



DVLD-1 Lightning Detector	Version 1.0 August 2015
User Manual	MAN1027

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Davicom Lightning Detector



User Manual

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1 General Information

1.1 Limited Warranty

Comlab Telecommunications Inc. warrants all its products to be free from manufacturing defects for a period of two years after delivery to the original purchaser. All warranty returns must be authorized by a Comlab representative.

The limitation of liability under this warranty shall be to repair or replace any part of the product, which proves to be defective after inspection by Comlab. This warranty shall not apply to any Comlab product that has been disassembled, modified, physically or electrically damaged, inappropriately installed, or any product that has been subjected to conditions exceeding the applicable specifications or ratings.

Comlab assumes no liability for any direct, indirect or consequential injury, loss, economic loss, damage, fines or penalties incurred through the use, or inability to use Comlab products.

Comlab products are not intended for use in medical, life-saving, life-sustaining or critical applications. Comlab customers using or selling Comlab products for use in such applications do so at their own risk and agree to fully indemnify Comlab for any damages resulting from such improper use or sale.

Comlab reserves the right to make design changes to its products without incurring any obligation to make the same changes to previously purchased units.

This warranty is the full extent of obligation and liability assumed by Comlab with respect to its products. Comlab neither makes nor authorizes any person or company to make any other guarantee or warranty concerning its products.

1.2 Safety



The Davicom DVLD should be installed by qualified technical personnel only. Installation of this device by an unqualified person could result in hazardous conditions to the installer or other personnel, and/or damage the DVLD or other equipment. Ensure that proper safety precautions have been taken before installing this DVLD and any associated equipment.

The DVLD is designed to meet standard safety requirements, and it is extremely important that it not be modified in any way. Modification of this equipment will void the warranty and could pose a hazard to the user of this equipment or to maintenance personnel. Service of the DVLD should be performed by qualified technical personnel who are familiar with the unit.

Depending on your installation, the DVLD may contain HIGH VOLTAGES. Exercise caution when working in and around the unit if it is connected to your site wiring.

2 Regulatory Compliance

FCC (USA)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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.

Changes or modifications not expressly approved by Comlab may void the user's authority, as granted by the FCC, to operate this device and should not be made.

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

3 Background

Davicom's DVLD Lightning Detector is an add-on sensor for Davicom's line of Intelligent Remote Monitoring and Control Systems. It is based on a circuit that is designed to automatically detect the approach of lightning storms by analyzing and recognizing the electromagnetic signature of lightning strikes. In addition, the circuit contains a hardwired averaging and distance estimation algorithm that provides the distance to the leading edge of the storm.

Together, the DVLD and Davicom units can be used to detect approaching lightning storms, to send alarms when the storm reaches a certain minimum distance, to de-activate or disconnect sensitive equipment and even to log the storm's track.

4 Installation and initial configuration

ATTENTION: *You are strongly advised to set up the DVLD and test it in your particular environment for several weeks before actually controlling site equipment from its readings. Although we have put every effort into ensuring that the unit will perform flawlessly in various electromagnetic environments, it is not impossible that certain installations contain defective or electrically noisy components that could affect the DVLD's operation.*

The DVLD comes in 2 parts:

- The outdoor detector (DVLD-1)
- The indoor USB converter (USB-RS485LD)

- 1) You must install the DVLD outdoors and secure it to a wall or post using the PVC clamp provided with the unit (or Tie-Wraps). The DVLD must be installed vertically so that the cable exits from the bottom of the unit. We recommend that the sensor be installed at a height of at least 6' from the ground and at a distance of at least 12" from a metallic structure. We do not recommend installation directly on the transmission tower.



For safety and optimum detection performance, make sure that the Davicom unit's chassis is properly grounded.

