Installation Guide

ProMinent® DCM 2 series

Aquatic Water Quality Controller

Certified to NSF/ANSI Standard 50

p/n 7500612

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DCM 2 Installation

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DCM 2 Installation

1. Overview

1.1. All ProMinent DCM2 controllers have an integral web server with an RJ-45 Ethernet connection, ready to communicate with any internet ready computer, regardless of operating system. This makes the ProMinent DCM2 one of the easiest aquatic controllers to remotely monitor and control your pool or spa.

1.2. DCM2 controllers are optimized for aquatic water disinfection control applications. These controllers use sensors to measure water quality and then control chemical feeders, UV systems, recirculation pumps, heaters and more to maintain a safe and comfortable aquatic environment.

1.3. AC powered pumps and solenoids for ON-OFF, Time Modulated, and PID control may also be used with pulse frequency controlled pumps.

2. Installation-Commissioning

2.1. Safety

Before we talk about any installation or configuration, we need to talk about safety for you and your co-workers, customers and swimmers. Please read and follow the caution and warning statements below to familiarize yourself with the hazards associated with installation and operation of the equipment covered in this manual.

General Precautions

Read this installation manual completely before attempting the installation of your ProMinent controller.

Follow all **CAUTIONS, WARNINGS** and **DANGER** notices for the safety of installers and pool users.

Electrical Shock Hazards

Opening the controller enclosure with the controller power turned on or plugged in, may expose the user to AC line voltages on the controller circuit boards.

Ground the controller AC power ground (earth) conductors to the ground lug provided.

A 120VAC plug and receptacle socket cables are usually provided with controllers installed in North America. All must be grounded to the ground lug provided. For personal safety, and moisture corrosion contamination prevention, the enclosure cover should always be installed and secured with all 4 screws when the DCM2-CL is in operation.

Configuration Hazards

⚠CAUTION

Aquatic Water Treatment Controllers operate chemical feeders and other devices that may pump hazardous, corrosive and toxic chemicals.

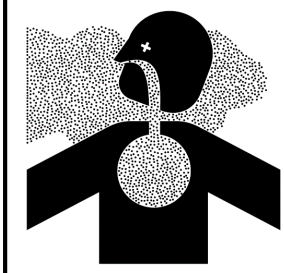
Fully understand the implications of the control setpoints, interlocks and alarms that you select.

Injury or damage to equipment may result from improper configuration.

Unplug or turn OFF the AC power to the controller if you have any concerns regarding safety or incorrect controller operation, and notify supervisory staff.

Flow Switch Function

⚠WARNING



NEVER OVERRIDE A FLOW SWITCH

Uncontrolled feeding of concentrated chemicals can result in personal injury or death. Sample and recirculation flow switches are critical safety devices which prevent uncontrolled chemical feed. Follow Instructions Carefully.

Flow switches are provided with all ProMinent pool controllers and are an integral safety device to prevent the uncontrolled feed of chemicals, which could cause personal injury or death. This critical safety device must always be available to protect the swimmers and others near the pool.

Flow switches should NEVER be bypassed, <u>even temporarily</u>.

The above precaution pertains to Input 'F' lockouts as well as the integral sample flow switch on input 'E'. If disabled or bypassed, the sensor would not be able to sense a hazardous situation and turn of the chemical feed pumps to prevent uncontrolled chemical feed.

Test Flow Switch Function

⚠WARNING

Test Flow Switches Weekly

Stop the flow of sample water to the sensor housing to verify interlocks are functioning.

If flow switch 'float' does not drop to the bottom and remain there during no-flow, backwash, or very low flow conditions, the controller cannot prevent the uncontrolled feed of chemicals, which could cause personal injury or death.

Testing of the flow switch periodically is essential to verify that low sample water flow will disable the feed of chemicals. When flow to sensor housing is interrupted or, slowed below 10 gallons/hour, the controller blue OK LED will start to flash and the LED status for each feeder will show "OFF:Interlocked E" within 2

seconds. If not, plumbing corrections or the installation of additional safeguards will be necessary to avoid dangerous uncontrolled chemical feed.

Chemical Feeders

NEVER CONNECT FEEDERS DIRECTLY TO POWER SOURCE

If the chemical feeders are connected to a wall outlet, the safety devices integral to your ProMinent controller, and to the safe feeding of chemicals, will be bypassed. It is very important that the chemical feeders be connected to the controller and never directly to a wall outlet. If the chemical feeders are connected to a wall outlet and feeding continuously, when the flow of water to the pool stops due to filter backwash, the circulation pump losing prime or other causes, potentially hazardous concentrations of chemicals can be fed into a pool or spa. Follow Instructions carefully to insure safe operation.

ALWAYS USE ANTI-SYPHON DEVICES

Uncontrolled feeding of chemicals can result in injury or death.

Anti-Syphon devices must be installed on chemical feeders to prevent uncontrolled feed of concentrated chemicals.

If a vacuum is created in the water circulation line and no anti-siphon device is installed on the chemical feeders, potentially hazardous concentrations of chemicals can be drawn into pool or spa. Always use injection check valves and anti-siphon valves in the chemical feed lines to prevent this situation from occurring.

Electrical Surges

ELECTRICAL SURGES CAN DAMAGE YOUR CONTROLLER

Uncontrolled feeding of chemicals can result in injury or death. A damaged controller could feed chemicals in an uncontrolled manner.

If you suspect your ProMinent controller is not operating properly, disconnect it from the chemical feeders until the problem has been corrected.

ProMinent controllers, like all modern electronic devices can be damaged by severe electrical spikes and surges, like lightning. Every effort has been made to harden your controller against such surges, but no precautions are 100% effective. Additional surge protection can be installed at time of installation, but even that is not a guarantee that surge damage will not occur. If surge damage occurs, chemicals could be fed to your pool or spa, continuously with no safety controls. If you inspect your ProMinent controller after a possibly damaging power surge (thunderstorm or power outage) and suspect the controller is not operating properly, disconnect the chemical feeders at once, and contact your ProMinent dealer for service.

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CAUTION

READ AND FOLLOW ALL MSDS PRECAUTIONS REGARDING CHEMICALS USED

IT IS THE RESPONSIBILITY OF THE USER OF THE EQUIPMENT TO OBTAIN AND FOLLOW THE SAFETY PRECAUTIONS OF THE MANUFACTURER OF THE HAZARDOUS MATERIAL, INCLUDING ALL PERSONAL PROTECTION EQUIPMENT.

Water disinfection control involves irritating, corrosive, caustic, and potentially toxic chemicals. Use extreme caution and comply with all national, state and local regulations and recommendations for the handling and storage of these chemicals.

System Mounting

WARNING!

DO NOT INSTALL YOUR CONTROLLER IN AREAS ACCESSIBLE TO THE PUBLIC

Fully Assembled System on Acrylic Backpanel

- Locate an area on a flat wall large enough to accommodate the full size of the 18 x 30” acrylic system panel with enough extra room to accommodate flexible sample tubing connections.
- ***NOTE: Location of the system should not be in the direct sunlight if mounted outside, as this may cause false temperature readings and can cause temperatures inside the enclosure to exceed maximum temperature ratings of 120°F.***
- The controller is shipped with a 3 ft. power cord already installed, for easy connection to a close indoor wall receptacle. Alternatively, you may choose, or be required by local electrical code, to install conduit into the bottom of the controller enclosure. Refer to the wiring section of this manual for enclosure opening sizes and locations.
- Refer to dimensional drawings for location and spacing of pre-drilled mounting holes, measure and mark these locations on the wall.
- Approximate weight of the assembled system with water flowing, may be in excess of 30 lbs., so take care to choose adequately sized mounting hardware.
- NOTE: Spacers on the back of the acrylic panel, if present, are not secured and can be easily removed from their groove, if desired.

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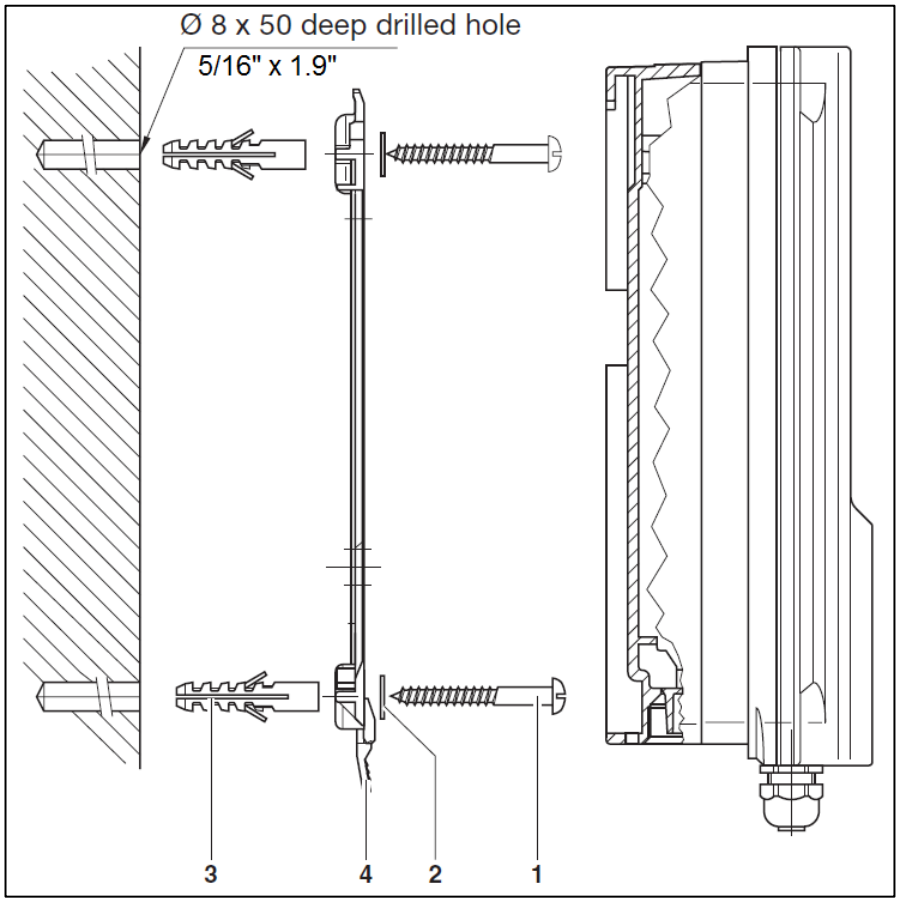
Individual Components

DCM2 Controller Enclosure Mounting

- Locate an area on a vertical wall where the controller can me mounted at approximately eye level and have enough clearance to allow the DGMa modular sensor housing to be installed near and below the controller. Avoid outdoor installations, especially in direct sunlight. The location of the DGMa sensor housing must have about 18” of clearance above it to allow removal of the sensors, and about 12 inches below to access water sample petcock and a sample cup.

