

G0310 Modbus to HART Gateway

User Manual



Microcyber Corporation

Caution

1. Please don't take off/install temperature board set at random.
2. Please check if the power of temperature board set meets the power request in the User Manual.

Version

V1.3

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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The technical data may change at any time.

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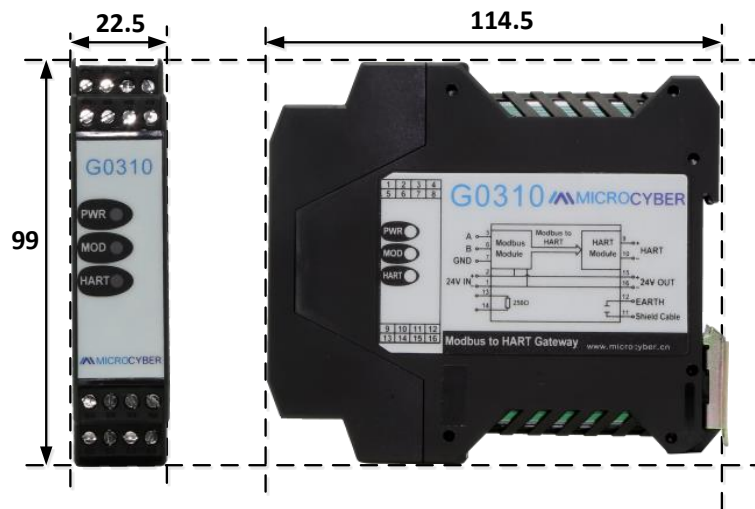
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Section 1 Overview

G0310 Modbus to HART Gateway, designed by Microcyber Corporation is a gateway device for Modbus-RTU protocol and HART protocol. As Modbus master, G0310 Modbus to HART Gateway communicates with devices that have Modbus-RTU communication function via RS485 interface. It can convert device data to HART device variables output, and it also supports 4~20mA current output.

1.1 Dimension



1.

Figure 1 Dimension (Unit: mm)

1.2 Structure



Figure 2 Structure

| | | | | | | | |
|---|----------------|---|----------------|---|---------------------|---|----------|
| 1 | Upside Housing | 2 | Bottom Housing | 3 | Communication Board | 4 | Terminal |
|---|----------------|---|----------------|---|---------------------|---|----------|

1.3 Wiring

| No. | Meaning | No. | Meaning |
|-----|---------|-----|---------|
| 1 | 24V- | 2 | 24V+ |
| 3 | NC | 4 | NC |
| 5 | A+ | 6 | B- |
| 7 | GND | 8 | GND |
| 9 | HART+ | 10 | HART- |
| 11 | Shield | 12 | EARTH |
| 13 | R | 14 | R |
| 15 | 24V- | 16 | 24V+ |

Section 2 Installation

2.1 Wiring

Dimension of G0310 MODBUS to HART gateway is 99×22.5×114.5mm, supporting standard DIN guide rail installation.

The power supply of G0310 MODBUS to HART gateway is HART bus, and 485 communication need external 24V power supply. The recommended is TP cable, and it shall improve device's anti-electromagnetic interference ability.

2.2 Jumper configuration

G0310 MODBUS to HART Gateway has 2 jumpers, as shown on figure 3. The left one is failure warning current setting and the right one is configuration protection setting jumper.

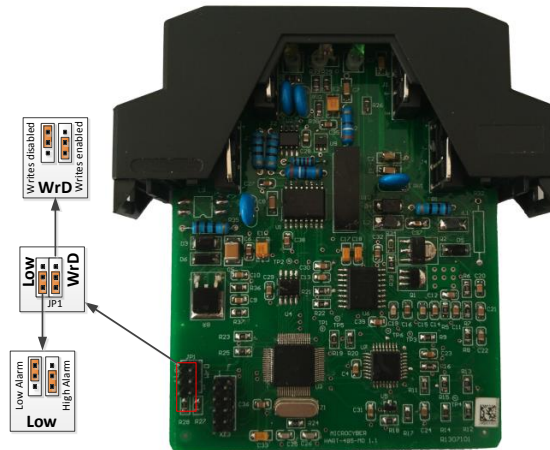


Figure 3 G0310 MODBUS to HART gateway jumper

- **Failure Warning Jumper Setting**

G0310 MODBUS to HART Gateway has self-diagnostic function. Once failure is found, intelligent instrument will output warning current automatically. Warning current mode is decided by failure warning current jumper on the left of the board. When there's no insertion or insertion of two points underside, it's high-level warning (warning current $\geq 21.75\text{mA}$); When it's the insertion of two points upside, it's low-level warning (warning current $\leq 3.7\text{mA}$).

