



APPLICATION NOTE Iron, Steel & Metal

Variable area flow measurement for dosing protective gas in industrial furnaces

- Reliable, accurate measurement of protective gas at extremely low operating pressure
- Space constraints necessitate extremely short inlet and outlet runs
- Local analogue display with electrical data output for control

1. Background

A manufacturer produces industrial furnaces heated electrically or with gas. Metal parts and tools are annealed and tempered through heat treatment with these furnaces. This includes, among other things, annealing, post weld heat treatment, tempering and carbonisation.

With many heat treatment processes, the operation must take place in a protective gas atmosphere to avoid undesired reactions such as oxidation and combustion. This requires the industrial furnaces to be gas-proof. Protective gases include nitrogen, argon, helium and forming gas.

With limited gauge pressure, protective gas flows continuously into the furnaces in order to displace the air/oxygen.

2. Measurement requirements

For this application, the protective gas atmosphere is established by nitrogen adjustment control in the range of 15...40 Nm³/h.

The supply gauge pressure of 8 bar is reduced to 100 mbar in two steps.

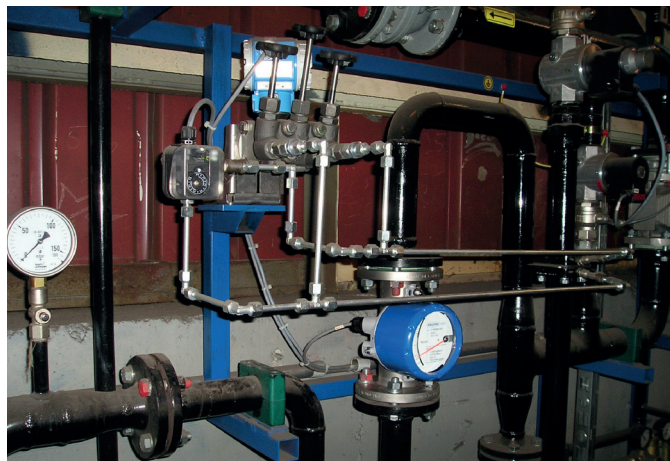
The limited space available necessitates compact installation and short inlet and outlet runs.

A 4...20 mA current output signal must control the adjustment valve of a superimposed system to regulate the desired nitrogen flow.

3. KROHNE solution

To measure the nitrogen, KROHNE supplied a DN50, H 250 M40 variable area flowmeter with flange connections.

This measuring device features a local, analogue display that requires no power supply. It also has a 4...20 mA current output with 2-wire connection technology to control the adjustment valve. The 1.6% measuring inaccuracy is absolutely adequate for this measurement task. The modular design of the H 250 M40 allows for simple combination of a mechanical measuring device with highly developed digital electronics, as in this application.



Nitrogen measurement for dosing

4. Customer benefits

When it comes to measuring clean products at low flow volumes, variable area flowmeters are the most widely used measuring principle for liquids and gases.

Other measuring principles usually require a minimum density and/or minimum flow velocity whereas variable area flowmeters are specifically designed for the measurement of low gas flows with simultaneously low operating pressure. Other advantages include the low investment and follow-up costs as well as the insignificantly short inlet and outlet runs for installation.



Closer look at local display

5. Product used

H 250 M40 Variable area flowmeter

- Sturdy construction for high pressure, temperature and media resistance
- Wide range of variants from extremely small flowmeters for a few litres per hour up to DN 100 measuring devices for 120 m³/h liquid or 2800 Nm³/h gas flow
- Many process connection variants: flanged, screwed, clamped, weld-on ends etc.
- Space-saving installation due to short inlet and outlet runs
- Universal Ex concept: Ex i and Ex d
- Local analogue display, operation without power supply or via 2-wire connection with LCD display, also with digital counter as well as current and binary outputs
- Unique and modular conception: from pure mechanics up to analogue output or fieldbus communication
- Measuring inaccuracy 1.6% of measured value according to VDI / VDE 3513, Bl. 2 (qG = 50%)



Contact

Would you like further information about these or other applications?
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