HG HighCl

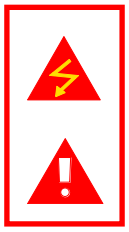
Water Quality Analyzer

User Manual

Version 5.2

Table of contents

1 General Safety Precautions



This section presents important information intended to ensure safe and effective use of this product.

Read the following carefully before handling the product. These warnings and cautions must be followed carefully to avoid injury to yourself or damage to equipment.

Warning: Only properly trained and licensed electricians should attempt to wire or service the electronic components of the analyzer/controller.

Attention! Seuls des électriciens qualifiés ayant reçu la formation adéquate peuvent entreprendre le branchement, l'entretien ou la réparation des composants électroniques de l'analyseur/du contrôleur.

There is an Electrical Shock Hazard when servicing this system.

Il existe un risque de choc électrique lors de l'entretien de ce système.

Always verify that all electrical power source(s) are off before opening the analyzer/controller unit or attempting to service electronic components or wiring.

Ayez soin de toujours vérifier que la ou les source(s) d'alimentation électrique est ou sont bien déconnectée(s) avant d'ouvrir l'unité ou d'entreprendre toute opération de service technique et tout branchement des composants électroniques.

Caution: Extreme caution should be used when installing, operating, and maintaining the HYDROGUARD® Analyzer. Only properly trained technicians are authorized to install and maintain the analyzer/controller.

Attention! Il y a lieu d'agir avec une extrême prudence lors de l'installation, de la mise en œuvre et de la maintenance l'HYDROGUARD®. Seuls des techniciens dûment formés à cet effet sont autorisés à effectuer l'installation et la maintenance de l'analyseur/du contrôleur.

Only properly trained and licensed operators should attempt to make any changes to chemical dosing levels.

Seuls des opérateurs qualifiés ayant reçu la formation adéquate sont habilités à modifier les dosages des produits chimiques utilisés.

Always follow local health and safety regulations when performing any service on the analyzer/controller unit or when changing chemical dosing settings.

Conformez-vous sans exception aux consignes locales de santé et de sécurité lorsque vous effectuez toute opération technique sur l'analyseur/le contrôleur, ou lorsque vous modifiez les paramètres de dosages chimiques.

The main power supply may be connected to either 110-120 or 220-240VAC 50/60Hz. Switching between voltages is accomplished by changing two (2) jumpers located above the main power connection, to the left of the transformer. For 110-120VAC, a 1amp fuse should be use; for 220-240VAC, a 0.5amp fuse should be used. These changes must be completed prior to wiring.

L'alimentation générale peut être branchée sur 110-120 ou sur 220-240VAC 50/60Hz. Pour basculer d'une tension à l'autre, il suffit de changer les deux (2) cavaliers situés au-dessus de la principale connexion électrique, à gauche du transformateur. Une tension à 110-120VAC requiert un fusible de 1 Amp. ; une tension à 220-240VAC requiert un fusible de 0,5 Amp. Ces modifications doivent être accomplies avant le branchement électrique.

Caution: Before connecting to a power source, confirm that both jumpers are located on the correct voltage and that the appropriate fuse is in place.

Précautions! Avant de relier l'appareil à une quelconque alimentation électrique, vérifiez que les deux cavaliers sont situés sur les valeurs correctes de tension et que c'est le bon fusible qui est en place.

Each relay connection is limited to 4 amps, to prevent overheating. The relays may show a higher rating but do not connect equipment exceeding 4 amps.

Chaque connexion relais est limitée à 4 Amp. afin d'éviter toute surchauffe. Même si les relais affichent éventuellement une valeur supérieure, ils ne se connecteront pas à un élément dépassant 4 Amp.

All electrical connections should comply with National Electrical Code (NEC) and all local regulations.

Tous les branchements électriques doivent être conformes au Code Electrique National (NEC – *National Electrical Code*) ainsi qu'à toutes les consignes locales.

Caution: Do not use chemicals that reduce the surface tension. When using hydrochloric acid, observe all safety regulations.

Attention! N'utilisez pas de produits chimiques susceptibles de réduire la tension superficielle. Lors de l'utilisation d'acide chlorhydrique, appliquez scrupuleusement toutes les consignes pertinentes.

Electrodes:
Warning: Do not swallow the electrolyte. Avoid electrolyte contact with skin or eyes. In case of accidental contact, wash with a lot of cold water! In case of eye inflammation, contact a doctor immediately. Wear safety glasses and gloves when working with the electrolyte solution.

Les électrodes:
Attention! N'avalez pas de substance électrolyte. Evitez tout contact de l'électrolyte avec la peau ou les yeux. En cas de contact accidentel avec cette substance, rincez abondamment à l'eau froide! En cas d'inflammation oculaire, consultez immédiatement un médecin. Portez des lunettes et des gants de protection lors de la manipulation de la solution électrolyte.

Caution: Do not touch or damage the electrodes. The electrolyte is sensitive to oxidation: Always keep the electrolyte bottle closed after use. Do not transfer the electrolyte to other containers. The electrolyte should not be stored for more than one year and should be clear (not yellow) in appearance (for use by date, see label). Avoid forming air bubbles when pouring the electrolyte into the measuring chamber.

Attention! Ne touchez pas ni n'abîmez les électrodes. L'électrolyte est sensible à l'oxydation. Maintenez la bouteille contenant l'électrolyte toujours fermée après utilisation. Ne transvasez pas l'électrolyte dans d'autres récipients. L'électrolyte ne doit pas être conservé plus d'un an et doit garder une apparence claire (pas jaunâtre) (pour la période d'utilisation, voir l'étiquette). Evitez la formation de bulles d'air en versant la solution électrolyte dans le compartiment de dosage.

Caution: HYDROGUARD's control board unit should not be opened except for initial installation and troubleshooting, and should only be opened by a trained and approved technician.

Attention! Le tableau de commandes de l'HYDROGUARD ne doit en aucun cas être ouvert si ce n'est lors de l'installation initiale et en cas de dépannage – auquel cas son ouverture ne doit être effectuée que par un technicien ayant reçu la formation adéquate et dûment habilité.

2 Preface

This document is a short installation guide for the HG HighCl Analyzer. Please refer to the HYDROGUARD Technician manual for more information.

