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iFLO



Swirl Flow Meter

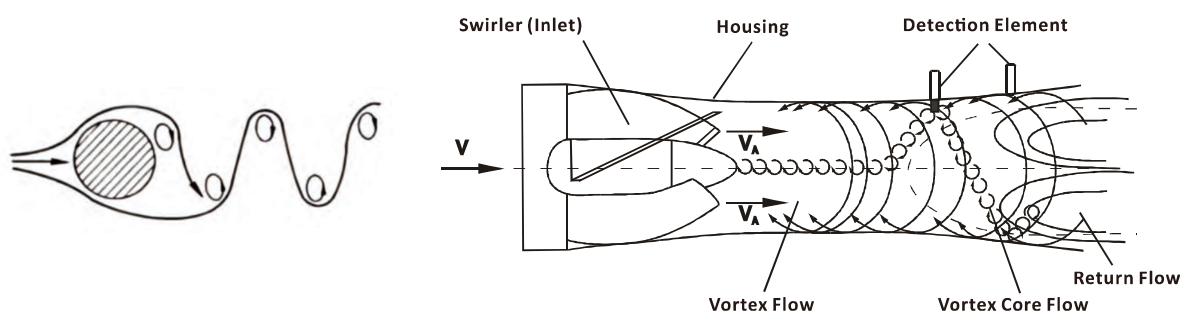
Working Principle

The flow cross-section of the flow sensor is similar to the profile of a Venturi tube. A set of spiral guide vanes is placed on the inlet side. When the fluid enters the flow sensor, the guide vanes force the fluid to generate a violent vortex flow.

When the fluid enters the diffusion section, the vortex flow is affected by the return flow and starts to rotate for the second time, forming a gyro-like vortex precession phenomenon. The precession frequency is proportional to the flow rate, and is not affected by the physical properties and density of the fluid. The detection element can obtain good linearity in a wide flow range by measuring the secondary rotation precession frequency of the fluid.

The signal is amplified, filtered, shaped by the pre-amplifier and converted into a pulse signal proportional to the flow velocity. Then, together with detection signals such as temperature and pressure, it is sent to the microprocessor for integration processing.

Finally, the measurement results (instantaneous flow, cumulative flow, as well as temperature and pressure data) are displayed on the liquid crystal display.



The flow totalizer consists of analog channels for temperature and pressure detection, a flow sensor channel, and a microprocessor unit. It is also equipped with external output signal interfaces to output various signals.

The microprocessor in the flowmeter performs temperature and pressure compensation according to the gas state equation and automatically corrects the compression factor.

The gas state equation is as follows:

$$Q_N = \frac{P_a + P}{P_N} \cdot \frac{T_N}{T} \cdot \frac{Z_N}{Z} Q_V$$

Where:

- QN — Volumetric flow rate under standard conditions (m³/h);
- QV — Volumetric flow rate under working conditions (m³/h);
- Pa — Local atmospheric pressure (kPa);
- P — Gauge pressure measured at the pressure tapping hole of the flowmeter (kPa);
- PN — Atmospheric pressure under standard conditions (101.325 kPa);
- TN — Absolute temperature under standard conditions (293.15 K);
- T — Absolute temperature of the fluid being measured (K);
- ZN — Compression factor of the gas under standard conditions;
- Z — Compression factor of the gas under working conditions;

Note: When calibrating with a bell jar or negative pressure, take $Z_N/Z = 1$. For natural gas, $(Z_N/Z)^{(1/2)} = FZ$, which is the supercompression factor. Calculate it according to the formula in the standard SY/T 6143 - 1996 of the China National Petroleum Corporation.

Features

- No mechanical moving parts, anti - corrosion, stable, reliable, long - life, no special maintenance for long - term operation.
- With a 16 - bit computer chip, high integration, small size, good performance, strong overall functions.
- Intelligent flowmeter integrates flow probe, microprocessor, pressure & temperature sensors (built - in), compact structure. Directly measures flow, pressure & temperature, with automatic real - time compensation and compression factor correction.
- Dual - detection tech enhances signal strength, suppresses pipeline - vibration interference.
- Domestic - leading intelligent anti - vibration tech suppresses interference from vibration/pressure fluctuations.
- EEPROM for easy parameter setting, permanent storage. Stores 1 - year historical data.
- Converter outputs frequency pulses, 4 - 20mA analog signals, has RS485, connects to PC directly (1.2km max).
- Paired with FM data collector, enables remote data transmission via Internet/phone network.



