ACU20FD High Pressure Mass Flow Controller/Flowmeter

Introduction

Beijing AccuFlow Technology specializes in manufacturing gas/liquid mass flow meters and controllers. The meters are designed according to the actual working conditions and needs of customers and are widely used in various industries to precisely measure and control the mass flow of gas/liquid.

It plays an important role in scientific research and production in various fields such as semiconductor and integrated circuit industry, special materials, chemical industry, petroleum industry, medicine, environmental protection and vacuum. Its typical applications include : electronic process equipment, such as diffusion, epitaxy, CVD, oxidation, plasma etching, sputtering, ion implantation; and coating equipment, optical fiber melting, micro-reaction device, mixed gas system, capillary measurement, gas chromatograph and other analytic The measured gas medium can be manually switched al instruments.



▲ACU20FD(High Pressure)

Performance and principle

ACU20FD is a high-precision series flowmeter/controller, and its measurement error is only +/-0.5 of full scale. The excellent accuracy of this series comes from a unique sensor probe. This sealed probe consists of two sensing elements-speed

The temperature sensor and temperature sensor can automatically correct the effects of temperature and pressure changes. The meter circuit heats the speed sensor to a constant value above the gas/liquid temperature and then measures the cooling effect of the gas flow. The flow rate is calculated by measuring the principle that the electric power consumed to maintain a constant temperature difference is proportional to the gas mass flow rate. Both sensors are standard-grade platinum resistance temperature detectors (RTDs) sealed into a 316 stainless steel package.

Applications in laboratory and industrial environments

ACU20FD series of high-precision flowmeter/controller, the measurement error of the full scale of ± 0.5%, enough to meet the needs of most customers, can be used in the laboratory to do all kinds of tests, but also can be used in the industrial environment of complex environment.

In order to adapt to the complex industrial environment, we also have some models that support IP67 grade dustproof and waterproof, and IICT4 intrinsically safe explosion-proof. In addition to the standard analog input/output interface, 485/232 interface is also supported, and the communication protocol is the standard modbus RTU protocol.

Applications

Vacuum	Coating	Solar Energy
Semiconductor coal metallurgy	petroleum and petrochemical	
Gas preparation and gas distribution	Environmental protection	Analysis of various instruments

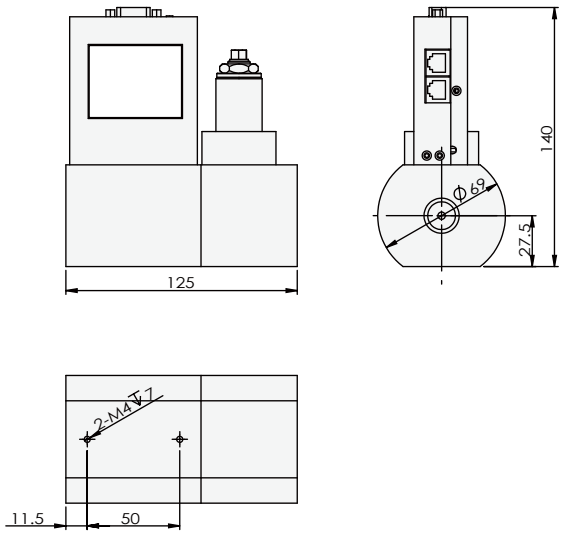
ACU20FD Basic characteristics

- Accuracy up±0.5%F.S
- Repeatability can reach±0.2%F.S
- Fast response speed and fast adjustment speed
- Touchable display
- Direct measurement of mass flow
- Automatic temperature compensation
- Integrated PID controller to regulate flow
- The measured gas medium can be manually switched
- Thermal principle,fast response, high precision
- Tubular shunt, not easy to block
- Suitable for all kinds of high and low pressure pipeline
- Short preheating time, small zero drift, high reliability

