 000227 | 000427 | 000627 | 001027 | 001227 | 001427 | 001627 | |
| 030 to 176 | 000030 to 000176 | 000230 to 000376 | 000430 to 000576 | 000630 to 000776 | 001030 to 001176 | 001230 to 001376 | 001430 to 001576 | 001630 to 001776 | |
| 177 | 000177 | 000377 | 000577 | 000777 | 001177 | 001377 | 001577 | 001777 | BCC code |

For kinds of support tools which is set by register address of parameter address and file 1, see page 13.

[2] JW30H

(1) Rack No.0

| Parameter area | | | | | | | | | Parameter name |
|-------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------------|
| Parameter address | Register address of file E (Setting value of module No. switch) | | | | | | | | |
| T-00 to 07 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 000 | 000000 | 000200 | 000400 | 000600 | 001000 | 001200 | 001400 | 001600 | Parameter transfer |
| 001 | 000001 | 000201 | 000401 | 000601 | 001001 | 001201 | 001401 | 001601 | BCC calculation |
| 002 | 000002 | 000202 | 000402 | 000602 | 001002 | 001202 | 001402 | 001602 | Communication mode |
| 003 | 000003 | 000203 | 000403 | 000603 | 001003 | 001203 | 001403 | 001603 | Transfer mode |
| 004 | 000004 | 000204 | 000404 | 000604 | 001004 | 001204 | 001404 | 001604 | Transfer rate |
| 005 | 000005 | 000205 | 000405 | 000605 | 001005 | 001205 | 001405 | 001605 | Data length |
| 006 | 000006 | 000206 | 000406 | 000606 | 001006 | 001206 | 001406 | 001606 | Stop bit |
| 007 | 000007 | 000207 | 000407 | 000607 | 001007 | 001207 | 001407 | 001607 | Parity |
| 010 | 000010 | 000210 | 000410 | 000610 | 001010 | 001210 | 001410 | 001610 | Control signal |
| 011 | 000011 | 000211 | 000411 | 000611 | 001011 | 001211 | 001411 | 001611 | Transfer code conversion |
| 012 | 000012 | 000212 | 000412 | 000612 | 001012 | 001212 | 01412 | 001612 | Sending time over interval |
| 013 | 000013 | 000213 | 000413 | 000613 | 001013 | 001213 | 001413 | 001613 | Receiving time over interval |
| 014 | 000014 | 000214 | 000414 | 000614 | 001014 | 001214 | 001414 | 001614 | EXP1 header |
| 015 | 000015 | 000215 | 000415 | 000615 | 001015 | 001215 | 001415 | 001615 | |
| 016 | 000016 | 000216 | 000416 | 000616 | 001016 | 001216 | 001416 | 001616 | |
| 017 | 000017 | 000217 | 000417 | 000617 | 001017 | 001217 | 001417 | 001617 | |
| 020 | 000020 | 000220 | 000420 | 000620 | 001020 | 001220 | 001420 | 001620 | EXP1 terminator |
| 021 | 000021 | 000221 | 000421 | 000621 | 001021 | 001221 | 001421 | 001621 | |
| 022 | 000022 | 000222 | 000422 | 000622 | 001022 | 001222 | 001422 | 001622 | EXP2 header |
| 023 | 000023 | 000223 | 000423 | 000623 | 001023 | 001223 | 001423 | 001623 | |
| 024 | 000024 | 000224 | 000424 | 000624 | 001024 | 001224 | 001424 | 001624 | |
| 025 | 000025 | 000225 | 000425 | 000625 | 001025 | 001225 | 001425 | 001625 | EXP2 terminator |
| 026 | 000026 | 000226 | 000426 | 000626 | 001026 | 001226 | 001426 | 001626 | |
| 027 | 000027 | 000227 | 000427 | 000627 | 001027 | 001227 | 001427 | 001627 | |
| 030 to 176 | 000030 to 000176 | 000230 to 000376 | 000430 to 000576 | 000630 to 000776 | 001030 to 001176 | 001230 to 001376 | 001430 to 001576 | 001630 to 001776 | Not used |
| 177 | 000177 | 000377 | 000577 | 000777 | 001177 | 001377 | 001577 | 001777 | BCC code |

For kinds of support tools which is set by register address of parameter address and file E, see page 13.

