



ACU-TROL[®] CHEMICAL CONTROLLER FOR POOL AND SPA MODEL AK600



INSTALLATION AND USER'S GUIDE



IMPORTANT SAFETY INSTRUCTIONS
READ AND FOLLOW ALL INSTRUCTIONS
SAVE THESE INSTRUCTIONS

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IMPORTANT WARNING AND SAFETY INSTRUCTIONS



SERIOUS BODILY INJURY OR DEATH CAN RESULT IF THIS PRODUCT IS NOT INSTALLED AND USED CORRECTLY.



INSTALLERS, POOL OPERATORS AND POOL OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS BEFORE USING THIS PRODUCT.



Most states and local codes regulate the construction, installation, and operation of public pools and spas, and the construction of residential pools and spas. It is important to comply with these codes, many of which directly regulate the installation and use of this product. Consult your local building and health codes for more information.



IMPORTANT NOTICE - Attention Installer: This Installation and User's Guide ("Guide") contains important information about the installation, operation and safe use of this product. This Guide should be given to the owner and/or operator of this product.

DO NOT INSTALL THE CHEMICAL CONTROLLER WHERE IT CAN BE READILY ACCESSIBLE TO THE PUBLIC.



Before installing this product, read and follow all warning notices and instructions in this Guide. Failure to follow warnings and instructions can result in severe injury, death, or property damage. Call (800) 831-7133 for additional free copies of these instructions.



RISK OF ELECTRICAL SHOCK OR ELECTROCUTION:

BEFORE WORKING ON THE CHEMICAL CONTROLLER: Always disconnect power to the controller at the circuit breaker before servicing. Failure to do so could result in death or serious injury to service person, pool users or others due to electric shock.

BE SURE TO DISCONNECT ALL SUPPLY CONNECTIONS BEFORE SERVICING.

This product must be installed by a licensed or certified electrician or a qualified pool professional in accordance with the National Electrical Code (NEC), NFPA 70 or the Canadian Electrical Code (CEC), CSA C22.2. All applicable local installation codes and ordinances must also be adhered to. Improper installation will create an electrical hazard which could result in death or serious injury to pool users, installers or others due to electrical shock, and may also cause damage to property.



BEFORE USING YOUR POOL, SPA OR HOT TUB, CHECK THE pH AND SANITIZER LEVELS OF THE WATER.



Do not permit children to operate this equipment.



When mixing acid with water, ALWAYS ADD ACID TO WATER. NEVER ADD WATER TO ACID. When adding any chemical to the pool/spa, be sure to follow the manufacturer's instructions thoroughly.



DO NOT MIX SODIUM HYPOCHLORITE AND MURATIC ACID



Risk of electrical shock. Connect the Chemical Controller to a ground-fault interrupter-circuit (GFCI). Contact a qualified electrician if you cannot verify that the receptacle is protected by a GFCI.



DISABLING THE OVERFEED TIMERS USING THE "CLEAR OVERFEED LIMITS" OR FLOW SWITCH WILL VOID NSF CERTIFICATION.

IF "CLEAR OVERFEED LIMIT" SETTING IS SET TO 24 HOURS, DO NOT SET "FEED TIME" GREATER THAN 20 HOURS AS THIS WILL VOID NSF CERTIFICATION.

IMPORTANT WARNING AND SAFETY INSTRUCTIONS

⚠ WARNING **WARNING CHEMICAL BURN HAZARD:** Make sure all pumps are switched off at the main circuit breakers at the house before drilling into any pipes. Securely fasten all electrical, water and chemical lines. Locate chemical feed pumps and chemical storage tanks in a safe and secure area.

⚠ WARNING Strictly follow the acid manufacturers safety and handling protocols including hand, body and eye protection when transferring or handling acid. Safety precautions should be used when handling Muriatic acid to control pH water levels. Muriatic acid can cause serious body injury and damage pool equipment. Extra care must be taken when installing, maintaining and operating acid pump feed systems. Acid is dangerous to handle and should be properly contained, transported, poured, stored, and dispensed.

⚠ WARNING Check the pH and sanitizer levels of the water before use.

Periodically use an independent pH and Chlorine test kit to verify that pH and chlorine is at a safe level. If the pH and Oxidation Reduction Potential (ORP) or Flow Cell sensors are broken, depleted or dirty with oils, lotions, or other contaminants, they can report inaccurate results to the system causing incorrect water chemistry, which could harm people or equipment.

Check the IntelliChem main status display each day to ensure there are no Alarm messages. See “Troubleshooting” section for more information. installing, maintaining and operating acid pump feed systems. Acid is dangerous to handle and should be properly contained, transported, poured, stored, and dispensed.

GENERAL WARNINGS AND SAFETY PRECATIONS

PLEASE READ THIS USER MANUAL completely before installing or operating the equipment. The Controller Pool and Spa Chemical Controller is a Class 1 product for protection against electric shock and a Type 1 product with regards to disconnection of the control circuits.

Be sure to observe the following safety precautions:

- Do not permit anyone untrained or under the age of 18 to use this product.
- Unit must be properly grounded.
- Front panel must be closed before power is applied.
- Always turn OFF main circuit breaker to unit and all equipment before servicing.
- Touching the controller’s internal parts could result in injury and or damage to the controller. In case of a malfunction, only a qualified technician should repair the controller.
- Risk of Electric Shock. Connect only to a grounding type receptacle protected by a ground-fault circuit interrupter (GFCI).
- Do not bury cord. Route cord to eliminate external damage.
- Be careful not to damage any of the insulation on wires or the power cord. Should the cord be damaged, return it to your dealer for a replacement. Continued use could result in fire or electric shock.
- To reduce the risk of electric shock, do not use an extension cord to connect unit to electric supply, provide a properly located GFCI.
- Never remove or install any cables on the circuit cards when power is applied, damage to the components may occur.

⚠ WARNING **CHEMICAL BURN HAZARD**

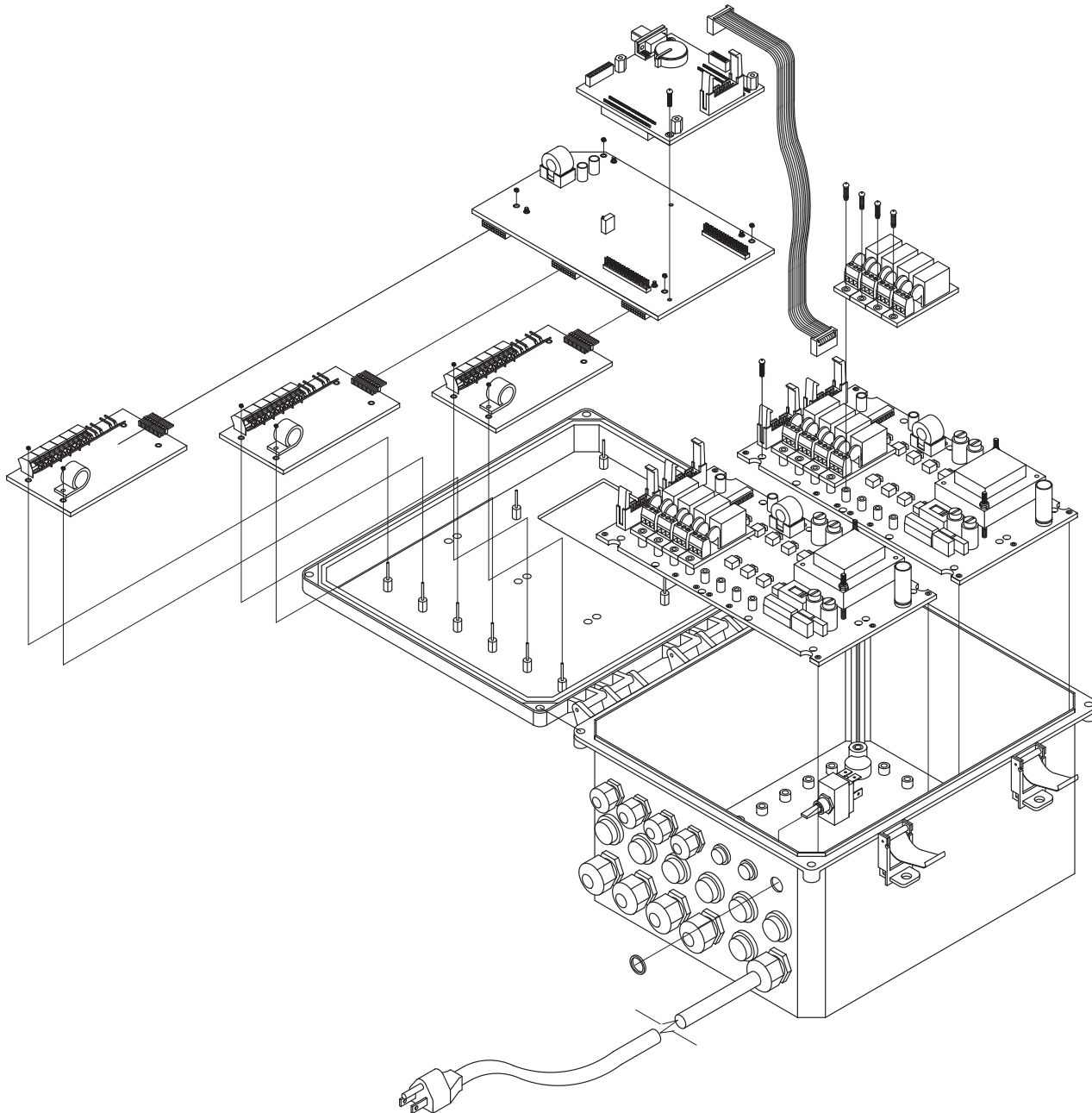
Make sure pumps are OFF before drilling into pipes.
Securely fasten all electrical, water and chemical lines. Locate chemical feed pumps and chemical storage tanks in a safe and secure area.

⚠ WARNING **CHEMICAL HAZARD CONDITION**

DO NOT TURN CHEMICAL FEED PUMPS ON WHEN BOTH FLOW CELL VALVES ARE CLOSED.

Controller Chemical Controller Installation Configuration

Exploded View



WARNING

For 230 VAC Power the Controller Input Voltage Selection Switch **MUST** be changed from 115 VAC to 230 VAC or damage will occur to the Controller. This damage is **NOT** covered by the warranty. Do **NOT** connect any load not rated for the supply voltage to any of these relays.

Parts List

DWG. #	PART #	DESCRIPTION
1		Enclosure, Controller, lid, overlay, and hardware
2	714000720	Kit, Controller, Power Switch
3	755000190	Cord, Power, Controller, GFCI ** Not permitted in all areas**
4	714000110	Strain Relief, 5/8", liquid tight
5	714000100	Strain Relif, 1/2", liquid tight
6	724000120	PCB, Relay Board, Controller, 4 NO
7	724000130	PCB, Sensor, pH, ORP, Temp, 3 switch
8	724000090	PCB, Motherboard, Controller
9	724000100	PCB, Interface Board, Controller
10	724000110	Display, Touchscreen, Controller
11		Ribbon Cable, Controller
12		Relay board mounting screws
13	724000050	Socket, Relay NO(110/24/Dry)
14	714000120	Kit, latch, Integra Enclosure

Not Shown

725000020	Modem, Standard
735000010	Modem, Wireless
724000150	PCB, Sensor, Pressure, Temp
724000160	PCB, Sensor, pH, ORP, Cond, Temp
724000180	PCB, Sensor, pH, ORP, Color, Temp
724000190	PCB, Sensor, pH, ORP, Color, Cond, Temp.
724000060	Socket, Relay, NC (110/24/Dry)

ORP and pH Sensor Replacement Part Numbers

ORP SENSOR	P/N 744000340
PH SENSOR	P/N 744000260

Controller CHEMICAL CONTROLLER OVERVIEW

Acu-Trol®[®], a technological leader in swimming pool automation, congratulates you on your selection of the Controller Chemical Controller ("Controller") swimming pool controller. The Controller will maintain the pH and sanitizer levels, maintain a set temperature, and control up to 16 external devices in a pump room, on up to three pools or spas. The Controller is specifically designed to be easy to use and install while meeting the needs of the most demanding applications.

The Controller Chemical Controller features:

MODULAR DESIGN: The Controller is designed to grow with your needs. Increase the number of bodies of water, add true PPM control, conductivity control, or add additional relays to automate your pump room. The Controller can be easily modified at the installation site with only a few basic tools.

INTERFACE: The Controller uses a touch screen display panel with a built in graphical user interface for simple operation. A full alphanumeric keyboard is available for easy calibration and programming. An automatic backlight ensures clear visibility of the touch panel, and conserves power by turning on only when the touch screen is in use.

MEMORY: The Controller has built-in memory that automatically saves your programming. If your controller ever loses power, it will retain all programmed values.

DATA RECORDING: The Controller has the ability to record data from all sensors and to store up to 6505 measurement lines, the equivalent of 271 days of hourly recordings.

CALCULATED READINGS: The Controller calculates and displays the free available chlorine, scaling index values for each body of water, and two (2) differential readings based on the four (4) pressure sensors.

RELAYS: The ability to control up to 16 relay modules enables the Controller to automate nearly every device in your pump room. There are various types of relay module configurations available to meet most load requirements.

DETAILED DISPLAY: In addition to the chemical readings, the Controller will display important information about the relays controlling each device. It will tell your operator whether each relay is currently on or off, how long each relay has been on, and any relays that have reached their programmed time limits and are now in alarm.

SENSORS: The Controller can interpret readings from many types of sensors, allowing you to measure pH, ORP, true PPM, Temperature, pressure, and conductivity. Each sensor has it's own unique circuitry, isolating it for more exact measurements.

VOLTAGE: The Controller can be configured to use either 115 VAC or 230 VAC. This allows the controller to be plugged in to an existing outlet, or wired directly in to the electrical system.

The Controller Installation, Operation and Programming Guide explains the procedures for proper installation and operation. Section one (1) the installation guide, consists of Sections 2, 3, 4, and 5, and introduces the parts of the controller and the process to follow when installing the electrical and plumbing portions. Section two (2) the operation guide, consists of Section 6, and describes all the available screens and menus of the controller, from navigating and initializing the screens to programming and customizing specifications. Section three (3) the programming guide, consists of Sections 7, 8, 9, 10, 11, and 12, and describes troubleshooting strategies, optional devices that may be added to your Controller, and many of the relevant charts and diagrams..

Technical Support

**Phone: (800) 831-7133 - Fax: (800) 284-4151
visit www.pentairpool.com and www.staritepool.com:**

The Importance of Water Maintenance

A chemical controller is designed to maintain specific levels of disinfecting and balancing chemicals. Disinfecting chemicals help to control the growth of bacteria and other organisms in the water of a pool or spa. Balancing chemicals keeps a pool or spa at a certain pH level, preventing the water from becoming acidic, and corroding the pool and its equipment, or becoming basic, and causing buildup on the equipment.

Water maintenance is an important part of operating a pool and spa. Pool operators should be trained in water maintenance by an authority recommended by their local health department. Water maintenance requirements are generally determined by the county or state and can vary widely. However, most requirements fall within the following range recommended by the National Swimming Pool Foundation:

Filtration: Minimum turnover rate of six hours for a pool and 30 minutes for a spa.

Water Balance: – pH 7.2 – 7.6, alkalinity 80-120 PPM.

Oxidation Reduction Potential (ORP) – A reading of 650 mV - 750 mV.

Total Dissolved Solids - Should not exceed 2000 PPM.
(excluding pools using a salt chlorine generator)

This information is meant to provide pool operators with a basic idea of the range of water maintenance requirements, and the importance of water maintenance. To ensure that your facility is in compliance with all local regulations please check with your local health department.

Section 2 Installation

Installation Preparation

As soon as your controller is delivered, inspect the shipping carton carefully for damage. Report any damage directly to the shipping company. Compare the packing list to the contents of the carton. If anything is missing contact your local Acu-Trol dealer. Use care when unpacking equipment to avoid damage or loss of small parts.

We strongly recommend that you plan out the pool room layout before you install the Controller Chemical Controller. Figure 1 is a sample of a pool room layout. Your layout will vary depending on your equipment, the size of your room, etc. It is important to mark and plan all electrical and plumbing connections before making changes to the existing system.

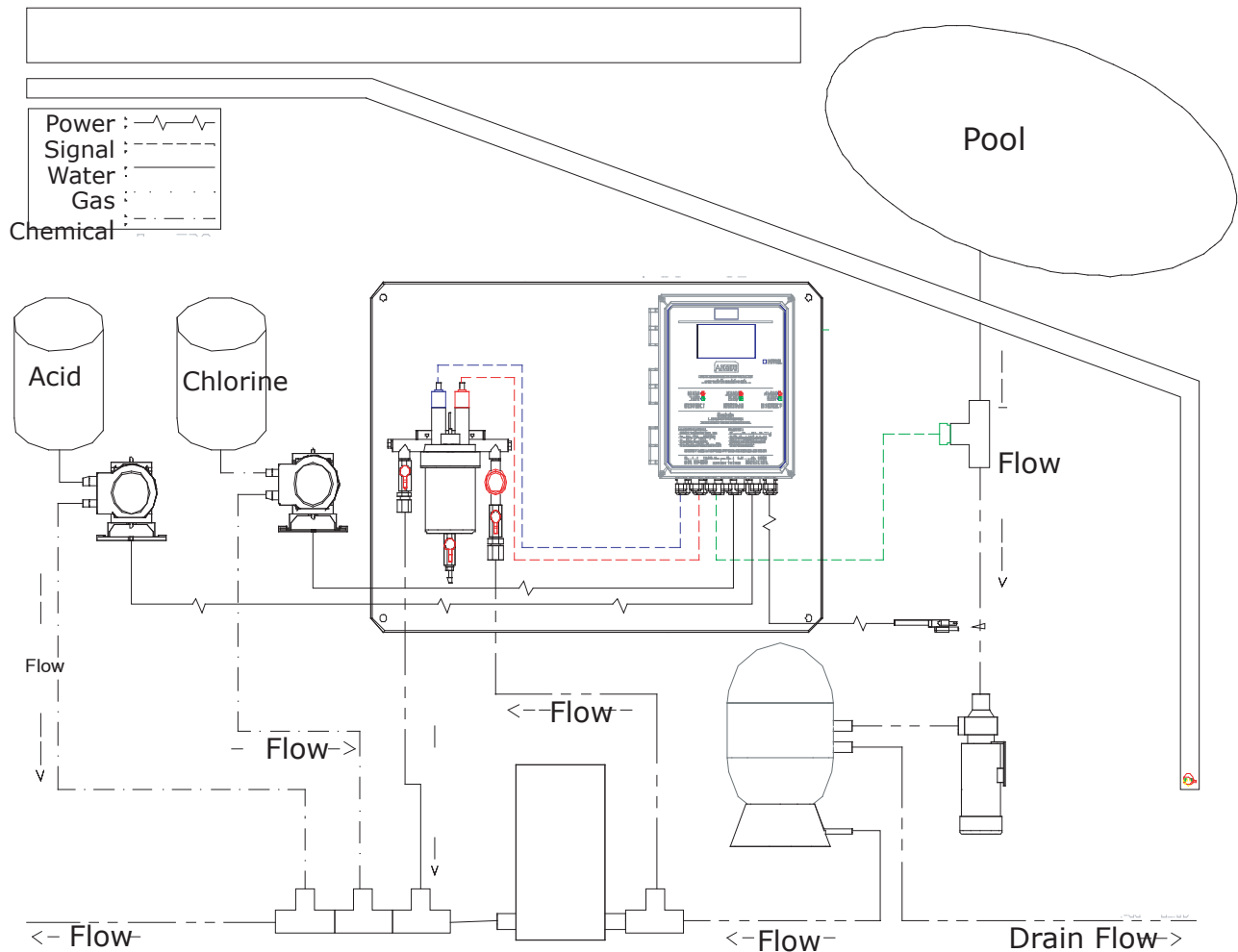


Figure 1. Controller Chemical Controller System

The modular design of the Controller allows the connection and control of any device to any relay. Determine which device you want to connect to each relay or input before you begin the installation process. For Controller can control multiple bodies of water. It is helpful if the configuration for each body of water is the same: i.e. your pH pump is always connected to relay 1.

