

# Common Resources

Source of common resources used across the Modbus Ethernet Gateways documentation

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# 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 <sup>2</sup> wire					
	Power	3-pin terminal block max. 2.5 mm <sup>2</sup> 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, EMC, LVD					
Norms		61000-6-2 - Immunity standard for industrial environments 61000-6-4 - Emission standard for industrial environments					

## Pin assignments

<p><b>G01</b></p> <p><b>G01</b> Modbus Gateway 2xRS232</p> <p>Power: --- 12-30V/DC &lt;1W Temperature: -40°C +75°C Port: 2xRS232 ETHERNET Ethernet: 10/100BaseT MAC: 1a2b3c4d5e6f REV1 MADE IN EU</p> <table border="1"> <tr> <td>4 Vin</td> <td>8 Tx2</td> <td>NC</td> <td>Ethernet RJ45</td> </tr> <tr> <td>3 Gnd</td> <td>7 Rx2</td> <td></td> <td></td> </tr> <tr> <td>2 Din</td> <td>6 Tx1</td> <td></td> <td></td> </tr> <tr> <td>1 FG</td> <td>5 Rx1</td> <td></td> <td></td> </tr> </table> <p>CE RoHS COMPLIANT Redisage ELECTRONICS</p>	4 Vin	8 Tx2	NC	Ethernet RJ45	3 Gnd	7 Rx2			2 Din	6 Tx1			1 FG	5 Rx1			<p><b>G02</b></p> <p><b>G02</b> Modbus Gateway 1xRS485</p> <p>Power: --- 12-30V/DC &lt;1W Temperature: -40°C +75°C Port: 1xRS485 ETHERNET Ethernet: 10/100BaseT MAC: 1a2b3c4d5e6f REV1 MADE IN EU</p> <table border="1"> <tr> <td>4 Vin</td> <td>12 NC</td> <td>Ethernet RJ45</td> </tr> <tr> <td>3 Gnd</td> <td>11 NC</td> <td></td> </tr> <tr> <td>2 Din</td> <td>10 A1</td> <td></td> </tr> <tr> <td>1 FG</td> <td>9 B1</td> <td></td> </tr> </table> <p>A1 B1</p> <p>SC - Software Control</p> <p>CE RoHS COMPLIANT Redisage ELECTRONICS</p>	4 Vin	12 NC	Ethernet RJ45	3 Gnd	11 NC		2 Din	10 A1		1 FG	9 B1		<p><b>G03</b></p> <p><b>G03</b> Modbus Gateway 2xRS232/RS485</p> <p>Power: --- 12-30V/DC &lt;1W Temperature: -40°C +75°C Port: 2xRS232/RS485 ETH Ethernet: 10/100BaseT MAC: 1a2b3c4d5e6f REV1 MADE IN EU</p> <table border="1"> <tr> <td>4 Vin</td> <td>8 Tx2</td> <td>12 A2</td> <td>Ethernet RJ45</td> </tr> <tr> <td>3 Gnd</td> <td>7 Rx2</td> <td>11 B2</td> <td></td> </tr> <tr> <td>2 Din</td> <td>6 Tx1</td> <td>10 A1</td> <td></td> </tr> <tr> <td>1 FG</td> <td>5 Rx1</td> <td>9 B1</td> <td></td> </tr> </table> <p>A1 B1 A2 B2</p> <p>SC - Software Control</p> <p>CE RoHS COMPLIANT Redisage ELECTRONICS</p>	4 Vin	8 Tx2	12 A2	Ethernet RJ45	3 Gnd	7 Rx2	11 B2		2 Din	6 Tx1	10 A1		1 FG	5 Rx1	9 B1					
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# 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. <b>Used only in Gateway Mode.</b>
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.

Command	Description
xmodem	Download image to the internal flash using xmodem.
defaults	Reset application variables to defaults.
ipconfig	Print or change the network configuration.

