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PI-6020

ULTRASONIC GAS FLOW METER





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Every day natural gas flows in great quantities through pipelines or into storage facilities, thus changing owners. Precise gas quantity measurement is of the utmost importance, as even very small measurement errors could result in substantial economic loss. In addition, challenging ambient measurement conditions often play a decisive role. Moisture, ice, cold, heat and desert sand place great demands on the instruments in the field. This is why a gas flow meter is needed that is both accurate and reliable.

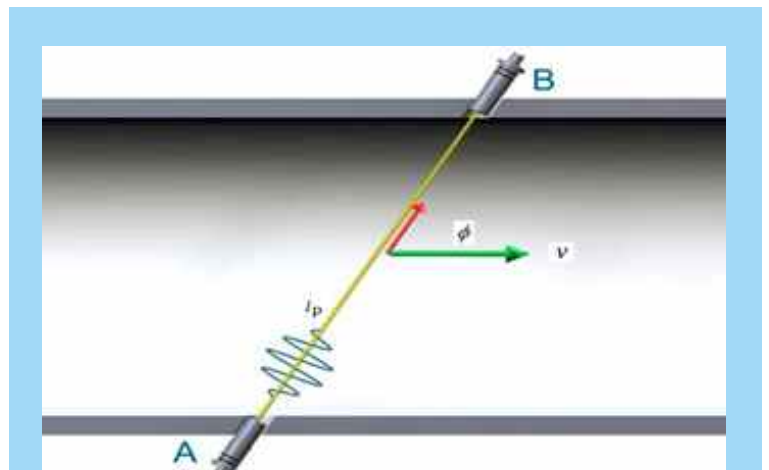
PI-6020 Ultrasonic gas flowmeter achieves both of these goals. It is ideal for both natural gas custody transfer and the highly precise measurement of process gases in the chemical industry. The meter is designed for measurement of volumetric flow rate and cumulative volume of natural gas underling operation condition or standard condition for options, when they are transported through circular pipelines in the forward and reverse directions. The meters can be used for gas metering in industrial and public utility companies, including for custody transfer purpose. PI-6020 are calibrated on air. Under the Customer requirement, calibration on natural gas could be performed.



Measurement Principle

Each sensor is an emitter and a receiver at the same time. Measurements are taken alternatively in both directions, i.e. after a transit time has been measured, the emitter becomes the receiver and vice versa. In this way, the impact of the velocity of sound which depends on the gas type, pressure and temperature is eliminated. In order to take the flow profile into account, measurements are taken using a total of 6 acoustic paths in 3 parallel planes. In each plane, there are 2 paths crossing each other. The arrangement of paths according to Gauss-Chebyshev guarantees optimum measurements of the flow velocity even in the case of asymmetries, swirl and crossflows. In addition, these variations of the ideal flow profile can also be measured, i.e. a flow diagnosis can be made.

PI-6020 ultrasonic flowmeter measures the flow velocity of the gas via the transit times of ultrasonic pulses and calculates the flow rate at measurement conditions therefrom. Here use is made of the fact that ultrasonic pulses move faster in the direction of flow than in the opposite direction





Specification

- ▶ Field-proven reliability for pipeline quality gas and dry gas
- ▶ No line obstructions
- ▶ No moving parts
- ▶ No flow calibration required
- ▶ No pressure loss
- ▶ Bi-directional capability
- ▶ Large turn-down ratio
- ▶ No lubrication or periodic maintenance
- ▶ Measurement is not affected by gas properties
- ▶ Powerful noise-reduction technology
- ▶ Self-diagnostics

Construction

PI-6020 ultrasonic flowmeter consists of the measuring element, i.e. a case with the 8 sensors, the electronic measuring system and the ultrasonic computer.

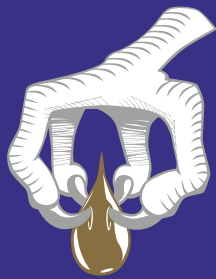
The sensors are directly attached to the case through flanges and do not extend into the pipeline. The arrangement of the paths is symmetrical with regard to the center of the gas meter, so that the latter can be used for both directions of flow without being modified or reprogrammed.