Specifications

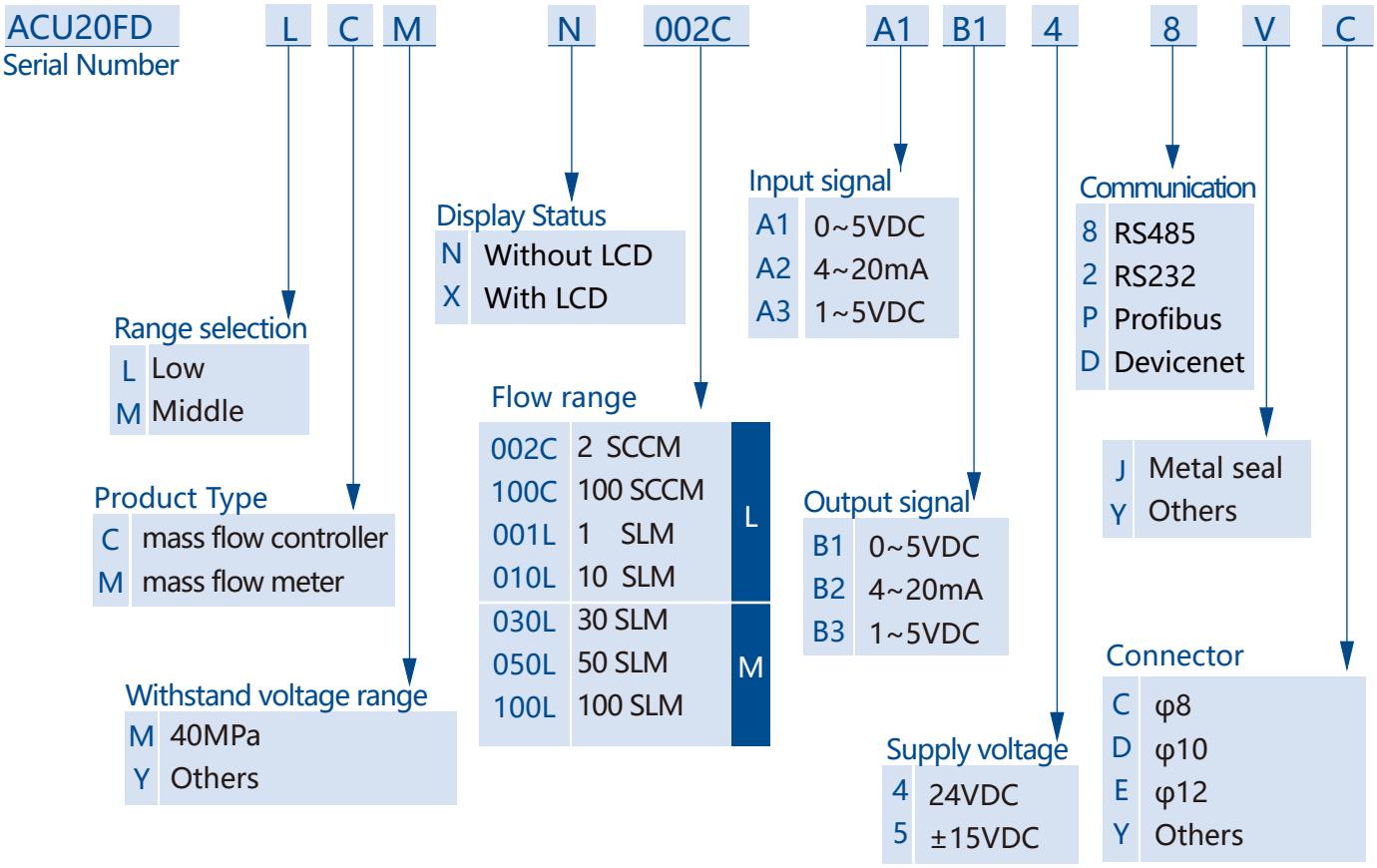
High Pressure mass flow controller		High Pressure mass flow meter
Technical indicators		
Range	0~(2SCCM...100SLM)	0~(2SCCM...100SLM)
control range	Controller valve control range50:1	flowmeter range ratio100:1
Accuracy	±0.5%F.S（Full scale）	
Liner	±0.25%F.S	
Repeat accuracy	±0.2%F.S	
Respon se time	<0.2s	<0.1s
temperature coefficient	±0.025%F.S/℃	
Working temperature	0～50℃	
Preheating time	30SAvailable，5Min Reach the best stat	
Working pressure	Working pressure difference：0.1~0.5MPa	Working pressure drop：<0.01MPa
Maximum withstand voltage	40MPa	
leakage rate	1 X 10^{-9} Pa m^3 /S	
Mechanical components		
Base Material	stainless steel	
Connector	φ8, φ10, φ12, LOK, pagodas, quick plug-inVCR, flange installation, etc	
Sealing material	NBR, FFKM, Metal Seal, etc	
Enclosure protection class	IP40	
Installation position	Horizontal installation	
Electrical Performance		
Electrical connection	DB9 hole, RJ11	
Display Status	With LCD, without LCD	
Digital quantity	RS232/485,Modbus protocol, Profibus protocol, EtherCAT protocol, Profinet protocol, FF protocol	
Analog quantity	0～5V、4-20mA、1～5V	
power supply	24VDC、±15VDC	

Dimensions (mm)



▲ACU20FD Mass Flow Controller（High Pressure）

Product selection



Instructions for use of conversion factor

Mass flow controllers and mass flow meters are generally calibrated with N2 when leaving the factory. In actual use, if other gases are used, readings can be corrected if necessary. The method is to multiply the flow displayed by the flow indicator by the flow conversion coefficient, such as single-component gas. The conversion factor can be found in the coefficient conversion table; if it is a multi-component gas (assumed to be composed of n gases), calculate its conversion according to the following formula

