

# Flow Sensors

Our Sensors detect even tiny amount ( $> 0.04\text{cc}$  per drop) of lubricant/grease applied to the sliding portion/rotor of a machine tool and industry machinery.

## Sensors

### ■ Lubrisensor (LUBSEN)

The terminal micro flow sensors for lubricants and greases

### ■ Flowsensor (FLOSEN)

The flow sensors for small to large amount of lubricant/grease

## Control Devices

### ■ Interface (INTERFACE)

The intermediate amplifier for the configuration where sensor signals are directly fed into a sequencer, etc.

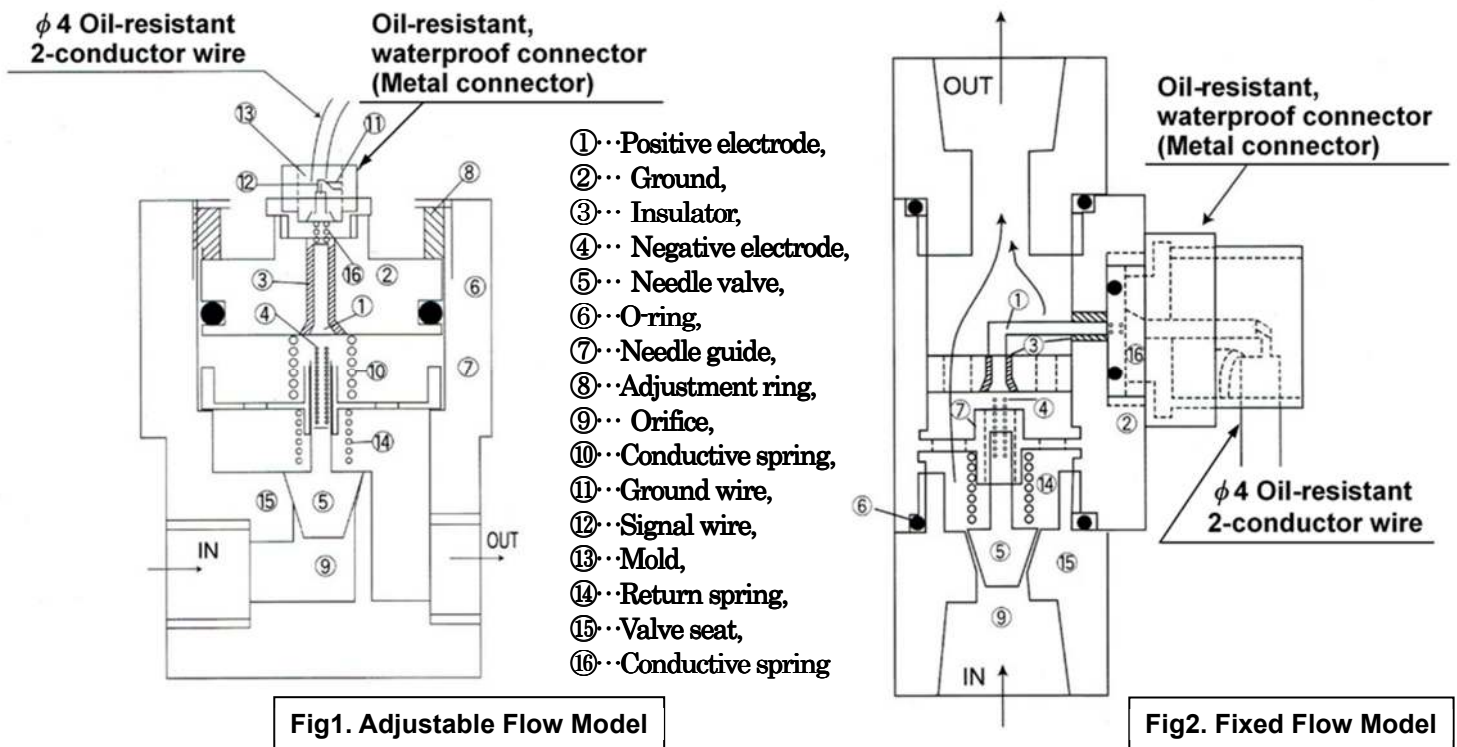


CONTEY JAPAN Co., Ltd.

## Operating Principle

Our Sensor opens and closes its valve by the dynamic pressure of fluid that goes through it, sending ON and OFF signals by the switching mechanism of the contact. As shown in the structure drawing below (Fig. 1), fluid goes in through "IN", goes through the orifice ⑨, pushes up the needle valve ⑤, and then goes out through "OUT".

The negative electrode ④ above the needle valve ⑤ is electrically connected to the ground ② through via the spring. As fluid pushes up the needle valve ⑤, the negative electrode ④ touches the positive electrode ① to send a signal. By adjusting the clearance "x" between the negative electrode ④ and positive electrode ① using the adjustment ring ⑧, you can change the threshold at which the Sensor starts sending a signal. **Since the electrodes of the contact come in contact with the fluid that goes through the Sensor, our Sensors cannot be used with conductive fluids.** Our Sensors are **intended for the use with industrial lubricants and greases.** Although no voltage runs through the Sensor itself, **its electrodes that are passing only a slight amount of current will suffer from electric erosion.** In order to avoid this, our Sensors require a special interface. We offer two kinds of Sensors both of which work based on the same operating principle: Lubrisensor, which is for detecting micro flow rate, and Flowsensor, which is for small to large flow rate. Each kind is available in the adjustable flow model and fixed flow model.



### ● General Features

1. This sensor detects one drop of oil. (TYPE BM-1)
2. Designed with a simple structure, our oil-resistant, waterproof Sensors have an extended operational life. They are also shock resistant to some extent.
3. Sensor heat resistant up to 80°C.
4. Small and lightweight design. Can be attached to almost any area of your machine in any direction.
5. Viscosity : Our standard Sensors are compatible with viscosity of air to about 8,000 cSt.  
Fluids with viscosity above 8,000 cSt require a high viscosity model.
6. With our Interface, our Sensors are guaranteed to run more than 10 million times.
7. If a sequencer is already installed, all you need is a Sensor and the Interface.

## Flow Sensors

### ■ Lubrisensor (LUBSEN) The terminal micro flow sensors for lubricants and greases

Faster, higher-performance, and more energy-efficient than ever---today's advanced machinery is expected to have higher reliability, and to ensure higher reliability, various sensors and safety devices are incorporated into today's machinery. However, there had been almost no reliable small sensors to monitor lubrication systems.

In order to solve this problem, we conducted extensive research and developed Lubrisensor.

Lubrisensor detects even a very small amount of oil as well as checks its discharge amount. This means that it can be used with both resistance-type and fixed-type lubrication systems. This device is designed to be mounted on the terminal of a lubrication system.

