DUO FLOW

Instruction Manual

for

DUO-PX/PF Series

Caution

Before using the DUO-Flow Series flowmeters, please read this Instruction Manual with caution, and then use it properly. Should you have any further difficulties that are not covered in this manual, then contact us and we could give you appropriate advice you would require. After reading, please always keep this Instruction Manual at hand for quick reference when necessary.

TOFLO CORPORATION

95-R010

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1. Safety precaution

We highly appreciate your purchasing our products, **Duo-Flow** of the model **"DUO-PX / PF Series".**
This instruction manual should be read thoroughly, and then use the **Duo-Flow** properly upon ensuring the following descriptions in order not only to use it safely, but to prevent from disaster that may occur.
The " **Safety precaution** " is intended to use the product you purchased safely and properly, and efficiently, and further intended to prevent the users or persons in charge from personal injuries or damage to the property, so that it is requested you to read it thoroughly and fully understand the correct content of it. Should it be lost , then contact us for its requesting.

⚠ **Warning**	This is the safety –alert symbol which indicates the potential for the death or serious injury which might be caused.
⚠ **Caution**	This is the safety-alert symbol which indicates the potential for personal injury, or only the material damage which might be caused.

2. General function

DUO-PX/PF Series flowmeter is the one that has been united the float typed flowmeter where flowrates are to be confirmed visually with the detector(Sensor) which a flow signal can be obtained at real time.

	DUO-PX20	DUO-PX25	DUO-PF200
Material of main body	BSBM (Metal machined goods)	SUS316 (Metal machined goods)	PFA (One-piece molding)
Material of tapered tube	Heat-resistant glass (Molded)		
Operating fluid	Gases and liquids (General purpose water, etc.)		Most suitable for semiconductor manufacturing process and excellent in chemical resistance
Applications and advantages	For general purpose use, strong in strength, but low at price.		

3. Design specifications

◆ Sensing range and pipe connection

Models aimed at	DUO-PX20/25	DUO-PF200
Fluid(Fluid color)	Gas and liquid(Water for general purpose, etc.)	Liquids(Purified water and chemical)
	(Transparence and translucence)	

◆ Tables of flowrates

☆ DUO-PX20/25G for gases

Std.	Measuring ranges	Pipe sizes
20	40 – 500 NmL/min	Rc 1/8
	0.1 – 1 NL/min	
	0.2 – 2	
	0.4 – 5	
	1 – 10	
	2 – 20	
25	10 – 40 NL/min	Rc 1/4
	20 – 90	

☆ DUO-PX20/25W for water

Std	Measuring ranges	Pipe size
20	10 – 100 mL/min	Rc 1/8
	20 – 200	
	40 – 500	
25	250 – 750 mL/min	Rc 1/4
	0.5 – 1.5 L/min	
	0.5 – 2.5	
	1 – 4.5	

☆ DUO-PF200 for liquids

Std	Measuring ranges	Pipe size
200	5 – 15 mL/min	TV 1/4" X 41
	10 – 40	
	10 – 100	
	50 – 150	
	50 – 250	
	100 – 500	
	0.1 – 1 L/min	
	0.2 – 1.7	

◆ Operating environment:

	Operating fluid temperature range	Max operating pressure	Ambient temperature range	Ambient humidity
PF200	0 – 40℃ (Non condensing)	0.35MPa(G)	0 – 40℃ (Non condensing)	35 – 85%RH (Non condensing)
PX20/25	0 – 60℃ (Non condensing)	0.5MPa(G)	0 – 60℃ (Non condensing)	35 – 85%RH (Non condensing)

Power supply voltage: 12 – 24 VDC (Timely: 80mA)
Output signal: Current output 4 –20mA
Voltage output 1 – 5V, 1 – 10V
Load resistance: Less than 400Ω Power supply voltage: 12 – 24 V±10%
Less than 500Ω Power supply voltage: 15 – 24 V±10%
Output performance: Output accuracy: Within FS±5% (including flow accuracy)
Resolution: Max 152 of resolution(according to the measuring range)
Specification on cable: Cable length (Standard length: 2m long)

Signal names	Color specification	Type of cable
V(−)0V	White	AWG#24
V(+)12 – 24VDC	Red	AWG#24
Analog output	Yellow	AWG#24
Outer shield	Green	AWG#24

◆ Representational function:

Red LED display: Power supply display → Red LED lights up, if impressing power supply.
Alarm display → Red LED blinks, if float detects wrongly because of the contaminated tapered tube.