Below are Relay and Input Mapping Tables to help in the planning and organization of new installations. Use these tables to record your input and relay configurations. This information will be valuable when the system has an alarm, or when you choose to upgrade the system to control an additional body of water.

Example Input Table

INPUT NAME	SYSTEM NAME	INPUT USED FOR
PH1	Kids Pool	Flow cell measurement for acid feed control
ORP1	Kids Pool	Flow cell measurement for Cl feed control
Temp1	Kids Pool	Flow cell measurement for heater control
FL1	Kids Pool	Flow cell magnet indicates flow

Example Relay Table

RELAY	SYSTEM NAME	RELAY USED FOR	VOLTAGE
1	Kids Pool	Acid Feed Pump	115VAC
2	Kids Pool	Erosion Feeder Solenoid	24VAC
3	Kids Pool		
4	Kids Pool	Heater Control	Dry

To simplify the installation process, Acu-Trol manufactures the Controller with default factory relay and input configurations. The factory default settings are stored in the controller and can be reloaded at any time.

Site Name _____

Input Mapping Table

INPUT NAME	SYSTEM NAME	INPUT USED FOR

Relay Mapping Table

RELAY	SYSTEM NAME	RELAY USED FOR	VOLTAGE

VOLTAGE: In most cases, the devices attached to the controller will use the same voltage as the Controller. A controller configured to use 115 VAC will not be able to run devices requiring 230 VAC, and vice versa. The Controller relay modules will switch the module's voltage to the load to turn it ON and disconnect the voltage from the load to turn it OFF.

Installation Overview

The following steps are required to completely install an Controller Chemical Controller:

1. Identify new and existing equipment to be connected.
2. Decide if the sensors will be in-line, in a separate by-pass line, or if the AK1200 flow cell will be used.

CAUTION

If the AK1200 is used, the input water maximum pressure is 25 PSI.

3. Determine the supply voltage, 115 VAC or 230 VAC, and set the supply voltage switch as necessary.
4. Determine if the control to the equipment uses the same voltage as the supply voltage. All controlled equipment must be compatible.
5. Determine the plumbing locations for the flow cell bypass inlet and outlet.
6. Mount the Controller away from direct sunlight and on a flat vertical surface.
7. Connect the supply voltage with main breaker off (Must be a separate dedicated circuit GFCI).
8. If using an AK1200 flow cell install the bypass now.
9. Connect the sensors.
10. Test the plumbing for leaks.
11. Turn on/plug in the Controller for the first time.
12. Test the equipment, using the Controller manual relay mode.
13. Calibrate the probes, then recalibrate as the probes acclimate to the water. Acclimation can take as little as two hours or as long as 24 hours.
14. Program the Controller.
15. Call or visit the controller over the next few days to insure the system is balanced and in control. Fine-tune the setup if necessary.

Mounting the Controller Chemical Controller

Select a location for mounting the Controller that will meet the following conditions:

- At least ten (10) feet from open water.

WARNING

Proper and safe operation requires an earth ground connection.

- Supply power must be routed to the Controller in accordance with the applicable codes in the area; the supplied cord is not code in some areas. Please have a licensed electrician perform any and all electrical.
- The installation surface must be solid and vertical. Do not mount the controller in a horizontal position.

WARNING

Keep the Controller out of direct sunlight and inside a room if possible, a shade screen should be used for outdoor installations.

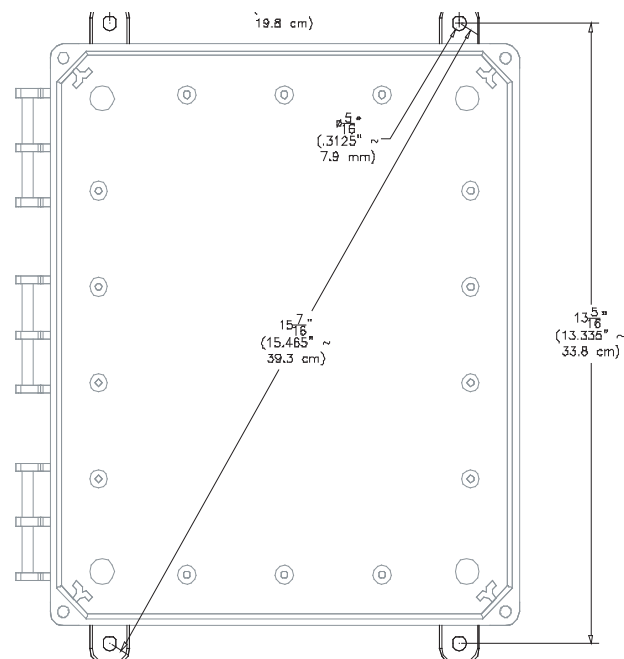
- Maintain adequate clearance for opening the enclosure door.
- The environment should be free of chemical fumes and excessive heat. Do not install the Controller in areas that exceed 110° Fahrenheit.
- Mount the controller as far as possible from potential sources of electrical interference. To mount the Controller to your chosen surface:

- Attach the four (4) mounting brackets to the back of the controller, using the supplied hardware.

- Hold the controller against the mounting surface with the lid closed and mark the four (4) holes located in the top and bottom brackets connected to the controller.

- Prepare holes as necessary and secure controller.

- Make sure the controller box is not



2.4 Plumbing Installation

Every Controller Chemical Controller installation will be different depending on the type of equipment you have, the plumbing that already exists, and the amount of available room for the installation. It is strongly suggested that you create an installation plan for the plumbing and the controller. This section gives the basic principles to be applied for any specific installation, which are listed as follows:

- Turn OFF all equipment.
- Determine a suitable location for the AK1200 Flow Cell.
(See flow cell manual for detailed setup instructions).
- Securely mount the AK1200.
- Locate where the water will be supplied from and returned to each AK1200.
- Install the supply and return lines for each AK1200.
- Locate the chemical injection points.
- Prepare and install the chemical injectors.
- Install the chemical storage containers.
- Install the sensors.
- Turn on the main circulation pump.
- Check for leaks.
- Verify flow switch magnet in AK1200 is being pushed up with the flow.
- Verify the AK1200 is not under any vacuum by opening the bottom sample valve. A stream of water should be released. If no water is released, and you see bubbling around the sample port, close the AK1200 outlet valve until the bubbling stops and a stream of water is released from the sample port.
- Leave the 1200 flow cell full of water to allow sensors to begin acclimating to system water.
- Call or visit several times over the next few days to verify system integrity

WARNING

To ensure that your installation complies with all local codes have a licensed plumber complete all plumbing installations.

Electrical Installation

Each electrical installation for the Controller Chemical Controller is different depending on the electrical codes in your local area, the types of devices you want the Controller to control, and the existing wiring in your facility. While we are unable to provide you with specific advice regarding your installation, we do suggest that you follow these basic steps.

- Identify the new and existing equipment to be connected.
- Determine the supply voltage, 115 VAC or 230 VAC and if an external ON/OFF switch is necessary.
- Determine if the equipment control voltage and supply voltage are the same.
- Connect the supply voltage. (Must be on a separate dedicated GFCI circuit)
- Connect each load to the corresponding relay.
- Connect the sensors. Route the sensor wires through the three small strain reliefs' into the controller and install them in to the appropriate connectors in the sensor module.
- The polarity (+ and -) of the pH and ORP sensors must be observed.
- The ORP sensor (+) is marked ORP+
- The pH sensor (+) is marked pH+
- The green leads are (-) polarity.
- Do not cut the sensor wires.
- After the wiring is complete, close the panel and tighten the strain reliefs'. Wrap and tie any excess wire into a coil.
- Do not stuff excess wire inside the controller.
- Test the equipment, using the Controller manual relay mode.



CAUTION

To ensure compliance with all state and local codes, have a licensed electrician perform any and all electrical work.

Input Voltage Selection

The Controller Chemical Controller operates on input voltages of 115 VAC or 230 VAC. The factory default input voltage is set for 115 VAC. The supply power is most commonly used to power the feed pumps and other external loads. If all the loads are 115 VAC then use 115 VAC and if all the loads are 230 VAC then use 230 VAC as the input voltage. It is also possible to have one relay board powered with 115 VAC and another relay board with 230 VAC. This is beneficial when there is a mix of load voltages. If you need to have your relay boards use different input voltages please contact your local Acu-Trol dealer for further instructions and assistance.

WARNING

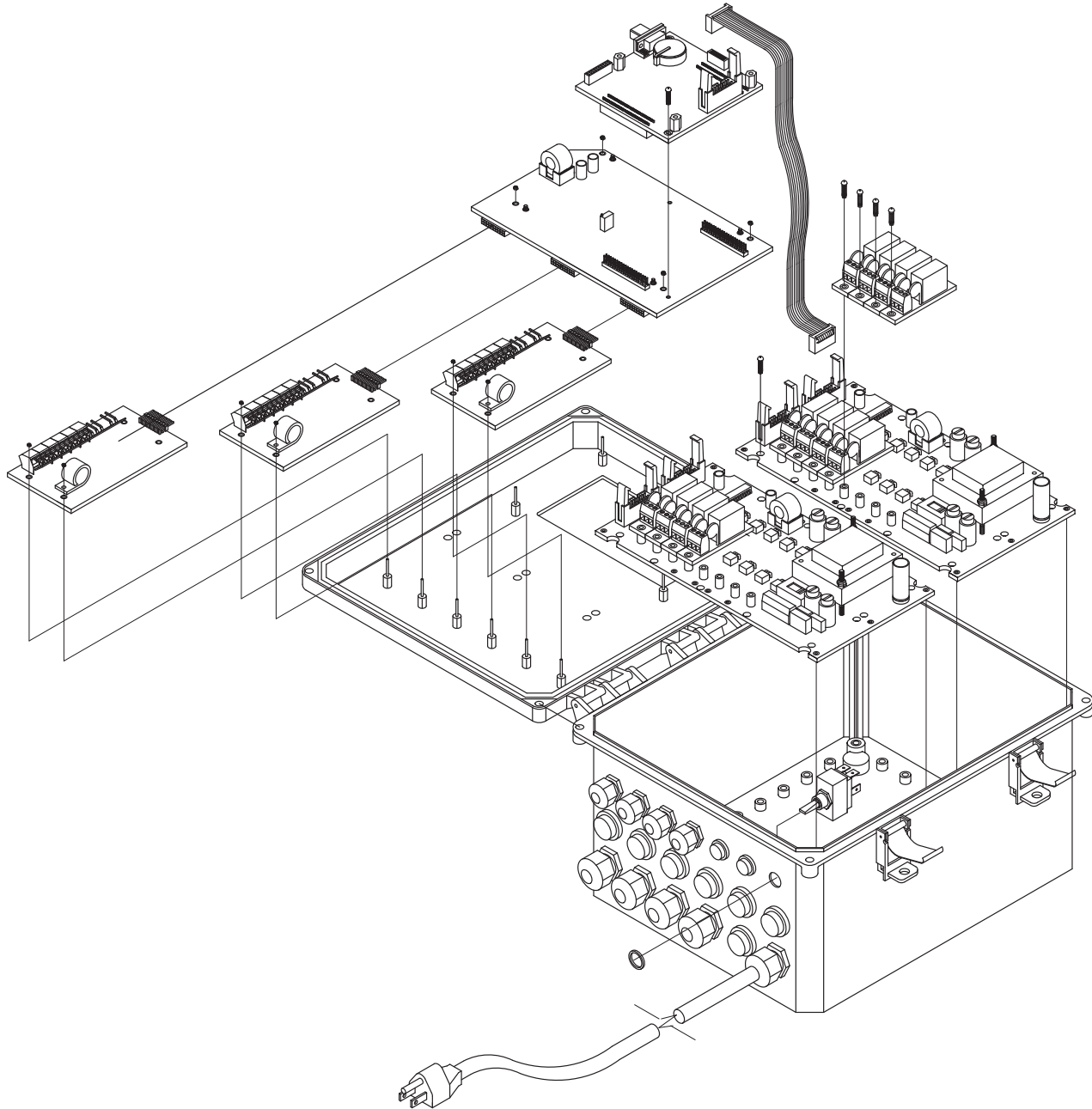
If the Controller Chemical Controller is connected to 230 VAC the voltage switch on the relay board must be changed to 230 VAC.

Electrical Limits for the Controller Chemical Controller

ITEM	DESCRIPTION	LIMIT
Input Voltage	Maximum Input AC Voltage	250 VAC
Input Current	Maximum Current for All Relays	10 Amps VAC per relay board
Input Current	Maximum Current for Single Relays	5 Amps VAC
Temperature	Minimum/Maximum Operating Temp	30-110 °F
Standby Current	Current with all relays OFF, LED ON	90 mA (AC) Typical
	Current with all relays OFF, LED OFF	65 mA (AC) Typical
Sensor Range	pH	4.2-9.8 pH units
	ORP	0-999 mV
	Temp	32 – 212°F
	AKColor PPM	0 – 8 PPM

Controller Chemical Controller Installation Configuration

Illustrated Parts View



WARNING

For 230 VAC Power the Controller Input Voltage Selection Switch **MUST** be changed from 115 VAC to 230 VAC or damage will occur to the Controller. This damage is **NOT** covered by the warranty. Do **NOT** connect any load not rated for the supply voltage to any of these relays.

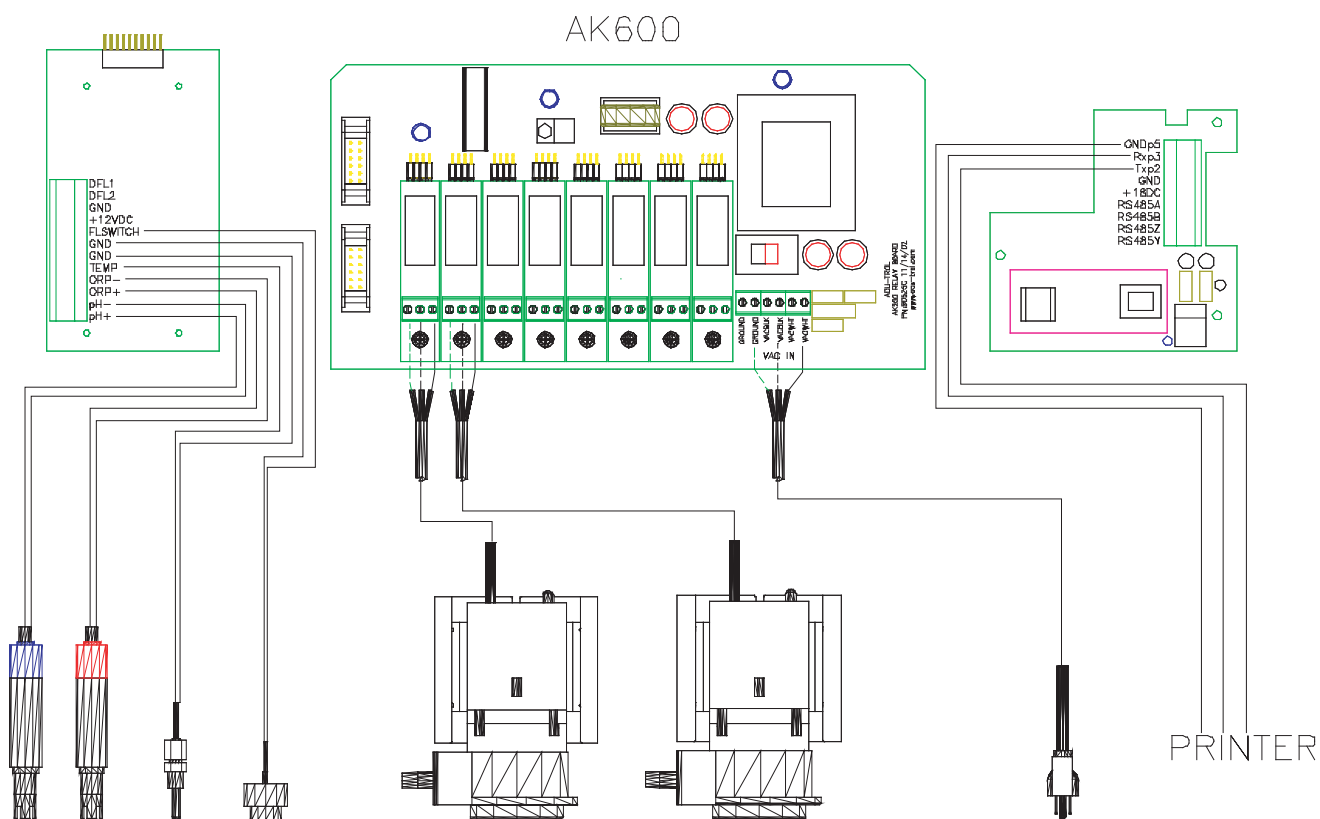
Parts List

DWG. #	PART #	DESCRIPTION
1		Enclosure, Controller, lid, overlay, and hardware
2	714000720	Kit, Controller, Power Switch
3	755000190	Cord, Power, Controller, GFCI ** Not permitted in all areas**
4	714000110	Strain Relief, 5/8", liquid tight
5	714000100	Strain Relif, 1/2", liquid tight
6	724000120	PCB, Relay Board, Controller, 4 NO
7	724000130	PCB, Sensor, pH, ORP, Temp, 3 switch
8	724000090	PCB, Motherboard, Controller
9	724000100	PCB, Interface Board, Controller
10	724000110	Display, Touchscreen, Controller
11		Ribbon Cable, Controller
12		Relay board mounting screws
13	724000050	Socket, Relay NO(110/24/Dry)
14	714000120	Kit, latch, Integra Enclosure

Not Shown

725000020	Modem, Standard
735000010	Modem, Wireless
724000150	PCB, Sensor, Pressure, Temp
724000160	PCB, Sensor, pH, ORP, Cond, Temp
724000180	PCB, Sensor, pH, ORP, Color, Temp
724000190	PCB, Sensor, pH, ORP, Color, Cond, Temp.
724000060	Socket, Relay, NC (110/24/Dry)

Controller Chemical Controller Inputs & Outputs



Chemical Feed Pump Installation

Follow the instructions included with the chemical feed pump for installation if it is not already installed. Follow the list below for location recommendations:

- Mount at least 10 feet from open water.
- Close enough to the Controller for the feed pump power cords to reach.
- Remove the electric plugs from the feed pumps and strip the ends.
- Route the power cords to the Controller through the lower fittings and attach to the appropriate relay terminals on the appropriate relay module boards.
- Conduit or external plugs can also be used (according to the codes in the local area).
- When installing metal conduit into the controller, a ground LUG should be used to connect the conduit to the relay board ground.

Solenoid Location

For a sanitizer erosion feeder a solenoid valve will be required to control the flow through the feeder. The solenoid should be installed on the inlet side of the feeder to minimize chemical contact with the internal parts of the solenoid, unless otherwise specified by the feeder manufacturer. The solenoid may have an inlet side and an outlet side; make sure the direction is correct. Special fittings for the solenoid may need to be obtained.

The control relay can supply a variety of voltages depending on the relay module installed (115, 230, 24 VAC or switch only). In order to support a 230 solenoid, a 230 supply voltage must be provided.

Erosion Feeder Location

To install a sanitizer erosion feeder follow the instructions included with the feeder for installation if it is not already installed.

Flow or Pressure Switch

It is highly recommended that a flow or pressure switch be used to prevent the Controller from feeding chemicals if the main pump is OFF. Any flow switch used in this manner should be closed when flow is present and open when flow is absent.

The AK1200 flow cell has a built in flow switch that protects against feeding chemicals in a NO flow condition.

WARNING

When using anything other than Acu-Trol switch devices the flow switch must not supply any voltage to any switch inputs or damage to the controller may occur.

Using An Existing Main Timer

After the Controller has been mounted cut the plug off the end of the supplied cord and strip the wires. Route the wires to the timer box and use an electrical strain relief connector to fasten the power cord to the box at the entry point. When using 115 VAC, connect the hot and neutral to the corresponding hot and neutral on the switched side in the timer box. For 230 VAC connect the white and black wires to the two hot wires in the timer box. For 230 VAC the Controller will use both wires as hot for two (2) phase 230 VAC or one wire as hot for single phase 230 VAC.

