

LUDLUM MODEL 133 SERIES GAMMA DETECTOR

February 2018

**Serial Number PR-373191 for Model 133-2 and
Serial Number PR-372938 for the remainder of the 133 Series
and Succeeding Serial Numbers**

**Manual covers these model numbers:
(133-2, 133-2-1, 133-3, 133-3-1,
133-4, 133-4-1, 133-6, 133-6-1, 133-7, 133-7-1)**

LUDLUM MODEL 133 SERIES GAMMA DETECTOR

February 2018

**Serial Number PR-373191 for Model 133-2 and
Serial Number PR-372938 for the remainder of the 133 Series
and Succeeding Serial Numbers**

Manual covers these model numbers:

**(133-2, 133-2-1, 133-3, 133-3-1,
133-4, 133-4-1, 133-6, 133-6-1, 133-7, 133-7-1)**



LUDLUM MEASUREMENTS, INC.
501 OAK STREET, P.O. BOX 810
SWEETWATER, TEXAS 79556
325-235-5494, FAX: 325-235-4672

Table of Contents

<i>Introduction</i>	1
<i>Unpacking and Repacking</i>	3
<i>Specifications</i>	4
<i>Operating Procedures</i>	5
<i>Safety Considerations</i>	6
<i>Parts List, Drawings and Diagrams</i>	7

Introduction

The Model 133 series of Geiger-Mueller (GM) gamma survey detectors can be used with any portable ratemeter, scaler instrument, or area monitor that provides the appropriate amount of voltage (see table below) with an input sensitivity of 30 \pm 10 mV.

Model #	Voltage needed	Energy Response (60 keV-3 MeV)	Linearity w/o dead time correction	Linearity w/dead time correction
133-2 and 133-2-1	550 Vdc	within 25%	0.1 mR/hr to 200 mR/hr	0.1 mR/hr to 1 R/hr
133-3 and 133-3-1	550 Vdc	Within 25%	0.1 mR/hr to 1 R/hr	0.1 mR/hr to 5 R/hr
133-4 and 133-4-1	550 Vdc	within 15%	1 mR/hr to 2 R/hr	1 mR/hr to 10 R/hr
133-6 and 133-6-1	550 Vdc	within 15%	4 mR/hr to 6 R/hr	4 mR/hr to 40 R/hr
133-7 and 133-7-1	460 Vdc	within 15%	25 mR/hr to 30 R/hr	25 mR/hr to 100 R/hr

In the Model 133 series, those Model numbers with the “-1” on the end are the waterproof versions of this detector. The waterproof detectors have the same characteristics as the non-waterproof models, other than they are waterproof, contain an O-ring, and do not have a “C” connector on the probe end (base). A 30-meter (100-foot) cable is hard-wired into the waterproof detector. The waterproof models also weigh slightly more and have a slightly larger diameter than the others.



Model 133-4

Note:

The detector does not contain any consumable materials.

Note:

If the detector is used in a manner not intended by the manufacturer, the detector may not function properly.

Unpacking and Repacking

Remove the calibration certificate or detector functional check certificate and place it in a secure location. Remove the detector(s) and accessories (if applicable) and ensure that all items listed on the packing list are in the carton. If multiple detectors are included, refer to the calibration certificates for serial number (SN) matches. The Model 133-4 serial number is located on the side of the detector.

To return an instrument or detector for repair or calibration, provide sufficient packing material to prevent damage during shipment and affix appropriate warning labels to promote careful handling.

Every returned instrument must be accompanied by an **Instrument Return Form**, which can be downloaded from the Ludlum website at www.ludlums.com. Find the form by clicking on the “Support” tab and selecting “Repair and Calibration” from the drop-down menu. Then choose the appropriate Repair and Calibration division where you will find a link to the form.

