

MONITOUCH
V7/V6 Series

Modbus Slave
Communication

Record of Revisions

Reference numbers are shown at the bottom left corner on the back cover of each manual.

Printing Date	Reference No.	Revised Contents
July, 2006	1046NE0	First edition

Preface

Thank you for selecting the MONITOUCH V7/V6 series.

For correct set-up of the V7/V6 series, you are requested to read through this manual to understand more about the product.

For more information about the V7/V6 series, refer to the following related manuals.

Manual Name	Contents	Reference No.
Reference Manual (Operation)	The V-SFT operating procedure is described.	1043NE
Reference Manual (Function)	The functions and instructions of the V7/V6 series are explained.	1044NE
PLC Connection Manual	Connections with various PLCs and universal serial communications are explained.	2200NE
V7 Hardware Specifications	Notes on usage and hardware specifications for the V7 series are described.	2010NE
V706 Hardware Specifications	Notes on usage and hardware specifications for the V706 are described.	2012NE
V6 Hardware Specifications	Notes on usage and hardware specifications for the V6 series are described.	2006NE
Temperature Control Network	The temperature control network function is explained.	1033NE
Connection with AB Control Logix	The connection, communication parameters and tag setting for AB Control Logix are explained.	1041NE
M-CARD SFT Operation Manual	The operating procedure of the memory card editor is described.	1023NE
V-SFT Additional Specifications	Additional specifications for the Reference Manual are explained.	5044NE

For further details about PLCs (programmable logic controllers), see the manual attached to each PLC.

Notes:

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2. The information in this manual is subject to change without prior notice.
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4. All other company names or product names are trademarks or registered trademarks of their respective holders.
5. This manual is intended to give accurate information about MONITOUCH hardware. If you have any questions, please contact your local distributor.

Notes on Safe Usage of MONITOUCH

In this manual, you will find various notes categorized under the following levels with the signal words "DANGER," and "CAUTION."




DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and could cause property damage.

Note that there is a possibility that the item listed with  CAUTION may have serious ramifications.



DANGER

- Never use the input function of MONITOUCH for operations that may threaten human life or damage the system, such as switches used in case of emergency. Please design the system so that it can cope with malfunction of a touch switch. A malfunction of the touch switch will result in machine accident or damage.
- Turn off the power supply when you set up the unit, connect new cables or perform maintenance or inspections. Otherwise, electrical shock or damage may occur.
- Never touch any terminals while the power is on. Otherwise, electric shock may occur.
- You must put a cover on the terminals on the unit when you turn the power on and operate the unit. Without the terminal cover in place, electric shock may occur.
- The liquid crystal in the LCD panel is a hazardous substance. If the LCD panel is damaged, do not ingest the leaked liquid crystal. If the liquid crystal spills on your skin or clothing, use soap and wash off thoroughly.
- For MONITOUCH using a lithium battery, never disassemble, recharge, deform by pressure, short-circuit, nor reverse the polarity of the battery, or dispose of the battery in fire. Failure to follow these conditions will lead to explosion or fire.
- For MONITOUCH using a lithium battery, never use a battery that is deformed, leaks, or shows any other signs of abnormality. Failure to follow these conditions will lead to explosion or fire.

 **CAUTION**

- Check the appearance of the unit when it is unpacked. Do not use the unit if any damage or deformation is found. Failure to do so may lead to fire, damage or malfunction.
- For use in a facility or for a system related to nuclear energy, aerospace, medical, traffic equipment, or mobile installations, please consult your local distributor.
- Operate (or store) MONITOUCH under the conditions indicated in this manual and related manuals. Failure to do so could cause fire, malfunction, physical damage or deterioration.
- Understand the following environmental limits for use and storage of MONITOUCH. Otherwise, fire or damage to the unit may result.
 - Avoid locations where there is a possibility that water, corrosive gas, flammable gas, solvents, grinding fluids or cutting oil can come into contact with the unit.
 - Avoid high temperature, high humidity, and outside weather conditions, such as wind, rain or direct sunlight.
 - Avoid locations where excessive dust, salt, and metallic particles are present.
 - Avoid installing the unit in a location where vibration or physical shock may be transmitted.
- Equipment must be correctly mounted so that the main terminal of MONITOUCH cannot be touched inadvertently. Otherwise, an accident or electric shock may occur.
- Tighten the fixtures of MONITOUCH with a torque in the specified range. Excessive tightening may distort the panel surface. Loose tightening may cause MONITOUCH to come off, malfunction or be short-circuited.
- Check periodically that terminal screws on the power supply terminal block and fixtures are firmly tightened. Loosened screws may result in fire or malfunction.
- Tighten terminal screws on the power supply terminal block equally to a torque of 0.5 N•m. Improper tightening of screws may result in fire, malfunction, or other trouble.
- MONITOUCH has a glass screen. Do not drop or give physical shock to the unit. Otherwise, the screen may be damaged.
- Connect the cables correctly to the terminals of MONITOUCH in accordance with the specified voltage and wattage. Over-voltage, over-wattage or incorrect cable connection could cause fire, malfunction or damage to the unit.
- Be sure to establish a ground of MONITOUCH. The FG terminal must be used exclusively for the unit with the level of grounding resistance less than 100Ω. Otherwise, electric shock or fire may occur.
- Prevent any conductive particles from entering into MONITOUCH. Failure to do so may lead to fire, damage or malfunction.
- After wiring is finished, remove the paper used as a dust cover before starting to operate MONITOUCH. Operation with the cover attached may result in accident, fire, malfunction, or other trouble.
- Do not attempt to repair MONITOUCH at your site. Ask Hakko or the designated contractor for repair.
- Do not disassemble or modify MONITOUCH. Otherwise, it may cause a malfunction.
- Hakko Electronics Co., Ltd. is not responsible for any damages resulting from repair, overhaul or modification of MONITOUCH that was performed by an unauthorized person.
- Do not use a sharp-pointed tool when pressing a touch switch. Doing so may damage the screen.
- Only experts are authorized to set up the unit, connect the cables or perform maintenance and inspections.
- For MONITOUCH using a lithium battery, handle the battery with care. The combustible materials such as lithium or organic solvent contained in the battery may generate heat, explode, or catch fire, resulting in personal injury or fire. Read related manuals carefully and handle the lithium battery correctly as instructed.
- When using a MONITOUCH that has an analog switch resolution with resistance film, do not press two or more points on the screen at the same time. If two or more positions are pressed at the same time, the switch located between the pressed positions will activate.
- Take safety precautions during such operations as setting change during running, forced output, start, and stop. Any misoperation may cause unexpected machine motions, resulting in machine accident or damage.
- In facilities where a failure of MONITOUCH could lead to accident threatening human life or other serious damage, be sure that the facilities are equipped with adequate safeguards.
- At the time of disposal, MONITOUCH must be treated as industrial waste.
- Before touching MONITOUCH, discharge static electricity from your body by touching grounded metal. Excessive static electricity may cause malfunction or other trouble.

[General Notes]

- Never bundle control cables and input/output cables with high-voltage and large-current carrying cables such as power supply cables. Keep these cables at least 200 mm away from high-voltage and large-current carrying cables. Otherwise, malfunction may occur due to noise.
- Plug connectors or sockets of MONITOUCH in their correct orientation. Otherwise, malfunctions may occur.
- Do not use thinners for cleaning because they may discolor the MONITOUCH surface. Use an alcohol-based cleaner which is commercially available.
- If a data receive error occurs when MONITOUCH and the counterpart (PLC, temperature controller, etc.) are started at the same time, read the manual for the counterpart unit and handle the error correctly.
- Avoid discharging static electricity on the mounting panel of MONITOUCH. Static charges can damage the unit and cause malfunctions. Otherwise, malfunction may occur due to noise.
- Avoid prolonged display of any fixed pattern. Due to the characteristics of the liquid crystal display, an afterimage may occur. If a prolonged display of a fixed pattern is expected, use the auto OFF function of the backlight.

