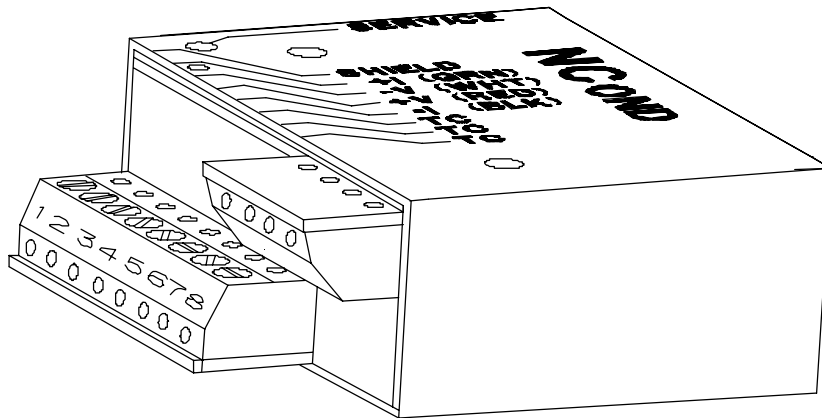


**LAKWOOD INSTRUMENTS**

**CONDUCTIVITY NODE (NCON)**  
**COND NODE KIT (NCKT)**

**INSTALLATION & OPERATION MANUAL**

SERIAL #: \_\_\_\_\_



**Lakewood Instruments**

*7838 North Faulkner Road, Milwaukee, Wisconsin 53224 USA*  
*Phone (800) 228-0839 • Fax (414) 355-3508*  
*<http://www.lakewoodinstruments.com>*



## Lakewood Instruments

We thank you for your selection and purchase of a Lakewood Instruments product.

With proper care and maintenance, this device should give you many years of trouble-free service. Please take the time to read and understand this Installation and Operation Manual, paying special attention to the sections on **OPERATION** and **MAINTENANCE**.

If, in the future, any parts or repairs are required, we strongly recommend that only original replacement parts be used. Our Customer Service Department is happy to assist you with your parts or service requests.

 **Lakewood Instruments Customer Service and Technical Support Departments can be reached by calling (800) 228-0839 or faxing (414) 355-3508, Monday through Friday, 7:30 a.m. - 5:00 p.m. CST.**

 **Mail should be sent to:**

**Lakewood Instruments  
7838 North Faulkner Road  
Milwaukee, WI 53224 USA**



# CONDUCTIVITY NODE (NCON) COND NODE KIT (NCKT)

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## Table of Contents

<b>INTRODUCTION</b>	<b>7</b>
Introduction	7
Specifications	8
<b>INSTALLATION</b>	<b>9</b>
Checking	9
Connections	9
Service Light	9
Operation with 2000 Series Controllers	10
<b>CONFIGURATION</b>	<b>12</b>
Sensor Configuration Chart	12
Configuration of Node with Sensors	12
<b>MAINTENANCE AND TECHNICAL SERVICE</b>	<b>14</b>
Technical Service	14
Service Guide	14
<b>DRAWINGS</b>	<b>15</b>



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## INTRODUCTION

### **NCON**

The Model NCON Conductivity Node is a LONWORKS®-compatible node that uses twisted pair communications. The NCON works with several different temperature compensation inputs and with two- or four-electrode sensors. These multiple-sensor input options allow for various conductivity sensors to be used. Temperature compensation is adjustable by percent per degrees Celsius for use with various processes. The NCON's ability to cover a wide range in conductivity is due to its advanced auto-ranging circuitry. The NCON's four-electrode circuitry allows for compensation when fouling occurs on sensor electrodes. When sensor fouling can no longer be corrected, the NCON sends a fouled electrode alarm.

