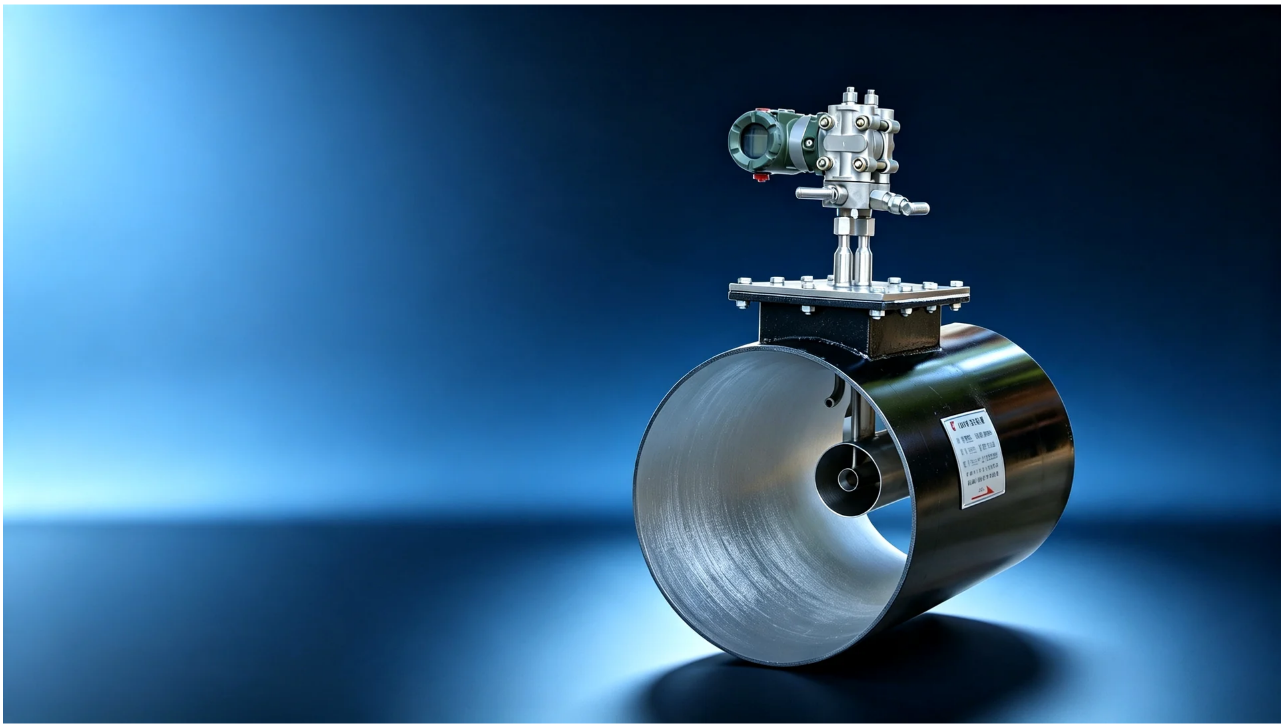
CUSTOM-ENGINEERED DP MEASUREMENT FOR LARGE GAS DUCTS

Double-Venturi Gas Flowmeter

Product · Configuration · Selection · Installation · Calibration · Maintenance



Customer challenge	Shizhong solution	Performance basis
Low-velocity gas in a large round or rectangular duct	Low-loss internal or insertion Double-Venturi DP assembly	Approved geometry plus project calibration or site correlation

More usable signal—without a conventional full-bore restriction

The Shizhong Double-Venturi family is designed for large, low-pressure gas systems where signal strength, pressure-loss allowance, access and retrofit cost must be solved together. Each meter is engineered around the actual duct and validation objective.

Jinan Shizhong Automation Instruments Co., Ltd.

1. Product Position and Application Value

The LGW Double-Venturi Gas Flowmeter converts the velocity of a ducted gas into a differential-pressure signal using a manufacturer-specific internal sensing geometry. It can be supplied as an internal assembly, an insertion assembly or an integrated meter section with differential-pressure, temperature and pressure instrumentation.

