Agrinovo

AGRINOVO-DEN-100

Tuning Fork Density / Concentration Meter (Insertion Type)

1. Overview

The AGRINOVO-DEN-100 is a rugged, fully-integrated insertion-type density and concentration meter. An acoustic excitation source drives a metal tuning fork at its free-oscillation centre frequency. The frequency shifts in proportion to the density of the liquid in contact with the fork; temperature drift is compensated by an internal PT100, and concentration is derived from the density relationship at 20°C. The sensor is a “plug-and-measure, maintenance-free” instrument for continuous inline or in-tank measurement.

Key Features

- Density range: 0–1.8 g/cc (0–1800 kg/m³)
- Accuracy: ±0.003 g/cc (±3.0 kg/m³)
- Repeatability: ±0.001 g/cc
- Integrated PT100 temperature compensation
- No moving parts — low maintenance
- 4–20 mA or Modbus RS485 output
- Insertion length up to 2 m
- Wetted materials: 316L / Hastelloy C / Zirconium
- Ex d II BT6 Gb hazardous-area rating
- Suitable for open tanks, closed vessels and pipelines

Applications

- Concentration control of acids, alkalis and process solutions
- Brine and salinity monitoring
- Fermentation and brewing concentration tracking
- Mass-flow computation (combined with volumetric flow metering)
- Evaporator concentration control and batch reaction end-point detection
- Interface detection in multi-product pipelines

2. Density Performance

Parameter	Specification
Range	0–1.8 g/cc (0–1800 kg/m³)
Accuracy	±0.003 g/cc (±3.0 kg/m³)
Repeatability	±0.001 g/cc (±1 kg/m³)
Temperature influence (compensated)	±0.0005 g/cc / °C (±0.5 kg/m³)
Pressure influence (compensated)	Negligible
Calibration range	0.6–1.5 g/cc (600–1500 kg/m³)
Maximum process viscosity	2000 cP

Temperature-influence figures are the maximum measurement offset caused by process fluid temperature deviating from the factory calibration point. Pressure-influence figures reflect sensitivity and flow response when the process pressure deviates from the calibration pressure.

3. Temperature & Pressure

Parameter	Specification
Process temperature	–20 to +100 °C
Ambient temperature	–20 to +85 °C
Temperature coefficient (compensated)	0.1 kg/m³ / °C
Internal temperature sensor	PT100
Maximum working pressure	2.5 MPa
Test pressure	1.5 × maximum working pressure

Actual maximum working pressure is limited by the selected process-connection rating.

4. Electrical Characteristics

Parameter	Specification
Supply voltage	12–24 VDC
Supply current	100 mA
Output	4–20 mA (4-wire) or Modbus RS485
Electrical entry	M20 × 1.5

5. Materials & Construction

Parameter	Specification
Wetted parts	316L stainless steel, Hastelloy C, Zirconium (selectable)
Tuning-fork finish	Standard polish or electro-polish
Enclosure	Aluminium alloy, IP65
Weight (short rod, stainless)	3.5 kg
Weight (long rod)	Dependent on rod length

6. Process Media Limits

Parameter	Limit
Particles < 10 µm	≤ 40% suspended solids
Particles 10–50 µm	≤ 20% suspended solids
Entrained gas	Not generally permitted
Viscosity	0–2000 cP

7. Hazardous Area Classification

Certification	Rating
Explosion-proof	Ex d II BT6 Gb

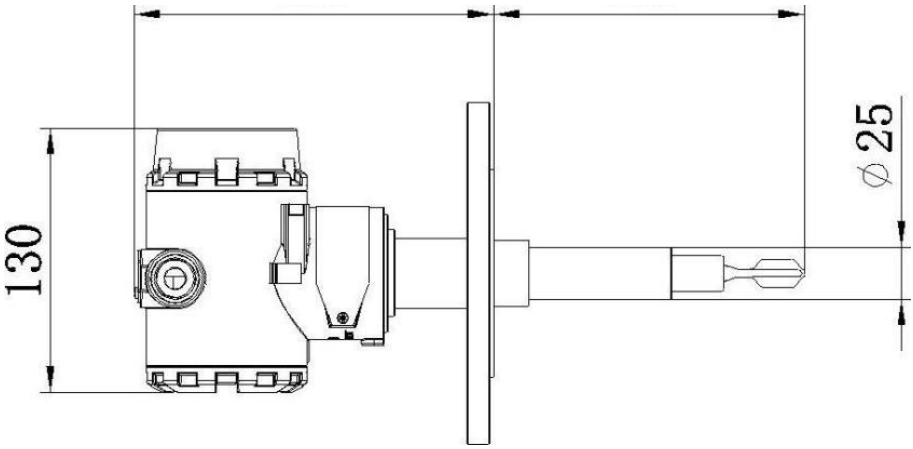
8. Process Connections

The AGRINOVO-DEN-100 is supplied with one of the following process connection options:

