



# Ultrasonic flow meter

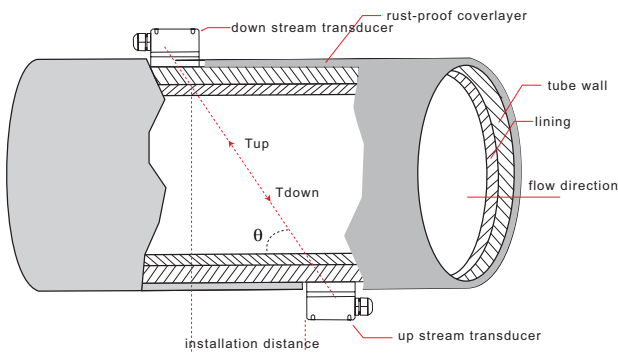


## Brief Introduction

TDS-100 series ultrasonic flow meters / ultrasonic heat meters / ultrasonic industrial water meter use low-voltage and multi - pulse transit time principle, and adopt high-accuracy and much stable detecting techniques to measure the flow. Our products features are good stability, small zero drift, high-accuracy, wide measuring range and strong anti-interference.

## Measuring Principle

The flow meter operates by alternately transmitting and receiving a frequency modulated burst of sound energy between the two transducers and measuring the transit time that it takes for sound to travel between the transducers. The difference in the transit time measured is directly and exactly related to the velocity of the liquid in the pipe, as shown flowing:



$$V = \frac{MD}{\sin\theta} \times \frac{\Delta T}{T_{up} \cdot T_{down}}$$

- V - The medium flow speed
- θ - The angle between the ultrasonic beam and flow direction
- M - The transmitting times of the ultrasonic beam
- D - The pipe diameter
- T<sub>up</sub>: the transmitting time of beam from upstream transducer to the downstream one
- T<sub>down</sub>: the transmitting time of beam from downstream transducer to the upstream one
- ΔT = T<sub>up</sub> – T<sub>down</sub>

## Specification

Parameters	Performances
Accuracy	Flow meter: better than ±1.0% ; water meter: better than ±2.0% ; heat meter: to EN1434 criteria
Repeatability	Flow meter: better than ±0.2% ; water meter/heat meter: better than ±0.5% ;
Flow direction	Forward and reverse, can measure positive, negative, and net accumulated flow
Max flow	64m/s
Measured medium	water、 sea water、 acid and alkali、 food oil、 gas、 coal oil、 diesel oil、 petroleum、 alcohol、 beer etc. these single and pure liquid which can transmit ultrasonic beam
Pipe materials	Steel、 stainless steel、 cast iron、 PVC、 cement pipe and other pipes whose materials are close . Liner are Optional (there can not be the interspace between the liner and the pipe exine)
Liquid temperature	≤160℃
Liquid turbidity	≤20000ppm and the bubble is less
Display	LCD display, instantaneous flow, accumulative flow, flow velocity, signal state
Signal output interface	4~20 mA, pulse, OCT, frequency, RS232 , and RS485 are optional.
Signal input interface	3-way 4-20mA analog signal input , 2-way PT100 platinum resistor, optional
Other functions	Day, month, and year totalizer, auto-memory the power-on and power-off time, self-diagnose working state.
Communication protocol	MODBUS protocol, M-BUS protocol, FUJI extended protocol and others
Notes	1.Clamp-on transducer is not for cement tube. 2.Others to see the product introduction.