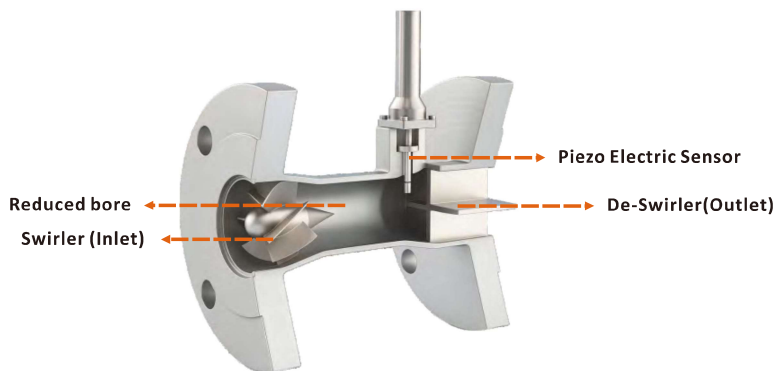
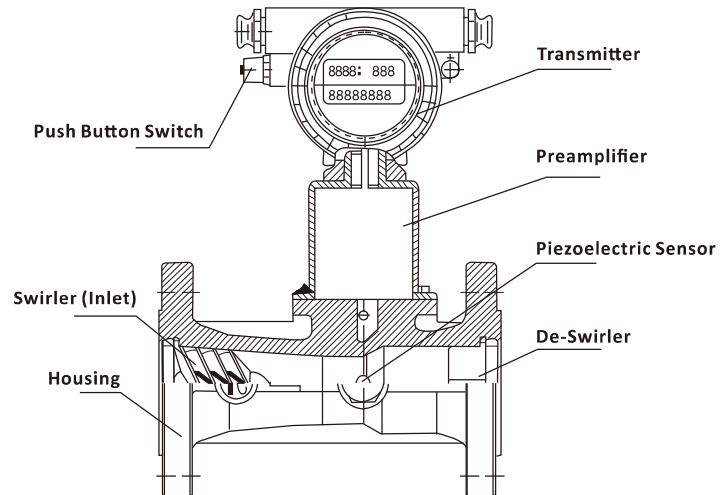
Applications

Swirl flow meters are widely used in industrial flow measurement. Key application scenarios include:

- **Petroleum & Petrochemical:** Measures natural gas, petroleum gas in production/transportation for trade settlement and process control.
- **Chemical Industry:** Applies to corrosive gases/liquids in fertilizer, pesticide, and raw material production lines for process monitoring.
- **Energy Management:** Measures fuel gas in power plants and urban natural gas for billing and resource allocation.
- **Metallurgy:** Measures blast furnace gas, oxygen in steel/non - ferrous metal smelting to optimize processes.
- **Pharmaceutical & Food:** Measures clean gases/liquids in production to ensure process accuracy and product consistency.
- **Water Treatment & Environmental Protection:** Measures aeration gas/ozone in sewage treatment for process control.
- **Special Gases:** Suits hydrogen, CO₂, inert gases in transportation and energy - related processes.
- **Building Automation:** In commercial buildings, swirl flow meters measure air flow in ventilation systems for air quality control. They also monitor chilled/hot water flow in HVAC systems, enabling precise temperature control and energy - efficient operation to boost occupant comfort.
- **Research and Development:** Applied in labs for fluid dynamics, environmental, and chemical research. Measures gas/liquid flow in pollutant dispersion studies, chemical reaction experiments, aiding process optimization and material development.