The electronic measuring system, which is located directly on the meter case, controls the sensors, evaluates the measuring results and calculates the flow velocity for each acoustic path. There are two variants available: A version where the electronic system on the meter case calculates the flow rate and has its own totalizers and pulse outputs, and a version with an external ultrasonic computer

Technical Specification

Display	OLED 192*64 pixel backlit type
Buttons	Three-button operation
Communication interface	RS-485 (Modbus RTU)
Accuracy	$\leq \pm 0.5\%$; $\pm 1\%$ and $\pm 1.5\%$ under dry calibration
Repeatability	0.1% of accuracy $\pm 0.5\%$; 0.2% of accuracy $\pm 1\%$; 0.3% of accuracy $\pm 1.5\%$
Design	Wetted, Non-intrusive, inline type
Flanges rating	#150, #300, #600, #900, #1500
Materials	Standard in SS304; SS316 for options
Operation conditions	
Size	1 inch to 14inch (DN25mm to Dn400mm)
Medium temperature	$\leq 149\text{ }^{\circ}\text{F}$ ($65\text{ }^{\circ}\text{C}$)
Ambient temperature	$-13\text{ }^{\circ}\text{F}$ to $131\text{ }^{\circ}\text{F}$ ($-25\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$)
Max. Process pressure	420bar (6090psig)
Measuring scope	0.1m/s ~ 30m/s
Protection rating	IP65 ; IP67 for options
Electrical characteristics	
Input power	DC 12-32V
Power consumption	5W(max)
Output	4 ~ 20mA; pulse (current output mode: Passive)
Communication interface	RS-485 (Modbus RTU)
Wire inlet specification	M20 x 1.5*2 Female ; 1/2" NPT for options
Conformities	ISO 17089-1 and AGA-Report No. 9
EMC regulation	IEC/EN 61326-1 Class A table2
Hazardous Area approval	IECEX and ATEX approved II 2 G Ex db ib IIB T4 Gb
Transducer paths	Up to 4 paths depend on sensor size

It can't display when OLED is lower than -20°C



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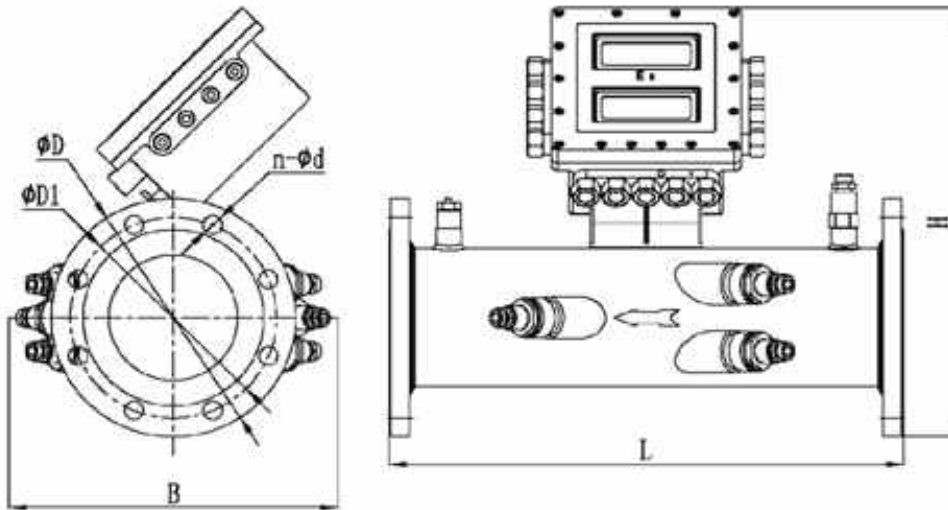
**PI-6020 ULTRASONIC GAS
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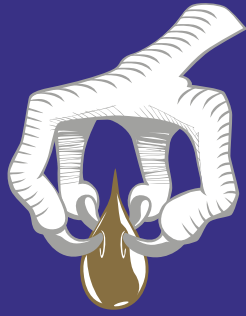
Flow range

