

pigsarTM, High-Pressure Test Facility for Gas Flow Meters

National Standard of the Federal Republic of Germany for High-Pressure Natural Gas
Harmonized reference value for the volume flow rate of high-pressure gas as used by PTB
(Germany), NMI (Netherlands) and LNE (France)
DKD/PTB-accredited according to DIN EN ISO/IEC 17025 for volume flow

Please use our internet form under www.pigsar.de for quick requests regarding reservation/quotation

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Fact sheet

Meters tested/calibrated

turbine meters, ultrasonic meters, vortex meters, Coriolis meters, orifice Meters, venturis and sonic nozzles upon special request

Calibration basis

frequency output (HF NAMUR / open collector): 0 - 5000 Hz
alternative current output (scalable and adjustable): 4 - 20 mA RS485 / RS232

Test conditions

Test medium

natural gas

Test pressures (gage)

16 – 50 bar (55 bar possible at appropriate upstream conditions)

Test temperature

about +15 °C

Volume flow

8 – 6,500 m³/h (maximum flow depends on test pressure and gas transportation conditions in pipeline system)

Test period

60 s (standard); possible range: 20 - 180 s

Measurement cycle

about 0.8 s (averaged over test period)

Length of test runs

up to 15.5 m (upon special request longer lengths possible)

Nominal diameter

DN25 to DN 400 (1" – 16")

Flange size

ANSI 600#RF (standard); other sizes including PN 16, 25, 40, 64 and ANSI 150, 300, 900, 1500 available upon request

9 working standards

four G 1000, four G 250 turbine meters and one G 250 IRPP

Gas compositions

detection by process gas chromatography

Best value for uncertainty

± 0.16 % (volume flow) ± 0.19 % (mass flow)

Calibration / test program and date of calibration to be agreed. A standard program would comprise 6 flow rates, minimum 3 repeats, e.g. 100 %, 70 %, 40 %, 25%, 10 %, 5 % of Q_{max} .

General issues

Customers are always welcome to witness the calibration.

Pressure test certificates according to EN 10204 (e.g. 3.1 B certificate) must be made available by the customer for all meters, spools and accessories to be tested.

The meters, spools and accessories must be delivered by the customer at least 2 working days before date of calibration, freight and customs fees prepaid, to:

pigsar™
c/o E.ON Ruhrgas AG
Zentrallager
Halterner Strasse 125

Loading/unloading times
Mo – Fr 7:30 to 14:30
Contact: Mr P. Schultz
Tel +49 2362 93 8504
Fax +49 2362 93 8710

The meters will again be available for collection by the customer 2 working days after the calibration. Contact details of a company to handle customs formalities can be made available upon request.

Please contact us if you need shorter turnaround times!

Calibration Procedure (Standard) – Overview

according to: PTB-Prüfregeln Band 30, Messgeräte für Gas, Hochdruckprüfung von Gaszählern, Physikalisch-Technische Bundesanstalt, Braunschweig und Berlin, 2003, ISSN 0341-7964

- (0) Specification of the calibration by the customer during enquiry and order. Please use our internet form under www.pigsar.de for quick requests. That form defines all necessary input data that are necessary regarding reservations and quotations.
- (1) Delivery of meter and accessories to be tested (to be arranged by customer)
- (2) Upon arrival: Perform as-received inspection of the meter for external damage, intactness and completeness; place meter in intermediate storage.
- (3) Transfer meter to metering building for temperature assimilation purposes.
- (4) Perform visual check of meter for internal damage, fouling, etc. (Note: The inner surface of the meters will usually not be cleaned). Document the results.
- (5) Install meter and spool pieces in meter run along with a flow conditioner (CPA-type) in the inlet. Upstream length with same nominal diameter in front of the meter amounts 10 D - 30 D. (Note: The inner diameter step between the upstream flange of USMs and the downstream flange of the upstream pipe must not exceed 1 %). It is recommended that the customer provides also upstream pipes of the USM. In that case weld seams in the pipes must have been removed before delivery. The configuration in the calibration meter run is exactly documented.

- (6) Connect the pigsar™ T and p transmitters: Use p_R -connection at the meter, T will be measured 2-5 D downstream of the meter.
- (7) In case customer witnesses calibration: crosscheck of the installation and calibration conditions together with the customer.
- (8) Pressurize and leak-test the complete test run.
- (9) Connect and check signal outputs to be tested. The HF output of the meter is generally the basis for the calibration. For USMs: Provide RS232/RS485 connection from the meter to PC (either from pigsar™ or customer's PC). Read/store parameter list before calibration.
- (10) Check of correct reading of all signals
- (11) Allow temperature to stabilize at maximum volume flow.
- (12) Start calibration at maximum load (usually $Q_{max} \pm 5\%$).
- (13) Wait for pressure, temperature and volume flow to stabilize.
- (14) Start measurements once stable process conditions have been reached:
 - Start log-file detection for USMs via serial link.
 - Take measurements at 20 s to 180 s intervals (standard period is 60 s).
 - Check that test conditions during the test run are stable.
 - Measure p, T, pulses (current) of test meters and working standards.
 - Convert flow rate of the working standards to determine reference value.
 - Calculate deviation between flow rate indicated by the meter under test and the reference value.
- (15) Take at least 3 measurements for each volume flow rate.
- (16) Continue tests by reducing flow rates until Q_{min} is reached. The calibration usually comprises 6 flow rates: 100 %, 70 %, 40 %, 25 %, 10 % and 5 % of Q_{max} . Repeat steps 13-15 for each flow rate.
- (17) Calculate flow weighted mean error (FWME) according to OIML procedure 32 and determine adjustment factors (e.g. for USMs).
- (18) Adjust the meter (nearest to FWME = 0 as possible), if possible and desired by customer (mandatory for "Eichung")

- (19) Verify adjustment at least for one flow rate, depending on the kind of adjustment.
For USMs: Read and store parameter list ("as left") after calibration.
- (20) Remove meter and spool pieces. Special treatment if desired by customer (e.g. N₂-filling).
- (21) Seal meter
- (22) Issue calibration certificate, detailing test conditions, test parameters and any deviations.
- (23) Box up the meter and supplies, using the packaging, boxes, etc. the items arrived in.
- (24) Place meter in intermediate storage for collection by customer.
- (25) Collection to be arranged by the customer.