(2) Rack No.1

| Parameter address | Parameter area | | | | | | | | Parameter name |
|-------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------------|
| | Register address of file E (Setting value of module No. switch) | | | | | | | | |
| | T-10 to 17 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| 000 | 002000 | 002200 | 002400 | 002600 | 003000 | 003200 | 003400 | 003600 | Parameter transfer |
| 001 | 002001 | 002201 | 002401 | 002601 | 003001 | 003201 | 003401 | 003601 | BCC calculation |
| 002 | 002002 | 002202 | 002402 | 002602 | 003002 | 003202 | 003402 | 003602 | Communication mode |
| 003 | 002003 | 002203 | 002403 | 002603 | 003003 | 003203 | 003403 | 003603 | Transfer mode |
| 004 | 002004 | 002204 | 002404 | 002604 | 003004 | 003204 | 003404 | 003604 | Transfer rate |
| 005 | 002005 | 002205 | 002405 | 002605 | 003005 | 003205 | 003405 | 003605 | Data length |
| 006 | 002006 | 002206 | 002406 | 002606 | 003006 | 003206 | 003406 | 003606 | Stop bit |
| 007 | 002007 | 002207 | 002407 | 002607 | 003007 | 003207 | 003407 | 003607 | Parity |
| 010 | 002010 | 002210 | 002410 | 002610 | 003010 | 003210 | 003410 | 003610 | Control signal |
| 011 | 002011 | 002211 | 002411 | 002611 | 003011 | 003211 | 003411 | 003611 | Transfer code conversion |
| 012 | 002012 | 002212 | 002412 | 002612 | 003012 | 003212 | 003412 | 003612 | Sending time over interval |
| 013 | 002013 | 002213 | 002413 | 002613 | 003013 | 003213 | 003413 | 003613 | Receiving time over interval |
| 014 | 002014 | 002214 | 002414 | 002614 | 003014 | 003214 | 003414 | 003614 | EXP1 header |
| 015 | 002015 | 002215 | 002415 | 002615 | 003015 | 003215 | 003415 | 003615 | |
| 016 | 002016 | 002216 | 002416 | 002616 | 003016 | 003216 | 003416 | 003616 | |
| 017 | 002017 | 002217 | 002417 | 002617 | 003017 | 003217 | 003417 | 003617 | |
| 020 | 002020 | 002220 | 002420 | 002620 | 003020 | 003220 | 003420 | 003620 | EXP1 terminator |
| 021 | 002021 | 002221 | 002421 | 002621 | 003021 | 003221 | 003421 | 003621 | |
| 022 | 002022 | 002222 | 002422 | 002622 | 003022 | 003222 | 003422 | 003622 | EXP2 header |
| 023 | 002023 | 002223 | 002423 | 002623 | 003023 | 003223 | 003423 | 003623 | |
| 024 | 002024 | 002224 | 002424 | 002624 | 003024 | 003224 | 003424 | 003624 | |
| 025 | 002025 | 002225 | 002425 | 002625 | 003025 | 003225 | 003425 | 003625 | |
| 026 | 002026 | 002226 | 002426 | 002626 | 003026 | 003226 | 003426 | 003626 | EXP2 terminator |
| 027 | 002027 | 002227 | 002427 | 002627 | 003027 | 003227 | 003427 | 003627 | |
| 030 to 176 | 002030 to 002176 | 002230 to 002376 | 002430 to 002576 | 002630 to 002776 | 003030 to 003176 | 003230 to 003376 | 003430 to 003576 | 003630 to 003776 | Not used |
| 177 | 002177 | 002377 | 002577 | 002777 | 003177 | 003377 | 003577 | 003777 | BCC code |

For kinds of support tools which is set by register address of parameter address and file E, see page 13.

