



# **Proposal for Supplying Parker On-Line THM Analyzer**



## TECHNICAL

### Summary:

The Parker On-Line THM Analyzer provides your organization with the unique ability to accurately measure your THM levels (speciation of each of the four trihalomethane compounds) on a parts-per-billion level. Operator's utilizing this analyzer as a process analysis & optimization tool will enjoy a user-friendly system providing a SCADA interface and fast in-house results, comparable to a certified laboratory without using any chemical reagents. Utilizing the grab sample feature, water plant operators have the ability to understand their THM concentration at any point in time enabling them to proactively improve the quality of their water, and the efficiency of their operations.

### Functionality of the Parker On-Line THM Analyzer:

The analyzer runs based on the modified EPA 524.2 method as it uses purge and trap to collect THMs from the water and desorbed from the trap to a gas chromatograph column followed by analysis of the each individual THM species. It reports each individual species of THM as well as the total THM. The analyzer uses nitrogen gas to do this analysis. The analyzer is being kept at 35°C by running the facility water by the heat exchanger located on the back of the gas chromatograph column and trap heater mounted panel inside the analyzer. If the facility water temperature is  $\leq 26^{\circ}\text{C}$  then the customer does not need any water chiller and connection kit to get the correct response for the THM analysis. However, if the water temperature goes  $\geq 26^{\circ}\text{C}$ , the customer should have a water chiller and connection kit for the Parker On-Line THM Analyzer. Parker will provide that with additional cost. Most of our present installations do not require a water chiller because their water temperature is  $\leq 26^{\circ}\text{C}$ .

### Key Features of the Parker On-Line THM Analyzer:

- No chemicals required for the analysis of THM species (no chemical cost)
- Runs every hour, each run takes less than 30 minutes
- From water facility SCADA, the operator can command to run it when it is not doing any scheduled THM analysis
- Operator can program the analyzer to run THM analysis at different hours (it does not need to run every hour if the water operator choose to do so)
- Each THM analysis is reported to the SCADA in microgram per liter (ppb) for each individual THM species and total THM
- Comes with a grab sampler – Operator can bring sample from different locations and use the local mode to run these samples on the On-Line THM Analyzer



### **Parker On-Line THM Analyzer – Analyzer and Amenities:**

Each Parker On-Line THM Analyzer is shipped with installation and preventive care packages. The installation package includes installation and training on the analyzer. In addition, the installation package comes with nitrogen gas connection kit, water connection kit, tubing both for the gas connection and water connection kit, calibration tool kit, and trihalomethane (THM) stock standard. There is a shared responsibility between the customer and Parker representative to complete a successful installation of the Parker On-Line THM Analyzer.

### **Installation (INS-OLTHM-FULL):**

#### **Customer need to provide the following items for the installation of the On-Line THM Analyzer:**

1. Ultra-high purity (UHP – 99.995% purity) Nitrogen (please specify the CGA connection on the nitrogen cylinder)
2. A water line near to the analyzer location – 50 psig max pressure
3. Drain line
4. The customer needs to provide a frame to mount the On-Line THM Analyzer (Please see the Appendix 2 for mounting layout and Appendix 3 for installation examples of the Parker On-Line THM)
5. Need to provide the SCADA wires for 5 signal (each ranging 4-20 mA) within 5 ft of the THM Analyzer
6. Powerlines for the THM Analyzer and the Water Chiller

#### **Parker will provide the following items (#1-5) for the Parker On-Line THM Analyzer and will perform #6-9 for set up and commissioning and will train the operators 10-13:**

1. Mounting drawing for the On-Line THM Analyzer as “Preinstallation” document
2. A 10 feet cable for the SCADA communication from the analyzer to their junction box
3. Connection tubing for the nitrogen gas connection (25 ft)
4. Connection tubing to come to the analyzer (40 ft)
5. Connection tubing from the analyzer to the drain line (40 ft)
6. Connect the gas and water connection kit
7. Connect the grab sampler
8. Power up the analyzer and carry out diagnostic check
9. Carry out performance check on the analyzer
10. Train the operators about the functionality of the On-Line THM Analyzer
11. Train the operators about making calibration/performance standard
12. Train the operator about how to run a non-routing sample on the analyzer
13. Communicate to the SCADA/Electrical personnel of the water plant/contractor about transferring signal from the analyzer to their SCADA system

Please see the specification of the On-Line THM Analyzer and the pre-installation document in the Appendix 1. Please see Appendix 2 for the mounting and other specification. Please see Appendix 3 for some installation pictures of the Parker On-Line THM Analyzer.



### **Preventive Care Package (PCP-OL-THM-YEAR-1):**

This package warrants the functionality of the Parker On-Line THM Analyzer. It also covers the warranty of the parts and service required to run the analyzer. The package covers the following items:

- 2 scheduled visits from Parker (depending on location)
- 2 emergency visits from Parker (depending on scenario)
- Bi-annual sample filter change
- Bi-annual preconcentrator change (if needed), 100 micron filter cleaning/replacement
- Bi-annual calibration
- Performance verification
- Last option - ship back the THM Analyzer to Huntsville, AL

### **Warranty information regarding the Parker On-Line THM Analyzer:**

The Parker On-Line THM Analyzer includes 1-years parts and labor warranty. The preventive care program details are mentioned in the “Technical” section of the proposal.

### **Optional Item for Parker On-Line THM Analyzer – (KIT-OLTHM-WATER-CHILLER) Kit:**

This package is a combination of Water Chiller and connection kit. It is required only when the water temperature on the site location is  $\geq 26^{\circ}\text{C}$ . Most of the water plants do not use this package. Only a few customer uses this package because most of the present customer’s water temperature is  $\leq 26^{\circ}\text{C}$ . They only use it during the month of July and August which are considered the hottest month of the year. The manual for the water chiller is available if needed by the customers.



