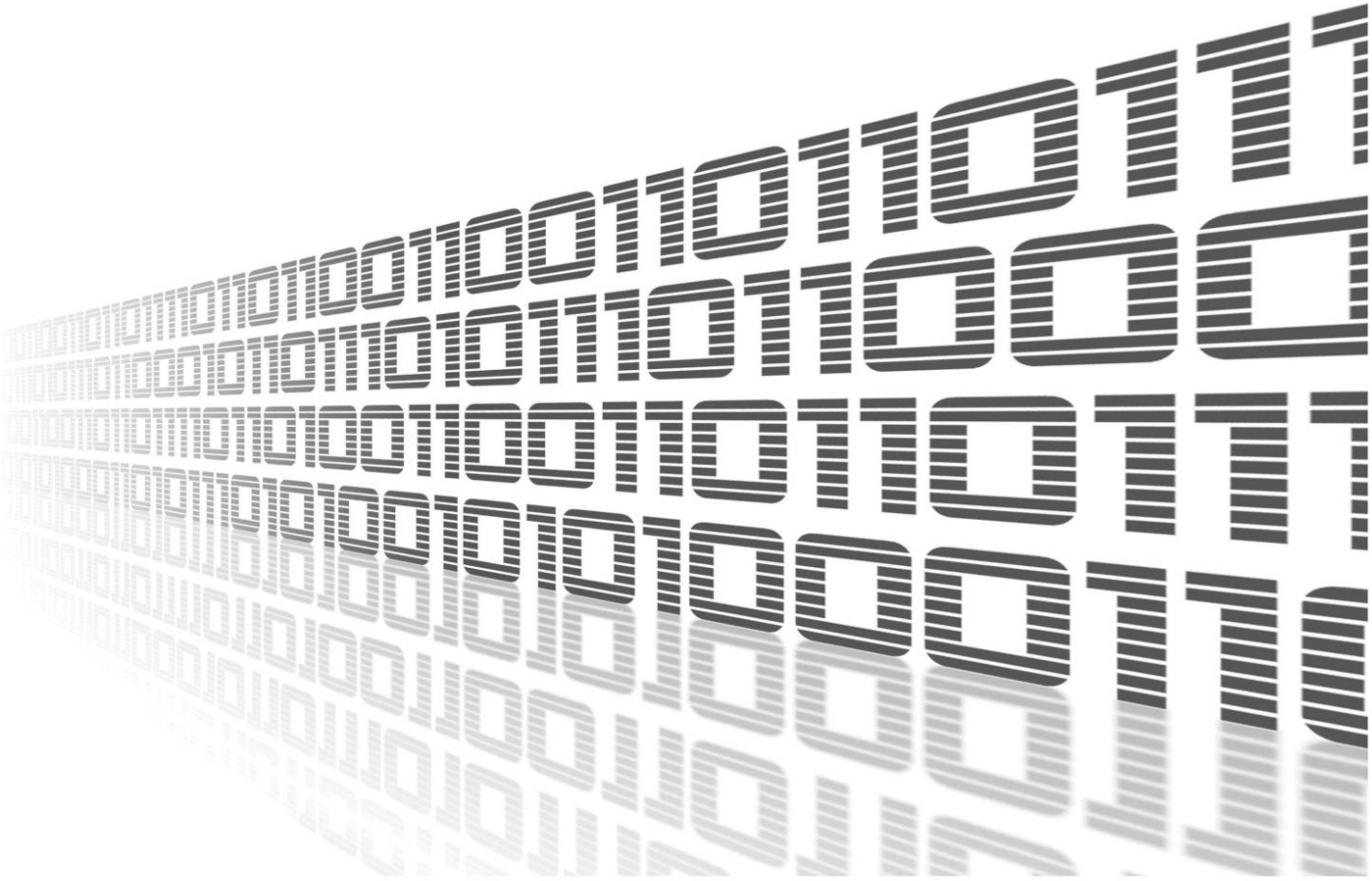
ADVANTECH

RouterApp

Modbus to IEC104



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Used symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that can arise in specific situations.

Information – Useful tips or information of special interest.

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1. Router App Description

This Router App is not included in the standard router firmware. Instructions for uploading this Router App can be found in the Configuration Manual (see Chapter Related Documents).

