CET Electric Technology

LoRa Wireless Gateway & Temperature Sensors

Overview

The PMC-1302-3 ESLG is an Industrial Ethernet Serial/LoRa Gateway which provides one 10/100BaseT Ethernet port, two RS-485 ports and one wireless LoRa port with configurable ISM Bands. It is an ideal equipment for connecting RS-485 devices and LoRa Temperature Sensors such as PMC-2601 or PMC-2603 to an IP-based Ethernet LAN over an Ethernet network for any SCADA or Automation applications. It also provides multiple Masters support for both Modbus and Transparent Gateway functions. Further, the PMC-1302-3 ESLG has been specifically designed with industrial automation in mind and therefore provides un-surpassed performance and reliability under the harshest industrial or commercial environments.

The PMC-2601 and PMC-2603 LoRa Temperature Sensors are CET's latest offer for Wireless Temperature and Humidity Monitoring of all critical connections and locations in Transmission and Distribution Networks. The compact size and flexible installation methods make the sensors perfect for detecting overheating problems of various application scenarios such as Transformer Enclosure, Circuit Breaker (Static and Movable contactors), Joint of Cables, Feeders and Busbars, Cabinets and Drawers, Motor Enclosure as well as Capacitor and Reactor Surface, etc.

PMC-1302-3 Features

- 1x10/100BaseT (RJ45) and 2xRS-485 ports are designed to withstand the harshest industrial environments
  - 2kV isolation protection for the Ethernet port
  - 15kV (Air Discharge) & 8kV (Contact Discharge) ESD protection and 3kV isolation protection for all serial ports
- One LoRa port with optional ISM Bands for EU 863-870/RU 864-870/IN 865-867, US 902-928, AU 915-928, AS1 920-923/AS2 923-925 MHz
- Transparent Gateway between Ethernet port and RS-485 ports
  - TCP Server/Client and UDP Server/Client modes
  - Maximum 4 Masters per RS-485 port
- Modbus TCP to RTU Gateway
  - TCP Server and TCP Client modes
  - 32 Slave IEDs per RS-485 port
  - Maximum 8 Modbus TCP Masters
- Multiple Masters support for both Modbus and Transparent Gateway functions
- Temperature & Humidity data collection from LoRa Temp. Sensor (PMC-2601 and/or PMC-2603) and measurements display via Built-in Web Server
  - Maximum 80xPMC-2601 and/or PMC-2603 per PMC-1302-3
  - 10-sec. real-time data for up to 10 areas (e.g. Breakers, Cabinets and Transformers, etc.)
  - Data Recorder (DR) logs for Temp. & Humidity data @15-minute interval for at least 2 months
  - Daily and Monthly Max./Min. Log for selectable Areas and Period
  - 2-Level Setpoint - Warning and Alarm for Temperature and Humidity
  - Up to 256 SOE logs of Setpoints on a FIFO basis
- Built-in Web Server for LoRa Temp. Sensors configurations, Temperature and Humidity measurements display, Comm. Configuration, Device Maintenance as well as User Management
- One-key Reset to Factory Default
- DIN-Rail Mounting
- Extended operating temperature

PMC-2601 and PMC-2603 Features

- PMC-2601 supports 1xBuilt-in NTC Sensor for Temperature Monitoring and 1xBuilt-in Humidity Sensor.
- PMC-2603 supports 3xExternal NTC Inputs for Temperature Monitoring and 1xBuilt-in Humidity Sensor.
- LoRa Wireless Communication - 300m transmission distance in an open environment or 100m transmission distance in a closed cabinet.
- Selectable Freq. Bands options
  - **C** EU 863-870 MHz/RU 864-870 MHz/IN 865-867 MHz
  - **D** US 902-928 MHz
  - **E** AU 915-928 MHz
  - **F** AS1 920-923 MHz/AS2 923-925 MHz
  - **G** Custom Channel in 860-930 MHz range

