SetPro 微電腦型盤面式 **PID** 控制器

RS-485 COMMUNICATION INSTRUCTION MANUAL

MODBUS Protocol Reference Guide

SetPro 微電腦型盤面式 **PID** 控制器

1. COMMUNICATION FUNCTIONS

1.1 General

☐ NT series provides a communication function by RS-485 interface, by which it can transmit and receive data to and from host computer, programmable controller, graphic display panel, etc.

☐ The communication system consists of master station and slave stations. Up to 255slave station can be connected per master station.

☐ In order that the master station and slave station can communicate, the format of the transmit/receive data must coincide. For the NT series, the format of the communication data is determined by the MODBUS protocol (RTU mode).

☐ Please use an RS-232C→RS-485 converter in case of designating a personal computer or other devices which have an RS-232C interface as a master station.

2. SPECIFICATIONS

2.1 Communication Specifications

Item	Specification	
Electrical specification	Based on EIA RS-485	
Transmit system	2-wire, semi-duplicate	
Synchronizing system	Asynchronous mode	
Connection format	1 : N	
Number connection unit	Up to 255 units	
Transmission distance	500m max	
Transmission speed	2400 / 4800 / 9600 / 19200 selectable	
Data format	Start bit	1 bit
	Data length bit	8 bits
	Parity bit	None
	Stop bit	2 bits
Transmission code	HEX value (MODBUS RTU mode)	
Error detection	CRC-16 bits	
Isolation	Functional isolation between transmission circuit and others (with stand voltage: 500V AC).	

A typical MODBUS protocol character is shown below:

1	2	3	4	5	6	7	8	9	10	11
Start bit	Data bits								Stop bits	

One character is including 1 Start bit and 8 Data bits and 2 Stop bits.

3. CONNECTION

⚠ WARNING
  For avoiding electric shock and malfunctions, don't turn on the power supply
  until all wiring has been completed.

3.1 Terminal Allocation

◆ NT-966 / NT-963

Terminal number	Signal name
1	+
2	-

◆ NT-946

Terminal number	Signal name
1	+
2	-

◆ NT-496

Terminal number	Signal name
1	+
2	-

◆ NT-726

Terminal number	Signal name
3	+
4	-

◆ NT-486 / NT-483

Terminal number	Signal name
13	+
14	-

3.2 Wiring

☐ Use twisted pair cables with shield.
  Recommended cable: UL2464, UL2448, etc.

☐ The total extension length of the cable is up to 500m. A master station and up to 255 units of
  the NT series can be connected per line.

☐ Both ends of the cable should be connecting with terminate resistors 100Ω 1/2W.

☐ The shield wire of the cable should be grounded at one place on the master station unit side.

4. SETTING OF COMMUNICATION CONDITION

In order that the master station and NT series can correctly communicate, following settings are required.

● All communication condition settings of the master station are the same as those of NT series.
● All NT series connected on a line are set to address (ADDR), which are different from each other.

4.1 Set Items

The parameters to be set are shown in the following table. Set them by operating the front panel keys.

Parameter	Item	Value at delivery	Setting range	Remarks
BAUD	Transmission speed	9600	2400/4800/9600/19200	Set the same communication condition to the master station and all slave station.
---------	Data length	8 bits	Fixed (can't be changed)	
---------	Stop bit	2 bit	Fixed (can't be changed)	
---------	Parity setting	None	Fixed (can't be changed)	
ADDR	Address	1	1 to 255	Set a different value to each station.

4.2 Setting Operation Method

The following example shows how to set the communication condition.
Example: Setting a transmission speed is 9600 bps and address at 12 on a station.

Key operation	Indication	Description
Power ON	25 / 100	Power on running state (PV/SV indication)
SET + ＜ (5 seconds)	LEVL / Pid	Press SET and SHIFT key simultaneously for approximately 5 seconds to get level parameter.
△	LEVL / OPTI	Press △ key to select option level.
SET	TYPE / K	Press SET key to go into option level.
SET	ADDR / 0	Press SET key repeatedly until ADDR is display.
△ or ▽	ADDR / 12	Press △ or ▽ key to setting "ADDR=12"
SET	BAUD	Press SET key again to select next parameter "BAUD"

△ or ▽	9.6K	Press △ or ▽ key to setting "BAUD=9.6K"
	BAUD	
	9.6K	
SET	BAUD	Press SET key to save "BAUD".
	9.6K	
SET + BACK	25	Press SET + BACK one time to return the normal indication (PV/SV indication).
	100	

5. MODBUS COMMUNICATION PROTOCOL

5.1 General

The communication system by the MODBUS protocol is that the communication is always started from the master station and a slave station responds to the received message.

