LMS-188-4P-BMS

4 POINT DIGITAL MONITOR/ALARM

WITH PROTOCOL CONVERTER

OPERATING INSTRUCTIONS

LEONARD ®
WATER TEMPERATURE CONTROLS

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Tableof   Contents

Front Panel

The Multi-Probe Alarm System front panel consists of the following:
- Graphic LCD
- Channel Status LEDs (*STATUS*)
- Alarm LED (*ALARM*)
- Audible alarm indicator (buzzer)
- Buttons ○ Test & Reset (*TEST/RESET*) ○ Step button (*STEP*)

○ Alarm Limits & decrement button (▾) (*DOWN*)
○ Min/Max & increment button (▴) (*UP*) ○ Mute
& Menu increment button (*MUTE/MENU*)

Sensor   Probe

The probes supplied with the Multi-Probe Alarm System are highly accurate temperature sensors. The sensor may be put in water or other mild aqueous solutions from -148°F to 212°F. **NOTE:** Avoid submerging the probe in solvents or harsh chemicals. Use protective thermowells when monitoring such materials.

NOTE: The warranty does NOT cover damage to probes or electronics that is caused by exceeding temperature limitations, or damage to probes caused by using them in solvents or other unsuitable environments.

NOTE: If the displayed temperature shows a consistent high (> 212°F) or low (< -148°F) value, most likely, the probe has failed.

Probe   Installation

RTD sensors supplied with the LMS-188-4P should be installed using the supplied fittings, which are 1/2" MNPT x 1/8" compression. After installing the fitting into a tee, insert the RTD into the fitting and adjust the depth of the probe so as the tip of the probe is approximately at the center of the piping. Tighten the nut finger tight, then with a small wrench turn the nut 1/4 to 1/2 turn past finger tight. Warning – do not overtighten.

Power-up
Shows LMS-188-4P-BMS startup screen.

NO BATTERY
Power Down + Install Battery

The unit will run without a backup battery but will show "NoBatt!" on the display to indicate lack of backup battery.

When a battery is properly installed battery status is shown on the display

up arrow	charging
solid block	full charge
flashing block or block with blank lines	battery problem

Power-down Sequence

To power down the MPS and electronically disconnect the battery:
1. The power supply must be plugged in.
2. Press-and-hold the TEST/RESET button, until the MPS goes fully "dark" (LCD backlight turns off and all LEDs are out).
3. Continue to hold the TEST/RESET button, and unplug the power supply.
4. Continue to hold the TEST/RESET button for 5 to 10 seconds.
5. Release the button.

If, when you release the button the MPS powers-up (in PowerFail mode), you will need to repeat the procedure from step 1 by plugging the power supply back into an outlet.

Runtime   Display
The runtime display shows the current readings of 4 probes. T1 Hot, T2 Cold, T3 Mixed and T4 Return.

```
1:    147'F
2:     55'F
3:    120'F
4:    110'F
```

Alarm Conditions / Temperature Alarms
If the readings are within the alarm limits, the STATUS LED will blink green.
When the temperature reading meets or exceeds the temperature limits the STATUS LED will blink red.
After the probe's alarm delay time is exceeded the unit will blink the ALARM LED and beep the buzzer.
The user can MUTE the buzzer by tapping the MUTE/MENU button. The unit will reduce the audible signal from a loud beep, to a quieter and less frequent chirp. It will remain muted until MUTE time expires or a different probe goes into alarm.
Once the Alarm state has been signaled the unit will wait the Relay Delay time before tripping the Relay.

Limit Parameters
```
1 Low, 1 High, 2 Low, 2 High, 3 Low, 3 High, 4 Low, 4 High
```

Time Parameters
```
1AlarmDelay, 2AlarmDelay, 3AlarmDelay, 4AlarmDelay,
     RelayDelay, Mute
```

Low /   High Alarm   Limits

For a quick view the Low and High Alarm Limits tap the DOWN ARROW.

1 `AlarmLow 110'F AlarmHigh 160'F`

2 `AlarmLow  34'F AlarmHigh 130'F`

3 `AlarmLow 100'F AlarmHigh 130'F`

4 `AlarmLow 100'F AlarmHigh 130'F`

Min/Max   Actual   Readings

To view the Min/Max readings since power up or user commanded reset, tap the UP ARROW.

