



LDR-M20

INSTRUCTION MANUAL

WARRANTY

MIREMADI warrants this product to be free from defects in material and workmanship for a period of 90 days from date of shipment.

During the warranty period, MIREMADI will, at its option, either repair or replace any product that proves to be defective.

To exercise this warranty, email support and you will be given prompt assistance and return instructions. Repairs will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the original warranty period of 90 days.

LIMITATION OF WARRANTY

This warranty does not apply to defects resulting from product modification, or misuse of any product or part. This warranty also does not apply to normal wear or failure to follow instructions on maximum input voltages and polarities.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. THE REMEDIES PROVIDED HEREIN ARE THE BUYER'S SOLE AND EXCLUSIVE REMEDIES.

NEITHER MIREMADI NOR ANY OF ITS EMPLOYEES SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF ITS INSTRUMENTS EVEN IF MIREMADI HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES. SUCH EXCLUDED DAMAGES SHALL INCLUDE, BUT ARE NOT LIMITED TO: COST OF REMOVAL AND INSTALLATION, LOSSES SUSTAINED AS THE RESULT OF INJURY TO ANY PERSON, OR DAMAGE TO PROPERTY.

THIS DEVICE IS MADE FOR HOBBY USE AND SHOULD NOT BE USED IN SAFETY CRITICAL SYSTEMS.

SAFETY PRECAUTIONS

ALTHOUGH THIS DEVICE IS EYE SAFE, DO NOT LOOK IN TO THE IR SOURCE DIRECTLY FOR PROLONGED PERIODS. DO NOT LOOK AT THE IR SOURCE WITH MAGNIFYING GLASS OR OTHER OPTICAL INSTRUMENTS. IF THE DEVICE IS MALFUNCTIONING, DO NOT USE, REMOVE POWER AND CONTACT SUPPORT.

OPERATION

Apply 11 to 14V to the power connector (2 pin black connector), the ground wire is towards the edge of the PCB. For best results, the power should be as clean as possible (below 50 mV p-p of noise). A red LED next to the white transmit lens will turn on if an object is detected.

All communication to the device is through the serial interface connector. An optional FTDI TTL-232R-3V3 cable can be used to attach the device directly to a computer. By placing the device in the diagnostic ASCII mode, operation can be verified using a terminal program.

The device serial communication interface is a 3.3V level, 115200 Baud, 8 bit data, 1 stop bit and no parity. Please make sure that you do not attach the unit to 5V interfaces, as this may damage the module.

On power up, the device sends a boot message, indicating calibration and software version. After a few seconds the unit starts to continuously send data at a rate of 1000 packets a second.

The packet message includes range data, energy and a check sum. The packet is formed of 5 bytes.

Byte	Description
1	'\n' Decimal=10 HEX=0A (start of packet)
2	Range Low Byte (6 bit encoded see Note 1)
3	Range High Byte (6 bit encoded see Note 1)
4	Energy Byte (6 bit encoded see Note 1)
5	Checksum = Byte2+Byte3+Byte4 (6 bit encoded see Note 1,2) (end of packet)

Note 1: Six bit encoding entails taking only the lower 6 bits and adding HEX 0x30.

For example to convert HEX 0x42 to Six bit encoding we follow these steps.

1- Mask the lower 6 bits (in C language $0x42 \& 0x3F = 0x02$)

2- Add 0x30 to the result (in C language $0x02 + 0x30 = 0x32$)

0x42 => 0x32

Note 2: The check sum is the addition of bytes 2-4, followed by 6 bit encoding of the lower 6 bits.

To convert from six bit encoding back to numbers, the process is reversed. Here is an example of the calculations required to obtain the Range, Energy and Checksum values.

Range (12 bit) = (Byte 3 - 0x30) * 64 + (Byte 2 - 0x30)

Energy (6 bit) = (Byte 4 - 0x30)

Checksum => Byte 5 - 0x30 = (Byte2+Byte3+Byte4) & 0x3F

OUTPUT DATA CHARACTERISTICS

Range is a 12 bit number (0-4095) and indicates the range to target in mm. This Range is calibrated with a white paper target and could vary depending on object reflectivity.

Energy is a 6 bit number (0-63) and indicates the amount of energy reflected by the target. A reading below 5 indicates no energy detected (target out of range). Energy reading above 35 indicates the sensor is saturated and the range reading may be inaccurate.

Checksum can be computed to ensure that the communication link is operating properly.



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INSTRUCTION MANUAL

SLEEP MODE

To place the device in sleep mode, send the single character 's'. To wake up the unit, send the single character 'w'. In sleep mode the transmitter is disabled, and the receiver is placed on lower power standby mode.

DIAGNOSTIC ASCII MODE

This mode allows testing of the device with a standard terminal. Every second the device outputs five numbers, separated by commas, as shown below. To invoke this mode send a single character 'a'. Sending the character 'a' a second time returns the unit to sending packet data.

000,254,1374,0122,-008

001,254,1372,0123,-008

002,254,1371,0122,-008

Table below has the description of each number.

Num	Description
1	Number of seconds in diagnostic ASCII mode (incremented for every update)
2	Temperature in degrees C multiplied by 10 measured at the modules PCB (254 = 25.4 C)
3	Range in mm (note that this is a single sample out of the 1000 measured per update with no averaging)
4	Energy detected multiplied by 4 for the Range sample above.
5	One of the Internal calibration values for the module.