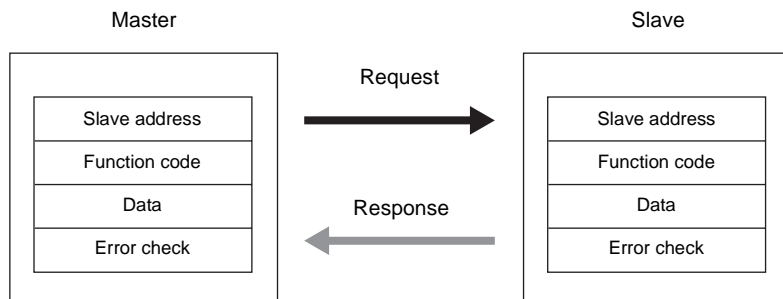
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1. Outline

Modbus Protocol

- The Modbus protocol, developed by Modicon, is a communication protocol widely adopted for PLCs or other devices.
- Under the Modbus protocol, a master and its slaves always exist. Communications will be established in a manner that the master sends out requests to the slaves and they send back responses.



- There are two modes in the Modbus protocol. They are ASCII and RTU. These two modes use different message formats. MONITOUCH performs Modbus slave communications in the Modbus RTU mode.
- Broadcast from the master is not supported.
- MONITOUCH is capable of communicating either as a master or a slave.

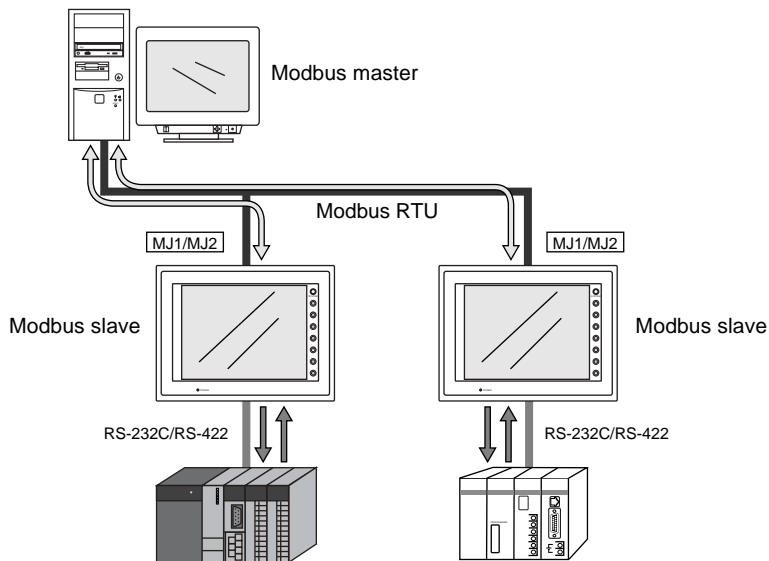
Modbus Slave Communication

- Under the Modbus protocol, the master can read from and write to the PLCs or temperature controllers connected to MONITOUCH as slaves. This form of communication through the mediation of MONITOUCH will eliminate the need for complicated settings and will allow varied devices to communicate without restraint via simple connections.
- Any device enabled to operate as a Modbus RTU master can become a master in Modbus slave communications.
- In a case where the Modbus master reads from or writes to the PLC memory or the temperature control memory that is connected to a slave MONITOUCH, the PLC or temperature control memory gains access to the Modbus protocol memory addresses. To enable its accessing, setting the memory tables provided for MONITOUCH is required. (For more information, refer to "Memory Table" in page 3-2.)

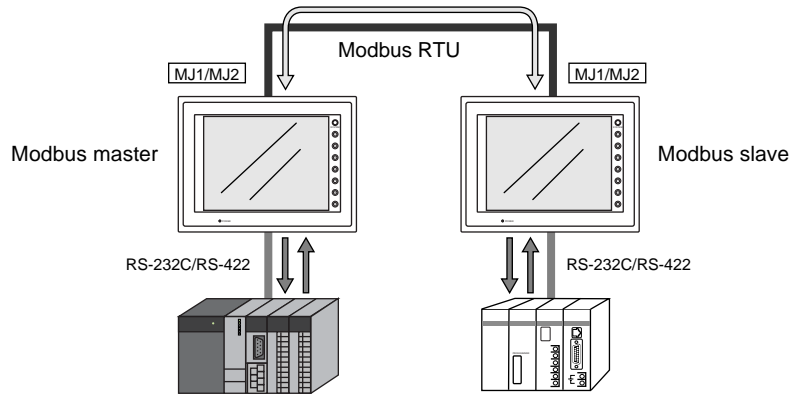
Example 1) Connecting with a computer

A computer acts as the Modbus master, and MONITOUCH acts as slave.

In this example, the computer accesses memory specified in the Modbus-specific memory tables in MONITOUCH, and thereby data exchanges between the computer and the PLC connected to MONITOUCH are enabled.



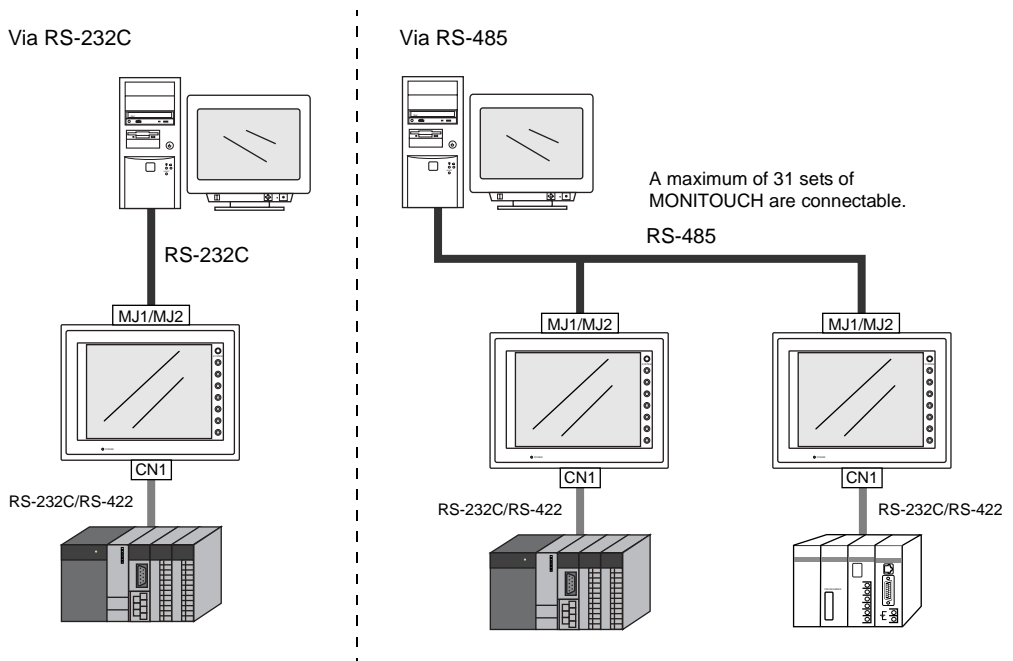
Example 2) Connecting between MONITOUCH



MONITOUCH acts as both the Modbus master and the Modbus slave. The master gains access to the slave on the temperature control network (Modbus Free). The master accesses the Modbus addresses of the slave, and thereby can receive data from the slave-side PLC. At the same time, the master-side PLC can send data to the slave-side.

Connection Outline

The Modbus master can be connected to the modular jack (MJ1/MJ2) of MONITOUCH as a Modbus slave via RS-232C or RS-485.



MEMO

Please use this page freely.

2. Connection

Applicable Devices

- Slave side
V7/V6/V706 series
 - * When one single V706 series is used, the MJ2 is dedicated to PLC connection. Typical users use the MJ1 for Modbus slave communication; however, with an option unit DU-01 installed, the MJ1 can also be used for Modbus slave communication.
- Master side
Devices which support to the Modbus RTU mode
 - * The V7/V6/V706 series is usable also as the Modbus master. (For more information, refer to “Chapter 4 Use of MONITOUCH as Modbus Master”.)

Communication Setting (For Slave)

Setting Procedure

[System Setting] → [Modbus Slave Communication Setting] → [Communication Setting] → [Modbus slave communication setting] dialog

1. In the dialog, select [Modbus RTU] for [Comm. Protocol] (default setting: Not used).
2. The [Refer to modular] button becomes enabled. Click the button. The [Modbus Slave Table] dialog is displayed. Choose the MJ port to be used for Modbus slave communication and check [Modbus Slave].

Note: [Modbus Slave] and [V-Link] cannot be used simultaneously.

