LUDLUM MODEL 3000 SERIES
DATA LOGGING OPTION
USER'S MANUAL

May 2016

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LUDLUM MEASUREMENTS, INC
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STATEMENT OF WARRANTY

Ludlum Measurements, Inc. warrants the products covered in this manual to be free of defects due to workmanship, material, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M and proportional tubes, and scintillation crystals which are broken due to excessive physical abuse or used for purposes other than intended.

There are no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages, arising from the purchase, use, or inability to use product.

RETURN OF GOODS TO MANUFACTURER

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

LUDLUM MEASUREMENTS, INC.
ATTN: REPAIR DEPARTMENT
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Table of Contents

Section 1

Introduction

The Data Logging Option for the Model 3000 allows the user to log radiation readings with the use of a handle mounted LOG button. Data can be logged in any of the Model 3000's operational modes (RATE, MAX and COUNT). Up to 1000 data points can be taken and stored internally. Depending on the chosen Data Logging Mode, the user can quickly save logged data using a single Location ID, select from up to 250 stored Location IDs, or continuous logging at user defined intervals (default 60 seconds, but settable from 1 to 1800 seconds). A Real Time Clock (RTC) is utilized to time and date stamp each data log entry.

The saved log data, and stored Location IDs, can be viewed, downloaded, and erased using the Lumic Data Logger software. Editing of Data Logging parameters and RTC via Setup Mode on the instrument is disabled.

Setup of the Data Logging parameters must be done through the Lumic Data Logger. (RTC parameter may be set up through Lumic Calibration).

- Data Logging Mode
  - Data Auto Log Interval (when applicable)
  - Real Time Clock (RTC) Values
- Data Logging User
- Data Logging Notes
- Location IDs

Section

2

Getting Started

Instrument Startup Display

The Data Logging Option firmware adds an additional screen on instrument startup. Following the Startup display, the firmware version, and the battery voltage, the instrument will then display the number of data log records currently stored in the instrument. Please refer to Figure 1 below.

Figure 1: Startup display for Data Logging firmware, showing 155 stored records.

The instrument will then move to normal operation, displaying the current rate for the Primary units (default: mR/hr).

If the Sigma Audio option is selected, the unit will display a countdown from :08 to :01 (in seconds) as the unit measures background radiation levels.

Note: During loss of count failure, the data log button is disabled.

Data Logging Operation – Mode 1

Data Logging Mode 1 will store the logged data using only the 1st Location ID in the Location ID table.

- When the LOG button is pressed, the current radiation reading and other log data is saved along with the 1st Location ID in the format specified in Section 3.
- In SCALER Mode:
  - With a set count time, the LOG button is disabled until completion of a Scaler count.
  - For a continuous Scaler count (Scaler time is 0), the LOG button is enabled at all times.
- For approximately 2 seconds, the LCD will display the Data Log Table index for the newly saved log data.

Figure 2: Display showing a Data Log Table index of 12.

- After displaying the Data Log Table index, the instrument will return to the previous mode of operation.
- The Data Log Table is linear; once the table is full, no further writes will be allowed until the Data Log Table is erased.
- If an attempt is made to write to a full Data Log Table, the maximum Data Log Table index (1.00 k) will be displayed for about 2 seconds. The instrument will then return to the previous mode of operation.

Data Logging Operation – Mode 2

Data Logging Mode 2 will allow the user to choose the Location ID (by Location ID Table index) to store with the logged data.

- When the LOG button is pressed, the current radiation reading and other log data is temporarily stored.
- In SCALER Mode:
  - With a set count time, the LOG button is disabled until completion of a Scaler count.
  - For a continuous Scaler count (Scaler time is 0), the LOG button is enabled at all times.
- The LCD display will show a possible Location ID Table index for the user. The index will be auto-incremented from the previously used index.

Figure 3: Display showing a Location ID Table index of 36.