(3) Rack No.2

| Parameter area | | | | | | | | | Parameter name |
|-------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------------|
| Parameter address | Register address of file E (Setting value of module No. switch) | | | | | | | T-20 to 27 | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | | |
| 000 | 004000 | 004200 | 004400 | 004600 | 005000 | 005200 | 005400 | 005600 | Parameter transfer |
| 001 | 004001 | 004201 | 004401 | 004601 | 005001 | 005201 | 005401 | 005601 | BCC calculation |
| 002 | 004002 | 004202 | 004402 | 004602 | 005002 | 005202 | 005402 | 005602 | Communication mode |
| 003 | 004003 | 004203 | 004403 | 004603 | 005003 | 005203 | 005403 | 005603 | Transfer mode |
| 004 | 004004 | 004204 | 004404 | 004604 | 005004 | 005204 | 005404 | 005604 | Transfer rate |
| 005 | 004005 | 004205 | 004405 | 004605 | 005005 | 005205 | 005405 | 005605 | Data length |
| 006 | 004006 | 004206 | 004406 | 004606 | 005006 | 005206 | 005406 | 005606 | Stop bit |
| 007 | 004007 | 004207 | 004407 | 004607 | 005007 | 005207 | 005407 | 005607 | Parity |
| 010 | 004010 | 004210 | 004410 | 004610 | 005010 | 005210 | 005410 | 005610 | Control signal |
| 011 | 004011 | 004211 | 004411 | 004611 | 005011 | 005211 | 005411 | 005611 | Transfer code conversion |
| 012 | 004012 | 004212 | 004412 | 004612 | 005012 | 005212 | 005412 | 005612 | Sending time over interval |
| 013 | 004013 | 004213 | 004413 | 004613 | 005013 | 005213 | 005413 | 005613 | Receiving time over interval |
| 014 | 004014 | 004214 | 004414 | 004614 | 005014 | 005214 | 005414 | 005614 | EXP1 header |
| 015 | 004015 | 004215 | 004415 | 004615 | 005015 | 005215 | 005415 | 005615 | |
| 016 | 004016 | 004216 | 004416 | 004616 | 005016 | 005216 | 005416 | 005616 | |
| 017 | 004017 | 004217 | 004417 | 004617 | 005017 | 005217 | 005417 | 005617 | |
| 020 | 004020 | 004220 | 004420 | 004620 | 005020 | 005220 | 005420 | 005620 | EXP1 terminator |
| 021 | 004021 | 004221 | 004421 | 004621 | 005021 | 005221 | 003421 | 005621 | |
| 022 | 004022 | 004222 | 004422 | 004622 | 005022 | 005222 | 005422 | 005622 | EXP2 header |
| 023 | 004023 | 004223 | 004423 | 004623 | 005023 | 005223 | 005423 | 005623 | |
| 024 | 004024 | 004224 | 004424 | 004624 | 005024 | 005224 | 005424 | 005624 | |
| 025 | 004025 | 004225 | 004425 | 004625 | 005025 | 005225 | 005425 | 005625 | |
| 026 | 004026 | 004226 | 004426 | 004626 | 005026 | 005226 | 005426 | 005626 | EXP2 terminator |
| 027 | 004027 | 004227 | 004427 | 004627 | 005027 | 005227 | 005427 | 005627 | |
| 030 to 176 | 004030 to 004176 | 004230 to 004376 | 004430 to 004576 | 004630 to 004776 | 005030 to 005176 | 005230 to 005376 | 005430 to 005576 | 005630 to 005776 | Not used |
| 177 | 004177 | 004377 | 004577 | 004777 | 005177 | 005377 | 005577 | 005777 | BCC code |

For kinds of support tools which is set by register address of parameter address and file E, see page 13.

