User Manual

Version 1.0.1 Oct 2021

GW-7828

(Modbus RTU Slave to M-Bus Master Gateway)



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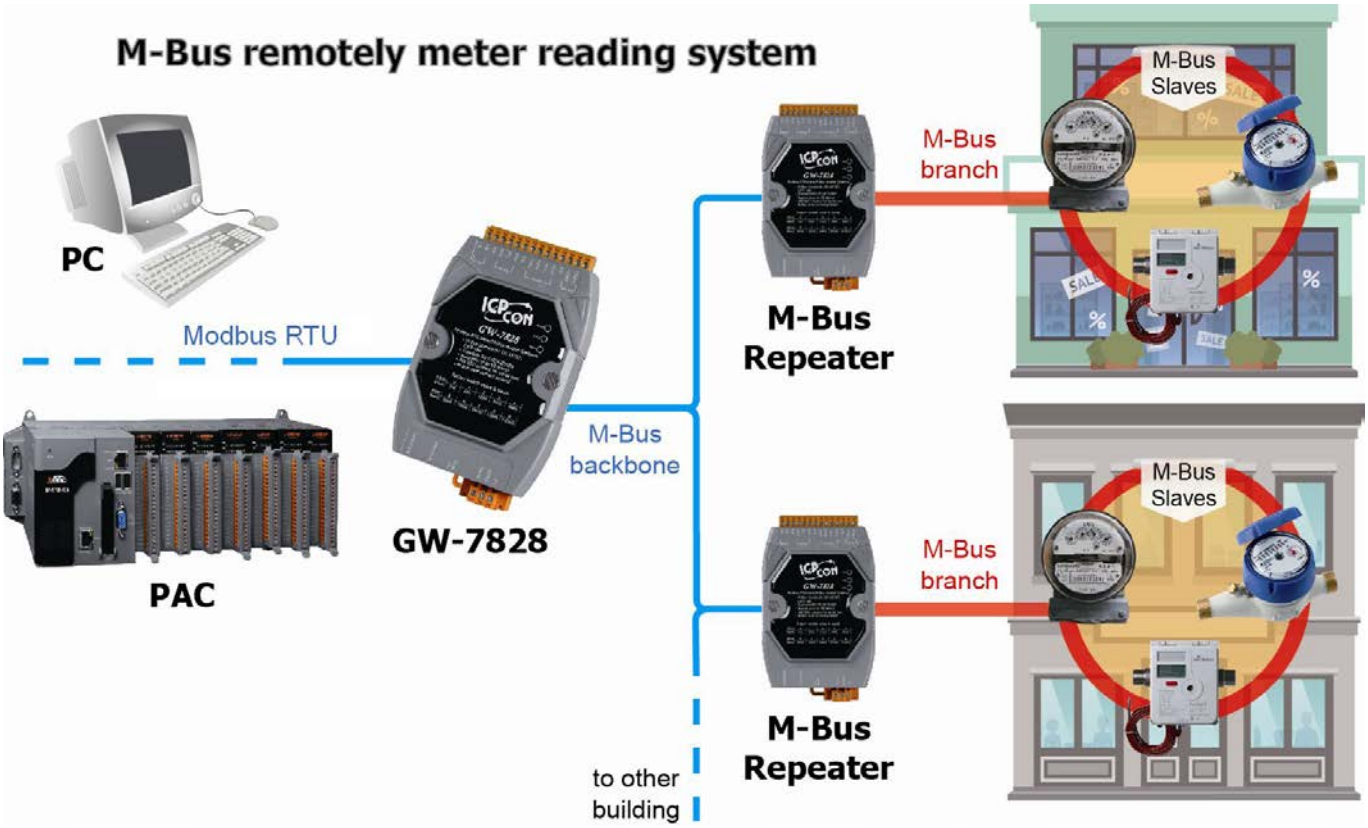
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Contact us

If you encounter any problems while operating this device, feel free to contact us via mail at: service@icpdas.com . We will reply as soon as possible.

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1. Introduction



The M-Bus ("Meter-Bus") is a standard for remote reading of meters. It is usable for most types of consumption meters as well as for various sensors and actuators. The GW-7828 is specially designed for M-Bus slave device. It offers Modbus RTU communication by three kinds of interface, RS-232, RS-422 and RS-485. On hardware the GW-7828 has two rotary switches for serial port and M-Bus port baud rate. GW-7828 supports Modbus RTU function code 0x03 and 0x04 to read data of M-Bus meters. Through this design, it is easy to communicate with any standard M-Bus slave.

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1.1 Features

- Supports M-Bus standard: EN-13757, CJ/T -188
- Supports Modbus RTU function code 0x03 and 0x04 to read Meter data
- Baud rate: Adjustable by rotary switch serial port from 300 to 115200 bps, and M-Bus from 300 to 2400 bps. Two baud rates are set individually.
- Default serial port data format: Data bit 8, Parity None, Stop bit 1
- Default M-Bus port data format: Data bit 8, Parity Even, Stop bit 1
- Supports up to 100 M-Bus slaves
- M-Bus over current protection
- Short-circuit protection on the M-Bus
- Update firmware from serial port
- Provides PWR, MTX and MRX 3 LED indicators
- Watchdog inside

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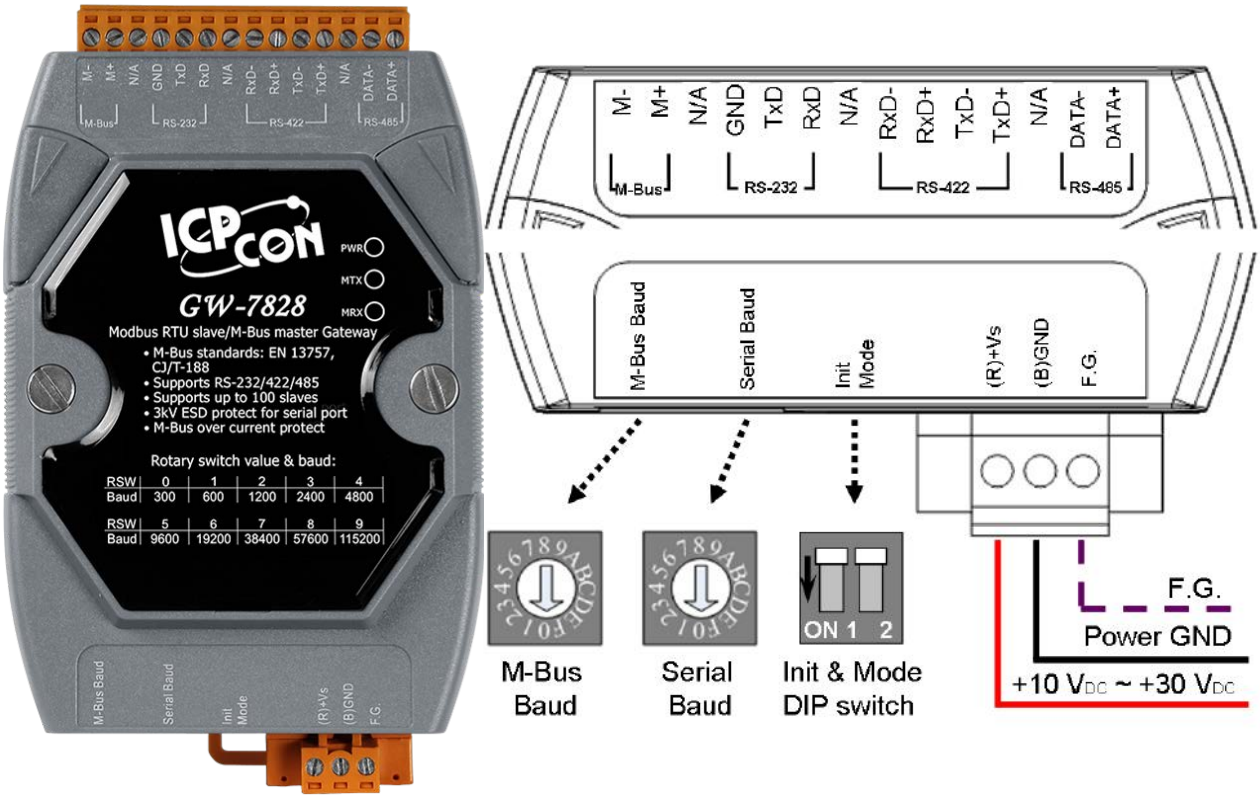
1.2 Specification

Module	GW-7828
M-Bus Interface	
Channel	1
Baud Rate (bps)	300 bps ~ 2400 bps
Data bit	5, 6, 7, 8
Stop bit	1, 2
Parity	None, Even, Odd, Space, Mark
Isolation	3750 Vrms for photo-couple
ESD Protection	Contact ±4 kv class B
Current Protection	short-circuit protection
UART Interface	
Channel	1 RS-232 / RS-422 / RS-485 (can't be used simultaneously)
Baud Rate (bps)	300 bps ~ 115200 bps
Data bit	5, 6, 7, 8
Stop bit	1, 2
Parity	None, Even, Odd, Space, Mark
ESD Protection	Contact ±4 kv class B
Power	
Power Supply	Unregulated +10 ~ +30 V_{DC}
Protection	Power reverse polarity protection, Over-voltage brown-out protection
Power Consumption	1.8 W @ 24 VDC (with 1 slave device) 11.8 W @ 24 VDC (with 100 slave devices)
Mechanical	
Installation	DIN-Rail
Dimension (W x L x H)	72mm x 122mm x 33mm
Environment	
Operating Temperature	-25 to +60°C
Storage Temperature	-40 to +80°C
Relative Humidity	10 to 90% RH, Non-condensing

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2. Getting Started

■ Appearance and pin assignments



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2.1 LED Indicator

The GW-7828 module provides three LED indicators, including indicators for power status and module status. The Following is an overview of the purpose and function of each LED indicator together with a description.

LED Name	LED Status	LED Description
Power (Yellow)	ON	The power of the module is ON
Power (Yellow)	Flashing	M-Bus overload (short or too much M-Bus slaves) Need reboot to recover the status.
MTX (Green)	Flashing	M-Bus communication normal Tx
MRX (Green)	Flashing	M-Bus communication normal Rx

*

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2.2 Rotary Switch

The GW-7828 module provides two rotary switches that are used to change UART Baud Rate and M-Bus Baud Rate. The following is an overview of the purpose and function of each rotary switch position together with a description.

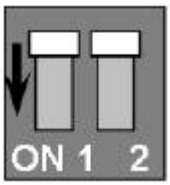
	Switch	Baud rate (bps)	Format
	0	300	M-Bus Port:8,e,1 Serial Port:8,n,1
	1	600	
	2	1200	
	3	2400	
	4	4800	
	5	9600	
	6	19200	
	7	38400	
	8	57600	
	9	115200	
	A~F	User defined	User defined

Note: M-Bus only supports baud rate from 300 to 2400 bps.

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2.3 DIP Switch

The DIP switch is used to update firmware and configure M-Bus Meter setting. The functions of each mode will be explained in detail in later chapters. After changing the configuration of the DIP switch, the GW-7828 needs to reboot to enable the new setting.

