KOFLOC Kyoto

Small Plastic Karman Vortex Flow Meter

FM31 Series

Instruction Manual

KOFLOC Corp.

■Checking the product

FM3101/3102/3103/3104 are shipped after they have been inspected thoroughly at Kofloc. When you have received the product, please check the following:

1. Check the appearance for damage.
2. The type name, basic specifications and product No. are shown on the nameplate attached to the top of the case.

Make sure the specifications are as ordered.

■Precautions for handling

Ⅰ. Storage

(1) The product must be stored in a place that satisfies the following conditions:

- A place not exposed to rain and water.
- A place not exposed to vibration and impact.
- A place of the following temperature and humidity. Normal temperature and humidity (about 25℃ and 65% RH) are preferable.

  Temperature: -10 to 60℃

  Humidity: 5 to 95%RH
- A place not filled with corrosive gas.

(2) The product should be stored in the package in which the product has been received.

(3) To store the flow meter with fluid remaining in the tube hole after use, be sure to clean it thoroughly before storing it.

Ⅱ. Installation Place

Observe the following precautions to ensure that the flow meter is used safely and accurately over a long period of time:

(1) The applicable fluid of the flow meter is liquid. Use industrial water equivalent to pure water and tap water.

(2) Do not use the flow meter under direct sunlight or in a place where it is exposed to radiant heat. If the flow meter needs to be used in such environment, provide sufficient shielding and insulating measures.

(3) Do not install the flow meter in corrosive gas atmosphere.

(4) This flow meter is of splash-proof structure (JIS C 0920), but it must be kept protected from rain and water.

(5) Install the flow meter in a place free of vibration and impact.

(6) If the flow meter is installed near electromagnetic noise sources, the meter may malfunction. Either install it away from such sources or provide magnetic shields.

(7) Provide a straight tube as long as possible to avoid influence of turbulent or pulsating flow.

The recommended straight tube length is 10D or over for the upstream and 5D or over for the downstream.

D = Diameter of piping

(8) Match the flow direction with the arrow direction marked on the body.

Ⅲ. Caution and Warning

(1) Do not apply water pressure exceeding the specified level. Do not clean the flow meter with reverse flow. Such practices may damage the sensor portion and the flow meter may fail.

(2) If fluid to measure in the tube hole is frozen, the sensor portion may be destroyed. If fluid is likely to be frozen, provide heat insulation measures.

(3) FM31 Series meters are made of resin including the thread portions. Do not apply excessive tightening force nor unnecessary external force when installing them.

(4) Do not hold the output cable when carrying the flow meter. The cable-to-electronic circuit soldered connection may be broken.

(5) Protect the circuit of the flow meter from dew condensation.

Ⅳ. Insulation Resistance and Dielectric Strength Tests

Never conduct insulation resistance and dielectric strength tests since such tests may damage the electronic circuit.

■Warranty

Ⅰ. Contents of Warranty

① Warranty period

The warranty period shall be one (1) year after shipment from Kofloc.

② Scope of warranty

Should the product fail for reasons attributable to Kofloc during the warranty period, Kofloc will, at its option and expense, provide a replacement product or repair the failed product at the Kofloc factory free of charge.

Please note that Kofloc shall not be held responsible for damages caused by reasons not attributable to Kofloc and the customer's opportunity loss, lost profits, secondary disaster, compensation for accidents and damage to products other than the Kofloc product and other compensation for reasons attributable to failure of the Kofloc product.

③ Out of warranty

The warranty shall not apply to the following failures even if they occur during the warranty period:

a) Failure due to misuse or improper repair or modification. (Failure resulting from use under conditions deviating from the manufacturing specifications included.)
b) Failure due to dropping of the product after purchase.
c) Failure due to a fire, natural disaster such as earthquake, flood and lightning and riot, war or the like.
d) Failure due to intrusion of foreign matter through piping.
e) Failure caused by a specific problem attributable to a combination with other equipment incorporated.
f) Other failures which are considered not attributable to Kofloc.

Kofloc shall not be held responsible for opportunity loss, damage to products other than the Kofloc product at the customer or customer's client and other compensation for reasons attributable to failure of the Kofloc product.

1. Overview

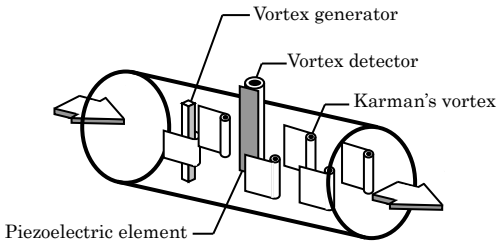
The FM31 Series vortex flow meter measures the flow velocity (vortex) of liquid (water) running through the tube hole, detects a vortex frequency proportional to the flow velocity and then outputs 4 to 20 mA from the processing circuit.

This is a small plastic vortex flow meter, where the flow velocity and the flow rate have a certain relationship in a wide range of use, and outputs as follows; 0.4 to 4 L/min. for FM3101, 2 to 20 L/min. for FM3102, 5 to 50 L/min. for FM3103 and 10 to 100 L/min. for FM3104.

This flow meter has no movable parts and its pressure loss is small. The output signals are proportional to the volume flow rate. It offers excellent linearity and reproducibility.