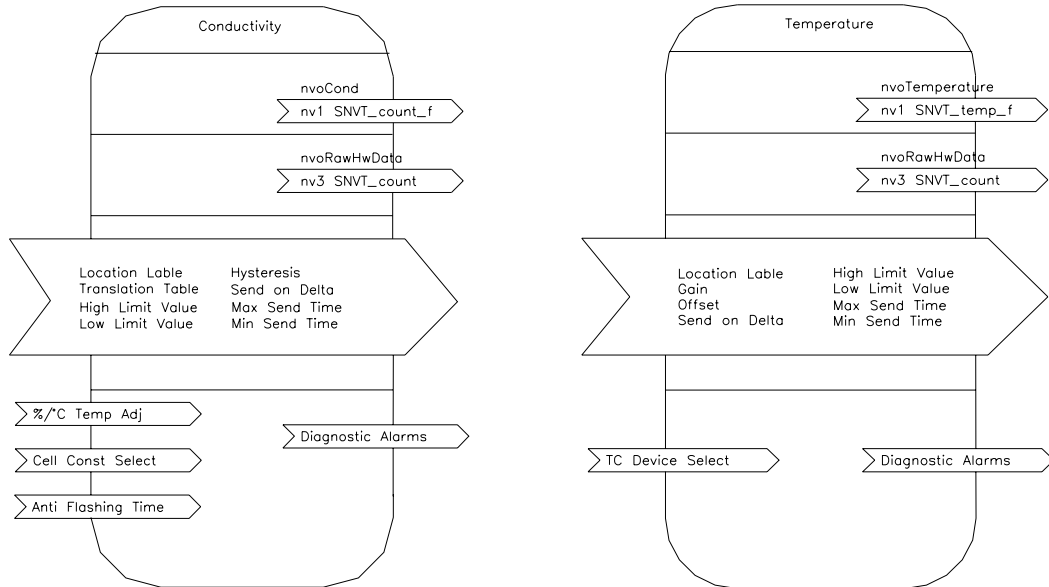
The NCON can be used with the Lakewood Model 2000 Series controllers. On cooling towers it can be used for chill loop monitoring and control as well as on the makeup line for multi-setpoint or cycles of concentration control on the cooling tower.

### **NCKT**

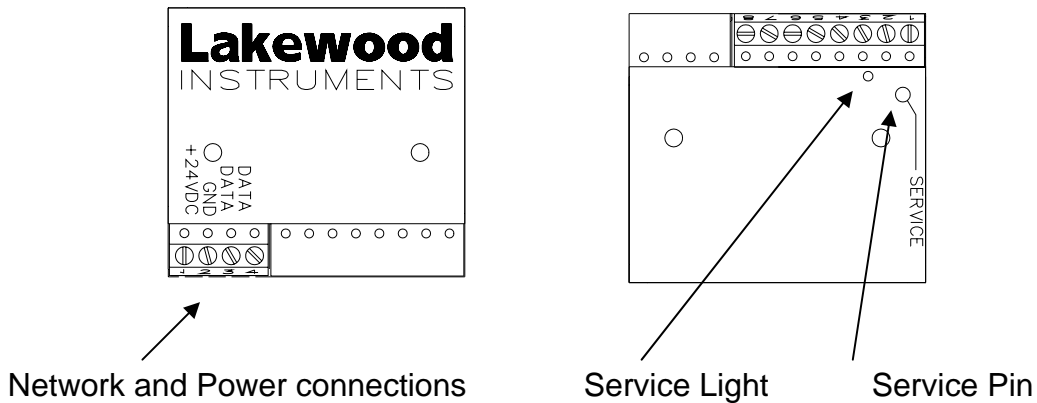
The NCKT is a pre packaged option that includes the NCON, NEMA 4X enclosure, sensor tee, and a 4 electrode conductivity sensor. Its primary application is in cooling towers but may be used in other applications. The sensor can cover a range of 0-10,000 $\mu$ S and is rated 100°F @ 140 psi.

LONWORKS is a registered trademark of Echelon Corporation.

