

High Performance Single-phase Thyristor Unit 150 A/200 A THV-A1 Communication Quick Manual

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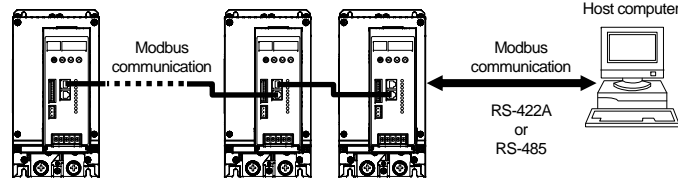
IMR02D08-E2

This manual describes the connection method with host computer, communication parameters and communication data of the THV-A1. For the detail host communication such as protocol, refer to the THV-A1 Communication Instruction Manual [Detailed version] (IMR02D05-E1).

The THV-A1 Communication Instruction Manual [Detailed version] (IMR02D05-E1) can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm.

1. OUTLINE

High Performance Single-phase Thyristor Unit THV-A1 (hereafter, called THV-A1) interfaces with the host computer via Modbus. RS-422A and RS-485 is used for the communication interface.



Maximum connections of THV-A1: 31 instruments (RS-422A, RS-485)

Data send/receive state for Modbus can be monitored by using PROTEM2 (communication tool).
The PROTEM2 can be downloaded from the RKC official website:
<http://www.rkcinst.com/>.

2. WIRING



WARNING

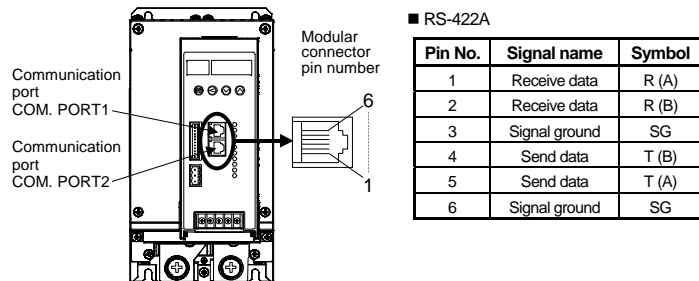
To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

2.1 RS-422A

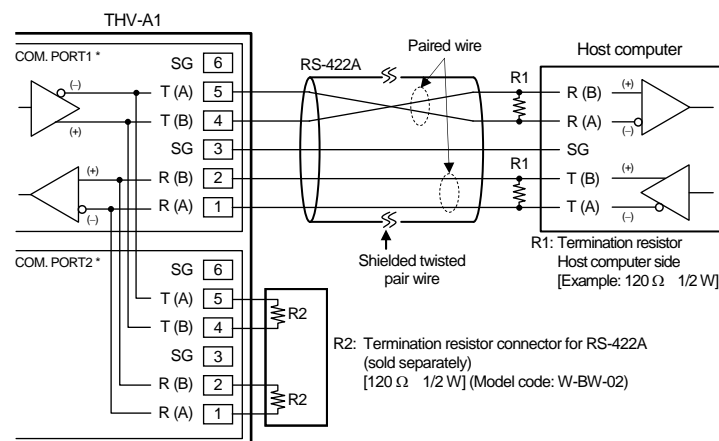
The communication cable must be provided by the customer. If communication errors occur frequently, connect termination resistors to the THV-A1.

Pin number and signal name

The signals are the same in the communication ports COM.PORT1 and COM.PORT2.



When the interface of host computer is RS-422A

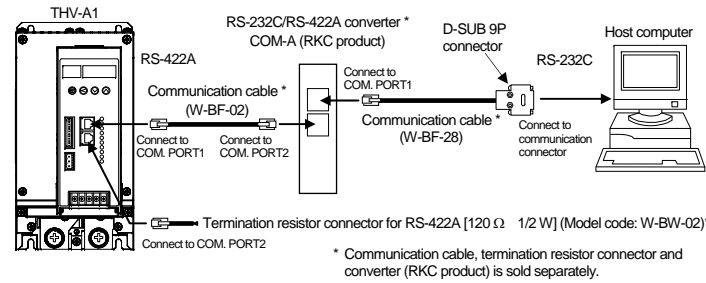


* COM. PORT1 and COM. PORT2 are internally connected.