Normal size mm/inch	Flow Rate				Max. Velocity		Transducer paths
	m3/hr		ft3/hr		m/s	ft/s	
	Min.	Max.	Min.	Max.			
1" DN25	1	45	35	1589	25m/s	82	1 path
1-1/2" DN40	3	115	90	4061	25m/s	82	2 paths
2" DN50	4	180	141	6357	25m/s	82	2 paths
3" DN80	10	450	353	15892	25m/s	82	2 paths
4" DN100	16	700	549	24720	25m/s	82	4 paths
6" DN150	36	1600	1256	56504	25m/s	82	4 paths
8" DN200	63	2830	2221	99941	25m/s	82	4 paths
10" DN250	98	4420	3469	156091	25m/s	82	4 paths
12" DN300	141	6360	4991	224602	25m/s	82	4 paths
16" DN400	200	11000	7063	388462	25m/s	82	4 paths

Dimension Drawings

Dimensions in mm (inch)





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Process connection size	Length(L), in mm		Height (H), in mm		Width (B), in mm		Net Weight lb, Kg
	≤ 300# (4 Mpa)	≥ 600# (6.3 Mpa)	≤ 300# (4 Mpa)	≥ 600# (6.3 MPa)	≤ 300# (4 Mpa)	≥ 600# (6.3 Mpa)	
1" (DN25mm)	19.69 500	24.21 615	18.11 460	18.62 473	9.05 230	9.05 230	38 17.24
1 ½" (DN40mm)	19.69 500	24.41 620	18.50 470	18.90 480	10.63 270	10.63 270	47 21.32
2" (DN50mm)	19.69 500	24.41 620	18.89 480	19.21 488	11.02 280	11.02 280	53 24.04
3" (DN80mm)	23.62 600	29.13 740	12.20 310	20.39 518	12.20 310	12.20 310	66 30
4" (DN100mm)	23.62 600	23.62 600	20.47 520	20.78 528	12.60 320	12.60 320	77 35
6" (DN150mm)	23.62 600	23.62 600	22.83 580	23.74 603	14.17 360	14.17 360	103.62 49
8" (DN200mm)	27.56 700	27.56 700	24.80 630	25.59 650	16.14 410	16.14 410	154.32 70
10" (DN250mm)	27.56 700	27.56 700	26.77 680	27.16 690	18.11 460	18.11 460	202.83 92
12" (DN300mm)	31.5 800	31.5 800	28.74 730	29.05 738	18.90 480	18.90 480	258 117
14" (DN400mm)	39.37 1000	39.37 1000	33.34 847	33.34 847	26.70 685	26.70 685	352 160

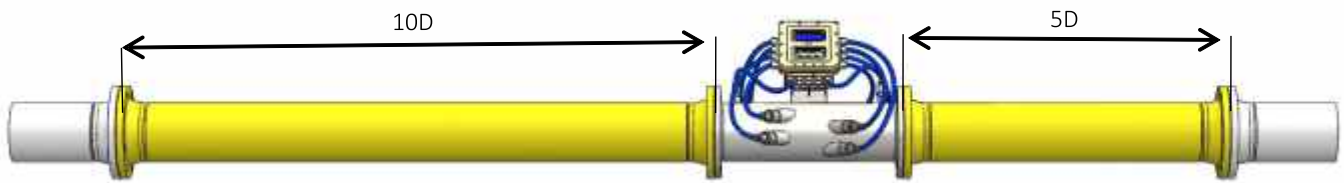
* Dimension listed in table refer to ASME and DIN series flanges, consult factory for dimensions of other standard.

