

FVL-100

BATTERY-OPERATED LASER *OPERATOR'S MANUAL*



BINMASTER[®]

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INSTALLATION AND OPERATION INSTRUCTIONS
PLEASE READ CAREFULLY

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WARNINGS

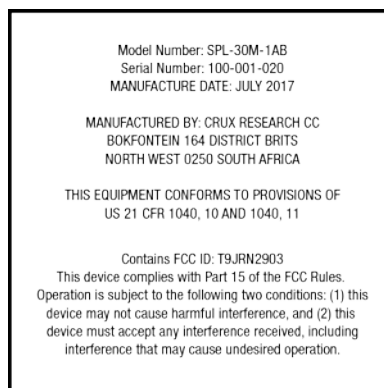
- Caution—use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- This product emits Class 2 laser radiation, <1mW from the shutter in a direction perpendicular to the shutter.
- Do not stare into the laser during operation.
- If eyes are exposed to the laser, blink and turn away immediately.
- The unit may begin laser operation immediately upon connecting the battery or at any time according to the software configurations applied.
- When servicing the unit, it is advised to first disconnect the battery in order to power the unit off.
- When connecting the battery, first ensure the unit is not pointed toward eyes.
- Do not tamper with or remove the electronics cover.
- Do not tamper with or remove the shutter or shutter attachment means.

WARNING LABELS

This product contains the following warning and certification labels affixed to the exterior of the body:

Label 1: Certification and Identification Label

The Certification and Identification label is located on the product body side.



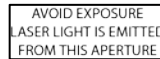
Label 2: Warning Logotype

The Warning Logotype label is located on the product body side.



Label 3: Aperture Label

The Aperture label is located on the product front adjacent to the aperture.



Label 4: Brand Label

The Brand label is located on the product body side.



FCC INFORMATION

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INTENDED USE

The FVL-100 is intended for mounting in fixed, known locations and for use in measuring distances to solid materials in low and no-dust environments.

HIGHLIGHTS

The FVL-100 is a fully wireless, battery-powered automatic single point laser level measuring sensor. The unit features a dust tube for dust protection. The unit operates at a configurable time, captures a measurement, and sends the measurement using the integrated LoRa transceiver to the LoRa modem that may be connected to the LG-100 gateway. The gateway may be configured to send and receive data and configuration files via BinView.

To reduce installation costs and complexity, the unit is completely wireless; neither power wires nor communications cables are required.

APPLICATIONS

Feed products contained in bins, tanks, silos, or hoppers in low dust environments. Applications include local feed tanks for hog or poultry production.

FEATURES

Hardware Features

- Single point measuring
- LoRa communication transceiver
- Battery powered
- 30 meter (98 feet) measuring range
- Visible range red laser
- Available matched LoRa modem
- 1.5" standard NPT male thread-in mounting
- Sealed to IP67
- ¼ Wave whip antenna, IP67 rated

Software Features

- General error reporting
- Fully configurable by MicroUSB
- Partially re-configurable by LoRa
- Configurable LoRa wake-up & measure times
- Cloud-based access (configuration & data)

