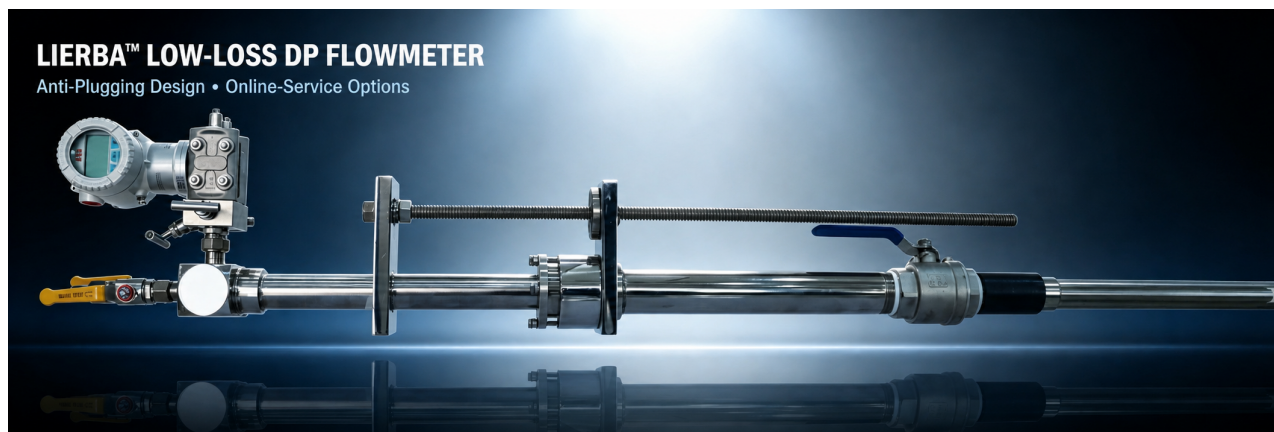


PROPRIETARY LOW-LOSS INSERTION MEASUREMENT

Lierba™ & Averaging Pitot Flowmeters

Product · Application · Selection · Installation · Acceptance



Lierba advantage	Installation value	Metrology basis
Anti-plugging pressure-opening concept	Very low loss · large-pipe economy	Project coefficient · calibration when required

Built for difficult process-gas measurement

Lierba is Shizhong's proprietary insertion DP probe. Its single total-pressure opening, drainage-oriented geometry and optional purge or retractable hardware are engineered to reduce the plugging and condensate problems encountered in coal gas, flue gas and other fouling-prone duties.

Jinan Shizhong Automation Instruments Co., Ltd.

1. Product Family and Selection Position

Insertion differential-pressure flowmeters create a total-to-static pressure difference with only a slender probe inside the pipe. This produces very low permanent pressure loss and makes the technology attractive for large lines, ducts and retrofit projects. Shizhong supplies two distinct measurement routes rather than treating every probe as the same product.

Route	Pressure-opening concept	Best-fit selection logic
Lierba™ proprietary probe	Single total-pressure opening plus a static-pressure path; drainage-oriented opening and optional purge/service hardware	Choose where fouling, condensate, maintenance access or online service leads the decision
Conventional multi-port averaging Pitot	Multiple impact-pressure ports connected to an internal averaging chamber plus static-pressure sensing	Choose for suitable clean-fluid service where multi-point profile sampling and large-pipe economy lead the decision

Do not transfer coefficients between designs

Probe cross-section, opening geometry, blockage ratio, flow profile and Reynolds number influence the meter coefficient. A coefficient, accuracy statement or straight-run claim from one proprietary design cannot be applied automatically to another.

Why buyers select this product family

- Very low permanent pressure loss compared with full-bore restriction devices.
- Economical pressure boundary and installation for large pipes and ducts.
- No moving parts in the primary sensing element.
- Direct-mounted or remote DP transmitter, pressure/temperature compensation and flow-computer options.
- Purge, retractable and online-service arrangements available after process-safety review.

