# Common Resources

Source of common resources used across the Modbus Ethernet Gateways documentation

- Tables
- Commands
- Procedures
- Introduction

# Tables

## Specification

| Redisage PN | | G01 | G02 | G03 | G14 | G15 | G16 |
|---|---|---|---|---|---|---|---|
| Ports | RS232 | 2x | - | - | 4x | 2x | - |
| | RS485 | - | 1x | - | - | 2x | 4x |
| | RS232/RS485 | - | - | 2x | - | - | - |
| Microcontroller | | ESP32 | | | STM32F4 | | |
| WiFi | | N/A | | | | | |
| Power | Voltage | 12-30 VDC | | | | | |
| | Power | < 1 W | | | | | |
| Frame ground connection | | yes | | | | | |
| Baud rate | | up to 115200 bps | | | | | |
| LED indicators | | communication Tx, Rx and power | | | | | |
| RS485 termination | | 120 ohm manually enabled | | | | | |
| Connector | RS232/RS485 | 8-pin terminal block max. 2.5 mm$^2$ wire | | | | | |
| | Power | 3-pin terminal block max. 2.5 mm$^2$ wire | | | | | |
| | Ethernet | RJ45 | | | | | |

| Redisage PN | | G01 | G02 | G03 | G14 | G15 | G16 |
|---|---|---|---|---|---|---|---|
| Transmission distance | RS485 | max. 1,200 m at 9.6 kbps; max. 400 m at 115.2 kbps (Belden 9841 2P twisted-pair cable, if different cables are used, the transmission distance may change) | | | | | |
| | RS232 | max. 15 m at 115.2 kbps | | | | | |
| Mounting and enclosure | | DIN rail, plastic PA - UL 94 V0, black/green | | | | | |
| Temperatures | | -40°C to +75°C operating and storage | | | | | |
| Humidity | | 10 - 90% RH, non-condensing | | | | | |
| ESD protection | | ±4 kV contact discharge / ±8 kV air discharge | | | | | |
| Certification | | CE, RoHS | | | | | |

# Pin assignments



# Configuration by the Web Page

# Ports page

| Item | | Description |
|---|---|---|
| Internal Modbus Address | | Internal Modbus Address is qualified by the Gateway/Router as a request for internal resources. The Internal Modbus Address has a higher priority than the Gateway Slave Address. |
| Idle Time [s] | | Determine a time thread waits for the TCP connection. If time expired, the connection and thread are closed. **Used only in Gateway Mode.** |
| UART Mode | Gateway | Define the port's role in the system. In the Gateway Mode the port is used to communicate with Modbus Slave. |
| | Router | Define the port's role in the system. In the Router Mode the port is used to communicate with Modbus Master. Note the Routing Configuration section below if the Router Mode is chosen. |
| | Disabled | Disable the port. |
| UART Protocol | | Determine a protocol used for a communication. |
| Gateway Slaves | | Addresses of Modbus Slave Devices connected to Gateway UART ports. Multiple addresses can be written in one field, e.g. *9;11;14-17;80*. This field is available only in the Gateway Mode. Use * to select all not assigned addresses. |
| Slaves Response Timeout [ms] | | Specify how long the device will wait for response from Modbus Slave. |
| Baud Rate | | Determine the port's transmission speed over the data channel. |
| Data Bits | | Determine the number of data bits in the port's message frame. |
| Parity | | Enable/disable the parity check in the port's message frame. |
| Stop Bits | | Determine the number of stop bits in the port's message frame. |
| Termination | | Enable/disable termination on RS line. |

| Item | Description |
| --- | --- |
| Routing Slaves | Addresses of Modbus Slaves connected to Modbus Router. Multiple addresses can be written in one field, e.g. 9;11;14-17;80. Use * to select all not assigned addresses. |
| Slaves Response Timeout [ms] | Specify how long the device will wait for response from Modbus Slave. |
| IP/Hostname | Determine IP address or Hostname of Modbus Slave. |
| TCP Port | Determine TCP port of Modbus Slave. |

# Network page

| Item | Description |
| --- | --- |
| Hostname | Label that is assigned to the device. |
| Configuration Method | Enable/disable the DHCP server. If the DHCP server is disabled, the IP address of the device has to be set manually. |
| IP Address | IP address of the device. |
| Netmask | Netmask associated with the IP address. |
| Gateway | Gateway address currently used by the device. |
| DNS Address | Domain Name System used by the device. |
| MAC Settings | Allow setting the default MAC address or typing it manually. |
| MAC Address | Allow changing the physical address of the device. |
| HTTP Port | Determine the port of the control panel. |
| Telnet Port | Allow connection with the device via Telnet. |
| Modbus TCP Listening Port | Used as an entry point for new Modbus TCP connections. |

