

**LAKWOOD INSTRUMENTS**

**RELAY NODE (NRLY)**

**INSTALLATION & OPERATION MANUAL**

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



**Lakewood Instruments**

7838 North Faulkner Road, Milwaukee, WI 53224 USA

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

<http://www.lakewoodinstruments.com>



# Lakewood Instruments

Congratulations on your purchase of a Lakewood Instruments product. We would like to take this opportunity to welcome you to the Lakewood Instruments product family.

With proper care and maintenance, your product should give you many years of trouble-free service. Please take the time to read and understand the operation manual, paying special attention to the sections on **INSTALLATION** 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 would be happy to assist you with your parts or service requests.

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



# RELAY NODE (NRLY)

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## 1.0 INTRODUCTION

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The RELAY NODE (NRLY) is a LONWORKS™ technology based NODE. It contains its own micro controller which talks directly to other LONWORKS NODES on a twisted pair communication wire. It contains four relays with both Normally Open and Normally Closed contacts.

The NRLY option adds four relays to any Lakewood Instruments Model 2000 controller. These relays can be selectably programmed the same as the relays in the main controller. They can be used for alarms, chemical feeds, biocide feeds, clock timers or any other function requiring an ON/OFF relay.

The NRLY is also used with the 2255 Multi Boiler Controller. It is required to operate the motorized ball valves for boilers. The relays can also be activated by any alarm condition generated by the 2000 Series Controller. It will also feed chemical based on percent of blowdown time, percent on time, after a predefined number of gallons from either water meter, and/or by a biocide schedule.

## 2.0 Specifications

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The NRLY is housed in a NEMA 4X PVC enclosure and requires a 2000 Series Controller with a Network Interface Node (NIN) for operation.

Enclosure	NEMA 4X PVC
Relays	Four NO and NC contacts
Current Rating	3 amps @ 230 VAC per relay
Distance between two furthest Nodes	400 m (1312 ft) max.

LonWorks is a registered trademark of Echelon Corporation.

## 3.0 Unpacking, Mounting and Installation

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### 3.1 Unpacking

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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 Relay Node is started up.

- ☎ **If there was shipping damage, call the Lakewood Instruments Customer Service Department at (800) 228-0839 for authorization to return the node to the factory in the original carton.**

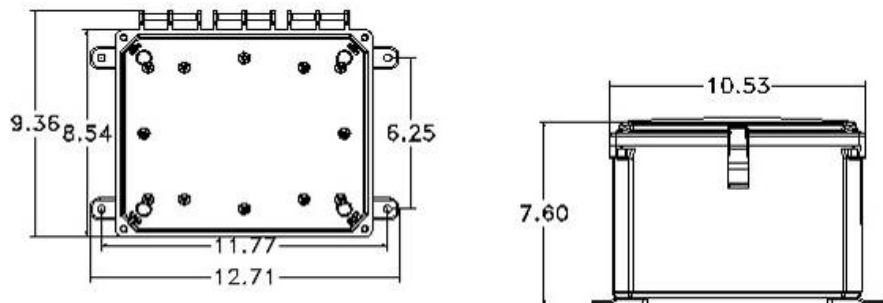
### 3.2 Mounting

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The NRLY is supplied with four mounting feet. The NRLY can be mounted to a panel or to a flat non-vibrating wall.

- Attach the four mounting feet to the back of the controller enclosure.
- Install on smooth surface to prevent stress on the mounting feet.
- Do not install on vibrating wall.
- If enclosure is installed in corrosive environments, consider purging.
- Dimensions indicated as inches (millimeters).
- The enclosure material is PVC.
- Use #10 mounting screws (4).
- Avoid drilling or punching additional holes in the controller enclosure. Damage incurred as a result of any alteration to the enclosure is not covered under the Lakewood Instruments product warranty.

The dimensions of the enclosure in inches are:



The model 2175e has a shipping weight of about 8 lbs.



