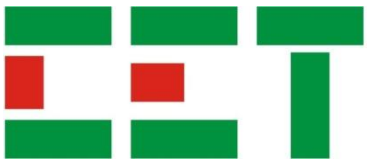
PMC-1302-3

Ethernet Serial/LoRa Gateway

User Manual

Version: V1.2

July 3, 2020,



Limited warranty

- CET Electric Technology (CET) offers the customer a minimum of 12-month functional warranty on the device for faulty parts or workmanship from the date of dispatch from the distributor. This warranty is on a return to factory for repair basis.
- CET does not accept liability for any damage caused by device malfunctions. CET accepts no responsibility for the suitability of the device to the application for which it was purchased.
- Failure to install, set up or operate the device according to the instructions herein will void the warranty.
- Only CET's duly authorized representative may open your device. The unit should only be opened in a fully anti-static environment. Failure to do so may damage the electronic components and will void the warranty.

Table of Contents

Chapter 1 Introduction

This chapter provides an overview of the PMC-1302-3 ESG and summarizes many of its key features.

1.1 Overview

The PMC-1302-3 ESG is an Industrial Ethernet Serial/LoRa Gateway which provides one 10/100BaseT Ethernet port, two RS-485 ports and an optional wireless LoRa port with configurable ISM Bands. It is the ideal equipment for connecting RS-485 and optionally LoRa enabled devices to an IP-based Ethernet LAN, making it possible to access serial and optionally LoRa enabled devices over your Ethernet network for any SCADA or Automation applications. The PMC-1302-3 ESG has been specifically designed with industrial automation in mind and therefore provides un-surpassed performance and reliability under the harshest industrial or commercial environments.

1.2 Features

- 1x10/100BaseT
- 2xRS-485 port
- Optional LoRa port with configurable ISM Bands for EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923 and AS923-925
- 8kV ESD protection
- 1.5kV isolation protection for Ethernet port
- 3kV isolation protection for RS-485
- One-key Reset to default factory
- Simple configuration via its built-in web interface
- DIN Rail Mount
- Extended operating temperature

1.3 Applications

The PMC-1302-3 ESG supports the efficient transfer of serial packets between the upstream network-based applications, the downstream RS-485 serial and optionally LoRa wireless devices via a TCP/IP connection. Instead of using a Windows based "Virtual COM" driver with a port-mapping utility, which is often plagued with driver incompatibility among the many different Windows versions, the PMC-1302-3 ESG allows applications to directly connect to it via a TCP/IP connection for the transparent transfer of serial packets inside TCP/IP frames to and from downstream devices. Perfectly suited for communicating with industrial devices that have timing sensitive protocols, the PMC-1302-3 ESG provides a reliable interface which allows SCADA or similar applications that already support direct connection with Ethernet Gateway to communicate with serial devices independent of the serial protocols used.

The PMC-1302-3 ESG optionally supports the LoRa port with configurable ISM Bands for wireless IoT applications in most countries.

1.4 Getting more information

Additional information is available from CET via the following sources:

- Visit www.cet-global.com
- Contact your local representative
- Contact CET directly via email at support@cet-global.com

Chapter 2 Installation

2.1 Appearance

Figure 2-1 Appearance

Figure 2-2 Upper Connector Arrangement

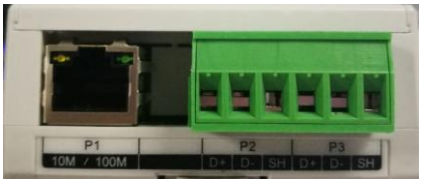


Figure 2-3 Lower Connectors Arrangement

2.2 Mounting

The PMC-1302-3 ESG should be installed in a dry environment with no dust and kept away from heat, radiation and electrical noise sources.

Installation steps:

- Before installation, make sure that the DIN rail is already in place.
- Move the installation clip at the back of the PMC-1302-3 downward to the “unlock” position.
- Align the top of the mounting channel at the back of the PMC-1302-3 at an angle against the top of the DIN rail as shown in Figure 2-4 below.
- Rotate the bottom of the PMC-1302-3 towards the back while applying a slight pressure to make sure that the device is completely and securely fixed on to the DIN rail.
- Push the installation clip upward to the “lock” position to secure the PMC-1302-3 on to the DIN Rail.

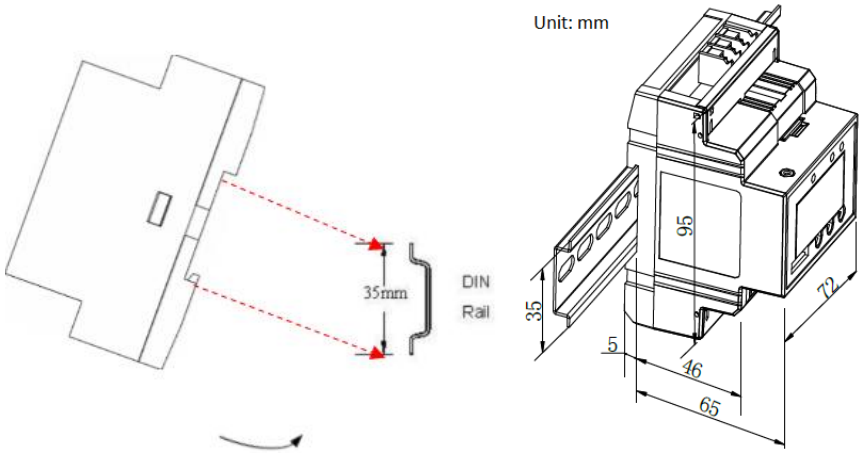


Figure 2-4 DIN-Rail Mounting

2.3 RS-485 Wiring

The PMC-1302-3 ESG provides two RS-485 ports (P2 and P3). Up to 32 devices can be connected on a RS-485 bus. The overall length of the RS-485 cable connecting all devices should not exceed 1200m.

If the master station does not have a RS-485 communications port, a RS-232/RS-485, USB/RS-485 or Ethernet/RS-485 converter with optically isolated outputs and surge protection should be used.

