

0960.NANOP

pH Controller

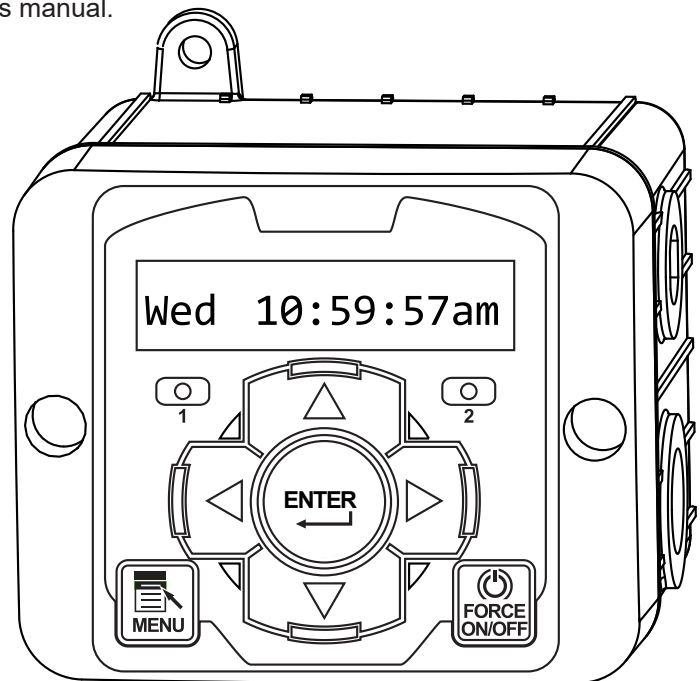


Product Manual



Important Safety Instructions

Read all warnings and instructions in this manual.
Save all instructions.



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I. Introduction

0960.NANOP microprocessor based controllers are designed to provide a wide range of control functions for irrigation water systems. The controller is programmed through a front panel keypad and can be configured to provide a customized control system for your application. Your particular unit's functions can be determined by comparing the units model number to the Model Numbering table listed below.

Model Numbering

0960.NANOP units have several base system control functions and unit optional features. Your unit may be supplied with one or more of the features described in this manual. To determine what features apply to your unit check the model number label located on the controller enclosure.

Base Control Function

P - pH Control and 1 Feed Timer

II. Description

0960.NANOP units are designed to automate pH control and the addition of various chemicals or activate other devices via a relay output. Relay 1 is activated by the pH sensor setpoint, and Relay 2 can be activated by various user-defined selections.

0960.NANOP units include:

- Typically not used in Irrigation systems. One totalizing water meter input that can be configured for contacting head or hall effect meter inputs.
- Typically not used in Irrigation systems. One drum level input that can be set for one of the following: alarm display only, alarm display and force of relay 1, alarm display and force off relay 2 or alarm display and force of relay 1 & 2.
- Two mechanical relay outputs with normally open and normally closed contacts that can be configured for powered or dry contact relay operation (see page 4 diagram). Relay 1 is labeled "pH" and Relay 2 is labeled "Relay 2" if pigtails are provided.
- A "force on" timer that allows for manual activation of the relays for a user defined amount of time.

pH Control (P) - The pH function monitors and controls pH on a scale of 0-14 pH units. The unit can be configured for single or dual set point control. Relay 1 is controlled by the single pH set point with the following settings: Set Point (**rising for acid feed** or falling for caustic feed); Differential (the amount of reading change that must occur before the relay is turned off); Limit Timer (the relay is forced off if the limit time is met).

For dual set point control to feed both an acid and a caustic the Relay 2 Set menu must be configured for Dual pH instead of a timer. This setting will add additional settings in the pH Set menu for the second set point. Relay 1 will operate off of the falling setpoint and Relay 2 off of the rising.

The High, Low Alarm settings and limit timer are the same for single or dual pH set point control.

