

User Manual and Installation

EDGE

CAN-J1939 Data Logger & Modbus - TCP Gateway



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1. PREFACE

1.1 Purpose of Document

The document covers Installation and usage of Embedos EDGE J1939 Datalogger device and J1939 to Modbus-TCP Gateway device.



2. Connection Diagram



3. Instructions

3.1. Power up the EDGE device

- a. Connect CAN-H and CAN-L lines from CAT Engine ECM to CANH and CANL ports of EDGE device. (No GND connection required).
- b. Switch ON COM-1 switch that corresponds to CAN Termination resistance of 120 Ohms.
- c. Connect 24VDC power supply to EDGE device (Keep it powered OFF).

3.2. Initial connection over the Ethernet port

- a. EDGE devices come set with a fixed IP 192.168.20.1. This IP domain can be used to connect to the EDGE device.
- b. Connect an Ethernet patch cord, one end of the cord to the Ethernet port of the EDGE and the other to the port on your computer.
- c. Power ON the EDGE using the correct source for the model of the device.
- d. On a Windows computer, Open 'Network & Internet Settings'. Then select 'Change adapter options'





On the next Window that opens up, search for your PC's Ethernet port, right click on its icon and select properties



On the next window that opens up, double click on 'Internet Protocol Version 4 (TCP/IPv4)'

etwork s	Ethernet Properties Networking Sharing	×
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ou have a tered conr	Client for Microsoft Networks General Printer Sharing for Microsoft Networks General PrintualBox NDIS6 Bridged Networking Driver Diver Nocap Packet Driver (NPCAP)	
ange conn	GoS Packet Scheduler Anternet Protocol Version 4 (TCP/IPv4) Microsoft Network Adapter Multiplexor Protocol	· ·
ow availab	Install Uninstall Pro	perties

On the next window that opens up, check the 'Use the following IP address' radio button. Enter the IP address as 192.168.20.2 and Subnet mask as 255.255.255.0



Click 'OK' to save settings.

e. Open windows command prompt 'cmd' and type "ping 192.168.20.1" A reply will confirm that the PC and EDGE are now on the same local network.

```
C:\WINDOWS\system32\cmd.exe
C:\Users\shiva>ping 192.168.20.1
Pinging 192.168.20.1 with 32 bytes of data:
Reply from 192.168.20.1: bytes=32 time=1ms TTL=64
Ping statistics for 192.168.20.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 1ms, Average = 1ms
```



3.3. J1939 Data Logger application setup

1) In the browser of the PC connected to the EDGE (ex: Google Chrome), type address <u>192.168.20.1:1880/ui</u>

<u>Note</u>: Here 192.168.20.1 is the Static IP address of the EDGE Datalogger and 1880 is the port number on which the application is running.

This will load the Dashboard page as shown below:





2) Go to Application Control and Select -> Stop Logging

😪 Embedos J1939 Parametric Da	ashi 🗙 😞 New Tab	× +			0	- 0 ×
← → C ▲ Not secu	re 192.168.20.1:1880/ui/#!/2?socketid=M	/Ipq9zAKEzXGXLAE4AAAC		Q	☆	lncognito
🕞 Action Plan - Zoho 🕞 De	evice Deployment 🚔 Orange Pi One as a	民 Versioning - Zoho S 🚺 Raspberry	Pi: Moun 🚷 How to Configure a			» 🔝 Reading list
Embedos J1939 Parame	etric Dashboard v1.0.0					
Realtime Data		Start/Stop Logging	Restart Application			
Settings		START LOGGING	RESTART DASHBOARD			
Application Control		STOP LOGGING				
Logs						

3) Go to Settings -> Type in the Source Address of the ECU/ECM whose parameters need to be monitored. (See end of this document to know -> How to find RAW CAN dump traces and view Source address)

Embedos J1939 Param	Saved Source address		
Realtime Data	ECU Source Address (00 to FF)	Save Addres	80
Settings	Source Address 80	SAVE	
Application Control			-
Logs			

As visible in the image above, the Source Address of the ECU is entered as "80" in HEX and can be saved by clicking on Save Button.