### ● Fixed Flow Model

From the table below (LUBSEN TYPE BM), please select the model that provides the desired sensitivity (standard flow rate threshold).

This model is available in two types: TYPE BM For Oil and For Grease.

Connection : PT1/8, Material : brass, Pressure : 210kg/c m<sup>2</sup> MAX,

BM type is the smallest sensor in our company.

Model		Standard flow rate threshold	Maximum flow rate
LUBSEN TYPE BM Oil : #68 Temperature : 20°C 1 drop ≒ 0.04 cc	-1	Turns ON at the flow velocity of 1 drop/15 sec (0.0027cc/sec, 0.16 cc/min) or more.	500 cc/min (When differential pressure is 500kPa)
	-3	Turns ON at the flow velocity of 3 drops/15 sec (0.008 cc/sec, 0.48 cc/min) or more.	
	-5	Turns ON at the flow velocity of 5 drops/15 sec (0.013 cc/sec, 0.8 cc/min) or more.	
	-10	Turns ON at the flow velocity of 10 drops/15 sec (0.027 cc/sec, 1.6 cc/min) or more.	

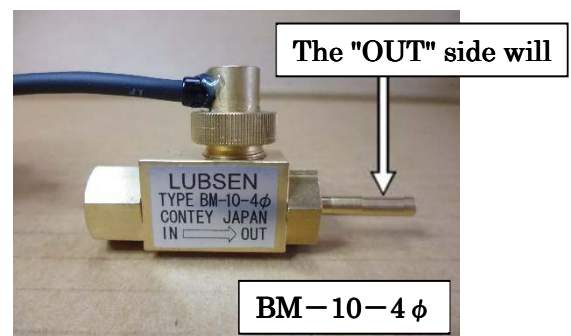
We also offer custom models BM-20, 25, 30, 40, 50, and 60.

Model		Standard flow rate threshold	Maximum flow rate
LUBSEN TYPE BM Grease : # 2 Temperature : 15°C	-G	Turns ON at the flow velocity of 0.015g/sec or 0.9g/min or more.	100g/min (When differential pressure is 500kPa)
	-GG	Turns ON at the flow velocity of 0.002g/sec or 0.12g/min or more.	

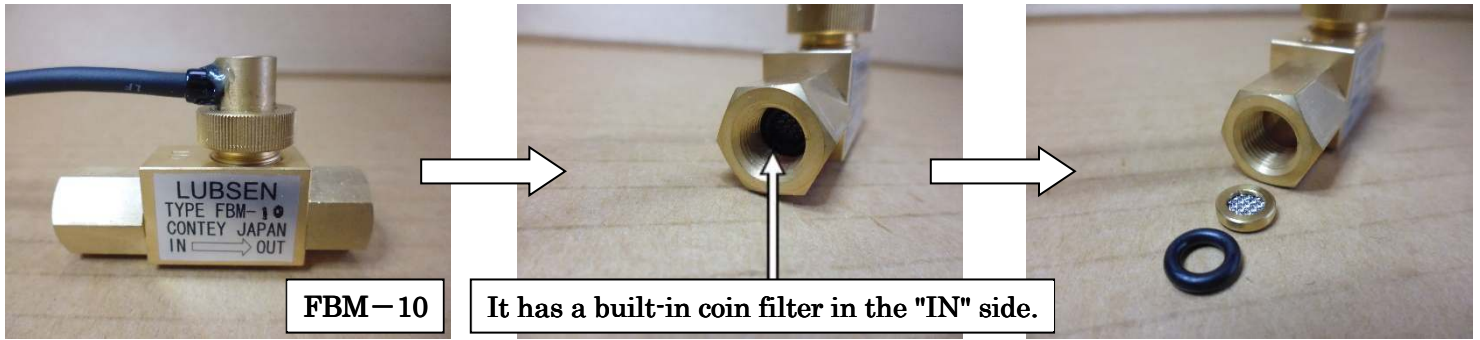
BM-Type comes with a standard 3m metal connector lead unless you don't specify the other length at the time of order. The lead is also available in 5m, 8m and 10m. Type BM is the smallest Sensor in our product lineup.

The oil-resistant and waterproof metal connector connection can be removed for easy maintenance.

Metal Connector Lead : 1P×0.3mm<sup>2</sup> Outer diameter 4.0mm, heat resistant, oil resistant, flame retardant, flexible, black/white = + signal wire, black = - ground wire

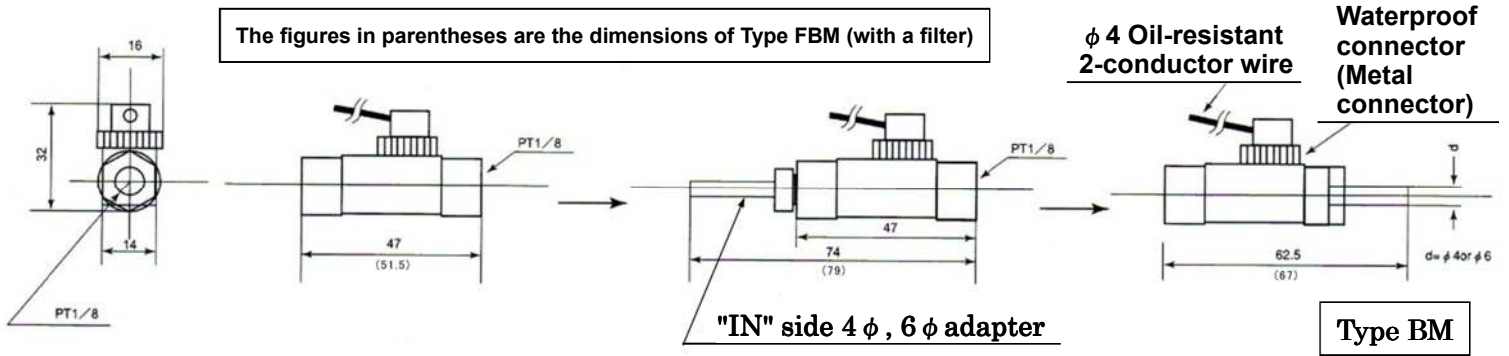


Type FBM has a built-in coin filter in the "IN" side of the Sensor to prevent malfunction of the Sensor due to dust. This coin filter can be removed using tweezers for easy maintenance.



**FBM-10**

It has a built-in coin filter in the "IN" side.