The following figure illustrates the RS-485 communications connections on the PMC-1302-3 ESG:

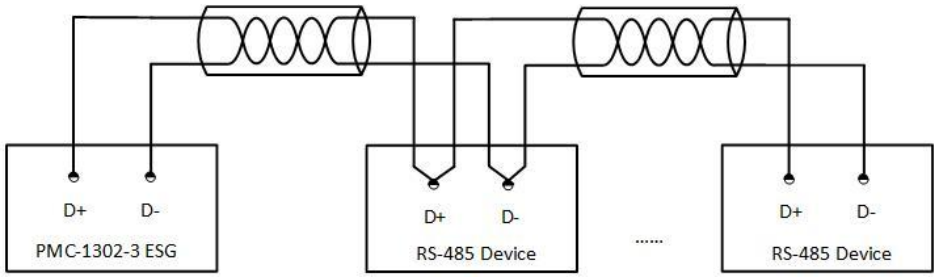


Figure 2-5 S485 Communications Connections

2.4 Ethernet Port (10/100BaseT)

The PMC-1302-3 ESG comes standard with an Ethernet Port (P1) using the MDI/MIDX Auto-detect RJ45 connector which means users can connect with a straight-through cable or an Ethernet cross-over cable. The table below lists the meaning for each pin.

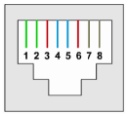
RJ45 Connector	Pin	Meaning
	1	Transmit Data+
	2	Transmit Data-
	3	Receive Data+
	4,5,7,8	NC
	6	Receive Data-

Table 2-1 RJ45 Connector Pin Description for 10/100BaseT Applications

2.5 Power Supply Wiring

For AC supply, connect the live wire to the L/+ terminal and the neutral wire to the N/- terminal.

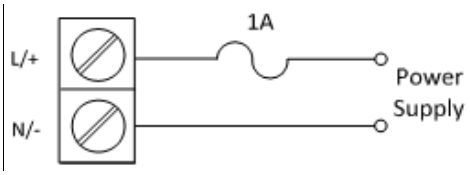


Figure 2-6 Power Supply Connections

Chapter 3 Operating the PMC-1302-3 ESG

3.1 Front Panel LED Indicators

There are three or four LED indicators on the PMC-1302-3 ESG's Front Panel as described in the following table.

LED Indicator	Color	Status	Function
Run	Green	On	System is running abnormally
		Off	Power off or system is running abnormally
		Blinking	Power is on and system is running normally
Data (LoRa option only)	Yellow	On	LoRa is running abnormally
		Blinking	LoRa is receiving or transmitting data
P2	Green	Blinking	P2 is receiving data
	Yellow	Blinking	P2 is transmitting data
P3	Green	Blinking	P3 is receiving data
	Yellow	Blinking	P3 is transmitting data

Table 3-1 LED Indicators

3.2 Reset Button

There is a **Reset** button at the lower right-hand corner of the PMC-1302-3's front panel. Pressing and holding the **Reset** button for 1 to 5 seconds will cause the PMC-1302-3 ESG to initiate a reboot sequence. The reboot process would be completed in approximately 30 seconds. Pressing and holding the **Reset** button for more than 5 seconds will reset the PMC-1302-3 ESG to default factory configuration.

3.3 Typical Application

The following figure shows the typical application for the PMC-1302-3 ESG.

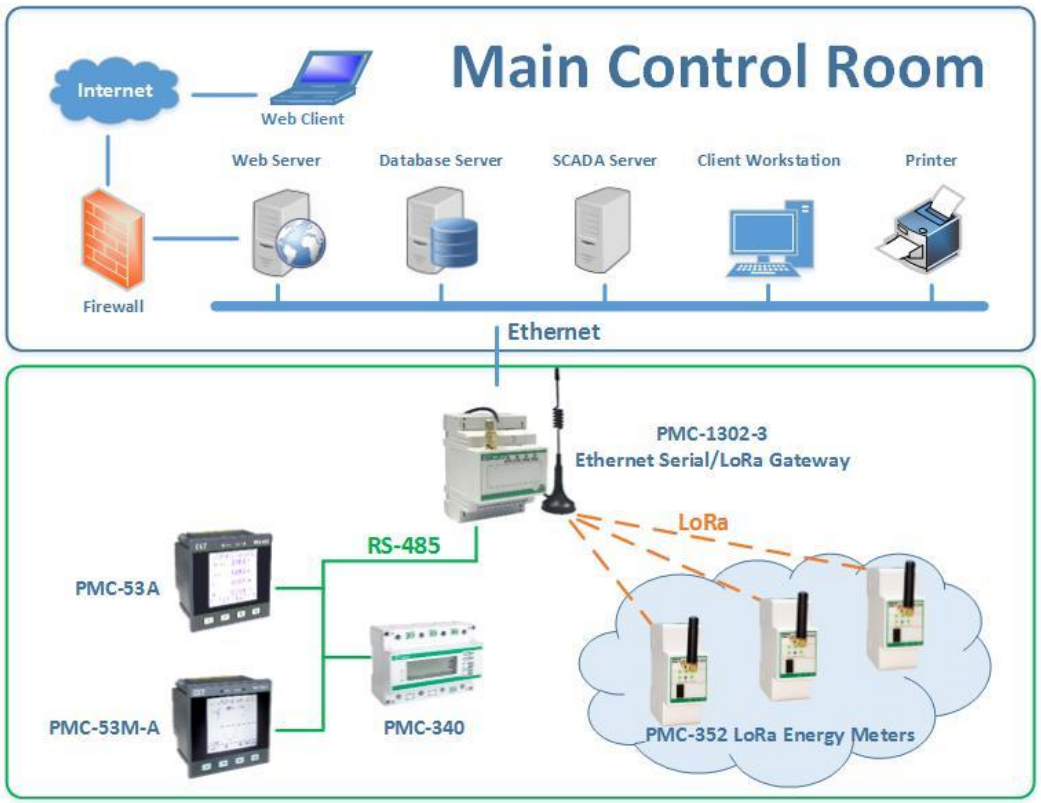


Figure 3-1 Typical Application

Chapter 4 Configuring the PMC-1302-3 ESG via Web Interface

4.1 Web Console Login

1) Open your Internet Explorer with the scripting function enabled. To enable scripting for your browser, right click on your Internet Explorer icon and then select Properties from the pop-up dialog box. The **Internet Options** window appears. Select the Security tab and then click on the **Custom Level** button near the bottom of the window. The **Security Settings** window appears. Enable the three options as shown below and then click **OK**.

