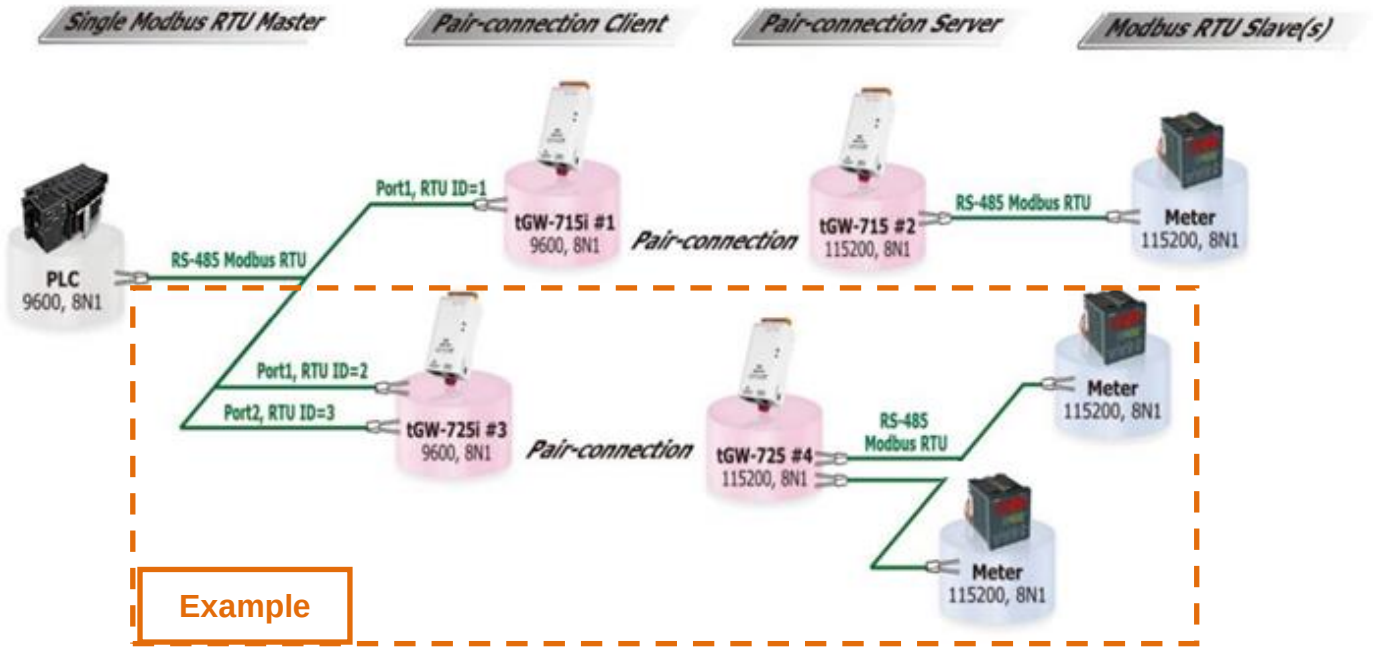
Classification	☐ tDS ☑ tGW ☐ PETL/tET/tPET ☐ DS/PDS/PPDS ☐ tM-752N ☐ I/O Card ☐ VXC Card ☐ VxComm ☐ Other				
Author	Mike Chou	Date	2020-06-22	NO.	FAQ054

Q: How do I access multiple Modbus RTU Slave devices from a single Modbus RTU Master device?



A:

By using pair-connection mode, the Modbus RTU master is then able to access a remote Modbus RTU slave device via the Ethernet. Currently, the pair-connection function only supports one-to-one connections. Consequently, multiple pair-connections are required in order to access multiple slave devices, and all the tGW-700 modules on the master side must be connected to the same RS-485 network as the master device.

The Virtual ID Range on the Modbus Settings for the tGW-700 can be used to access specific Modbus RTU slave devices within limit range. Any messages that have the wrong ID will be ignored by that tGW-700 module. For example, in the above figure, tGW-715i module #1 processes messages that contain ID 1, while tGW-725i module #3 processes messages that contain ID 2 and 3, and so on. Consequently, the remote slave device will only receive messages that contain its ID. This reduces Ethernet network traffic, and reduces the loading on the slave device.

