

Dust Collection Water of Steel Converter

Industry: Iron & Steel

Product: 2-wire magnetic flowmeter, ADMAG AXR Series

Introduction

This paper introduces the ADMAG AXR 2-wire magnetic flowmeter solution for dust collection water application of steel converter.

Expected benefits

- Cost reduction of supporting infrastructure by US\$1,000 to \$2,000 per unit.
- Lifetime energy savings.
- 4-wire comparable stable and accurate process control to maximize the productivity.

Application

- The dust collection water is the circulation water that contain a lot of steel dust in the steel converter. The flow measurement of dust collection water is one of the difficult applications in the steel industry because of the built-up of steel dust in the pipe.
- The particles in the fluid and conductive material adhesion on the electrodes may cause the instability of the measurement.
- Stable and accurate measurement in these severe process condition is the key to optimize the process control and the performance of plant operation.
- Traditionally, 4-wire magnetic flowmeter is applied for the dust collection water flow measurement because of the better performance against the adhesive process condition and noise caused by the dust particles.

Yokogawa's improved solution;

- Newly released 2-wire ADMAG AXR series delivers dual benefits, 4-wire comparable excellent performance and cost reduction of 2-wire system in various applications.



1. Best-in-class performance.

The ADMAG AXR is the world's first 2-wire magnetic flowmeter which employs the unique "Dual Frequency Excitation Method"^{*1)}, achieving 0.5% of rate of best-in-class accuracy and excellent stability for process measurement. In addition, the newly developed AXR key technologies^{*2)}, achieves the same level of noise immunity as 4-wire type under the fluid condition change and delivers enough performance to meet the requirement to apply in the control loop.

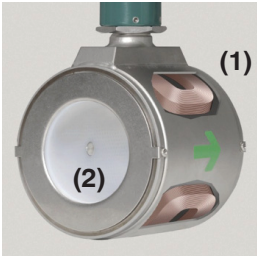
*1) Dual Frequency Method

The dual frequency method successfully combines the best properties of low frequency excitation enabling the stability in measurement, and high frequency excitation delivering excellent noise immunity. As a result, AXR can suppress process-generated noise securing zero stability without sacrificing fast response time.



ADMAG AXR

*2) **AXR Key Technologies**



(1) Super-high density coil

Yokogawa has developed a perfectly aligned “super high density” coil winding technique to maximize the S/N ratio. This new technology increased the number of coil turns by 1.5 times compared to 4-wire magemeters, and successfully increase the signal portion of S/N ratio.

(2) Mirror finished lining

Rough lining surface is likely to generate turbulent flow near electrodes, which results in larger flow noise. AXR employs a mirror finished lining to ensure a smooth surface. It minimizes flow noise by reducing the flow turbulence.

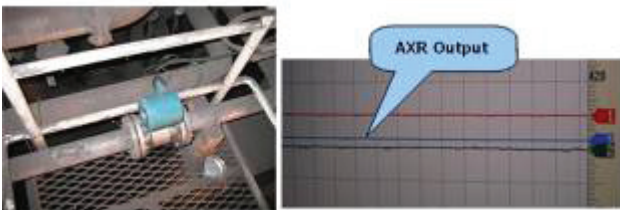
Field test result;

Application; Dust collection water line (size 80mm) in steel converter.

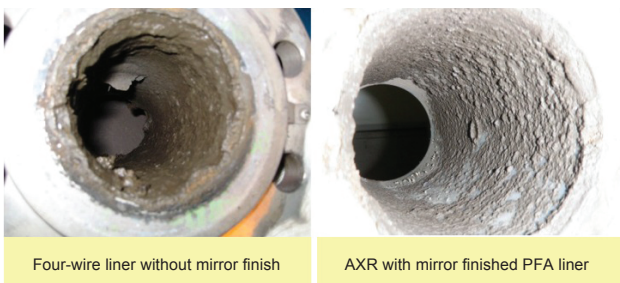
Flow span; 100m³/h(5.5m/s)

Normal flow velocity; 40m³/h(2.2m/s)

Test Model; AXR080G



Field test in dust collection water of steel converter



Four-wire liner without mirror finish

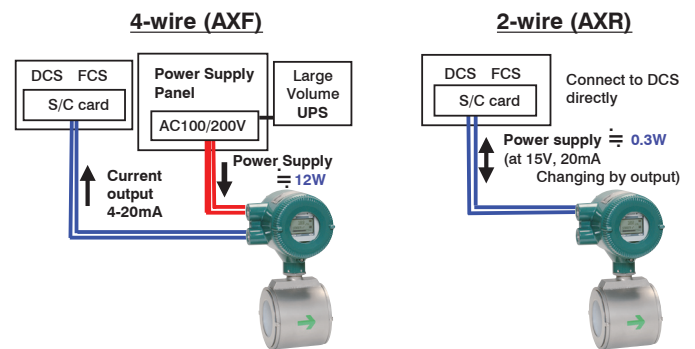
AXR with mirror finished PFA liner

Adhesion level on liner.

AXR has been installed for the performance evaluation for 6 months where a 4-wire magnetic flowmeter has been installed. During the test period, AXR has kept stable measurement. AXR mirror finished smooth liner has enabled to decrease the adhesion level compared to the existing 4-wire meter with non-mirror finish liner.

2. Cost Reduction & ECO Friendly

The ADMAG AXR 2-wire magnetic flowmeter can be installed in the 2-wire system without any AC power source, thus drastically reducing the initial instrumentation cost, and power consumption. The power consumption of 2-wire type is only 1-4% of that of 4-wire type, and contributes to the operation cost reduction. In addition, over 96% reduced power consumption contribute to the life time energy saving and reduce the carbon foot print.



Estimated cost reduction;

Initial Cost compared to 4-wire (cable length 100m)

Cable: \$2 -\$3/m

Conduit pipe: \$5 -10/m

(including construction cost)

Power supply unit: \$300

US \$1000 - \$2000 /unit cost saving

CO2 reduction;

46kg CO₂ excretion can be reduced to 1.2kg /year