

# Flowmeters



Model ERL



Model ESF

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## Flowmeters

# Model ERL Karman vortex Flowmeter

RoHS2



ERL-6, ERL-10

### Features

- ⦿ The flowmeter for fluids that detects the Karman vortex using piezoelectric element.
- ⦿ This series has no monitor, lightweight and compact.
- ⦿ It can be parallel piping in narrow-spaced, and it is appropriate for compact equipment design.

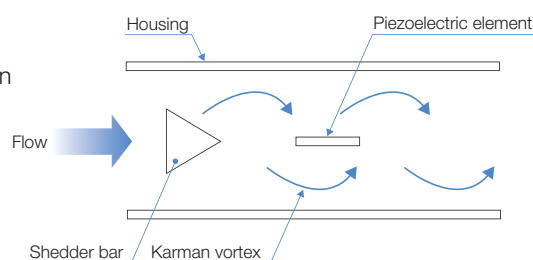
### Specifications

Type		ERL-6	ERL-10	ERL-10H	ERL-15
Fluids		DI water / Fluids not corrosive against wetted parts			
Flow range		0.3~2.5L/min	0.4~4L/min	0.4~7L/min	2~16L/min
Accuracy (Accuracy for DI water)		±2% F.S.(at 25℃)			
Ambient temperature		15~60℃			
Fluid temperature		15~85℃			
Fluid pressure		Max.800kPa(at 25℃) Max.590kPa(at 85℃)			
Tube size		1/4" (Ø6.35×Ø3.95)	3/8" (Ø9.53×Ø6.35)	3/8" (Ø9.53×Ø6.35)	1/2" (Ø12.7×Ø9.53)
Connection type		Tube			
Wetted parts		PFA			
Mounting positions		Horizontal, Vertical or Diagonal ("OUT" side can not be lower than horizontal)			
Analog output	Output	DC4mA(0.0L/min)~20mA(2.5L/min)	DC4mA(0.0L/min)~20mA(4L/min)	DC4mA(0.0L/min)~20mA(7L/min)	DC4mA(0.0L/min)~20mA(16L/min)
	Load resistance	500Ω or less			
Pulse output	Output	NPN open collector			
	Applied voltage/current	Max.DC30V/80mA			
	Pulse unit	10mL/P			
	Pulse range	5msec			
Power supply		DC24V±10%			
Current consumption		110mA or less			
Cable		2m			

### Operation Principal

By placing the shedder bar in the flow, Karman vortices proportional to the flow velocity in the downstream direction are regularly generated.

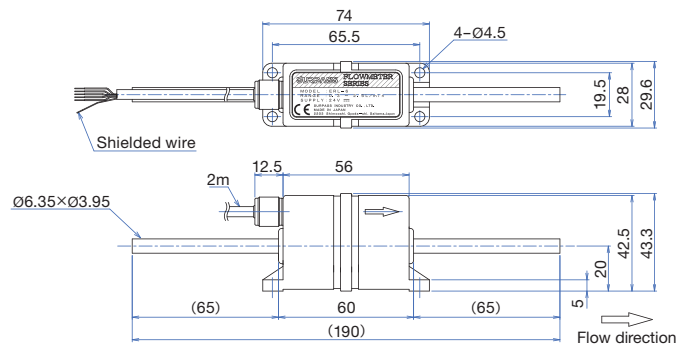
An piezoelectric element receives generated the number of Karman vortices and measures the flow rate by detecting the voltage change.