- The ones digit of the index will be blinking, indicating a changeable value. The user may then enter the preferred Location ID Table index by using the ON/OFF (to select the digit) and MODE (to change the value) buttons as in Setup mode.
- Once the user has the preferred Location ID Table index entered, press the LOG button to save the log data.
- For approximately 2 seconds, the LCD will display the Data Log Table index for the newly saved log data (*See Figure 2*).
- After displaying the Data Log Table index, the instrument will return to the previous mode of operation.
- The Data Log Table is linear; once the table is full, no further writes will be allowed until the Data Log Table is erased.

Data Logging Operation – Mode 3

Data Logging Mode 3 will automatically record data log records using the current location with the user settable auto log interval (settable to record every 1 to 1800 seconds).

- When the Device is turned on and in RATE or MAX mode, the current radiation reading and other log data is recorded at the set interval.
- In SCALER Mode:
    - Auto log will be paused and will only log at the completion of each count.
    - For a continuous Scaler count (Scaler time is 0), logs will be recorded at auto log interval.
- The Data Log Table is linear; once the table is full, no further writes will be allowed until the Data Log Table is erased.

NOTE: Mode 3 is not available on the Model 3002.

Section

3

Specifications

Handle mounted LOG button (part # 4498-479 when ordering new and 4498-428 when it is purchased after an instrument in purchased)

Real Time Clock (RTC)

Internal Storage of up to 250 32-byte Location IDs

Internal Storage of up to 1000 64-byte Data Log records

Data Log format:

- Format Version (1 Byte)
- Month (1 Byte)
- Year (2 Bytes)
- Day (1 Byte)
- Hour (1 Byte)
- Minutes (1 Byte)
- Seconds (1 byte)
- Logged Value (4 Bytes)
- Range (1 byte)
- Units (1 Byte)
- Mode (1 Byte)
- Detector Number (1 Byte)
- Elapsed Count Time in seconds (4 Bytes)
- Scaler Count Time in seconds (4 bytes)
- Status (1 byte)
- Location ID (32 bytes)
- Reserved (7 bytes)

USB Interface with Lumic Data Logger software

Section 4

View Data Logging Parameters

Overview

The firmware version for the Model 3000 Data Logging Option adds a fifth page (P-5) to Setup Mode. This page is used to display the Data Logging parameter settings, as well as the current Real Time Clock (RTC) values. The RTC values are updated in real time.

Note:

The Data Logging parameters and the RTC values must be set up using the Lumic Data Logger software. They cannot be changed using Setup Mode on the Model 3000.

Default Data Logging Parameter Values

	Setup Parameter	Default Value	Notes
P5-1	Data Logging Mode	1	Mode 1
P5-2	RTC Month	1	
P5-3	RTC Day	7	
P5-4	RTC Year	14	2014
P5-5	RTC Hour	16	24 Hour format
P5-6	RTC Minute	30	
P5-7	RTC Second	00	

Viewing Parameters

To view the Data Logging parameters on the instrument itself, enter setup mode as specified in the device's User Manual. Once in Setup Mode, advance to P-5 (Setup Page 5) using the Mode button to increment the Setup Page number.

Figure 4: Setup Page Selection display (showing page 5).

Pressing the UNITS button will then display the first Data Logging parameter. To advance through the parameters list, press the UNITS button.

Pressing and holding the UNITS button, no matter what parameter is shown, will first return the user back to the Page Selection screen. If the UNITS button is then held down for about 4 seconds, the display will exit the Setup Mode.

Data Logging Option List of Parameters (in order)

Page 5 (P-5)

- Data Logging Mode
- Month
- Day
- Year
- Hour
- Minute
- Second

Setup Page 5

Data Logging Mode (Default 1) – Displays the current Data Logging Mode selection for the device. Valid values are: 1, 2, and on Firmware N20 and above Mode 3.

Month (Default 1) – Displays the month of the Real Time Clock. Available values are: 1-12.

Day (Default 7) – Displays the numerical day of the Real Time Clock. Available values are: 1-31.

Year (Default 14) – Displays the decade and year of the Real Time Clock. Available values are: 00-99.

Note: Valid year range is 2000-2099.

Hour (Default 16) – Displays the hour of the Real Time Clock in 24-hour format. Available values are: 0-23.