### 3.3 Installation

#### 3.3.1 Incoming Power 115/230 VAC

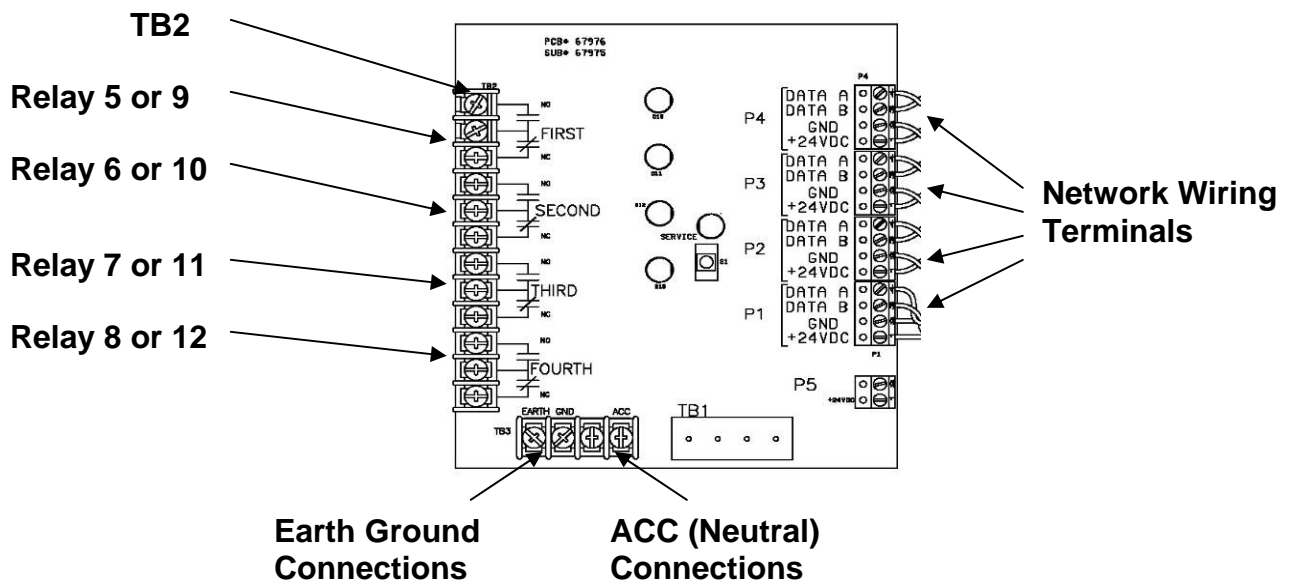
The NRLY can be powered from either 115 VAC or 230 VAC at 50/60 Hz. The NRLY comes with a power cord and receptacles. The power cord and receptacles are rated for 115VAC. If the relay node will be powered by 230 VAC, the power cord and receptacles will need to be removed and the incoming power and the relay outputs will need to be hard-wired.

#### 3.3.2 NRLY Relay Outputs

All 4 relays in the NRLY have both a Normally Open and a Normally Closed contact. The Normally Open relay contacts are wired to the receptacles. If 115 VAC and only the Normally Open contact are to be used simply plug your devices into the molded receptacles. If 230 VAC or both the Normally Open and the Normally Closed contacts are to be used, remove the receptacles and hard-wire your devices to the relay outputs.

The relays are designed with both a Normally Open and Normally Closed contact so that motorized valves may be used. If a motorized valve is to be used, connect the Normally Open (NO) contact to the open connection of the valve and connect the normally closed (NC) contact to the close connection of the valve. Each relay output requires a neutral connection and an earth ground connection for proper operation.

The receptacle on the far left is relay #5 (or #9 for a second NRLY) and the receptacle on the far right is relay #8 (or #12 for a second NRLY). On the NRLY board, relay #5 (or #9) is at the top of terminal block TB2 and relay #8 (or #12) is on the bottom of TB2.



There are 3 terminals for each relay in the NRLY. The top 3 terminals on TB2 are the Normally Open, Center Tap, and Normally Closed contacts for relay #5 (or #9) in that order. The bottom 3 terminals of TB2 are the Normally Open, Center Tap, and Normally Closed contacts for relay #8 (or #12). The center taps of each relay have a jumper wire to the other relays to make them hot. If the jumper wires are removed the relays become dry contacts.

Terminal Block TB3 is used as a tie point for ACC and Earth Ground connections.

Refer to the drawing in the back of this manual for wiring instructions.

