



APPLICATION NOTE Oil & Gas

Process instrumentation for chemical injection

- Injection of corrosion and gas hydrate inhibitors
- Variable area flow measurement of low flow chemicals at high pressures up to 400 barg / 5,802 psig
- Full scope of supply including magnetic level indicators and pressure transmitters

1. Background

Chemical injection is a common technique in upstream oil and gas operations to enhance production capacities, increase process efficiency and maintain high plant uptime. It helps to increase oil and gas recovery and has a cleaning effect as the special chemicals remove formation damage, prevent corrosion of the infrastructure and avoid plugging of tubing by waxes and scaling.

A Tunisian supplier of process automation solutions for the oil and gas industry manufactures skid-mounted chemical injection packages comprising tanks, metering pumps, instrumentation, piping, valves, and control panels. For an Algerian producer and pipeline operator of natural gas, the company engineered bespoke chemical injection solutions for gas wells.

2. Measurement requirements

The chemical injection skids are used to pump special chemicals like mono-ethylene glycol (MEG) and corrosion inhibitors into the injection points using piston pumps. The injection chemicals must be pumped at high pressures of up to 400 bar / 5,802 psig to overcome the prevalent line pressures in the gas field and to reach the primary process fluid.

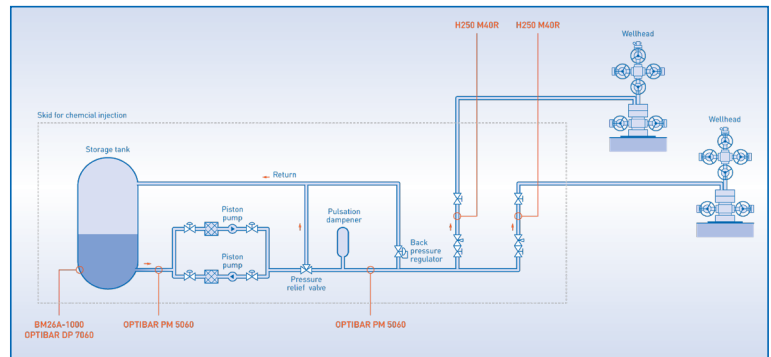
For each injection point, the chemical injection must be carried out precisely. Too little chemical injection bears the risk of plugging, corrosion and even damage of the infrastructure. Too much injection increases operating costs due to a waste of costly chemicals. The pumping and injection process therefore needs monitoring of critical system parameters such as the metering pump flowrate, the metering pump discharge pressure, and the level in the chemical buffer tanks.

To measure and control the flow rate for each injection point individually, a reliable, yet cost-effective instrumentation for low flow rates of 3.4...34 l/h was of particular importance to the manufacturer. The flowmeters were required to operate reliably and safely under the given process conditions. They were specified to provide a local display, a current output, and a limit switch.

KROHNE

3. KROHNE solution

KROHNE provided the heavy-duty H250 M40R variable area (VA) flowmeter for high-pressure chemical injection. The extremely rugged flowmeter has a long track record in high pressure oil and gas applications and can be designed for pressures of up to 900 barg / 13,000 psig. The versatile VA meter is modularly extendable, allowing for a combination of mechanical flow measurement with state-of-the-art diagnostics and communication capabilities. In this application, the 2-wire device provides an analogue output signal and is equipped with a display with totalizer functionality along with an additional limit switch. For increased process safety, the H250 M40R utilizes Continuous Float Monitoring (CFM) to issue an alert in the unlikely event that a blockage of the pipe occurs.



Process scheme of chemical injection

More than 70 units (DN15) of the H250 M40R have been mounted on the skids. Next to high pressure MEG measurement, the VA meter also monitors the injection of corrosion inhibitors. Due to the harsh operating and process conditions in the gas field, all wetted, pressurised parts of the VA meter were made in stainless steel (316L) and meet the requirements of the NACE MR0175 standard. The VA flowmeters have flameproof design (Ex d) for use in hazardous areas. The instrumentation for the chemical injection package also included OPTIBAR PM 5060 pressure transmitters used for gauge pressure monitoring in the injection pipes. In addition, the skids were equipped with BM26A-1000 magnetic level indicators and OPTIBAR DP 7060 differential pressure transmitters for level measurement of the chemical tanks.

4. Customer benefits

The tried and tested VA flowmeters play a vital role in improving gas recovery and protecting the infrastructure. The low flow rates combined with high pressures and harsh conditions have placed high demands on the reliability and robustness of the instrumentation, which have been fully met by the H250 M40R. It offers a universal Ex-design – from flameproof (explosion-proof) to intrinsically safe – according to various standards such as ATEX, FM, IECEx, NEPSI, INMETRO, COE/PESO or KGS for projects around the world. Due to the modular design, all diagnostics and features, e.g. totalizer and fieldbus options, can even be retrofitted to existing installations without process interruption. Compared to other flow principles such as Coriolis, the KROHNE meter is a much more cost-effective instrument for high pressure chemical injection, saving on CAPEX for both the manufacturer and the end-customer. In addition to flowmeters, KROHNE also provided a comprehensive package of instruments for level and pressure measurement from a single source. The full scope of supply is accompanied by local support and after-sales services tailored to the needs of the oil and gas industry.

5. Products used

H250 M40R

- Variable area flowmeter for oil and gas applications

OPTIBAR PM 5060

- Rugged pressure transmitter for process pressure and level applications

BM26A-1000

- Magnetic level indicator for basic liquid applications

OPTIBAR DP 7060

- High performance DP transmitter with integrated line pressure measurement



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
application@krohne.com

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