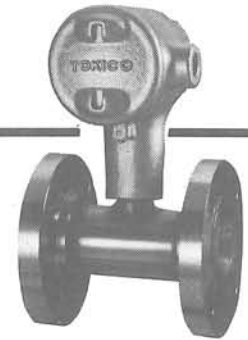


GENERAL SPECIFICATIONS

TOKICO TURBINE METER

TOKICO GS-F2010E



GENERAL

TOKICO Turbine Meter demonstrates an excellent performance by structural feature and is small and lighter than the flow meter of other methods and is possible a highly accurate measurement of a wide range. Therefore Turbine Meter is a typical meter of the turbine type adopted for a wide-ranging usage for the industrial control and the process control, etc. in all fields of the industrial world including dealings.

FEATURES

Wide measurement range and high accuracy
Compared with other types of flowmeters, TOKICO turbine meter is much smaller and lighter and can measure accurately in a very wide flow range. The high precision integrating accuracy of $\pm 0.2\%$ can be always maintained for dealings and $\pm 0.5\%$ for general purpose with excellent accuracy repeatability.

Extremely wide range of application

● Applicable fluid

Being of stainless steel construction, the meter has very high corrosion resistance. Therefore, the range of application is extremely wide, including water, petroleum and chemical liquids.

● Temperature

By selecting a suitable pickup coil for the standard measuring unit according to the temperature of the fluid to be handled, the meter can be applied for a wide range of temperature from -250°C to 500°C .

● Pressure

As the housing is pressure resistant cylindrical form, the meter can be used for high pressure fluid measuring purposes. (highest record of performance : 343 MPa { 3500 kgf/cm^2 })

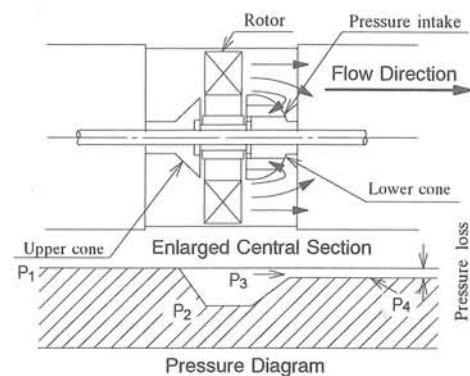
Unique rotor floating structure

The rotor rotates in a floating state by a unique fluid-dynamic balancing structure, which facilitates to provide very high accuracy in a wide flow range and superb durability.

Light and compact structure for easy maintenance

The light and compact structure facilitates easy handling and maintenance.

Principle of Floating Rotor



STANDARD SPECIFICATION (MEASURING UNIT)

Applicable Fluid	Water, Petroleum, Chemical Liquids, LPG, LNG etc.
Accuracy	$\pm 0.2\%$ or $\pm 0.5\%$
Flow Rate Range	0.36 ~ 3,500 m ³ /h
Fluid Temperature	$-250 \sim 500^{\circ}\text{C}$
Max. Working Press.	Flange Ratings
Fluid Viscosity	5 mm ² /s { 5 cSt } or less
Connection Size	20 mm (3/4 inch) ~ 350 mm (14 inch)
Flange Rating	JIS 10K, 20K FF or RF ANSI · JPI 150, 300 RF
Material	Housing
	Blade
	Bearing
	Others
	Piping Installation
Paint Color	

SUS304
(Under capacity model 54 type)
SUS304+S25C (Flange)
(More than capacity model 57 type)

SUS631
(Under capacity model 54 type)
SUS430
(More than capacity model 57 type)

Super Hard Alloy

SUS304

Horizontal Piping

Silver (Only indicating unit)

STANDARD SPECIFICATION (PREAMPLIFIER UNIT)