4) Go to Settings and click on "Start Logging " button and then click on "Restart Dashboard".Restarting the system might take some time (30sec to 45sec). Text "Connection lost" is an expected behavior



Click on start logging and Restart the dashboard

Embedos J1939 Parametric Dashi 🗙 😤 Embedos Engineering LLP : 192.	1 × +		0	- 0 ×			
$\leftrightarrow \rightarrow \mathbf{C}$ (A Not secure 192.168.20.1:1880/ui/#1/2?socketid=WGJHK9QUq3NCKb2AAAC Q \Rightarrow (a) Incognito :							
🗜 Action Plan - Zoho 🛱 Device Deployment 🎡 Orange Pi One as a 🛱 Versioning - Zoho S 🙀 Raspberry Pi: Moun 🔇 How to Configure a 😮 📋 Reading list							
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📑 Realtime Data	Start/Stop Logging	Restart Application					
Settings	START LOGGING	RESTART DASHBOARD					
Application Control	STOP LOGGING	2					
Logs							

Note:

a) Once required Logging is done, "Stop Logging" button can be pressed.



- b) Source Address will be taken as previously saved value by default if no Value is entered.
- 5) Recorded logs can be seen in the "Logs" Section.
- -> Click on "Logs" in the left side Tab
- -> Click on "Refresh" button to reload the log files
- -> Click on the required log file to download.



Note:

- a) It is recommended to download the logs when the Data logging is stopped or paused.
- b) For larger log files, time taken to download the logs will be more.
- c) Logs older than a month get automatically deleted.

6) Viewing the Logs can be done in Notepad or on Microsoft Excel. The saved logs are in .csv format. Hence they can be easily opened in MS Excel.



Embedos J1939 Parame	tric Dashboard v1.0.0			
Realtime Data	File Browser			
Settings	C REFRESH			
Application Control	File Name	Changed 1/1/2000, 6:56:12 AM	Size 0.039743 MB	
Logs		11/20/2021, 8:34:57 PM 11/23/2021, 3:00:59 PM 11/24/2021, 10:28:20 PM	4.287693 MB 0.643085 MB	
	1005-201-11_002-153V	1/3/2000, 5:30:10 AM	0.201844 MB 0.004777 MB	
	1			
2				
(logs 3 1 2000.csv	^			Show all X

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	Clipboard	G		Font 🕞		Alignm	ent	G.	Num	iber 🛱		Styles		Cells			Editing		
	A1		• (*	fx 3/1/2000															
	А	В		С	D	E	F	G	Н	I.	J	K	L	M		N	0	Р	Q
1	3/1/2000	5:25:15	AM	Percent Load	47	%	61443												
2	3/1/2000	5:25:15	AM	Fuel Pressure	280	kPa	65263												
3	3/1/2000	5:25:15	AM	Oil Pressure	380	kPa	65263												
4	3/1/2000	5:25:15	AM	Battery Voltage	24	V	65271												
5	3/1/2000	5:25:15	AM	Inlet manifold Temperatur	re 33	Ã,°C	65270												
6	3/1/2000	5:25:15	AM	Boost Pressure	4	kPa	65270												
7	3/1/2000	5:25:15	AM	Fuel Temperature	215	Ã,°C	65262												
8	3/1/2000	5:25:15	AM	Coolant Temperature	79	Ã,°C	65262												
9	3/1/2000	5:25:15	AM	Fuel rate	96.25	L/hr	65266												
10	3/1/2000	5:25:15	AM	Engine Speed	1925.5	RPM	61444												
11	3/1/2000	5:25:15	AM	Percent Load	47	%	61443												
12	3/1/2000	5:25:15	AM	Fuel Pressure	280	kPa	65263												
13	3/1/2000	5:25:15	AM	Oil Pressure	380	kPa	65263												
14	3/1/2000	5:25:15	AM	Battery Voltage	24	V	65271												
15	3/1/2000	5:25:15	AM	Inlet manifold Temperatu	re 33	Ã,°C	65270												
16	3/1/2000	5:25:15	AM	Boost Pressure	4	kPa	65270												
17	3/1/2000	5:25:15	AM	Fuel Temperature	215	Ã,°C	65262												
18	3/1/2000	5:25:15	AM	Coolant Temperature	79	Ã,°C	65262												
19	3/1/2000	5:25:15	AM	Fuel rate	96.25	L/hr	65266												
20	3/1/2000	5:25:15	AM	Engine Speed	1925.5	RPM	61444												
21	3/1/2000	5:25:16	AM	Percent Load	47	%	61443												
22	3/1/2000	5:25:16	AM	Fuel Pressure	280	kPa	65263												
23	3/1/2000	5:25:16	AM	Oil Pressure	380	kPa	65263												
24	3/1/2000	5:25:34	AM	Percent Load	47	%	61443												
25	3/1/2000	5:25:34	AM	Fuel Pressure	280	kPa	65263												
26	3/1/2000	5:25:34	AM	Oil Pressure	380	kPa	65263												
4 4	► H log	s_3_1_	2000	0 ⁄ 💭								4							