**WARNING! THE CONTROL RELAYS ARE INTENDED FOR ELECTRONIC OR SMALL MOTOR-DRIVEN CHEMICAL PUMPS. LARGER PUMPS REQUIRE THE -HR OPTION WITH 25-AMP-RATED INTERPOSING RELAYS. CONTACT LAKEWOOD INSTRUMENTS FOR SPECIAL INSTRUCTIONS.**

### 3.3.3 Network Wiring Installation

The relay node (NRLY) must be wired to the controller before installation and programming can take place. Nodes require +24 VDC for operation and twisted pair wire for data transmission. The NIN option card can provide the +24 VDC for up to two nodes using non-twisted pair wire. If using three or more nodes an external +24 VDC power supply run in parallel is recommended.

Recommended twisted pair for data specifications are:

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.

If shielded cable is used, the shield should be connected to earth ground via a 470K ohm, .25 watt, metal film resistor to prevent static charge buildup.

The NRLY communicates with other nodes on a twisted pair network. There is no polarity to the twisted pair communications. Normally, any other nodes are wired directly to the relay node and the relay node is wired to the NIN card inside the controller enclosure. However, due to the advantages of LonWorks technology, nodes can be daisy-chained together in multiple configurations.

Please refer to the diagram in the back of this manual for wiring instructions.

### 3.3.4 Node Installation

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Before it can be used, the NRLY must be installed in the firmware of the controller.

Node installation is a 3-step process; select the node to be installed, press the service pin on the node, and press any key on the keypad.

To install the NRLY in the firmware:

- Go to the **Main Menu** by pressing "**CLR**".

MAIN MENU	
=====	
3	FEED 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	SECURITY
4	SOFTWARE VERSIONS
5	DIAGNOSTICS
6	COMMUNICATIONS
7	<b>NODE INSTALLATION</b>

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

NODE INSTALLATION	
=====	
1	<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
  
```

- Highlight the node to be installed, then press **ENT**.

It is recommended that the first NRLY be installed as **RELAYS 5-8**. The second NRLY would be **Relays 9-12**.

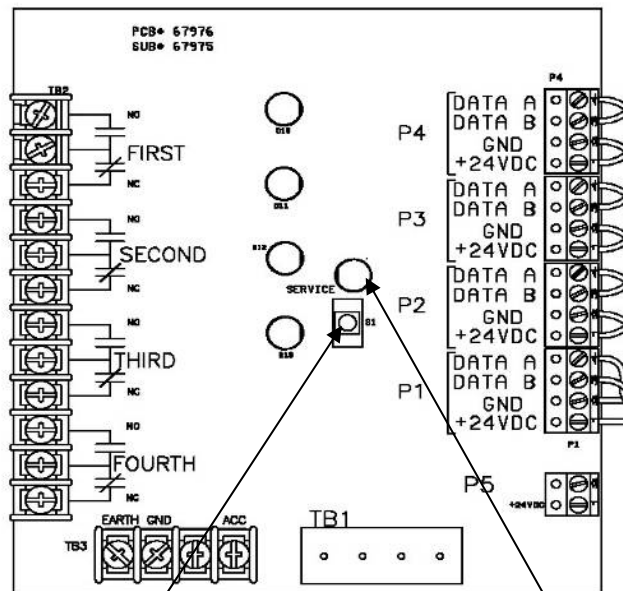
The following screen should appear:

```

PRESS SERVICE PIN
AND THEN
PRESS ANY KEY
  
```

- Press the **Service Pin** on the relay node to be installed.

The service pin on the NRLY is located:



**SERVICE PIN  
LOCATION**

**SERVICE LIGHT  
LOCATION**


The service light will come on solid while the service pin is pressed. When the service pin is released the service light will turn off.

- After the service pin is pressed, press **any key** on the controller keypad to complete the installation of the relay node.

The relays are programmed and manually operated in the same fashion as the chemical relays in the 2000 Series Controller box. They will be labeled **RELAYS 5-8** or **RELAYS 9-12**. Please refer to the instruction manual of your 2000 Series Controller for configuration of the relays.

## 4.0 Technical Service

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 Lakewood Instruments Technical Support Department 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 and returns should be sent to:

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

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

- Customer's name, address, phone and fax numbers.
- A purchase order number (no exceptions) for cases where parts are required that are not under warranty.
- A contact person's name and phone number to call if the equipment is beyond repair or to discuss any other warranty matter.
- Equipment model and serial numbers.
- Reason for return (i.e., 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.**

## Service Guide

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When calling Lakewood Instruments, please have the controller's complete model number and serial number available so that the technician can better assist you.

When any parts are returned to the factory, please indicate:

- Customer's name and address
- Individual at customer location to send the repaired controller or new part to.
- The person (and phone number) to call if the equipment is beyond repair or for any warranty matter

## **5.0 Maintenance**

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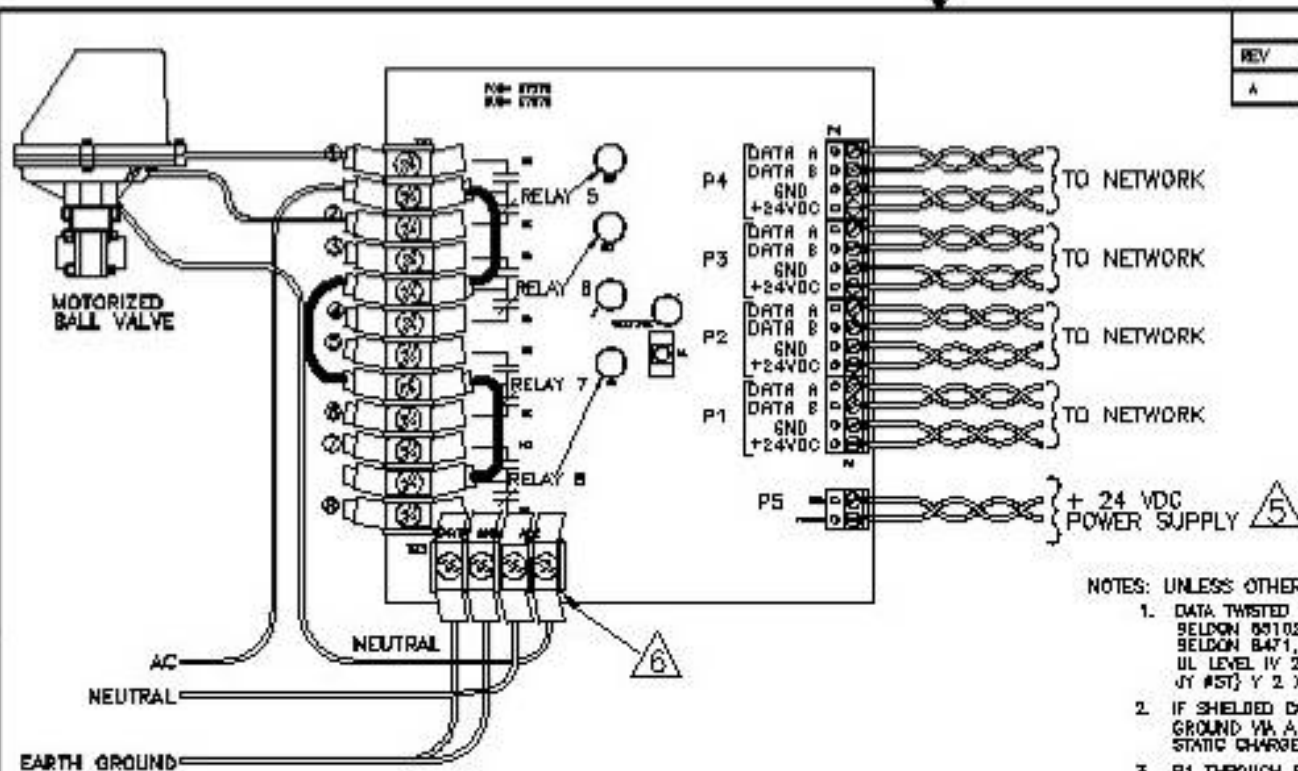
### **5.1 Replacing the Fuse**

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The NRLY contains a 10A, 250V fuse. The fuse holder is located on the bottom of the enclosure. It is accessible from the outside of the box. Replacement fuses must be a fast blow type. If the fuse is blown, the relays will not work.

## **6.0 Drawings**

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REVISION HISTORY					
REV	DESCRIPTION	EDD	DWH	DATE	APVD
A	RELEASED	1004E	PSG	8-14-07	

**NOTES**

- ⊕ RELAY 5 (OR 9) N.O. HOT
- ⊖ RELAY 5 (OR 9) N.C. HOT
- ⊕ RELAY 6 (OR 10) N.O. HOT
- ⊖ RELAY 6 (OR 10) N.C. HOT
- ⊕ RELAY 7 (OR 11) N.O. HOT