◆ Description of the types

■ DUO-PX Series for gas

DUO	-	PX	Std.	Gas	-	Shape 1	Shape 2	Name of fluid	-	Units of flow	Max flow	-	Designed pres. /temp.	-	Option	
															B	With stand (Stand-alone type)✳4
															SW	With joint of Swagelok type ✳4
															V	With joint of VCR type ✳4
															FPM	Viton packing
													1 atm/20℃		Shows designed pres./temp. ✳3	
											Max		Shows max flowrate. ✳2			
										A	N mL/min					
										B	N L/miln					
										D	S mL/min					
										E	S L/min					
										Z	For specif. unit ✳1					
								1	Air							
								2	N_2							
								3	O_2							
								4	CO_2							
								5	Ar							
								6	He							
								7	C_3H_8(Propane)							
								9	For specifi. fluid							
							1	4-20 mA output								
							2	1-5 V output								
							3	1-10 V output								
							9	For specif. item ✳1								
						0	With no needle valve									
						1	With needle valve at lower side									
						2	With needle valve at upper side									
						9	For specif. shape ✳1									
				G	Shows to be used for gas.											

Std	Max flowrates specified	Pipe sizes	Materials
20	Up to 20 NL/min	Rc 1/8	BSBM
25	Up to 90 NL/min	Rc 1/4	SUS316

✳ 1: For specific items, specifiy them at the end of Type seleIction in order. For more details, contact ius with your spedifications.
✳ 2: See the measuring range of the flow.
✳ 3: See the technical information at the end of the catalog, if applying any pressure and temperature other than 1 atm and 20℃.
✳ 4: Available for Std. 25 only.

■ DUO-PX Series for liquids

DUO	-	PX	Std.	Liquid	-	Shape 1	Shape 2	Name of fluid	-	Units of flow	Max flow	-	Option	
													B	With stand (Stand-alone type)∗4
													SW	With joint of Swagelok type ∗4
													FPM	Viton packing
											Max		Shows max flowrate. ∗2	
										A	mL/min			
										B	L/miln			
										Z	For specif. unit ∗1			
								1		Water				
								9		For specifi. fluid				
							1	4-20 mA output						
							2	1-5 V output						
							3	1-10 V output						
							9	For specif. item ∗1						
						0	With no needle valve							
						1	With needle valve at lower side							
						2	With needle valve at upper side							
						9	For specif. shape ∗1							
				W	Shows to be used for liquids.									

Std	Max flowrates specified	Pipe sizes	Materials
20	10 – 100 mL/min	Rc 1/8	BSBM
	20 – 200 mL/min		
	40 – 500 mL/min		
25	250 – 750 mL/min	Rc 1/4	SUS316
	0.5 – 1.5 L/min		
	0.5 – 2.5 L/min		
	1 – 4.5 L/min		

∗ 1: For specific items, specifiy them at the end of Type selelction in order. For more details, contact ius with your spedifications.
∗ 2: See the measuring range of the flow.
∗ 3: Available for Std. 25 only.