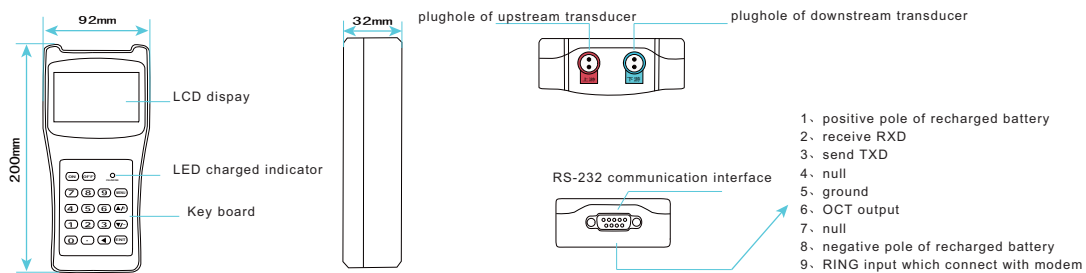
## Handheld ultrasonic flow meters

The flow meter operates by alternately transmitting and receiving a frequency modulated burst of sound energy between the two transducers and measuring the transit time that it takes for sound to travel between the transducers. The difference in the transit time measured is directly and exactly related to the velocity of the liquid in the pipe, as shown flowing:



- Measuring accuracy: better than 1%
- Repeatability: better than 0.2%
- Power supply: 90~230VAC (built-in Ni-MH accumulator which can work for more than 12hours continuously.)
- Installation: clamp-on, easy operating.
- Display: four lines which display the instant flow, velocity, accumulated flow and signal state.
- Signal output: non-isolation RS232 (FUJI extended protocol)  
1 way isolation OCT output
- Other functions: built-in data logger, register time, accumulated flow, signal state, working time and so on.  
standard data interface RS232 is used in checking on internet or lead out the data.  
self -diagnose: tell the current working state whether it is normal or not.

### • host dimension



### • standard configuration



### • optional transducers



## Transducer parameters

Technical parameters	HS TYPE	HM TYPE	Standard S1 type	Standard M1 type	Standard L1 type	High-temp. S1H type	High-temp. M1H type
Pipe size(mm)	15~100	50~700	15~100	50~700	300~6000	15~100	50~700
Materials	Aluminum alloy		ABS			Special high-temp materials	
Working frequency	1MHz						
Installation	V (N, W)	V, Z	V (N, W)	V, Z	Z	V (N, W)	V, Z
Calibration	Whole flow meter matching calibration						
Magnetism	Yes				No		
Temp	0°C ~ 70°C					0°C ~ 160°C	
Protection	IP65						
Outline dimension	200×25×25	280×40×40	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
Weight	250	1080	75	250	650	94	150
Medium type	water、 sea water、 acid and alkali、 food oil、 gas、 coal oil、 diesel oil、 petroleum、 alcohol、 beer etc. these single and pure liquid which can transmit ultrasonic beam						
Medium turbidity	≤20000ppm and the bubble is less						
Pipe materials	Carbon steel、 stainless steel、 cast iron、 PVC、 cement pipe and other pipes whose materials are close . Liner are allowed (there can not be the interspace between the liner and the pipe exine)						
Liner material	epoxy bitumen, rubber, mortar, polypropylene, cooper, PVC, aluminum, glass steel and others						
Signal cable	Standard configuration: 5m × 2; selectable: 10m × 2 or 10m × 2						

### ● Model-selection of handheld ultrasonic flow meter

TDS-100- <sup>A</sup> <sup>B</sup> <sup>C</sup> <sup>D</sup> <sup>E</sup> <sup>F</sup> <sup>G</sup> <sup>H</sup>  
 +  +  +  +  +  +  -   
 basic model

Letters	Flow meter assemblies/parameters	Options
A	Standard configuration transducer	HM standard medium- rack transducer
B	Optional transducer( can select more than one)	HS standard small- rack transducer
C		S1 standard small transducer
D		M1 standard medium transducer
E		L1 standard large transducer
F		S1H high-temp small transducer
G		M1H high-temp medium transducer
H		Cable length

For example: TDS-100H-S1+M1+L1-5

Details of the model: handheld ultrasonic flow meter, standard small, medium, large transducer, cable length is 5m × + + 2