1 `ActualMin 144'F ActualMax 152'F`

2 `ActualMin  52'F ActualMax  59'F`

3 `ActualMin 118'F ActualMax 124'F`

4 `ActualMin 107'F ActualMax 118'F`

To manually reset the Min/Max readings, while the Min/Max readings are shown on the display, tap the TEST/RESET button. You will be asked to repeat TEST/RESET to confirm.

Installation   Instructions

Setting   the   IP   Address

To begin, do not plug in the Ethernet cable at this time. First enter parameters in the LMS.

To configure the LMS to send temperature data to the ProtoNode please configure a static IP for the LMS and the ProtoNode and set the subnet mask and gateway.

At Runtime tap **MENU**, you will see "Edit Limits". Then tap **MENU** AND **RESET** simultaneously to access the ***SETUP*** group of parameters. Use **STEP** to advance to the IP parameters. If you need to step back, use the TEST/RESET button to step back.

Special Group ***SETUP***

LMS IP1, LMS IP2, LMS IP3, LMS IP4,	LMS IP 1.2.3.4
ProtoNode1, ProtoNode2, ProtoNode3, ProtoNode4,	ProtoNode IP 1.2.3.4
Netmask1, Netmask2, Netmask3, Netmask4,	Netmask 1.2.3.4
Gateway1, Gateway2, Gateway3, Gateway4,	Gateway 1.2.3.4

1 Offset, 2 Offset, 3 Offset, 4 Offset, # channels,

1 Define, 2 Define, 3 Define, 4 Define, 0:tenthC 1:wholeC 2:tenthF 3:wholeF 4:wholeRH

Relay Def,   0:single unit relay 1:individual channel relays

DoorAlarm   -1:AlarmOnContactClosed 0:NoAlarm 1:AlarmOnContactOpen

To modify parameter values use **DOWN** and **UP**

- Enter the the IP Address for the LMS's Ethernet port in the "LMS IP" parameters.
- Enter the the IP Address for the ProtoNode's Ethernet port in the "ProtoNode" parameters.
- If necessary, change the Subnet Mask setting in the "Netmask" parameters.
- If necessary, change the IP Gateway setting in the "Gateway" parameters.

NOTE: If the LMS is connected to a router, the IP Gateway of the ProtoNode should be set to the IP Address of that router.

- Once you have set all parameters, use MENU to step back to the runtime screen
- Hold the TEST/RESET button until the screen goes blank. This will reset the unit and restart with the assigned IP
- Now plug the Ethernet cable from the LMS to:
    IF THE BUILDING MANAGEMENT SYSTEM USES ETHERNET
        the network hub or router. OR
    IF THE BUILDING MANAGEMENT SYSTEM **DOES NOT** USE ETHERNET the
        ProtoNode.

LMS-BMS/ProtoNode   Connectivity/Wiring Diagrams

If Building Management System uses Ethernet/IP Protocol

Both the LMS-188-4P-BMS and the ProtoNode need to connect to separate 10/100 Ethernet jacks using standard CAT-5 Ethernet Patch Cables (supplied by others). They need to be connected to a switch or router on the same Ethernet Subnet as the BMS. See Figure 1.
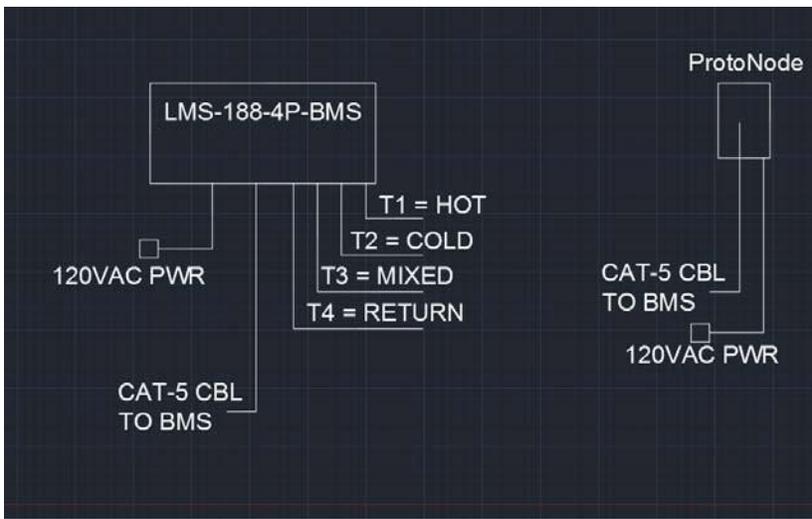
FIGURE 1