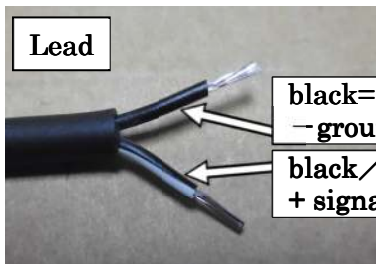
The figures in parentheses are the dimensions of Type FBM (with a filter)

$\phi$  4 Oil-resistant 2-conductor wire

Waterproof connector (Metal connector)

"IN" side 4  $\phi$  , 6  $\phi$  adapter

Type BM



Type BM Full length 47mm Height 32mm Width 16mm  
 BM-4 $\phi$  Model Full length 62.5mm Height 32mm Width 16mm  
 4 $\phi$ -BM Model Full length 79mm Height 32mm Width 16mm  
 Type FBM Full length 51.5mm Height 32mm Width 16mm  
 The full length of Type FBM is longer than that of Type BM by 4.5mm.

Model	Body weight
BM-10	60g
BM-10-4 $\phi$	60g
FBM-10	65 g
FBM-10-4 $\phi$	65 g

Metal connector lead	Body weight
3m (standard)	76g
5m	116g
8m	178 g
10m	218 g

Example) BM-10=Body weight 60g+Metal connector lead (standard : 3m) 76g=Total weight 136g

●LUBSEN Order Symbol

Example) 4  $\phi$  - FBM-5-4  $\phi$  -5M

4 $\phi$	The adapter is added to the "IN" side	4 $\phi$ , 6 $\phi$ (If standard PT 1/8, no marking)
F	With filter	200 mesh For Oil (74 micron) 60 mesh For Grease (250 micron)
BM	Sensor type	
5	Sensor sensitivity	1, 3, 5, 10, G, GG, etc.
4 $\phi$	OUT side shape	4 $\phi$ , 6 $\phi$ (If standard PT 1/8, no marking)
5M	Lead length	Also available in 5 m, 8 m, 10 m (if standard 3 m, no marking)

## ●Adjustable Flow Value Model

Model	Flow rate adjustable range	Maximum flow rate (when differential pressure is 500 kPa)
LUBSEN TYPE CA Oil : #32, Temperature : 20°C	0.05 to 500 cc/min	1,000 cc/min

Model	Flow rate adjustable range
LUBSEN TYPE CB Can be used with Grease # 000 to # 2	Detects even at 0.01g/SHOT

Materials : aluminum (body), anodized surface, brass (other parts); Pressure : 210kg / c m<sup>2</sup> MAX,  
connector type : oil-resistant, waterproof.

Lead : 1P×0.3mm<sup>2</sup> Outer diameter 4.0mm, heat resistant, oil resistant, flame retardant, flexible,  
black/white = + signal wire, black = - ground wire

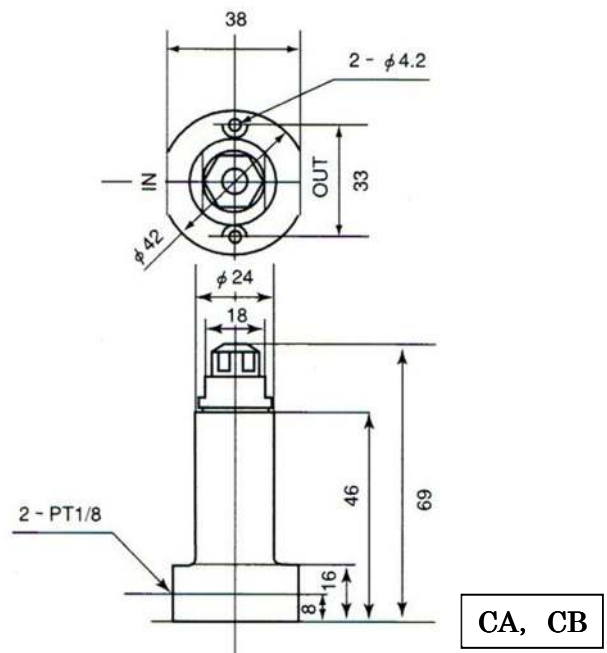
Comes with a standard 3m lead. You can also specify a different length for the lead (5m, 8m or 10m).

Weight 174 g (including the standard 3m lead)

For harder grease, we offer made-to-order Type

CB models (CB-K1, CB-K2, CB-K3).

CB-K3 is for the hardest grease.



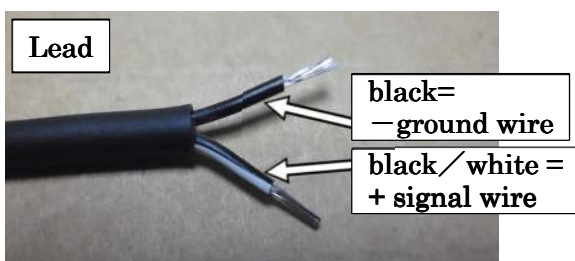
In terms of performance, LUBSEN TYPE CA is equivalent to FLOSEN TYPE CE, while LUBSEN TYPE CB is equivalent to FLOSEN TYPE CE-G.

As to made-to-order models, the performance of CB-K1 is equivalent to CE-G-K1, CB-K2 to CE-G-K2, and CB-K3 to CE-G-K3.

Our new Type CE has a compact design with a shorter full length as well as uses a metal connector lead which can be easily removed to make it easy to adjust the flow rate or install a Sensor.

Type CA and Type CB are the oldest in our product line and will be discontinued in the future.

If you are a new customer and interested in our products, we strongly recommend purchasing either Type CE or Type CE-G.



**■ Flowsensor (FLOSEN)** The flow Sensors for small to large amount of lubricant/grease

While Lubrisensor was developed in order to detect micro flow rate and is available in only one diameter (PT1/8), Flowsensor is available in PT 1/8, 1/4, and 3/8 (the fixed flow value model is only available in PT1/8 and 1/4).

The adjustable flow value model allows us to adjust the flow value from a small to large value to serve your purpose. It can start sending a detection signal at a micro flow rate, passing a larger amount of oil/grease. You can also set the Sensor to send a signal when a large flow rate is decreased to the set micro flow rate.

**● Fixed Flow Model**

Model	Bore Diameter	Standard flow rate threshold (Oil : #68, Temp : 20°C)	Maximum flow rate (when differential pressure is 500 kPa)
FLOSEN TYPE BM-C	PT1/8	Turns ON at 10 cc/min	500 cc/min
FLOSEN TYPE KM-C	PT1/4	Turns ON at 100 cc/min	3,000 cc/min

Material : brass, Pressure : 210/c m<sup>2</sup> MAX, product comes with a standard 3m metal connector lead.

The lead is also available in 5m, 8m and 10m.