2.1 Intended Use

This manual is for qualified and trained service technicians who will install and service the HG HighCl Water Quality Analyzer. It provides instructions on how to install the HYDROGUARD system, how to integrate it with external chemical dosing systems, as well as how to calibrate, operate, and maintain the system.

2.2 Safety Precautions

Warning

Only properly trained and licensed electricians should attempt to wire or service the electronic components of the analyzer. There is an Electrical Shock Hazard when servicing this system. Always verify that all electrical power source(s) are off before opening the analyzer unit or attempting to service electronic components or wiring.

Caution

Extreme caution should be used when installing, operating, and maintaining the HG HighCl Water Quality Analyzer and Controller. Only properly trained technicians are authorized to install and maintain the analyzer. Only properly trained and licensed electricians should attempt any change to the system's electrical components. Only properly trained and licensed operators should attempt to make any changes to chemical dosing levels.

Always follow local health and safety regulations when performing any service on the HYDROGUARD unit or changing chemical dosing settings.

3 Overview

3.1 Measurements and Features

The HG HighCl can be configured to measures any combination of the following water quality parameters.

Available Measurements

- Cl (5 to 200 ppm -- Amperometric)
- Temperature (default with CL, pH, EC)
- pH
- Turbidity
- Conductivity
- Flow Rate

Note

It is highly recommended to include pH measurements as this will provide automatic compensation for the Cl measurement.

Several communication options are also available:

- Internal 4 to 20 mA Outputs (1 or 2 channels)
- 4-20 mA / NTU Outputs (up to 4 channels)
- HydroSoft - Direct Connection
- Water Guard OL -- Wireless Communication Package

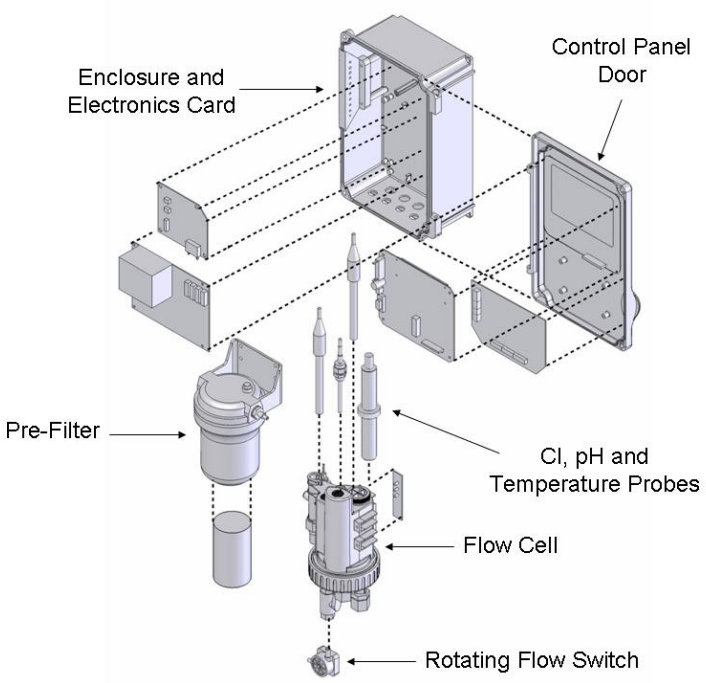
3.2 Water Guard OL – Optional Wireless Management Suite

Water Guard OL (Online) is an advanced and unique HYDROGUARD option providing web based monitoring of up to 5 analyzers using cellular communication. The Water Guard OL communicator accepts HYDROGUARD's alarms and readings and transmits them to a web based application server. The information is easily accessible remotely through the Internet or mobile telephone. Additional information is provided with the remote communication package.

Caution

Remote control of water chemistry is potentially dangerous; therefore, the Water Guard OL remote monitoring and control service is set by default to monitoring and reporting only.

3.3 System Components



Flow Cell - contains the sensors, including the Cl, pH and temperature sensors.

I/O (Input/Output) Card – Power Supply to the analyzer and contains the dry-contact relays for direct control of external dosing systems.

Control Panel Card – Operates main display for measurements and menus. Provides up to 2, 4-20mA and RS-485 outputs for connection to external communication devices.

Keyboard Panel - mounted on the cover of the control panel, it functions as HYDROGUARD's user interface. All settings and adjustments are performed through the keyboard.

Cl, pH, Temp Card – receives the signal from the pH and temperature probes.

NTU, Cond, 4-20 Card* - Contains Input connections for Turbidity, Conductivity, and Flow meters, and up to 4, 4-20 Outputs.

*Optional Module

3.4 Operating Conditions

- Temperature: 1ºC (35°F) to 45ºC (113°F)
- Pressure: < 0.5 Bar (7 psi)
- Flow: 30 L/H (0.13 GPM)

4 Installation

4.1 Working Environment

Pollution Degree: 2

Installation Category: 2

Altitude: 2,000 m

Humidity: 1 to 90% non-condensing

Electrical Supply: 100-115Vac, 1.0A or 200-230Vac, 0.5A, 50/60Hz

Temperature: 5°C to 45°C

4.2 Selecting a Location

Take extra time in selecting a location since the installation location will determine the ease of the installation and future operation and maintenance. The location where HYDROGUARD is installed is dependent on various considerations:

Convenient Access - HYDROGUARD should be installed where it can easily be viewed and operated.

Dry Area – HYDROGUARD handles electricity and includes electronic circuitry that is susceptible to short-circuiting and/or corrosion when exposed to water or high ambient moisture levels.

Away from Chemicals - Many water treatment chemicals can be corrosive to HYDROGUARD's electronic circuitry. It is highly recommended that HYDROGUARD is not installed adjacent to the chemicals storage area or the dosing systems themselves.

Minimum Distance from Supply Pipe - The water sampling line feeding the HYDROGUARD should be as short as possible. A long sample line creates an unnecessary delay between supply, measurement, analysis, and chemical dosing.

Freezing Temperatures – The analyzer should be installed in a location that is not susceptible to freezing temperatures.