Composition Specification	Without Direct-reading Indicator				With Direct-reading Indicator
	Standard Type	High Sensitivity Type	Non-frequency Multiplication Type	Frequency Multiplication Type	Two Wire Transmission Type
Type					
Model	M	N	O	P	T
Application Model	Standard Capacity Type 60 or Under	In Case Pickup Coil B	—	Standard Capacity Type 63 or Over	—
Power Supply	12V DC±1.2V		24V DC±2.4V		
Power Consumption	30 mA		100 mA	25 mA or less	
Output Pulse	4V±1V ^{P-P} (Non-compensation) (6.5V or less in floating voltage)	7V±1.5V ^{P-P} (Non-compensation) (4V or more in floating voltage)	6V±1.5V ^{P-P} (Non-compensation) (4V or more in floating voltage)	「0」 About 4 mA 「1」 About 20 mA	Current Pulse (calculation correction or non-correction)
Load Resistance	1 kΩ		200 Ω	470 Ω or less	
Ambient Temperature	-10 ~ 80 °C			-10 ~ 60 °C	
Structure	Flame-Proof (d2G4)				
Cable	2-core Shielded Cable (Cross-section area of cores. 0.75~2 mm ²).				
Transmission Distance	2 km (at 2 mm ² section area of wick wire)				
Wiring Connection	G1/2 (PF1/2 Female Screw)				

Totalizer (8 digits)
(also for momentary flow rate indication)



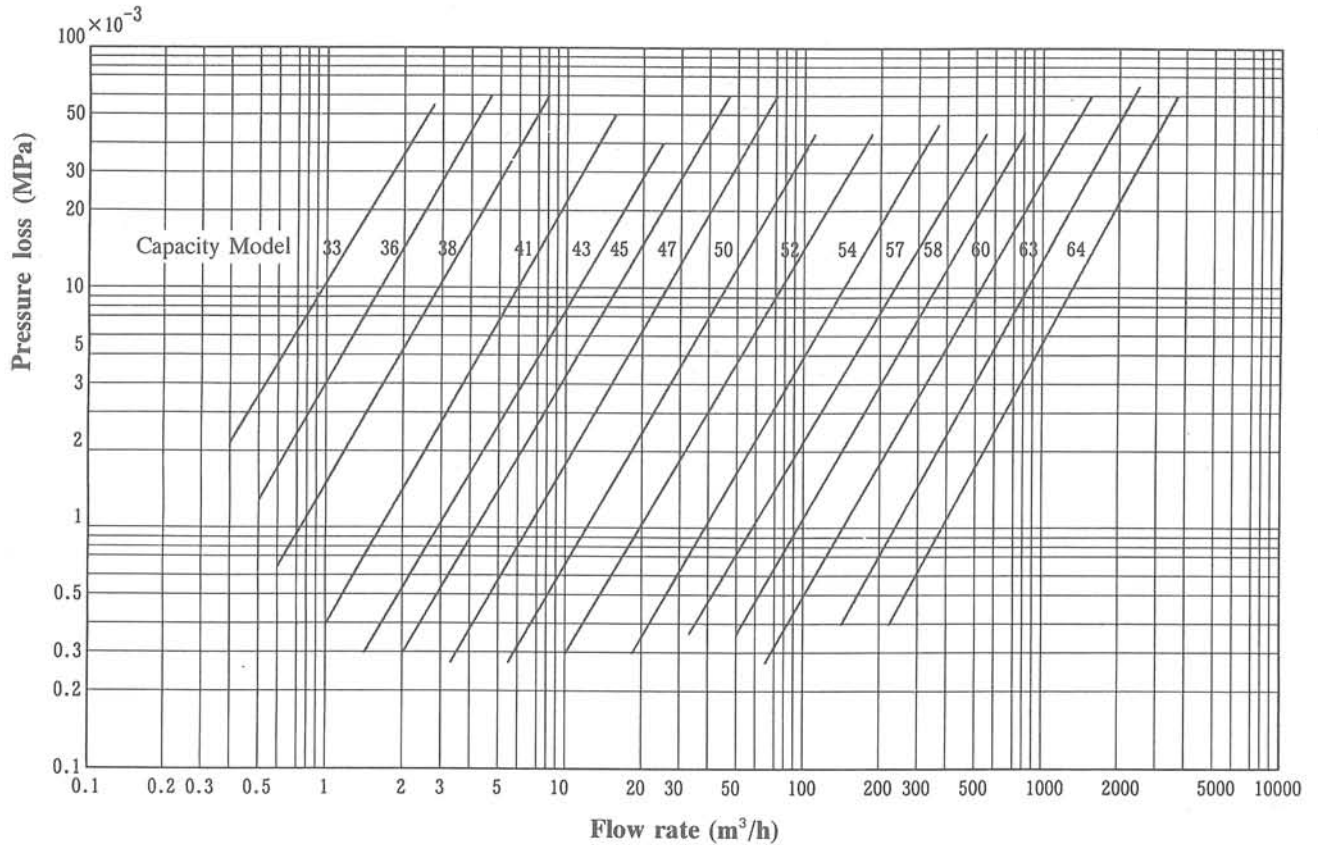
Turbine Meter with direct-reading indicator.