Minute (Default 30) – Displays the minute of the Real Time Clock. Available values are: 00-59.

Second (Default 00) – Displays the second of the Real Time Clock. Available values are: 00-59

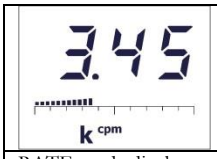
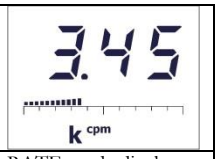
Using Data Logging on the LMI Model 3000 Series

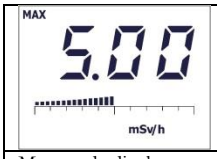
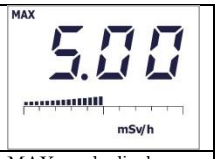
An LMI Model 3000 Series device equipped with the data logging option can store up to 1000 readings, and up to 250 Location IDs. Data Logging Mode 1 will store data using Location ID 1 for each reading. Data Logging Mode 2 allows the user to choose the Location ID, by index, to store with each reading. Data Logging Mode 3 will store data using Location ID 1 for each reading that is taken automatically based on the auto log interval.

Data logging in RATE and MAX modes

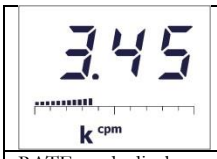
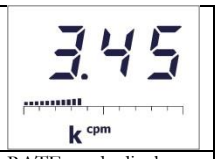
Data logging Mode 1 – RATE and MAX modes

The handle-mounted LOG button is used to log the current reading. The reading will be saved along with the Location ID stored in Index 1 in the Location ID Table. The number of log records currently stored will be displayed briefly, and two short 'beeps' will sound. The display will then return to its previous mode.

				
RATE mode display		Saved log records		RATE mode display

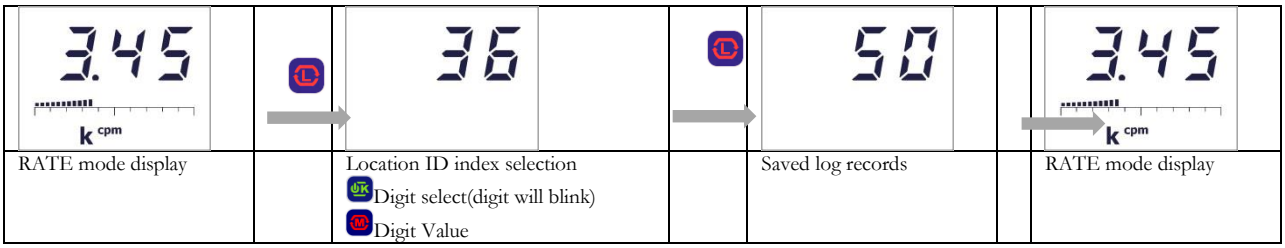
				
Max mode display		Saved log records		MAX mode display

In either mode, if the log record table is full, the display will flash the maximum number of log records.

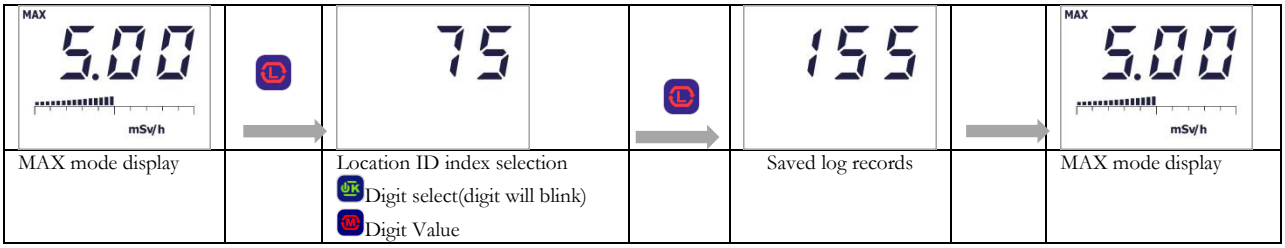
				
RATE mode display		Maximum log records		RATE mode display

Data logging Mode 2 – RATE and MAX modes

The handle-mounted LOG button is used to log the current reading. The reading will be saved along with the user-selected Location ID, chosen by Location ID Table index. When the LOG button is pressed, the Location ID Table index selection screen is shown. Using the ON/OFF button (digit selection) and MODE button (digit value), the user can enter the Location ID table for the desired Location ID. After the Location ID Table index has been chosen, a second press of the LOG button saves the reading and Location ID. The number of log records currently stored will be displayed briefly, and two short 'beeps' will sound. The display will then return to its previous mode.