CAUTION

Only use proper wires and conduits for these conditions in accordance with all local codes and regulations.

Section 3 Hardware

Modules

Modules are the electronic controls and components that make up the Controller. Each module has a specific function or functions that tell the controller what information to accept, and what information to display. The modular design of the Controller enables it to interface with many types of modules including Sensor, Communication, Relay, Memory and Remote.

Sensor Modules

Sensor modules determine the types of sensors that the controller can receive signals from. There are six available sensor modules for the Controller. They are:

- AK610: pH, ORP and Temperature control, calculated PPM can also displayed.
- AK612: Pressure control, Temperature, 5 Switch inputs.
- AK613: pH, ORP, Temperature, and Conductivity/TDS control
- AK615: pH, ORP, Temperature and Colorimetric PPM control
- AK616: pH, ORP, Temperature, Colorimetric PPM and Conductivity/TDS control.
- AK617: Pressure, Temperature, 5 Switch inputs and Backwash Stager Control

The following table lists the sensor modules with the sensors they interface with. The sensor number indicates how many sensors are included with the module; * indicates the sensors not included with the sensor module.

Communication Modules

The Controller has the ability to work with several types of communication modules. The controller can communicate with a PC through an RS232 cable, a standard modem, or a wireless modem. The Controller can also communicate directly with a serial printer, and certain remote modules. Most of the communication modules can be installed simultaneously; however the corresponding hardware will only allow one communication device to function at a time.

AK620: High-speed voice modem. This modem has only the modem connector, and no other connectors

AK621: A high speed voice modem with the addition of two more com-ports. These additional comports include an additional serial RS232 interface for printers and an RS485 for remote module connections.

AK622: Two additional communication ports. These additional com-ports include an additional serial RS232 interface for printers and an RS485 for remote module connections. No modem is included in this communication module.

Wireless Modem: The wireless modem allows the controller to be accessed over the internet from any PC. Wireless modems are a perfect solution for installations without phone lines. Please note that the wireless modem and the standard modem can not be installed in the same controller.

Memory Module

The memory module expands the data recording capabilities of the Controller and enables the controller to be accessed from any touch tone telephone.

The Controller memory module expands the size of the data log in the controller. It enables the controller to record each time one of the 16 available relays turns on or off, and the corresponding time and date. The memory module will hold up to 4500 lines of relay state change data.

The Controller Voice module is included in the memory module. The memory module is required for voice operation of the Controller. The voice module enables communication with the controller from any standard touch tone telephone. This module allows the operator to hear the chemical readings and relay on and off times over the phone. He or she can then make any necessary adjustments to the controller's programming using a simple menu.

Note: For more information on the operation of memory, communication, or sensor modules please refer to the PROGRAMMING GUIDE.

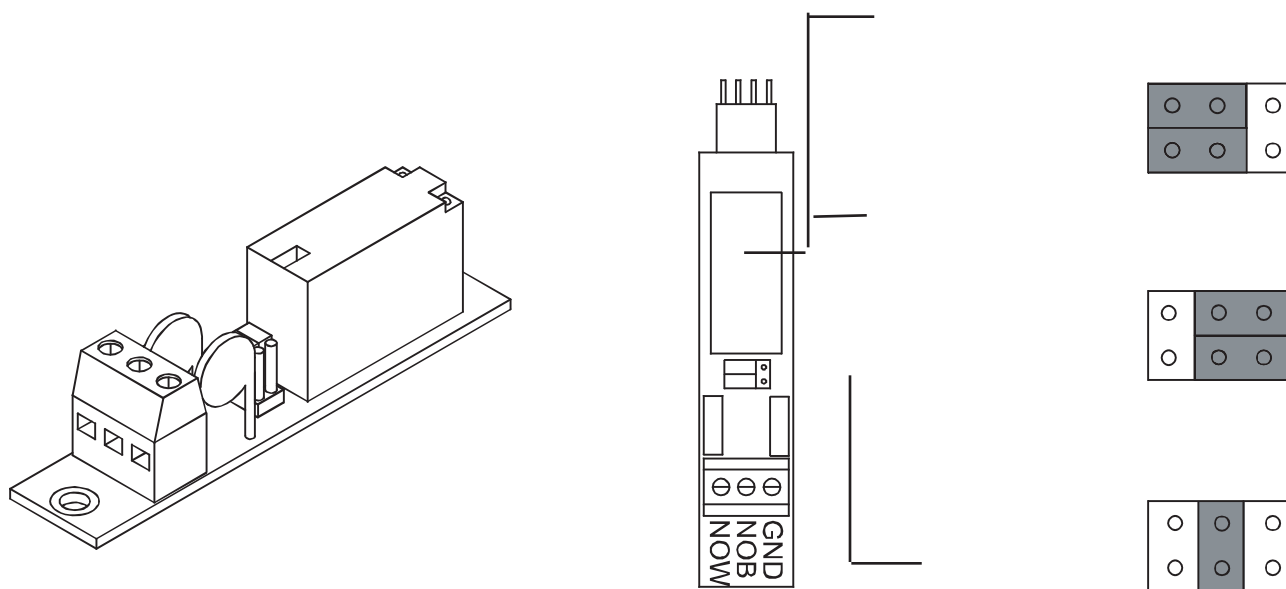


WARNING
Removing the memory chip from the board will erase all the data stored on the memory module.

Relay Modules

The AK 600 is able to automate nearly any device in your pump room. The controller uses a relay module to turn electricity to the device on and off. Each Controller can control up to 16 relay modules. Each relay module can control one device. All relay modules must be installed in a relay board. A relay board can hold 8 relay modules. An Controller can hold two relay boards. Relay boards can be installed at the factory, or added later in the field.

Relay modules are available in seven different models. The type of relay module used depends on the load requirements of the device you wish to control with the relay module. To determine the load requirements, please consult the instruction manual or the device manufacturer. Any combination of the seven models of relay modules can be installed in the eight available slots on a relay board, so long as the combination does not exceed the combined maximum current for the relay board. The combined maximum current for any individual relay board is 10 amps. The combined maximum current for two relay boards is 20 amps. The maximum relay current for the relay board is 5 amps when switching 115 VAC and .5 amps when switching 24 VAC.



- **DRY CONTACTS:** These relays act as a dry contact switch only and have no connection to the input VAC. The relay ratings are 5A and 250 VAC
- **115 VAC Normally Closed:** These relays supply the input voltage to the load when the relay is in the "OFF" mode. Note that both VAC inputs are controlled by the relay. The relay ratings are 5A and 250 VAC.
- **115 VAC Normally Open:** These relays supply the input voltage to the load when the relay is in the "ON" mode. Note that both VAC inputs are controlled by the relay. The relay ratings are 5A and 250 VAC.

- **115 VAC SPDT:** These relays are hardwired selectable to be either NO (Normally Open) or NC (Normally Closed) switching of the input voltage. They are always powered, and the wiring will dictate whether the power flows in the on or off position. The relay ratings are 5A and 250 VAC. The neutral is common for both NO and NC.
- **24 VAC Normally Closed:** These relays supply 24 VAC to the load when the relay is in the "OFF" mode. Note that both VAC inputs are controlled by the relay. The relay ratings are 5A and 250 VAC.
- **24 VAC Normally Open:** These relays supply 24 VAC to the load when the relay is in the "ON" mode. Note that both VAC inputs are controlled by the relay. The relay ratings are 5A and 250 VAC.
- **24 VAC SPDT:** These relays are hardwired selectable to be either NO (Normally Open) or NC (Normally Closed) switching of the 24 VAC. They are always powered, and the wiring will dictate whether the power flows in the on or off position. The relay ratings are 5A and 250 VAC. The neutral is common for both NO and NC.

Remote RS485 Modules

The remote modules are connected to the Controller using RS485 serial communication and require the appropriate communication module. These modules can be located up to 4000 feet from the Controller. The present modules are as follows:

AK245 Quad Output: This module has four (4) isolated outputs of which each can be configured for 0-5VDC, 0-25mA, or 4-20mA: Each output on this module is isolated and the 4-20mA includes power. These outputs can be used for variable loads and for remote monitoring equipment, including chart recorders, pumps, and valves.

AK250 Quad Input: This module has four (4) isolated inputs of which each can be configured for 0-5VDC or 4-20mA input. These inputs can be used for sensors and controls. There are also four (4) switch inputs for general switch operations.

SECTION 4 AK1200 Flow Cell

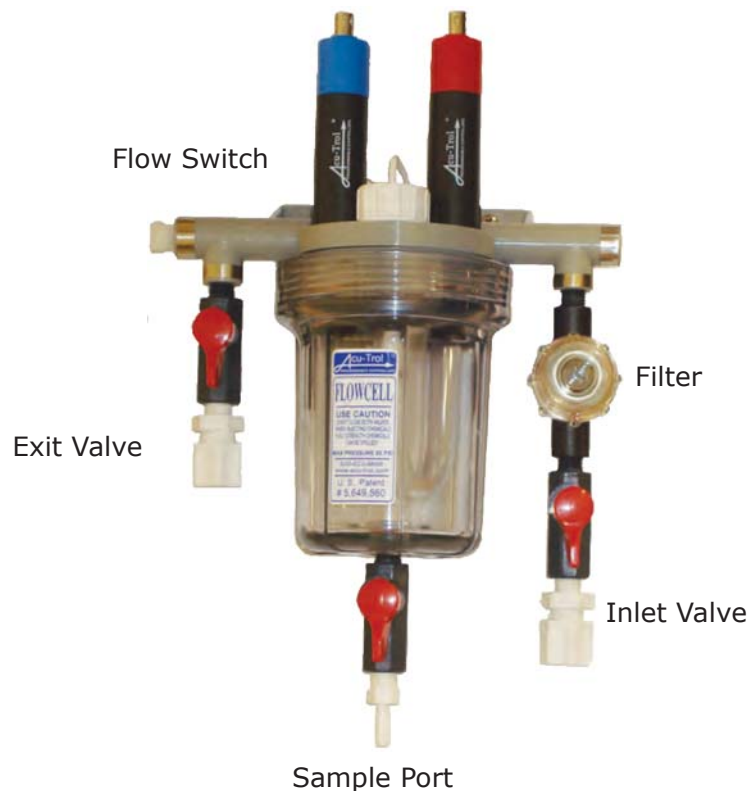
4.1 AK1200 Flow Cell

Remove flow cell from shipping carton and make sure all parts are included with AK1200 flow cell.

- 1 – AK1200 Lid
- 1 – Flow switch magnet
- 1 -Sample barb fitting
- 1 - Filter assembly w/ O-Ring
- 1 - Flow switch w/ O-Ring, 2' and 10' wire lengths available.
- 2 - Mounting screws
- 1 – AK1200 Jar with O-Ring
- 3 - ¼" Valves.
- 4 - ¼" NPT by ½" flex fittings.
- 2 - ¼" plugs.
- 1 - ¼" Close Nipple
- 1 - Thread Sealing Tape
- 1 – Pressure gauge*

Note that ½" flexible tubing is not included and must be supplied by the installer.

* Use of Pressure Gauge is Optional



Flow Cell Assembly

WARNING

DO NOT OVER TIGHTEN FITTINGS ON GRAY FLOW CELL TOP AS THIS MAY BREAK OR CRACK FLOW CELL TOP.

1. Wrap all four flex fittings with thread seal tape. Install two flex fittings into two ball valves.
2. Wrap barb fitting with thread seal tape. Install barb into remaining ball valve.
3. Wrap both ends of the close-nipple with thread seal tape. Install into the filter assembly using (either end OK). Hand-tighten only.
4. Install one ball valve into the filter.
5. Install the filter and remaining ball valves as shown in the figure.
6. Verify that the flow switch magnet is in the flow cell tube with the large, or hat end pointing down.

NOTE: Wrap fittings only twice around with thread seal tape.

Flow Cell Mounting

1. Select a suitable location for the flow cell meeting the following recommendations:
2. The flow cell location should be within ten (10) feet of the controller so the sensor wires will reach.
3. The sensors should be away from direct sunlight, as this may affect the readings.
4. The location should be where some water spillage will not damage anything. Preferably below the level of the controller.
5. Securely mount the bracket to wall using the two supplied screws.
6. Securely fasten all electrical, water and chemical lines.
7. Locate chemical feed pumps and chemical storage tanks in a safe and secure area.
8. Check filter daily for debris buildup and clean as needed.
9. To clean filter, turn both flow cell inlet and exit valves OFF, (see caution in paragraph above) remove filter cover and filter, being careful not to lose seal.
10. Clean stainless steel filter and return to housing being careful to seat it properly. The filter screen can be easily damaged if seated improperly when the cap is installed.
11. Maximum operating pressure = 25 lbs.
12. Extreme pressure variances may affect readings and can cause damage to the sensors.
13. Avoid installing the outlet before the main pump as the vacuum may damage the chemical sensors.
14. Only inject chemicals on the outlet side of the AK1200.
15. Do not over tighten fitting on flow cell top.

Inlet and Exit Lines

1. It is essential that the supply line be at a higher pressure than the discharge line so the water will flow through the cell at a steady rate in the right direction. Installing a ball valve in the main circulation line may be required if the pressure is too low.
2. Inlet should be installed after filter and before heater.
3. Exit should be installed after heater and as far away from any equipment as possible.
4. Drill and tap at above locations with 7/16" drill and 1/4" NPT tap. Choose a location on a fitting where the pipe enters so you are drilling through both the pipe and fitting to get maximum depth of thread.
5. Install 1/4" NPT by 1/2" flex fittings then route inlet and exit lines.

Sensors

1. Keep pH and ORP sensors wet at all times, install the sensors into the flow cell. Hand-tighten only and save caps for future use, fill flow cell with water. The sensors have O-Rings and don't require thread seal tape.
2. Route the flow switch wires into the controller through the strain relief and connect to the controller. One wire (either one) to ground and one to the appropriate input switch.

CAUTION

The flow switch is a dry contact only. (No Current)
Use with any other brand controller VOIDS WARRANTY

3. Route the chemical sensors into the controller through the strain relief and connect to the controller. The sensor wires are labeled and the plus and minus polarity must be observed.
4. Turn the main pump on and open the valves to test for leaks and the free movement of the magnet. The Magnet must be all the way up in order to close the flow switch. 1/4 GPM will push the magnet all the way up.

WARNING

Make sure that all pumps are OFF before drilling into pipes.

WARNING

Never turn chemical feed pumps on when both
flow cell valves are closed..

Section 5 Sensors

The Controller can accept readings from a wide variety of sensors. The sensors that the Controller is able to read depend on the sensor module installed in the controller. Each sensor has its own unique circuitry that is connected directly to the micro-controller for measurement. The pH, ORP, PPM and conductivity sensors are isolated from each other and from the input power. Isolation of each sensor ensures more accurate measurements.

The Controller measures the following sensor measurements with the listed characteristics:

1. pH
 - Range: 4.22 to 9.78, ± 0.02 .
 - This measurement is temperature compensated.
2. ORP
 - Range: 0 to 999 mV, ± 1 mV.
3. Conductivity
 - Range: 0 to 9999 μ S.
 - This measurement is temperature compensated.
4. Temperature
 - Range: 32 to 212 $^{\circ}$ F, ± 0.02 .
5. Flow Switch
 - This input measures if a switch is open or closed.
6. Flow Rate (1 to 6 inputs);
 - Range: 0 to 5000 gallons per minute.
7. Pressure (1 to 4 inputs),
 - Range: 100 PSI, ± 0.1 PSI.
 - The Controller has 12VDC available to power the sensor.
8. AKColor Colormetric PPM Sensor
 - Range 0 to 8 PPM

WARNING

Sensors are shipped with a protective cap covering the electrode tip to protect the sensing element. Sensors should be kept in the protective cap until ready for installation, if the sponge in the cap becomes dry, wet it with tap water. During shipment, air bubbles may have entered the electrode, carefully shake the electrode downward (like a thermometer) to dispel the air from the sensing elements inside the electrode. Before using the sensor, remove the cap.

pH and ORP Sensors

pH electrodes sense the acidity of the water and work with any acid or base. The blue bands on the cables identify the pH sensors. Each sensor is also identified on the sensor body. ORP electrodes are used to monitor the Oxidation-Reduction Potential (sanitization quality of the water) of a given solution. The sensing element of the ORP electrode is made of a precious metal such as platinum or gold. The red bands on the cables identify ORP sensors.

The polarity (+ and -) of the pH and ORP sensors must be observed. The ORP sensor (+) is color-coded red and the pH sensor (+) is color-coded blue, and the green leads are (-) polarity coded. Leave excess wire outside the controller enclosure. **Do not stuff excess wire inside the controller as this may cause excess strain on sensor and relay connections. Do not cut the sensor wires.** If the cable is longer than needed, it should be coiled neatly and attached under the controller enclosure.

pH and ORP Sensor Care

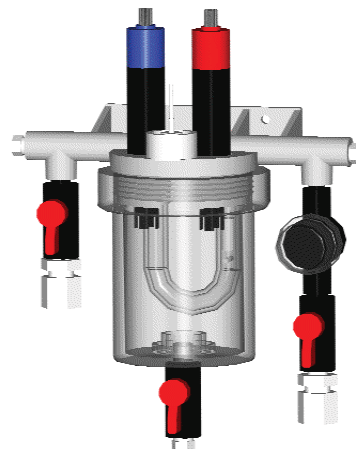
Contamination of the sensing elements often results in slow response and inaccurate readings. Clean the elements by the following procedures:

pH and ORP sensors

- Wash electrode tip in a liquid detergent and water. Carefully use a soft bristled toothbrush to wash the electrode tip and white sensing ring.
- Rinse after cleaning. To install, place in flow cell according to the diagram and hand tighten.
- Make sure the O-ring is installed on sensor.
- If the cable is longer than needed, it should be coiled neatly and attached under the cabinet.

pH Sensors Only

- Attempt to clean the sensor with liquid detergent first.
- If this is not successful, swirl the tip of the sensor in a 5 parts water 1 part muriatic acid solution for 10 - 20 seconds.
- Rinse again and reinstall.



Flow Sensors

The Controller can accept information from two types of flow sensors:

- 1) Flow switches
- 2) Digital flow sensors.

Each AK610, 611, and 613 sensor module has three (3) flow inputs. The first flow input, FS1, must be a flow switch. The Second and third flow inputs, FS2 and FS3, can be either a digital flow sensor or a flow switch.

The AK612 and 617 pressure sensor modules have five flow inputs and are primarily used for backwash operations. Each of these five flow inputs must be a flow switch. This sensor module is not compatible with digital flow sensors.

When installing a digital flow sensor, follow the instructions that come with the sensor. Most digital flow sensors will have three different colored wires. One will be a positive wire, which provides the supply voltage for the sensor.

1. The wire with the positive charge should be installed in the connection on the sensor module labeled +12.
2. The second wire will be a ground or negative voltage wire. This should be connected to the ground connection on the sensor module.
3. The third wire, the signal, should be connected to either the FS2 or FS3 slot.

Pressure Sensors

The AK612 or AK617 sensor modules have the ability to receive signals from up to four amplified pressure sensors. The Controller can accept readings from any pressure sensor that has an output of 0.500 volts at 0 PSI, and 4.50 volts at 100 PSI. Pressure measurements can not be calibrated.

When installing a pressure sensor, connect the red wire to +12, the black wire to the ground and the white wire to the pressure input on the AK612 or AK617.

Finishing your Installation

To following outlines some finishing touches needed for any good installation.

1. Verify the programming in the Controller
2. Balance the water to your desired set point.
3. Turn the Controller on, and allow it to begin automatically controlling the water balance.
4. Calibrate all sensors to the balanced water.
5. If the sensors have not finished acclimating to the system water, recalibrate the sensors the following day.
6. Call or visit several times over the next few days to fine-tune the setup and programming.
7. Submit the registration card for your controller to Acu-Trol.