# Device page

| Item | Description |
| --- | --- |
| Firmware Update | Update firmware. |
| Factory Reset | Restore default ports settings and default network configuration. |
| Reboot | Reboot the device. |
| About | Basic information about the device. |

# Configuration by the Serial Console

## List of all commands

| Command | Description |
| --- | --- |
| help | Print the help. |
| conn | Print active TCP connections. |
| net_stat | Print lwIP statistics. |
| eth_mac | Print or change MAC address. |
| ipconfig | Print or change the network configuration. |
| http_port | Print or change default http port. |
| telnet_port | Print or change default telnet port. |
| modbus_tcp_port | Print or change modbus port. |
| ping | Check internet connection with the desired host. |
| restart | Restart the system. |
| user | Print or change user configuration. |
| sys_heap_usage | Print current heap usage. |
| modbus | Print or changes modbus settings. |
| modbus_ports | Print or changes modbus ports settings. |
| modbus_routing | Print or change modbus routing settings. |
| exit | Exit console. |

## List of commands in the service mode

| Command | Description |
| --- | --- |
| help | Print the help. |
| credits | Print current credits value for this device. |
| dev_ident | Print the device identification value. |
| restart | Restart the system. |
| serial_num | Print the serial number of this device. |
| version | Display the bootloader version. |
| xmodem | Download image to the internal flash using xmodem. |
| defaults | Reset application variables to defaults. |
| ipconfig | Print or change the network configuration. |

| Command | Description |
| --- | --- |
| flash_read | Read bytes from flash memory. |
| md | Read bytes from memory address. |

> In the service mode, the "ipconfig" command can only show a last static IP address.

# Commands

## Modbus ports configuration commands

- **modbus**
  - **modbus help**
    Print command help.

  - **modbus int_addr VALUE**
    Set internal Modbus address.

    Example:
    modbus int_addr 5

  - **modbus idlet VALUE**
    Show or set the idle TIME (in seconds) of the TCP connection after which the TCP connection is terminated by the converter and the TCP socket is released.

    Example:
    modbus idlet 720

    If a subcommand that normally sets a value is not given an argument, it will print the current value.

    Example:
    modbus idlet
    Set idle time is 5000

- **modbus_ports**
  - **modbus_ports help**
    Print command help, does not require com_number.

  - **modbus_ports PORT_NUMBER add_slaves [SLAVE_ADDR ;/- SLAVE_ADDR, *]**
    Set all addresses of slaves connected to com_port. A star in value means fill rest free slaves. It means all slaves that are not set to other ports will be set to this one.

    Example:
    modbus_ports 1 addslaves 124

    Example:
    modbus_ports 1 addslaves 12-124

    Example:

modbus_ports 1 addslaves 12;14;18

Example:
modbus_ports 1 addslaves 12;14-17;150-200

Example:
modbus_ports 1 addslaves 12;14-17;150-200, *

- **modbus_ports PORT_NUMBER show_slaves**
  Show addresses of slaves connected to com_port.

  Example:
  modbus_ports 1 showslaves

- **modbus_ports PORT_NUMBER mode [ascii/rtu]**
  Set Modbus port mode to ASCII or RTU.

  Example:
  modbus_ports 2 mode ascii

- **modbus_ports PORT_NUMBER baud [RATE]**
  Set the baud rate to RATE. For a list of acceptable baud rates, please refer to the manual.

  Example:
  modbus_ports 1 baud 9600

- **modbus_ports PORT_NUMBER bits [CPS]**
  Set bit count to C, parity to P, and stop bits to S. Valid values are:
  C: 7, 8 or 9
  P: N, E or O (N- none, E- even, O- odd)
  S: 1 or 2

  Example:
  modbus_ports 1 bits 8N1

  Example:
  modbus_ports 2 bits 7O1

- **modbus_ports PORT_NUMBER state [GATEWAY/ROUTER/DISABLE]**
  Enable or disable uart functionality.

  Example:
  modbus_ports 1 state GATEWAY

  Example:
  modbus_ports 2 state DISABLE

- **modbus_ports PORT_NUMBER termination [on/off]**
  Enable or disable termination on RS485 port.

  Example:
  modbus_ports 1 termination on

- **modbus_ports PORT_NUMBER slave_response_timeout TIMEOUT**
  Set response timeout (serial slave) in ms. When this timeout expires, delayed frames are dropped.

  Example:
  modbus_ports 1 slave_response_timeout 2000

  If a subcommand that normally sets a value is not given an argument, it will print the current value.

  Example:
  modbus_ports 2 baud
  Set baud rate is 115200

> PORT_NUMBER is a number of ports in modbus gateway and it is counted from 0.

- **modbus_routing**
  - **modbus_routing help**
    Print routing's help.