1.1 Modbus, DI and DO to IEC-104

mbio2iec104 is a Router App designed to enable seamless communication between Modbus TCP/RTU devices, DI, DO, and *IEC-104* devices. It functions as a Modbus TCP/RTU master to interact with Modbus devices and as an *IEC-104* server to communicate with an *IEC-104 client*. DI and DO ports operate as Read-Only or Read/Write Single Points for the *IEC-104* server.

1.2 Web Interface

Once the module is installed, its graphical user interface (GUI) can be accessed by selecting the module name on the *Router Apps* page within the router's web interface.

The GUI features a menu on the left side, which includes *Status*, *Configuration*, and *Customization* sections. The *Status* section provides *Log* and *Mapping Table* views, while the *Configuration* section includes options for basic *Settings*, *Expansion Ports 1 and 2*, and *USB Port*. The *Customization* section contains a Return option to navigate back to the router's main web configuration pages. See Figure 1 for an illustration of the menu.

Figure 1: Menu

2. Configuration

2.1 Basic Settings

Basic configuration for this *Router App* is available on the Basic page under the *Configuration* menu. The details of all configuration items on the Basic page are illustrated in Figure 2 and described in the table below.

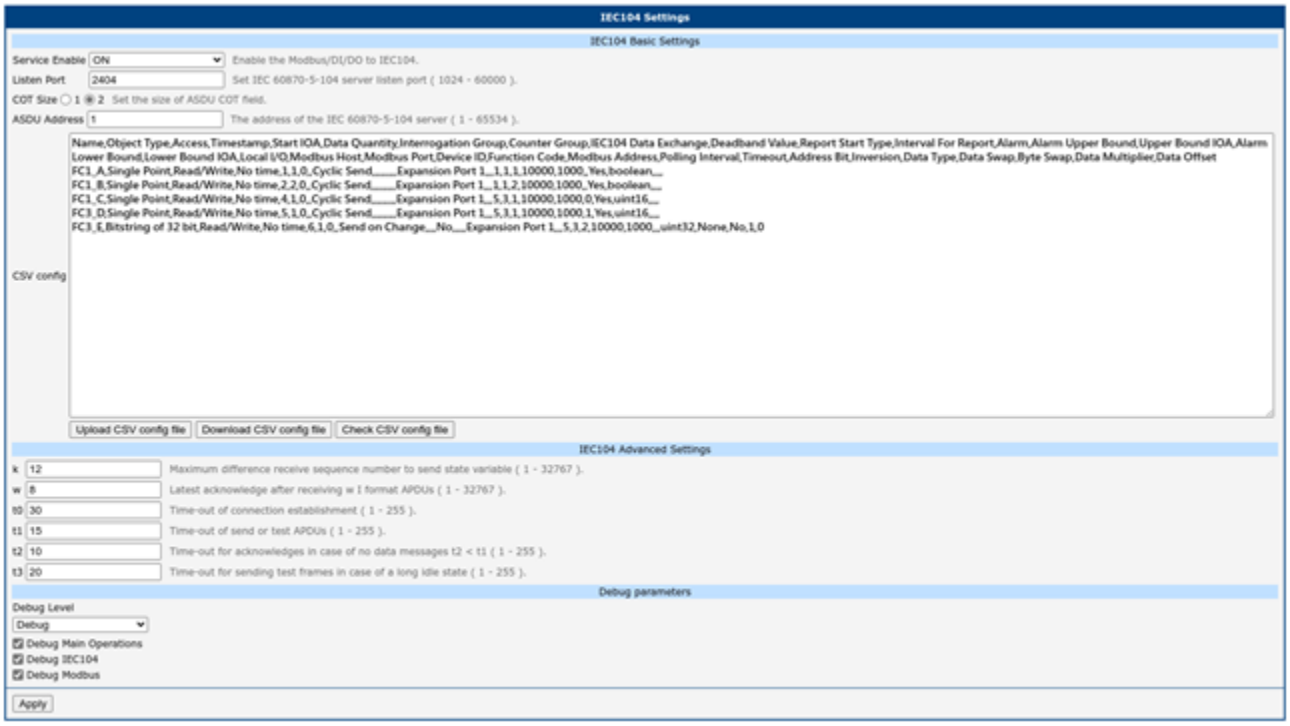

Figure 2: Basic Settings

Item	Description
Service Enable	Enable Modbus RTU/TCP to IEC 60870-5-104 functionality.
Listen Port	Set the IEC-104 server listen port. Range: 1024 – 60000
COT Size	Set the size of the ASDU Cause of Transmission (COT) field.
ASDU Address	Address of the IEC 60870-5-104 server. Range: 1 – 65534
CSV config	Upload/Download/Check CSV config file for correct rules
k	Maximum difference receive sequence number to send state variable. Range: 1 – 32767
w	Latest acknowledge after receiving w I format APDUs. Range: 1 – 32767
t0	Time-out of connection establishment. Range: 1 – 255
t1	Time-out of send or test APDUs. Range: 1 – 255
t2	Time-out for acknowledges in case of no data messages t2 < t1. Range: 1 – 255