FLOW RATE RANGE AND SPECIFICATION

Capacity Model	Conn. Size (mm)	Min. Flow Rate (m ³ /h)				Max. Flow Rate (m ³ /h)		Meter Constant (P/L)	Max. Output Frequency (Hz)	Strainer Standard Screen Mesh
		Accuracy ±0.5%		Accuracy ±0.2%		Continuous	Intermittent			
		1 mm ² /s or less	5 mm ² /s or less	1 mm ² /s or less	5 mm ² /s or less					
33 (05)	20	0.36	0.9	1.2	1.6	2.2	2.7	830	620	200
36 (06)	25	0.48	1.5	1.8	2.5	3.6	4.5	490	610	100
38 (07)		0.6	2.0	2.0	3.0	6.6	8.0	270	600	
41 (08)		1.0	3.5	4.5	6.5	14	18	130	650	
43 (09)	50	1.4	4.5	6.0	9.0	21	26	85	610	80
45 (10)		2.0	5.6	8.0	12	30	36	60	600	
47 (11)		3.6	7.2	10	18	58	72	35	700	
50 (12)	80	6.0	15	17	30	90	110	20	610	40
52 (13)	80,100	10	25	23	38	150	180	12	600	
54 (15)	100	20	37	40	53	280	340	5.5	520	
57 (16)	150	35	47	63	66	450	580	2.4	390	
58 (17)	200	50	61	80	90	660	820	1.25	280	
60 (18)	250	75	100	110	120	1,200	1,450	0.58	230	
63 (19)	300	150	160	210	230	1,800	2,230		360	
64 (20)	350	220	225	280	300	2,800	3,500	0.38	370	

- Note) 1. () in Capacity : old type.
 2. Meter constant and max. output frequency are approx. values (to be confirmed by calibration)
 3. This table shows values for standard specification.
 4. Continuousness is a operation of 8-24 hours a day. Intermittent is a operation for eight hours or less a day.
 5. 1 mm²/s=1 cSt

PRESSURE LOSS CHARACTERISTIC



STANDARD UNITS OF RECEIVER AND DIRECT READING INDICATOR

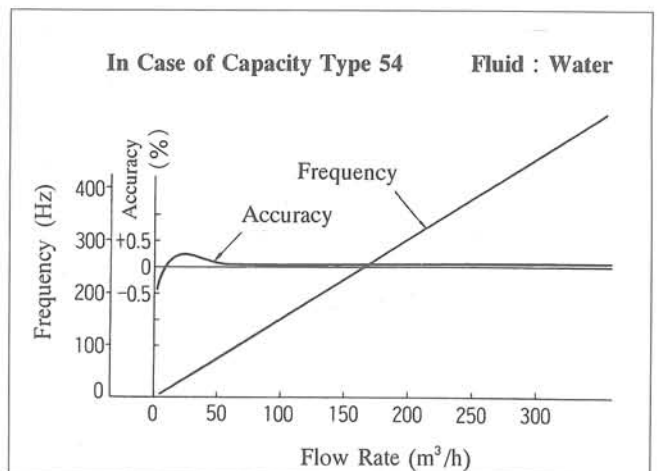
Capacity Model	Receiver		Direct-Reading Indicator		
	Scale Compensation Output units L/P	Totalizer Standard Units L	Totalizer Standard Units kL	Momentary Flow Rate Indicator Units kL/h	Scale Compensation Output units L/P
33 (05)	0.01	1	1 (L)	1 (L/h)	* 0.01
36 (06)					
38 (07)					
41 (08)					
43 (09)	0.1	10	0.01	0.01	* 0.1
45 (10)					
47 (11)					
50 (12)					
52 (13)	1	100	0.1	0.1	1
54 (15)					
57 (16)					
58 (17)					
60 (18)	10	1,000	1	1	10
63 (19)					
64 (20)					

Note 1) This table indicates the case of the water of the specific gravity 1.00 and viscosity 1.0 cst.