Applications

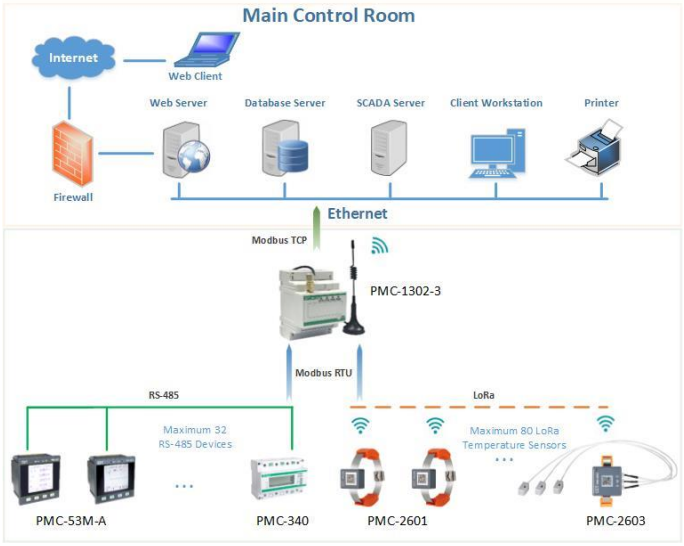
The PMC-1302-3 ESLG supports the efficient transfer of serial packets between the upstream network-based applications and the downstream RS-485 devices via a TCP/IP connection. Instead of using a Windows based "Virtual COM" driver with a port-mapping utility, which is often plagued with driver incompatibility among many different Windows versions, the PMC-1302-3 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 ESLG provides a reliable interface for SCADA or similar applications that already support direct connection with Ethernet Gateway to communicate with serial devices independent of the protocols used.

The PMC-1302-3 ESLG also supports the Modbus TCP to Modbus RTU Gateway function that makes it extremely simple for any Modbus TCP Master applications to interface with Modbus RTU enabled IEDs over a local area network. A simple web-based interface allows users to easily configure the TCP to RTU address mapping for downstream Slave IEDs connected via RS-485.

The PMC-1302-3 ESLG can be enabled to support multiple Masters to facilitate information sharing while minimizing the implementation cost.

The PMC-1302-3 ESLG supports Data Collection from up to 80xPMC-2601 and/or PMC-2603 LoRa Temp. Sensor. The temperature and humidity measurements will be automatically transmitted to the PMC-1302-3 through LoRa wireless communication and stored in PMC-1302-3 as well as displayed via Built-in Web Server. Besides, the PMC-1302-3 ESLG is capable of generating and displaying Max./Min. logs, DR logs, as well as SOE Logs for collected Temperature and Humidity data.

Typical Application Diagram



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LoRa Wireless Gateway & Temperature Sensors

Technical Specifications

PMC-1302-3

Communication	
Ethernet Port (P1)	
Speed	10/100 Mbps
Protocol	TCP, UDP, HTTP
RS-485 (P2, P3)	
Baudrate	300/600/1200/2400/4800/9600/19200/38400bps
Data Bits	7, 8
Stop Bits	1, 2
LoRa	
RF Range	860-935 MHz
ISM Bands	EU 863-870/RU 864-870/IN 865-867, US 902-928, AU 915-928, AS1 920-923/AS2 923-925
RF Output Power	18 dBm (Maximum)
Receiver Sensitivity	-136 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	
Standard (L/+, N/-)	95-250VAC/DC, 47-440Hz
Optional (+, -)	20-60VDC
Burden	≤3W
Protection	
ESD Protection	15kV (Air) & 8kV (Contact)
Isolation Protection	3kV for RS-485, 2kV 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 106kPa
Mechanical Characteristics	
Unit Dimensions	72x65x95mm
Mounting	DIN Rail
IP Rating	30
Antenna	
Frequency Range	860-935MHz
Band Width	75MHz
Impedance	500Ω
Power Capability	50W
Height	239.5±5mm
VSWR (Voltage Standing Wave Ratio)	≤2
Gain	4dBi