If Building Management System **DOES NOT USE** Ethernet/IP Protocol
In this case, the LMS-188-4P-BMS' Ethernet port can be directly connected to the ProtoNode's Ethernet port via standard CAT-5 Ethernet Patch Cables (supplied by others), and then the ProtoNode will be connected to the BMS via the output RS-485 connector on the ProtoNode box. In this case, serial communications with the BMS will be accomplished by using twisted pair wires on the RS-485 connection. See Figure 2.

FIGURE 2

LMS Overview

Buttons: **TEST/RESET**, **STEP**,   **DOWN**, **UP**, **MUTE/MENU**
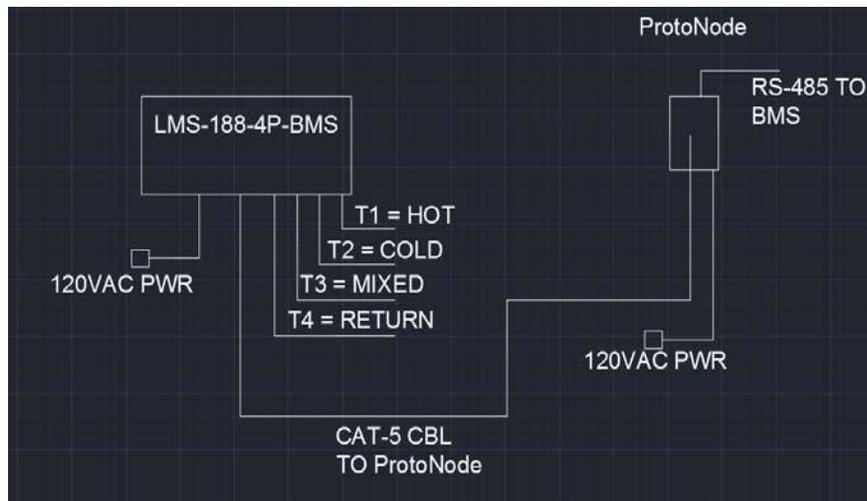

Runtime Display

```
    1:    147'F
    2:     55'F
    3:    120'F
    4:    110'F
```


Edit Parameters

At Runtime tap **MENU**   Repeat **MENU**, **MENU**, To `Edit Limits`, `Edit Times`,

Return to Runtime

`Edit Limits`   or while in Edit tap **MENU** AND **RESET** simultaneously to access

`*SETUP*` group

`1 Low`

    `110`   To step through parameters in group use **STEP**

`To STEP BACK tap TEST`   To modify parameter values use **DOWN**, **UP**

                                 To step out of edit and back to runtime screen use **MENU**

Group 1 `Limits`
 `1 Low, 1 High, 2 Low, 2 High, 3 Low, 3 High, 4 Low, 4 High` Group
2 `Times`
 `1AlarmDelay, 2AlarmDelay, 3AlarmDelay, 4AlarmDelay, RelayDelay, Mute`
Special Group `*SETUP*`

`LMS IP1, LMS IP2, LMS IP3, LMS IP4,`	LMS IP 1.2.3.4
`ProtoNode1, ProtoNode2, ProtoNode3, ProtoNode4,`	ProtoNode IP 1.2.3.4
`Netmask1, Netmask2, Netmask3, Netmask4,`	Netmask 1.2.3.4
`Gateway1, Gateway2, Gateway3, Gateway4,`	Gateway 1.2.3.4

 `1 Offset, 2 Offset, 3 Offset, 4 Offset, # channels,`
 `1 Define, 2 Define, 3 Define, 4 Define,` 0:tenthC 1:wholeC 2:tenthF 3:wholeF
4:wholeRH
 `Relay Def,`   0:single unit relay 1:individual channel relays
 `DoorAlarm`   -1:AlarmOnContactClosed 0:NoAlarm 1:AlarmOnContactOpen