2. What Makes Lierba Different



Design focus	Lierba engineering response	Customer value
Pressure-port plugging	A proprietary single total-pressure opening and cut geometry replace the conventional row of small impact ports	Fewer small openings exposed to particulate deposition
Condensate accumulation	The opening orientation is designed to encourage liquid return toward the process	Reduced risk of trapped condensate distorting the pressure signal
Cleaning and maintenance	Purge connection and retractable/online-service configurations are available	Maintenance strategy can be engineered into the meter package
Signal and compensation	DP transmitter plus optional pressure and temperature measurement	Volumetric, standard-volume or compensated mass-flow output by project

Claim-control note

The source brochure describes demanding performance capabilities. This external guide intentionally states them as engineered options, not universal guarantees. Accuracy, turndown, straight run, pressure/temperature limit and maintenance interval are confirmed only after process-data review and, where required, representative flow calibration.

Recommended public performance statement

Accuracy is project-specific; $\pm 0.5\%$ – 1.0% can be offered with a representative calibration and approved installation basis. Turndown is 10:1 typical and may be as wide as 50:1 only when minimum DP, transmitter capability, flow profile, installation and calibration support it.

3. Measurement Principle and System Architecture

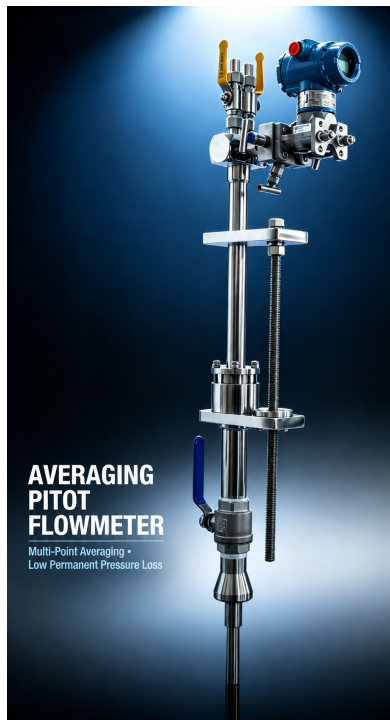
The probe senses total pressure on the upstream side and a static or reference pressure on the downstream side. The measured differential pressure represents velocity head. The general relationship is $V = K \cdot \sqrt{(2\Delta p/\rho)}$, and volume flow is obtained from the representative velocity, pipe area and the approved probe/installation coefficient. Gas and steam calculations also require pressure, temperature, compressibility and composition data.

System element	Function	Selection responsibility
Primary probe	Generates a differential-pressure signal from the flowing fluid	Geometry, insertion depth, orientation, material and process connection
Isolation / manifold	Provides isolation, equalization, vent/drain and maintenance access	Pressure class, valve material, leakage class and operating procedure
DP transmitter	Converts differential pressure to a digital or 4–20 mA signal	Range, static pressure, zero stability, hazardous-area approval and protocol
Pressure and temperature sensors	Provide density/compensation inputs for gas and steam	Measuring point, range, accuracy, thermowell and response
Flow computer / totalizer	Applies coefficient, density, compensation and totalization	Equation, units, reference conditions, alarm and communication requirements

Square-root range reality

Because DP is proportional to flow squared, a 10:1 flow range produces about a 100:1 DP range. The usable low end is set by minimum signal, transmitter zero stability, velocity-profile sensitivity and the uncertainty target—not by transmitter rangeability alone.

4. Conventional Multi-Port Averaging Pitot



Retractable integrated configuration



Panoramic multi-port configuration

A conventional averaging Pitot probe places several impact-pressure openings at selected radial positions. Their pressures combine in an internal chamber, while a separate path senses the reference/static pressure. This can provide a representative profile average in suitable, stable flow, but it also creates several small openings that require a clean-service or approved purge/maintenance strategy.

Common strengths

- Multi-point sampling across the pipe or duct.
- Low permanent pressure loss and a single process penetration.
- Economical scaling for large diameters.
- Compatible with familiar DP transmitter and compensation architecture.

Application cautions

- Small impact ports can foul in particulate, condensing, tar-bearing, crystallizing or fibrous service.
- Swirl, asymmetry and nearby disturbances can change the velocity profile and coefficient.
- Pulsating flow, two-phase flow and severe entrainment require a dedicated engineering review.
- Annubar™ and BiTuoba are third-party trade names; Shizhong documentation uses the generic engineering term unless identifying a specific third-party product.

