STEAM · GAS · CLEAN LIQUIDS

Vortex Flow Meter

Product · Standards Boundary · Selection · Installation · Commissioning

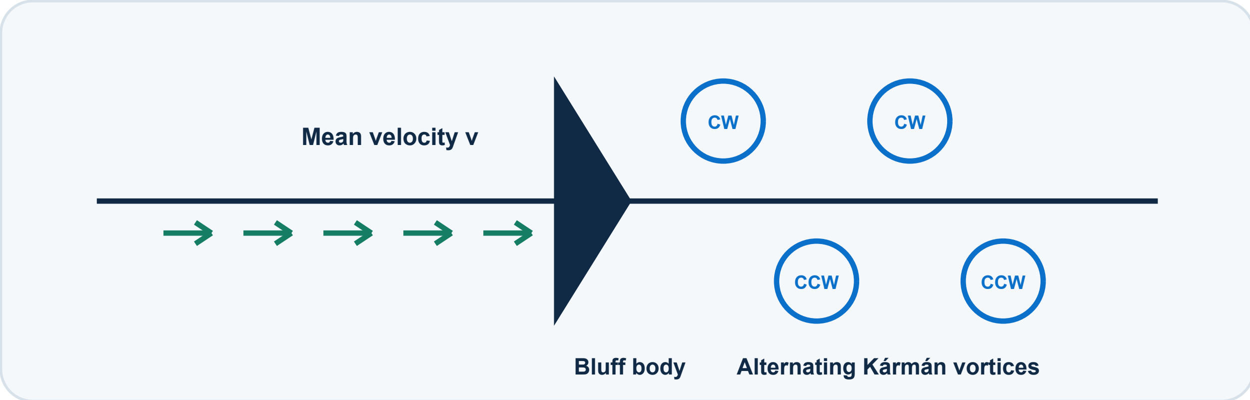
No moving parts	Process outputs	Engineering basis
Low routine mechanical wear	Volume, mass, standard volume or energy by configuration	Model-, fluid-, size- and installation-specific

A complete measurement system—not a universal sensor claim

Shizhong matches the vortex body, K-factor, electronics, pressure and temperature inputs, piping conditions and acceptance evidence to the actual duty. Public ranges are enquiry-screening values; the approved model datasheet and sizing calculation govern the supply.

Jinan Shizhong Automation Instruments Co., Ltd.

1. Product Principle and Position



A non-streamlined bluff body produces alternating vortices. Over the validated operating range, shedding frequency follows $f = St \times v / d$. A calibrated meter factor K converts frequency to volume flow. K-factor, low-flow cut-off and influence corrections belong to the approved meter configuration; they are not transferred from an orifice, nozzle or Venturi coefficient.

What the principle offers	What engineering must still control
No moving parts in the flow sensor	Mechanical vibration, pipe stress and electrical noise
Frequency output proportional to flow velocity over the validated range	Minimum Reynolds number, density, viscosity and signal threshold
One platform for liquid, gas and steam models	Single-phase condition, condensate, wet steam, bubbles and solids
Optional P/T compensation	Sensor location, reference conditions, fluid properties and calculation basis

Best fit

Steady or slowly varying, single-phase steam, industrial gas or clean low-viscosity liquid in a full circular conduit, with adequate signal and an installation that controls disturbance and vibration.

Do not force-fit

Wet steam, persistent two-phase flow, flashing, high viscosity, slurry, crystallizing/fouling service, severe pulsation, partial pipe or flow below the validated shedding range requires another measurement route or a dedicated study.

2. Public Product Envelope

The values below come from Shizhong's historical SER-UB family literature and are retained as an enquiry-screening envelope. Final performance is confirmed only after application review and model selection.

Parameter	Public selection basis
Full-bore size	DN25–DN300 standard historical family
Media	Stable single-phase steam, industrial gases and clean low-viscosity liquids compatible with wetted materials
Normal Reynolds-number reference	ReD 2×10^4 to 7×10^6; the final lower limit is model- and fluid-specific
Historical velocity screening	Liquid 0.5–7 m/s; gas 4–35 m/s; steam 7–70 m/s. Verify every point during sizing
Accuracy class	±0.5% or ±1.0% of reading under defined model and test conditions; do not transfer across all duties
Typical turndown	8:1–16:1 historical family range; actual range is limited by Re, density, velocity, vibration and signal threshold
Temperature	−40 to +260°C standard family; up to +400°C by approved high-temperature model and remote electronics
Pressure class	PN16 / PN25 / PN40 typical; final flange, material and pressure-temperature rating by approved datasheet
Outputs	Pulse or 4–20 mA; compensated, totalized or digital outputs by configuration
Wetted body	Stainless steel; exact grade, gasket and seal system by application

Insertion products are separate projects

Historical literature listed insertion arrangements for larger pipes. ISO 12764 and ASME MFC-6 exclude insertion-type vortex meters. An insertion supply therefore needs its own geometry, K-factor, structural design, installation and acceptance basis and is not presented as a standards-conforming full-bore meter.