The six-pin type modular connector should be used for the connection to the THV-A1.
Recommended manufacture and model: Hirose Electric, TM4P-66P

When the interface of host computer is RS-232C

When the interface of host computer is RS-232C, connect the RS-232C/RS-422A converter between the host computer and the THV-A1.

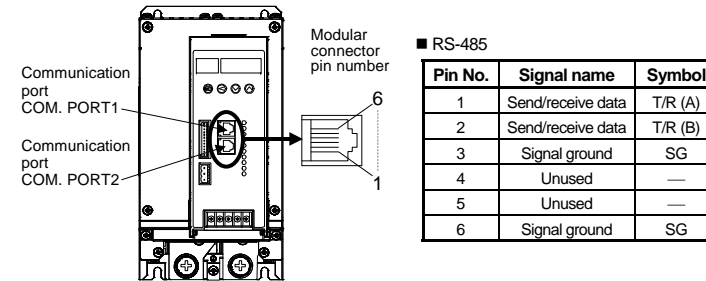


2.2 RS-485

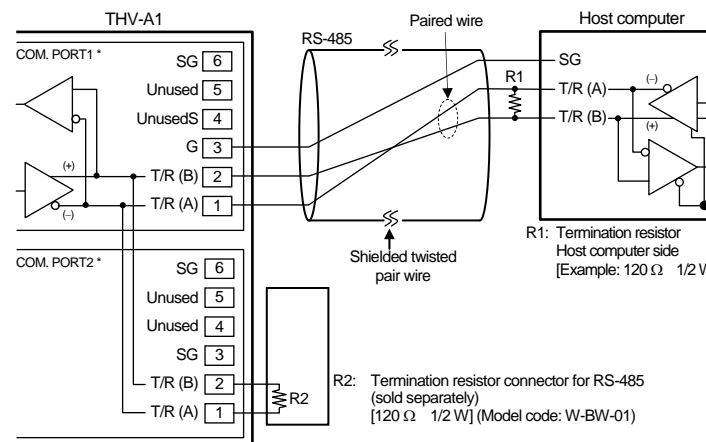
The communication cable must be provided by the customer. If communication errors occur frequently, connect termination resistors to the THV-A1.

Pin number and signal name

The signals are the same in the communication ports COM.PORT1 and COM.PORT2.



When the interface of host computer is RS-485

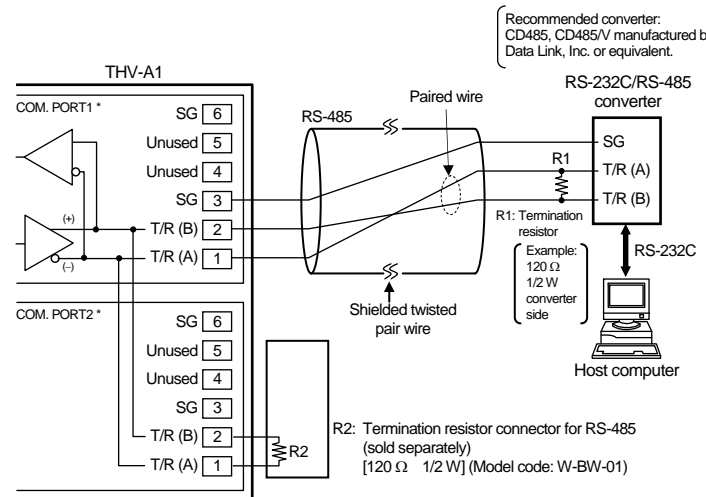


* COM. PORT1 and COM. PORT2 are internally connected.