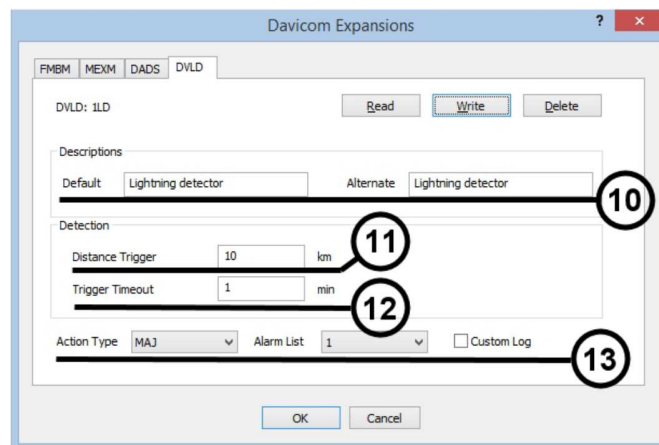
- 2) Run the DVLD cable from the probe to the interior of the building. Avoid passing the cable near sources of electrical noise such as fluorescent lights and ballasts.
- 3) Secure the USB-RS485LD to the equipment rack or panel.
- 4) Connect the DVLD cable to the connector labeled DVLD-1 on the USB-RS485LD.



- 5) Connect one end of the USB cable to the USB connector on the USB-RS485LD.

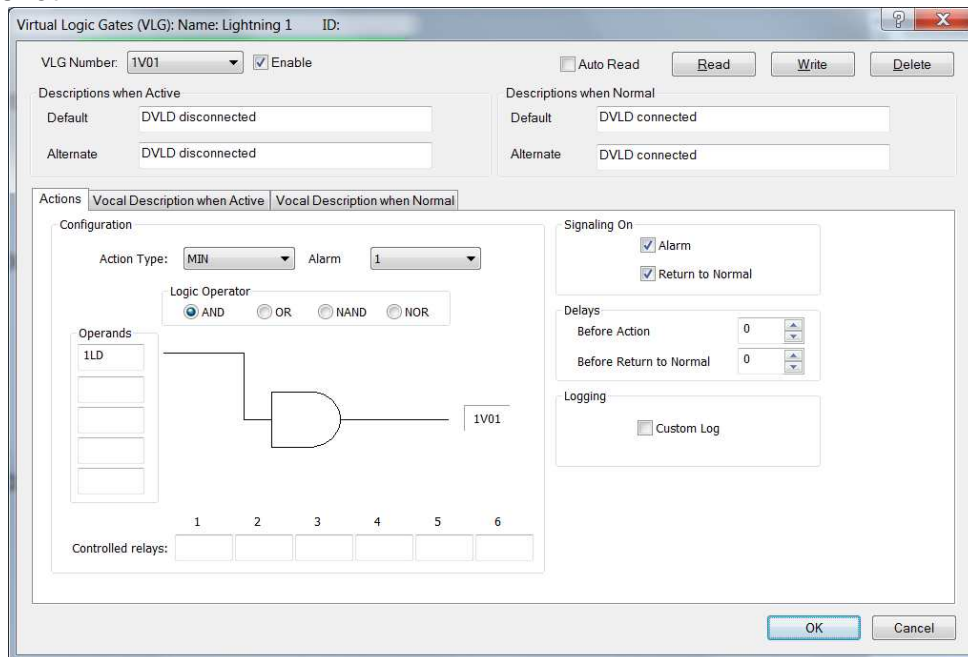


- 6) Connect the other end of the USB cable to the USB connector located on the rear panel of the Davicom unit.
- 7) Connect to the Davicom unit using the DavLink software.
- 8) In the DavLink software, go to the configuration menu by clicking on the configuration icon or select Unit from the main menu and Unit Configuration from the dropdown list.
- 9) Click on Devices. Next, click on the Davicom Expansions tab and finally click on the DVLD tab.