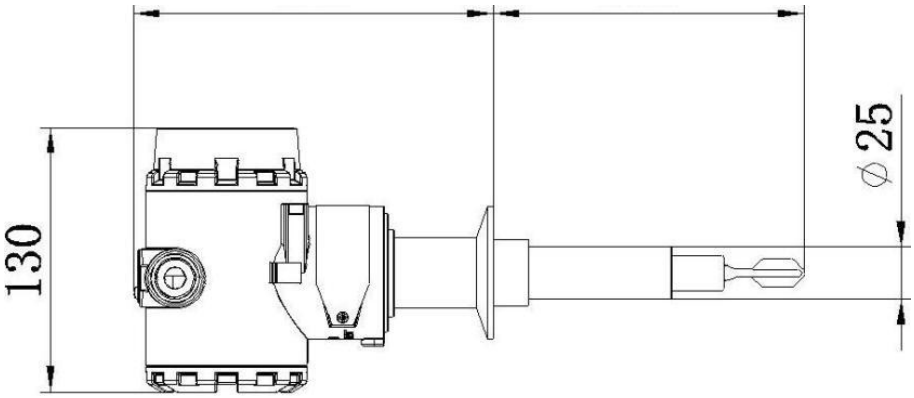
- **Flange:** 2” 150LB, 2” 300LB, or DN50 PN25
- **Tri-clamp:** 2” or 3” sanitary clamp
- **Threaded:** G1 male thread

Dimensional Drawings

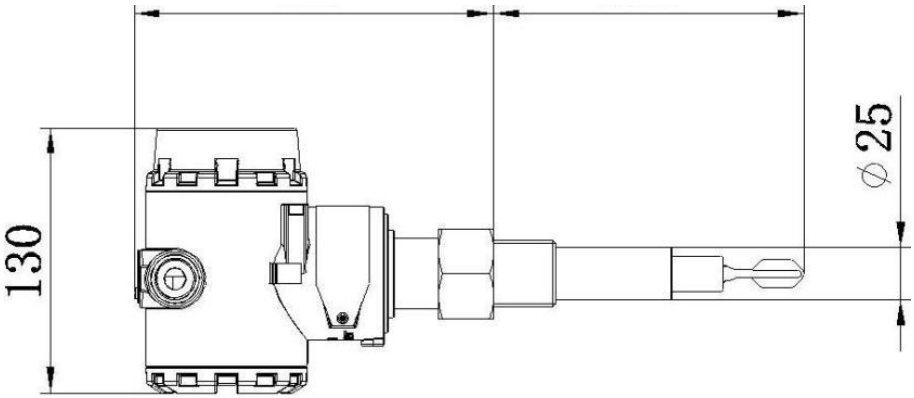
Flange Connection



Tri-clamp Connection



Threaded Connection



Standard insertion length is 127 mm. Custom insertion lengths of 100, 200, 300 and 500 mm are available, up to a maximum of 2 m. Housing height is 130 mm, fork rod diameter Ø25 mm.

9. Material Compatibility

Guidance for selecting wetted materials against common process media. Use this table as a starting point; confirm against the process conditions of the installation.

Media	Formula	Concentration	Zirconium	Hastelloy C	316 SS
Hydrochloric acid	HCl	0–40%	★	○	×
Sulphuric acid	H_2SO_4	0–50%	★	○	○
Sulphuric acid	H_2SO_4	50–75%	○	○	×
Sulphuric acid	H_2SO_4	75–98%	○	○	○
Nitric acid	HNO_3	0–100%	★	○	○
Phosphoric acid	H_3PO_4	0–98%	×	★	○
Sodium hydroxide	NaOH	0–100%	×	★	○
Potassium hydroxide	KOH	0–50%	★	★	○
Calcium hydroxide	$Ca(OH)_2$	0–50%	○	★	○
Urea	$(NH_2)_2CO$	0–100%	★	★	×
Sodium hypochlorite	NaOCl	0–16%	×	○	×
Hydrogen peroxide	H_2O_2	0–90%	×	★	★

Legend: ★ recommended · ○ usable within specified concentration and temperature limits · × not suitable

10. Installation Notes

Placement

- Install where process temperature is stable and free of shock / vibration

Maintenance & Handling

- The medium must not freeze on the fork — ice damage will destroy the sensing element

- Keep the fork opening perpendicular to flow so sediment and gas cannot build up on the fork
- Fork must remain fully submerged below the minimum liquid level
- Horizontal pipe mounting: open the flange on the pipe **side**, not on top (top openings trap gas)
- Vertical pipe: install on an upward-flowing section
- For pipe flow, keep fluid velocity 0.3–0.5 m/s across the fork; if main flow exceeds 1 m/s, use an expansion section or bypass line
- Minimum main-pipe bore: ≥100 mm horizontal / ≥150 mm vertical
- Do not allow sediment to accumulate inside the vessel at the fork location
- Handle gently during installation; do not drop
- Do not operate above rated working pressure
- Do not exceed the specified test pressure when pressure testing
- Do not weld on pipework while the meter is installed
- For slurries or scaling media, select a protective guard, T-sleeve or bell-mouth accessory
- Confirm the selected model is rated for the hazardous-area classification of the installation

11. Ordering Information

Build the full part number by concatenating one option from each column.

Code	Option
Range	1 = 0–1.5 g/cm³ · 2 = 0–1.8 g/cm³ · X = Other
Process connection	D1 = 2” 150LB flange · D2 = 2” 300LB flange · D3 = DN50 PN25 flange · K1 = 2” tri-clamp · K2 = 3” tri-clamp · M = G1 thread · XX = Other
Wetted material	J1 = 316 SS · J2 = Titanium · J3 = Zirconium · J4 = Hastelloy C · JX = Other
Surface finish	A = Standard polish · B = Electro-polish
Insertion length	0 = Standard 127 mm · 1 = 100 mm · 2 = 200 mm · 3 = 300 mm · 5 = 500 mm · X = Other (up to 2 m)
Accessories	F0 = None · F1 = Mounting bracket · F2 = Bypass pipe · F3 = Flow chamber · F4 = Flush port · F5 = Flange support · F6 = Protective guard · FX = Other

Accessories are supplied in 316 stainless steel. Accessory dimensions depend on the selected meter configuration.