



Making Data Acquisition Easy

CAGE/NCAGE CODE: 3FNFO

GW-7238D

J1939 to Modbus TCP / Modbus RTU Gateway

Quick Start Guide

Product Website:

http://www.icpdas-usa.com/gw_7238.html

Package checklist

The package includes the following items:

- One GW-7238D hardware module
- One Quick Start
- One software utility CD
- One screw driver
- One RS-232 cable (CA-0910)



1. Introduction

The GW-7238D J1939 to Modbus TCP server / Modbus RTU Slave Gateway is a gateway that provides conversion between J1939 and Modbus TCP/ Modbus RTU protocol. For J1939 network, the GW-7238D supports PDU1, PDU2, broadcast and destination specific type of J1939 messages. For Modbus TCP/RTU network, the GW-7238D is a Modbus TCP server / RTU slave to reply the request from Modbus TCP client / RTU master. Utility software is provided for users to configure J1939 and Modbus TCP/RTU setting in the GW-7238D. The application fields can be diesel power-train applications, In-Vehicle networks for trucks and buses, etc.

2. Appearance and Pin Assignment

Table 1: COM Connector Pin Assignment

Pin No.	Name	Description
1	CTS1	CTS pin of COM1 (RS-232)
2	RTS1	RTS pin of COM1 (RS-232)
3	RXD1	RXD pin of COM1 (RS-232)
4	TXD1	TXD pin of COM1 (RS-232)
5	INIT*	Initial pin for enable/disable AUTOEXEC.BAT
6	(Y)D2+	Data+ pin of COM2 (RS-485)
7	(G)D2-	Data- pin of COM2 (RS-485)
8	(R)VS+	V+ of power supply
9	(B)GND	GND of power supply

Table 2: CAN bus Connector Pin Assignment

Pin No.	Name	Description
1	N/A	Not Connected
2	CAN_L	CAN_L bus line (dominant low)
3	N/A	Not Connected
4	CAN_H	CAN_H bus line (dominant high)
5	N/A	Not Connected



3. LED Displays Indication

Table 3: LED indication of the GW-7238D

LED Name	GW-7238D Status	LED Status
PWR LED	Firmware is running	On
	Power Failure	Off
ERR LED	No Error	Off
	Error	Blink
J1939 LED	Transmission	Blink
	Bus Idle	Off
MODBUS LED	Transmission	Blink
	Bus Idle	On or Off