NOTE: a common mistake made at installation, is not allowing enough space above the sensor housing to accommodate routine sensor maintenance.



- Individual DCM2 controllers are shipped with mounting bracket (4) and mounting screws (1) to assist with wall mount installation.
- Disconnect the bracket from the back of the enclosure by pressing the black plastic release clip (4) at the bottom, and slide the enclosure down towards the clip, then tip the bracket off the back of the enclosure. The wall mounting bracket can then be used as a drilling template as shown.
- Mount the bracket on a vertical wall at approximately eye level, within 30 in. of the nearest 120VAC power outlet. Alternatively, mount near a power disconnect, and wire the power directly to the controller through electrical conduit. Conduit adaptor fittings are available from ProMinent. Refer to local and national electrical codes for wet locations.
- Fasten enclosure securely to the bracket as shown, by hanging enclosure on the bracket, pushing the enclosure against wall and lifting until the enclosure snaps securely to the bracket.
- After controller is mounted, time is best used mounting the DGMa modular sensor housing to allow sensors to equilibrate while the remainder of the installation, wiring and configuration is performed.

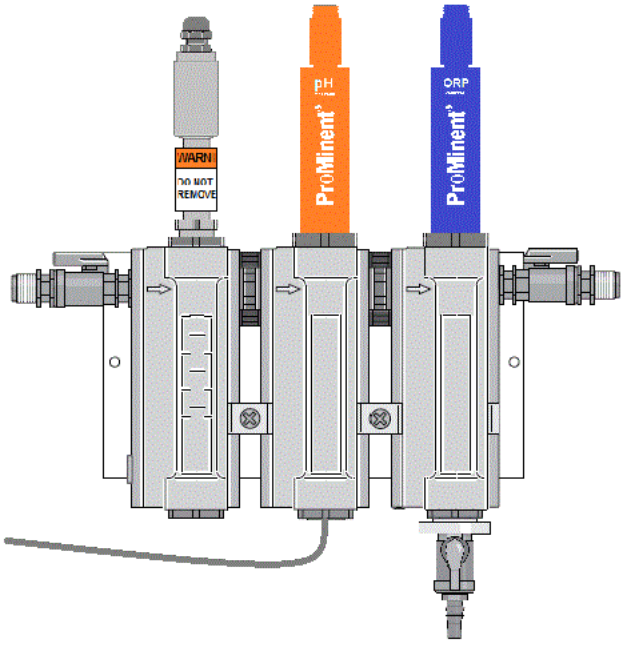
2.2.1. Sample Connections

Modular Sensor Housing (DGMa)

- When shipped separately, the DGMa Sensor housing is mounted to a small white acrylic backpanel.
- Mount plate within 60” of the DCM2 controller, and allow at least 18” clearance above the top of the mounting plate. Do not mount in direct sunlight as this will promote algae growth and create temperature swings not representative of the pool or spa under control.
- Using the typical installation drawings on the following pages, connect sample tubing to the DGMa modular sensor housing and the main recirculation lines, using the fittings supplied.

NOTE: The default mounting of the modular housing is to flow from left to right (note the flow direction molded into each module).

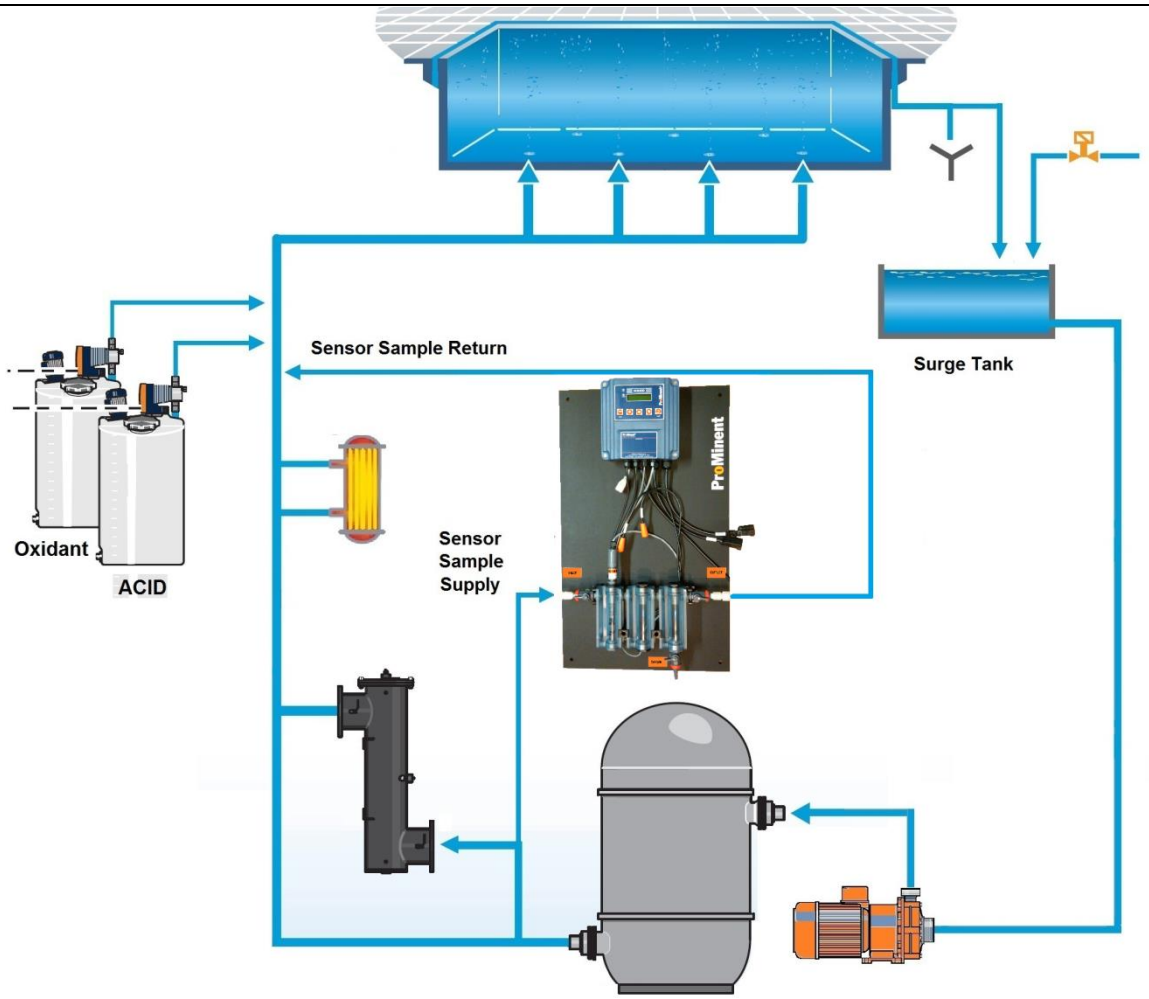
- If preferred, the modular housing is reversible by removing the assembled modules from the black upper snap clips.
- First disconnect the spacer standoff brackets and pull the module assembly to unsnap it from the upper clips.
- Once it is loose, simply flip the assembled modules so that the molded arrows on the modules are pointing right to left,
- Then reconnect it to the standoff brackets and remount onto the backpanel. Adjustment of the standoff brackets mounting screws may be needed.
- Next, use the typical installation drawing below as a guide, and connect the sample supply and return tubing using the selection of fittings supplied.



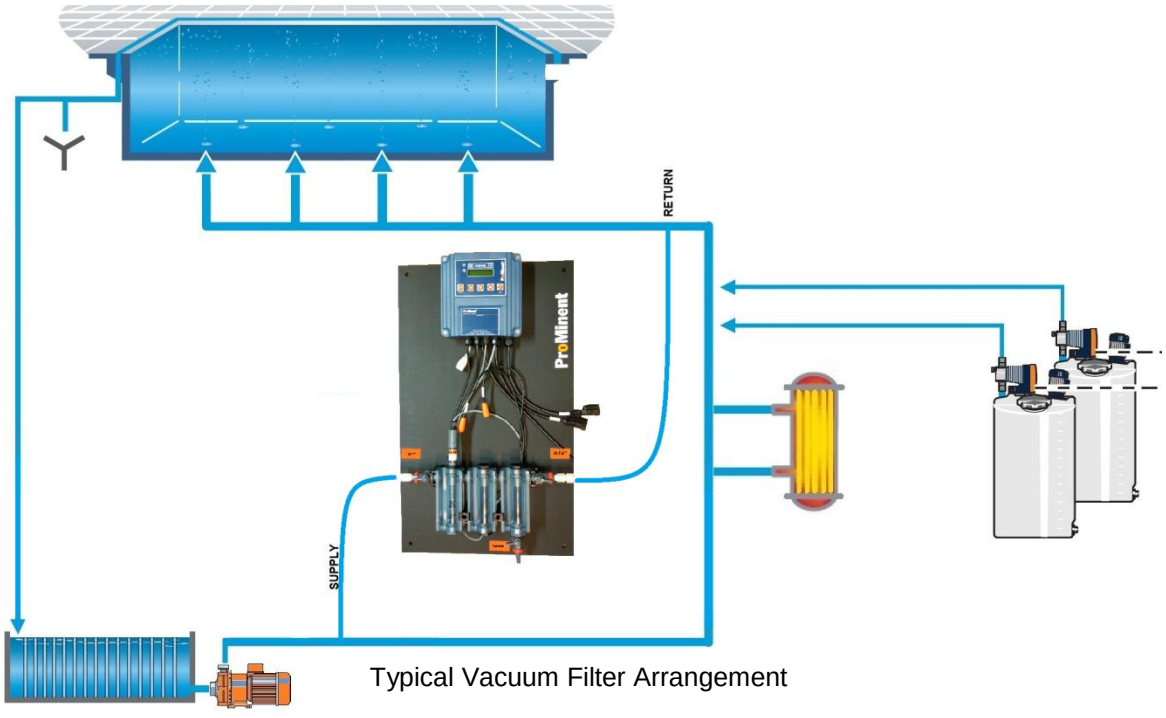
NOTE: Keep in mind that a very small sample volume (11-12 GPH) is needed for ProMinent controllers. That is only (0.18 GPM) compared to other aquatic controllers requiring 1-3 GPM. Sensor sample should always be taken from downstream of the filter, but up stream of UV or Ozone treatment system, heater and any chemical injection. Discharge sample into the line returning to the pool or spa as close to the pool as possible to get the maximum pressure differential. Using the pressure drop created by other devices like heaters or the UV system works best.

CAUTION: Never take the sensor sample from unfiltered water as this may introduce hair or other debris into the flow switch and sample cell. Never return sample to the suction side of the recirculation pump as this will cause a negative pressure environment (vacuum) for the sensors, which will cause non-warranty damage to the sensors, and more importantly, will cause erroneous readings and poor water quality control.