Metal Connector Lead : 1P×0.3mm<sup>2</sup> Outer diameter 4.0mm, heat resistant, oil resistant, flame retardant, flexible, black/white = + signal wire, black = - ground wire

Type BM-C is also available in the flow rate threshold of 50cc/min and 100cc/min.

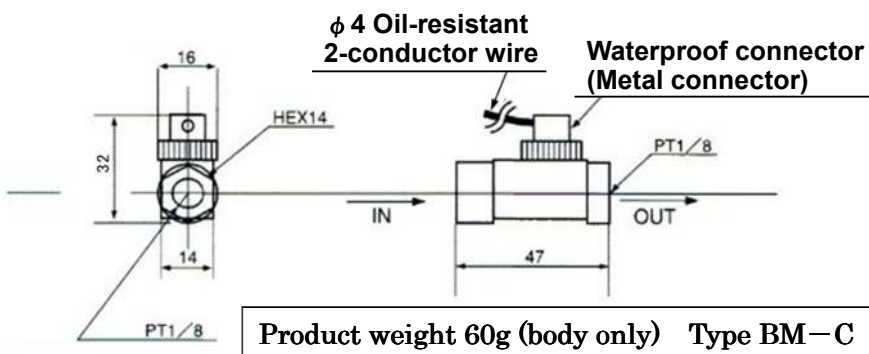
Type KM-C is also available in 200cc/min (These are all made to order.)



BM-C

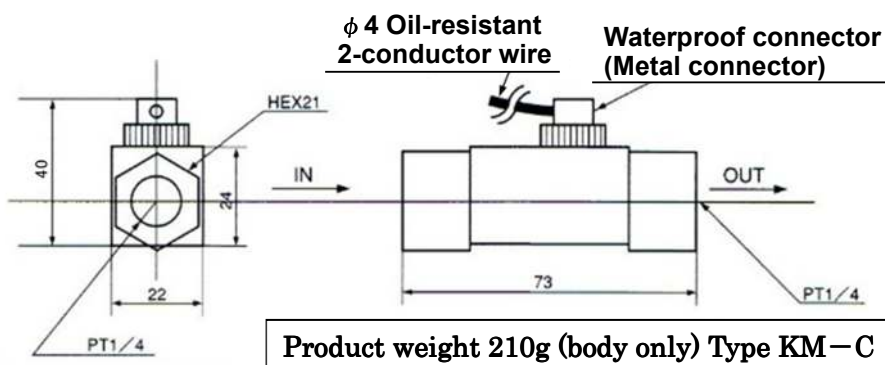


KM-C



Product weight 60g (body only) Type BM-C

TYPE BM-C = Body weight 60g + Metal connector lead (standard 3m) 76g = Total weight 136g



Product weight 210g (body only) Type KM-C

TYPE KM-C = Body weight 210g + Metal connector lead (standard 3m) 68g = Total weight 286g

## ●Adjustable Flow Model

Model	Bore Diameter	Adjustable threshold range (Oil : #68, Temp : 20°C)	Maximum flow rate (when differential pressure is 500 kPa)
FLOSEN TYPE CE	PT1/8	0.05 to 500 cc/min	1,000 cc/min
FLOSEN TYPE CK	PT1/4	0.3 to 2,000 cc/min	3,000 cc/min
FLOSEN TYPE CL	PT3/8	0.5 to 3,000 cc/min	10,000 cc/min

Material (body) : aluminum, anodized surface, Pressure 210kg/c m<sup>2</sup> MAX.

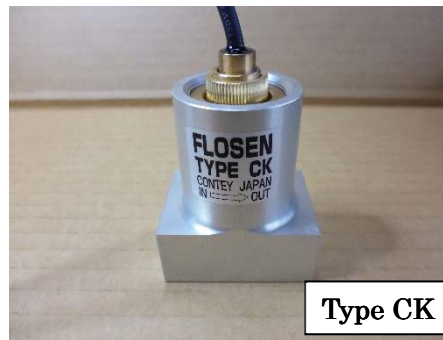
Product comes with a standard 3m metal connector lead (which comes out from the top of the Sensor).

Metal Connector Lead : 1P×0.3mm<sup>2</sup> Outer diameter 4.0mm, heat resistant, oil resistant, flame retardant, flexible, black/white = + signal wire, black = - ground wire

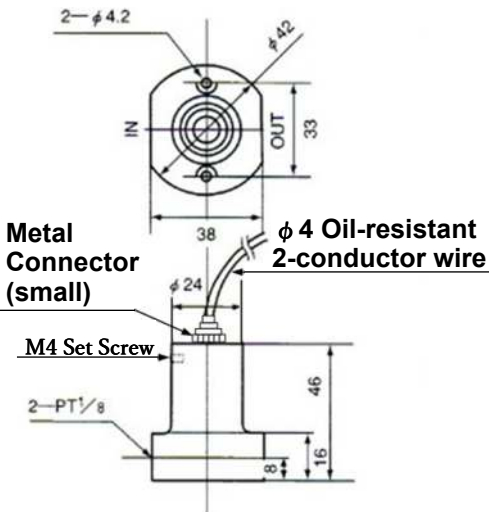
For grease, use CE-G, CK-G, and CL-G, which are specifically designed to detect grease.

For harder grease, CE-G has the made-to-order models CE-G-K1, CE-G-K2, and CE-G-K3.

CE-G-K3 is for the hardest grease.

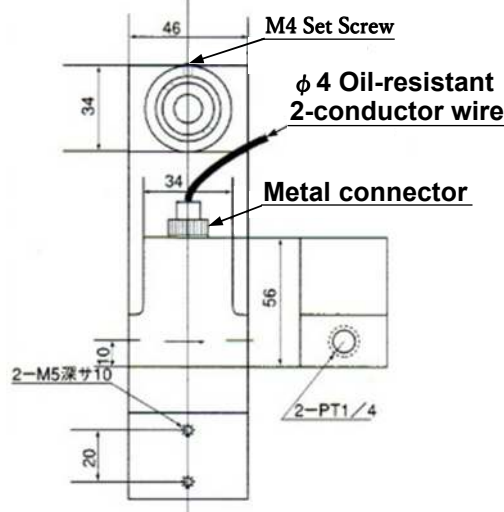


Body weight 106 g



Type CE = body weight 106g + metal connector lead (standard, 3m) 68g = Total weight 174g