	Init Pin	Mode Pin	Description
	OFF	OFF	Operation Mode
	OFF	ON	Configure Mode
	ON	OFF	Firmware Update Mode
	ON	ON	Reserved

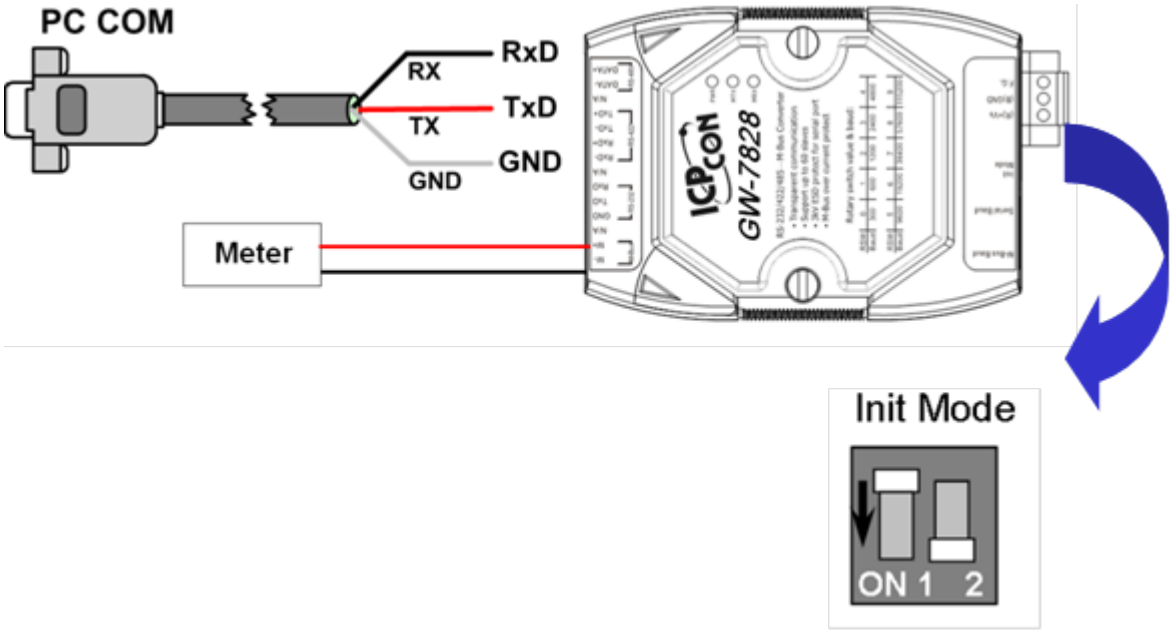
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3. Configuration and Communicate test

The configuration for the module parameters or communication setting on the GW-7828 module can be performed via M-Bus utility. The M-Bus utility can be downloaded from the following website:

http://ftp.icpdas.com/pub/cd/fieldbus_cd/m-bus/converter/I-7590/software/

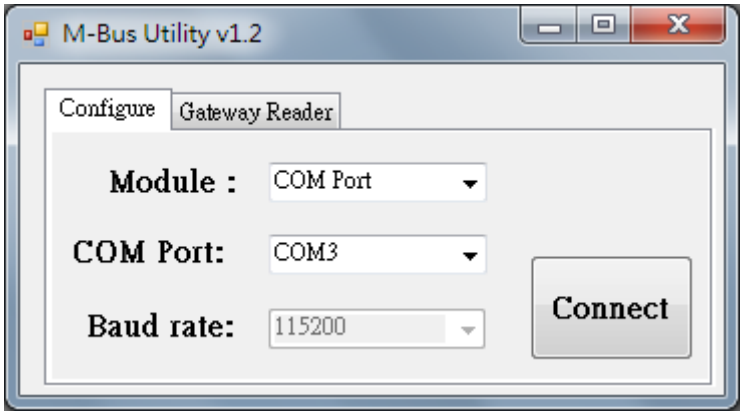
The figure below is an illustration of module wiring. Connect the PC COM port to the RS-232 port and connect M-Bus meter to M-Bus port of the GW-7828. Set the DIP switch to the configuration mode and then power it on.



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3.1 Connect

Execute the M-Bus utility. There will be a connection diagram as first.

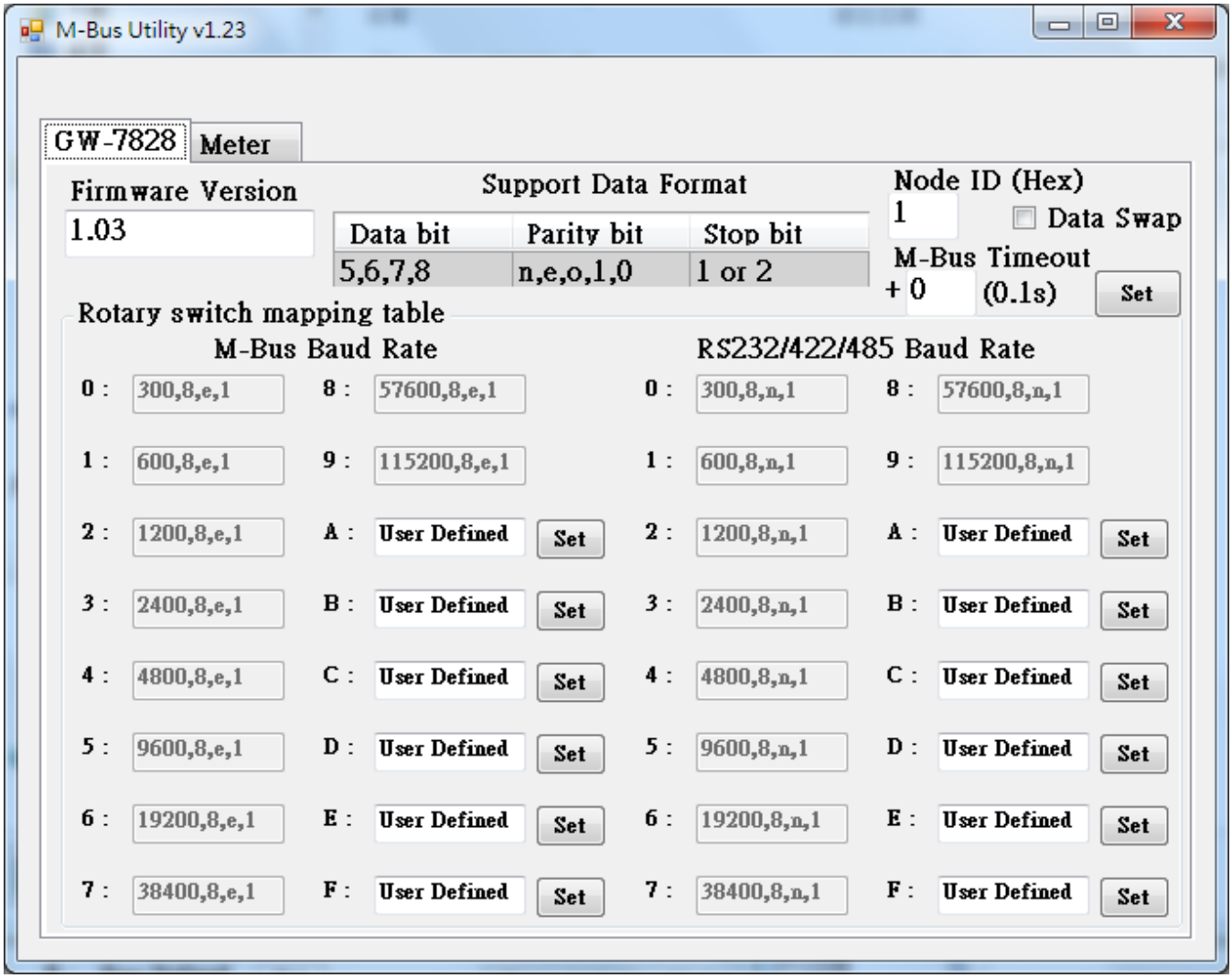


Click “Configure” tab page, choose the corresponding COM port in PC then click “Connect” button to connect with module. Please be noted that the UART baud rate of GW-7828 will be 115200bps when it is in configuration Mode.

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3.2 Baud Rate and Data Format Settings

The first page of the utility lists baud rate and data format configuration of the serial port and the M-Bus port and it also shows the Modbus node ID and IP related parameters of the GW-7828. User could add a new baud rate and data format setting or change IP address as need in this page. In addition, because of the slow response of some M-Bus meters, the utility also provides an M-Bus timeout setting “M-Bus Timeout”, which users can adjust according to their needs.

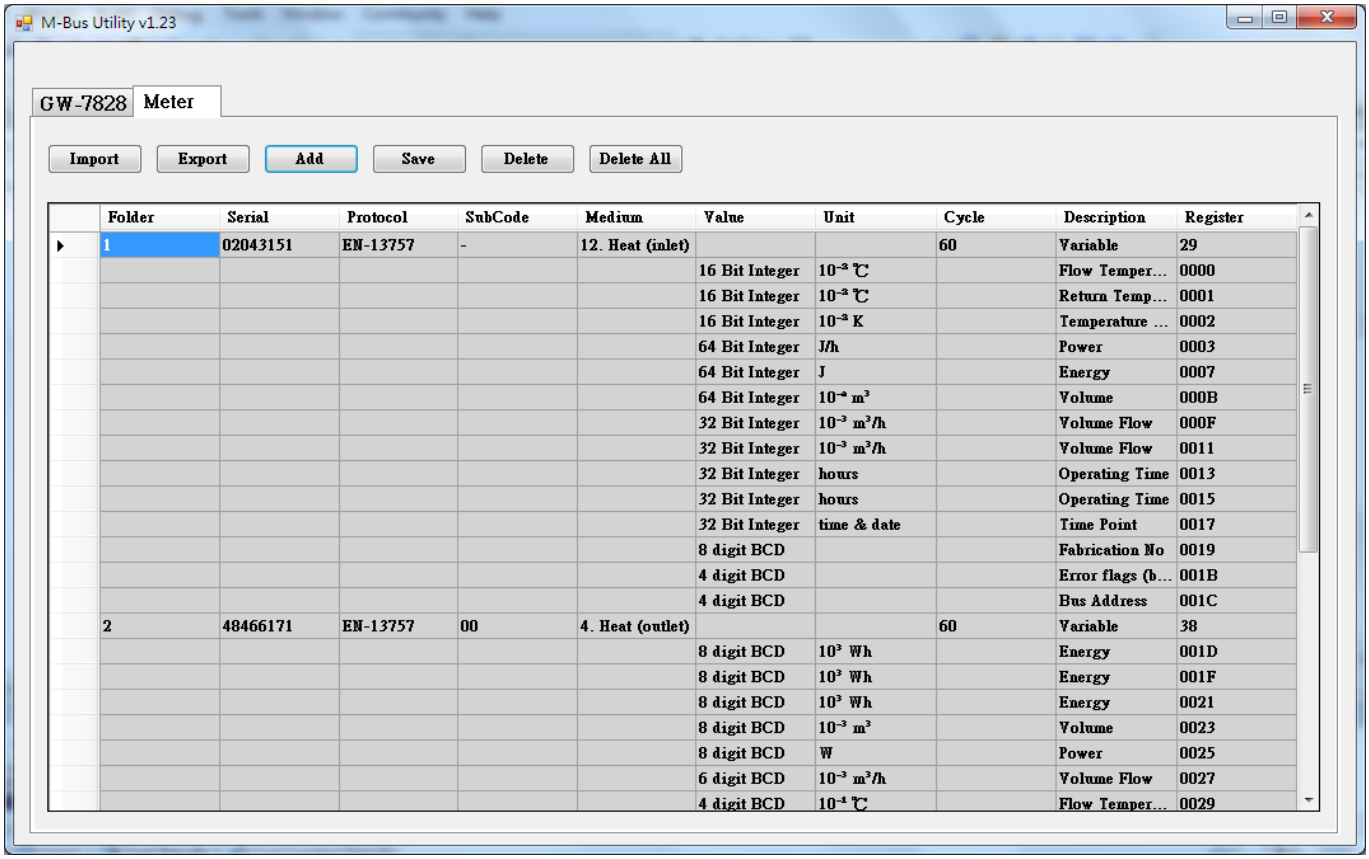


Note: The GW-7828 only supports 300 bps ~ 2400 bps baud rate currently.

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3.3 M-Bus Meter Settings

In the “Meter” page of the utility, user could configure the M-Bus communication setting by using “Import” or “Add” functions. The usages of these functions are listed as following sections.



