# How to Make a Demo Kit for Data Visualization

powered by ThingsPro Edge

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### Outline

- ThingsPro Edge Resources and Eligible Models
- Demo Scenarios & Prerequisites
- A Demo Kit: Data Visualization
  - ThingsPro Edge Installation
  - Modbus Master Configuration
  - MQTT Broker Installation
  - MQTT Client Creation & Custom Payload
  - Node-RED Installation and Configuration



### **ThingsPro Edge Resources**

Category	Item	Link
	Product Page	Link
	Eligible Models	Link
ThingsPro Edge Overview	Software Download	Link
	Software Life-cycle Policy	Link
	IIoT Solution Microsite	Link
	User Manual	Link
ThingsPro Edge Document	RESTful API User Manual	Link
	Development Guide	Link



### **Eligible Models for ThingsPro Edge**

Series	Model Name					
	UC-8210-T-LX, UC-8210-T-LX-S					
UC-8200 Series	UC-8220-T-LX					
	UC-8220-T-LX-US-S, UC-8220-T-LX-EU-S, UC-8220-T-LX-AP-S					
	UC-8112A-ME-T-LX					
LIC 9100A ME T Sorias	UC-8112A-ME-T-LX-AP					
UC-8100A-IME-1 Series	UC-8112A-ME-T-LX-US					
	UC-8112A-ME-T-LX-EU					
UC-8100 Series	UC-8112-LX					
	UC-3101-T-US-LX, UC-3101-T-EU-LX, UC-3101-T-AU-LX					
	UC-3111-T-US-LX, UC-3111-T-EU-LX, UC-3111-T-AU-LX					
LIC 2100 Series	UC-3121-T-US-LX, UC-3121-T-EU-LX, UC-3121-T-AU-LX					
UC-3100 Series	UC-3101-T-US-LX					
	UC-3111-T-US-LX					
	UC-3121-T-US-LX					
LIC 2100 Series	UC-2112-LX					
	UC-2112-T-LX					



# **Demo Scenario (1/2)**

Data visualization via Node-RED





# **Demo Scenario (2/2)**

- 1. Use Demo Kit to acquire the value of Knob and temperature, and power meter.
- 2. Install a MQTT broker to receive the telemetry message
- 3. Create a MQTT Client to publish messages
- 4. Customize the payload
- 5. Install Node-RED to
  - receive messages via MQTT in
  - parse and convert JSON string to object
  - visualize the data (gauge)



### **Prerequisites**

- An eligible model for ThingsPro Edge (TPE)
- A power meter
- An ioLogik with
  - a knob
  - a temperature sensor
- An Ubuntu environment with
  - MQTT broker
  - Node-RED



### For Moxa IIoT Portable Demo Kit Owner

 If you have purchased the IIoT Portable Demo Kit from Moxa, you just need to replace the original computer, UC-8112-ME-T-LX, with an eligible model of ThingsPro Edge.





# **ThingsPro Edge Installation**



### **Download From Moxa Website**

- 1. Download the ThingsPro Edge
- 2. Connect your computer to Moxa computer (via LAN 2)
- 3. Setup your computer IP address 192.168.4.x/ 24
- 4. Launch your computer terminal (console) and execute the commands below
  - SSH default account/ password: moxa/moxa
  - \$scp moxa-thingspro-edge-x.deb moxa@192.168.4.127:/home/moxa
  - \$ssh moxa@192.168.4.127
- 5. Execute the commands below in the Moxa computer console
  - \$sudo su
  - \$dpkg -i moxa-thingspro-edge-x.deb
- 6. Once the installation is completed, you will see the below message:





# Install TPE via ThingsPro Proxy

- 1. Download the <u>ThingsPro Proxy</u> (TPP) and install it in the Windows 10 OS.
- 2. Create Provisioning Plan first