# Specifications



**Conductivity Range**                    0-1,000,000  $\mu$ S (with proper conductivity sensor)  
**Temperature**  
**Compensation Inputs**            None            100 PTC  
    500 NTC        1K PTC  
    4K NTC        3K PTC  
    10K NTC      10K PTC  
    Compensation is adjustable by % per  $^{\circ}$ C  
  
**Power**                                        24 VDC





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# INSTALLATION

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## Checking

Inspect the shipping carton for obvious external damage. Note on the carrier's bill-of-lading the extent of the damage, if any, and notify the carrier. Save the shipping carton until your Node is started up.

**📞 If shipping damage has occurred, call the Lakewood Instruments Customer Service Department at (800) 228-0839 and return the controller to the factory in the original carton.**

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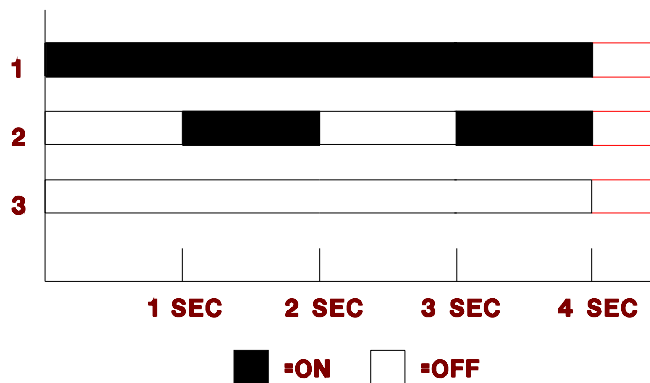
## Connections

The NIN option is required on the 2000 series controller for the NCON to operate. The NIN option provides power and two way communications to the NCON. Refer to the drawings in the back of this manual for wiring details.

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## Service Light

The service light is used for installation of the node and for troubleshooting. Below is a chart of what the service light might indicate during operation.



Behavior	Description	Resolution
1	Bad Node	Replace Node
2	Node is unconfigured,	Install Node
3	Node is running normally	none
3	Node does not have power	Check power supply

Light will also be on while the service button is pressed.

## Operation with 2000 Series Controllers

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Before it can be used, the NCON must be installed into the software of the controller.

Under the **Main Menu**,

MAIN MENU	
=====	
3	FEED SCHEDULE
4	ALARMS
5	WATER METERS
6	4-20 MA OUTPUTS
<b>7</b>	<b>SYSTEM SETUP</b>
8	CLOCK

highlight **SYSTEM SETUP**, then press **ENT**. You should see the following screen:

SYSTEM SETUP	
=====	
1	PROCESS PARAMETERS
2	INITIALIZATION
3	DIGITAL INPUTS
4	FIRMWARE VERSIONS
5	SECURITY
6	DIAGNOSTICS
7	COMMUNICATIONS
<b>8</b>	<b>NODE INSTALLATION</b>

Highlight **NODE INSTALLATION**, then press **ENT**. You should see the following screen:

NODE INSTALLATION	
=====	
<b>1</b>	<b>INSTALL A NEW NODE</b>
2	DE-INSTALL A NODE

Highlight **INSTALL A NEW NODE**, then press **ENT**. You should see the following screen:

```
INSTALL A NEW NODE
=====
1 RELAYS 5-8
2 RELAYS 9-12
3 MAKEUP COND
4 REMOTE SENSOR
5 REMOTE SENSOR
6 REMOTE SENSOR
7 REMOTE SENSOR
8 ANOLOG INPUTS (4)
9 ANOLOG INPUTS (4)
10 DIGITAL INPUTS (4)
11 DIGITAL INPUTS (4)
```

Select which node to install.

**NOTE: YOU MUST ASSIGN YOUR NCON TO MAKEUP COND OR REMOTE SENSOR.**

The following screen should appear:

```
PRESS SERVICE PIN

PRESS ANY KEY
```

Momentarily press the Service Pin on the node to be installed. The Service Light should turn on while the Service Pin is pressed. After the Service pin is released press any key on the key pad and the node will be installed.