* The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect, Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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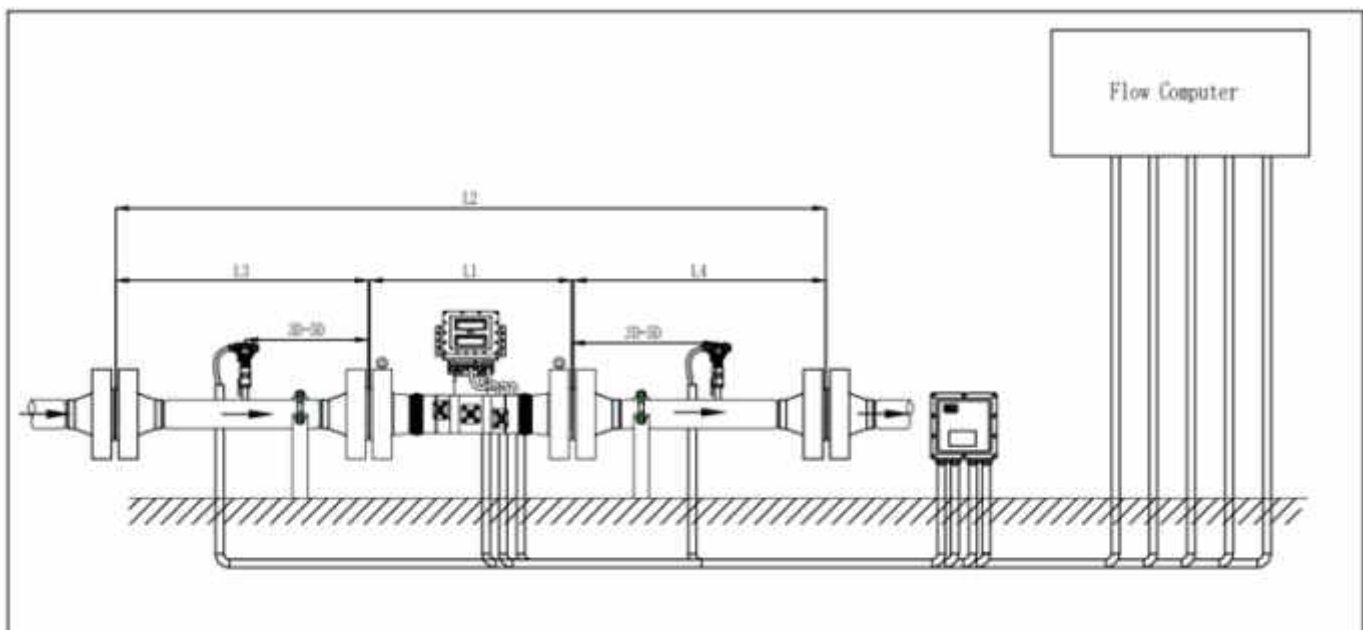
Instruction for Installation

PI6020 Ultrasonic gas flowmeter integration into the pipeline for unidirectional use in following configuration



- D is the size of nominal diameter
- A flow conditioner is essential to install at the upstream for custody transfer measurement or consider 20D at upstream and 10D at downstream for PI6020 Ultrasonic gas flowmeter installation.

Typical meter run configuration



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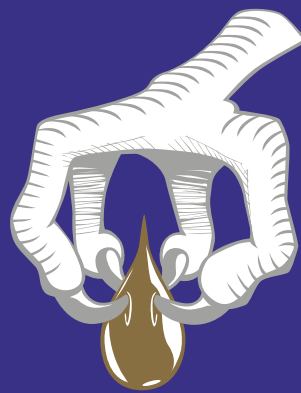
Ordering Code

Please contact your local Peregrine application engineer, while placing order
You also need to provide the following information:

Ordering Model	Gas medium	Engineering or standard flow range	Process pressure.	Process Temperature	Integral or external pressure and temp. compensaton

Model Selection

PI-6020 Ultrasonic Gas Flowmeter Series						
PI-6020	Ordering Code					Description
1"	025					Size
1½"	040					
2"	050					
3"	080					
4"	100					
6"	150					
8"	200					
10"	250					
12"	300					
14"	400					
Liquid	L					Process connection
Gas	Q					
DIN PN16	D06					
DIN PN25	D25					
DIN PN40	D40					
DIN PN63	D63					
DIN PN100	D100					
DIn PN160	D16					
ANSI/ASME 150#	A15					
ANSI/ASME 300#	A30					
ANSI/ASME 600#	A60					
ANSI/ASME 900#	A90					
Special connection	SPC					
230Psi(16bar)	1					Max. Process
360Psi(25bar)	2					
580Psi(40bar)	3					
915Psi(63bar)	4					
1450Psi(100bar)	5					
2320Psi(160bar)	6					
Special pressure	x					
Not for hazadous application	NX					Explosion proof
UL approved for Class I, Div.1 Groups B, C and D	CS					
ATEX and IECEX approved for Ex 2G Ex db ib IIB T4 Gb	AX					
Modbus RTU Comunication	R4					Communication
No Modbus RTU communicaiton	No					
DC12 to 32V	DC					Power
4 to 20mA+ Pulse	P					Power
No output	N					Output
+/-1.5% of RD	15					Accuracy
+/-1.0% of RD	10					
+/-0.5% of RD	05					
Integral temperature and pressure compensation	W					Compensation
No integral compensation	N					



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