Setting Items

The following setting items are provided for the MONITOUCH to act as a Modbus slave.

Setting Items	Setting (<u>underlined</u> as a default)
Comm. Protocol	Modbus RTU (fixed)
Data Length	8-bit (fixed)
Signal Level	<u>RS-232C</u> , RS-485
Stop Bit	<u>1-bit</u> , 2-bit
Baud Rate	4800, 9600, <u>19200</u> , 38400, 57600, 115200 bps *1
Local No.	<u>1</u> to 31 (“0” not usable)
Send Delay (× msec)	<u>0</u> to 255
Parity	None, Odd, <u>Even</u>
Timeout (× msec)	0 to 25 (<u>2</u>) *2

*1 A baud rate of 115,200 bps is not available for V606, V606i, V606e, and V609E.

*2 Timeout:
The item [Timeout] for Modbus slave communication refers to the time for monitoring commands to be received from the master.
When the specified timeout period has elapsed and no more data arrives, the data that has been received so far is recognized as one command.

Connection

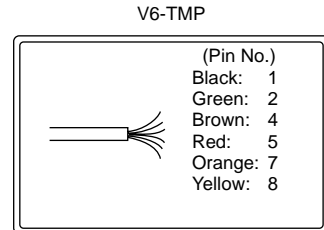
Cable

Use Hakko Electronics' V6-TMP (3 m) cable for connection with the Modbus master. The shielded cable (V6-TMP) is connected to the FG (frame ground) when the V7 series is used and to the SG (signal ground) when V706 is used.

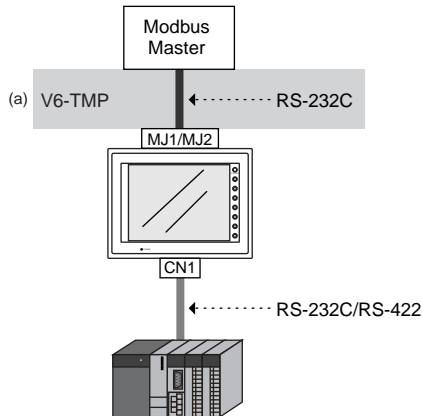
* Notes on Use of V6-TMP

There are six wires in the V6-TMP cable as shown on the right.

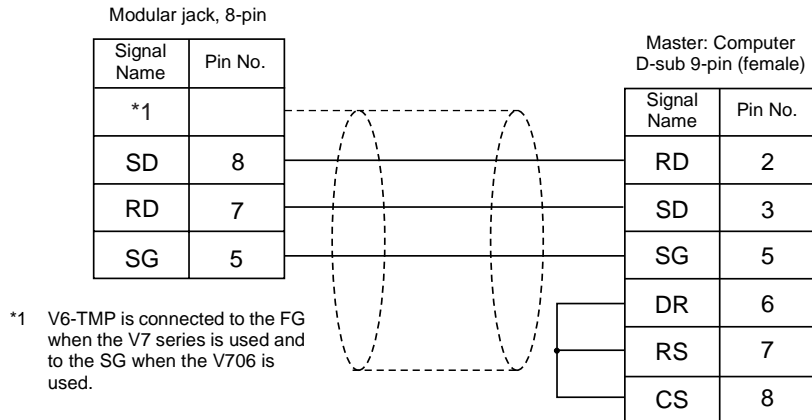
The wires to be used are determined depending on the connecting method. For wires not in use, be sure to properly insulate with tape, etc.



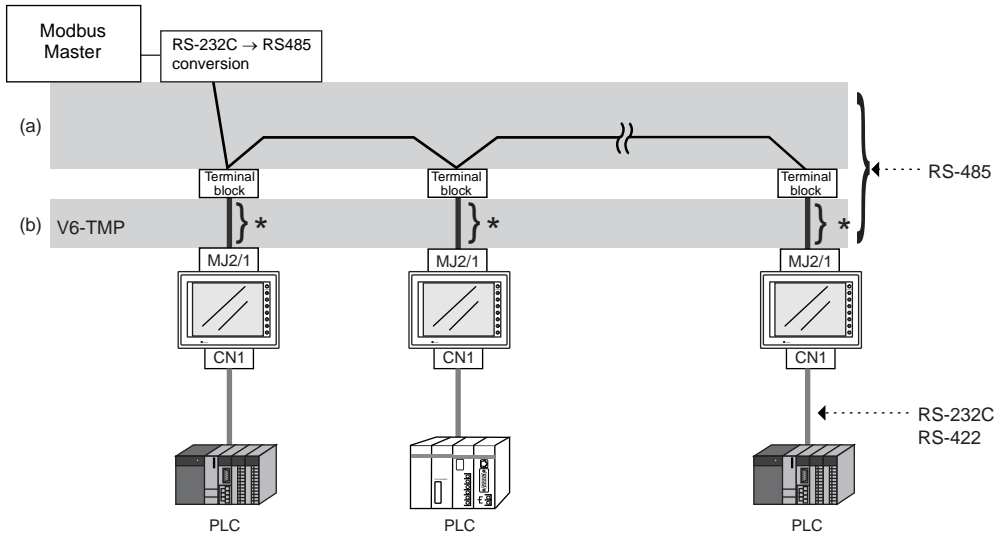
Via RS-232C (with one MONITOUCH)



Wiring example of above (a)

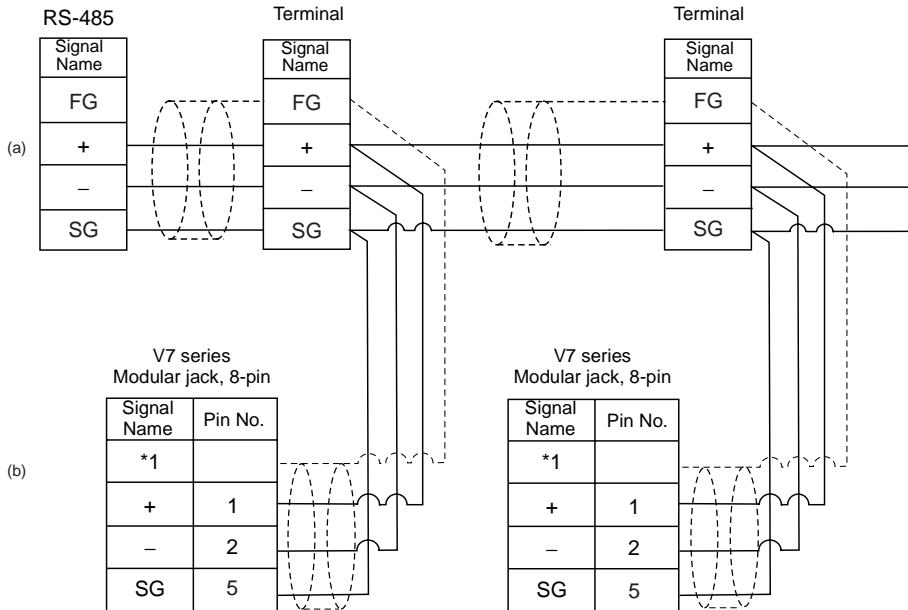


Via RS-485 (with a maximum of 31 MONITOUCHs)



* 0.5-m-long cable recommended (1.0 m maximum)

Wiring example of above (a) and (b)



*1 V6-TMP is connected to the FG when the V7 series is used and to the SG when the V706 is used.

MEMO

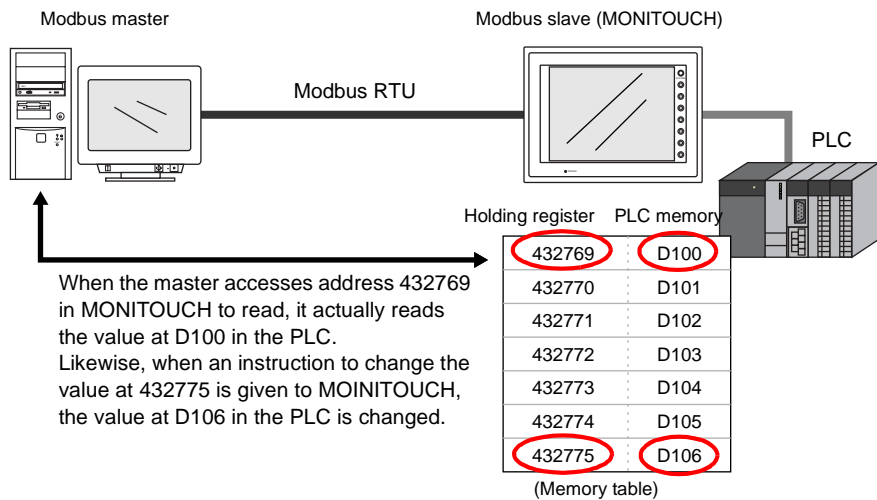
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3. Modbus Slave Communication

Outline of Communication

- By means of Modbus slave communication, the Modbus master connected to MONITOUCH as a slave gains access to the device that is connected to MONITOUCH.
- The addresses 400001 to 465536 of the holding register are available to Modbus slave communication.