As seen above, logs of 13 Parameters is saved inside the csv file and can be viewed on MS-Excel

3.4. J1939 to Modbus-TCP Gateway device setup

1) Connection Diagram for Modbus TCP Gateway:





Note:

1) EDGE device can be physically connected via Ethernet cable to any PC or PLC on its RJ45 Connector port for Modbus-TCP communication.

2) Modbus TCP communication is carried out by EDGE device on IP address: 192.168.20.1 and Port number : 11502

Follow steps 1) to 4) from the previous section 3.3 to setup the configuration for Modbus TCP Datalogger

2) Modbus TCP Application on Windows PC

```
a. Download Modbus TCP application from Ethernet in case ModScan Software is unavailable.
Open source Modbus Software QModMaster can be found here : <u>https://sourceforge.net/projects/qmodmaster/files/latest/download</u>
```



b. After downloading the app, unzip the setup into a new folder.

```
The gModMaster-Win32-exe-0.5.3-beta 8/24/2021 7:46 PM WinRAR ZIP archive 26,827 KB
```

c. Search in Windows for qModMaster.exe and launch the application or directly go to installation folder to launch the same .exe application.

All Apps Documents Web More 🕶	<i>₽</i> ··· ×
Best match	
QModMaster Text Document Last modified: 11/24/2021, 9:55 PM App	QModMaster Text Document
Search the web Click here to launch app Image: Provide the second sec	Location C:\Users\shiva\OneDrive\Documents\Softwar es\qModMaster-Win32-exe-0.5.3-beta\qMo dMaster-0.5.3-beta Last modified 11/24/2021, 9:55 PM Image: Copy path Open Image: Copy path Copy path
𝒫 qmod Master	

- 3) qModMaster Configuration settings:
- a) Following window opens when the application is launched.



a QModMaster	_	_	\times
File Options Commands View Help			
9 I 🕺 🖀 🗘 🍾 C 📄 🗆 💥 🗊	朢 ☑	20	٢
Modbus Mode RTU V Slave Addr 1 + Scan Rate (ms) 1000 +			
Function Code Read Coils (0x01) V Start Address 1	Dec 🗸	/	
Number of Coils 1 🗘 Data Format Bin 🗸			
-			
RTU : COM1 9600,8,1,None Base Addr : 1 Packets : 0 Endiar	n : Little	Errors : 0	

b) Select Modbus Mode : TCP

■ QModMaster - ×
File Options Commands View Help
9 🖓 🕺 🖾 😒 🖕 C 📄 💷 🔏 🥅 😫 🖬 😒 🕚 🥹
Modbus Mode TCP Junit ID 1 🕏 Scan Rate (ms) 1000 🗢
Function Code Read Edils (0x01) V Start Address 1 Dec V
Number of Coils 1 Data Format Bin 🗸
Select TCP
TCP : 127.000.000.001:502 Base Addr : 1 Packets : 0 Endian : Little Errors : 0

c) Select Modbus Mode : TCP and enter the IP address and TCP Port as shown below:



QModMaster	×
Modbus Mode TCP V Unit ID 1 Scan Rate (ms) 1000	0
Function Code Read Modbus TCP Settings ? X Dec V	
Number of Coils 1 Slave IP 192.168.201_ - TCP Port 11502 OK Cancel	
TCP : 127.000.000.001:502 Base Addr : 1 Packets : 0 Endian : Little Errors : 0	

d) Select Function code as "Read Holding Registers (0x03)"