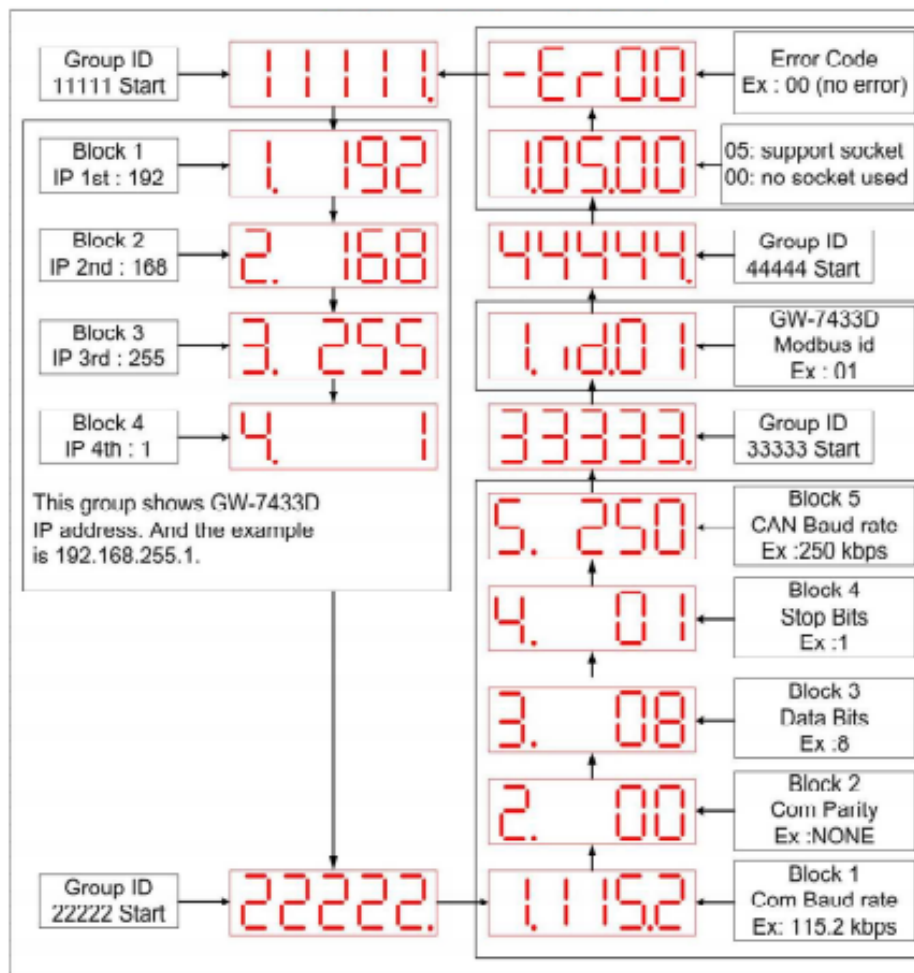


Figure 2: The meaning of the 7-segment LED

4. Installation

If users want to start the GW-7238D normally, it needs to follow these steps to install the GW-7238D below:

Step1: Check GW-7238D Firmware Mode

Users need to set the dip-switch to the “Normal” position as Figure 3 and reset the power, and then the GW-7238D would run in the operation mode.

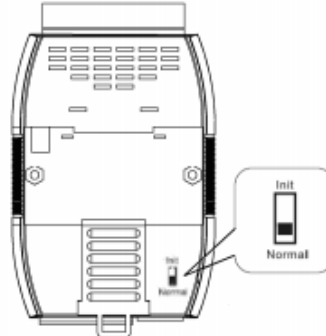


Figure 3: Operation mode Position of Dip-Switch

Step2: J1939 network - CAN bus connection

Connect the CAN ports with the GW-7238D modules and ECU (e.g. engine) in J1939 network using the following structure as Figure 4.

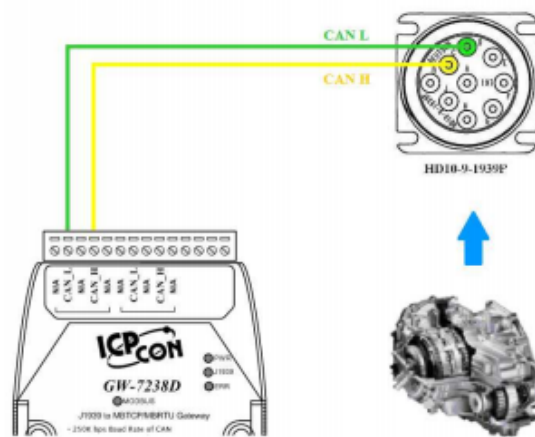


Figure 4: CAN bus Wire Connection

Step3: Modbus network - Serial / Ethernet port connection

The GW-7238D can communicate both Modbus TCP and Modbus RTU to J1939 at the same time. In Modbus RTU communication, it is recommended to use only one serial port (RS-232 or RS-485) of the gateway at the same time.

The following figures describe the COM, Ethernet and Power port connections.

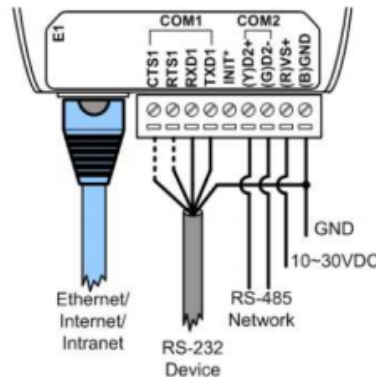


Figure 5: COM, Ethernet and Power port connections of GW-7238D

Step4: Power wire connection

Connect the power supply to the GW-7238D module's power terminal connector; please see as Figure 5.