Transmission procedures is as shown below.
1. The master station sends a command message to a slave station.
2. The slave station checks that the address in the received message matches with the own address or not.
3. If matched, the slave station executes the command and sends back the response message.
4. If mismatched, the slave station leaves the command message and wait for the next command message.
5. The master station can individually communicate with any one of slave stations connected on the same line upon setting the address in the command message.

5.2 Composition of Message

Command message and response message consist of 4 fields; Address, Function code, Data and CRC check code. And these are sends in this order. The allowable character transmitted for all fields are hexadecimal 0-9,A-F

RTU mode framing

START	ADDRESS	FUNCTION	DATA	CRC CHECK	END
T1-T2-T3-T4	8 BITS	8 BITS	N × 8 BITS	16 BITS	T1-T2-T3-T4

In the following, each field is explained.

1. Start
In RTU mode, messages start with a silent interval of at least 3.5 character times. This is most easily implemented as a multiple of character times at the baud rate that is being used on the network (shown as T1-T2-T3-T4 in the figure above). The first field then transmitted is the device address.

2. Address
Address is the number specifying a slave station. Valid slave device addresses are in the range 0f 1-255 decimal. A master addresses a slave by placing the slave address in the address field of the message. When the slave sends its

response, it places its own address in this address field of the response to let the master know which slave is responding.

Address 0 is used for the broadcast address, which all slave stations recognize. When the broadcast address (address 0) is applied on the command message, no any response message will be sent from the slave stations.

3. Function

This is a code to designate the function executed at a slave station. When a message is sent from a master to a slave device the function code field tells the slave what kind of action to perform. When the slave responds to the master, it uses the function code field to indicate either a normal response or that some kind of error occurred. For normal response, the slave simply echoes the original function code. For an exception response, the slave returns a code that is equivalent to the original function code with its most-signification bit set to a logic 1.

4. Data

Data are the data required for executing function codes. The composition of data varies with function codes. Refer to chapter 6 for details.

A data address is assigned to each data in the temperature controller. For reading/writing the data by communication, designate the data address.

5. CRC check

This is the code to detect message errors (change in bit) in the signal transmission. On the MODBUS protocol (RTU mode), CRC-16 (Cyclical Redundancy Check) is applied. For CRC calculation method, refer to section 5.5.

6. End

Following the last transmitted character, a similar interval of at least 3.5 character times marks the end of message. A new message can begin after this interval.

5.3 Response of Slave Station

1. Response for normal command

To a relevant message, the slave station creates and sends back a response message, which corresponds to the command message. The composition of message in this case is the same as in section 5.2. Content of the data field depend on the function code. For details, refer to Chapter 6.

2. Response for abnormal command

If contents of a command message have an abnormality (for example, non-actual function code is designated) other than transmission error, the slave station does not execute that command but creates and sends back a response message at error detection.

The composition of response message at error detection is shown on below, the value used for function field is function code of command message plus 80H.

ADDRESS	FUNCTION (Function code + 80H)	ERROR CODE	CRC CHECK
8 BITS	8 BITS	8 BITS	16 BITS

Error Code	Contents	Description
01	Illegal function	The function code received is not an allowable action for the slave.
02	Illegal data address	The data address received is not an allowable address for the slave.

03	Illegal data value	A value contained in the data field is not an allowable value for the slave.

5.4 Function Code

The listing below shows the function codes supported by NT-482 series controllers.

Function code		
Code	Function	Object
03	Read-out	Holding Register
04	Read-out	Input Register
06	Write-in	Holding Register

5.5 Calculation of Error Check Code (CRC-16)

CRC-16 is the 2-bytes (16-bits) error check code. From the top of the message (address) to the end of the data field are calculated.
The slave station calculates the CRC of the received message, and does not respond if the calculated CRC is different from the contents of the received CRC code.