### **Create Provisioning Plan**

### 3. Download the plan after the creation.

Create Provisioning Plan     Create Provisioning Plan     ThingsPro Edge Installation     ThingsPro Edge Installation     Add ThingsPro Edge installation settings to plan     Upgrade Software     Upgrade Software
1       ThingsPro Edge Installation       Image: ThingsPro Edge Installation       Summary         1       ThingsPro Edge Installation       Image: ThingsPro Edge Installation       Plan overview         Image: ThingsPro Edge Installation settings to plan       Image: Upgrade Software       ThingsPro Edge Installation
LingsPro Edge Installation     Digrade Software     ThingsPro Edge Installation
Select the ThingsPro Edge (TPE) version to install
<ul> <li>Provisioning device configuration and cloud enrollment require TPE installed on the devices</li> <li>This process only takes effect on the devices in which TPE aren't installed yet. For service packs and updates installation, please go to Software Cloud Enrollment</li> </ul>
Cloud Enrollment     Install version     Latest version compatible with the device firmware     Security Settings     Security Settings     Security Settings
5 Security Settings
6 Linux Command     7 Summary     Plan Name       Password     Password
Summary     Image: Second
B Finish

### **Provisioning**

							General settings     Onfirm     Settings for actions     G     Confirm	
ngsPro Proxy							Select provisioning plan file to be uploaded Plan File	
ovisioning								
General settings	n-air Provisioning	0	Settings for actions —			3 Confirm	Plan overview ThingsPro Edge Installation Installation Version : Latest compatible with device's firmware Upgrade software Upgrade Mode : Auto	
Access User: admin Password: &						EDIT	Security Settings  Enable provisioning service on device  Disable password change on device	
rget Devices								_
1 item(s) selected					🛋 scat	Q SEARCH	< BACK CANCEL NEXT >	
Model Name	Permission	Serial No.	TPE Installed	TPE Version	Firmware Version		Eligible Device (1) Ineligible Device (0)	
AIG-301-T-AP-AZU-LX	Granted	MOXAIBGQAS22	Ø Uninstalled		1.1	1	© Device list can be provisioned	Q SEARCH
UC-8220-T-LX-EU-S	Granted	TBZEB1051949	⊘ Uninstalled		1.3	(i)	Model Name Prai No. TPE Installed TPE Version Firmware Versi	on Message
AIG-301-T-AZU-LX	Granted	rmoxAlBGRD02	⊘ Installed	2.2.0-3036	1.2	0	UC-8222 LX-EU-S TBZEB1051949 1.3	
UC-8220-T-LX-EU-S	Granted	TAIGB1193257	⊘ installed	2.2.0-3081	1.3	0	Items per page: 10 🗸 1 - 1 of 1  +	: < > >
AIG-501-T-AP-AZU-LX	Granted	TBZJE1013036	⊘ Installed	2.2.0-3055	1.0	<b>(</b> )		
					CA		< BACK	CANCEL

ThingsPro Proxy
Provisioning



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# **ThingsPro Edge Configuration**

**Modbus Master** 



### **Set Modbus TCP Master in TPE**



- 1. Go to Modbus > Modbus Master > TCP
- 2. Create a new device. Fill in IP (192.168.4.254) and parameters for ioLogik E1210





## **Set Modbus Commands in TPE**

### 3. Add Modbus commands



Temp

Knob

MO

### **Finish Modbus Master in TPE**



### 4. Click "Apply" to finish setting Modbus Master

		Modbus Master			
← TCP ▾		Home > Protocol > Modbus > Modbus Ma	ster		
Home > Protocol > Modbus > Modbus Master > M	Modbus TCP > TCP				
Operation Mode: TCP 😰		Protocol Name	Device Fail Event	Command Fail Event	
Search Command Name		Modbus Master Version: 1.2.4	⊘ Enable	⊘ Enable	:
ADD DEVICE		Modbus TCP			
ioLogik_E1210 ⊗ Enable :		<ul> <li>✓→ TCP</li> <li>1 Device , 1 Command</li> </ul>			
Slave IP: 192.168.4.100 Slave Port: 502 Slave ID: 1		Modbus RTU/ASCII			
		COM1 (RTU) Not configured	COM2 (RTU) Not configured		
	Select a device to view its details.			2	
Editing	GO TO APPLY SETTINGS	Editing		DIS	APPLY

