

## Technical Report

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'Schneider DirectMount Systems' reduce measurement errors in gas pipelines:

# Accurate Gas Measurement

**Nordheim - 30 April 2014 - The effects of pulsation on Natural Gas Measurement are a major factor to consider when designing your meter installations. Pulsations created by compressor, flow control valves, and gas regulators, can produce pulsations in a magnitude that will effect accuracy.**

Another problem can be created by some piping configurations that can produce vortices that will create pulsations which would also affect accuracy. The resulting error is called Square Root Error (SRE) which is always a positive error and is inherit to the piping system and can only be reduced by modifications to the piping system which can be costly. A secondary effect of SRE is called Gauge Line Error (GLE) this effect is where the Differential pressure for your measuring instrument at the orifice fitting connection is not the same differential pressure that is at the measurement instrument's connection. This error can be both a positive error or can be a negative error. A study by Pipeline and Compressor Research Council (PCRC) in cooperation with Southwest Research Institute (SWRI) in San Antonio, Texas has shown the gauge line error can be reduced mounting your measurement instrument closer to orifice fitting. The best results is a maximum distance of 18" (45 centimeters) and keep your measurement sensing lines a minimum internal diameter of .375" (9.5 millimeters) this will allow the pulsations to move in and out of the sensing lines and not build up pressure giving an inaccurate reading. Another factor is keeping both sides of the sensing lines from the orifice fitting to the measuring instrument the same length, deviation or unequal lengths of the "Low Side" and the "High Side" sensing lines could result in a Gauge Line Error.

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Another consideration is in Gas Production and Gas Gathering system designs. Designing an installation that will drain condensate and other liquids is important. These liquids will build up in small orifice valves which will affect your accuracy. In these applications it is important to install the measurement instrument above the orifice fitting connections to allow self-draining of the manifold and sensing lines.

AS-Schneider, the specialist for industrial instrumentation, offers the solution that satisfies all of these requirements with its 'Schneider DirectMount Systems'. This direct vertical assembly allows the measurement instrument to be installed within the required distance and with the minimum diameter orifice of .375" (9.5 millimeters) from the orifice to the measurement instruments sensing element. This assembly is a safe and efficient method of close coupling the measurement instrument to the orifice fitting and thus eliminating or reducing the effects of Gauge Line Error from inaccurate measuring systems. The large orifice valves also allow the self-draining of liquids to prevent liquid build which would also affect your measurement accuracy. AS-Schneider, a family-owned international company with its headquarters in Nordheim near Heilbronn, developed this measuring instrumentation in close cooperation with customers from the gas industry.

### **Stabilized Connector provides for more security**

At the heart of the 'Schneider DirectMount Systems' is the patent pending, stabilized connector. This may be manufactured from carbon steel, stainless austenitic steel or nickel-based alloys depending on requirements. In order to be able to connect the valve manifold to the measuring orifice flange, a special adapter is necessary. This adapter is supported on the body of the measuring orifice flange which provides for more stability, explains Markus Häffner, Head of Design & Development on AS-Schneider: "Normally, the connector is only screwed into the orifice with a conical thread. The entire structure with the 5 valve

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manifold and measuring instrument has, however, a high net weight. In addition, vibrations from the pipeline can affect this connection so that this thread is often damaged or destroyed." With the AS-Schneider Stabilized Connector, there is no such risk. The system therefore is much more secure. If necessary, AS-Schneider can also equip the connector with an isolation/block valve.

Between the stabilized connector and 5 valve manifold, a dielectric isolator kit is installed. This is a plastic gasket and bolt insulator to shield the measuring instrument from electrical voltage. "In order to protect the pipelines from corrosion, a mild electric current is present in the pipeline. This procedure is known as cathodic corrosion protection," says Markus Häffner. However, if this current connects with the measuring instrument it would falsify the measurement results. Thus the insulation made of plastic: "The dielectric kit ensures that there is no metal to metal contact between the orifice fitting and the measuring instrument", explains Häffner.

### **Reliably tight up to 6,092 psi (420 bar)**

On the 5 valve manifold, two shut-off valves ensure a reliable primary shut-off if the measuring instrument has to be dismantled and serviced. The valves are available with different sealing materials such as the plastic PTFE and withstand temperatures from -67°F (-55°C) to 450°F (232°C) and a pressure up to 6,092 psi (420 bar) depending on the version. In addition, the 5 valve manifold has a venting valve, over which the static pressure in with closed primary shut-off can escape in a controlled manner as well as two equalizer valves. "Using this, the operator can calibrate the measuring instrument for the differential pressure measurement without having to dismantle it," Häffner explains. If the valves are open, the pressure difference between the two outputs of the 5 valve manifold on which the measuring instrument is connected equals zero. If the measuring gauge displays a value other than zero in this state, it must be re-adjusted.