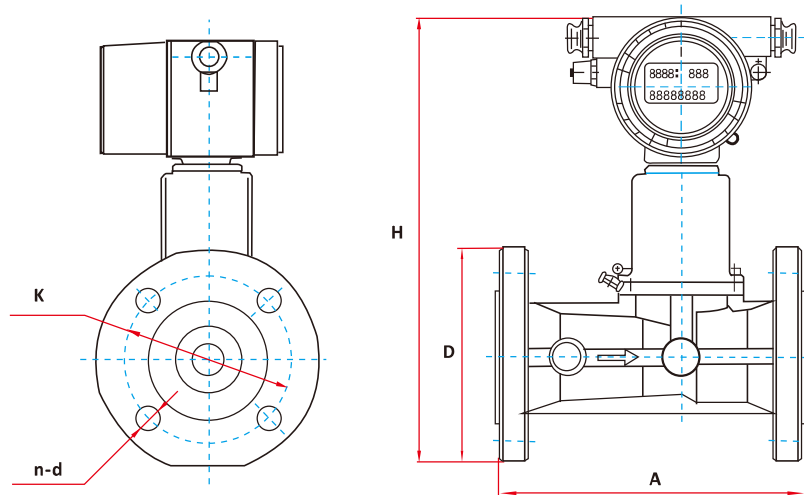


Structure



Technical Data

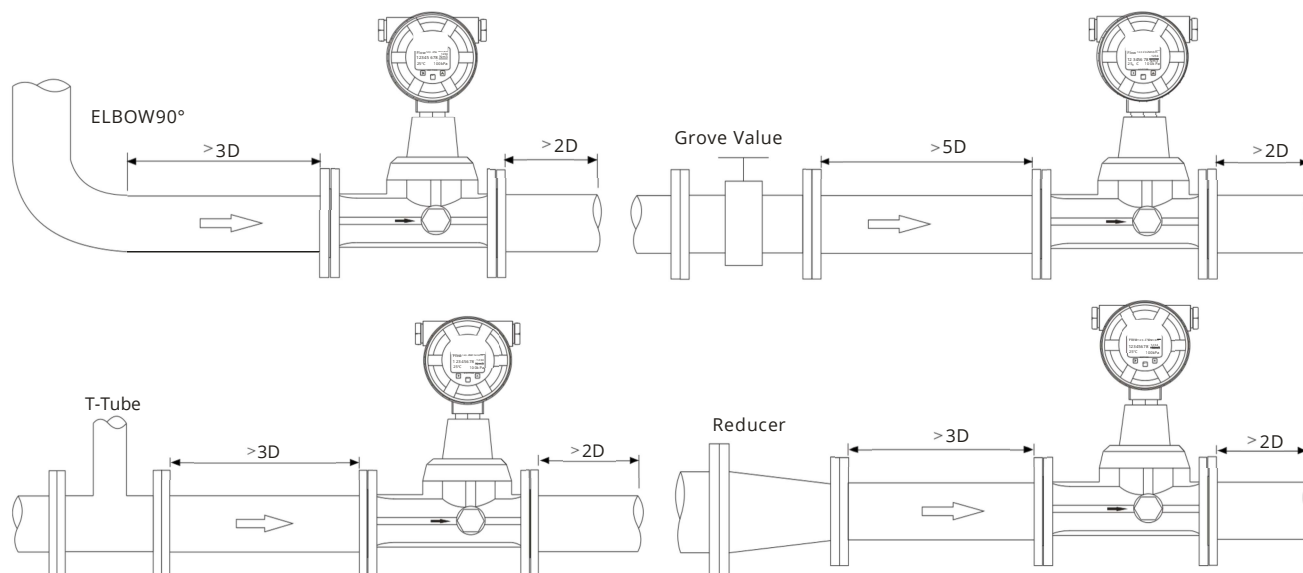
Accuracy	±1.5% of rate; ±1.0% of rate
Ambient Temperature	-30...+65°C
Fluid Temperature	-20...+80°C
Power Supply	24V DC ±15%; 3.6V Lithium Battery
Power Consumption	External: <2W
Humidity	5% - 95%
Output	4-20mA; Pulse; RS485
Connection	Flange; Thread
Protection	IP65
Electrical Interface	M20*1.5 internal thread
Data Storage	Daily, monthly, time interval recording



Model	Diameter	A	H	D	K	n*Ød	Pressure Rating
IFLO-LUX-15	15	162	305	95	65	4*Ø14	PN1.6MPa
IFLO-LUX-20	20	162	305	105	75	4*Ø14	
IFLO-LUX-25	25	180	315	115	85	4*Ø14	
IFLO-LUX-32	32	200	330	140	100	4*Ø18	
IFLO-LUX-40	40	233	355	150	110	4*Ø18	
IFLO-LUX-50	50	233	355	165	125	4*Ø18	
IFLO-LUX-65	65	300	375	185	145	8*Ø18	
IFLO-LUX-80	80	330	390	200	160	8*Ø18	
IFLO-LUX-100	100	410	410	220	180	8*Ø18	
IFLO-LUX-125	125	516	470	250	210	8*Ø18	
IFLO-LUX-150	150	580	470	285	240	8*Ø22	
IFLO-LUX-200	200	670	535	340	295	12*Ø22	

Note: Taking the conventional nominal pressure of 1.6MPa as an example, high-pressure specifications can be customized upon request.

