

Independent Testing Confirms Rosemount 3095MFA Annubar Flowmeter $\pm 0.9\%$ of Mass Flow Performance

Rosemount 3095MFA Annubar Flowmeters were tested at two independent European flow laboratories, Pigsar and Advantica Flow Centre. The 3095MFA Flowmeter is a patented design differential pressure flowmeter that uses the same principles of measurement as an orifice plate. The 3095MFA integrates the fifth generation Rosemount 485 Annubar Primary Element with the market-leading Rosemount 3095 MultiVariable transmitter. Testing was conducted on the complete, integrated assembly to demonstrate total system performance.

Rosemount has conducted extensive performance testing of the Annubar Flowmeter in water. The objective of the tests conducted at both laboratories was to add to the baseline mass flow rate as a function of Reynolds number in a natural gas medium. The purpose of this test was to evaluate the measurement accuracy of the Annubar Flowmeters compared to reference meters. The test results shown below clearly demonstrate the 3095MFA Flowmeter's capability of providing highly accurate mass flow measurements in control while providing fiscal measurement uncertainty.

ADVANTICA FLOW CENTRE INDEPENDENT TESTING

Advantica Flow Centre, located in the UK, is an UKAS accredited laboratory in accordance with ISO/IEC 17025. Reference uncertainty is $\pm 0.19\%$ of flow rate, traceable to 100mm (4") and 200mm (8") turbine meters. Test conditions were conducted utilizing natural gas under field conditions.

The test rig for the 3095MFA Annubar Flowmeter was pressurized to a nominal pressure of 47 Bar (680 psi) and the site control valve adjusted to produce a flow, which produced a DP of 230" water gauge across the Annubar Primary element. When the conditions had steadied, three test points were collected. Each test point comprised of a 100 second count of reference turbine meter output frequency and 100 readings of all temperatures, pressures and differential pressures. Then the mass flow rate was taken and the average of each calculated. This procedure was repeated for five other lower flows across three different Annubar Flowmeters. Figures 1, 2, and 3 show test results for these Flowmeters.

Figure 1. Results for 1st Advantica Annubar test unit

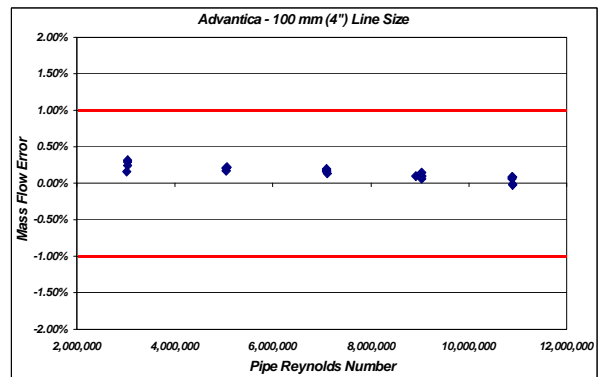


Figure 2. Results for 2nd Advantica Annubar test unit

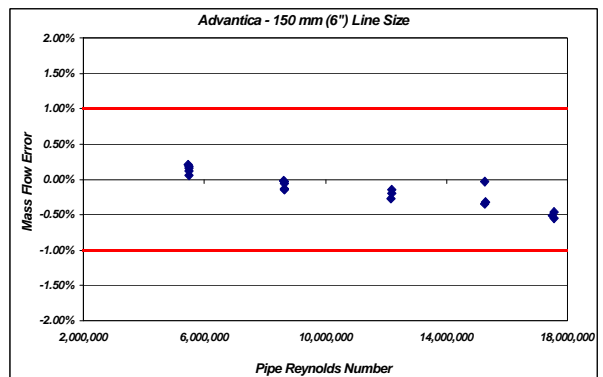
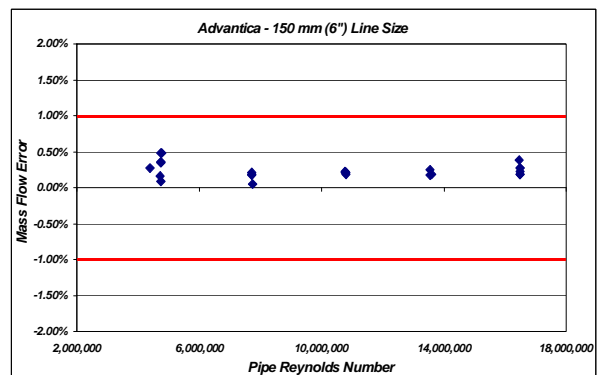


Figure 3. Results for 3rd Advantica Annubar test unit



Rosemount Annubar Flowmeter

PIGSAR™ LABORATORY INDEPENDENT TESTING

Pigsar, located in Germany, is a high-pressure natural gas calibration facility, which falls under supervision of the Physikalisch-Technische Bundesanstalt (PTB). It is a DKD accredited laboratory in accordance with DIN EN 45001 and ISO/IEC 17025. Reference uncertainty is $\pm 0.15\%$ of flow rate, traceable to SI-based units over 4" and 8" GTMs and a high pressure piston prover. Test conditions were conducted utilizing natural gas under field conditions.