Specifications

Model #	133-2 & 133-2-1	133-3 & 133-3-1	133-4 & 133-4-1	133-6 & 133-6-1	133-7 & 133-7-1
Recommended Operating Voltage	550 V	550 V	550 V	550 V	460 V
Energy Response (60 keV-3 MeV)	within 25%	within 25%	within 15%	within 15%	within 15%
Sensitivity (137Cs Gamma)	1000 cpm/mR/hr	450 cpm/mR/hr	100 cpm/mR/hr	18 cpm/mR/hr	4.2 cpm/mR/hr
Background	12 cpm	6 cpm	1 cpm	1 cpm or less	1 cpm

INPUT SENSITIVITY: 30 mV \pm 10 mV

DEAD TIME: typically 50 microseconds

TUBE: 30 mg/cm² stainless steel (Halogen quench) GM

SIZE: Model 133-3, 133-4, 133-6, 133-7:

2.2 x 10.2 cm (0.88 x 4 in.) (Dia x L)

Model 133-2, 133-2-1, 133-4-1, 133-6-1, 133-7-1:

2.5 x 10.2 cm (1 x 4 in.) (Dia x L)

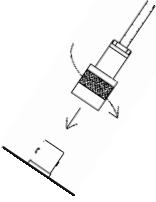
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F)

WEIGHT: 0.090 kg (0.20 lb)

CONNECTOR: series "C," unless a waterproof detector. Other connectors are available upon request.

Operating Procedures

CONNECTING TO AN INSTRUMENT



Connect one end of the cable provided to the detector by firmly pushing the connector together while twisting clockwise $\frac{1}{4}$ turn until latched. Repeat the process in the same manner with the other end of the cable and the instrument.

TESTING THE DETECTOR

1. Ensure that the instrument high voltage (HV) is at the proper setting for the detector (550 volts).
2. Connect the detector to the instrument and check for a proper background reading (see table on page 4).
3. Expose the detector to a check source and verify that the instrument indicates within 20% of the check source reading from the last calibration. Alternatively, expose the detector to a source of known value and verify that the detector detects greater than or equal to the efficiency listed in the specification section of this manual.
4. Instruments and detectors, which meet these criteria, are ready for use. Failure to meet these criteria may indicate a malfunction in the detector.

Safety Considerations

ENVIRONMENTAL CONDITIONS FOR NORMAL USE

1. Indoor or outdoor use (in a dry environment)
2. No maximum altitude
3. Temperature range of -20 to 50 °C (-4 to 122 °F); May be certified for operation from -40 to 65 °C (-40 to 150 °F).
4. Maximum relative humidity of less than 95% (non-condensing)
5. Pollution Degree 3 (Occurs when conductive pollution or dry nonconductive pollution becomes conductive due to condensation. This is typical of industrial or construction sites.)

CLEANING INSTRUCTIONS AND PRECAUTIONS

The detector may be cleaned externally with a damp cloth, using only water as the wetting agent. Do not immerse the instrument in any liquid. Observe the following precautions when cleaning:

1. Turn the instrument electronics OFF.
2. Allow the instrument to sit for one minute.
3. Disconnect the detector cable before cleaning the detector.

Parts List, Drawings and Diagrams

Model 133-2

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
UNIT	Completely Assembled Model 133-2 Gamma Detector	47-1717
1 EA	GM TUBE (LND 71210)	01-5295
1 EA	RES – 5.62 MEG ¼ W, 1%	10-7093
1 EA	Model 133-2 BODY FOR SCREWS	7002-1201
1 EA	Model 133-2 CONNECTOR CAP FOR SCREWS	7002-1202
3 EA	SCREW-2-56 X 3/16 FH	17-8551
1 EA	SCREW-2-56 X 1/8 BH	17-8727
1 EA	BUSS WIRE #22	03-5363
1 EA	LUG #2 922-902	18-9034
1 EA	O RING-2-018	16-8307
1 IN.	SHRINK-GPF-135 3/32 CLR	22-9540
1 EA	CONNECTOR SERIES “C”	4478-011

Model 133-3

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
UNIT	Completely Assembled Model 133-3 Gamma Detector	47-1314
1 EA	GM TUBE (LND 73122)	01-5311
1 EA	RES – 3.3 MEG ¼ W, 5%	10-7044
1 EA	Model 133 BODY FOR SCREWS	7002-1195