## **APPENDIX 1**

**(Specification of the Parker On-Line THM Analyzer)**



## **Parker Online THM Analyzer Technical Specifications**

Dimensions:	25 in [622 mm] H x 20 in [508 mm] W x 11 in [282 mm] D
Weight:	40 lbs. [18.2 kg]
External Power Connection:	120 / 230 VAC $\pm$ 10%, 60/50 HZ, 3.1 / 1.6 Amps
Power Consumption:	300 W
Power Consumption (Nominal):	50 W
Internal System Power:	24 VDC
Protection:	IP-54
Carrier gas:	Nitrogen (Ultra High Purity Grade, 99.999%)
Nitrogen Supply pressure:	45 psig [3.1 bar] maximum, 40 psi [2.8 bar]
Feed water pressure:	40 psi [2.8 bar] maximum, 30 psi [2.1 bar]
Feed water flow rate:	Minimum flow rate 10 gal/hour [0.63 L/min]
Feed Water source:	½" Female NPT connection within 20 feet (6 meters) of the analyzer, insure source is clean filtered water
Feed Water Temperature:	Maximum 25 °C [77 °F]
Feed Water discharge:	Non-pressured drain, three 1/4" tubes, one 1/8" water bypass tube within 20 feet (6 meters) of the analyzer
Sampling:	Automatic 40 mL, Manual Grab Sample volume 125 mL
TTHM Accuracy:	+/- 10% TTHM
Precision:	+/- 5% RSD
Calibration:	Factory calibrated
Performance test and recalibration:	External standards
Cycle time:	Minimum 60 minutes
Operating temperature:	5° C – 40° C
Storage temperature:	5° C - 40° C
Relative humidity:	< 98%
User interface:	LCD with keypad
Display:	2 x 20 LCD
Key pad:	Small membrane keypad
Outputs:	(5) 4 – 20 mA, (3) Discrete Outputs, (2) Discrete Inputs (All Dry Contact)



## Site Location for the Analyzer:

Locate the analyzer in a structure protected from the elements. Avoid direct sunlight and extreme temperatures. Avoid operating at temperatures greater than 40 °C or below 5 °C as this will affect measurement accuracy.

For proper heat dissipation, ensure a 6 inch (152 mm) clearance on all sides of the Analyzer.

## Analog Outputs:

The Analyzer has five 4-20 mA outputs. The SCADA communications cable is to be stranded, #28-18 AWG, rated to 300 Volts with shield and drain wire. [Example: Beldin #9542 2024, 20 conductor, #24 AWG]

No voltage is to be applied to these connections.

- The maximum 4-20 mA load is 600 ohms, and power isolation level is 500 VAC rms.

Wire 1 (**Black**) = 4-20 mA + Signal Out (TTHM, 0 – 200 ppb, factory set, range can be adjusted by the end user)

Wire 2 (**White**) = 4-20 mA – Signal Return

Wire 3 (**Red**) = 4-20 mA + Signal Out (CHFM, 0 – 80 ppb, factory set, range can be adjusted by the end user)

Wire 4 (**Green**) = 4-20 mA – Signal Return

Wire 5 (**Orange**) = 4-20 mA + Signal Out (DCBM, 0 – 80 ppb, factory set, range can be adjusted by the end user)

Wire 6 (**Blue**) = 4-20 mA – Signal Return

Wire 7 (**White/Black**) = 4-20 mA + Signal Out (DBCM, 0 - 80 ppb, factory set, range can be adjusted by end user)

Wire 8 (**Red/Black**) = 4-20 mA – Signal Return

Wire 9 (**Green/Black**) = 4-20 mA + Signal Out (BRFM, 0 - 80 ppb, factory set, range can be adjusted by end user)

Wire 10 (**Orange/Black**) = 4-20 mA – Signal Return

A sample wiring connection is shown in Figure 1.

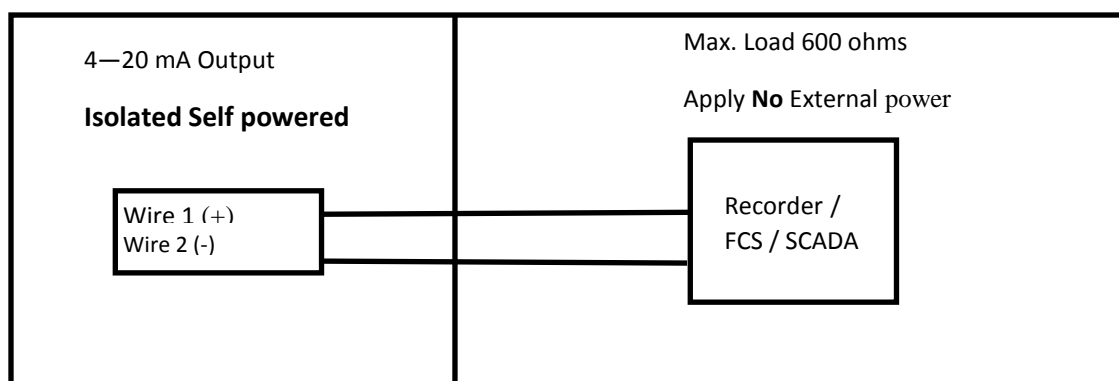


Figure 1: Wiring Diagram for the 4-20 mA Connection



## Discrete (Digital) Inputs / Outputs:

The Analyzer has three outputs and two inputs.