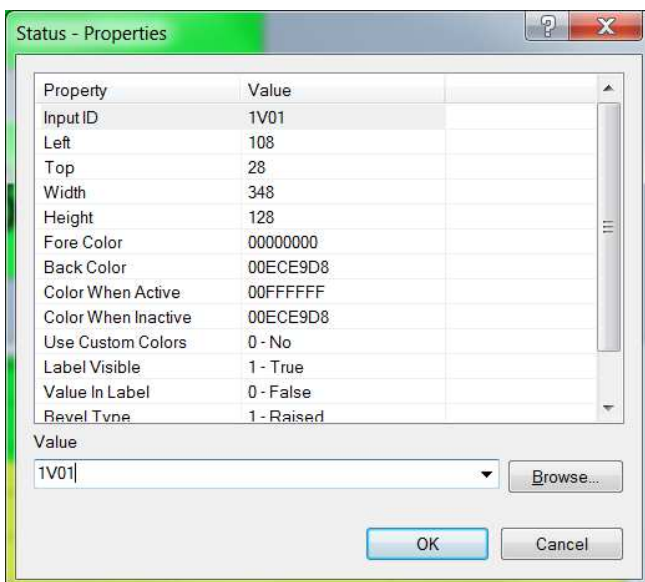


- 10) If necessary, change the Default and Alternate (language) text descriptions.
- 11) Set the Distance Trigger parameter to any value between 5 km and 40 km. Lightning activity outside this range will not be logged. Default value is 10 km.
- 12) Set the Trigger Timeout (additional delay before returning to normal conditions after the last detected lightning activity—see section 6 below). Default value is 10 min.
- 13) Select the Action Type, the Alarm List number and check the Custom log box if the alarms need to be logged.
- 14) Click OK and confirm the changes.
- 15) To display the information provided by the DVLD, you must create workspaces in DavLink by using the 2 flags/variables that contain the DVLD's information.
- 16) The first flag of interest is the 1LD flag. It is used to indicate the connection state of the DVLD. The 1LD flag must be passed through a Virtual Logic Gate (VLG) in order for its value to be displayed. It is not directly useable as an input for a display "object" in DavLink. The figure below shows how to create a VLG for this purpose. This VLG is also set to give

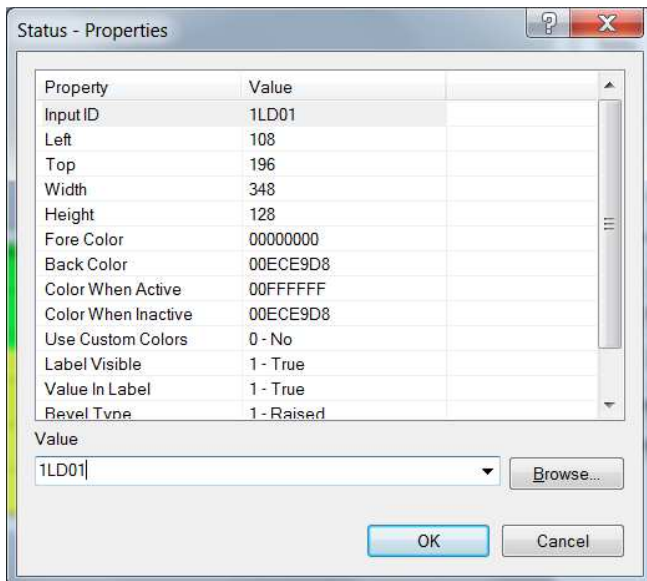
a Minor alarm should the DVLD stop communicating. This is illustrated in the following screen shot.



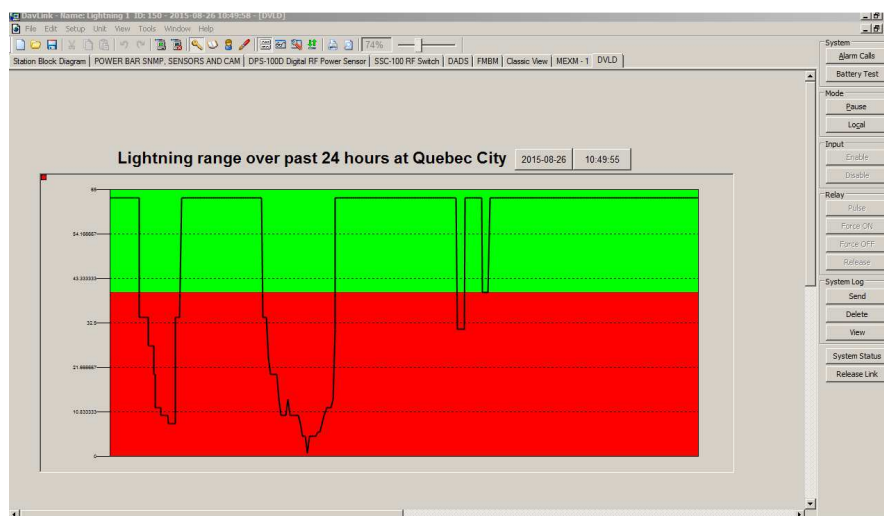
- 17) A display button is then created through the DavLink display edition window as shown on the left below. It will appear as on the right below.