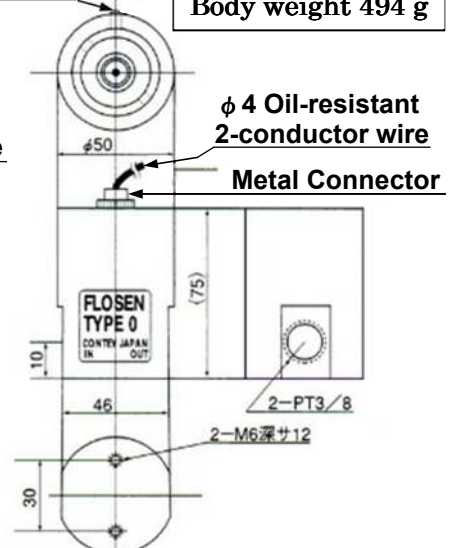
Body weight 194 g



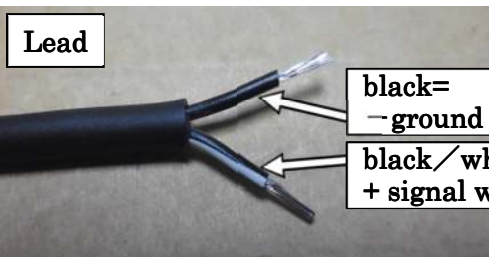
Type CK = body weight 194g + metal connector lead (standard, 3m) 78g = Total weight 272g

M4 Set Screw

Body weight 494 g



Type CL = body weight 494g + metal connector lead (standard, 3m) 78g = Total weight 572g

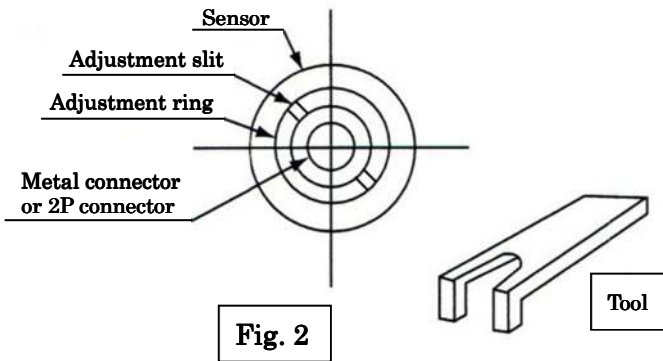


Dedicated adjustment tool for Type CE, CK and CL (sold separately)

## ●Adjusting Adjustable Flow Model Sensors

Although the setting values of our Sensors vary depending on the flow rate and viscosity of fluid, they can send an ON/OFF signal at a certain set value under fixed conditions. As we looked in Fig.

1, which shows the Sensor's operating principle, the Sensors send a signal at any flow value by adjusting the clearance "x" between the negative electrode ④ and positive electrode ①.



As shown in Fig. 2, the clearance "x" can be reduced by turning the adjustment ring clockwise using the dedicated tool to detect fluid at a smaller flow rate. To detect fluid at a larger amount, turn the adjustment ring counter-clockwise. The setting value of the Sensor has 10-20% hysteresis when the Sensor turns ON with increasing flow rate and turns OFF with decreasing flow rate, depending on the type of fluid.

Do not turn the adjustment ring too much counter-clockwise. This will loosen the O-ring which will cause the fluid to leak outside the Sensor.

The Sensor can be mounted in any direction as long as the inside the Sensor is completely degassed. Especially when the Sensor is used to detect micro flow rate, it must be mounted in the way that allows it to be degassed by itself.

## ●Adjusting Type CA and Type CB Sensors

Connect the Sensor to your oil line and pass the oil (grease) at the flow rate you want to be detected through the Sensor.

Loosen the black plastic cap, and then unscrew the aluminum top lid by hand.

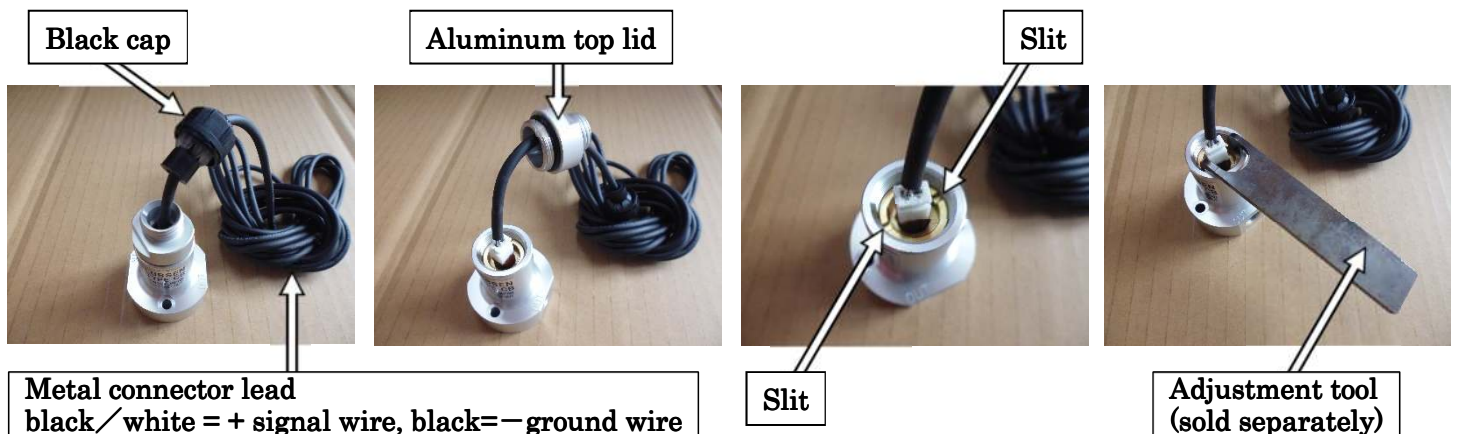
Insert the finger of the adjustment tool (sold separately) into the slit of the adjustment ring and turn it little by little to adjust the sensitivity.

For a better sensitivity, tighten the ring clockwise (to respond to a smaller amount of fluid). For a less sensitivity, loose the ring by turning it counter-clockwise.

The ring should be adjusted by turning it little by little, as only a few millimeter turn makes a great difference in the sensitivity.

Once adjustment is complete, put the aluminum top lid and black cap back on.

Note: This adjustment tool is sold separately and does not come with the Sensor.