- ⊖ RELAY 7 (OR 11) N.C. HOT
- ⊕ RELAY 8 (OR 12) N.O. HOT
- ⊖ RELAY 8 (OR 12) N.C. HOT

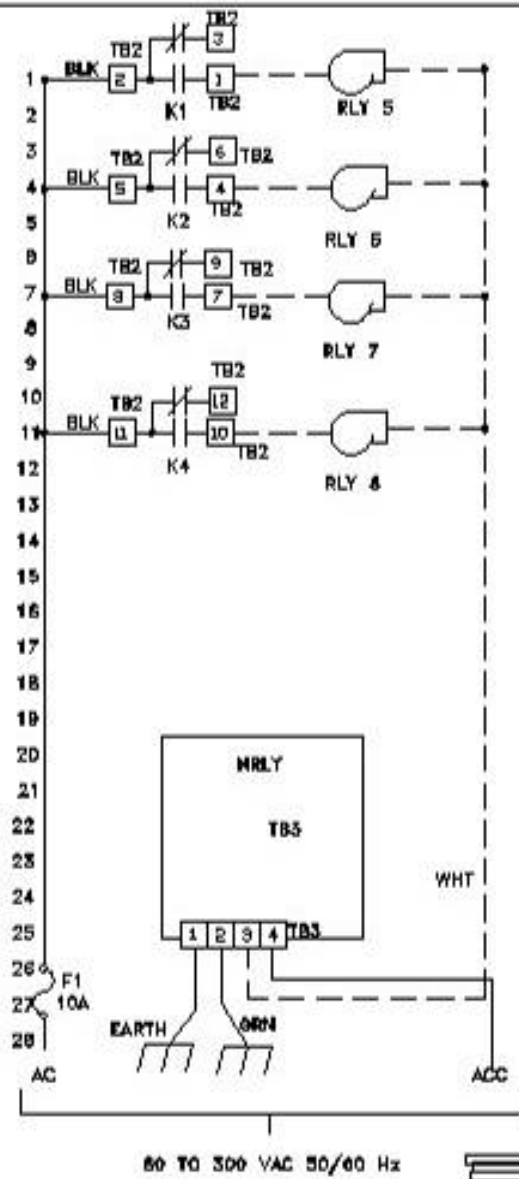
**NOTES: UNLESS OTHERWISE SPECIFIED:**

1. DATA TWISTED PAIR SPECIFICATIONS:  
 BELDON 80102, SINGLE TWISTED PAIR, STRANDED 9/28, UNSHIELDED, PLENUM,  
 BELDON 8471, SINGLE TWISTED PAIR, STRANDED 9/28, UNSHIELDED, NONPLENUM,  
 UL LEVEL IV 28 AWG, TWISTED PAIR, TYPICALLY BOLD AND UNSHIELDED,  
 (Y #ST) Y 2 X 2 X 2, 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. P1 THROUGH P4 PROVIDED FOR WIRING CONVENIENCE, ON NETWORKS WITH LESS THAN 100 MA SUPPLY REQUIREMENT, USE 2000 SERIES TO POWER NETWORK. SEE DRAWING NUMBER 60006.
  4. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.
- ⚠ P5 IS AN INPUT FOR 24VDC. A 24VDC EXTERNAL POWER SUPPLY MAY BE REQUIRED WHEN 3 OR MORE NODES ARE ON THE NETWORK. THE NIN OPTION SUPPLIES ENOUGH VOLTAGE AND CURRENT FOR UP TO 3 NODES.
- ⚠ TSS IS A TIE POINT FOR LOCATING GROUND AND NEUTRAL WIRES. GND AND NEUTRAL MUST BE ATTACHED TO TSS FOR THE RELAY TO OPERATE.

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<p>FINISH: FRAG, RECHALF, ANGLE</p> <p>35/16 .001 ± .010 ± .5"</p>			<p>TITLE: INSTALLATION LAYOUT RELAY NODE TO VALVE</p>		
ORDER NO.	DWH	PSG	DATE	2/14/07	
CUSTOMER	APVD	DATE			
CUSTOMER LOC.	APVD	DATE			
DO NOT SCALE			SCALE	NONE	
			FILE TYPE	DWG	
			SHEET	1 OF 1	



REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
A	ECO 10042	FSC	2-14-07

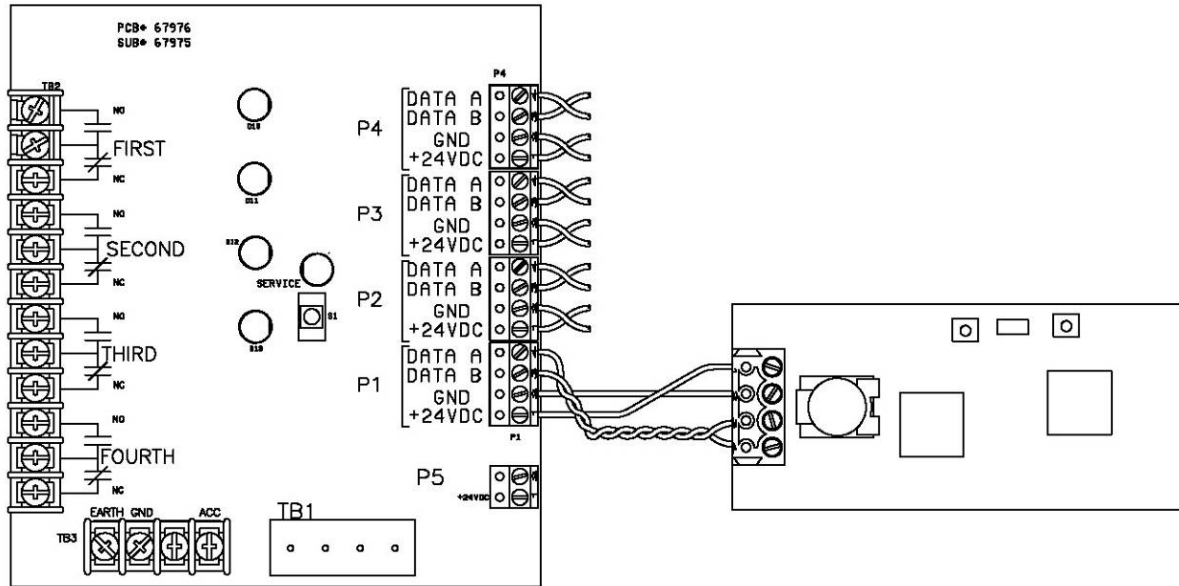


NOTES: UNLESS OTHERWISE SPECIFIED;  
 1. WIRING BY LAKEWOOD \_\_\_\_\_  
 2. WIRING BY OTHERS - - - - -  
 3. RELAY CONTACTS RATED 10A/250 VAC,  
 1/3 HP/250 VAC.

NOTICE ON REPRODUCTION

		<b>Lakewood</b> ELECTRO INSTRUMENTS	
		DIAGRAM - LADDER MRLY	
		P. DESIGN 2-14-07	
REV	DESCRIPTION	DATE	APPROVAL
B			1268833_2a
APPLICATIONS		NONE	
		1 OF 1	

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	0571	EV	2/96	
B	REVISED	1263	EV	9/2/97	



**NOTICE ON REPRODUCTIONS**  
THIS DRAWING, THE DESIGN AND THE PATENTS IT COVERS, ARE THE PROPERTY OF OSMONICS INC. THEY ARE LOANED MERELY AND ON THE BORROWER'S EXPRESS AGREEMENT THAT THEY WILL NOT BE REPRODUCED, COPIED, LOANED, EXHIBITED, NOR USED EXCEPT IN THE LIMITED WAY AND THE PRIVATE USE PERMITTED BY WRITTEN CONSENT GIVEN BY THE LENDER TO THE BORROWER.

MATERIAL	TOLERANCES UNLESS NOTED		
	FRAC	DECIMALS	ANGLES
		.X ± .1	
FINISH	±1/16	.XX ± .03	±.5°
		.XXX ± .010	
ORDER NO.	DWN EV	DATE 5/23/97	
CUSTOMER	CHKD JWZ	DATE 10.96	
CUSTOMER LOC.	APVD	DATE	
DO NOT SCALE	APVD	DATE	



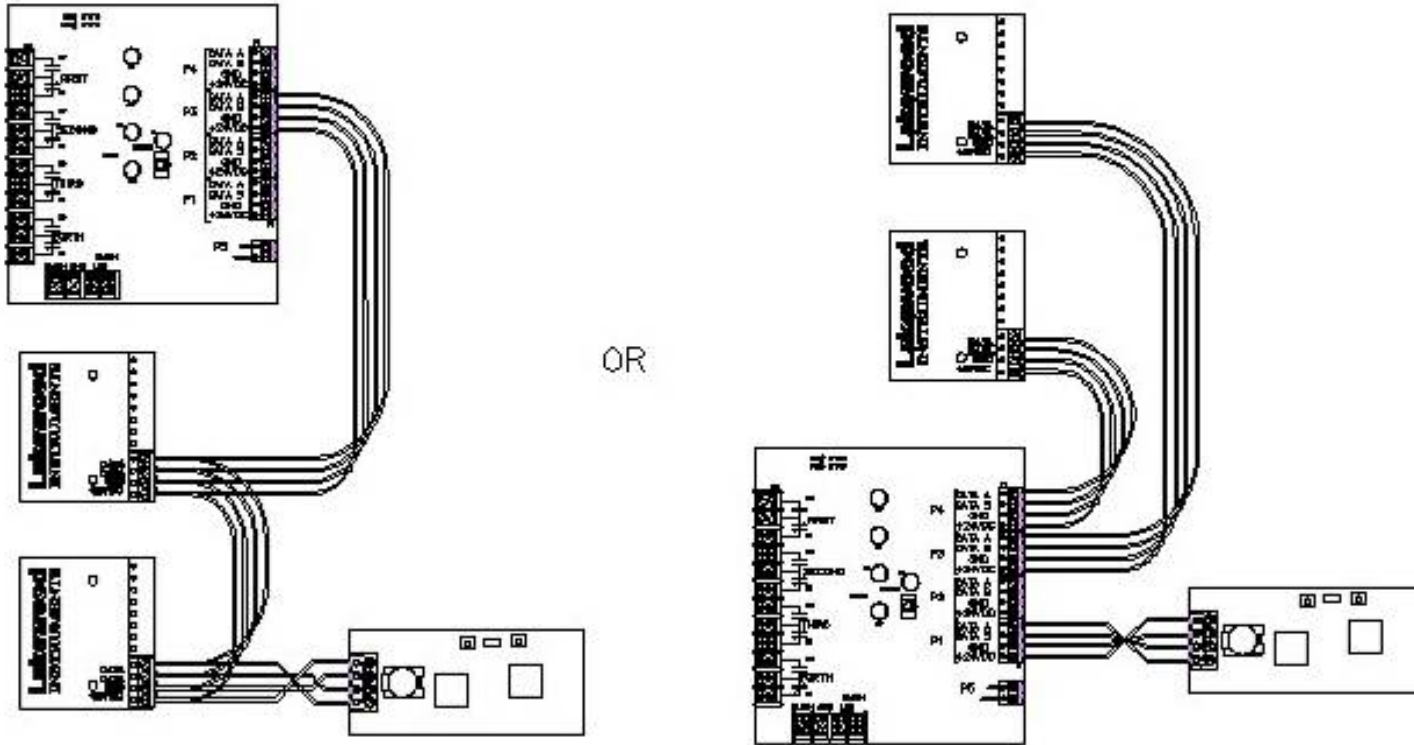
TITLE				COMPONENT ASSEMBLY	
				WIRING DIAGRAM, NRLY TO NIN	
SIZE	THIRD ANGLE	DWG NO./PN	REV		
B		69862	B		
SCALE	NONE	FILE TYPE	.DWG	SHEET 1 OF 1	

P/N 61676 REV-A PG-1/2