### **Set Modbus RTU in TPE**



Power Meter

- 1. Go to Modbus > Modbus Master > COM1
- 2. Create a new device



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### **Set Modbus Commands in TPE**



Power Meter

### 3. Add Modbus commands

Add Command  C Enable This Command  Basic  Command Name  PowerMeter  Function  03 - Read Holding Registers					Modbus • Slave Power M • Funct • Start a • Quant • Data t • Scaled	RTU Device ID: 1 eter - Voltage Val ion: 03 – Read Ho address: 0 :ity: 1 ype: int16 d slop: 0.01	ue Iding Regi	sters		
Read Holding Registers	Read Quantity									
0	1		Powe	erMeter					+ ADD CC	OMMAND
Trigger Cyclic		•	No.	Command Name	Function	Address, Quantity	Trigger	Poll Interval (ms)	Enable	
Poll Interval (ms)			1	PowerMeter	3	Read 0, 1	Cyclic	1000	Enable	:
1000		/					Items	per page: 10 💌 1 - 1	of 1 🛛 🕹 🔨	> >
Endian Swap										
None										
	CANC	EL DONE		Со	nfidential				MOX	<

### Set COM Port

- 1. Go to System Settings > Serial > Edit
- 2. Configure COM port settings

Serial Home > System Cor	nfiguration > System Sett	ings > Serial			Interface rs485-2w
				Q SEARCH C	REFRESH Baud Rate 9600
Port	Interface	Baud Rate	Parity, Data Bits, Stop Bits	Flow Control	Parity
#1 COM1	rs232	9600	none, 8,1	none	i
#2 COM2	rs232	9600	none, 8,1	none	Data Bits
			Items per page: 10	▼ 1-2 of 2  < <	>>> >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
					Flow Control
				Confidential	SAVE



#### COMx

- rs485-2w
- Baudrate: 9600
- N, 8, 1

Alias - optional	
COM1	
interrace rs485-2w	•
Baud Rate	
9600	•
Darity	
none	-
Data Bits	
05060708	
Stop Dito	
Flow Control	-
lione	
SAVE SAVE & CLONE	
SAVE & GEONE	



### **Install MQTT Broker**



### **Install a MQTT Broker**

- 1. Prepare an Ubuntu environment (e.g. 18.04)
- 2. Launch the Terminal and enter commands below
  - sudo apt-get update
  - 2 sudo apt-get install mosquitto
  - <sup>3</sup> sudo service mosquitto start

### 3. Enter commands below to check whether the MQTT broker installed successfully





# **ThingsPro Edge Configuration**

### How to Create MQTT Client & Custom Payload



## **Create a MQTT Client**

- 1. Go to MQTT Client and click ADD CONNECTION
- 2. Enter your MQTT broker IP address (same with your Ubuntu IP address)
- 3. Enter port 1883 and select 3.1 MQTT Version



**Edit Connect Settings** 

General

Server

10.123.13.21

MQTT Version () 3.1.1 () 3.1

Client ID

SSL/TLS



Will and Testament

Port

1883

### **Create a MQTT Client**

- 4. Create Telemetry Message
- 5. Select Providers and Tags



SELECT ALL

events

CLEAR

MO

### **Customize Payload**

- 1. Enable Custom Payload
- 2. Enter { (.tagName) : .dataValue } in jq Filter column and click "TEST"





# Install and Configure Node-RED



### Install Node-RED

- 1. (Install nodejs and npm first) Launch Terminal in your Ubuntu environment and enter commands below
  - 1 sudo apt update
  - <sup>2</sup> sudo apt install nodejs npm