DCM 2 Installation

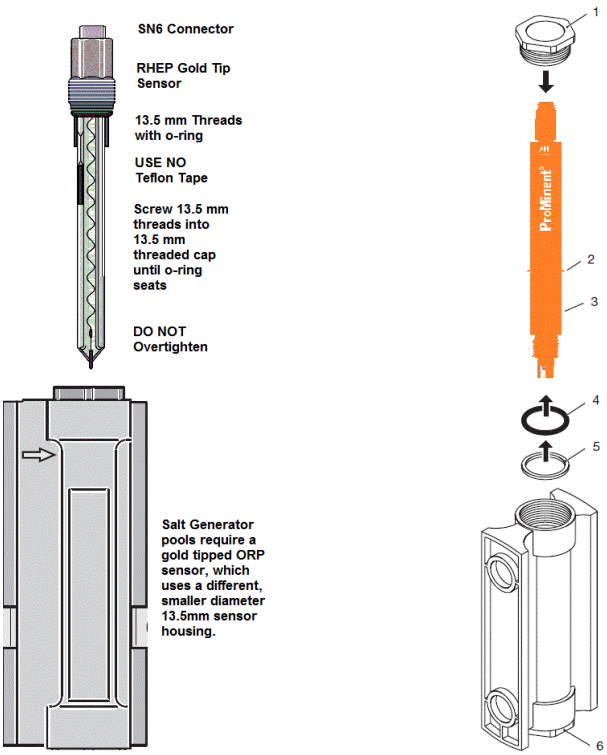


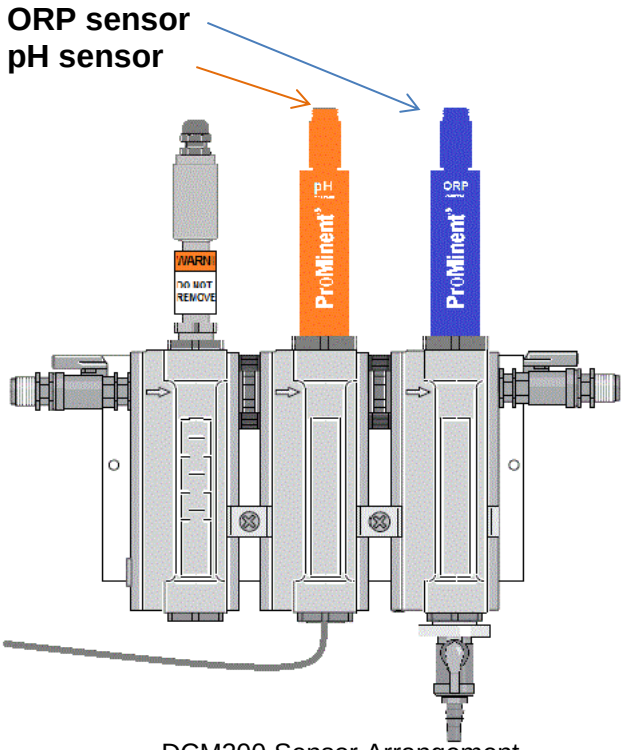
Typical Pressure Filter Arrangement



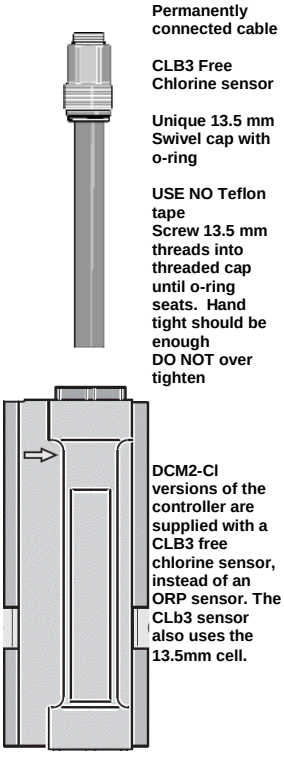
Typical Vacuum Filter Arrangement

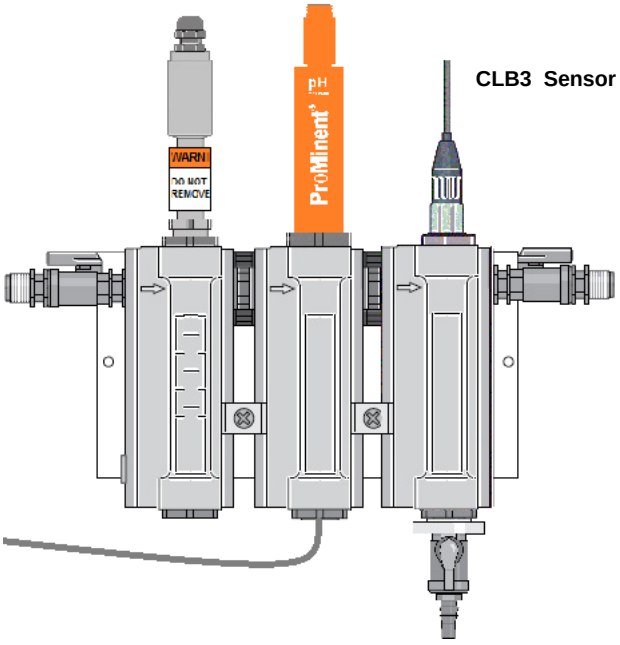
2.2.2. Sensor Installation





DCM200 Sensor Arrangement



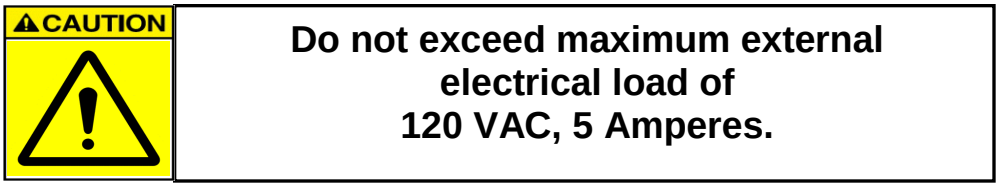


DCM2-Cl Sensor Arrangement

NOTE: ***Salt seeded pools with Chlorine Generators require the use of a special, gold tipped ORP sensor. Free Chlorine measuring versions use a CLB3 sensor. Both of these sensors screw into a smaller 13.5 mm housing module as shown above.***

- Check that all fittings of the assembly have O-rings installed, and fittings are secure.
- Adjust flow switch shaft so the top of the ring at the bottom of the shaft is at the 12.5 gph mark if using the CLB3 sensor, and tighten the compression nut to keep the shaft from leaking and secure the flow switch shaft in place. pH and ORP sensors are not as flow sensitive, so any flow between 11 and 25 gallons/hour is fine.
- When you are ready to open up the sample water valves, remove the protective caps from the pH and ORP sensors, and clean both sensors with Isopropyl alcohol followed by a mild acid, using a soft bristled toothbrush. Shake or gently tap pH sensors to free any bubbles from the glass bulb tip.
- Open the supply and return valves fully to evacuate all the air from the DGMa modular sensor housing.
- Once all air has been evacuated, reduce flow through the assembly to 12-15 GPH for optimum CLB3 sensor performance.
- Allow sensors to equilibrate while you complete the wiring of the controller.

2.3. Wiring



Before beginning controller wiring, be sure power has been removed, locked out and tagged as under repair, before proceeding. Observe all national and local electrical codes and safety procedures during wiring and installation. This will best assure your safety, the safety of the pool operations staff and swimmers.

Wiring Guidelines

AC Controller Power

Power the controller using a dedicated, separate breaker in the local lighting-distribution panel. Do not route the controller AC power in common conduit with variable frequency pump drives.

AC Power to Solenoid Pumps, Valves & Solenoids

Controller relays 1-3 switch and power the AC line to solenoids and chemical pumps and feeders. Ensure that each feeder has a dedicated neutral cable between the controller and the feeder. Do not share a common neutral to multiple feeders.

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Fractional Horsepower Chemical Feed Pumps

Fractional horsepower or larger chemical feed pumps cannot be directly powered by the controller. Use the controller 120VAC control output to switch a motor start relay with a 120VAC coil for these type pumps or feeders.

The DCM2 controller's 120VAC relays 1 through 3 are fused at 5 amps maximum external load. They can power solenoids and other chemical feeder and pumps, but not the larger fractional horsepower rotational motor pumps. Fractional horsepower feed pumps are commonly used in high pressure chemical feed applications and for large volume Sodium Hypochlorite pumps. The high motor current requires a dedicated breaker, separate from the AC breaker powering the DCM2 controller.

Sensor Wiring

Do not put CLB sensor cable in a conduit with any other wiring. Other analog sensors (pH, ORP, and Temperature), contact sets, water meters and flow switches may be cabled in a common conduit without causing operational problems.
Do not mix AC Line, 120VAC wiring with any sensor or communications cable in a common conduit. Grounded, metallic conduit is preferred in areas where variable frequency drives operate.
There is not a sensor transmitter (preamplifier) available for the DCM2. pH, ORP and temperature sensors may not be extended past the maximum available length of coaxial SN6 cable, 33 feet (10 meters). Never try to splice or extend the sensor signal cables. For applications where the distance from the controller to the sensors exceeds 33 feet, consult your ProMinent distributor for options available to you.

Water turbine meter cables can be extended. Verify that the shields on water meters are also extended if meter cables are extended.
Connect signal cable shields at one end only to the internal frame lower bottom grounding screw.

Ethernet LAN Cabling

CAT5 LAN cabling is limited to a maximum of 300ft / 100m from controller to access hub.
Do not exceed this limit.

Controller Enclosure Wiring

If shipped with the controller pre-mounted to an acrylic back panel, the controller has already been wired to the sensors you purchased with the controller. Unless requested otherwise, the controller has also been equipped with a 120VAC power cord. Refer to sections below for proper wiring of power, individual sensors and feeders.
To facilitate easier wiring connections, the enclosure lid can be "parked in the open position as shown below.

- Loosen enclosure lid's captive screws.
- Carefully pull lid straight out just a few inches to avoid unplugging ribbon cables and internal connectors.
- Raise lid straight up until tabs on the sides of the lid align with recessed parking slots on the side of the rear enclosure section.
- Push tabs into slots until they snap into place, supporting the lid in an upright orientation.