The six-pin type modular connector should be used for the connection to the THV-A1.
Recommended manufacture and model: Hirose Electric, TM4P-66P

When the interface of host computer is RS-232C

Use a RS-232C/RS-485 converter with an automatic send/receive transfer function.



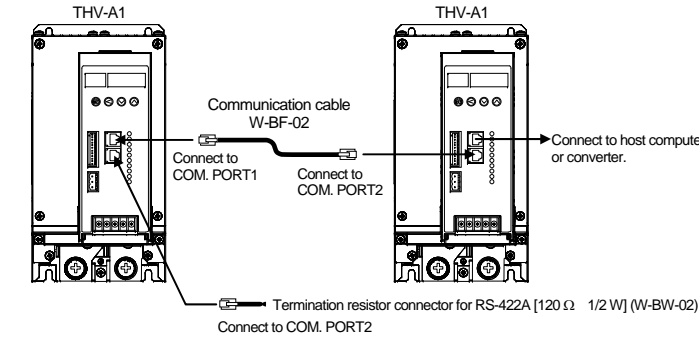
* COM. PORT1 and COM. PORT2 are internally connected.

The six-pin type modular connector should be used for the connection to the THV-A1.
Recommended manufacture and model: Hirose Electric, TM4P-66P

2.3 Multiple THV-A1 Connections

Connections can be added using our communication cable (sold separately: W-BF-02). W-BF-02 cable can be used for both RS-422A and RS-485.

Connection example (RS-422A)



3. SETTING

To establish communication parameters between host computer and THV-A1, it is necessary to set the device address (THV-A1 device address) and interval time on each THV-A1 in the setting mode 1. The communication speed and data bit configuration of the THV-A1 are fixed at the values indicated below. Set the communication speed and data bit configuration of the host computer to the same values as the THV-A1.

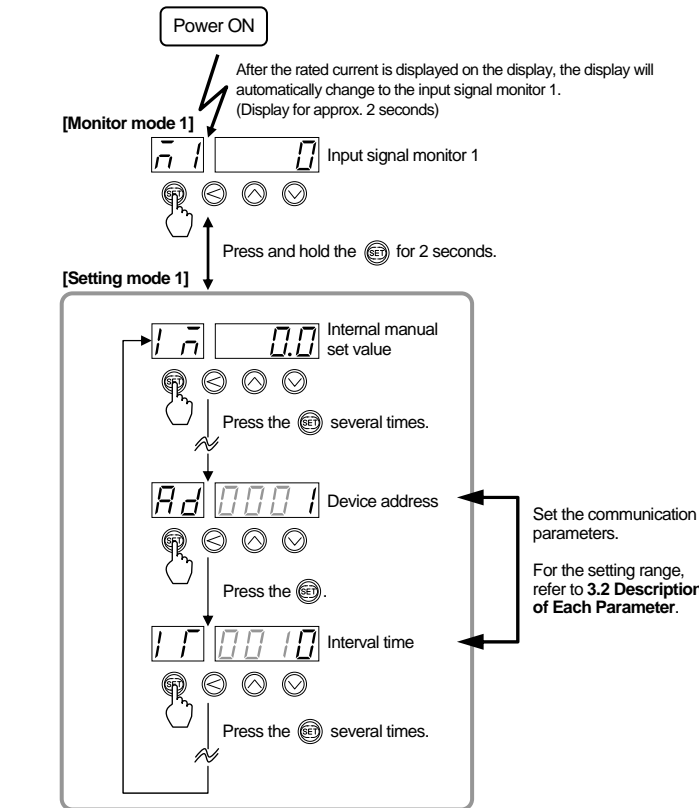
Communication speed: 9600 bps
Data bit configuration: Data 8-bit, Without parity, Stop 1-bit

Setting mode 1 automatically returns to the monitor mode 1 if no key operation is performed for more than 1 minute.

After completing the device address (Ad) and interval time (IT) settings, turn on the power again, and register the set value which changed.

This section describes the parameters to need setting for host communication. For the screen operation and key operation, refer to the THV-A1 Quick Operation Manual (IMR02D07-E1).