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## CONFIGURATION

### Sensor Configuration Chart

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Sensor	Cell Constant	Temp Comp.
SR	.1	NONE
2 Elec Cooling	1	500 NTC
4 Elec Cooling	.38	500 NTC
540K.1-500	.1	500 NTC
540K.1-1000	.1	1K PTC
540K.01-500	.01	500 NTC
540K.01-1000	.01	1K PTC
543H	.5	4K NTC
543M	.38	4K NTC
543L	.1	4K NTC
543LL	.1	1K PTC

If you are not familiar with Damping or Percent/°C the values should be left at .5 and 2%/°C respectively.

### Configuration of Node with Sensors

---

For the NCON to work properly with different sensors it must be configured properly.

Under the **Main Menu**,

MAIN MENU	
=====	
3	BIO SCHEDULE
4	ALARMS
5	WATER METERS
6	4-20 MA OUTPUTS
7	<b>SYSTEM SETUP</b>
8	CLOCK

highlight **SYSTEM SETUP**, then press **ENT**. You should see the following screen:

SYSTEM SETUP =====
1 PROCESS PARAMETERS
2 INITIALIZATION
3 DIGITAL INPUTS
4 FIRMWARE VERSIONS
5 SECURITY
6 DIAGNOSTICS
7 COMMUNICATIONS
8 <b>NODE INSTALLATION</b>

Highlight **PROCESS PARAMETERS**, then press **ENT**. You should see the following screen:

WHICH PROCESS =====
1 pH
2 COND
3 MCON
4 REMOTE SENSOR
5 REMOTE SENSOR

Select which node to set up. pH and COND are not nodes. Highlight the appropriate node and press **ENT**. You should see the following screen:

MCON =====
1 CHANGE MY NAME
2 TEMP COMPENSATION
3 CELL CONSTANT
4 PERCENT PER °C

See the Sensor Configuration Chart on the previous page to configure selections 2-4 above.

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## Maintenance and Technical Service

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### Technical Service

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-  Technical Support for Lakewood Instruments can be reached by calling (800) 228-0839 or faxing (414) 355-3508, Monday through Friday, 7:30 a.m. – 5.00 p.m. CST.

***NOTE: IF YOU CALL FOR TROUBLESHOOTING HELP, PLEASE HAVE THE MODEL NUMBER, SERIAL NUMBER, AND ANY OPTIONS PERTAINING TO YOUR UNIT AVAILABLE FOR REFERENCE.***

-  Mail and returns should be sent to:

**Lakewood Instruments  
7838 North Faulkner Road  
Milwaukee, WI 53224 USA**

When any merchandise is to be returned to the factory, please call and obtain a Return Goods Authorization (RGA) number and have the following information available:

- Customer's name, address, telephone and fax numbers (shipping and billing).
- A hard copy purchase order number for cases where repairs or parts are required that are not under warranty.
- A contact person's name and telephone number to call if the equipment is beyond repair or to discuss any other warranty matter.
- Equipment model and serial numbers.
- Reason for return, e.g., repair, warranty, incorrect part, etc.

We will then fax to your attention an RGA form that must accompany the returned item.