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.

REVISION HISTORY						
REV	DATE	DESCRIPTION	BY	APP	DATE	APP
A		RELEASE	10/0	EV	5/3/07	



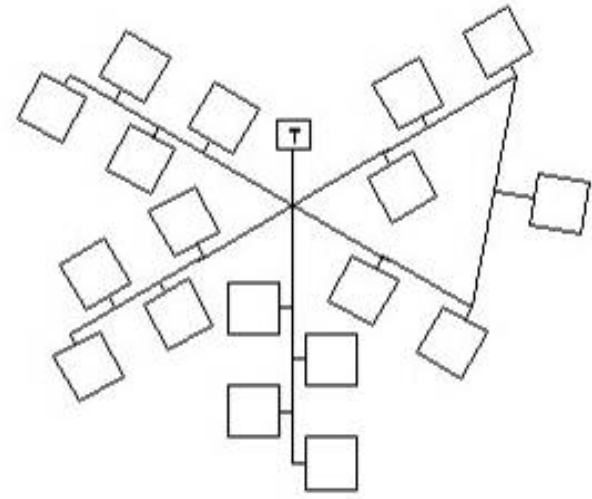
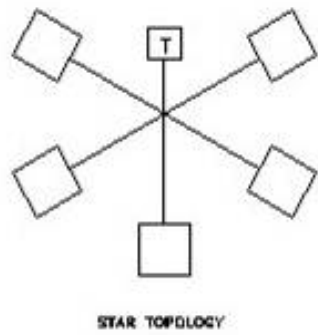
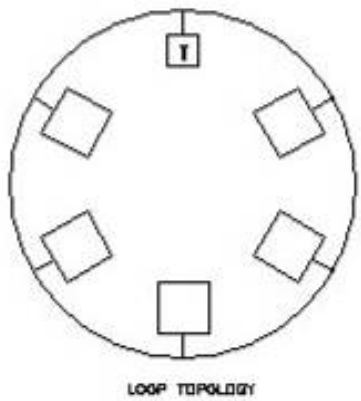
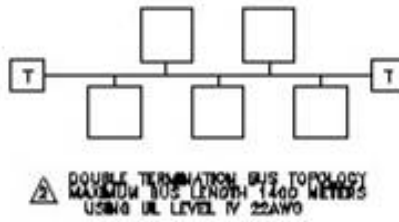
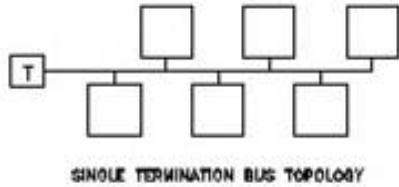
OR

NOTES ON INSTRUMENTS				Lakewood INSTRUMENTS	
DATE	REV	BY	APP	TITLE	1187B05-1a
10/0	01	EV		INSTALLATION DRAWING	
				NIN OPTION	
DO NOT SCALE	APPD	DATE	SCALE	REV	A

NOTES: UNLESS OTHERWISE SPECIFIED:

- DATA TWISTED PAIR SPECIFICATIONS:  
 BELDON 8310L SINGLE TWISTED PAIR, STRANDED 9/30, UNSHIELDED, PLUMBUM,  
 BELDON 8471, SINGLE TWISTED PAIR, STRANDED 9/20, UNSHIELDED, NONPLUMBUM,  
 UL LEVEL IV 22 AWG, TWISTED PAIR, TYPICALLY SOLID AND UNSHIELDED,  
 JY (ST) Y 2 X 2 J6, FOUR WIRE HELICAL TWIST, SOLID, SHIELDED.
- 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.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVALS
A	ECC 0234	MLM 9/95	



<b>DRAWING DIAGRAM</b> <b>NETWORK WIRING TOPOLOGIES</b> <b>SERIES 2000 CONTROLLERS</b>			
REV	APP	DATE	OF
A		12/08/08-1a	A
APPLICATIONS		NONE	2000



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

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**Manufactured in the USA**

## **Lakewood Instruments**

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