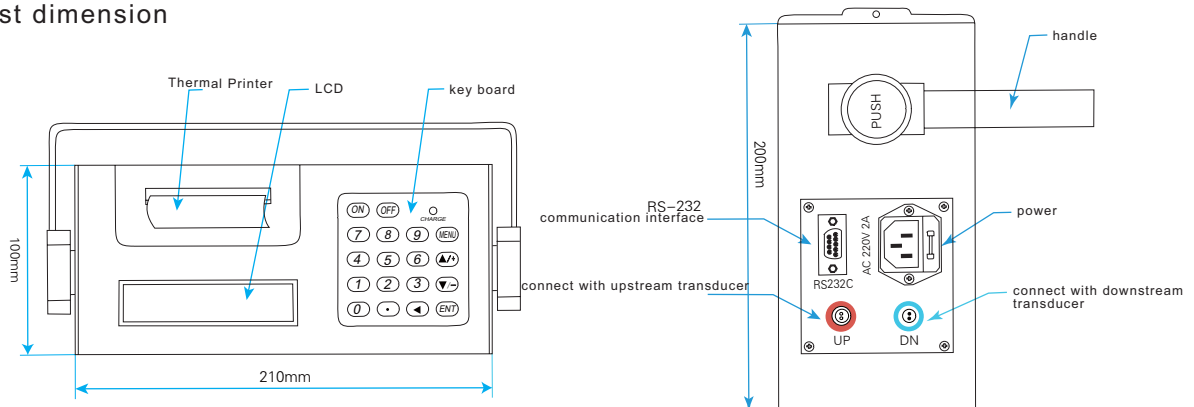
## Portable ultrasonic flow meter

TDS-100 series portable ultrasonic flow meters are used in the on-line calibration and measuring of the liquid flow in all kinds of conditions. It is high accuracy, good consistency, long-time battery power supply, easy operation, print on line and portable, and widely used in petrochemical industry, metallurgy, electric power, water, water conservancy, and energy monitoring industry.



- Measuring accuracy: better than 1%
- Repeatability: better than 0.2%
- Power supply: 220VAC (standard); 110 VAC (selectable)
- Measuring period: 500ms (twice / second, to collect 128 group data per period)
- Battery: built-in Ni-MH accumulator which can work for more than 24 hours continuously.
- Installation: clamp-on, easy operating.
- Display: double lines which display the instant flow, velocity, accumulated flow and signal state.
- Signal output: isolation RS485
- Communication protocol: MODBUS protocol, FUJI extended protocol and others.
- Print output: built-in whole thermal printer, which can realize in-time and set-time print
- Other functions: self -diagnose: tell the current working state whether it is normal or not.