(4) Rack No.3

| Parameter address | Parameter area | | | | | | | | Parameter name |
|-------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------------|
| | Register address of file E (Setting value of module No. switch) | | | | | | | | |
| | T-30 to 37 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| 000 | 006000 | 006200 | 006400 | 006600 | 007000 | 007200 | 007400 | 007600 | Parameter transfer |
| 001 | 006001 | 006201 | 006401 | 006601 | 007001 | 007201 | 007401 | 007601 | BCC calculation |
| 002 | 006002 | 006202 | 006402 | 006602 | 007002 | 007202 | 007402 | 007602 | Communication mode |
| 003 | 006003 | 006203 | 006403 | 006603 | 007003 | 007203 | 007403 | 007603 | Transfer mode |
| 004 | 006004 | 006204 | 006404 | 006604 | 007004 | 007204 | 007404 | 007604 | Transfer rate |
| 005 | 006005 | 006205 | 006405 | 006605 | 007005 | 007205 | 007405 | 007605 | Data length |
| 006 | 006006 | 006206 | 006406 | 006606 | 007006 | 007206 | 007406 | 007606 | Stop bit |
| 007 | 006007 | 006207 | 006407 | 006607 | 007007 | 007207 | 007407 | 007607 | Parity |
| 010 | 006010 | 006210 | 006410 | 006610 | 007010 | 007210 | 007410 | 007610 | Control signal |
| 011 | 006011 | 006211 | 006411 | 006611 | 007011 | 007211 | 007411 | 007611 | Transfer code conversion |
| 012 | 002012 | 006212 | 006412 | 006612 | 007012 | 007212 | 007412 | 007612 | Sending time over interval |
| 013 | 006013 | 006213 | 006413 | 006613 | 007013 | 007213 | 007413 | 007613 | Receiving time over interval |
| 014 | 006014 | 006214 | 006414 | 006614 | 007014 | 007214 | 007414 | 007614 | EXP1 header |
| 015 | 006015 | 006215 | 006415 | 006615 | 007015 | 007215 | 007415 | 007615 | |
| 016 | 006016 | 006216 | 006416 | 006616 | 007016 | 007216 | 007416 | 007616 | |
| 017 | 006017 | 006217 | 006417 | 006617 | 007017 | 007217 | 007417 | 007617 | |
| 020 | 006020 | 006220 | 006420 | 006620 | 007020 | 007220 | 007420 | 007620 | EXP1 terminator |
| 021 | 006021 | 006221 | 006421 | 006621 | 007021 | 007221 | 007421 | 007621 | |
| 022 | 006022 | 006222 | 006422 | 006622 | 007022 | 007222 | 007422 | 007622 | EXP2 header |
| 023 | 006023 | 006223 | 006423 | 006623 | 007023 | 007223 | 007423 | 007623 | |
| 024 | 006024 | 006224 | 006424 | 006624 | 007024 | 007224 | 007424 | 007624 | |
| 025 | 006025 | 006225 | 006425 | 006625 | 007025 | 007225 | 007425 | 007625 | |
| 026 | 006026 | 006226 | 006426 | 006626 | 007026 | 007226 | 007426 | 007626 | EXP2 terminator |
| 027 | 006027 | 006227 | 006427 | 006627 | 007027 | 007227 | 007427 | 007627 | |
| 030 to 176 | 006030 to 006176 | 006230 to 006376 | 006430 to 006576 | 006630 to 006776 | 007030 to 007176 | 007230 to 007376 | 007430 to 007576 | 007630 to 007776 | Not used |
| 177 | 006177 | 006377 | 006577 | 006777 | 007177 | 007377 | 007577 | 007777 | BCC code |

For kinds of support tools which is set by register address of parameter address and file E, see page 13.

Appendix 2. Address and name of control relay

The below table shows the relation between address of control relay area and name of control relay set by module No. switches.

