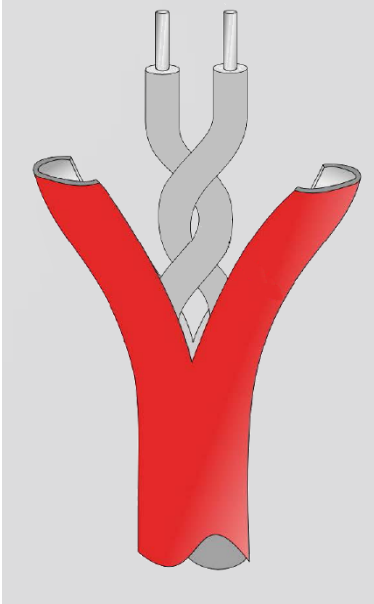




Fire detection and evacuation solutions that save lives.



LST Digital Interface

Monitor Module (LST-DiMM)

MAN3109-3

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1 Important Guidelines

Please read this instruction leaflet thoroughly before commencing installation.

- ✓ Install the Digital Interface Monitor Module (LST—DiMM) accordingly to meet local and country installation requirements.
- ✓ The LST—DiMM must be installed in accordance with NFPA 70 & 72, NEC 760 (National Electric Code) and Authorities Having Jurisdiction.
- ✓ Ensure the product is installed, commissioned and maintained by persons according to good engineering practices and who received sufficient training on the unit.
- ✓ Only use LST Digital Linear Heat Detection cable with the LST—DiMM.
- ✓ Test the Linear Heat Detection Cable before connecting it to the LST—DiMM using a multimeter.
- ✓ Ensure the end of line resistor (1kohm) is securely connected at the end each linear heat detection cable.
- ✓ If only one zone is required leave the end of line resistor (1kohm) connected across the terminals of the unused zone.
- ✓ Ensure any cable glands used are tightened to form a secure and moisture proof seal around the detection cable and any other cable in or out of the unit.



Do not exceed the maximum operating voltage of the LST—DiMM (36Vdc)



Do not connect lengths of linear heat detection cable in 'T' connections or spurs.

2 General Description

Digital Interface Monitor Module

The LST Digital Interface Monitor Module (LST-DiMM) is a dual zone module for monitoring up to two zones of LST Digital Linear Heat Detection (DLHD) Cable. If an overheat or fire situation triggers either zone of the DLHD cable the unit automatically calculates and displays the distance along the cable, in feet and metres, to the alarm point. The two zones can operate independently of each other, or in interlock mode and a separate alarm and normally conducting fault output

are provided for each zone. The unit is intended to be installed between the Digital Linear Heat Detection cable and a conventional or addressable fire alarm control panel. It has power, fault and alarm lights, as well as volt free outputs for fault and alarm, corresponding to each zone. It may also be connected to a industrial process control system using the two wire RS-485 Modbus RTU output.