The following table shows both the Pair-connection settings and the Virtual ID Range mapping configuration for tGW-700 modules #1 to #4:

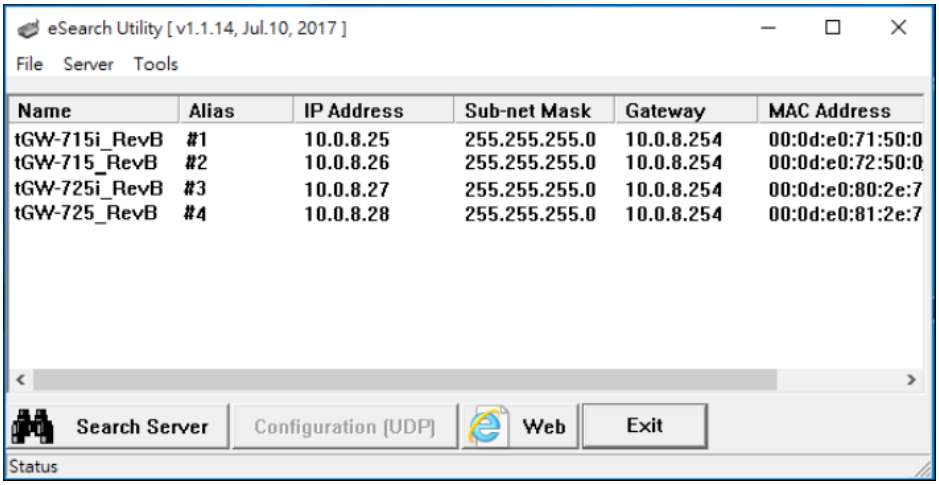
Module	COM Port	Port Settings		Modbus Settings	Pair-Connection Settings			
		Baud Rate	Data Format	Virtual ID Range	Application Mode	Network Protocol	Remote Server IP	Remote TCP Port
tGW-715i #1	Port1	Baud Rate and Data Format for the Master device e.g., 9600, 8N1		1 to 1	Client	TCP	IP address of tGW-715 #2	502
tGW-725i #3	Port1			2 to 2	Client	TCP	IP address of tGW-725 #4	502
	Port2			3 to 3				503
tGW-715 #2	Port1	Baud Rate and Data Format for the Slave device e.g., 115200, 8N1		1 to 247	Server	-	-	-
tGW-725 #4	Port1			1 to 247	Server	-	-	-
	Port2							

Note: It is recommended that tGW-700i isolation models are used on the master side in this type of architecture to ensure stable operation of the hardware. If you are using the tGW-700 non-isolated models, please use DC power rather than PoE power.

Step 1: Confirm that both the Ethernet connection and the tGW-700 series module are functioning correctly. For detailed information regarding how to install, configure and operate your tGW-700 series module, refer to the tGW-700 Quick Start Guide:

Download the

Quick Start Guide



The following example provides a detailed description where the tGW-725i module #3 and tGW-725 module #4 that are used.

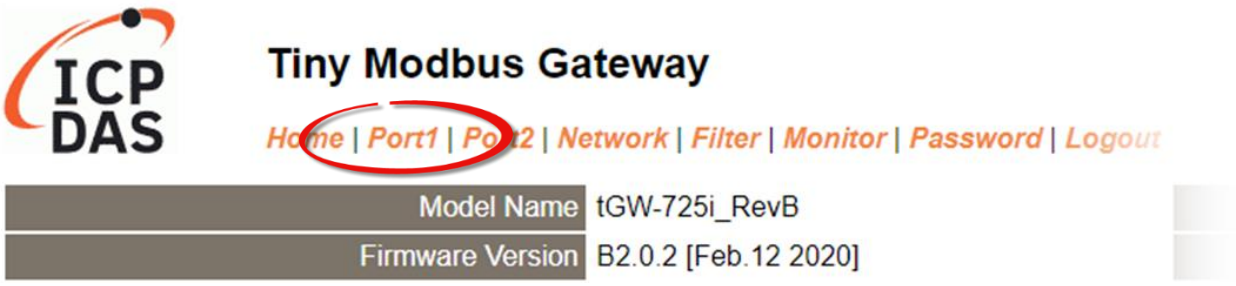
Step 2: Enter the URL for tGW-725i module #3 in the address bar of the browser to log in to the web configuration pages (use the default password "admin").