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The 'Schneider DirectMount Systems' has a continuous inner diameter of 3/8" (9.5 millimetres), as recommended in the PCRC study. In addition, the distance between orifice and measuring instrument is less than 30 centimetres which is also an important recommendation for accurate measurement. The robust design of the stabilized connector ensures high stability and makes the 'Schneider DirectMount Systems' insensitive to vibrations. The user can forego additional lines or valves and thus gets a compact, easy-to-use and robust installation - which is also easy, fast and cost-effective to install. Because AS-Schneider provides the 'Schneider DirectMount Systems' Stabilized Connector with integral isolation/block valve pre-assembled, pretested and ready for installation.

### **More accurate measurement saves costs and avoids lost and unaccounted for gas**

"With the 'Schneider DirectMount Systems', we can eliminate a significant amount of the pulsations in the differential pressure lines", says Markus Häffner. "Flow measurement is thus much more accurate and less error-prone." Much to the delight of the users. "Based on the more accurate measurement, you now have fewer errors in the billing. This not only eliminates much "lost and unaccounted for gas", but also saves substantial costs." Due to its robust construction, the 'Schneider DirectMount Systems' is also extremely durable and resistant to malfunctions - even under the often harsh conditions to which it is exposed in the gas pipelines. "This is definitely noticeable with the service and maintenance costs," says Häffner.

**Scope:** 7,532 characters including spaces

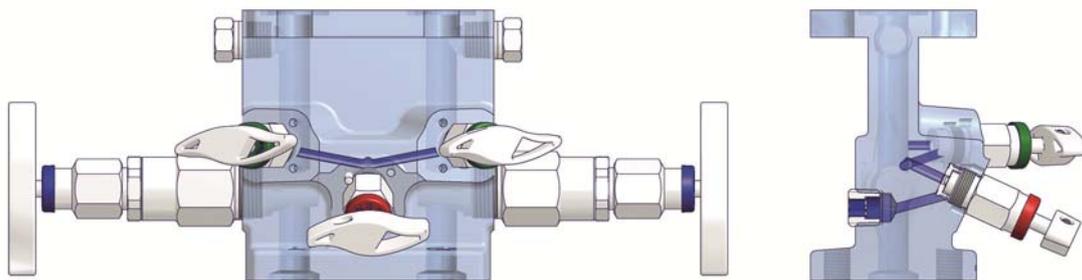
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### Captions:



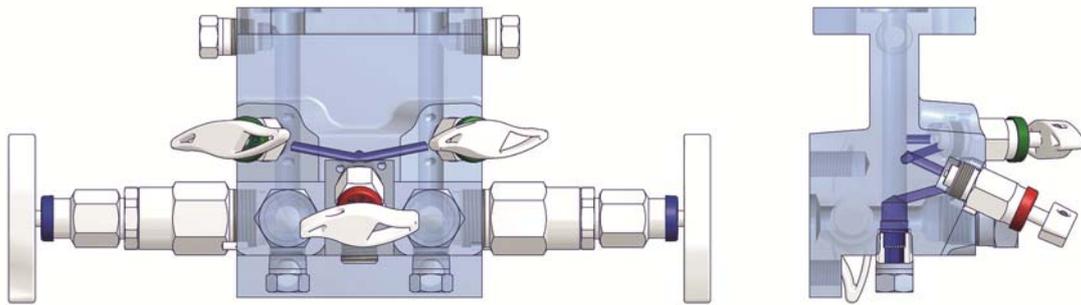
**Picture 1:** 'Schneider DirectMount Systems' - More accurate measurement saves costs and lost and unaccounted for gas.