SYSTEM ARCHITECTURE

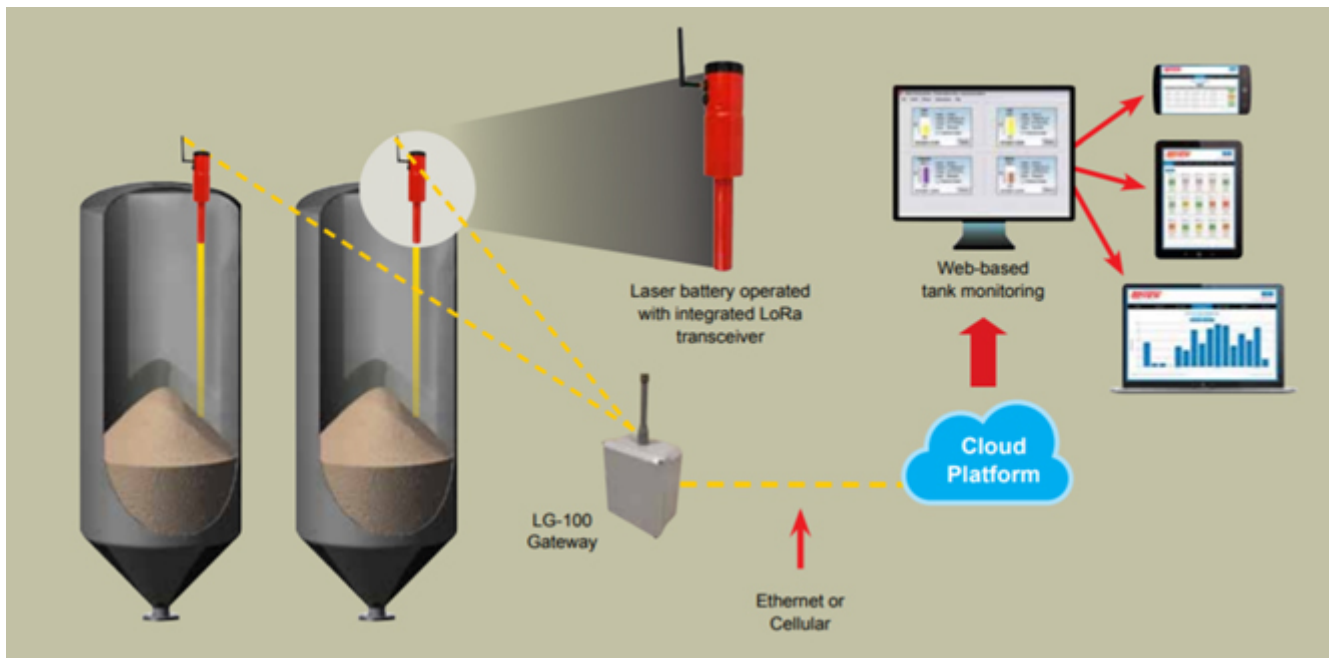


Figure 1: System Configuration

SPECIFICATIONS

- Measurement range: 30m (98 feet)
- Measurement Accuracy: $\pm 5\text{mm}$ (0.20 inches)
- Data I/O: LoRa
- Configuration I/O: LoRa and Micro USB (under sealed cover)
- Wireless Communications Range:
 - $>10\text{km}$ (>6 miles) Line-of-Sight (LOS)
 - $>1.6\text{km}$ (>1 mile) Non-Line-of-Sight (NLOS) (Dependent upon terrain and line of sight obstacles)
- Power Source: 3.6V, 19AH Internal Li-Ion battery
- Battery Life (Est.): ~ 10 years, one measurement per day
- Antenna: $\frac{1}{4}$ Wave Whip
- Dust Tube: Available
- Ingress Protection: IP67
- Ambient Operating Temperature: -30 to $+85\text{C}$
- Ambient Storage Temperature: -40 to $+85\text{C}$
- Battery Voltage Reporting: Configurable
- Receiver Addressing: Configurable
- Hazardous Location: Not rated for hazardous locations
- Mounting: 1.5" NPT male, multiple mounting flange types
- Laser Beam Size: $2.5 \times 5 \text{ mm}$ @ 3 meter (FWHM)
- Laser Wavelength: $635 \pm 10\text{nm}$
- Laser Safety: $<1 \text{ mW}$ (Class 2)
- Laser Emissions Direction: Collimated and perpendicular to the aperture face.
- Housing Material: Aluminum and Injection molded plastic

DIMENSIONS

External Dimensions



Figure 2: Dimensions (units in mm)

Weight

Approximate weight:

1.8kg

4 pounds

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CONTROLS

The unit has no user controls. Factory supplied configuration may be changed by the factory or BinMaster technical services.

CONFIGURATION AND ADJUSTMENTS

Before installation, users may wish to change the factory confirmation.

Factory Configuration

The following configurations may be set by the factory or BinMaster technical services:

- Measurement times and frequency
- Power consumption reporting to help predict when the battery must be replaced.
- Transmission frequency

The LoRa configuration method is intended primarily to allow units installed in field applications to be reconfigured. New configurations will only be received and applied when the unit wakes at its previously configured wake time.

ASSEMBLY

The unit is supplied fully assembled and requires no user assembly other than attachment of antenna and insertion of battery.

INSTALLATION

The unit may be installed using the 2.0" NPT female threaded nose by threading the unit into a suitable flange equipped with a 2.0" NPT male threaded receptacle. Using this method, the unit should be hand-tightened-only to compress the O-ring seal for water-tightness. The unit should be rotated and additional 1/8 – 1/4 turn after the mounting flange assembly contacts the O-ring.

The laser may be temporarily continuously activated for 1 minute during mounting to facilitate aiming. Continuously activating the laser consumes battery power and may reduce the life of the laser emitter and should be used sparingly to avoid excessive power consumption. Each time the battery cover is closed, the laser will activate for ~1 minute.

OPERATION

The unit is factory supplied with no battery installed.

When the battery is installed and the battery cover is closed, the unit will begin normal operation following factory or user-applied configuration settings. The laser will come on for 60 seconds to aid in aiming the unit.

During normal operation the unit is programmed to wake, make and send a measurement, then return to low-power sleep mode.

When a measurement is initiated the following sequence will occur:

1. The laser is activated
2. A measurement is taken
3. Measurement data is transmitted along with any reporting codes
4. Any available reconfiguration files are received and applied
5. The unit returns to low-power sleep mode

To start the unit:

1. Remove the battery cap
2. Open the battery cover
3. Insert the battery
4. Close the battery cover
5. Replace the Battery Cap

MAINTENANCE

The unit may require periodic servicing for the following reasons:

1. Battery replacement
2. Reconfiguration
3. Cleaning

The unit does not require maintenance or servicing to remain in compliance with CFR Title 21 1040.10.

Service Warnings

Disconnect the battery before servicing the unit.

If it is impossible to disconnect the battery prior to servicing, take precautions to prevent the laser aperture located on the shutter from being pointed at eyes.

Do not tamper with or remove the electronics cover.

Do not tamper with or remove the shutter or shutter attachment means.

Battery Replacement

For battery replacement, remove the battery cap. Open the battery cover. Remove the battery and replace with a new battery. Close the battery cover and replace the battery cap. Batteries can be purchased from BinMaster. Contact your RSM for pricing and availability.

Reconfiguration

Reconfiguration of the unit may be accomplished over LoRa or using the MicroUSB connector located under the MicroUSB cover on the back end of the unit by the factory or BinMaster technical services.

Cleaning

The exterior of the unit may require periodic cleaning. Simply wipe the unit with a soft damp cloth. Mild detergent may be used as required.

MANUFACTURER AND CONTACT INFORMATION

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