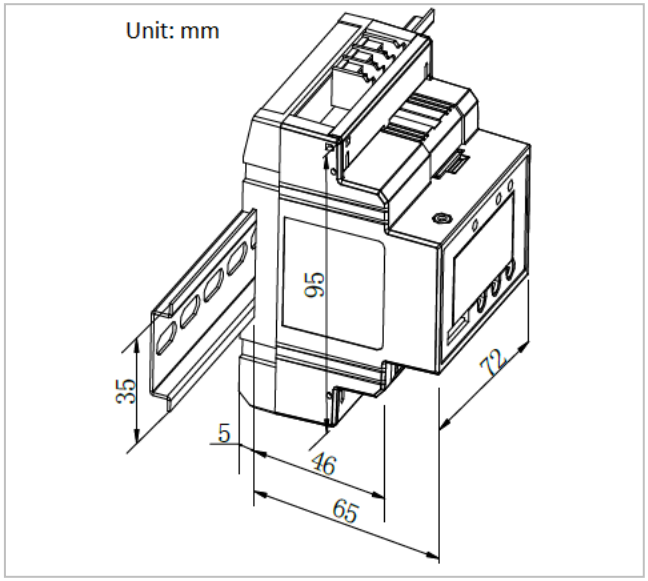
LoRa Temp. Sensor

	PMC-2601-A	PMC-2601-B	PMC-2603
No. of Sensor	1xNTC (Built-in) +1xHumidity (Built-in)		3xNTC (External) +1xHumidity (Built-in)
Measurement Range	Temp.: -40°C to 125°C (Accuracy: ±1°C) Humidity: 10% to 90% (Accuracy: ±2%)		
Dimensions	26x22x11mm	38x38x22mm	
Power Supply	Self-Powered by Induction Current	3V, 1000mAh 5-Year Battery Life	Self-Powered by Induction Current
Starting Current	3.5A Minimum	-	3.5A Minimum
Startup Time	30s @ Ist=5A		
LoRa			
Baudrate	15000bps		
Working Current	22.5mA		
RF Output Power	14dBm	15dBm	14dBm
Transmission Cycle	TC Change ≤ 2°C: 30s, TC Change > 2°C: 10s Humidity: 60s		

Standard of Compliance

Safety Requirements	
Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements	EN 62368-1: 2014+A11: 2017
Electromagnetic Compatibility CE EMC Directive 2014 / 30 / EU (EN 55035: 2017+A11: 2020)	
Electrostatic Discharge	EN 61000-4-2: 2009
Radiated Fields	EN IEC 61000-4-3: 2020
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 IEC 61000-4-11: 2020
Emission Tests	
Electromagnetic Compatibility of Multimedia Equipment-Emission Requirements	EN 55032: 2015+AC: 2016+A11: 2020
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤16 A	EN IEC 61000-3-2: 2019+A1: 2021
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16 A	EN 61000-3-3: 2013+A2: 2021
Emission Standard for Residential, Commercial and Light-Industrial Environments	EN 61000-6-4: 2007+A1: 2011
Radiated Emission and Conducted Emission	ETSI EN 301 489-1 V2.2.3 ETSI EN 301 489-3 V2.3.2
Radio Equipment Directive (RED) 2014 / 53 / EU	
Assessment of Electronic and Electrical Equipment Related to Human Exposure Restrictions for Electromagnetic Fields (0Hz - 300 GHz)	EN IEC 62311: 2020
Short Range Devices (SRD) Operating in the Frequency Range 25 MHz to 1000MHz	ETSI EN 300 220-1 V3.1.1: 2017 ETSI EN 300 220-2 V3.1.1: 2017
Mechanical Tests	
Spring Hammer Test	IEC 62052-11: 2003
Vibration Test	IEC 62052-11: 2003
Shock Test	IEC 62052-11: 2003

Dimensions and Installation



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Ordering Information

PMC-1302-3

CET Electric Technology — *Version 20240929*

Product Code	Description
PMC-1302-3 Ethernet Serial/LoRa Gateway	
Basic Function	
T	Modbus Gateway and Transparent Gateway
Power Supply	
2	95-250 VAC/DC, 47-440Hz
3	20-60 VDC
Wire Communication	
T2	1x10/100BaseT + 2xRS-485
Wireless Communication	
T	LoRa (860-935 MHz) with configurable Frequency Bands for data collection from LoRa Temp. Sensors (PMC-2601 and PMC-2603)
Language	
E	English

PMC-1302-3	-	T	2	T2	T	E	PMC-1302-3-T2T2TE (Standard Model)

