

Safety test for gas couplings



Application note A049-GP06-0117B



A coupling manufacturer employs a test setup for a specific type of gas couplings that are used for the United States market. These gas couplings need to be gas tight during a certain minimum period of time in the occasion of fire.

The testing is conducted as follows: the gas coupling is mounted at the end of a tube, which is put in a furnace that is heated to a certain constant temperature. Then this coupling-tube setup is subjected to 10 bars (139.5 psi) of air overpressure. A coupling passes the test when the air leakage during a certain amount of time is below a prescribed value. As this is a destructive testing method, not all gas couplings from a batch are tested, but only a few. In the original setup, the pressure sensor malfunctioned often, because of the high flow (it was a flowmeter based on the pressure drop principle). With the Bronkhorst Flow-Pressure Solution the flow cannot be higher than the full scale range of the MFC.

- ◆ Gas couplings
- ◆ Valves



Housing of the Flow-Pressure Solution

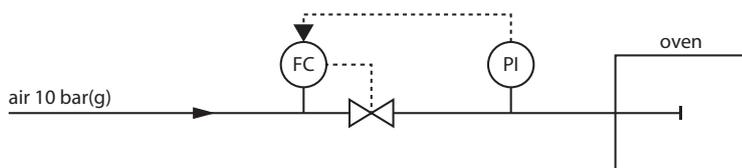
Application requirements

The coupling manufacturer needed a compact plug & play system, which is easy to operate with only one input and one output for the air flow and the rest 'out of sight'. Furthermore, a filter is necessary to prevent soot from the furnace entering the measuring device.

Important topics

- ◆ Pressure measurement with flow control
- ◆ Plug & Play system

Process solution



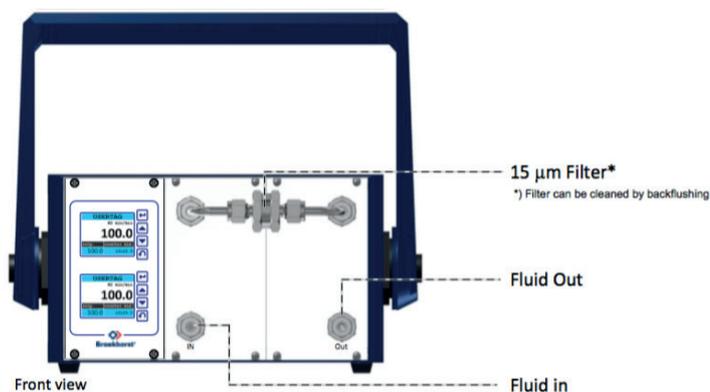
Flow scheme

Bronkhorst's Flow-Pressure Solution comprises a pressure meter (Bronkhorst EL-PRESS PM51 pressure module), which is a sensor that controls a flow controller upstream. When the gas coupling fails during testing, the pressure meter detects a pressure that is lower than the initial 10 bars, after which it forces the flow controller to generate an air flow to the system. At that point, when this flow has a non-zero value, indeed a leakage is detected. According to the coupling manufacturer, the system is robust with reliable pressure sensing.

For this leakage testing application, a combination of a pressure meter with a flow controller is better than a traditional combination of a pressure controller with a flow meter. In the latter case, there may be a risk of losing signal in the initial period when a pressure controller wants to reach its setpoint very fast. The advantage of Bronkhorst's setup is that the generated flow can never be too high.

The setup comprises a 15 µm filter to prevent soot particles from the furnace to enter the flow controller, which is detrimental for this device. In case of blockage, this filter can be cleaned by back-flushing of air, so there is no need for disassembling the setup to clean the filter. By default, the setup is delivered with a digital control pane to control and ... ▶

... display the settings. Via an RS-232 serial port the control panel can be connected to a computer system using Bronkhorst's own software. If desired a modification can be made where a potentiometer is incorporated to adjust the settings manually. This modification includes analog-to-digital switch. ■



Housing of the Flow-Pressure Solution

Recommended Products



EL-PRESS

The EL-PRESS series digital electronic pressure transducers and controllers for gases and liquids have a well-proven compact thru-flow design. The instruments include a diaphragm type piezo-resistive pressure sensor for pressure measurement/control from: lowest ranges 2 ... 100 mbar absolute, gauge or differential up to highest ranges 8 ... 400 bar absolute / gauge or 0,3 ... 15 bar dif.

- ◆ Thru-flow design
- ◆ Compact arrangement
- ◆ Stable control, even at varying process volumes
- ◆ High pressure capability up to 400 bar
- ◆ Metal sealed and/or down-ported versions available
- ◆ High accuracy and repeatability



EL-FLOW

EL-FLOW Select Series Mass Flow Meters/Controllers are thermal mass flow meters of modular construction with a 'laboratory style' pc-board housing. Control valves can either be integrally or separately mounted, to measure and control gas flows from lowest range 0,014...0,7 mln/min up to highest range 8...1670 ln/min.

- ◆ High accuracy (standard 0,5% Rd plus 0,1% FS)
- ◆ Rangeability in digital mode up to 1:187,5
- ◆ Fast response (down to 500 msec), excellent repeatability
- ◆ Optional Multi-Gas / Multi-Range functionality: freely programmable ranges and gas types
- ◆ Pressure ratings 64 / 100 bar (Multi-Gas / Multi-Range functionality up to 10 bar)
- ◆ Compact, modular construction



EL-FLOW METAL SEALED

Metal Seal Gas MFMs and MFCs are characterised by their unique, patented metal-to-metal seal construction with excellent resealing capability. They distinguish themselves by a high surface quality and are therefore especially suitable for meeting the semiconductor and solar industry requirements. The base blocks of the Mass Flow Meters and Controllers have 1/4" face seal male (VCR) connections.

- ◆ High accuracy (standard 0,5% Rd plus 0,1% FS)
- ◆ Resealable metal-to-metal outer seal construction
- ◆ Electropolished wetted parts
- ◆ Cleanroom assembled
- ◆ Multi Gas / Multi Range functionality
- ◆ Analog and digital I/O, with optionally integrated interface
- ◆ Super stable zero (no need for auto-zero circuit)



E-8000

The E-8000 Series have one or two colour TFT displays per module for indication of measured/totalised values and a push button menu to easily enable the user to change the setpoint, reset the counter value, select another fluid and many functions more. This module is available with or without display and with various fieldbus options.

- ◆ Bright, wide angle, 1.8" display (TFT technology)
- ◆ User friendly operation
- ◆ Programmable alarm functions
- ◆ Fluid selection (up to 8 fluids/curves)
- ◆ Indication/operation/configuration of measured-value, setpoint, totalised flow, fluid/tag number, control characteristics, fieldbus settings

Contact information



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GP: General Purpose
06: Leak detection

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