Section 6 Operations

Introduction

This PROGRAMMING GUIDE introduces and describes all the available screens and menus of the Controller, from navigating and initializing the screens to programming and customizing specifications. If you have any questions after reading through this manual, please contact your local Acu-Trol dealer for further assis-

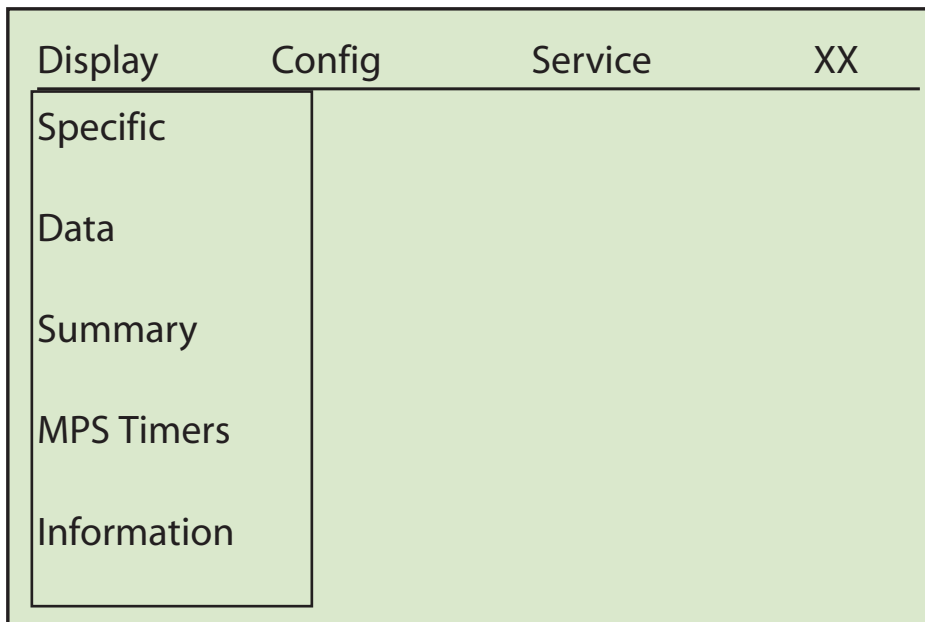
Navigating in the Controller Chemical Controller

The Controller has a touch screen display, similar to a PDA or an ATM machine. All of the menus in the Controller are accessed using this touch panel display. The touch screen display should be operated using the plastic stylus included with the controller. Hold the stylus as you would an ordinary pen, being careful not to touch the display with fingers. Do NOT exert pressure when using the stylus or you may damage the display.

WARNING

Using a pen or other sharp object on the touch screen will damage the display.

There are three main menu selections in the Controller, DISPLAY, CONFIG, and SERVICE. All other menu selections are contained in these three main menu choices. To Access one of these three main menus, touch the menu title with the stylus. Note: The small xx on the top right-hand side of the screen can be used to back out to the previous screen. Touching the left corner (hidden symbol) will exit out all the way back to the main menu.



Selecting Items

The Controller offers the option to make changes or to customize the screens. There are several methods for selecting menu items in the menu screens.

The System menus are accessed by touching the menu item title directly on the screen. In this manual, System menus are always in BOLD CAPITAL LETTERS. There are three system menus in the Controller, DISPLAY, CONFIG, and SERVICE.

Each main menu contains a series of related sub-menus. Sub-menu titles will always be in Bold Letters. To access these sub-menus, touch the sub-menu title with the stylus.

Some of the sub-menus include on-screen buttons. On-screen buttons are indicated in this manual in Bold Italic Highlighted Letters. On-Screen buttons are used to organize large sub-menus into categories. Touching an on screen button will open up a smaller section of a sub-menu. All of the items contained in a button menu will be related to a specific part or function of the controller.

A few of the buttons in the Controller are multifunction or toggling buttons 

These buttons are used in cases where there are a limited number of specific choices for a certain setting or program parameter. Pressing one of these buttons changes the button label as well as the current controller setting. Multifunction or toggling buttons will be shown in Regular Italic Highlighted Letters.

When there is a list of 7 or more items to select from, a set of directional arrows will appear at the bottom of or on the right side of the screen. These arrows are used to scroll through the list of choices. The current item will be highlighted as you scroll. When directional arrow keys appear at the top right of the screen they are used to access the previous and/or next screen.

Changing Item Values

The Controller offers several ways to change or input information in the controller. The method you will use to change a value will depend upon the type of value it is and the number of choices available for that variable. Some items will have a limited number of specific choices. In this situation a Change button will appear at the bottom right hand corner of the screen. Once you highlight the item you wish to change using the directional arrows, pressing the Change button will scroll through the choices for that item. Once you reach the choice you wish to select, use the Enter or OK button to exit and save your changes.

Other items have a longer list of specific choices. For these items you will be shown the entire list of choices, along with directional arrows to help you scroll through the choices. Once the choice you wish to select is highlighted, press the Enter or OK button at the bottom of the screen.

Many of the settings in the Controller are completely user selectable. For these settings you may enter any combination of letters, numbers, and symbols. The controller will generally prompt you for a certain number of characters, and will reject characters that do not meet certain logical standards for that specific setting. Any setting that requires a user specified value will automatically launch the alphanumeric keyboard.

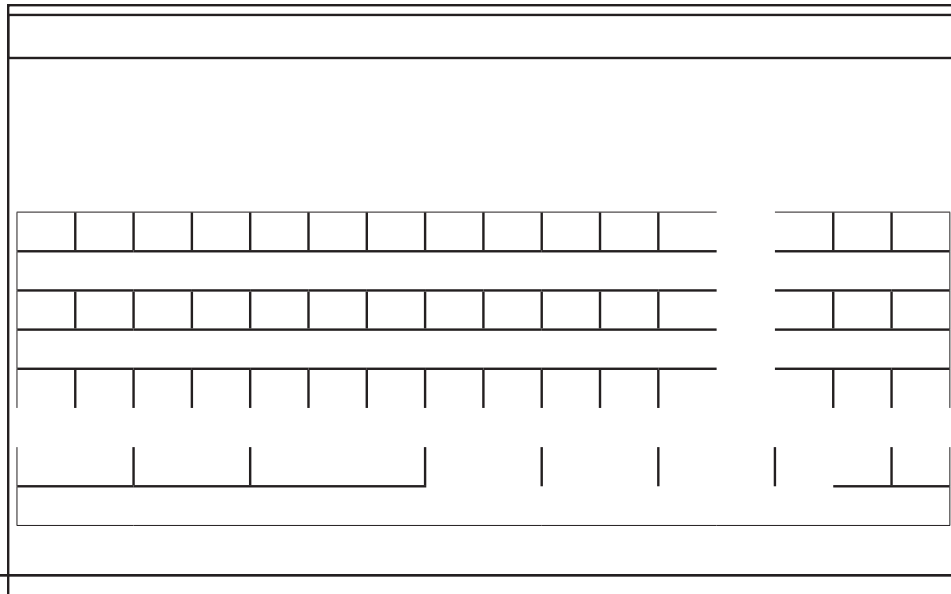
The Alphanumeric Keyboard

The Controller includes an alphanumeric keyboard with capital letters, numbers and special characters. If the item being changed needs this keyboard it will appear and the current value or text will be displayed, ready for editing. The correct format for the value being entered is shown on the guide line above the text entry line.

To edit any character, touch the character with the stylus. Then use the alphanumeric keyboard to enter a new character or change the character above the underline. Use the Enter button at the bottom of the screen to save your changes.

The top line on the alphanumeric keyboard screen holds several shortcut buttons. The "CAPS" button is used to change from capital to lower case letters. When "CAPS" is displayed, the alphanumeric keyboard will display capital letters. When "caps" is displayed, the alphanumeric keyboard will display lower case letters. Touching the "CAPS" button with the stylus will toggle between the two choices. The "d" button can be used to delete or clear a character. The "I" button will insert a space for a character in between two existing characters. The ">" and "<" buttons are used to move the cursor right and left while editing the characters.

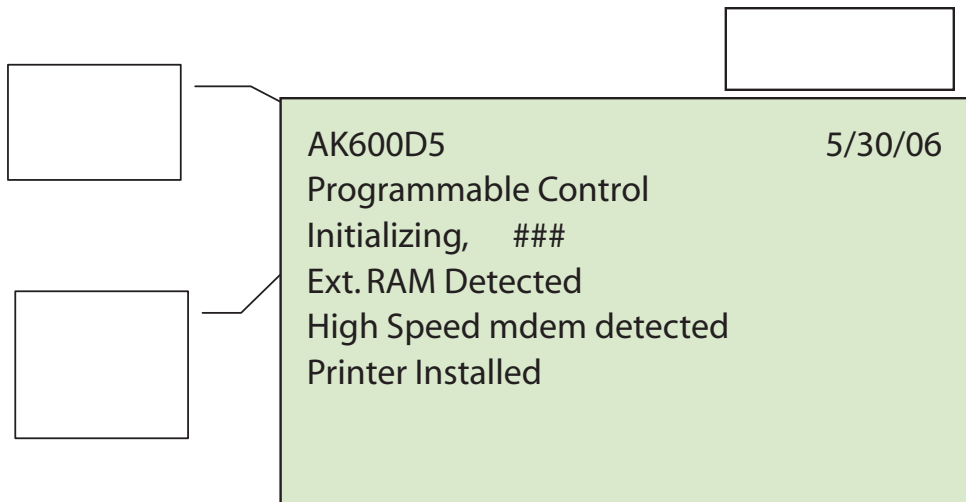
The Enter button saves your changes and closes the alphanumeric keyboard. If the values you have entered do not match the required format, an error message will appear. To return to the alphanumeric keyboard, touch the screen with your stylus. The Cancel button closes the alphanumeric keyboard without making any changes to the current settings and values. Once changes have been saved the only way to return to the original value is to re-enter it.



Initializing the Controller

Anytime the controller is turned on, the Controller will perform a brief check of its internal systems and load variables into memory for operation. After this check the controller will open the initialization screen and display the results of this check.

The initialization screen displays information about the controller. It will tell the operator the model of the controller, the version of firmware the controller is using, and display a list of detected hardware. This list may include modems, printers, sensor cards, and memory modules; the exact list is determined by the components in your controller. If the external memory module was previously installed and is now not detected, an error message will be displayed in the initialization screen.



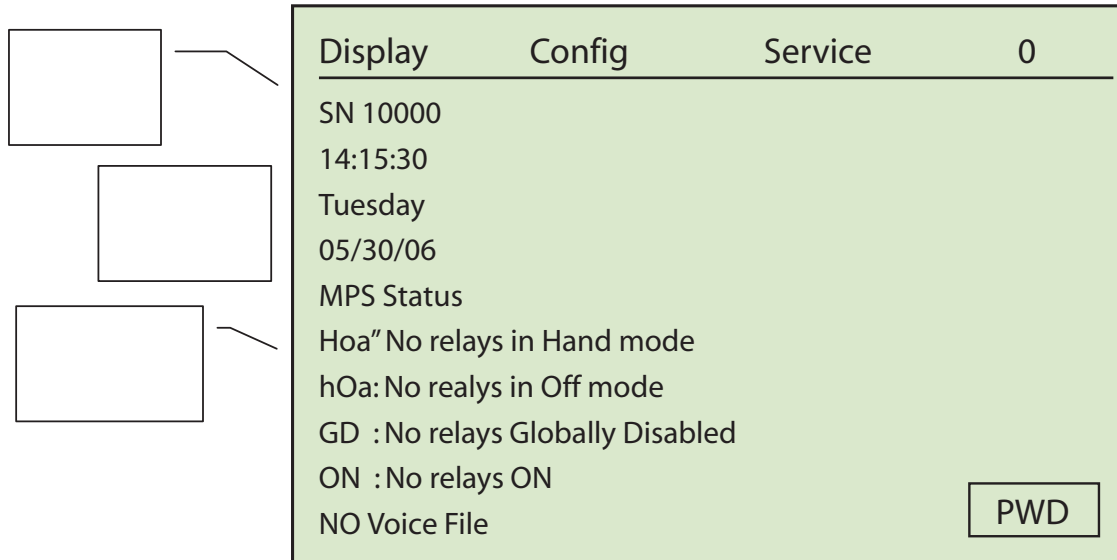
Once all initialization tests have been passed, the controller will automatically open the Dealer Information screen.

Acu-Trol Multi System Control XX

Pentair Water Pool and Spa®
10951 W. Los Angeles Ave.
Moorpark, CA 93021
(800)-831-7133
www.pentairpool.com

Section 7 The System Menu

Once the controller has identified itself, it will open the system menu screen. The system menu screen displays the unique serial ID number for your Controller. It also displays the current time, day and date. The MPS status for the relays is also displayed on the system menu screen. This information will tell you if any relays have been changed to manual operation only, turned off, or globally disabled.



NOTE

If the external memory is installed, but the voice file is missing or corrupt, the message "No Voice File" will be displayed on this screen.

NOTE

The serial number, time day and date may be replaced with various warning messages and not always displayed on the system menu screen.

The Controller has many features to protect the security of your pool or spa. Your controller can be programmed with up to 7 passwords, providing 4 access levels. The default factory setting for the Controller does not have any passwords. You may choose to program passwords as a part of your set up. Once a password or passwords have been programmed, no one will be able to progress beyond the display menu without entering the password. To enter a password, press the PWD button on the bottom right hand corner of the system menu screen. The alphanumeric keyboard will automatically open for you to enter the password.

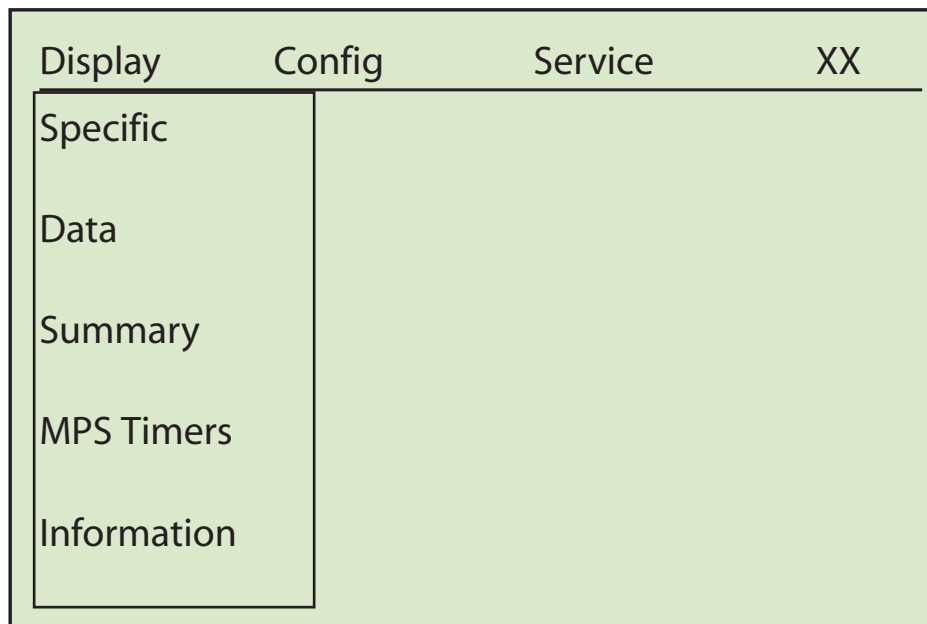
There are three menu headings on the System menu screen. These three menus, DISPLAY, CONFIG and SERVICE, are opened by touching the appropriate heading with your stylus. After touching one of the three system menu headings, a drop down menu will appear and display the sub-menus underneath each system menu.

The Display Menu

The DISPLAY MENU has five sub-menus, Specific, Data, Summary, MPS Timers, and Information. Each of these sub-menus will help you to view the data captured by the Controller.

- The Specific sub-menu displays an overview of chemical levels and feed times for each pool or spa controlled by the Controller
- The Data sub-menu displays the data recorded from the sensors at a set interval.
- The Summary submenu displays the chemical levels for up to three pools or spas
- The MPS Timers submenu displays the status of each mini program
- The Information submenu displays information about the status of the Controller.

A more detailed description of each display submenu will follow this section.



The Specific Display Screen

The Specific Screen displays an overview of the current chemical levels and feed times for one pool or spa. When the Controller is controlling more than one pool or spa, a series of numbers will appear next to the screen title, System. These numbers correspond with a specific body of water. To view information on a specific pool or spa, press the corresponding number in the screen heading.

System	<input type="checkbox"/> 1	2	3	XX
ITEM	Meas	Set	On Today	Flow
pH1	7.06 <input type="checkbox"/>	7.50	00:00:00	1 <input type="checkbox"/>
ORP	486 <input type="checkbox"/>	700	02:23:26	2 <input type="checkbox"/> 3 <input type="checkbox"/>
Temp1	77.5 <input type="checkbox"/>	76.9	01:36:17	
P1L	0.0			
P1H	2.9			

Specific Screen

The specific screen can display measurements from eight sensor inputs. The controller will display the name of each sensor input along with its current measurement, the user specified set point, the time the corresponding feed devices have been on in the last 24 hours, and whether the flow to the system is on or off. You may change the order that the sensor displays this information in.

Each column on the specific screen serves a specific function. The Controller is designed so that the operator can find the current measurement for each sensor input quickly and easily. The name of each sensor input being received is displayed under the ITEM heading.

All current measurements are displayed under the Meas heading. The box next to the current measurement is used to display whether the corresponding relay is currently on or off. An X in this box indicates that the relay is currently on. An O in this box indicates that the feed relay has already been on for its maximum allotted time. This is called an overfeed alarm. The controller will not allow this relay to feed more chemicals in to the system until the overfeed timers are reset. An "a" to the left of the relay status box indicates that an alarm condition for that relay exists.

The ON TODAY heading displays the total time that the associated relay has been on since the controller was reset. The Controller factory default settings will reset the controller every 24 hours at 8:00 am. The controller can also be manually reset.

The Flow column is used to indicate whether or not there is flow in the system. When there is flow an X will appear in the box. The box will be empty if no flow is detected.

If the Controller has any kind of alarm it will alert you here. The controller will display the alarm condition, as well as the relay that has met or exceeded this condition. More information about specific alarm codes may be found on p. .


The Data Display Screen

The Data Display screen displays recorded data from selected sensors. The operator has the ability to choose how often the controller will record its readings. The Controller can record data at any interval in the range of two (2) seconds to eighteen (18) hours. In the absence of power, the Controller retains all recorded data and program values for up to ten (10) years.





Mm/dd	hh:mm	pH1	ORP	PPM1	Temp	xx
05/30	14:00	7.06	485	1.01	77.7	
05/30	13:00	7.06	486	1.02	77.5	
05/30	12:00	7.06	486	1.01	77.7	
05/30	11:00	7.05	485	1.02	77.8	
05/30	10:00	7.05	485	1.03	77.7	
05/30	09:00	7.05	486	1.05	77.9	
05/30	08:00	7.06	475	1.01	78.7	
05/30	07:00	7.06	475	.95	80.3	
05/30	06:00	7.07	470	.91	80.5	
05/30	05:00	7.07	473	.90	79.7	

Data Display Screen

The Data Display screen will show up to 10 lines of recorded readings at a time. The controller will automatically display the 10 most recent recorded data lines. Each line of data contains the time and date of the recording, and the sensor readings at the time the record was made. Sensor data readings from Modules 1-3 may be obtained by touching the desired module one, two or three (1, 2, or 3), on the bottom right hand portion of the screen.

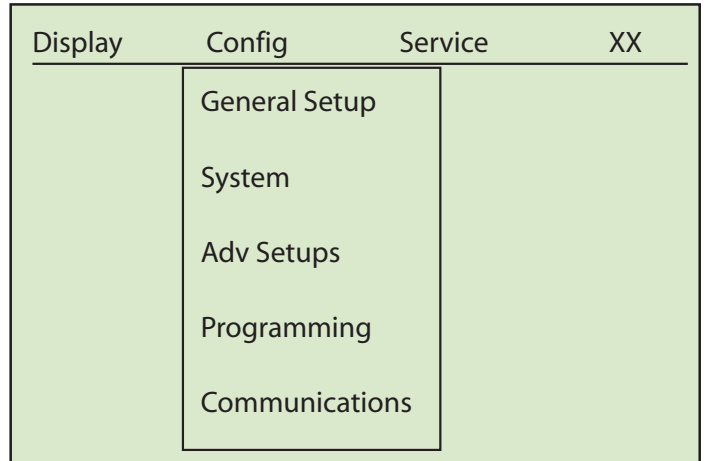
The status code of the flow, alarm, remote, modem, and password security level for all three sets of sensors are recorded during each reading. To view these status code readings, usually referred to as the FARMP readings, use the right arrow button  while in the data display screen. The status code reading is displayed under the first letter of the device name.