Relay 2 Set – The second relay can be controlled by one of the following modes: Set Point 2 for pH units, Alarms for P (not doing dual set point) units or one of the selectable timers below:

1. **Pulse Timer** – Accepts dry contact pulses from a water meter (supplied separately). It can accumulate 1-9999 pulses to activate the timer to run from 0-99 minutes, 59 seconds. Timer will store up to 5 additional activations during an individual run time.
2. **Recycle Timer** – Provides a user defined "off" time in HH:MM and a user defined "on" cycle in MM:SS that is repeated constantly.
3. **28-Day Timer** – 28-day feed timers, typically used for biocide feed are based on a 28-day cycle with two independent programmable feed cycles allowing for feed on selectable days and weeks.
4. **Utility** – Relay on all of the time.

III. Installation

Electrical Wiring

The controller has an internal regulated power supply that will operate in the range of approximately 100 to 240 VAC on the incoming wiring. Output relay(s) are protected with a replaceable fuse. Relay output voltage will equal the incoming line voltage.

Prewired units are supplied with a 16 AWG cable with a 3-wire grounded USA 120 volt plug for incoming power and 18 AWG 3-wire grounded receptacle cords for all control relay outputs. Conduit units are supplied with liquid tights and adaptors for easy hard wiring to supplied connector.

 CAUTION 	
1.	There are live circuits inside the controller even when the power switch on the front panel is in the OFF position. Never open the front panel without first disconnecting power from the outlet. Prewired controllers are supplied with an 8 foot, 18 AWG power cord with USA style plug. A #1 Phillips driver is required to open the front panel.
2.	Low voltage signal wires (probes, flow switch, water meter, etc.) should never be run in conduit with high voltage (like 115VAC) wires.
3.	Never attempt to land connections to the controller without first disconnecting power from the outlet.
4.	Do not block access to disconnect power during mounting and installation.
5.	The controller should be connected to its own isolated circuit breaker, and for best results, the ground should be a true earth ground, not shared. Any attempt to bypass the grounding will compromise the safety of users and property.
6.	The electrical installation of the controller must be performed by trained personnel only and conform to all applicable National, State and Local codes.
7.	Operation of this product in a manner not specified by the manufacturer may result in damage to equipment or persons.
8.	Avoid mounting in locations that expose the controller to direct sunlight, vapors, vibration, liquid spills or extreme temperatures; less than 0°F (-17.8°C) or greater than 120°F (50°C). EMI(electromagnetic interference) from radio transmissions and electric motors can also cause damage or interference and should be avoided.