Model 133 Series Gamma Detector

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
1 EA	Model 133 CONNECTOR CAP FOR SCREWS	7002-1194
3 EA	SCREW-2-56 X 3/16 FH	17-8551
1 EA	SCREW-2-56 X 1/8 BH	17-8727
1 EA	BUSS WIRE #22	03-5363
1 EA	LUG #2 922-092	18-9034
1 EA	O RING-2-016 BUNA 70	16-8364
1 IN.	SHRINK-GPF-135 3/32 CLR	22-9540
1 IN.	SHRINK-1/16 INCH BLACK	22-9501
1 EA	CONNECTOR SERIES "C"	4478-011
1 EA	Model 133 RESISTOR BOARD	6525-664

Model 133-4

UNIT	Completely Assembled Model 133-4 Gamma Detector	47-1674
1 EA	GM TUBE (LND 71412)	01-5306
1 EA	RES – 3.3 MEG ¼ W, 5%	10-7044
1 EA	Model 133 BODY FOR SCREWS	7002-1195
1 EA	Model 133 CONNECTOR CAP FOR SCREWS	7002-1194
1 EA	Model 133 CAP	7002-020-01
3 EA	SCREW-2-56 X 3/16 FH	17-8551
1 EA	SCREW-2-56 X 1/8 BH	17-8727
1 EA	BUSS WIRE #22	03-5363
1 EA	LUG #2 922-092	18-89034
1 EA	O RING-2-016 BUNA 70	16-8364
1 IN	SHRINK-1/16 INCH BLACK	22-9501
1 IN	SHRINK-GPF-135 3/32 CLR	22-9540
1 EA	CONNECTOR SERIES "C"	4478-011
1 EA	Model 133 RESISTOR BOARD	6525-664

Model 133 Series Gamma Detector

Model 133-6

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
UNIT	Completely Assembled Model 133-6 Gamma Detector	47-1718
1 EA	GM TUBE (LND 71616)	01-5298
1 EA	RES – 3.3 MEG ¼ W, 5%	10-7044
1 EA	Model 133 BODY FOR SCREWS	7002-1195
1 EA	Model 133 CONNECTOR CAP FOR SCREWS	7002-1194
3 EA	SCREW-2-56 X 3/16 FH	17-8551
1 EA	SCREW-2-56 X 1/8 BH	17-8727
1 EA	BUSS WIRE #22	03-5363
1 EA	LUG #2 922-092	18-9034
1 EA	O RING-2-016 BUNA 70	16-8364
1 IN	SHRINK-1/16 INCH BLACK	22-9501
1 IN	SHRINK-GPF-135 3/32 CLR	22-9540
1 EA	CONNECTOR SERIES “C”	4478-011
1 EA	Model 133 RESISTOR BOARD	6525-664

Model 133-7

UNIT	Completely Assembled Model 133-7 Gamma Detector	47-1216
1 EA	GM TUBE (CSF 3G70)	01-5045
1 EA	RES – 4.7 MEG ¼ W, 5%	10-7030
1 EA	Model 133 BODY FOR SCREWS	7002-1195

Model 133 Series Gamma Detector

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
1 EA	Model 133 CONNECTOR CAP FOR SCREWS	7002-1194
3 EA	SCREW-2-56 X 3/16 FH	17-8551
1 EA	SCREW-2-56 X 1/8 BH	17-8727
1 EA	BUSS WIRE #22	03-5363
1 EA	LUG #2 922-092	18-9034
1 EA	O RING-2-016 BUNA 70	16-8364
1 IN	SHRINK-1/16 INCH BLACK	22-9501
1 IN	SHRINK-GPF-135 3/32 CLR	22-9540
1 EA	CONNECTOR SERIES "C"	4478-011
1 EA	TUBE SHIELD	01-5055
1 EA	Model 133 RESISTOR BOARD	6525-664

Additional parts for Model 133 series for waterproof detectors

1 EA	Model 133-10 COVER	7002-582
1 EA	Model 133-10 BASE	7002-583

Model 133 Series Gamma Detector

Model 133 Series Probe Assembly

REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
1	VALID	7/13/17	JAC
2	SHORTENED LUG SCREW	11/27/17	JWI
3	REMOVED M 133-8-5, 133-9 & 133-10	12/11/17	JWI

SECTION A-A
SCALE 1 : 1

Labels in drawing: 16-8364, 17-8727, 18-9034, 7002-1194, 7002-1195, SPONGE, GM TUBE, 6525-664, RESISTOR, 1.634, 3.910, 3.325, A, A