- **Configuration Protection Jumper Setting**

G0310 MODBUS to HART Gateway provides jumper setting of device configuration protection or not, that is the configuration protection setting jumper described above, as shown on figure 3. When it's the insertion of two points upside, it's configuration protection. At this moment no change of device configuration is allowed. It is allowed when there's no insertion or insertion of two points underside.

- **Saturation fixed output (manufacturer setting, no configuration)**

When HART intelligent instrument is running, it will compare PV and range upper and lower limiting value constantly. When PV exceeds the limit, instrument will output fixed current. When PV is higher than upper limit, it output 20.8mA; When PV is lower than upper limit, it output 3.8mA.

2.3 Internal load resistance

Terminal 13 and 14 connects 250Ω internal load resistance, which has no connection with internal circuit. User can use internal load resistance to replace resistance in figure 3. Then HART Modem can connect on terminal 13 and 14.

Section 3 Working Principle

G0310 MODBUS to HART gateway connection diagram is shown asfollowing:

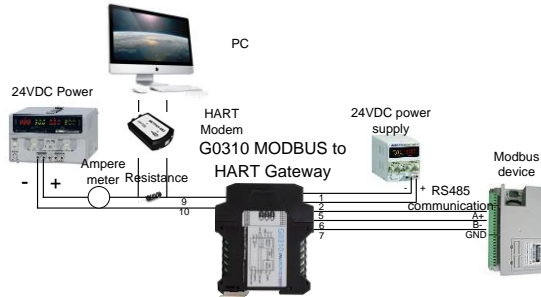


Figure 4 G0310 MODBUS to HART gateway connection diagram

G0310 MODBUS to HART Gateway supports 4 dynamic variables, 6 device variables. Via MODBUS register, the data selected by MODBUS device is configured to device variables of G0310 MODBUS to HART Gateway, and then, it enters the mapping from device variable to dynamic variable, as the device output, supporting 4~20mA analog signal output. G0310 MODBUS to HART Gateway functional block diagram is shown as on figure 5:

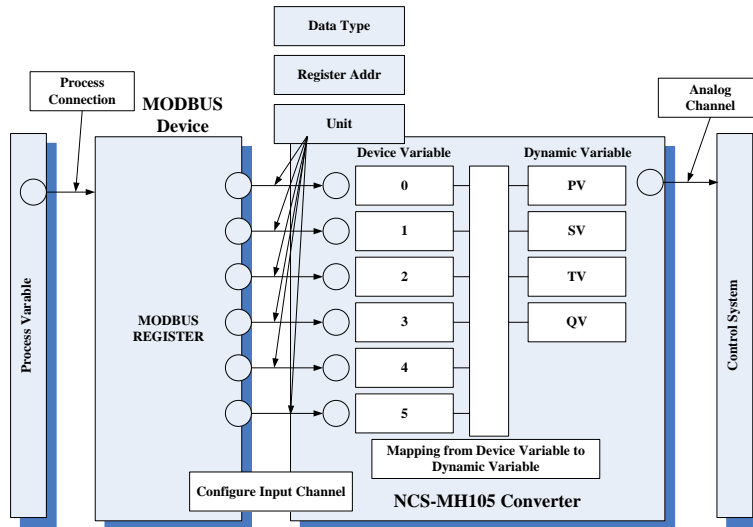


Figure 5 G0310 MODBUS to HART Gateway functional block diagram

Section 4 Gateway Configuration

G0310 MODBUS to HART support standard HART device connection: point to point and multipoint connection. User can use Microcyber HartMPT configuration.

When G0310 MODBUS to HARTgateway is online on HartMPT, mouse left-click online devices, then tabcontrol will show related devices. Click “Modbus to HART Setting”, and for the first time, it will take about 1 min to read device information and then it will show gateway configuration function, as shown on figure 6. .