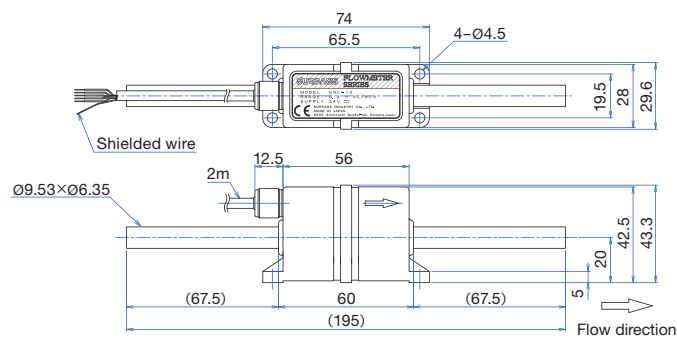


## Dimensions

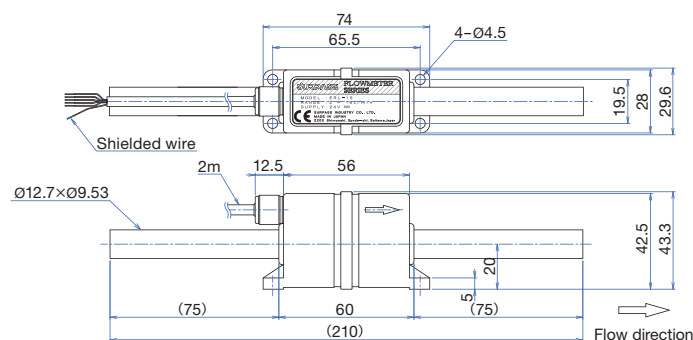
### ● ERL-6



### ● ERL-10 ● ERL-10H



### ● ERL-15

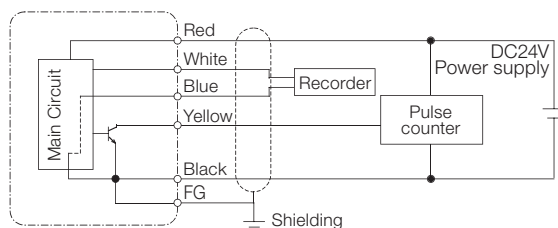


### Caution

- Install straight-tube parts on both sides of flowmeter. The straight-tube length of "IN" side must be at least 7 times longer than the inner tube diameter, and that of "OUT" side must be at least 5 times longer than the inner tube diameter.
- Provide a back pressure on the secondary side of the flowmeter to generate a stable Karman vortex.

## Wiring Diagram

※When wiring, be sure to make the appropriate connection with reference below.



※Black, Blue cable, and FG are connected on the circuit.

Signals	Color
DC24V Power supply	Red
0V Power supply	Black
4~20mA output (+)	White
4~20mA output (-)	Blue
Pulse output (+)	Yellow

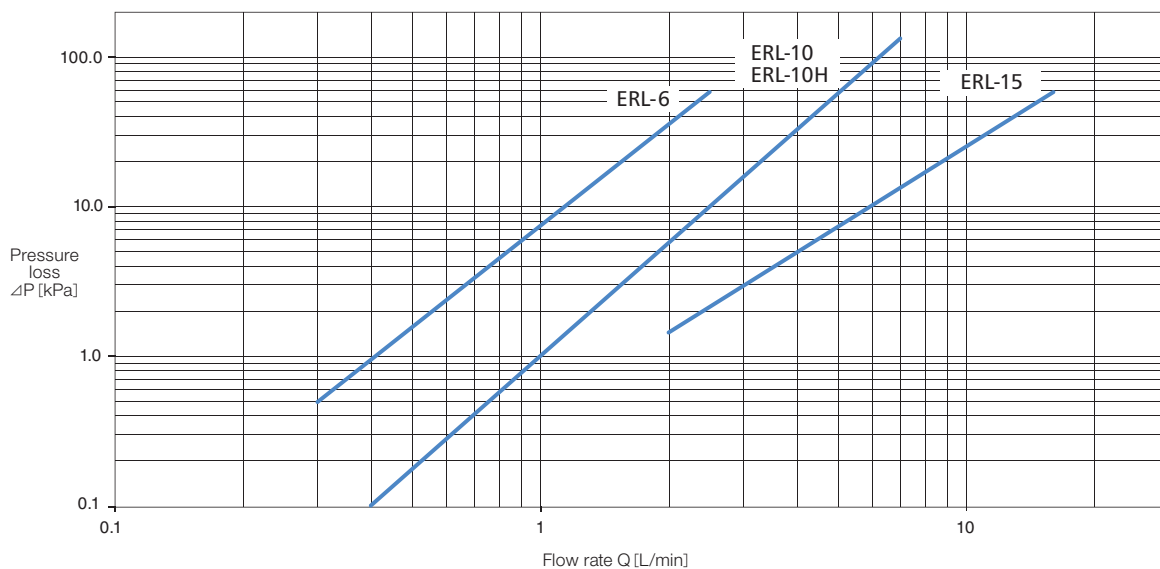
Cable specification: AWG #28X7C with shield

Item	Specifications
Size	AWG28
Number of cores	7 cores
Cable core diameter	Ø0.83
External diameter	Ø3.6
Outer cover material	PVC covering
Standard	UL Style2725



# Flowmeters

## Flow Characteristics



Fluid : Water Fluid Temperature : Room Temp. Ambient Temperature : Room Temp.