Low/High Alarm Setpoint Display At

Runtime tap **DOWN**

1 `AlarmLow 110'F AlarmHigh 160'F`

2 `AlarmLow  34'F AlarmHigh 130'F`

3 `AlarmLow 100'F AlarmHigh 130'F`

4 `AlarmLow 100'F AlarmHigh 130'F`

Min/Max Temperatures Display

At Runtime tap **UP**

1 `ActualMin 144'F ActualMax 152'F`

2 `ActualMin  52'F ActualMax  59'F`

3 `ActualMin 118'F ActualMax 124'F`

4 `ActualMin 107'F ActualMax 118'F`

Min/Max Reset *while viewing Min or Max

tap **RESET**

Min & Max
Reset
`RESET to confirm`
`STEP to cancel`

Relay Test

At Runtime tap **TEST**

Relay Test

Relay 15   * seconds counting down
`To Step, tap STEP`
`To Hold, hold STEP`

ALARM DELAY MODULE (RDU   Option)
INSTALLATION INSTRUCTIONS I

Description:

The Alarm Delay Module is designed to accept dry contact inputs, either Normally Open (N.O.) or Normally Closed (N.C.), and to delay the transmission of the contact change information to another device.

II Application:

The primary application is in alarm systems where it is desirable to insert a fixed time interval between the detection of an alarm condition and the transmission of the alarm information to monitoring systems, telephone dialers, external services, etc. Such delay is particularly important in areas where short power interruptions are frequent, or where transitory alarm conditions are likely to occur. The user can select a time period of delay that results in the minimum number of "false" (self-correcting) alarm transmissions while still providing the degree of safety required.

III Installation:

1. Remove the plastic case cover by removing the 2 Phillips screws from the back. Apply light pressure on the face plate, the cover and face plate will come off together.
2. Locate the **ALARM INPUT** switch on the circuit board. Move the switch to the condition of the contacts in the alarm sending device **when in the NON-ALARM condition**. The unit is shipped with the switch in the N.O. (Normally Open) position, this will be correct for the majority of installations, however, if your alarm device opens its contacts when it alarms, simply slide the switch to the N.C. position.
3. Locate the row of pins on the short edge of the board labeled "minutes". A shorting clip will be at the 8 minute position. In this position the alarm delay module will require 8 minutes of CONTINUOUS incoming alarm indication before sending the alarm status on to the next system. Move the jumper to the set of pins marked either 0.5, 1, 2, 4, 8, 16, or 32 minutes, as your needs require. The pair of pins marked "T" are for test purposes and should not be used.
4. Install the signal wires from your alarm. Route the wires through the drilled hole at the bottom of the case and to the terminals marked 1 & 2.
5. Install the output wires to your output device, route the wires through the drilled hole at the bottom of the case and to the terminals marked 4 & 5 if it requires contact closure for operation or to terminals 3 & 4 if it requires contact opening for operation.
6. Install a 9 volt **rechargeable battery** in the holder provided if you desire the battery backup function AND you have the 120 Volt adapter. If you do not have the 120 Volt adapter you may use any 9Volt battery, we recommend Alkaline.
7. Check the system for proper operation and reassemble.

8. Using the peel-and-stick Velcro provided, mount the RDU where the LED indicators can be easily seen.

IV   Operation

When the unit is monitoring there are no LEDs lit, pressing RESET will light the green LED to indicate OK.

•   A flashing yellow light indicates that an alarm condition is being timed. • A flashing red light means that an alarm condition has persisted for the set time and has been transmitted to the monitoring device, this LED will continue to flash even if the alarm condition has corrected itself.

•   Pressing **RESET** will cause the red LED to stop flashing and reset the output contacts to their normal non-alarm state, if the alarm condition persists the yellow LED will again flash to indicate timing and, after timing out, will light the red LED and change the output contacts.