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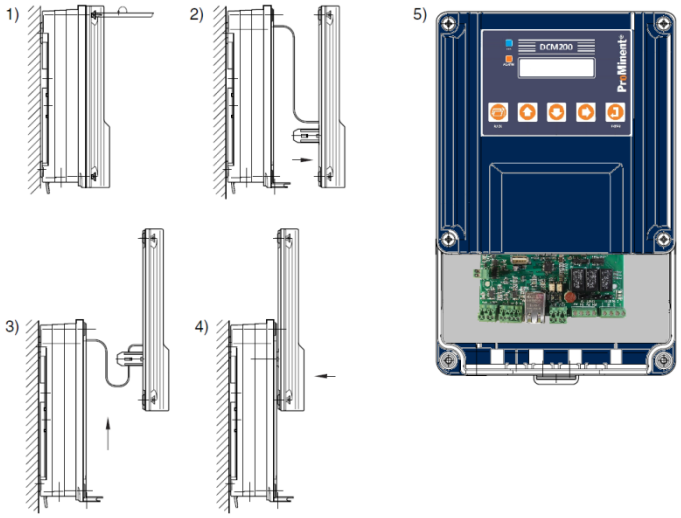
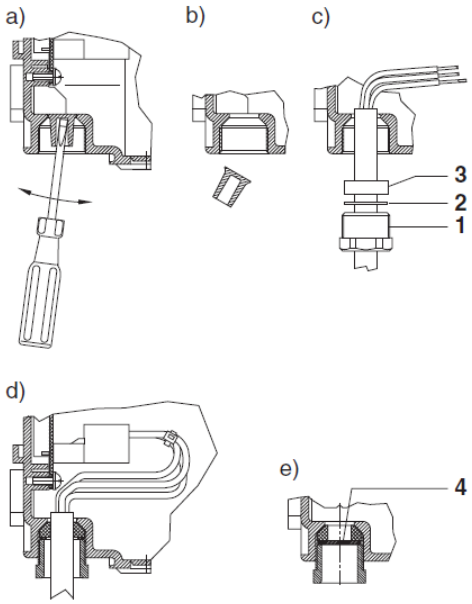


Controller Wiring Terminals

DCM2 Controllers consist of two main circuit boards, a **main** circuit board and an LCD driver board.
The **main** Printed Circuit Board is located in the rear half of the enclosure and supports 3 sensor inputs, 2 digital inputs and 5 digital outputs. The digital outputs consist of three (3), 120VAC relays and two (2), DC contacts.
The main PCB is connected to a single 2 line x 16 character LED driver board and OLED display mounted on the back of the lid using three ribbon cables. The Ethernet jack and USB port are integral to the main PCB.

Controllers may be supplied prewired with either 120VAC receptacle cords, or ready to be installed with conduit and individual wiring. Shown below are pictorial diagrams of how to install cable glands into the bottom of the DCM2 enclosure.
The diagrams show how to best open and install fittings in the rear, then the front entrances on the bottom of the enclosure.

Interior of DCM 200 controller



Enclosure Entries

2.3.1. 120VAC Line Power and Feeder Wiring

⚠CAUTION

Do not put conduit entries in the top of the enclosure. Resulting conduit condensation and failure to seal may damage controller circuit boards.
Sensor wiring in the same conduit with AC power will cause measurement errors and measurement instability.

⚠CAUTION

Remove the controller frame assembly prior to drilling additional enclosure entries to prevent damage to wiring and circuit boards. The frame assembly is secured by 4 Phillips screws.

⚠CAUTION

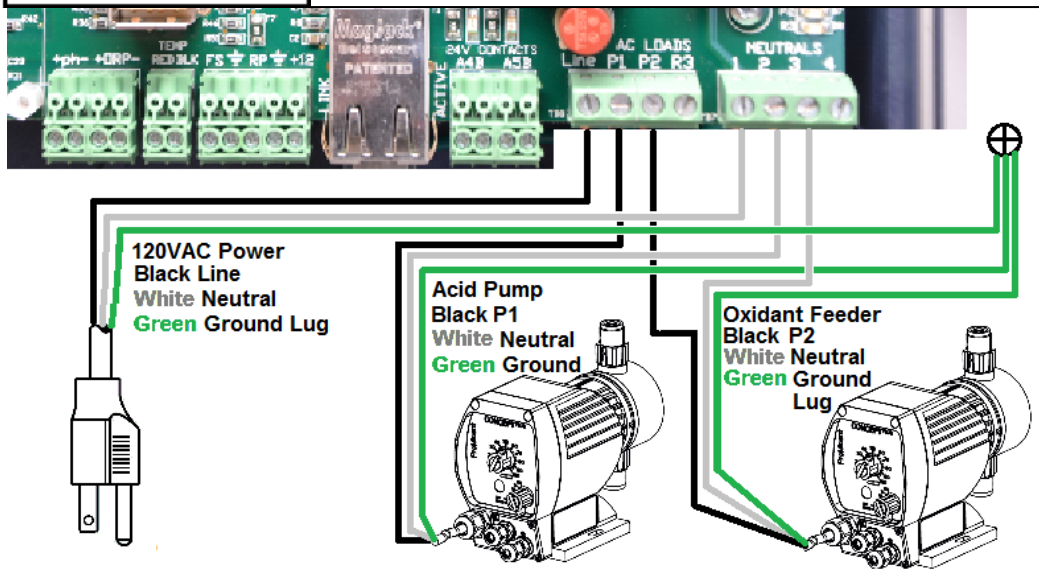
Do not exceed maximum external electrical load of 120 VAC, 5 Amperes.

The factory pre-wired your controller with a power cord and two 120VAC receptacle cords, unless you requested otherwise. For conduit wiring configurations, remove the cords supplied and replace the cord wiring with the individual wires from the conduit. The same terminals are used and are shown in the diagram below for reference.

⚠WARNING

NEVER CONNECT FEEDER DIRECTLY TO POWER SOURCE

If the chemical feeders are connected to a wall outlet, the safety devices integral to your ProMinent controller, and to the safe feeding of chemicals, will be bypassed. It is very important that the chemical feeders be connected to the controller and never directly to a wall outlet. If the chemical feeders are connected to a wall outlet and feeding continuously, when the flow of water to the pool stops due to filter backwash, the circulation pump losing prime or other causes, potentially hazardous concentrations of chemicals can be fed into a pool or spa. Follow Instructions carefully to insure safe operation.



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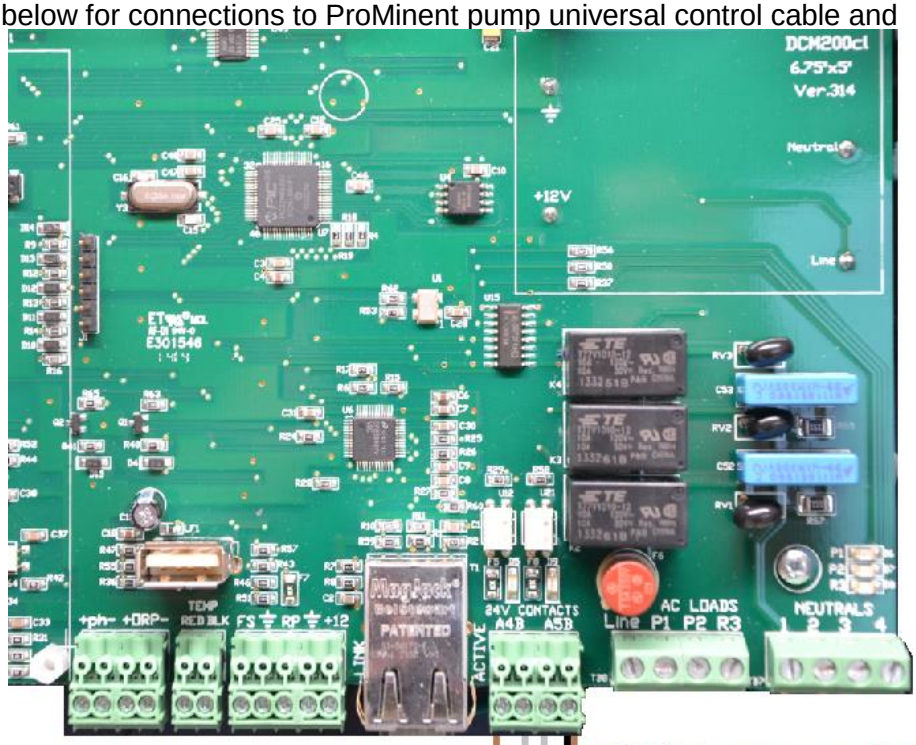
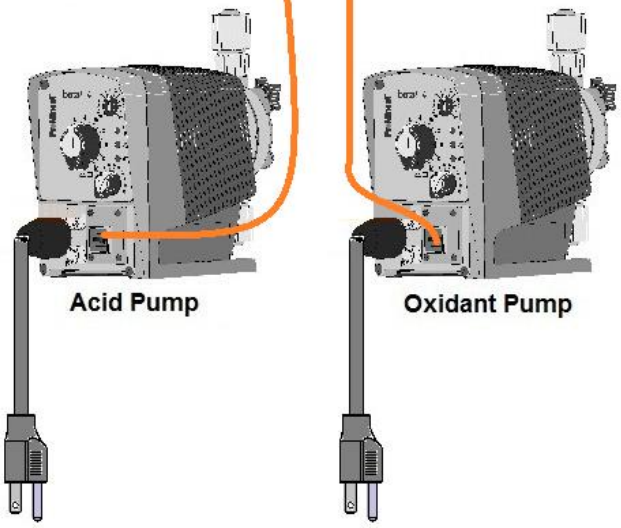
Pulse Controlled Pumps

Pulsed controlled pumps can be connected to give more precise control options like PID control and use low voltage wiring to convey pumping signals to the feeders. These features are built into all DCM2 controllers as a standard feature. Use the diagram below for connections to ProMinent pump universal control cable and similar cables for other pumps.



Pulse outputs connect to 'External Control' input requiring a low current DC switch closure.

Black wire connects to Brown as Common (-), White is the pulse signal (+).