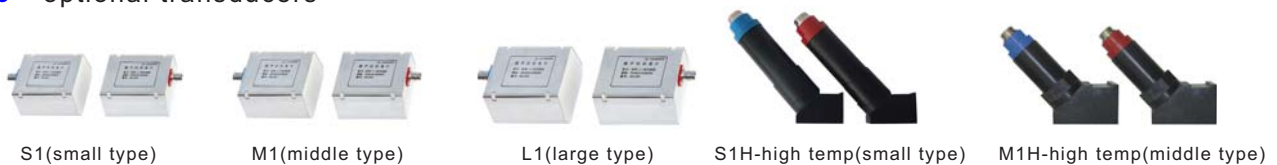
### • host dimension



### • standard configuration



### • optional transducers



## Sensor parameters

Technical parameters	HS TYPE	HM TYPE	Standard S1 type	Standard M1 type	Standard L1 type	High-temp. S1H type	High-temp. M1H type
Pipe size(mm)	15~100	50~700	15~100	50~700	300~6000	15~100	50~700
Materials	Aluminum alloy		ABS			Special high-temp materials	
Working frequency	1MHz						
Installation	V (N, W)	V, Z	V (N, W)	V, Z	Z	V (N, W)	V, Z
Calibration	Whole flow meter matching calibration						
Magnetism	Yes				No		
Temp	0°C ~ 70°C					0°C ~ 160°C	
Protection	IP65						
Outline dimension	200×25×25	280×40×40	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
Weight	250	1080	75	250	650	94	150
Medium type	water、 sea water、 acid and alkali、 food oil、 gas、 coal oil、 diesel oil、 petroleum、 alcohol、 beer etc. these single and pure liquid which can transmit ultrasonic beam						
Medium turbidity	≤20000ppm and the bubble is less						
Pipe materials	Carbon steel、 stainless steel、 cast iron、 PVC、 cement pipe and other pipes whose materials are close . Liner are allowed (there can not be the interspace between the liner and the pipe exine)						
Liner material	epoxy bitumen, rubber, mortar, polypropylene, cooper, PVC, aluminum, glass steel and others						
Signal cable	Standard configuration: 5m × 2; selectable: 10m × 2 or 10m × 2						

### ● Model-selection of handheld ultrasonic flow meter

TDS-100- <sup>A</sup> <sup>B</sup> <sup>C</sup> <sup>D</sup> <sup>E</sup> <sup>F</sup> <sup>G</sup> <sup>H</sup>  
 +  +  +  +  +  +  -   
 basic model

Letters	Flow meter assemblies/parameters	Options
A	Standard configuration transducer	HM standard medium- rack transducer
B	Optional transducer( can select more than one)	HS standard small- rack transducer
C		S1 standard small transducer
D		M1 standard medium transducer
E		L1 standard large transducer
F		S1H high-temp small transducer
G		M1H high-temp medium transducer
H		Cable length

For example: TDS-100H-S1+M1+L1-5

Details of the model: handheld ultrasonic flow meter, standard small, medium, large transducer, cable length is 5m × + + 2

## Fixed ultrasonic flow meter

TDS-100 series fixed ultrasonic flow meters are used in the on-line calibration and measuring of the liquid flow in all kinds of conditions. The host computers have fixed standard type, fixed anti-explosion type, embedded plate type and field display type. Transducers have clamp-on type, insertion type and pipe type.



- Measuring accuracy: better than 1%
- Repeatability: better than 0.2%
- Measuring period: 500ms (twice / second, to collect 128 group data per period)
- Max flow velocity: 64m/s
- Display: double lines which display the instant flow, velocity, accumulated flow and signal state.
- Operation: 4 × 4 touch keyboard (F4 computer magnetism key-press 4)
- Signal input: 3-way 4~20MA analog input, accuracy 0.1%, can input pressure, liquid level, temperature and so on.  
2-way PT100 platinum resistor
- Signal output: isolation RS485 output  
1 way isolation OCT (pulse width is 6~1000ms, adjustable, factory setup 200ms)  
1 way relay output (pulse width is 200ms)  
1 way 4-20MA output
- Communication protocol: MODBUS protocol, M-BUS protocol, FUJI extended protocol and others
- Other functions: Auto-memory the positive, negative, net accumulative flow 512 days, former months, former 10 year  
Auto-memory the power-on and power-off time and the flow of former 30 times, and also can realize auto and manual adding  
can read out the data by MODBUS protocol  
can program the batch (ration) controller, self -diagnose function  
can realize the update of software through the code files sent by E-mail
- Protection: transducer—IP68, F4 host computer—IP68, other host computer—IP65.
- Ex-proof grade: Exd BT4 (TDS-100F2 model)

### ● optional transducers



S1(small type)



M1(middle type)



L1(large type)



S1H-high temp(small type)