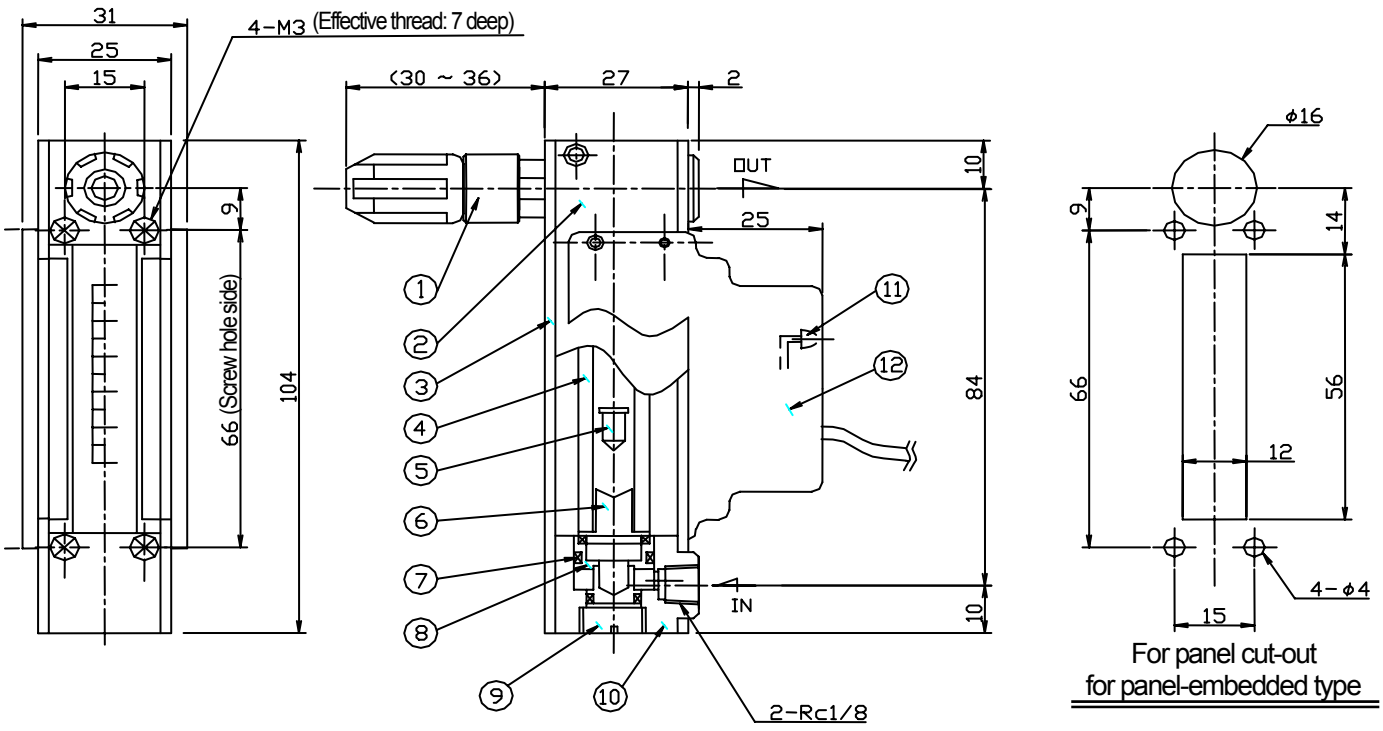
■ DUO-PF Series for liquids

DUO	-	PF	Std.	-	Shape 1	Shape 2	Name of fluid	-	Units of flow	Max flow	-	Pipe size	-	Option	
														W	Cap to weld
												21		1 / 4	
										Max		Shows max flowrate. ∗2			
									A	mL/min					
									B	L/miln					
									Z	For specif. unit ∗1					
							1		Purified water						
							9		For specifi. fluid						
						1			4-20 mA output						
						2			1-5 V output						
						3			1-10 V output						
						9			For specif. item ∗1						
					0				With no needle valve						
					2				With needle valve at upper side						
					9				For specif. shape ∗1						
			Std.		Measuring ranges										
			200		5 – 15 mL/min										
					10 – 40 mL/min										
					10 – 100 mL/min										
					50 – 150 mL/min										
					50 – 250 mL/min										
					100 – 500 mL/min										
					0.1 – 1 L/min										
					0.2 – 1.7 L/min										

∗ 1: For specific items, specifiy them at the end of Type selelction in order. For more details, contact ius with your spedifications.
∗ 2: See the measuring range of the flow.
∗ The measuring ranges as shown above indicate the ones equivalent to water at 20°C{293K}.