CONDITIONS ON STRAIGHT PIPE



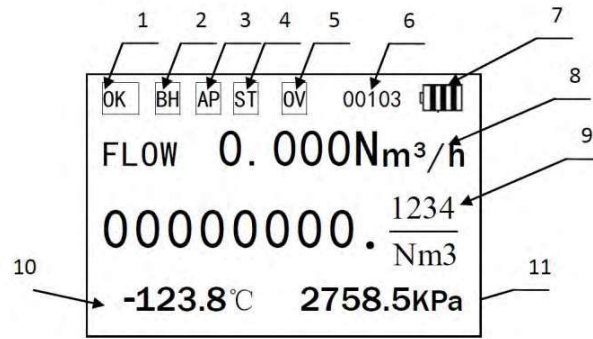
MODEL SELECTION GUIDE

Model	Suffix Code								Description
IFLO-LUX	①	②	③	④	⑤	⑥	⑦	⑧	Swirl Flow Meter
Fluid	G								Gas / Air
Diameter	XXX								Stand for diameter 020: DN20; 050: DN50 100: DN100; 300: DN300
Structure		S							Compact type
Converter Type			B						Battery power supply; No output; Ex; Digital display Temperature & Pressure Compensation
			U						24V DC; 2/ 3 wires 4-20mA output; RS485; Digital display Temperature & Pressure Compensation
			H						24V DC; 3-wire 4-20mA output; Hart; Digital display Temperature & Pressure Compensation
Body Material						S4			SS304
						S6			SS316
						CA			Cast Aluminum
Explosion Proof							BT		ExdIIBT6
							NA		No explosion proof
Connection								DXX	D16: DIN PN16 Flange; D25: DIN PN25 Flange...
								AXX	A15: ANSI 150# Flange; A30: ANSI 300# Flange...
								JXX	J10: JIS 10K Flange; J20: JIS 20K Flange...
								THR	Thread connection ≤ DN50

Flow Range

DN(mm)	Type	Liquid Flow Range (m³/h)	Gas Flow Range (m³/h)	Pressure (Mpa)	Accuracy	Repeatability
15	A	0.1~2	0.5~9	1.6; 2.5; 4.0; 6.3.	1.0 1.5	Less than 1/3 of the absolute value of the basic error limit
15	B		1~10			
20	A	0.2~3.5	1.2~15			
20	B		1~15			
20	C		2~18			
20	D		0.5~9			
25	A	0.3~5	2.5~30			
25	B		1.5~30			
25	C		3~60			
32	A	0.4~9	4.5~60			
32	B		3~60			
32	C		5~120			
40	A	0.7~14	7~100			
40	B		5~100			
40	C		7~180			
40	D		2.5~30			
50	A	1.1~21	10~150			
50	B		7~150			
50	C		10~240			
50	D		2.5~30			
65	A	1.8~36	20~280			
65	B		15~280			
65	C		20~400			
65	D		7~100			
80	A	4~54	28~400			
80	B		20~400			
80	C		28~500			
80	D		20~280			
100	A	6~85	50~800			
100	B		35~1400			
100	C		28~400			
125	A	9~132	100~1500			
125	B		80~2200			
150	A	13~192	150~2250			
150	B		100~2600			
200	A	24~340	360~3600			
200	B		200~4000			
250	A	37~530	400~4000			
250	B		400~6000			
250	C		200~4000			
300	A	53~765	500~5000			
300	B		500~7000			
300	C		200~4000			

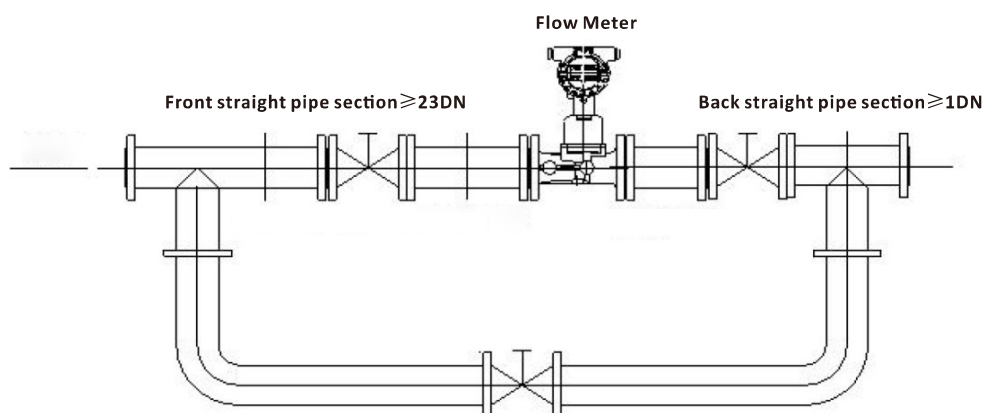
Note: Accuracy: the system accuracy after temperature and pressure correction.