- 18) The second flag/variable from the DVLD is the 1LD01 flag. It is the one that contains the actual distance to the storm front. It can be displayed directly, without having to pass through a VLG. Placing the 1LD01 value in a display button object in the DavLink display editor as shown below on the left will produce the display shown on the right.



- 19) Of particular interest is the display of data trending with the 1LD01 variable. Simply putting it into the Input ID of a Trending graph object will produce a display as shown below. Note that you must log-off after setting this up, the data will appear in the graph the next time you log back on.



5 Extra information on operation of the DVLD

5.1 Averaging time & distance thresholds

Independently of the Davicom's settings, the DVLD's internal circuit is always operating and actively listening for the electromagnetic signature of lightning strikes. It can detect both cloud-to-ground and cloud-to-cloud strikes. If the hardware-based averaging and distance estimation

algorithm detects a strike at a distance that is closer than about 40 km, it will output this number to the Davicom unit for further action. Actually, the Davicom unit reads the data out of the DVLD once every second. It is important to note that this averaging and distance estimation takes place on a 17 minute cycle in the hardware. This means that once a strike has been detected (and the information sent to the Davicom), the DVLD won't send a return to normal reading until 17 minutes later (if no other lightning strikes are detected).

If the storm keeps approaching however, the DVLD will continue to update its output to the Davicom with shorter and shorter distances.

This is where the "Distance Trigger" setting on the Davicom comes into play. Although the DVLD is continuously monitoring and outputting any distances to approaching lightning activity, a user can decide to ignore any strikes that occur too far away by setting the Davicom's distance threshold to a smaller distance. The closer this distance is to the site, the fewer nuisance alarms will be caused by tangentially moving storms. On the other hand it is up to the user to decide how comfortable he is with the risk that a fast-approaching storm could zoom-in to his site with little or no forewarning. A display of 63 km indicates that no lightning has been detected.

6 Timeout delays

As explained in the paragraph above, the DVLD's normal averaging period is 17 minutes, and this period is fixed in the hardware. The Davicom unit however, has a "Trigger Timeout" period that is **added to the basic 17 minute timeout**. Since the minimal time settable for the Trigger Timeout in the Davicom is 1 minute, the total minimal timeout period is 18 minutes. The maximal extra delay that can be added here is 99 minutes. The Davicom's default Trigger value of 10 minutes will therefore produce a total timeout period of 27 minutes. The maximum extra delay that can be added here is 99 minutes.