※The data is reference value, not a guaranteed value.

To prevent the occurrence of cavitations\*, the pressure value at the downstream side should be more than one obtained from the following formula.

$$P_d = 2.7 \Delta P + 1.3 P_0$$

$P_d$  : Pressure values at the downstream side [kPa]

$\Delta P$  : Pressure loss values [kPa]

$P_0$  : Vapor pressure values of fluids [kPa abs]

### \*Cavitations

When the pressure of the liquid drops below the saturation vapor pressure, the liquid evaporates, and generating air bubbles.



# Model ESF Eddysonic Flowmeter

RoHS2



## Features

- The flowmeter for fluids that detects the Karman vortex using ultrasonic sensor.
- ESF is simple structure to provide cleanliness and no-moving parts.
- High and Low limit alarm can be set to any level using selector keys.
- Monitor available for all ESF series, you can confirm actual value on the spot.

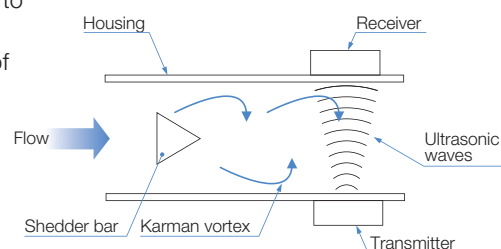
## Specifications

Type		ESF-10	ESF-15
Fluids		DI water / Fluids not corrosive against wetted parts	
Flow range		0.5~3.5L/min	1.0~16.0L/min
Flow rate display range		0.0~4.0L/min	0.0~18.0L/min
Accuracy (Accuracy for DI water)		±5% F.S.(at 25°C)	±2.5% F.S.(at 25°C)
Ambient temperature		5~60°C	
Fluid temperature		5~85°C	
Fluid pressure		Max.800kPa(at 25°C)	
Tube size		3/8" (Ø9.53×Ø6.35)	1/2" (Ø12.7×Ø9.53)
Connection type		Tube	
Wetted parts		PFA	
Mounting positions		Horizontal, Vertical or Diagonal ("OUT" side can not be lower than horizontal)	
Analog output	Output	DC4mA(0.0L/min)~20mA(3.5L/min)	DC4mA(0.0L/min)~20mA(16.0L/min)
	Load resistance	500Ω or less	
Pulse output	Output	NPN open collector	
	Applied voltage/current	Max.DC30V/80mA	
	Pulse unit	10mL/P	
	Pulse range	5msec	
Hi / Low limit setting output	Output	NPN open collector	
	Applied voltage/current	Max.DC30V/80mA	
	LED indicator	LO turns off : less than Low limit, HI/LO turns on : within High & Low limit, HI turns off : more than High limit	
Power supply		DC24V±10%	
Current consumption		120mA or less	
Cable		2m	

## Operation Principal

By placing the shedder bar in the flow, Karman vortices proportional to the flow velocity in the downstream direction are regularly generated.

An ultrasonic sensor installed outside the body detects the number of Karman vortices and measures the flow rate.

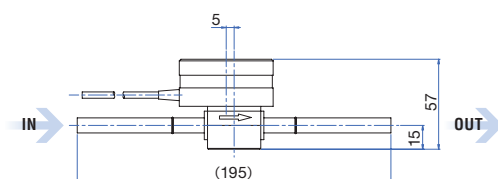
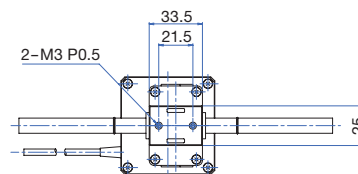
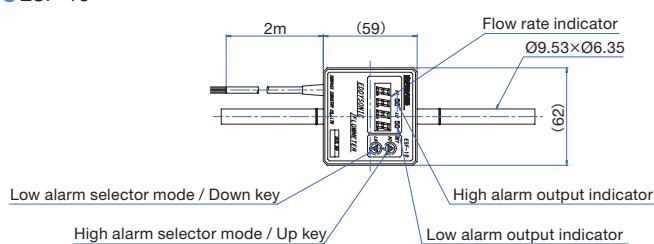




