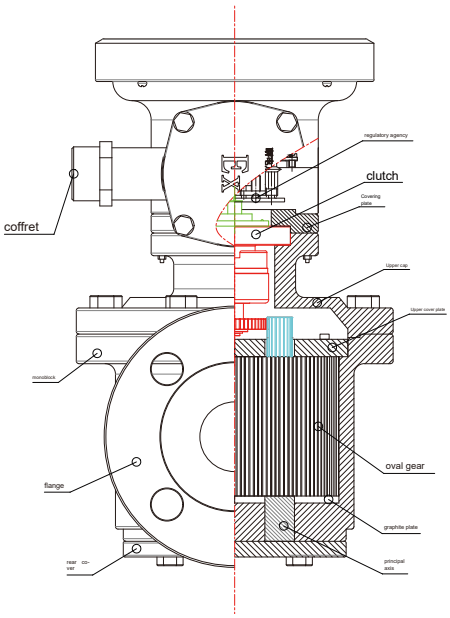
Elliptical Gear Flowmeter-SN5A



Principle Characteristics

I. Overview

The elliptical gear flowmeter is a volumetric measurement instrument designed for continuous or intermittent liquid flow measurement and control in pipelines. It boasts numerous advantages including wide measurement range, high accuracy, low pressure loss, strong viscosity adaptability, capability to measure high-temperature and high-viscosity liquids, convenient calibration, and recommended installation methods. This device is widely applicable for flow measurement in industries such as petroleum, chemical engineering, fiber production, transportation, commerce, food processing, and healthcare sectors.

The SN5A series elliptical gear flowmeter is equipped with a pointer and digital wheel accumulation device, enabling direct on-site display of liquid flow rate and instantaneous flow rate through pipelines. By integrating a signal transmission device with the counting mechanism and compatible electrical display instruments, it achieves centralized remote control for cumulative, quantitative, and instantaneous flow measurement. The addition of a heat sink or elliptical wheel tooth reduction allows measurement of high-temperature and high-viscosity liquids.

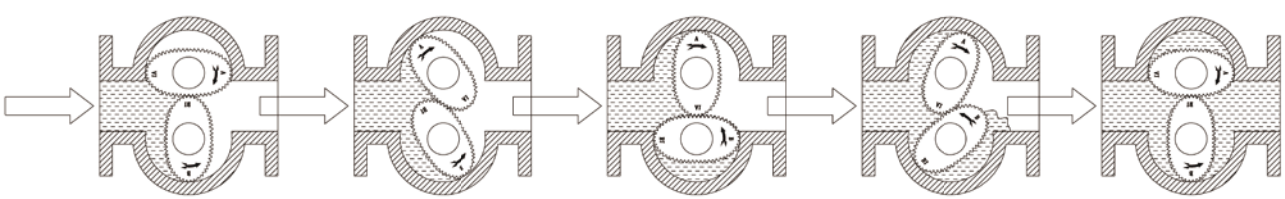
The main body of flow meters for different liquids (e.g., acids, alkalis, salts, organic solutions) can be manufactured from various materials.

II. Structure and Working Principle

The elliptical gear flowmeter consists of a flow transmitter and a counting mechanism. When a heat sink is installed between the transmitter and the counting mechanism, it forms a high-temperature type flowmeter. The transmitter comprises a metering chamber equipped with a pair of elliptical gear rotors and a sealed coupling. The counting mechanism includes a speed reduction mechanism, a regulating mechanism, a counter, and a transmitter.

The metering chamber features an initial crescent-shaped cavity formed by a pair of elliptical gears and a cover plate, serving as the flow measurement unit. The elliptical gears rotate driven by the pressure differential between the flow meter's inlet and outlet, continuously metering liquid through the initial crescent-shaped cavity and directing it to the outlet. Each rotation delivers four times the volume of liquid through the cavity. A sealed coupling transmits both the total rotation count and rotational speed of the elliptical gears to the counting mechanism or transmitter, enabling accurate determination of both the total liquid volume and instantaneous flow rate in the pipeline.