4) Structural drawing

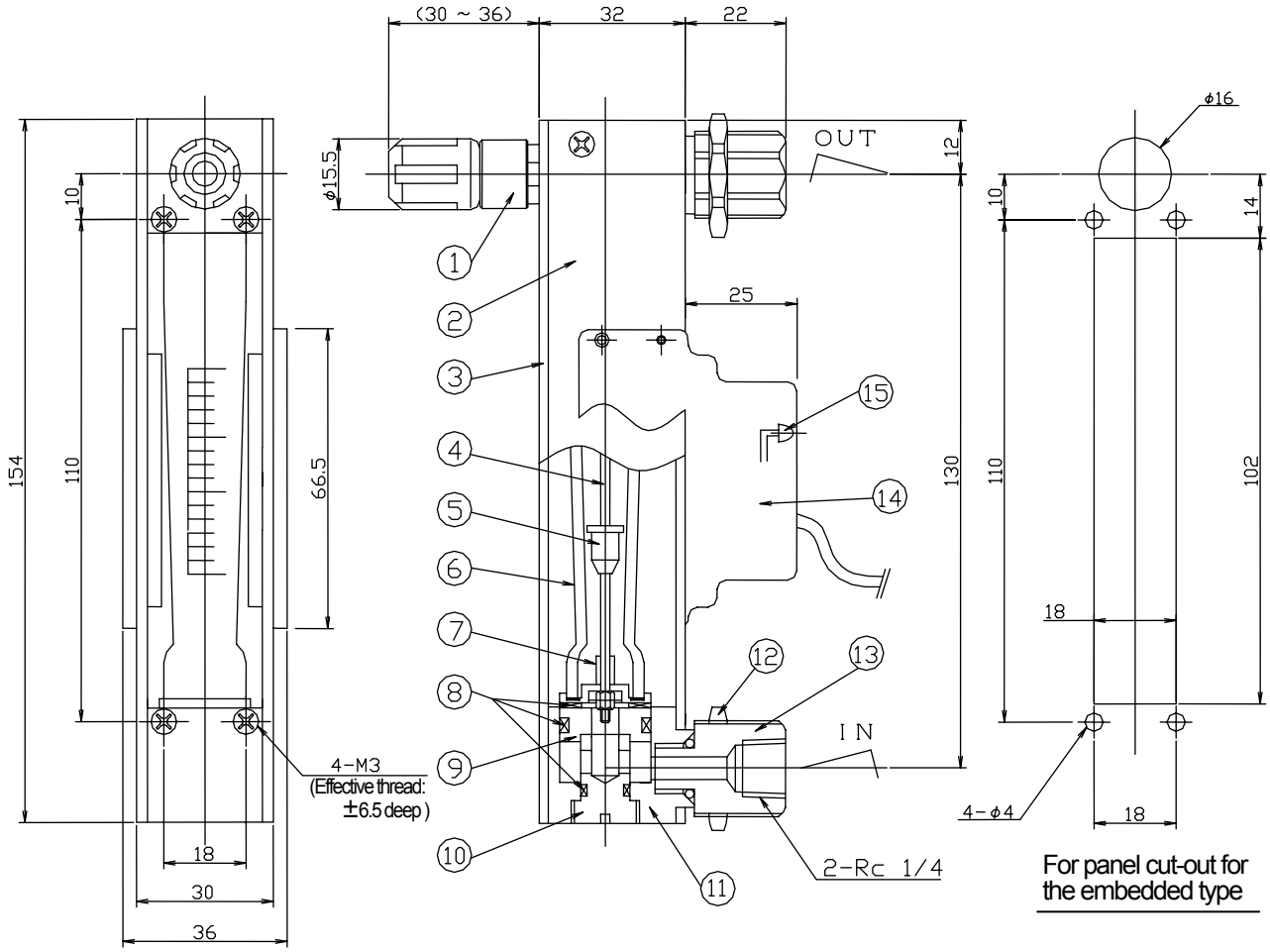
◆ DUO-PX20 type



■ **Materials for DUO-PX20 type**

Item No.	Names of parts	Materials	Remarks
①	Needle valve	SUS316	
②	Case	Al	Black alumite
③	Front plate	PMMA	Clear
④	Tapered tube	Heat-resistant glass	
⑤	Float	SUS304	
⑥	Stopper	PTFE	
⑦	O-ring	NBR	
⑧	Retainer	BSBM	Plating
⑨	Cap	BSBM	Plating
⑩	Fitting	BSBM	Plating
⑪	LED	—	
⑫	A set of linear sensor	PBT, etc.	