[1] JW20H

| Control relay address (Setting value of module No. switches) | | | | | | | | Name of control relay (Bit address) | | | | | | | | Signal direction |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|----------------|----------------|------------------|-----------------------------|----------------|------------------|----------------|------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | |
| J0200 | J0220 | J0240 | J0260 | J0300 | J0320 | J0340 | J0360 | — | — | RS | — | R _{REQ} | — | T _{RDY} | — | JW20H → JW-21SU |
| J0201 | J0221 | J0241 | J0261 | J0301 | J0321 | J0341 | J0361 | U _{RDY} | — | CS | R _{ACK} | R _{RDY} | — | T _{REQ} | — | JW20H ← JW-21SU |
| J0202 | J0222 | J0242 | J0262 | J0302 | J0322 | J0342 | J0362 | Error code | | | | | | | | |
| J0203 | J0223 | J0243 | J0263 | J0303 | J0323 | J0343 | J0363 | Sending header/terminator | | | | Receiving header/terminator | | | | JW20H → JW-21SU |
| J0204 | J0224 | J0244 | J0264 | J0304 | J0324 | J0344 | J0364 | Number of sending bytes (Lower) | | | | | | | | |
| J0205 | J0225 | J0245 | J0265 | J0305 | J0325 | J0345 | J0365 | Number of receiving bytes (Upper) | | | | | | | | |
| J0206 | J0226 | J0246 | J0266 | J0306 | J0326 | J0346 | J0366 | Number of transfer bytes (Lower) | | | | | | | | JW20H ← JW-21SU |
| J0207 | J0227 | J0247 | J0267 | J0307 | J0327 | J0347 | J0367 | Number of transfer bytes (Upper) | | | | | | | | |
| J0210 | J0230 | J0250 | J0270 | J0310 | J0330 | J0350 | J0370 | Number of receiving bytes (Lower) | | | | | | | | JW20H → JW-21SU |
| J0211 | J0231 | J0251 | J0271 | J0311 | J0331 | J0351 | J0371 | Number of receiving bytes (Upper) | | | | | | | | |
| J0212 to J0217 | J0232 to J0237 | J0252 to J0257 | J0272 to J0277 | J0312 to J0317 | J0332 to J0337 | J0352 to J0357 | J0372 to J0377 | Not used | | | | | | | | — |

[2] JW30H

(1) Rack No.0

| Control relay address (Setting value of module No. switches) | | | | | | | | Name of control relay (Bit address) | | | | | | | | Signal direction |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|----------------|----------------|------------------|-----------------------------|----------------|------------------|----------------|------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | |
| j3000 | j3020 | j3040 | j3060 | j3100 | j3120 | j3140 | j3160 | — | — | RS | — | R _{REQ} | — | T _{RDY} | — | JW30H → JW-21SU |
| j3001 | j3021 | j3041 | j3061 | j3101 | j3121 | j3141 | j3161 | U _{RDY} | — | CS | R _{ACK} | R _{RDY} | — | T _{REQ} | — | JW30H ← JW-21SU |
| j3002 | j3022 | j3042 | j3062 | j3102 | j3122 | j3142 | j3162 | Error code | | | | | | | | |
| j3003 | j3023 | j3043 | j3063 | j3103 | j3123 | j3143 | j3163 | Sending header/terminator | | | | Receiving header/terminator | | | | JW30H → JW-21SU |
| j3004 | j3024 | j3044 | j3064 | j3104 | j3124 | j3144 | j3164 | Number of sending bytes (Lower) | | | | | | | | |
| j3005 | j3025 | j3045 | j3065 | j3105 | j3125 | j3145 | j3165 | Number of receiving bytes (Upper) | | | | | | | | |
| j3006 | j3026 | j3046 | j3066 | j3106 | j3126 | j3146 | j3166 | Number of transfer bytes (Lower) | | | | | | | | JW30H ← JW-21SU |
| j3007 | j3027 | j3047 | j3067 | j3107 | j3127 | j3147 | j3167 | Number of transfer bytes (Upper) | | | | | | | | |
| j3010 | j3030 | j3050 | j3070 | j3110 | j3130 | j3150 | j3170 | Number of receiving bytes (Lower) | | | | | | | | JW30H → JW-21SU |
| j3011 | j3031 | j3051 | j3071 | j3111 | j3131 | j3151 | j3171 | Number of receiving bytes (Upper) | | | | | | | | |
| j3012 to j3017 | j3032 to j3037 | j3052 to j3057 | j3072 to j3077 | j3112 to j3117 | j3132 to j3137 | j3152 to j3157 | j3172 to j3177 | Not used | | | | | | | | — |