Reference and the second secon		-	-	×
904200) 🖸 🔏 🔳	🛡 🖳 🗹	۰ 😟	۲
Modbus Mode TCP V Unit ID 1 🕏 Sci	an Rate (ms) 1000	×		
Function Code Read Holding Registers (0x03) Read Colis (0x01) Read Colis (0x01) Read Discrete Inputs (0x02) Number of Registers (0x03) Number of Registers (0x04) Read Input Registers (0x04) Write Single Coli (0x05) Write Single Register (0x06) Write Multiple Colis (0x07) Write Multiple Colis (0x07)	Start Address	1 Dec		
TCP : 192.168.20.1:11502 Base Addr : 1	Packets : 0	Endian : Little	Errors : 0	

e) Perform following steps as shown below in the figure:



R QN	1odMas	ster									_		\times
File	Options	s Com	nmands	View	v Helj	р							
Ð	3		0	6	Ċ		• 🔀		\$	2		20	٢
Mode	Modbus Mode TCP V Unit ID 1 + Scan Rate (ms) 1000 + 2												
Func	tion Coo	de Read	d Holding	Registe	ers (0x0)	3) ~	Start Ad	dress	1	De	ec 🗸		
Num	ber of R	egisters	13 🗘	Data F	ormat	Dec	 ✓ Sign 	ed 🗌					
-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-				
-/-	-/-	-/-	x	x	x	x	x	x	x				
										_			
• тср	: 192.10	68.20.1:1	1502 B	ase Ado	dr:1	Pack	ets:0	ľ	Endian : I	Little	Erro	ors:0	

f) Clicking on Connect button should cause the sign to change as shown below. Also the indication of successful TCP connection can be seen with TCP IP Address as 192.168.20.1:11502

File	Options Cor	nmands Vie	w Help			
Ð	3 💉 3	E 🖸 🏷	¢ 🔋			
Mod	dbus Mode TCP	∨ Unit ID 1	Scan			
TCF	2 : 192.168.20.1:11502	Base Addr : 1	Packets: 0	Endian : Little	Errors: 0	

Note:

1) Above steps will only be successful when EDGE Gateway device is powered up properly with



proper Ethernet setup between the device and the PC having ModScan/ qModMaster Software.

2) Blinking Ethernet LEDs will indicate the communication between PC and the EDGE Modbus Gateway

3) The Modbus Source address can be configured by the user from J1939 dashboard but the purpose of Gateway is to only broadcast the 13 J1939 decoded parameters to following registers.

4) Following is the Register Mapping on Modbus TCP Holding Registers (0 to 12) for corresponding 13 J1939 Parameters.

Sr. No.	J1939 Parameter	PGN	SPN	Modbus TCP Holding Register
1	Percent Load	61443	92	0
2	Oil Pressure	65263	100	1
3	Fuel Pressure	65263	94	2
4	Battery Voltage	65271	168	3
5	Boost Pressure	65270	102	4
6	Inlet manifold Temperature	65270	105	5
7	Coolant Temperature	65262	110	6
8	Fuel Temperature	65262	174	7
9	Fuel rate	65266	183	8
10	Engine Speed	61444	190	9
11	Auxiliary Temperature	65164	441	10
12	Auxiliary Pressure	65164	1387	11
13	Engine Hours	65253	247	12

f) If the Data is being received by the CAN bus when CAT Engine ECM is powered up, following data or similar data can be seen:



- Q	ModMas	ter								_		×
File	File Options Commands View Help											
Ð	3	/	Q	6	Ċ		2 🔏		👻 🖳		٥ 0	٢
Mod	Modbus Mode TCP V Unit ID 1 🗘 Scan Rate (ms) 1000 🗘											
Fun	iction Cod	e Read	Holding	Registe	rs (0x03) > 5	Start Ad	dress	1 🗘 Dec	: ~		
Nur	nber of Re	egisters	13 🗘	Data F	ormat [Dec 🗸	Sign	ed 🗌				
0	1	2	3	4	5	6	7	8	9			
0	380	280	3267	4	33	79	215	96	1925			
0	0	0	x	x	x	x	x	x	x			
10	11	12										
Holding Registers (0 to 12) represent 13 Parameters as mentioned in the table above.												
• TC	TCP : 192.168.20.1:11502 Base Addr : 1 Packets : 38 Endian : Little Errors : 5											

Note: The 13 Parameters in the above image are a result of Simulation performed on CAN-J1939 Bus and don't represent any real-time Engine data.