LoRa Modbus Analog I/O Controller

LM100 / LC100 Series

Complete LoRa Controller for Analog In/Out, PWM Output, and RS485

The LM100/LC100 series utilizes the latest Low Power Wireless Access (LPWA) technology to build Modbus/RTU communication for long-distance, wide-coverage, and low power consumption wireless IoT applications.

Multiple analog inputs and outputs are supported in LC100 series, such as voltage inputs and outputs, current inputs and outputs, PWM output and one RS-485 port for Modbus RTU slave. One LM100 RS485 Modbus RTU can connect up to 250pcs LC100 LoRa end nodes for two-way communications where field site analog signals are sent from LC100 and controlled by LM100. The LoRa wireless distance can reach up to 3-6KM distance depending on the environment.

The LM100/LC100 series offers great flexibility in wireless IoT applications, such as LED light control, environment sensors and meters reading for Smart City Applications such as Lighting, Smart Farming, Smart Environment Monitor, etc.

-40~75°C

Features & Benefits

Modbus/RTU Extension by LoRa

• Transparent Two-Way Modbus Communication by LoRa

• LM100 Sends Modbus Control to LC100 series LoRa End node

• LC100 series Sends Modbus Data through LM100 Modbus Agent to Modbus Master Device

Tradition Modbus/RTU Operating Mode

• Utilize Modbus/RTU protocol for LoRa Agent / LoRa Node configure and communication

• Auto forward Modbus Data to Far-End node

• Auto re-present Far-End Modbus Data at Local Bus

Reliable LoRaMAC Radio Communication

• ECHO & Re-Send mechanism – LoRa Agent / LoRa Node

• Configurable Retransmit Mechanism- LoRa Agent

Secured Radio Communication

• AES 128 Data Encryption

• Configurable Encryption Key – Modbus Register , WoMaster End-Node Utility

Windows© Configure Tools

• User-Friendly, Model Auto Detection

• Analog IO Parameter Read and Write

• Micro-USB Interface

0~10V Input / Output

• 2 Channels 0~10V High Impedance Input- Luminance Sensing

• 1 Channel 0~10V Open Drain Output, Dimmer Control

4~20mA Input / Output

• 2 Channels Current Sensing, 0.3%High Accuracy

• 1 Channel Current Output, 0.3% High Accuracy

PWM Output with Duty Cycle Control

• 5V PWM Output / 10V Open Collect (O.C.)

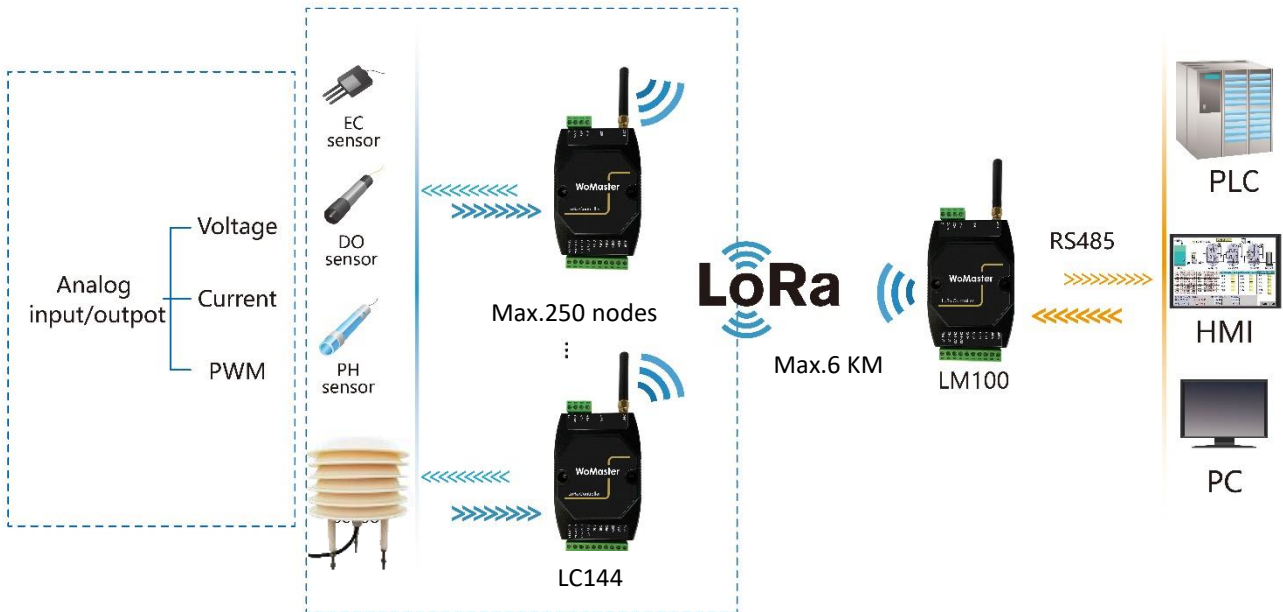• Duty Cycle Adjustable - 100Hz~1Khz , 0.2% Accuracy