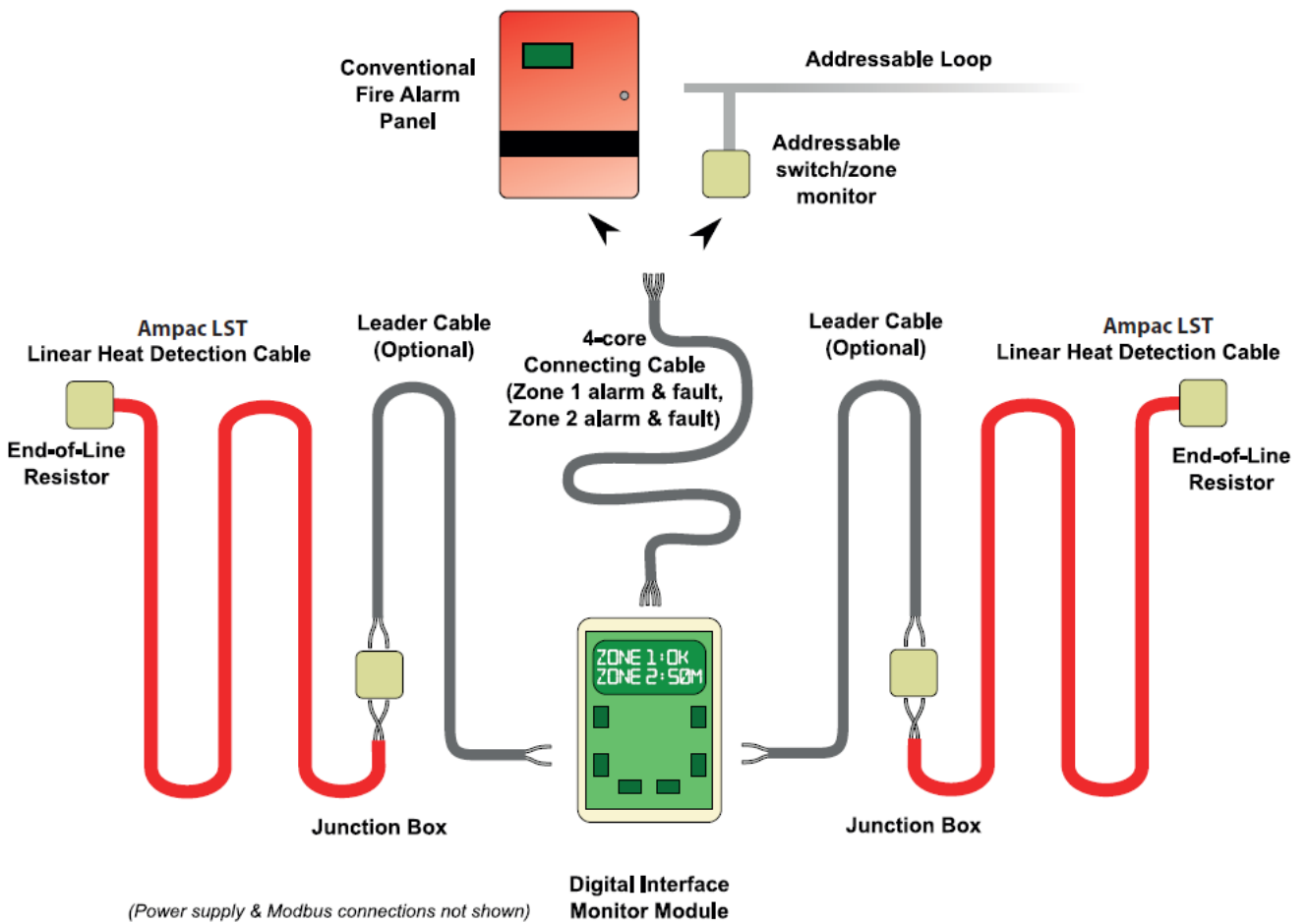


Figure 1: Typical Installation of the LST Digital interface Monitor Module

3 Specifications

Part No	LST—DiMM (-M suffix M16 knockouts on bottom)	(-
Description	LST Digital Interface Monitor Module (LST-DiMM)	
Revision	1.5	
Enclosure		
Dimensions	H180mm x W120mm x D60.5mm (H7.1in x W4.72in x D2.38in)	
Rating	NEMA 4, 4X (IP65)	
Finish	Light Gray with clear lid	
Display	2 line, 16 character backlit display showing zone status	
Approvals	UL 864 10th ed	
Power Requirements	All circuits power limited if powered from a power limited supply	
Operating Voltage	12Vdc - 36Vdc	
Current Consumption		
Normal Operation (standby)	<12mA <4mA	
Alarm	<40mA <15mA	
Operating Temperature Range	-20°C – +50°C (-4°F – +122°F)	
Terminal Blocks		
Spacing	5mm Rising Clamp	
Wiring	16A	
Wire Size	0.08mm ² (28AWG) to 4mm ² (11AWG)	
Supervised Circuits	Power, Input Zone 1 & Input Zone 2	
Inputs	Up to two Class B zones of LST Digital LHD Cable	
Max Zone Strength	3000m (10,000ft)	
Min Zone Strength	1m	
End of Line Resistor	1kohm (included)	
Short Circuit Current	0.5mA	
Max Voltage	5V	
Ground Fault Impedance	0ohms	
Outputs		
Communications	T wo wire RS-485 Modbus RTU (field wiring limited to the same room to comply with UL listing)	
Sounder	2 .4kHz 92dBa @ 10cm Buzzer	
Alarm	2x Form C volt-free relay contacts (resistive, common)	
	Max V	30Vac or 42.4Vdc
	Max Current	2A
Fault	2 x Optoisolated phototransistor output (resistive, common)	
	Max V	35Vdc
	Max Current	80mA