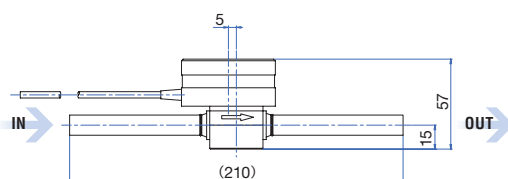
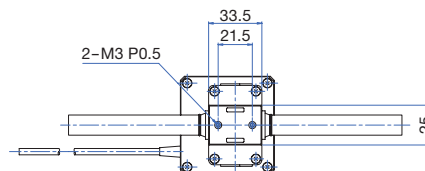
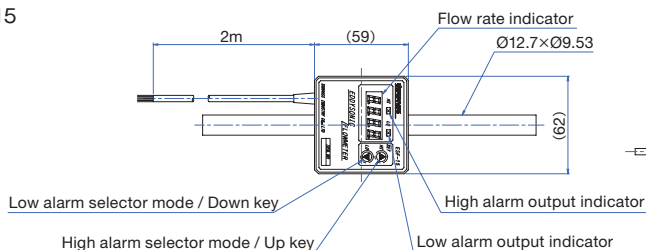
# Flowmeters

## Dimensions

### ● ESF-10



### ● ESF-15

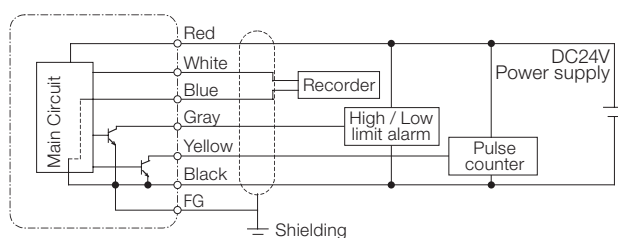


### Caution

- Install straight-tube parts on both sides of flowmeter. The straight-tube length of "IN" side must be at least 7 times longer than the inner tube diameter, and that of "OUT" side must be at 5 times longer than the inner tube diameter.
- An abnormal output may occur if the pressure in the piping is not pressurized while water flow is stopped. Be sure to apply a pressure of 100 kPa or more.
- Provide a back pressure on the secondary side of the flowmeter to generate a stable Karman vortex.

## Wiring Diagram

※When wiring, be sure to make the appropriate connection with reference below.



※Black, Blue cable, and FG are connected on the circuit.

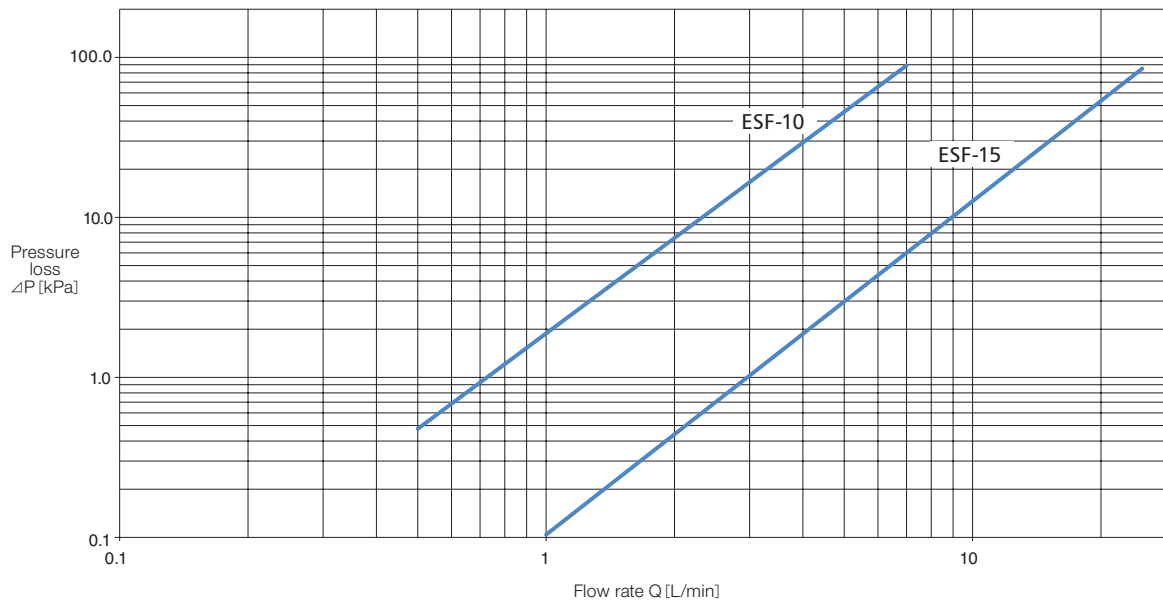
Signals	Color
DC24V Power supply	Red
0V Power supply	Black
4~20mA output (+)	White
4~20mA output (-)	Blue
Pulse output (+)	Yellow
High / Low limit output	Gray