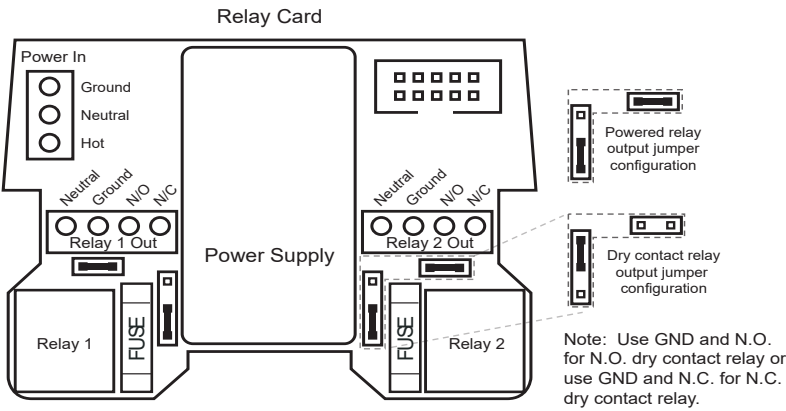
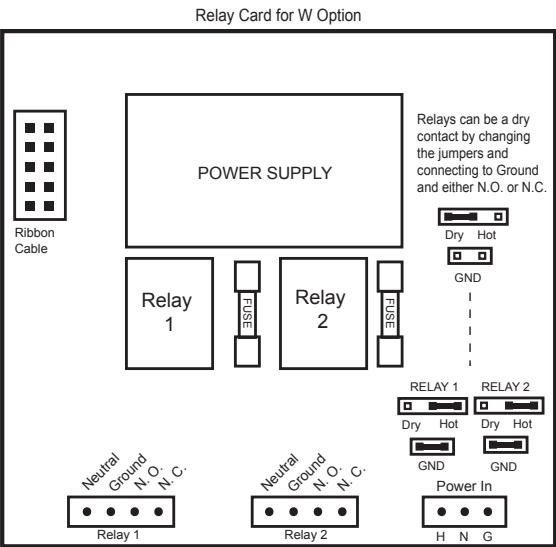
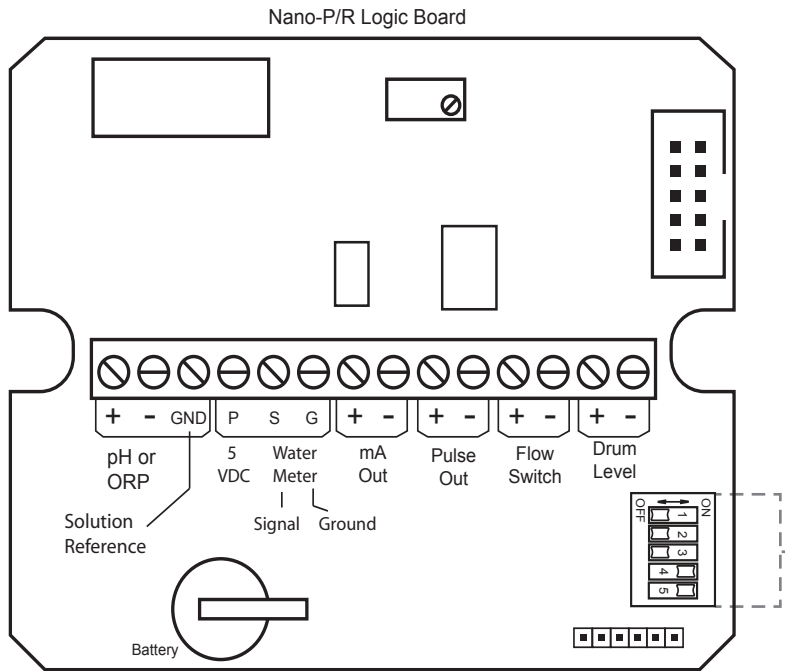
NOTES:

1. Liquid tight fittings and some labeled signal leads are provided for signal (low voltage) connections, such as water meter inputs.
2. Hall effect meters that require +12 VDC must use an external power supply (TFS-PWR).
3. The 4-20mA output is produced with 12 VDC on the loop. Do not connect output to devices that are trying to power the loop. This feature is used when a 0960.NANOP is paired with the Flex Flow 0960.L pump.
4. When installing a Flow Switch (part number 0960.FS.SHORT or 0960.FS.long) connect the flow switch lead wires to the RED and the BLACK wires coming from the right side of the NANOP.
5. When using the 0960.NANOP with DEMA's Flex Flow (Part number, 0960.L) Model L pump (GREEN), connect the pump wire leads thorough the compression nut on the 0960.NANOP Controller, into the bus board (mA Output), GREEN wire to (+) mA Out port and the WHITE wire to the (-) mA Out port.

Mounting Instructions

Select a mounting location that provides the operator easy access to the unit and a clear view of the controls through the cover of the controller. The location should be convenient to grounded electrical connections.

Logic and Relay Cards



Relay 1 is activated by sensor setpoint.

Relay 2 is activated by user-defined selection, timer, alarm, etc...

Switch #	Position	Function
1	OFF	Backlight normally off; flashes on w/ alarm
1	ON	Backlight normally on; flashes off w/ alarm
2	OFF	Normal Operation
2	ON	“Burn-in” Mode
3	OFF	Normal Operation
3	ON	Clear Memory (Resets to factory defaults)

Electrode Installation

0960.NANOP controllers may come configured for various circulating water systems.

A. Irrigation System Setup:

The standard pH probe and Flow Switch assembly for an irrigation system are typically constructed using PVC piping and fittings. When incorporating DEMA's Flow Switch, thread the $\frac{3}{4}$ " male threads of the flow switch into a PVC tee. Example of the tee: slip x slip x female $\frac{3}{4}$ ".