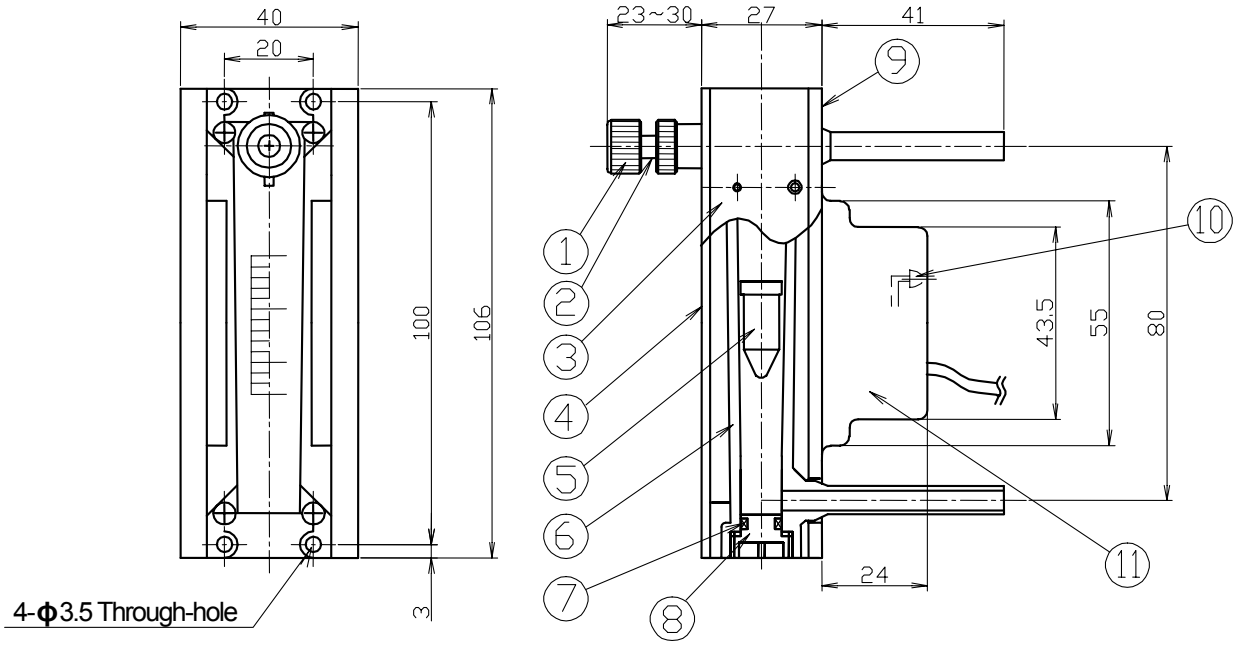
◆ DUO-PX25 type

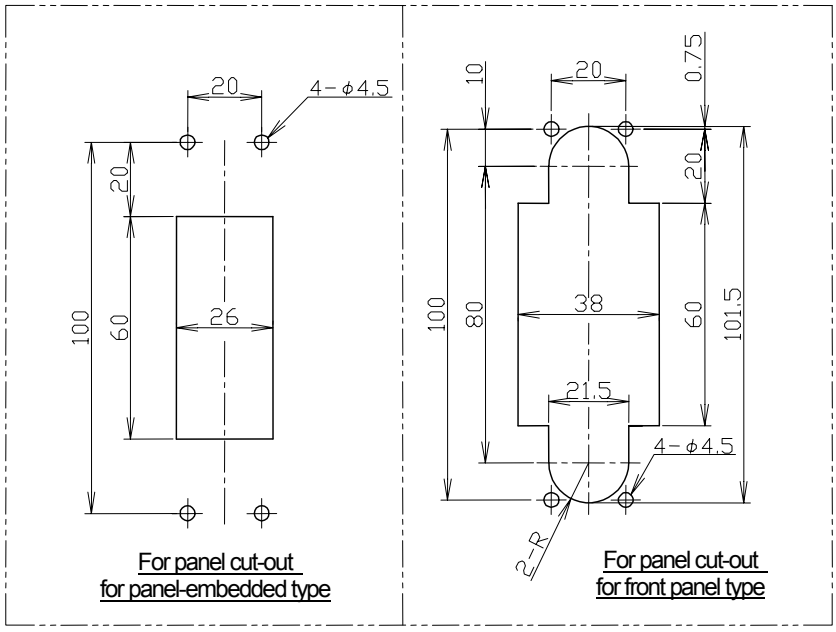


■ Materials for DUO-PX25 type

Item No.	Names of parts	Materials	Remarks
①	Needle valve	SUS316	
②	Front plate	PMMA	Clear
③	Float	SUS316	
④	Tapered tube	Heat-resistant glass	
⑤	Stoppers	PTFE	
⑥	O-rings	NBR	
⑦	Retainer	SUS316	
⑧	Cap	SUS316	
⑨	Fittings	SUS316	
⑩	Lock nuts	BSBM	
⑪	Adapters	SUS316	Plating