RS485-Modbus/RTU

• Modbus/ RTU Slave Mode – LM100

• Modbus/RTU Host Mode – LC100

• 2-Wires RS-485

Industrial Application

• 10~30V DC wide power range input

• Low Power Consumption

• Wide Coverage up to 6KM

• Max.250 LC100 Nodes to one LM100

• -40 ~ 75°C / 90%H Operating Temperature / Humidity

• Compliance IEC 61000-6-2/-6-4 Heavy Industrial EMC

✓ **Transparent LoRa Communication to extend Two-Way Modbus Sensor Read and Control**

EC sensor

DO sensor

PH sensor

Voltage

Current

PWM

Analog input/outpot

Max.250 nodes

LC144

LoRa

Max.6 KM

LM100

RS485

PLC

HMI

PC

✓ **Transparent LoRa Communication for Programmable Node-RED Controller for 0-10V or PWM LED Light Control**

WR322-EC-LoRa supports open system OpenWRT to embed customer own software as well as NodeRED for easy to use Modbus controlling program. The Modbus control program can be extended wirelessly through LoRa Controller LC144 with PWM and 0-10V Dimmer Control.

WR322-EC-LoRa Node-RED Illumination Control

LoRa
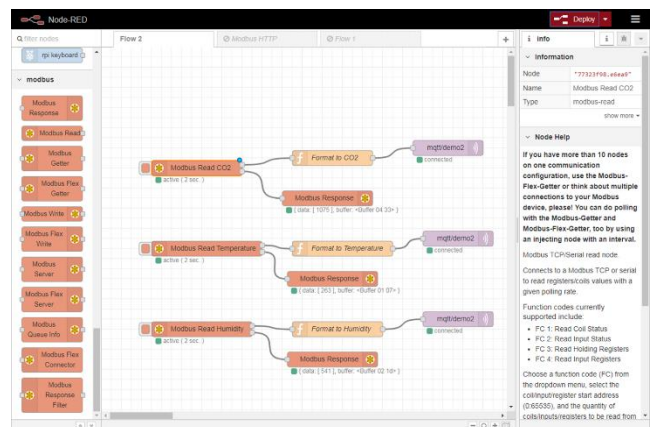
LC144

LC144

LC144

Library With Building Blocks

Light Control

Information Panel

SMA Antenna Socket

USB Configuration

Power Connector
• V+, COM, Earth Ground

DIN Rail Clip

IP-40 Plastic Housing

WoMaster

LoRa Controller

LC144

CH0	Input Voltage 0~10V Positive
CH1	Input Current 4~20mA Positive
CH2	Input Voltage 0~10V Positive
CH3	Input Current 4~20mA Positive
CH4	Output Current 4~20mA Positive
CH5	Output Voltage(OC) 0~10V Positive
CH6	Output PWM Voltage 0~5V Positive
CH7	Output PWM(OC) 0~10V Positive
CH8	RS485A
CH9	RS485B

Dimensions

(mm)
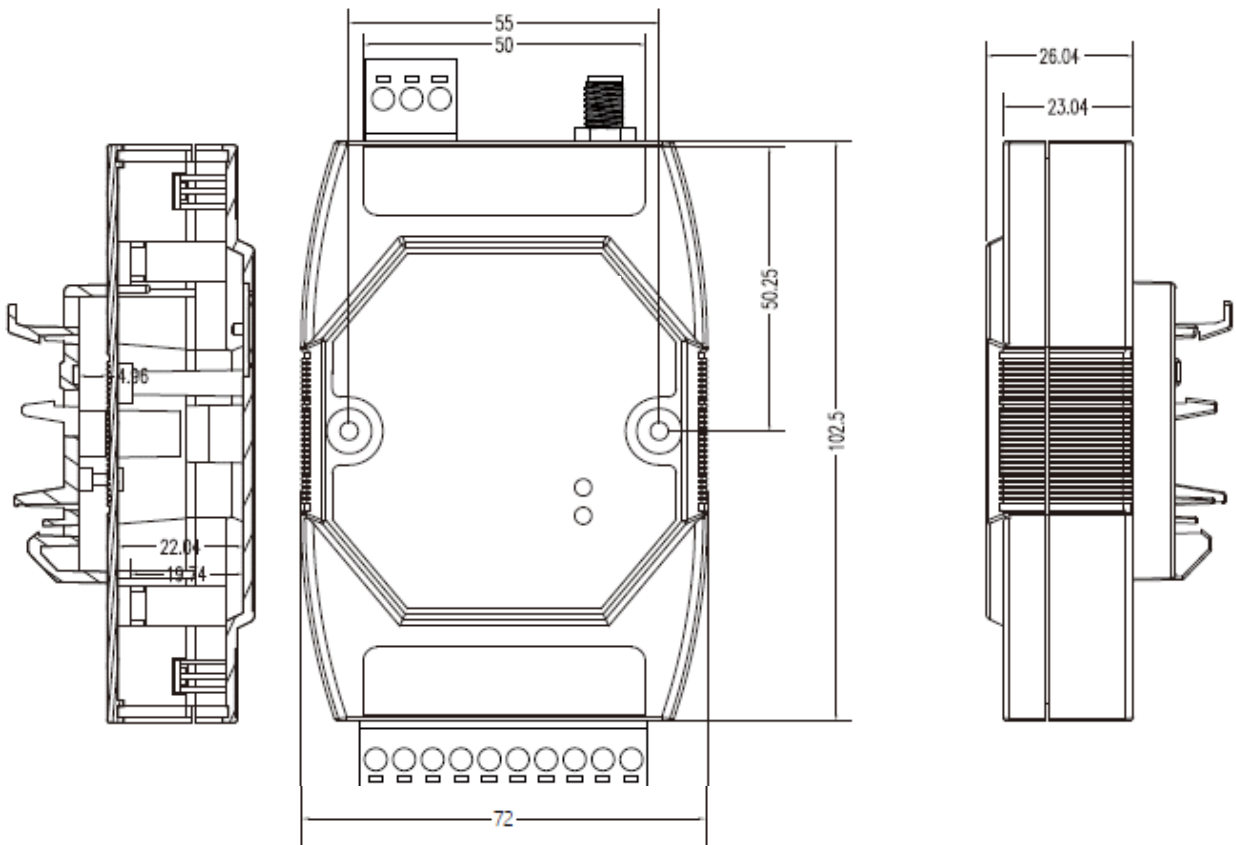
Specifications

Wireless Specification	
Frequency	EU 433Mhz, EU 868Mhz, US915Mhz, AS 923Mhz, KR 920Mhz
Wireless Technology	Low Power Wide Access – LoRa MAC Technology
Radio TX Power	22dBm
Radio RX Sensitivity	- 148dBm, SF=12 @ 250bps
Spreading Factor	SF5/SF6/SF7/SF8/SF9/SF10/SF12, Default SF7 Remote Configurable by ModBus RTU / Register writing command
Demodulator SNR	LoRa Demodulator Signal to Noise Ratio: -2.5dB ~ -20dB
Operating Mode	Modbus protocol over the Air (LoRa MAC Transparent Transmission) with configurable Echo time and retransmission technology
Forwarding Data Buffer	256Bytes FIFO Data Buffer for LoRa signal transmission
Data Encryption	128bits AES with configurable key