If a reducer bushing is used in your "TEE", ensure that the paddle legs of the Flow Switch are threaded in and extend far enough to reach the water flow when fully threaded. Proper contact with the water flow is critical for the switch to function accurately. 3gpm or more of flow is required to activate the flow switch.

When installing the pH probe into the PVC piping, be sure the probe will remain wet even when the irrigation system is not running. You can slop the piping to the direction where the probe is, to insure it is staying wet. An installation where 90° fittings are used to make a drop-down section to ensure water is touching the probe at all times. Connect the plug from the pH probe to the right side of the NANOP's connection point labeled pH. Be sure to connect the green ground wire from the probe wire to the ground wire on the side of the NANOP.



NOTES:

1. Install an isolation valve on either side of the flow assembly so electrode can be easily isolated for removal and cleaning.
2. A line strainer is recommended upstream from the probes to protect against fouling and damage.
3. Mount pH electrodes vertically.
4. Green solution reference wire must be connected to pH sensor.
5. Systems with a flow switch require 3 gpm flow rate to operate outputs.

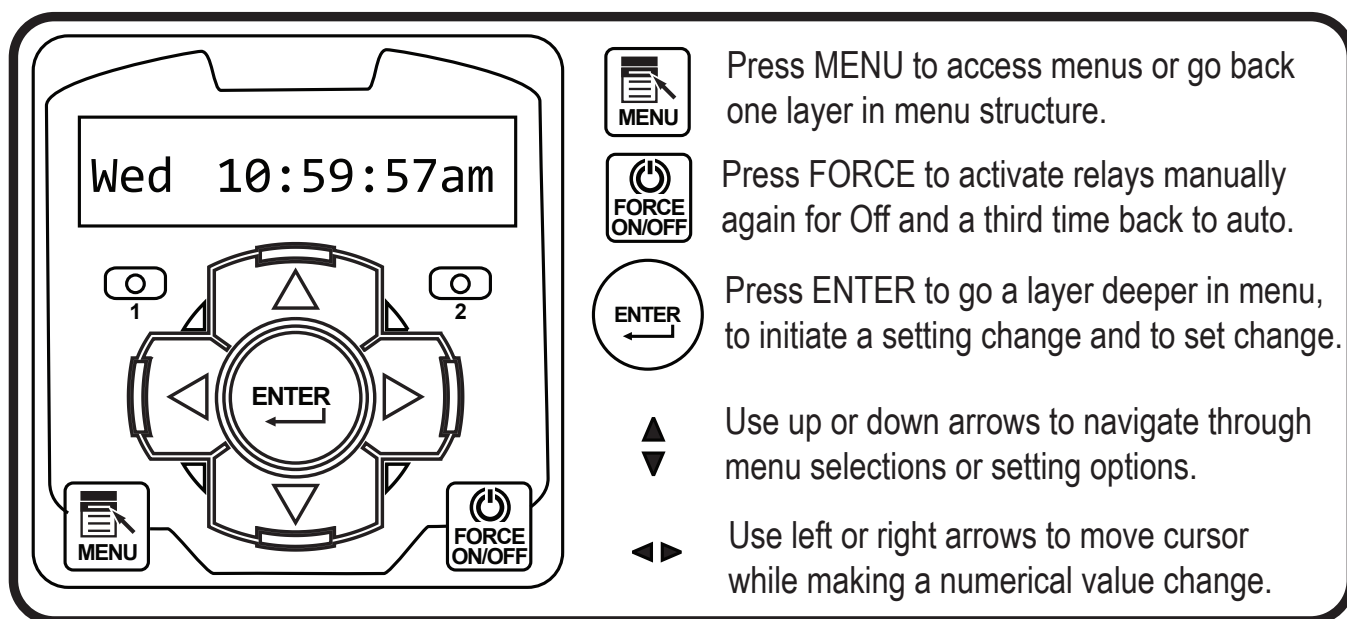
WARNINGS:

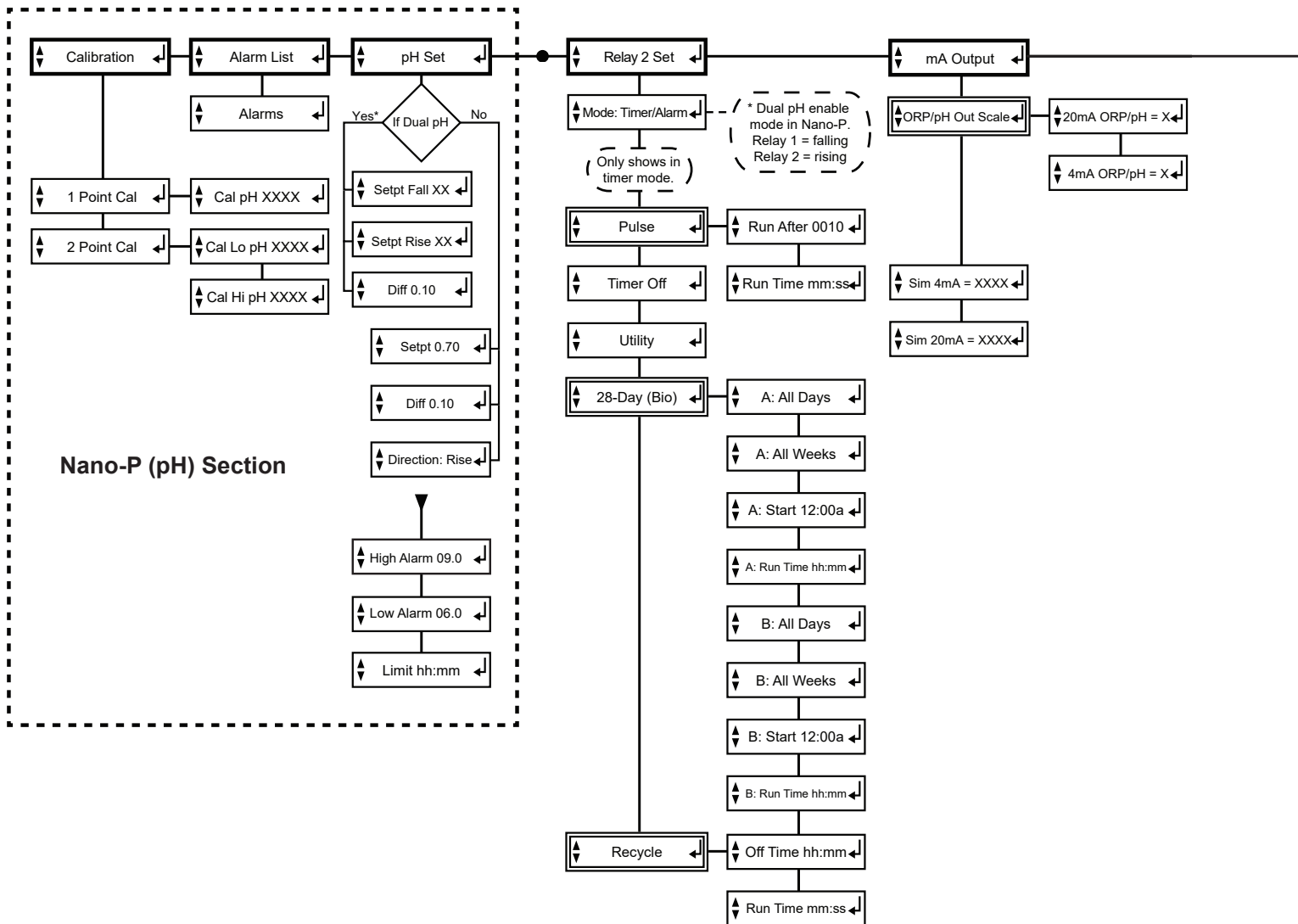
1. Electrodes are O-ring sealed, which if damaged will cause a leak.
2. Do not allow pH sensor tips to dry out, damage will occur.
3. Do not exceed a water temperature range of 32°F to 140°F.
4. Do not exceed a maximum pressure of 125 psi.