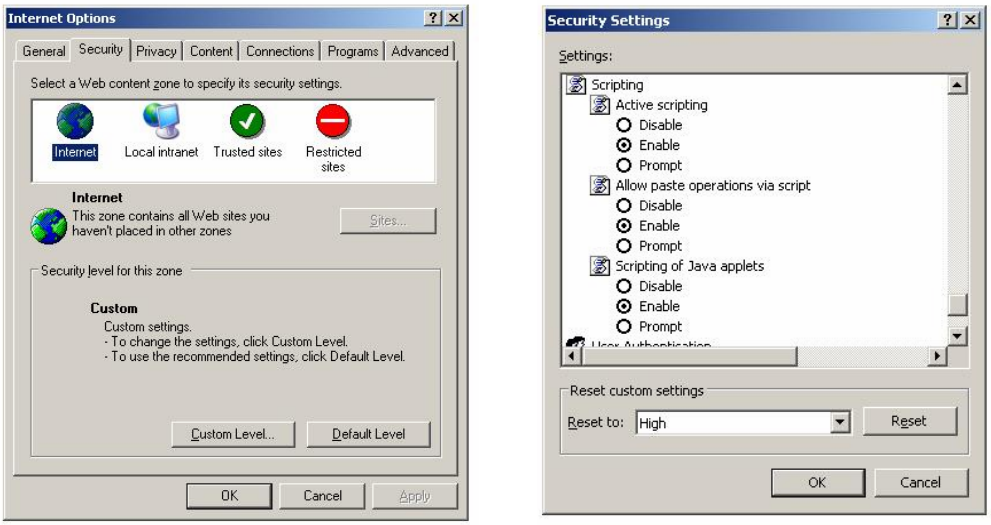


Figure 4-1 Internet Setting

2) The default IP Address of the PMC-1302-3 ESG's Ethernet Port is 192.168.0.127. Configure the IP Address and the Subnet Mask of the PC as 192.168.0.100 and 255.255.255.0 as shown below.

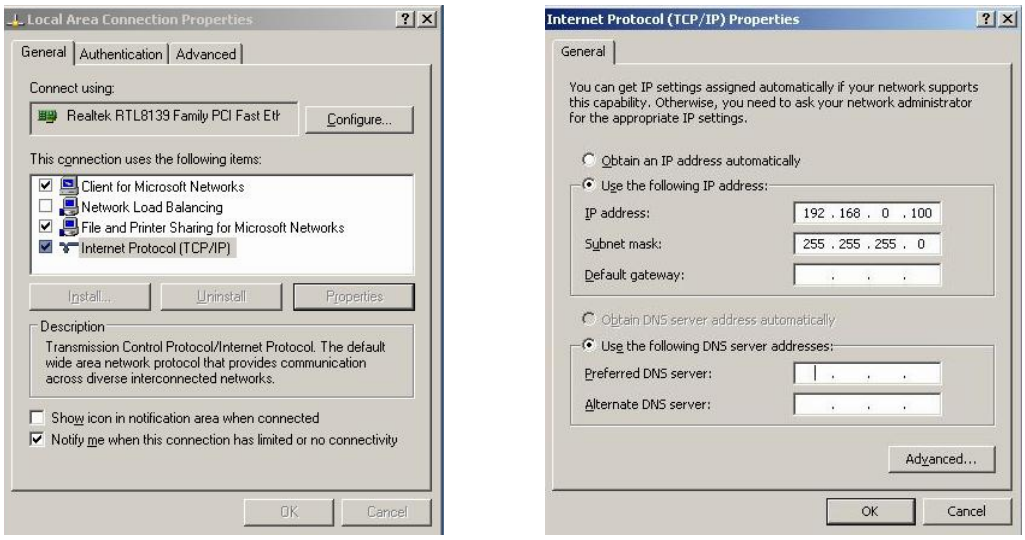


Figure 4-2 Setting IP Address

3) Enter the IP Address of the PMC-1302-3 ESG in the Address input box of the Internet Explorer and then press **<Enter>**.

4) The PMC-1302-3's Web Console Login page appears. Enter the User Name and Password and then click **Login**. The default user name is "user", and the default password is "123456".

Figure 4-3 Login Interface

5) Once the log-in credentials are confirmed, the following page appears.

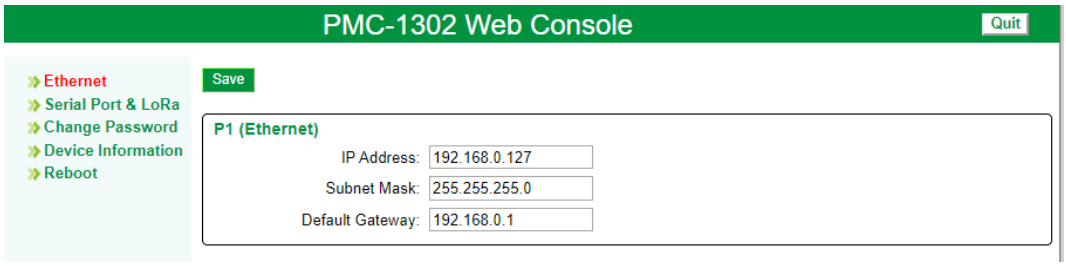


Figure 4-4 Basic Settings

4.2 Ethernet

The **P1 (Ethernet)** port's settings can be configured here based on the actual situation. Click **Save** to confirm your changes. Please be reminded that the **IP Address** and **Default Gateway** for the Ethernet port should be in the same subnet.