$$\Delta P = \{\text{Viscosity (mPa}\cdot\text{s)}\}^{1/4} \times \{\text{Specific gravity}\}^{3/4} \times \Delta P(\text{Water})$$

2) 0.98 MPa = 10 kgf/cm², 1 mPa·s = 1 cP

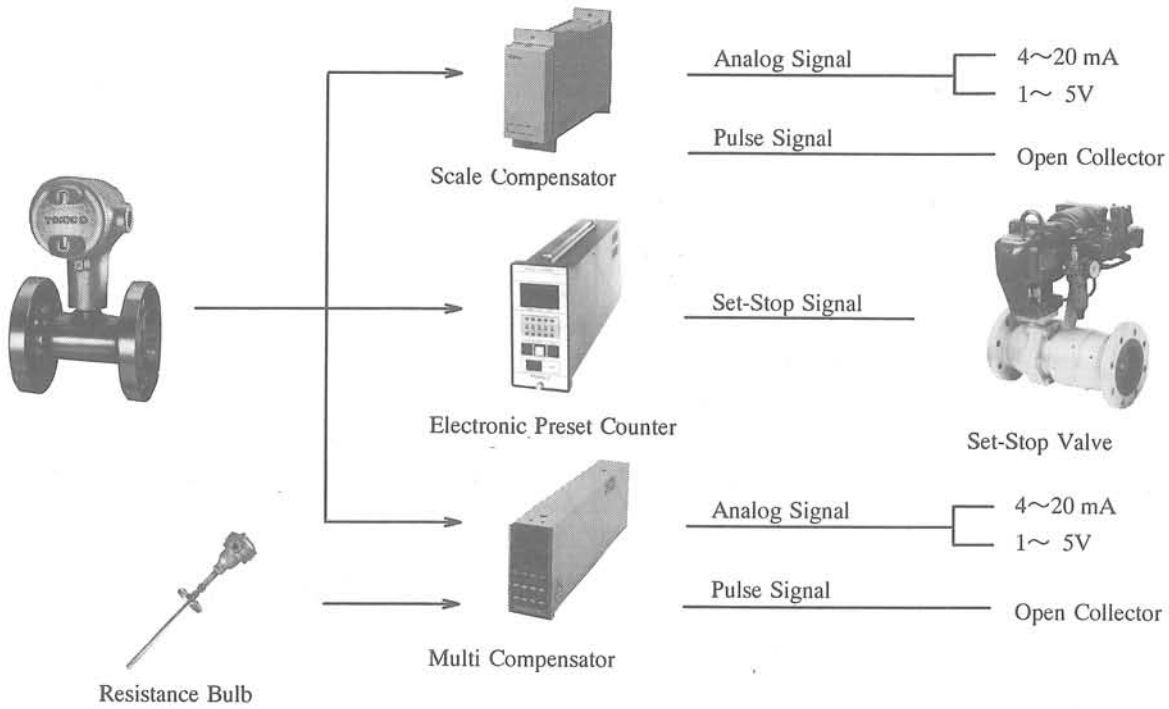
PERFORMANCE CHARACTERISTIC



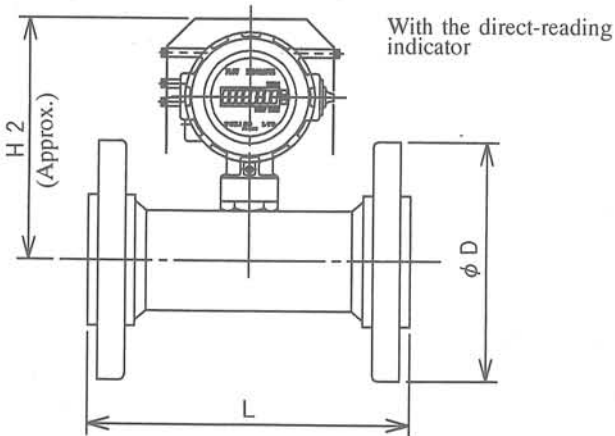
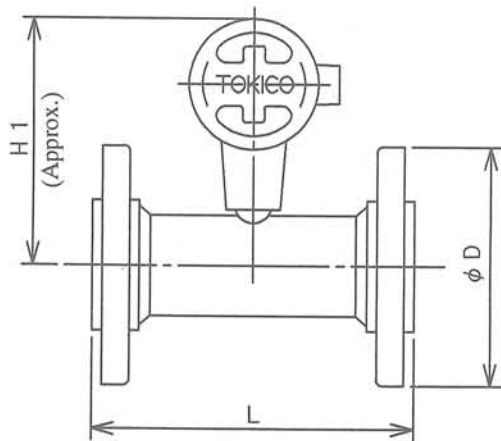
Note 1) () in Capacity : old type.

