DR-LR2000 LoRaWAN Wireless Data Acquisition Module

1. Product Overview

The **DR-LR2000** is a low-power LoRaWAN wireless data acquisition module designed to convert 4-20mA analog signals from industrial sensors into digital data for wireless transmission. It supports multiple regional frequency bands and delivers long-range line-of-sight communication, making it ideal for industrial monitoring, environmental monitoring, and various IoT applications.

With built-in sensor power feed (12V), the DR-LR2000 is compatible with both active and passive sensors, offering a complete, ready-to-deploy solution for users ranging from industrial enterprises to individual developers.

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2. Key Specifications

Parameter	Specification
Product Model	DR-LR2000
Supported Bands	KR920, US915, EU868, AS923, AU915, IN865
LoRaWAN Version	1.0.3 Class A
Activation Method	OTAA (default)
Sensitivity	-138 dBm
LOS Transmission Range	Up to 10 km (depends on environment)
Communication Distance (Urban NLOS)	0.5-3 km (depends on environment)

Parameter	Specification
Communication Distance (Suburban)	3-10 km (depends on environment)
Input Signal	1 x 4-20mA analog input
Sampling Accuracy	<0.01mA, resolution 0.001mA, overall accuracy ⩽0.01mA (room temperature)
Sampling Rate	Configurable from 1s to 3600s per sample via network server
Data Rate Strategy	ADR (Adaptive Data Rate) enabled by default
Power Supply Options	Option 1: ER34615 (19Ah lithium battery) Option 2: 2×18650 (7Ah total) + 6V 200mA solar panel
Deep Sleep Current	⩽ 10 μA
Operating Temperature	-45°C to +85°C (battery dependent)
Protection Features	Reverse polarity protection, open-circuit detection, surge/lightning protection (TVS + current limiting)
Dimensions	Customizable
Interfaces	4-20mA input terminal, magnetic switch control, LED indicator

3. Key Features

3.1 Multi-Region Support

The DR-LR2000 supports six major LoRaWAN frequency bands, allowing global deployment without hardware modification.

3.2 Ultra-Low Power Design

With deep sleep current ⩽10μA and intelligent power management, the DR-LR2000 achieves exceptional battery life:

- **ER34615 (19Ah) battery: ≥3 years** (with 1-hour reporting interval)
- **2×18650 (7Ah) + solar panel: ≥3 years** (renewable operation)

3.3 High-Precision Analog Acquisition

- **Sampling accuracy**: <0.01mA
- **Resolution**: 0.001mA
- **Built-in high-precision, low-drift ADC and sampling resistor**
- **Input protection**: Reverse polarity, open-circuit detection, TVS surge protection

3.4 Flexible Sampling & Reporting

- Sampling interval: **Configurable from 1 second to 3600 seconds**
- Reporting interval: **Remotely configurable via LoRaWAN downlink commands**
- **ADR (Adaptive Data Rate)** enabled by default for optimal power/range balance

3.5 Intelligent Alarm System

The DR-LR2000 features a sophisticated, anti-false-alarm mechanism:

Alarm Type	**Trigger Condition**	**Anti-Flood Protection**	
Threshold Alarm	Immediate trigger when threshold exceeded	Minimum interval ⩾60s (configurable)	

Alarm Type	Trigger Condition	Anti-Flood Protection	
Debounced Alarm	Continuous N times (N=2, configurable) OR duration ⩾T seconds (T=5s, configurable)	-	
Rate-of-Change Alarm		ΔI	⩾ threshold for T seconds (both configurable)

3.6 Magnetic Switch Control

The built-in magnetic switch enables intuitive, button-free operation:

Action	Magnet Approach Duration	Response
Manual Report	⩾3 seconds	Immediate data upload
Power Menu	⩾8 seconds	LED fast blink, enter power menu
Power ON/OFF	Maintain 3 seconds after menu	Execute power on/off
Anti-False-Trigger	Minimum interval between operations ⩾10 seconds	Prevents accidental activation

3.7 LED Status Indication

Status	LED Behavior
Power-on self-test	Green, 1 long flash

Status	LED Behavior
Joining network	Green, slow blinking
Join success	Green, 3 fast flashes
Join timeout (not joined)	Red, slow blinking
Transmitting data	Blue, fast flashing
Low battery warning	Red, double flash