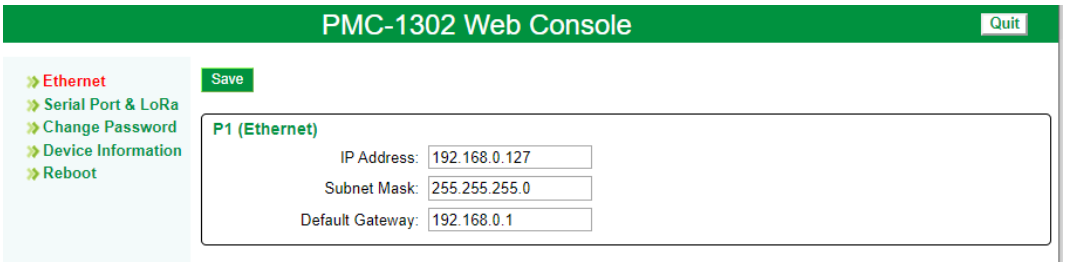


Figure 4-5 P1 Settings

4.3 Serial Port & LoRa

The PMC-1302-3 comes standard with two RS-485 ports (P2 and P3) and an optional LoRa wireless port (P4). All setup parameters such as **Baudrate**, **Data Bits**, **Parity**, **Stop Bits**, **IP Port** and **Timeout** can be configured here to match the settings of the downstream RS-485 devices. Please be reminded that the **IP Port** number of the Serial Gateway feature for P2 (default = 20001) and P3 (default = 20002) should be different. Click **Save** to confirm your changes. The following table shows the setup parameters for P2, P3 and P4. Most setup parameters are basic and self-explanatory.

Please note that the **Packet Timeout (s)** parameter refers to the timeout setting for the IP connection instead of the serial or LoRa connection, meaning that the IP connection will be closed if there are no

activities between the application software and the PMC-1302-3 ESG for the specified amount of time. This is to prevent a potential lock up of the IP connection at the PMC-1302-3 ESG if the application software fails to close the IP connection for some unknown reasons. It is recommended that the default **Packet Timeout** of 300 seconds be used.

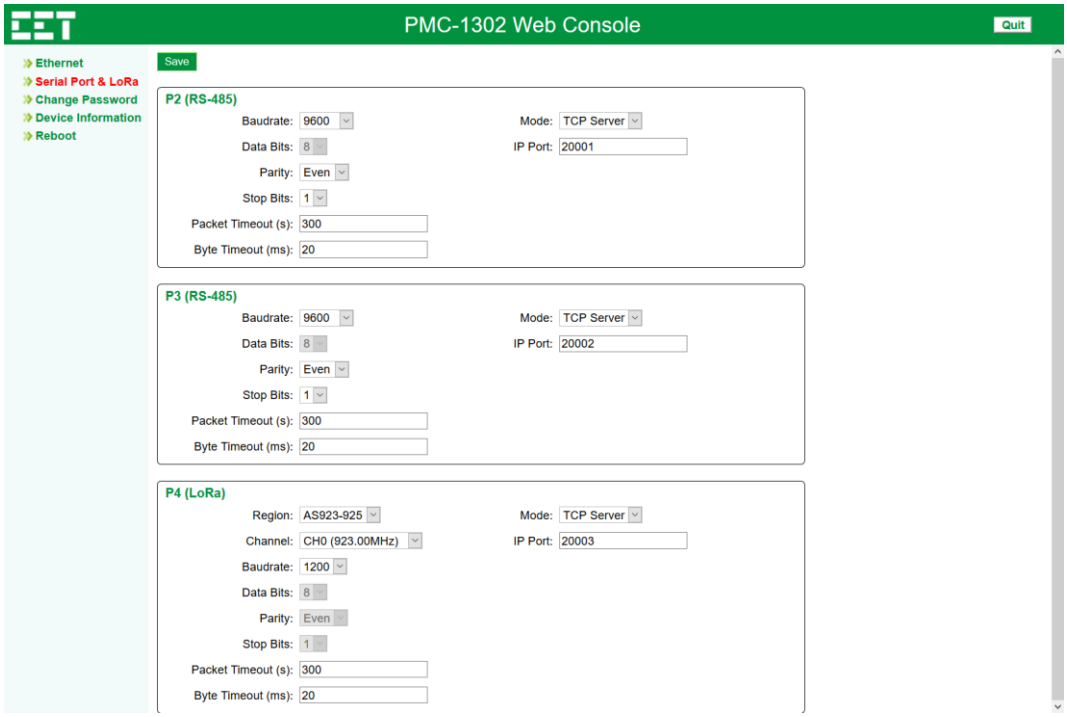


Figure 4-6 Serial Port & LoRa Settings

Parameters	Options/Default*	Parameters	Options/Default*
P2 (RS-485)			
Baudrate	1200 to 38400 bps, 9600*	Data Bits	8
Parity	None, Even*, Odd	Stop Bits	1
Packet Timeout(s)	0 to 60,000s, 300s*	Byte Timeout(ms)	0 to 60,000ms, 20ms*
Mode	TCP Sever, TCP Client If the **Mode** is set to **TCP Server**, only the **IP Port** appears. Please note that the **TCP Client** function is reserved for future applications so its setup parameters will not be discussed here.		
IP Port	1 to 60000, 20001*		
P3 (RS-485)			
Baudrate	1200 to 38400 bps, 9600*	Data Bits	8
Parity	None, Even*, Odd	Stop Bits	1
Packet Timeout(s)	0 to 60,000s, 300s*	Byte Timeout(ms)	0 to 60,000ms, 20ms*
Mode	TCP Sever, TCP Client If the **Mode** is set to **TCP Server**, only the **IP Port** setting appears. Please note that the **TCP Client** function is reserved for future applications so its setup parameters will not be discussed here.		
IP Port	1 to 60000, 20002*		
P4 (LoRa) The LoRa parameters only appear when the device is equipped with the corresponding option.			
Region	EU863-870 RU864-870 IN865-867 US902-928 AU915-928 AS920-923 AS923-925* Custom	Channel	See **Table 4-2** CH0 (923.00MHz)*
Baudrate	1200*, 3800, 7500 bps	Data Bits	8
Parity	None, Even*, Odd	Stop Bits	1
Packet Timeout(s)	0 to 60,000s, 300s*	Byte Timeout(ms)	0 to 60,000ms, 20ms*
Mode	TCP Sever, TCP Client The following parameters only appear when the **Mode** is set to **TCP Client.** Please note that the **TCP Client** function is reserved for future applications so its setup parameters will not be discussed here.		
IP Port	1 to 60000, 20003*		