⑫	LED	—	
⑬	A set of liner sensor	PBT, etc.	

◆ DUO-PF200 type





■ Materials for DUO-PF200 type

Item No.	Names of parts	Materials	Remarks
①	Handle	PCTFE	
②	Needle valve	PFA	
③	Side plate	PBT	
④	Front plate	PVC	Clear
⑤	Float	PTFE	
⑥	Body	PFA	
⑦	Plug	PFA	
⑧	O-ring	PF	
⑨	Back plate	PVC	
⑩	Photodiode		
⑪	Substrate case	PBT	

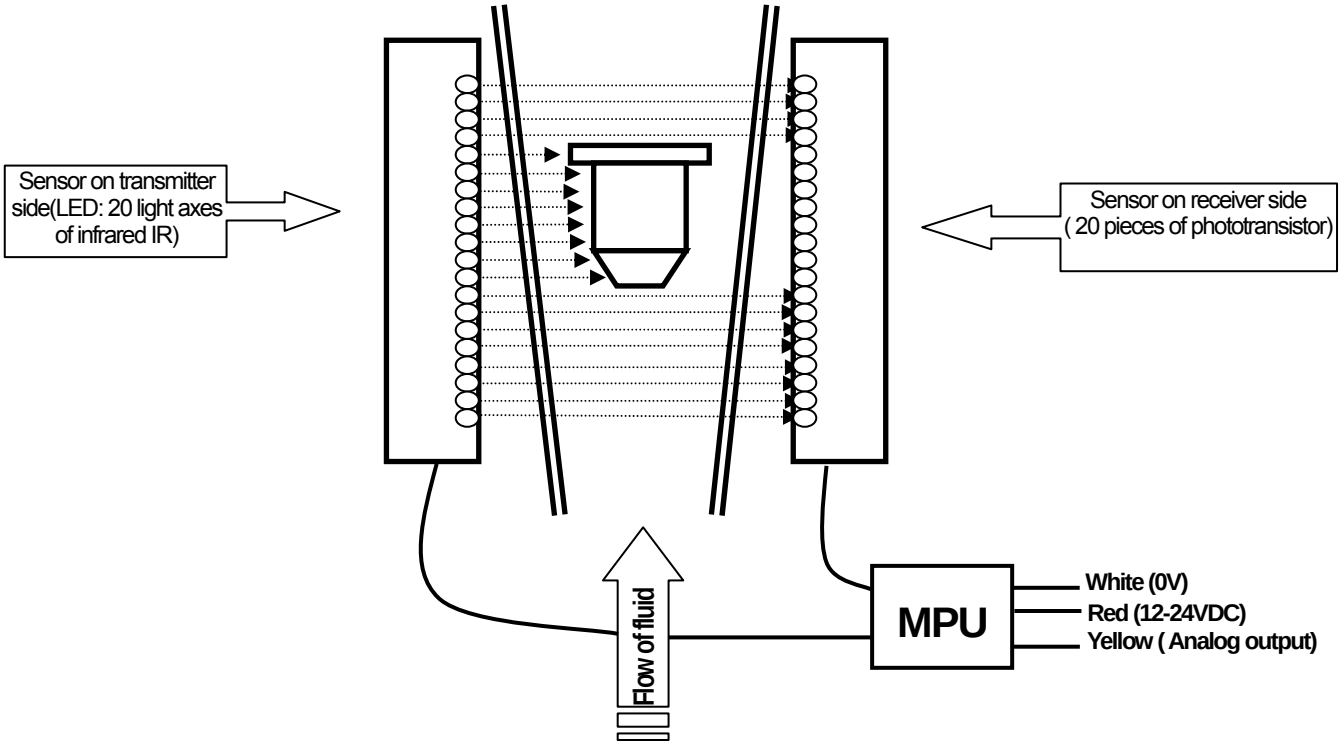
■ Cable specifications(2m long)