6.1 Noise rejection

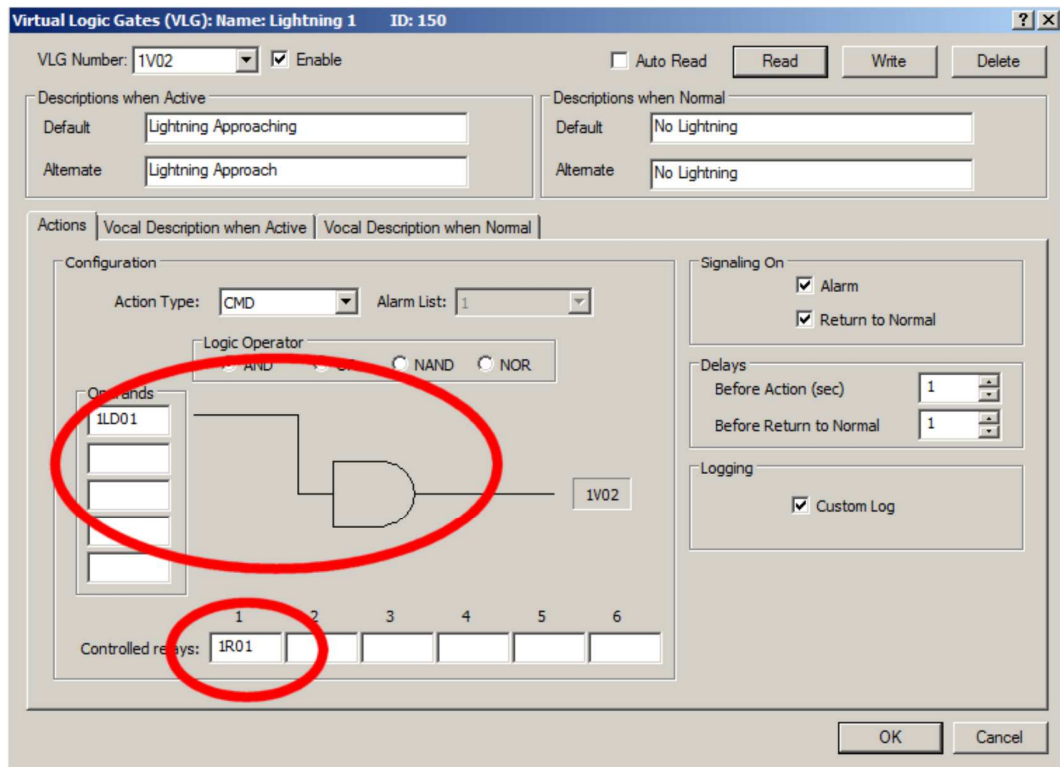
In addition to the sophisticated averaging and distance estimation algorithm described above, the DVLD also features an embedded man-made noise rejection algorithm. This feature reduces false alarms that can be caused by electrical arcing, motor noises and other non-natural sources.

7 Using the DVLD

There are two suggested methods of using the DVLD to protect remote site equipment. One method follows the lines of a "hands-off" philosophy and the other is more of a "hands-on" method. You may obviously decide to adapt these suggestions to your particular operational needs.

7.1 Hands-off setup

In this philosophy of operation, you set the Distance Trigger to a value that you think will be at the limit for safe operation of your site (say 5 or 10 km). Once a reading has breached this distance, the Davicom is configured to automatically take action at the site and shut things down. This can be done by passing the LD01 flag through a Virtual Logic Gate (VLG) and controlling a relay as shown in the screen shot below.



For DV-Mini or DV-2-8/216 units, the control could also take the form of sending an SNMP trap or performing an SNMP SET.

If you wish, the Davicom can also be configured to send an alarm when the Distance Trigger event occurs, in addition to the local control commands. The example below shows an e-mail address configured as an alarm destination.

Alarm-Call Lists: Name: Lightning 1 ID: 150

Alarm-Call Lists | Alphanumeric Pager

#	Seq	Description	Telephone Number/Address	Type	Modem	Pager #	Smartpl
1	1	Lightning 1	dvld@davicom.com	14	0		
2							
3							
4							
5							
6							
7							
8							
9							
10							

Change Delete

Type: MAJ Alarm List: 3 ☐ Auto Read Qualifier : ☐ Do List Once

Read Write

Descriptions

Default: Lightning 1

Alternate: Lightning 1

Sequence Telephone Number/Address Transfer Type Callout Device Pager Number

1 dvld@davicom.com (14) E-Mail No Attach Ethernet

OK Cancel

7.2 Hands on setup

In this philosophy of operation, you set a threshold to give you a “heads-up” minor alarm so you can “track” the incoming storm and then decide what action you wish to take (yourself, manually) when a certain closer threshold is reached.

To achieve this dual-threshold capability, it is necessary to use the Metering Math Functions built-in to the Davicom units. The MMF’s have two-level alarm capability built-in. The example below shows that a Minor Alarm has been set for a minimum distance of 30 km and a Major Alarm has been set for a minimum of 10 km. Note the * in the “High” field, indicating a “don’t care” condition.

