

Performance Verification and Monitoring- Deploying the RH40

Liquid flow is basic to the control of many processes. We measure it increasingly with sensors, but often still rely on pumps to determine flow rates and volumes, even at critical process points. This may reflect the unavailability or limitations of flow sensors during process design; perceived costs of instrumentation; traditional practices and assumptions about the acuity of measurement really needed in a given application. These decisions and assumptions often get revisited during process augmentation, upgrade, or repair, when knowing the flow at a specific point may be critical to ensuring a process', or even a facility's, proper operation. And often, the process is too critical to be shut down long enough for flow sensors to be inserted in the piping.

In such instances, externally mounted (clamp on) ultrasonic sensors can allow for reliable measurement of flows with no interruption of process. Used with a portable transmitter, ultrasonic technology provides a simple, easily installed solution to flow measurement in difficult locations, or where no measurement had been intended. Portable ultrasonic flow can provide the means to characterize systems, verify assumptions, demonstrate equipment performance, and diagnose problems. One such opportunity occurred during a recent facility upgrade In New England, where contract provisions required verification that the facility, specifically the secondary lift station, could meet anticipated peak flow demands. This capability could be assumed on inspection of the nameplate capacities of the pumps and their curves. However, experienced operators and contactors knew that the output of the pumps, most of them years in service, was below their nameplate production. A similar performance capability demonstration was required at the final effluent bypass, designed to keep up with overflow conditions at the effluent weirs. The associated pumps were new, replacing Archimedes' screws. Neither site was designed to incorporate fixed flow instrumentation.

Understanding the instrument's function is critical to properly deploying it. Clamp on ultrasonic flow transducers, by design, are intended for use with a variety of process piping, under a variety of conditions. That said, certain sensor guidelines remain true regardless the application, and must be considered when selecting an instrument for any measurement task. Inspecting the sites involved would be the first step in a successful project.

Testing at Secondary Influent



Inspecting Effluent Bypass Conditions





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Each location required entry into confined spaces, to measure wastewater in wet wells containing at least four feet of sewage or treated effluent. Observing the physical conditions, and confirming the depths, lengths, access and safety protocols, and the availability of support personnel as needed, were all key to facilitating the measurements. Identifying and securing site resources, such as ladders, harnesses, LEL sensors, and listing incidental instrument accessories, such as extension cords or stainless sensor tethers, ensured full preparedness for the conditions. Lastly, proof of concept at the secondary lift station was offered. Remember, the pumps in this station were all rated to produce one flow rate, but were expected of producing something less. The station had never had flow metering, so no one actually knew. Two pumps were selected, and transducers installed on their effluent pipes. This allowed us to confirm the need for the project; develop a baseline performance expectation for the station; and gain some knowledge of transducer raw signals on HDPE of undetermined age.

The project piping included the HDPE mentioned above, 12" diameter, 3/4" wall thickness; new 12" ductile iron; and new HDPE of 18" diameter, 1 1/2" wall thickness, replacing the screws. Regal RH40 was selected for its ability to work with a number of sensor types: 1MHz, 2MHz, and 1/2MHz. 1/2MHz sensors are typically used on very large diameter piping, but in this instance, with 18" HDPE 1 1/2" thick, we wanted the option to use the 1/2MHz transducers if signal quality proved an issue in the effluent bypass. As it turned out, only 1MHz transducers were needed, but RH40 gave us the option to address potential obstacles without selecting alternate instrumentation.

Demonstrating pump performance required not only local observation of flow rate on the portable meter display, but capturing this flow for review by engineers and facility management.



RH40 incorporates data logs, recording up to 16,000 lines of data per log, at a freely programmable interval. A recording interval of one minute over two hours was determined to be sufficient to document each pump's production. This information allowed the identification of which pumps required rebuild.

The effluent bypass station presented a challenging installation condition, with the pipes running above the beds of the original Archimedes screws. Initial assessment of the station layout was invaluable to being fully prepared to enter, install and exit each section easily and quickly. The positioning feature of the RH40, allowing the programming of pipe, fluid and transducer types, provides a recommended optimal sensor orientation, further speeding and simplifying the installation process.



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Always assess the site conditions to determine the best options for entry, sensor installation, adjustment, and especially your exit. Designate a safety officer, who will monitor conditions and be prepared to assist in your exit.



Minimizing the time spent in a wastewater lift station, or any confined space, should always be a goal.

The ease of set up, reliable performance and ability to capture the necessary data made RH40 the right tool for this project. This facility now has four RH40s of their own, using them to investigate processes across the facility and collection system. Factory calibrated, running on rechargeable battery or 120V power, with multiple data logs available, and on board diagnostics to ensure optimal positioning of the transducers the first time out, RH40 provides a complete solution to flow and energy monitoring in your facility.

Have a station to monitor, a pump to validate, a treatment process to investigate? Contact us today at 888 738 0188, or email us at sales@SpireMT.com. We look forward to helping.