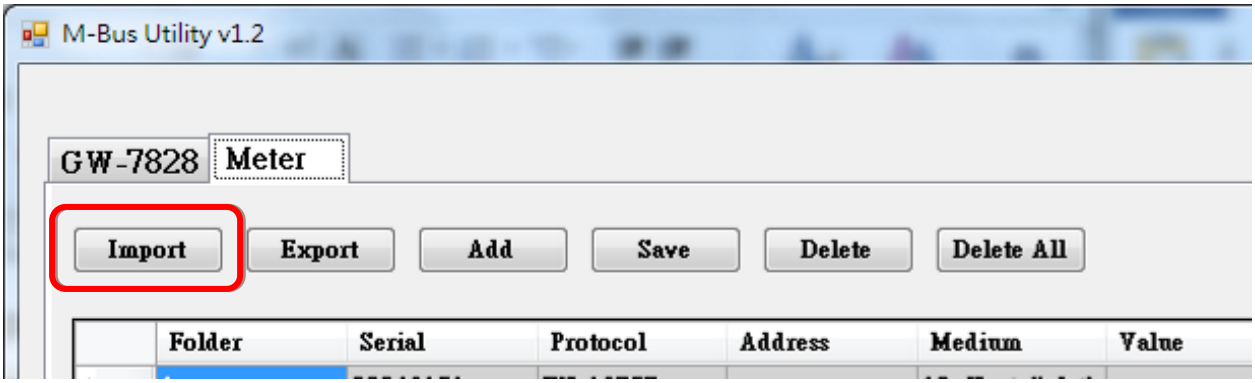
	Folder	Serial	Protocol	SubCode	Medium	Value	Unit	Cycle	Description	Register
▶	1	02043151	EN-13757	-	12. Heat (inlet)			60	Variable	29
						16 Bit Integer	10^{-3} ℃		Flow Temper...	0000
						16 Bit Integer	10^{-3} ℃		Return Temp...	0001
						16 Bit Integer	10^{-3} K		Temperature ...	0002
						64 Bit Integer	J/h		Power	0003
						64 Bit Integer	J		Energy	0007
						64 Bit Integer	10^{-4} m^3		Volume	000B
						32 Bit Integer	10^{-3} m^3/h		Volume Flow	000F
						32 Bit Integer	10^{-3} m^3/h		Volume Flow	0011
						32 Bit Integer	hours		Operating Time	0013
						32 Bit Integer	hours		Operating Time	0015
						32 Bit Integer	time & date		Time Point	0017
						8 digit BCD			Fabrication No	0019
						4 digit BCD			Error flags (b...	001B
						4 digit BCD			Bus Address	001C
	2	48466171	EN-13757	00	4. Heat (outlet)			60	Variable	38
						8 digit BCD	10^{3} Wh		Energy	001D
						8 digit BCD	10^{3} Wh		Energy	001F
						8 digit BCD	10^{3} Wh		Energy	0021
						8 digit BCD	10^{-3} m^3		Volume	0023
						8 digit BCD	W		Power	0025
						6 digit BCD	10^{-3} m^3/h		Volume Flow	0027
						4 digit BCD	10^{-1} ℃		Flow Temper...	0029

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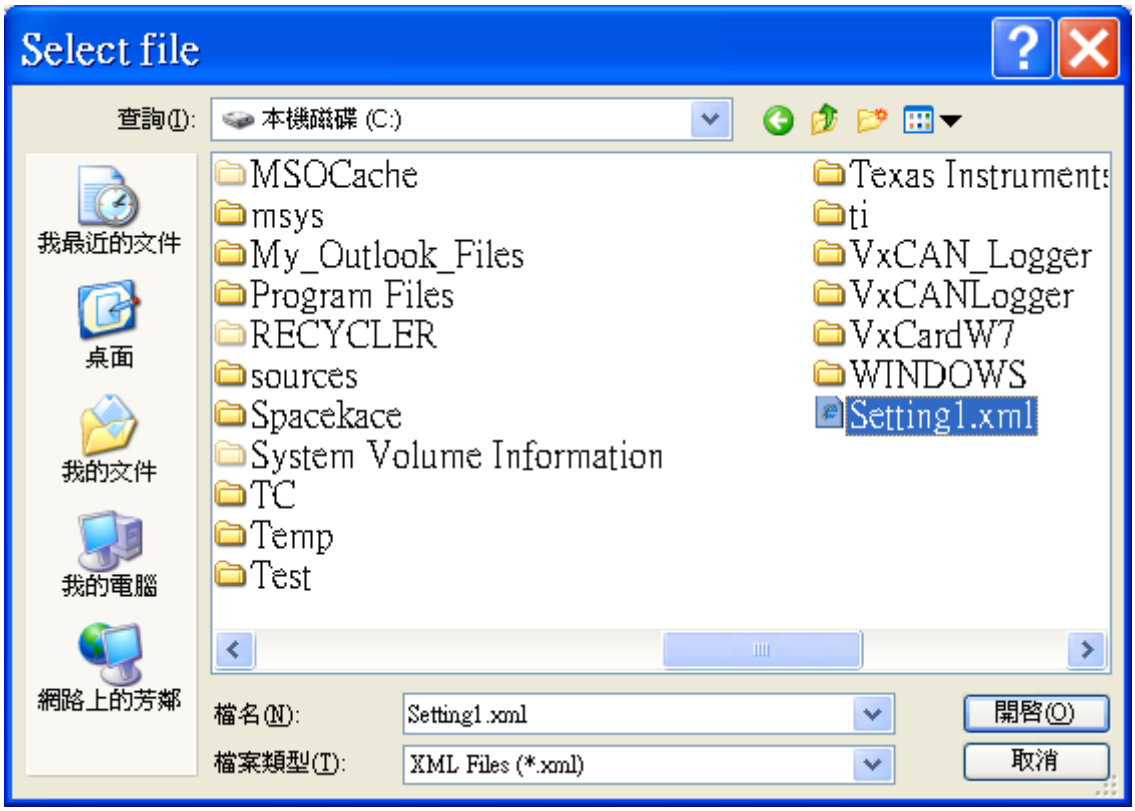
3.3.1 Import

There are two ways to add M-Bus Meter setting into GW-7828. One is using “Import” to import an existed configuration file and save to GW-7828. The configure steps are as following:

Step1: Press “Import” button.

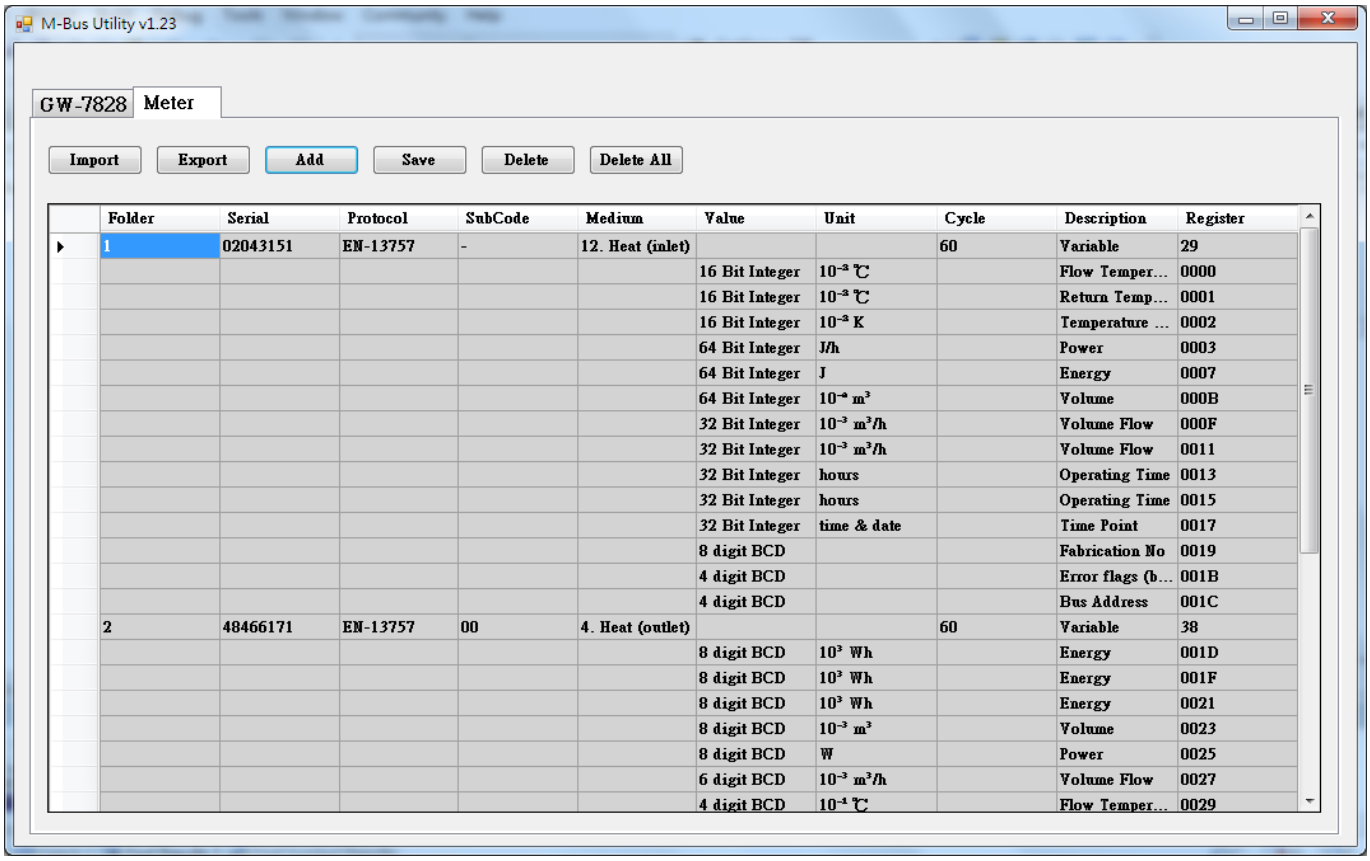


Step2: Open an existed configuration file of XML format.



Step3: The configuration will be loaded into the utility as following:

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	Folder	Serial	Protocol	SubCode	Medium	Value	Unit	Cycle	Description	Register
▶	1	02043151	EN-13757	-	12. Heat (inlet)			60	Variable	29
						16 Bit Integer	10^{-3} ℃		Flow Temper...	0000
						16 Bit Integer	10^{-3} ℃		Return Temp...	0001
						16 Bit Integer	10^{-3} K		Temperature ...	0002
						64 Bit Integer	J/h		Power	0003
						64 Bit Integer	J		Energy	0007
						64 Bit Integer	10^{-4} m^3		Volume	000B
						32 Bit Integer	10^{-3} m^3/h		Volume Flow	000F
						32 Bit Integer	10^{-3} m^3/h		Volume Flow	0011
						32 Bit Integer	hours		Operating Time	0013
						32 Bit Integer	hours		Operating Time	0015
						32 Bit Integer	time & date		Time Point	0017
						8 digit BCD			Fabrication No	0019
						4 digit BCD			Error flags (b...	001B
						4 digit BCD			Bus Address	001C
	2	48466171	EN-13757	00	4. Heat (outlet)			60	Variable	38
						8 digit BCD	10^3 Wh		Energy	001D
						8 digit BCD	10^3 Wh		Energy	001F
						8 digit BCD	10^3 Wh		Energy	0021
						8 digit BCD	10^{-3} m^3		Volume	0023
						8 digit BCD	W		Power	0025
						6 digit BCD	10^{-3} m^3/h		Volume Flow	0027
						4 digit BCD	10^{-1} ℃		Flow Temper...	0029

Step4: Press “Save” button and confirm to save configuration.