operational principle



Technical Parameter

1、 Cast Iron Type, Cast Steel Type, and Stainless Steel Type Elliptical Gear Flowmeter

model	SN5A-A cast iron mold	SN5A-B stainless steel type	SN5A-E cast steel mold
nominal pressure MPa	1.6	1.6、2.5、4.0、6.3	1.6、2.5、4.0、6.3
temperature range ℃	Conventional pointer type: -20~+80; High-temperature pointer type: 20~+200; Conventional pointer type: -20~+60; High-temperature pointer type: 20~+150;		
accuracy class	0.5%		
bore （mm）	Viscosity: 0.6-2 mPa·s	Viscosity: 2-200 mPa·s	
10	0.2-0.4 m^3 /h	0.08-0.4m^3 /h	
15	0.6-1.5 m^3 /h	0.3-1.5m^3 /h	
20	0.8-3m^3 /h	0.6-3m^3 /h	
25	1. 2-6m^3 /h	0. 8-6m^3 /h	
40	5-15m^3 /h	3-15m^3 /h	
50	6-24m^3 /h	4-24m^3 /h	
65	10-40m^3 /h	8-40m^3 /h	
80 （light-duty）	10-40m^3 /h	8-40m^3 /h	
80 (severe)	15-60m^3 /h	10-60m^3 /h	
100	30-100m^3 /h	15-100m^3 /h	
150	45-190m^3 /h	34-190m^3 /h	
200	68-340m^3 /h	56-340m^3 /h	

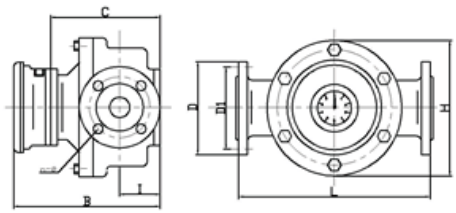
2、 High-viscosity Elliptical Gear Flowmeter

model	SN5A-A cast iron high-viscosity type	SN5A-NE cast steel high-viscosity type	SN5A-NB high-viscosity stainless steel
nominal pressure MPa	1.6	1.6、2.5、4.0、6.3	1.6、2.5、4.0、6.3
temperature range ℃	Conventional pointer type: -20~+80; High-temperature pointer type: 20~+200; Conventional pointer type: -20~+60; High-temperature pointer type: 20~+150;		
accuracy class	0.5%		
Flow range m^3/h			
bore （mm）	Viscosity: 200-1000 mPa·s	Viscosity: 1000-2000 mPa·s	
10	0.04 -0.3 m^3 /h	0.03-0.2m^3 /h	
15	0.2-1.0 m^3 /h	0.1-1.7m^3 /h	
20	0.4-2.1m^3 /h		
25	0.6-4.2m^3 /h	0.25-1.5m^3 /h	
40	2.1-10.5m^3 /h		
50	2.4-16.8m^3 /h	0.6-3m^3 /h	
65	6-28m^3 /h 6		
80 (lightweight)	-28m^3 /h 8	1.0-7.5m^3 /h 2-12m^3 /h	
80 (severe)	-42m^3 /h 10	4-20m^3 /h 4-20m^3 /h 6	
100	-70m^3 /h	-30m^3 /h 10-50m^3 /h 19	
150	27-133m^3 /h	-95m^3 /h	
200	48-238m^3 /h	34-170m^3 /h	

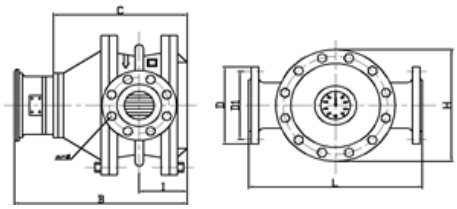
3、 High Precision Elliptical Gear Flowmeter

Model	SN5A-A cast iron mold	SN5A-B stainless steel type	SN5A-E cast steel mold
Nominal pressure MPa	1.6	1.6、2.5、4.0、6.3	1.6、2.5、4.0、6.3
Temperature range ℃	Conventional pointer type: -20~+80; High-temperature pointer type: 20~+200; Conventional pointer type: -20~+60; High-temperature pointer type: 20~+150;		
Accuracy class	0.5%		
Flow range m ^{3}/h			
Bore （mm）	0.6-2Pa.s	2-200mPa.s	
10		0.2-0.4m^3 /h	
15		0.5-1.5m^3 /h	
20	1.5-3m^3 /h	1-3m^3 /h	
25	3-6m^3 /h	1.2-6m^3 /h	
40	8-15m^3 /h	5-15m^3 /h	
50	12-24m^3 /h	8-24m^3 /h	
65	20-40m^3 /h	10-40m^3 /h	
80 (lightweight)	20-40m^3 /h	10-40m^3 /h	
80 (severe)	30-60m^3 /h	15-60m^3 /h	
100	40-100m^3 /h	20-100m^3 /h	
150	90-190m^3 /h	56-190m^3 /h	
200	170-340m^3 /h	68-340m^3 /h	