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 (**red** 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

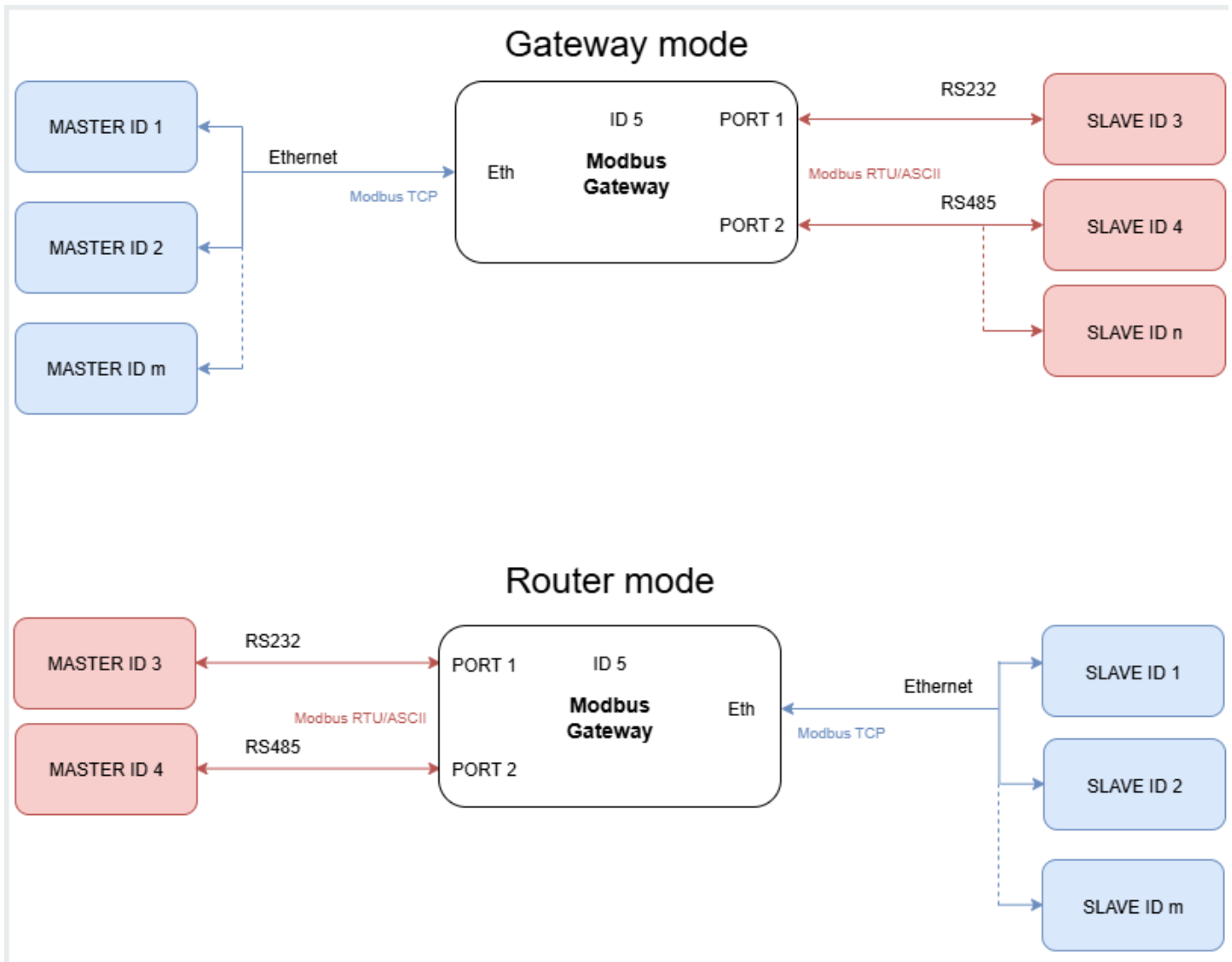
- Install STM32 Virtual COM Port Driver (if it was not done before).
- Turn off the power of the device.
- Connect Ethernet converter directly to the PC (the dedicated USB/UART converter is not obligatory).
- Open the serial console (default baud rate is 115200 bps).
- Press and hold the S1 button.
- Turn on the power.
- Wait until the ST indicator (**red** 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.



The device has max 20 sockets open in Gateway mode and max 8 in Router mode. It is possible to increase this value at client's request.