Metering Math Functions: Name: Lightning 1 ID: 150

Func Number: 1F01 ☒ Enable Qualifier State

Descriptions
Default: DVLD_1F01
Alternate: DVLD_1F01

Operator: + (plus) Measurement Unit: kM Normal Value: 0

Operands
1LD01

Actions | Vocal Description

Level 1
Action Type: MIN Alarm List: 1
Limits: (*=don't care) Low: 30.0 Hysteresis: 0 High: * Hysteresis: 0
Controlled Relays: 1 2 3 4 5 6

Level 2
Action Type: MAJ Alarm List: 1
Limits: (*=don't care) Low: 10.0 Hysteresis: 0 High: * Hysteresis: 0
Controlled Relays: 1 2 3 4 5 6

Automatic Limit Change
Qualifier: Multiplier: 1.00

Meter Window
Low: 0 High: 70.0

Signaling On
☒ Alarm
☒ Return to Normal

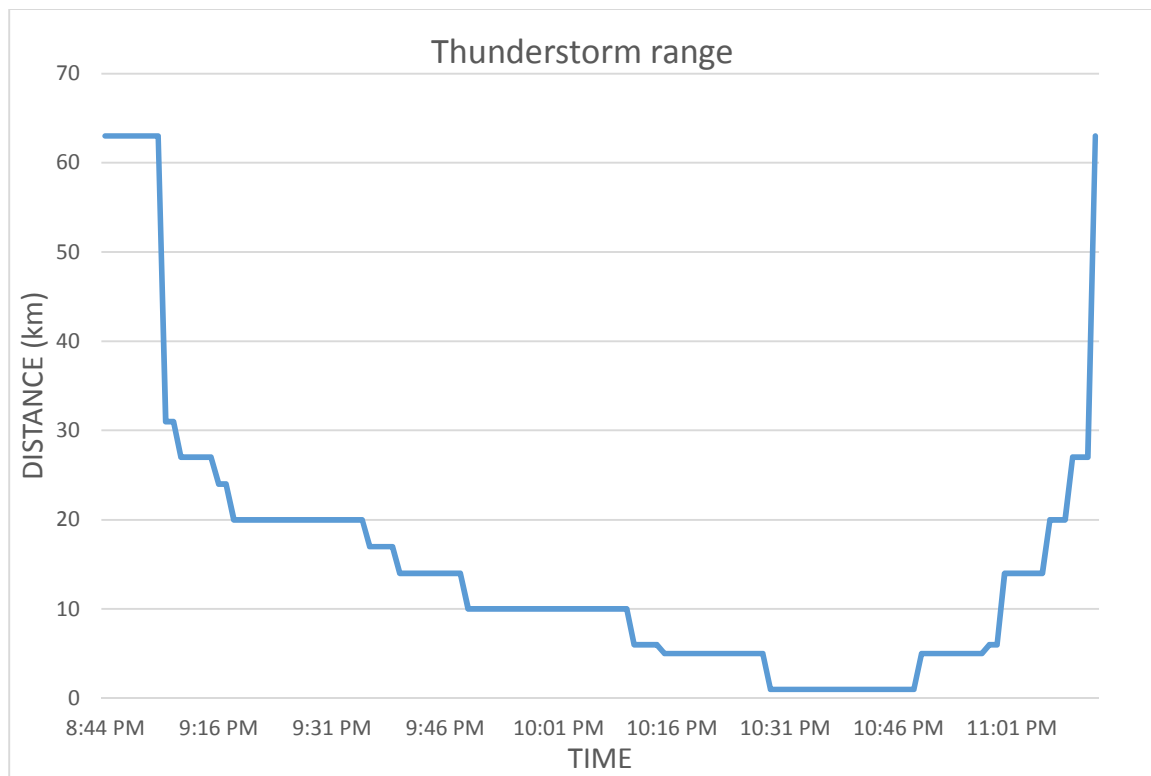
Delays
Before Action (sec): 0
Before Return to Normal: 0

Logging
☒ Custom Log

This Metering Math Function feature only works with firmware 5.56.17355 or more recent.