A procedure for generating a CRC is:
1. Load a 16-bits register with FFFF hex (all 1's). Call this the CRC register.
2. Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC registers, putting the result in the CRC register.
3. If the LSB is 0: Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB.
   If the LSB is 1: Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB. Exclusive OR the CRC registers with the polynomial value A001 hex.
4. Repeat step 3 until 8 shifts have been performed. When this is done, a complete 8-bit byte will have been processed.
5. Repeat step 2 through 5 for the next 8-bit byte of the message. Continue doing this until all bytes have been processed.
6. The final content of the CRC register is the CRC value. The CRC field is appended to the message as the last field in the message. When this is done, the low-order byte of the field is appended first, followed by the high-order byte. The CRC high-order byte is the last byte to be sent in the message.

5.6 Transmission Control Procedure

1. Transmission procedure of master station

The master station must proceed to a communication upon conforming to the following items.
- 1-1. Before sending a command message, provide 44 bits time or more vacant status.
- 1-2. For sending, the interval between bytes of a command message is below 22 bits time.
- 1-3. Within 22 bits time after sending a command message, the receiving status is posted.
- 1-4. Provide 44 bits time or more vacant status between the end of response message reception and beginning for next command message sending (same as in 1-1).

1-5. For ensuring the safety, make a confirmation of the response message and make an arrangement so as to provide 3 or more retries in case of no response, error occurrence, etc.

Note: The above definition is for most unfavorable value. For ensuring the safety, it's recommended the program of the master to work with safety factors of 2 to 3. Concretely, it is advised to arrange the program for 9600 bps with 10ms or more for vacant status (1-1), and within 1ms for byte interval (1-2) and changeover from sending to receiving (1-3).

2. Description

(1). Detection of the message frame

Since the communication system uses the 2-write RS-485 interface, there may be 2 statuses on a line below.

(a) Vacant status (no data on line)

(b) Communication status (data is existing)

Instruments connected on the line are initially at a receiving status and monitoring the line. When 22 bits time or more vacant status has appeared on the line, the end of preceding frame is assumed and, within following 22 bits time, a receiving status is posted. When data appears on the line, instruments receive it while 22 bits time or more vacant status is detected again, and the end of that frame is assumed. Data, which appeared on the line from the first 44ms time or more vacant status to the next 44 bits time or more vacant status is fetched as one frame.

1-1. 44 bits time or more vacant status precedes the command message sending.

1-2. Interval between bytes of 1 command message is smaller than 22 bits time.

(2). Response of this instrument (NT)

After a frame detection (22 bits time or more vacant status), this instrument carries out-processing with that frame as a command message. If the command message is destined to the own station, a response message is returned. Its processing time is 1 to 10ms (depends on contents of command message). After sending a command message, therefore, the master station must observe the following.

1-3. Receiving status is posted within 22 bits time after sending a command message.

6. DETAILS OF MESSAGE

6.1 Read-out of Word Data [Function Code: 03]

Read the contents of holding registers (0000~ 007D) in the slave.

Broadcast is not possible.

1. Message composition

Command message composition

Address	Function	Starting Address	Word Number*	CRC-16	
01~FF	03	0xxx	0001~007E	Low-order byte	High-order byte
1 byte	1 byte	2 byte	2 bytes	2 bytes	

* Maximum word number = 7E

Response message composition

Address	Function	Byte Number *	Word Data	CRC-16	
01 ~ FF	03	02~FC		Low-order byte	High-order byte
1 byte	1 byte	1 bytes	N bytes	2 bytes	

* Byte number = Word number × 2

2. Message transmission (example)

The following show an example of reading the Setpoint Value (1000) from address No.1 controller.

Command message composition

Address	Function	Starting Address	Word Number	CRC-16
01	03	0000	0001	840A

Response message composition

Address	Function	Byte Number	Word Data	CRC-16
01	03	02	03E8	B8FA

6.2 Read-out of Read-Only Word Data [Function Code: 04]

Read the contents of input registers (1000~1002) in the slave.

Broadcast is not possible.

1. Message composition

Command message composition

Address	Function	Starting Address	Word Number	CRC-16	
01~FF	04	1xxx	0001~007E	Low-order byte	High-order byte
1 byte	1 byte	2 bytes	2 bytes	2 bytes	

Response message composition

Address	Function	Byte Number	Word Data	CRC-16	
01 ~ FF	04	02~FC		Low-order byte	High-order byte
1 byte	1 byte	1 byte	N bytes	2 bytes	

2. Message transmission (example)

The following show an example of reading the Process Value (27) from address No.1 controller.