LoRa Temp. Sensor

CET Electric Technology — *Version 20241011*

Product Code	Description
PMC-2601	LoRa Temperature Sensor
PMC-2603	LoRa Temperature Sensor
Power Supply	
A	Self-Powered by Induction Current
B	Battery (3V, 1000mAh, 5-Year Battery Life and PMC-2601 only)
Sensor Input	
1	1xBuilt-in NTC Sensor + 1xBuilt-in Humidity Sensor (PMC-2601 only)
2	3xNTC Inputs (for External NTC Sensor[^]) + 1xBuilt-in Humidity Sensor (PMC-2603 only)
Frequency Band[#]	
C	EU 863-870 MHz/RU 864-870 MHz/IN 865-867 MHz
D	US 902-928 MHz
E	AU 915-928 MHz
F	AS1 920-923 MHz/AS2 923-925 MHz
G	Custom Channel in 860-930 MHz range (MOQ = 500pcs)
LoRa Channel	
1	Channel 1
2	Channel 2
3	Channel 3
4	Channel 4
5	Channel 5
6	Channel 6
7	Channel 7
8	Channel 8
Installation Method	
1	3M adhesive pad and cable zip ties (PMC-2601 Power Supply option B only)
2^^	3M adhesive pad, cable zip ties, and Magnetic mount (PMC-2601 Power Supply option B only)
3	Permalloy Strip
Language	
E	English

PMC-2601	-	A	1	C	1	3	E	PMC-2601-A1C13E (Standard Model)
PMC-2603	-	A	2	C	1	3	E	PMC-2603-A2C13E (Standard Model)

*Additional charges apply.

#The factory preset options for the LoRa Channel configurations of each Frequency Band Option is listed in Table A. Please note that the LoRa Channel is not field-configurable and only one Channel should be selected for a PMC-2601 or a PMC-2603. Please select a proper LoRa Channel when placing order for the LoRa Temperature Sensor.

Table A

LoRa Channel Options	Frequency Band Options C	D	E	F	G
Channel 1	863.25MHz	902.50MHz	915.50MHz	920.50MHz	Custom
Channel 2	864.25MHz	907.50MHz	917.50MHz	921.50MHz	-
Channel 3	865.25MHz	912.50MHz	919.50MHz	922.50MHz	-
Channel 4	866.05MHz	917.50MHz	921.50MHz	923.50MHz	-
Channel 5	866.85MHz	922.50MHz	923.50MHz	924.50MHz	-
Channel 6	867.85MHz	927.50MHz	925.50MHz	-	-
Channel 7	868.85MHz	-	927.50MHz	-	-
Channel 8	869.85MHz	-	-	-	-

If the total number of monitoring nodes is less than 247, it is recommended to order the PMC-2601 or PMC-2603 with the same LoRa Channel.

^Magnetic mounting is not suitable if the PMC-2601 is installed at cable joints or other situations where the Load Current is greater than 10A.

△ Please order the external NTC sensors from "NTC Sensor" sheet.

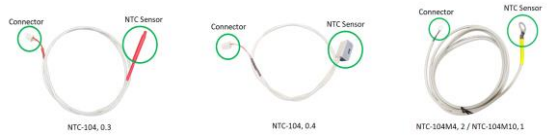
CET Electric Technology — *Version 20240301*

NTC Sensor

Model #	Specification/Description
NTC-104, 0.3*	1xNTC Sensor with insulated metal protective sleeve and 0.3m cable
NTC-104, 0.4	1xNTC Sensor with PC-ABS enclosure, thermally conductive silicone pad and 0.4m cable
NTC-104M4, 2	1xNTC Sensor with ϕ4mm ring connector and 2m cable
NTC-104M10, 1~	1xNTC Sensor with ϕ10mm ring connector and 1m cable
NTC-1043, 2	3xNTC-104 Sensor (yellow, green and red) as one set, each with insulated metal protective sleeve and 2m cable

* We also offer NTC Sensor option with an insulated metal protective sleeve and a choice of 1.5m or 3m cable. Please contact us for any specific requirements.

~ We also offer an NTC Sensor option with ϕ10mm ring connector and 2m cable. Please contact us for any specific requirements.

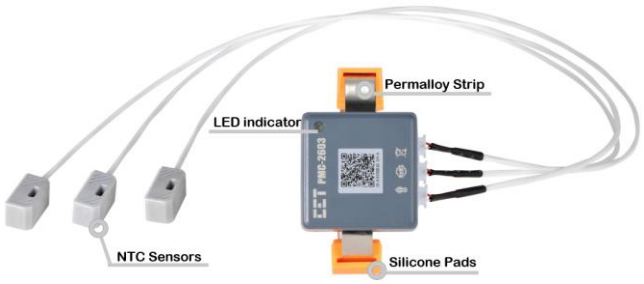


PMC-2601 and PMC-2603 Appearance

- **PMC-2601-A (Self-powered by Induction Current)**

- **PMC-2601-B (Powered by 3V Battery)**

- **PMC-2603 (Self-powered by Induction Current, with 3xNTC Inputs)**



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