By allowing the PLC memory or the temperature controller memory (connected to MONITOUCH) to access the holding register, the master is enabled to monitor or write to the PLC or the temperature controller through MONITOUCH.



- Setting the holding register and the PLC memory in relation to each other can be made in the memory tables for MONITOUCH (page 3-2).

Slave Setting

Setting Procedure

1. Communication setting
[System Setting] → [Modbus Slave Communication Setting] → [Communication Setting] → [Modbus slave communication setting] dialog
2. Memory table
[System Setting] → [Modbus Slave Communication Setting] → [Memory Table] → [Modbus Slave Table]
3. Connection
Establish a connection with the Modbus master through either MJ1 or MJ2.
4. Communication start
Start accessing a memory table in MONITOUCH from the master.

Communication Setting

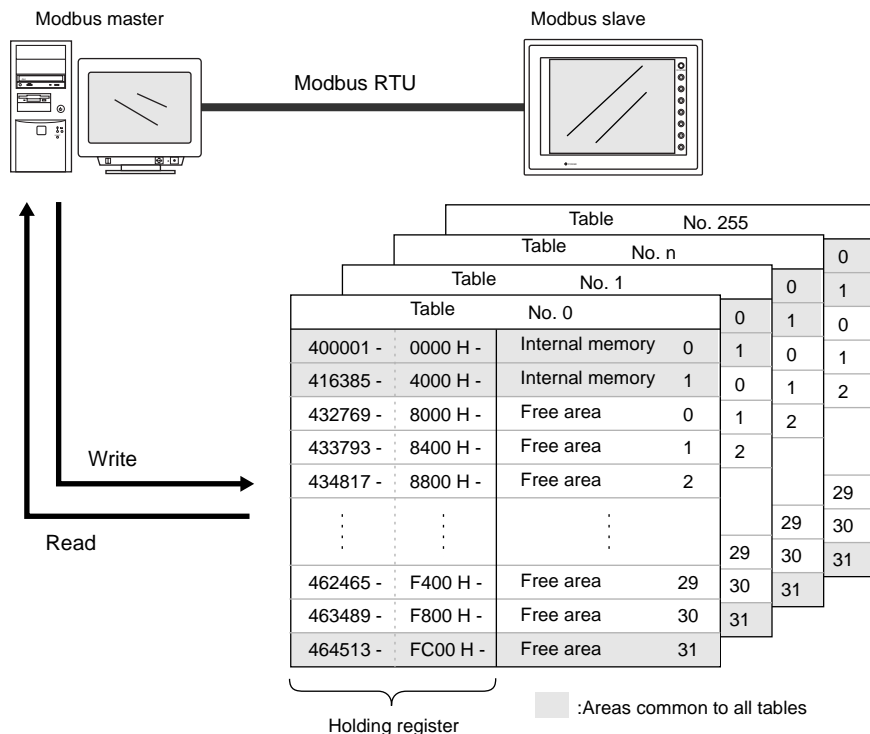
For information, refer to page 2-1.

Memory Table

Structure

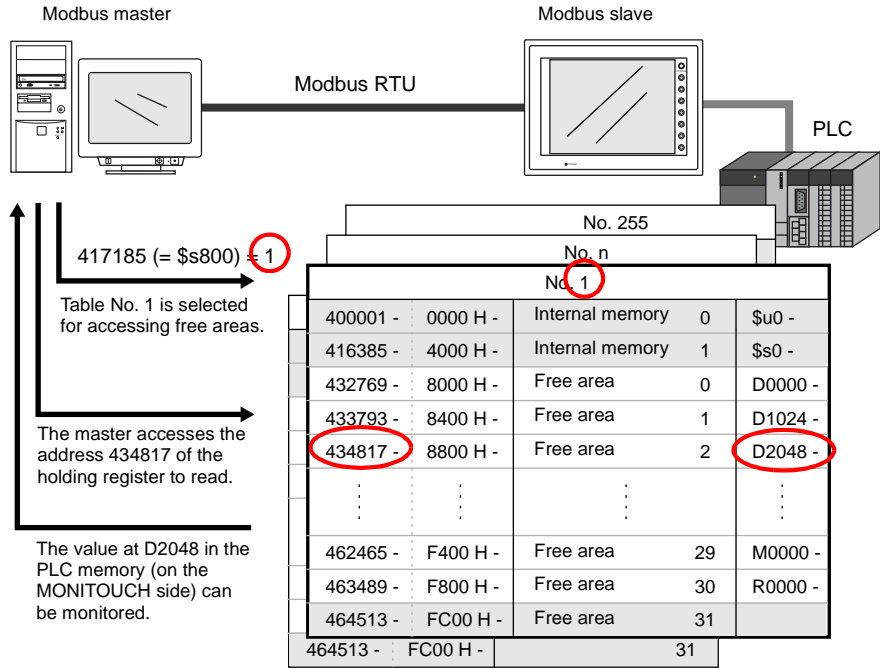
It is possible to create 256 memory tables in total.

One single memory table includes 31 free areas. To these free areas, addresses of MONITOUCH and the device connected to MONITOUCH can be assigned. Each memory table is provided with the holding register, to which the master gains access.



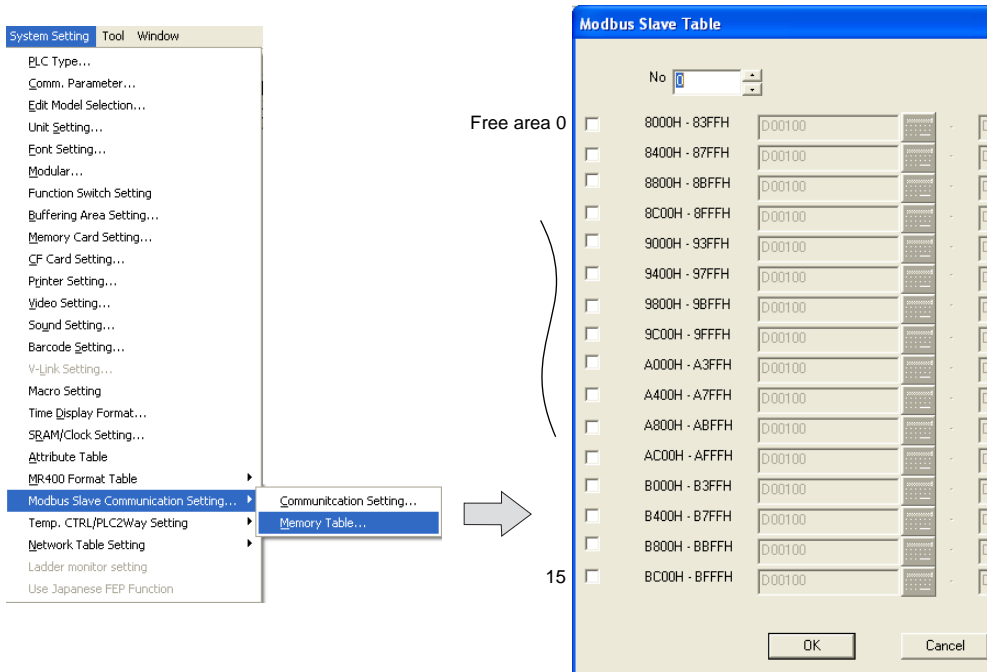
* Assignment to free area 31 is not performed directly in the memory tables. Desired memory addresses will be assigned to the area from the master. (Refer to page 3-10.)