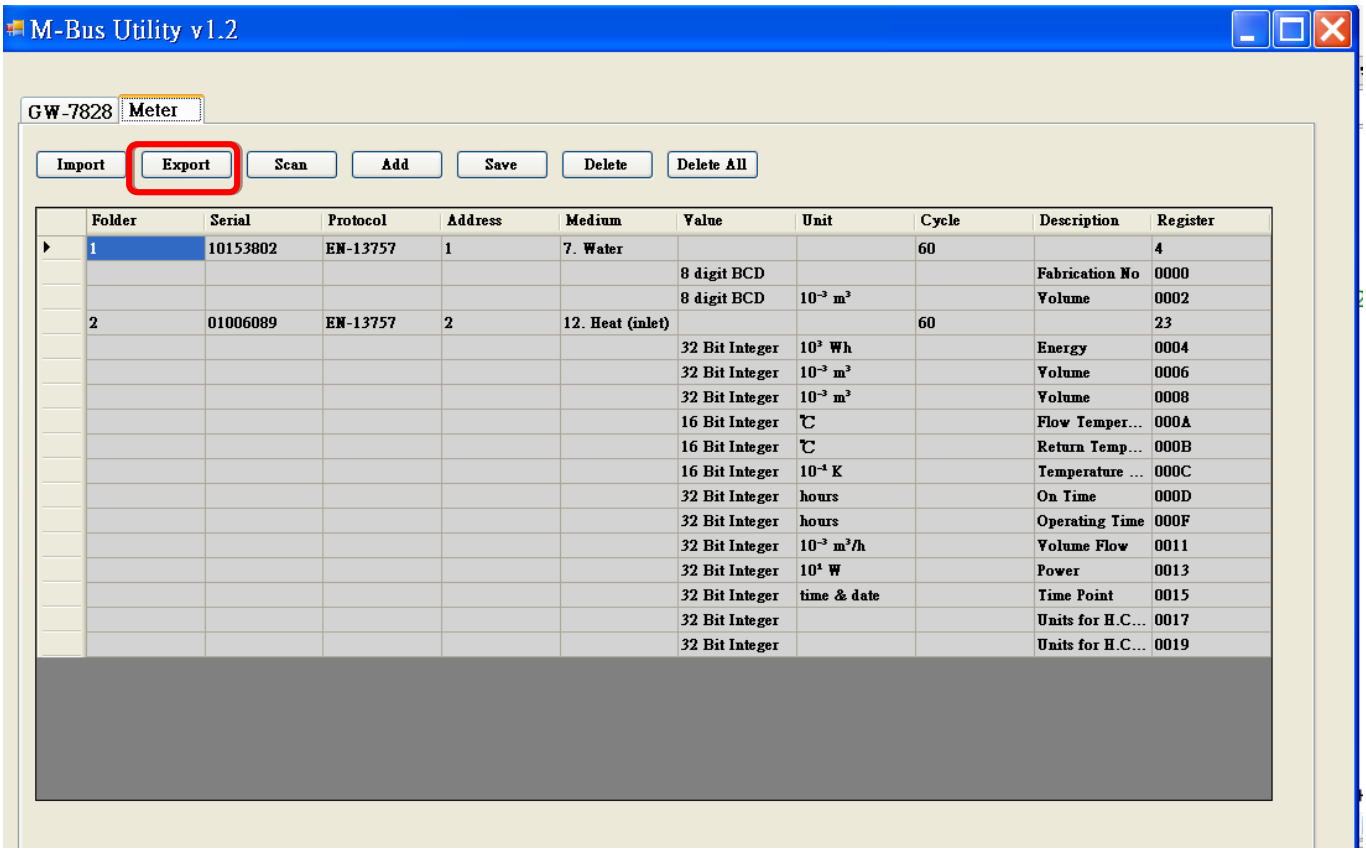
Step5: After saving success diagram showed, set the DIP switch to operation mode and reboot the module.



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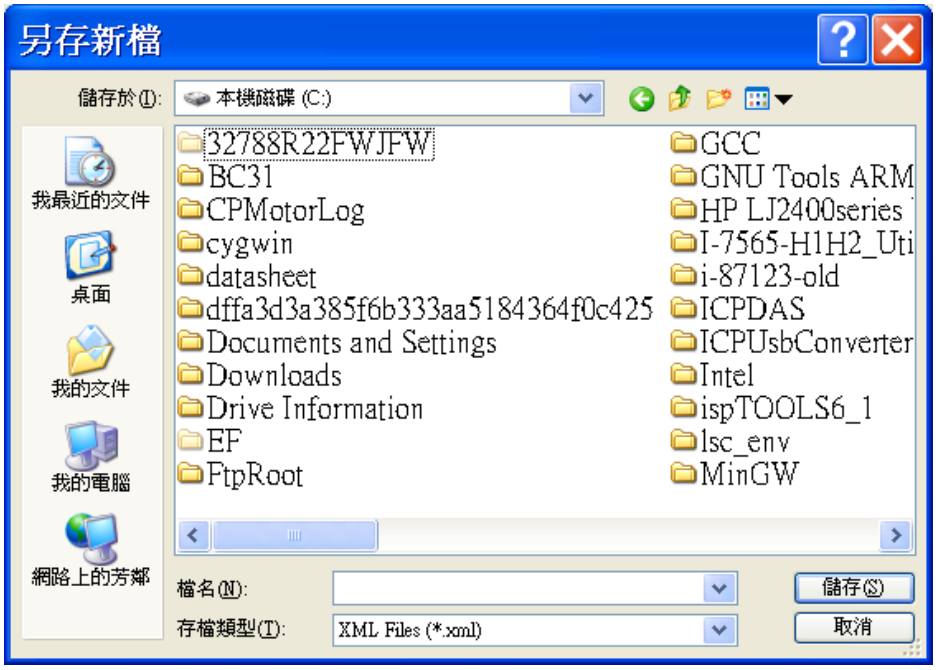
3.3.2 Export

User could export the existed module configuration to a XML file by the “Export” function.



Folder	Serial	Protocol	Address	Medium	Value	Unit	Cycle	Description	Register
1	10153802	EN-13757	1	7. Water			60		4
					8 digit BCD			Fabrication No	0000
					8 digit BCD	10^{-3} m³		Volume	0002
2	01006089	EN-13757	2	12. Heat (inlet)			60		23
					32 Bit Integer	10^{3} Wh		Energy	0004
					32 Bit Integer	10^{-3} m³		Volume	0006
					32 Bit Integer	10^{-3} m³		Volume	0008
					16 Bit Integer	℃		Flow Temper...	000A
					16 Bit Integer	℃		Return Temp...	000B
					16 Bit Integer	10^{-1} K		Temperature ...	000C
					32 Bit Integer	hours		On Time	000D
					32 Bit Integer	hours		Operating Time	000F
					32 Bit Integer	10^{-3} m³/h		Volume Flow	0011
					32 Bit Integer	10^{1} W		Power	0013
					32 Bit Integer	time & date		Time Point	0015
					32 Bit Integer			Units for H.C...	0017
					32 Bit Integer			Units for H.C...	0019

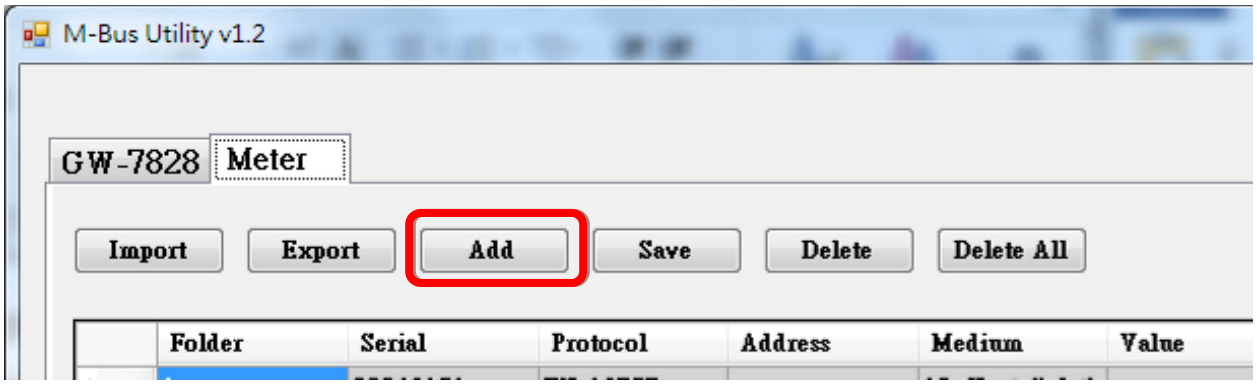
Step1: Press “Export” button. Then select path and input file name to export the configuration.



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3.3.3 Add

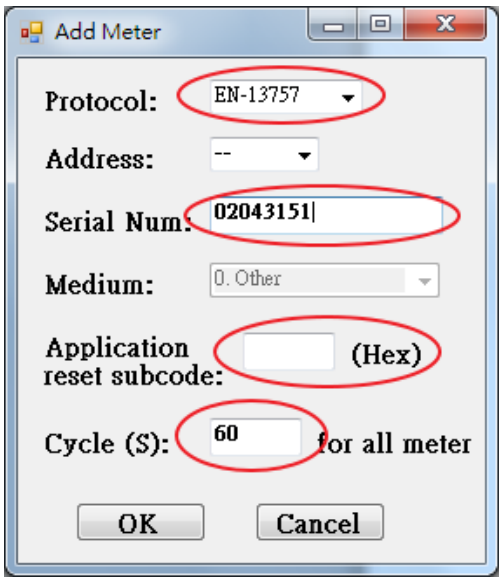
The second way to add meter configuration to GW-7828 is using “Add” function. The “Add” function can add meter of EN-13757 protocol or CJ/T-188 protocol into GW-7828. Refer below operation example for detail setting step.

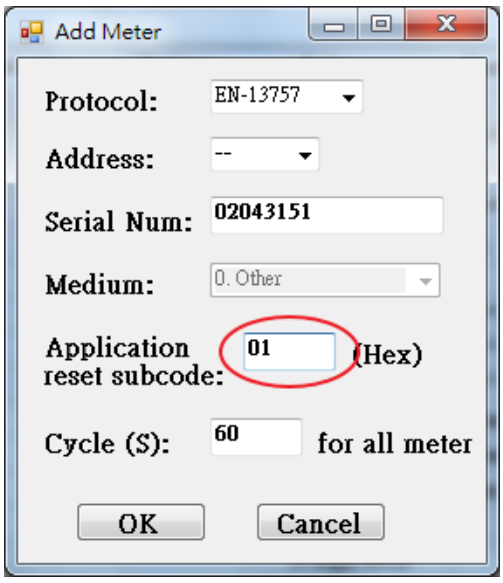


Step1: Press “Add” button and select the protocol of the meter. There are two protocols, EN-13757 and CJ/T188 for select. Input the meter serial number and M-Bus network polling cycle time. Then press “OK” to connect to the meter.

Some meters supported several data group, this calls subcode. If the data of user needs at different subcode, user can input the subcode number at “Application reset subcode” field. There can add several different subcode in one meter. If user needs not the subcode field, please keep it empty. The below example is using subcode 0x01.