5. Configurations and Design Envelope

Configuration	Typical use	Engineering checks
Fixed insertion probe	Routine clean or moderately difficult service	Orientation, support, pressure class, removal plan
Retractable / hot-tap assembly	Online insertion or removal where permitted	Process isolation, insertion force, travel, packing, safety procedure
Purgeable Lierba	Particulate or deposit-prone gas	Purge gas compatibility, pressure, flow, valves and discharge route
Integrated multivariable package	Compensated gas or steam flow	DP, pressure and temperature range; density equation; heat management
Large rectangular duct	Combustion air, flue gas and ventilation	Actual duct dimensions, velocity/temperature profile, access and structural support

Public design envelope

Parameter	Published selection basis
Nominal size	DN100–DN3000; circular, square and rectangular ducts by project
Accuracy	Project-specific; $\pm 0.5\%$ – 1.0% available with representative calibration
Turndown	10:1 typical; as wide as 50:1 subject to verified minimum DP, transmitter, installation and calibration
Temperature	Engineered configurations from -20°C to $+550^{\circ}\text{C}$; material and mounting dependent
Pressure	Engineered configurations up to 42 MPa; design code, probe support and connection dependent
Materials	304SS, 316L SS and project-selected corrosion-resistant alloys
Straight run	Application-specific; disturbance review or representative calibration required

6. Selection Data Required with the RFQ

A reliable selection cannot be made from pipe diameter and maximum flow alone. Submit the operating envelope and piping context below; Shizhong will return the selected probe, DP range, configuration and validation route.

Data group	Required information
Fluid	Name, composition, phase, density, viscosity, compressibility, moisture/condensate, solids, tar, corrosive constituents
Flow	Minimum, normal and maximum flow; mass/actual/standard volume; normal and upset duty
Pressure and temperature	Operating minimum/normal/maximum plus design pressure and design temperature
Pipe or duct	DN/NPS, schedule or actual bore, circular/square/rectangular dimensions, wall thickness, material and rating
Piping layout	Orientation, available straight runs, bends, tees, valves, reducers, fans, compressors and distances
Installation	Shutdown available or online installation; fixed/retractable; access, support and maintenance clearance
Instrumentation	DP transmitter, pressure/temperature compensation, output/protocol, hazardous area, power and display
Quality and acceptance	Target uncertainty, calibration medium/points, verification, material certificates, NDE, pressure test and documentation

Selection decision sequence

- 1. Determine whether fouling/condensate risk favors Lierba or clean service favors multi-port averaging.
- 2. Check minimum velocity and predicted DP against transmitter performance and uncertainty target.
- 3. Review the upstream disturbance and decide whether calculation, site survey or representative calibration is required.
- 4. Select fixed, retractable, purgeable, direct-mounted or remote-transmitter construction.
- 5. Approve the calculation, drawing, materials, inspection and calibration/verification plan before manufacture.

7. Installation, Commissioning and Maintenance

Service	Preferred pressure-path arrangement	Commissioning focus
Gas	Transmitter above taps where practical; lines slope back to process	Drain condensate, leak-test and eliminate liquid pockets
Liquid	Transmitter below taps where practical; lines avoid trapped gas	Fill both sides, vent gas and equalize hydrostatic head
Steam	Matched condensate legs and protected transmitter	Equalize condensate level/temperature and verify freeze protection
Dirty or condensing gas	Short accessible paths with approved purge/drain provisions	Baseline DP, purge procedure, inspection and maintenance interval

Mechanical installation checks

- Match the arrow and pressure-opening orientation to the actual flow direction.
- Set insertion depth and probe alignment to the approved drawing; document actual pipe/duct dimensions.
- Provide opposite-wall support where required by diameter, velocity, vibration or probe strength.
- Verify the hot-tap valve bore, travel, insertion force and safe isolation method for retractable assemblies.
- Avoid leaks, plugged pressure paths, trapped gas/liquid and unequal impulse-line temperature.
- Record zero, static pressure, DP, pressure, temperature and flow-computer constants at commissioning.

Maintenance promise

No universal 'maintenance-free' interval is stated. Maintenance frequency depends on the fluid, deposit mechanism, purge quality, operating cycle and access. Lierba is designed to reduce blockage risk and make servicing more practical; the approved maintenance plan governs the project.