(2) Rack No.1

| Control relay address (Setting value of module No. switches) | | | | | | | | Name of control relay (Bit address) | | | | | | | | Signal direction |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|----------------|----------------|------------------|-----------------------------|----------------|------------------|----------------|------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | |
| j3200 | j3220 | j3240 | j3260 | j3300 | j3320 | j3340 | j3360 | — | — | RS | — | R _{REQ} | — | T _{RDY} | — | JW30H → JW-21SU |
| j3201 | j3221 | j3241 | j3261 | j3301 | j3321 | j3341 | j3361 | U _{RDY} | — | CS | R _{ACK} | R _{RDY} | — | T _{REQ} | — | JW30H ← JW-21SU |
| j3202 | j3222 | j3242 | j3262 | j3302 | j3322 | j3342 | j3362 | Error code | | | | | | | | JW30H → JW-21SU |
| j3203 | j3223 | j3243 | j3263 | j3303 | j3323 | j3343 | j3363 | Sending header/terminator | | | | Receiving header/terminator | | | | |
| j3204 | j3224 | j3244 | j3264 | j3304 | j3324 | j3344 | j3364 | Number of sending bytes (Lower) | | | | | | | | JW30H → JW-21SU |
| j3205 | j3225 | j3245 | j3265 | j3305 | j3325 | j3345 | j3365 | Number of receiving bytes (Upper) | | | | | | | | |
| j3206 | j3226 | j3246 | j3266 | j3306 | j3326 | j3346 | j3366 | Number of transfer bytes (Lower) | | | | | | | | JW30H ← JW-21SU |
| j3207 | j3227 | j3247 | j3267 | j3307 | j3327 | j3347 | j3367 | Number of transfer bytes (Upper) | | | | | | | | |
| j3210 | j3230 | j3050 | j3270 | j3310 | j3330 | j3350 | j3370 | Number of receiving bytes (Lower) | | | | | | | | JW30H → JW-21SU |
| j3211 | j3231 | j3251 | j3271 | j3311 | j3331 | j3351 | j3371 | Number of receiving bytes (Upper) | | | | | | | | |
| j3212 to j3217 | j3232 to j3237 | j3252 to j3257 | j3272 to j3277 | j3312 to j3317 | j3332 to j3337 | j3352 to j3357 | j3372 to j3377 | Not used | | | | | | | | — |

(3) Rack No.2

| Control relay address (Setting value of module No. switches) | | | | | | | | Name of control relay (Bit address) | | | | | | | | Signal direction |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|----------------|----------------|------------------|-----------------------------|----------------|------------------|----------------|------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | |
|]3400 |]3420 |]3440 |]3460 |]3500 |]3520 |]3540 |]3560 | — | — | RS | — | R _{REQ} | — | T _{RDY} | — | JW30H → JW-21SU |
|]3401 |]3421 |]3441 |]3461 |]3501 |]3521 |]3541 |]3561 | U _{RDY} | — | CS | R _{ACK} | R _{RDY} | — | T _{REQ} | — | JW30H ← JW-21SU |
|]3402 |]3422 |]3442 |]3462 |]3502 |]3522 |]3542 |]3562 | Error code | | | | | | | | |
|]3403 |]3423 |]3443 |]3463 |]3503 |]3523 |]3543 |]3563 | Sending header/terminator | | | | Receiving header/terminator | | | | JW30H → JW-21SU |
|]3404 |]3424 |]3444 |]3464 |]3504 |]3524 |]3544 |]3564 | Number of sending bytes (Lower) | | | | | | | | |
|]3405 |]3425 |]3445 |]3465 |]3505 |]3525 |]3545 |]3565 | Number of receiving bytes (Upper) | | | | | | | | |
|]3406 |]3426 |]3446 |]3466 |]3506 |]3526 |]3546 |]3566 | Number of transfer bytes (Lower) | | | | | | | | JW30H ← JW-21SU |
|]3407 |]3427 |]3447 |]3467 |]3507 |]3527 |]3547 |]3567 | Number of transfer bytes (Upper) | | | | | | | | |
|]3410 |]3430 |]3450 |]3470 |]3510 |]3530 |]3550 |]3570 | Number of receiving bytes (Lower) | | | | | | | | JW30H → JW-21SU |
|]3411 |]3431 |]3451 |]3471 |]3511 |]3531 |]3551 |]3571 | Number of receiving bytes (Upper) | | | | | | | | |
|]3412 to]3417 |]3432 to]3437 |]3452 to]3457 |]3472 to]3477 |]3512 to]3517 |]3532 to]3537 |]3552 to]3557 |]3572 to]3577 | Not used | | | | | | | | — |