2) * marked output units indicate cases that the meter max. frequency is less than 600 Hz. In case of 600 Hz or over, value is 1/10 division.

EXAMPLE OF INSTRUMENTATION



DIMENSION DRAWING



Conn. Size Capacity Type	Conn. Size (mm)	Dimensions (mm)				Approx. Weight (kg)	
		φ D	L	H1	H2		
B633	20	98	140	210	255	5	
B836	25	108		215	260	6	
B838			152	165	225	270	9
B841							11
0543	50	152	165	225	270	10	
0545						16	
0547						15	
0850	80	190	254	240	285	29	
0852						24	
1052	100	229	305	250	295	24	
1054						36	
1557	150	279	356	275	320	36	
2058	200	343	406	300	345	65	
2560	250	406	508	325	370	105	
3063	300	483	610	350	395	160	
3564	350	533	711	365	410	200	

- Note) 1) The table shows the dimensions of ANSI·JPI 150 flange. However, dimension L is common up to JIS 20K and ANSI·JPI 300.
- 2) As for the Approx weight, when the direct-reading indicator is installed, 2kg is added to the value of the table on.

BASIC MODELS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Contents
F	P	L														TOKICO Turbine Meter
Conn. Size	B	6														3/4 inch (20 mm)
	B	8														1 inch (25 mm)
	0	5														2 inch (50 mm)
	0	8														3 inch (80 mm)
	1	0														4 inch (100 mm)
	1	5														6 inch (150 mm)
	2	0														8 inch (200 mm)
	2	5														10 inch (250 mm)
	3	0														12 inch (300 mm)
3	5														14 inch (350 mm)	
Capacity Model			Intermittent Max. Flow Rate (Conn. Size)													
	3	3														2.7 m ³ /h (20 mm)
	3	6														4.5 m ³ /h (25 mm)
	3	8														8 m ³ /h (25 mm)
	4	1														18 m ³ /h (25 mm)
	4	3														26 m ³ /h (50 mm)
	4	5														36 m ³ /h (50 mm)
	4	7														72 m ³ /h (50 mm)
	5	0														110 m ³ /h (80 mm)
	5	2														180 m ³ /h (80,100 mm)
	5	4														340 m ³ /h (100 mm)
	5	7														580 m ³ /h (150 mm)
	5	8														820 m ³ /h (200 mm)
	6	0														1450 m ³ /h (250 mm)
6	3														2230 m ³ /h (300 mm)	
6	4														3500 m ³ /h (350 mm)	
Max. Working Pressure							Nominal Working Press. {kgf/cm ² }		Max. Working Press. MPa {kgf/cm ² }		Hydraulic Test Press. MPa {kgf/cm ² }		Applicable Flange Rating			
	B						10	1.18 {12 }	1.96 {20 }	10K						
	D						20	1.89 {19.3}	2.93 {29.9}			150				
	F						30	3.04 {31 }	4.90 {50 }	20K						
	G						40	4.16 {42.5}	6.25 {63.8}			300				
Material	P P						Housing		Blade		Application					
	P B						SUS304		SUS631		Type 54 or Under : Standard					
	K B						SUS304+S25C		SUS430		Type 57 or Over : Standard					
Transmission part composition							Structure		Fluid Temp.		Explosion Proof					
	A						Mono-Block		-10~80°C		Flame-Proof (d2G4)					
	C						Separate		Under -10°C More than 80°C		Intrinsic Safety (i3nG5)					
	E						Direct-Reading		-10~50°C		Flame-Proof (d2G4)					
Pickup Coil							Type		Fluid Temp.		Blade Material					
	A						Reluctance Coil	For Normal Temp.	-20~180°C		Magnetic Body (SUS631) (SUS430)					
	B							For High Temp.	More than 180°C							
C						For Low Temp.		Under -20°C								
Preamplifier							Type		Application Capacity Type		Fluid Temp.		Power Source			
	M						Standard		33~60 type		180°C or Under		12V DC			
	N						High Sensitivity		33~64 type		180°C or Over					
	O						Non-Frequency Multiplication		33~60 type		-10~80°C		24V DC			
	P						Frequency Multiplication		63~64 type							
T						Direct-Reading Indicator		33~64 type		-10~50°C						
Extension																
							L		For Low Temperature							
							H		For High Temperature							
						X		Without Extension								

Note 1) The maximum working pressures are for the temperature 220°C or under for JIS and 38°C or under for ANSI and JPI.