Cable specification: AWG #28X7C with shield

Item	Specifications
Size	AWG28
Number of cores	7 cores
Cable core diameter	Ø0.83
External diameter	Ø3.6
Outer cover material	PVC covering
Standard	UL Style2725



## Flow Characteristics



Fluid : Water Fluid Temperature : Room Temp. Ambient Temperature : Room Temp.

※The data is reference value, not a guaranteed value.

To prevent the occurrence of cavitations\*, the pressure value at the downstream side should be more than one obtained from the following formula.

$$P_d = 2.7 \Delta P + 1.3 P_0$$

$P_d$  : Pressure values at the downstream side [kPa]

$\Delta P$  : Pressure loss values [kPa]

$P_0$  : Vapor pressure values of fluids [kPa abs]

### \*Cavitations

When the pressure of the liquid drops below the saturation vapor pressure, the liquid evaporates, and generating air bubbles.



## Flowmeters

## Model ESF Eddysonic Flowmeter

RoHS2



## Features

- The flowmeter for fluids that detects the Karman vortex using ultrasonic sensor.
- ESF is simple structure to provide cleanliness and no-moving parts.
- High and Low limit alarm can be set to any level using selector keys.
- Monitor available for all ESF series, you can confirm actual value on the spot.
- There is a optional base for ESF-20 available.

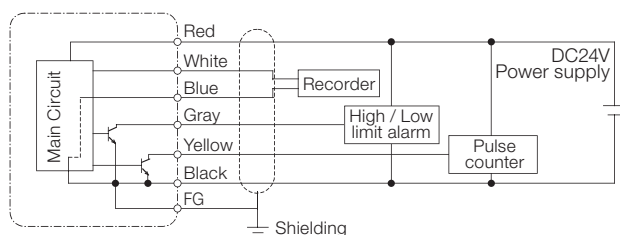
## Specifications

Type		ESF-20	ESF-20-B	ESF-25
Fluids		DI water / Fluids not corrosive against wetted parts		
Flow range		2.0~40.0L/min		5.0~130L/min
Flow rate display range		0.0~44.0L/min		0.0~145L/min
Accuracy (Accuracy for DI water)		±1.5%F.S.(at 25℃)		±2.5%F.S.(at 25℃)
Ambient temperature		5~60℃		
Fluid temperature		5~85℃*		5~85℃
Fluid pressure		Max.600kPa(at 25℃)		Max.450kPa(at 25℃)
Tube size		3/4" (Ø19.05×Ø15.9)		1" (Ø25.4×Ø22.2)
Connection type		Tube		
Wetted parts		PFA		
Mounting positions		Horizontal, Vertical or Diagonal ("OUT" side can not be lower than horizontal)		
Analog output	Output	DC4mA(0.0L/min)~20mA(40.0L/min)		DC4mA(0.0L/min)~20mA(130L/min)
	Load resistance	500Ω or less		
Pulse output	Output	NPN open collector		
	Applied voltage/current	Max.DC30V/80mA		
	Pulse unit	10mL/P		100mL/P
	Pulse range	5msec		
Hi / Low limit setting output	Output	NPN open collector		
	Applied voltage/Current	Max.DC30V/80mA		
	LED indicator	LO turns off : less than Low limit, HI/LO turns on : within High & Low limit, HI turns off : more than High limit		
Power supply		DC24V±10%		
Current consumption		120mA or less		
Cable		2m		

\*For the ESF-20, when the liquid temperature is 70℃ or higher, the flow rate range is 6.0~40.0L/min.