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Item	Description
t3	Time-out for sending test frames in case of a long idle state. Range: 1 – 255
Debug Level	Debug log level: Debug > Info > Error > None Category: • Main Operations • IEC104 • Modbus

Table 1: Settings Items Description

2.1.1 CSV File

The mbio2iec104 module allows users to configure the mapping between Modbus TCP/RTU and IEC-104 using a CSV file. In the CSV file, fields are separated by commas.

The CSV file could be imported into B&B router in user module Setting WEB page. After import CSV file and click "Apply" button, the new mapping configuration will take effect immediately.

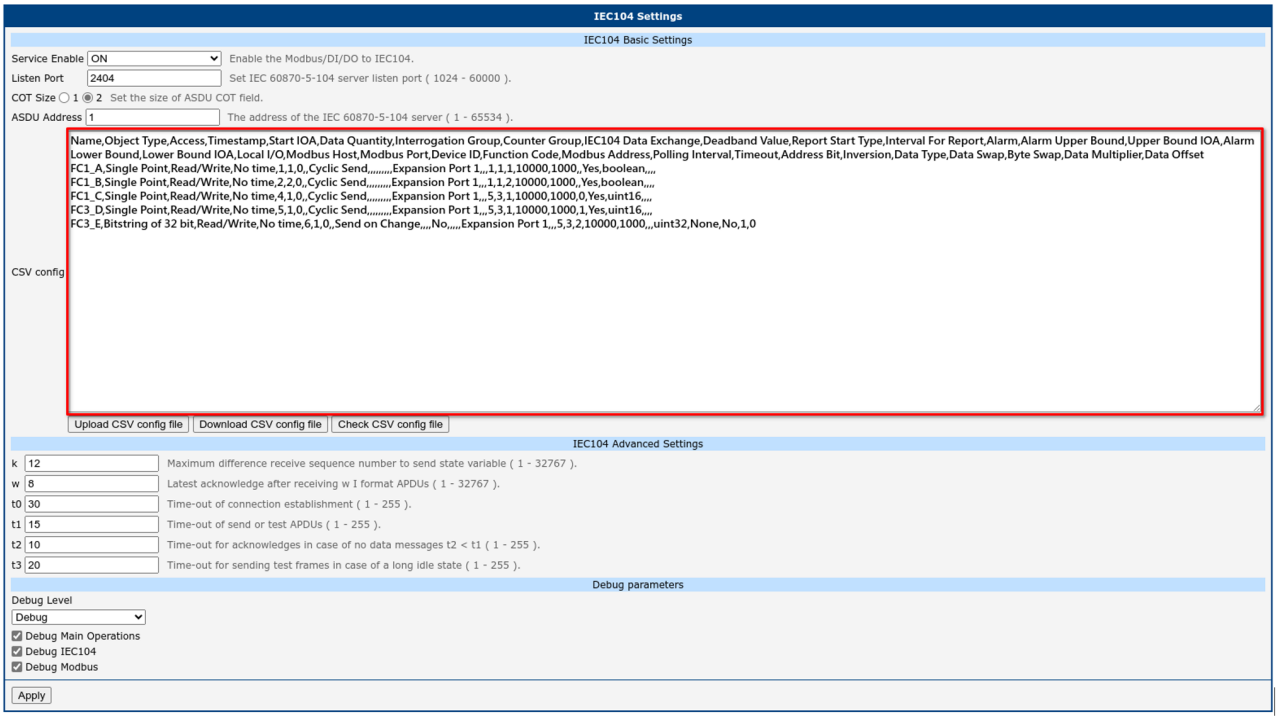

Figure 3: CSV Configuration Settings

Name	Object type	Access	Time stamp	Start IOA	Data Quantity	Interrogation Group	Counter group	IEC104 Data Exchange	Deadband Value
FC3_A	Bitstring of 32 bit	Read/Write	No time	1	1	0		Send on Request	
FC3_B	Bitstring of 32 bit	Read/Write	No time	2	1	1		Send on Request	
FC3_C	Bitstring of 32 bit	Read/Write	No time	3	1	2		Send on Request	
FC3_D	Bitstring of 32 bit	Read/Write	No time	4	1	3		Send on Request	