M1H-high temp(middle type)



standard plug in B type



long plug in B type



sanitary piping transducer

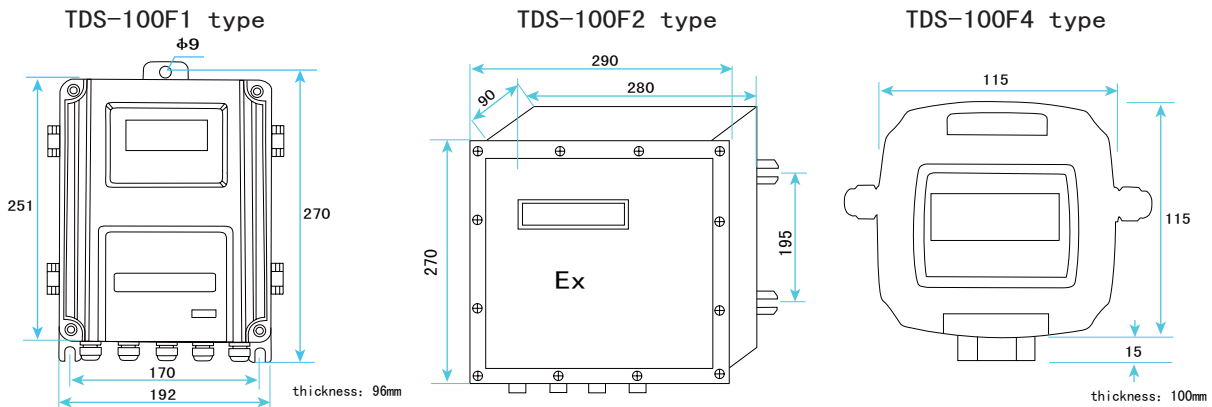


π type piping transducer



standard piping transducer

● Host outline dimension and Wiring Diagram of mainboard ( mm )



### Transducer parameters

Technical parameters	HS TYPE	HM TYPE	Standard S1 type	Standard M1 type	Standard L1 type	High-temp. S1H type	High-temp. M1H type
Pipe size(mm)	15~100	50~700	15~100	50~700	300~6000	15~100	50~700
Materials	Aluminum alloy		ABS			Special high-temp materials	
Working frequency	1MHz						
Installation	V (N, W)	V, Z	V (N, W)	V, Z	Z	V (N, W)	V, Z
Calibration	Whole flow meter matching calibration						
Magnetism	Yes				No		
Temp	0°C ~ 70°C					0°C ~ 160°C	
Protection	IP65						
Outline dimension	200×25×25	280×40×40	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
Weight	250	1080	75	250	650	94	150
Medium type	water、 sea water、 acid and alkali、 food oil、 gas、 coal oil、 diesel oil、 petroleum、 alcohol、 beer etc. these single and pure liquid which can transmit ultrasonic beam						
Medium turbidity	≤20000ppm and the bubble is less						
Pipe materials	Carbon steel、 stainless steel、 cast iron、 PVC、 cement pipe and other pipes whose materials are close . Liner are allowed (there can not be the interspace between the liner and the pipe exine)						
Liner material	epoxy bitumen, rubber, mortar, polypropylene, cooper, PVC, aluminum, glass steel and others						
Signal cable	Standard configuration: without cables						



## One-body ultrasonic flow meters

TDS-100 series one-body ultrasonic flow meters avoid the errors in sensors installation of clamp-on and insertion type transducer. It is high accuracy, wide measuring range, no pressure lose and easy installation.



sanitary type (DN25~DN100)



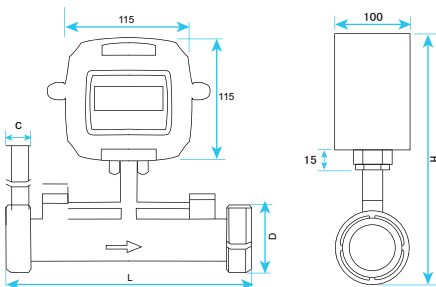
π piping type (DN15~DN40)



piping type(DN50~DN1000)