Step5: Connect to GW-7238D

When in the first connection, the controller may run the **Serial network** at 115200 baud with none parity, 1 stop bit and 1 Net ID; or run the **Ethernet network** and set on the same subnet to connect via IP address(192.168.255.1) shown as below figure.

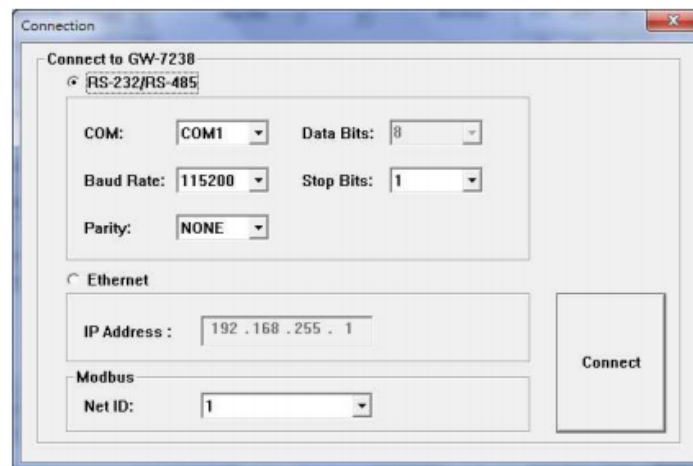


Figure 6: Connection Interface of GW-7238D Utility

5. GW-7238D Utility Configuration

■ Modbus Network Configuration

The GW-7238D and the controller must be set the same serial communication parameters or be on the same subnet via Ethernet communication of the Modbus network configuration. The Modbus network configuration screen from the GW-7238D is shown as Figure 7.



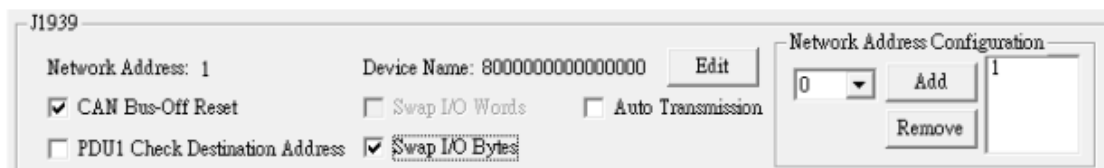
Communication Settings		
Net ID:	1	Data Bits:
Baud Rate:	115200	Stop Bits:
Parity:	NONE	IP Address :
		Net Mask :
		Gateway :

Figure 7: Modbus configuration screen

■ J1939 Network Configuration

The device NAME should be set according to the application and the vendor where the module is being used based on the J1939 network specification.

The J1939 network configuration screen from the GW-7238D is shown as Figure 8.



J1939		Network Address Configuration	
Network Address: 1	Device Name: 8000000000000000	0	1
<input checked="" type="checkbox"/> CAN Bus-Off Reset	<input type="checkbox"/> Swap I/O Words	Add	Remove
<input type="checkbox"/> PDU1 Check Destination Address	<input checked="" type="checkbox"/> Swap I/O Bytes		

Figure 8: Modbus configuration screen



■ J1939 I/O Configuration

The following figure is a PGN definition about Electronic Transmission Controller when users want to receive the Transmission Output Shaft Speed from the transmission and send the Transmission Input Shaft Speed to the transmission via the GW-7238D.

PGN 61442		Electronic Transmission Controller 1		- ETC1
Transmission Repetition	10 ms			
Data Length:	8			
Data Page:	0			
PDU Format:	240			
PDU Specific:	2	PGN Supporting Information:		
Default Priority:	3			
Parameter Group Number:	61442	(0xF002)		
Start Position	Length	Parameter Name	SPN	
1.1	2 bits	Transmission Driveline Engaged	560	
1.3	2 bits	Torque Converter Lockup Engaged	573	
1.5	2 bits	Transmission Shift In Process	574	
2-3	2 bytes	Transmission Output Shaft Speed	191	
4	1 byte	Percent Clutch Slip	522	
5.1	2 bits	Engine Momentary Overspeed Enable	606	
5.3	2 bits	Progressive Shift Disable	607	
6-7	2 bytes	Transmission Input Shaft Speed	161	
8	1 byte	Source Address of Controlling Device for Transmission Control	1482	