Important standards boundary

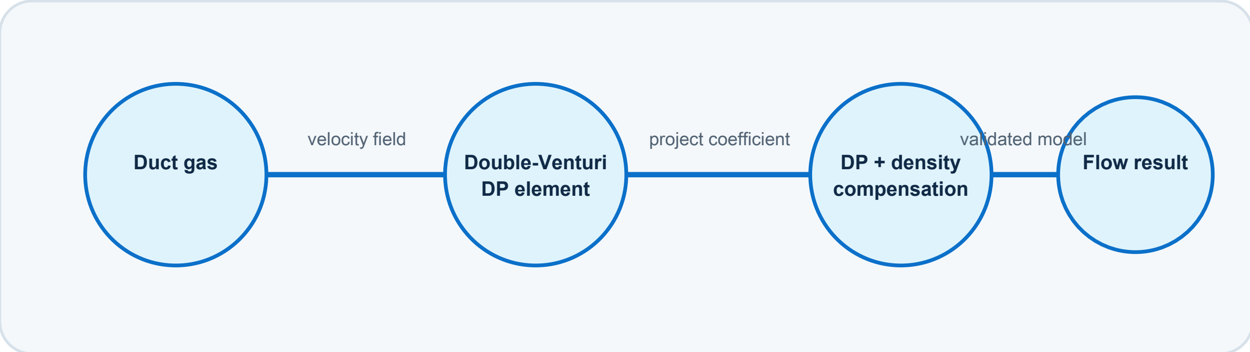
This product is not the classical Venturi tube defined by ISO 5167-4. No ISO 5167-4 discharge coefficient, geometry limit, accuracy or straight-run table is transferred to this device. Performance is stated only for the approved Shizhong geometry, process data, installation and validation basis.

Why it is considered

- Large circular pipes and rectangular ducts make conventional full-bore restrictions expensive or impractical.
- Low gas density and low velocity can leave conventional insertion probes with too little usable differential pressure.
- The process cannot accept the energy penalty of a high-loss primary element.
- Retrofit access, installation time and maintainability are as important as the nominal meter coefficient.
- Temperature, pressure, moisture, dust and velocity-profile effects require a complete measurement-system review.

Typical service	Measurement objective
Blast-furnace, coke-oven, converter or mixed gas	Process balance, energy management or agreed commercial measurement
Boiler primary/secondary air and combustion air	Combustion control and performance monitoring
Flue gas and process exhaust	Flow monitoring with an approved reference/correlation method
Large ventilation and utility-gas ducts	Low-loss velocity or flow measurement

2. Measurement Principle and System Architecture



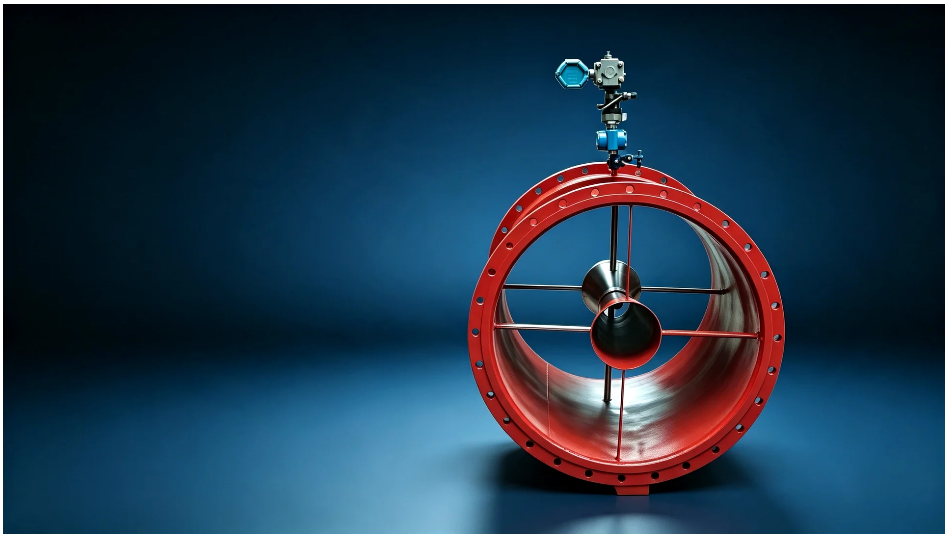
The sensing geometry creates a differential pressure that increases with gas velocity. A project model may be expressed as $v = K_v \times \mathrm{sqrt}(2\ \mathrm{deltaP} / \mathrm{rho})$, where K_v belongs to the supplied geometry and approved installation. Section flow additionally requires the actual duct area and a documented profile/area factor.