8. Standards, Calibration and Acceptance

Reference	Correct use in this product family
ISO 3966:2025	Current international reference for Pitot-static velocity-area measurement in full, steady flow; it addresses local velocity from DP and integration across the section
ASME MFC-12M-2006 (R2014)	Specific engineering reference for flow measurement with multi-port averaging Pitot primary elements
ISO 2186:2007	Pressure-signal transmission-system design, layout and installation between primary and secondary devices
ISO 5167-1:2022	Does not list Pitot or averaging-Pitot probes among its covered primary-element types; do not claim a device-specific ISO 5167 coefficient
JJG 640-2016	Chinese metrology verification basis for differential-pressure flowmeters when the instrument and verification scope are applicable
Product type approval	Shizhong holds model approvals for LRB-300 Lierba and LGA averaging-Pitot products; supply documents are matched to the ordered model

Acceptance hierarchy

- Approved process data and sizing calculation.
- Approved general-arrangement and installation drawing.
- Product type approval and contractual technical specification.
- Representative or individual flow-calibration certificate when included.
- Material, NDE, pressure-test and transmitter certificates required by the purchase order.
- Site zero, leak test, compensation and functional commissioning records.

Traceability rule

Calibration establishes performance only for the meter, conditions and installation represented by the certificate. Coefficients must not be copied to a different probe geometry or materially different velocity profile without an approved technical basis.

9. Applications and Product Comparison

Application	Preferred route	Why / caution
Coal or coke-oven gas	Lierba with purge/service review	Anti-plugging and condensate-management features; review tar, dust and moisture
Flue gas / combustion air	Lierba or averaging Pitot	Large-duct economy; survey non-uniform velocity/temperature profile
Natural gas / utility gas	Averaging Pitot or calibrated Lierba	Low loss; confirm clean service, coefficient and acceptance route
Steam	Engineered integrated package	Condensate-leg design, compensation, transmitter temperature and wetness review
Cooling / process water	Multi-port averaging Pitot	Large-line economy; confirm air entrainment, deposits and calibration basis
Flare or highly variable gas	Application-specific Lierba	Minimum DP, composition, pulsation, wet gas and relief-event range require specialist review

When another technology may be better

- Choose a standard orifice when a replaceable ISO 5167-2 element and a recognized uncalibrated coefficient are the priority.
- Choose a Venturi tube when minimum permanent pressure loss is dominant and a full-bore meter body is acceptable.
- Choose a wedge meter for viscous, crystallizing or difficult single-phase media that benefit from a segmental opening.
- Choose thermal or ultrasonic technology only after checking composition, wetness, profile, pressure loss, maintenance and traceability against the project objective.

10. Deliverables, References and Contact

Typical Shizhong project deliverables

- Product data sheet and approved differential-pressure sizing calculation.
- General arrangement, insertion depth and installation drawing.
- Materials, welding/NDE and pressure-test records as ordered.
- Transmitter/manifold data and compensated-flow configuration sheet.
- Calibration or verification certificate when included in the approved scope.
- Installation, commissioning and maintenance instructions in English.

Authoritative references used

ISO 3966:2025 — Measurement of fluid flow in closed conduits — Velocity area method using Pitot static tubes
<https://www.iso.org/standard/86000.html>

ASME MFC-12M — Measurement of Fluid Flow in Closed Conduits Using Multiport Averaging Pitot Primary Elements
<https://www.asme.org/codes-standards/find-codes-standards/measurement-of-fluid-flow-in-closed-conduits-using-multiport-averaging-pitot-primary-elements>

ISO 2186:2007 — Connections for pressure signal transmissions between primary and secondary elements
<https://www.iso.org/standard/38091.html>

ISO 5167-1:2022 — General principles and covered differential-pressure device families
<https://www.iso.org/standard/79179.html>

China NIM testing capability — JJG 640-2016 differential-pressure flowmeter verification
<https://www.nim.ac.cn/node/948>

Emerson official Annubar overview — third-party market reference
<https://www.emerson.com/en/measurement-instrumentation/catalog/flow-measurement/differential-pressure-flow-meters/annubar>

Contact Shizhong

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Product page: www.shizhongflow.com/products/averaging-pitot-tubes

This guide supports product selection. The approved calculation, drawing, data sheet, calibration/verification certificate and contractual technical specification govern the supplied meter.