Step 3: Check that the firmware version for the module is v2.0.1 [Jan. 16, 2020] or later. Note that if your firmware version is earlier than v2.0.1 [Jan. 16, 2020], the firmware must first be updated to the latest version. For detailed information regarding the firmware update process, refer to the tGW700 firmware update documentation, which can be downloaded from:

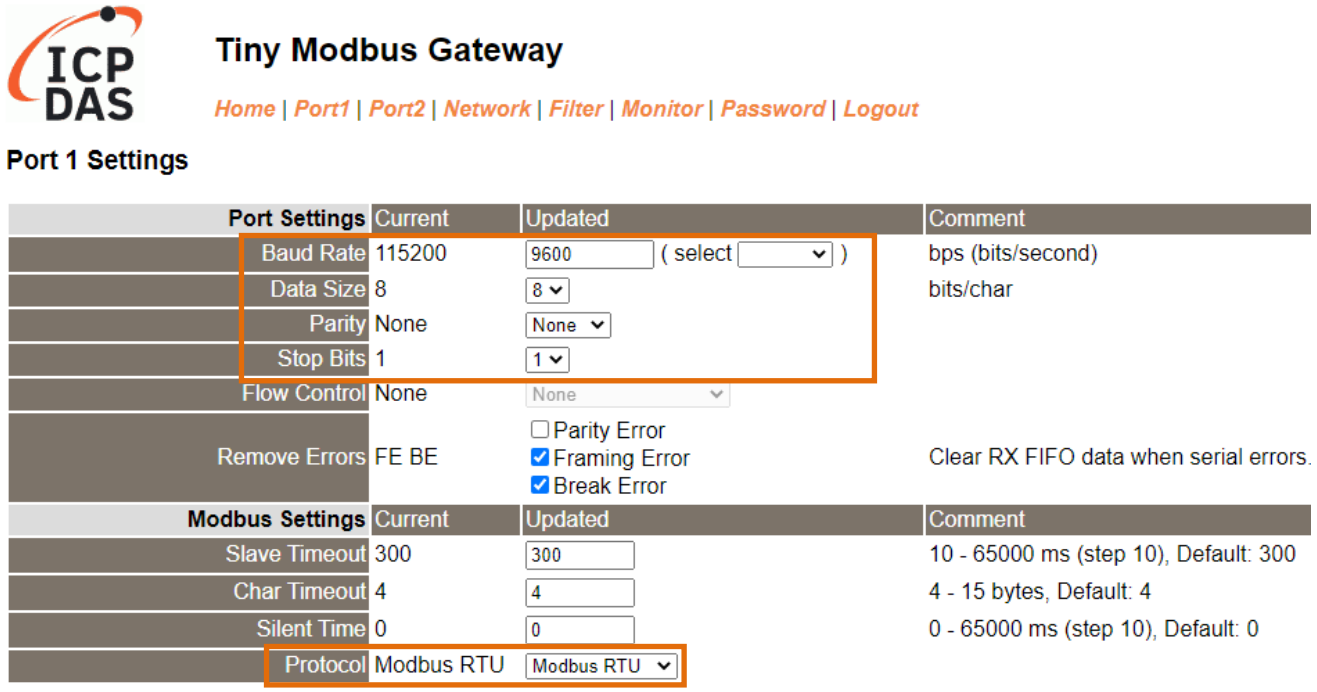
Download the tGW-700 firmware update documentation

➢ Configuring tGW-725i module #3 in Client Mode

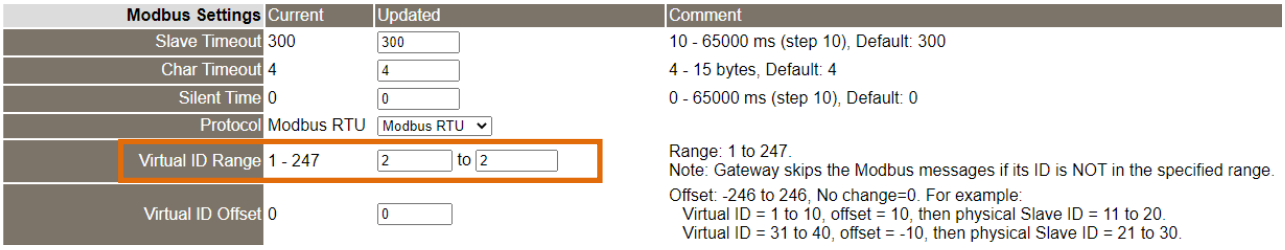
Step 4: Click the "Port1" tab to display the Port1 Settings page.



Step 5: Select the appropriate Baud Rate, Data Format and Modbus Protocol settings from the relevant drop down options depending on the model and type of module being used as the **Modbus RTU Master** device. The following is an example: Baud Rate (bps): 9600, Data Bits (bits): 8, Parity: None, Stop Bits (bits): 1 and Modbus Protocol: Modbus RTU.