(4) Rack No.3

| Control relay address (Setting value of module No. switches) | | | | | | | | Name of control relay (Bit address) | | | | | | | | Signal direction |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|----------------|----------------|------------------|-----------------------------|----------------|------------------|----------------|------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | |
|]3600 |]3620 |]3640 |]3660 |]3700 |]3720 |]3740 |]3760 | — | — | RS | — | R _{REQ} | — | T _{RDY} | — | JW30H → JW-21SU |
|]3601 |]3621 |]3641 |]3661 |]3701 |]3721 |]3741 |]3761 | U _{RDY} | — | CS | R _{ACK} | R _{RDY} | — | T _{REQ} | — | JW30H ← JW-21SU |
|]3602 |]3622 |]3642 |]3662 |]3702 |]3722 |]3742 |]3762 | Error code | | | | | | | | JW30H → JW-21SU |
|]3603 |]3623 |]3643 |]3663 |]3703 |]3723 |]3743 |]3763 | Sending header/terminator | | | | Receiving header/terminator | | | | |
|]3604 |]3624 |]3644 |]3664 |]3704 |]3724 |]3744 |]3764 | Number of sending bytes (Lower) | | | | | | | | JW30H → JW-21SU |
|]3605 |]3625 |]3645 |]3665 |]3705 |]3725 |]3745 |]3765 | Number of receiving bytes (Upper) | | | | | | | | |
|]3606 |]3626 |]3646 |]3666 |]3706 |]3726 |]3746 |]3766 | Number of transfer bytes (Lower) | | | | | | | | JW30H ← JW-21SU |
|]3607 |]3627 |]3647 |]3667 |]3707 |]3727 |]3747 |]3767 | Number of transfer bytes (Upper) | | | | | | | | |
|]3610 |]3630 |]3650 |]3670 |]3710 |]3730 |]3750 |]3770 | Number of receiving bytes (Lower) | | | | | | | | JW30H → JW-21SU |
|]3611 |]3631 |]3651 |]3671 |]3711 |]3731 |]3751 |]3771 | Number of receiving bytes (Upper) | | | | | | | | |
|]3612 to]3617 |]3632 to]3637 |]3652 to]3657 |]3672 to]3677 |]3712 to]3717 |]3732 to]3737 |]3752 to]3757 |]3772 to]3777 | Not used | | | | | | | | — |

Appendix 3. ASCII (JIS) code table

[1] Binary/hexadecimal

How to use ASCII code table.

Capital "A" is located in "4" of upper bit and "1" of lower bit. Thus, ASCII code of "A" is "41_{HEX}" in hexadecimal.

| | | | | | | | |
|-----------|---|-----------|---|---|---|---|---|
| | | Upper bit | | | | | |
| | | 0 | 1 | 2 | 3 | 4 | 5 |
| Lower bit | 0 | | | | | | |
| | 1 | | | | | A | |
| | 2 | | | | | | |