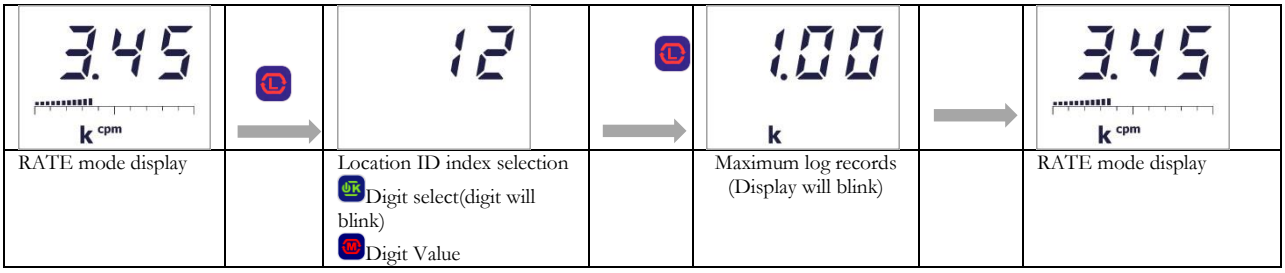


RATE mode display	Location ID index selection Digit select(digit will blink) Digit Value	Saved log records	RATE mode display



MAX mode display	Location ID index selection Digit select(digit will blink) Digit Value	Saved log records	MAX mode display

In either mode, if the log record table is full, the display will flash the maximum number of log records after selection of the Location ID Table index.



RATE mode display	Location ID index selection Digit select(digit will blink) Digit Value	Maximum log records (Display will blink)	RATE mode display

Location ID Index

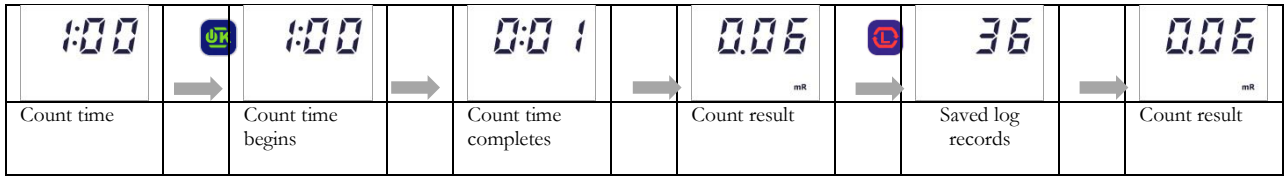
The Location ID Index will auto-increment from the last used index up to the maximum of 250. However, it will not automatically roll over to 1. The user must change from Index 250 to Index 1. The Location ID Index is reset to 1 whenever the device is powered on.

Data logging in COUNT mode

Data logging Mode 1 – COUNT mode

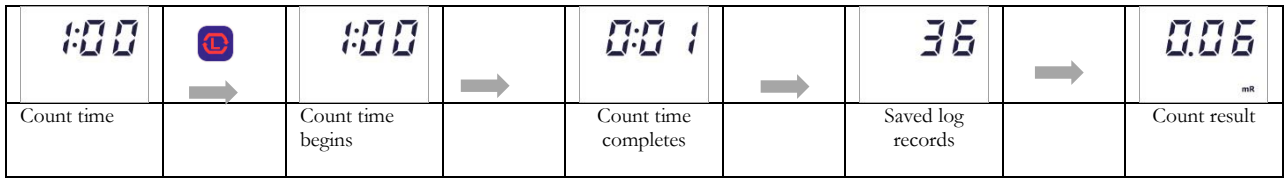
In COUNT mode, the LOG button can be used to log a completed count result, or to start a count and automatically log the result on completion of the count. The result will be saved along with the Location ID stored in Index 1 in the Location ID Table. The number of log records currently stored will be displayed briefly, and two short 'beeps' will sound. The display will then return to the count result. For a completed count, pressing the LOG button will not automatically reset the count. The ON/OFF button is used to reset a completed or active count.