Step 6: In the Modbus Settings area for Port1, enter the Virtual ID Range setting.
The following is an example: Virtual ID Range "2 to 2".



Step 7: In the Pair-connection Settings area for Port1, verify that the configuration details are same as those shown in the table below:

Field	Application Mode	Network Protocol	Remote Server IP	Remote TCP Port
Pair-connection Settings	Client	TCP	10.0.8.28	502
		Modbus Protocol, IP address and TCP port for the tGW-725 module #4		

Step 8: Amend any details as required and then click the "Submit" button to complete the configuration.

Pair-Connection Settings (Master/Slave Mode)	Current	Updated	Comment
Application Mode	Server	Client	Server=Slave, Client=Master
Network Protocol	TCP	TCP	
Remote Server IP	0.0.0.0	10 . 0 . 8 . 28	
Remote TCP Port	502	502	
		Submit	

Step 9: Click the "Port2" tab to display the Port2 Settings page.

Step 10: Select the appropriate Baud Rate, Data Format and Modbus Protocol settings from the relevant drop down options depending on the model and type of module being used as the **Modbus RTU Master** device. The following is an example: Baud Rate (bps): 9600, Data Bits (bits): 8, Parity: None, Stop Bits (bits): 1 and Modbus Protocol: Modbus RTU.

※ Refer to **Steps 4 to 5** for an illustration of how to perform **Steps 9 to 10** of the procedure described above.

Step 11: In the Modbus Settings area for Port2, enter the Virtual ID Range setting.
The following is an example: Virtual ID Range "3 to 3".

Modbus Settings	Current	Updated	Comment
Slave Timeout	300	300	10 - 65000 ms (step 10), Default: 300
Char Timeout	4	4	4 - 15 bytes, Default: 4
Silent Time	0	0	0 - 65000 ms (step 10), Default: 0
Protocol	Modbus RTU	Modbus RTU	
Virtual ID Range	1 - 247	3 to 3	Range: 1 to 247. Note: Gateway skips the Modbus messages if its ID is NOT in the specified range.
Virtual ID Offset	0	0	Offset: -246 to 246, No change=0. For example: Virtual ID = 1 to 10, offset = 10, then physical Slave ID = 11 to 20. Virtual ID = 31 to 40, offset = -10, then physical Slave ID = 21 to 30.

Step 12: In the Pair-connection settings area for Port2, verify that the configuration details are same as those shown in the table below:

Field	Application Mode	Network Protocol	Remote Server IP	Remote TCP Port
Pair-connection Settings	Client	TCP	10.0.8.28	503
		tGW-725 #4 模組的 Modbus Protocol、IP address、 TCP port。		

Step 13: Click the "Submit" button to complete the configuration.

Pair-Connection Settings (Master/Slave Mode)	Current	Updated	Comment
Application Mode	Client	Client	Server=Slave, Client=Master
Network Protocol	TCP	TCP	
Remote Server IP	0.0.0.0	10 . 0 . 8 . 28	
Remote TCP Port	503	503	
		Submit	

Step 14: Click the "Home" tab and confirm that the Pair-connection settings for Port1 and Port2 are correct.

Current port settings:

Port Settings	Port 1	Port 2
Baud Rate (bps)	9600,8N1	9600,8N1
Flow Control	None	None
Protocol	RTU	RTU
Slave Timeout (ms)	300	300
Char Timeout (bytes)	4	4
Silent Time (ms)	0	0
Read Cache (ms)	980	980
Connection Idle (Seconds)	180	180
Local TCP Port	502	503
Virtual ID Range	2-2	3-3
Virtual ID Offset	0	0
Pair-Connection Settings (Master/Slave Mode)	**Port 1**	**Port 2**
Application Mode	TCP Client	TCP Client
Remote Server IP	10.0.8.28	10.0.8.28
Remote TCP Port	502	503

➢ Configuring tGW-725 module #4 in Server Mode

Step 15: Enter the URL for tGW-725 module #4 in the address bar of the browser to log in to the web configuration pages (use the default password "admin").

Step 16: Click the "Port1" tab to display the Port1 Settings page.

Step 17: Select the appropriate Baud Rate, Data Format and Modbus Protocol settings from the relevant drop down options depending on the model and type of module being used as the **Modbus RTU Slave device**. The following is an example: Baud Rate (bps): 115200, Data Bits (bits): 8, Parity: None, Stop Bits (bits): 1 and Modbus Protocol: Modbus RTU.