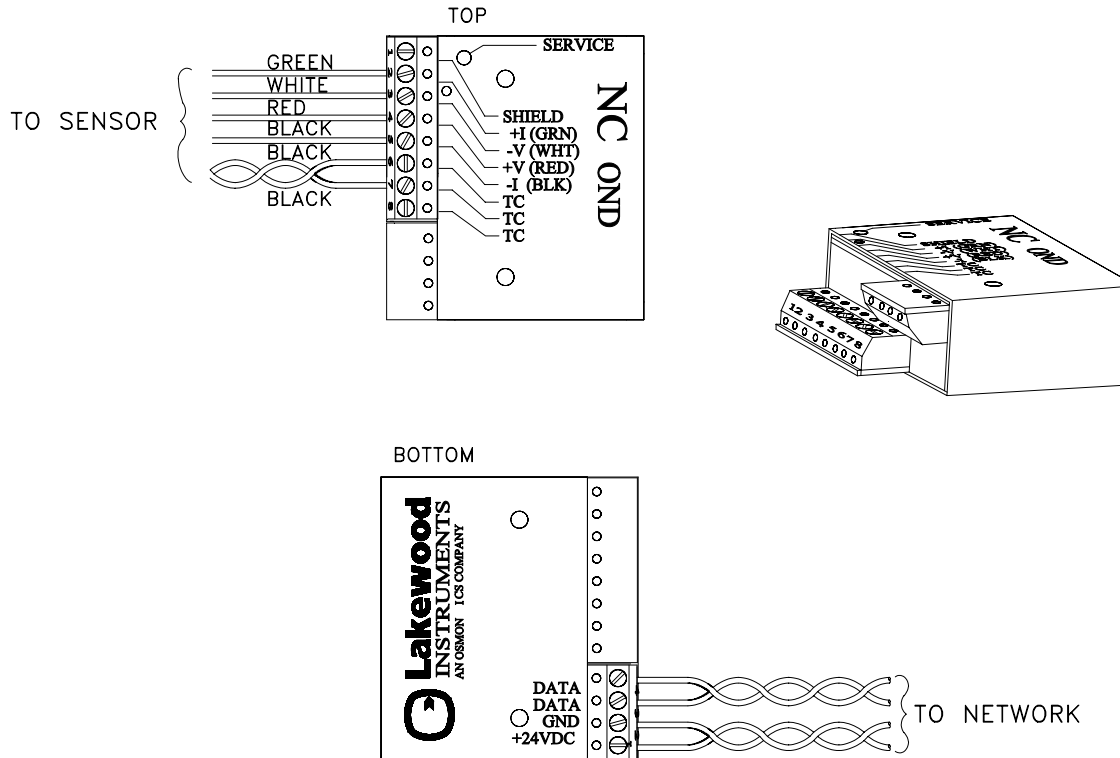
***NOTE: THE RGA NUMBER MUST BE CLEARLY WRITTEN ON THE OUTSIDE OF THE PACKAGE(S) BEING RETURNED.***

**ANY ITEMS SENT BACK TO THE FACTORY  
WITHOUT AN RGA NUMBER WILL BE REFUSED  
AND RETURNED TO SENDER**

NOTES: UNLESS OTHERWISE SPECIFIED;

1. DATA TWISTED PAIR SPECIFICATIONS:  
 BELDON 85102, SINGLE TWISTED PAIR, STRANDED 9/29, UNSHIELDED, PLENUM.  
 BELDON 8471, SINGLE TWISTED PAIR, STRANDED 9/29, UNSHIELDED, NONPLENUM.  
 JY ØST) Y 2 X 2 X .8, UL LEVEL IV 22 AWG, TWISTED PAIR, TYPICALLY SOLID AND UNSHIELDED.  
 FOUR WIRE HELICAL TWIST, SOLID, SHIELDED.
2. IF SHIELDED CABLE IS USED, THE SHIELD SHOULD BE CONNECTED TO EARTH  
 GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT  
 STATIC CHARGE BUILD-UP.
3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVALS
A	ECO 0406	MLM 10/95	
B	ECO 0667	MLM 8/96	