3. Standards and Metrology Boundary

Reference	Applicable use	Critical boundary
ISO 12764:2017	Selection, application, influence quantities, installation, calibration and performance for full-conduit vortex measurement	Full circular conduit, steady/slowly varying single-phase liquid, gas or steam; insertion type excluded
GB/T 25922-2023	Current Chinese national standard for vortex measurement in closed conduits	Apply with the selected model, project conditions and Chinese contractual requirements
ASME MFC-6-2013 (R2024)	Components, operation, installation, performance, influence quantities and calibration	Full-conduit single-phase liquid, gas or steam; insertion type excluded
JJG 1029-2007	Chinese verification where applicable	Revision project was listed in 2025; verify the effective edition at order and test
ISO/TR 3313:2018	Guidance on pulsation effects	Influence guidance, not a product accuracy or compliance standard
ISO/IEC 17025:2017	Competence of a calibration or testing laboratory	Does not establish vortex product performance

ISO 5167 is not a vortex standard

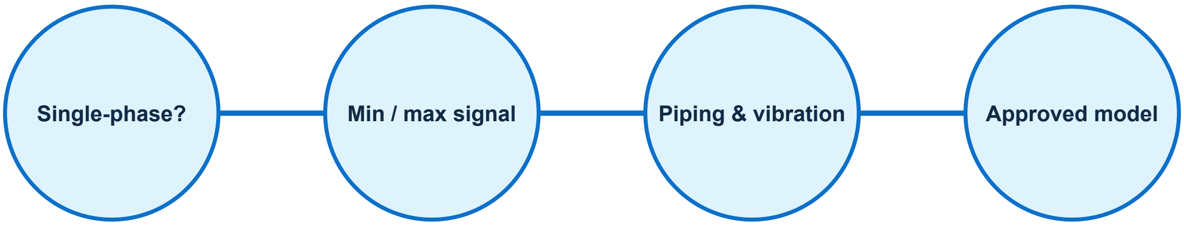
ISO 5167 defines differential-pressure primary devices such as orifice plates, nozzles and Venturi tubes. A vortex meter uses a bluff-body frequency relationship and K-factor; it must not be advertised as ISO 5167-compliant.

Controlled external wording

Full-bore application basis: ISO 12764:2017, GB/T 25922-2023 and ASME MFC-6-2013 (R2024), as applicable. Final performance remains model-, fluid-, size- and installation-specific.

Shizhong uses applicable standard guidance without reproducing copyrighted standard text. Contractual projects should identify the purchased edition and required verification route.

4. Selection Workflow



No shortcut: the operating envelope and installation are selected as one system.

Step	Engineering decision	Required evidence
1	Define actual volume, standard volume, mass flow or energy output	Units, reference conditions and calculation basis
2	Confirm stable single-phase service across minimum/normal/maximum conditions	Composition, phase behavior, steam dryness/condensate risk
3	Check low-end Re, expected frequency and sensor signal	Minimum density, viscosity, flow and temperature
4	Check high-end velocity, pressure loss, cavitation/flash and mechanical load	Maximum flow, pressure, temperature and line size
5	Select body size, material, temperature structure and connection	Pipe ID, flange code, corrosion and pressure-temperature rating
6	Review piping disturbance, vibration, pulsation and supports	Isometric sketch, available straight run and operating equipment
7	Select outputs, compensation inputs and verification route	I/O list, DCS interface, calibration/verification requirement

Minimum enquiry data

- Fluid name, composition, phase and contamination; for steam, saturated/superheated condition and wet-steam risk.
- Minimum, normal and maximum flow, pressure and temperature with clear units and absolute/gauge pressure basis.
- Density, viscosity, compressibility or fluid-property source at all relevant conditions.
- Pipe internal diameter, schedule, material, flange standard, pressure class and orientation.
- Upstream/downstream fittings, valves, reducers, pumps/compressors and available straight lengths.
- Mechanical vibration, flow pulsation, hazardous area, ambient conditions and desired protection rating.
- Required output, communications, totalization, reference conditions, accuracy and acceptance evidence.

5. Steam, Gas and Liquid Application Notes

Service	Selection focus	Common failure mode
Saturated steam	Pressure or temperature basis, dryness, condensate management, insulation and minimum load	Wet steam or condensate causes unstable shedding and density error
Superheated steam	High-temperature sensor arrangement, material, pressure rating and heat isolation	Electronics overheating or compensation input not representing the meter location
Industrial gas / air	Minimum density and velocity, pressure compensation, pulsation and standard conditions	Low DP/frequency signal or compressor/valve pulsation
Clean liquid	Full pipe, no bubbles, viscosity/Re, cavitation/flash margin and grounding	Gas pockets, flashing or flow below stable Re

Compensation has a defined job

Pressure and temperature inputs can calculate density-dependent mass flow, standard volume or energy from a valid vortex volume signal. They cannot correct a false frequency created by vibration, a non-single-phase process or an unstable flow profile.