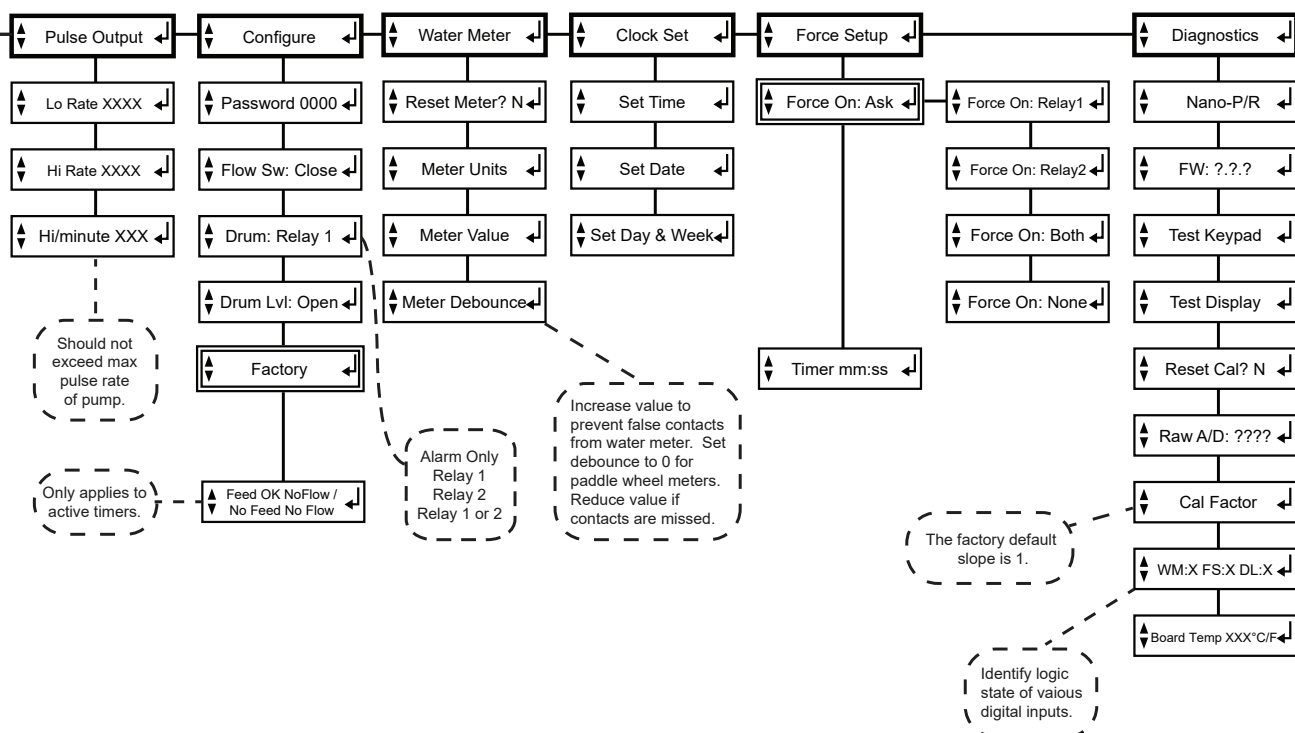
Replacement Probe

NANOP..... 0960.PE.21

IV. Front Panel Description







V. 0960.NANOP Menu Map

0960.NANOP pH units have a main menu circle that includes:

Calibration	- Calibrating the conductivity reading
Alarm List	- Shows active alarms
pH Set	- Setting the pH set point and alarms
Relay 2 Set	- Select the timer type and run values
mA Output	- Set mA output scale
Pulse Output	- Set pulse output scale
Configure	- Password, flow and drum level settings
Water Meter	- Reset totalizer and setting contact value
Clock Set	- Set time, date and week
Force Set	- Set the force on time for manual relay activations
Diagnostics	- Tests and calibration reset

VI. System Operation Overview

Description of Menus

0960.NANOP controllers have three modes of operation, Run, Menu and Force. All menus are circular. Pressing the DOWN key will display the next line of information on the display.