4.3 Site Requirements and Installation

The HYDROGUARD assembly should be located where operators and service technicians can easily access it for normal operation and maintenance. The complete analyzer weighs approximately 6 lbs. (3 kg), so, it must be mounted securely onto a stable wall. The base should be mounted at least 24" (60 cm) above the floor (preferably at eye level).

The HYDROGUARD unit and its mounting panel are not shipped with mounting screws or anchors. The installer must provide screws and anchors that can hold the weight of the HYDROGUARD unit, mounting panel, intake filter, and electrical outlets and junction boxes.

4.3.1 Mechanical Installation

1) HYDROGUARD is shipped pre-mounted on a mounting panel, along with a water filter. The mounting panel includes four screw holes, one in each corner.
2) Determine the location of one hole on the HYDROGUARD unit or on the mounting panel.
3) Secure one corner of the HYDROGUARD unit or mounting panel to the wall.
4) Level the HYDROGUARD unit or mounting panel and mark the remaining three (3) screw holes.
5) Secure the remaining corners to the wall using 5/16" (8 mm) screws.

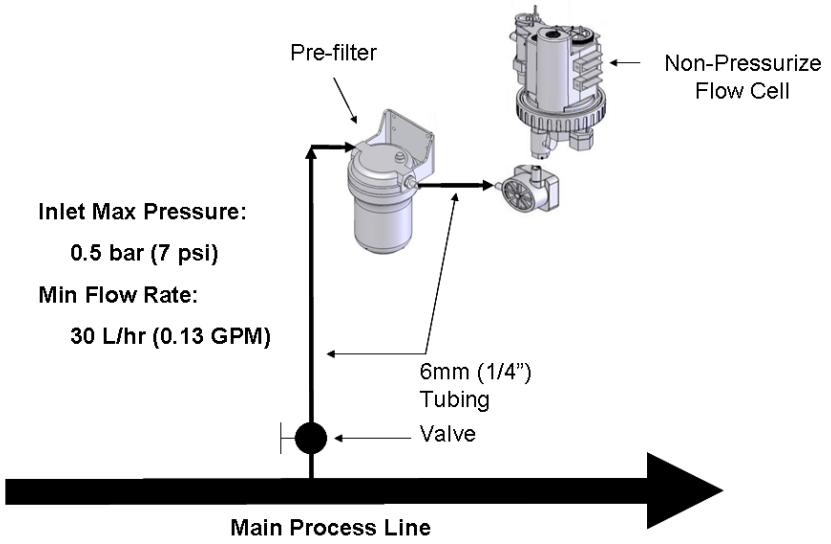
4.4 Plumbing Requirements and Installation

Note

The minimum flow rate to the analyzer is 30 L/hr (0.13 GPM) at a maximum pressure of 0.5 bar (7 psi). The recommended option is none pressurize cell.

4.4.1 Water Supply

HYDROGUARD requires continues water supply to the flow cell, which must be adjusted below 0.5 bar (7 psi) while entering the pre-filter. A fitting is supplied for 6mm (1/4") tubing; however other tubing and fittings may be attached to the 3/8" FNPT connector on the pre-filter. The distance from the main process pipe should be as short as possible, in order to minimize the delay time between the water being sampled and HYDROGUARD testing the water.



4.4.2 Water Return

A drain line is required from the outlet of the flow cell and a ¼" FNPT fitting with a ¼" tube quick connect is supplied. The outlet water must be at least 0.25 bar (4 psi) lower than the inlet water pressure.

In case of none pressurize cell, gravity drain is required

4.5 Electrical Requirements and Installation

HYDROGUARD requires a 90-120 or 180-240 VAC, 50/60 Hz electrical power source on a separate 16A circuit in the plant room's electrical board. The main HYDROGUARD power supply should be connected to a non-dependent power supply, so that the unit remains powered constantly. Any relays used to directly activate equipment should be powered by a dependent power supply (interlocked power supply).

4.5.1 Connecting the Main Electrical Power

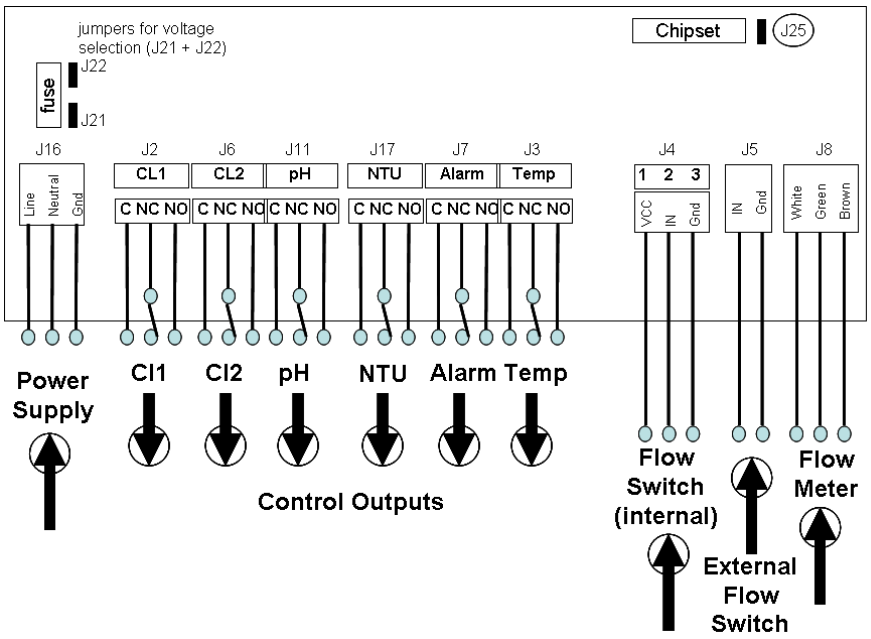
The Main Power Supply may be connected to either 90-120 or 180-240VAC 50/60Hz. Switching between voltages is accomplished by changing two (2) jumpers located above the main power connection, to the left of the transformer. For 90-120VAC, a 1amp fuse should be use; for 180-240VAC, a 0.5amp fuse should be used. These changes must be completed prior to wiring.

Caution

Before making a connection to a power source, confirm that both jumpers are located on the correct voltage and that the appropriate fuse is in place.

1) Verify that the power switch or circuit breaker to the non-dependent power source is off.
2) Connect the line (live) wire to the I/O board connector marked Line.

3) Connect the neutral wire to the I/O board connector marked Neutral.
4) Connect the earth wire to the I/O Module connector marked Ground.
5) Continue with the other electrical connections.
6) Turn on electrical power only after all electrical connections have been completed.



4.5.2 Input Switches

Flow input switch terminal blocks on the I/O module allow for three input switches to be connected to the system as additional layers of security against accidental chemical additions when there is no flow. If a connection is expected but not detected at each input, the analyzer/controller will indicate an alarm and will open all relays (and close the alarm relay). Therefore, if a safety switch (flow, level, etc.) will not be installed, a fixed connection (jumper wire) is required to allow the controller to operate.

Two flow switches and one flow meter may be connected:

- Flow Switch (internal): Flow switch connected to flow cell of analyzer. Supports both 2 and 3 wire flow switches.
    - If a 2 wire switch is used, it should be connected to the “In” and “GND” connections. If a 3 wire switch is used, the “VCC” connection will also be used.
- External Flow Switch ("external off"): Connection for external 2-wire flow switch. If an external switch is not connected, a jumper must be installed for the analyzer to operate properly.
- Flow Meter: Connection for 2 or 3 wire flow Meter. The analyzer will not look for the flow meter connection unless the option is turned ON in technician menu; therefore, no jumper is required if a meter is not installed.

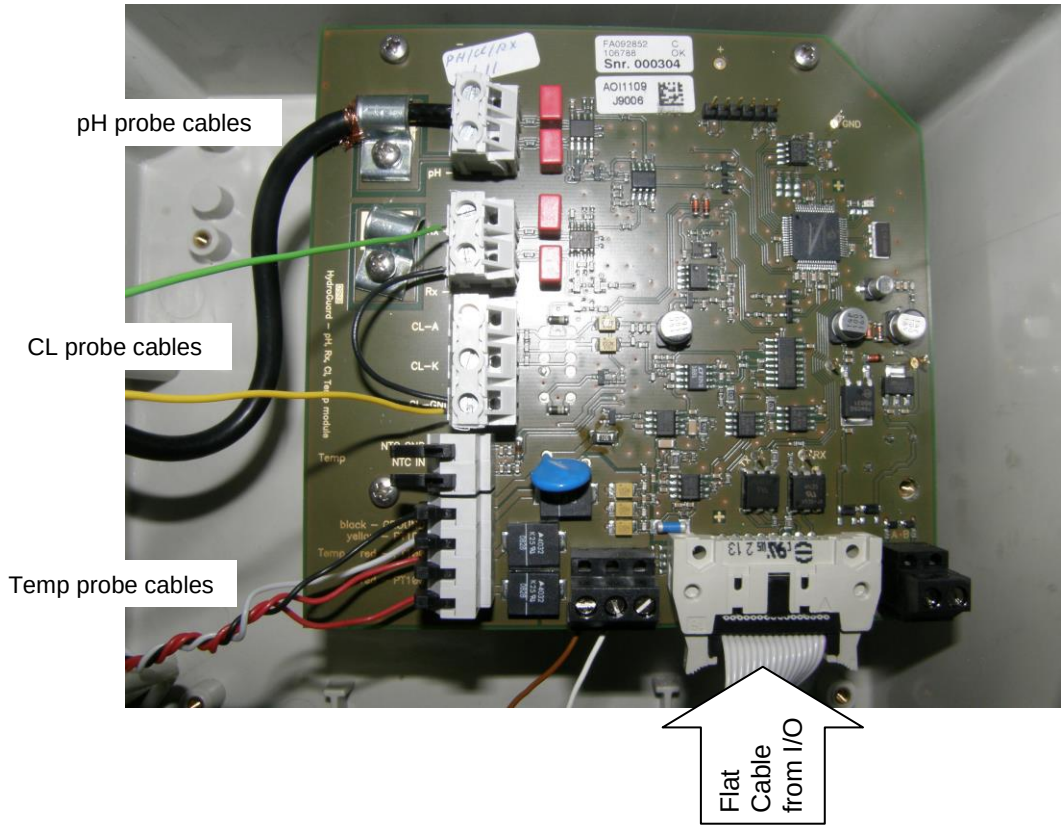
Caution

Electrical connections in this section are ONLY recommendations. All electrical connections should comply with National Electrical code (NEC) and all local regulations.

4.5.3 Electrode wiring

The electrode wire is pre installed on the electronic board

Please verify the wiring before first time start up the controller



4.5.4 Electrode set up

Note

Chlorine sensors are supplied with membrane slightly assembled on the electrode.
Please keep the gap between the membrane cap and the electrode (marked by the red arrow). Do not tighten the membrane cap (this may damage the membrane) and do not touch the gray tape (marked by blue arrow)

1. Unscrew the membrane cap from the electrode shaft. Place the membrane cap onto a clean base.

2. Fill up the membrane cap up to the edge with the enclosed electrolyte. Be careful so that there are no bubbles in the electrolyte. Then replace it onto the base.

3. Hold the electrode shaft upright and put it on the filled membrane cap. Then screw the membrane cap onto the electrode shaft. Turn it anticlockwise until the thread engages, then screw slowly the electrode shaft clockwise (by hand) onto the membrane cap. Excess electrolyte will escape through a valve (located above the type marking) in the membrane cap. Do not close this vent (see arrow) with your finger.

Caution

The electrolyte may spurt from the vent.

4. Check whether the membrane cap is completely screwed-in up to the stop. The first screw-in resistance comes from the O-ring seal; however the screwing procedure of the cap must be gently continued until it hits the adapter! When the membrane cap has been screwed on, the membrane is curved to the outside and must not be screwed any more, as this will damage the membrane and thus make it unusable. Wash up the excess electrolyte with water.

As a rule, the probe must run about one hour, before the first adjustment can be made. The adjustment should be repeated after approx. one day.

Install the Electrode in the Sampling cell

Unscrew the sampling cell cap. Enter the Electrode into the sample cell until it is stopped by the O-ring. Screw the sampling cell cap,

5 First Time Operation and Calibration

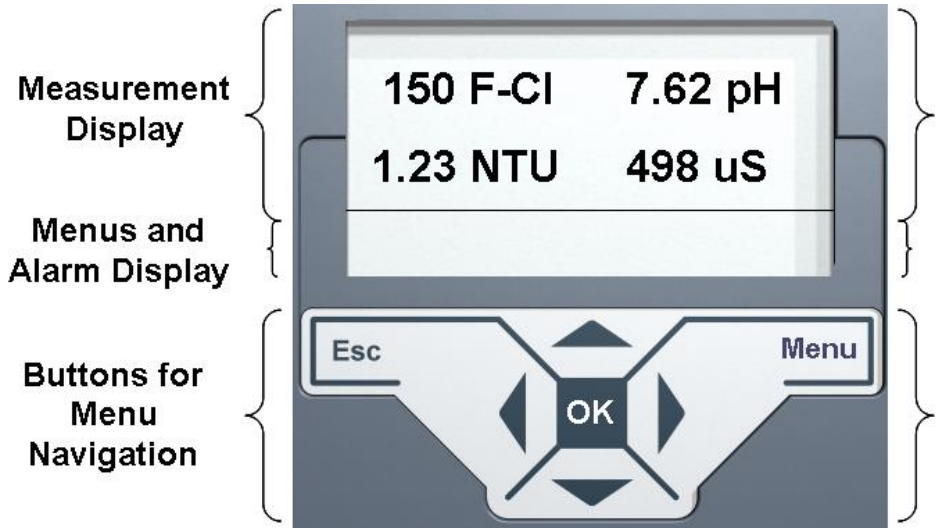
This section describes how to configure the settings (set points, alarms, and calibrations) through the HYDROGUARD control panel.

Caution

HYDROGUARD's control board unit should not be opened except for initial installation and troubleshooting and should only be opened by a trained and approved technician.

5.1 HYDROGUARD Control Panel

The HYDROGUARD control panel is a simple, intuitive interface for monitoring and controlling water quality with the following components:



Note

The default Operator Password is: 123 and the default Technician Password is: 456.

Caution

DO NOT Forget your password! There is no way to reset the technician password without a complete reprogramming of the HYDROGUARD System.

Control Panel structure is as follows:

LCD Display	At the top of the control panel is an LCD display which shows all measured variables at top and all Alarms and Menus at bottom
Menu Button	Enters and scrolls through the menus
Esc	Moves one level back in the menu without making changes
OK	Enters setting change mode and accepts setting change
Up/Down Arrows	Changes value up or down

5.2 Menus and Settings

HYDROGUARD has two menu levels: Operator and Technician. The Operator menu includes settings that may be controlled by on-site operators. The Technician menu includes settings and calibrations that should be restricted to specially trained HYDROGUARD maintenance technicians. Each menu has a separate password. The technician level password may be used whenever a password is required, however the operator password will only be accepted in the operator menu.

5.2.1 Operator's menu

Operator's Menu Functions and Descriptions are detailed in the table below

Function Name	Description
Menu Relays	Manual activation of Relays
Cl set point1	Controls Cl relay 1 – On/Off or Proportional
Cl set point2	Controls Cl relay 2 – On/Off only
Cl calibrated to sensor value was	Most recent calibration & sensor value at calibration for troubleshooting purposes
Cl low alarm	Initiates an alarm when Cl is below value
Cl high alarm	Initiates an alarm when Cl is above value
pH set point*	Controls pH relay 3 – On/Off or Proportional
pH 7 calibrated to* sensor value was	Most recent calibration & sensor value at calibration for troubleshooting purposes
pH 4,10 calibrated to* sensor value was	Most recent calibration & sensor value at calibration for troubleshooting purposes
pH low alarm*	Initiates an alarm when pH is below value
pH high alarm*	Initiates an alarm when pH is above value
Temp set point*	Controls Temperature relay 6
Temp calibrated to* sensor value was	Most recent calibration & sensor value at calibration for troubleshooting purposes
Temp low alarm*	Initiates an alarm when Temp is below value
Temp high alarm*	Initiates an alarm when Temp is above value
Turbidity set point*	Controls Turbidity relay 4 – optional module
NTUl calibrated to* sensor value was	Most recent low NTU & sensor value at calibration for troubleshooting purposes
NTUh calibrated to* sensor value was	Most recent high NTU & sensor value at calibration for troubleshooting purposes
Turbidity high alarm*	Initiates an alarm when Turbidity is above value
Cond. calibrated to* sensor value was	Most recent conductivity & sensor value at calibration for troubleshooting purposes
Alarm delay	Time delay before alarm relay 5 closes
Flow low limit*	Low limit for external flow meter
Flow k-factor*	k- factor for external flow meter
Total Alkalinity	Manually entered for Langelier Index
Total Hardness	Manually entered for Langelier Index
TDS	Manually entered for Langelier Index
Language	Choice of language
SYSTEM RESET	Restarts the controller – a safer option than turning it off/on

* Optional features

Operator's Menu and variables limits are detailed in the table below

Function Name	Min Value	Max Value	Default	Units
Menu Relays	OFF	ON	OFF	--
Cl set point1	1 **	199.9	15	ppm
Cl set point2	1 **	199.9	15	ppm
Cl calibrated to	1 **	199.9	n/a	ppm

sensor value was				
Cl low alarm	1	199.9	5	ppm
Cl high alarm	1	199.9	60	ppm
pH set point*	4.0	10.0	7.40	--
pH 7 calibrated to* sensor value was	4.0	10.0	n/a	--
pH 4,10 calibrated to* sensor value was	4.0	10.0	7.40	--
pH low alarm*	4.0	10.0	6.90	--
pH high alarm*	7.0	14.0	7.80	--
Temp set point*	1/34	49.9 /121.9	22^{0}C	^{0}C / ^{0}F
Temp calibrated to* sensor value was	1/34	49.9 /121.9	n/a	^{0}C / ^{0}F
Temp low alarm*	1/34	49.9 /121.9	18^{0}C	^{0}C / ^{0}F
Temp high alarm*	1/34	49.9 /121.9	50^{0}C	^{0}C / ^{0}F
Turbidity set point*	0	40	0.60	NTU
NTUI calibrated to* sensor value was	0	1	n/a	NTU
NTUh calibrated to* sensor value was	0	1	n/a	NTU
Turbidity high alarm*	0	99.9	99.9	NTU
Cond. calibrated to* sensor value was	1	5000	740	us
Alarm delay	0	10	0:30	min
Flow low limit*	0	200 or 999	0 = off	M^3/hr or GPM
Flow k-factor*	0.001	655	0.01	--
Total Alkalinity	0	600	0	ppm
Total Hardness	0	600	0	ppm
TDS	0	5000	0	ppm
Language	--	--	English	--
SYSTEM RESET	n/a	n/a	n/a	--

* Optional features

** High Chlorine measurements are effective starting from 5 ppm

5.2.2 Configuration Settings

Operator's Menu

Each of the parameters in the operator menu is configured in the same way. The following procedure describes how to configure a typical setting:

1) Locate the desired parameter in the menu:
   a) Press Menu until the desired parameter name appears in the LCD display.
2) Press OK. Enter Password 100 appears in the LCD display.
3) Enter the Operator password (or technician password; both are accepted)
4) Press the up arrow or down arrow until the password number is reached.

Note

Holding Menu why pressing up or down will advance the first digit. Holding up or down for an extended period of time will proceed through the numbers more quickly.

The factory-set operator password is 123. The operator password can only be changed by entering the current operator or technician password (see Technician Menu Setup).

5) Press OK to accept the password. The parameter name and current setting appear in the LCD display.
6) Press OK, again. The LCD display shows the parameter and the current setting.

7) Enter the new parameter setting:
   a) Press the up arrow or down arrow until the desired value is reached.
   b) The second row of the menu display, below the value that is being changed, shows the current value.
8) Press OK to save the new setting or Esc to abort without saving the new setting.

To change the settings of additional parameters, press Menu until the desired parameter appears in the LCD display and repeat steps 6-8 above to set the new parameter. The table on the right outlines an example of menu settings.

Menu	Value
Low Cl Alarm	100
High Cl Alarm	175
Low pH	6.5
High pH	8.5
Low Temp	20
High Temp	30

Technician Menu

Navigation within in the Technician Menu is identical to the operator menu.

1) To enter the Technician menu, press Menu and then press the up arrow and down arrow simultaneously until the menu display changes.
2) Navigate the menus exactly the same as the operator menus, but the technician password is the only password accepted.

Please refer to the Technician Manual for more information.

5.2.3 Configuring 4-20mA

The menu for “4-20mA output settings” is found in the technician menu.

1) Set the 4-20mA outputs
   a) Enter the technician menu and scroll until “4-20mA output settings” appears in the LCD
   b) Press OK
   c) Enter the technician password and press OK
   d) Select built-in Channel (1 to 2)
   e) Select Parameter (Cl, pH, etc.)

   Note
   Optional features appear in the selection as well. Choose only a viable option (e.g. choose NTU only if NTU card was ordered)

   f) Select “read” or “control” function
   g) Set control to “Normal” or “invert”

   Repeat the above steps for all active 4-20mA.

2) Set the 4-20mA alarm output
   a) “on alarm go to” option follows the “4-20mA output settings” on the technician menu
   b) Select alarm output: 2mA, 4mA, 20mA, or hold

   Note
   The 4-20 alarm output is the output value that will be sent in case of an insufficient flow problem to the HYDROGUARD. In case of low or high level (i.e. low chlorine), no 4-20mA alarm will be activated.

5.2.4 Configuring external 4-20mA/NTU card

The menu for internal 4-20mA settings is found in the technician menu.

1) Set the 4-20mA outputs
   a) Enter the technician menu and scroll until “4-20 Settings” appears in the LCD
   b) Enter the technician password and press OK.
   c) Select the Output Channel (1 to 4)

d) Select the output Parameter (Free Cl, pH, etc.)
e) Select the Min Value (value = 4mA output)
f) Select the Max Value (value = 20mA output)
g) Test the output (with multimeter set on mA)using the test output settings will help adjusting the external unit (PLC)

Repeat the above steps for the remaining outputs.

2) Set the 4-20mA alarm output
   a) 2mA, 4mA, 20mA, or hold last value

The 4-20 alarm output is the output value that will be sent in case of an insufficient flow problem to the HYDROGUARD. In case of low or high level (i.e. low chlorine), no 4-20mA alarm will be activated.

6 4-20mA Control

In the 4-20mA Control Output:

- Normal Control: 4mA = 0% ON and 20mA = 100% ON
- Invert Control: 4mA = 100% ON and 20mA = 0% ON

The % ON will vary based on:

- Cl SetPoint1
- Cl P-Factor
- Measured Value

The higher the P-factor, the faster the controller will increase or decrease the %ON of the feed system.

6.1.1 Setting Proportional Factor

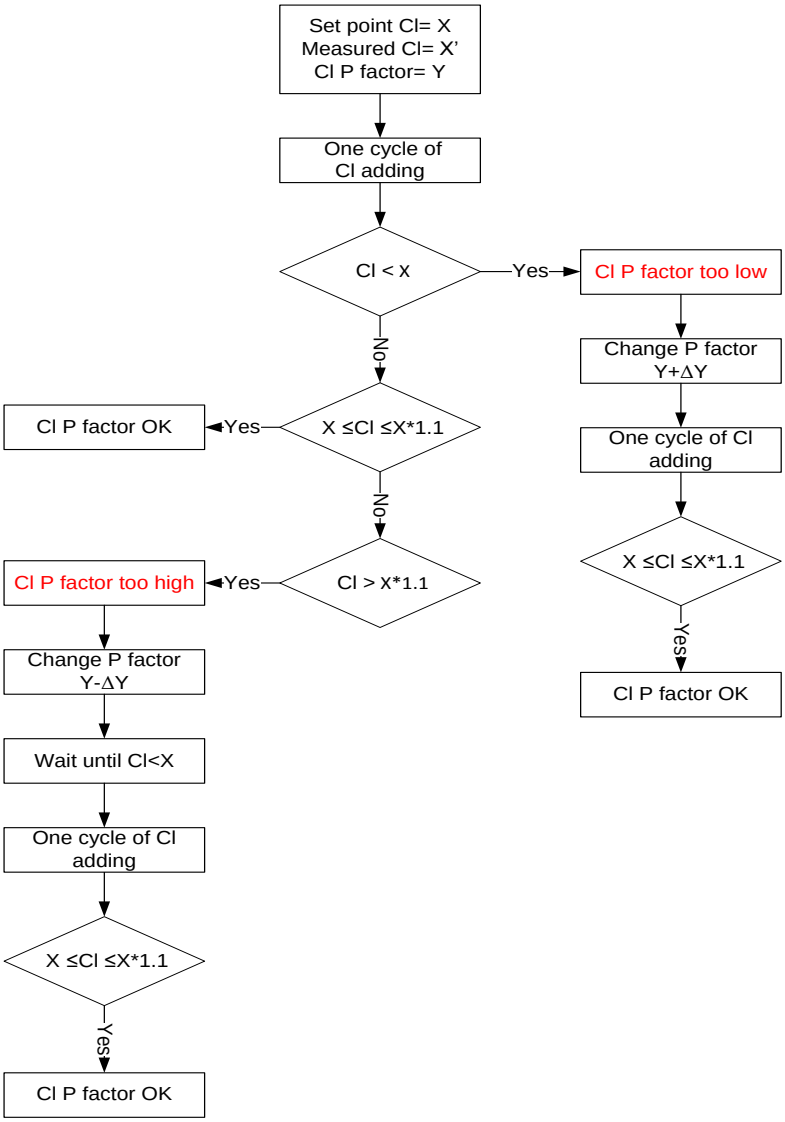
Proportional control of chemical dosing requires configuration according to various factors. The primary factors are the ratio between the system size and the rate the chemical dosing systems can feed chemicals, and the delay time between when the chemical level changes and when it is sensed by the controller.

The length of time between the change and when the controller identifies the change also affects control. The controller can only identify water chemical levels after they have been delivered to the system and have reached the analyzer. This lag time varies for each system and in general, systems with shorter lag-times will operate better with high P-factors and systems with longer lag-times will operate better with low P-factors.

The following figure explains the process of determining the chlorine P factor.

Note

After each cycle of chlorine addition, please take into account the system cycle time e.g. the time it takes the chlorine to dissolve in the water reservoir, before measuring the chlorine levels.



6.1.2 Step By Step Proportional Settings

1) Finish the installation of the analyzer and feed systems.
2) Calibrate the analyzer to the water chemical values at the sample point.
3) Set the proportional factor of the chlorine at an initial setting.
4) Let the controller operate the chlorinator devices and make sure that chemicals are injected into the water.
5) Watch the chlorine levels as they change. We recommend that you record the values frequently so that the process is closely monitored.
   a) If the values greatly exceed the set point, you need to decrease the proportional factor.
   b) If it takes too long to get to the set point, you need to increase the proportional factor.

Note

The delay time between adding chemicals and measuring the change with the analyzer will vary for every system. Be aware of this lag time.

7 Relay Operation and Control

There are 6 dry-contact relays on the I/O module. Five of the relays may be used for direct control of recirculating, closed loop systems. All of the relays may be used as dry-contacts, and will operate based on the set-points, selected in the operator menu.

7.1 Connecting external equipment to the Relays

This is only required if the relays are being used to power and control external dosing equipment. The relays will act as dry contacts if no power is supplied. A dependent power supply should be used such that no equipment will be activated unless the process line has flow.

Please refer to the technician's manual for further information.

8 Calibration

Parameters must be calibrated with measurements taken with external testing devices. Always use digital calibration devices, not the less accurate visual test kits. Alternatively, standard solutions may be used. Make sure the standard solution is not expired or contaminated prior to using. Follow the procedures below EXACTLY as instructed.

ALWAYS take water for calibration from the sampling valve, NOT from the process line directly. The analyzer should always be calibrated with water from exactly the same source.

8.1.1 Chlorine Calibration

Note

Calibrate temperature and pH (if installed) and insure that both temperature and pH are at normal operating levels before calibrating chlorine. If pH is not an installed parameter, the pH value must be set in the calibration menu.

This method is also valid for other variable calibration using external testing devices.

1) Fill the sampling container from the HYDROGUARD flow cell.
2) Test the water sample for chlorine using a digital photometer or other external testing device
3) Press Menu until "Cl Calibrated to" appears in the LCD display.

   The top line will display "Cl Calibrated to" and a number. The number displayed is the last value someone entered for the calibration. The bottom line will display "Cl Sensor was" and a number. This number is the sensor reading without any calibration at the time of the last calibration. If there is a large discrepancy between these two numbers, the sensor was calibrated improperly or there is a problem with the analyzer. The value displayed normally on the main screen and the value the analyzer uses to determine dosing rates is the calibrated value.

   Note

   Chlorine calibration should always be performed within 25% of the set point. If current chlorine level is 25% above or below the set point, do not perform calibration until the chlorine level is closer to the set point.
4) Press OK.
5) Enter the password. Press the up arrow or down arrow until the password is reached.
6) Press OK.
7) Press OK again.

   The display will now show "Calibrate Cl to" on the top line and "Sensor Reading" on the bottom line. The "Sensor Reading" is the current reading of the sensor with no calibration. The "Calibrate Cl to" value is the new value which you want to set.
8) Press the up arrow or down arrow until the value is the same as the value given by the digital photometer.
9) Press OK to save the new calibration or Esc to abort without saving.
10) Press Esc to return to the main display.