Figure 9: Example of a parameter group definition of SAE J1939/71

Table 4: Configuration data of J1939 and Modbus

Parameters	PGN	Data Length (bytes)	Byte Order In J1939 Data Field	Byte Order in MODBUS	MODBUS Address
Send					
Input Shaft Speed	61442(Dec) F002(Hex)	2	5	0	40001
Receive					
Output Shaft Speed	61442(Dec) F002(Hex)	2	1	0	30001

Note: PGN/Data Length/Byte Oder in J1939 Data Field

=> Transmission manufacturers provide the information required

Byte Order in MODBUS

=> User-defined Modbus address

Register Offset	Data Length	PGN	Priority	Address	Update Rate	Message Offset
0	2	61442	3	6	10	5
J1939 Input Table						
Input Register	Data Length	PGN	Source Addr...	Update Rate	Message Off...	
0	2	61442	6	10	1	
J1939 Output Table						
Output Reg...	Data Length	PGN	Priority	Destinatio...	Update Ra..	Message O...
0	2	61442	3	6	10	5
Byte Order In Modbus	Data Length	PGN (DEC)	Priority	ECU's J1939 Address	Transm-ission Repetiti-on	Byte Order In J1939 Data Field

Figure 10: J1939 configuration screen

■ Upload Parameter to the GW-7238D

After the previous parameter settings, users need to upload the parameters to the GW-7238D. Please refer to the following figure to finish the operation.

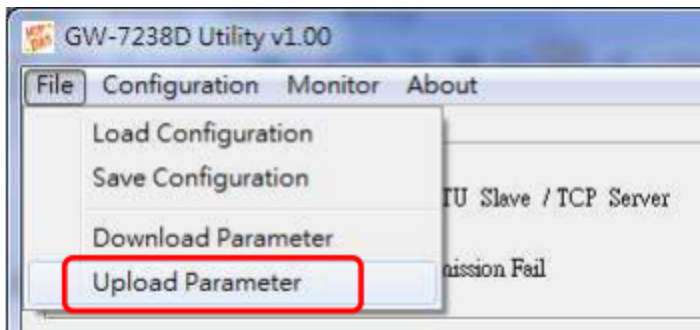


Figure 11: Parameter upload screen



Making Data Acquisition Easy

■ Modbus Communication – Modbus RTU

Set J1939 output data

Using the Modbus command as below:

FC16 Write multiple registers (4xxxx) for AO

Example:

In the address 40001, write the value in 0x1234.

[Request Command] (Byte0, Byte1... Byten) (Hex)

01 10 00 00 00 01 02 **12 34** AB 27(CRC)

Get J1939 input data

Using the Modbus command as below:

FC4 Read multiple input registers (3xxxx) for AI

Example:

Read a value of one word in the address 30001.

[Request] (Byte0, Byte1... Byten) (Hex)

01 04 00 00 00 01 31 CA(CRC)

GW-7238D responds a value of one word in the address 30001.

[Response](Byte0, Byte1... Byten) (Hex)

01 04 02 **12 34** B4 47(CRC)



Start or Stop sending J1939 output message

1 · Using the Modbus command as below:

FC6 Write single register (4xxxx) for AO

Example: Start sending J1939 output message

In the address 42009, write the value in 0x00.

[Request Command] (Byte0, Byte1... Byten) (Hex)

01 06 07 D8 00 00 08 85(CRC)

Example: Stop sending J1939 output message

In the address 42009, write the value in 0x01.

[Request Command] (Byte0, Byte1... Byten) (Hex)

01 06 07 D8 00 01 C9 45(CRC)

Or

2 · Without have to control the Modbus register 42009 (Dec), just enable “Auto Transmission” function in J1939 configuration area as below, and upload to GW-7238D.