The inputs are “dry contact” only from the Facility Control System (FCS / SCADA) system. The outputs contacts are dry contacts, maximum voltage is rated 200 Vdc, 0.5 amperes, maximum 0.15 ohms contact resistance.

Wire 11 (**Blue/Black**) = FCS Start A, Input (From the FCS / SCADA, **Start** requested if logic “1”)

Wire 12 (**Black/White**) = FCS Start B, Input

Wire 13 (**Red/White**) = FCS Suspend A, Input (From the FCS, **Suspend** analyzer if logic “1”)

Wire 14 (**Green/White**) = FCS Suspend B, Input

Wire 15 (**Blue/White**) = Type Out A, Output (To FCS to identify that the data was an Automatic or Local Run)

Wire 16 (**Black/Red**) = Type Out B, Output (When “0” = Automatic mode, when “1” = Local mode)

Wire 17 (**White/Red**) = Status 0 Out A, Output (To FCS the analyzer is “**READY**” to operate when logic “1”)

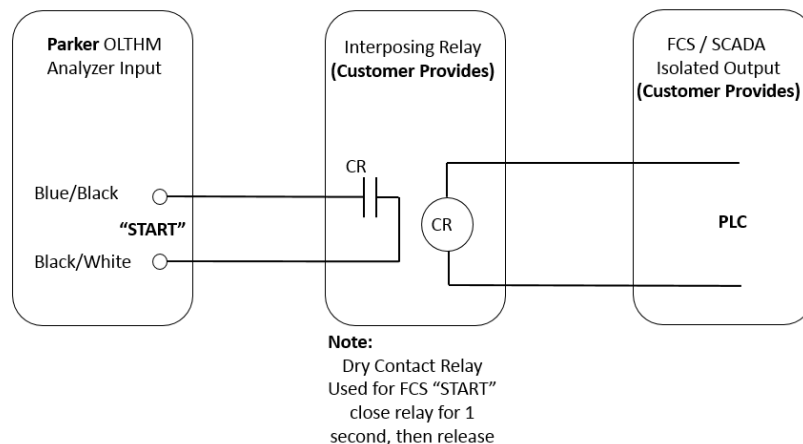
Wire 18 (**Orange/Red**) = Status 0 Out B, Output

Wire 19 (**Blue/Red**) = Status 1 Out A, Output (To FCS, the analyzer is in “**ERROR**” condition when logic “0”)

Wire 20 (**Red/Green**) = Status 1 Out B, Output

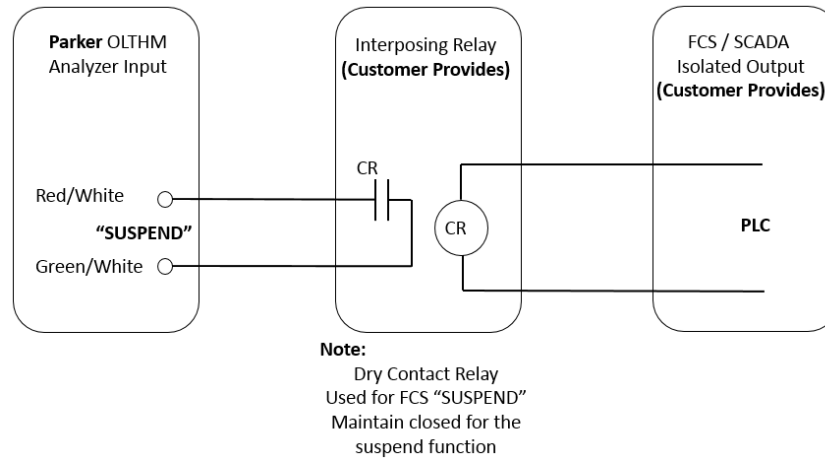
Notice: (When in “ERROR” the analyzer will not run and requires localized attention / intervention)

A sample wiring connection is shown in Figures 2 and 3:

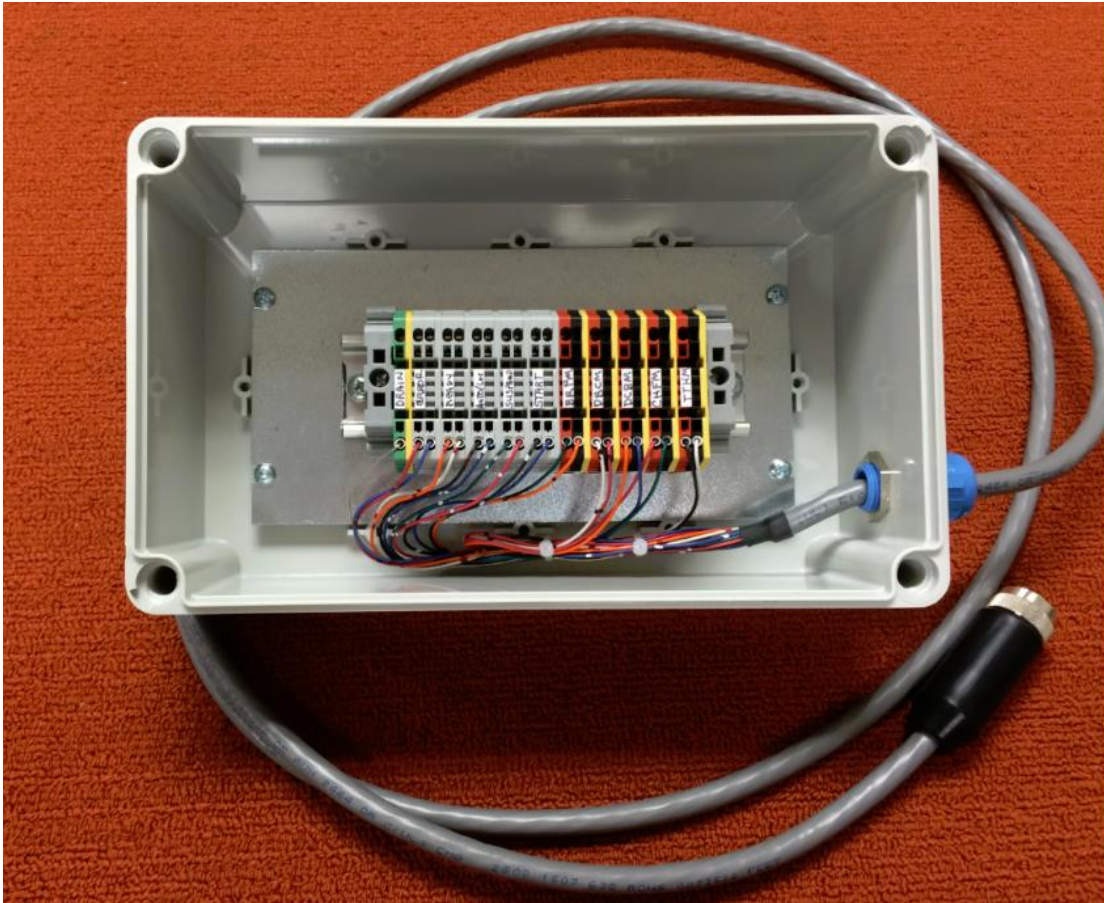


**Figure 2: Wiring Diagram for the Discrete Connection - START**





**Figure 3: Wiring Diagram for the Discrete Connection – SUSPEND**



**Example of the FCS / SCADA Communications Cable Junction Box**



### **Connecting the Incoming Power (Mains) Source:**

The Parker THM Online Analyzer comes with a power cable. The power source for this Analyzer is to be 120 / 230 VAC  $\pm 10\%$ , 60 / 50 HZ, 3.1 / 1.6 Amps.

The power cable plugs into the receptacle located on the left side Analyzer. The power wire will be a three conductor 16 AWG, rated to 300 Volts.



**Power Connection- Interface Connection**



**Appendix 2**  
**(Mounting of the Parker On-Line THM Analyzer and Pictures of the Water and Gas Connection)**

## Mounting the Enclosure

The On-Line THM Analyzer must be mounted directly to studs, framing, or suitable load bearing members using no less than four mounting points. Each mounting point, including fasteners, must be rated for a minimum shear and pullout force of 42 lbs. Maximum fastener diameter is 3/8". Unistrut is recommended for wall mounting to ensure that there is adequate clearance for air flow between the back of the analyzer and the wall.

Always use two hands to handle the analyzer, with one hand around a top corner opposite from your relative position to the instrument and the other hand around the lower, diagonal corner. Never bend over to lift the instrument; always squat and lift with your legs. Do not support the analyzer by any of the external plumbing fittings while handling or mounting.