Specify the desired table number in the range of 0 to 255, to which the master gains access.
 (MONITOUCH internal memory address \$s800 is used. For more information, refer to page 3-8.)
 The master will access the MONITOUCH-side device addresses assigned to the holding register in the specified table.



Memory Table Setting

Click [System Setting] → [Modbus Slave Communication Setting] → [Memory Table].
 The [Modbus Slave Table] dialog is displayed.



Clicking the [Next] button displays the following free areas.

Free area 15 →

<input type="checkbox"/>	B000H - B3FFH	D00100	-	D01123	
<input type="checkbox"/>	B400H - B7FFH	D00100	-	D01123	
<input type="checkbox"/>	B800H - BBFFH	D00100	-	D01123	
<input type="checkbox"/>	BC00H - BFFFH	D00100	-	D01123	

Next

OK Cancel



Free area 16 →

Free area 30 →

Free area 31 →

Modbus Slave Table

No. 0

<input type="checkbox"/>	C000H - C3FFH	D00100	-	D01123	Prev.
<input type="checkbox"/>	C400H - C7FFH	D00100	-	D01123	
<input type="checkbox"/>	C800H - CBFFH	D00100	-	D01123	
<input type="checkbox"/>	CC00H - CFFFH	D00100	-	D01123	
<input type="checkbox"/>	D000H - D3FFH	D00100	-	D01123	
<input type="checkbox"/>	D400H - D7FFH	D00100	-	D01123	
<input type="checkbox"/>	D800H - DBFFH	D00100	-	D01123	
<input type="checkbox"/>	DC00H - DFFFH	D00100	-	D01123	
<input type="checkbox"/>	E000H - E3FFH	D00100	-	D01123	
<input type="checkbox"/>	E400H - E7FFH	D00100	-	D01123	
<input type="checkbox"/>	E800H - EBFFH	D00100	-	D01123	
<input type="checkbox"/>	EC00H - EFFFH	D00100	-	D01123	
<input type="checkbox"/>	F000H - F3FFH	D00100	-	D01123	
<input type="checkbox"/>	F400H - F7FFH	D00100	-	D01123	
<input type="checkbox"/>	F800H - FBFFH	D00100	-	D01123	
<input type="checkbox"/>	FC00H - FFFFH	D00100	-	D01123	Next

OK Cancel

Checking the box of any free area allows you to specify a top memory address as desired. When an address is specified, the consecutive 1024 words starting from the top memory address will automatically be assigned.

* Setting in the dialog is enabled for free areas 0 - 30.

The above dialog is not applied to internal memory (\$\$, \$u) area 0 and area 1 that are already set, and free area 31 (PLC memory, temperature control memory, \$L, etc.), to which addresses will be assigned from the master.

To go to memory table No. 1 and after (up to 255), change the value for [No.] in the upper left corner of the dialog.

Modbus Slave Table

No. 1

<input type="checkbox"/>	8000H - 83FFH	D00100	-	D01123	Prev.
<input type="checkbox"/>	8400H - 87FFH	D00100	-	D01123	
<input type="checkbox"/>	8800H - 8BFFH	D00100	-	D01123	
<input type="checkbox"/>	8C00H - 8FFFH	D00100	-	D01123	
<input type="checkbox"/>	9000H - 93FFH	D00100	-	D01123	
<input type="checkbox"/>	9400H - 97FFH	D00100	-	D01123	

Memory table list (1 table)

Holding Register	Memory Table	Modbus Slave Side
400001 - 416384 (16384 words)	0000 H - 3FFF H	Internal memory area 0 \$u0 - 16383
416385 - 417408 (1024 words)	4000 H - 43FF H	Internal memory area 1 \$s0 - 1023
432769 - 433792 (1024 words)	8000 H - 83FF H	Free area 0 (PLC memory, temperature control memory, \$L, etc.)
433793 - 434816 (1024 words)	8400 H - 87FF H	Free area 1 (PLC memory, temperature control memory, \$L, etc.)
434817 - 435840 (1024 words)	8800 H - 8BFF H	Free area 2 (PLC memory, temperature control memory, \$L, etc.)
435841 - 436864 (1024 words)	8C00 H - 8FFF H	Free area 3 (PLC memory, temperature control memory, \$L, etc.)
436865 - 437888 (1024 words)	9000 H - 93FF H	Free area 4 (PLC memory, temperature control memory, \$L, etc.)
437889 - 438912 (1024 words)	9400 H - 97FF H	Free area 5 (PLC memory, temperature control memory, \$L, etc.)
438913 - 439936 (1024 words)	9800 H - 9BFF H	Free area 6 (PLC memory, temperature control memory, \$L, etc.)
439937 - 440960 (1024 words)	9C00 H - 9FFF H	Free area 7 (PLC memory, temperature control memory, \$L, etc.)
440961 - 441984 (1024 words)	A000 H - A3FF H	Free area 8 (PLC memory, temperature control memory, \$L, etc.)
441985 - 443008 (1024 words)	A400 H - A7FF H	Free area 9 (PLC memory, temperature control memory, \$L, etc.)
443009 - 444032 (1024 words)	A800 H - ABFF H	Free area 10 (PLC memory, temperature control memory, \$L, etc.)
444033 - 445056 (1024 words)	AC00 H - AFFF H	Free area 11 (PLC memory, temperature control memory, \$L, etc.)
445057 - 446080 (1024 words)	B000 H - B3FF H	Free area 12 (PLC memory, temperature control memory, \$L, etc.)
446081 - 447104 (1024 words)	B400 H - B7FF H	Free area 13 (PLC memory, temperature control memory, \$L, etc.)
447105 - 448128 (1024 words)	B800 H - BBFF H	Free area 14 (PLC memory, temperature control memory, \$L, etc.)
448129 - 449152 (1024 words)	BC00 H - BFFF H	Free area 15 (PLC memory, temperature control memory, \$L, etc.)
449153 - 450176 (1024 words)	C000 H - C3FF H	Free area 16 (PLC memory, temperature control memory, \$L, etc.)
450177 - 451200 (1024 words)	C400 H - C7FF H	Free area 17 (PLC memory, temperature control memory, \$L, etc.)
451201 - 452224 (1024 words)	C800 H - CBFF H	Free area 18 (PLC memory, temperature control memory, \$L, etc.)
452225 - 453248 (1024 words)	CC00 H - CFFF H	Free area 19 (PLC memory, temperature control memory, \$L, etc.)
453249 - 454272 (1024 words)	D000 H - D3FF H	Free area 20 (PLC memory, temperature control memory, \$L, etc.)
454273 - 455296 (1024 words)	D400 H - D7FF H	Free area 21 (PLC memory, temperature control memory, \$L, etc.)
455297 - 456320 (1024 words)	D800 H - DBFF H	Free area 22 (PLC memory, temperature control memory, \$L, etc.)
456321 - 457344 (1024 words)	DC00 H - DFFF H	Free area 23 (PLC memory, temperature control memory, \$L, etc.)
457345 - 458368 (1024 words)	E000 H - E3FF H	Free area 24 (PLC memory, temperature control memory, \$L, etc.)
458369 - 459392 (1024 words)	E400 H - E7FF H	Free area 25 (PLC memory, temperature control memory, \$L, etc.)
459393 - 460416 (1024 words)	E800 H - EBFF H	Free area 26 (PLC memory, temperature control memory, \$L, etc.)
460417 - 461440 (1024 words)	EC00 H - EFFF H	Free area 27 (PLC memory, temperature control memory, \$L, etc.)
461441 - 462464 (1024 words)	F000 H - F3FF H	Free area 28 (PLC memory, temperature control memory, \$L, etc.)
462465 - 463488 (1024 words)	F400 H - F7FF H	Free area 29 (PLC memory, temperature control memory, \$L, etc.)
463489 - 464512 (1024 words)	F800 H - FBFF H	Free area 30 (PLC memory, temperature control memory, \$L, etc.)
464513 - 465536 (1024 words)	FC00 H - FFFF H	Free area 31 (PLC memory, temperature control memory, \$L, etc.)

* When assigning PLC memory, temperature control memory, or \$L to individual free areas, be sure to reserve 1024 words from the top memory address.

Connection

For information, refer to page 2-2.

Communication Start

For information, refer to page 3-8.