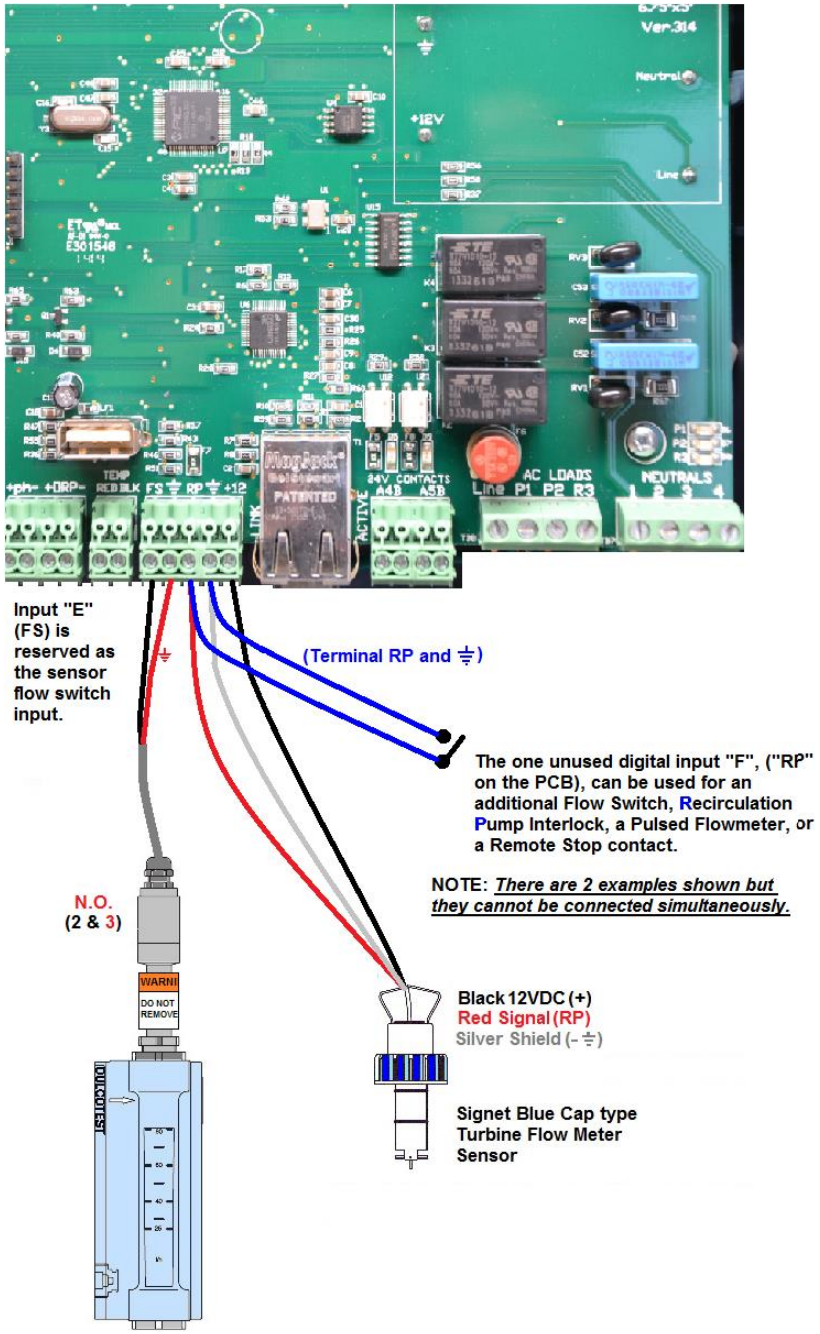
On ProMinent pumps, you must select "Extern" on the pump speed selector switch.

2.3.3. Flow switches, Contact Sets, and Water Meters

Water meters, flow switches and 'dry' contact sets are connected to input terminal 'F' and a ground terminal. 5VDC limited by >10KΩ puts less than 0.5 mA through a closed contact set. Input 'E' is reserved for the sample flow switch function and cannot be changed.

Paddlewheel and Turbine water meters (Square Wave types) are powered by the 12VDC controller power supply, and thermally fused at 100mA.

Connect cabling shields at the controller ends of the cable only, to any ground terminal either on the Measure Card or on the bottom center of the aluminum back plate.



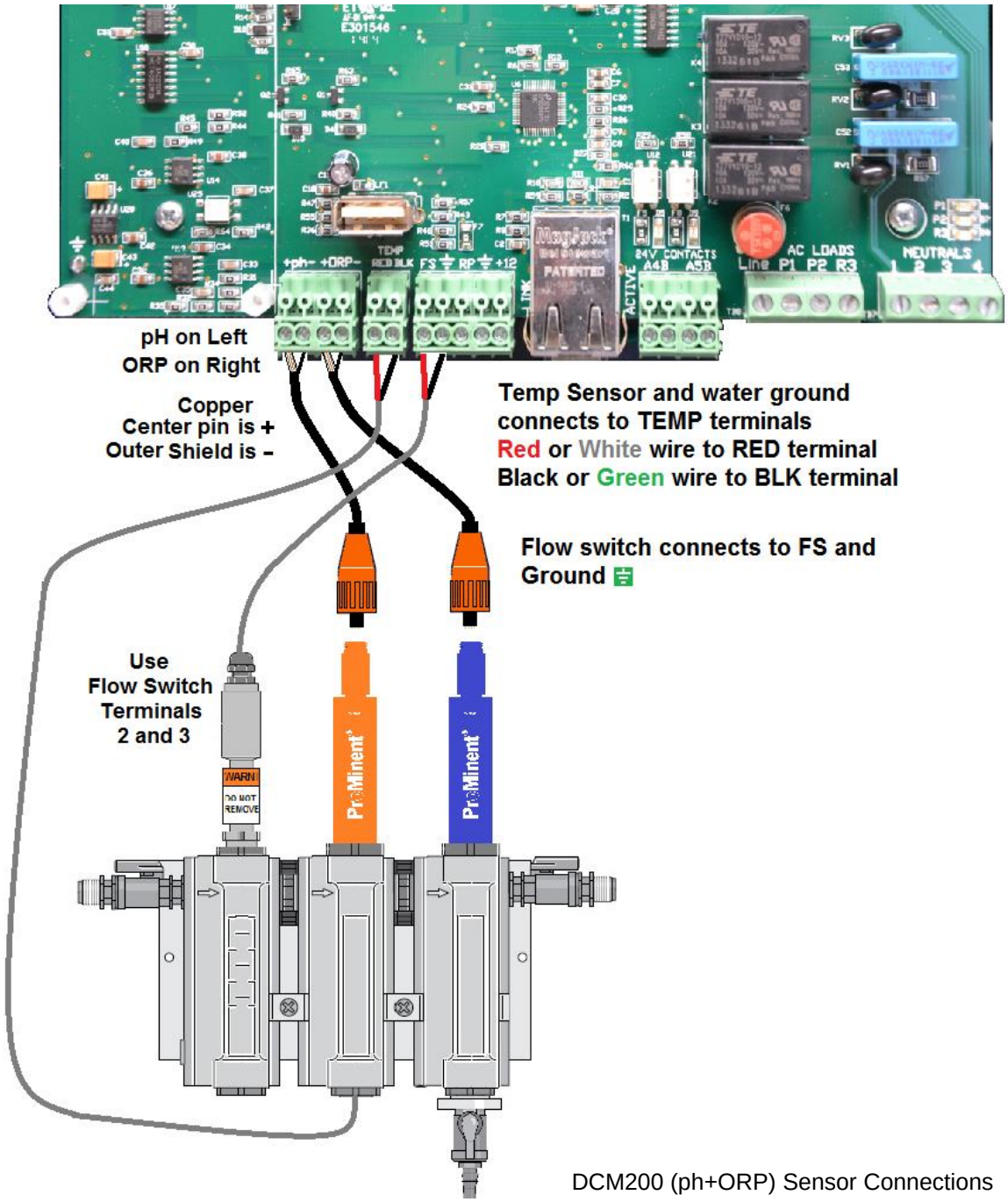
WARNING!

The flow switch provided by ProMinent is not meant to detect main recirculation flow.
It is meant to detect the loss of sample flow, and interrupt chemical feed accordingly.
A generally accepted safety practice of installing an additional safety switch for main recirculation flow is highly recommended, and included as input "F", on connection "RP".

2.3.4. Sensors

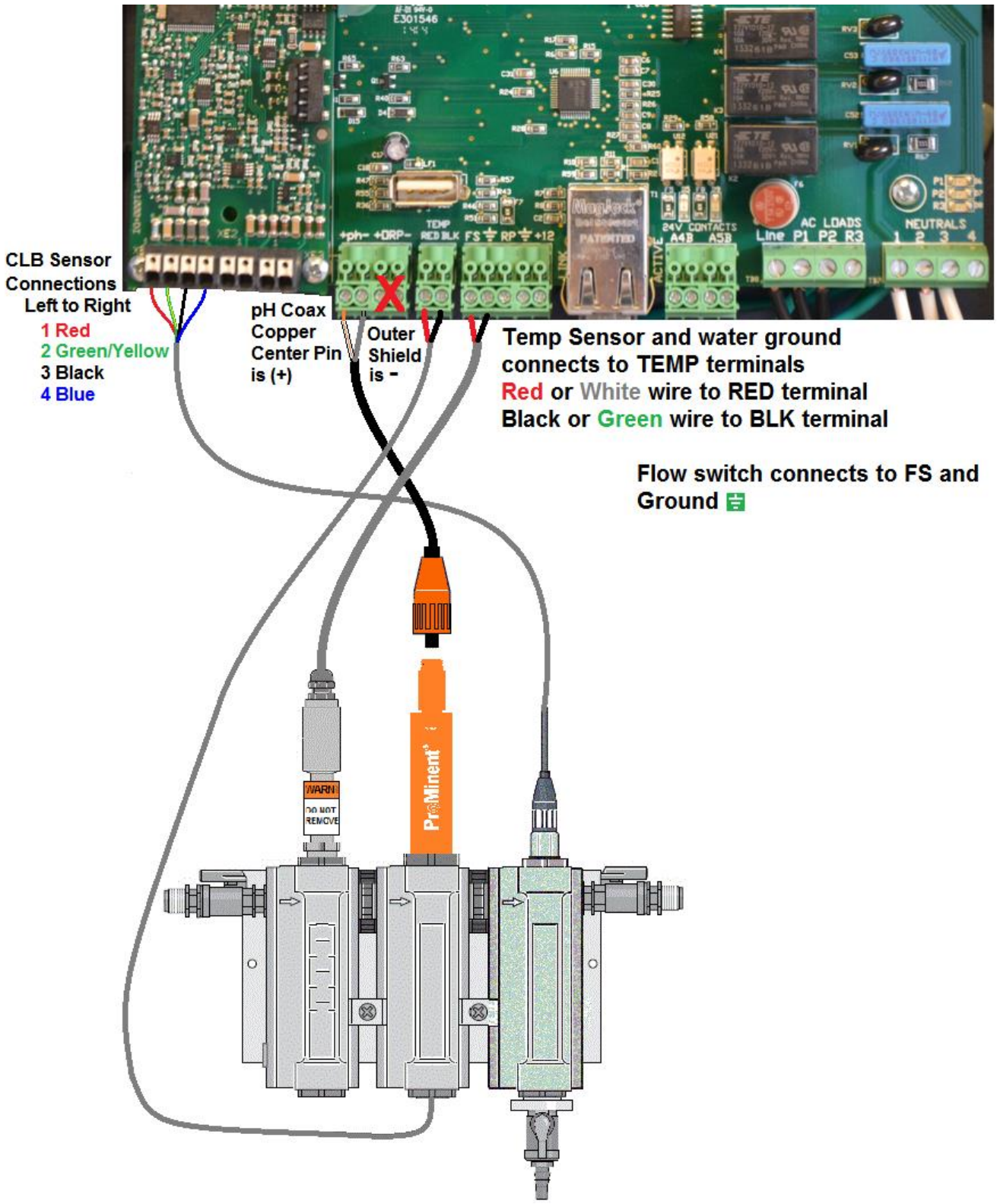
pH and ORP Sensor Wiring

DCM2 controllers normally have the cables for the pH and ORP sensors pre-wired and marked on the cables for the appropriate sensor. The SGT (Solution Ground+Temp) sensor and flow switch are also pre-wired at the factory. If replacing these cables, connect the center pins on the coaxial cables to the positive [+] terminal and the metallic shield is connected to negative [-]. A solution ground reference is required for proper operation. An SGT sensor has a solution reference (Green or Black) and temperature sensor (White or Red). Even if the temperature sensor is not being used, the solution reference must be connected to the ground terminal. The DCM200 sensor connections are shown below, followed by the DCM2-Cl sensor connection diagram on the next page.