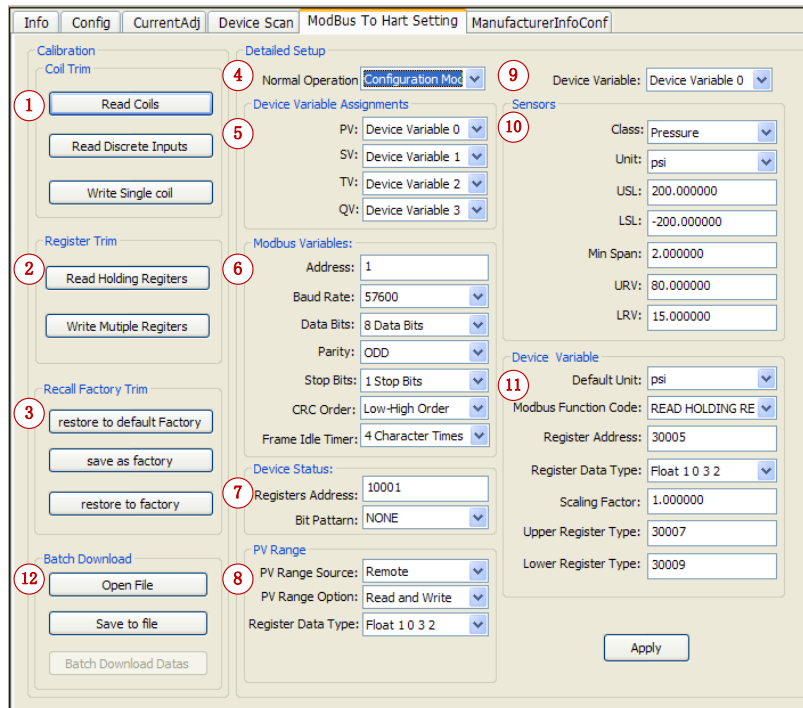


Figure 6 Gateway Configuration

4.1 Mode Selection

1. Find “detailed setup”->“normal operation”, as shown on figure 6, part 4. There are two operation modes, one is “configuration mode”, and the other is “normal operation”.
2. “Configuration mode” can configurate all options, but “normal operation” can only configurate “restore to factory”.
3. In initial configuration, it should be “configuration mode”. When configuration is finished, user need to change it to “normal operation”.

4.2 Device Variable Assignments

Dynamic variable assignment is to set mapping relation of device variable and dynamic variable. There are 6 device variables, which can be mapped to 4 dynamic variables according to users’ requirement.

For example: map PV to Device variable 4.

1. Choose drop-down box of PV in “Device Variable Assignments”, as shown in Figure 6 part 5;
2. Then choose the variable no. that needs modifying;
3. Click”apply” button and save it.

4.3 Modbus Variables

Modbus communication parameter should be configurated by specific communication parameter.

4.3.1 Address

1. Find “ModbusVariables”->“Address”, as shown in figure6, part 6, address range is 1~255;
2. Input modified value, click”apply” button and save it.

4.3.2 Baud Rate

1. Choose “ModbusVariables”->“Baud Rate”, as shown in figure 6, part6, choose baud rate value and click Set and Send button.it supports: 1200, 2400, 4800, 9600, 19200, 35700, 38400, 57600.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.3.3 Data Bits

1. Choose drop-down box of “ModbusVariables”->“Data Bits”, as shown in figure 6, part6, choose supported data bits, 7 or 8.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.3.4 Parity

1. Choose drop-down box of “ModbusVariables”->“Parity”, as shown in figure 6, part6, mode supported : Odd parity check, even parity check and no check;
2. Then choose the value that needs modifying. Click ”apply” button and save it.

4.3.5 Stop Bits

1. Choose drop-down box of “ModbusVariables”->“Stop bits”, as shown in figure 6, part6, stop bits supported : 1 stop bits and 2 stop bits.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.3.6 CRC Order

1. Choose drop-down box of “ModbusVariables”->“CRC order”, as shown in figure 6, part6, stop bits supported : Low-high and High-low.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.3.7 Frame Idle Timer

1. Choose drop-down box of “ModbusVariables”->“4.3.7 Frame Idle Timer”, as shown in figure 6, part6, interval time range is: 4~10.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.4 Device Status

4.4.1 Register Status

1. Find “device status”->“register address” input box, as shown in Figure 6, part7, address range is 1~65536.
2. Input modified value, click ”apply” button and save it

4.4.2 Bit Pattern

1. Choose drop-down box of “device status”->“Bit Pattern”, as shown in Figure 6, part7. Bit range is 0~16. 0 means no device state feedback.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.5 PV Range

4.5.1 PV Range Source

“PV Range Source” indicates if it’s from local (used gateway configuration).

1. Choose drop-down box of “PV range”->“PV range source”, as shown in figure 6, part8, including local and long-distance.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.5.2 Range Option

If “PV Range Source” is from MODBUS device, “PV range option” indicates if range supports write operation, only valid under long-distance.

1. Choose drop-down box of “PV range”->“PV range option”, as shown in figure 6, part8, including read only and read-write.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.5.3 Register Data Type

Choose drop-down box of “PV range”->“Register Data Type”, including read only and read-write, only valid under long-distance.