| | | Upper bit | | | | | | | | | | | | | | | | |
|-----------|--------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | Hexa-decimal | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Lower bit | Hexa-decimal | Binary | 0000 | 0001 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1000 | 1001 | 1010 | 1011 | 1100 | 1101 | 1110 | 1111 |
| | 0 | 0000 | NUL | DLE | SP | 0 | @ | P | ` | p | | | SP | ー | タ | ミ | | |
| | 1 | 0001 | SOH | DC1 | ! | 1 | A | Q | a | q | | | 。 | ア | チ | ム | | |
| | 2 | 0010 | STX | DC2 | ⋈ | 2 | B | R | b | r | | | 「 | イ | ツ | メ | | |
| | 3 | 0011 | ETX | DC3 | # | 3 | C | S | c | s | | | 」 | ウ | テ | モ | | |
| | 4 | 0100 | EOT | DC4 | \$ | 4 | D | T | d | t | | | , | エ | ト | ヤ | | |
| | 5 | 0101 | ENQ | NAK | % | 5 | E | U | e | u | | | ・ | オ | ナ | ユ | | |
| | 6 | 0110 | ACK | SYN | & | 6 | F | V | f | v | | | ヲ | カ | ニ | ヨ | | |
| | 7 | 0111 | BLE | ETB | ^ | 7 | G | W | g | w | | | ァ | キ | ヌ | ラ | | |
| | 8 | 1000 | BS | CAN | (| 8 | H | X | h | x | | | ィ | ク | ネ | リ | | |
| | 9 | 1001 | HT | EM |) | 9 | I | Y | i | y | | | ゥ | ケ | ノ | ル | | |
| | A | 1010 | LF | BUS | * | : | J | Z | j | z | | | ヱ | コ | ハ | レ | | |
| | B | 1011 | VT | ESC | + | ; | K | [| k | { | | | ォ | サ | ヒ | ロ | | |
| | C | 1100 | FF | FS | , | < | L | ¥ | l | l | | | ャ | シ | フ | ワ | | |
| | D | 1101 | CR | GS | - | = | M |] | m | } | | | ュ | ス | ヘ | ン | | |
| | E | 1110 | SO | RS | . | > | N | ^ | n | — | | | ョ | セ | ホ | 。 | | |
| F | 1111 | SI | US | / | ? | O | _ | o | DEL | | | ッ | ソ | マ | 。 | | | |

Note

This table only shows JIS standard and undefined parts are omitted.

[2] Octal

How to use ASCII code table.

Capital "A" is located in "10" of upper 2 digits and "1" of lower 1 digit. Thus, ASCII code of "A" is "101_{oct}" in octal.

| | | Upper | | | | | | | |
|-------|---|-------|----|----|----|----|----|----|----|
| | | 04 | 05 | 06 | 07 | 08 | 10 | 11 | 12 |
| Lower | 0 | | | | | | | | |
| | 1 | | | | | | A | | |
| | 2 | | | | | | | | |

| | | Upper 2 digits | | | | | | | | | | | | | | | |
|---------------|---|----------------|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|
| | | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| Lower 1 digit | 0 | NUL | BS | DLE | CAN | SP | (| 0 | 8 | @ | H | P | X | ` | h | p | x |
| | 1 | SOH | HT | DC1 | EM | ! |) | 1 | 9 | A | I | Q | Y | a | i | q | y |
| | 2 | STX | LF | DC2 | SUB | ⋄ | * | 2 | : | B | J | R | Z | b | j | r | z |
| | 3 | ETX | VT | DC3 | ESC | # | + | 3 | ; | C | K | S | [| c | k | s | { |
| | 4 | EOT | FF | DC4 | FS | \$ | , | 4 | < | D | L | T | ¥ | d | l | t | |
| | 5 | ENQ | CR | NAK | GS | % | - | 5 | = | E | M | U |] | e | m | u | } |
| | 6 | ACK | SO | SYN | RS | & | . | 6 | > | F | N | V | ^ | f | n | v | ~ |
| | 7 | BEL | SI | ETB | US | ´ | / | 7 | ? | G | O | W | _ | g | o | w | DEL |

| | | Upper 2 digits | | | | | | | | | | | | | | | |
|---------------|---|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| Lower 1 digit | 0 | | | | | SP | イ | ー | ク | タ | ネ | ミ | リ | | | | |
| | 1 | | | | | 。 | ウ | ア | ケ | チ | ノ | ム | ル | | | | |
| | 2 | | | | | 「 | エ | イ | コ | ツ | ハ | メ | レ | | | | |
| | 3 | | | | | 」 | オ | ウ | サ | テ | ヒ | モ | ロ | | | | |
| | 4 | | | | | 、 | ヤ | エ | シ | ト | フ | ヤ | ワ | | | | |
| | 5 | | | | | ・ | ユ | オ | ス | ナ | ヘ | ユ | ン | | | | |
| | 6 | | | | | ヲ | ヨ | カ | セ | ニ | ホ | ヨ | 。 | | | | |
| | 7 | | | | | ア | ツ | キ | ソ | ヌ | マ | ラ | 。 | | | | |

Note

This table only shows JIS standard and undefined parts are omitted.

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SHARP

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