DCM200 (ph+ORP) Sensor Connections

DCM 2 Installation



DCM2-Cl (pH+CLB Free Cl_2) Sensor Connections

3. Calibrations

3.1. Single Point Calibrations, One-Point or Standardization

The pH, Free Chlorine and Temperature inputs A, B and C, have single point (Offset only) calibrations. When input B is the ORP input it should never need field calibration. Calibration of contact set inputs “E and F” is not needed.

3.2. Two Point Calibration

Two point calibration is limited to pH sensors.

Sensor **OFFSET** is adjusted so the sensor input at point 1 value matches the value of the first calibration standard.
Sensor **GAIN** is adjusted so that the sensor input at point 2 value matches the value of the second calibration standard. This is the measured response for each engineering unit, and normally does not change for pH and Temperature sensors used in aquatic applications.

The value of a sensor = Measured Level (mV) x GAIN + OFFSET.
This value may be modified by sensor compensation.
Compensation (Temperature, Rate-Volume, Corrosion Rate…) is applied after **GAIN** & **OFFSET**.

From the calibration menu, users have the option to Reset to Factory, which resets the sensor **GAIN** & **OFFSET** to default values. **OFFSET** or **GAIN** settings outside of the fault limits, typically indicate a sensor, cabling or driver fault. If the calibration **OFFSET** or **GAIN** is outside fault limits, users are offered the option to OVERRIDE. OVERRIDE consists of submitting or pressing enter an additional time. Clearly, this option should be used with caution.

Users also have the option to manually enter **OFFSET** and **GAIN** by selecting Sensor then Configure in the Browser interface, but this is not advised without consulting your authorized ProMinent Service Company. See the DCM2 Browser Manual for more information.

WATER METER F:
When Input F is configured as a volume (flow) meter, the user calibration value is Volume/contact for contact head meters (rare in aquatic applications) and ‘K’ factor (Pulses per unit volume [gallon]) for more typical paddlewheel (turbine) meters.

Reset to Factory
Newly installed firmware & reconfigured water meters are Reset to Factory Default calibrations when controller Power is first turned on after install.
User selected Reset to Factory loads the **GAIN**, **OFFSET** set from the following table.

Sensor Type	Input Type	Factory Gain	Factory Offset	Fault MAX	Fault MIN
Calculated Value		100	0	None	None
Manual Entry		1	0	0	0
pH	**pH** **ORP**	-0.0170 1.0000	7.0000 0.0000	OFFSET NA	OFFSET NA
Temperature **US units (°F)** **Metric units (°C)**	**Temp IC Chip**	 0.20 0.2	 -66.8 -66.8	OFFSET -430 -253	OFFSET -590 -293

4. Password Security

4.1. Overview

DCM2 controllers use 4 levels of password for controller access and to stamp the activity log:
Public, Operator, Configuration, and Administrator
Refer to Section 4.2 for default user IDs and passwords.

Passwords are defaulted OFF for keypad users and ON for Browser users.
Passwords cannot be turned OFF for Browser users.

There are 7 user assignable passwords which are distributed between Operators & those allowed to Configure.

Passwords are a maximum of 9 letters and numbers and are case sensitive. The controller blocks the use of HTML delimiter characters by limiting password content to letters and numbers only.

The controller blocks duplicate passwords.

4.2. Password Level Activities

Password Level	Activities	Notes
Public **1 per DCM2**	Views current state and alarm log. Cannot adjust or edit.	Password not required for keypad or browser use. Browser access to controller alarm log only.
Operator **4 per DCM2** **Operator1 - 4**	Calibrate sensors. Prime Pumps or force them off. Changes setpoints and feed rates. Can view but not edit all controller configure level settings	Can edit own user ID & password. Keypad users, password only editing. Controller default user ID is **Operator1** thru **Operator4** with default passwords 1..4.
Configure **3 per DCM2** **Configure 5 - 7**	Configure controls, interlocks and blocking. Sets sensor compensation, feed alarms & limits. Sets Event Timers, blocking & cycle days. Zeroes water meters All Operator Activities	Can edit own user ID & password. Keypad users, password only editing. Controller default user ID is **Configure5** thru **Configure7** with default passwords 5..7.
Administrator **1 per DCM2**	Set IP address and network parameters. All Operator & Configure Activities	Browser: Can define other users as **Operator** or **Configure** Cannot view other users passwords. Can edit own password, default ‘AAAA’ Cannot edit ‘Admin’ user id

4.3. Browser Passwords & Lockout

After 5 unsuccessful attempts to log on, the controller locks out Ethernet and Keypad access.
Locked out users will see an **Alarmed** status message in place of **Password Incorrect**.

Browser & modem resets at 7:00AM or when AC power OFF/ON.
Therefore, the maximum lockout time is 24 hours and the minimum is less than a minute.

This feature blocks scripting attacks on controllers and cannot be disabled.
There is no limit on the number of keypad password attempts.

Changing all passwords from their default values is strongly recommended.

Passwords can be reset to the factory default by logging on as the **Reset Pswrds** user and entering a factory provided password.
Refer to Browser Manual for more information.

4.4. LCD Keypad Passwords

Passwords are defaulted OFF for keypad users.

The **System/Password** menu item does not display unless **System/Configure** has turned passwords ON.
Once passwords are turned ON, only the administrator can access **System/Configure** to turn Passwords OFF

If passwords are ON, you are prompted with the required password level; **Admin / Configure / Operate** when you attempt to execute a command which reconfigures the controller.
Passwords are not required to view the current status.

Default Passwords & User IDs

User Type	User ID	Default Password
Operator	Operator1 Operator2 Operator3 Operator4	1 2 3 4
Configure	Configure5 Configure6 Configure7	5 6 7
Administrator	admin	AAAA

Keypad-LCD access cannot change User Type or ID.

NOTE: If you are going to use keypad passwords, your first action should be to change the admin and all other passwords, since leaving any password at its default value, bypasses password protection. After changing all the passwords, turn keypad passwords ON using the keypad or the browser interface.

4.5. Passwords Reset

Contact ProMinent's Technical Service Department, at **(412) 787 – 2484**, with the controller serial number and the time shown on the controller, to obtain a reset password which resets all passwords to the factory defaults shown above.
Proof of controller ownership is understandably required.
ProMinent controllers have no backdoor or super user password.
If you forget the password, this is the only way to recover controller access.

5. Application Notes

5.1. Sensor Inputs & Control Outputs

The controller uses the letters '**A**' thru '**F**' to identify input sensors, like pH, ORP, Free Chlorine, Temperature, Flow Switch, Surge Tank Level, Recirculation water flow meter, and other Digital signals. The numbers **1** to **5** identify the three (3) AC power switching relays and two (2) DC outputs for enable, alarm or pump pulse frequency use.

'**A**' to '**C**' and '**E**' to '**F**' exist as terminal blocks where inputs are connected. Sensor input '**D**' is 'virtual' and used to calculate Ryznar's and Langelier's SI indices.

Users can also change the default names of sensors, pumps and valves to more meaningful, site specific names. For example, although you may change the name of the controller pH input "pH Sensor_A" to "Acid Sensor", 'A' identifies where the sensor is connected and the letter "**A**" is used to represent the "Acid Sensor" input in hardware connections and data logging.
Most inputs may be used to control almost any output with some logical aquatic application exceptions.

I/O Point	Function	Notes
Sensor **A**	Fixed pH sensor input Operating Range 2.0 to 12.0 pH units	Support for all ProMinent pH sensors. All controllers have one pH sensor input.
Sensor **B**	Fixed ORP sensor input Operating Range 0.0 to 1000.0 mV	Support for all ProMinent ORP sensors. All controllers have either one ORP sensor input, or a CLB3 free chlorine sensor input. Selection of ORP or CLB is set permanently at time of manufacture.
	Fixed CLB Free Chlorine sensor input Operating Range 0.0 to 5.0 ppm	Support for ProMinent CLB3 sensors. All controllers have either one CLB free chlorine sensor input, or an ORP sensor input. Selection of ORP or CLB is set permanently at time of manufacture.
Sensor **C**	Fixed Temperature input Operating Range 32.0°F to 212°F	Support for the ProMinent SGT 10mV/°K temperature sensor. Thermal compensation for the "A" pH sensor, and LSI/Ryznar calculations.
Phantom or Virtual Sensor **D**	Virtual sensor inputs have no physical connection and are used for alarms, control and logging.	This is a calculated value for LSI/Ryznar's scale and corrosion indices using pH, temperature, and manual entries of other water analysis values.
Sensor **E**	Fixed digital input	There are two digital inputs. Input E is always used as the Sample flow switch and cannot be changed or disabled.
Sensor **F**	Fixed digital input	Digital input 'F' can be configured as an additional Recirculation Pump flow switch interlock, remote enable/disable, float switch (for auto-fill), or square wave pulsing flow meter (like GFSignet 2536 blue cap).

Relays **1** to **3**	AC Line powered outputs ON/OFF controls	Controller powered outputs switch 120 VAC pumps, valves & solenoids ON/OFF. Relays are Normally Open only. Outputs can alarm on runtime per actuation.
Relays 4 and 5	DC switching outputs Pulsing or ON/OFF controls	DC Contacts, unpowered, up to 24VDC, remote enable, or Variable speed pulse output feeds. Presets for popular ProMinent and other pumps (400 strokes/min maximum rate.)

5.2. Communications

Ethernet LAN TCP-IP:

The DCM2 controller contains a 10 Base T, RJ45 Ethernet port with a Fixed IP address assigned by the administrator. Additional parameters adjustable are Netmask, Gateway and Primary DNS. The controller operates as an HTML micro-server for command & control using most common internet browsers available on most computers including Apple OS computers and most all mobile internet enabled devices.