System element	Engineering function	Selection control
Double-Venturi sensing assembly	Converts gas velocity into a measurable DP signal	Geometry, insertion depth, orientation, supports and material
DP transmitter and manifold	Measures and conditions the primary signal	Minimum usable DP, rangeability, static pressure, temperature and response
Pressure/temperature inputs	Support working-density and reference-condition conversion	Sensor location, synchronization and reference-condition definition
Flow computer or DCS	Applies the approved coefficient, compensation and totalization	Equation revision, units, alarm logic and audit trail
Purge/drain/inspection hardware	Protects availability in dusty, wet or condensing service	Solids, moisture, purge medium, safety and service access

One geometry—one coefficient basis

A coefficient from another sensor, duct, insertion depth or pressure circuit must not be reused without engineering evidence. Representative calibration or site correlation is part of the supplied measurement concept, not an optional marketing add-on.

3. Configuration Routes



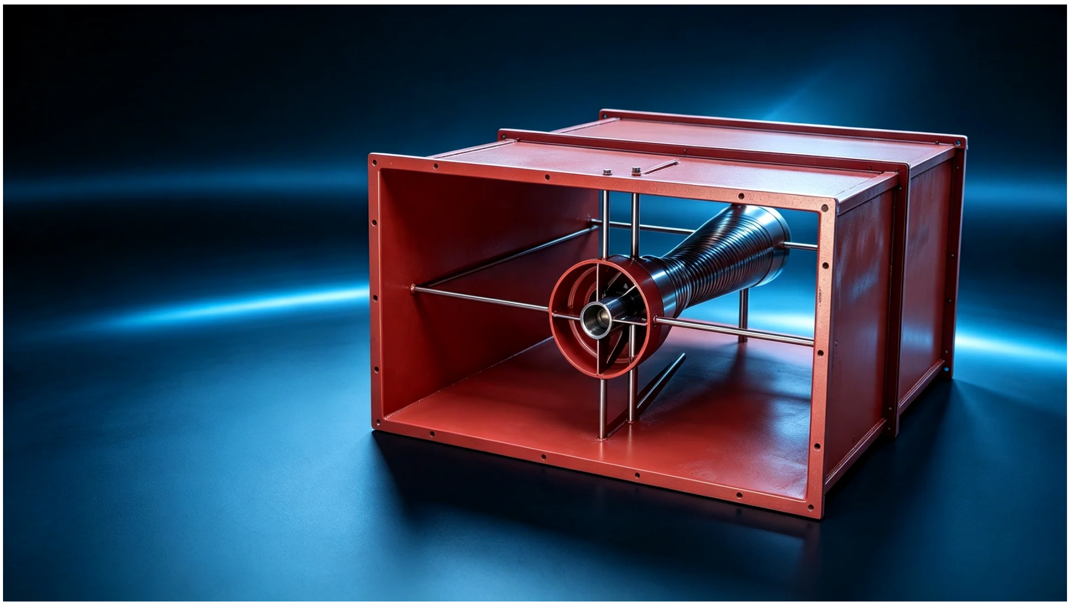
Configuration	Best fit	Key checks
Internal / built-in	New meter sections, controlled factory assembly, large round ducts	Mechanical supports, welding, pressure boundary, lifting and inspection
Insertion	Large-duct retrofit with limited transport or shutdown scope	Insertion depth, vibration, sealing, thermal expansion and removal safety
Integrated transmitter package	Compact field installation and shorter impulse paths	Temperature protection, condensate management, access and hazardous-area rating
Rectangular-duct assembly	Square or rectangular air, flue-gas and process-gas ducts	As-built W × H, corner radii, liners, distortion and profile verification

Indicative engineering envelope

Parameter	Public selection basis
Round ducts	DN500–DN4000 typical family envelope; final structure by project
Rectangular ducts	600 × 600 to 3600 × 3600 mm typical family envelope; unequal rectangles by project
Temperature	Below 400°C typical; higher temperature by materials, support and transmitter review
Pressure	Up to PN6.4 MPa within the historical family; final design per code and supplied assembly
Materials	Stainless steel, carbon steel, Hastelloy and project-specific alloys
Pressure connections	G3/4, M20 × 1.5 or 1/2 NPT; project alternatives available

These values support enquiry screening. The approved project datasheet and drawing govern the delivered meter.