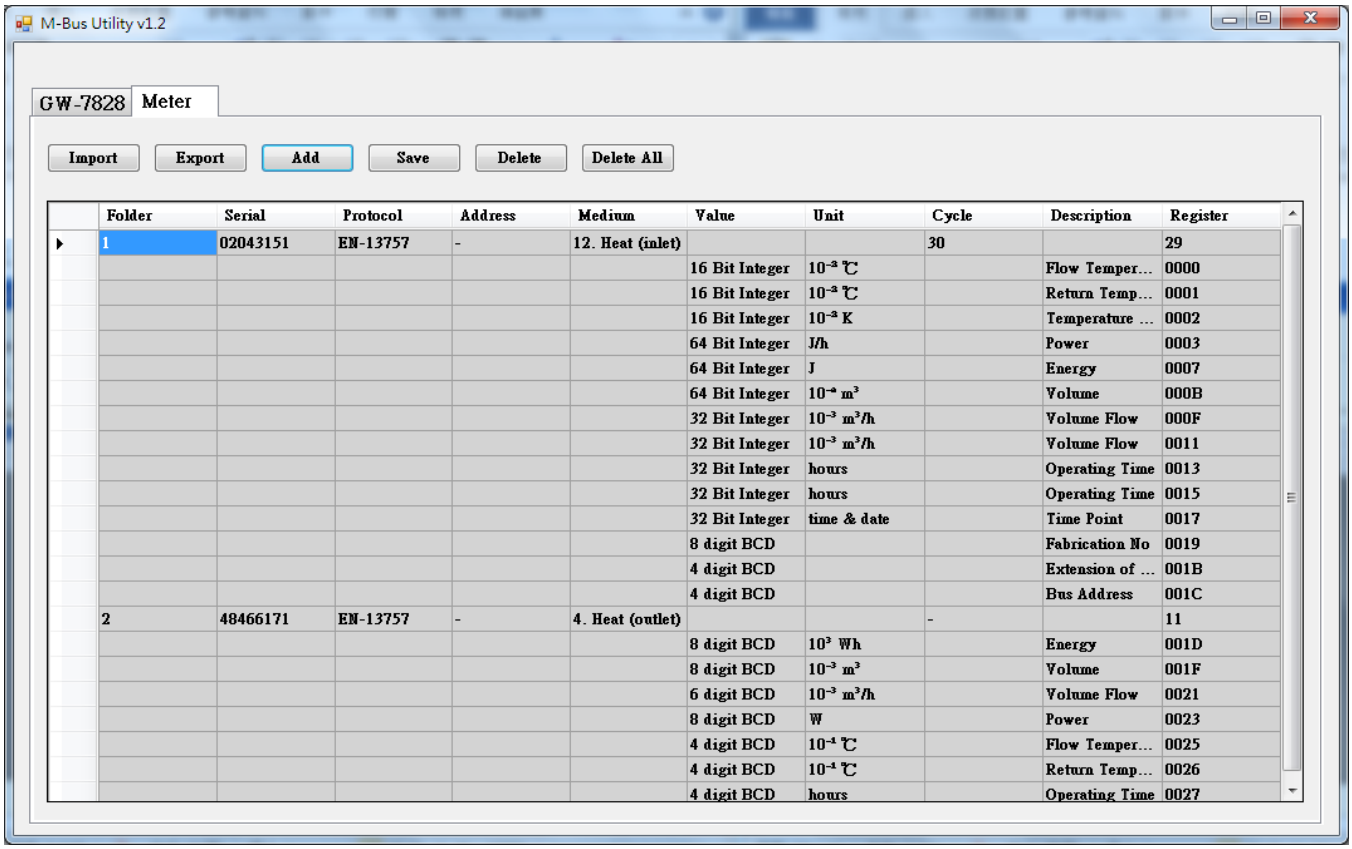
Note: The meter serial number of EN-13757 is 8 numbers, and the serial number of CJ/T188 is 14 numbers.





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Step2: The meter information shows as below.



Folder	Serial	Protocol	Address	Medium	Value	Unit	Cycle	Description	Register
1	02043151	EN-13757	-	12. Heat (inlet)			30		29
					16 Bit Integer	10^{-3} ℃		Flow Temper...	0000
					16 Bit Integer	10^{-3} ℃		Return Temp...	0001
					16 Bit Integer	10^{-3} K		Temperature ...	0002
					64 Bit Integer	J/h		Power	0003
					64 Bit Integer	J		Energy	0007
					64 Bit Integer	10^{-6} m^3		Volume	000B
					32 Bit Integer	10^{-3} m^3/h		Volume Flow	000F
					32 Bit Integer	10^{-3} m^3/h		Volume Flow	0011
					32 Bit Integer	hours		Operating Time	0013
					32 Bit Integer	hours		Operating Time	0015
					32 Bit Integer	time & date		Time Point	0017
					8 digit BCD			Fabrication No	0019
					4 digit BCD			Extension of ...	001B
					4 digit BCD			Bus Address	001C
2	48466171	EN-13757	-	4. Heat (outlet)			-		11
					8 digit BCD	10^{3} Wh		Energy	001D
					8 digit BCD	10^{-3} m^3		Volume	001F
					6 digit BCD	10^{-3} m^3/h		Volume Flow	0021
					8 digit BCD	W		Power	0023
					4 digit BCD	10^{-1} ℃		Flow Temper...	0025
					4 digit BCD	10^{-1} ℃		Return Temp...	0026
					4 digit BCD	hours		Operating Time	0027

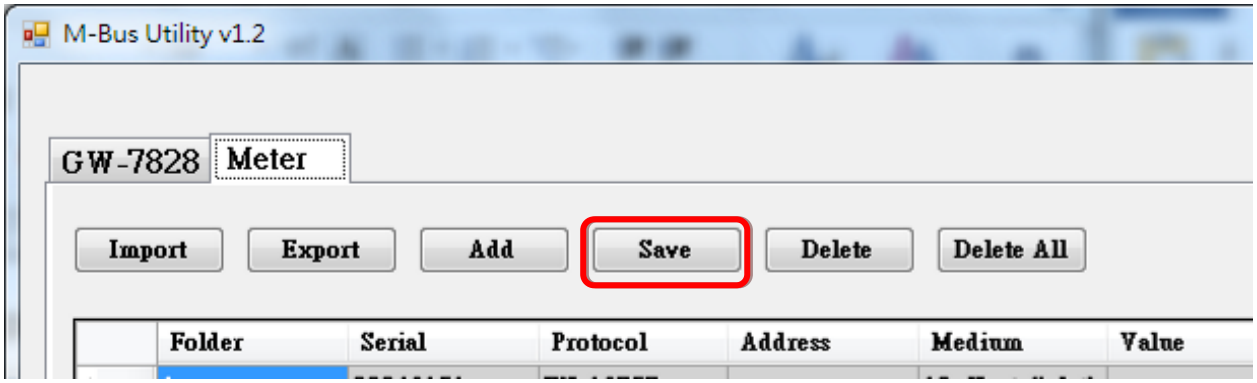
Step3: After add all meters on the utility list, press “Save” to save these parameters to the GW-7828.

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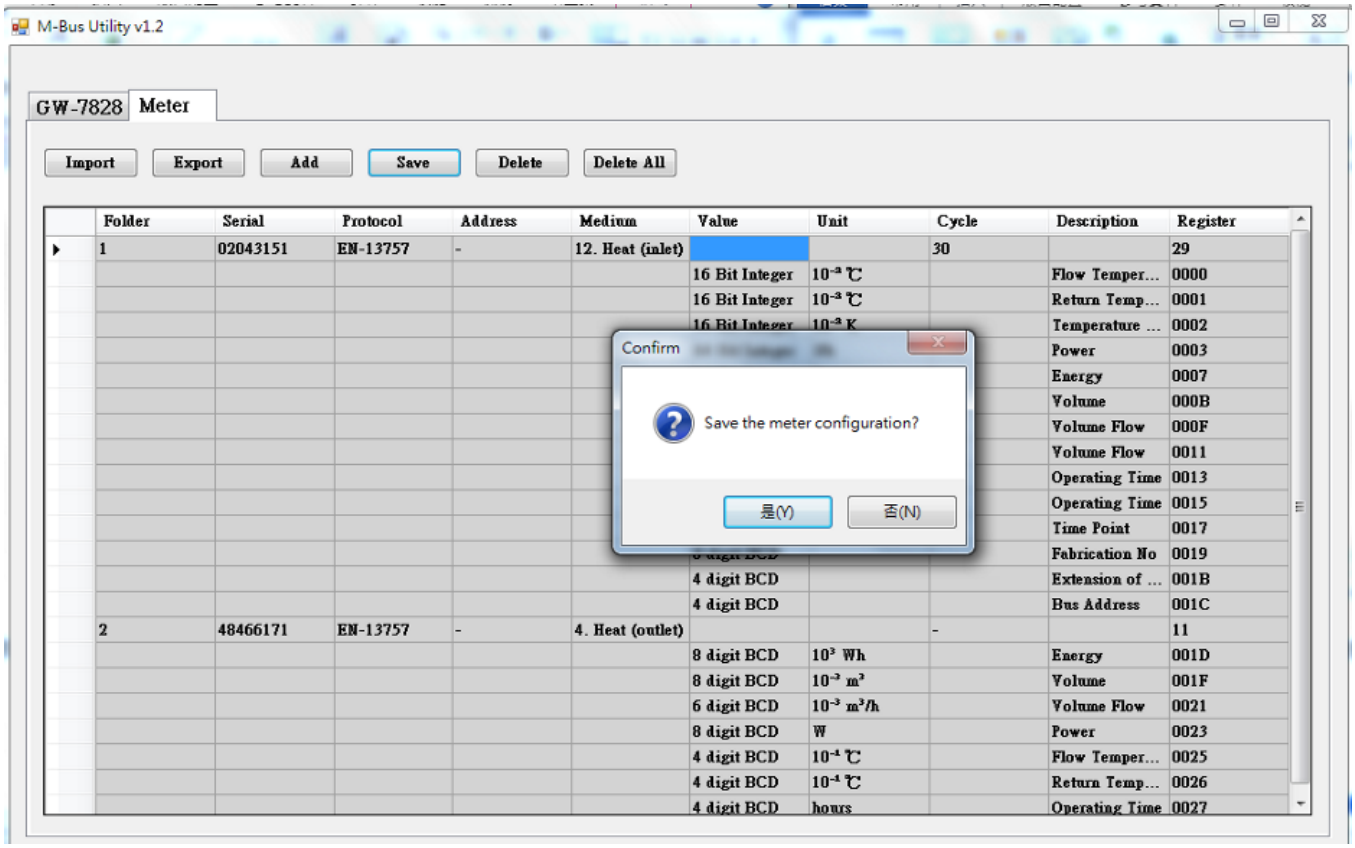
3.3.4 Save

After adding meters setting or importing configuration, use “Save” function to save configuration into the GW-7828.

Step1: Press “Save” button.

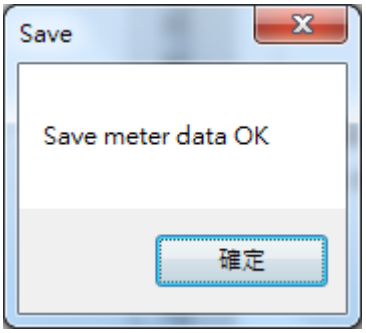


Step2: Confirm to save the configuration.



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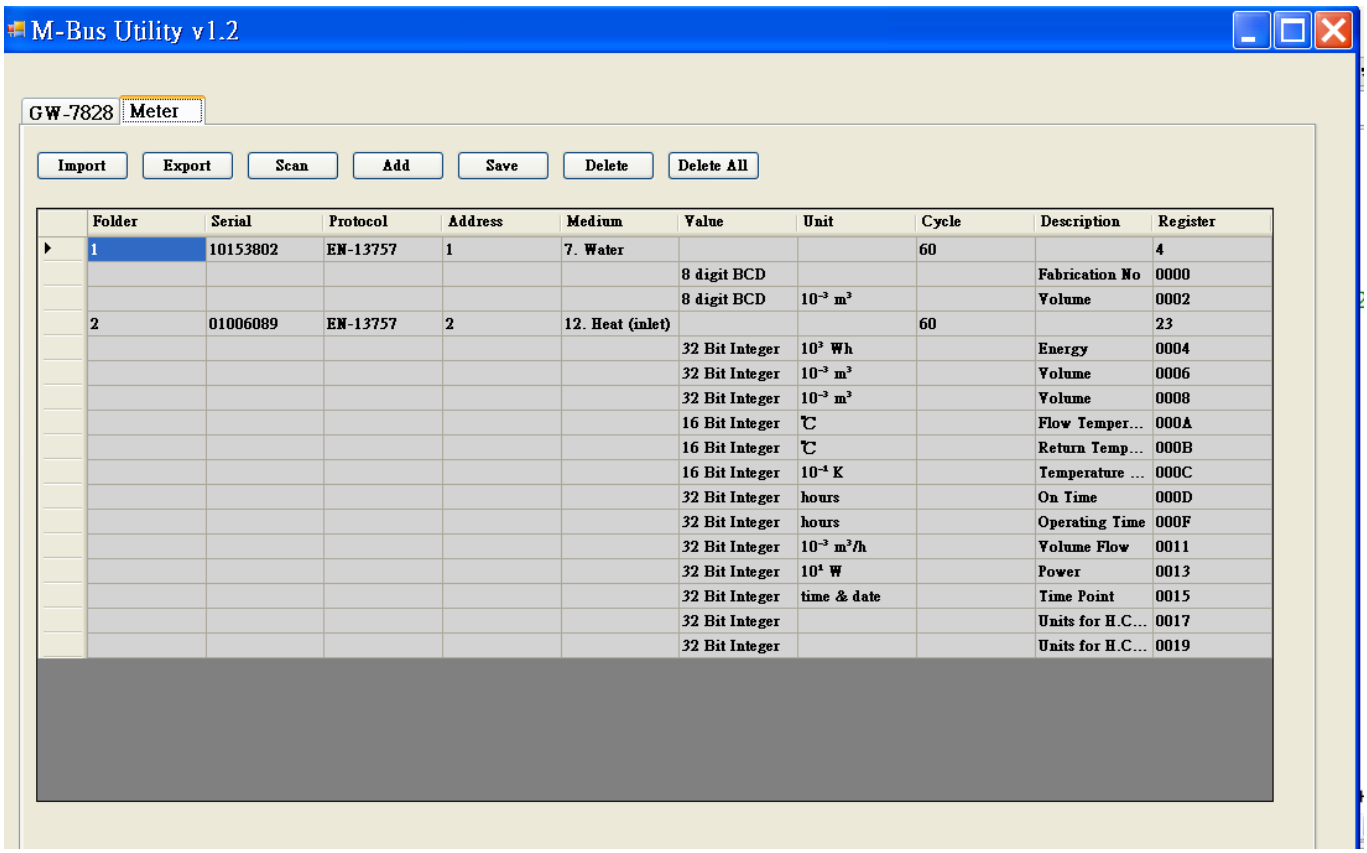
Step3: After saving success diagram showed, set the DIP switch to operation mode and reboot the module.