The test rig for the 3095MFA Annubar Flowmeter was pressurized to a nominal pressure of 22 Bar (320 psi) and the site control valve adjusted to produce a flow, which produced a DP of 244" water gauge across the Annubar Primary element.

When the conditions had steadied, three test points were collected. Each test point comprised of a 100 second count of reference turbine meter output frequency and 100 readings of all temperatures, pressures and differential pressures. Then the mass flow rate was taken and the average of each calculated. This procedure was repeated for five other lower flows across three different Annubar Flowmeters. Figures 4, 5, and 6 show results for these test units.

The tests clearly demonstrate the Rosemount 3095MFA Annubar Flowmeter's capability of providing highly accurate mass flow measurements of natural gas. The tests highlight the opportunity that exists in the growing natural gas industry. The continuing trend towards regulation of hazardous emissions also contributes to the increased demand for natural gas production. Customers not only get high accuracy when using a 3095MFA, but also receive the cost reducing benefits in terms of lower installed costs and lower operating costs when utilized for their natural gas measurement.

Figure 4. Results for 1st Pigsar Annubar test unit

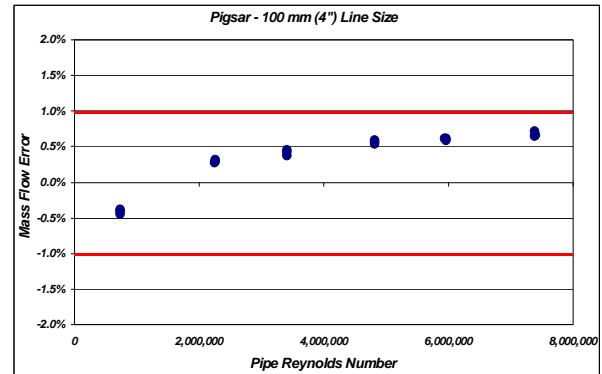


Figure 5. Results for 2nd Pigsar Annubar test unit

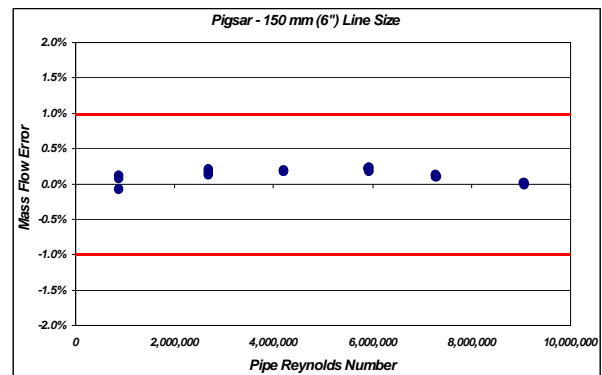
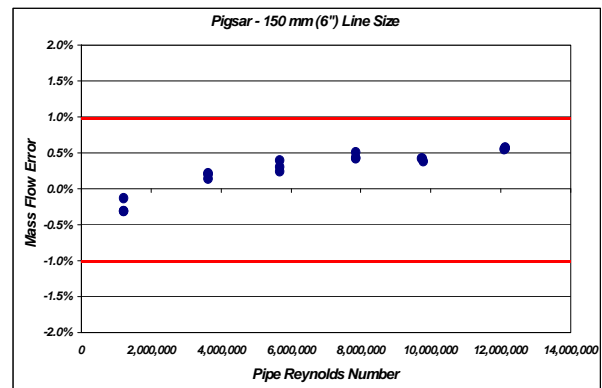


Figure 6. Results for 3rd Pigsar Annubar test unit



Rosemount Annubar Flowmeter

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**Emerson Process Management
Rosemount Measurement**
8200 Market Boulevard
Chanhassen MN 55317 USA
Tel (USA) 1 800 999 9307
Tel (International) +1 952 906 8888
Fax +1 952 949 7001

Emerson Process Management
Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

**Emerson Process Management Asia Pacific
Pte Ltd**
1 Pandan Crescent
Singapore 128461
Tel +65 6777 8211
Fax +65 6777 0947
Service Support Hotline : +65 6770 8711
Email : Enquiries@AP.EmersonProcess.com