Report Start Type	Interval For Report	Alarm	Alarm UpperBound	UpperBound IOA	Alarm LowerBound	LowerBound IOA	Local I/O	Modbus Host	Modbus Port
		No						192.168.1.102	502
		No						192.168.1.103	502
		No						192.168.1.104	502
		No						192.168.1.105	502

Device ID	Fuction Code	Modbus Address	Polling Interval	Timeout	Address Bit	Inversion	Data Type	Data Swap	Byte Swap	Data Multiplier	Data Offset
1	3	1	10000	1000			uint32	None	No	1	0
2	3	1	10000	1000			uint32	None	No	1	0
3	3	1	10000	1000			uint32	None	No	1	0
4	3	1	10000	1000			uint32	None	No	1	0

Figure 4: CSV Example File

Item	Description	Note
Name	User defined description for the data point.	• The "Name" column cannot be empty. • The "Name" column cannot contain a comma.
Object Type	The data type defined in IEC60870-5 for each data point. Options: • Single Point • Double Point • Bitstring of 32 bit • Measured Normalized Value • Measured Scaled Value • Measured Short Floating Point Value • Integrated Totals • Clock Synchronization	• The "Object Type" column cannot be empty. • The "Object Type" column must be "Single Point" if the "Local I/O" column is DI or DO.
Access	The access right for the data point. Options: • Read-Only • Write-Only • Read/Write	• The "Access" column cannot be empty. • The "Access" column must be "Read Only" if the "Object Type" column is "Integrated Totals". • The "Access" column must be "Write Only" if the "Object Type" column is "Clock Synchronization". • The "Access" column must be "Read Only" if the "Local I/O" column is DI. • The "Access" column must be "Write Only|Read/Write" if the "Local I/O" column is DO. • The "Access" column cannot be "Write Only" if the "Address Bit" column is not empty.
Timestamp	Time Stamp Format for each data point. Options: • No time • CP24Time2a • CP56Time2a	• The "Timestamp" column cannot be empty. • The "Timestamp" column must be "No time" if the "Object Type" column is "Clock Synchronization". • The "Timestamp" column must be "CP56Time2a" if the "Local I/O" column is DI. • The "Timestamp" column must be "No time" if the "Local I/O" column is DO.
Start IOA	Unique Information Object Address (IOA) for the data point.	• The "Start IOA" column cannot be empty. • Check that the IOA range is unique and non-overlapping.
Data Quantity	Total number of data points, where the total bit count must not exceed the maximum Modbus read limit of 2000 bits.	• The "Data Quantity" column cannot be empty. • The "Data Quantity" column must be "1" if the "Object Type" column is "Clock Synchronization". • The "Data Quantity" column must be "1" if the "Local I/O" column is DI or DO. • The "Data Quantity" column must be "1" if the "Address Bit" column is not empty. • The product of "Data Quantity" column and the length of "Data Type" cannot exceed 2000.

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Item	Description	Note
Interrogation Group	Define the interrogation group (0 – 16, with 0 for General, 1 for Interrogation Group 1, etc.).	• The "Interrogation Group" column cannot be empty if the "Object Type" column is not "Integrated Totals" or "Clock Synchronization". • The "Interrogation Group" column must be empty if the "Object Type" column is "Integrated Totals" or "Clock Synchronization".
Counter Group	Define the counter group (1 – 5, with 5 for the general counter group).	• The "Counter Group" column cannot be empty if the "Object Type" column is "Integrated Totals". • The "Counter Group" column must be empty if the "Object Type" column is not "Integrated Totals".
IEC104 Data Exchange	Decides when should send data to IEC104 client. Option: • Send on Request Data will only be returned when asked. • Cyclic Send Periodically send data at the interval defined in "Polling Interval" field. • Send on Change Send data only when the data is chaned. • Silence within Deadband Send data only when the data changes exceed the deadband range.	• The "IEC104 Data Exchange" column cannot be empty. • The "IEC104 Data Exchange" column cannot be "Silence within Deadband" if the "Object Type" column is "Single Point" or "Double Point". • The "IEC104 Data Exchange" column must be "Send on Request" if the "Object Type" column is "Clock Synchronization".
Deadband Value	If the difference between current data and the previous deadband instance is less than this value, data will not be sent to the IEC104 client. Otherwise, it will be sent and updated.	• The "Deadband Value" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Deadband Value" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is not "Silence within Deadband". • The "Deadband Value" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is "Silence within Deadband".