Count started with ON/OFF button



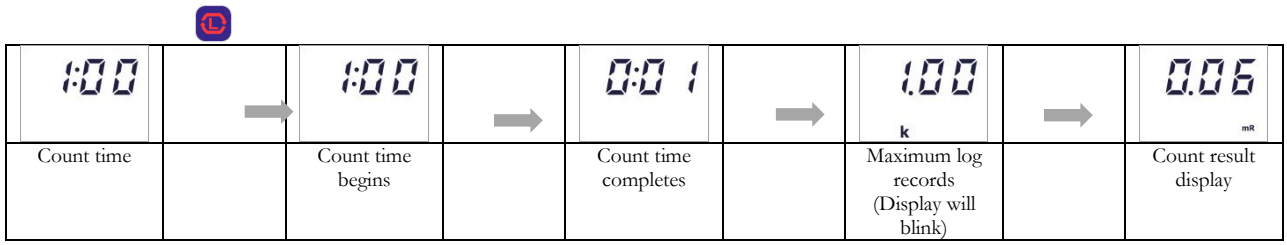
Count time		Count time begins		Count time completes		Count result		Saved log records		Count result

Count started with LOG button



Count time		Count time begins		Count time completes		Saved log records		Count result

With either method, if the log record table is full, the display will flash the maximum number of log records.



Count time		Count time begins		Count time completes		Maximum log records (Display will blink)		Count result display

Data logging Mode 2 – COUNT mode

In COUNT mode, the LOG button can be used to log a completed count result, or to start a count and automatically log the result on completion of the count. The result will be saved along with the user selected Location ID, chosen by Location ID Table index. For a completed count, pressing the LOG button will not automatically reset the count. The ON/OFF button is used to reset a completed or active count.

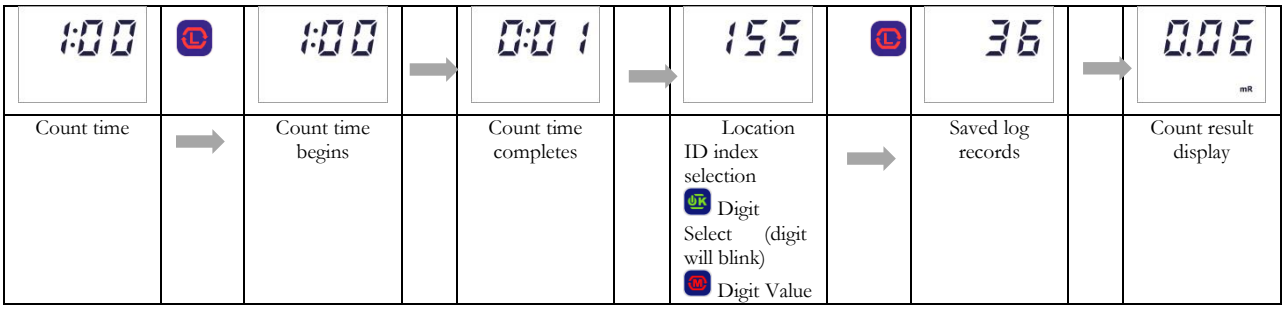
Count started with the ON/OFF button

When the count is complete, pressing the LOG button will show the Location ID Table index selection screen. Using the ON/OFF button (digit selection) and MODE button (digit value), the user can enter the Location ID table for the desired Location ID. After the Location ID Table index has been chosen, a second press of the LOG button saves the count result and Location ID. The number of log records currently stored will be displayed briefly, and two short 'beeps' will sound. The display will then return to showing the count result.