Table 4-1 Serial Port & LoRa Settings

Region / Channel	EU 863-870	RU 864-870	IN 865-867	US 902-928	AU 915-928	AS 920-923	AS 923-925	Custom (Default)
Channel 0	863.00	864.00	865.00	902.00	915.00	920.00	923.00	915.00
Channel 1	863.47	864.41	865.33	903.73	915.87	920.33	923.29	915.33
Channel 2	863.93	864.81	865.66	905.47	916.73	920.66	923.57	915.66
Channel 3	864.40	865.21	865.99	907.20	917.60	920.99	923.86	915.99
Channel 4	864.87	865.61	866.32	908.93	918.47	921.32	924.14	916.32
Channel 5	865.34	866.01	866.65	910.67	919.34	921.65	924.43	916.65
Channel 6	865.80	866.40	866.98	912.40	920.20	921.98	924.71	916.98
Channel 7	866.27	866.80	867.31	914.13	921.07	922.31	924.99	917.31
Channel 8	866.74	867.20	867.64	915.86	921.94	922.64	920.10	917.64
Channel 9	867.20	867.60	867.97	917.60	922.80	922.97	920.46	917.97
Channel 10	867.67	867.99	868.30	919.33	923.67	923.30	920.82	918.30
Channel 11	868.14	868.39	868.63	921.06	924.54	923.63	921.18	918.63
Channel 12	868.60	868.79	868.96	922.80	925.40	923.96	921.54	918.96
Channel 13	869.07	869.19	869.29	924.53	926.27	924.29	921.91	919.29
Channel 14	869.54	869.59	869.62	926.26	927.14	924.62	922.27	919.62
Channel 15	869.99	869.99	869.95	927.99	927.99	924.95	922.63	919.95

Table 4-2 16 Channel Assignments

If **Region** is set as **Custom**, the **LoRa Custom Channels (xxx.xx MHz)** setup parameters will appear to allow the frequencies for the 16 channels to be customized as shown below:

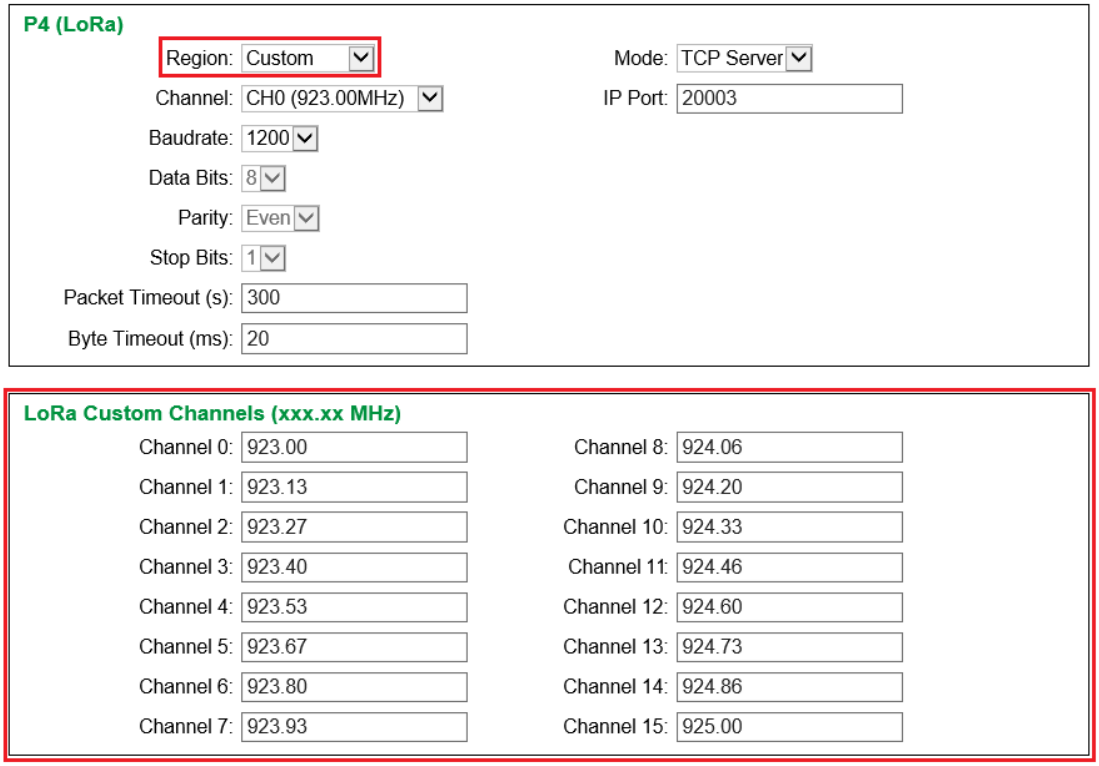


Figure 4-7 LoRa Custom Channel Settings

Notes:

For the **LoRa Custom Channels (xxx.xx MHz):**

1) The valid range of Frequency is: 860.00-935.00MHz. Otherwise, the error message "*Channel x: Invalid value. Please specify a frequency between 860.00 and 935.00"* would be shown.
2) Up to two decimals can be entered.
3) The channel frequency assignment must be unique. Otherwise, the error message "*Channel x: Duplicate frequency. Please enter another value."* would be shown.

4.4 Change Password

Click **Change Password** on the left-hand pane and the following screen appears on the right-hand pane where the **Username** and **Password** can be changed. Click **Save** to save your changes.

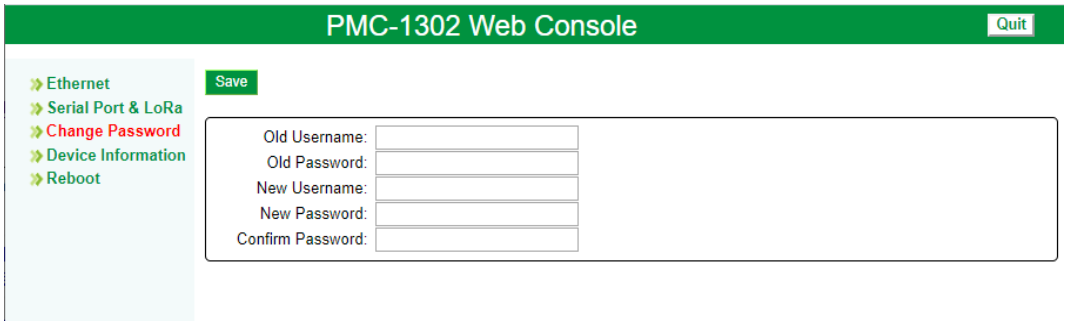


Figure 4-8 Change Password Screen

4.5 Device Information

Click **Device Information** on the left-hand pane and the following screen appears on the right-hand pane, which includes **Model** and **Information** of the PMC-1302-3.