- F
 - o the Flow status code,
 - Records whether the flow was on or off at the time of the reading.
 - 1 = Flow
 - 0 = No Flow
- A
 - o the Alarm status code,
 - Records whether or not any alarms were on at the time of the reading.
 - 1 = Alarm
 - 0 = No Alarm
- R
 - o the RS232 status code,
 - Records whether an RS232 connection was in use since the last reading.
 - 1 = RS232 Connection in use
 - 0 = RS232 Connection not in use
- M
 - o the Modem status code,
 - Records whether or not the installed modem was in use since the last reading.
 - 1 = Modem in use
 - 0 = Modem not in use
- P
 - o The user determined password level
 - Records the pre-determined password level of anyone using the controller since the last reading.
- B
 - o The Backlight Status
 - Records Whether or not the touch screen backlight was on at the time of the reading.
 - B = Backlight on
 - = Backlight not on
- W
 - o Sensor Warning
 - Sensors may have been over calibrated or need to be replaced
 - W = Sensor Warning
 - = no sensor warning

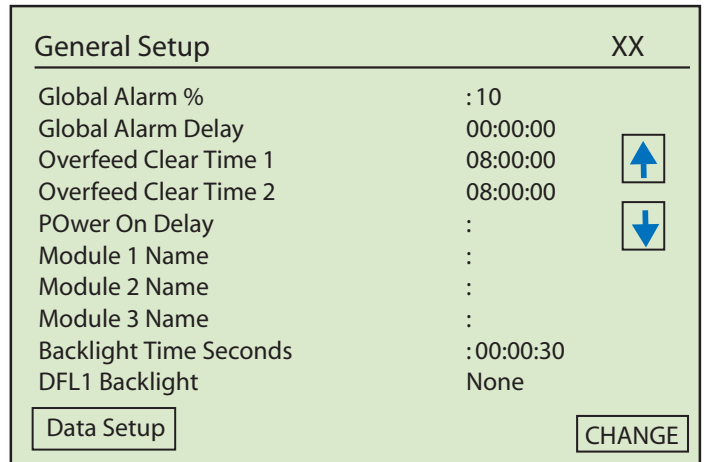
The Controller has the ability to store 6505 lines of data, the equivalent of 271 days of hourly recordings. To view more data measurement lines, you can scroll line by line using the up and down arrow     buttons on the bottom of the screen. To scroll more quickly through the data, the page down PD and page up PU buttons will move your view up or down a page. A page in the data display screen is the equivalent of 10 lines of data. To find data from a specific day, the day down DD button will take you to the first reading of the previous date and day up DU buttons will move you to the first reading of the following date. To see additional information on the same line, use the left and right arrow buttons.

Program the Data Recording Interval

The factory default data recording interval is one hour. To change the data recording interval start in the system screen. Open the CONFIG menu by pressing on the heading with your stylus

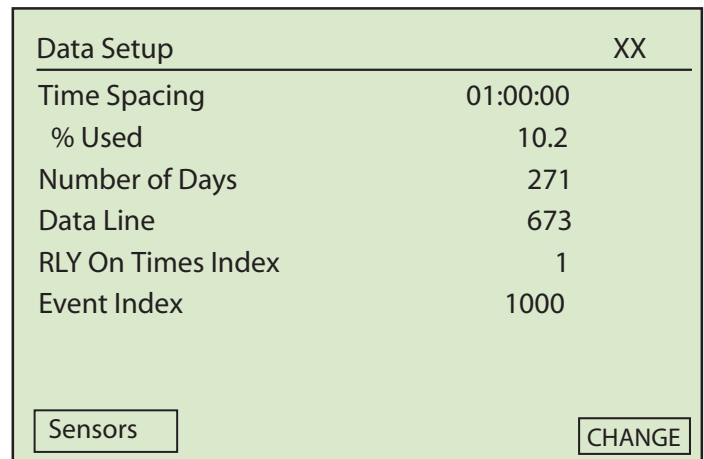


Open the General Setup Menu by pressing on the menu title with your



Open the Data Setup menu by pressing the Data Setup button.

The Data Setup menu will open with the time spacing already highlighted. Press the change button with your stylus. The alpha numeric keyboard will automatically open and prompt you for a new data recording interval.



Summary Display Screen

The Summary Screen provides a brief overview of the sensor readings and relay status for all systems controlled by the Controller. For each system, the Controller will display the current pH reading, the current ORP reading, the current temperature, the feed relay status, and the flow status for each individual system.

SYS 1			SYS 2			SYS3			XX			
pH1	7.06	<input type="checkbox"/>	pH1	7.06	<input type="checkbox"/>	pH1	7.06	<input type="checkbox"/>				
ORP1	486	<input type="checkbox"/>	ORP1	486	<input type="checkbox"/>	ORP1	486	<input type="checkbox"/>				
TEMP	77.5	<input type="checkbox"/>	TEMP	77.5	<input type="checkbox"/>	TEMP	77.5	<input type="checkbox"/>				
F1	<input type="checkbox"/>	F2	<input type="checkbox"/>	F3	<input type="checkbox"/>	F1	<input type="checkbox"/>	F2	<input type="checkbox"/>	F3	<input type="checkbox"/>	
NEXT	R1-R12:	x										PWD

The Controller will display the status of the feed relays controlling the chemicals to the system. The feed relay status is displayed in a box to the right of the current sensor reading. If the feed relay status box has an "O" inside, the relay assigned to this sensor is in overfeed and will not turn on again until the overfeed timer is cleared. An X in the feed relay status box indicates that the relay is currently on. On occasion a letter "a" will appear to the right of the feed relay status box. This "a" indicates that the feed relay is in alarm.

The summary screen also displays the flow switch status for each system. The flow status is located on the bottom left hand side of the summary screen. The system is identified by an F and then the number of the system, 1, 2, or 3. The box to the right of the System number is used to display the status of that system. An "X" will appear in this box when there is flow in the system.

The status for each of the first 12 relays in the Controller is displayed along the bottom of the summary screen. There are twelve individual boxes. The order of these boxes is the same as the numbering scheme of the relays: relay one status is displayed in the first box, relay 12 status in the last box, etc. When a relay is on an "X" will appear in its specific box.

The summary screen will be slightly different depending on the types of sensors and devices you have installed on your Controller. If the Controller has been set up to work with an AK Color system with an AK615 or AK616 sensor module, the letter "c" will appear to the right of the SYS 3 heading. For more information on the AK Color refer to Section 12.1.

The summary screen also contains a brief overview of information that can help you to maintain your water balance. The Water balance screen is reached by pressing the NEXT button at the bottom right hand corner of the summary screen.

	SYS 1	SYS 2	SYS 3	XX
Alkalinity	80	80	80	
Hardness	450	450	450	
TDS PPM	1500	1300	1500	
Cyanuric	0	0	0	
Langelier (LSI)	0.0 B	0.0 B	0.0 B	
Puckorius (PSI)	7.55 B	7.55 B	7.55 B	
Ryzner (RSI)	7.06 C	7.06 C	7.06 C	
NaCl PPM	27647	27647	27647	
B = Balanced C = Corrosive S = Scaling				
<input type="button" value="NEXT"/>				

The Controller will calculate your waters score on several water balance indices based on the sensor measurements and some values that must be entered by the operator. A "C" will appear next to any index value that indicates your water is corrosive. A "B" will appear next to any index value that indicates your water is balanced. An "S" will appear next to any index value that indicates your water is scaling.

NET	CH1	CH2	CH3	CH4	SW1234	xx
1	0	0	0	0	0000	
2	0.0	0.0	0.0	0.0	0000	
3	0	0	0	0	0000	
4	0	0	0	0	0000	
5	0	0	0	0	0000	
1	0	0	0	0	0000	
2	0	0	0	0	0000	
3	0	0	0	0	0000	
4	0	0	0	0	0000	
5	0	0	0	0	0000	
<input type="button" value="NEXT"/>						

Touching NEXT again will take you to the RS485 network screen. These screens allow you to view

sensor values of any networked sensors. The Controller can display information from five networked sensors. The RS485 network screen is actually two screens combined in to one display: the first five lines on the screen displays the sensor values, and the

NOTE

If no network items are installed, the NEXT button takes you back to the summary screen.

MPS Timers

The relays in the Controller are organized in to five distinct groups. The physical, or R relays are used to

Alarm or A relays are used to turn on an alarm condition when user specified conditions are met. "A" relays

to call a specific pager number and to send it a user specified numeric string of information. "P" relays are

To view the status of a specific group of relays, use the appropriately lettered button at the bottom of the

MPS timers are grouped numerically by relay group when displayed. The first four R MPS timers will always be displayed first. To view other timers, press the NEXT 4 button on the bottom right of the screen.

MPS#	TOTAL	ON-TODAY	TIMER	xx
R 1	0000:13	00:00:00	00:00:00	
	Day Count: 0		Cnt: 0	
R 2	0006:51	00:12:20	00:00:39	
	Day Count: 0		Cnt: 348	
R 3	0000:19	00:00:00	00:00:00	
	Day Count: 0		Cnt: 0	
R 4	0002:22	00:18:17	00:00:10	
	Day Count: 1		Cnt: 237	

R
S
A
PVE

PREV 4
OK
NEXT 4

turning on again. They can also tell the controller to page or call a specific technician when a specific

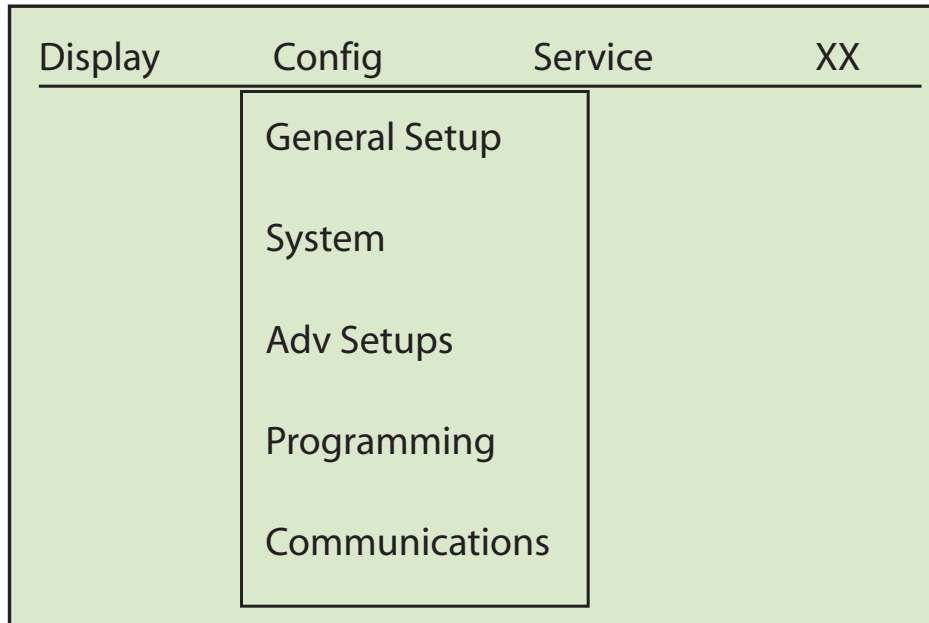
grams. Relays in the Controller are configured at the factory to accept any of the mini programs and function

Information Screen

AK600D5 5/30/06		xx
1. Power On Cycles		32
2. Total Hours On		1056
3. Serial Number		10000
4. Future		
5. MPS Delay		0
6. Relays On		1
7. Watchdog Timer:		0
8. Constant Checksum		###
9. FAULTS:	NO SYSTEM FAULTS	
10. Model	AK600D5 (Date)	
11. F1= gpm, Tot = kgal, Temp = Far		

has a specific failure code. The message indicates which fault is present. Controllers with a



configured to display Flow Rate, Total Flow, and Temperature in. The Controller can display



Configuration Screen

General Setup Screen

is used to set alarm parameters, the overfeed reset time, and to name each system for easy identification. The

General Setup		XX
Global Alarm %	: 10	
Global Alarm Delay	00:00:00	
Overfeed Clear Time 1	08:00:00	
Overfeed Clear Time 2	08:00:00	
POwer On Delay	:	
Module 1 Name	:	
Module 2 Name	:	
Module 3 Name	:	
Backlight Time Seconds	:00:00:30	
DFL1 Backlight	None	
<input type="button" value="Data Setup"/>		<input type="button" value="CHANGE"/>

Global Alarm %

The Specific display screen and the Summary display screen both display the letter "a" next to a sensor

Global Alarm Delay

Some fluctuation of the chemical levels is normal in every body of water. A reading outside of the

the Controller will delay activating its alarm LED and any programmed pager routines for a specific period

Alarm Delay. If the delay is changed in the Config/General menu there is nothing else that has changed and

Overfeed Clear Times

NOTE: The Controller's Overfeed feature is equivalent to the amount of time the chemical feeders will feed during an alarm condition.

Module 1, 2, or 3 Name

be displaying 3 ORP values, 3 pH values, etc. In order to make it easy to assign measurements to a specific

Backlight Time

DFL1 Backlight

The Controller is configured to allow a user to turn on the Controller backlight with an external switch

Data Setup

Data Setup	XX
Time Spacing	01:00:00
% Used	10.2
Number of Days	271
Data Line	673
RLY On Times Index	1
Event Index	1000

Time Spacing

% Used

This line displays the percentage of the data memory that has been filled. When 100% of the data memory has been filled the controller will begin to record over the existing data, oldest data first.

Number of Days

The Controller will use the user specified time spacing to calculate the number of day's worth of readings

Data Line

6700 available data lines. When all the data lines have been filled, the Controller will begin to record over the existing data, deleting the oldest data line first.





Relay On Times Index

Event Index

The example below is an actual section from a data index. The first column is the date, the second is the

Graphing the Event Index

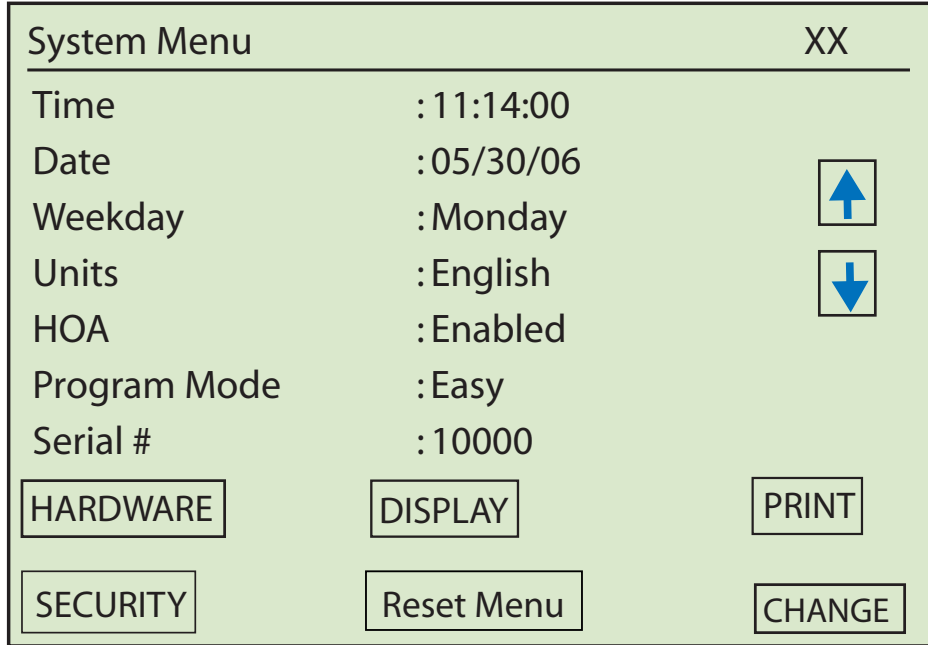
Sensor Setup

MODULE		Sensor Setup			XX
Measurement	M1	M2	M3		
PH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
ORP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
PPM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Temp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Cond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Cond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Flow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Phigh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="button" value="Toggle"/>	<input type="button" value="Toggle"/>			<input type="button" value="CHANGE"/>	

these additional choices, use the toggle buttons on the lower left hand side of the screen. The first TOGGLE

choices on the fifth line; the sensor choices available in this second menu include Flo1, Flo2, Tot1, TOT2, CPPM, and TPPM. The second TOGGLE button will scroll through choices on the sixth line; the sensor

The System Menu



One of your first steps to set up an Controller will be to set the Time, Date, Weekday, Units, and Mode.

Time

Date

Weekday

Units

Program Mode

(Version D6 and Higher)

CAUTION

When editing an MPS, if sequences other than 1 are used the MPS will default to advanced programming. If an MPS is contained in advanced programming, its associated values can be edited at any time in easy programming, so long as only sequence 1 is used.

HOA

configured to allow the operator to change easily between manual operation, having certain relays off altogether, and allowing the programming to manage the controller. This configuration is called HOA mode.

Serial Number

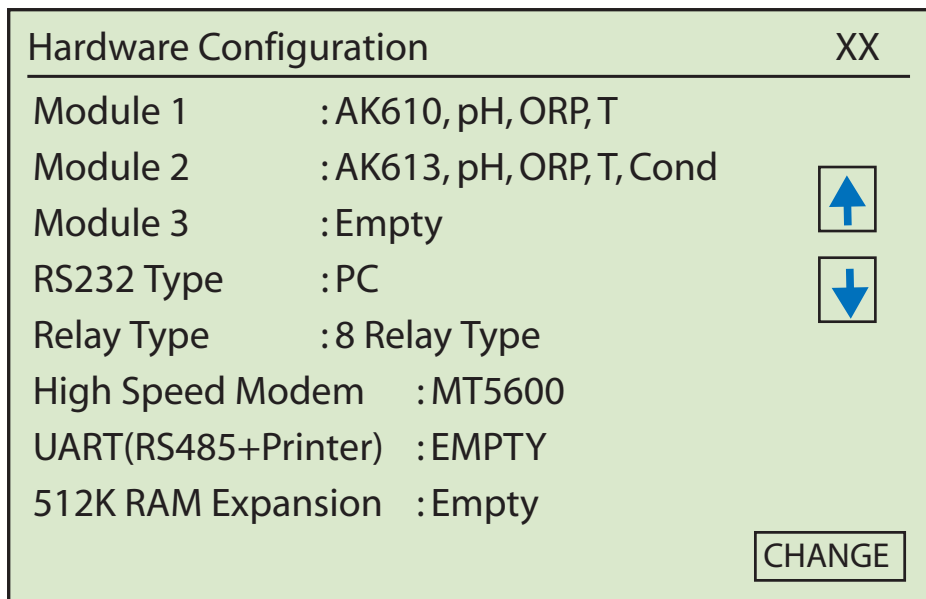
The serial number can be viewed [here](#). The serial number is a unique identification number for your Con

The System Menu Sub Menus

Hardware Configuration

The Hardware Configuration sub-menu is used when the sensor modules in the Controller are expanded or changed. To open the Hardware Configuration menu, touch the HARDWARE button, in the System menu.

The Hardware Configuration menu contains a list of each installed sensor module. This list is organized by



Hardware Configuration Screen

To navigate the Hardware Configuration Menu, use directional arrows to highlight the sensor module you

configured at the factory with the correct sensor modules. This step will only be necessary if you uninstall or

controller will then ask you; “Do you want to reset the associated 4 relays to the factory defaults for Module type of sensor module. Pressing "N" will not make any changes to the current programming.

CAUTION

The AK612 pressure sensor can only be installed in module three (M3).

