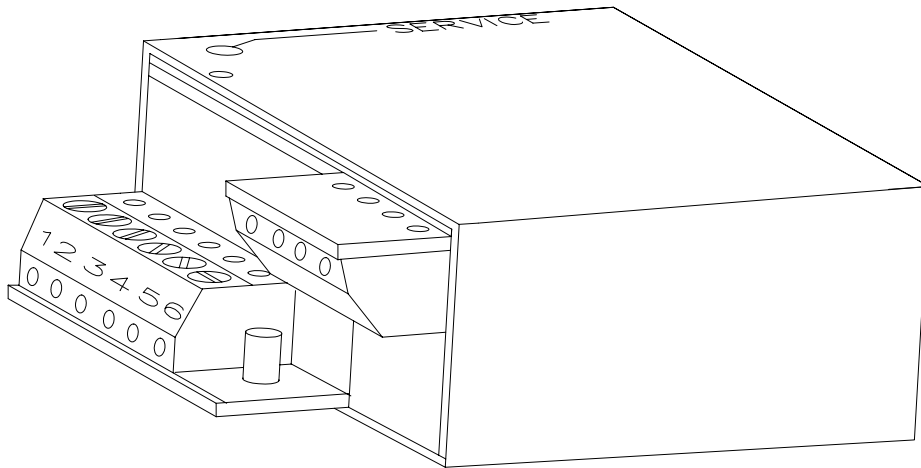


LAKWOOD INSTRUMENTS

pH AND ORP NODE (NpH)

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**

pH AND ORP NODE (NPH)

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NPH

The Model NPH pH and ORP Node is a LONWORKS[®]-compatible node that uses twisted pair communications. The NPH works with several different temperature compensation inputs and with pH or ORP sensors. These multiple-sensor input options allow for various sensors to be used. Temperature compensation is adjustable by pH per Celsius for use with various processes. Up to four NpH nodes may be installed on the 2000 series controller.

<p>NOTE: To use the NpH with a 2000 series controller it must have the NIN option and contain Rel 98 Firmware. All controllers shipped after 1 June 98 will have Rel 98 firmware.</p>
--

Relay configuration and datalogging

After a NpH is installed, not only will you be able to view additional inputs you will also be able to datalog information and control relays based on the external device.

LONWORKS is a registered trademark of Echelon Corporation.

Specifications

Sensor Connections

BNC Sensor BNC

Pin 1 none

Pin 2 none

Pin 3 Reference

Pin 4 none

Pin 5 Solution Ground and Temperature Compensator

Pin 6 Temperature Compensator

Range

pH Range 0-14 (with proper pH sensor)

ORP Range -2000 to +2000 (with proper ORP sensor)

Temperature

Compensation Inputs None 100 PTC

500 NTC 1K PTC

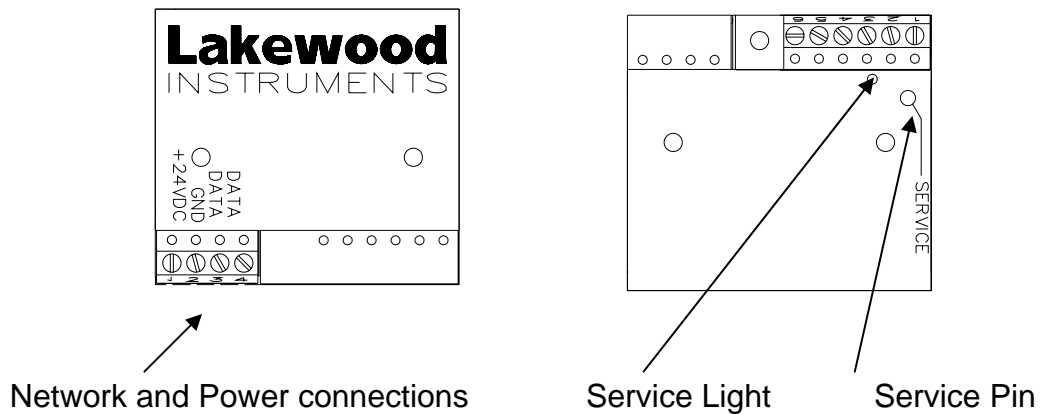
4K NTC 3K PTC

10K NTC 10K PTC

Compensation is adjustable by pH per °C (pH only)

Power

24 VDC



INSTALLATION

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.