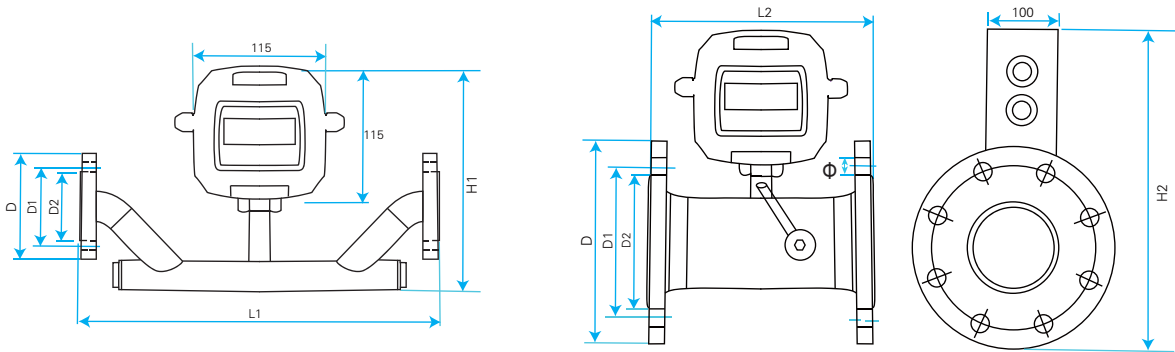
Measuring accuracy: better than 1%  
 Repeatability: better than 0.2%  
 Measuring period: 500ms (twice / second, to collect 128 group data per period)  
 Max flow velocity: 64m/s  
 Display: display the instant flow, velocity, accumulated flow and signal state.  
 Operation: magnetism key-press 4 operation in window  
 Signal input: 3-way 4~20MA analog input, accuracy 0.1%, can input pressure, liquid level, temperature and so on.  
 2-way PT100 platinum resistor  
 Signal output: isolation RS485 output  
 1 way isolation OCT (pulse width is 6~1000ms, adjustable, factory setup is 200ms)  
 1 way relay output (pulse width is 200ms)  
 1 way 4-20MA output  
 1 way bidirectional serial peripheral interface, can directly connect multiple external devices in series (such as mass data storage module, printers, etc)  
 Communication protocol: MODBUS protocol, M-BUS protocol, FUJI extended protocol and others  
 Connection: flange / loose joint (sanitary type)  
 Other functions: Auto-memory the positive, negative, net accumulative flow 512 days, former months, former 10 year  
 Auto-memory the power-on and power-off time and the flow of former 30 times, and also can realize auto and manual adding  
 can read out the data by MODBUS protocol  
 can realize the update of software through the code files sent by E-mail  
 Power-off protection: can reserve 100,000 hours data when it is power-off  
 Protection: IP68  
 Electric Interface: M16\*1.5

Union joint type (sanitary type) dimension (stainless steel)



DN (mm)	Pressure (MPa)	Loose joint external dimensions			
		L	H	D	C
25	4.0	300	282	51	19
40		300	300	74	23
50		300	310	84	24
65		350	330	100	28
80		400	345	114	30
100		450	365	128	31

### Flange piping type dimension



DN (mm)	pressure (MPa)	π pipe external dimensions (mm)		pipe external dimensions (mm)		Flange dimensions (mm)			
		L1	H1	L2	H2	D	D1	D2	N-Φ
15	2.5	320	136			95	65	46	14x4
20		360	142			105	75	56	14x4
25		390	151			115	85	65	14x4
32		450	157			140	100	76	18x4
40		500	169			150	110	84	18x4
50	1.6			200	260	165	125	99	18x4
65				200	280	185	145	118	18x4
80				225	295	200	160	132	18x8
100				250	314	220	180	156	18x8
125				250	347	250	210	184	18x8
150				300	372	285	240	211	22x8
200				350	430	340	295	266	22x12
250				450	489	405	355	319	26x12
300				500	543	460	410	370	26x12
350				550	599	520	470	429	26x12
400	1.0			600	653	580	525	480	26x16
450				700	708	640	585	548	30x20
500				800	771	670	620	585	25x20
600	0.6			1000	884	780	725	685	30x20
700				1100	964	860	815	775	24x25
800				1200	1072	975	920	880	24x30
900				1300	1172	1075	1020	980	24x30
1000				1400	1287	1175	1120	1080	28x30