## ● Adjusting Type CE, Type CK, Type CL Sensors

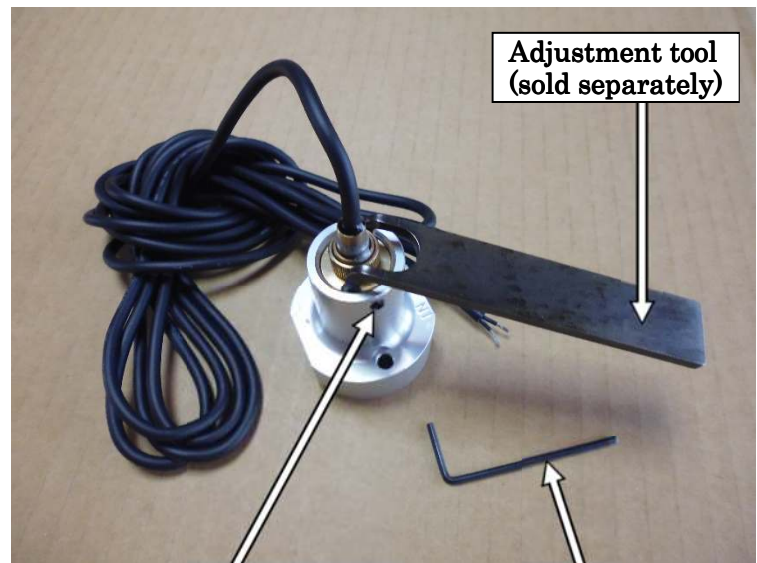
Connect the Sensor to your oil line and pass the oil (grease) at the flow rate you want to be detected through the Sensor. Loosen the set screw using a hex key, and then turn the adjustment ring little by little using the adjustment tool (sold separately). For a better sensitivity, tighten the ring clockwise (to respond to a smaller amount of fluid). For a less sensitivity, loose the ring by turning it counter-clockwise.

The ring should be adjusted by turning it little by little, as only a few millimeter turn makes a great difference in the sensitivity. Once adjustment is complete, tighten the set screw.

Note: This adjustment tool is sold separately and does not come with the Sensor.



Metal connector lead  
black / white = + signal wire  
black = - ground wire



Adjustment tool  
(sold separately)

M4 Set Screw

Hex key

## ● Notes on Adjusting the Sensors

- ⊙ The Sensor's sensitivity changes significantly depending on the flow rate and viscosity of fluid.
- ⊙ **Before adjusting the Sensor, the air remained between the pump and the Sensor must be completely removed.**  
Air remained in there will lower the flow rate of the passing fluid, which will lower the Sensor's sensitivity and take the Sensor longer to detect fluid.
- ⊙ For the first time use, the air inside the Sensor must be completely removed. This can be done by holding the Sensor with the "OUT" side up.
- ⊙ If your piping uses a flexible hose, you will need to re-adjust the Sensor as it will lower the flow velocity.
- ⊙ If you use the Sensor in an environment where the oil temperature (viscosity) fluctuates drastically (e.g., between summer and winter, between when the machine is running and stopped), **adjustment should be done in the conditions where the oil temperature is high (the viscosity is low)**. In extreme cases, the Sensor adjusted in winter season may stop working properly in summer when the viscosity of the oil is lowered. The lower the flow rate is, the more the Sensor will be affected by air and the viscosity of the oil.

## ● Notes on Using Lubrisensor for Detecting Grease Lubrication

Compared to oil lubricants, greases are more subject to volume expansion and contraction, and therefore users must pay particular attention to the following.

- ◎ If the pipe between the continuous flow valve and the Sensor is thick and a large volume of grease goes through it, a rise in the temperature will cause the discharge of grease by its volume expansion, which activates the Sensor even when the continuous flow valve is not passing the grease.
- ◎ Conversely, low temperature may cause the volume contraction of grease. If this happens, the grease discharged through the continuous flow valve may be quickly absorbed into the pipe before it reaches the Sensor. In this case, the Sensor will not detect the grease.
- ◎ This is highly likely to occur when you select a high-sensitivity Sensor to detect a small discharge amount and the oil/grease to be detected is highly viscous (#1, 2 and 3).
- ◎ Unless the temperature is kept constant with thermostat, **a Sensor should be mounted as close to the discharge opening of the continuous flow valve as possible.**
- ◎ If a flexible hose is attached to the "IN" side of the Sensor, it may discharge some grease into the Sensor even when the continuous flow valve is stopped, which will activate the Sensor.
- ◎ Conversely, a flexible hose may absorb the grease discharged by the continuous flow valve, in which case the Sensor will not be activated. **Flexible hoses should not be used unless absolutely necessary.**
- ◎ Too much air remained in the "IN" side of the Sensor will significantly lower the flow velocity of grease discharged by the continuous flow valve, in which case the Sensor may fail to detect grease. **The Sensor must be completely degassed before use.**

# Control

## ■ Interface for Lubrisensor and Flowsensor

(An intermediate amplifier for the configuration where Sensor signals are directly fed into a sequencer)

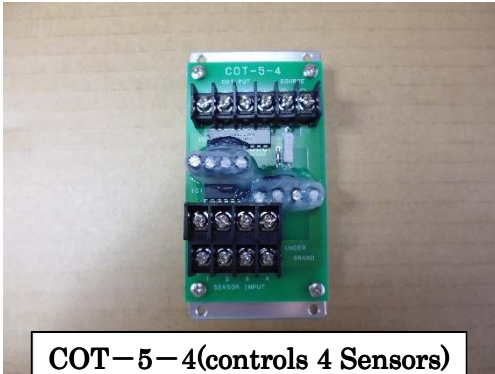
If you keep turning ON and OFF the Sensor that is passing milliamp-scale current, **the life of the Sensor may be significantly affected by electric erosion** caused on the internal contacts.

To output sensor signals into a sequencer, this Interface should be used together with the Sensor so that it can lower the current to microamp level and amplify the signals enough to activate the sequencer. We recommend using this interface together with our Sensor, as the use of this interface guarantees more than 10 million runs of the Sensor. The outputs are transistor outputs, which means that it stays ON when the Sensor is activated (detecting fluid). To prevent excessive vibration, silicone rubber is partially applied to this Interface.

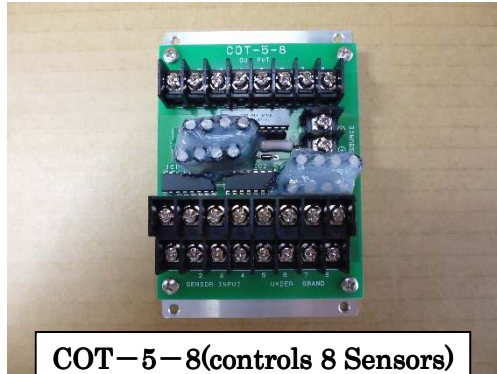
The Interface is available in 1, 4, 8, 16, and 24 points.