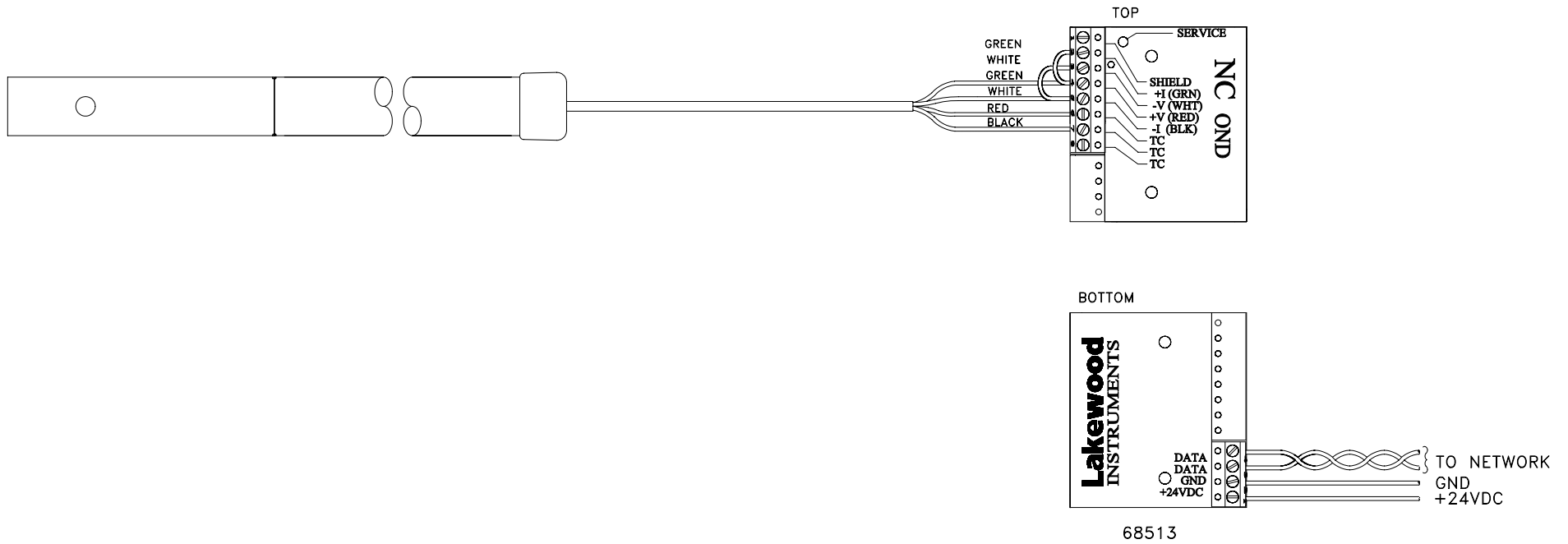


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: DECIMALS ±.XX = .010 ±.XXX = .005	REFERENCE NUMBER		 DRAWING - DETAIL CONDNODE	
	APPROVALS	DATE		
MATERIALS:	DESIGNER		DRAWING NO. 1168513-2b	REV B
	DRAWN ML MCBRIDE	CHECKED 9/28/95		
FINISH:	ENGINEER		MODEL NO. 2000	SHEET 1 OF 1
	DO NOT SCALE DRAWING			

NOTES: UNLESS OTHERWISE SPECIFIED;

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3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.