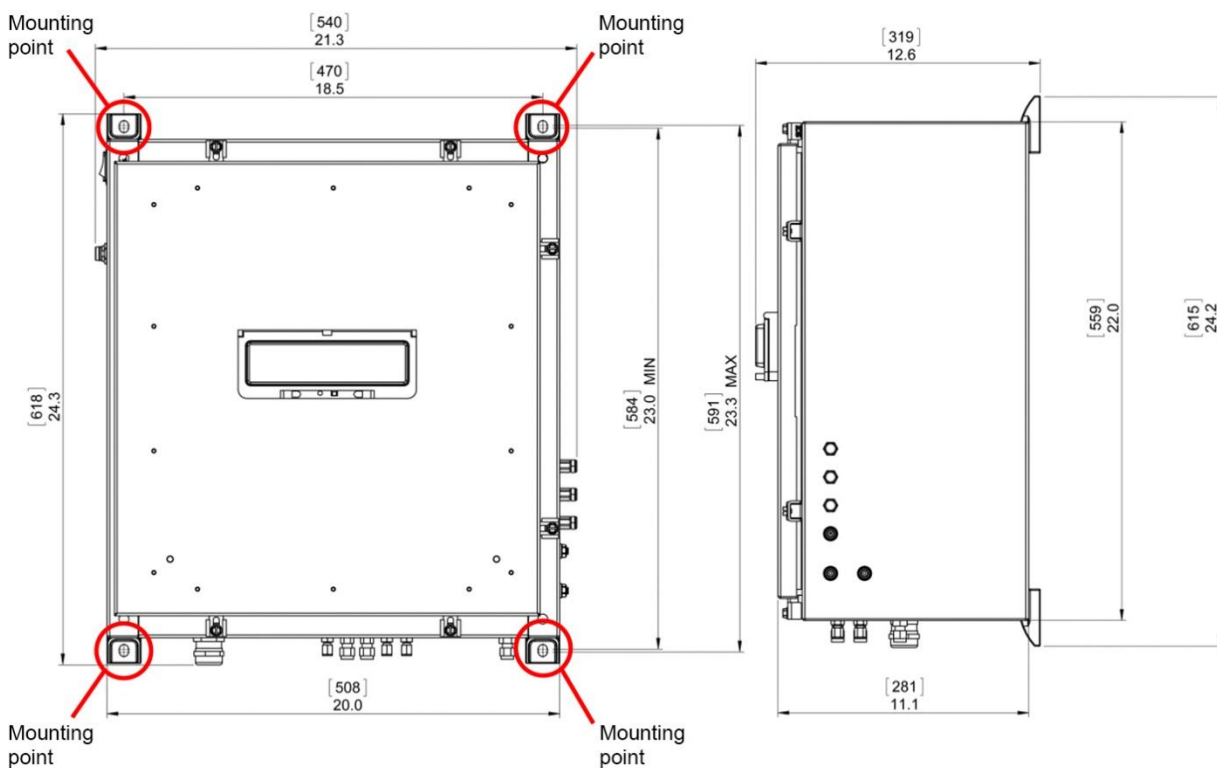


Figure 2.2 – On-Line THM Analyzer mounting dimensions



## Source Water, Carrier Gas and Grab Sample Connections

Source water, drain and carrier gas connections are located on the bottom and left sides of the analyzer. The connection types and line sizes are shown in Figure 2.3.