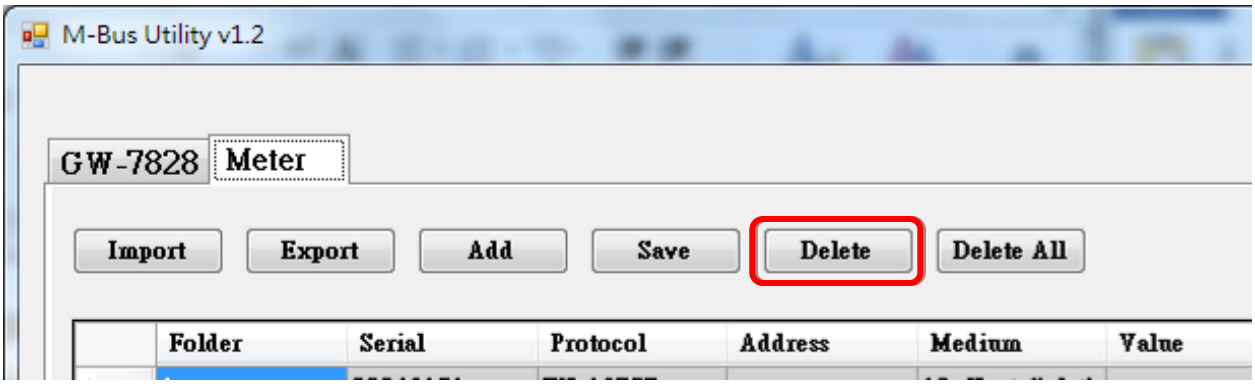
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3.3.5 Delete

The “Delete” function will delete one meter setting each time. Take the following setting as an example.

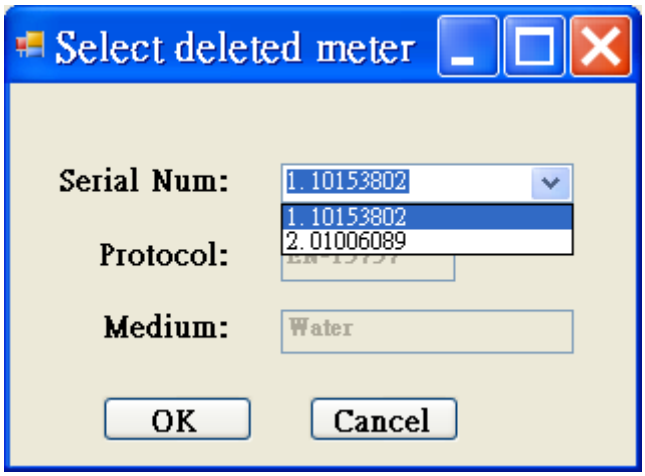


Step1: Press “Delete” button.



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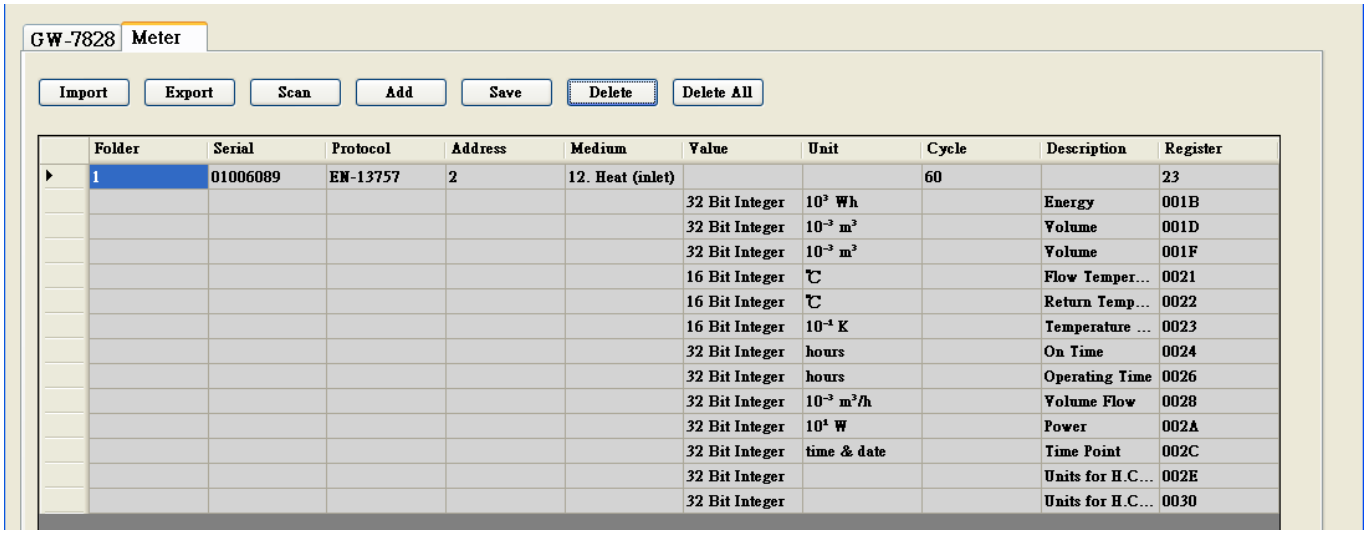
Step2: Select the serial number of meter which wanting to be deleted.



Step3: Confirm to delete meter which is selected.



Step4: it will show the meter information after deleting as below.



Folder	Serial	Protocol	Address	Medium	Value	Unit	Cycle	Description	Register
1	01006089	EN-13757	2	12. Heat (inlet)			60		23
					32 Bit Integer	10^3 Wh		Energy	001B
					32 Bit Integer	10^{-3} m^3		Volume	001D
					32 Bit Integer	10^{-3} m^3		Volume	001F
					16 Bit Integer	℃		Flow Temper...	0021
					16 Bit Integer	℃		Return Temp...	0022
					16 Bit Integer	10^{-1} K		Temperature ...	0023
					32 Bit Integer	hours		On Time	0024
					32 Bit Integer	hours		Operating Time	0026
					32 Bit Integer	10^{-3} m^3/h		Volume Flow	0028
					32 Bit Integer	10^1 W		Power	002A
					32 Bit Integer	time & date		Time Point	002C
					32 Bit Integer			Units for H.C...	002E
					32 Bit Integer			Units for H.C...	0030

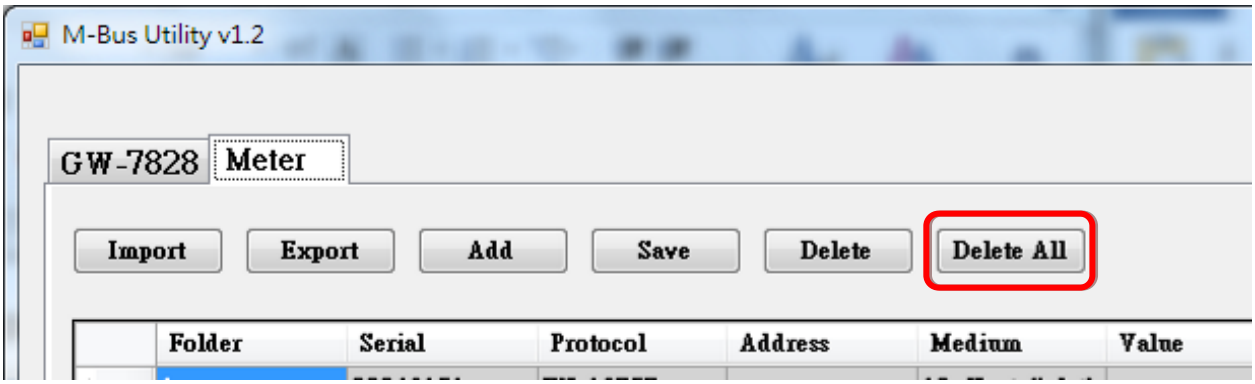
Step5: After delete meter configuration completely, press “Save” to save change to GW-7828.

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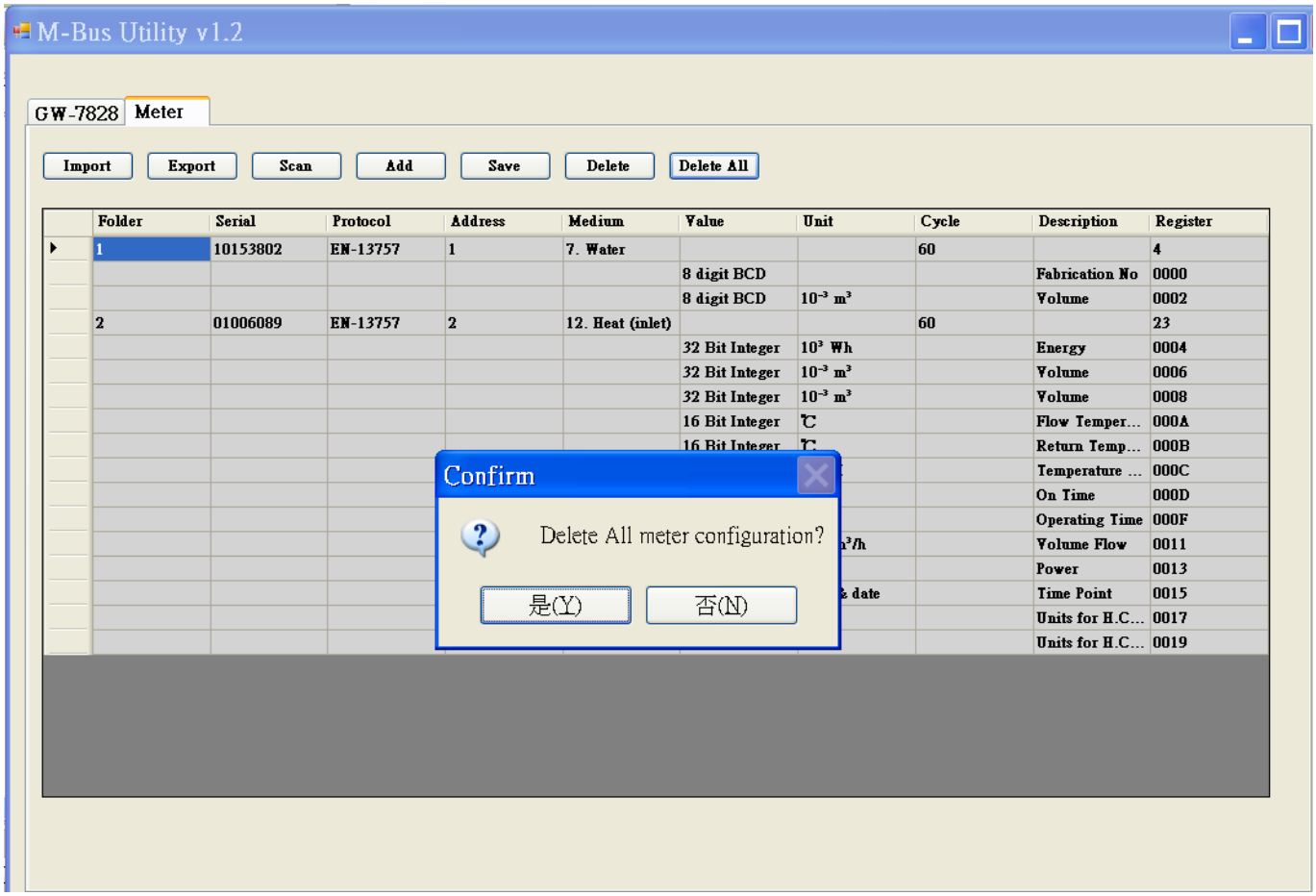
3.3.6 Delete All

The “Delete All” function can delete all meters setting on the utility list.