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Item	Description	Note
Report Start Type	The Freeze Start Type parameter will define when the gateway starts sending the M_IT messages or M_BO, M_MA, M_MB, M_MC messages which still within deadband value. Option: • Day • Hour • Minute • Not Used	• The "Report Start Type" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Report Start Type" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is not "Silence within Deadband". • The "Report Start Type" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is "Silence within Deadband".
Interval For Report	The time interval for spontaneous data reporting, measured in seconds. For instance, if "Report Start Type" is "Hour" and "Interval For Report" is set to 900, it means that within one hour, data will be reported every 15 minutes.	• The "Interval For Report" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Interval For Report" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is not "Silence within Deadband". • The "Interval For Report" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "IEC104 Data Exchange" column is "Silence within Deadband". • The "Interval For Report" column must be between 0 to 3600 if the "Report Start Type" column is "Hour". • The "Interval For Report" column must be between 0 to 60 if the "Report Start Type" column is "Minute".
Alarm	When the data is in alarm mode and exceeds the upper and lower bound, an alarm (qualitity descriptor 0x01) will be issued. If upper bound IOA or lower bound IOA is set, that Single Point IOA will be set to 1.	• The "Alarm" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Alarm" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization".

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Item	Description	Note
Alarm Upper Bound	The upper bound of alarm threshold.	• The "Alarm Upper Bound" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Alarm Upper Bound" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "Alarm" column is "No". • The "Alarm Upper Bound" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", and the "Upper Bound IOA" column is not empty. • The "Alarm Upper Bound" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", the "Alarm Lower Bound" column is empty and "Lower Bound IOA" column is empty.
Upper Bound IOA	The upper bound of alarm threshold. Bind a writable Single Point IOA to trigger an upper bound alarm.	• The "Upper Bound IOA" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Upper Bound IOA" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "Alarm" column is "No". • The "Upper Bound IOA" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", and the "Alarm Upper Bound" column is not empty. • The "Upper Bound IOA" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", the "Alarm Lower Bound" column is empty and "Lower Bound IOA" column is empty.

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Item	Description	Note
Alarm Lower Bound	The lower bound of alarm threshold.	• The "Alarm Lower Bound" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Alarm Lower Bound" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "Alarm" column is "No". • The "Alarm Lower Bound" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", and the "Lower Bound IOA" column is not empty. • The "Alarm Lower Bound" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", the "Alarm Upper Bound" column is empty and "Upper Bound IOA" column is empty.
Lower Bound IOA	Bind a writable Single Point IOA to trigger an lower bound alarm.	• The "Lower Bound IOA" column must be empty if the "Object Type" column is "Single Point", "Double Point" or "Clock Synchronization". • The "Lower Bound IOA" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "Alarm" column is "No". • The "Lower Bound IOA" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", and the "Alarm Lower Bound" column is not empty. • The "Lower Bound IOA" column cannot be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", the "Alarm" column is "Yes", the "Alarm Upper Bound" column is empty and "Upper Bound IOA" column is empty.
Local I/O	The Port that MODBUS RTU connection will be established on or operate as binary input or binary output. If “Modbus Host” and “Modbus Port” exist IP address and TCP port for Modbus/TCP, the filed MUST be empty.	• The "Local I/O" column cannot be empty if the "Modbus Host" column is empty and "Modbus Port" column is empty. • The "Local I/O" column must be empty if the "Modbus Host" column is not empty. • The "Local I/O" column must be empty if the "Modbus Port" column is not empty.
Modbus Host	The Modbus device IP address.	• The "Modbus Host" column cannot be empty if the "Local I/O" column is empty and "Modbus Port" column is not empty.

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Item	Description	Note
Modbus Port	The TCP port number of the remote Modbus slave device.	• The "Modbus Port" column cannot be empty if the "Local I/O" column is empty and "Modbus Host" column is not empty.
Device ID	The Modbus TCP/RTU slave ID.	• The "Device ID" column must be empty if the "Local I/O" column is DI or DO. • The "Device ID" column cannot be empty if the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Device ID" column cannot be empty if the "Modbus Host" column is not empty and "Modbus Port" column is not empty.