2) When the meter is employed for high pressure gas, corrosive fluid or fluid pressure over ANSI·JPI 300, apply the body material code PP or PB.

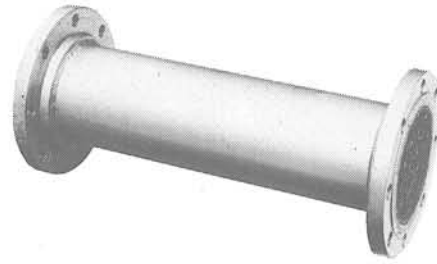
3) By providing the pulse barrier and the power unit for the pulse barrier, the device can be converted into intrinsic safety explosion proof type (i3nG4) (for reluctance type coil only)

ACCESSORIES

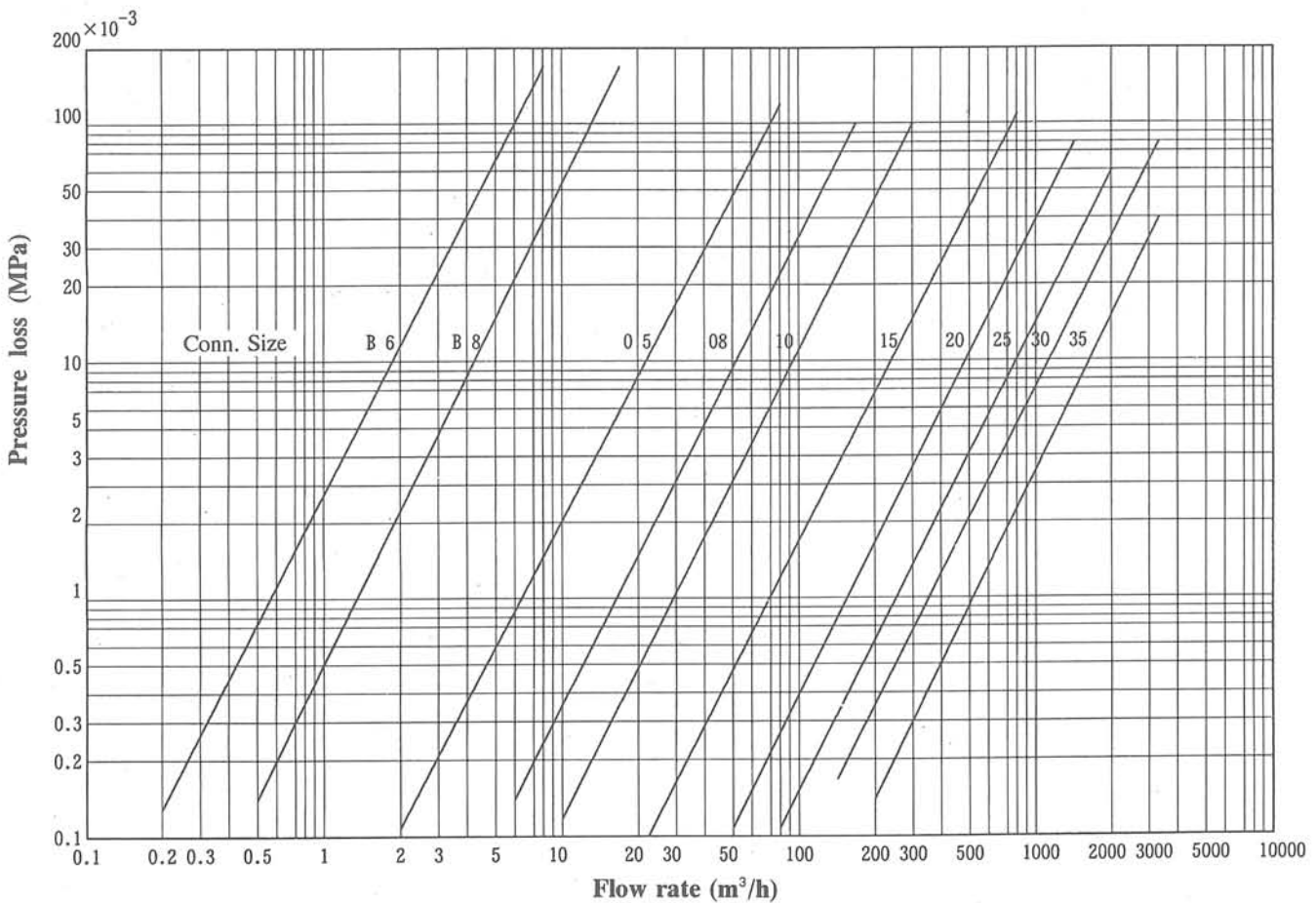
STRAIGHTENER

GENERAL

The Straightener is a device in which a lot of rectification tubes are arranged in the pipe with the flow to steady. To reproduce the accuracy when the instrument accuracy at the time of calibration, the strainer is installed at a fixed position of the upstream side of Turbine Meter as Turbine Meter is not influenced by the disturbance of the flow of the upstream side.



PRESSURE LOSS CHARACTERISTIC



Note 1) This table indicates the case of the water of the specific gravity 1.00 and the viscosity 1.0cSt.

$$\Delta P = \{\text{Viscosity (mPa}\cdot\text{s)}\}^{1/4} \times \{\text{Specific gravity}\}^{3/4} \times \Delta P(\text{Water})$$

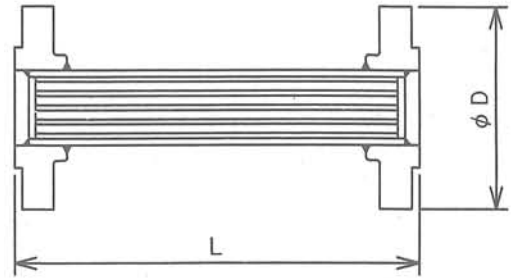
2) 0.98 MPa = 10kgf/cm², 1 mPa·s = 1 cP