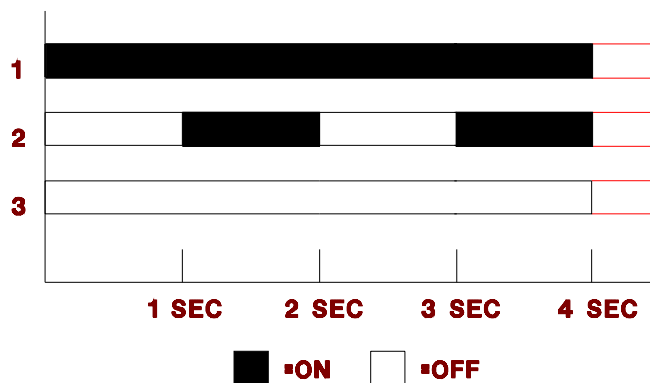
☎ If shipping damage has occurred, call the Lakewood Instruments Customer Service Department at (800) 228-0839 and return the controller to the factory in the original carton.

Connections

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

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 un-configured,	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

Before it can be used, the NPH 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
7 SYSTEM SETUP
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 NODE INSTALLATION
```

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

```
NODE INSTALLATION
=====
1 INSTALL A NEW NODE
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)
```

NOTE: YOU MUST ASSIGN YOUR NPH TO REMOTE SENSOR. THEN YOU MAY SELECT PH OR ORP (DEPENDING ON SENSOR BEING USED).

Select which node to install.

```
WHICH PROCESS?
=====
1 CONDUCTIVITY
2 pH
3 ORP
```

The following screen should appear:

```
PRESS SERVICE PIN

PRESS ANY KEY
```

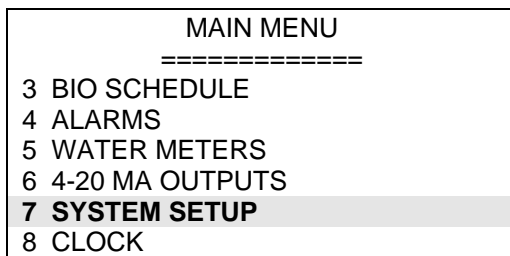
Momentarily press the Service Pin on the node to be installed. The Service Light should turn on while the Service Pin is pressed. After the Service pin is released press any key on the key pad and the node will be installed.

CONFIGURATION

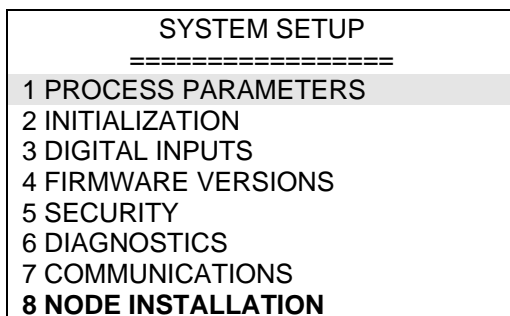
Configuration of Node with Sensors

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

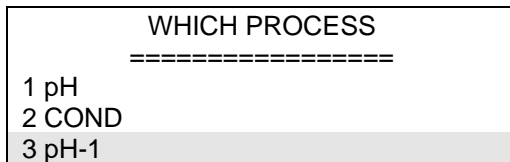
Under the **Main Menu**,



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



Highlight **PROCESS PARAMETERS**, then press **ENT**. You should see the following screen (screen will vary depending on which other nodes are installed):



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:

pH-1	
=====	
1	CHANGE MY NAME
2	TEMP COMPENSATION
3	pH PER °C
4	SENSOR SHEILD
5	DAMPING

See the Sensor Configuration Chart to configure selections 2-5 above.

Sensor	Sensor Shield	Temp Comp.
1167153 and 1167154	GND	NONE
1167155	REF	NONE
1169065	REF	NONE
520 Series	GND	10K PTC
521 Series	REF	Varies
530 Series	GND	10K PTC

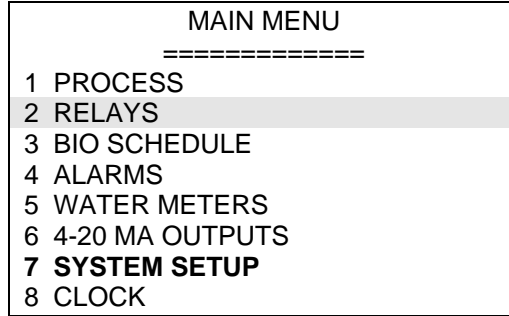
If you are not familiar with Damping or Percent/°C the values should be left at .5 sec for damping and 0.00 pH for pH per °C.