The hardware configuration menu is also used to selecte the communication method being used by the con

In addition, the hardware configuration menu is used to select the type of relay board being used by your

Display

#	RLY MEAS	RLY MEAS	RLY MEAS	XX
1.	1 pH1	5 pH2	0 pH3	
2.	2 ORP1	6 ORP2	0 ORP3	
3.	0	0	0	
4.	4 Temp1	8 Temp2	0 Temp3	
5.	0	0	0	
6.	0	0	0	
7.	0	0	0	
8.	0	0	0	
9.	0	0	0	

↑
↓
←
→
CHANGE

Display Setup

to select which measurement will be displayed on a specific line. It also will enable the user to select the



condition for each line. It is also possible to select a specific relay to associate with a specific

Display Setup		XX
Relay: 1 1 - 16	pH	
	Cond2	<input checked="" type="checkbox"/>
	PPM2	
	Temp2	
	Orp2	
	pH2	
	cond3	
	PPM3	
	Temp3	
	ORP3	
	pH3	
<input type="button" value="OK"/>		

- Cond1, 2, 3: Conductivity measurements monitor the mineral content of the water. These
- F11, 2, 3, 4, 5, 6: Digital flow inputs monitor the rate of flow of the water in the system. These inputs should be connected to digital flow meters only. The output is displayed in gallons per
 specific sensor module is not required to monitor digital flow meters. Digital flow meters do not have a default configuration, and will need to be configured manually.



- Lan1, 2, 3: The Langlier saturation index is an indication of the waters tendency to be scaling,
- ORP1, 2, 3: ORP is the oxidation reduction potential measurement of the water. This
- Temp1, 2, 3: The temperature inputs require the AK10K negative coefficient thermistor.
- P1H, P2H: Pressure High is used to identify the high pressure input for the differential
- P1L, P2L: Pressure, low is used to identify the low pressure input for the differential
- PPM1, 2, 3: The Controller can use the AK610 sensor card to display a calculated PPM reading.
- pH 1, 2, 3: The pH of the water in your system is very important for pool maintenance.
- TPPM 1, 2, 3: There are two types of chlorine in your system: free chlorine which is available for
- CPPM 1, 2, 3: There are two types of chlorine in your system: free chlorine which is available for

Printer Setup

Printer Setup		XX
Moterhboard RS232	PC	
Print time Interval	01:00:00	
Printer Type	Wide	
If Modem Board Installed		
Printer assigned to the Modem RS232.		
Changing the Motehrboard RS232 disables communications with the PC.		
<input type="button" value="Send Setup to Printer"/>		
<input type="button" value="Send Data to Printer"/>		<input type="button" value="CHANGE"/>

RS232 method: The first method uses the RS232 connector on the motherboard. An RS232 cable is used to

To prepare to print, press the Send Setup to Printer: This will send the setup file to the printer. To print, press the Send Data to Printer button to send the data file to the printer. The printing can be aborted at any time by

Main Security Setup		XX
Master	:	
Operator	:	
Operator	:	
Operator	:	
Service	:	
Service	:	
Service	:	
CLEAR ALL	: select	
		<input type="button" value="CHANGE"/>

allow you to monitor when the controller is viewed or modified, and by whom.

calibrate or manually turn on relays; any changes in the programming are blocked. There are

OPERATOR: An operator level password allows viewing and modification of most of the settings in the

it must match the first four numbers of one of the passwords in the security menu. In addition, only numbers

access to your Controller so that only a few individuals or computers can communicate with it; you will

NOTE

When a password has been entered to allow access, it will be reset when the backlight turns off.



NOTE

The password can use upper and lower case characters in addition to numbers and symbols.

NOTE

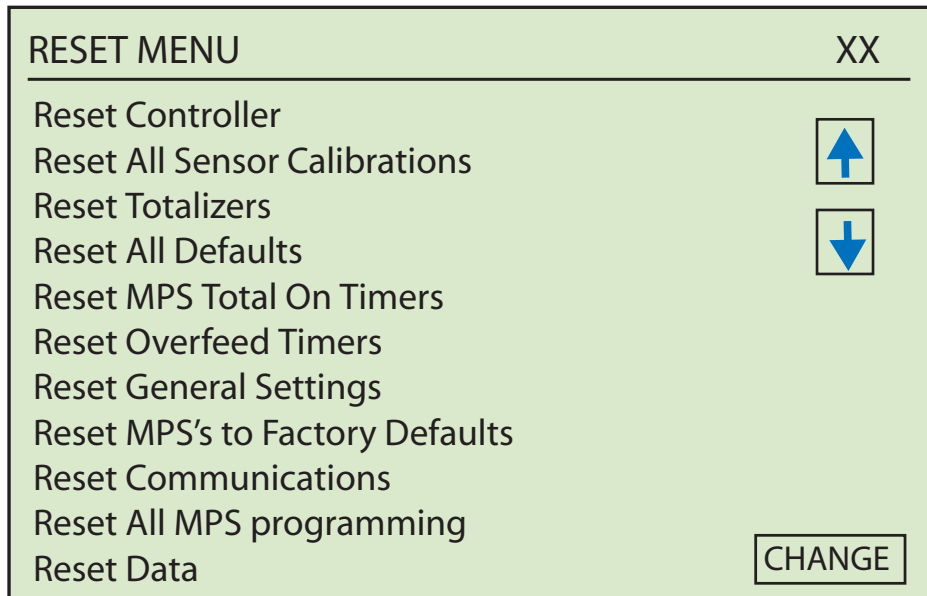
When the wireless modem is being used any password must be entered and security must be enabled or direct communication "WILL NOT BE ALLOWED." This is one of the main security features of the wireless.

Entering a Password

Main Security Setup		XX
Master	:	
Operator	:	
Operator	:	
Operator	:	
Service	:	
Service	:	
Service	:	
CLEAR ALL	: select	
		<input type="button" value="CHANGE"/>

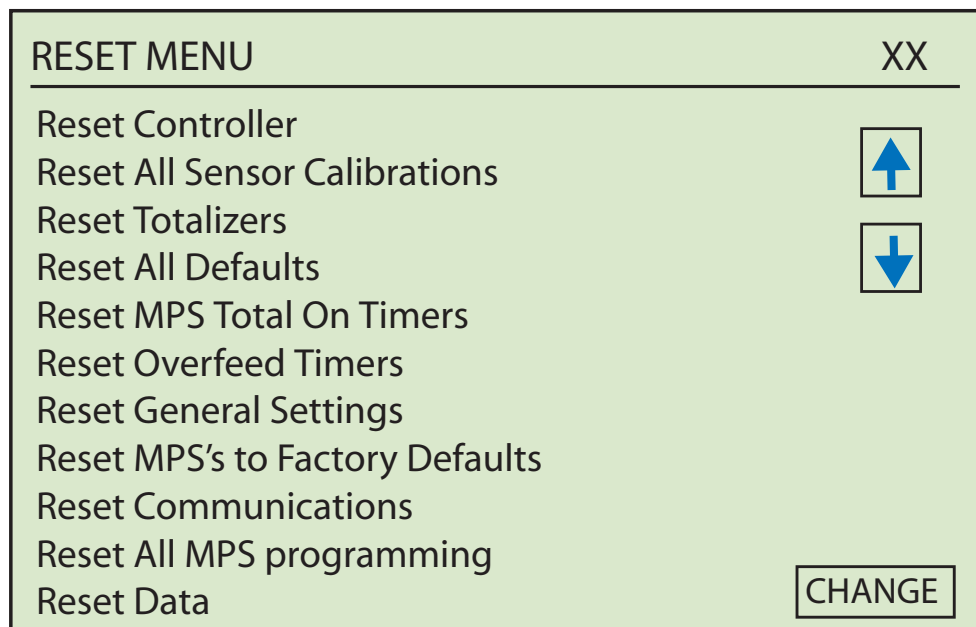
Reset Menu

calibrations or resetting the hardware configuration.

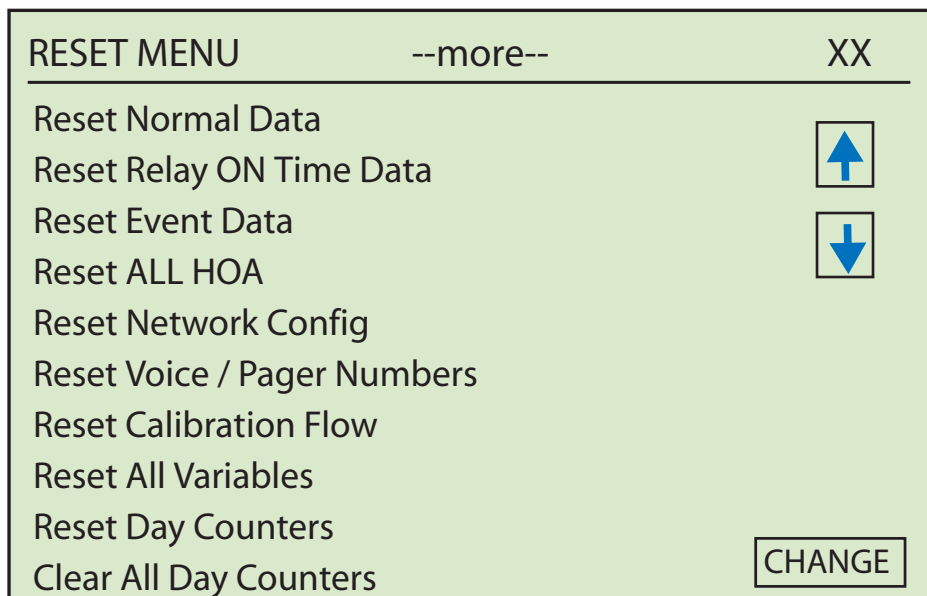


- Reset Controller: This command has the same affect as turning the Controller OFF and ON with
- Reset All Sensor Calibrations: This command clears all sensor calibrations, with the exception of any installed flow meters. Once these calibrations have been cleared, each individual sensor will

- Reset Totalizers: This command clears the accumulated volume measurements for all flow
- Reset Configuration: This command clears the hardware sensor modules and leaves the
- Reset MPS Total ON Timers: Clears the cumulative MPS relay timers for all relays. Clearing
- Reset Overfeed Timers: Clears the daily MPS timers for all relays. This command is especially
- Reset General Settings: This command sets the general settings to the factory defaults. The
- Reset MPS to Factory Default: This action sets all relay configurations (MPS) to the factory
- Reset Communications: This command resets the user programmed communication options to
- Reset All MPS Programming: This command clears all relay (MPS) programming.
- Reset Data: Clears all Normal data, Event Data, and Relay On Time records



settings at this time. Once you have confirmed your choice, The Reset Menu will stay open for any more



- Reset Normal Data: This command clears just the normal data records in the data log.
- Reset Relay ON Time Data: This command clears the cumulative timers for only the
- Reset Event Data: This command clears just the event data records from the data log.
- Reset All HOA: This command Sets HOA setting to “Automatic on ALL relays when the HOA
- Reset Network Config: This command clears all of the user programmed
- Reset Voice/Pager Numbers: Clears all Pager, Voice, and Email entries.
- Reset Calibration Flow: Resets all Flow calibrations to defaults.
- Reset All Variables: Resets the Controller to the factory deefault settings.
- Reset Day Counters: Not Used
- Clear All Day Counters: Not Used.

Section 9 Programming

the controller to page or call a specific technician when a specific condition occurs.

be programmed using a wizard and then modified to suit the system being controlled. The Controller uses

Controller are configured at the factory to accept any of the mini programs and function with the selected

situations a custom program may be able to be written for your specific application. Please feel free to

MPS Modules

Select MPS Module	XX			
Relays	1 - 4	5 - 8	9 - 12	13 - 16
Soft	1 - 4	5 - 8		
Alarms	1 - 4			
PVE	1 - 4	5 - 8		
		9 - 12	13 - 16	

The relays in the Controller are organized in to five distinct groups. The physical, or R relays are used to
fied conditions are met. Pager/Voice/Email relays, or PVE relays are used by the Controller to communicate
relays are numbered and are viewed in groups of four on the display screen. To configure a specific relay,

Select MPS to Configure

The Select MPS to Configure screen opens the specific group of four relay modules and their status. This

Select MPS Module to Configure		XX
RLY01	<input type="checkbox"/> pH - Acid	M1 <input type="button" value="WIZ"/>
RLY02	<input type="checkbox"/> Sanitizer	M1 <input type="button" value="WIZ"/>
RLY03	<input type="checkbox"/> Empty	<input type="button" value="WIZ"/>
RLY04	<input type="checkbox"/> Temp	M1 <input type="button" value="WIZ"/>
<input type="button" value="PREV 4"/> <input type="button" value="OK"/> <input type="button" value="NEXT 4"/>		

Select MPS to Configure Screen

tom of the screen. Once you have finished in this screen, press the OK button to exit from this screen.

To change which device the relay is controlling, you will need to open the Select New Configuration Screen. To do this, press the WIZ button on the same line as the MPS you wish to configure. The Select New Configuration screen will automatically be opened.

Select New Configuration

The Select New Configuration screen allows you to select the type of device you wish to control with the

Select New Configuration		XX
PRESSING OK RESETS ALL COMMANDS AND TIMERS FOR THIS MPS!!! MODULE 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> <input type="button" value="CANCEL"/> <input type="button" value="OK"/>	Empty	<input type="button" value="↑"/>
	Sanitizer	
	Sanitizer/Super	
	pH - Acid	<input type="checkbox"/>
	pH - Base	
	Heater	
	Circ / Pump Basic	<input type="checkbox"/>
	→ De - Chlor	
	Alarm	
	Pager/ Voice	
Backwash Start	<input type="button" value="↓"/>	

All of the configuration options for the MPS you have selected are in a list on the right hand side of the screen. The arrow shows the configuration option that is currently highlighted for selection. Use the



CAUTION

Sensor Modules must be selected in the Select New Configuration Screen to ensure that the MPS is programmed correctly.

Modifying MPS Settings Screen

Select the MPS that is to be changed in the Select MPS to Configure screen. The following screen, Modi



PH - Acid		XX
SequencesON		
Manual ON Time	00:01:00	
Prop GON %	10	
On if pH >	7.50	
Max Time On	00:01:00	



The Wiz Button

To configure an individual MPS, follow the instructions below:

3. After selecting the MPS module group, the MPS Module to Configure screen opens the list of

Alarm Configuration

Automatic Set Point Alarms



General Setup		XX
Global Alarm %	: 10	
Global Alarm Delay	00:00:00	
Overfeed Clear Time 1	08:00:00	
Overfeed Clear Time 2	08:00:00	
POver On Delay	:	
Module 1 Name	:	
Module 2 Name	:	
Module 3 Name	:	
Backlight Time Seconds	:00:00:30	
DFL1 Backlight	None	
<input type="button" value="Data Setup"/>		<input type="button" value="CHANGE"/>

alarm. If a set point alarm is active, the specific display will show “ON If SET ALRM 5” for relay 5 instead percentage feature. A benefit of this feature is if the set points are changed, the alarm band will be

Pager/Voice/Email Alarms

Communication

The ability to communicate is one of the most useful and beneficial features of the Controller. While mo

Communications Setup	--more--	XX
Rings to Answer On	:1	
Long Hangup Time	00:30:00	
Sync Byte 1:	0	
Sync Byte 2:	0	
Voice Code:	0	
	<input type="button" value="PVE"/>	<input type="button" value="VOICE"/>
	<input type="button" value="PVE"/>	<input type="button" value="CHANGE"/>

or computers can communicate with it; you will need to change the sync byte values in the Controller and

Modem Advanced Diagnostics XX

Status: 32	PagDelay : 0
Timer: 16400	PagNumber: 0
CMD : 0	PagStatus : 0
From Modem :	&KO-SDR = 7S8 = 4 OK AT#
CLS = 0 OK	

Reset

Voice Communication

1. A 4 digit security password will need to be set into the "Config/System/Security" menu before

"Config/Programming/PVE menu.

2. The unit will pick up on the number of rings set in the "Config/Communication Setup"

3. The system will then ask you to press "3" on your touch-tone phone. (If you do not press "3"

4. Once "3" has been pressed, the system will go into voice mode and instruct you to:

4a. Press "*" when you are ready for the system to hang up.

4c. Press "0" to change to a different menu.

"Display/Summary" screen.

Voice Button

Status:	Not Ready	XX
Manually Call the UNIT and be in This menu to record or playback (Statement or value)		
String Time (x100):	291	
Status =	Not Ready	
Seconds Remaining (250 Max)	45	
Word / Phase Index	0	
Record : 3-STOP	PREV 4	PREV
PLAYBACK	NEXT 4	NEXT

(3) button on the phone must be held down in order to stop the recording when finished. Touch

String Time: The string time for the first phrase is 2.54 seconds. The times will vary according to

NOTE

The high speed modem MTS5600 is the only modem that supports voice communication with the Controller. If you are unsure which modem your controller has installed, check the "Config/System/hardware" menu for the modem information.

Voice system Testing

You will want to verify that your Controller has been correctly configured to call out when alarm conditions out. Check to see that a proper set of numbers are entered into the “Config/Setup/PVE” program. Then se

PVE

Select PVE	XX
1. 18001234567 ,,, 12345 ,, 123#	
2. 18009871234	
3. ralf@skylab.com	
4. AM	
<input type="button" value="NEXT 4"/>	

automatically; it must be included in the string. When getting this page, the pager would show the code

EMAIL: Must be a valid email address including the '@' symbol. The first character can't be '-'.

Pager Testing

Display	Config	Service	XX
		Manual	
		Calibration	
		Global Disable	
		Clear Overfeeds	

multiple relays for a specified period of time, reset the controller or the overfeed timers, and enter a service

Manual MPS Operation

Select MPS Module	XX			
Relays	1 - 4	5 - 8	9 - 12	13 - 16
Soft	1 - 4	5 - 8		
Alarms	1 - 4			
PVE	1 - 4	5 - 8		
		9 - 12	13 - 16	

Manually Toggle MPS	XX
RLY01 <input type="checkbox"/> pH - Acid	hoA
RLY02 <input type="checkbox"/> Sanitizer	hoA
RLY03 <input type="checkbox"/> Empty	hoA
RLY04 <input type="checkbox"/> Temp	hoA
PREV 4	OK
	NEXT 4

of Hand, Off or Automatic. The first letter of the mode you are currently in will be capitalized. Hand or H

is capitalized. An “O” will appear next to the ON/OFF indicator box (□) advising that the relay is disabled.