4. Selection Workflow



Step	Decision	Required output
1	Define actual, standard or mass flow and the contractual acceptance objective	Units, reference conditions, uncertainty target
2	Confirm minimum/normal/maximum flow, pressure, temperature, composition and moisture	Operating matrix and density basis
3	Survey the duct and all upstream/downstream disturbances	As-built dimensions, isometric and available straight run
4	Classify dust, droplets, condensation, corrosion and cleaning constraints	Material, port, purge, drainage and maintenance plan
5	Select internal, insertion, integrated or rectangular configuration	GA drawing, support and pressure-connection arrangement
6	Agree calibration, reference traverse or site-correlation evidence	Coefficient, uncertainty statement and acceptance plan

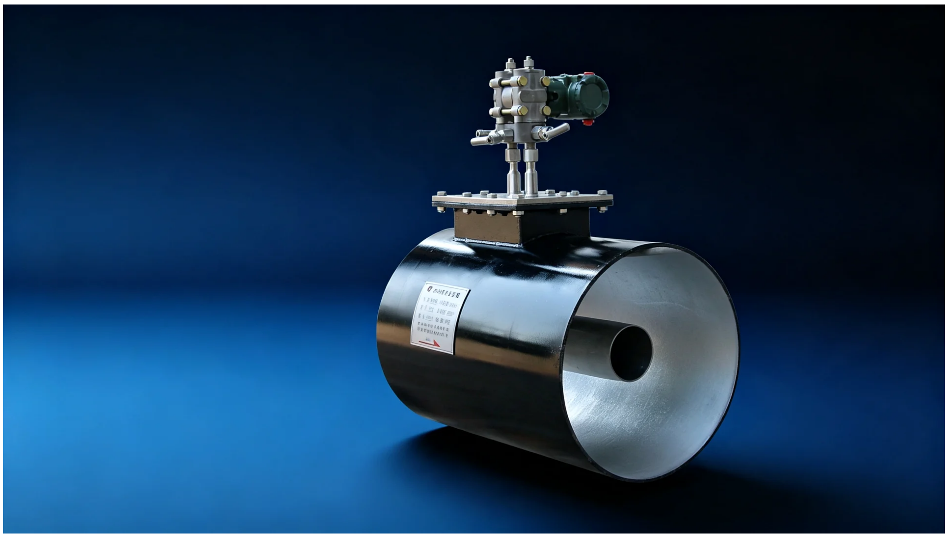
Do not select from duct size alone

Minimum usable flow depends on gas density, available DP, transmitter performance and flow-profile stability. Maximum flow depends on structural loading, allowable loss and transmitter range. Turndown is therefore an engineered result—not a universal catalogue number.

Alternatives to compare

A full-section matrix flowmeter may be preferred when cross-sectional profile representation and diagnostics dominate. An averaging Pitot or Lierba probe may be preferred for a simpler insertion duty. A standard orifice/nozzle/classical Venturi should be evaluated first when its standard envelope, process phase and installation are appropriate.

5. Performance and Validation



Performance topic	How Shizhong states it
Accuracy / uncertainty	Project-specific; stated after representative calibration or approved site correlation
Turndown	Calculated from minimum usable DP, gas density, transmitter rangeability, profile stability and validated model
Permanent pressure loss	Low-loss design objective; calculated or tested for the selected geometry and operating points
Straight run	Established from actual disturbances and the approved validation basis; no universal 1.5D/1D claim
Dust tolerance	Application-dependent; purge, drainage, inspection and cleaning provisions are specified where required
Repeatability	Reported for the actual calibration/test configuration when included in the scope

Available evidence routes

- Full-size calibration when a suitable facility and project scope are available.
- Representative-model calibration with a documented scaling and similarity basis.
- Velocity–area reference traverse in accordance with an agreed method such as ISO 3966 or ISO 16911-1 where applicable.
- Site correlation against an approved reference during commissioning.
- CFD-assisted profile and grid review as engineering evidence—not a replacement for traceable calibration.

Metrology wording

ISO 3966, ISO 16911 and ISO 14164 can support reference measurement, commissioning and automated-system performance. They do not convert the Shizhong Double-Venturi geometry into an ISO-standard primary element.