All other pH and ORP sensors not manufactured by Lakewood Instruments will use REF for SENSOR SHIELD. Temperature input will vary by manufacturer.

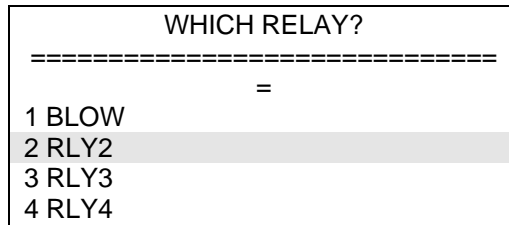
Configuration of Node with Relays

The N420I can be used to control relays in the 2000 series controller or the NRLY node.

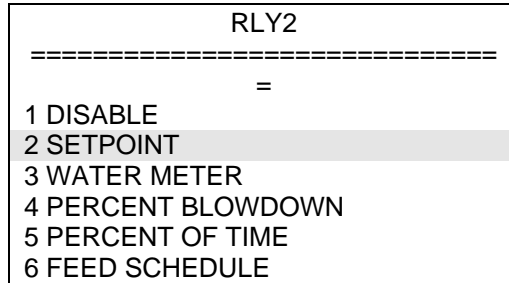
Under the **Main Menu**,



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



Highlight the appropriate relay , then press **ENT**. You should see the following screen:



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

WHICH PROCESS	
=====	
1	COND
2	pH-1

Highlight the appropriate Input , then press **ENT**. You should see the following screen:

SETPOINT	
=====	
1	SETPOINT VALUES
2	WHEN TO ACTIVATE

Highlight **SETPOINT VALUES**, then press **ENT**. You should see the following screen:

SETPOINT=
0.00 pH
DEADBAND
0.00 pH

Type in the appropriate setpoint and deadband for when the relay should be activated. Press **ENT** to save setpoint and deadband values.

SETPOINT	
=====	
1	SETPOINT VALUES
2	WHEN TO ACTIVATE

Highlight the appropriate **WHEN TO ACTIVATE** , then press **ENT**. You should see the following screen:

WHEN TO ACTIVATE	
=====	
1	*ABOVE SETPOINT
2	BELOW SETPOINT

This screen configures the relay to turn on above or below the setpoint. Press **1** or **2** to make selection. * indicates current selection.