Coefficient C:

Basic formula: C = 0.3106N/ (Cp)

Where: ρ —— is the density of the gas in the standard state

Cp —— constant pressure specific heat of gas

N —— molecular composition coefficient of the gas (related to the composition of the gas molecules, see the followingtable)

gas molecular composition	Examples	N value
monoatomic molecule	Ar He	1.01
diatomic molecule	CO N2	1.00
triatomic molecule	CO2 NO2	0.94
polyatomic molecule	NH3 C4H8	0.88

For the gas mixture: N=N1 (ω1/ωT) +N2 (ω2/ωT) +...+Nn (ωn/ωT)

Among them:

ω1...ωn —— the flow rate of the corresponding gas

ωT —— is the flow rate of the mixed gas

ρ1...ρn —— is the density of the corresponding gas in the standard state (see the gas conversion coefficient table for the value)

Cp1...Cpn —— is the specific heat of the corresponding gas at constant pressure (see the gas conversion coefficient table for the value)

N1...Nn —— is the molecular composition coefficient of the corresponding gas, see the gas molecular composition coefficient table

Gas Flow Conversion Coefficient Table

Gas	Code	specific heat (Kcal/g ℃)	Density (g/L 0 ℃)	conversion coefficient	Gas	Code	specific heat (Kcal/g ℃)	Density (g/L 0 ℃)	conversion coefficient
Air	008	0.240	1.2930	1.006	HI	017	0.0545	5.7070	0.999
Ar	004	0.1250	1.7837	1.415	H2S	022	0.2278	1.5200	0.844
AsH3	03	0.1168	3.4780	0.673	He	001	1.2418	0.1786	1.415
BBr3	079	0.0647	11.1800	0.378	Kr	005	0.0593	3.7390	1.415
BCl3	070	0.1217	5.2270	0.430	N2	013	0.2468	1.2500	1.000
BF3	048	0.1779	3.0250	0.508	Ne	002	0.2464	0.9000	1.415
B2H6	058	0.5020	1.2350	0.441	NH3	029	0.5005	0.7600	0.719
CCl4	101	0.1297	6.8600	0.307	NO	016	0.2378	1.3390	0.976
CF4	063	0.1659	3.9636	0.420	NO2	026	0.1923	2.0520	0.741
CH4	028	0.5318	0.7150	0.719	N2O	027	0.2098	1.9640	0.709
C2H2	042	0.4049	1.1620	0.581	O2	015	0.2196	1.4270	0.992
C2H4	038	0.3658	1.2510	0.598	PCl3	193	0.1247	6.1270	0.358
C2H6	054	0.4241	1.3420	0.481	PH3	031	0.2610	1.5170	0.691
C3H4	068	0.3633	1.7870	0.421	PF5	143	0.1611	5.6200	0.302
C3H6	069	0.3659	1.8770	0.398	POCl3	102	0.1324	6.8450	0.302
C3H8	089	0.3990	1.9670	0.348	SiCl4	108	0.1270	7.5847	0.284
C4H6	093	0.3515	2.4130	0.322	SiF4	088	0.1692	4.6430	0.348
C4H8	104	0.3723	2.5030	0.294	SiH4	039	0.3189	1.4330	0.599
C4H10	111	0.4130	2.5930	0.255	SiH2Cl2	067	0.1472	4.5060	0.412
C5H12	240	0.3916	3.2190	0.217	SiHCl3	147	0.1332	6.0430	0.340
CH3OH	76	0.3277	1.4300	0.584	SF6	110	0.1588	6.5160	0.264
C2H6O	136	0.3398	2.0550	0.392	SO2	032	0.1489	2.8580	0.687
C2H3Cl3	112	0.1654	5.9500	0.278	TiCl4	114	0.1572	8.4650	0.206
CO	009	0.2488	1.2500	1.000	WF6	121	0.0956	13.2900	0.215
CO2	025	0.2017	1.9640	0.737	Xe	006	0.0397	5.8580	1.415
C2N2	059	0.2608	2.3220	0.452					
Cl2	019	0.1145	3.1630	0.858					
D2	014	1.7325	0.1798	0.998					
F2	018	0.1970	1.6950	0.931					
GeCl4	113	0.1072	9.5650	0.267					
GeH4	043	0.1405	3.4180	0.569					
H2	007	3.4224	0.0899	1.010					
HBr	010	0.0861	3.6100	1.000					
HCl	011	0.1911	1.6270	1.000					
HF	012	0.3482	0.8930	1.000					