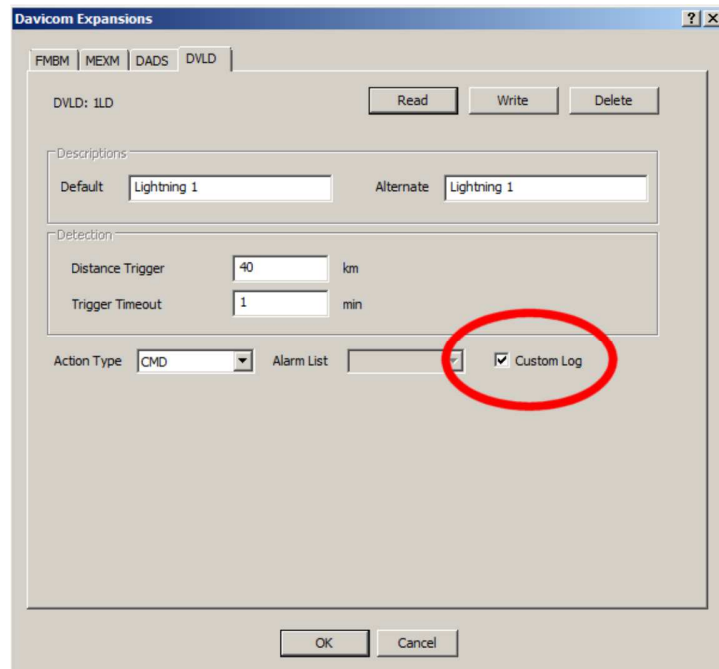
7.3 Logging

The DVLD and Davicom units can also be used to log lightning storm activity in the vicinity of your site. The data can be transferred at periodic intervals and compiled in Excel to produce a chart of storm activity and proximity to the site. The figure below shows the DVLD range data of a real thunderstorm that passed right over our offices in the evening on June 18th 2015.

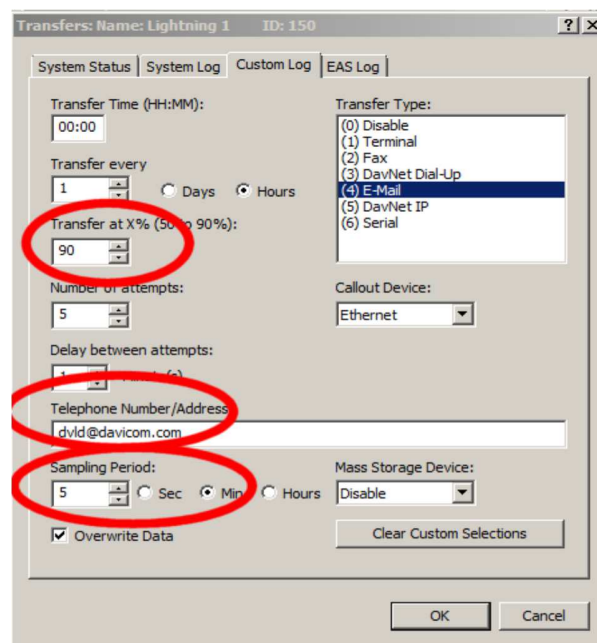


To achieve this functionality, the custom-log and data logging features must be used.

Firstly, the « Custom Log » box must be checked as shown below.



Then, the Custom Log can be configured as shown below to transfer the log by e-mail when it reaches 90% capacity. The Data logging must be activated to take periodic samples (every 5 minutes in this example). This will give about 288 samples per day and should produce an e-mail every 3 or 4 days.



8 Support/Contact

For more detailed information on setting up and using the advanced features of your Davicom unit, please refer to the Davicom Reference Manual

For technical support concerning this product, please consult the www.davicom.com web site or contact us:

- By telephone at 1-866-282-3380 (toll-free in North America) or at +1-418-682-3380 from elsewhere.
- Through our web site at www.davicom.com/contact

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