Maintenance and Technical Service

Technical Service

-  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.

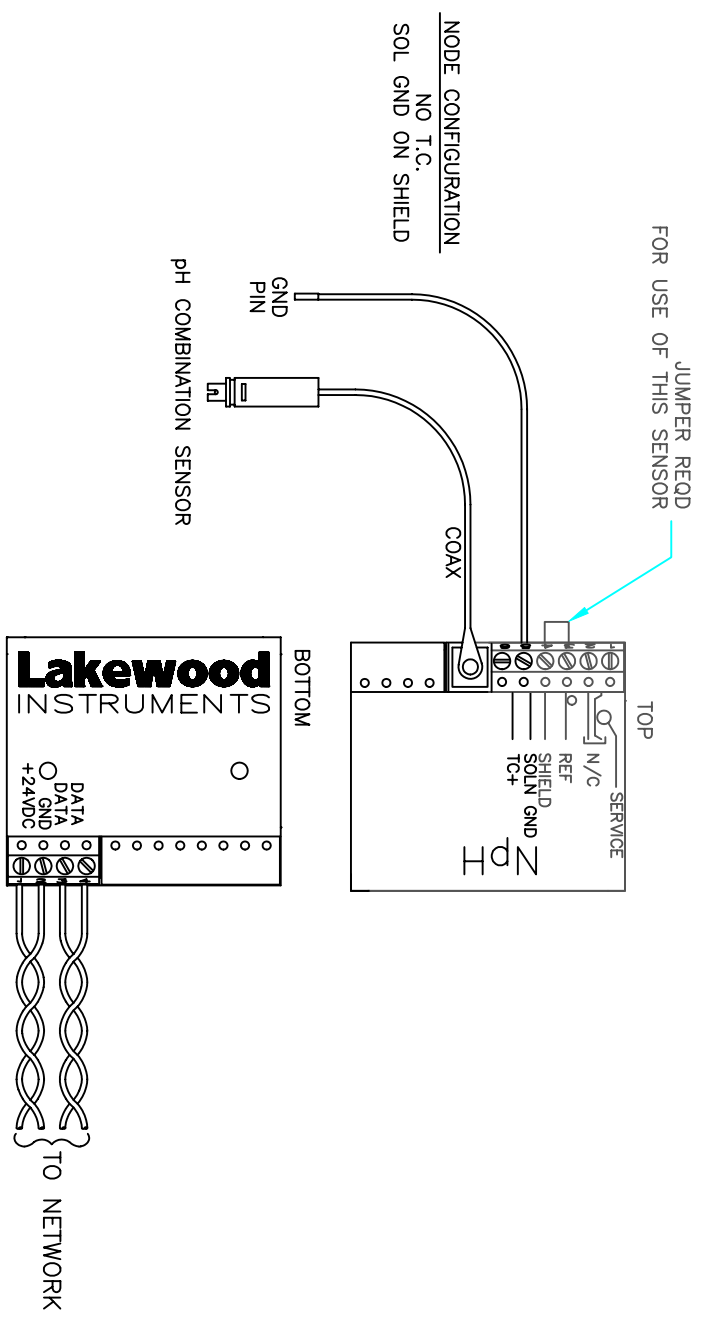
**ANY ITEMS SENT BACK TO THE FACTORY
WITHOUT AN RGA NUMBER WILL BE REFUSED
AND RETURNED TO SENDER**

Troubleshooting

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
Screen Displays "pH-1: LOW ALARM"	The pH input is below the low alarm setting.	Refer to Alarms under the Main Menu in the 2000 series controller.
Screen Displays "pH-1: HIGH ALARM"	The pH input device is above the high alarm setting.	Refer to Alarms under the Main Menu in the 2000 series controller.
Service light flashes	Node is not installed	Install the node.
Values do not change	NpH is not seeing a change in the sensor.	The sensor may not be properly connected or configured.
Relay does not activate when set up for set point.	There may be no flow to the controller or deadband to large	Restore flow to the controller Correct deadband if to large.
Screen Displays "pH-1: HIGH-REF IMPEDANCE"	pH or ORP sensor is not being properly read.	check wiring and configuration. pH sensor can be damaged if dried out.
Screen Displays "pH-1: HIGH-REF VOLTAGE"	pH or ORP sensor is not being properly read.	check wiring and configuration. pH sensor can be damaged if dried out.
