Datasheet

Low power mobile data logger

ThingsLog LPMDL-110X

Version: 1.0.5

Visit us at www.thingslog.com; (+359) 875 32 80 70; sales@thingslog.com

Contents

1 Overview

ThingsLog LPMDL-110X is a universal, low power mobile data logger able to meter various kinds of pulse meters, analog sensors and i2c and 1-wire sensors through their digital inputs. The logger is transmitting the metered data over LoRaWAN.

LPMDL-110X has the following key characteristics:

Optimal data transmissions - LPMDL-110X is able to transmit the data over a two-way LoRa/LoRaWAN network in an optimal for the battery way. That allows the logger to meter per minute, to transmit a couple of times per day and still to achieve more than 10 years of battery life.

Intelligence - the data is transmitted over a widely distributed, cellular network and is automatically gathered in ThingsLog platform.

Pulse metering - **LPMDL-110X** has ability for an independent counting of pulse output meters for water, gas, electricity and heating. With a single data logger, you can meter two meters for example for cold and hot water or if your meters are in proximity distance you can meter with a single device gas, electricity and heating.

Analog sensors metering - LPMDL-110X has two extra inputs for connecting analog sensors with 4-20 mA output. An example could be connecting two pressure sensors or one pressure and one temperature sensor.

Combined monitoring - LPMDL-110X can fulfill use cases where with a single logger have to be monitored one water meter and two pressure sensors. For example monitoring of pressure reduction areas by measurements of pressure sensors before and after the pressure reduction valve and its water meter.

Alarms and notifications - LPMDL-110X together with the ThingsLog platform is able to monitor consumption and notify the customer or the utility company for leaks, high or low consumption, fraud or thresholds bridging of certain sensor value or a combination of a sensor and metered value.

Application - LPMDL-110X fulfills various use-cases in Water, Electricity and Gas distribution utilities but also many other use-cases in property management, hotel, manufacturing, condominium sub-metering or in common need is spread.

Ability to work in any environment - **LPMDL-110X** has IP68 dust and leakage protection and is suitable for any kind of home or industrial usage.

2 Technical specification

Technical parameter	Value
Length	132.3 mm / 5.2 in 155 mm / 6.1 in

Height	52 mm / 2.04 in
Width	70 mm / 2.75 in
Weight	130 gram
Temperature range:	-40 - +60 °C
Transmit power	+20 dBm
Sensitivity	-142 dBm
Cable length	1m, 2m, 3m, 4m, 5m
Physical data transmission layer	GSM
MAC layer	GPRS Class 12
Dust & Water protection	IP68
Battery power	4.5 V, 3xAA 1.5 batteries
External sensor battery packs	6x1.5V batteries - up to 9V, fits inside the logger Anything else – in an external battery holder

Table I Technical specification

3 Communication technical characteristics

Table 1 LoRa/LoRaWAN transmission characteristics

Technical parameter	Value
Maximum transmission power	+20 dBm
Sensitivity	-142 dBm
Physical transmission layer	LoRa
MAC transmission layer:	LoRaWAN

4 Functional specification

- **Pulse metering:** the logger supports pulses generated by reed contacts, hol sensors or S0 pulse outputs of water, gas and electricity meters

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- **Analog sensor metering:** The logger supports analog sensors with output from 4 to 20 mA or 0-3V
- **Digital sensor metering:** i2c and 1-wire
- **Data transmission:** LPMDL-110X supports LoRa/LoRaWAN
- **Low powered:** Preinstalled interchangeable long-life battery able to support more than 5000 transmissions of millions of individual counter values
- **Average battery life:** 5 years
- **Antenna: Internal or optional external SMA**
- **Secured configuration**
- **Certified for both industrial and home usage**

5   Safe and Healthy instructions

Important information	Please read the complete information, the specifications, the installation instruction and the electrical interconnect schema prior to working with this product. For your own health and safety and for the equipment to function correctly please ensure that you understand completely the contents of this guide, prior installation, configuration, operations or prophylactics.
CE	From license point of view, unauthorized modifications or additions are not authorized.
Terms of use	The data logger is intended for use in the following environmental conditions: ● for use indoors or outdoors without prolonged exposure to direct UV radiation ● for altitudes up to 2000 m ● for ambient temperatures from -40 ° C to + 60 ° C, with continuous exposure to temperatures of -20 to -40 ° C not recommended ● for relative humidity of 4% to 100% ● for supply voltage deviation of up to + 20% and -15% of declared voltage ● for use under the overvoltage category I; ● for environment with pollution degree 3 (PD3).
Health and safety rules for installation	All installation work has be performed in accordance with the local regulations on health and safety at work in electrical systems as well as the regulations governing the electrical system and networks.

	Only engineers or technicians with product expertise that has previously read and understood this guide should install this product.
Installation and maintenance	Installation is done in accordance with the instructions in this document. Incorrect installation may cause damage to the logger and inaccurate measurements. That is why the installation, the initial configuration must be done with due attention. Incorrect installation results in violation of warranty conditions and failure of the warranty. An example of improper installation is to connect the pulse or analog input of the device shortly or to a power source. If you need to connect the logger to an equipment in an ATEX zone 0, 1,2 please do so outside the zone and through an external IC circuit barrier.
Transport and storage	Store in dry rooms without access to water or other liquids at temperatures not lower than -20 ° C and not higher than 60 ° C in the original package. Transportation is allowed to happen accidentally at temperatures below -20 ° C but not more than 8 hours. Protect against shocks and avoid extreme conditions.
Subsequent maintenance	Once installed, the data logger should be cleaned using a dry or lightly moistened cloth, explicitly prohibiting the use of aggressive and abrasive detergents. Every six months, it is desirable for the user of the logger to check the enclosure integrity and the integrity and waterproofness of the cable and connecting terminals to the measured device or sensor.
Recycling	When recycling the product and its disposal, local and national legislation and regulations must be observed. If you hesitate, please return the appliance, we will recycle it for you.

Table II Health and safety instructions
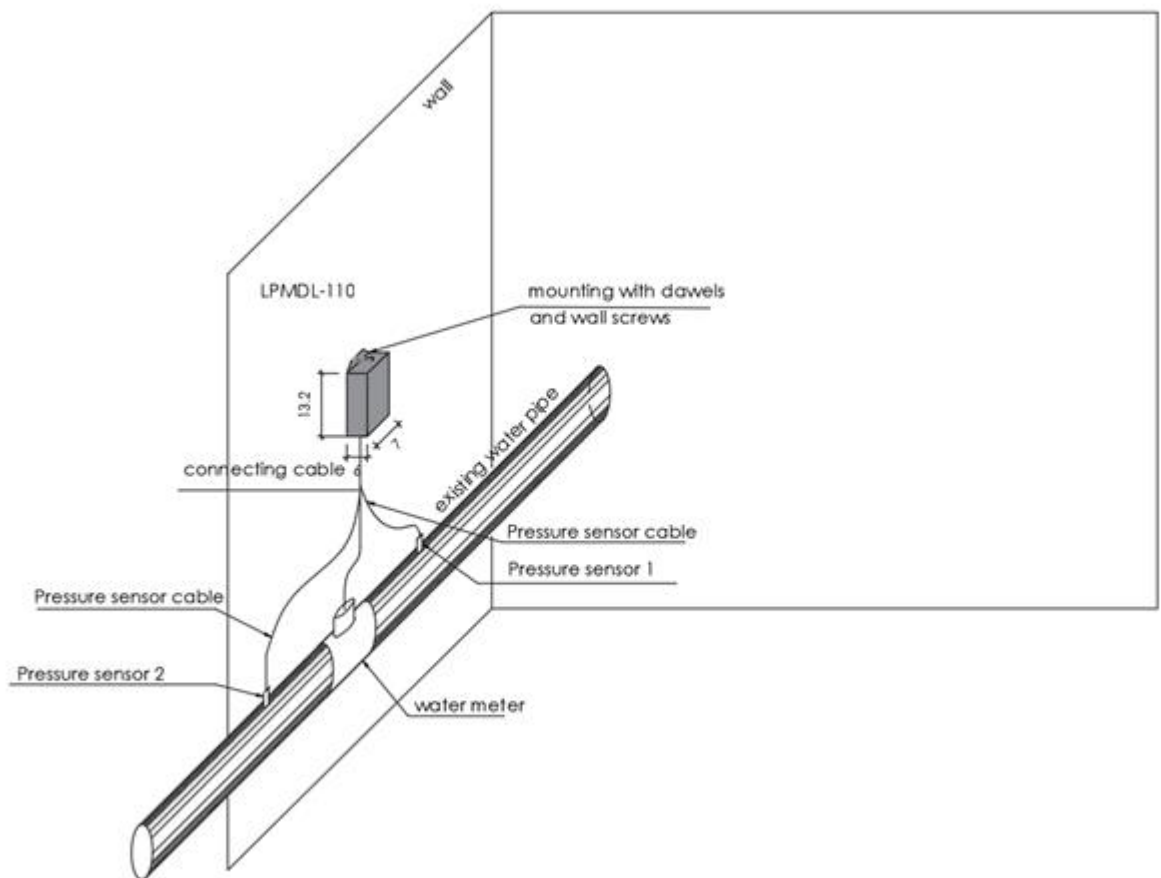
6 Physical installation

Figure 1 LPMDL-110X Logger outlook

Figure 2 Example installation schema for interconnecting LPMDL-110X with a water meter

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- Prior to install the logger please review the health and safety instructions described in chapter 4.
- The data logger is coming with an installation manual and an optional attachment kit
- In order to attach the logger you will need a wall with stiff, flat surface close to the meter or the sensor that you would like to measure.
- Mark and drill holes with size 4x25 mm for attaching the logger to the wall.
- Attach the logger input/outputs to the connecting cable.
- Attach the corresponding connecting cable input/outputs to the meters/sensors.

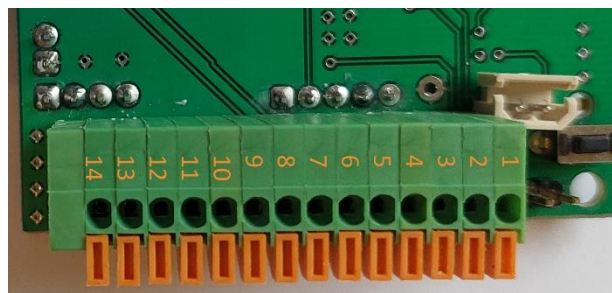# 7 Input/output ports

LPMDL-110X has 14 input/output ports.

Figure 3 Logger input/output ports

1) Power supply:
   a) output for external sensors - for models: LPMDL-110-XX-YYYY-ZZZZ-LLLL-EE-S12/LAS/LNS.
      (1) S12 is 12V power supply. It is switched by the logger for a short period of time (settling time parameter) configured in the logger, during the measurements.
      (2) LAS is 3.6V or 4.5V depending on the logger battery. It is switched by the logger for a short period of time, during the measurements.
      (3) LNS is 3.6V or 4.5V depending on the logger battery. It is not switched by the logger so the sensors should be low power.
   b) input from external source – for models: LPMDL-110-XX-YYYY-ZZZZ-LLLL-L1/L0-000
      (1) The external power supply can be in range from 5-12V.
   c) not connected – for models: LPMDL-110-XX-YYYY-ZZZZ-LLLL-00-000
2) Ground
3) ON/OFF alarm input 1. Alarm on transition from OFF (opened circuit - the pin is not grounded) to ON (closed circuit - the pin is grounded)
4) ON/OFF alarm input 2. Alarm on transition from OFF (opened circuit - the pin is not grounded) to ON (closed circuit - the pin is grounded)
5) Ground
6) Pulse input 2
   a) can be dry contact (reed contact) – for models: LPMDL-110-XX-2R0S-ZZZZ-LLLL-EE-SSS
   b) S0 (open collector) – for models LPMDL-110-XX-0R2S/1R1S-ZZZZ-LLLL-EE-SSS
7) Pulse input 1
   a) can be dry contact (reed contact) – for models: LPMDL-110-XX-2R0S/1R1S-ZZZZ-LLLL-EE-SSS
   b) S0 (open collector) – for models: LPMDL-110-XX-0R2S-ZZZZ-LLLL-EE-SSS

8) Ground
9) ON/OFF output 1 (open collector)
10) ON/OFF output 2 (open collector)
11) Analog input 4
    a) 4-20 mA - for models: LPMDL-110-XX-YYYY-0V4C/1V3C/2V2C/3V1C-LLLL-EE-SSS
    b) 0-3 V - for models: LPMDL-110-XX-YYYY-4V0C-LLLL-EE-SSS
    c) Not connected – for models: LPMDL-110-XX-YYYY-0000-LLLL-EE-SSS
12) Analog input 3
    a) 4-20 mA - for models: LPMDL-110-XX-YYYY-0V4C/1V3C/2V2C-LLLL-EE-SSS
    b) 0-3 V - for models: LPMDL-110-XX-YYYY-4V0C/3V1C-LLLL-EE-SSS
    c) Not connected – for models: LPMDL-110-XX-YYYY-0000-LLLL-EE-SSS
13) Analog input 2
    a) 4-20 mA - for models: LPMDL-110-XX-YYYY-0V4C/1V3C-LLLL-EE-SSS
    b) 0-3 V - for models: LPMDL-110-XX-YYYY-4V0C/3V1C/2V2C-LLLL-EE-SSS
    c) Not connected – for models: LPMDL-110-XX-YYYY-0000-LLLL-EE-SSS
14) Analog input 1
    a) 4-20 mA - for models: LPMDL-110-XX-YYYY-0V4C-LLLL-EE-SSS
    b) 0-3 V - for models: LPMDL-110-XX-YYYY-4V0C/3V1C/2V2C/1V3C-LLLL-EE-SSS
    c) Not connected – for models: LPMDL-110-XX-YYYY-0000-LLLL-EE-SSS

7.1 Nomenclatures

The name of the logger is formed as follows:

        LPMDL-110-XX-YYYY-ZZZZ-LLLL-EE-SSS

    1. XX – Modem
        a. 30,31,32 - LoRa (30-EU, 31 - NA, 32 AU/AS)

    2. YYYY – Pulse input
        a. 2R0S - 2 reed switch
        b. 0R2S - 2 S0
        c. 1R1S - 1 reed, 1 S0

    3. ZZZZ – Analog input
        a. 4V0C - 4 voltage (0-3V)
        b. 0V4C - 4 current (4-20mA)
        c. 2V2C - 2 voltage, 2 current
        d. 1V3C - 1 voltage, 3 current
        e. 3V1C - 3 voltage, 1 current
        f. 0000 - no analog inputs

    4. LLLL - Logger Power supply
        a. 36CH - Li-SOCl2, Battery, 3.6V, C SAFT, ESH
        b. 36CS - Li-SOCl2, Battery, 3.6V, C SAFT, 26500
        c. 36CE - -SOCl2, Battery, 3.6V, EVE, C 26500
        d. 0000 - no-battery (customer provided battery)

    5. EE - External Power supply
        - L0 is not compatible with any of the options in LLLL

    a. 00 - No external power supply

    b. L0 - No battery, only external power supply 5-12V

    c. L1 - With battery, and external power supply 5-12V

6. **SSS - Output power supply for sensors**

   - S12, LAS are non-compatible with L0 or L1

    a. LNS - Sensor is powered by logger power supply (Sensor should be low power)

    b. LAS - Sensor is powered by logger power supply only for configurable settling time

    c. S12 - Sensor is powered with 12V power supply generated by the logger (configurable settling time)

    d. 000 - Sensor is not power by the logger
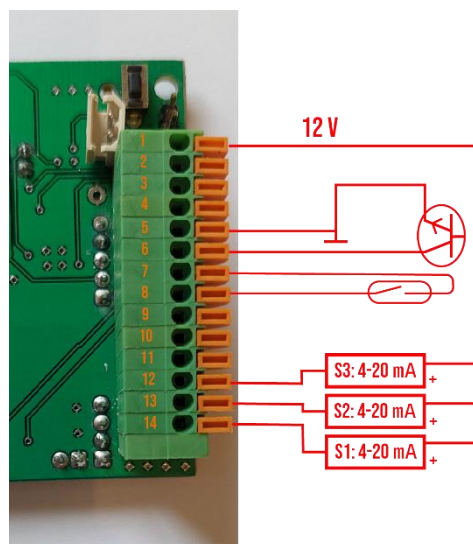
7.2 Example connection circuits

1. Connect 2 reed pulse inputs

   a. You need following logger models: LPMDL-110-XX-2R0S-0000-LLLL-EE-SSS

   b. Circuit
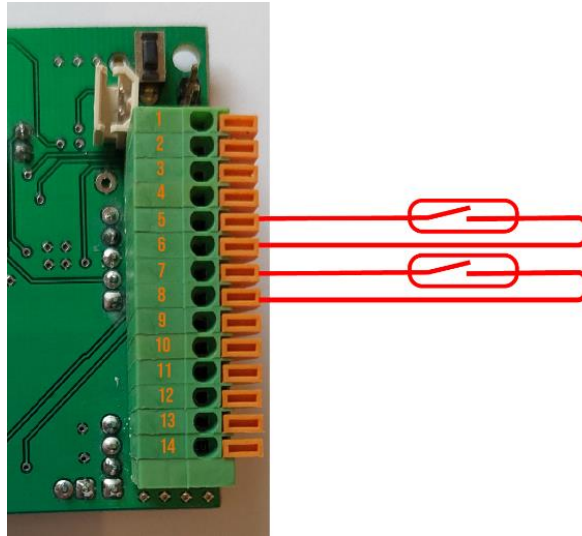
2. Connect 1 reed and 1 S0 pulse input, 3 analog 4-20 mA inputs. The analog sensors are power by 12 V supply, generated by the logger
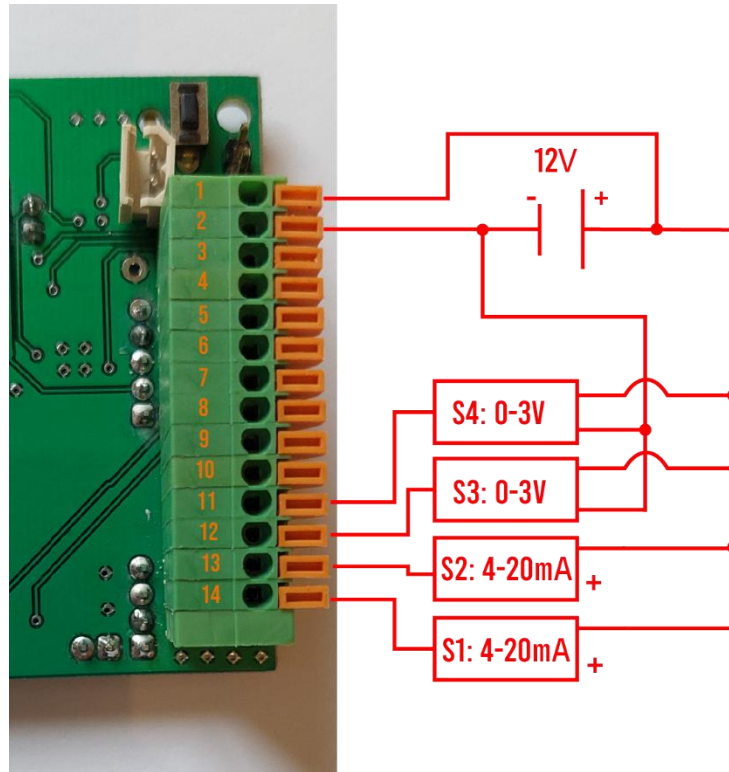
   a. You need following logger models: LPMDL-110-XX-1R1S-1V3C/0V4C-LLLL-00-S12

   b. Circuit

3. Connect 2 analog 4-20 mA and 2 analog 0-3V inputs. The analog sensors 4-20 mA are power by external power supply (non-low power case). The logger is powered by external power supply.

    a. You need following logger models: LPMDL-110-XX-YYYY-2V2C-LLLL-L0/L1-000
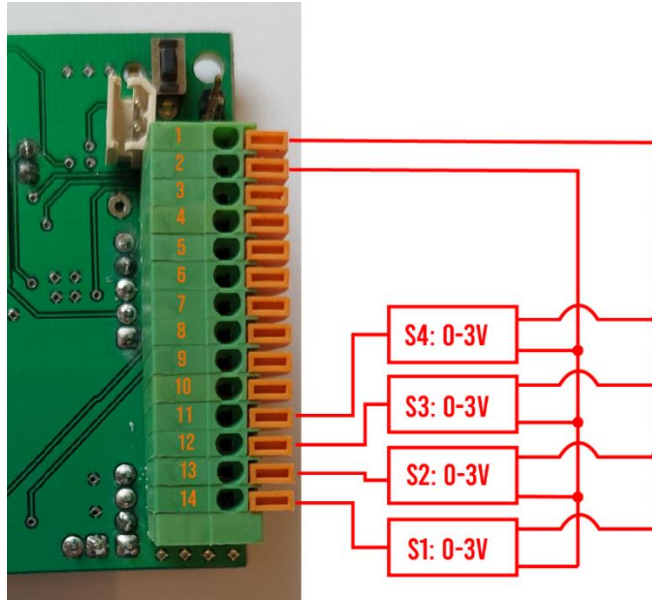
    b. Circuit

4. Connect 4 analog 0-3V inputs. The analog sensors are powered by the logger power supply but only for the time of reading analog value.

    a. You need following logger models: LPMDL-110-XX-YYYY-4V0C-LLLL-00-LAS

    b. Circuit

5. Connect 4 analog 4-20 mA. The analog sensors are power by 12 V supply, generated by the logger.

    a. You need following logger models: LPMDL-110-XX-YYYY-0V4C-LLLL-00-S12

    b. Circuit
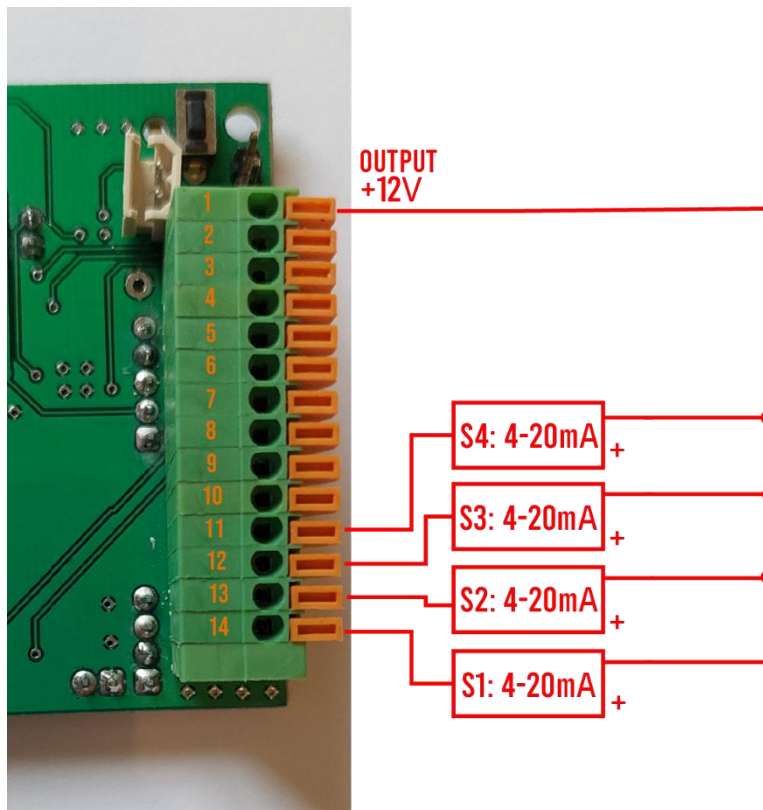
8 Device configuration

LPDML-110X is configurable through CLI (command line interface) over a TTL to USB cable.

ThingsLog LPMDL-110X is initially coming with OTAA/ABP keys and OTAA set by default. The keys will be initially provided.

They are always visible over the CLI console. The user can always change its network identity through the CLI interface.

8.1 Network provisioning

In order to provision the data logger to your favorite network you will have to refer to the documentation of the network itself.

Typically what has to be done is device number and keys to be provisioned and an integration to be setup in order to get the useful data from the device.

The device does an uplink for each configured and enabled network port.

8.2 Configuration through the CLI

In order to configure the device over the CLI please refer to the config section of the LPMDL-110X command line guide.

9 Communication protocol

For communication protocol and decoders please refer to the "LPMDL-110X open lora data format" guide.