### 2. Enter commands below

curl -sL https://deb.nodesource.com/setup\_12.x | sudo -E bash sudo apt-get install -y nodejs build-essential

sudo npm install -g --unsafe-perm node-red

3. Open a browser and enter "https://127.0.0.1:1880"



### **Receive Messages**

- 1. Drag "mqtt in" from network and drop it in a Flow
- 2. Double-click "mqtt in" and click Edit button
- 3. Enter your MQTT broker IP address, port 1883 and select MQTT V3.1 (legacy)

Node-RED		Edit matt in node			Edit mqtt in nod	e > Edit mqtt-br	oker node		
Q filter nodes	Flow 1	Delete		Canaal	Delete			Cancel	pdate
oldelay		Delete		Cancer	¢ Properties				•
trigger	-	Properties			Name	Name			
exec		Server	VM@10.123.13.21:1883		Connectio	n	Security	Messages	
filter		📰 Торіс	/DemoKit		Server	10.123.13.21		Port 1883	
✓ network	) /DemoKit	⊛ QoS	2 🗸			Use TLS			
	connected	🕩 Output	auto-detect (string or buffer)	~	Protocol	MQTT V3.1	(legacy)	~	
) mqtt in	-	Name	Name		Client ID	VM			
(mqtt out )					😵 Keep Alive	60			
Attp in					i Session	✓ Use clean s	session		
http response									

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### Parse and Convert JSON String to Object

- 1. Drag "json" and drop it in the Flow and connect to "mqtt in"
- 2. Double-click "json" and select Convert between JSON String & Object



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- 1. Click Menu > Manage palette and click Install tab
- 2. Search "node-red-dashboard" and click Install

Deploy      Deploy			
Import Export	User Settings	Close Installing 'node-red-dashboard' Before installing, please read the node's documentation. Some node	es
Search flows Configuration nodes	View	Nodes     Install       A sort:     If a-z recent	
Flows	Keyboard	Cancel Open node information	
<ul><li>Subflows</li><li>Groups</li></ul>	Palette	C node-red-dashboard      C     Site as     S	
Manage palette		A set of dashboard nodes for Node-RED           2.30.0         1 month ago         installed	
Settings		🔊 node-red-node-ui-list 🗷	
Keyboard shortcuts Node-RED website v2.0.5		Node-RED Dashboard UI widget node for simple list         0.3.6        1 month ago	

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- 3. Drag "gauge" and drop it in the Flow (repeat 3 times)
- 4. Click 😐 on the upper-right corner
- 5. Click "+ tab"
- 6. Hover Tab 1 and click "+ group"
- 7. Click "+ edit" and give a Name (e.g. Status)



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- 8. Double-click each "guage"
- 9. Select [Tab 1] Status and modify Value format {{msg.payload.knob2}}, {{msg.payload.PowerMeter}}, {{msg.payload.TempSensor}} respectively

Edit gauge node	Edit gauge node	Edit gauge node
Delete Cancel Done	Delete Cancel Done	Delete Cancel Done
Properties     Properties	Properties	Properties
⊞ Group [Tab 1] Status ✓	⊞ Group [Tab 1] Status 🗸 🖌	I Group [Tab 1] Status
I Size auto	151 Size auto	ISI Size auto
I≣ Type Gauge ✓	I≣ Type Gauge ✓	i≣ Type Gauge ✓
I Label Knob2	1 Label PowerMeter	I Label TempSensor
J Value format     {{msg.payload.Knob2}}	I Value format {{msg.payload.PowerMeter}}	] Value format {{msg.payload.TempSensor}}
1 Units units	I Units units	1 Units units
Range min 0 max 10000	Range min 0 max 10	Range min 0 max 100000
Colour gradient	Colour gradient	Colour gradient
Sectors 0 optional optional 10000	Sectors 0 optional optional 10	Sectors 0 optional optional 100000
Name Knob2	Name PowerMeter	Name TempSensor

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PowerMeter TempSensor 19348 100000 Knob2 7608 10000

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