1. Choose drop-down box of “PV range”->“Register Data Type”, as shown in figure 6, part8, including read only and read-write.
2. Then choose the value that needs modifying. Click”apply” button and save it.

4.6 Device Variable

User can set related parameters of device variables, including sensor and corresponding device variables parameter. In default there are 6, namely “device variables: 0”~“device variables: 5”. It is device variables: 0 in default under system initialization, as shown in figure 6, part 9. When device variables change in choice box, system will refresh corresponding “sensor” and “device variable” parameter. After the modification, system will reminder to save data or not if user switch to other device variables without saving. Click “yes” to save it and click “no” means the contrary.

4.6.1 Sensor

1. Choose drop-down box of “Sensor”, as shown in figure 6, part 10.
2. Choose the value that needs modifying, including “class”、“unit”、“USL”、“LSL”、“Min span”、“URV” and “LRV”.
3. “USL” should be bigger than “LSL”, “URV” and “LRV” should be within “URV” and “LRV”; If the device variable is not used, set “class” as “NONE”.
4. Then choose the value that needs modifying. Click “apply” button and save it.

4.6.2 Device Variable

1. Choose drop-down box of “Device Variable”, as shown in figure 6, part 11.
2. Choose the value that needs modifying, including “Default Unit”、“Modbus Function Code”、“Register Address”、“Register Data Type”、“Scaling Factor”、“Upper Register Type” and “Lower Register Type”.
3. “Upper Register Type” and “Lower Register Type” are only valid when PV range source is long-source.
4. Then choose the value that needs modifying. Click “apply” button and save it.

Section 5 Maintenance

- Simple Maintenance

| No. | Phenomena | Reason | Solution |
|-----|--|---|--|
| 1 | Current output is 0 | a. Power failure b. Wire open circuit | a. Repair the power b. Check the wire |
| 2 | Output current beyond limit | Failure between MODBUS device and circuit | Check MODBUS communication |
| 3 | The current is stable at 4mA. | Device in multi-point mode | Modify sub PC address in single PC mode |
| 4 | No connection. | a. Connection failure b. Multi-point mode | a. Check loop wiring b. Check network |
| 5 | 485Power supply 24V Power light off | a. Power failure b. Wire open circuit c. internal failure | a. Repair the power b. Check the wire c. Contact technical support |
| 6 | HART communication light off | a. No HART Communication b. Power failure c. Internal failure | a. Check HART masterdevice and HART Modem b. Check power sourceand connection c. Contact technical support |
| 7 | 485 communication light off | a. Slave device no connection b. Slave device failure c. Internal failure | a. Connect slave device correctly b. Check slave device and connection c. Contact technical support |

- Daily maintenance is only for device cleansing.
- Failure maintenance: Please return to factory if there is failure.

Section 6 Technical Specification

6.1 Basic parameter

| | |
|--------------------|--|
| Measurement Object | Modbus RTU slave device |
| Power | 12~42VDC |
| Bus Protocol | 2-wire, 4~20mA+HART |
| Load resistance | 0~1500Ω (4~20mA) 230~1100Ω (HART communication) |
| Isolation Voltage | Modbus and HART bus interface, 500VAC |
| Temperature Range | -40℃~85℃ |
| Humidity Range | 5~95%RH |
| Start Time | ≤5s |
| Refresh Time | 0.2s |
| Damping adjustment | Time constant 0~32s |

6.2 Performance Index

| | |
|------------------|---|
| Protection Level | IP20 |
| EMC | GB/T 18268.1-2010 GB/T 18268.23-2010 |

6.3 Physical Performance

| | |
|--------------------|--|
| Weight | 0.2kg |
| Structure Material | Housing: Polyamide PA6.6 Coating: Polyester epoxy resin |

6.4 Default Communication Parameter

| | |
|-----------------------|---------------------|
| Slave station address | 1 |
| Baud rate | 9600 |
| Data bits | 8 |
| Stop bits | 1 |
| Check out | EVEN |
| CRCcheck out | Low byte in advance |

6.5 Supporting Modbus Function Code

| | |
|---|------------------|
| 1 | read loop status |
|---|------------------|

| | |
|----|--------------------------------|
| 2 | read discrete input status |
| 3 | read keeping register value |
| 4 | read input register value |
| 5 | write loop |
| 16 | write multiple register values |

Appendix Model Selection

| | | | |
|---------------------|----|-------------------------------------|----------------------|
| GW-MODB-HART | | G0310 Modbus to HART Gateway | |
| | | Code | Hardware Interface |
| | | R4 | RS485 |
| | | Code | Software Interface |
| | | M | Modbus RTU |
| GW-MODB-HART | R4 | M | —— Selection Example |

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