Master Setting

The tasks below are required for master settings.

- Specifying a slave memory table number
(Note that internal memory (\$u, \$s) and free area 31 are accessible, irrespective of the memory tables. When accessing these areas, you do not need to specify a table number.)
- Reading the holding register of the slave
- Writing to the holding register of the slave

Applicable Commands

Description	Function No. (Code)
Read Holding Registers	03 (03 H)
Write Single Registers	06 (06 H)
Diagnostics	08 (08 H)
Write Multiple Registers	16 (10 H)

Applicable Memory

Memory	Description	Function No. (Code)
Holding Register (words) 400001 to 465536 *1 (0000 to FFFF H) *2	Read Holding Registers	03 (03 H)
	Write Single Register	06 (06 H)
	Write Multiple Registers	16 (10 H)

*1 Reference number

*2 Hexadecimal number

Modbus RTU Format

Reading the holding register

Slave Address		XX #1
Function Code		03 H
Starting Address	Hi	XX H
	Lo	XX H
No. of Registers	Hi	XX H
	Lo	XX H
Error Check	Hi	CRC (16 bits)
	Lo	

Writing to the holding register

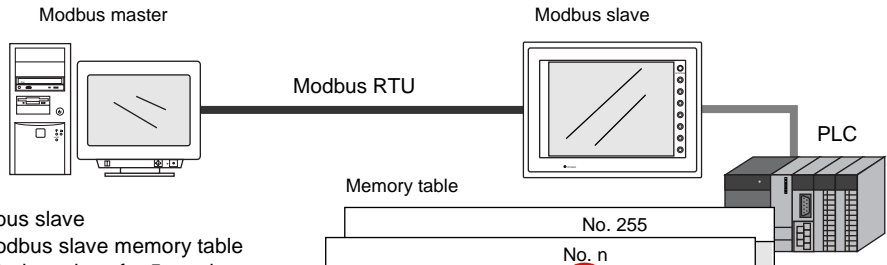
Slave Address		XX #1
Function Code		10 #2
Starting Address	Hi	XX H
	Lo	XX H
Quantity of Registers *	Hi	XX H
	Lo	XX H
Byte Count *		XX H
Register's Value 1	Hi	XX H
	Lo	XX H
}		
Register's Value n	Hi	XX H
	Lo	XX H
Error Check	Hi	CRC (16 bits)
	Lo	

*1 Broadcast from the master (broadcasting commands to slaves by specifying port No. 00) is not supported.

*2 Function code 10 H is used for writing to multiple words of the holding register. For writing to one word of the holding register, function code 06 H is also usable. In the latter case, defining the number and the byte count is not necessary.

Access Example

Modbus slave communication is executable in a configuration as the following example.

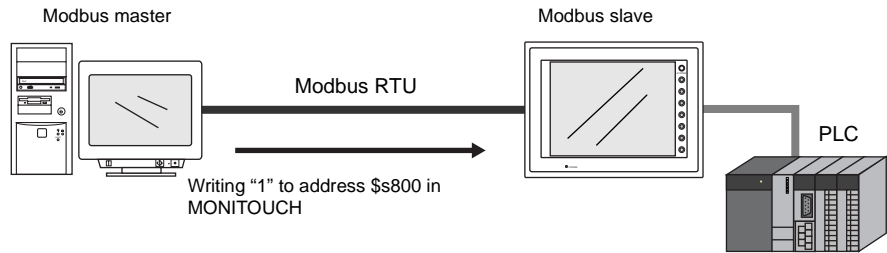


Modbus slave
In Modbus slave memory table No. 1, the values for 5 words starting from D2000 specified at free area 1 will be monitored by the master and then changed.

* Specifying a memory table number is not necessary when accessing the internal memory (\$u, \$s) or free area 31 that are independent of memory tables.

Memory table			
No. 255			
No. n			
No. 1			
400001 -	0000 H -	Internal memory 0	\$u0 -
416385 -	4000 H -	Internal memory 1	\$s0 -
432769 -	8000 H -	Free area 0	D0000 -
433793 -	8400 H -	Free area 1	D1024 -
434817 -	8800 H -	Free area 2	D2048 -
⋮	⋮	⋮	⋮
462465 -	F400 H -	Free area 29	M0000 -
463489 -	F800 H -	Free area 30	R0000 -
464513 -	FC00 H -	Free area 31	

1. Specifying a MONITOUCH-side memory table number (writing to the holding register)
Specify the desired memory table number from the master first.



Writing "1" (= table No. 1) from the master to the MONITOUCH internal memory address \$s800 allows accessing to free areas in table No. 1.

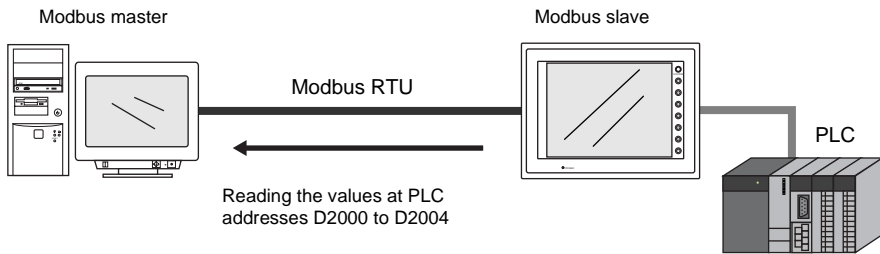
* The value at \$s800 cannot be changed directly on MONITOUCH. It is changeable only through communication from the master.
Address \$s800 stores the default value "-1." Be sure to specify the desired table number from the master.

The RTU format is defined as follows:

Slave address		01 H	← MONITOUCH station number (01 or later)
Function code		06 H	← Writing to one word of the holding register
Address	Hi	43 H	← Address of the target (4320 H = 4000 H + 320 H (= 800))
	Lo	20 H	
Register's value	Hi	00 H	← Data to be written
	Lo	01 H	
Error check	Hi	CRC (16 bits)	
	Lo		

2. Reading the holding register (MONITOUCH side)

Read 5 words starting from address D2000 at free area 1 in table No. 1 from the master.



According to the definition of free area 1 (page 3-8), the accessing target is D2000 = holding register 434769 = hexadecimal No. 87D0 H.

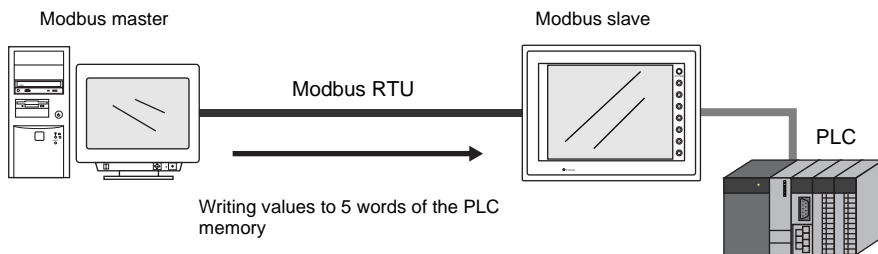
The RTU format is defined as follows:

Slave address		01 H	← MONITOUCH station number (01 or later)
Function code		03 H	← Reading the holding register
Starting address	Hi	87 H	← Top address D2000
	Lo	D0 H	(87D0 H = 34768, 400001 + 34768 = 434769)
No. of registers	Hi	00 H	← Word count
	Lo	05 H	
Error check	Hi	CRC (16 bits)	
	Lo		

3. Writing to the holding register (slave)

Write values to addresses as specified below:

D2000 = 100 (= 64 H)
 D2001 = 5000 (= 1388 H)
 D2002 = 1234 (= 4D2 H)
 D2003 = 789 (= 315 H)
 D2004 = 200 (= C8 H)



D2000 = 100 (= 64 H)
 D2001 = 5000 (= 1388 H)
 D2002 = 1234 (= 4D2 H)
 D2003 = 789 (= 315 H)
 D2004 = 200 (= C8 H)