3.1 Display Flowcharts



3.2 Description of Each Parameter

Symbol	Name	Data range	Description	Factory set value
Ad (Ad)	Device address	0 to 99	Do not use the same device address for more than one THV-A1 in multi-drop connection. Communication is not possible when the address is 0.	1
IT (IT)	Interval time *	0 to 250 ms	The interval time for the THV-A1 should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for the host.	10

* The interval time for the THV-A1 should be set to provide a time for host computer to finish sending all data including stop bit and to switch the line to receive status for host. If the interval time between the two is too short, the THV-A1 may send data before the host computer is ready to receive it. In this case, communication transmission cannot be conducted correctly.

3.3 Communication Requirements

Processing times during data send/receive

THV-A1 requires the following processing times during data send/receive. Have the host computer switch from reception to transmission after the times below elapse.

Procedure details	Time
Read holding registers [03H] Response send time after the slave receives the query message (When 80 registers are collectively read)	10 ms max.
Preset single register [06H] Response send time after the slave receives the query message	5 ms max.
Diagnostics (loopback test) [08H] Response send time after the slave receives the query message	5 ms max.
Preset multiple registers [10H] Response send time after the slave receives the query message (When 68 registers are collectively write)	10 ms max.

RS-422A/RS-485 Fail-safe

A transmission error may occur with the transmission line disconnected, shorted or set to the high-impedance state.

In order to prevent the above error, it is recommended that the fail-safe function be provided on the receiver side of the host computer.

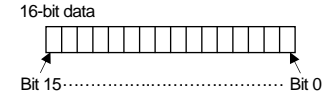
The fail-safe function can prevent a framing error from its occurrence by making the receiver output stable to the MARK (1) when the transmission line is in the high-impedance state.

Data backup

The nonvolatile memory (EEPROM) for data backup has limitations on the number of memory rewrite times (Approx. One million times).

4. HOST COMMUNICATION DATA MAP

- Modbus register address
HEX: Hexadecimal DEC: Decimal
- Attribute
RO: Read only data
R/W: Read and Write data
- Data



No. 27 to 64 are engineering mode data. Engineering mode data are locked prior to shipping. Release the engineering mode lock using the set data lock (address: 0013H).

Communication data

No.	Name	Register address		Attribute	Data range	Factory set value
		HEX	DEC			
1	Input signal monitor 1	0000	0	RO	0 to 100 %	—
2	Phase angle ratio monitor	0001	1	RO	0 to 100 %	—
3	CT input monitor ¹	0002	2	RO	0.0 to 202.5 A (150 A type) 0.0 to 270.0 A (200 A type)	—
4	Voltage value monitor	0003	3	RO	0 to 280 V { 90 to 264 V AC [Power supply voltage range] Rating 100 to 240 V AC }	—
5	Power value monitor ²	0004	4	RO	0.00 to 56.70 kW (150 A type) 0.00 to 75.60 kW (200 A type)	—
6	Power frequency monitor	0005	5	RO	40 to 70 Hz	—
7	Power supply voltage monitor	0006	6	RO	0 to 280 V { 90 to 264 V AC [Power supply voltage range] Rating 100 to 240 V AC }	—
8	Input signal monitor 2	0007	7	RO	0 to 100 %	—
9	External gradient set value monitor	0008	8	RO	0 to 100 %	—
10	External manual set value monitor	0009	9	RO	0 to 100 %	—
11	Contact input state monitor	000A	10	RO	Bit data Bit 0: Contact input 1 (DI1) Bit 1: Contact input 2 (DI2) Bit 2: Contact input 3 (DI3) Bit 3 to Bit15: Unused Data 0: Contact open 1: Contact closed [Decimal number: 0 to 7]	—
12	Memory area monitor ¹	000B	11	RO	1 to 4	—

¹This data becomes valid on the instrument with a constant current control or constant power control.

²This data becomes valid on the instrument with a constant power control.