Leader Cable

The LST DiMM can be connected via leader cable to the start of the Linear Heat Detection cable. During installation the voltage drop across the leader cable is calibrated out to give an accurate distance reading when an alarm is triggered (see page 9 for calibration procedure). The maximum length of leader cable that can be used per zone is dependent upon the cable diameter. The following is a guideline for typical cable sizes and maximum length:

Cable Size	Max Leader Cable Length
20AWG (16x0.2mm or 0.8mm)	1000m
22AWG (7x0.25mm or 0.6mm)	600m
24AWG (7x0.2mm or 0.5mm dia,	390m

Static Discharge Cautionary

The following items are cautionary notes that will help prevent equipment damage or malfunction caused by static discharge:

CAUTION

Static charges produce voltages high enough to damage electronic components. Follow these precautions when installing, servicing, or operating the LST-DiMM:

- Work in a static-free area.
- Discharge any static electricity you may have accumulated.
- Discharge static electricity by touching a known, securely grounded object.
- Do not handle the printed circuit board (PCB) without proper protection against static discharge.

In the event that the LST-DiMM malfunctions after encountering a static discharge correct operation of the unit can be restored by interrupting power to unit for a brief period (approximately 10s). Setup information can be verified by following the steps in the installation procedure section. In the event of the setup information being corrupted the unit should be reset following the *Resetting the LST-DiMM procedure*.

Mounting Dimensions

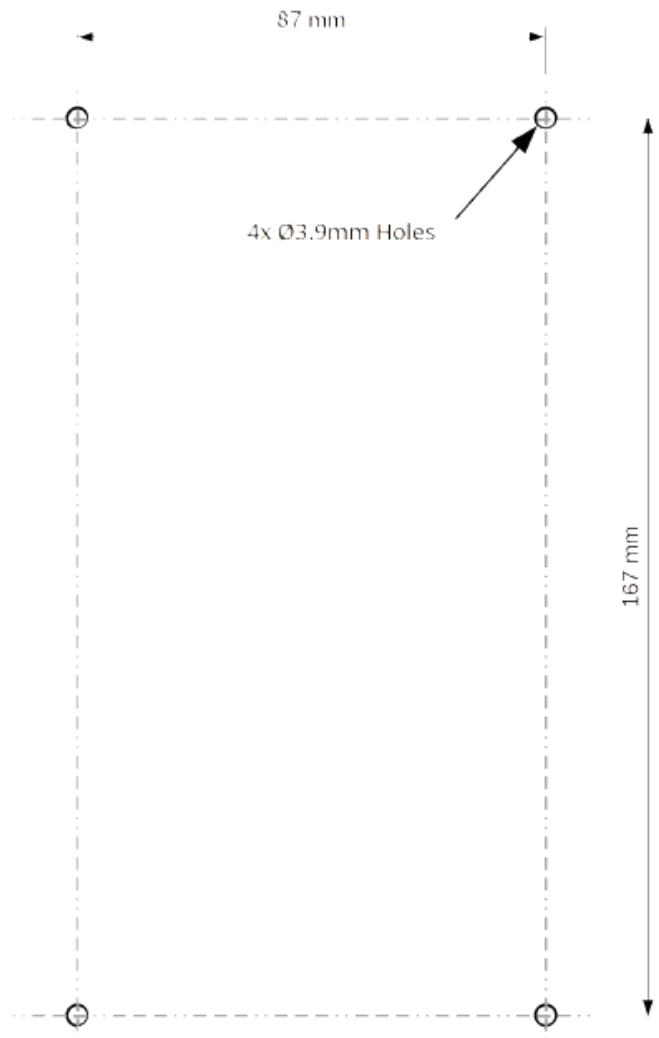


Figure 2: Mounting Dimensions for the LST DiMM

4 Installation

The LST—DiMM allows accurate location of an alarm point along a length of LST Digital Linear Heat Detection (DLHD) cable. It continuously monitors up to two zones of DLHD cable for a fault (open circuit) or an alarm (overheat or fire condition). Because of the wide range of applications that digital Linear Heat Detection cable can be used for, it may not always be possible, or be too time consuming, to locate where along the cable an alarm has occurred. Using the LST—DiMM, when an alarm occurs the distance to the overheat condition is immediately calculated and displayed on the integrated display.