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Item	Description	Note
Function Code	Modbus Function Code. In mbio2iec104, supported function codes are: 1, 2, 3, 4, 5, 6, 15, 16 • 01: Read coils • 02: Read discrete inputs • 03: Read holding registers • 04: Read input register • 05: Write single coil • 06: Write single register • 15: Write multiple coils • 16: Write multiple registers	• The "Function Code" column must be empty if the "Local I/O" column is DI or DO. • The "Function Code" column cannot be empty if the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Function Code" column cannot be empty if the "Modbus Host" column is not empty and "Modbus Port" column is not empty. • The "Function Code" column must be "16" if the "Object Type" column is "Clock Synchronization". • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read Only", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", the "Address Bit" column is empty and "Function Code" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read Only", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", and the "Address Bit" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read Only", the "Modbus Host" column is not empty, the "Address Bit" column is empty and "Function Code" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read Only", the "Modbus Host" column is not empty and "Address Bit" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Data Quantity" column is "1", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", and the "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Data Quantity" column is not "1", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", and the "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", the "Address Bit" column is not empty and "Data Type" column is "uint16".

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Item	Description	Note
		• The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", the "Address Bit" column is not empty and "Data Type" column is "uint32". • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Data Quantity" column is "1", the "Modbus Host" column is not empty and "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Data Quantity" column is not "1", the "Modbus Host" column is not empty and "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Modbus Host" column is not empty, the "Address Bit" column is not empty and "Data Type" column is "uint16". • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Read/Write", the "Modbus Host" column is not empty, the "Address Bit" column is not empty and "Data Type" column is "uint32". • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Write Only", the "Data Quantity" column is "1", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", and the "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Write Only", the "Data Quantity" column is not "1", the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port", and the "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Write Only", the "Data Quantity" column is "1", the "Modbus Host" column is not empty and "Address Bit" column is empty. • The "Function Code" column must be empty if the "Object Type" column is "Single Point", the "Access" column is "Write Only", the "Data Quantity" column is not "1", the "Modbus Host" column is not empty and "Address Bit" column is empty.

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Item	Description	Note
		• The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Read Only", and the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Read Only", and the "Modbus Host" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Read/Write", and the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Read/Write", and the "Modbus Host" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Write Only", and the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Function Code" column must be empty if the "Object Type" column is "Double Point", the "Access" column is "Write Only", and the "Modbus Host" column is not empty. • The "Function Code" column must be empty if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization", and the "Access" column is "Read Only". • The "Function Code" column must be empty if the "Object Type" column is not "Single Point", "Double Point", "Integrated Totals" or "Clock Synchronization", the "Access" column is "Read/Write", and the "Data Quantity" column is "1". • The "Function Code" column must be empty if the "Object Type" column is not "Single Point", "Double Point", "Integrated Totals" or "Clock Synchronization", the "Access" column is "Read/Write", and the "Data Quantity" column is not "1". • The "Function Code" column must be empty if the "Object Type" column is not "Single Point", "Double Point", "Integrated Totals" or "Clock Synchronization", the "Access" column is "Write Only", and the "Data Quantity" column is "1". • The "Function Code" column must be empty if the "Object Type" column is not "Single Point", "Double Point", "Integrated Totals" or "Clock Synchronization", the "Access" column is "Write Only", and the "Data Quantity" column is not "1".