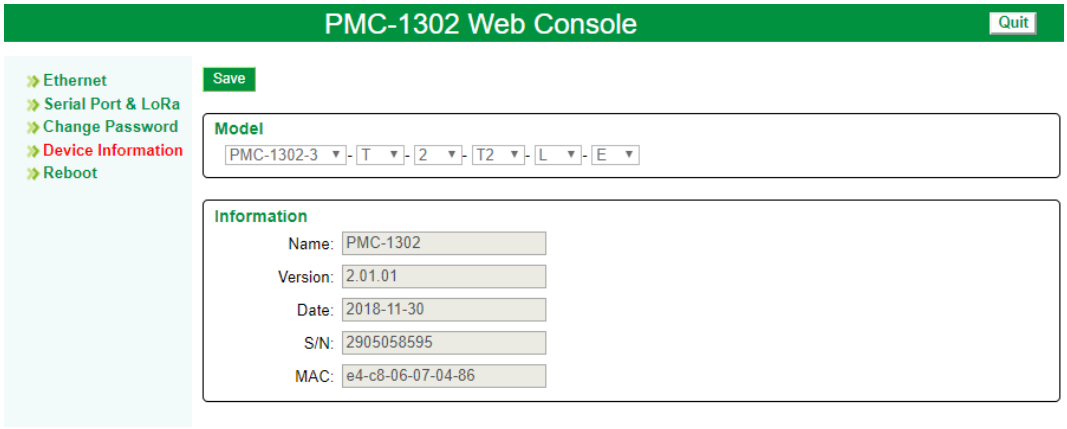


Figure 4-9 Device Information Screen

4.6 Exit

Click the **Quit** button near the top right-hand corner to exit the Web Console. For example, at the **Device Information** page, click **Quit** and then **Confirm** to exit when the dialog box appears.

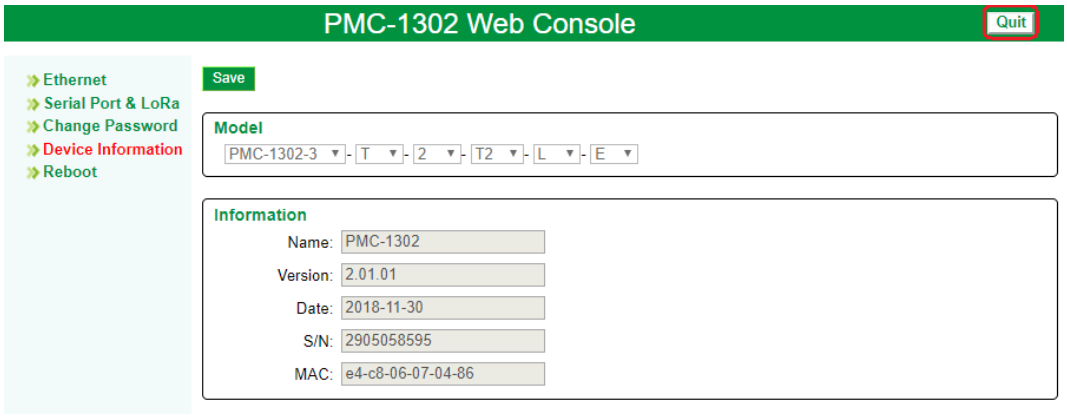


Figure 4-10 Quit at the Device Information Screen

4.7 Reboot

Configuration changes will not take effect until the **Reboot** operation has been executed. Click **Reboot** on the left-hand pane and the following screen appears on the right-hand pane. Click the **Reboot** button to initiate the restart sequence. After restart, the user needs to log in again to access to the PMC-1302-3 ESG's Web Console.

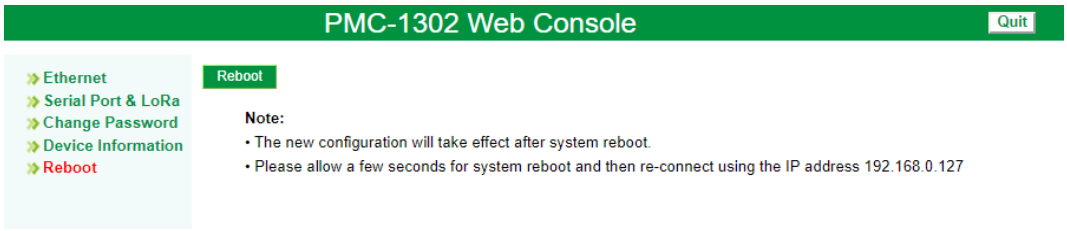


Figure 4-11 Reboot Screen

Chapter 5 Communications through the PMC-1302-3 ESG

This section provides details on how to communicate with a PMC-660 meter (Unit ID = 100) via the PMC-1302-3 ESG.

5.1 Topological Graph

In this example, a PMC-1302-3 ESG without the LoRa option with the P2 port is used. The default IP address for P1 is 192.168.0.127.

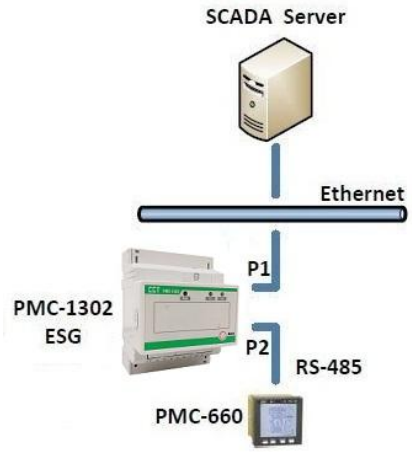


Figure 5-1 Topological Graph

5.2 Configuring the PMC-1302-3 ESG

To configure the PMC-1302-3 ESG, the user can log on to its Web Console page via the Internet Explorer by entering the IP address of the PMC-1302-3 ESG's Ethernet port in the browser's address bar. For example, type http://192.168.0.127/ at the address bar and then press **<Enter>**. Enter the default user name "user", the default password "123456" and then click **Login** to open the PMC-1302-3 ESG's Web Console.