NOTE It is important that the battery condition be checked regularly by pressing **RESET**. A dead battery may prevent proper operation of the Alarm Delay Module.
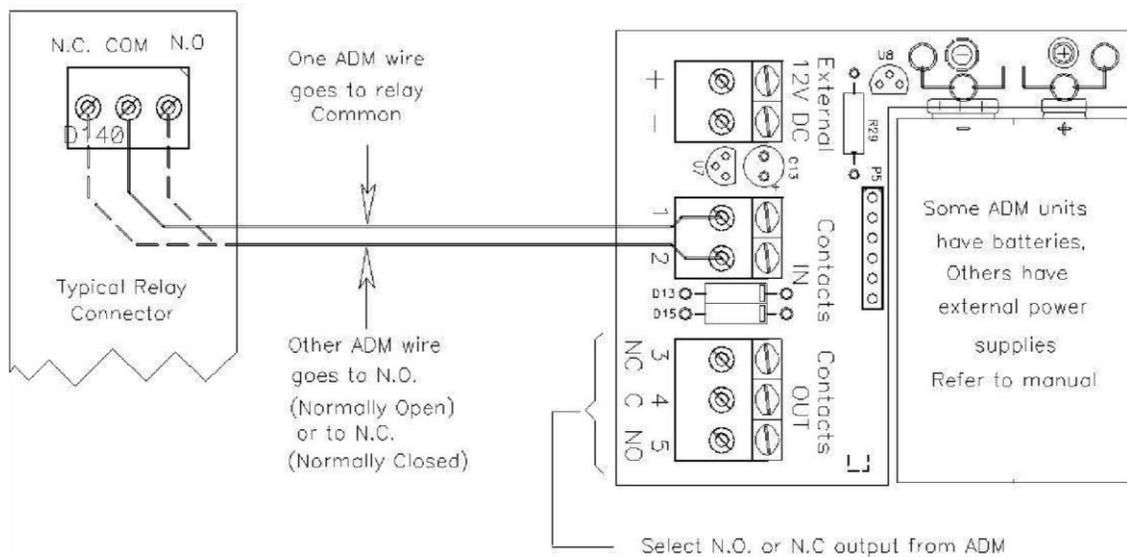
This is the hookup from a relay (contact) output of an LMS-188-4P-BMS, or other device, to the RDU.

Use the slide switch on the main board to choose N.O. or N.C. input.

On the output side, the RDU offers Normally Open (4, 5) or Normally Closed (3, 4) contacts, and may be connected to a dialer, beeper, strobe light, etc.

SOLENOID CONTROL OPTION PROVIDED BY
LEONARD VALVE

Description:

The Solenoid Control Option (SCO) is designed to accept dry contact inputs, either Normally Open (N.O.) or Normally Closed (N.C.), in order to switch an AC powered solenoid opened or closed. **Solenoid valve and associated power supply are to be provided by others.**
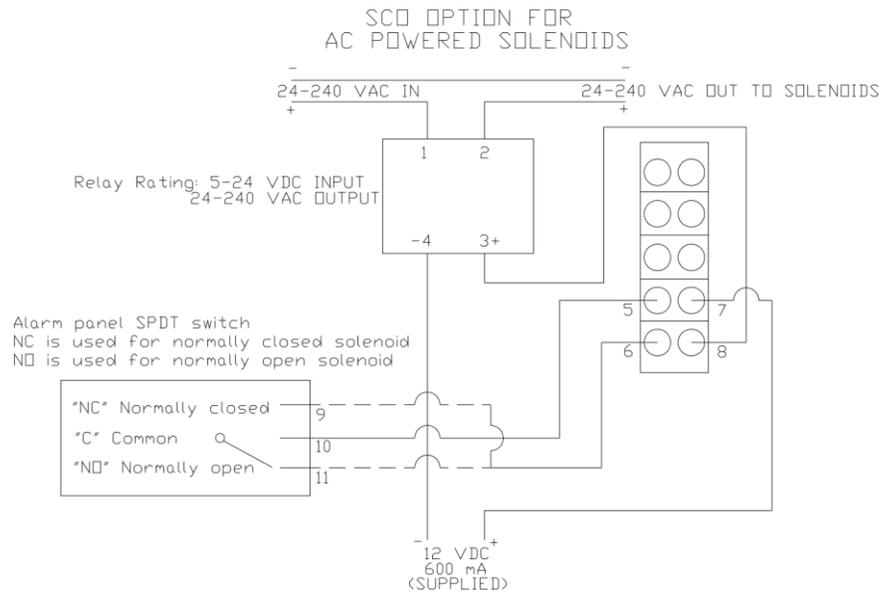
Application:

The primary application is in systems where it is desirable to control an AC powered solenoid in the event that the alarm on the LMS-188-4P-BMS is active. When in non-alarm condition the relay is in a N.O. state and the solenoid will allow water to flow through it freely. Once the alarm is active, the relay on the LMS-188-4P-BMS will switch to N.C. and the solenoid will shut down. **Solenoid valve and associated power supply are to be provided by others.**

Installation:

Included with every SCO is a 12 VDC/600 mA power source with a 10' lead that requires a dedicated 110 VAC outlet to plug into. See wiring diagram below for reference. Do Not Energize SCO, LMS-188-4P-BMS, or solenoid valve until wiring is complete. **Solenoid valve and associated power supply are to be provided by others.**

1. Connections from the power source to the SCO (+ side to terminal **7**), terminal to solid state relay (terminals **3+ to 8**), and power source to solid state relay (- side to terminal **4-**) have been made at the factory.
2. Properly ground the SCO by using the screw provided inside of the enclosure and connect to suitable earth ground
3. Connect terminal **5** (12VDC) to the **COMMON 'C'** terminal (**9**) of the LMS-188-4P-BMS relay switch.
4. Connect either terminal **9 or 11** from the LMS-188-4P-BMS relay switch to terminal **6** on the terminal strip. Use terminal **9** with N.C. solenoids; use terminal **11** with N.O. solenoids.
5. Connect the positive side of the solenoid power supply to terminal **1** on the solid state relay.
6. Connect terminal **2** on the sold state relay to the positive side of the solenoid valve. Complete the circuit by connecting the neutral side of solenoid to the neutral side of power supply.

```
                        SCO OPTION FOR
                     AC POWERED SOLENOIDS
                    ‒                        ‒
          24-240 VAC IN            24-240 VAC OUT TO SOLENOIDS
                    +                        +

                        ┌─────────────┐
                        │  1     2    │      ○ ○
   Relay Rating: 5-24 VDC INPUT       │      ○ ○
             24-240 VAC OUTPUT        │      ○ ○
                        │ -4    3+    │    5 ○ ○ 7
                        └─────────────┘    6 ○ ○ 8

   Alarm panel SPDT switch
   NC is used for normally closed solenoid
   NO is used for normally open solenoid

   ┌─────────────────────────────┐
   │ "NC" Normally closed  ─┐ 9  │
   │                        │     │
   │ "C" Common      ○──────┼ 10  │
   │                        │     │
   │ "NO" Normally open ─┘  11  │
   └─────────────────────────────┘

                        ‒  12 VDC  +
                          600 mA
                        (SUPPLIED)
```

DC POWERED SOLENOID CONTROL
HARDWARE SUPPLIED BY OTHERS

Description:
This solution is for systems that utilize a DC powered solenoid valve and want to make use of the SPDT relay switch included with LMS-188-4P-BMS. **Solenoid valve and associated power supply are to be provided by others.**

Application:
The primary application is in systems where it is desirable to control a DC powered solenoid in the event that the alarm on the LMS-188-4P-BMS is active. When in non-alarm condition the relay is in a N.O. state and the solenoid will allow water to flow through it freely. Once the alarm is active, the relay on the LMS-188-4P-BMS will switch to N.C. and the solenoid will shut down. **Solenoid valve and associated power supply are to be provided by others.**

Installation:
Solenoid power supply is to be supplied by others and is not available from Leonard Valve. The relay contacts are rated up to 30 V/1A. See wiring diagram below for reference. Do Not Energize LMS-188-4P-BMS or solenoid valve until wiring is complete. **Solenoid valve and associated power supply are to be provided by others.**

1.   Connect positive side of power supply to the **COMMON** terminal (**2**).
2.   Connect either terminal **1 or 3** from LMS-188-4P-BMS relay switch to positive side of DC solenoid. Use terminal **1** with N.C. solenoids; use terminal **3** with N.O. solenoids.
3.   Connect neutral side of power supply directly to neutral side of DC solenoid.

DC POWERED SOLENOIDS
SUPPLIED BY OTHERS

Alarm panel SPDT switch
NC is used for normally closed solenoid
NO is used for normally open solenoid

"NC" Normally closed 1
"C" Common   2
"NO" Normally open   3

−
12-24 VDC OUT TO SOLENOID
+

−   +
12-24 VDC
1A MAX
POWER SUPPLY BY OTHERS