Step1: Press “Delete All” button.



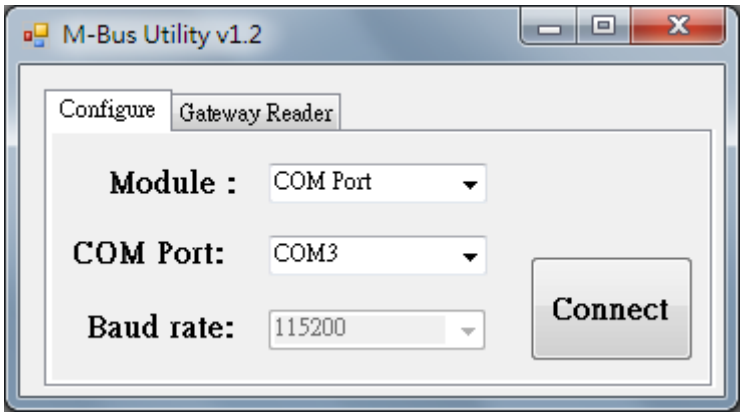
Step2: Confirm to delete all meters’ configuration.



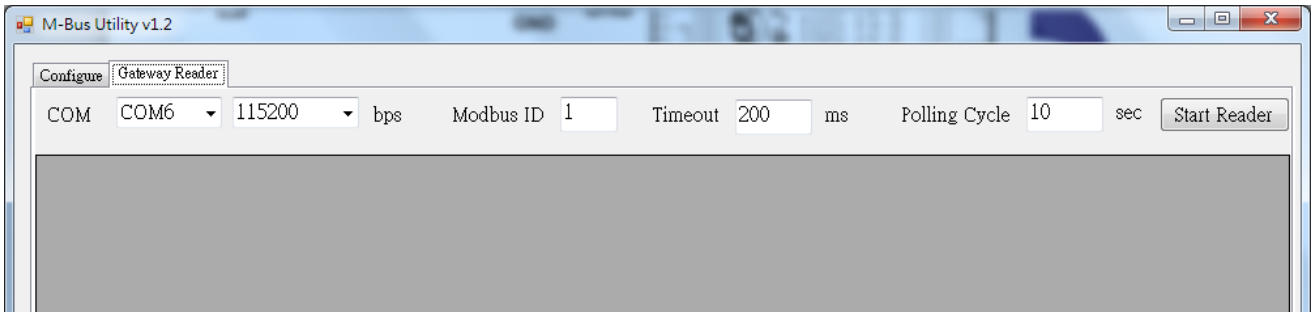
Step3: Finally press “Save” to save changing configuration.

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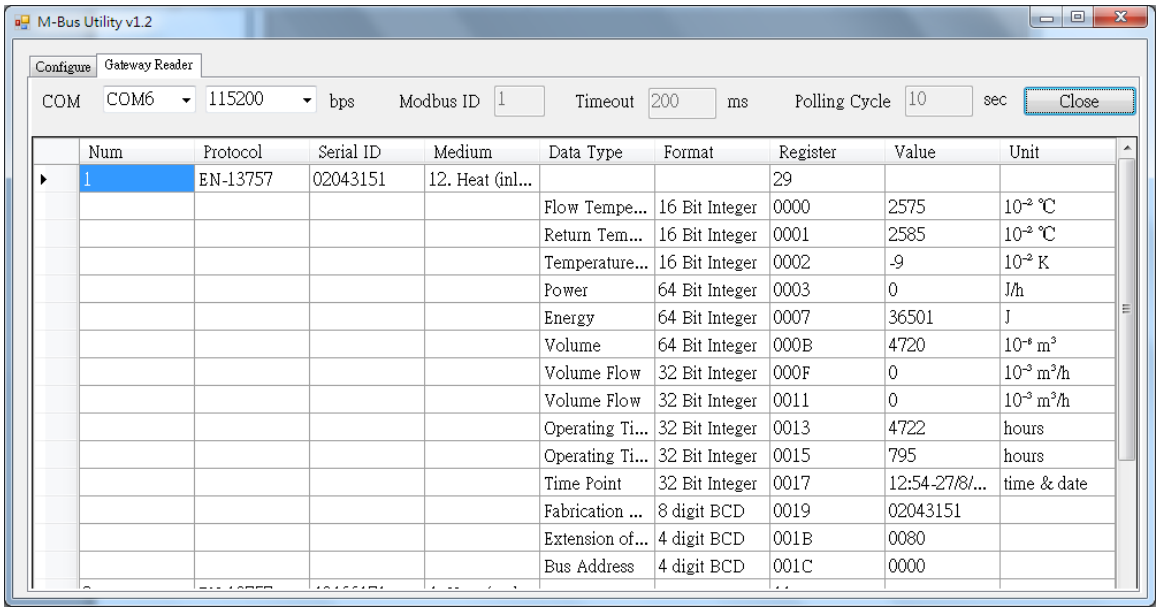
3.4 M-Bus Meter Communicate Test



After the meter is configured, the user can re-execute the M-Bus utility and then click “Gateway Reader” to read the meter data and check if the settings are correct.



After executing the “Gateway Reader”, select the COM port and timeout related options, and press the “Start Reader” button to import the configuration file exported in Section 3.3.2.



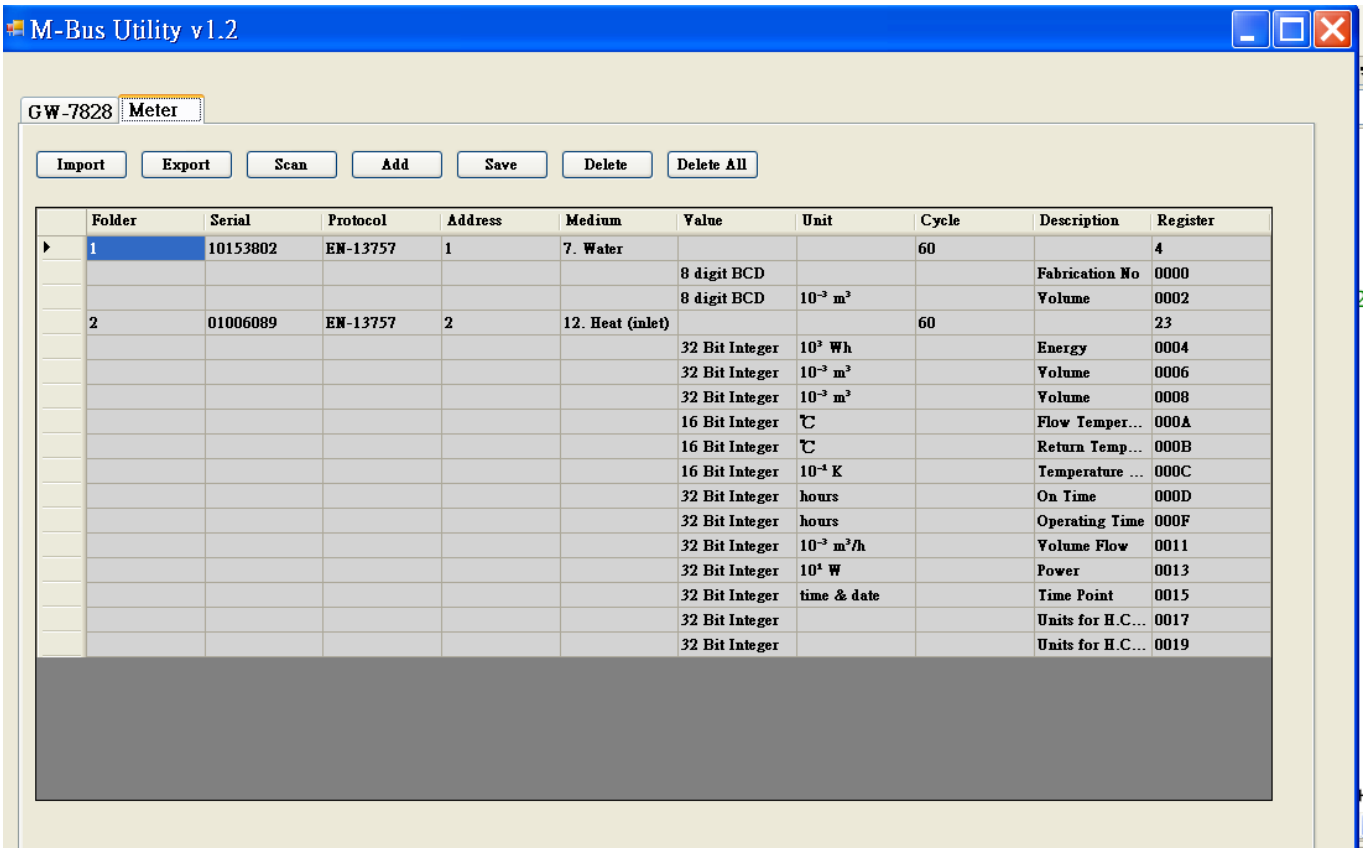
Num	Protocol	Serial ID	Medium	Data Type	Format	Register	Value	Unit
1	EN-13757	02043151	12. Heat (inl...			29		
				Flow Tempe...	16 Bit Integer	0000	2575	10^{-2} ℃
				Return Tem...	16 Bit Integer	0001	2585	10^{-2} ℃
				Temperature...	16 Bit Integer	0002	-9	10^{-2} K
				Power	64 Bit Integer	0003	0	J/h
				Energy	64 Bit Integer	0007	36501	J
				Volume	64 Bit Integer	000B	4720	10^{-6} m^3
				Volume Flow	32 Bit Integer	000F	0	10^{-3} m^3/h
				Volume Flow	32 Bit Integer	0011	0	10^{-3} m^3/h
				Operating Ti...	32 Bit Integer	0013	4722	hours
				Operating Ti...	32 Bit Integer	0015	795	hours
				Time Point	32 Bit Integer	0017	12:54-27/8/...	time & date
				Fabrication ...	8 digit BCD	0019	02043151	
				Extension of...	4 digit BCD	001B	0080	
				Bus Address	4 digit BCD	001C	0000	

It can test whether the value read matches the setting.

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4. Meter Configuration Label Description

After adding meters' configuration, the meters' information will be showed as below.