BASIC MODELS

1	2	3	4	5	6	7	8	Contents	
F	L	S						Straightener	
Conn. Size	B	6						3/4 inch	(20 mm)
	B	8						1 inch	(25 mm)
	0	5						2 inch	(50 mm)
	0	8						3 inch	(80 mm)
	1	0						4 inch	(100 mm)
	1	5						6 inch	(150 mm)
	2	0						8 inch	(200 mm)
	2	5						10 inch	(250 mm)
	3	0						12 inch	(300 mm)
3	5						14 inch	(350 mm)	
Max. Working Pressure					Nominal Working Press. {kgf/cm ² }		Max. Working Press. MPa {kgf/cm ² }	Applicable Flange Rating	
	B				10		1.18 {12 }	10K	150
	D				20		1.89 {19.3 }		
	F				30		3.04 {31 }	20K	300
	G				40		4.16 {42.5 }		
Material					Housing		Straightening Tube		
	B	P			STPG370 (Standard)		SUS304		
	P	P			SUS304				

Note) The maximum working pressures are for the temperature 220°C or under for JIS and 38°C or under for ANSI and JPI.

DIMENSION DRAWING



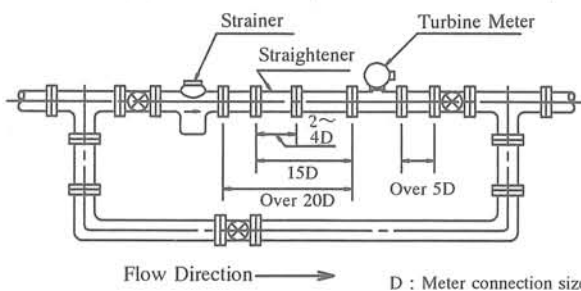
Application Conn. Size (mm)	Size (mm)		Approx. Weight (kg)
	φD	L	
20	98	100	1.6
25	108	110	2.2
50	152	210	7
80	190	330	15
100	229	410	22
150	279	610	42
200	343	810	82
250	406	1010	130
300	483	700	145
350	533	800	200

Note) The table shows the dimensions of ANSI·JPI 150 flange. However, dimension L is common up to JIS 20K and ANSI·JPI 300.