Screen Displays "pH-1: OPEN TC"	Temperature sensor is not being properly read.	check wiring and configuration.
Screen Displays "pH-1: SHORTED TC"	Temperature sensor is not being properly read.	check wiring and configuration.

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 (ST) 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
 STATIC CHARGE BUILD-UP
 GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT
3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.



NODE CONFIGURATION
 NO T.C.
 SOL GND ON SHIELD

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
1	RELEASE	0975	EV	8/21/97	
2	ADD JUMPER AND NOTE		TJM	012400	

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OSMONICS
 PHOENIX OPERATIONS

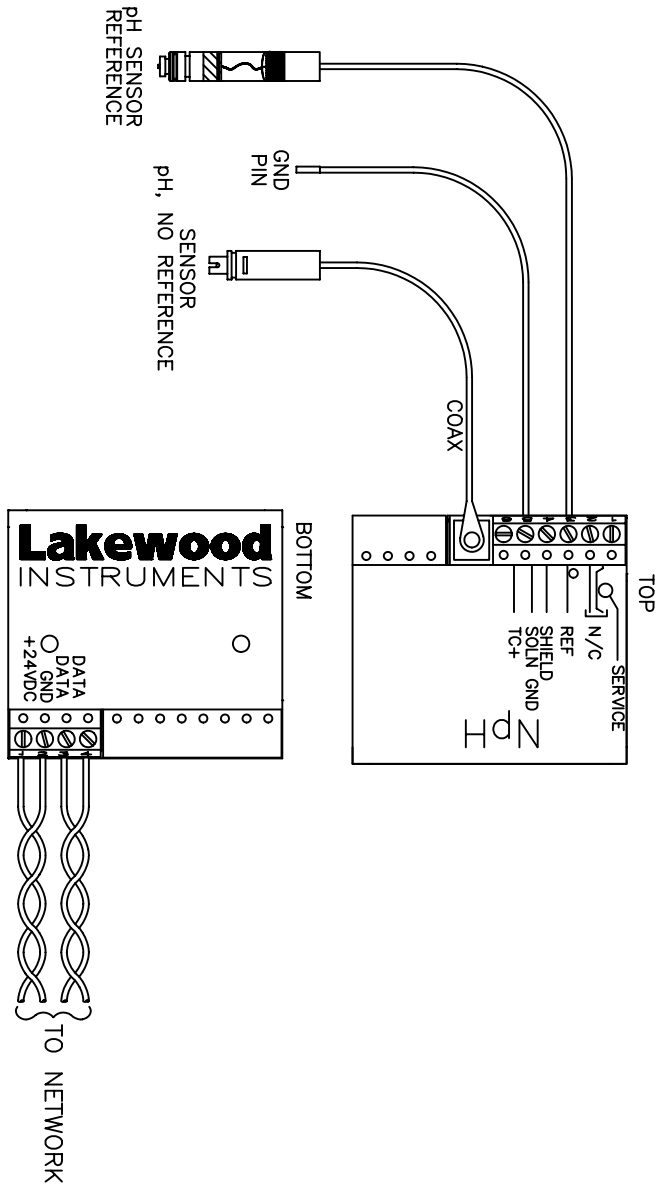
COMPONENT ASSEMBLY
 WIRING, NpH TO pH SENSOR

FINISH	FRAC DECIMALS	DECIMALS	NOTES	TITLE	SIZE	THIRD ANGLE	DWG NO/PN	FILE TYPE	DWG	SHEET 1 OF 1
	.X ± .1	.XX ± .03	EV	WIRING, NpH TO pH SENSOR	B		04599	DWG		1
ORDER NO.	DMN	EV	DATE 8/21/97	DATE	DATE	DATE	SCALE	NONE		
CUSTOMER	CHKD	APVD	APVD	DO NOT SCALE						

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 (S7) 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.

NODE CONFIGURATION
 NO T.C.
 SOL GND ON SHIELD



REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
1	RELEASE	0975	EV	8/21/97	