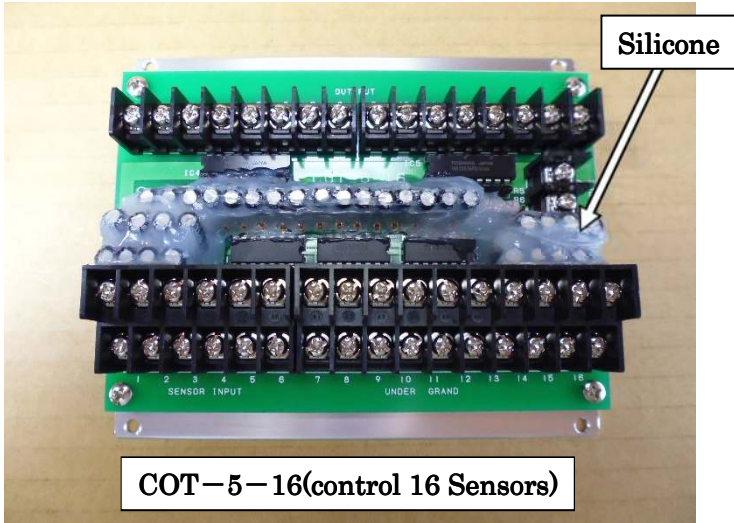
COT-5-1(controls 1 Sensor)



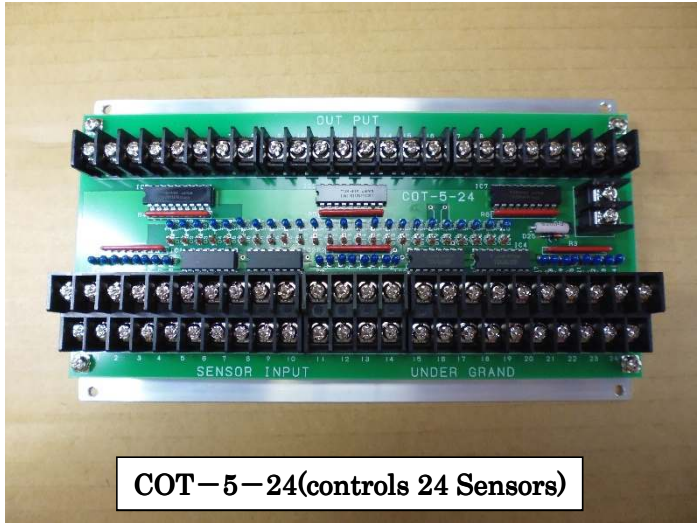
COT-5-4(controls 4 Sensors)



COT-5-8(controls 8 Sensors)



COT-5-16(control 16 Sensors)



COT-5-24(controls 24 Sensors)

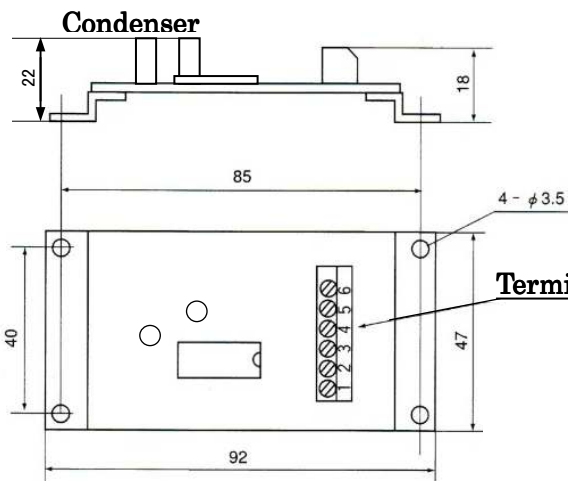
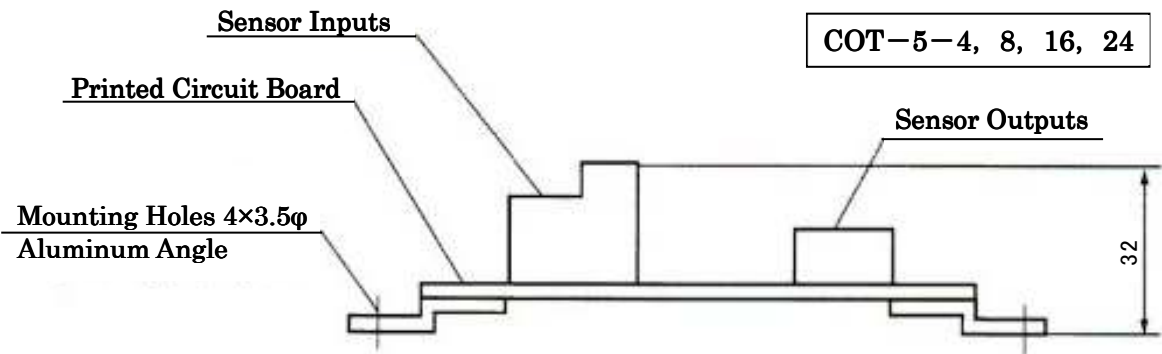
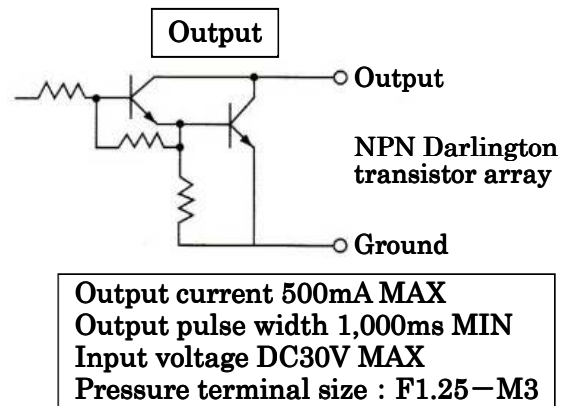
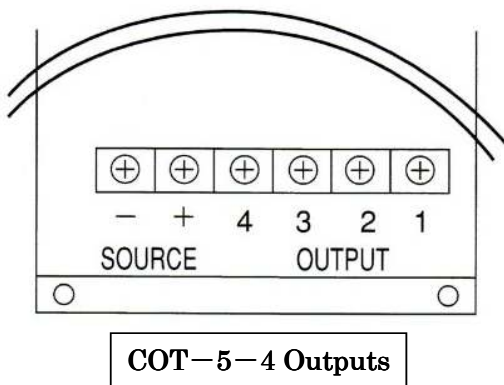
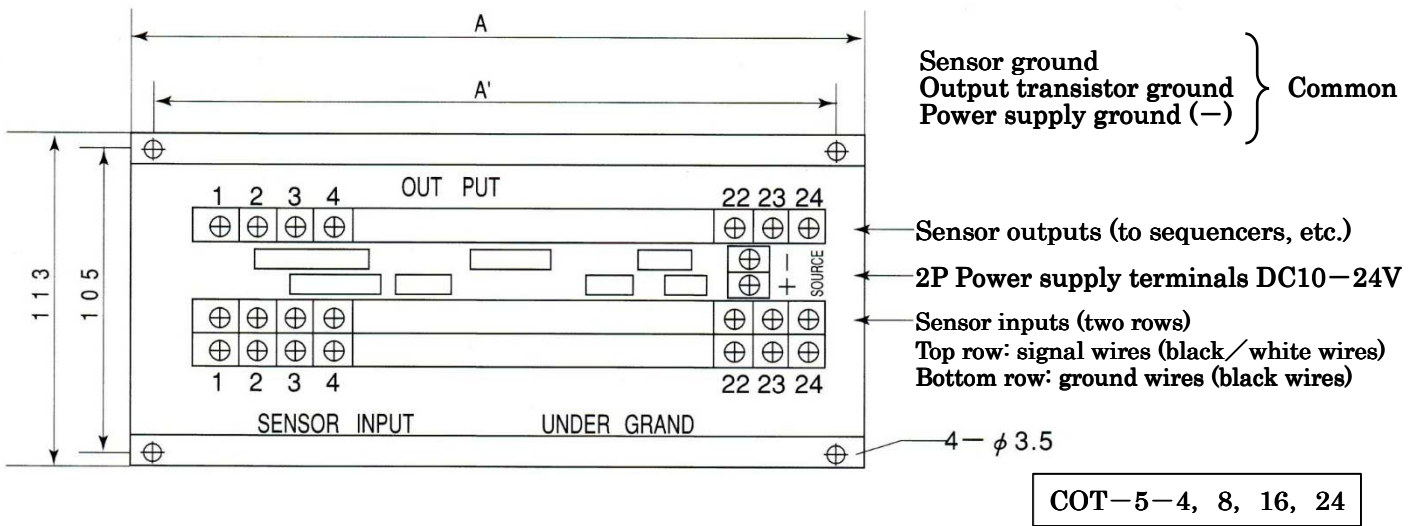
Model	Sensor	A(mm)	A` (mm)	Height	Weight (g)
COT-5-1	1	Figure below	Figure below	18	32
COT-5-4	4	55	45	32	78
COT-5-8	8	75	65		127
COT-5-16	16	135	125		237
COT-5-24	24	200	190		318