If a fault is detected, the corresponding fault output stops conducting, triggering a fault at the fire alarm control panel. If an alarm is detected, the corresponding alarm output changes state, triggering an alarm at the fire alarm panel. The fault outputs also stop conducting on power loss to the unit or microprocessor fault, triggering a fault at the fire alarm control panel.

The two wire RS-485 Modbus RTU output also outputs the current state of both zones. See the section “RS-485 Modbus Communications” for more detail.

There are two primary configurations of the LST—DiMM (see figure 1):

- 1) The DLHD cable can be connected directly to the LST—DiMM
- 2) The DLHD cable is connected to a length of leader cable which is connected to the LST—DiMM. In this scenario the leader cable must be “calibrated out” during commissioning of the LST—DiMM.

Connections Diagram

Figure 3 shows the connections diagram for the LST—DiMM unit. The unit is provided with a 1kohm end of line resistor in each zone input. If only one zone is required, leave the 1kohm resistor connected across the zone which is not in use. Otherwise the 1kohm resistor should be connected at the end of the Digital Linear Heat Detection cable.

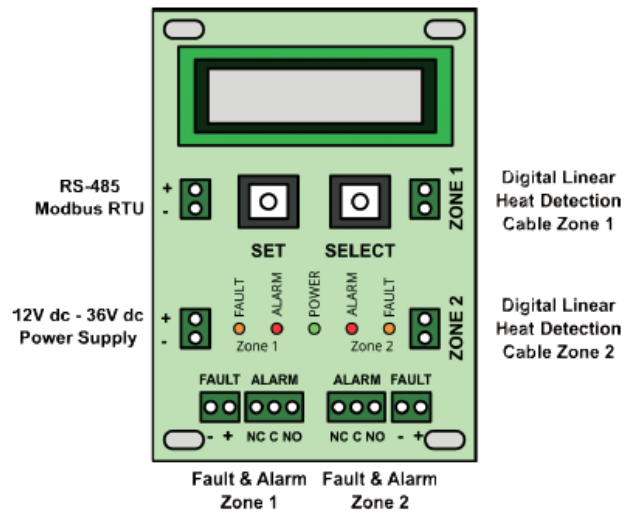


Figure 3: Wiring Diagram for the LST DiMM

5 Operating Modes Wiring Diagram Independent

There are two operating modes for the Digital interface Monitor Module:

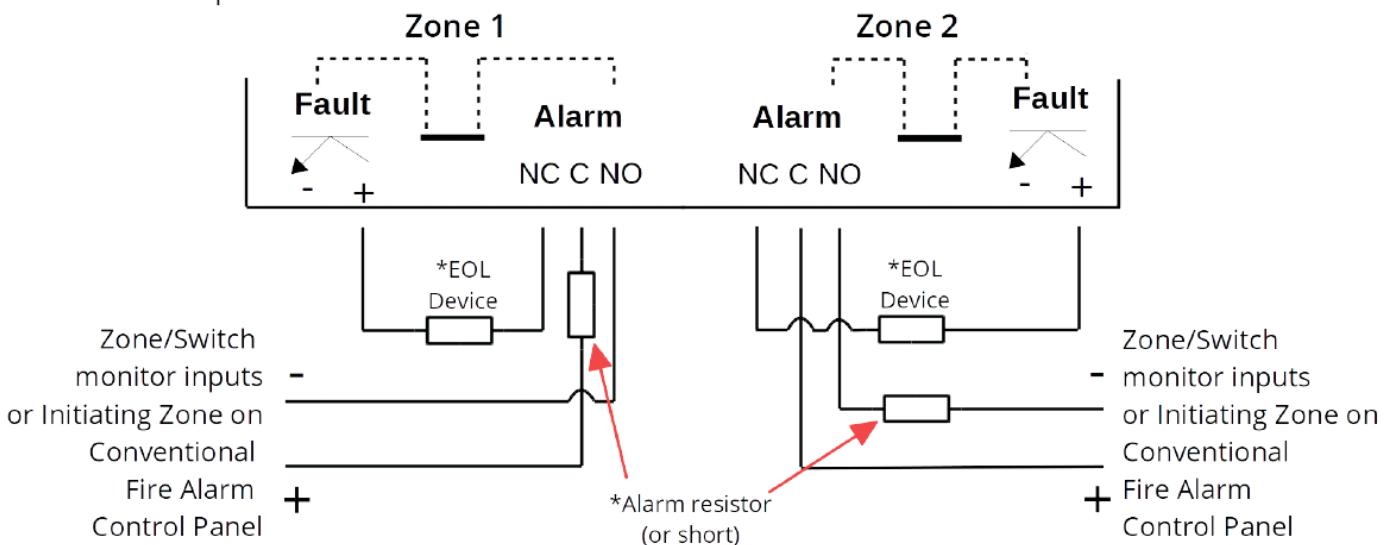
1. Independent – This is when the LST—DiMM is used as a two zone system. When a fault or overheat condition occurs on an LHD zone, the corresponding fault or alarm output respectively is triggered. The two zones operate independently and both sets of outputs should be connected to a fire alarm control panel.

If the zone is not required leave the 1kohm resistor in the zone input terminals as supplied. In this mode, the two zones can either contain identical rated temperature LHD cables or two different rated temperature LHD cables, e.g. a 68 deg C in zone 1 and a 105 deg C in zone 2.

Operating Mode: Independent (Default)

Alarm and fault outputs operate independently and correspond to the LHD zone. May be used with one or two zones of LHD as required

Fault – and Alarm NO linked by jumper on PCB
Do not remove if being used with UL fire alarm system



* the EOL device and alarm resistor should be provided with the fire alarm control panel, zone or switch monitor

6 Operating Modes Wiring Diagram Interlock

Interlock – this mode is for applications which require a fail-safe guarantee that an alarm is only triggered when an overheat condition has been detected. This mode may also be known as coincidence detection. In this case, the same rated temperature LHD cable should be attached to both zones of the DiMM. The alarm output is only activated when both LHD cables trigger an alarm due to an overheat condition. If one LHD cable zone input registers an alarm but the second does not, the alarm output will not be activated. This is to prevent an alarm if a mechanical or other issue has triggered one LHD cable and not an overheat condition.

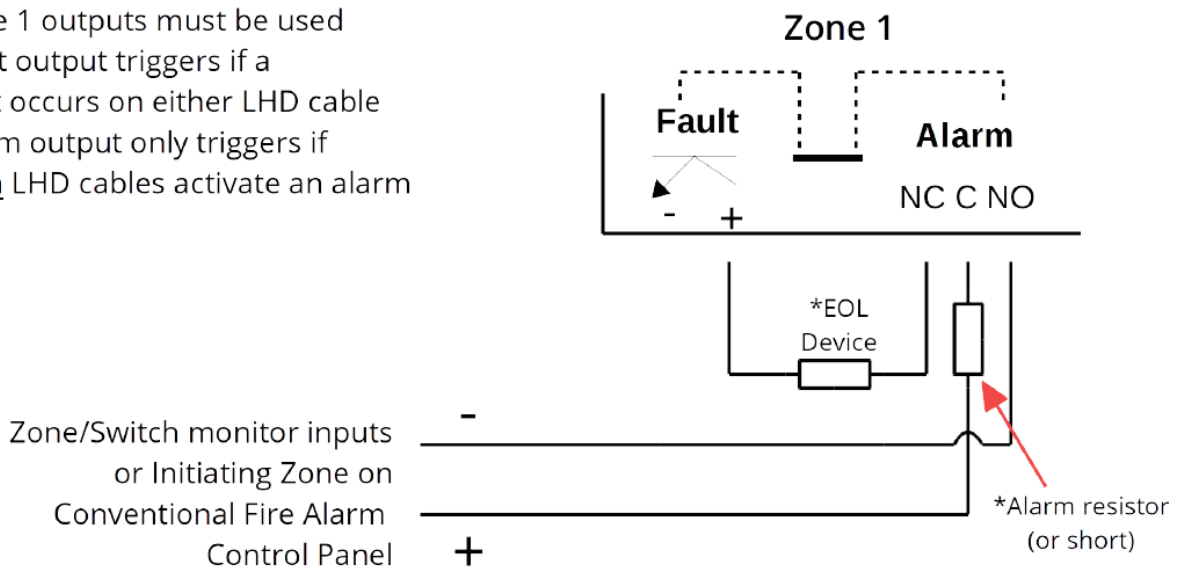
- Only use Zone 1 fault and alarm outputs in Interlock mode.
- Two linear heat detectors with the same temperature rating must be used and a minimum of two linear heat detectors must be installed in each protected space.
- The spacing between detectors should be less than 0.7 times the rated linear spacing, in accordance with National Fire Alarm Code, NFPA 72.