Management	
System Management	1 x Micro USB 2.0 port for system configuration
Software Utility	Windows© Based Utility
Remote Management	Remote Configure by Modbus RTU/ Read/Write Command

I/O Interface	
Antenna Connector	1x 50 ohm, Female SMA
Serial Interface	2-wires RS-485 Terminal Connector with 1kv isolation Connector Type: Removable Terminal Connector Supported Model: LM-100 (Slave), LC-100(Host)
Serial Parameters	Baud Rate: 1200bps, 4800bps, 9600bps,115,200bps Data Bits: 8 Parity Check: None Stop Bit: 1 CRC: Enable (default)
Current Input	2 Channels Detection Range: 4-20mA Accuracy Level: 0.3%
Voltage Input	2 Channels Detection Range: 0~10 V Accuracy Level: 0.2%
Current Output	1 Channel Output Range: 4-20mA @ Typical 24V Power Input Accuracy Level: 0.3%
Voltage Output	1 Channel Output Range: 0~10V Output Type: Open Collect (O.C.) Accuracy Level: 0.2%, Full Scale (F.S.)
PWM Output	Frequency: 100Hz~1KHz with 0.2% Duty-Cycle Accuracy Output Type-1: 5V, 200mA (Max) Output Type-2: Open Collect (O.C.), 10V /200mA (Max)

System Indication	
LED	Power (On): System Power applied LoRa (Blinking): LoRa RF Signal on Communication

Power Requirement	
Input Rating	Typical DC 24V, Rating: 10~30V 3-Pins Removable Terminal Connector for V+ ,Com and Earth Ground
Reverse Protection	Yes
Power Consumption	LM100: 1 Watt @ DC 24V power input LC144: 3 Watts @ DC 24V power input
Mechanical	
Installation	DIN Rail Mount
Enclosure Material	UL94v0, ABS , Anti- U/V
Ingress Protection	IP 40
Dimension	26(D) x 102.5 (H) x 72 mm (W) / with wall mounting clip
Weight	115g
Environmental	
Operating Temperature	-40°C~75°C, 0% ~ 90%, Non-Condensing
Storage Temperature	-40°C~80°C, 0% ~ 90%, Non-Condensing
Reliability & Warranty	
MTBF	20000> Hours
Warranty	3 Years, No-Natural damaged
Standards	
EMC	Compliance with IEC / EN61000-6-2, IEC/ EN61000-6-4
EMI	Electromagnetic Immunity: CISPR 22, FCC part 15B Class A
EMS	Electromagnetic Suspension: IEC 61000-4-2 ESD IEC 61000-4-3 RS IEC 61000-4-4 EFT IEC 61000-4-5 Surge IEC 61000-4-6 CS IEC 61000-4-8 Pulse Magnetic Field

Model	Description
LM100-EU433 **LM100-EU868** **LM100-AS923** **LM100-KR920** **LM100-US915**	LoRa /Modbus RTU Client Agent 1 x RS-485 Slave 2-wire, 1 x SMA Antenna Connector EU433: 433Mhz, EU868:868Mhz, AS923:923Mhz, KR920:920Mhz,US915:915Mhz
LC144-EU433 **LC144-EU868** **LC144-AS923** **LC144-KR920** **LC144-US915**	LoRa End-Node, 8CH AIO, 1 Modbus RTU 485 Host 2 x 0~10V input, 0.2% accuracy 2 x 4~20mA input, 0.3% accuracy 1 x 0~10V Output, Open Collect (O.C.) Type, 0.2% accuracy 1 x 4~20mA Output, 0.3% accuracy 1 x PWM Output (0~5V), 200mA (max), 0.2%Duty_Cycle Accuracy @1khz 1 x PWM (0~10V), Open Collect (O.C.) Type, 200mA, 0.2% Duty Cycle accuracy @1Khz, 10V(Max) 1 x RS485 Host, 2-wire 1 x SMA /LoRa Antenna Connector EU433: 433Mhz, EU868:868Mhz, AS923:923Mhz, KR920:920Mhz,US915:915Mhz
Packing & Accessories	
	LoRa Device x 1
	Antenna x 1, 6dBm , SMA
	User's QIG x1
Optional Accessories	

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