Figure 5-2 Login Interface

In this example, P2 of the PMC-1302-3 ESG is used. The PMC-660's serial port has been configured with the following parameters:

1. Baud rate = 9600
2. Data Bits = 8
3. Parity = Even
4. Stop Bits = 1
5. Mode = TCP Server
6. IP Port = 20001

It is important for the communications parameters of the PMC-1302-3 ESG's P2 to be programmed to match those of the PMC-660. The IP Port Number for P2 is 20001.

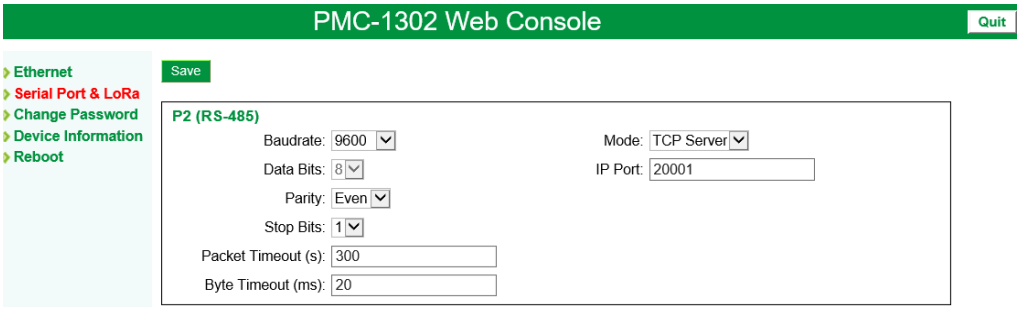


Figure 5-3 P2's Setting

After the P2 settings of the PMC-1302-3 ESG has been correctly configured, click **Reboot** on the left-hand pane and then click the **Reboot** button on the right-hand pane to save the settings. The PMC-1302-3 ESG will perform a reboot operation with the new configuration. When the Log-In page returns, the PMC-1302-3 ESG is now ready.

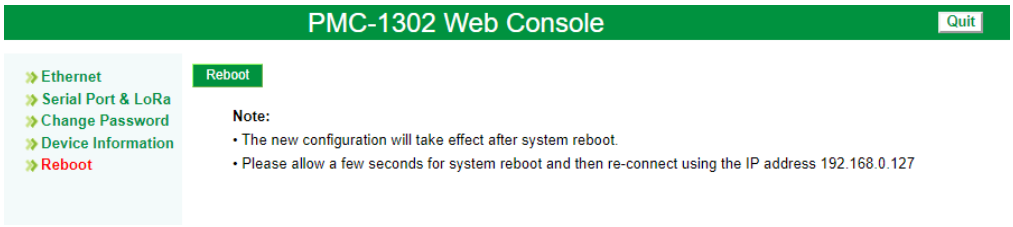


Figure 5-4 Reboot Page

5.3 Configuring PecStar iEMS

In PecStar iEMS's **PecConfig** interface, select **Site 1** on the left-hand pane and then click on the **Properties** icon to bring up the **Site Properties** dialog box.

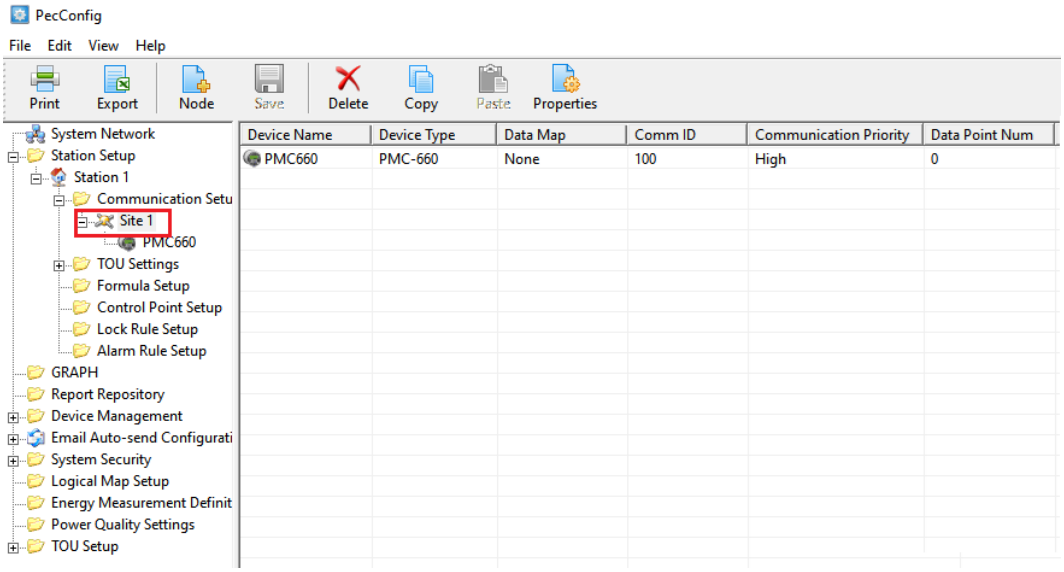


Figure 5-5 Systemconfig Interface

In this example, **P1** of the PMC-1302-3 ESG is used, and **Site 1** has been configured with the following parameters:

1. Drive Type = MODBUS Protocol Master Site Driver
2. Polling Mode = Serial
3. Port Type = Ethernet
4. IP = 192.168.0.127
5. Port = 20001 (for P2 of PMC-1302-3 ESG)

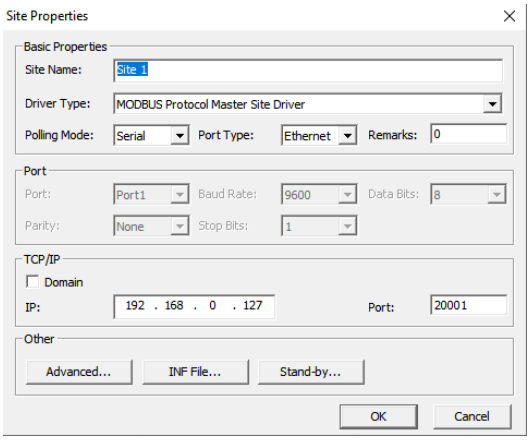


Figure 5-6 Site Node Properties

Select **PMC-660** on the right-hand pane under the **Device Name** column and then click the **Properties** icon on the Tool Bar to bring up the **Device Properties** dialog box. Change **Device Type** to PMC-660, **Comm ID** to 100 and then click **OK** to save and exit the dialog box.

