1. CONNECTION TO HOST COMPUTER

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

1.1 RS-485

Communication terminal number and signal details

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Symbol</th>
<th>Name</th>
<th>Description</th>
<th>Factory set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>Signal ground</td>
<td>SG</td>
<td>25</td>
<td>Signal ground</td>
<td>28</td>
</tr>
</tbody>
</table>

Signal ground(SG) connection is necessary, connect the signal ground of the AG500 (slave) and the host computer (master) using a single wire. The connection terminal is on the equipment for the AG500 (slave). See the diagram.

- When the interface of the host computer (Master) is RS-485
  - Connect the USB communication converter between the host computer and the AG500 (slave).

- When the interface of the host computer (Master) is RS-485
  - Connect the USB communication converter between the host computer and the AG500 (slave).

- When the host computer (Master) has a USB connector
  - Connect the USB communication converter between the host computer and the AG500 (slave).

1.2 RS-422A

Communication terminal number and signal details

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Symbol</th>
<th>Name</th>
<th>Description</th>
<th>Factory set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Signal ground</td>
<td>SG</td>
<td>28</td>
<td>Signal ground</td>
<td>29</td>
</tr>
</tbody>
</table>

Signal ground(SG) connection is necessary, connect the signal ground of the AG500 (slave) and the host computer (master) using a single wire. The connection terminal is on the equipment for the AG500 (slave). See the diagram.

- When the interface of the host computer (Master) is RS-422A
  - Connect the USB communication converter between the host computer and the AG500 (slave).

- When the host computer (Master) has a USB connector
  - Connect the USB communication converter between the host computer and the AG500 (slave).

2. SETTING

To establish communication parameters between host computer and AG500, it is necessary to set the following parameters.

- When all communication parameters settings have been completed, turn the power of and then turn it on to make the new set values take effect.

3. COMMUNICATION REQUIREMENTS

3.1 Processing times during communication

When the host computer is using either the polling or selecting procedure for communication, the following processing times are required on the AG500 to send data.

- Response wait time after AG500 sends BCC in polling procedure
- Response wait time after AG500 sends ACK or NAK in selecting procedure

3.2 Communication data list

<table>
<thead>
<tr>
<th>Data item</th>
<th>Format</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>decimal</td>
<td>Address</td>
<td>0000H to FFFFH</td>
</tr>
</tbody>
</table>

4. COMMUNICATION DATA LIST

The AG500 communication data list shows data which can be used for communication between the host computer and AG500.

- Explanation of data map
  - Modbus register address
  - Modbus register address
  - Modbus register address

5. RS-422A/RS-485 fail-safe

A communication error may occur with the communication line disconnected, shortened 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 or eliminate errors from occurring by making the receiver output the same as the input when the transmission line is in the high-impedance state.

6. Modbus data processing precautions

The numeric range of data used in Modbus protocol is 0000H to FFFFH. Only the set numeric range of data is used in Modbus protocol. Any attempt to write to an unused item is not processed as an error. Data cannot be sent to an unused item.

7. Attribute (A method of how communication data items are read or written when viewed from the host computer is described)

R/W: Reading and writing data is possible  (Host computer) 
W/E: Reading and writing data is possible  (Host computer)
**5. MODBUS ERROR CODE**

**Problem**
- Function: Error code (Device status)
- Data: 1 byte

**Possible cause**
- 0: Software error
- 1: Communication error

**Solution**
- Confirm the function code.
- Confirm the setting of the device.

**Error code**

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Software error</td>
<td>0: Software error</td>
<td>Confirm the function code.</td>
</tr>
<tr>
<td>1</td>
<td>Communication error</td>
<td>1: Communication error</td>
<td>Confirm the setting of the device.</td>
</tr>
</tbody>
</table>

**6. COMMUNICATION SPECIFICATIONS**

**Interface**
- Based on RS-422A or RS-485, EIA standard

**Synchronization method**
- Data bit: 8 (RS-422A) or 7 (RS-485)

**Data bit configuration**
- Data length: 8 bits
- Parity: Even, Odd, or None
- Stop bit: 1 or 2

**Protocol**
- Communication via RS-422A/485 or standard multi-drop communication
- Error check: CRC-16
- Communication code: ASCII format
- Modbus

**Signal transmission mode**
- Function code: Remote Terminal Unit (RTU) mode 03h (Read holding registers), 06h (Write single register), or 16h (Write multiple registers)

**Error check method**
- CRC-16

**Maximum connections**
- Up to 31 instruments

**Termination resistor**
- External connection: "Termination resistor: 100 Ω (for A, B, C (100 Ω) terminal for the B (terminal)."

**Signal log**
- RS-422A: RS-485