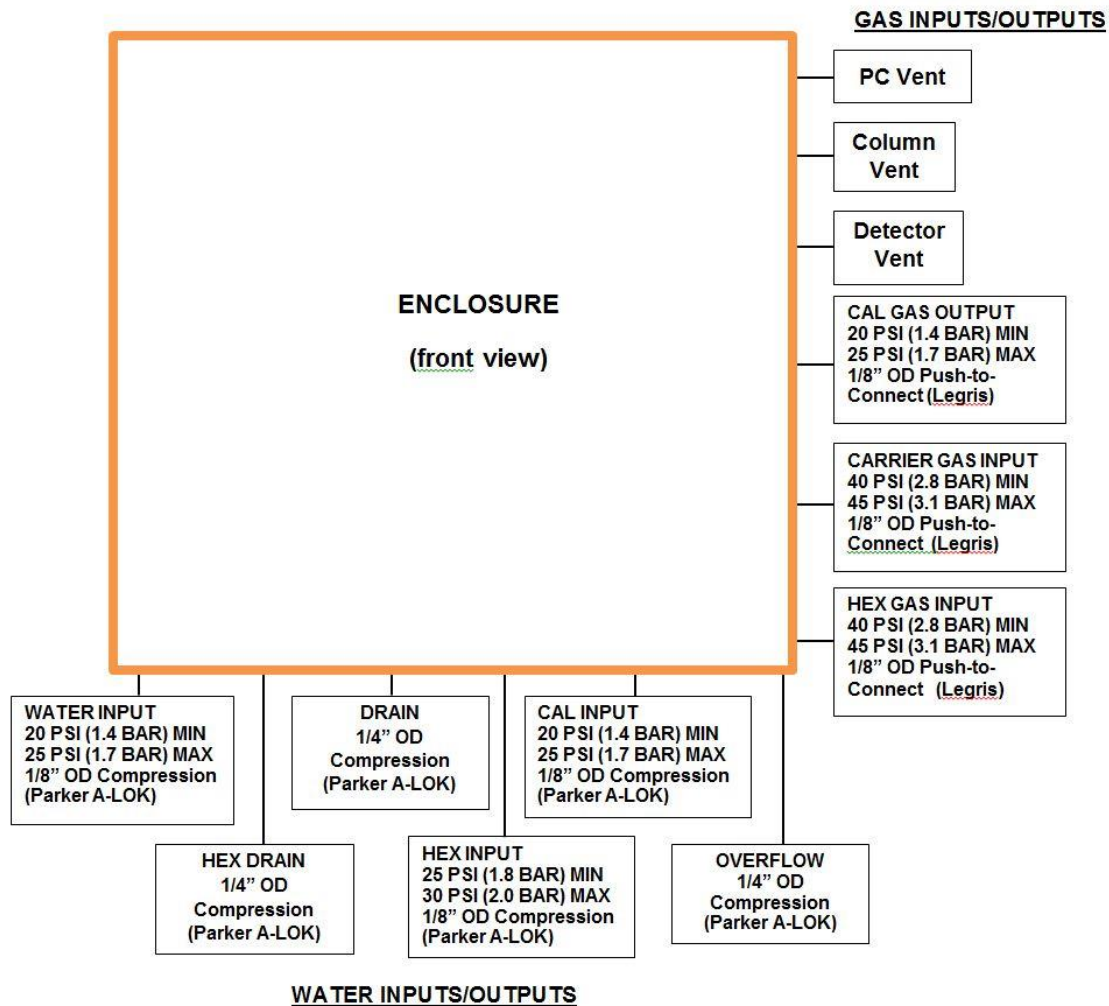


Figure 2.3 – Water, drain and carrier gas connection points

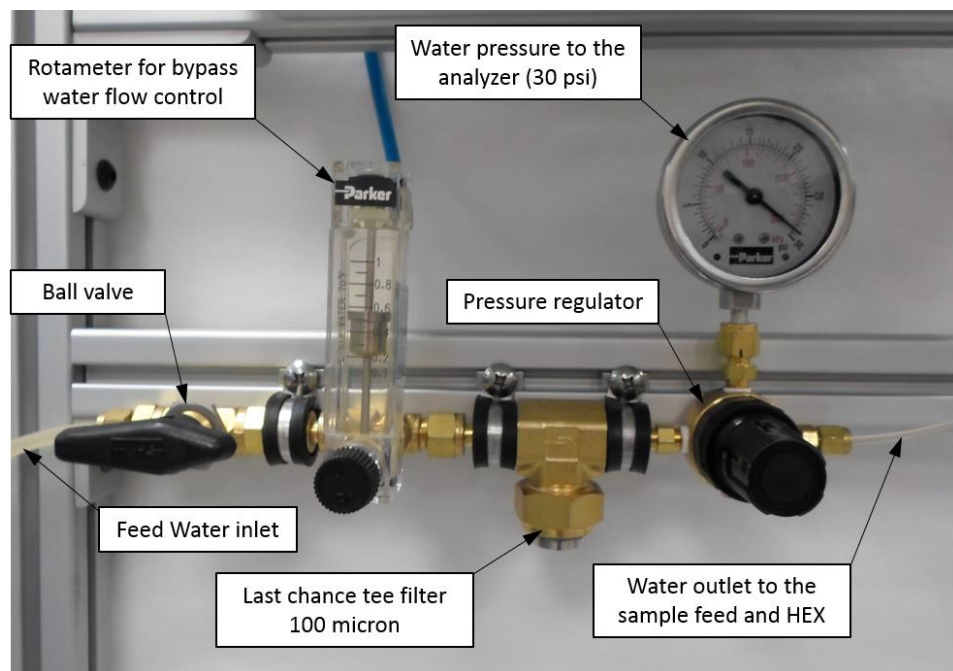
## Water Connections

The source water bypass (not shown in Figure 2.3) is not connected directly to the analyzer but the bypass should be located as close as possible to the analyzer. This assures that the water sample delivered to the analyzer is a fresh sample, representing the current condition of the water. Additionally, since the analyzer uses the source water for internal cooling (HEX input), it is important to maintain the lowest water temperature as possible (25°C maximum). This is especially important in high ambient temperature locations. The source water bypass flow must be set high enough to assure both water freshness and lowest water temperature but not so high that water pressure at the analyzer falls below 25 psi. To protect the analyzer



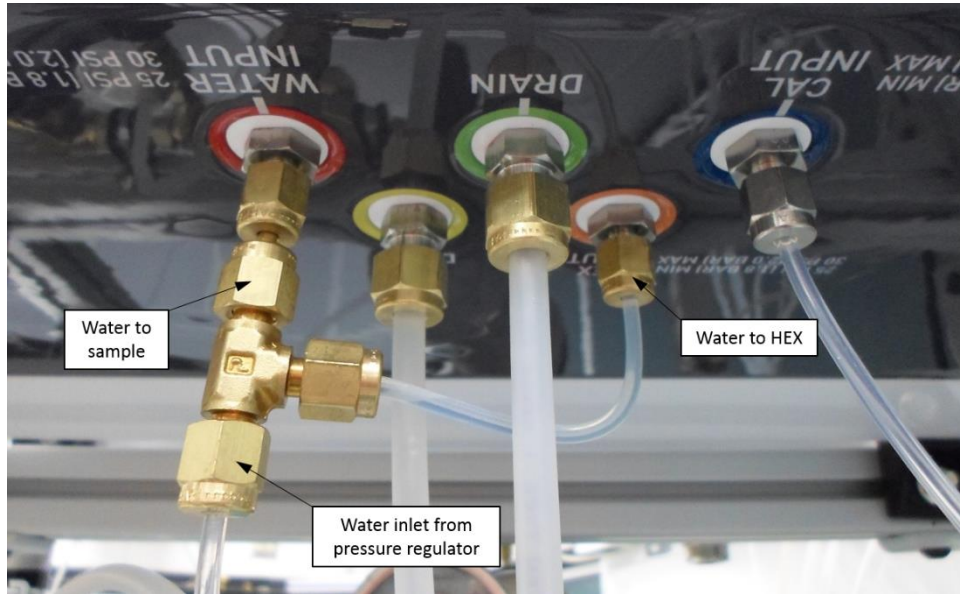
water sampling and cooling system valves, the source water delivered to the analyzer must be clean and filtered and not prone to sudden and uncontrolled precipitation of dissolved minerals.

The recommended water connection set up is shown below in Figure 2.4. This kit, available from Parker Hannifin Corporation, should be placed in close proximity to the analyzer, with the water outlet from the pressure regulator within 12" to the water inlet connections to the heat exchanger (HEX) and sample (Water Input). The branch connection between the HEX and Water Input must be close coupled as shown in Figure 2.5 to assure best water freshness delivered to the sample.



