

Krohne Flow Meter and Installation

**Description:** This work includes furnishing and installing a new Krohne Optiflux 2000 flow meter within the existing dry well of the Three Lakes Lift Station.

**Contractor Qualifications:** A responsible representative who is thoroughly familiar with the equipment and type of work to be performed, must be in direct charge and control of the operation at all times. In all cases, the supervisor must be continually present at the job site during the actual meter installation.

**Materials:**

1. Krohne Optiflux 2000 4" flow meter
  - a. Flow meter accuracy shall be +/- 0.5% of actual flow rate from 2 to 20 ft/sec and +/- 1% from 1 to 3 ft/sec. Repeatability shall be +/- 0.1% and response time programmable from 1 seconds to 100 seconds.
2. Krohne IFC 100 signal converter
3. EBAA Iron 2100 series Megaflange restraint with stainless steel nuts and bolts.

**Submittals:**

Prior to the preconstruction meeting the Contractor shall submit shop drawings for all materials used for the meter installation as a single package.

A wiring diagram of the meter installation shall be submitted with the shop drawings.

**Operation and Maintenance Data:**

Hydraulic calibration results including printout of actual calibration data giving indicated vs. actual flows at minimum of 1 ft/sec flow rate with at least 3 calibration points.

**Meter Requirements:**

Flow Meter

1. Low frequency, electromagnetic induction type: Produce dc pulse signal directly proportional and linear to liquid flow rate.
2. NEMA 6 housing: Watertight external and internal electrical conduit connections.
3. Power from signal converter.
4. Flow meter liner shall be hard rubber. Electrode materials shall be 316SST. Electrode shall be self-cleaning design.
5. Use stainless steel or Hastelloy C grounding rings on each end of magnetic flow meter to provide ground path and prevent interference with flow signal on non-metallic or lined pipe. Do not provide grounding probes. Provide braided grounding cable from grounding ring to approved point of earth ground.

6. Sensing head shall be interchangeable with meter body without performing flow recalibration.
7. High impedance device of not less than 1012 ohms to minimize span shift due to electrode coating.
8. Explosion proof sensor certified by Factory Mutual Research for Class I, Division I or Division H as specified or shown, Groups C and D when sensor is located in hazardous area.

#### Signal Converter

1. Remote mounted, microprocessor controlled.
  - a. Operate on 120 VAC, 60 Hz power.
  - b. Provide pulsed dc voltage to magnet coils of magnetic flow meter to establish magnetic field.
  - c. Convert flow signal from magnetic flow meter to analog and digital output signals, for bidirectional flow.
2. Span shall be continuously adjustable between 1 and 33 ft/sec. Adjustment shall be by keypad.
3. Display flow rate scaled in field selectable engineering units. Display shall have 2 rows of 16 alpha numeric characters. Top row shall indicate instantaneous flow.
4. Converter interchangeable with magnetic flow meter element and require no additional flow calibration.
5. Isolated 4-20 mA<sub>dc</sub> analog current output into 0 to 500 ohm load and 24 VDC scaled, software adjustable pulse output.
6. NEMA 4 enclosure.
7. Noise reduction feature to stabilize flow reading.
8. Automatic empty pipe detection.
9. Suitable for -40°F to 150°F ambient temperature. 2.04

#### Cable

1. Provide sufficient length of manufacturers standard shielded signal cable to connect meter primary element and converter.
2. Provide conduit as shown in attached photos for signal cable.

#### Tagging

1. Provide identification tags and markers with ENGINEER'S equipment name and tag number.

#### Source Quality Control

1. Hydraulically calibrate flow meter at manufacturer's facility located in United States. Manufacturer's calibration facility shall be traceable to National Institute Standards Testing or Institute of Science and Technology.

#### Construction Requirements:

The meter, signal converter and signal connection up to the existing PLC shall be done in accordance with manufacturer recommendations. The Contractor will not be responsible for connecting the signal converter to the PLC, nor programming the PLC. This will be done at a later date by the County.

The Contractor shall be responsible for reviewing the layout and orientation of all fixtures within the dry well including conduit capacity for all signal wires from the meter to the control cabinet.

All boxes and connections made to existing panels shall meet NEMA 4 enclosure requirements.

The signal converter shall be mounted in the control cabinet as approved by the County.

***Location of meter installation shall be approved by the County prior to cutting into the existing force main pipe within the dry well. Inlet and outlet lengths of straight pipe shall be approved by the manufacturer. Inlet length shall be >5DN and outlet length shall be <2DN as listed in the Krohne meter operations manual. Dimensions are listed for coordination purposes on the attached photo exhibit. Final location to be approved prior to cutting any pipe.***

There is an existing de-humidifier adjacent to the discharge piping that is supported by a steel rack. The contractor shall relocate the support rack within the existing dry well. All new installations and welds shall be coated with industrial grade paint closely matching the color of the existing. The paint shall be suitable for marine environments.

Contractor to provide wiring diagram for connection of the flow meter and follow the attached photo exhibit. The flow meter shall come with shielded signal cable of sufficient length to run continuous from the meter to the signal converter installed in the control cabinet. It is anticipated the Contractor will utilize existing conduit between the dry well and the control cabinet for this cable.

All wiring must be done in a neat workmanlike manner as approved by the County.

Upon installation of the flow meter the Contractor shall have the supplier or manufacturers technician on site for startup and troubleshooting to ensure meter is operating at the specified accuracies. During this visit the technician shall also train County staff on operation of the meter for operation of the system.

**Cleaning and Protection of Equipment:**

When any work is taking place within the pump room of the can a welding blanket shall be draped over the pump motors to protect them from debris.

The Contractor shall thoroughly clean any construction debris, sewage and wash down the wall and floors with soap and water.

**Suggested Force Main Shut Down Sequencing:**

The following is a suggested sequence of operations for shutting down the force main and draining the pipe prior to making any cuts into the piping within the can station.

1. Coordinate with the County for day and time so staff can be available for operation of pumps.
2. Provide a vacuum truck on site to vacuum sewage out of the wet well during drainage and shut down period of the force main.
3. Shut one of the gate valves in the can and turn the other pump on and provide support for the check valve arms so the valves remain open and allow the force main to drain back into the wet well.
4. Drain down the force main until there is no flow coming from the force main in the wet well.

5. Cut in the force main pipe and install the proposed meter.
6. Return the station into operation, open valves and remove supports on check valve arms.

**Method of Measurement:**

This work will be measured per lump sum.

**Basis of Payment:**

Payment for "Three Lakes Meter (Supply Only)" will be made at 100% upon Contractor's purchase of the meter. Payment for "Three Lakes Meter (Installation)" will be made at 75% after successful installation of the meter and 100% following the manufacturer's technician onboarding County staff during system turn on.