1:00		1:00		0:01		0.06 mR		12	
Count time		Count time begins		Count time completes		Count result display		Location ID index selection Digit Select (digit will blink) Digit Value	
36		0.06 mR							
Saved log records		Count result display							

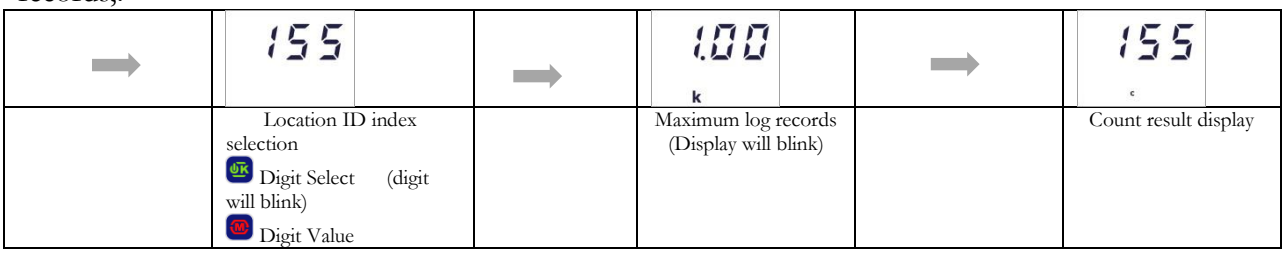
Count started with LOG button

When the count is complete, the Location ID Table index selection screen will be shown. Using the ON/OFF button (digit selection) and MODE button (digit value), the user can enter the Location ID table for the desired Location ID. After the Location ID Table index has been chosen, press the LOG button to save the count result and Location ID. The number of log records currently stored will be displayed briefly, and two short 'beeps' will sound. The display will then return to showing the count result.



Count time	Count time begins	Count time completes	Location ID index selection Digit Select (digit will blink) Digit Value	Saved log records	Count result display

With either method, if the log record table is full, the display will flash the maximum number of log records,.



	Location ID index selection Digit Select (digit will blink) Digit Value		Maximum log records (Display will blink)		Count result display

Section 5

Revision History

NOTE: *This section of the manual will be updated with each revision of the Data Logging Option in order to document changes over time. Ludlum Measurements' policy is to provide free software upgrades to instruments for the life of the instrument.*

June 2015: New manual.

May 2016: Combined both the Data Log User's Manual and Quick Reference Guide into one manual. Replaced references of Triad with Lumic. Took out references to audio alarms for the 1000 place. Added note on page 2-1 regarding log button being disabled on loss of count failure. Updated Mode 3 description starting on page 2-3. Added part #s to Specs on page 3-1.

Section

6

Recycling

Ludlum Measurements, Inc. supports the recycling of the electronics products it produces for the purpose of protecting the environment and to comply with all regional, national, and international agencies that promote economically and environmentally sustainable recycling systems. To this end, Ludlum Measurements, Inc. strives to supply the consumer of its goods with information regarding reuse and recycling of the many different types of materials used in its products. With many different agencies – public and private – involved in this pursuit, it becomes evident that a myriad of methods can be used in the process of recycling. Therefore, Ludlum Measurements, Inc. does not suggest one particular method over another, but simply desires to inform its consumers of the range of recyclable materials present in its products, so that the user will have flexibility in following all local and federal laws.

The following types of recyclable materials are present in Ludlum Measurements, Inc. electronics products, and should be recycled separately. The list is not all-inclusive, nor does it suggest that all materials are present in each piece of equipment:

Batteries	Glass	Aluminum and Stainless Steel
Circuit Boards	Plastics	Liquid Crystal Display (LCD)

Ludlum Measurements, Inc. products that have been placed on the market after August 13, 2005, have been labeled with a symbol recognized internationally as the "crossed-out wheelie bin," which notifies the consumer that the product is not to be mixed with unsorted municipal waste when discarding. Each material must be separated. On the Model 3000, the symbol will be placed on the serial number label located on the side of the instrument.

The symbol appears as such: