

HydroGuard 4 to 20 mA Output Module

For use with HydroGuard
Water Quality Monitor and Controller

Technician's Manual
Installation, Operation, and Maintenance Guide



Chapter 1: Preface.....	3
1.1 Intended Use	3
1.2 Safety Precautions	3
1.3 Overview of Chapters	3
Chapter 2: Overview	4
Chapter 3: 4 to 20 mA Module Installation	4
3.1 Required Parts.....	4
3.2 Installation.....	4
3.2.1 Selecting and Location.....	4
3.2.2 Hardware Installation	5
3.2.3 Electrical Installation	5
Chapter 4: Troubleshooting	8

Chapter 1: Preface

1.1 Intended Use

This manual is intended for qualified and trained pool service technicians who will install and service the HydroGuard Controllers. It provides instructions on how to install and set-up the HydroGuard 4 to 20 mA output module with an existing HydroGuard controller.

1.2 Safety Precautions

Warning: Only properly trained and licensed electricians should attempt to service the electrical components of this system. There is an Electrical Shock Hazard when servicing the system. Always verify that all electrical sources are off before opening the controller or attempting to service electronic components or wiring.

1.3 Overview of Chapters

Chapter	Description
Chapter 1: Preface	Describes the intended product use and provides general precautions
Chapter 2: Overview	Provides a general overview of what information the 4 to 20 mA output can provide
Chapter 3: Installation:	Instructs how to install the components of the 4 to 20 mA output module and connection to the controller
Chapter 4 Troubleshooting	Describes some basic troubleshooting of the 4 to 20 mA module

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Chapter 2: Overview

The 4 to 20 mA output provides a connection of the HydroGuard water quality controller to any external monitoring or control system. For each parameter, an output signal is transmitted and the strength of the signal (in mA) can be simply correlated to the actual parameter value. Likewise, specific alarm information may also be transmitted to alert personnel of a problem not related to the output parameters.

Chapter 3: 4 to 20 mA Module Installation

3.1 Required Parts

The 4 to 20mA module upgrade includes two (2) main components that are supplied with the upgrade:

- External 4 to 20 module case
- 4 to 20 module (electronics card)

To complete the installation a few additional components, not supplied with the upgrade will be needed:

- Hardware to attach the external module case to a wall or other secure structure.
- 110-115 or 220-230V AC power supply with 3 wires
- A 2-wire cable for connection between the module and controller
- A 2-wire cable for each output channel/parameter

Tools Required:

- Wire cutter and stripper
- Screwdriver
- Digital Multi-meter (capable of measuring between 4 and 20 mA)

3.2 Installation

Caution: The controller may be powered with multiple power supplies. Prior to opening the controller or installing any electrical components, turn off all power supplies to the controller.

3.2.1 Selecting and Location

There are several considerations when considering a location for the installation:

Dry Area – the 4-20 module handles electricity and includes electronic circuitry that is susceptible to short-circuiting and/or corrosion when exposed to water or high ambient moisture levels.

Chemicals - Chemicals can be corrosive to electronic circuitry. It is highly recommended that module is not installed adjacent to the chemicals storage area or the dosing systems themselves.

Maximum Distance from the Controller - The 2-wire connection to the controller must not exceed 100m (1000 feet).

Minimum Distance to the External System - The module should be installed close to the external system to allow for easy connection of the multiple output channels.

Convenient Access – the module should be installed in a location that allows for easy initial installation and any future changes.

3.2.2 Hardware Installation

- 1.
2. The external case has 4 mounting brackets on the back. All 4 should be used to securely attach to the wall.
3. Mark the location of each screw hole and drill a hole for a screw anchor.
4. Thread the screws almost completely into the anchor leaving about ¼" (6 mm) of thread exposed.
5. Attach the external case to the screws
6. Adjust the screw depth to securely fasten to the wall

3.2.3 Electrical Installation

The 4 to 20 mA module requires a separate power supply in order to operate. The 2-wire connection to the controller is for communication only and does not supply any power.

The Module 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 used; for 220-240VAC, 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 on the correct voltage and that the appropriate fuse is in place.

Connecting Main Power and Controller Communication

1. Verify that the power switch or circuit breaker to the non-dependent power source is off.
2. Locate the power supply connection, number 1 in Figure 3.

3. Connect the line (live) wire to the electronic relay board connector marked **Line**.
4. Connect the neutral wire to the electronic relay board connector marked **Neutral**.
5. Connect the earth wire to the I/O Module connector marked **Ground**.
6. Locate the RS485 connections on the controller control panel (electronics card on the controller door) and the 4 to 20 mA module, Figure 1 and Figure 2.
7. Connect the 2-wire cable from the RS485 connection on the controller to the RS485 connection on the 4 to 20 mA module.
 - i. Connect the '+' wire from the controller to the 'A' connection on the module
 - ii. Connect the '-' wire from the controller to the 'B' connection on the module
8. Turn on electrical power only **after** all electrical connections have been completed.

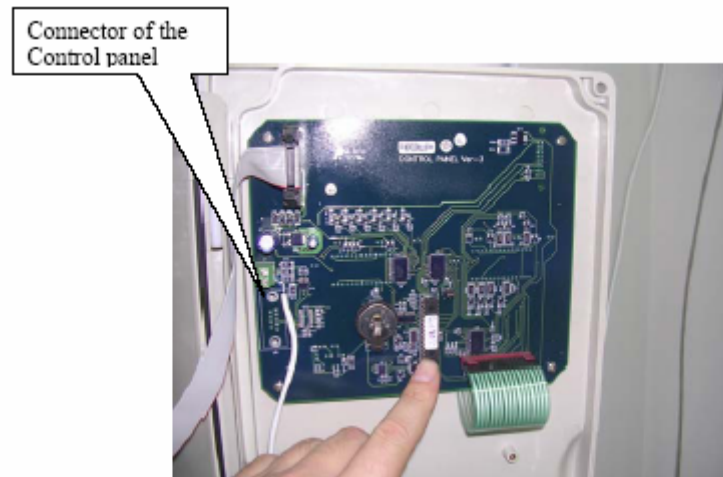


Figure 1: Controller Control Panel and RS485 Connection

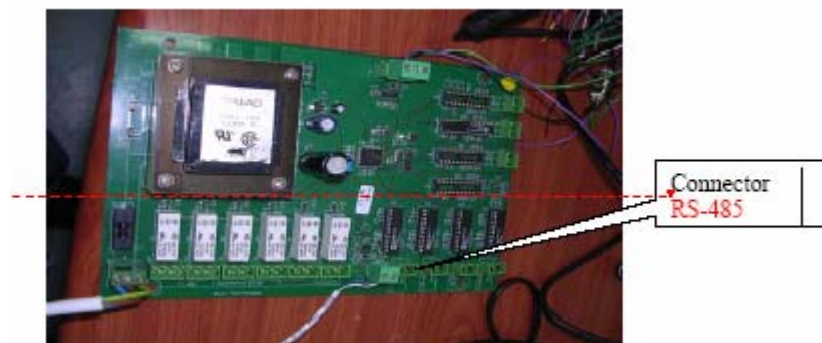


Figure 2: 4 to 20 mA Module with Power Supply and RS485 Connection

Confirming Operation and Communication

Prior to connecting to the external monitoring or control system, it is best to confirm that all desired outputs are working properly using a digital multi-meter. This must be done without output wires connected to an external system.

1. Set the multi-meter to measure current and connect the multi-meter to an active output (an output is inactive if it does not have a chipset installed next to the terminal block).
2. Record the current in mA.
3. Confirm that the value is accurate using, **Error! Reference source not found.**
4. Repeat for each active output.

$$mA = 16 * \left(\frac{MeasuredValue}{FullScale} \right) + 4$$

Equation 1: **Determining Parameter Value from mA output**

mA = milliamp output value

Full Scale = Maximum – minimum value for parameter (see table below)

Parameter	Min Value = 4 [mA]	Max Value = 20 [mA]	Full Scale
Free Chlorine	0	9.99	10
pH	0	9.99	10
ORP	0	999	10
Temp	0	212	212
NTU	0	9.99	10
Flow Rate	0	500	500
Total Chlorine	0	9.99	10
Combined Chlorine	0	9.99	10

Connecting to External Monitoring System

1. For Measurement Output
 - a. Connect two wires from the active output to the appropriate connection on the external system
 - b. Repeat for each active output
2. If an active output (output with a chipset installed) is not to be used, place a jumper wire between the contacts.
3. For alarm notification
 - a. Connect two wires to the appropriate dry contact
 - i. Connection between C and Nc will have contact unless alarm
 - ii. Connection between C and No will only have contact during alarm
 - b. Repeat for each alarm

Connections on the 4 to 20mA Module

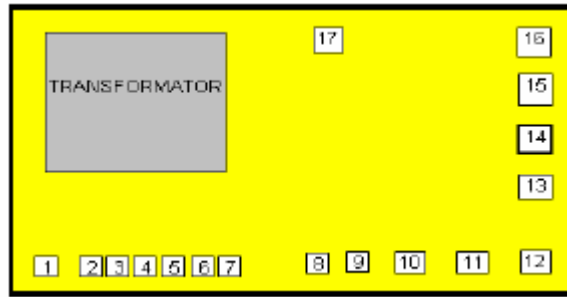


Figure 3: 4 to 20 mA Output Module Electrical connections

1. Power Input 110-115 or 220-230VAC 50/60 Hz

Alarm (Dry Contacts)

2. No Flow
3. Unclean Cell
4. No Communication with the Colorimeter
5. Reagents Close to completion
6. No Reagents
7. External Disconnected

Communication Connection

8. RS485 Communication Terminal Block
17. RS 232 Communication Terminal Block

Communication Connection

9. Free Cl (4mA = 0; 20mA = 9.99)
10. pH (4mA = 0; 20mA = 9.99)
11. ORP (4mA = 0; 20mA = 999)
12. Temp (4mA = 0; 20mA = 212)
13. NTU (4mA = 0; 20mA = 9.99)
14. Flow Rate (4mA = 0; 20mA = 500)
15. TCL (Total Cl) (4mA = 0; 20mA = 9.99)
16. CC (Combined Cl) (4mA = 0; 20mA = 9.99)

Chapter 4: Troubleshooting

There are a few indicator lights on the 4 to 20 mA module to aid in troubleshooting. The following conditions are possible:

- Green Light
 - ON – 4 to 20 mA module is powered
 - OFF – 4 to 20 mA module is not powered
- Red Light
 - ON – One or more of the outputs is not connected (use jumper wire on unused outputs)
 - Flashing – No communication between 4 to 20 mA module and controller
 - OFF – Communication and Outputs are working properly