## Wiring Diagram

※When wiring, be sure to make the appropriate connection with reference below.



※Black, Blue cable, and FG are connected on the circuit.

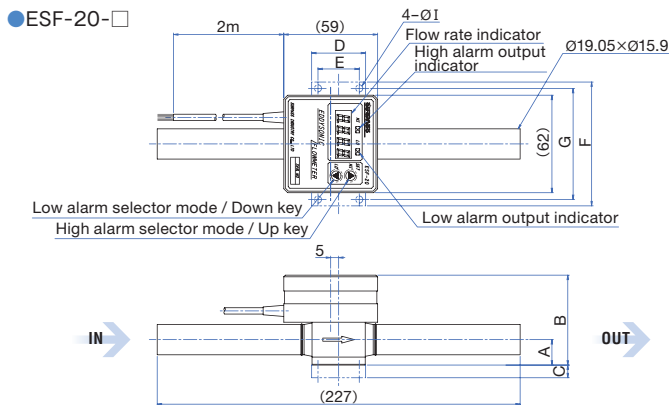
Signals	Color
DC24V Power supply	Red
0V Power supply	Black
4~20mA output (+)	White
4~20mA output (-)	Blue
Pulse output (+)	Yellow
High / Low limit output	Gray

Cable specification: AWG #28X7C with shield

Item	Specifications
Size	AWG28
Number of cores	7 cores
Cable core diameter	Ø0.83
External diameter	Ø3.6
Outer cover material	PVC covering
Standard	UL Style2725



## Dimensions

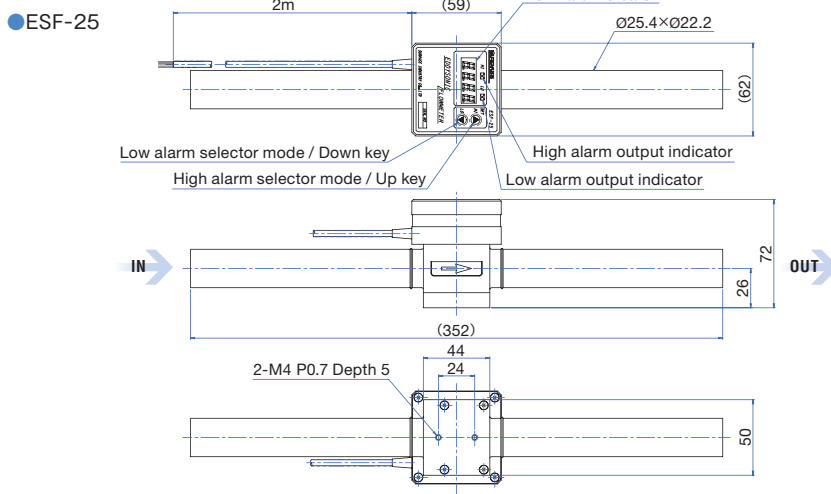


Model	A	B	C
ESF-20	16	57	—
ESF-20-B	16	57	8

○ Mounting dimension table

Model	D	E	F	G	ØI
ESF-20-B	34	26	78	70	4.5

※ Please select model with attachment base when installation of ESF-20.



### Caution

- Install straight-tube parts on both sides of flowmeter. The straight-tube length of "IN" side must be at least 7 times longer than the inner tube diameter, and that of "OUT" side must be at 5 times longer than the inner tube diameter.
- An abnormal output may occur if the pressure in the piping is not pressurized while water flow is stopped. Be sure to apply a pressure of 100 kPa or more.
- Provide a back pressure on the secondary side of the flowmeter to generate a stable Karman vortex.