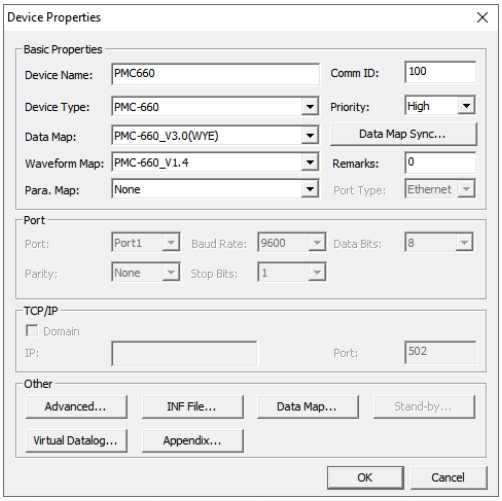


Figure 5-7 Device Node Properties

Right click on **PMC-660** on the left-hand pane, click **Import SNF file** and select the appropriate SNF file from the pop-up dialog box.

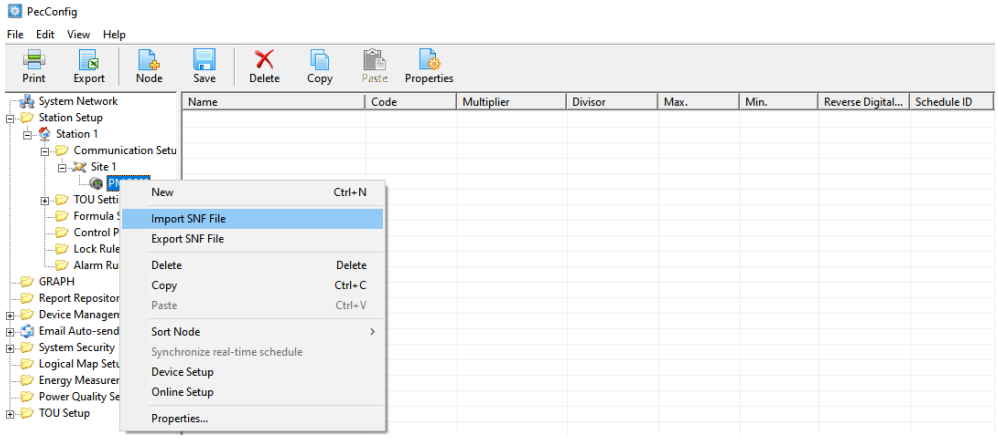


Figure 5-7 Import SNF File

Click the **Save** icon on the Tool Bar to save the current configuration into PecStar iEMS's database. The PecStar iEMS software is now ready to communicate with the PMC-660 via P2 of the PMC-1302-3 ESG.

Appendix A - Technical Specifications

Communication	
Ethernet Port (P1)	10/100 Mbps
Protocol	TCP, UDP, HTTP
RS-485 (P2, P3)	
Baudrate	1200/2400/4800/9600/19200/38400 bps
LoRa (Optional)	
RF Range	860-935 MHz
ISM Bands	EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923 and AS923-925
RF Output Power	19 dBm (Maximum)
Receiver Sensitivity	-137 dBm (Maximum)
Output Watts	0.03 (Typical)
FCC Part 15C	Certified by TCB
Front Panel LED Indicators	
Run (Green)	Blinking - System is running normally
Data (Yellow)	Blinking - LoRa is receiving or transmitting data
P2, P3 (Green)	Blinking - Receiving activity
P2, P3 (Yellow)	Blinking - Transmitting activity
Power Supply (L/+, N/-)	
Standard	95-250VAC/DC, 47-440Hz
Burden	<3W
Protection	
ESD Protection	8kV
Isolation Protection	3kV for RS-485 1.5kV for Ethernet Port
Environmental Conditions	
Operating Temp.	-25°C to +70°C
Storage Temp.	-40°C to +85°C
Humidity	5% to 95% non-condensing
Atmospheric pressure	70kPa to 110kPa
Mechanical Characteristics	
Unit Dimensions	72x65x95mm
Shipping Weight	TBD
Shipping Dimensions	TBD
Mounting	DIN Rail
IP Rating	20

Appendix B - Standards Compliance

Safety Requirements	
Insulation	EN61010-1: 2010 EN61010-2-030: 2010
Dielectric Test	2kV @ 1 minute
Insulation Resistance	>100MΩ
Impulse Voltage	5kV, 1.2/50μs
Electromagnetic Compatibility CE EMC Directive 2014 / 30 / EU (EN 61326: 2013)	
Electrostatic Discharge	EN 61000-4-2: 2009
Radiated Fields	EN 61000-4-3: 2006+A1: 2008+A2: 2010
Fast Transients	EN 61000-4-4: 2012
Surges	EN 61000-4-5: 2014+A1: 2017
Conducted Disturbances	EN 61000-4-6: 2014
Magnetic Fields	EN 61000-4-8: 2010
Voltage Dips and Interruptions	EN 61000-4-11: 2004+A1: 2017
Emission Tests	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN 55011: 2016
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	EN 55032: 2015
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤16 A	EN 61000-3-2: 2014
Limitation Of Voltage Fluctuations And Flicker In Low-Voltage Supply Systems For Equipment With Rated Current ≤16 A	EN 61000-3-3: 2013
Emission Standard for Residential, Commercial and Light-Industrial Environments	EN 61000-6-4: 2007+A1: 2011
Mechanical Tests	
Spring Hammer Test	IEC 62052-11: 2003
Vibration Test	IEC 62052-11: 2003
Shock Test	IEC 62052-11: 2003

Appendix C - Ordering Guide

CET Electric Technology

Version 20200611

Product Code	Description
PMC-1302-3 Ethernet Serial/LoRa Gateway	
Basic Function	
T	Transparent Transmission
Power Supply	
2	95-250 VAC/DC, 47-440Hz
Wire Communication	
T2	1x10/100BaseT, RJ45 connector and 2xRS-485
Wireless Communication	
N	None
7*	LoRa (860-935 MHz) configurable for EU863-870, RU864-870, IN865-867, US902-928, AU915-928, AS920-923 and AS923-925
Language	
E	English

PMC-1302-3	-	T	2	T2	N	E	PMC-1302-3-T2T2NE (Standard Model)

* Additional charges apply

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