See the LST Digital LHD Installation Instructions for the Linear spacing specification.

Operating Mode: Interlock

Zone 1 outputs must be used
 Fault output triggers if a
 fault occurs on either LHD cable
 Alarm output only triggers if
both LHD cables activate an alarm

Fault – and Alarm NO linked by jumper on PCB
 Do not remove if being used with UL fire alarm system



* the EOL device and alarm resistor should be provided with the fire alarm control panel, zone or switch monitor

7 Commissioning

1. After wiring the unit up (see wiring diagram) power up the device. Device will show screen including software revision number.
2. If the unit is being setup for the first time the following options will be shown. If the unit has previously been installed the display will automatically cycle through the options, showing the stored settings.
3. Select the operating mode. (see “Operating modes” (pages 7-8) for more detail. **Independent:** the two zones operate independently of each other (default). **ww Interlock:** Both fault outputs activate when a fault occurs on either zone 1 or zone 2. Both alarm outputs activate **only** when both LHD zones trigger an alarm.
4. Select the cable type connected to Zone 1 (68°C/78°C/88°C/105°C/185°C)
5. Select the cable type connected to Zone 2 (68°C/78°C/88°C/105°C/185°C)
6. If leader cable is connected between the linear heat detection cable and the LST-DiMM for this zone, press the Select button and select Yes. Press the Set button to continue.
7. The controller will then ask if the zone is ready to be calibrated. **The leader cable must be connected to the LST-DiMM and shorted out at the end where it connects to the START of the LHD cable. Once this is done press the Set button.**
8. The DiMM will display the voltage drop across the leader cable. **Remove the short from the leader cable and connect it to the START of the LHD cable as normal.**
9. If the Linear Heat Detection cable is connected directly to the LST-DiMM then select No and press the Set button to continue.
10. Select whether you would like the alarm outputs for both zones to be latching. If set to Yes, then **if an alarm is triggered the unit will either require the power supply to be interrupted (min. 10s) or the Set button to be pressed to reset to normal once the alarm conditioned has been cleared.**
11. Select whether the Modbus RTU output should be enabled. If this is not enabled then proceed to step 17
12. Set the Modbus RTU address of this unit. (1 - 247)
13. Cycle through the possible Baud Rates for the Modbus RTU output. (1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200).
14. Select the number of data bits for the Modbus RTU output. (7 or 8)
15. Select the number of stop bits for the Modbus RTU output. (1 or 2).
16. Select the parity for the Modbus RTU output. (even/odd/none).
17. Once the unit has been commissioned the display will show the zone status. In normal operation the display will show OK for each Zone. In Interlock mode the display will show {Zone 1: OK {Zone 2: OK to indicate the zones are linked and an alarm is only transmitted if both zones are triggered.
18. If an alarm condition occurs the DiMM automatically calculates the distance along the cable to the trigger point and first displays this value in metres.
19. The display alternates showing the distance along the cable to the trigger point in metres and in feet.
20. If a fault occurs (open circuit) on the Linear Heat Detection Cable the display will show FAULT on the corresponding line.
21. If a ground fault occurs on either zone the display will show a GND FAULT on the corresponding line.