  - **modbus_routing show**
    Display all active routing table in system.
    [LP]: [SLAVES NUMBERS] [IP/HOSTNAME] [PORT] [TIMEOUT]

  - **modbus_routing add SLAVE_ADDR HOSTNAME PORT TIMEOUT**
    SLAVE_ADDR with HOSTNAME PORT is used by uarts working in Modbus router mode. TIMEOUT (in ms) is used to close the connection if a slave is not responding. The maximum records is 8. One record for one address/ip.

    Example:
    modbus_routing add 18 192.168.0.10 502 2000

Example:
modbus_routing add 18;25 192.168.0.10 502 2000

Example:
modbus_routing add 18-25 192.168.0.10 502 2000

Example:
modbus_routing add 18-25;* 192.168.0.10 502 2000

Example:
modbus_routing add 18-25 modbus.local 502 2000

- **modbus_routing remove [HOSTNAME_NUMBER/all]**
  Remove Modbus Routing Table record. HOSTNAME_NUMBER is line number from /show/ command.

  Example:
  modbus_routing remove 2

  Example:
  modbus_routing remove all

## Network settings

The following commands might be helpful to change network settings according to target LAN parameters,

- **ipconfig**
  - **ipconfig addr ADDRESS**
    Set IP address to ADDRESS.

    Example:
    ipconfig addr 192.168.0.10

  - **ipconfig mask NETMASK**
    Set subnet mask to NETMASK (in dot-decimal format).

    Example:
    ipconfig mask 255.255.255.0

  - **ipconfig mask BIT_COUNT**
    Set subnet mask to BIT_COUNT bits.

    Example:
    ipconfig mask 24

- **ipconfig gateway GATEWAY_IP**
  Set network gateway to GATEWAY_IP.

  Example:
  ipconfig gateway 192.168.0.1

- **ipconfig dhcp [enable/disable]**
  Enable or disable DHCP client.

  Example:
  ipconfig dhcp enable

- **ipconfig dns1 ADDRESS**
  Set primary DNS to ADDRESS, disable getting DNS from DHCP if enabled.

  Example:
  ipconfig dns1 192.168.100.1

- **ipconfig dns2 ADDRESS**
  Set secondary DNS to ADDRESS, disable getting DNS from DHCP if enabled.

  Example:
  ipconfig dns2 1.1.1.1

- **eth_mac**
  - **eth_mac help**
    Print the help message.

  - **eth_mac default**
    Set device's MAC address to factory-default one.

  - **eth_mac set MAC_ADDR**
    Set device's MAC address to MAC_ADDR. Accepts both dash and colon-separated formats.

    Example:
    eth_mac set 01-02-03-04-05-06

    Example:
    eth_mac set 01:02:03:04:05:06

- **http_port**
  - **http_port help**
    Print the help message.

  - **http_port PORT_NUMBER**
    Set http port to PORT_NUMBER. A PORT_NUMBER value must be in range: 1-65535.

Example:
http_port 80

- ○ **http_port status**
  Print current http port.

  Example:
  http_port status
  A current http port is 80

- **telnet_port**
  - ○ **telnet_port help**
    Print the help message.

  - ○ **telnet_port PORT_NUMBER**
    Set Telnet port to PORT_NUMBER. A PORT_NUMBER value must be in range: 1-65535.

    Example:
    telnet_port 23

  - ○ **telnet_port status**
    Print current Telnet port.

    Example:
    telnet_port status
    A current telnet port is 23

- **modbus_tcp_port**
  - ○ **modbus_tcp_port help**
    Print the help message.

  - ○ **modbus_tcp_port PORT_NUMBER**
    Set http port to PORT_NUMBER. A PORT_NUMBER value must be in range: 1-65535.

    Example:
    modbus_tcp_port 502

  - ○ **modbus_tcp_port status**
    Print current Modbus port.

    Example:
    modbus_tcp_port status
    A current modbus port is 502

# Changing username or password

To change username or password, use user command. Available commands:

- **user help**
  Print the help message.

- **user mod_name USER_NAME NEW_NAME**
  Change the user name to NEW_NAME. It fails if the name is used by another user.

  Example:
  user mod_name admin NEW_NAME

- **user passwd USER_NAME**
  Change USER_NAME's password.

  Example:
  user passwd admin
  ****** <- here is entered password, but '*' appears instead

  Note: Everyone can change the password for themselves.

# Procedures

## Configuration by the Serial Console

### Procedure to enter serial console mode on G01 - G03

- Turn off the power of the device.
- Connect Ethernet converter to the dedicated USB/UART converter via the microUSB port.
- Connect the USB/UART converter to the PC.
- Open the serial console (default baud rate is 115200 bps).
- Press and hold the S1 button.
- Turn on the power.
- Wait until the ST indicator (orange LED) lights up (it should light up after red light - service mode).
- Release the S1 button.
- Login using user's personal credentials or default login details.
- If the process is successful, configuration command can be typed into the terminal.