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Item	Description	Note
Modbus Address	Designate the read from/write to starting address for the Modbus registry.	• The "Modbus Address" column must be empty if the "Local I/O" column is DI or DO. • The "Modbus Address" column cannot be empty if the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Modbus Address" column cannot be empty if the "Modbus Host" column is not empty and "Modbus Port" column is not empty.
Polling Interval (ms)	Modbus Polling Interval, unit: milliseconds. The value range: 1 – 10000000	• The "Polling Interval" column cannot be empty.
Timeout	The time span within which the Modbus server must return the Modbus response. Range: 100 – 10000 ms.	• The "Timeout" column must be empty if the "Local I/O" column is DI or DO. • The "Timeout" column cannot be empty if the "Local I/O" column is "Expansion Port 1", "Expansion Port 2" or "USB Port". • The "Timeout" column cannot be empty if the "Modbus Host" column is not empty and "Modbus Port" column is not empty.
Address Bit	The value used to address a bit in "Data Type" uint16 or uint32 as a "Single Point" point	• The "Address Bit" column must be empty if the "Object Type" column is not "Single Point". • The "Address Bit" column must be between 0 – 15 if the "Data Type" column is "uint16" • The "Address Bit" column must be between 0 – 31 if the "Data Type" column is "uint32".
Inversion	To inverse Single Point value or not.	• The "Inversion" column must be empty if the "Object Type" column is not "Single Point". • The "Inversion" column cannot be empty if the "Object Type" column is "Single Point".
Data Type	Modbus data type. Options: • boolean • int16 • uint16 • float16 • int32 • uint32 • float32 • int64 • uint64 • float64	• The "Data Type" column cannot be empty. • The "Data Type" column must be empty if the "Object Type" column is "Single Point", the "Address Bit" column is empty and "Data Type" column is not empty. • The "Data Type" column must be empty if the "Object Type" column is "Single Point", and the "Address Bit" column is not empty. • The "Data Type" column must be "boolean" if the "Object Type" column is "Double Point". • The "Data Type" column cannot be "boolean" if the "Object Type" column is not "Single Point", "Double Point" or "Clock Synchronization". • The "Data Type" column must be "uint32" if the "Object Type" column is "Clock Synchronization".

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Item	Description	Note
Data Swap	The Data Swap field determines the order in which the particular bytes of the received/transmitted data are delivered. • None: Do not swap • Word: 0x1a2b becomes 0x2b1a • Double Word: 0x1a2b3c4d becomes 0x3c4d1a2b • Double Word - Frame: 0x1a2b3c4d becomes 4d3c2b1a • Quad Word: 0x1a2b3c4d5e6f7980 becomes 0x79805e6f3c4d1a2b	• The "Data Swap" column must be empty if the "Object Type" column is "Single Point" or "Double Point". • The "Data Swap" column cannot be empty if the "Object Type" column is not "Single Point" or "Double Point". • The "Data Swap" column must be empty if the "Object Type" column is not "Single Point" or "Double Point", and the "Data Type" column is "int16", "uint16" or "float16". • The "Data Swap" column cannot be empty if the "Object Type" column is not "Single Point" or "Double Point", and the "Data Type" column is "int32", "uint32" or "float32".
Byte Swap	Option: • True • False When Option is True: • 0x1a2b becomes 0xa1b2 • 0x1a2b3c4d becomes 0xa1b2c3d4	• The "Byte Swap" column must be empty if the "Object Type" column is "Single Point" or "Double Point". • The "Byte Swap" column cannot be empty if the "Object Type" column is not "Single Point" or "Double Point".
Data Multiplier	The value used to multiply the data value.	• The "Data Multiplier" column must be empty if the "Object Type" column is "Single Point" or "Double Point". • The "Data Multiplier" column cannot be empty if the "Object Type" column is not "Single Point" or "Double Point".
Data Offset	The value used to add/subtract the data value.	• The "Data Offset" column must be empty if the "Object Type" column is "Single Point" or "Double Point". • The "Data Offset" column cannot be empty if the "Object Type" column is not "Single Point" or "Double Point".

Table 2: CSV Items Description

2.1.2 Data Swap vs. Byte Swap

The following table are the examples of different combination of *Data Swap* and *Byte Swap*.

Source Data from Modbus Slave	Data Swap	Byte Swap	Resulting Data
0x1a2b	None	FALSE	0x1a2b
0x1a2b	None	TRUE	0xa1b2
0x1a2b	Word	FALSE	0x2b1a
0x1a2b	Word	TRUE	0xb2a1
0x1a2b3c4d	None	FALSE	0x1a2b3c4d
0x1a2b3c4d	None	TRUE	0xa1b2c3d4
0x1a2b3c4d	Double Word	FALSE	0x3c4d1a2b
0x1a2b3c4d	Double Word	TRUE	0xc3d4a1b2
0x1a2b3c4d	Double Word – Frame	FALSE	0x4d3c2b1a
0x1a2b3c4d	Double Word – Frame	TRUE	0xd4c3b2a1
0x1a2b3c4d5e6f7890	None	FALSE	0x1a2b3c4d5e6f7890
0x1a2b3c4d5e6f7890	None	TRUE	0xa1b2c3d4e5f68709
0x1a2b3c4d5e6f7890	Quad Word	FALSE	0x78905e6f3c4d1a2b
0x1a2b3c4d5e6f7890	Quad Word	TRUE	0x8709e5f6c3d4a1b2