Display	Config	Service	0
SN 10000			
14:15:30			
Tuesday			
05/30/06			
MPS Status			
Hoa" No relays in Hand mode			
hOa: No realys in Off mode			
GD : No relays Globally Disabled			
ON : No relays ON			
NO Voice File			
			PWD

Calibration

When you first install your Controller the raw reading from each sensor will probably not match up with the manufacturing process and the natural profile of the water in your area. Since every sensor is different, and every water profile is different, it will be necessary to ask the controller to make adjustments

Module	1	2	3	XX
PH	ORP	PPM	T	
Flow	Cyn			
Cond	Alk	TDS	Hard	

pH Calibration

Calibrate pH1		XX
	Actual	Measure
Point 1:	7.50	<input type="text" value="7.50"/>
Current Measurement		7.06
	<input type="text" value="Reset"/>	<input type="text" value="OK"/>

display the following warning message "WARNING, Sensor may be bad!". A large difference in the actual

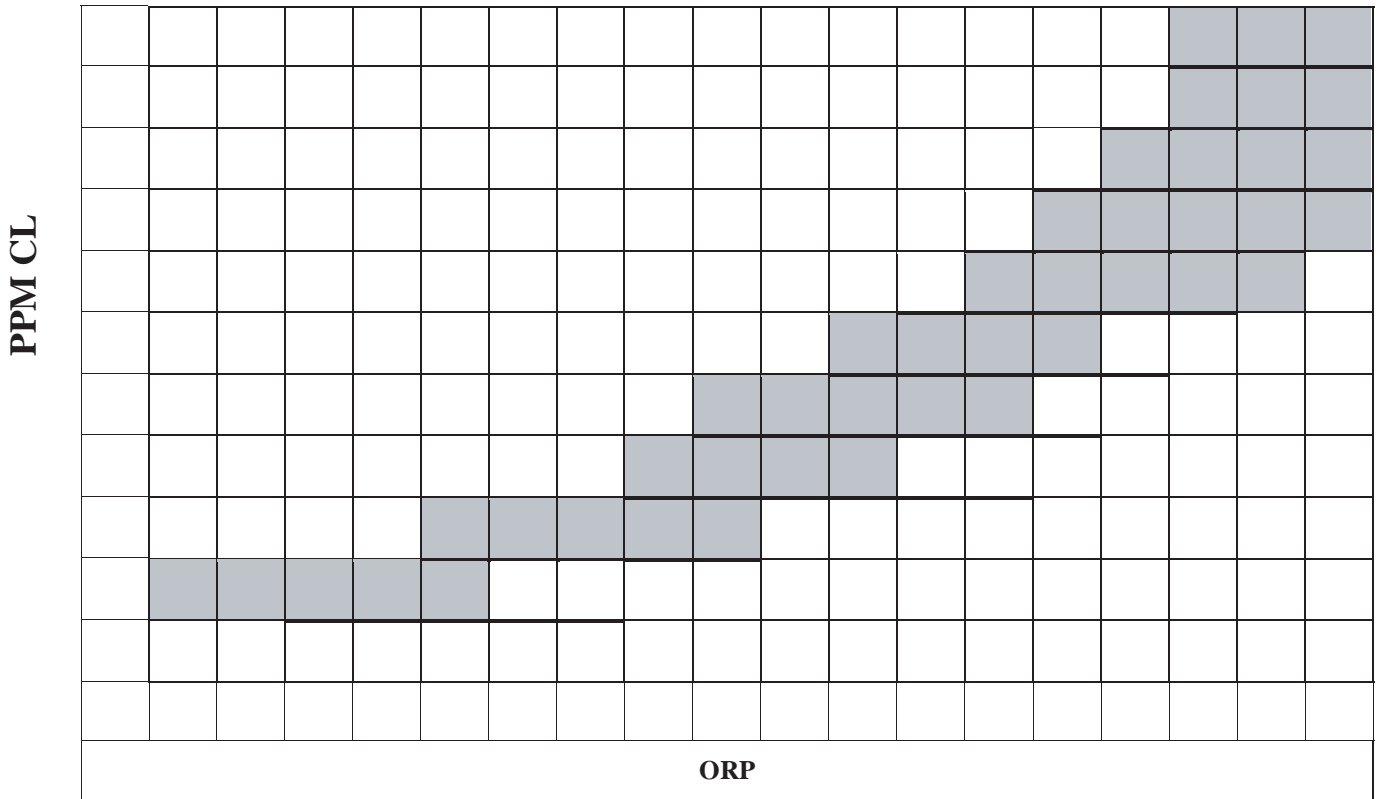
WARNING
If the pH is below 7.4 or above 7.6 the ORP readings will be significantly affected. The ORP reading will be lower or higher than the actual ORP level in the system

ORP Calibration

Calibrate ORP1			XX
	Actual	Measure	pH
Point 1:	700	<input type="text" value="700"/>	7.50
Current Measurement			679
<input type="text" value="Reset"/>		<input type="text" value="OK"/>	

To calibrate the ORP sensor, you must first balance the chemical levels in the pool until the PPM and pH

the ORP calibration curve to find the ORP equivalent of your current PPM measurement. To use the chart



WARNING
Do not calibrate your ORP measurement unless the pH of your system is at or very near your chosen set point

ORP Calibration for Large Systems

When working with especially large bodies of water, especially ones being opened for the first time, it can

7.5. The difference between the current PPM and the desired PPM should be identified. Then, identify the

Calibrating Calculated PPM

Cal Calculated PPM		XX
PPM:	0.01	
ORP:	486	
pH :	7.06	
<input type="button" value="--"/>		
<input type="button" value="-"/>		
<input type="button" value="+"/>		
<input type="button" value="++"/>		
<input type="button" value="Reset"/>		<input type="button" value="OK"/>

Calculated PPM; to confirm the correct measurements.

Calibrating Temperature

Calibrate Temperature 1		XX
	Actual	Measure
Point 1:	76.9	<input type="text" value="76.9"/>
Current Measurement F:		77.5
<input type="text" value="Reset"/>		<input type="text" value="OK"/>

Temperature Calibration Screen

than five degrees, you will probably want to calibrate the temperature reading. Before making additional

- Temperature variance within the system itself. The temperature is not always the same at the
- The temperature sensor may be damaged. Water inside the sensor will cause it to malfunction. Remove the temperature sensor from the flow cell and inspect the cable for damage. If the sensor

Calibrating Digital Flow

The Controller is compatible with most digital flow sensors. Digital flow sensors improve accuracy, especially when measuring low flows. The Calibrate Flow screen displays the following items:

Name: Column listing of flow readings updated every ten (10) seconds. The name indicates the number of the flow sensor, F1, 2, or 3 and the module in the Controller that reads the flow sensor, 2, or 3. Each module can monitor two flow sensors.

K p/g: The K factor is a flow constant used in the calculation of the flow rate. The K factor will be supplied by the manufacturer of the flow sensor you are using. The K factor may be in pulses per

Flow: The flow registered by the flow sensor in gallons per minute. This reading is refreshed every

Volume: The total flow of water, in gallons, through your system since the last time this value was

Calibrate Flow				XX
Name	K p/g	Flow	Volume	
F1M1	100.00	0		
F2M1	0.0			
F1M2	3328.0	0		
F2M2	0.0			
F1M3	0.0			
F2M3	0.0			
Flow updates every 10 seconds!				
Enter the Flow Constant				
K - Pulses / Gallon or Pulses / Liter				<input type="button" value="CHANGE"/>

To install a digital flow sensor

- AK110: Main Board
- Controller: Sensor Card
- AK400: Relay Board
- AK2100: Sensor Card

Calibrating any digital flow sensor requires that the K factor provided by the manufacturer be included in the flow calculations. The K factor plays an important role in adjusting the flow rate to account for pipe size,

Select the flow sensor you wish to calibrate using the directional arrows on the right hand side of the screen. Once you have selected a flow sensor, press the CHANGE button. The alphanumeric keyboard will automatically open and prompt you to enter the manufacturer supplied K factor or flow constant for this flow sensor. Once you have finished, press the Enter button to exit the alphanumeric keyboard and save your

automatically recorded, along with the sensor flow reading at the time the calibration was made.

Conductivity Setup

Conductivity sensors measure the ability of a specific body of water to conduct an electric current. Conductivity unit of measurement for conductivity is microSiemens (uS/cm). Electricity flows more easily through water

number by 1000; the resultant number should be entered. Example: For a sensor with a cell constant

Entering a Cyanuric Acid Measurement

Module	1	2	3	XX
PH	ORP		PPM	T
Flow	Cyn			
Cond	Alk		TDS	Hard

Entering an Alkalinity Measurement

Module	1	2	3	XX
PH	ORP		PPM	T
Flow	Cyn			
Cond	Alk		TDS	Hard

Entering a Total Dissolved Solids Measurement

Module	1	2	3	XX
PH	ORP		PPM	T
Flow	Cyn			
Cond	Alk		TDS	Hard

Entering a Hardness Measurement



Module	1	2	3	XX
PH	ORP		PPM	T
Flow	Cyn			
Cond	Alk		TDS	Hard

Global Disable

The Global Disable feature is used to turn OFF any MPS relay group for a specified period of time. The

Highlighted Items are Disabled				XX
Relays	1 - 4	5 - 8	9 - 12	13 - 16
Soft	1 - 4	5 - 8		10 Mins
Alarms	1 - 4			30 Mins
PVE	1 - 4	5 - 8		4 Hrs
				12 Hrs
PVE	9 - 12	13 - 16		

Clear Overfeeds

RESET MENU	XX
Reset Controller	
Reset All Sensor Calibrations	
Reset Totalizers	
Reset All Defaults	
Reset MPS Total On Timers	
Reset Overfeed Timers	
Reset General Settings	
Reset MPS's to Factory Defaults	
Reset Communications	
Reset All MPS programming	
Reset Data	CHANGE

Enter Password

for servicing and reconfiguration.

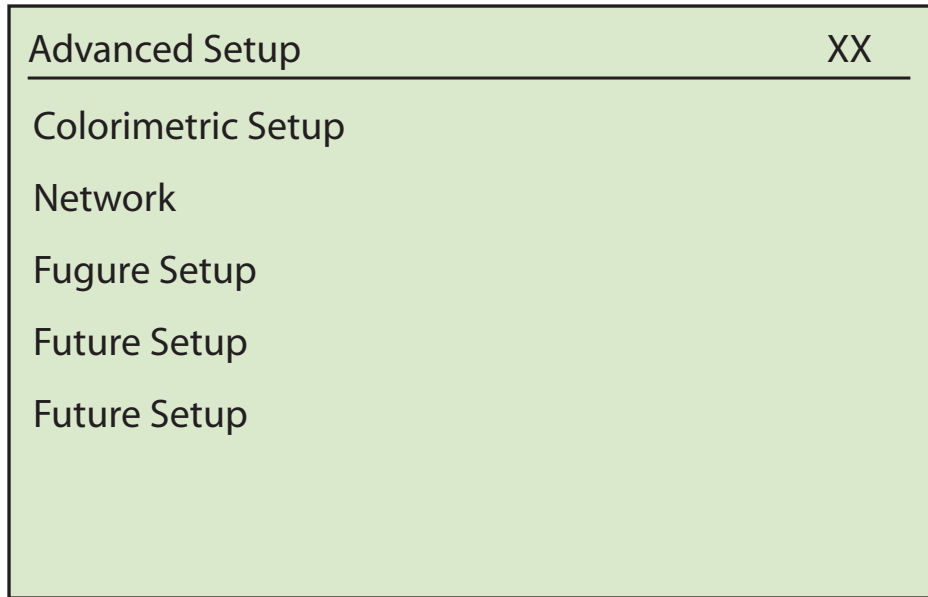
Troubleshooting

			Back wash main filter.
		Check flow switch	
			Search for threed.vbx files

Section 12 Optional Features

The Advanced setup menu contains the menus that will allow you to configure and activate optional

To open the advanced setups menu, Touch the Adv Setups menu item in the Configuration menu. Open the



AK Color Setup

Overview

Expansion Modules

Overview

any specific installation as follows:

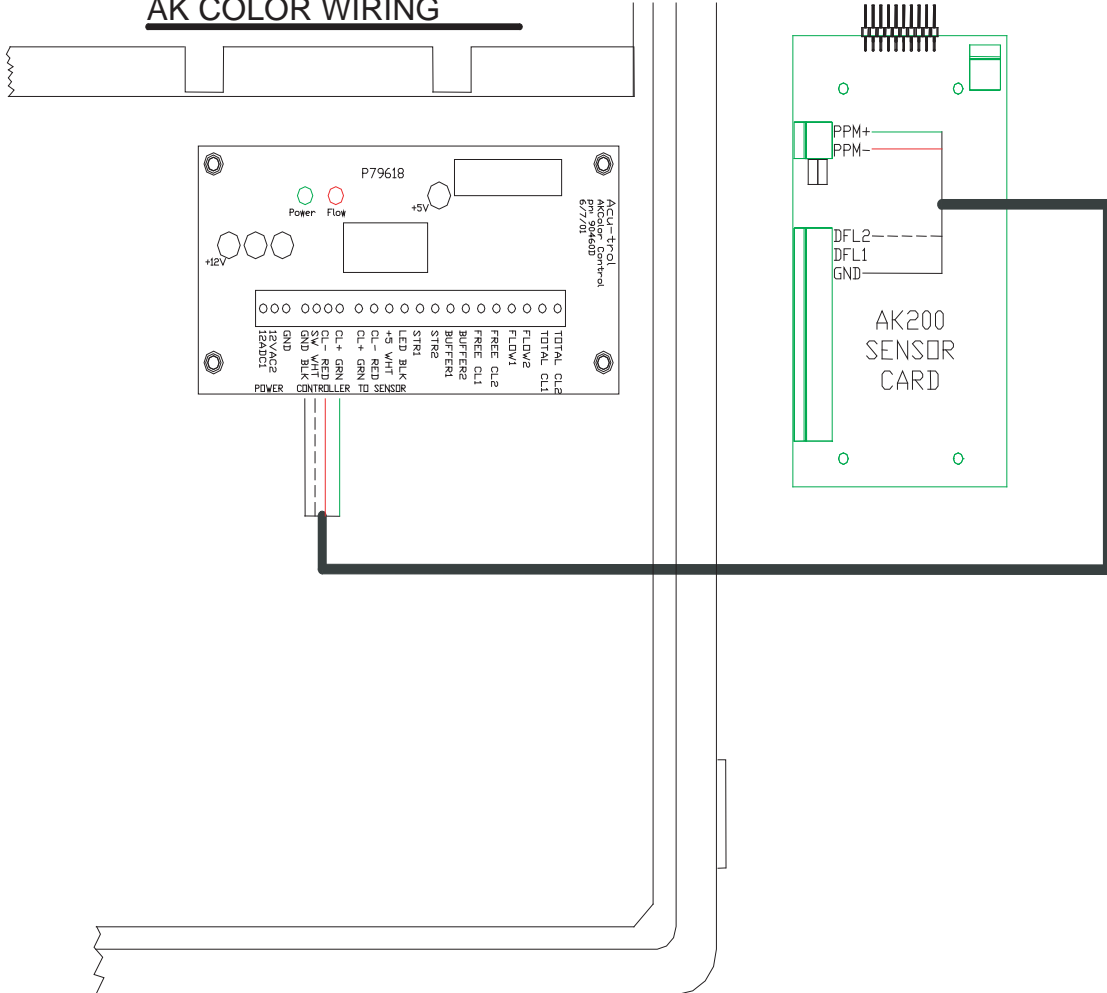
damage! Do not plug in the wall pack to the supply voltage.

sample point, such as a flow cell, to ensure a fresh sample is collected each time. The AKCOLOR operates in a low water waste mode by only flushing the test chamber just before

this hose to a drain. DO NOT run the drain back into the water source being sampled!

WARNING
 Have a licensed electrician perform all electrical wiring. It is important that any electrical work be compliant with all electrical codes in the area.



AK COLOR WIRING



AKColor Configuration



To configure the Controller for the configuration menu. Once in the configuration

Display	Config	Service	XX
	General Setup		
	System		
	Adv Setups		
	Programming		
	Communications		



System Menu		XX
Time	: 11:14:00	
Date	: 05/30/06	
Weekday	: Monday	
Units	: English	
HOA	: Enabled	
Program Mode	: Easy	
Serial #	: 10000	
<input type="button" value="HARDWARE"/>	<input type="button" value="DISPLAY"/>	<input type="button" value="PRINT"/>
<input type="button" value="SECURITY"/>	<input type="button" value="Reset Menu"/>	<input type="button" value="CHANGE"/>



hardware configuration is done. Select Yes to

Hardware Configuration		XX
Module 1	: AK610, pH, ORP, T	
Module 2	: AK613, pH, ORP, T, Cond	
Module 3	: Empty	
RS232 Type	: PC	
Relay Type	: 8 Relay Type	
High Speed Modem	: MT5600	
UART(RS485+Printer)	: EMPTY	
512K RAM Expansion	: Empty	
		<input type="button" value="CHANGE"/>

AKColor Setup

System Menu		XX
Time	: 11:14:00	
Date	: 05/30/06	
Weekday	: Monday	
Units	: English	
HOA	: Enabled	
Program Mode	: Easy	
Serial #	: 10000	
<input type="button" value="HARDWARE"/>	<input type="button" value="DISPLAY"/>	<input type="button" value="PRINT"/>
<input type="button" value="SECURITY"/>	<input type="button" value="Reset Menu"/>	<input type="button" value="CHANGE"/>

Advanced Setup		XX
Colorimetric Setup		
Network		
Fugure Setup		
Future Setup		
Future Setup		

AKColor Diagnostic Screen

the upper right corner from either the Display/Specific or Summary screens.

AKCOLOR Diagnostic Screen					XX
#	ClrV	FPPM	TPPM	CPPM	CurV
1.					
2.	3.49	2.50	2.59	0.09	3.49
3.					
2.	80% Full, 193 Waiting				
Press Here for Manual Control					

filling and emptying the sample chamber. The lowest current measurements will occur just after the addition

AKCOLOR Manual Operation						XX
Stir off	Buff Stir	DPD Stir	TOT Stir	Flow Prg	Prg Off	Off
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3

Current Measurement
2.55

Colormetric Setup					XX
	TOT	Ctime 1	Begins	Ctime2	Begins
1	7	15	20		
2	Off				
3					

TOT: On to enable Combined
 Ctime: Cycle time in minutes
 Begins: The hour the cycle begins

age tanks. This is only true if you reset this number after refilling the storage tanks.

Now adjust the sample flow rate into the sample chamber by throttling the inlet valve.

3. Pull out the flow straw from the chamber and place in the soda can.
4. Go to the AKCOLOR Manual Operation screen. (Press Display/Specific or Summary, c in the module in the Flow column to start sample flow.

correctly it should take 2 minutes to fill the can.

6. When finished adjusting the flow press either x in the upper right corner to return to the

11. Call or visit over the next few days to fine-tune the setup.

Cleaning the Sensor

7. If the system is powered down for more than 48 hours without flushing the tubes, crystallization

Loading the AKColor Reagents

reaction process. The efficiency of DPD solution diminishes over time and provides less and less accurate

WARNING: do not mix more than 10% OLD DPD solution with NEW DPD solution created in step 1! (see

Reset the volume used indicators; they should read 99%, letting you know that the bottles are 99%

Calibration

Preparation for Non-Operation

Remove any chemical from the bottles and fill with clean de-mineralized water. From the controller AK

Troubleshooting

PPM Reading is 0 or 9.99

controller and back on again, the sample will flush for about 30 seconds. You can also remove the rubber

Internal Red LED is on Continuously

The Clear Voltage is Reading > 4.0 Volts

The Clear Voltage is Reading < 2.3 Volts

Remove sample chamber view window plug and observe sample chamber during flushing. Sample chamber

If during sample chamber viewing the water is pinkish or colored during flush then the sample flow rate is slow and needs to be increased. Note: the proper flow rate will fill a 12oz soda can in exactly 2 minutes.

DPD and Clear Voltage are the Same

chemicals being added during sampling are being flushed before the sample readings are being taken. If debris is

the filter. Make sure you re-attach and unclamp the tube.

Chemicals Don't Last

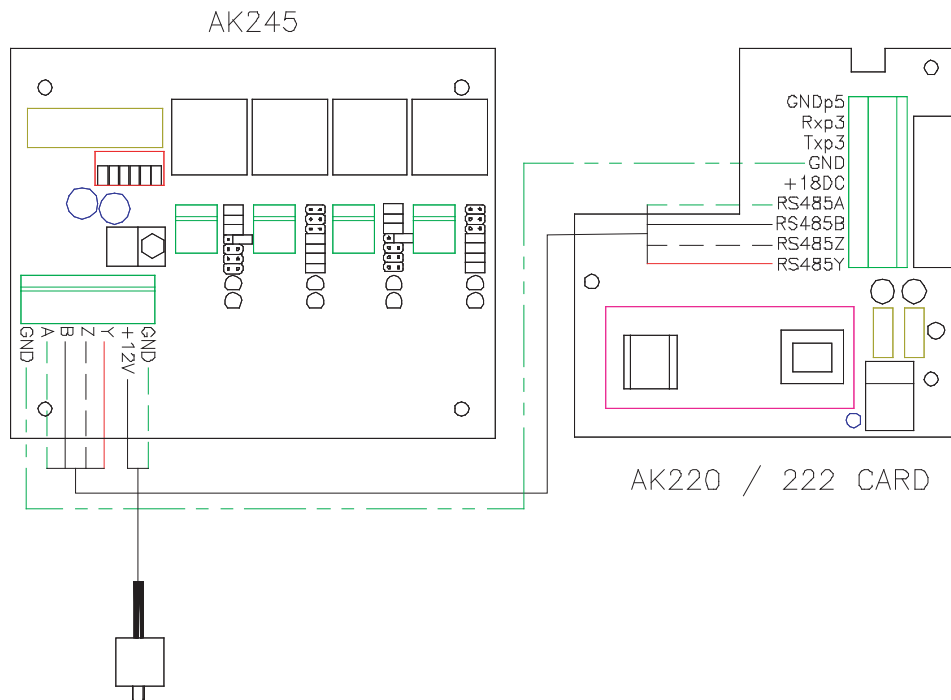
turn the unit off and remove the buffer and DPD tube from the cap. Verify that no fluid is leaking from the tube.