3.8 Sensor Power Feed

- **12V feed output** for powering external sensors
- **Compatible with both active and passive sensors**
- Simplifies field deployment by eliminating separate sensor power supplies

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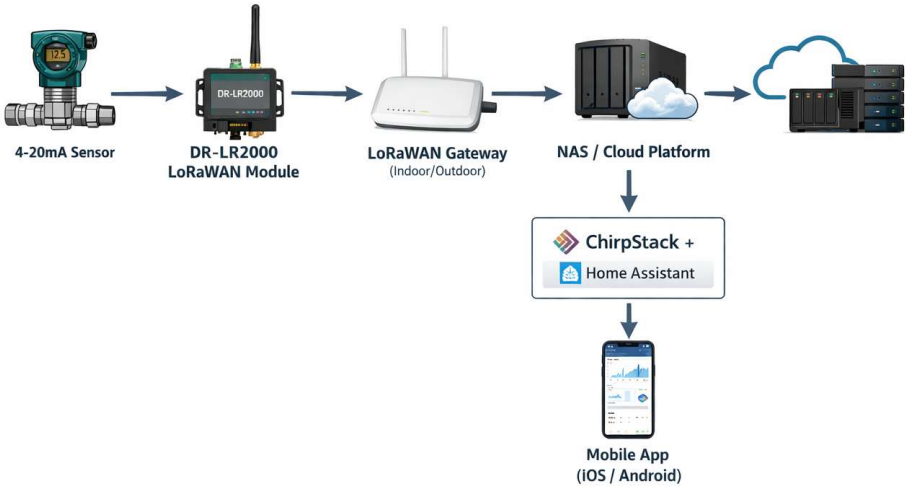
4. Complete Ecosystem Solution

The DR-LR2000 is part of Fandesensor's **end-to-end LoRaWAN solution**, including:



Platform Highlights:

- **NAS Support**: Local deployment option for data security
- **Cloud Platform**: Remote access and management
- **ChirpStack + Home Assistant**: Enterprise-grade LoRaWAN network server with user-friendly dashboard
- **Mobile App**: View sensor data anytime, anywhere

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5. Application Cases

Case 1: Industrial Tank Level Monitoring

Scenario: A chemical plant needs to monitor the liquid levels of 50 storage tanks spread across a 5km² facility.

Solution:

- Deploy 50 DR-LR2000 modules connected to level transmitters (4-20mA output)
- Install 2 outdoor LoRaWAN gateways on existing building rooftops
- Configure sampling interval: 5 minutes (normal), 30 seconds (when level changes rapidly)

Results:

- **Cost savings**: Eliminated 45km of wiring and trenching (~$45,000 saved)
- **Manpower reduction**: From daily manual rounds to remote monitoring (80% labor reduction)
- **Real-time alerts**: Immediate notification when any tank approaches overflow or empty condition
- **Mobile access**: Plant manager can view all 50 tank levels from smartphone during off-hours

Case 2: Remote Water Pipeline Pressure Monitoring

Scenario: A municipal water utility needs to monitor pressure at 200 points along a 50km pipeline in a rural area with no cellular coverage.

Solution:

- Deploy DR-LR2000 modules with pressure transmitters at each monitoring point
- Powered by ER34615 batteries (3+ years maintenance-free)
- Configure alarm thresholds: Low pressure (indicating leak) and high pressure (indicating blockage)
- Gateway installed at water treatment plant with 10km coverage radius

Results:

- **Leak detection**: Identified 3 small leaks within 24 hours of occurrence
- **Preventive maintenance**: Pressure trend analysis enabled early pump replacement
- **Annual savings**: $120,000 in water loss reduction and repair cost avoidance
- **Mobile app**: Field technicians receive real-time pressure alerts on their phones

Case 3: Agricultural Greenhouse Environmental Monitoring

Scenario: A large greenhouse operator wants to monitor soil moisture, CO2, and temperature across 100 greenhouses.