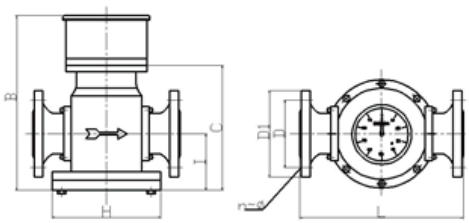
Dimensional drawing



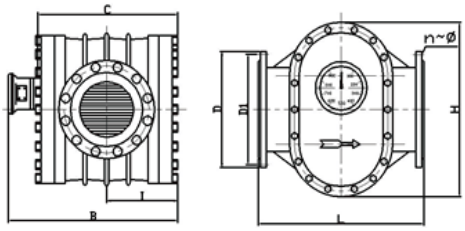
DN10~DN50 (lightweight)



DN50 (heavy-duty) to DN100



DN65, DN80 lightweight



DN150~DN200

Dimension Table

Model: SN5A-A, SN5A-NA

DN (mm)	L (mm)	H (mm)	B (mm)	C (mm)	I (mm)	D (mm)	D1 (mm)	N	Φ(mm)
10	150	100	210	120	45	90	60	4	14
15	170	118	226	136	48	95	65	4	14
20	200	150	238	148	53	105	75	4	14
25	260	180	246	156	60	115	85	4	14
40	245	180	271	181	77	145	110	4	18
50 (mild)	290	218	310	220	80	160	125	4	18
50 (severe)	340	250	372	230	88	160	125	4	18
65	325	245	320	220	90	180	145	4	18
80 (lightweight)	325	245	320	220	90	195	160	8	18
80 (severe)	420	325	433	253	118	195	160	8	18
100	515	418	458	278	131	215	180	8	18
150	540	515	557	377	210	280	240	8	23
200	650	650	624	444	247	335	295	12	23

Model: SN5A—E, SN5A—NE, (same appearance as above)

DN (mm)	L (mm)	H (mm)	B (mm)	C (mm)	I (mm)	D (mm)	D1 (mm)	N	Φ(mm)
10	150	100	212	120	45	90	60	4	14
15	200	138	232	142	53	95	65	4	14
20	250	164	250	150	63	105	75	4	14
25	300	202	252	162	68	115	85	4	14
40	300	202	293	203	83	150	110	4	18
50 (mild)	320	220	325	235	85	160	125	4	18
50 (severe)	384	262	394	394	88	160	125	4	18
65	350	260	365	275	100	145	145	4	18
80 (lightweight)	350	260	365	275	100	200	160	8	18
80 (severe)	450	337	452	272	118	200	160	8	18
100	555	442	478	298	131	220	180	8	18
150	540	510	557	377	210	285	240	8	23
200	650	650	624	436	247	340	295	12	23

SN5A—B type stainless steel elliptical gear flowmeter dimensions (unit: mm)

DN (mm)	L (mm)	H (mm)	B (mm)	C (mm)	I (mm)	D (mm)	D1 (mm)	N	Φ(mm)
10	150	100	212	120	45	90	60	4	14
15	200	120	226	132	48	95	65	4	14
20	230	150	238	148	58	105	75	4	14
25	260	180	246	156	64	115	85	4	14
40	265	180	271	181	77	150	110	4	18
50	265	180	290	200	92	165	125	4	18
65	365	260	400	310	125	180	145	4	18
80 (lightweight)	350	260	365	275	125	200	160	8	18
80 (severe)	420	325	443	263	118	200	160	8	18
100	515	418	468	288	131	220	180	8	18

Selection Table

Type code	-	Special mark	Material Label	Latus rectum	Pressure	/	Counter	Transmitter	Explain
SN5A	-								Oval gear flowmeter
		T							High-temperature type
		U							Insertion type
		N							High-viscosity type
			A						Cast iron mold
			E						Cast steel mold
			B						304 Stainless steel type
			C						316 Stainless steel type
				10					Nominal diameter: DN=10mm
				40					Nominal diameter: DN=40mm
				200					Nominal diameter: DN=200mm
					1				Nominal pressure (1.0 Mpa)
					2				Nominal pressure (1.6 Mpa)
					3				Nominal pressure (2.5 Mpa)
					4				Nominal pressure (4.0 Mpa)
					6				Nominal pressure (6.3 Mpa)
							A/A1		The mechanical pointer below DN (lightweight) indicates: A1 can carry transmitters.
							J1		The mechanical pointer display for DN100 (heavy-duty) and above indicates: transmitter compatible
							A5/A6		The A5 single pointer sub-wheel display and A6 pointer reset
							Z		both support transmitter dual-handle reset functionality.
							13		Output only signals (pulse, 4-20mA)
							ELZ (BELZ)		Liquid crystal display (output pulse: -1; output 4-20mA: -2; output RS485: -3); BELZ is a flameproof liquid crystal display
								GF-I	Triple-line pulse (clockwise)
								GF-II	Triple-line pulse (counterclockwise)
								MF	4-20mA analog signal (two-wire-1; three-wire-2)