Logged data is served as an XML file in response to an HTML request. This feature makes configuration easy using common Ethernet network browsers already installed on most computers, and easily supported by local IT departments.

USB Services

All DCM2 controllers include a USB port which is used for Comma, Separated Variable (CSV) formatted datalogging extraction to a USB flash drive or “thumb drive”.

Data Logging

Each enabled input and output is logged by the controller as a user set interval from 1 to 1440 minutes. The default rate for all data is 60 minutes with a 24,000 sample log size. Range is 16.6 to 24,000 days. Default resolution is therefore ~1000 days of information.
24,000 @ 60 minutes = 24,000 hours = 24,000/24 = 1000 days = 2.7 years
24,000 @ 30 minutes = 12,000 hours = 24,000/48 = 500 days = 1.3 years
24,000 @ 10 minutes = 4,000 hours = 24,000/144 = 166 days = 5.5 months
24,000 @ 5 minutes = 2,000 hours = 24,000/288 = 83 days = 2.7 months

5.3. Control Configuration

5.3.1. Control Method

Relays 1 to 5 ON/OFF Controls

When in On/Off control mode (no special control selected), the deadband or hysteresis is the difference between the “Turn ON Setpoint” and the feeder “Turn OFF” point. This applies to relays, controlled by sensors A, B and C. Not applicable to relays controlled by flow meters or contact set F.

Method	Function	Examples
Rising Setpoint [Feed Down]	ON: Sensor > Turn ON Setpoint OFF: Sensor < Turn OFF Setpoint	Acid Feed
Falling Setpoint [Feed Up]	ON: Sensor < Turn ON Setpoint OFF: Sensor > Turn OFF Setpoint	Oxidant Feed Caustic Feed
Between Setpoints *[Not normally used in pools and spas]*	ON: Sensor < Turn ON Setpoint & Sensor > Turn OFF Setpoint OFF: Sensor > Turn ON Setpoint	Blocking Controls or Level Controls

	Sensor < Turn OFF Setpoint	
Event Rising *[Not normally used in Aquatic applications]*	Rising Setpoint Operates only during Timed Events	Acid Feed or Dechlorination
Event Falling	Falling Setpoint Operates only during Timed Events	Oxidant alternate setpoint
Event Between [Not normally used in Aquatic applications]	Between Setpoints Operates only during Timed Events	Blocking – sequencing controls.

Frequency Controlled Pumps, Contacts 4 & 5

Sets the variable frequency control range for pumps controlled by sensors A, B or C.
Not applicable to pumps controlled by volume meters or contact set F.

Method	Function	Examples
Always	Frequency varies proportional to sensor value when value between Turn OFF setpoint and deadband limit.	Proportional acid or oxidant controls. Substitutes for more expensive 4-20mA controlled pumps. Can also select PID control functions in addition to strictly proportional control.
During Events	Control active during events until event volume pumped.	Periodic flocculent feed during a timed feed event.

5.3.3. Special Control Responses

Multiple Types of Control For Standard Relays

Time Modulation: Relays 1-5

Application: Cycles a chemical feed pump ON/OFF, decreasing the ON time as the controlling sensor approaches the Turn OFF setpoint (Turn on + Deadband).
Typically used for pH control, reducing acid feed rate as the Turn OFF setpoint is approached.
Use if you can't use a variable pulse frequency controlled pump.

Setup: User selects a relay & selects Time Modulation in Special Control.
User sets Period in seconds, minimum 60 (recommended), Default is currently at 120 Seconds, maximum is 600 seconds.

Operation: Relay ON 100% of Time Period when Control is beyond Turn ON setpoint.
Relay ON time = [(Control – Turn OFF Setpoint) / Deadband] x Period
where Deadband = Turn ON – Turn OFF setpoints.
Relay is OFF when Control is beyond Turn OFF setpoint.

Example: Acid Pumps Turn ON = 7.52 pH and deadband of 0.02 pH (Turn OFF = 7.50 pH).
Period = 60 seconds
At pH >= 7.520, Pump ON for 60 seconds in every 60 seconds [100% of Period]
At pH = 7.515, Pump ON for 45 seconds, off for 15 seconds [75%]
At pH = 7.510, Pump ON for 30 seconds, off for 30 seconds [50%]
At pH = 7.505, Pump ON for 15 seconds, off for 45 seconds [25%]
At pH <= 7.500, Pump OFF [0%]

Notes: Time Modulation control is not advisable when the system response time is faster than 5x the period. In the previous Example; If the measured pH moves from 7.52 to 7.50 in less than 300 seconds (5 Min.), Time Modulation may not hold pH more stable.
Process buffering, sample line length, pump settings, feed point and system volume all affect the response to chemical feed.
Time modulation works on both Rising or Falling Setpoints.

PID Time Modulation: Relays 1-5

Application: Time Modulation applications where additional variable loading control is needed like extremely variable bather loading.

Setup: User selects a relay & selects Special Control = PID Control
User sets Relay Period in seconds, as in Time Modulated control, minimum 60 (recommended), default= 120, maximum is 600 seconds.
User sets Kp Proportional factor for correction to deviation from setpoint (how much it reacts to sensor changes).
User Sets Ki Integral factor for correction for loading. (How much does it change if it's been away from setpoint too long)
User Sets Ki updated time for how often checks are made for loading correction. (How long is too long away from setpoint)
User Sets Kd Differential factor for corrections due to quicker than normal sensor changes. (Shock absorber response)
User Sets Kd updated time for how often checks are made for quicker than normal sensor changes

Operation: See PID Appendix for detailed setup explanation.

6. Sensors

6.1. Compensation

Analog Sensors A..C

Type	Setup	Notes
Thermal (pH)	Temperature sensor C. Defaulted as OFF (see note below)	Applied to pH sensors. Zero compensation at 7 pH. Compensation adjusts sensor gain (slope) +0.00467%/°C above 25°C & -0.0058%/°C below 25°C pH thermal compensation can only be applied to directly connected pH sensors and not to 4-20mA inputs which may represent pH.
Rate-to-Volume	Water meter F displays and logs resulting volume. User selected rate/minute or rate/hour	Can be used to show turnover rate of main pool.
Calculated	LSI and Ryznar's indices	Used on Virtual input D

Note: pH thermal compensation is seldom used in pools and spas since the pH is typically between 7.2 & 7.8 and the temperature fairly stable, so the effect of thermal compensation is limited to the third decimal place.

Digital Input Sensor F

Switching from Contact Set to Water Meter clears the log on the switched input.

Type	Setup	Notes
Contact Head *[not typical in Aquatic applications]*	User set volume/contact	Contact Head compensation turns ON software de-bouncing. Volume counts on contact closure. Contact opening ignored. Not normally used in Pools and Spas.
Turbine or Paddlewheel	User set 'K' factor, pulses/unit volume	Counts pulse on falling edge, 400Hz max. Ignores rising edge. Typical pool and spa circulation flow meter sensors. (must be 12VDC powered, open collector type, square wave sensors)

Contact Set, Flow Switch F

Switching from Water Meter to Contact Set clears log.

Type	Setup	Notes
Contact Set *[Typical uses are, main recirculation flow switch, auto fill switch, or low chemical level alarm]*	User selects Contact Set	Contact sets are ON when closed and OFF when open. ON time is logged. Contact sets used for interlocking, prevent relays from turning ON when contact set is OFF, or open. Contact sets may be configured as 'inverted' to act and display as ON when they are OFF.

6.4. Frequency Controlled Pumps Feed Rate Setting

The controller knows the pump's mL/stroke and maximum stroke rate (Maximum SPM), based on the ProMinent pump model entered, or the values you entered for 'Other'.
Once you select the pump feed method or control mode, the controller sets the optimum Pump Speed.

Modes	User Sets	Pump Speed
Sensor Controlled **pH** **ORP**	**Turn OFF :** pH, ppm or ORP setpoint **100%ON :** pH, ppm or ORP setpoint	**pH: Acid** As the pool or spa chemistry changes from swimmers or Chlorine feed, the pH rises. The acid pump is OFF at pH < Turn OFF. The pump speed increases linearly between Turn OFF (Turn ON – Deadband) and 100% Turn ON setpoint. **Free Cl_2 or ORP: Oxidant** As the pool or spa operates, contaminants are introduced, Chlorine is consumed and the residual and

	Proportional control.	ORP falls. The hypochlorite pump is OFF at ppm/ORP > Turn OFF (Turn On + Deadband) The pump speed increases linearly between Turn OFF and 100%, when it reaches the Turn ON setpoint.
Base Feed	mL/minute setpoint	Pump feeds at user set rate unless flow switch interlocks (turns OFF) feed. *[Not normally used in pool and spa applications.]*
Feed Events	Start Day# & Time Feed Volume	Pumps user set volume at maximum SPM. (Probe Wash)
Timed Cycling	User sets cycle period in minutes and ON volume in mL.	Pumps user set volume (1mL to 10L) at maximum SPM at the start every user set period if above TurnON setpoint. *[Not typically used in Pool and Spas]*

6.5. Technical: Pump Frequency-Stroke Controls

1 Gallon = 3785 mL. Set pump frequency control to External & Stroke to 100%
GPH = Gallons per hour GPD = Gallons per day

Pump Defaults – User Adjustment Range & Resolution
Pump default mL/stroke is set for a 25psi head, typical for chemical injection piping.
The user mL/stroke adjust is limited to +25% and –70% for rated outputs of ProMinent pumps.
The user mL/stroke adjust is limited to 0.01mL/stroke and 10ml/stroke for 'Other' type pumps.
In both cases the adjust resolution is 0.01mL

'Other' type Pump SPM rates are limited to a minimum of 50 SPM and a maximum of 400 SPM

Maximum Feed Rate
A pump's maximum feed rated is its rated maximum strokes/minute x mL/stroke.
Example: A ProMinent Beta 1602 pump is rated 180 SPM with a default of 0.24 mL/stroke @ ½ the rated back pressure.
The maximum feed rate for this pump = 180 x 0.24 x 60 = 2592 mL/hour, 0.685 GPH, 15.44 GPD
At the –70% minimum user adjust: 0.78 L/hour, 0.2 GPH
At the +25% maximum user adjust: 3.24 L/hour, 0.856 GPH

Minimum Feed Rate or Turn Down
The minimum pump frequency is set to 0.1 SPM; a turn down of 1800:1 for a 180 SPM pump and 2400:1 for a 240 SPM pump.
The 0.1 SPM limit turns the pump drive LED ON for 5 minutes and OFF for five minutes; a maximum for an observer visually verifying that a pump is stroking.

Minimum feed rate only applies to pumps that are controlled by analog sensors; pH, ORP, temperature, flow rate…
Other pump controls operate at either the user set mL/minute or MAX SPM, so minimum feed rate is not applicable.

