

Keypad User Manual

ProMinent DCM 500 series

Aquatic Water Quality Controller

DCM 500 Keypad-LCD Display User Manual Insert
Refer to DC5600_Browser for Ethernet users.

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KEYPAD

If you get lost in a sub-menu, press **EXIT** & you'll stop what you're doing & move back to the main menu

An **ENTER** symbol on the display signals that there are sub-menus available.

Press & Hold **ENTER** or **RIGHT** when viewing a pump to switch between Auto-OFF-Manual. See section **1.4**

UP & **DOWN** to view options or to EDIT numbers



Move **RIGHT** to select next field when EDITing



ENTER to select an option & to execute EDITing



EXIT to escape option, info display or EDITing



MAIN MENU

The sensors and controls in the main menu vary with your controller part number and sensors and pumps that you enable or disable.

The main menu auto-groups sensors with the pumps that they control so you will find the menu order changing when you modify a pH sensor from controlling an ON/OFF pump connected to Relay #1 to a frequency controlled pump connected to output #7.

Where are Sensors, Solenoids, Valves & Pumps Connected

You may modify the names of sensors, meters, flowswitches and pumps but the controller tags each input with a letter **A** to **Z** and each output with a number **1** to **9** representing where each is wired so you can locate each I/O within the controller enclosure.

Inputs **A**, **B** and **G** and **O** to **V** have fixed wiring terminals on the upper controller board. **A** is always a conductivity sensor, **B** a temperature sensor and **G** a 4-20mA input.

DCM500 controllers use inputs **C** & **D** for pH & ORP and inputs **E** & **F** for various types of oxidant sensors or for a second set of pH & ORP sensor.

Inputs **O** to **V** may be individually selected to be either a water meter, volume input or a contact set, flowswitch input.

Terminals for relay outputs **1** to **5** are located on the lower board. They are ON/OFF power relays that switch 120 or 230VAC to pumps & solenoids.

Terminals for outputs **6** to **9** are also located on the lower circuit board. They are electronic switches configurable as frequency control pumps & dry contact, DO outputs.

Sensor inputs **H** to **N** are used by the optional I/O expander card
W to **Z** don't physically exist in the controller and are used for enhanced control functions.

FREQUENCY CONTROLLED PUMPS

DCM500 controllers combine the 5 ON/OFF controls with 4 frequency controls.
Installing the I/O expander card adds 2 DC isolated, open loop alarmed 4-20mA outputs.

Depending on your feed application, frequency controlled pumps may deliver more accurate feed, easier to understand setpoints and fed volume tracking, without increasing pump cost.

Frequency controls may be new to you:

| Typical Applications | ON/OFF Controller switches AC power ON/OFF to pump or solenoid. | Frequency Controller-to-pump cable varies stroke rate. |
|-----------------------------------|---|---|
| PID controls | Modulates pump ON & OFF time within a user set period | Continuously modifies the pump feed rate. |
| Acid or Oxidant Feed on Setpoints | Turn ON pump when pH greater than 7.65 & OFF when pH less than 7.55 | Increase the acid feed rate as the pH increases. Decrease the oxidant feed rate as the ORP increases. |
| Proportional Feed | Requires a 4-20mA controlled pump or modulates the pump ON & OFF times | Any sensor can control the feed rate from a 1000:1 turn down to maximum feed rate. |
| Metered Feeds Priming | Turn-on pump for 45 minutes @ 7:00 every Tuesday | Turn-on pump for 0.535 Gallons @ 7:00 every Tuesday |
| Typical Base Feed | Turn pump ON for 45 seconds every 5 minutes | Feed @ 4.5mL/minute |
| Tank Level Alarms | Requires feed meter on pump outlet or inlet. | Calculate tank level from fed volume. |
| User Support | Relies on user to correctly set pump stroke & frequency | Won't let you set feed rate greater than the pump can deliver. Auto-switches from proportional to MAX rate depending on feed mode. |

You can select one of 6 of the most popular ProMinent pumps for each frequency control which automatically sets the maximum stroke rate and volume per stroke OR you can define a mL/stroke and maximum frequency for any manufacturer's frequency controlled pump.

Sidebar: Are used to explain typical uses for feed and control functions.
Sidebars are at the bottom of the page detailing the function.
New aquatics users & users new to the DCM50 may find these explanations helpful.

1.0 Day-to-Day Operation

1.1 Main Menu

Power ON display

Pool 716.1mV ◀◀
7.23pH 0.23ppm ▶▶



Pool oxidant ◀◀
ON: 70.5min ▶▶

Alternating @ 2 secs

Alarms ◀◀
C K 4 ▶▶



pH Sensor ◀◀C
7.23 pH ▶▶



Acid Pump ◀◀1
OFF:Setpoints ▶▶

Alternating @ 2 secs

Auto Control ◀◀1
⊖=Manual →=OFF ▶▶



ORP Sensor ◀◀D
716.1 mV ▶▶



Oxidant Pump ◀◀3
ON 70.5min ▶▶

Alternating @ 2 secs

Auto Control ◀◀3
⊖=Manual →=OFF ▶▶



CGE Sensor ◀◀E
1.46 ppm ▶▶

Displays the current values of controlling sensors.

Alternates every 2 seconds to display
the 2nd pool or spa sensors.

Press **ENTER** to view or modify system settings

Displays the status of the pool primary oxidant feed.

Alternates with the 2nd pool or spa oxidant feed.

Alternates with **Alarms**.

Active alarms are displayed by the letter, **A..Z**, of the input
or the number **1..9**, of the output or **'None'**.

Press **ENTER** to reset alarms, to view alarm detail,
or to scroll the key-press log,

Present value of the **pH Sensor** connected to
sensor input **'C'**. Updates every second.

Press **ENTER** to Calibrate, view-set Alarms & Diagnostics.

pH Sensor 'C' controls the **Acid Pump** connected to
relay output **'2'** so they display together.

The pump is **OFF** because the pH is less than
the turn ON **Setpoint**

Press **ENTER** to view-modify Setpoints, Alarms, Diagnostic...

Alternates with Auto-Manual-OFF selector

Press & hold **EXIT** or **RIGHT** to select

Present value of the **ORP Sensor** connected to
sensor input **'D'**. Updates every second.

Press **ENTER** to Calibrate, view-set Alarms & Diagnostics.

ORP Sensor 'D' controls the **Oxidant Pump** connected to
relay output **'3'** so they display together.

The pump is **ON** & has been on **70.5** minutes this feed cycle.

Press **ENTER** to view-modify Setpoints, Alarms, Diagnostic...

Alternates with Auto-Manual-OFF selector

Press & hold **EXIT** or **RIGHT** to select

Press **UP** or **DOWN** to scroll through all of the enabled I/O,
flowswitches, solenoids, manual LSI-Ryznar entries...

Press **ENTER** to select each I/O's sub-menus.

1.2 Checking & Clearing Alarms

Key **DOWN** from the power ON display to view alarms.

In this example, the pH sensor connected to input '**C**', the LSI-Ryznar calculation @ input '**J**' and the acid pump to controlled by Relay '**1**' have alarmed

Press **ENTER** to view or clear **Alarms**

Press **ENTER** to clear **Alarms**, resets all alarmed feeds and controls, zeroing owed time & volume, and resets the delay on alarm for all sensors.

Exit the acknowledge display, press **ENTER** or any key.
The adjacent flashing **RED** LED will switch to **BLUE**.

Returns to the main menu **Alarms** display.
See **Sidebar** @ bottom of page.

Press **ENTER** then **DOWN** to view active alarms.
Alarms display until cleared so you'll know there was a problem although it may have occurred when you were not @ the controller.

Press **ENTER** at **Alarms**
and **UP** or **DOWN** to view active alarms.

'**C**' is a pH sensor which has exceeded
or is exceeding its high alarm limit.

'**1**' is a pump, which has exceeded its minutes ON today
alarm.

Acid pumps are usually set to stay OFF after alarming until
the issue that caused the alarm has been corrected.

Pool 716.1mV
7.23pH 0.23ppm



Alarms
C J 1



Clear Alarms
Alarms



Cleared Alarms
Reset All



Alarms
none

View Alarms

Alarms
C J 1



Alarms
Activity Log



pH Sensor
Alarmed High



Acid Pump
Limit, Time/Day

Sidebar: Feed limit and water meter alarms will immediately re-trip unless you adjust the alarm limits. Sensor alarms will re-trip after the user set 'Delay' unless the fault is corrected.

1.3 View & Adjust Setpoints

Key **UP** or **DOWN** to the target Pump or Solenoid then press **ENTER**.

Press **ENTER** @ Setpoints.
Setpoint types differ with control type and ON/OFF or frequency.

When the controlling ORP or ppm sensor falls below **735mV** the **Oxidant Pump** will **TurnON**.
Key **ENTER** to adjust.

When the controlling ORP or ppm sensor exceeds **740mV** the **Oxidant Pump** will **TurnOFF**.
Key **ENTER** to adjust.

Key **RIGHT** to move the underline and then **UP** or **DOWN** to change the number.

Press **ENTER** to change the setpoint or **EXIT** to leave unchanged

Adjust Setpoints

Oxidant Pump ←2
ON 16.2min



Setpoints ←
Test-Prime ↕



TurnON setpoint ←
735.0 mV ↕



OFF Setpoint ←
740.0 mV ↕



Editing, ← or Exit
720.0 mV → ↕



then



OFF Setpoint ←
720.0 mV ↕

Sidebar:

'Alarms-Limit' displays if the new setpoint exceeds the sensor alarm limits.

Setpoint is auto-set to the alarm limit.

'ON=OFF fault' displays if the ON setpoint = OFF setpoint.

Setpoints auto corrected for a 1% deadband.

'Out of Range' displays if ON > OFF on Oxidant feed or ON < OFF on Acid feed

'Out of Range' displays if PID control setpoint = 0.0. Setpoint change rejected in both cases.

Frequency outputs 6 to 9 configured as dry contact special controls (Digital Outs)
display **No Sensor, No Setpoints**.

ON-OFF Acid pumps without PID control selected typically use setpoints 0.05 pH apart so that the delay between feeding acid and measuring its pH does not cause wide pH swings.

1.3 View & Adjust Setpoints

Key **UP** or **DOWN** to the target Pump, Valve or Solenoid then press **ENTER**.

The **Acid Pump**, frequency controlled by output **6** is **ON** and feeding at **65.84%** of maximum SPM (strokes/minute).

This chemical is fed based on the value of a pH sensor.

Key **ENTER** once to **Setpoints** and again to view the **100%ON Setpoint**. At pH's greater than 7.50 the '6' **Acid Pump** is @ maximum, rated SPM.

Press **ENTER** to adjust.

Press **DOWN** to view the **OFF Setpoint** setpoint. At pHs less than 7.25 the '6' **Acid Pump** is OFF.

Press **ENTER** to adjust.

Key **RIGHT** to move the underline and then **UP** or **DOWN** to change the number.

Press **ENTER** to change the setpoint or **EXIT** to leave unchanged

In this example, we've narrowed the control range from 0.25pH (7.5-7.25) to 0.13pH (7.5-7.37).

Adjust Setpoints Variable Frequency

Acid Pump ← 6
Feed@ 65.84%



Setpoints ←
Test-Prime ↕



100%ON Setpoint ←
7.50 pH ↕



OFF Setpoint ←
7.25 pH ↕



Editing, or Exit ←
7.37 pH → ↕



then



OFF Setpoint ←
7.37 pH ↕

Sidebar:

The controller knows the pump type connected to output '6' and its rated maximum SPM. Pumps of varying SPM and ml/stroke rating may be controlled at the same time.

In this example, the green 'P6' indicating LED on the lower controller board flashes at the pump stroke rate. As the feed rate approaches zero, the time between flashes increases.

Any sensor may be used to frequency control any pump connected to outputs '6' to '9' delivering proportional control without using 4-20mA controlled pumps.

Controls inherit the setpoint units and resolution from the controlling sensor.

1.4 Auto-Manual-Off Selection

Key **UP** or **DOWN** to the target Pump, Valve or Solenoid Output displays alternate with Auto-Manual-OFF selection

If you are operating in Auto, a sensor is controlling the pump.
Press & **HOLD EXIT** or **RIGHT** to change state.

The **HOLD** time to change state is user settable from 1 to 10 seconds, defaulting to 2 seconds.
HOLD time is adjusted @ **System/Configuration**

Manual turns the output controlling the pump or solenoid ON all of the time.

Open flowswitch and RUN-STOP contacts will still turn the output OFF.

Selecting **OFF**, turns **OFF** the pump or solenoid & it remains OFF until **Manual** or **Auto** is selected

An alarm may be set when **OFF** is selected if **Alarm on STOPS** is set to **Yes** in the **SYS Configure** browser page.

HOA: Hand/OFF/Auto

Oxidant Pump ←3
ON 4.2 min

Alternating @ 2 secs

Auto Control ←3
⊖=Manual →=OFF

or

Always On ←3
⊖=Auto →=OFF

Alternating @ 2 secs

Oxidant Pump ←3
User selects ON

or

Always Off ←3
⊖=Auto →=Manual

Alternating @ 2 secs

Oxidant Pump ←3
OFF:User STOPS!

Sidebar:

Manual is an easy way to prime pumps or to slug feed a chemical on system start-up.
Manual overrides sensor control to turn ON a control relay but it does not bypass safety interlocks and blocking.

Stop finds most use remotely as a way to disable a faulted feed control until corrective maintenance

Hold on Select:

The 1 to 10 seconds **HOLD** delay on pressing the **RIGHT** or **EXIT** key blocks accidental state change selection.

ON/OFF Indicators

If the green LED on the lower controller circuit board is ON, the pump or valve connected to that output 1 to 9 should also be ON.

2.0 Chemical Feed Controls

2.1 Limiting Feed & Alarms

To view or modify the **Alarms-Limits** used on a pump or solenoid, key **UP** or **DOWN** to the target Pump, & press **ENTER**.

Key **UP** or **DOWN** to **Alarms-Limits** & key **ENTER**.

The **Minutes per Actuation** limit is the elapsed ON time for each ON-OFF cycle. Key **ENTER** to adjust.

The **Minutes per Day** limit is the total ON time In any one day. Key **ENTER** to adjust.
The total time resets at midnight.

If this pump alarms, it will turn OFF.
Acid Pumps ALWAYS are set to **OFF on alarm**.
Key **ENTER** to adjust.

Set to **Yes** to control any output with the Alarm Relay special control set.

ENTER ends all owed time or volume & feed events.
Will not restart after a **Minutes/Day** alarm unless limit extended

If this pump or solenoid has ever previously alarmed, displays type of alarm and time & date it occurred.
Used to flag alarms that have been **Reset**

Alarms-Limits

Acid Pump ← 1
OFF:Setpoints



Alarms-Limits ←
Diagnostic ↔



Mins/Actuation ←
45.0 min ↔



Minutes/Day ←
400.0 min ↔



OFF on alarm ←
Yes ↔



Alarm Relay ←
No ↔



Reset Alarm ←
Yes ↔



Limit,ON timer
16:55 23/09/11 ↔

Sidebar:

Alarms and Feed Limits prevent over feeds and/or alert users to operating faults.
Set limits to more than 1440 to block alarms.

Example:

An acid feed that exceeds 15 minutes indicates that we're out of acid, the pump's unplugged or incorrectly adjusted, the pH sensor isn't responding...

2.1 Limiting Feed & Alarms

To view or modify the **Alarms-Limits** used on a pump or solenoid, key **UP** or **DOWN** to the target Pump, & press **ENTER**.

In this example, the **Oxidant** pump is frequency controlled by output **8** and is currently **ON** & **Owes 56.4 mL** of feed.

Key **ENTER** & **DOWN** to **Alarms-Limits** & key **ENTER**.

The **Volume/ day** limit is currently set @ 23.8 Gallons. Controllers set to metric units, will display in Liters. Key **ENTER** to adjust.

Key **RIGHT** to move the underline and then **UP** or **DOWN** to change the number.

Press **ENTER** to change the **Volume/day** limit or **EXIT** to leave unchanged.

In this example we've decreased the **Volume/day** limit from **23.8** to **1.5** Gallons

Sanity Check: An 18mL/minute pump, would have to be ON for more 3.5 hours to trip the alarm.

Alarms-Adjust

Oxidant ← 8
ON:Owes 56.45mL

← and ↓

Alarms-Limits ←
Pump Type ↕

← and ↓

volume/day ←
23.8 G ↕

←

Editing, ← or Exit
01.5 G → ↕

↓ ↑ then →

volume/day ←
1.5 G ↕

Sidebar:

Feed Limits are times for pumps & solenoids controlled by relays **1** to **5** and volumes for frequency controlled outputs **6** to **9**.

Set the limits so that worst-case operation on the hottest day or highest bio-load load will not trip the limit, avoiding nuisance alarms. In more critical applications, run the limit close to actual operating volume or time & use the limit alarms to flag atypical system operation.

Typically you are only concerned with either the **Actuation** or **Day** limit.

Examples:

Oxidant feeds usually use the **Actuation** limit to prevent overfeeds & to detect loss of feed, setting the **Day** limit so it never trips.

Acid feeds would use both **Actuation** and **Day** limits since different fault types trip each limit alarm.

To view or modify the **Alarms-OFF on Alarm** used on a pump or solenoid, key **UP** or **DOWN** to the target Pump, & press **ENTER**.

Key **ENTER** & **UP** to **Alarms-Limits** & key **ENTER**.

Key **ENTER** & **DOWN** or **UP** to **OFF on Alarm**

Key **ENTER, DOWN, ENTER**.
to change the **OFF on Alarm** from **No** to **Yes**
or **EXIT** to leave unchanged.

To view or modify the **Alarms-Alarm Relay** used on a pump or solenoid, key **UP** or **DOWN** to the target Pump, & press **ENTER**.

Key **ENTER** & **DOWN** to **Alarms-Limits** & key **ENTER**.

Key **ENTER** & **DOWN** or **UP** to **Alarm Relay**

Key **ENTER, DOWN, ENTER**.
to change the **Alarm Relay** from **No** to **Yes**
or **EXIT** to leave unchanged.

2.1 Limiting Feed & Alarms

Alarms-OFF On Alarm

Acid Pump ←1
ON:Owes 56.45mL

← and ↑

Alarms-Limits ←
Setpoints ↓

← and ↓

OFF on alarm ←
No ↓

← and ↓ then ←

OFF on Alarm ←
Yes ↓

Alarms-Alarm Relay

Acid Pump ←8
ON:Owes 56.45mL

← and ↓

Alarms-Limits ←
Pump Type ↓

← and ↓

Alarm Relay ←
No ↓

← and ↓ then ←

Alarm Relay ←
Yes ↓

Sidebar:

Chemical feeds are usually all set to **OFF on alarm** since an overfeed indicates an operating problem which requires correction.

Setting **Alarm Relay = YES** turns ON the output with Alarm Relay special control set. Multiple sensors and pumps may be set to trip the alarm power relay or contact set.

2.2 Feed Diagnostics

To view or modify the **Diagnostic** for a pump or solenoid,
key **UP** or **DOWN** to the target Pump
The main menu display provides the current state.
Press **ENTER**.

Key **DOWN** to **Diagnostic** & key **ENTER**.
then **UP** or **DOWN**.

Displays **Alarmed** if feed stopped on
Actuation or **Day** limits.

Displays the controlling sensor, meter or contact
set & current value
This example shows a pump controlled by the
ORP sensor connected to input '**D**'.

Displays the first setpoint type & value.
This example is ORP sensor controlled so the first setpoint
is the mV value @ pump turn ON

Displays the 2nd setpoint type & value.
This example is ORP controlled so the OFF setpoint is
higher than ON. Adding oxidant increases the ORP.

Typical ORP controls **Feed Oxidant**, but it's also possible
to use the same ORP sensor to De-Chlor.
Similarly, a pH sensor can be used to control
both Acid & Caustic chemical pumps.

A pump that never runs may indicate a setpoint,
sensor or flow cell problem. Always ON may indicate a
setpoint, pump sizing, feed or sensor problem.

Pump Diagnostics

Oxidant Pump ← 3
ON 21.9min



Diagnostic ←
Alarms-Limits ↕



Current State
Operational ↕



Control by:D
738.2mV ↕



TurnON setpoint
735.0 mV ↕



OFF Setpoint
740.0 mV ↕



Control Type
Feed Oxidant ↕



ON today
186.4 min ↕

Sidebar:

Diagnostics vary with the output type and control. Relays '1' to '5' use ON time instead of the volumes displayed Frequency controls '6' to '9'.

The main menu displays **Blocked** & the blocking output OR **Lockout** & the **Interlock** input OR **Alarmed** if a pump cannot feed OR **Delayed** on power-on sample cell delay.

2.2 Feed Diagnostics

Diagnostics cont.



Pumps or solenoids with ON time or volume events will display the time or volume owed

Time Owed
0.0 min



Available **Special Controls** vary with the type of output: Relay, Frequency or Digital Out and the controlling sensor type.

Special Control
none

OR

Displays active **Special Control**; PID, Percentage Time-Base Feed, Time Modulate, Alarm Output, Recirc Pump, Filter Events.. Meter paced feeds don't use **Special Controls**.

Special Control
Sensor wash



& we're back at the top of the **Diagnostic** scroll.

Current State
Operational

Sidebar:

DCM500 controllers are **Diagnostic** intensive.

Each sensor, water meter, contact set, relay-frequency-digital output and the controller itself has a **Diagnostic** display sequence.

Diagnostic tells you a lot about the operation of the control system and is invaluable if you have a configuration problem or feed fault.

Even if you have **Passwords** turned ON, any user can still view the **Diagnostics**.

An untrained user reading you the **Diagnostic** screen sequence may save you a site trip.

Browser access available locally or remotely via a VPN or modem connection displays all controller Diagnostics.

Periodic E-mails sent by LAN connected DCM500s contain diagnostic & configuration information on sensors and controls.

Controller outputs '6' to '9' may be used for frequency controlled pumps or as dry contact, digital outputs.

To view or modify a **Pump Type** key **UP** or **DOWN** to the target pump and press **ENTER** then **UP**.

Key **ENTER** @ **Pump Type**.

Displays one of six default pump types or **Other**.
In this example **Oxidant '9'** controls a **ProMinent 1001** type pump.
Key **ENTER** to modify.

Displays the current **mL/stroke** volume in mL.
In this example, it's the default for a **ProMinent 1001** type pump.
Key **ENTER** to modify.

Displays the current **Rated SPM** in strokes per minute.
In this example, it's fixed by selecting a **ProMinent 1001** type pump.

2.3 Selecting a Pump Type

Pump Type

Oxidant ← 9
Feed@ 51.07%

← and ↑

Pump Type ←
Diagnostic ↕

←

Pump Type ←
ProMinent 1001 ↕

↓

mL/stroke ←
0.10 ↕

↓

Rated SPM
180 ↕

Sidebar:

Pump Type:

If you select one of the 6 built-in ProMinent pumps, the feed volume mL/stroke and maximum frequency are correctly and automatically assuming a nominal 40psi feed line pressure.

If you select '**Other**' as a pump type, you'll need to provide both the nominal mL/stroke and maximum stroke rate. Pumps with maximum stroke rates from 50 SPM to 400 SPM are supported by the controller.

Relay Controls:

Frequency controlled pumps may be switched ON/OFF by one of the controller's relays '1' to '5'. Disconnect and remove the frequency control cable and plug the pump power cord into the controller.

This is not the best use for a frequency controlled pump but if you need more than the controller's four frequency controls, it's an option.

3.0 Sensors

3.1 Calibration

Sensor Calibrate

To calibrate a sensor, key **UP** or **DOWN** to the target sensor and press **ENTER**.

pH Sensor ←C
7.46 pH



Key **ENTER** @ **Calibrate**.

Calibrate ←
Alarms ↓↑



Displays current value. Key **ENTER** to modify.

Enter value ←
7.46 uS ↓↑



Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the digit underline.

Editing, ← or Exit →
7.36 uS →↑↓

Press **ENTER** to calibrate.
or **EXIT** to leave unchanged.



In this example we decreased the value measured by a pH sensor from **7.46** to **7.36**.

pH Sensor ←C
7.36 pH

Sidebar:

Single Point Calibration: All sensors but some 4-20mA inputs can be single point calibrated. Measure a grab sample from the sensor installation line and calibrate the sensor based on the grab sample. It's the simplest, most repeatable method.

Corrosion rate sensors are not calibrated.

Aquatics systems, setpoint control so that the ppm, pH or ORP is controlled within a narrow range, allowing simple, single point calibration.

Process control and monitoring only sites which may operate over a wide sensor range benefit from 2-point calibration.

Calibration Faults: Refer to the next page for options on fault.


Inventory and Manual Input sensors

Use **Calibrate** when you fill a tank to correct the **Inventory** level.

Use **Calibrate** after you measure a drop count to update a **Manual Input**.

3.1 Sensor Calibration



Calibrate Faults

Sensor Fault 
Ignore warning



pH Sensor 
7.36 pH





Calibrate 
Alarms 



and



Factory Reset 
Yes 



pH Sensor 
7.62 pH 

If the controller cannot calibrate you'll view this warning after you modify the sensor value & key **ENTER**.

Key **ENTER** to ignore the warning or **EXIT** to return the sensor to its pre-calibration value.

To reset the sensor to its factory default setting key **ENTER** and **DOWN** to **Factory Reset**.

Press **ENTER**.
Factory Reset doesn't correct the problem which caused the warning

In this example, we started at **7.46**, got a warning when we calibrated at **7.36** and returned to **7.62** after **Factory Reset**.
Is the fault due to a failing pH sensor or our pH tester.
Verify the tester against a calibration buffer.

Sidebar:

Sensor Fault: The controller verifies that sensor OFFSET or GAIN required to make the sensor read its new value are within the range of typical sensor operation. **Sensor Fault** on out of range.

Fault Cause varies with sensor type.

ORP: Verify sensor cable not shortened & firmly connected. Verify not visibly fouled. If stream contains organics, clean with alcohol or solvent. If stream high in iron or copper the sensor's platinum surface reads low and responds slowly & requires strong acid stripping.

pH: Verify solution ground in sensor header connected & excess pH sensor cable coiled at sensor, not in enclosure. Verify sensor cable not shortened & firmly connected. Then replace if no recovery after **Factory Reset**. pH sensor life decreases with handling and temperature extremes.

Temperature: Verify color-coding correct and sensor wires firmly connected. Inspect sensor for damage or leaking.

Conductivity: Fouling lowers the measured value. Remove and inspect. Whitish deposits indicate high calcium & may require HCl cleaning to remove. Biofilming typically results in no visible fouling, clean sensor with alcohol or solvent then **Factory Reset**.

3.2 LSI-Ryznar Manual Entry

To calibrate the Langelier – Ryznar indexes,
key **UP** or **DOWN** to the **LSI RSI** display
and press **ENTER**.

Key **ENTER** @ **Calibrate**.

Displays current calcium hardness ppm value.
Key **ENTER** to modify.

Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the digit underline.

Press **ENTER** to calibrate or **ENTER** to
view-modify **Alkalinity**.

Displays current alkalinity ppm value.
Key **ENTER** to modify.

Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the digit underline.

Press **ENTER** to calibrate or **ENTER** to
View the updated **LSI** & **RSI** indexes.

LSI: 0.4
RSI: 6.8



Calibrate
Alarms



CaCO3 Hardness
200.0



Editing, or Exit
210.0



then



Alkalinity
90.0



Editing, or Exit
92.0



then



LSI: 0.5
RSI: 6.7

Sidebar:

The LSI-Ryznar scaling & corrosion indexes calculations require current pH, temperature & conductivity is addition to hardness & alkalinity.

If your DCM500 does not have an installed conductivity sensor, you'll be prompted for a conductivity calibration after you view-modify **Alkalinity**.

Calcium limits = 50 to 400ppm

Alkalinity limits = 30 to 140 ppm

Conductivity limits = 100 to 10000

If you enter a value outside of the limits, it will be set to the limit

3.3 Sensor Alarms

Alarms

To view or adjust sensor alarm, key **UP** or **DOWN** to the target sensor and press **ENTER**.

In this example we're viewing the alarms on a **CGE** oxidant sensor connected to input 'E'

Key **UP** and **ENTER** @ **Alarms**.

In this example, the controller will alarm if the **CGE Sensor** exceeds **5.0 ppm**. Key **ENTER** to modify.

In this example, the controller will alarm if the **CGE Sensor** falls below **1.0 ppm**. Key **ENTER** to modify.

Delay on Alarm prevents nuisance alarms by requiring, in this example, **5** minutes of fault occur before alarming.

Set the Delay to zero minutes if you require an immediate alarm.
Key **ENTER** to modify.

CGE Sensor ← E
2.4 ppm

← and ↓

Alarms ←
Diagnostic ↕

←

High Alarm ←
5.0 ppm ↕

↓

Low Alarm ←
1.0 ppm ↕

↓

Delay on Alarm ←
5.0 minute ↕

Sidebar:

Sensor Alarms: Nuisance alarms tend to be ignored.

Select alarm limits that represent user safety & comfort and trap control fault & sensor failure.

LAN connected DCM500's auto E-mail out on each sensor and control alarm unless E-mailing is disabled.

Sensors can be configured using the browser interface to trip a relay or digital output designated as an Alarm Output

3.3 Sensor Alarms

Adjust Alarms

To adjust a sensor alarm, key **UP** or **DOWN** to the target sensor and press **ENTER**.


Key **UP** and **ENTER** @ **Alarms**.

Key **UP** or **DOWN** to select **High Alarm**, **Low Alarm** or **Delay on Alarm** & press **ENTER**.

Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the digit underline.

Press **ENTER** to modify.
or **EXIT** to leave unchanged.

In this example we've increased the **High Alarm** from **2500 uS** to **3000 uS**.

Conductivity A
1134 uS

 and 

Alarms 
Configure 



High Alarm 
2500 uS 



Editing,  or Exit
3000 uS  

  then 

High Alarm 
3000 uS 

Sidebar:

Reset Alarms: Section 1.2 **Clear Alarms** resets the **Delay on Alarm** time

If the **Delay on Alarm** is set to zero minutes and the sensor is above the **High Alarm** or below the **Low Alarm**, the sensor alarm will immediately re-trip.

Alarms when OFF Line:

If the sensor installation piping drains or siphons when the system turns OFF and a sensor alarm results, install a check valve on the sensor line.

A check valve will prevent alarms but more importantly will prevent wet-dry cycles from depositing on sensing surfaces, causing calibration problems and shortening sensor life.

3.4 Sensor Diagnostics

Diagnostic

To view sensor **Diagnostics**,
key **UP** or **DOWN** to the target sensor
and press **ENTER**.

Key **UP** and **ENTER** @ **Diagnostic**.

Sensor Type; 'pH Sensor' in this example.
Also displays Oxidant, ORP, Temperature, Conductivity,
Calculated, unused, 4-20mA Input or Corrosion.

Current State may also display **Alarmed**, **Fail Calibrate**,
4-20mA Open (4-20mA Inputs only), or
Overrange (Hardware fault).

Current value of the sensor.
With user set digits after the decimal and user set units.
Sensors may be displayed with from 0 to 3
digits after the decimal

Thermal Compensation is used conductivity sensors.
Oxidant Compensation pH corrects some ppm sensors.
Corrosion Compensation sequences LPR sensors.

Gain Multiply is the value required to convert
the sensor millivolts to the displayed pH.
See following page for an example.

Default Gain is the **Gain** after a **Factory Reset**.
pH Sensor **Gain** is usually only modified
by a 2 point sensor calibration.

pH Sensor ←C
7.65 pH

← and ↑

Diagnostic ←
Calibrate ↕

←

Sensor Type ↕
pH Sensor

↓

Current State ↕
Operational

↓

Displayed Value ↕
7.65 pH

↓

Compensation ↕
None

↓

Gain Multiply ↕
0.0170

↓

Default Gain ↕
0.0170

continued

Sidebar:

Diagnostic displays how the sensor is configured, compensated and calibrated.
This is where you go if you have a non-obvious sensor problem.

3.4 Sensor Diagnostics

Diagnostic cont.

Offset Adjust is the value required to make the displayed pH, ORP, temperature or corrosion rate match your last calibration.

Default Offset is the **Offset** after a **Factory Reset**. pH & ORP sensors with offsets remote from the default offset will not usually track & have failed, contaminated or fouled.

Measured Level is the sensor voltage measured by the controller. Varies with sensor type. Useful when converting 4-20mA currents to GPM... & diagnosing non-tracking sensors.

The controller uses the **card ID** to auto-configure on new driver cards. Some cards also use this level to determine range.

Offset Adjust
6.8960



Default offset
7.0000



Measured Level
44.3 mV



Input card ID
1444.3 mV

Example: $44.3 \text{ mV} \times 0.0170 \text{ Gain} + 6.896 \text{ Offset} = 7.65 \text{ pH}$
The **pH Sensor** value displayed on the previous page.

Sidebar:

Offset & Default Offset

When you calibrate a pH, ORP, temperature or corrosion rate sensor, the controller adjusts the OFFSET to make your measured value match the displayed value.

Note above that the actual pH sensor OFFSET is not the Default.

Gain & Default Gain

When you calibrate a conductivity sensor, the controller adjusts the GAIN to make your measured uS value match the displayed uS value.

When you two point calibrate a 4-20mA input, the controller adjusts both OFFSET and GAIN.

Inventory, ppm and Manual Sensors:

These sensor types use only the OFFSET to set the displayed value.

The controller ignores GAIN for these sensor types.

For example when you fill a tank and **Calibrate** an Inventory sensor to display 48.5 Gallons, **Offset Adjust** will display 48.5.

Measured Level:

pH sensors have a well defined mV to pH relationship.

Example pH7 = 0mV, pH10=176 mV and pH4 = -176 mV.

Displayed sensor value = $(\text{GAIN} \times \text{Measured Level}) + \text{OFFSET}$.

Using this simple equation, you can directly modify the OFFSET & GAIN to get a desired display. This is seldom done, but it's convenient for some unusual sensor types.

3.4 Sensor Diagnostics

Meter Diagnostic

To view Diagnostic for a meter key
UP or **DOWN** to the target meter
and press **ENTER**.

Key **UP** and **ENTER** @ **Diagnostic**.

Both Turbine & Contact Head meter display as
Digital Type Volume Meter.

Displays **Alarmed** if **Volume Today** greater than
High Alarm or less than **Low Alarm**.

Volume Today is the measured volume from
midnight of the current day.

Compensation displays **Feed Verify**
if its set on the displayed volume meter and
used to verify that a chemical is feeding
when the pump is ON.

Vol. this year is the measured volume in
the current calendar year.

Pool Make-up ← 0
9860 gal



Diagnostic ←
Alarms ↕



Digital Type
Volume Meter ↕



Current State
Operational ↕



volume today
9860 gal ↕



Compensation
None ↕



vol. this year
1642900 gal ↕

continued

Sidebar:

If we are viewing the **Volume Today** at noon and this site runs 24 hours a day,
is this the expected volume for the current load?

If it's high, are we losing water? If it's low is the meter volume/contact correct?
& if it is, is the level control functioning?

Diagnostics are only useful if you draw operating conclusions from the data.

3.4 Sensor Diagnostics

Diagnostic cont.

Vol. Last year is the measured volume in the previous calendar year.

Vol. Last year
2694250



Days Online is the number of days that this meter has been enabled and operating in this controller.

Days Online
286



Volume/Contact or '**K**' **Factor** is the current scaling factor for the installed meter

Volume/contact
100 gal

Sidebar:

If **Days Online** = 286 and **Vol. this year** = 1642900 & the site operates 24/7 then we're averaging 5750 Gallons/day.

Is this the expected make-up volume for the load?

If we've been averaging 5750 and today at noon we've measured

Volume today = 9860 Gallons, why the increase?

Meter Alarms: Low Alarm

The **Low Alarm** for water meters only trips at midnight if the meter has not exceeded the **Low Alarm** volume. Set **Low Alarms** = 0 to prevent alarms @ midnight.

Use **Low Alarm** to flag sites that have not made-up.

Meter Alarms: High Alarm

The **High Alarm** for water meters trips when the meter exceeds the **High Alarm** volume.

Set **High Alarms** higher than the volume expected @ highest load to prevent nuisance alarms OR close to actual usage to flag you on increased load..

Set **High Alarms** on feed verify meters to flag you on increased usage.

Note; clearing a water meter **High Alarm** without adjusting the **High Alarm** level will immediately trip another alarm on the meter.

3.5 Contact Set Alarms

Alarms

To view or modify contact set **Alarms** key **UP** or **DOWN** to the target contact set input and press **ENTER**.

Key **UP** and **ENTER** @ **Alarms**.

Alarms if the contact set is **ON** today for longer than the **ON Time Alarm**.
Timing resets every time contact set turns **OFF** and at midnight.

Alarms if the contact set is **OFF** today for longer than the **No Flow Alarm**.
Timing resets every time contact set turns **ON** and at midnight.

Keying **ENTER** to modify.
Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the underline.

Press **ENTER** to save the new **No Flow Alarm**.
or **EXIT** to leave unchanged.

In this example we've reduced the **No Flow Alarm** from its factory default of **1500** minutes to **60** minutes.

Flowswitch ←S
ON 52.6min

← and ↑

Alarms ←
Configure ↕

←

ON Time Alarm ←
1500.0 min ↕

↓

No Flow Alarm ←
1500.0 min ↕

←

Editing, or Exit ←
0060.0 min →↕

↓ ↑ then →

No Flow Alarm ←
60.0 min ↕

Sidebar:

Default alarm times are set so that contact sets won't alarm unless user configured. It's unlikely that you would set both alarms on any one contact set but the ability to alarm both ON & OFF states gives you a lot of application flexibility.

ON Time Alarm:

If the pressure switch on your RO or side-stream filter shows high pressure for more than 30 minutes, you'd like to log an alarm.

No Flow Alarm:

If you had a system that typically runs 24/7 you'd want to alarm on a flowswitch that has no flow since it indicates that the sensor or injection line is blocked or inadvertently valved OFF.

If you expected a switch to trip or a contact set to close daily when an event or action occurred, you'd want an alarm if it did not occur.

4.0 4-20mA Outputs

4.1 4-20mA Output Setpoints

4-20mA Outputs display both the loop current and its corresponding the 0-100%. Installing an I/O Expander places 4-20mA outputs @ 'M' & 'N'.

To view or modify a current output **Manual** setpoint key **UP** or **DOWN** to the target output and press **ENTER**.

Key **ENTER** @ **Setpoints**.

Manual = User sets current. **Auto** = Sensor controls current. Displays the present **0%** to **100%** output setpoint. Key **ENTER** to modify.

Key **UP** or **DOWN** to change the underlined digit. Key **RIGHT** to move the underline.

Press **ENTER** to save the new **Manual Mode** setpoint or **EXIT** to leave unchanged.

Key **EXIT** twice to view the effect of the new setpoint.

In the example we've increased the loop current from **4.00mA** to **8.32mA**.

Manual Setpoint

Re-Circ VFD ◀M
4.00mA 0.0%



Setpoints
Configure ▶



Manual Mode
0% ▶



Editing, or Exit
27 ▶



then



Manual mode
27% ▶



Re-Circ VFD ◀M
8.32mA 27.0%

Sidebar:

Manual Mode:

Use **Manual mode** to verify the 100% ON=20mA, OFF=4mA or modulate operation of the proportional pump or valve that the 4-20mA output is controlling.

Use **Manual mode** to verify the monitoring input that is using the current loop value to represent a controller conductivity, pH, ORP or corrosion rate sensor or ppm calculation.

Load Powered 4-20mA Loop:

4-20mA current outputs are powered by the loop load or by the controller 15VDC power supply. Building automation system typically supply 24VDC to power current loops. Current loop controlled pumps and valves usually use the controller 15VDC supply to power the loop.

Open Loop Alarm:

The DC isolated 4-20mA output alarms on an open loop or a loss of loop power.

4.1 4-20mA Output Setpoints

In this example a temperature sensor is controlling the 4-20mA out current to a heater.
As the temperature increases, we'd like the turn down the heater

To view or modify the **20mA Setpoint** press **ENTER**.

Key **ENTER** @ **Setpoints**.

Key **DOWN** to **20mA Setpoint**.
When the temperature sensor measures than **70.0F** the loop current is **20mA**
Key **ENTER** to modify.

Key **UP** or **DOWN** to change the underlined digit.
Key **RIGHT** to move the underline.

Press **ENTER** to save the new **20mA Setpoint** .
or **EXIT** to leave unchanged.


Key **EXIT** twice to view the effect of the new setpoint.

In the example the loop current is now **12.0mA**.
50% of the **55F** to **82.5F** span is 68.8F

Sensor Setpoint

Heater Control 
16.4mA 77.5%



Setpoints 
Configure 



4mA Setpoint
82.5F 



20mA Setpoint
70.0F 



Editing, or Exit
55.0 



then



20mA Setpoint 
55.0 



Heater Control 
12.0mA 50.0%

Sidebar:

Setpoints: Setpoints may be positive or negative numbers.

The 4mA Setpoint may be greater or less than the 20mA setpoint so that the loop current may either increase or decrease as the controlling sensor increases.

A pH sensor can control an acid pump on one 4-20mA output and a caustic pump on another 4-20mA output.

Calculating Loop Current:

4-20mA Output current (mA) = $4 + 16 \times (\text{Sensor Value} / (\text{20mA Setpoint} - \text{4mA Setpoint}))$
Use the absolute value of the setpoint difference for **20mA Setpoint < 4mA Setpoint**.

To view or modify the sensor controlling the 4-20mA output current, key **UP** or **DOWN** to the target 4-20mA output and press **ENTER**.

Key **UP** and **ENTER** @ **Configure**.

We're presently in **Manual** mode.
Key **ENTER** to **Return to Auto**
and then **UP** to **Control by**:

Key **ENTER** to modify **Control by**:

Key **UP** or **DOWN** to scroll through
all enabled sensors.

Key **ENTER** to select or **EXIT** to leave unchanged.

In this example we selected **Conductivity**
to control the 4-20mA loop current.

4.2 4-20mA Configuration

Select Sensor

4-20mAOutput_D ← D
4.00mA 0.0%

← and ↑

Configure ←
Setpoints ↕

←

Return to Auto ←
Yes ↕

← and ↑

Control by: ←
No Control ↕

← and ↑ or ↓

Control by: ←
Conductivity ↕

Sidebar:

Control by: Any enabled sensor of any type 'A' to 'N' may be used to control the 4-20mA loop current.

Once you've selected a controlling sensor, adjust the **4mA Setpoint** and **20mA Setpoint** to reflect the range for either control of a pump or valve or for a remote DCS monitoring input.

Example: You are controlling the 4-20mA output current using a pH sensor.

If the 4-20mA current is controlling a pump feeding acid you could set 4mA= 7.0pH and 20mA = 8.0pH.

The pump would be OFF at 7.0pH and at 100% at 8.0pH.

If the 4-20mA current is monitored by a building automation system or distributed control system, you could set 4mA= 6.0pH and 20mA = 10.0pH. since this span represents the likely range of measured pH.

To calibrate, view or modify a 4-20mA output key **UP** or **DOWN** to the target output and press **ENTER** then **UP**.

Key **ENTER** @ **Configure**.

The 4-20mA current output is in **Manual** mode
The current mA level is fixed at the user set level.

Selecting **Auto** controls the current based on the value of a sensor and the 4mA and 20mA setpoints.


Trim Zero adjusts the 4mA level.
Put a mA meter in series with the loop current and key **ENTER** and **UP** or **DOWN** to adjust.

Trim Span adjusts the 20mA level.
Put a mA meter in series with the loop current and key **ENTER** and **UP** or **DOWN** to adjust.

4-20mA outputs may be **Interlocked** like pumps and valves.
When the interlock is **ON** the current is **4.00mA, 0%**
Displays the contact set or flowswitch inputs
O to **Z** which interlock the 4-20mA current.

4.2 4-20mA Configuration


Calibrate - Interlock

4-20mAOutput_D  D
4.00mA 0.0%



Configure 
Setpoints 



Return to Auto 
Yes



Trim Zero 
9



Trim Span 
950



Interlocked
none

Sidebar:

Calibrate:

Trim Zero and **Trim span** places the current loop into **Manual** mode and then adjusts the zero, 4mA or span, 20mA level.

Set your digital voltmeter to measure mA and install it in *series* with the current loop wiring.
(*Series*: Disconnect one 4-20mA wire from the controller terminal.

Connect the wire to the DVM '-' or Common and connect the DVM '+' to the wiring terminal)

If **UP** or **DOWN** stops changing the measured current it's because you've hit the limits of loop adjustment.

Resolution: The nominal resolution of the current loop is 0.1%.

Example: If 4mA = 0uS and 20mA = 1000uS the current loop has 1uS resolution.

If 4mA = 0uS and 20mA = 10000uS, the current loop has 10uS resolution.

Controllers are defaulted to **Keypad Password** OFF.

To turn ON the **Keypad Password** press **ENTER** and **DOWN** to **Configure** at the power up or top of menu display.

Key **ENTER** @ **Configure**.

Key **DOWN** to **Keypad Password**.

Key **ENTER DOWN ENTER** to turn ON **Keypad Password**.

You'll view the **Login** display when you select a password protected part of the controller. See **Login Displays**.
Key **ENTER**

Key **UP** or **DOWN** to change the underlined letter or digit.
Key **RIGHT** to move the underline.

Press **ENTER** to **Login**.
If you have not keyed any of the current, valid passwords, you'll view an error message.

5.0 System Settings

5.1 Passwords

Turn ON Passwords

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Configure ↵
Time&Date ⬇

↵ then ⬇

Keypad Password ↵
No ⬆

↵ then ⬇

Keypad Password ⬆
Yes ↵

↵

⊗ Password ON

Login ↵
Yes ⬆

↵

Editing, or Exit ↵
1 ⬆

⬇ ⬆ then ⬆

Sidebar:

Default Passwords:

The first time you turn ON **Keypad Password** the 8 default passwords are:

Operator1 = **1** Operator2 = **2** Operator3 = **3** Operator4 = **4**.

Configure5 = **5** Configure6 = **6** Configure7 = **7** Administrator = **AAAA**

There are 3 password levels, Operator, Configure and Administrator.

The 8 default User IDs are used in the controller's keypress log.

Modify Password: Once you Login you can modify your password.

Refer to the following page.

Login Displays: Prompts you for the required password level. **Login @ Admin, Config or Operate** depending on what key press activity required a password.

5.1 Passwords

After you've turned ON passwords and logged in as one of the eight users:

To modify your **Keypad Password** press **ENTER** and **UP** to **Passwords** at the power up or day-time display.

Key **ENTER** @ **Passwords**.

To **Logout** as the current user, key **ENTER** at **Logout**.

The controller automatically logs you out 30 minutes after your last key press.

Note that this display shows **Operator1**, your user ID.

Key **ENTER** at **Reset Pswrds**.
to key in the reset code which returns all passwords to default.

Key **ENTER** at **Edit Passwords** to view or modify your password.

Key **UP** or **DOWN** to change the underlined letter or digit.
Key **RIGHT** to move the underline.

Press **ENTER** to change your password or EXIT to leave unchanged.
In this example we changed **Operator1**'s default password from '1' to **OP1**.

Modify Password

Pool 716.1mV ↵
7.23pH 0.23ppm ↕

↵ then ↑

Passwords ↵
Diagnostic ↓

↵

Logout ↵
Operator1 ↕

↓

Reset Pswrds
Yes ↕↵

↓

Edit Passwords ↵
Yes ↕

↵

Editing, or Exit
OP1 →↕

↓ ↑ then →

Sidebar:

Modify Passwords:

Because all 8 default passwords are listed on the previous page.

You'll should modify all 8 passwords when you initially turn ON passwords.

Passwords are limited to 8 capital letters and numbers.

Any space in a password ends the password on both editing and **Login** password entry

Two users cannot share the same password because the password is used to identify the user.
The controller displays **Password Fail** on a duplicate password.

Reset Passwords: If you forget your password, a **Reset Password** is available from ProMinent, specific to your controller's serial number ; sets all passwords to default.

Passwords: This menu item only displays on controllers that have turned ON **Keypad Password**.

5.2 Time & Date

To view or adjust the **Time&Date**
press **ENTER** and **DOWN** to **Time&Date**
at the power up display.

Key **ENTER** @ **Time&Date**.

See **Controller Response to a new Time&Date:**
on this page **Sidebar** prior to adjusting.

Display current date and time.
Key **UP** or **DOWN** to change the underlined digits.
Key **RIGHT** to move the underline.

Press **ENTER** to save the new **Time&Date**.
or **EXIT** to leave unchanged.

Time & Date

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Time&Date ↵
Enable I/O ⬇

↵

DD/MM/YY HH:MM
20/08/11 14:20→⬆

⬇ ⬆ then ➡

Thu 16:54:10 ↵
S/N: A041X0486

Sidebar:**Time & Date:**

The controller uses a 24 hour clock where 14:30 is 2:30 PM.

When you set the Date, the controller automatically sets the correct day of the week.

Controller Response to a new Time&Date:

When you change the time & date, the controller:

1. Turns all outputs OFF, resets all control timing and restarts the logging period on each I/O
2. Ends time and volume owed which ends all events.
3. Does a midnight reset which will may set volume-meter Low Alarms.
4. Sets the event control Day 1 to the most recent Sunday.

Example: If you are at Day 19, Thursday of week 3, on a 28 day event feed cycle.

After a **Time&Date** change you are now at, Day 5, Thursday of week 1

To view the **Activity Log**
press **ENTER** and **DOWN** to **Activity Log**
at the **Alarms** display.

Key **ENTER** @ **Activity Log**.

Each entry in the log initially displays
it's activity as you key **DOWN** .

In this example the feed limit **Alarms** for
Bleed Valve 2 were **Adjusted**.

Key **RIGHT** to view the User ID and the
Time & Date stamp for the Activity.

Key **RIGHT** again to get back to the **Activity**
or key **DOWN** to scroll the User ID and Time-Date stamps.

Scroll **UP** or **DOWN** through the Activity Log.
Keying **RIGHT** to view the User Ids & Time-Date stamps

5.3 Keypress-Alarm Log



View Activity Log

Alarms  
C J 1



 and 

Activity Log 
Clear Alarms 





Acid Pump 
Alarms Adjusted 





Configure1 
17:19 23/08/11 



OxidantPump 
Reconfigured 



Oxidant E 
New driver card 

  or 

Sidebar:

Keypress-Alarm Log:

The log contains the last 25 activities that effect the operation of the controller.
Most recent activities first. Both keypad and browser user activities are logged.

User IDs:

Keypad Password ON: Logs the User IDs listed in **Section 11.1 Sidebar:Default Passwords**.

Keypad Password OFF: Logs all User IDs as **Keypad**.

Browser user IDs are always logged because login is required to browse.

Actions taken by the controller, like configuring a new driver card, use the **System** used ID.

5.4 Enabling Inputs & Outputs

To **Enable I/O** press
ENTER and **DOWN** to **Enable I/O**
at the power up display..

Key **ENTER** @ **Enable I/O**.

Displays the number of sensor inputs and
meter-contact input available for enabling.
Key **ENTER** to select one.

Displays the number of relays and frequency
controlled outputs available for enabling.
Key **ENTER** to select one.

Enable I/O

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Enable I/O ↵
Passwords ⬆

↵

Enable Inputs ↵
12 unused ⬆

⬇ ⬆ or ↵

Enable Outputs ↵
4 unused ⬆

Disabling I/O:

Individual Inputs and Outputs are disabled using the browser interface.
I/O in use by the controller for control or sensor compensation cannot be disabled.
Disabled I/O does not display, is not logged and does not appear in the selections used
to compensate and configure other enabled I/O

Enabling Inputs:

Sensor inputs **A**:Conductivity, **B**:Temperature and **G**:4-20mA Input are fixed.

A,B & G may be enabled or disabled but their function is fixed.

DCM500s use inputs **C-D** for pH & ORP.

The function of Sensor inputs **E-F** is set by the installed sensor-driver card to be
4-20mA input ppm sensor set or another pH & ORP....

Phantom Sensor inputs '**H**' to '**N**' are enabled as needed to for tank inventory and ppm
calculations and to log manually values or used by the I/O expansion card.

Meter-Volume and Contact Set Inputs '**O**' to '**V**' are enabled and configured for either water-
volume meters OR flowswitches, ON line contact sets, level-pressure switches ...

Phantom Meter-Volume or Contact Set inputs '**W**' to '**Z**' are enabled as needed as

Enabling Outputs:

Outputs **1** to **5** are AC power switching relays that are enabled to power pumps,
solenoids or motorized valves.

Outputs **6** to **9** are frequency controlled outputs that are enable to proportionally control pumps
or used as 24VDC dry contact digital outputs.

5.5 Metric & U.S. Units

To view or adjust the Metric - U.S. Units setting
press **ENTER** and **DOWN** to **Configure**
at the power up display.

Key **ENTER** @ **Configure**

This controller is currently set to U.S. units.
Temperatures are in F and volumes
greater than 100mL are in Gallons.

Key **ENTER** to **DOWN** to switch to **Metric Units**.

Key **ENTER** to set **Metric Units**
or **EXIT** to leave as U.S. Units.

Switch to Metric

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Configure ↵
Time&Date ⬇

↵

Metric Units ↵
NO ⬆

↵ and ⬇

Metric Units ↵
Yes ⬆

↵

Metric Units ↵
Yes ⬆

Sidebar:

Commissioning:

Select U.S. or Metric Units when you commission or install the controller.

Data logging uses the Units setting for the units on logged volumes and temperatures.
Changing units does not change data already logged.

Metric Inputs:

Non 4-20mA temperature inputs are converted to Centigrade using the default offset and gain for each of the thermal input type.

If you switch back to U.S. units, temperatures are converted to Fahrenheit using the default offset & gain, removing the effect of any user calibration.

Inventory volumes are calculated in Liters but units are not changed.

ppm calculations now assume metered volumes in Liters and not gallons.

Metric Outputs:

Pumped volumes are reported in mL & Liters.

Timed event volumes are in Liters and not Gallons.

The controller uses the units of the controlling sensor for setpoints.

If a water meter was set to measure Gallons prior to switching the **Metric Units**, it will still display Gallons on the meter and wherever it's used for control.

To view or adjust the configuration of the whole controller press **ENTER** and **DOWN** to **Configure** at the power up display.

Key **ENTER** @ **Configure**

Load Factory configures the controller to one of the 1 to 14 configurations shipped with the controller. This controller is currently running **AQ_1pool1**, pH & ORP and ppm sensors, configuration. View and select an alternative controller configuration by keying **ENTER**.

Load Config. returns to the last saved configuration. Key **ENTER**, select **Yes** & **ENTER**.

After you've modified the controller for your site preference **Save config.** by keying **ENTER** & selecting **Yes**. Once saved, you can always recover by using **Load config.**

You can modify the keypress response to your preference from 150mS, default to 500mS. Key **ENTER** to modify.

You can modify the Auto-Manual-OFF, **HOA** Press & HOLD response to prevent accidental Selection from 1 to 10 seconds; 2 second default. Key **ENTER** to modify

5.6 Configuration

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Configure ↵
Time&Date ⬇

↵ and ⬇

Load Factory ↵
AQ_1pool_1 ⬆

⬇ ⬆ or ↵

Load config. ↵
No ⬆

⬇ ⬆ or ↵

Save config. ↵
No ⬆

⬇ ⬆ or ↵

Key Response ↵
150 mS ⬆

⬇ ⬆ or ↵

HOA Response ↵
2 Sec ⬆

Sidebar:

Warning: **Load Factory** & **Load config** controller re-configuration may change sensors, Meters & contact sets, pump and solenoid controls & timed events.
Reconfiguration and run occurs as soon as either option selected.

Recommended:

Turn on Keypad password (Manual Section 11.4).
Log on as the 'admin' and modify the password if this controller is likely to be accessed by uninformed users. Do this to prevent accidental or malicious controller reconfiguration.

To view or adjust the controller Ethernet setting press **ENTER** and **DOWN** to **Communicate** at the power up or top of menu display.

Key **ENTER** @ **Communicate**

Displays the current LAN **IP address**.
In this example, it's the factory default.
If you are connected into the site LAN,
IP address may be auto-assigned by **DHCP**.
Key **ENTER** to modify if the enter key displays.

Netmask is usually this value for most sites.
If you are connected into the site LAN,
Netmask may be auto-assigned by **DHCP**.
Key **ENTER** to modify if the enter key displays.

This is the default **HTML Port** for browsing.
It can be modified only via the browser & is rarely changed.
But if it is, you'll need to know the new value to browse.

DHCP (**D**ynamic **H**ost **C**onfig. **P**rotocol) automatically
assigns an **IP Address** if **DHCP** = **Yes**.
Key **ENTER** & **UP** then **ENTER** to turn OFF **DHCP**.

Warning: Turning **DHCP** ON or OFF
changes the **IP Address**.
Press **ENTER** after changing to view
the current **IP Address**.

5.7 Communications

Communicate

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆

↵ then ⬇

Communicate ↵
Configure ⬇

↵

IP Address ↵
10.10.6.106 ⬆

⬇ ⬆ or ↵

Netmask ↵
255.255.255.0 ⬆

⬇ ⬆ or ↵

HTML Port ⬆
80 ⬆

⬇ ⬆

DHCP ↵
NO ⬆

⬇ ⬆

IP Address ↵
10.10.6.106 ⬆

Sidebar:

Not Connected to the Site LAN?

Leave the IP Address at 10.10.6.106. Connect a crossover cable from your notebook PC to the controller and browse 10.10.6.106.

Browser passwords are the same as the default keypad passwords listed in manual Section **5.1 Passwords**.

You'll need to configure your notebook or netbook to connect & browse.

Refer to DCM500_browser manual.

To view or adjust the Ethernet **IP Address** press **ENTER** and **DOWN** to **Communicate** at the power up or top of menu display.

Key **ENTER** @ **Communicate**

Key **ENTER** to modify.

Key **UP** or **DOWN** to change the underlined number
Key **RIGHT** to move to the next 3 digit number.

Key **ENTER** to change or **EXIT** to leave the **IP Address** unchanged.

In this example we've changed the **IP Address** from **10.10.6.106** to **192.168.24.86**.

5.7 Communications

Modify IP Address

Thu 16:54:10 ◀↕
S/N: A076X486

◀ then ▼

Communicate ◀↕
Configure ↓

◀↕

IP Address ◀↕
10.10.6.106 ↕

◀↕

IP Address →◀↕
192.168.024.106 ↕

▼ ▲ then →

IP Address ◀↕
192.168.24.86 ↕

Sidebar:

Note :

When you connect the DCM500 into the site LAN, the LAN's DHCP server-router assigns the DCM500 an IP address, sets the netmask correctly & sets the gateway so the DCM500 can E-mail out.

Not LAN connected: Using An Ethernet CrossOver Cable:

You'll need to set your notebook PC's IP Address to the same network to browse the controller using a crossover cable. In this pages example, the controller **IP Address** is **192.168.24.86**. To be on the same network, your notebook needs an **IP Address** **192.168.24.xxx** where xxx is any number from 1 to 255, excluding **86**.

To view the controller's **Diagnostic** press **ENTER** at the power up or top of menu display.

Key **ENTER** @ **Diagnostic**.

Displays the state of the Relay 1 to Relay 5 AC power fuse.
Displays '**OPEN**' if AC fuse has failed.

The **Internal 2.5V** level auto-calibrates analog voltages measured by the controller. Displays from 2.4500 to 2.5500.

The **15VDC Power** level is the unregulated voltage @ the controllers **+DC Power Output** terminals.
Displays from 15 to 23 Volts depending on AC line voltage and load on the **+DC Power Output** supply.

Displays the time and date of the last controller reset or the time and date of the most recent **Load Factory** was executed.

An **Admin Password** @ **Default** has not been modified from '**AAAA**'. If modified displays '**Changed**'.

An **Watchdog Resets** should always display **0**.
An increasing number of **Resets** indicates corrupted firmware or controller electrical fault or interference.

The controller **Firmware Version** indicates the date of issue of the software operating the controller.

5.8 System Diagnostic

Pool 716.1mV ↵
7.23pH 0.23ppm ⬆



Diagnostic ↵
Communicate ⬇



Relay Fuse ⬆
OK ⬆



Internal 2.5V ⬆
2.4743 ⬆



15VDC Power ⬆
16.97 ⬆



Reset to Factory ⬆
10:32 20/08/11 ⬆



Admin Password ⬆
Default ⬆



watchdog Resets ⬆
0 ⬆



Firmware Version ⬆
Q491 ⬆

Sidebar:

Reset to Factory: Sets all volume-water meter totals for this year and the previous year to zero.