8.1.2 Calibrating other Sensors and Meters

Calibration of other sensors and meters is similar to the chlorine calibration and requires the use of a reliable external testing device or standard solution. When using an external testing

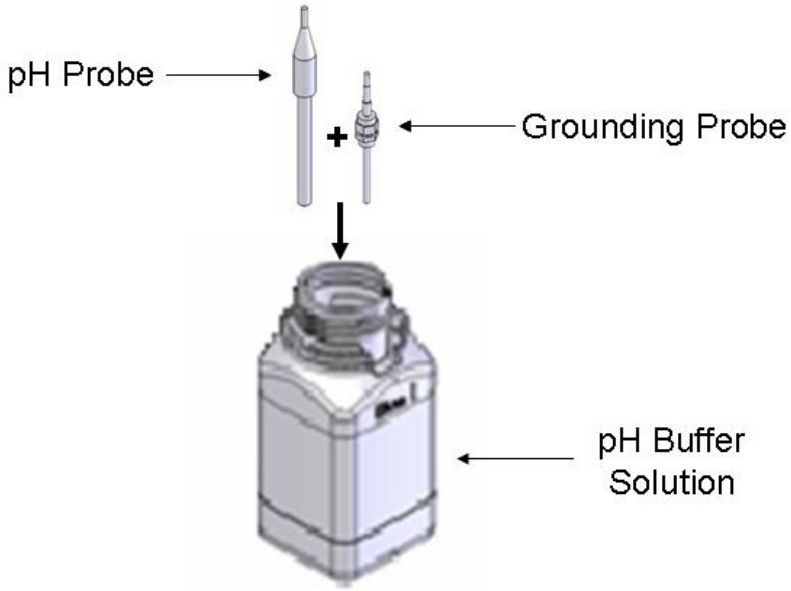
device, follow the Chlorine calibration sequence making sure to take the sample water from the same supply to that probe or sensor.

8.1.3 Using Standard Solutions

1) Remove the probe or sensor, clean with a dry cloth and place in the standard solution
2) Place the probe or sensor in the standard solution and wait for the reading to stabilize.

Note
For pH (or ORP) calibration, the temperature probe must also be placed in the standard for the reading to stabilize.

3) Press Menu until "… Calibrated to" appears in the LCD display.
4) Press OK.
5) Enter the password. Press the up arrow or down arrow until the password is reached.
6) Press OK.
7) Press OK again.
8) Press the up arrow or down arrow until the value is the same as the standard solution.
9) Press OK to save the new calibration or Esc to abort without saving.
10) Press Esc to return to the main display.



9 Maintenance

9.1 Cleaning the Filter

This filter must be cleaned regularly as it becomes clogged with debris and impurities. The frequency at which the filter requires cleaning depends entirely on how much debris is in the water. Clean the filter whenever a visible layer of dirt has accumulated on the filter using only water.

9.2 Maintenance of the sensor

Caution

The brown coating of the electrode finger must not be emeried!

If an adjustment is impossible due to unstable or too low values displayed, the hose ring on the membrane cap above the type marking sealing the vent is to be lifted sideways so that the opening is free. The membrane cap is unscrewed and then air streams into the uncovered vent. The electrode finger is cleaned with a clean, dry paper towel. With the special abrasive paper supplied just the tip of the dry electrode finger (= working electrode) is cleaned. Place the special abrasive paper on paper towel, hold it at one corner and rub the electrode tip of the perpendicularly held probe two or three times across the abrasive paper. Then replace the hose ring onto the vent and fill with electrolyte (see Section 2). If necessary, use a new membrane cap.
Recommendation: change the electrolyte every 3 months.

9.3 Shut-Down and Winterizing

The HYDROGUARD analyzer is designed to keep the probes submerged even if there is no flow to the analyzer. However, if the analyzer is going to be offline for an extended period of time and/or exposed to freezing temperatures, it must be winterized to prevent damage to the analyzer and the probes.

1) Store all probes following directions in the supplemental manuals for each sensor.
   a) Cl and pH sensors MUST be stored in water at all times.
2) Drain the flow cell completely by opening the sampling valve on the bottom. Leave the valve in the open position to allow air to completely dry the cell.
3) Check the security of the analyzer doors to ensure a weatherproof seal.

9.4 Start-up and Preventive Maintenance

1) Replace all additional sensors and meters, close the sampling valve and turn on flow immediately to re-wet any probes.
2) Recalibrate the analyzer.

Note

Cl may take as long as 90 minutes to re-polarize and will need to be recalibrated at that time. pH (and ORP) probes will likely require 24-48 hours to re-stabilize and will require re-calibration at this time.

10 Troubleshooting

The table below outlines very basic troubleshooting. Refer to the latest troubleshooting tables, documents and technical notes, available for download at www.blueitechnologies.com. For more information or contact your Blue I Technologies' representative.

Before Troubleshooting a problem:

1) Perform a System Reset (last menu of operator menu)
2) Check that all flat cable connections between electronic cards are secure
3) Check that all chipsets on electronic cards are secure and no pins are bent

Problem / Symptoms	Potential Cause	Solution / Suggestion
Cl display showing +++	Chlroine level above 200 ppm	Adjust chlorine to normal operating conditions
Display not functioning or is displaying odd numbers	Connection between boards is loose	Check all connections between boards
	pH and ORP wires reversed	Trace pH and ORP wires from probe back to board
	Chipset is loose or pin bent	Check that no pins on the chipset are bent and it is in completely and correctly
Controller won't power up	Fuse is blown	Check and Replace fuse above main Power Supply
	I/O board has been damaged due to improper electrical installation	Check for burn marks on I/O board. Recheck for proper wiring -- confirm all neutrals and grounds in contact are from the same power supply
Unstable Cl, ORP and/or pH Readings	Poor Grounding	Check: PT100, I/O board ground, ORP and pH wire grounding
pH and/or Cl not Feeding	In menu change mode	Hit escape to exit out of menu -- return to auto mode
	Overfeed Safety Shut-off	Check for overfeed alarm -- system reset to restore (adjust overfeed time if needed)
Chlorine Measurement is Zero or Low	Cl calibrated too low	Check Cl calibration menu for Cl calibrated to < Cl sensor value. Recalibrate if needed.
	Membrane Blocked	Clean probe/membrane
	Electrolyte needs to be replaced	Replace electrolyte solution and membrane
	At zero Cl for long time	Bring probe back to normal Cl leve and re-calibrate
	Probe off for a long time	needs to re-polarize. Wait 60 minutes and recalibrate.
Cl Measurement is High	Cl calibrated too high	Check Cl calibration menu for Cl calibrated to >Cl sensor value. Recalibrate if needed.
	Membrane Damaged	Repalce Membrane and electrolyte solution