REVISIONS				
REV	ECO NUMBER	CHANGED BY	DATE	APPROVALS
A	ECO 0667	MLM	8/96	

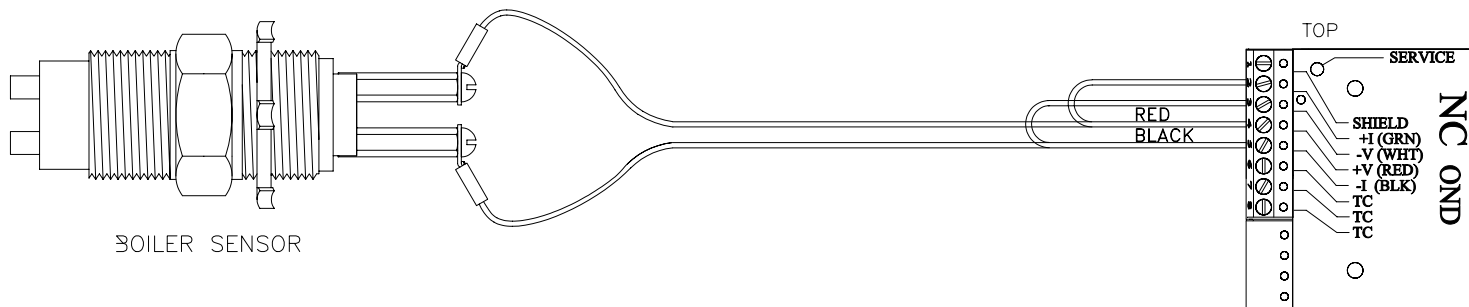


NOTICE ON REPRODUCTIONS  
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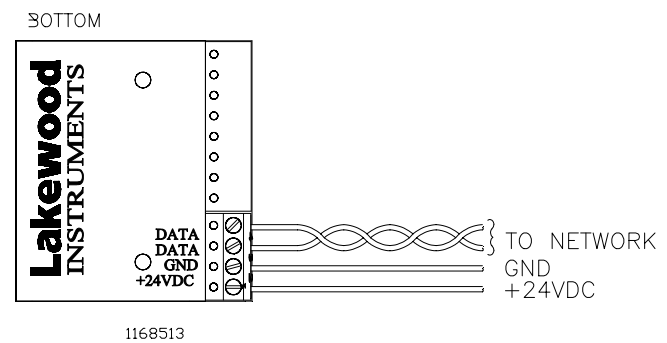
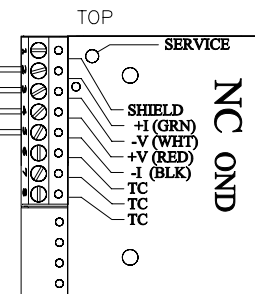
<small>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE:</small> .XX = ± .010 .XXX = ± .005	REFERENCE NUMBER <b>68513</b>				
	APPROVALS	DATE			DIAGRAM, WIRING NODE, CONDUCTIVITY 2 ELECTRODE SENSOR
MATERIALS:	DESIGNER <b>ML MCBRIDE</b>	DATE <b>8/96</b>	SIZE <b>B</b>	DRAWING NUMBER <b>1168513_6a</b>	
FINISH:	ENGINEER	DO NOT SCALE DRAWING	MODEL NO. <b>540</b>	SHEET 1 OF 1	



REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	0667	MLM	8/96	
B	REVISED	1073	EV	8/96	
C	CHANGED CABLE TO 2 WIRE	10127	PSG	5/4/11	