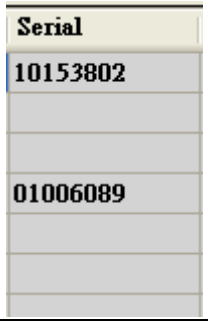
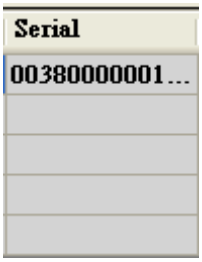
Folder	Serial	Protocol	Address	Medium	Value	Unit	Cycle	Description	Register
1	10153802	EN-13757	1	7. Water			60		4
					8 digit BCD			Fabrication No	0000
					8 digit BCD	10^{-3} m³		Volume	0002
2	01006089	EN-13757	2	12. Heat (inlet)			60		23
					32 Bit Integer	10^{3} Wh		Energy	0004
					32 Bit Integer	10^{-3} m³		Volume	0006
					32 Bit Integer	10^{-3} m³		Volume	0008
					16 Bit Integer	℃		Flow Temper...	000A
					16 Bit Integer	℃		Return Temp...	000B
					16 Bit Integer	10^{-1} K		Temperature ...	000C
					32 Bit Integer	hours		On Time	000D
					32 Bit Integer	hours		Operating Time	000F
					32 Bit Integer	10^{-3} m³/h		Volume Flow	0011
					32 Bit Integer	10^{1} W		Power	0013
					32 Bit Integer	time & date		Time Point	0015
					32 Bit Integer			Units for H.C...	0017
					32 Bit Integer			Units for H.C...	0019

There are some labels to record the meters' information for user's reference. User can find the meaning of the labels in the following section.

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4.1 Serial

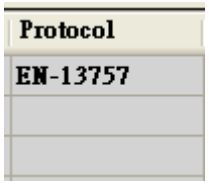
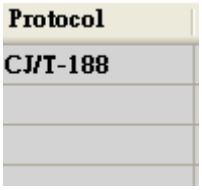
The “Serial” column records serial number of meters. Each meter that complies with the EN-13757 specification will have a set of 8-digit serial numbers, while meters that comply with the CJ / T-188 specification will have a set of 14-digit serial numbers. The meter serial number will be displayed in each meter data in the first column of the “Serial” field.

EN-13757	CJ/T-188
	

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4.2 Protocol

The “Protocol” field is used to indicate which specification of the meter following. GW-7828 supports two protocols EN-13757 and CJ/T-188.

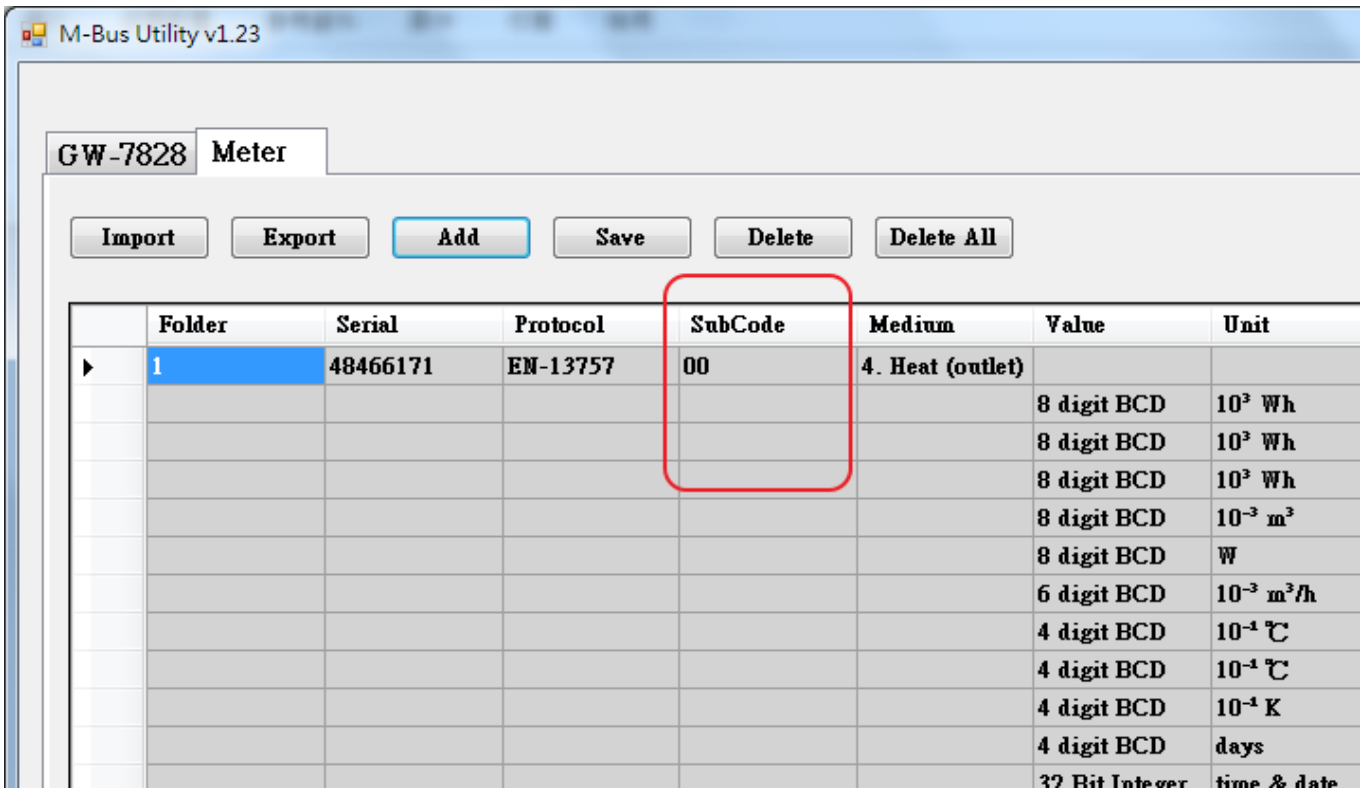
EN-13757	CJ/T-188
	

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4.3 SubCode

If the SubCode field is enabled, it will be filled with the array subcode currently used to read the table data.

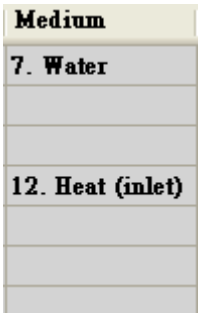
Note that the new meter can read the data preset by the meter manufacturer without filling in the subcode during the "Add" process. Once the subcode is filled in, the data read will no longer be the manufacturer default data, unless the meter is added again and fill in the original factory default subcode. It means that once the subcode is set, it will be permanently saved. About the default subcode, user should contact the meter manufacturer for it.



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4.4 Medium

The “Medium” field records medium of meters. It will show the medium of meters according to the definition in EN-13757 protocol or CJ/T-188 protocol.



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4.5 Value

The “Value” field records value type of meters’ data. It will show the value type of meters’ data according to the definition in EN-13757 protocol or CJ/T-188 protocol.

Value
8 digit BCD
8 digit BCD
32 Bit Integer
32 Bit Integer
32 Bit Integer
16 Bit Integer

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4.6 Unit

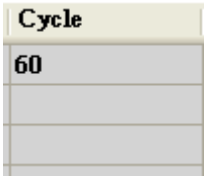
The “Unit” field records unit of meters’ data. It will show the unit of meters’ data according to the definition in EN-13757 protocol or CJ/T-188 protocol.

Unit
10^{-3} m^3
10^{3} Wh
10^{-3} m^3
10^{-3} m^3
℃
℃
10^{-1} K
hours
hours
10^{-3} m^3/h
10^{1} W
time & date

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4.7 Cycle

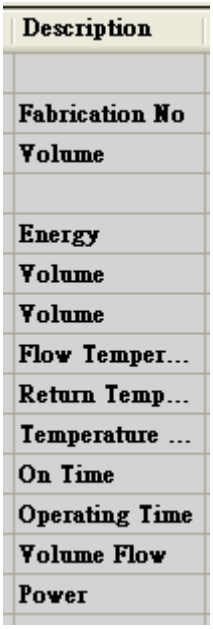
The “Cycle” field records the minimum cycle time (unit is sec.) for polling all meters’ data. Please be noted that the cycle time parameter is for all meters of the M-Bus network.



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4.8 Description

The “ Description” field records meaning of meters’ data. It will show the real meaning of meters’ data according to the definition in EN-13757 protocol or CJ/T-188 protocol.



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4.9 Register

The “Register” field records the total word count and the Modbus address of every data at GW-7828. Take the below as an example, this is a water meter (Medium) of EN-13757 protocol (Protocol) with serial number 10153802 (Serial). It has total 4 words data length (Register) and 1st data is 8 digit BCD type (Value) from Modbus address 0x0000 ~ 0x0001 (Register) and 2nd data is also 8 digit BCD type (Value) from Modbus address 0x0002 ~ 0x0003 (Register). The GW-7828 will update the meter data as fast as per 60 second one time (Cycle).

	Folder	Serial	Protocol	Address	Medium	Value	Unit	Cycle	Description	Register
▶	1	10153802	EN-13757	1	7. Water			60		4
						8 digit BCD			Fabrication No	0000
						8 digit BCD	10^{-3} m³		Volume	0002

Note: If GW-7828 updates all meters data faster than setting cycle time 60 second, the all meters data will be update every 60 second. But if slower than 60 seconds, GW-7828 will update all meters data as soon as possible.

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Appendix A. Firmware Update

The firmware on the GW-7828 module can be updated via COM Port. The latest firmware file (*.fw file) and the latest version of the firmware update utility (FW_Update_Tool.zip) are available from the web link below. A notification will not be sent when a new version is released.

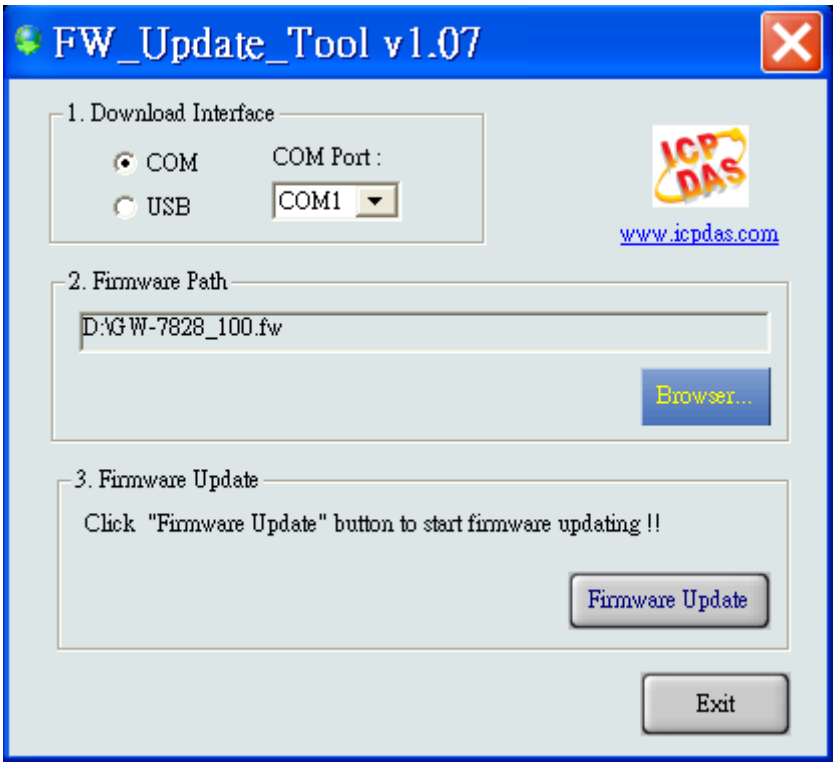
http://ftp.icpdas.com.tw/pub/cd/fieldbus_cd/m-bus/gateway/GW-7828/firmware/

http://ftp.icpdas.com.tw/pub/cd/fieldbus_cd/m-bus/gateway/GW-7828/software/

Following shows the firmware update process for GW-7828 using firmware update utility.

Step 1: Move DIP switches to the firmware update mode (Init ON) and reboot the module.

Step 2: Run firmware update utility, FW_Update_Tool_vX.XX.exe (X denotes version number).



- **Download the Firmware:**
  - (1) Click the "**Browser…**" button to select the location of the firmware file. The name of the firmware file is GW-7828_XXX.fw (X denotes version number).
  - (2) Click the " **Firmware Update**" button to being the firmware update process. Once the firmware has been successfully updated, a notification "Firmware Update Success" will be displayed.

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Appendix B. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
1.0.0	January 2020	First Release

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