LST Dual
Operating Mode
Z1CableType
Zone Cable
Ready to
Zone2cal
Zone Cable
Latching Outputs
Modbusoutputon
Modbusaddress
BAUDRATE
DATABITS
StopBITS
PariTY
Zone10K
Zone1534m
Zone1534m
Zone10K
Zon10K

8 Two-Wire RS-485 Modbus RTU Communications

The LST DiMM includes a two wire RS-485 Modbus output which can be enabled to output the status of each zone of Digital Linear Heat Detection Cable. The DiMM Modbus output supports the Modbus RTU protocol and the following functions:

- Function code 4 (Read Input Registers)

The request for reading the input registers should be constructed in the following manner:

- Address for first register to be read (16-bit)
- Number of registers to read (16-bit)

The DiMM will respond in the following manner:

- Number of bytes of register values to be read (8-bit)
- Register values (16-bits per register)

The DiMM stores the information for each zone of the DLHD cable in the following format:

Register	Description	Possible Values
0	Zone 1 status	-1 or 65535=fault on zone 0=zone ok 1-32767=distance in metres to trigger point
1	Zone 2 Status	-1 or 65535=fault on zone 0=zone ok 1-32767=distance in metres to trigger point
2	Zone 1 Cable Type	1=68°C, 2=78°C, 3=88°C, 4=105°C, 5=185°C
3	Zone 2 Cable type	1=68°C, 2=78°C, 3=88°C, 4=105°C, 5=185°C

If the start address plus the requested number of registers exceed 4, the DiMM will return an ILLEGAL DATA ADDRESS error.

If the request contains a function code other than those supported the LST-DiMM will return an ILLEGAL FUNCTION error.

9 Resetting the LST DiMM Unit

WARNING: This procedure will erase ALL stored settings and reset the LST DiMM unit back to its factory default state. The cable types, leader cable calibration, latching output selection and Modbus setup will all require selecting after this procedure.

To reset the LST DiMM unit back to the factory state, when the unit is powered up and in normal operation (see step 15 in the Commissioning procedure), press and hold the SET and SELECT buttons for a minimum of 10 seconds continuously. While the SET and SELECT buttons are held down the power LED will flash quickly to confirm this procedure is about to take place. After approximately 10 seconds, the unit will restart and return to step 1 in the Commissioning procedure.

LST Digital LHD Cables by Part No

Refer to LST Digital Linear Heat Detection Installation Instructions and LST LHD Application Guide for more information on installation and uses.

Part No	Description
4114-1001	LST Digital LHD 68°C PVC
4114-1101	LST Digital LHD 68°C Nylon outer sheath
4114-1201	LST Digital LHD 68°C Polypropylene outer sheath
4114-1301	LST Digital LHD 68°C Stainless steel outer braid on PVC
4114-1002	LST Digital LHD 78°C PVC
4114-1102	LST Digital LHD 78°C Nylon outer sheath
4114-1202	LST Digital LHD 78°C Polypropylene outer sheath
4114-1302	LST Digital LHD 78°C Stainless steel outer braid on PVC
4114-1003	LST Digital LHD 88°C PVC
4114-1103	LST Digital LHD 88°C Nylon outer sheath
4114-1203	LST Digital LHD 88°C Polypropylene outer sheath
4114-1303	LST Digital LHD 88°C Stainless steel outer braid on PVC
4114-1004	LST Digital LHD 105°C PVC
4114-1104	LST Digital LHD 105°C Nylon outer sheath
4114-1204	LST Digital LHD 105°C Polypropylene outer sheath
4114-1304	LST Digital LHD 105°C Stainless steel outer braid on PVC
4114-1105	LST Digital LHD 185°C Nylon outer sheath
4114-1305	LST Digital LHD 185°C Stainless steel outer braid on Nylon

UNCONTROLLED DOCUMENT

NOTE: Due to AMPAC's commitment to continuous improvement specifications may change without notice.