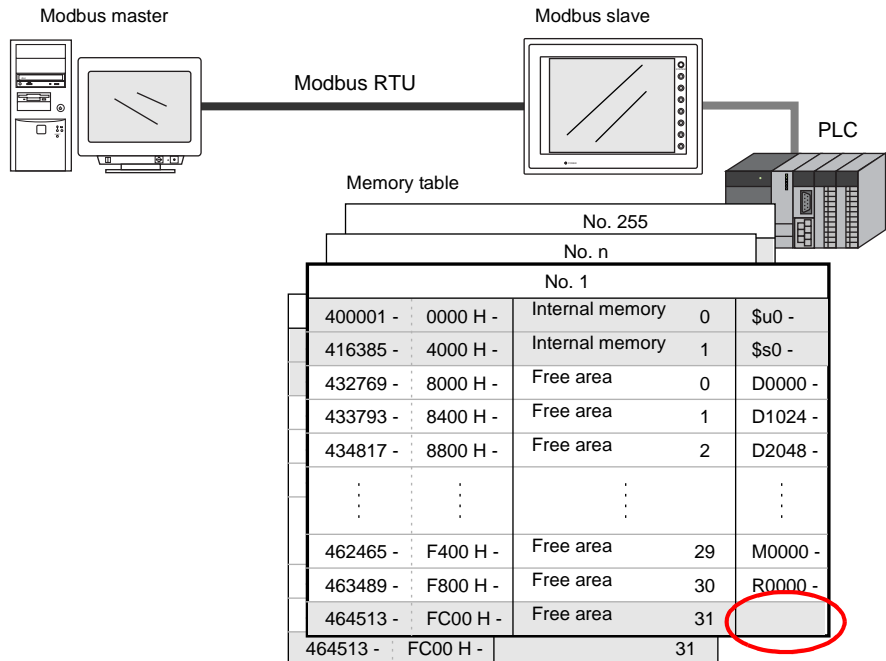
The RTU format is defined as follows:

Slave address		01 H	← MONITOUCH station number (01 or later)
Function code		10 H	← Writing to multiple words of the holding register
Starting address	Hi	87 H	← Top address D2000 = 434769 (434769 – 400001 = 34768, 34768 = 87D0 H)
	Lo	D0 H	
Quantity of registers	Hi	00 H	← Word count (5 words)
	Lo	05 H	
Byte count		0A H	← Byte count (10 bytes)
Register's value	Hi	00 H	← Data to be written (100)
	Lo	64 H	
Register's value	Hi	13 H	(5000)
	Lo	88 H	
Register's value	Hi	04 H	(1234)
	Lo	D2 H	
Register's value	Hi	03 H	(789)
	Lo	15 H	
Register's value	Hi	00 H	(200)
	Lo	C8 H	
Error check	Hi	CRC (16 bits)	
	Lo		

Memory Assignment to Free Area 31

MONITOUCH free area 31 can be defined from the master.

The area will be helpful when the access area from the master should be changed depending on conditions.



Memory assigned to this area is changeable from the master.

Irrespective of the memory table number currently being accessed, free area 31 is always assigned to holding register addresses 464513 to 465536 (FC00 H to FFFF H).

Slave internal memory (system memory) addresses \$s801 to 805 are used to define memory for free area 31.

System Memory (\$s)

The settings of the system memory depend on the type of memory to be defined.

- MONITOUCH internal memory (\$u, \$s, \$L/\$LD (0 - 65535))
 PLC memory (0 - 65535)
 Temperature control/PLC2Way memory (0 - 65535)

System Memory	Description				
	15	(MSB)	8	7 (LSB)	0
\$s801	Model		Memory type		
\$s802	Top memory number (address)				
\$s803	Extension code			00 H	
\$s804	00 H			Station number	
\$s805	00 H				

- MONITOUCH internal memory (\$L/\$LD (65536 or later))
 PLC memory (65536 or later)
 Temperature control/PLC2Way memory (65536 or later)

System Memory	Description				
	15	(MSB)	8	7 (LSB)	0
\$s801	Model		Memory type		
\$s802	Top memory number (address) lower-order				
\$s803	Top memory number (address) higher-order				
\$s804	Extension code			00 H	
\$s805	00 H			Station number	

- Model, memory type (HEX)

		Model	Memory Type
Internal memory	\$u	00	00
	\$s		01
	\$L		0 - 65535
		65536 -	
	\$LD	0 - 65535	03
		65536 -	
\$T	0 - 1023	04	
PLC memory	0 - 65535	01	The memory type depends on the PLC or memory used. Refer to the PLC Connection Manual and set the type of the memory.
	65536 -	81	
Temperature control memory	0 - 65535	03	The memory type depends on the memory used. Refer to the Temperature Control Network Manual and set the type number of the memory.
	65536 -	83	

- Extension code (HEX)

Set an extension code when you specify a SPU memory slot number for a Mitsubishi PLC, etc.

Ex.:

Mitsubishi: Slot No. 0: 00 H
 Mitsubishi: Slot No. 1: 01 H
 Yokogawa: CPU No. 1: 00 H
 Yokogawa: CPU No. 2: 01 H
 JTEKT: PRG No. 1: 00 H
 JTEKT: PRG No. 2: 01 H

- Port No. (HEX)

1:1 or multi-link: Not used
 Multi-drop: Set the PLC station number.
 Temperature controller: Set the temperature controller station number.

2. Read 50 words starting from the assigned D100.

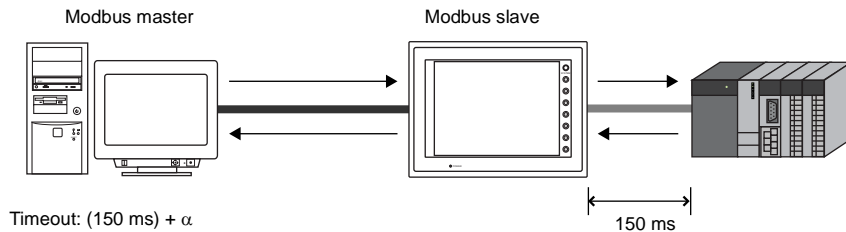
The RTU format is defined as follows:

Slave address		01 H	← MONITOUCH station number (01 or later)
Function code		03 H	← Reading the holding register
Starting address	Hi	FC H	← Top address Top address at free area 31 FC00 H
	Lo	00 H	
Quantity of registers	Hi	00 H	← Word count 50 (32 H)
	Lo	32 H	
Error check	Hi	CRC (16 bits)	
	Lo		

Notes

- Memory assignment to free area 31 is allowed when MONITOUCH is in the state of RUN. When MONITOUCH is brought to the state of STOP, the assigned memory will be cleared. When you wish to use free area 31, be sure to assign memory at each start of the master-MONITOUCH communication.
- Definition at \$s800 to 805 cannot be changed directly on MONITOUCH. It is changeable only through communication from the master.
- When setting a timeout period for the master associated with Modbus slave communication, the processing time (cycle time) required on MONITOUCH side should be taken into account.

Ex.)When a processing time (cycle time) required between MONITOUCH and the PLC is approximately 150 ms:



Timeout: (150 ms) + α

The timeout period required on the master side is 150 ms or longer.

For the additional time " α " a processing time between the master and MONITOUCH should be considered.

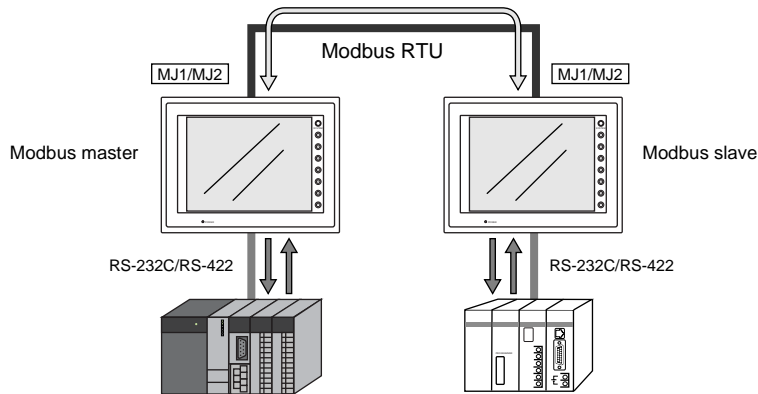
This processing time is determined by the amount of data to be accessed at one time.

If the amount of data increases, the timeout period should also be increased appropriately.

4. Use of MONITOUCH as Modbus Master

Outline of Communication

It is possible to establish a connection between a MONITOUCH as a master and another MONITOUCH as a slave.
This form of connection will greatly help read from/write to the PLCs connected to individual MONITOUCH.