LDR-M20

INSTRUCTION MANUAL

SPECIFICATIONS

Dimensions: 1.7 x 1.3 x 1.3 in (43 x 33 x 33 mm)

Weight: 0.69 oz (19.5 grams)

Range: 10 feet (3 m) range (white paper target)

Minimum Range: 0.5 to 1.5 feet (depending on object reflectivity and size)

Detect a white wall 15 feet (4.5 m) away

Resolution: 0.16 in (4 mm) RMS Typical @ 10 feet (white paper target)

Beam width: +/- 3 Degree

Voltage: 11-14V

Current: 60 mA @ 12V

Sleep mode: 12V @ 35 mA Typical

Update Rate: 1 kHz

Interface: Serial TTL 3.3V

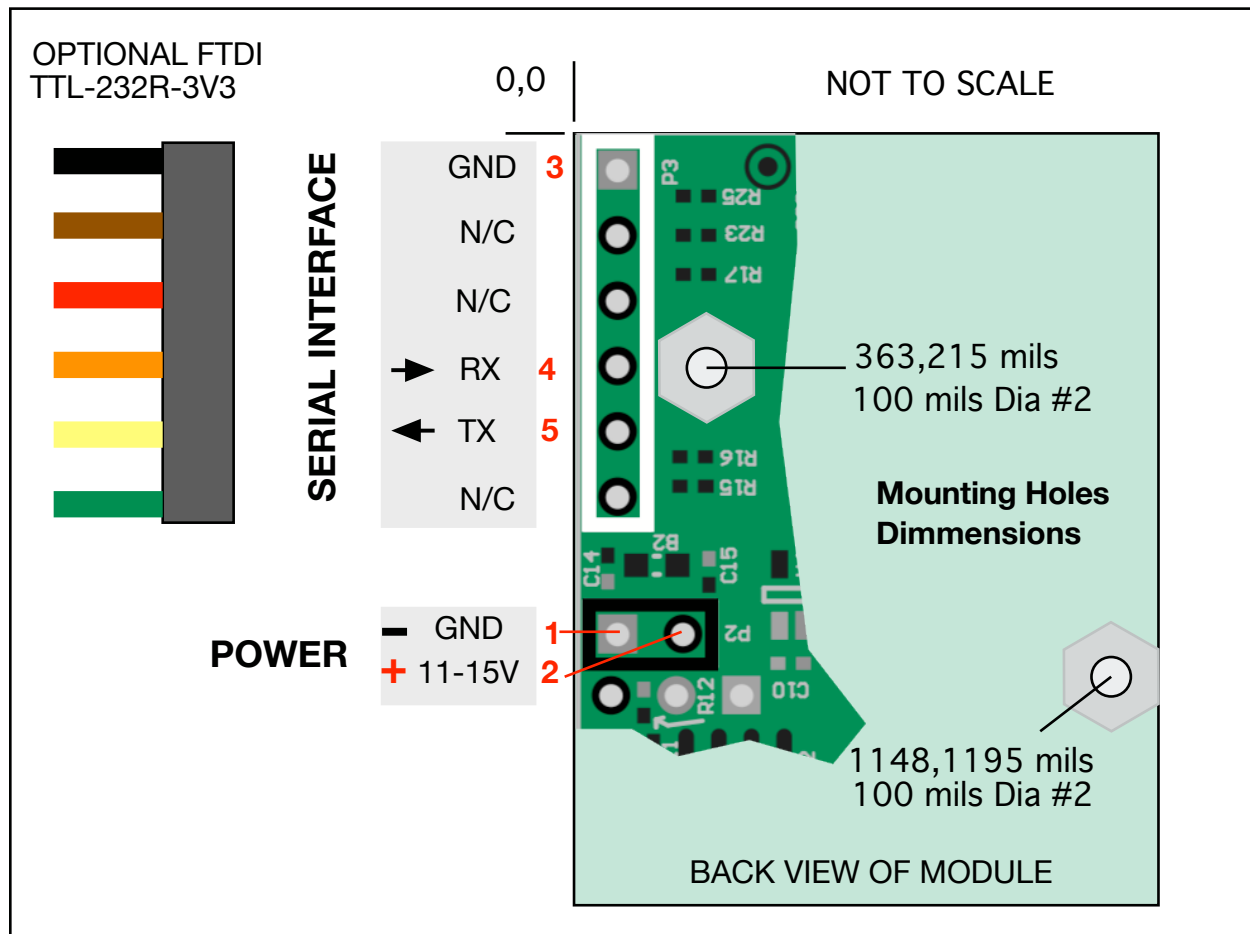
Works outdoors in indirect sunlight

Eye Safe LED Technology (850nm)

Temperature: 0 - 50 °C non condensing

Made in USA

INTERFACE



Pin Name	Function	Description
POWER CONNECTOR (2 PIN BLACK)		
1	POWER	Power Input Ground return
2	POWER	11 - 14 VDC Power Input (60mA @ 12V) (Keep power supply noise low for best sensitivity)
SERIAL INTERFACE CONNECTOR (6 PIN WHITE)		
3	POWER	GND Return
4	INPUT	3.3V 115200 8,N,1 Serial input NOTE: DO NOT DRIVE WITH 5V SERIAL DATA
5	OUTPUT	3.3V 115200 8,N,1 Serial output

NOTE: ALL N/C pins should be left floating