*Figure 2.4 – The Parker water connection kit showing key components*

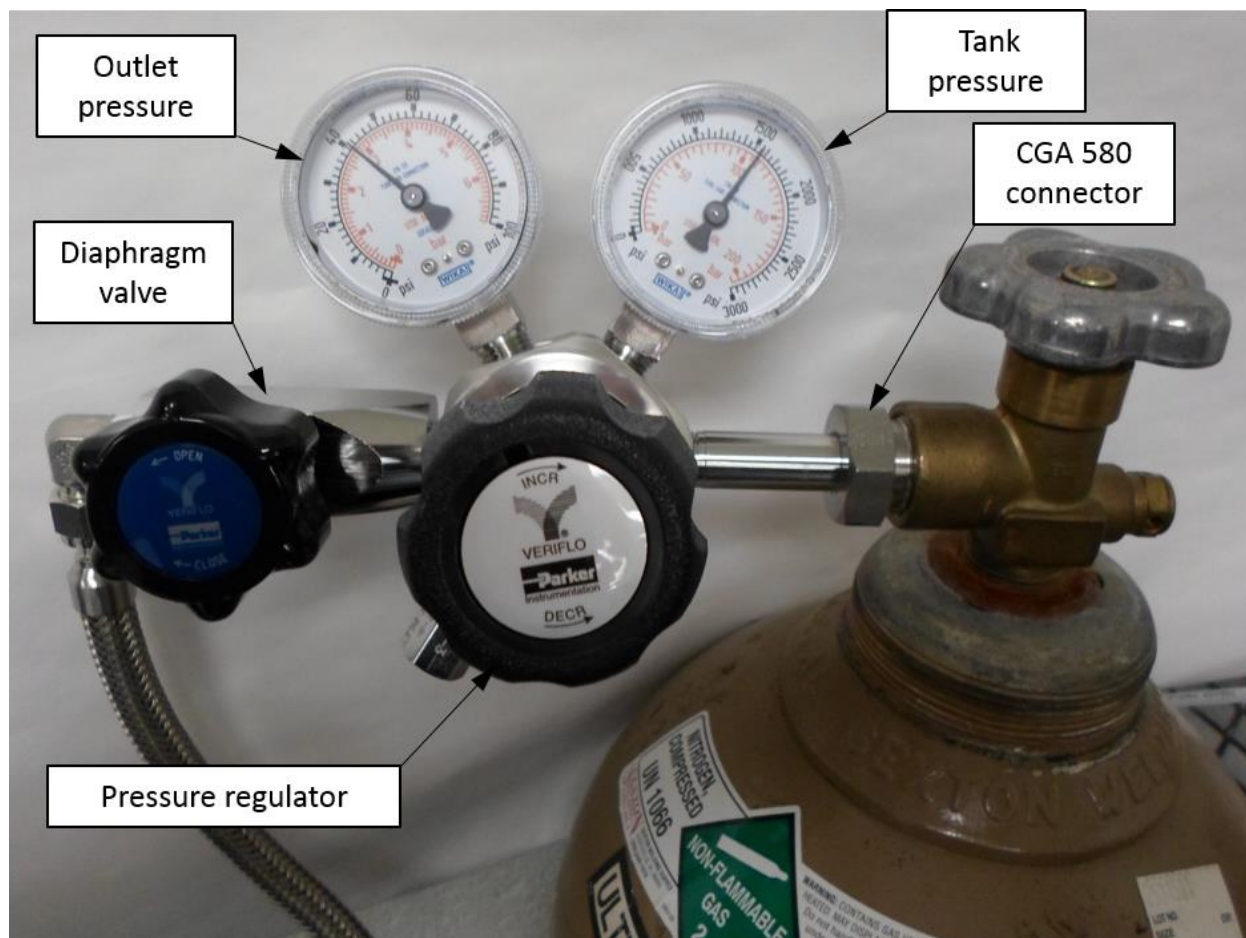




*Figure 2.5 – Close coupled HEX and Water Input connections*

## Carrier Gas

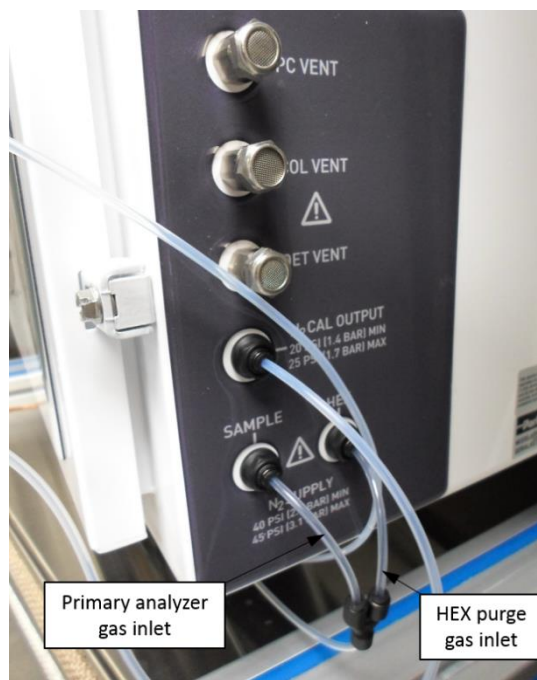
Ultra-high purity grade of nitrogen is required for carrier gas. This gas is readily available in standard 300 ft<sup>3</sup> high pressure tanks. Gas usage by the analyzer is very small for each analysis run so a single tank of gas can last several months even at sampling rates of once per hour. Parker Hannifin Corporation offers a carrier gas connection kit that can connect directly to the standard CGA 580 connection and accurately regulate pressure to the 40–45 psi range required. The Parker Veriflo 2-stage regulator has a maximum output pressure of 60 psi, which protects the analyzer from accidental over pressurization.



*Figure 2.6 – Parker Veriflo pressure regulator*

The two carrier gas connections are on the right side of the analyzer. Both are push to connect and accept 1/8" OD plastic tube only. One connection is the main gas supply to the analyzer and the other is used to purge water from the HEX during extended periods of inactivity.