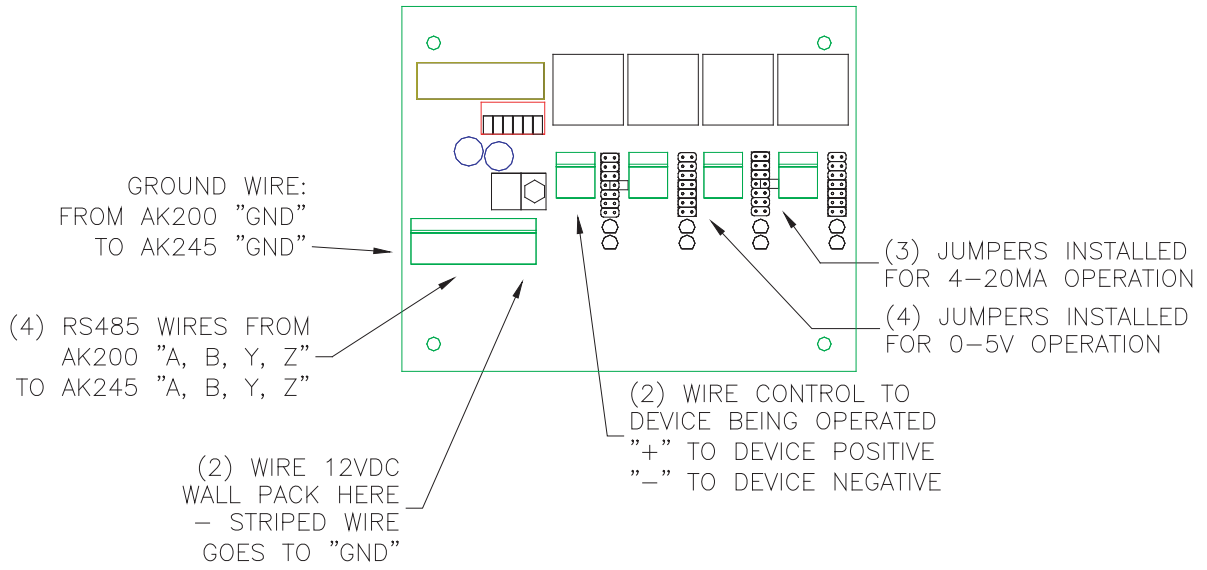
Inaccurate Readings

Network - AK245 Expansion Circuit Board

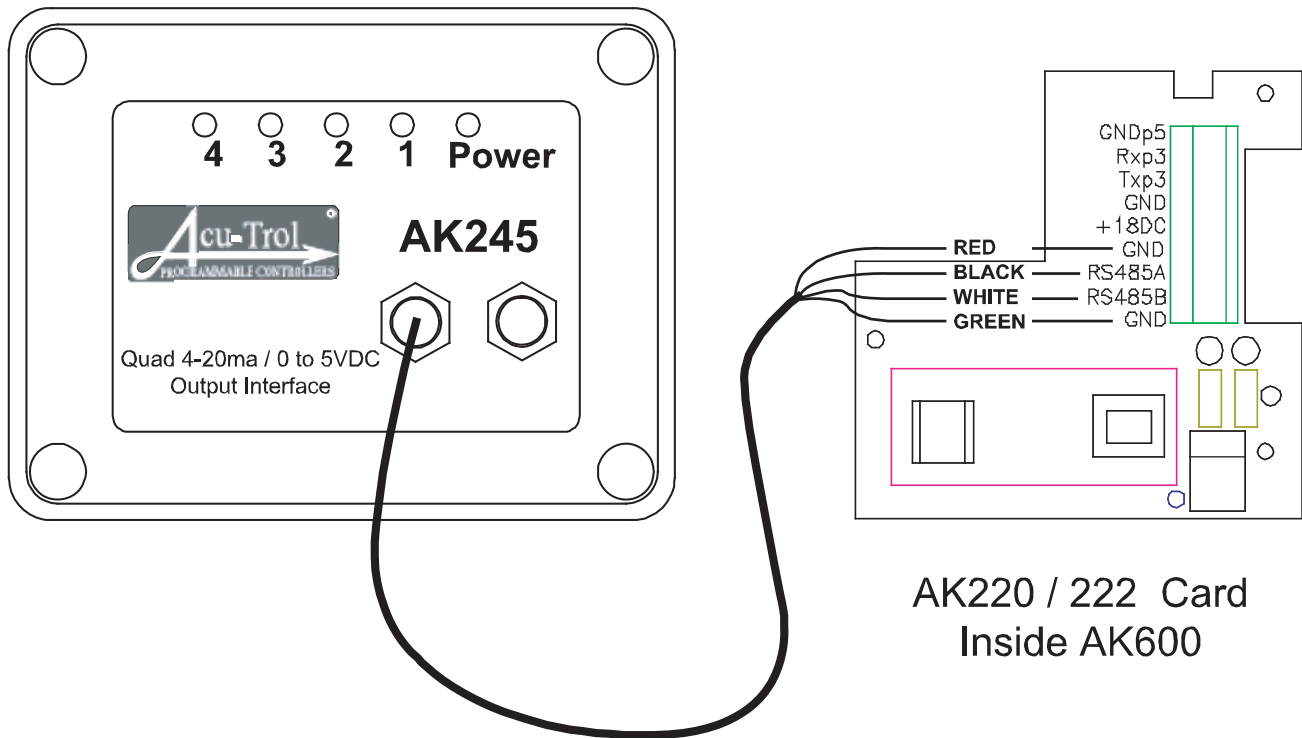
AK245 Installation

plied for any specific installation as follows:





serial connections for a total of five units. The connection supports both RS485 and RS422. The



Setting an AK245 Address

The factory default configuration for the AK245 Dip switches is switch 1 down and switches 2-4 up. This

Output Signals

0-25MA Signals

4-25MA Signals

0-5V Signals

Reversing

Electrical Specifications

The following electrical specifications in the table below must not be exceeded.

Controller Network - AK245 Setup

to open the Configuration Menu. Once in the

for the RS485 device you wish to configure. The

Network Setup XX

RS485 #1:

RS485 #2:

RS485 #3:

RS485 #4:

RS485 #5:

RS485 1: XX

Remote Address: 1

Remote Model: AK245

Channel Configuration

CH SEN	Sen L	Sen H	OL%	OH%
1:Temp1	49.9	139.8	16.0	80.0
2:pH 1	5.00	9.99	16.0	80.0
3:	0	0	16.0	80.0
4:	0	0	16.0	80.0

↑
↓
←
→

CLR 4-20

CHANGE



RS485 1: XX

Remote Address: 1
 Remote Model: AK245
 Channel Configuration

CH SEN	Sen L	Sen H	OL%	OH%
1:Temp1	49.9	139.8	16.0	80.0
2:pH 1	5.00	9.99	16.0	80.0
3:	0	0	16.0	80.0
4:	0	0	16.0	80.0

CLR 4-20
CHANGE



RS485 1: XX

Remote Address: 1
 Remote Model: AK245
 Channel Configuration

CH SEN	Sen L	Sen H	OL%	OH%
1:Temp1	49.9	139.8	16.0	80.0
2:pH 1	5.00	9.99	16.0	80.0
3:	0	0	16.0	80.0
4:	0	0	16.0	80.0

CLR 4-20
CHANGE



RS485 1: XX

Remote Address: 1
 Remote Model: AK245
 Channel Configuration

CH SEN	Sen L	Sen H	OL%	OH%
1:Temp1	49.9	139.8	16.0	80.0
2:pH 1	5.00	9.99	16.0	80.0
3:	0	0	16.0	80.0
4:	0	0	16.0	80.0

CLR 4-20
CHANGE



RS485 1: XX

Remote Address: 1
 Remote Model: AK245
 Channel Configuration

CH SEN	Sen L	Sen H	OL%	OH%
1:Temp1	49.9	139.8	16.0	80.0
2:pH 1	5.00	9.99	16.0	80.0
3:	0	0	16.0	80.0
4:	0	0	16.0	80.0

CLR 4-20
CHANGE



RS485 1:					XX
Remote Address: 1					
Remote Model: AK245					
Channel Configuration					
CH SEN	Sen L	Sen H	OL%	OH%	
1:Temp1	49.9	139.8	16.0	80.0	
2:pH 1	5.00	9.99	16.0	80.0	
3:	0	0	16.0	80.0	
4:	0	0	16.0	80.0	
					<input type="button" value="CLR 4-20"/> <input type="button" value="CHANGE"/>

RS485 1:					XX
Remote Address: 1					
Remote Model: AK245					
Channel Configuration					
CH SEN	Sen L	Sen H	OL%	OH%	
1:Temp1	49.9	139.8	16.0	80.0	
2:pH 1	5.00	9.99	16.0	80.0	
3:	0	0	16.0	80.0	
4:	0	0	16.0	80.0	
					<input type="button" value="CLR 4-20"/> <input type="button" value="CHANGE"/>



Resetting AK245 Setup

To reset the entire network go to “Config/System/Reset/More” and select “Reset Network Config”. This resets all five channels to empty.

Controller Viewing AK245 Sensors

screen summarizes the setup of all five networks.

RS485 View:					XX
Net	CH1	CH2	CH3	CH4	SW1234
1.	7.51	79.8	0	0	0000
2.	0	0	0	0	0000
3.	0	0	0	0	0000
4.	0	0	0	0	0000
5.	0	0	0	0	0000
1.	pH1	Temp1			
2.					
3.					
4.					
5.					

Navigation icons: Up, Down, Left, Right arrows.

Buttons: CLR 4-20, CHANGE

Finishing and Testing

steps are required for final system finishing and testing.

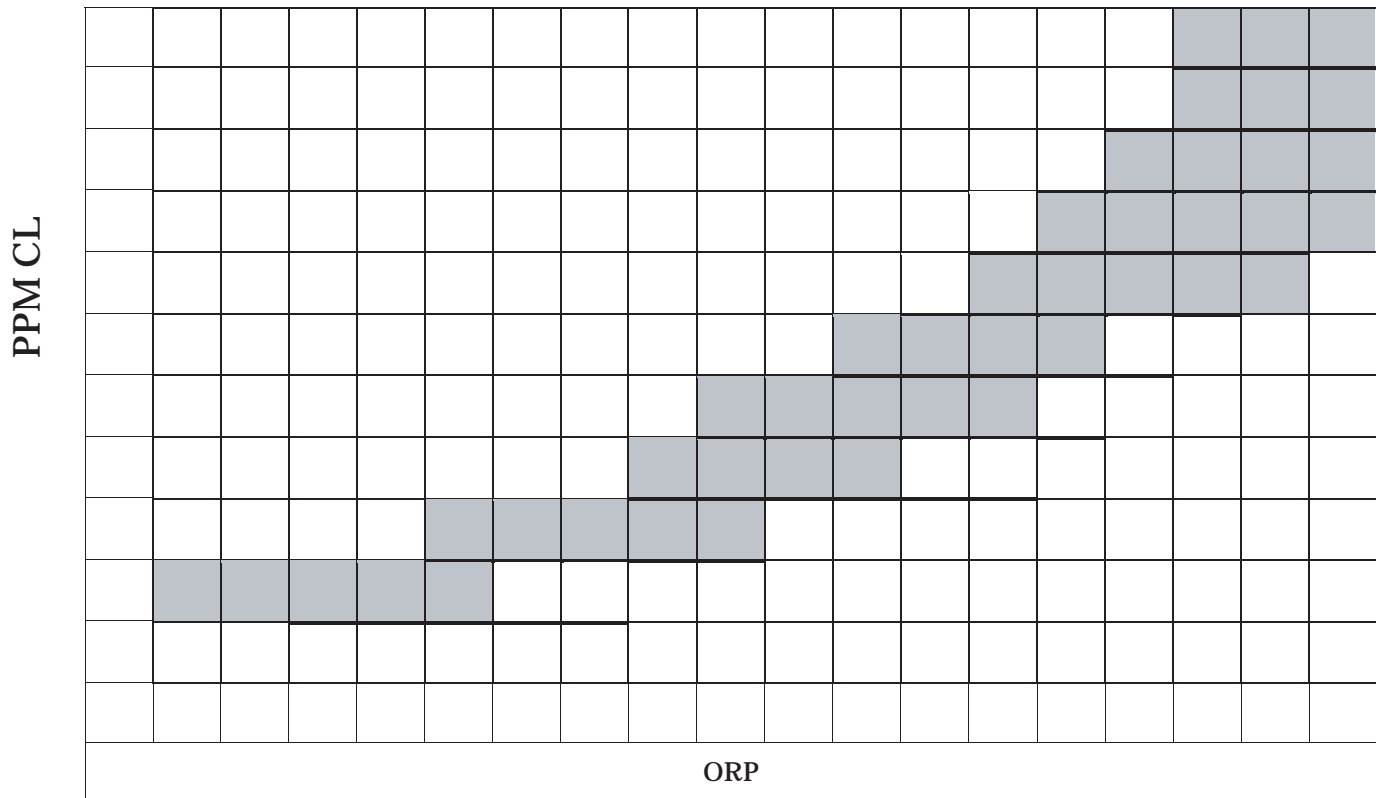
receptacle located on the cover of the AK245; it is keyed and can only be inserted one way.

Troubleshooting

Section 13 Appendix

ORP Calibration Curves

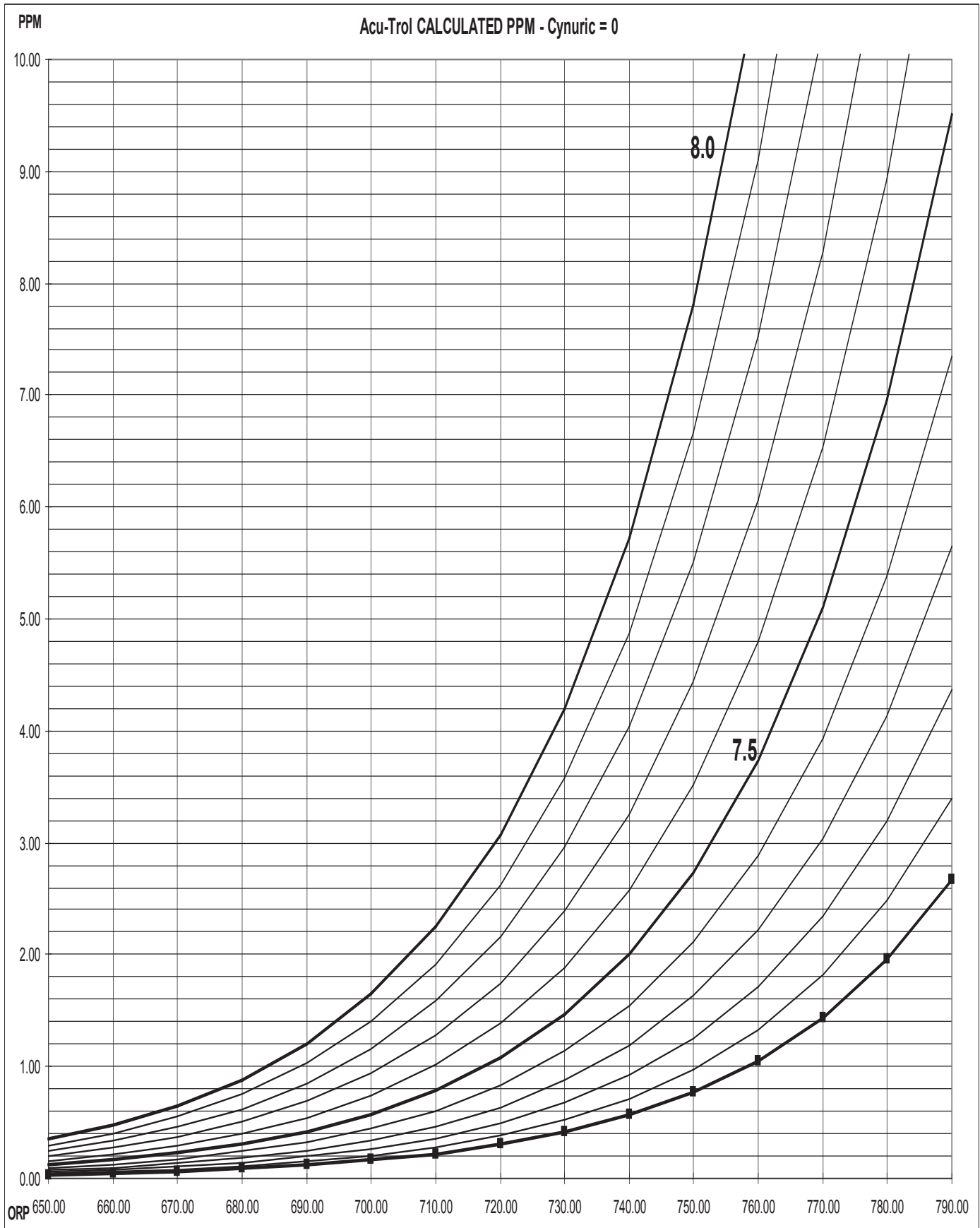
PPM v. ORP at pH 7.4-7.6



- Follow the approximate pH value down to the bottom of the chart to find the approximate of water in different areas. The ORP reading will fluctuate slightly depending on the mineral

ORP Chemical Standards

Calculated PPM Calibration Curve



NOTE

Max Ctime ON: In cases where the chemicals are injected ahead of the sensors this command will allow the readings to exceed the setpoint without stopping the feed cycle.

NOTE

Set Overfeed: This command is calculated based on the amount of feed time it would take to bring the worst case out of range measurement in to range.

EX. If it would take 1 gallon of CL to bring the pool from 0 to the setpoint of 2, and 35 gallon per day pumps are used, then this time should be set to
 $1 \text{ gallon} / 35 \text{ gallons} = 41 \text{ minutes} * 60 \text{ seconds} = 86400 \text{ seconds}.$

NOTE

Overfeed can be used to limit the total amount of chemical injected in a period of time. In the above example, to limit the amount of CL fed to 3 gallons per day, the value entered would be $41 * 3 \text{ minutes}.$

NOTE

There are On Conditions and Off conditions. If a command is an ON Condition, such as ON if pH > 7.5, it is not automatically true that this command will ensure that the function will be off if the pH is less than 7.5. An additional command OFF if pH < 7.5 would be necessary to ensure this.

Proportional Feed Gain

MPS Wizards

Program for Super Chlorination

Super chlorination is the addition of excessive amounts of sanitizer at a specific time. The purpose is to oxi

fixed amount or to add sanitizer until the ORP reaches a higher set point.

The remaining lines are the standard ORP control for both sequences; this gives the ability to have different

Program for Dechlorination

undesirable for many hours; the de-chlorination cycle will quickly bring the pool back within limits.

CMD 2, 3, 4: These commands are set to do a fifteen (15) minute feed at 5:00 A.M. to remove the

CMD 6: This safety command will not allow turning on the MPS when there is no flow.

Program for Auto Fill

Auto fill is the addition of additional water to the pool or spa when the water level is below a preset threshold. There are two (2) basic methods for determining when to add water. The first is to use a level sensor

sensor on the digital flow input one (DFL1) (not the flow switch input):

13.6.4 Program for chemical Storage Tank Auto Fill

ing the Chemical Storage Tank Auto fill program allows you to automate this mixing process. The method

In the MPS Wizard, select Cal Hypo Refill for the desired MPS. The resulting commands are as follows:

Cal Hypo Refill

Program for pH

- 6. This command will calculate how long the relay should be ON; the time listed in the command

- 7. The relay will be held off for the length of time specified. If the pH drops below the set point

- 9. This command will limit the amount of chemicals to be fed in a specified time period. If the

- 10. If there is no flow turn OFF relay. NOTE: This command is critical for safety and ensures the MPS will not be ON when there is no flow. Even if the previous commands determine the MPS should be ON, this is the last command and its calculation is final. EXAMPLE: If this command

Program for PPM

Program for Temperature

There are two ways to control a heater with the supplied MPS. The first (and default) is that when the heater

NOTES

NOTES

NOTES



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