MONITOUCH acting as the Modbus master employs the temperature control network.

For the execution of Modbus communication, MONITOUCH as a slave will be recognized as a Modbus Free device on the temperature control network.

Slave Setting

Slave setting is the same as for a normal case (computer-MONITOUCH connection). For more information, refer to "Slave Setting" on page 3-2.

Master Setting

MONITOUCH as the master will treat a slave MONITOUCH as a Modbus Free device on the temperature control network when communicating with it.

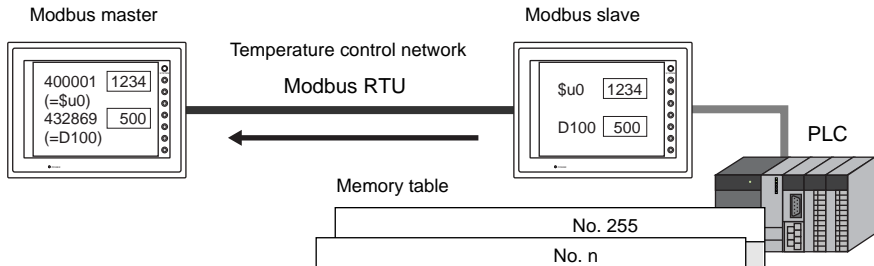
* If the master MONITOUCH is already connected to any temperature controller or inverter, which is not Modbus Free, the Modbus slave function by means of the temperature control network is not available.

- [System Setting] → [Temp. CTRL/PLC2Way Setting] → [Temp. CTRL/PLC2Way Comm. Setting]

Model: Modbus Free
 Communication parameter: The same as that for the slave
 Format setting: Reading the holding register [62 words] (Function code [03 H])
 Writing to the holding register [62 words] (Function code [10 H])

- Creating screens

Setting the [Memory Input Temp. Mem. Modbus Free] dialog is necessary to allow the master to gain access to slaves. In the dialog, select [Temp. Mem.] under [Type]. In the case of Modbus Free, select [4] in the dialog for the holding register.



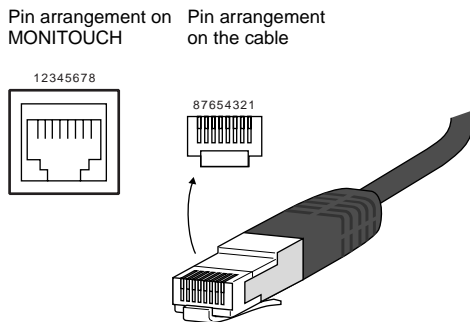
A reference number is determined from the hexadecimal number in the memory table, and then the reference number is specified as a holding register address.

Memory table			
No. 255			
No. n			
No. 1			
400001 -	0000 H -	Internal memory	0 \$u0 -
416385 -	4000 H -	Internal memory	1 \$s0 -
432769 -	8000 H -	Free area	0 D0000 -
433793 -	8400 H -	Free area	1 D1024 -
434817 -	8800 H -	Free area	2 D2048 -
⋮	⋮	⋮	⋮
462465 -	F400 H -	Free area	29 M0000 -
463489 -	F800 H -	Free area	30 R0000 -
464513 -	FC00 H -	Free area	31
464513 -	FC00 H -		31

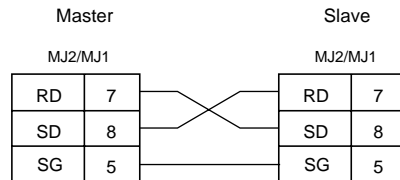
As same as a normal Modbus slave communication (computer-MONITOUCH), specify a memory table number at slave address \$s800 first for Modbus slave communication between MONITOUCHs. Once done, access to free areas is obtained. For the procedure used in setting the holding register for the master MONITOUCH, refer to the Temperature Control Network manual.

Connection

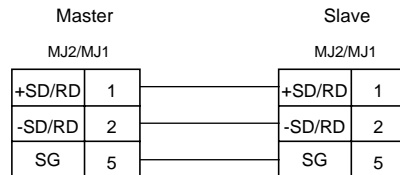
Use the modular jacks MJ1/MJ2 for both master and slave.



- RS-232C connection



- RS-485 connection



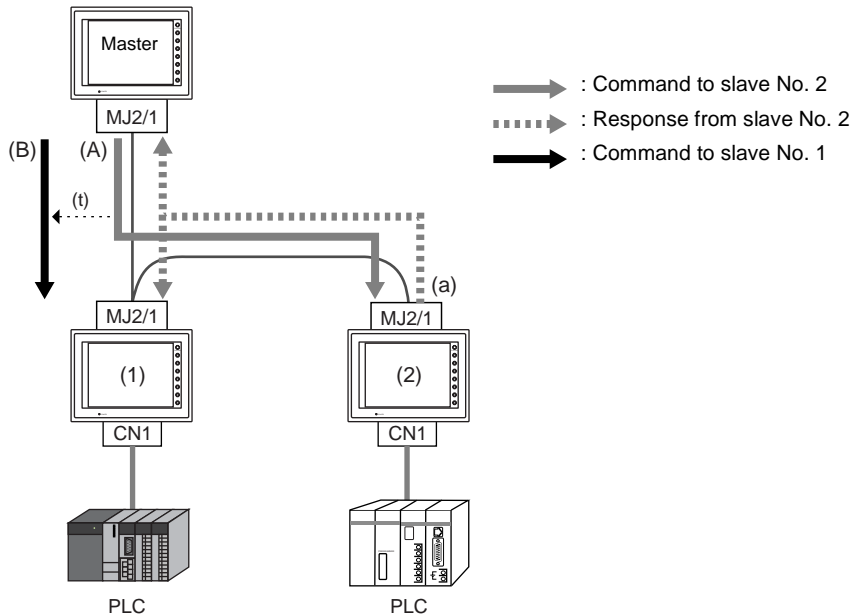
Connection with Multiple MONITOUCH as Slaves

Be sure to make the time for [Send Delay Time] on the master side longer than the time for [Timeout] on the slave side.

If the master sends a command to slave No. 2 ("A" in the figure), slave No. 2 will return a response to the master and slave No. 1 ("a" in the figure).

Normally, slave No. 1 does not recognize the response as a command to slave No. 1, and thereby does not process the response.

After the receipt of the response from slave No. 2, however, slave No. 1 may receive a new command from the master ("B" in the figure) though a timeout has not occurred yet. In an incident like this, slave No. 1 will not accept the new command, regarding it just as another response from slave No. 2.



To avoid the problem noted above, make the time for [Send Delay Time] ("t" in the figure) on the master side longer than the time for [Timeout] on the slave side so that a command will not be transmitted before a timeout occurs.

MEMO

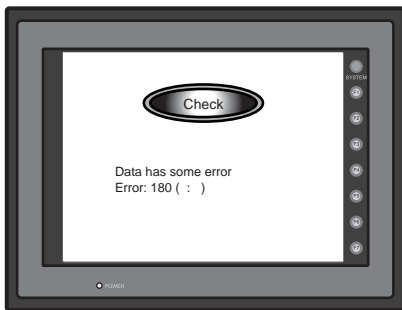
Please use this page freely.

5. Appendix

System Memory (\$s)

Address	Description	Memory Type
800	Modbus slave communication Reference table number	← V
801	Modbus slave communication Memory setting for free area 31	
802	Modbus slave communication Memory setting for free area 31	
803	Modbus slave communication Memory setting for free area 31	
804	Modbus slave communication Memory setting for free area 31	
805	Modbus slave communication Memory setting for free area 31	

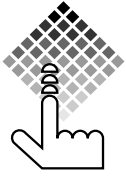
Error



V7	V6	Error No.	Description	Remedy
☉	☉	180	The Modbus slave communication program is not found.	Transfer the screen data again.
☉	☉	181	The slave communication program is stored in the V series though [Modbus Slave] is not set for [Modular Jack] for the screen data.	Set [Modbus Slave] in the [Modular Jack] setting.
☉	☉	182	The [Modular Jack] setting for the screen data includes both [Modbus Slave] and [V-Link] settings.	[Modbus Slave] and [V-Link] are not usable simultaneously.

MEMO

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MONITOUCH

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