Port 1 Settings

Port Settings	Current	Updated	Comment
Baud Rate	115200	115200 (select)	bps (bits/second)
Data Size	8	8	bits/char
Parity	None	None	
Stop Bits	1	1	
Flow Control	None	None	
Remove Errors	FE BE	☐ Parity Error ☑ Framing Error ☑ Break Error	Clear RX FIFO data when serial errors.
Modbus Settings	**Current**	**Updated**	**Comment**
Slave Timeout	300	300	10 - 65000 ms (step 10), Default: 300
Char Timeout	4	4	4 - 15 bytes, Default: 4
Silent Time	0	0	0 - 65000 ms (step 10), Default: 0
Protocol	Modbus RTU	Modbus RTU	

Step 18: In the Modbus Settings area for Port1, enter the Virtual ID Range setting.
The following is an example: Virtual ID Range "1 to 247". (Default setting)

Modbus Settings	Current	Updated	Comment
Slave Timeout	300	300	10 - 65000 ms (step 10), Default: 300
Char Timeout	4	4	4 - 15 bytes, Default: 4
Silent Time	0	0	0 - 65000 ms (step 10), Default: 0
Protocol	Modbus RTU	Modbus RTU	
Virtual ID Range	1 - 247	1 to 247	Range: 1 to 247. Note: Gateway skips the Modbus messages if its ID is NOT in the specified range.
Virtual ID Offset	0	0	Offset: -246 to 246, No change=0. For example: Virtual ID = 1 to 10, offset = 10, then physical Slave ID = 11 to 20. Virtual ID = 31 to 40, offset = -10, then physical Slave ID = 21 to 30.

Step 19: In the Pair-connection Settings area for Port1, select "Server" from the "Application Mode" drop down options, and click the "Submit" button to complete the configuration.

Pair-Connection Settings (Master/Slave Mode)	Current	Updated	Comment
Application Mode	Server	Server Submit	Server=Slave, Client=Master

Step 20: Click the "Port2" tab to display the Port2 Settings page

Step 21: Select the appropriate Baud Rate, Data Format and Modbus Protocol settings from the relevant drop down options depending on the model and type of module being used as the **Modbus RTU Slave** device

Step 22: In the Modbus Settings area for Port2, enter the Virtual ID Range setting.
The following is an example: Virtual ID Range "1 to 247". (Default setting)

Modbus Settings	Current	Updated	Comment
Slave Timeout	300	300	10 - 65000 ms (step 10), Default: 300
Char Timeout	4	4	4 - 15 bytes, Default: 4
Silent Time	0	0	0 - 65000 ms (step 10), Default: 0
Protocol	Modbus RTU	Modbus RTU	
Virtual ID Range	1 - 247	1 to 247	Range: 1 to 247. Note: Gateway skips the Modbus messages if its ID is NOT in the specified range.
Virtual ID Offset	0	0	Offset: -246 to 246, No change=0. For example: Virtual ID = 1 to 10, offset = 10, then physical Slave ID = 11 to 20. Virtual ID = 31 to 40, offset = -10, then physical Slave ID = 21 to 30.

Step 23: In the Pair-connection Settings area for Port2, select "Server" from the "Application Mode" drop down options, and click the "Submit" button to complete the configuration.

Pair-Connection Settings (Master/Slave Mode)	Current	Updated	Comment
Application Mode	Server	Server Submit	Server=Slave, Client=Master

※ Refer to **Steps 16 to 19** for an illustration of how to perform **Steps 20 to 23** of the procedure described above.

Step 24: Click the "Home" tab to confirm that the pair-connection settings for Port1 and Port2 on tGW-725 module #4 are correct

Current port settings:

Port Settings	Port 1	Port 2
Baud Rate (bps)	115200,8N1	115200,8N1
Flow Control	None	None
Protocol	RTU	RTU
Slave Timeout (ms)	300	300
Char Timeout (bytes)	4	4
Silent Time (ms)	0	0
Read Cache (ms)	980	980
Connection Idle (Seconds)	180	180
Local TCP Port	502	503
Virtual ID Range	1-247	1-247
Virtual ID Offset	0	0
Pair-Connection Settings (Master/Slave Mode)	Port 1	Port 2
Application Mode	TCP/UDP Server	TCP/UDP Server
Remote Server IP	-	-
Remote TCP Port	-	-