Table 3: Data & Byte Swap Combinations

2.1.3 Integrated Total behavior in IEC104 Data Exchange Modes

When the Object Type of IEC104 data is "Integrated Totals", the behavior of each "IEC104 Data Exchange" are:

Send on Request:

- When FRZ of received counter interrogation command (T101) is 0, the latest counter value will be replied. (The behavior is Integrated Totals Mode B)
- After FRZ of received T101 is 1, the value of IEC104 data will be frozen.
- After receiving a T101 with FRZ as 1, and then receiving a T101 with FRZ as 0, the frozen value will be replied, and counter value's frozen state will be lifted. (The behavior is Integrated Totals Mode C)

Cyclic Send:

- The IEC104 data will be sent periodically with the value of "Polling Interval" as the time interval.
- Before any T101 received, the value of IEC104 data will be the latest counter value. (The behavior is Integrated Totals Mode A)
- After FRZ of received T101 is 1, the value of IEC104 data will be frozen.
- When FRZ of received T101 is 0, the frozen counter value will be replied and counter value's frozen state will be lifted. (The behavior is Integrated Totals Mode D)

Send on Change:

- Before any T101 received, when the counter value is changed, the IEC104 data will be sent.
- After FRZ of received T101 is 1, the IEC104 data won't be sent anymore because the value has been frozen.
- When FRZ of received T101 is 0, the frozen counter value will be replied and counter value's frozen state will be lifted. After that, when the counter value is changed, the IEC104 data will be sent.

Silence within Deadband:

- The object will follow the behavior of deadband.
- After FRZ of received T101 is 1, the value of IEC104 data will be frozen.
- After FRZ of received T101 is 0, the frozen value will be replied and counter value's frozen state will be lifted.

2.2 Modbus RTU Port Settings

Expansion Port 1 is for RS232, Expansion Port 2 is for RS485. USB Port for device */dev/ttyUSB0*.

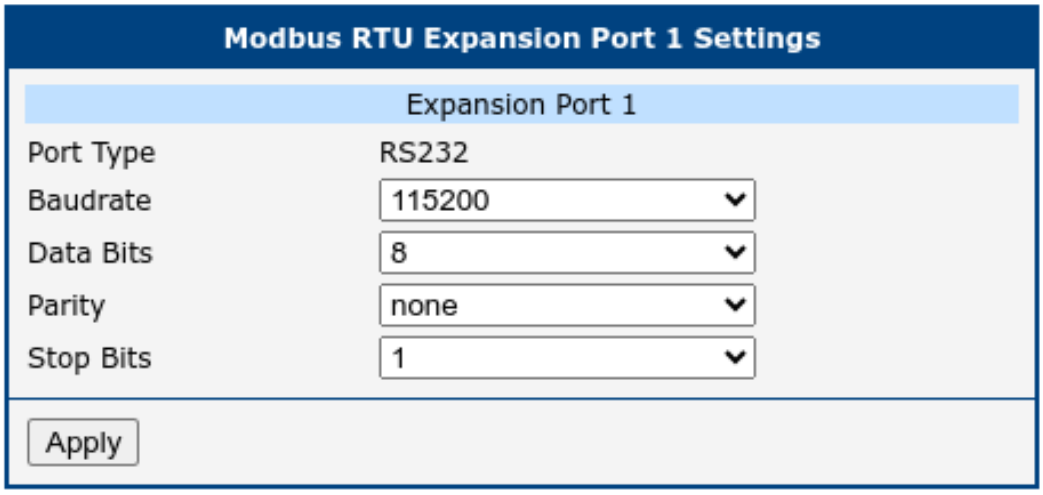

Figure 5: Modbus RTU

Item	Description
Baudrate	Modulation rate (number of distinct symbol changes – signaling events – made to the transmission medium per second)
Data Bits	Number of data bits (7 or 8)
Parity	Parity (none, even or odd)
Stop Bits	Number of stop bits (1 or 2)

Table 4: Modbus RTU Items Description

3. Related Documents

You can obtain product-related documents on *Engineering Portal* at *icr.advantech.com* address.

To get your router's *Quick Start Guide*, *User Manual*, *Configuration Manual*, or *Firmware* go to the *Router Models* page, find the required model, and switch to the *Manuals* or *Firmware* tab, respectively.

The *Router Apps* installation packages and manuals are available on the *Router Apps* page.

For the *Development Documents*, go to the *Development* page.