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FINISH	FRAC	DECIMALS	NOTES
		.X ± .1	
		.XX ± .03	
ORDER NO.	DIM	EV	DATE 8/21/97
CUSTOMER	CHKD		DATE
CUSTOMER LOC.	APVD		DATE
DO NOT SCALE	APVD		DATE

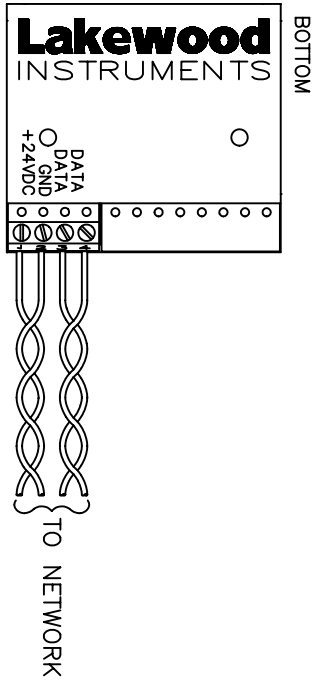
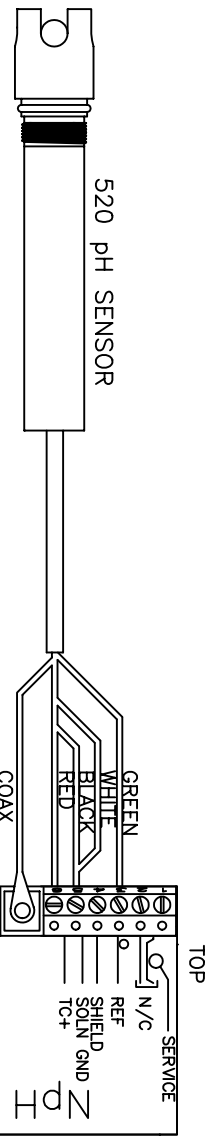


TITLE		COMPONENT ASSEMBLY	
WIRING, NpH TO pH SENSOR			
SIZE	B	DWG NO/PN	04598
SCALE	NONE	FILE TYPE	DWG
REV	1	SHEET 1 OF 1	

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 (ST) 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
 STATIC CHARGE BUILD-UP
 GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT
3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.

NODE CONFIGURATION
 TC 10KPTC
 SOL GND ON SHIELD



REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
1	RELEASE	0975	EV	7/31/97	

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FINISH	FRAC DECIMALS	ANGLES
	.XX ± .03	.X ± .1
ORDER NO.	DMV EV	DATE 7/31/97
CUSTOMER	CHKD	DATE
CUSTOMER LOC.	APVD	DATE
DO NOT SCALE	APVD	DATE

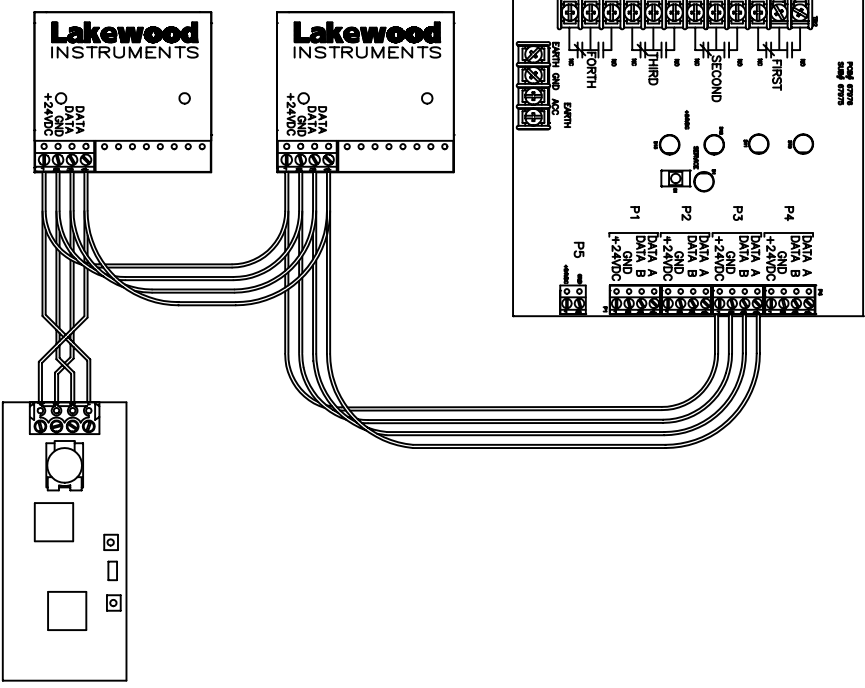
OSMONICS
 PHOENIX OPERATIONS

COMPONENT ASSEMBLY
 WIRING, NPH TO 520 pH SENSOR

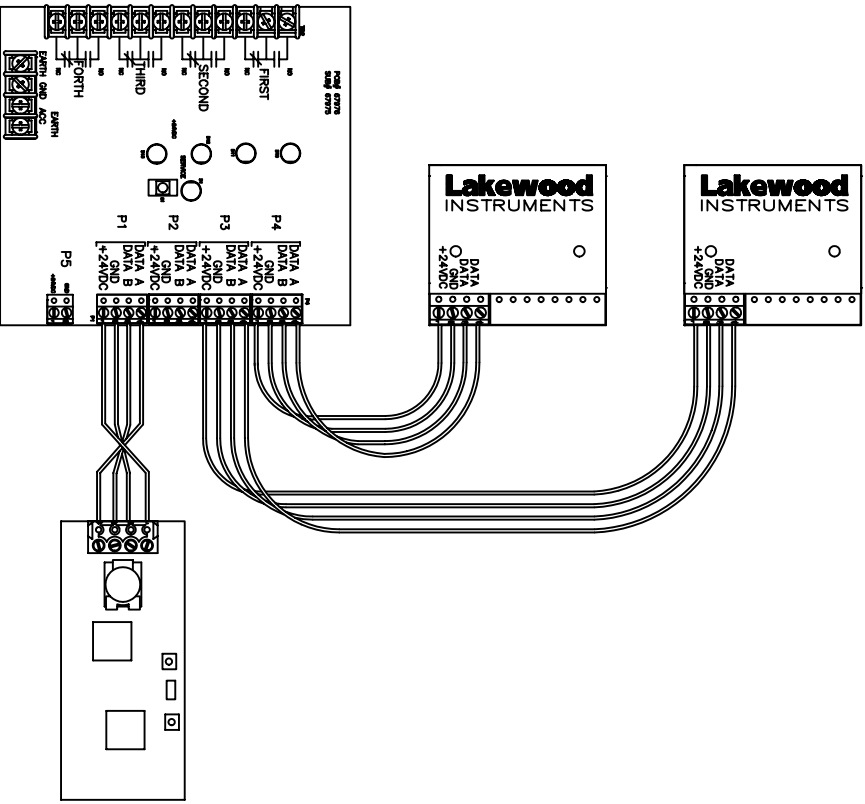
TITLE	SIZE	DWG NO/PN	REV
WIRING, NPH TO 520 pH SENSOR	B	04558	1
SCALE NONE	THIRD ANGLE	FILE TYPE DWG	SHEET 1 OF 1

REVISION HISTORY						
REV	ZONE	DESCRIPTION	ECO	DWN	DATE	APPD
A		RELEASE	1045	EV	9/5/97	