Signal names	Color specifications	Type of cable
12 – 24 VDC	Red	AWG#24
0V	White	AWG#24
Analog output	Yellow	AWG#24
Outer shield	Green	AWG#24

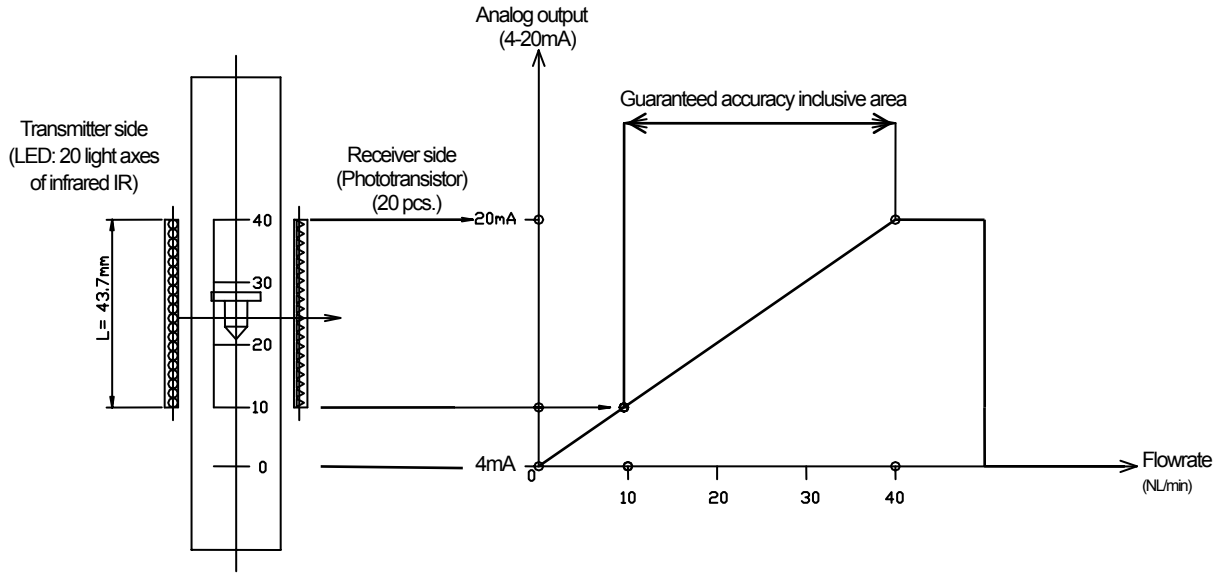
5) General structure(Features)

Twenty pieces of infrared IR and phototransistor are attached to the both, transmitter and receiver, respectively. The float located in between shadows light, thus darkening the shadow causes photosensors to react, and making it possible to turn ON/OFF.

The shadow of the float is read out as a high-low level, carried out an operation to the analog signal, and becoming an output signal.



◆ Structural sensor section and linear characteristic drawing



※If the 0 at scale enters into within the sensor length of L=43.7mm, the guaranteed accuracy inclusive area is from 0 L/min.

⚠ Caution

6) About the product storage

1. The product should be stored in a place, where it is not subjected to vibration and impact shock.
2. For storage environment,
   it should be stored in room temperature, and the case surface temperature should not be more than 40℃ and condensation of humidity will not occur.