Figure 12: J1939 Auto Transmission function screen

■ Modbus Communication – Modbus TCP

Set J1939 output data

Using the Modbus command as below:

FC16 Write multiple registers (4xxxx) for AO

Example:

In the address 40001, write the value in 0x1234.

[Request Command] (Byte0, Byte1... Byten) (Hex)

00 00 00 00 00 09 01 10 00 00 00 01 02 12 34



Get J1939 input data

Using the Modbus command as below:

FC4 Read multiple input registers (3xxxx) for AI

Example:

Read a value of one word in the address 30001.

[Request] (Byte0, Byte1... Byten) (Hex)

00 00 00 00 00 06 01 04 00 00 00 01

GW-7238D responds a value of one word in the address 30001.

[Response](Byte0, Byte1... Byten) (Hex)

00 00 00 00 00 05 01 04 02 12 34

Start or Stop sending J1939 output message

1 · Using the Modbus command as below:

FC6 Write single register (4xxxx) for AO

Example: Start sending J1939 output message

In the address 42009, write the value in 0x00.

[Request Command] (Byte0, Byte1... Byten) (Hex)

00 00 00 00 00 06 01 06 07 D8 00 00

Example: Stop sending J1939 output message

In the address 42009, write the value in 0x01.

[Request Command] (Byte0, Byte1... Byten) (Hex)

00 00 00 00 00 06 01 06 07 D8 00 01

Or

2 · Without have to control the Modbus register 42009 (Dec), just enable "Auto Transmission" function in J1939 configuration area as below, and upload to GW-7238D.

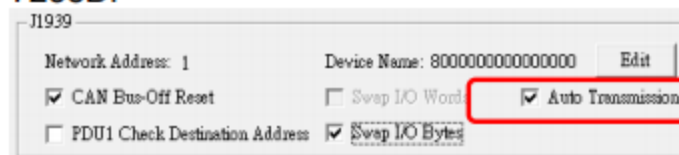
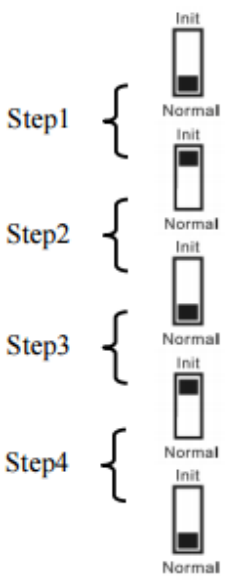


Figure 13: J1939 Auto Transmission function screen

6. Troubleshooting

Item	Trouble state	Solution
1	CAN Bus Transmission Fail (Power LED Blink per 100 ms)	Make sure the CAN bus wiring is connected, and connected to the correct pin.
2	CAN Bus-Off (Power LED Blink per 500 ms)	Make sure the CAN bus wiring does not short-circuit
3	Can't Claim Address in J1939 Network (Power LED Blink per 1000 ms)	Please configure another J1939 network address in GW-7238D Utility.
4	Can not transmit the output J1939 message	<ol style="list-style-type: none"> 1. Make sure the Start/Stop sending J1939 output message register (42009) is 0x00. 2. Make sure the Update Rate of J1939 output message table is not zero.
5	<p>How to restore factory default</p> 	<ol style="list-style-type: none"> 1. Power on the GW-7238D 2. Change the Dip-Switch position of the GW-7238D and to complete the following steps in 5 seconds. <ul style="list-style-type: none"> Step1. From "Normal" to "Init" position. Step2. From "Init" to "Normal" position. Step3. From "Normal" to "Init" position. Step4. From "Init" to "Normal" position. 3. When the correct implementation of the above steps, the J1939/Modbus LEDs of the GW-7238D should be turn on, and that should be turn off after 500 ms later. 4. Reset the power of the GW-7238D, and the GW-7238D



Making Data Acquisition Easy

CAGE/NCAGE CODE: 3FNFO

		<p>would back to factory defaults. 6. Reconnect the GW-7238D by using the serial network setting as 115200 baud with none parity, 1 stop bit and 1 Net ID; or run the Ethernet network and set on the same subnet to connect via IP address(192.168.255.1)</p>
--	--	--