The models in the table above are standard products with NPN transistor outputs. Products with model numbers that end with the letter P have PNP transistor outputs.

PNP transistor output is available only for COT-5-4P.

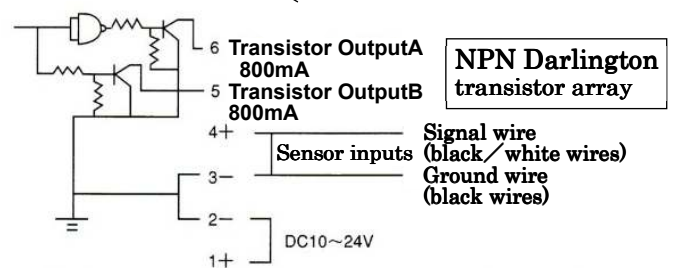
The models with PNP transistor outputs type have a circuit board which is the same size as those with NPN transistor outputs.

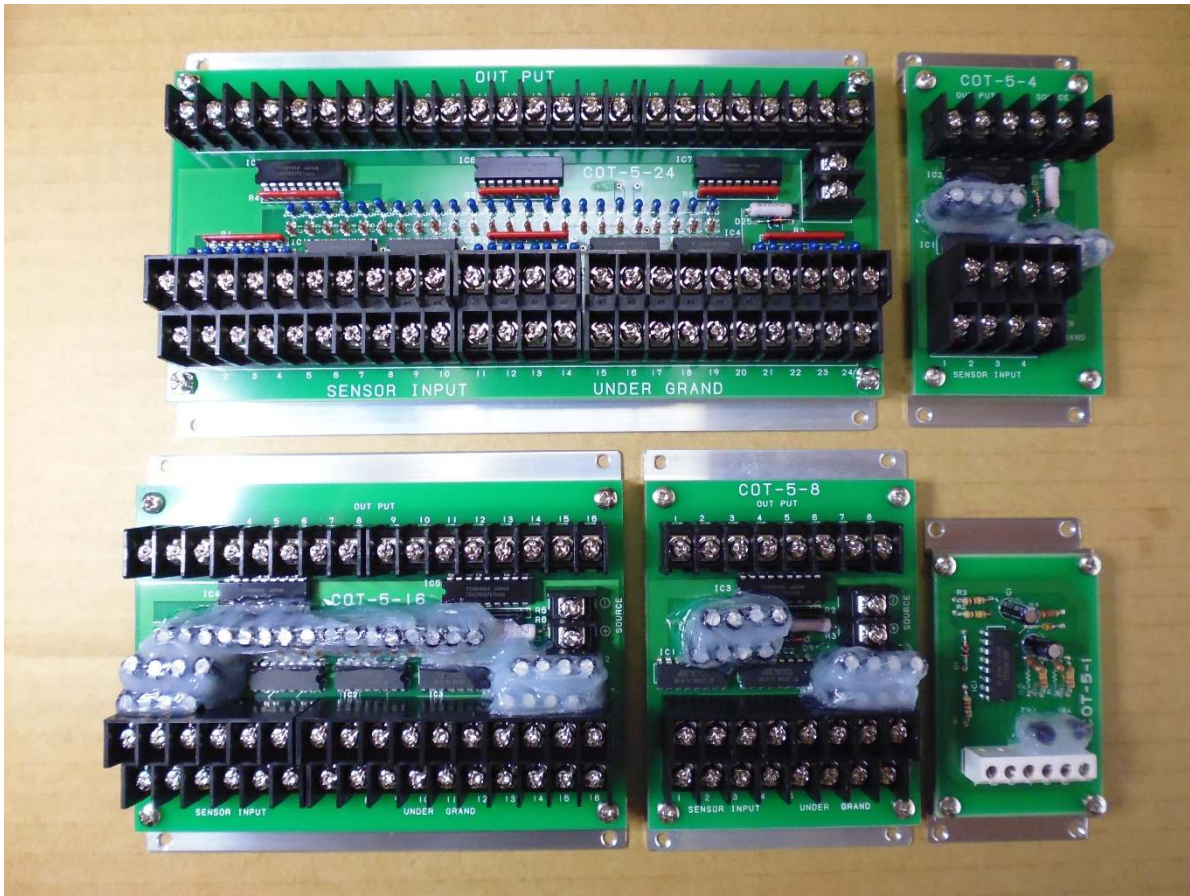
● Drawing for Interface



**M2.6x5 Clamp Screw**  
(Fasten electrical wires directly here)

**COT-5-1**





Manufactured and distributed by

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