⚠ Warning

7) Handling precaution(when piping)

1. Power supply should not exceed the ratings. Failure to observe this warning may cause failure and abnormal operation.
2. Avoid wiring together with noise producing sources such as power line, relay, electromagnetic valve and solenoid operated valve. Failure to observe this warning may cause malfunction due to induction.
3. Wiring should not be done until after the power supply has been turned off.

8) Precaution for type selection

1. If applying to the equipment which requires high reliability, use it upon taking appropriate measures in order to maintain a reliability and safety of these devices.
2. In no event should it be applied to the following applications which requires extremely high reliability.
   (A. Medical equipment which affect directly on human lives, B. Atomic power control machine, and C. Space equipment.)
3. Using colored fluid and low fluid in transparency , and further the fluid having sensitivity change over time (due to mixture of dust, particulate suspended matter and bubbles, etc.) may cause failure in operation.

⚠ Warning

9) Instructions for use

1. Avoid using the Duo-flow in the following locations:

- In the locations where the corrosive gases and flammable gases will occur.
- In the locations where it is splashed with water, oil and chemicals.
- In the locations where there are much powder dust, metal powder, or saline matter.
- In the locations where it is subjected to the direct rays of the sunlight and there is a strong light source such as IR and flash light, etc..
- In the locations where the ambient temperature will exceed the range between 0℃ and 55℃.
- In a location where there is a lot of moisture.
- In the locations where it is subjected to a sudden, extreme temperature change and condensation of humidity will occur.
- In locations where it is subjected to great vibration and impact shock.

2. When visually checking the flowrate, do not illuminate the illuminant such as pen light and flashlight directly to the sensor section. Failure to adhere to this warning may cause malfunction.
3. When taking measurement in liquids, fill the inside of the flowmeter fully with liquids (Mixtures of gas or air bubbles inside the Duo-flow can cause malfunction.)

10) How to deal with the DUO-Flow, if trouble occurs.

We would like to ask you to contact us at sales office as shown below as soon as the memoranda about the faulty contents of the product are attached

11) Warranty

Warranty

All products we made have been carefully inspected and passed through the intraoffice inspection before shipping, but contact us at the nearest sales offices upon confirmation of the symptom, if a trouble occurs by chance.

⇩

Warranty period

The warranty period shall be for one year after the date of delivery.

Scope of warranty

When a trouble for which we are held liable occurs during the warranty period, we will repair or replace it free of charge. Provided that in case of the following items it shall not be covered by warranty.

① In the case that it is improperly handled and used.
② In the case that it is due to any causes other than the product we delivered.
③ In the case that it is improperly remodeled and repaired,
④ In the case that it is due to natural calamity, disaster and others.
⑤ In the case that it is used for medical care (involving human lives), atomic energy control, or space equipment.

In addition the warranty said above means the warranty of the single unit of the product that we delivered. As to the damage triggered by the trouble of the delivery goods we shall not assume any it cannot be warranted.

12) In conclusion • • • • • • where to call

TOFLO CORPORATION

Headquarters: 3-17 Minamidaira, 4-chome Hino City, Tokyo 191-0041
Tel: 81-42-593-8811 / Fax: 81-42-593-8812

Tokyo Sales Office: 3-17 Minamidaira, 4-chome Hino City, Tokyo 191-0041
Tel:81-42-592-6111 / Fax: 81-42-592-6112

Osaka Sales Office: Suite 915, East Exit Station Bldg.
20-14 Higashinakajima, 1-chome Higashiyodogawa ward, Osaka City
Osaka-Fu 533-0033
Tel:81-6-4809-0411 / Fax:81-6-4809-0412

Fukuoka Sales Office: 2F K-2 bldg.
8-5 Hakataekiminami, 5-chome Hakata ward, Fukuoka City Fukuoka pref. 812-0016
Tel:81-92-482-2101 / Fax:81-92-482-2102

Sendai Sales Office: Suite 102, Izumi Kankoh bldg.
8-6 Shohgen, 1-chome Izumi ward, Sendai City Miyagi pref. 981-3132
Tel:81-22-218-2451 / Fax:81-22-218-2452

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