Steam energy metering checklist

- Define whether the output is mass flow, steam energy or net energy after condensate return.
- Confirm pressure and temperature sensor locations and absolute-pressure conversion.
- Use an approved steam-property method and consistent reference state.
- Protect against condensate slugs and verify the meter remains full of the intended steam phase.
- Validate the lowest operating load—many steam meters fail because the selected line size is too large.

6. Installation and Commissioning

Installation control	Good practice
Flow direction and full pipe	Match the body arrow; prevent persistent gas pockets or liquid pockets and maintain the intended phase
Straight run	Use the applicable standard/model recommendation for the actual upstream disturbance; do not apply one universal number
Pipe stress	Align and support piping so the meter body does not correct flange mismatch or carry thermal expansion load
Vibration	Support the line, separate severe machinery vibration and investigate zero-flow signal before changing cut-off settings
Control valves	Position to reduce cavitation, flashing, strong pulsation or unstable flow at the meter
High temperature	Use the approved orientation, remote electronics/heat isolation, cable and insulation arrangement
Compensation sensors	Install where pressure and temperature represent the fluid state used by the flow calculation
Electrical	Verify power, shielding, grounding, hazardous-area installation, output scaling and pulse weight

Commissioning sequence

- Verify model, serial number, bore, flow direction, K-factor, engineering units and output configuration.
- At verified zero flow, investigate any apparent signal as vibration/electrical/process evidence—not just a number to suppress.
- Test minimum, normal and higher operating points and trend frequency, output, pressure and temperature together.
- Confirm compensation inputs, standard conditions, steam/fluid property basis and DCS scaling.
- Archive final parameters, as-installed drawings, photos, baseline trends and certificates.

Acceptance principle

The approved datasheet, sizing calculation, installation drawing, K-factor/calibration record and agreed site checks form one evidence package. A brochure value alone is not an acceptance criterion.

7. Troubleshooting and Lifecycle Controls

Observed symptom	Priority checks	Avoid
Reading at zero flow	Pipe/machinery vibration, electrical noise, grounding, nearby equipment and true valve isolation	Raising the cut-off until the symptom disappears without finding the cause
No low-flow signal	Re, density, viscosity, selected bore, sensor threshold and bluff-body condition	Assuming transmitter rangeability creates more vortex signal
Unstable reading	Pulsation, wet steam/two phase, swirl, control valve, support and signal quality	Averaging unstable data and calling it accurate
Consistent bias	K-factor, bore/model, flow direction, fluid properties, compensation, disturbance and reference meter	Applying an arbitrary correction without traceability
Steam mass/energy mismatch	Absolute pressure, temperature location, steam state, condensate and property algorithm	Treating compensated output as independent of the raw vortex signal

Recommended records

- Approved sizing calculation and application questionnaire.
- Meter body drawing, material/pressure documentation and K-factor record.
- Transmitter parameter backup and DCS scaling sheet.
- Commissioning baseline at several loads and zero-flow condition.
- Maintenance log showing process changes, cleaning, verification and parameter revisions.

8. Ordering Worksheet and References

Required order item	Project entry
Fluid / phase / output objective	
Minimum / normal / maximum flow	
Minimum / normal / maximum pressure and temperature	
Pipe ID / schedule / material / flange / pressure class	
Density / viscosity / compressibility / steam condition	
Piping disturbance / straight run / vibration / orientation	
Material / temperature structure / environmental protection	
Power / output / communications / totalization	
Calibration / verification / documents / inspection	

Primary official references

ISO 12764:2017 — Measurement of fluid flow in closed conduits — Flowrate measurement by means of vortex shedding flowmeters. https://www.iso.org/standard/64603.html

ASME MFC-6-2013 (R2024) — Measurement of Fluid Flow in Pipes Using Vortex Flowmeters. https://www.asme.org/codes-standards/find-codes-standards/measurement-of-fluid-flow-in-pipes-using-vortex-flowmeters

GB/T 25922-2023 — Measurement of fluid flow in closed conduits — Vortex flowmeters. https://openstd.samr.gov.cn/bzgk/std/newGbInfo?hcno=A3146493FD5BF5AAA4A695FD90595C3A

ISO/TR 3313:2018 — Measurement of fluid flow in closed conduits — Guidelines on the effects of flow pulsations on flow-measurement instruments. https://www.iso.org/standard/69223.html

ISO/IEC 17025:2017 — General requirements for the competence of testing and calibration laboratories. https://www.iso.org/standard/66912.html

Contact Shizhong application engineering

Send the completed process data and piping sketch to info@shizhongflow.com. Jinan Shizhong Automation Instruments Co., Ltd. · 7036 Jingshi West Road, Jinan, Shandong 250022, China · +86-531-82909656 · www.shizhongflow.com