6. Installation, Commissioning and Maintenance

Stage	Mandatory controls
Site survey	Confirm internal dimensions, direction of flow, liner, obstructions, access, lifting and the actual disturbance layout
Mechanical installation	Align orientation and insertion depth; verify supports, sealing, welding/NDE and pressure-boundary requirements
Pressure system	Leak-test lines and manifold; confirm slopes, condensate legs, purge/drain points and transmitter elevation
Commissioning	Check zero, pressure/temperature synchronization, units, reference conditions, coefficient revision and DCS scaling
Performance check	Complete the agreed reference traverse or correlation and record the operating matrix
Maintenance	Inspect ports and surfaces; review zero drift, purge history, deposits, leakage and any process/profile change

Application cautions

- Two-phase, strongly pulsating or cyclonic flow requires a separate study and may be unsuitable.
- Wet or condensing gas requires impulse-line and drainage design; the sensor alone does not eliminate liquid errors.
- Dusty or adhesive service requires a defined inspection and cleaning interval; never market the system as maintenance-free.
- Commercial-settlement or regulated reporting requires approval of the legal-metrology and traceability route in the destination country.
- A materially changed duct, fan, damper, load range or gas composition can invalidate the original correlation.

Lifecycle support

Shizhong can supply calculations, GA drawings, material documentation, pressure/leak test records, transmitter configuration, calibration/correlation records, commissioning guidance and replacement/service documentation according to the approved project scope.

7. Enquiry Data Sheet

Data group	Information required from the customer
Measurement objective	Process control / energy management / reporting / settlement; actual, standard or mass flow; required uncertainty
Gas	Composition, dust, droplets, moisture, corrosion, minimum/normal/maximum flow, pressure, temperature and density basis
Duct	Internal diameter or clear W × H, wall/liner, orientation, upstream/downstream fittings and available straight lengths
Mechanical	Design pressure/temperature, code, flange, material, corrosion allowance, access, shutdown and lifting limits
Instrumentation	DP range, compensation, output, communication, power, hazardous-area and ingress-protection requirements
Maintenance	Purge supply, drainage, heating, cleaning, retractable service, platform and inspection interval
Evidence	Factory calibration, representative test, reference traverse, site correlation, uncertainty report and witnessing
Documents	GA, calculation, MTC, WPS/PQR, NDE, pressure/leak test, IOM, calibration and data-sheet format

Fastest route to a defensible quotation

Send minimum, normal and maximum flow; gas composition; pressure and temperature; an as-built duct drawing; upstream/downstream layout; allowable pressure loss; and the required acceptance method to info@shizhongflow.com.

Model description

The final model code is generated after the engineering review. It identifies the Double-Venturi family, internal/insertion configuration, round/rectangular section, size, pressure class, material, transmitter/compensation package and validation scope. The approved datasheet—not an abbreviated code—controls the supply.

8. Specification Summary and Contact

Product	Shizhong LGW Double-Venturi Gas Flowmeter
Primary value	Stronger usable DP for large, low-velocity gas ducts with a low-loss engineering objective
Configurations	Internal, insertion, integrated round-duct and rectangular-duct assemblies
Typical media	Industrial gas, combustion air, flue gas and selected dusty gas after application review
Public size family	Round DN500–DN4000; rectangular 600 × 600 to 3600 × 3600 mm; other sections by review
Performance	Project-specific; based on approved geometry, process, installation and calibration/correlation
Standard status	Manufacturer-specific non-standard device; not ISO 5167-4 classical Venturi

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Reference framework

ISO 3966:2025 — Velocity-area method using Pitot-static tubes.
ISO 16911-1/-2:2013 — Manual reference and automated flow measurement in stationary-source ducts.
ISO 14164:1999 — Performance principles for automated duct-gas volume-flow systems.
ISO 15259:2023 — Measurement sections, sites, objectives, plans and reports.
ISO 10780:1994 and US EPA Method 1/2 — Additional duct-gas velocity and traverse context where contractually applicable.

Controlled product information

This guide supports preliminary selection. Final performance, materials, dimensions, pressure boundary, validation and documentation are confirmed in the approved quotation, datasheet and drawings. Revision 1.0 · August 2026.