No.	Description	Display Conditions
1	Running Status of Meter	"OK" if system is working well, "ERR" otherwise
2	Steam Compensation Tips	"BH" for saturated steam, "GR" for superheated steam
3	Pressure Sensor Type Hints	"GP" for gauge pressure sensor, "AP" for absolute pressure sensor
4	Temperature and Pressure Parameter Overflow	"ST" if system is abnormal or temperature is manually set, blank if sensors are working well
	Temperature Range	-50°C to ...+300°C
	Pressure Overflow	"SP" if system is abnormal or pressure is manually set, blank if sensor is working well
	Absolute Pressure Range	50KPa to 20000KPa
	Combined Temperature and Pressure Overflow	"TP" if both are abnormal or manually set
5	Operation Parameters Overflow	"OV" if parameters are out of range, blank if normal
6	Instrument Communication State Information	Parity bit and baud rate indicators
	Parity Bit	0: no parity, 1: odd parity, 2: even parity
	Baud Rate	0: 1200, 1: 2400, 2: 4800, 3: 9600
	Example Display	"00103" for no parity, baud rate 9600
	Output Current Overflow	"mA" if overflow, normal parameters otherwise
7	Indicator of Running Modes	Battery voltage in battery mode, "II" in two-wire mode, "III" in three-wire mode
8	Flow Rate	Max value is 9999 999
9	Total Flow	Max value in 8 bits, displays 9999 9999 if exceeded
10	Temperature	Displays set temperature if manually set, otherwise displays sensor reading
11	Pressure	Displays set pressure if manually set, otherwise displays sensor reading

Installation

- When the flowmeter is installed, it is strictly forbidden to directly weld the inlet and outlet flanges to avoid burning the internal parts of the flowmeter.
- For newly installed or overhauled pipelines, be sure to clean and remove the debris in the pipelines before installing the flowmeter.
- The flowmeter should be installed in a place that is easy to maintain, free from strong electromagnetic field interference, strong mechanical vibration and heat radiation;
- The flowmeter should not be used in occasions where the flow is frequently interrupted and there is a strong pulsating flow or pressure pulsation.
- When the flowmeter is installed outdoors, there should be a cover on the upper part to prevent rainwater immersion and sun exposure from affecting the service life of the flowmeter;
- The flowmeter can be installed at any angle, and the flow direction of the fluid should be consistent with the flow direction marked on the flowmeter;
- During pipeline construction, installation of telescopic tubes or corrugated tubes should be considered to avoid serious stretching or breaking of the flowmeter;
- The flowmeter should be installed coaxially with the pipe, and prevent the sealing sheet and butter from entering the inner cavity of the pipe;
- When using an external power supply, the flowmeter must be reliably grounded and must not share the ground wire with the strong current system. During pipeline installation or maintenance, the ground wire of the welding system must not be overlapped with the flowmeter.
- In order not to affect the normal delivery of the fluid and facilitate maintenance, it is required to install the bypass pipe, and ensure the straight pipe section of the front $\geq 3DN$ and the back $\geq 1DN$;



Description	Details	
General	Ensure that the length of the straight pipe section on the upstream side is at least 3D, and the length of the straight pipe section on the downstream side is at least 2D. See I for the schematic diagram. (D: Nominal diameter of precision vortex flowmeter)	
Bend Pipe	For bent pipes, ensure that the length of the straight pipe section on the upstream side is at least 3D, and the length of the straight pipe section on the downstream side is at least 2D. See II for the schematic diagram.	
Shorten Pipe	For the reduced pipe, ensure that the length of the straight pipe section on the upstream side is at least 3D, and the length of the straight pipe section on the downstream side is at least 2D. See III for the schematic diagram.	
Expansion Pipe	For pipe expansion, it is necessary to ensure that the length of the straight pipe section on the upstream side is at least 3D, and the length of the straight pipe section on the downstream side is at least 2D. See IV for schematic diagram.	
Valve	If there is a valve on the upstream side, ensure that the length of the straight pipe section on the upstream side is at least 5D, and the length of the straight pipe section on the downstream side is at least 2D. See V for a schematic diagram.	