BOILER SENSOR



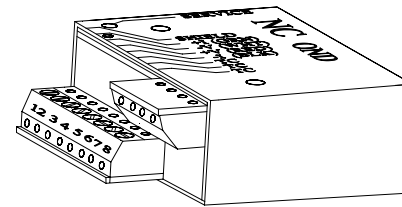
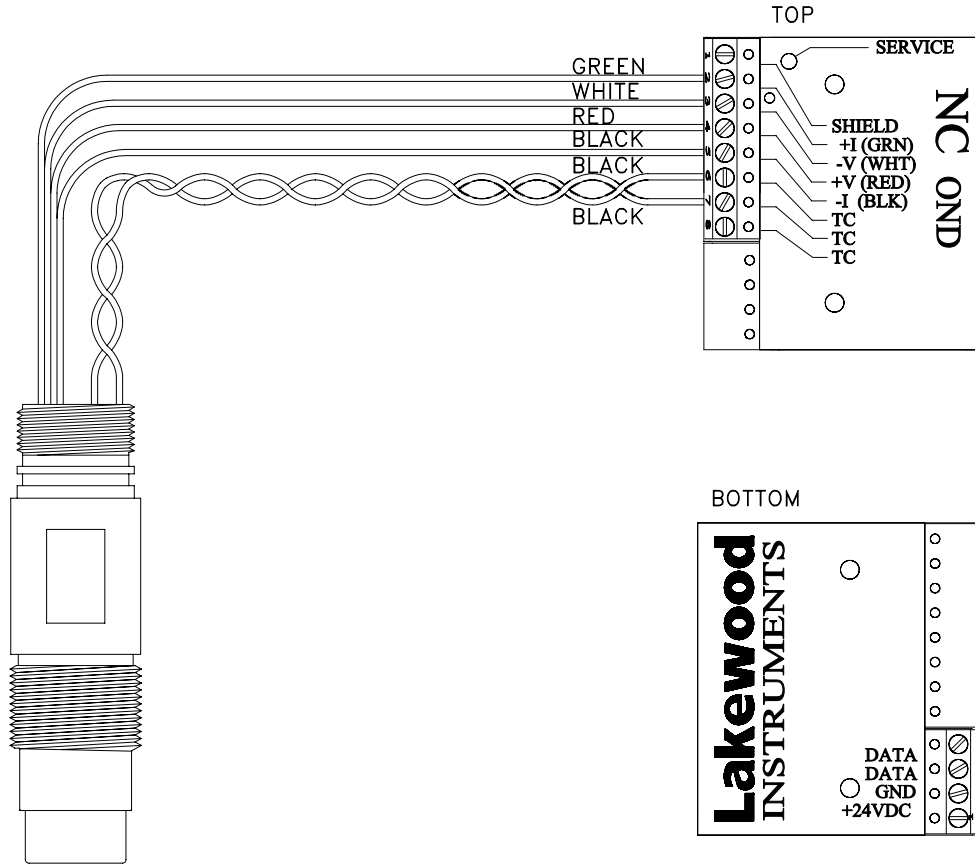
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  2. IF SHIELDED CABLE IS USED, THE SHIELD SHOULD BE CONNECTED TO EARTH GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT STATIC CHARGE BUILD-UP.
  3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.
  4. JUMPER 2-4 AND 3-5 WITH 22 AWG WIRE

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<p>TOLERANCES UNLESS NOTED</p> <p>FRAC DECIMALS ANGLES</p> <p>.X ± .1</p> <p>.XX ± .05</p> <p>±1/16 .XXX ± .010 ±.5°</p>						<p>TITLE</p> <p>WIRING DIAGRAM</p> <p>NODE, COND, BOILER SENSOR</p>						
MATERIAL	FRAC	DECIMALS	ANGLES	ORDER NO.	DWN	MLM	DATE	8/96	SIZE	<p>THIRD ANGLE</p>	DWG NO/PN	REV
FINISH	ORDER NO.	DWN	MLM	DATE	8/96	SIZE	B	1168513_4c	C			
ORDER NO.	DWN	MLM	DATE	8/96	SCALE	1/1		FILE TYPE	.DWG		SHEET 1 OF 1	
CUSTOMER	CHKD	DATE	CUSTOMER LOC.	APVD	DATE	DO NOT SCALE		APVD	DATE	<p>P/N 61676 REV-A PG-1/2</p>		

NOTES: UNLESS OTHERWISE SPECIFIED;

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- MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVALS
A	ECO 0234	MLM 10/95	



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: DECIMALS ±.XX = .010 ±.XXX = .005 MATERIALS: FINISH:	REFERENCE NUMBER					
	APPROVALS	DATE			DRAWING -- DETAIL WIRING, CONDNODE AND CONDUCTIVITY SENSOR	
	DESIGNER		SIZE	DRAWING NO.		REV
	DRAWN	ML MCBRIDE	9/28/95	A		1168513-3a
	CHECKED		MODEL NO. 2000-543		SHEET 1 OF 1	
	ENGINEER					
DO NOT SCALE DRAWING						



**For more information call toll free in the USA (800) 228-0839**

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**Manufactured in the USA**

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