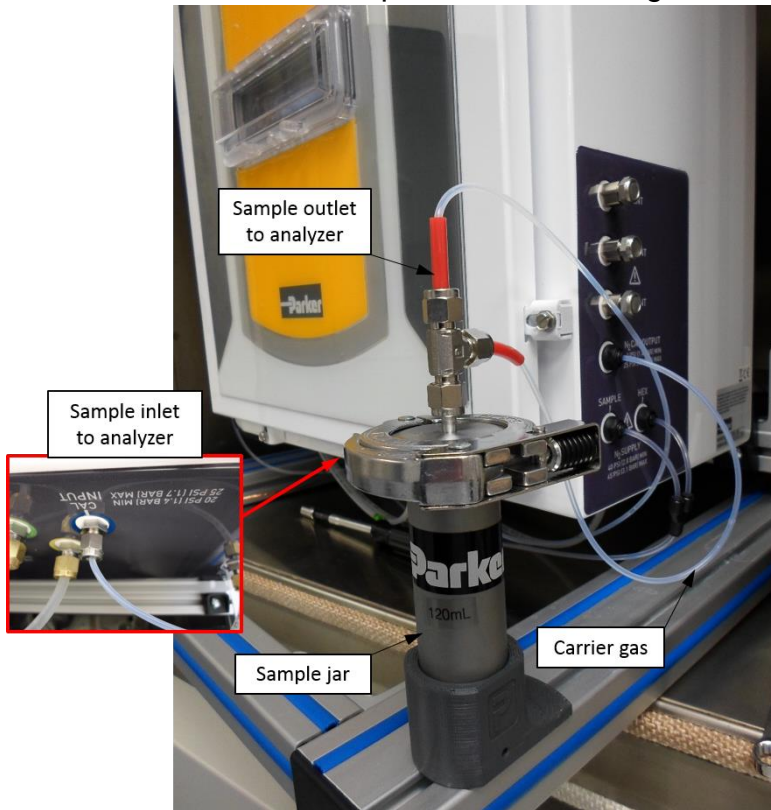


*Figure 2.7 – Carrier gas connections to the analyzer*



## Grab Sample

Parker Hannifin Corporation offers an optional kit for performing manual grab sample analysis, instrument calibration and performance testing.

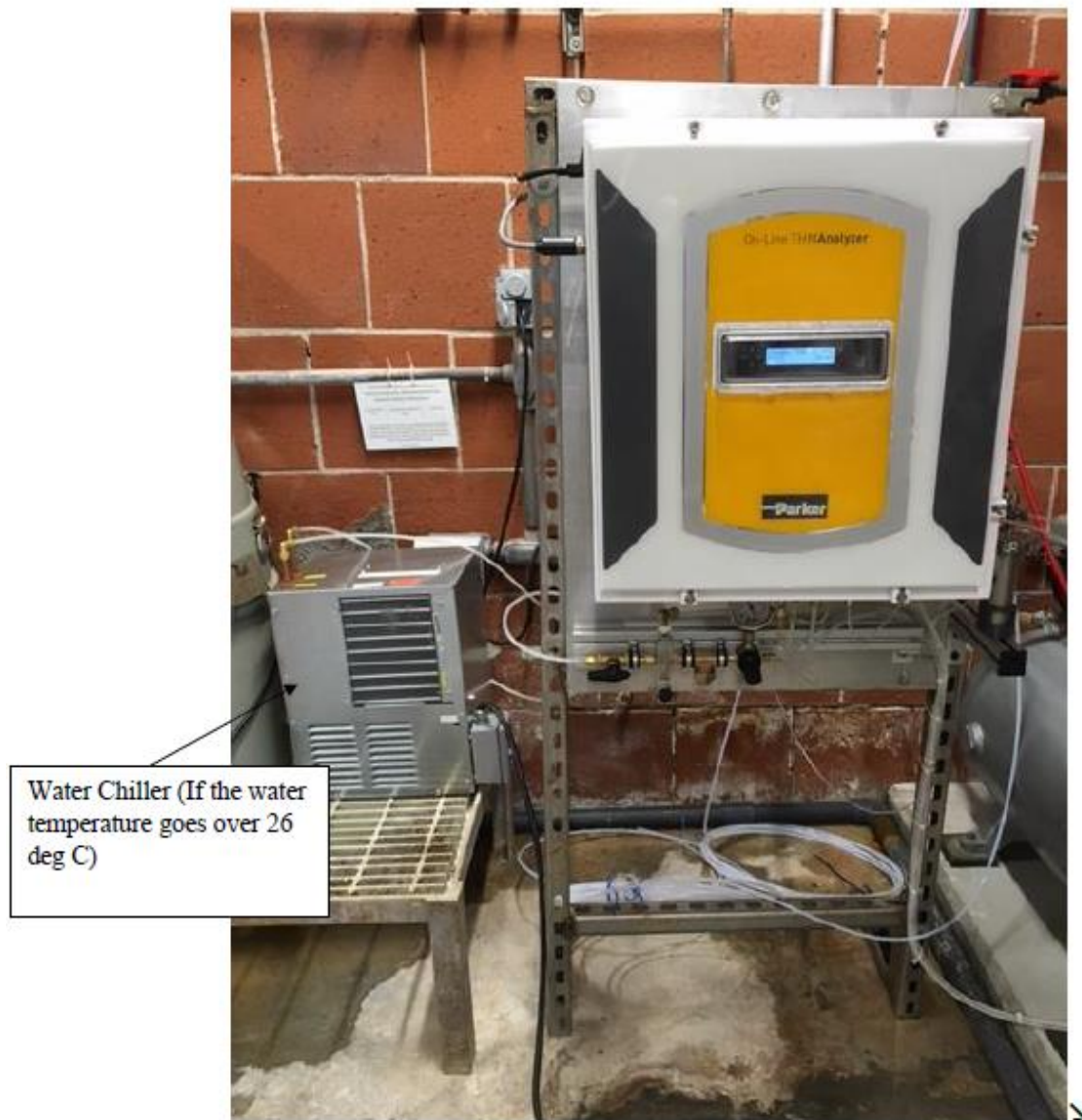


*Figure 2.8 – Grab sample kit showing connections to analyzer*



### **Appendix 3**

#### **(Installation Pictures of Parker On-Line THM Analyzer)**



**Figure 1: Installation at the City of Rock Hill, SC (Stand Up Frame)**



**Figure 2: Installation at the East Bay MUD, CA (Wall Mounted)**