Command message composition

Address	Function	Starting Address	Word Number	CRC-16
01	04	1000	0001	350A

Response message composition

Address	Function	Byte Number	Word Data	CRC-16
01	04	02	001B	F93B

6.3 Write-in of Word Data (1 word) [Function Code: 06]

1. Message composition

Command message composition

Address	Function	Starting Address	Word Data	CRC-16	
1 ~ FF	06	0xxx	0xxx	Low-order byte	High-order byte
1 byte	1 byte	2 bytes	2 bytes	2 bytes	

Response message composition

Address	Function	Starting Address	Word Data	CRC-16	
1 ~ FF	06	0xxx	0xxx	Low-order byte	High-order byte
1 byte	1 byte	2 bytes	2 bytes	2 bytes	

2. Message transmission (example)

The following show an example of writing the Setpoint Value to address No.1 controller.

Command message composition

Address	Function	Starting Address	Word Data	CRC-16
01	06	0000	01F4	89DD

Response message composition

Address	Function	Starting Address	Word Data	CRC-16
01	06	0000	01F4	89DD

7. ADDRESS MAP AND DATA FORMAT

7.1 Data Format

1. Transmission data format

The MODBUS protocol used in this instrument (NT) is RTU (Remote Terminal Unit) mode.

Transmitted data is "numeric value" and not "ASCII code".

2. Internal calculation value and engineering unit

There are 3 different kinds of set value in the NT-482 series controllers.

1. Normal value:

The data value is transfer into Hexadecimal regardless of decimal. For example: 1000 ℃ will be transfered to 03E8(hex), However, such as output percentage and Pb (proportional band), 100.0 % will be transfered to 03E8(hex).

2. Time value:

The time value such as St1(soak time), rt1(ramp time) will be express as follow: 55.30 (55 minute 30 second) will be express as 0D02(hex) which is calculated by

(55 × 60) ＋ 30 = 3330 (sec.)

3. Index code:

Some parameters value are set by index code. For example, to change the unit to ℃ via communication. The data value would be 0017(hex).

Code	English	Code	English	Code	English	Code	English	Code	English
00	None	20	0000	40	NO	60	PROG	80	
01	A1SP	21	0001	41	YES	61	USER	81	
02	A2SP	22	0010	42	REV	62	PID	82	
03	AT	23	0011	43	DIR	63	OPTI	83	
04	HAND	24	0100	44	STOP	64	ENGR	84	
05	OUTL	25	0101	45	GO	65	FACT	85	
06	RUN	26	0110	46	HOLD	66	OFF	86	
07	PROG	27	0111	47	NONE	67	END1	87	
08	PB	28	1000	48	HI	68	END2	88	
09	TI	29	1001	49	LO	69	ENDA	89	
0A	TD	2A	1010	4A	DIF.H	6A	HOD1	8A	
0B	CT	2B	1011	4B	DIF.L	6B	HOD2	8B	
0C	CPB	2C	1100	4C	BD.HI	6C	HODA	8C	
0D	CTI	2D	1101	4D	BD.LO	6D	LOP1	8D	
0E	CTD	2E	1110	4E	T.SNL	6E	LOP2	8E	
0F	CCT	2F	1111	4F		6F	LOPA	8F	
10	HYS1	30	J	50	HH.MM	70	P1.RP	90	
11	HYS2	31	K	51	MM.SS	71	P1.SK	91	
12	A1HY	32	T	52	0000	72	P2.RP	92	
13	A2HY	33	E	53	000.0	73	P2.SK	93	
14	DB	34	B	54	00.00	74	P3.RP	94	
15	SPOF	35	R	55	0.000	75	P3.SK	95	
16	PVOF	36	S	56	SP-1	76	P4.RP	96	
17	℃	37	N	57	SP-2	77	P4.SK	97	
18	℉	38	C	58	PV	78	P5.RP	98	
19	ENG	39	D-PT	59	SV	79	P5.SK	99	
1A	NO	3A	J-PT	5A	NONE	7A	P6.RP	9A	
1B	YES.1	3B	LINE	5B	STDY	7B	P6.SK	9B	
1C	YES.2	3C	2.4K	5C	LATH	7C	P7.RP	9C	
1D	OFF	3D	4.8K	5D	ST.LA	7D	P7.SK	9D	
1E	PTN1	3E	9.6K	5E	T.END	7E	P8.RP	9E	
1F	PTN2	3F	19.2K	5F		7F	P8.SK	9F	