Solution:

- One DR-LR2000 per greenhouse, connected to soil moisture, CO2, and temperature transmitters

- Powered by 2×18650 batteries + small solar panel (no battery replacement needed)
- Sampling interval: 10 minutes
- Integration with Home Assistant for automation rules

Results:

- **Crop yield improvement**: 25% increase through optimized irrigation timing
- **Energy savings**: $8,000/year in reduced heating/cooling costs
- **Mobile app**: Farm manager can check all greenhouse conditions from anywhere
- **Scalability**: Adding 50 more greenhouses only requires additional sensors and modules

Case 4: Pump Station Condition Monitoring

Scenario: A wastewater treatment plant needs to monitor vibration and temperature on 30 pumps to predict failures.

Solution:

- DR-LR2000 modules connected to vibration and temperature sensors (4-20mA)
- Configure rate-of-change alarms: Trigger alert if temperature rises >2°C in 5 minutes
- Historical data logged to local NAS for predictive analytics

Results:

- **Unplanned downtime reduced**: 65% decrease through early failure detection
- **Maintenance cost**: 40% reduction by moving from scheduled to condition-based maintenance
- **Mobile app**: Maintenance team receives instant alerts on their phones when anomalies detected
- **ROI**: System paid for itself within 8 months

Case 5: Smart Building Energy Monitoring

Scenario: A commercial building owner wants to monitor HVAC system performance across 20 floors.

Solution:

- DR-LR2000 modules connected to duct pressure and temperature sensors
- Single indoor gateway covers the entire building
- Integration with building management system via ChirpStack API
- Facility managers access data via mobile app

Results:

- **Energy reduction**: 18% decrease in HVAC energy consumption
- **Comfort improvement**: Real-time adjustments maintained consistent temperature
- **Tenant satisfaction**: Proactive issue resolution before tenant complaints
- **Mobile access**: Building manager can monitor all floors from smartphone during weekend calls

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6. Why DR-LR2000? (Value Proposition)

Consideration	DR-LR2000 Advantage
Performance	-138dBm sensitivity, 10km LOS range, 0.001mA resolution
Battery Life	3+ years on single ER34615 battery (1-hour reporting)
Flexibility	6 regional bands, configurable sampling from 1s to 3600s
Protection	Built-in reverse polarity, open-circuit, surge/lightning protection
Ease of Use	Magnetic switch control, clear LED status, mobile app access
Complete Solution	NAS, gateway, module, sensor, and platform from single source
Cost Efficiency	Eliminates wiring costs, reduces manual inspection, prevents equipment damag
Scalability	Add hundreds of sensors without significant infrastructure investment

7. Mobile App Feature Highlights

With the Fandesensor mobile app (compatible with ChirpStack and Home Assistant):

- **Multi-device dashboard**: View all sensors on one screen
- **Real-time data**: Instant updates when sensors report
- **Historical charts**: Trend analysis for any time period
- **Alert management**: Receive push notifications for alarms
- **Remote configuration**: Change sampling intervals, alarm thresholds, and other parameters
- **Multi-user support**: Share access with team members
- **Cross-platform**: Available for iOS and Android

Example screenshot description:

The dashboard shows 25 pressure sensors across 3 pump stations. Green indicators show normal operation. One sensor shows yellow (warning threshold approaching). Two sensors show red (alert triggered). Tap any sensor to view 7-day trend chart and historical data.

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8. Ordering Information

Part Number	Description
DR-LR2000-US	US915 band, 4-20mA input
DR-LR2000-EU	EU868 band, 4-20mA input
DR-LR2000-AS	AS923 band, 4-20mA input
DR-LR2000-AU	AU915 band, 4-20mA input
DR-LR2000-KR	KR920 band, 4-20mA input

Part Number	Description
DR-LR2000-IN	IN865 band, 4-20mA input

Included Accessories:

- DR-LR2000 module ×1
- 4-20mA input terminal block ×1
- Magnetic switch activation magnet ×1
- Quick start guide ×1

Optional Accessories:

- ER34615 battery pack
- 2×18650 battery holder with solar panel
- Outdoor antenna kit
- IP67 enclosure

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9. Technical Support

- **Documentation**: Complete user manual, integration guide, API reference
- **Firmware updates**: OTA (Over-The-Air) updates supported
- **Warranty**: 12 months
- **Support channels**: Email, ticketing system, remote assistance

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10. Contact Information

sales@fandesensor.com

Providing complete solutions from NAS, gateway, acquisition terminal to sensors.