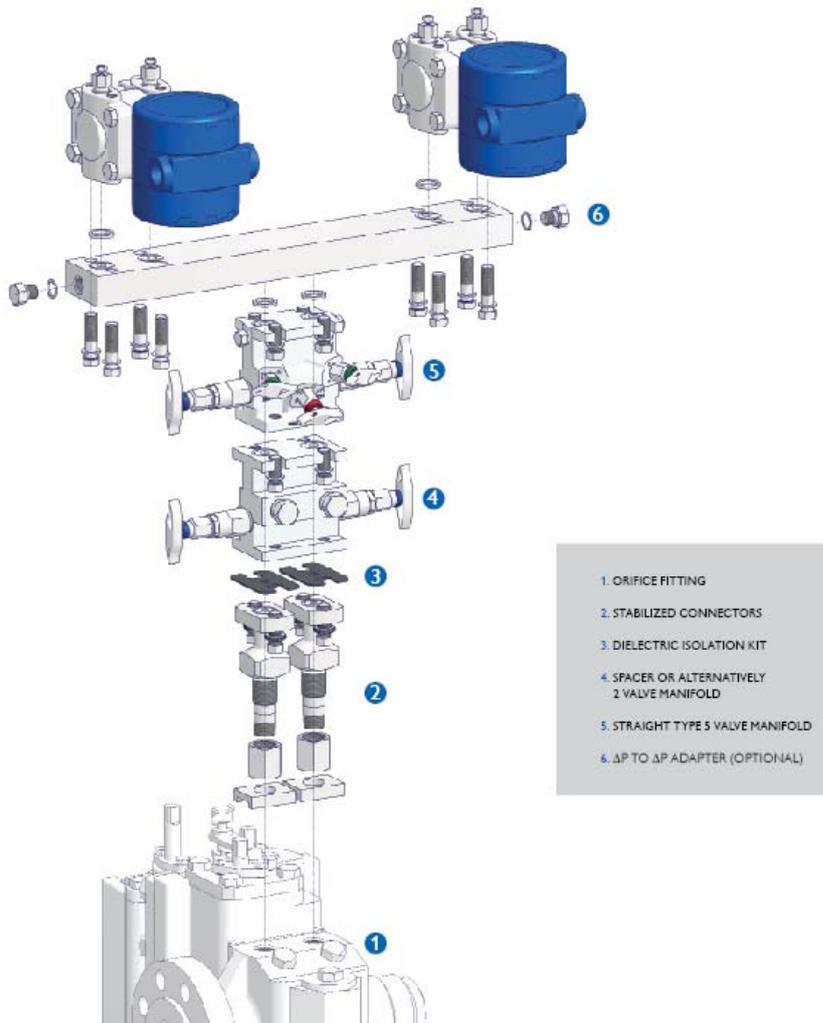
**Picture 2:** Flow pattern of straight type 5 valve manifold - Eliminate freezing issues: Flow paths machined to self-drain condensates and liquid accumulation.

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**Picture 2:** Flow pattern of angle type 5 valve manifold.



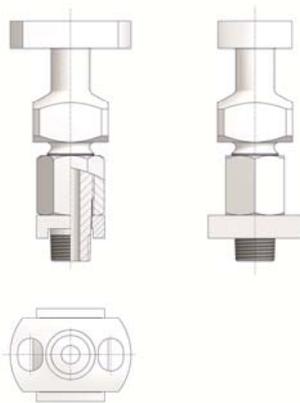
**Picture 3:** Vertical installation - Exploded view. See pdf file.

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**Picture 4:** Horizontal installation - Exploded view. See pdf file.



**Picture 5:** Long type stabilized connector (Patent Pending) - The robust design of the stabilized connector ensures high stability and makes the 'Schneider DirectMount Systems' insensitive to vibrations.

**Pictures by:** Armaturenfabrik Franz Schneider GmbH + Co. KG

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### **About the editor**

Markus Häffner, born in Heilbronn in 1967, studied Mechanical Engineering at the University of Heilbronn. After working for 5 years in a storage system company, he changed firms and began working for AS-Schneider in 1998. At AS-Schneider, he initially worked as a design and development engineer and in 2001 he took over the management of this department. He is a member of several DIN standards committees such as "Industrial valves - Basic standards", "Petroleum and natural gas extraction" and "Mechanical pressure and temperature measurement devices"/"Flow and volume".

### **About AS-Schneider**

The family-run company, AS Schneider, was founded in 1875 and with over 300 employees, is one of the leading manufacturers of industrial valves and manifolds for measurement and control technology worldwide. In the market segment for large diesel engine valves such as those used in marine propulsion and the generation of electricity, AS-Schneider is even the world market leader. With our own subsidiaries in Romania, Singapore, Dubai (UAE) and Houston (USA) and professional partners in more than 20 countries worldwide, we are located everywhere our customers need our support.

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