7.2 Data Address Map

■ Word data (read-out/write-in) : Function code [03,06]

Data Address	Parameter	Range	Unit
0000	SV	HiLt~LoLt	℃/℉
0001	A1SP	-1000~1000	℃/℉
0002	A2SP	-1000~1000	℃/℉
0003	AT	Yes.1/Yes.2/No (English code)	
0004	HAND	Yes/No (English code)	
0005	OUTL	-100.0~100.0	%
0006	RUN	Hold/Go/Stop (English code)	
0007	PROG	oFF/End1/End2/EndA/Hod1/Hod2/HodA/LoP1/LoP2/LoPA (English code)	
0008	PB	0.0~300.0	%
0009	TI	3600	Sec
000A	TD	900	Sec
000B	CT	0~100	Sec
000C	CPB	0.0~300.0	%
000D	CTI	3600	Sec
000E	CTD	900	Sec
000F	CCT	0~100	Sec
0010	HYS1	0~2000	℃/℉
0011	HYS2	0~2000	℃/℉
0012	A1HY	0~2000	℃/℉
0013	A2HY	0~2000	℃/℉
0014	DB	-1000~1000	℃/℉
0015	SPOF	-1000~1000	℃/℉
0016	PVOF	-1000~1000	℃/℉
0018	TYPE	J/K/B/R/S/T/E/N/C/DPT/JPT/LINE (English code)	
0019	UNIT	℃ / ℉ / ENG (English code)	
001A	DP	0000/000.0/00.00/0.000 (English code)	
001B	ACT	REV / DIR(English code)	
001C	LOLT	-1999~9999	℃/℉
001D	HILT	-1999~9999	℃/℉
001E	FILT	0.0~-100.0	
001F	P.TME	HH.MM / MM.SS (English code)	
0020	A1FU	None/Hi/Lo/dif.H/dif.L/bd.Hi/bd.Lo/T.SNL (English code)	
0021	A1MD	None/Stdy/Lath/St.La/T.End (English code)	
0022	A1FU	None/Hi/Lo/dif.H/dif.L/bd.Hi/bd.Lo/T.SNL (English code)	

0023	A1MD	None/Stdy/Lath/St.La/T.End (English code)	
0026	PTN	Ptn1 / Ptn2 (English code)	PTN
0027	BAND	0~1000	℃/℉
0028	SP1	LoLt~HiLt	℃/℉
0029	RT1	End/00.00~99.59	HH.MM/MM.SS
002A	ST1	00.00~99.59	HH.MM/MM.SS
002B	SP2	LoLt~HiLt	℃/℉
002C	RT2	End/00.00~99.59	HH.MM/MM.SS
002D	ST2	00.00~99.59	HH.MM/MM.SS
002E	SP3	LoLt~HiLt	℃/℉
002F	RT3	End/00.00~99.59	HH.MM/MM.SS
0030	ST3	00.00~99.59	HH.MM/MM.SS
0031	SP4	LoLt~HiLt	℃/℉
0032	RT4	End/00.00~99.59	HH.MM/MM.SS
0033	ST4	00.00~99.59	HH.MM/MM.SS
0034	SP5	LoLt~HiLt	℃/℉
0035	RT5	End/00.00~99.59	HH.MM/MM.SS
0036	ST5	00.00~99.59	HH.MM/MM.SS
0037	SP6	LoLt~HiLt	℃/℉
0038	RT6	End/00.00~99.59	HH.MM/MM.SS
0039	ST6	00.00~99.59	HH.MM/MM.SS
003A	SP7	LoLt~HiLt	℃/℉
003B	RT7	End/00.00~99.59	HH.MM/MM.SS
003C	ST7	00.00~99.59	HH.MM/MM.SS
003D	SP8	LoLt~HiLt	℃/℉
003E	RT8	End/00.00~99.59	HH.MM/MM.SS
003F	ST8	00.00~99.59	HH.MM/MM.SS
0040	SP9	LoLt~HiLt	℃/℉
0041	RT9	End/00.00~99.59	HH.MM/MM.SS
0042	ST9	00.00~99.59	HH.MM/MM.SS
0043	SP10	LoLt~HiLt	℃/℉
0044	RT10	End/00.00~99.59	HH.MM/MM.SS
0045	ST10	00.00~99.59	HH.MM/MM.SS
0046	SP11	LoLt~HiLt	℃/℉
0047	RT11	End/00.00~99.59	HH.MM/MM.SS
0048	ST11	00.00~99.59	HH.MM/MM.SS
0049	SP12	LoLt~HiLt	℃/℉
004A	RT12	End/00.00~99.59	HH.MM/MM.SS
004B	ST12	00.00~99.59	HH.MM/MM.SS
004C	SP13	LoLt~HiLt	℃/℉