Run - This mode is for normal operation. The control relays will only be automatically active in this mode. In the Run mode, the display will read system values. If an alarm is present, the display flashes with the alarm status.

The Run menu will display values such as day, time, date and other values depending upon the features present on the unit. The unit will automatically return to the Run mode if no keys are pressed for three minutes.

Menu - This mode is used to make adjustments to settings and readings on the controller. To access the Menu mode from the run screen, press the Menu key. Use the up or down arrow to scroll through the various menus. When you want to access a specific menu, press the Enter key. Once you have entered a sub-menu you will be able to step through that menu's options with the up or down arrow key.

Force - Relays may be forced on or off for a user defined amount of time. Press the Force key to force relays on for the time configured in the Menu's force sub-menu. Press it a second time to force them off for the same amount of time. Press a third time to go back to automatic Run mode. Unit returns to the Run mode automatically when the force time has elapsed.

VII. Maintenance

The only required maintenance for normal uninterrupted operation of your 0960.NANOP controller is cleaning of the electrode. pH sensors have a 6-18 month life depending on installation and will need to be replaced regularly.

pH Electrode Cleaning Procedure

1. Remove the pH electrode from the system.
2. Spray with water and/or detergent, using a soft brush to dislodge any fouling.
3. Visually inspect the electrode for signs of damage.
4. Calibrate the electrode while it is in a known solution.

Slow response or non-reproducible measurements are signs that the electrode has become coated or clogged. The pH glass is susceptible to mounting by many substances. The speed of response, normally 95% of the reading in less than 10 seconds, is dramatically degraded when the pH glass is coated.

To restore the speed of response for a pH electrode, clean the bulb with a high quality detergent, methyl alcohol or other suitable solvent using a "Q-tip". Rinse well with distilled water and retest. If the electrode now responds, but erratically, soak the sensor in 0.1 Molar HCl for 5 minutes. Remove and rinse with water and place in 0.1 Molar NaOH for 5 minutes. Remove, rinse again and then place the sensor in pH 4. buffer for 10 minutes before use.

VIII. Troubleshooting

The 0960.NANOP controller is designed for many years of trouble free operation. Should a problem occur, refer to the following chart to help identify the problem. If replacement is required, follow the procedures listed in the Warranty and Factory Service portion of this manual.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
False reading.....	Bad or dirty electrode Out of calibration	Clean, as needed Calibrate unit
Will not calibrate	Dirty electrode Faulty electrode Faulty wiring to electrode	Clean electrode Replace electrode if needed Replace wiring if needed
No system power.....	Check power source Check fuse Check connections	Plug into different receptacle Replace as needed Make sure ribbon cables are secure
Pulse timer not activating	Check wiring Check external device	Repair as needed Repair/replace as needed
Outputs not energized	No flow Check fuse	Check sample line for clogged pipes or strainers Replace as needed

IX. Manufacturer's Product Warranty

Merchandise Returns

No merchandise will be returned for credit without DEMA'S written permission. Returned merchandise authorization number is required in advance of return.

Product Warranty

DEMA products are warranted against defective material and workmanship under normal use and service for one year from the date of manufacture. This limited warranty does not apply to any products that have a normal life shorter than one year or failure and damage caused by chemicals, corrosion, physical abuse, or misapplication. Rubber and synthetic rubber parts such as "O"-rings, diaphragms, PVC tubing, and gaskets are considered expendable and are not covered under warranty. This warranty is extended only to the original buyer of DEMA products. If products are altered or repaired without prior approval of DEMA, this warranty is void.

Defective units or parts should be returned to the factory with transportation prepaid. If inspection shows them to be defective, they will be repaired or replaced without charge, F.O.B. factory. DEMA assumes no liability for damages. Return merchandise authorization number must be granted in advance of returned units for repair or replacement (See "Merchandise Returns" above).