NOTES: UNLESS OTHERWISE SPECIFIED:
 1. NIN OPTION PROVIDES +24 VDC TO ALL NODES.
 IF USING MORE THAN 3 NODES AN EXTERNAL
 +24 VDC POWER SUPPLY IN PARALLEL IS
 RECOMMENDED.



OR



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OSMONICS
 PRECISION OPERATIONS

TITLE: INSTALLATION DRAWING
 NIN OPTION

ORDER NO. 04263
 CUSTOMER LOC. A
 DO NOT SCALE

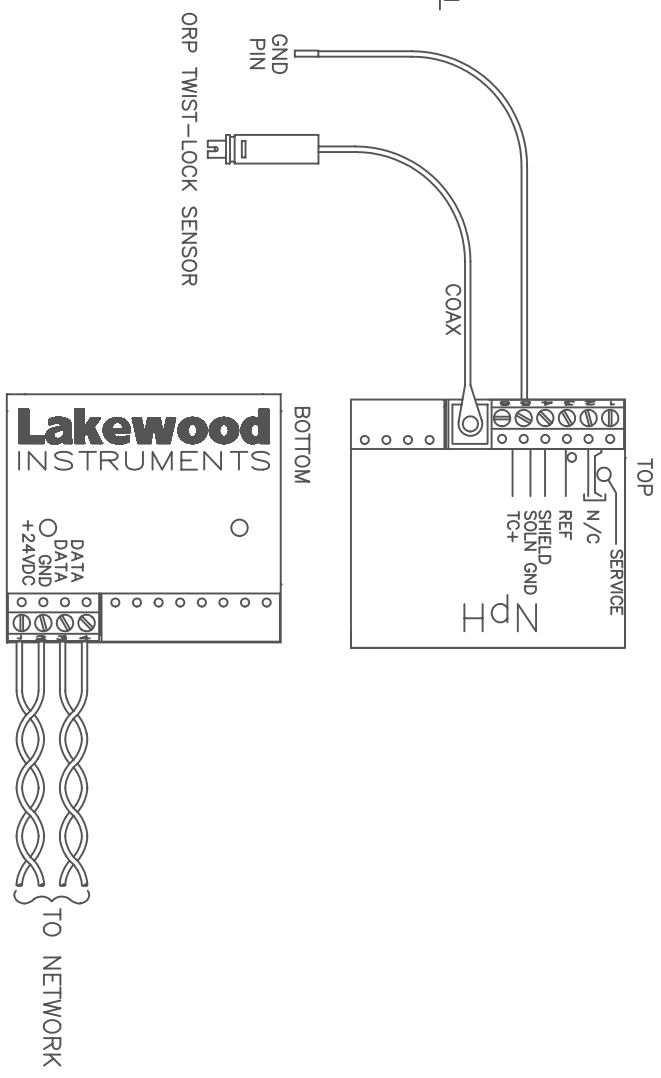
DATE: 9/5/97
 DATE: 9/5/97
 DATE: 9/5/97

SCALE: NONE
 SHEET 1 OF 1

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 (ST) 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.

NODE CONFIGURATION
 NO T.C.
 SOL GND ON SHIELD



REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
1	RELEASE	0975	EV	8/21/97	

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FINISH		FRACTIONAL DECIMALS		TITLES	
ORDER NO.		.XX ± .03		COMPONENT ASSEMBLY	
CUSTOMER		.X ± .1		WIRING, NPH TO ORP SENSOR	
CUSTOMER LOC.		.XX ± .03		SIZE	
DO NOT SCALE		.XXX ± .010		B	
		.5°		THIRD ANGLE	
		DATE 8/21/97		DWG NO/PN	
		DATE		04600	
		APVD		SHEET 1 OF 1	
		APVD		REV	
		DATE		1	
		SCALE NONE		FILE TYPE .DWG	



PHOENIX OPERATIONS

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

Manufactured in the USA

Lakewood Instruments

7838 North Faulkner Road, Milwaukee, WI 53224 USA

Phone (800) 228-0839 • Fax (414) 355-3508

<http://www.lakewoodinstruments.com>