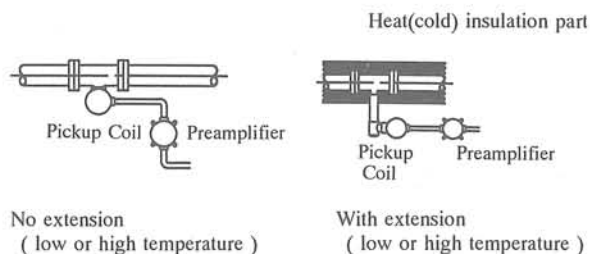
CAUTIONS FOR USE

(1) Caution for piping installation

Standard piping example (Depend on JIS Z8765)



Please separate pickup coil and the preamp, except when it is -10 ~ 80°C in temperature of the fluid. (Make the length of the wiring 5m or less between the pickup coil and the preamp)



(2) Caution for wiring installation

●Wiring must be used two wick shield line.
The relation between the thickness and the transmission distance of the wick wire is shown in the table below.

Core Cross Section Area	Transmission Distance
0.9 mm ²	1.2 km Below
1.25 mm ²	1.2~1.5 km
2.0 mm ²	1.5~2.5 km

- Please install straight tubes on the upstream and the downstream of TOKICO turbine meter like left drawing to correctly reproduce the accuracy at the time of calibration. And, please set up the strainer in TOKICO turbine meter.
- Please set up the detection edges such as the thermometer and pressure gauges (well) from meter exit to the downstream sides of 5D or more. And, adjust the flow on the downstream sides of the meter.
- Please use a concentric reducer when you install reducer at the entrance of the meter.
- For the evaporation prevention of the liquid, please maintain the value which satisfies the following expression in fluid pressure P on the meter exit side.

$$P \geq 2\Delta P + 1.25P_v$$
 (Depend on API 2534)
 ΔP : Pressure loss of meter in the maximum flow
 P_v : Steam pressure of fluid at maximum working temperature
- Please avoid the installation in the following places to prevent a turbulence and secure a normal signal because TOKICO turbine meter detects a minute flow signal.
Please separate as a standard by 10m or more.
 - ① High voltage or high current source and the vicinity of that wiring.
 - ② Place of magnetic field.

- Please ground the earth by one point on the receiver side.
- Wiring must not coexist with the electric wire tube etc. of the same position duct as power line of 100V AC or more. Please separate by 1m or more when adjoining concurrently even in case of an different duct.

ORDERING INSTRUCTIONS : Specify the followings when ordering

No.	Item	Contents
1	Applications	Production Control, Dealings, Loading and unloading etc.
2	Applicable Fluid Name	Name, Components, Existence of Admixture and Corrosion.
3	Accuracy	$\pm 0.2\%$, $\pm 0.5\%$
4	Flow Rate	Maximum, Normal, Minimum (time of use for each day) (L/h or m ³ /h)
5	Operating Temperature	Maximum, Normal, Minimum (°C)
6	Operating Pressure	Maximum, Normal, Minimum (MPa)
7	Viscosity and Specific Gravity	Viscosity (at°C), Specific Gravity (at°C)
8	Connection Standard	Connection Size and Flange Standard, etc.
9	Flow Direction	Right → Left Left → Right
10	Unit of Calculation	Unit of Counter (with direct-reading counter part) (L)
11	Unit of Transmission	Unit of Output Pulse (with direct-reading counter part) (L/P)
12	Applied Regulations	Name of Regulations and Standards
13	Attached Equipment	Necessity of Strainer, Straightener and Valve, etc.
14	Power Supply	
15	Air Source	for Set-stop Measuring System
16	Amount and Time of Intake	for Set-stop Measuring System (Please order the intake accuracy if necessary)

*Please use the flowmeter correctly after reading 'Guidance book'.

*The information in this General Specification subject to change without prior notice.

TOKICO LTD.

INTERNATIONAL OPERATIONS
PARALE MITSUI BUILDING
8 HIGASHIDA-CHO KAWASAKI-KU
KAWASAKI-CITY 210 JAPAN
TEL. (044)200-0244
INT'L FAX. (044)200-0271