004D	RT13	End/00.00~99.59	HH.MM/MM.SS
004E	ST13	00.00~99.59	HH.MM/MM.SS
004F	SP14	LoLt~HiLt	℃/℉
0050	RT14	End/00.00~99.59	HH.MM/MM.SS
0051	ST14	00.00~99.59	HH.MM/MM.SS
0052	SP15	LoLt~HiLt	℃/℉
0053	RT15	End/00.00~99.59	HH.MM/MM.SS
0054	ST15	00.00~99.59	HH.MM/MM.SS
0055	SP16	LoLt~HiLt	℃/℉
0056	RT16	End/00.00~99.59	HH.MM/MM.SS
0057	ST16	00.00~99.59	HH.MM/MM.SS
0058	CH01	0~2000	
0059	CL01	0~2000	
005A	CH02	0~2000	
005B	CL02	0~2000	
005C	RTSH	0~3000	
005D	RTSL	0~3000	
005E	PVSV	PV/SV (English code)	
005F	SV2	SP-1 / SP-2 (English code)	
0060	MR	0.0~100.0	%
0061	AR	-100.0~100.0	%
0062	(reserve)		
0063	(reserve)		
0064	(reserve)		
0065	(reserve)		
0066	(reserve)		
0067	(reserve)		
0068	1-02	00~16 (English code)	
0069	1-03	00~16 (English code)	
006A	1-04	00~16 (English code)	
006B	1-05	00~16 (English code)	
006C	1-06	00~16 (English code)	
006D	1-07	00~16 (English code)	
006E	1-08	00~16 (English code)	
006F	2-01	00~16 (English code)	
0070	2-02	00~16 (English code)	
0071	2-03	00~16 (English code)	
0072	2-04	00~16 (English code)	
0073	2-05	00~16 (English code)	
0074	2-06	00~16 (English code)	

0075	2-07	00~16 (English code)	
0076	2-08	00~16 (English code)	
0077	2-09	00~16 (English code)	
0078	2-10	00~16 (English code)	
0079	2-11	00~16 (English code)	
007A	2-12	00~16 (English code)	
007B	2-13	00~16 (English code)	
007C	2-14	00~16 (English code)	
007D	2-15	00~16 (English code)	
0088	RAMP		
0089	SSP		
008a	OUT		

■ Word data (read-out only) : Function code [04]

Data Address	Parameter	Contents	Unit
1000	PV	Process value	
1001	HOP	Heating output percentage 0.0 ~ 100.0	
1002	COP	Cooling output percentage 0.0 ~ 100.0	
1003	LED	BIT,S8,S7,S6,S5,S4,S3,S2,S1,PTN2,PTN1,RUN,PRO,C2,C1,A2,A1	
1004	MCODE	14=NT486,1E=NT483,07D0=VD	

8. TROUBLESHOOTING

8.1 Troubleshooting

If the communication is unavailable, check the following items.

☐ Whether all devices related to communication are turned on.

☐ Whether connections are correct.

☐ Whether the number of connected instruments and connection distance are as specified.

☐ Whether communication conditions coincide between the master station (host computer) and slave station (NT).

    ☐ Transmission speed : ☐ 2400 bps ☐ 4800 bps ☐ 9600 bps ☐ 19200 bps

    ☐ Address :01 ~ FF (master and slave station must be match)

☐ Whether send/receive signal timing conforms to Section 5.4 in the manual.

☐ Whether more than one instrument connected on the same transmission line share the same address.