M 133-3
TUBE: 01-5311 GM TUBE-LND 71922 EC
RES: 10-7044 3.3 MEG 1/4W

M 133-4
TUBE: 01-5306 GM TUBE-LND 71412
RES: 10-7044 3.3 MEG 1/4W

M 133-6
TUBE: 01-5298 GM TUBE-LND 71616 4G300
RES: 10-7044 3.3 MEG 1/4W

M 133-7
TUBE: 01-5045 GM TUBE-T2420 (3G70)
THOMSON TUBE SHIELD 01-5055
RES: 10-7030 4.7 MEG 1/4W

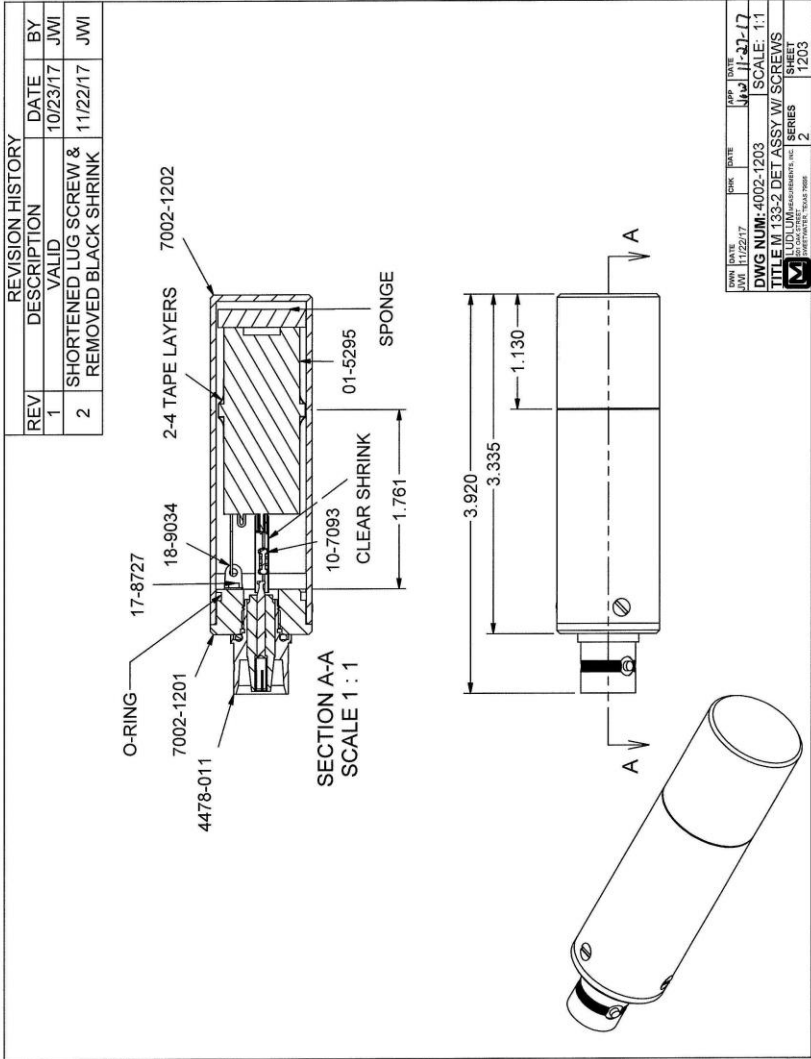
M 133-8
TUBE: 01-5053 2422 (3G10)
THOMSON TUBE SHIELD 01-5055
RES: 10-7030 4.7 MEG 1/4W

M 133-12
TUBE: 01-5336 GM TUBE-LND 71623 HIGH RANGE
RES: 10-7031 10 MEG 1/4W

REV DATE	CHK DATE	APP DATE	DATE
JWI 12/11/17	JWI 1/8/18	JWI 1/8/18	1-17
DWG NUM: 4002-1196			SCALE: 1:1
TITLE: M.133 DET ASSY W/ SCREWS			SHEET
LUDLUM MEASUREMENTS, INC.			1196
SHEET NO. 2			

Model 133 Series Gamma Detector

Model 133-2 Probe Assembly



**Energy Response Curves
Sensitivity vs. Gamma Energy
(shield: 0.45 mm lead + 0.25 mm tin)**