## Flow Characteristics

To prevent the occurrence of cavitations\*, the pressure value at the downstream side should be more than one obtained from the following formula.

$$P_d = 2.7 \Delta P + 1.3 P_0$$

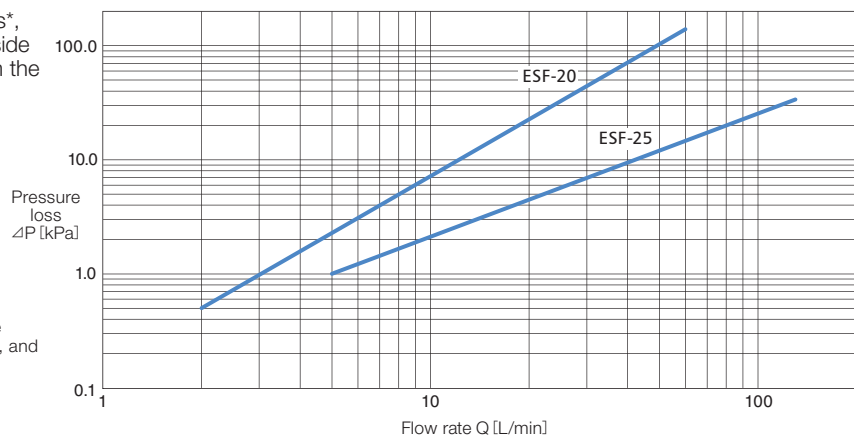
$P_d$  : Pressure values at the downstream side [kPa]

$\Delta P$  : Pressure loss values [kPa]

$P_0$  : Vapor pressure values of fluids [kPa abs]

### \*Cavitations

When the pressure of the liquid drops below the saturation vapor pressure, the liquid evaporates, and generating air bubbles.



Fluid : Water Fluid Temperature : Room Temp. Ambient Temperature : Room Temp.

※ The data is reference value, not a guaranteed value.



# Flowmeters

## ● Safety Instructions



- Before using the product, read the instruction manual carefully and use it correctly.  
We are not liable for accidents that occurred during use other than those described in the instruction manual.
- Do not apply voltage or current exceeding the maximum allowable value to the input terminals.  
The equipment damage may result.
- Do not use the power supply voltage exceeding the specified range.  
If doing so, fire, electric shock or device failure may occur.
- Wait for more than 30 minutes for warming up with the power being supplied.
- Avoid the parallel wiring or the sharing of wiring tube with any high-voltage cable and power cable.  
It may cause of induction, resulting in malfunction of the product.
- Confirm the compatibility of the product material with the type of fluid and ambient atmosphere before use.
- When there is pulsation, a regulator or a damper must be installed to suppress pulsation.
- Before tubing, confirm the correct flow direction by checking the arrow direction of "IN-OUT" marked on the side of flowmeter unit.
- Do not use the product in a harsh environment where fluid temperature changes rapidly, as this may cause damage to the product.
- Connect this product not to apply any bending, tensile or compression, and other forces on the connection between tube and product.
- Do not use the product with excessive vibration or shock.
- Do not disassemble the product.
- If any noise-generating equipment are closely used, flowmeter should be grounded to on F.G. terminal.
- Use this product within the specified range.
- This product was not design for outdoor use.
- Before wiring, be sure to turn off the power supply.
- Please make a clearance when multiple flowmeters are installed parallel mount.
- If the inner pipe diameter "IN" and "OUT" the flowmeter is smaller than the inner diameter of the flowmeter, errors in measurement accuracy may occur.
- The tubing system must be filled with the fluid at all times.
- The flowmeter may be disable to measure the flow rate when it is mixed with gas-liquid two-phase flows or air bubbles. When using flowmeter, be sure to release the air inside its tube.
- Please be sure to set up the load condition the back of Eddysonic flowmeter.  
If there is no load condition, it may generate an error in measurement.
- Install straight-tube parts on both sides of Eddysonic flowmeter. The straight-tube length of "IN" side must be at least 7 times longer than the inner tube diameter, and that of "OUT" side must be at 5 times longer than the inner tube diameter.
- Do not use fluids that contain refuse or foreign matter, as this may interfere with normal function.
- Abrasive or coagulative fluids may interfere with normal function, and take measures to prevent sticking residue on the wetted parts.
- If static electricity is generated, the equipment may seriously damage.  
Please use after applying antistatic measures.
- Periodic inspection should be performed for safety when using chemical solution with high permeability for a long time.