### Procedure to enter serial console mode on G14 - G16

- Install STM32 Virtual COM Port Driver.
- Turn off the power of the device.
- Connect Ethernet converter directly to the PC (the dedicated USB/UART converter is not obligatory).
- Open the serial console (default baud rate is 115200 bps).
- Press and hold the S1 button.
- Turn on the power.
- Wait until the ST indicator (yellow LED) lights up.
- Release the S1 button.
- Login using user's personal credentials or default login details.
- If the process is successful, configuration command can be typed into the terminal.

## Service mode

### Procedure to enter service mode for G01 - G03 gateways

- Turn off the power of the device.
- Connect Ethernet converter to the dedicated USB/UART converter via the microUSB port.
- Connect the USB/UART converter to the PC.
- Open the serial console (default baud rate is 115200 bps).

- Press and hold the S1 button.
- Turn on the power.
- Wait until the ST indicator (<span style="color:red">red</span> LED) lights up.
- Release the S1 button.
- If the process is successful, service commands can be typed into the terminal.

# Procedure to enter service mode for G14 - G16 gateways

- Install STM32 Virtual COM Port Driver (if it was not done before).
- Turn off the power of the device.
- Connect Ethernet converter directly to the PC (the dedicated USB/UART converter is not obligatory).
- Open the serial console (default baud rate is 115200 bps).
- Press and hold the S1 button.
- Turn on the power.
- Wait until the ST indicator (<span style="color:red">red</span> LED) lights up.
- Release the S1 button.
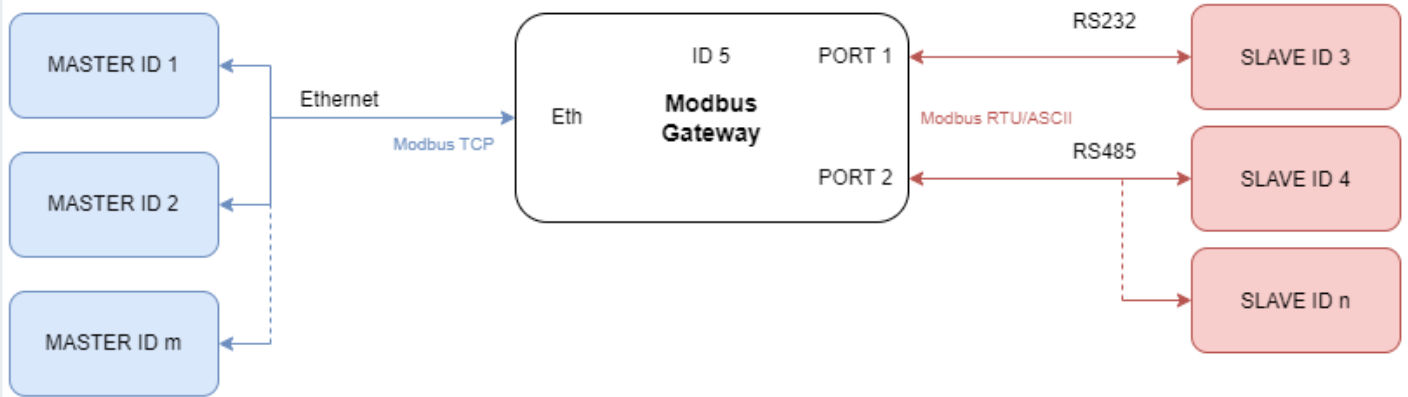- If the process is successful, service commands can be typed into the terminal.

# Introduction

## Modbus Ethernet Gateways (G01 - G03 & G14 - G16)

Modbus gateways allow data transmission between LAN hosts and serial devices by converting Modbus protocols (Modbus TCP and Modbus RTU/ASCII). They are intended to be used in industrial networks especially in the field of Industry 4.0 but not only. Apart from extending the capabilities of industrial devices, they can be also adapted up to user's requirements and needs.

Transmission is carried out by two modes: Gateway and Router. In the Gateway mode the port is used to communicate with Slave devices, but in the Router mode with Master devices. It is also possible to set up different modes on every port. Block diagrams below describe how each of these modes works.

# Gateway mode

MASTER ID 1

MASTER ID 2

MASTER ID m

Ethernet
Modbus TCP

**Modbus Gateway**
Eth    ID 5    PORT 1
PORT 2

RS232
Modbus RTU//ASCII
RS485

SLAVE ID 3

SLAVE ID 4

SLAVE ID n

# Router mode

MASTER ID 3

MASTER ID 4

MASTER ID n

RS232
Modbus RTU//ASCII
RS485

PORT 1    ID 5
**Modbus Gateway**
PORT 2    Eth

Ethernet
Modbus TCP

SLAVE ID 1

SLAVE ID 2

SLAVE ID m