Control Resolution
Control resolution = 1mS. 1mS defines the precision of pulsed output variable frequency control. The DCM2 controller calculates pulsed output strokes per minute to the nearest 1000th of a second (1mS), based on deviation from setpoint and other factors like PID control calculations.
Example: At 180 SPM, the pump pulses 3 times per second. At 179 strokes per minute the pump strokes 2.983 times per second. The number of times per minute, to the nearest 1mS control resolution is 667 feed rates between 179 and 180 SPM. At 10 SPM, with 1mS control resolution, up to 6000 calculated feed rates are possible.

As the example clarifies, control resolution is more important at high pump speeds, and much more control precision than Time Modulated control.

6.6. Relay & Frequency Controls Comparison

6.6.1. ON/OFF Controls :
Relays **R1** to **R3** are used for ON/OFF controls.
The relay switches 120VAC ON or OFF, powering pumps, solenoids and motorized valves.

6.6.2. Frequency Controls :
P4 and **P5** DC outputs control pump frequency, or enable/disable a DC controlled device (like a salt chlorine generator). The pulse controlled pump is always plugged into an AC supply and the pumping rate is set remotely by the frequency of pulses from the controller.

Modes	Frequency Controls	ON/OFF Controls
Control Setpoints	**Sensors:** Control Range Setpoints are TurnOFF & 100%ON Proportional variable frequency control. **Meters:** Setpoints are ppm & volume. **Contact Sets: See Notes 1** Setpoints are seconds & feed volume In mL 100%ON @ user set seconds after contacts close then feed setpoint volume.	**Sensors:** Control Range Setpoints are TurnOFF & TurnON Relay is OFF or ON. **Meters:** Setpoints are volume & ON time. **Contact Sets: See Notes 1** Setpoints are seconds. TurnON@ user set seconds after contacts close. Turn OFF user set seconds after ON.
Timed Events	User sets event volume. Event ends on volume fed	User sets ON time. Event ends when time elapsed.
Data Logging	Logs volume fed in each log interval	Log ON time in each log interval
Feed Limits	Limit = Volume per Feed @ MAX SPM Limit = Volume/Day **Notes 2**	Limit = Time ON per actuation Limit = Time ON /Day **Notes 2**
Control Method	'Always' OR 'During Events'	Rising, Falling & Between setpoints. OR Rising, Falling & Between during events.
Blocking ***[not typical in pools and spas]***	Up to 4 Relay or Frequency controls may block. Blocks on any Relay ON or any Frequency at a non-zero SPM.	Up to 4 Relay or Frequency controls may block. Blocks on any Relay ON or any Frequency at a non-zero SPM.
Interlocking ***[Flow Switches]***	Up to 2 **Contact Sets** may interlock.	Up to 2 **Contact Sets** may interlock.

Time Modulation	**Not applicable**	Pump ON time reduced as sensor approaches TurnOFF setpoint.
Pump Type Selection	User selects Pump Type which sets default mL/stroke & Max. SPM.. 'Other' type allow user to set MAX SPM. All types allow user to modify mL/stroke. Checks that existing feed rates are possible when user changes pumps or set to MAX SPM and alarm message if feed rate modified. Pump changes update the event log.	**Not applicable**

Relay & Frequency Controls Comparison (cont.)

Notes	
1.	**Contact Sets** Runs once per controlling contact closure. In addition to being able to use Contact sets to turn ON & OFF relays and frequency controls, contact sets can have the following compensation: **Invert ON/OFF:** Switches the logical sense of the contact set so you can control on contacts opening or closing. **Applications: Allows a control only when relay changes state** Surge tank fill, remote disable, second flow switch
2.	**Feed Limits** Users may set **OFF on Alarm**, turning OFF a Relay or Frequency on a time limit.

6.7. System Alarms & Indicating LEDs

System Alarms

Alarms are not specific to any sensor or control.

Name	Alarm Message & Cause	Effect
12VDC External	"**Low Alarm**" Wiring errors or a fault on any sensor powered by the controller 12VDC 'DC Power Output' supply	Correct wiring. Remove defective sensor. 12VDC thermal fuse auto-recovers. While alarmed: sensors, meters and current loops powered by the 12VDC supply will not operate.
Internal 2.5V	"**Out of Range**" Sensor, meter or contact set wiring error	Used to auto-calibrate all sensor measurements to remove power supply drift error. All sensor measurements stop auto-calibration.

Indicating LEDs

Name	Location	Function
Blue 'OK'	Facepanel to left of LCD Screen	On when there are no Alarms Flashes when flow switch is OFF or in Flow ON Delay
Red 'ALARM'	Facepanel to left of LCD Screen	Flashes when any alarms are active.
Green 'LINK'	Top Left of Ethernet jack	On steady with Ehternet connected
Green	Top Right of Ethernet jack	Flashes with Ethernet activity

'ACTIVE'		
Green **P1, P2, R3**	Lower Right Main board Above Neutral Terminal #4	ON whenever the Relay is ON.
Red **D5,D9**	Lower Edge of Main PCB Above Relay 4 & 5 24V CONTACTS terminals	ON when contact is closed or ON for 50% of the pump frequency period. Mirrors the time that the electronic contact set pulsing the pump is closed. **Example:** A pump running at 10 SPM would have its indicating LED on for 3 Seconds and OFF 3 Seconds.
OLED **Display**	Main Blue LED Text Display	ON when the controller is AC powered and its internal 5VDC supply is @ 5VDC. Should never be blank when AC power is supplied.

6.8. Units for Volumes & Temperatures

6.8.1. Metric – US Units Selection

Controller units are selected by the **Metric/US Units** keypad and/or browser switch.

Although the increasing use of ppm controls and frequency controlled pumps moves more sites to **Metric** units, the familiarity with GPH, GPD, and GPM recirculation rates indicates that sites will continue to use both unit systems.
This application note details how the controller applies the **Metric/US Units** switch setting.

Caution: Sensor values, meter and pumped volumes are logged with the units applicable at the time of log entry. Typically the **Metric/US Units** switch is set once, when the controller is commissioned, since changing units causes problems with interpreting data logs, & adjusting feed, timeout and alarm setpoints.

6.8.2 Water Meter Volumes

The measured and displayed water meter volumes, volume per contact, K Factor and the high and low alarms are all in the units set by the **Metric/US Units** switch.

US Units: All volumes measured in Gallons.
Metric: All volumes in Liters

6.8.3 Zeroing a Water Meter

Switching a water meter to a contact set and then back to a water meter will zero the meter and set the default units to L or Gal, depending on the **Metric/US Units** switch.

6.8.4 Temperatures

Temperature default units are set by the **Metric/US Units** switch for each input, which measures a temperature and is then used for the pH sensor, which may be temperature compensated.

Default offsets & gains for thermal sensors are set to the defaults corresponding to the **Metric/US Units** switch.

US Units: Temperature units = 'F'. Metric: Temperature units = 'C'.

Caution: Remember that even if you change the default units on a temperature input, the controller internally applies the units set by the **Metric/US Units** switch.

ProMinent strongly recommends that you do not change the default units on any temperature used for control or for temperature compensation of pH. Errors in both temperature calibration and tracking over temperature for temperature compensated pH will result.

6.8.5. User Assigned Units

User assigned units have no effect on controller temperature compensation calculations.

You are free to assign whatever units you wish and to mix unit types in any one controller bearing in mind how the controller handles unit conversions in Metric & US Units modes.

If you need to override the units on any input, you can edit the OFFSET & GAIN that's applied to the target input.

7. Spare Parts

	DCM2 SPARE PARTS
Part Number	**Description**
	Sensors
7500441	pH sensor, Aquatic, Industrial Grade, 38.9mL Inorganic gel, 25mm dia. with SN6 connector, (DCM 5/200), NSF-50
7500442	ORP Sensor, Aquatic, Industrial Grade, 38.9mL Inorganic gel, with proprietary Platinum tip design , SN6 connector, (DCM 500/200), NSF-50
7746896	SGT - Temperature sensor and solution ground (DCM 5/200), NSF-50
1003875	ORP (Redox) Sensor **Gold** Tip for salt generator pools with SN6 connector RHEP- Au-SE
1041696	CLB3-uA-5 ppm 0.05 to 5.0 ppm Free Chlorine (for DCM2-Cl)
	Sensor Accessories and Rebuild Parts
305030	Coax Cable (for pH/ORP), SN6 x Open End, 6 ft
305039	Coax Cable (for pH/ORP), SN6 x Open End, 16 ft
305040	Coax Cable (for pH/ORP), SN6 x Open End, 33 ft
1033011	SN6 to BNC connector Cable for retrofits on controllers with BNC, 2m (6Ft.), SN6-BNC
	Sample Cell Parts
1010380	Lab valve for DGMa flowcell
791635	Flow Switch Sensor
1004739	Sampling tap for 25mm flow modules (petcock)
1004737	Sampling tap for 13.5mm flow modules (petcock)
791634	Flow switch Float
1023973	Flow expansion module with scale in gph
	Accessories and Replacement Parts
7500539	Flow sensor for 1/2" to 4" pipe with direct connection to DCM5/200. Saddle ordered separately
7500540	Flow sensor for 5" to 8" pipe with direct connection to DCM5/200. Saddle ordered separately
7500541	Flow sensor for 10" and greater pipe with direct connection to DCM5/200. Saddle ordered separately

7500542	PVC Saddle 2" PVC
7500543	PVC Saddle 3" PVC
7500544	PVC Saddle 4" PVC
7500545	PVC Saddle 6" PVC
7500546	PVC Saddle 8" PVC
7500547	PVC Saddle 10" PVC
7500548	PVC Saddle 12" PVC
7500505	10 foot corded Antenna for 3G service
7500507	27 foot corded Antenna for 3G service
7500609	Fuse, Relay, 5A, 250V, 374 series - DCM2
7500560	Pool Test Kit w Photometer Cl pH CYA LPAP3
7500561	Pool Test Kit w Photometer Cl Br pH CYS TA CAL LPAP6
7746887	Gray 4-cond 22 gauge Shielded Cable
7500448	Keypad DCM500
792866	Clamping disc, for probe groove, D30/D23x2.1 PVC

	DCM2 SPARE PARTS (Continued)
	Accessories and Replacement Parts (Continued)
Part Number	**Description**
	Documents
987356	Operating Instructions, DGMa In-line sensor housing, G/GB/F/E
7500612	Install Manual DCM2
7500608	Quick Start Guide DCM2
7500613	Browser Manual DCM2
7500614	Keypad User's Manual (O&M) – DCM2
7500591	Thumb (Flash) USB Drive – Digital copies of DCM2 and DCM5 Manuals and data download use