PFA (all Teflon) is used for the body to secure mechanical strength and high reliability. Its simple structure causing little liquid accumulation ensures maintenance-free service, requiring no periodic servicing and check.

Principle of measurement



2. Standard Specifications

■ Main specifications

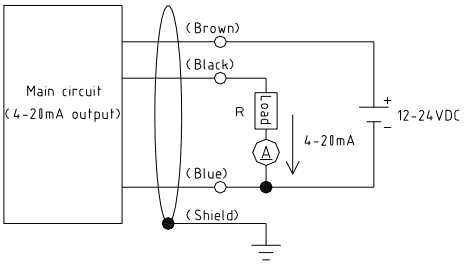
Item	Specification
Fluid	Ultra pure water, Chemicals
Material	Body: PFA, Cover: PBT Output cord: Conductor = Tinned bare copper wire Sheath = Heat-resistant/cold-resistant PVC
Accuracy	±3%+1digit
Reproducibility	±0.5%F.S. max.
Max. working pressure	1MPa(10kgf/cm²)
Fluid temperature	0-90℃
Ambient temperature	0-5
Power supply voltage	12-24VDC
Output	4-20mADC,3-wire
Load resistance	0-250Ω(250-500Ω when 24VDC)
Time constant	1 second
Waterproof	Splash-proof structure (JIS C 0920)
Cable length	2 m terminated (pre-soldered)
Weight	Without indicator: about116g (FM3101) With indicator: about182 g (FM3101)

■ Model, diameter, flow measuring range and connection

Model	Diameter	Flow Measuring Range	Connection
FM3101	L	Low flow: 0.4 – 4 L/min	3/8“ (tube end)
FM3102	M	Medium flow: 2– 20 L/min	1/2“ (tube end)
FM3103	H	Large flow: 5 – 50 L/min	3/4“ (tube end)
FM3104	H	Large flow: 10 – 100 L/min	1“ (tube end)

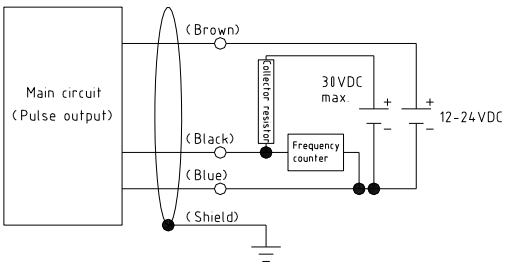
3． Wiring Diagram

Electric current specification



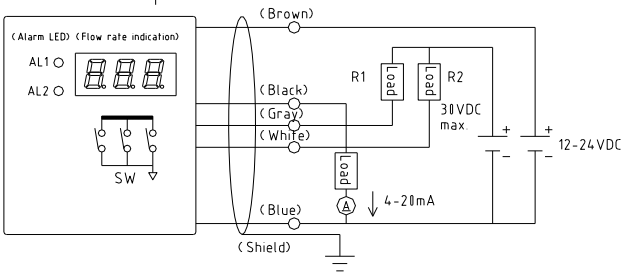
Load resistance R: 0～250Ω (Power voltage 12 VDC)
250～500Ω (Power voltage 24VDC)

Pulse specification



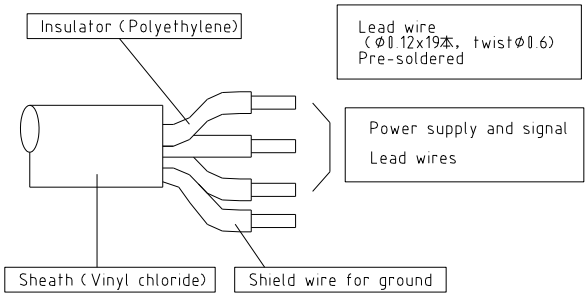
Determine the collector resistor to make the output current 10 mA or less.

Indicator specification



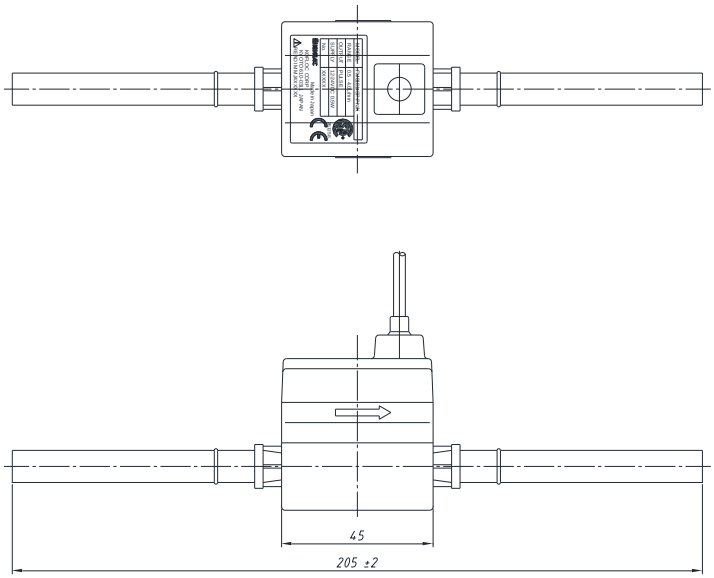
Determine the load resistors R1 and R2 to make the output current 80 mA or less.
Load resistance R0: 0～250Ω (Power voltage 12 VDC)
250～500Ω (Power voltage 24 VDC)

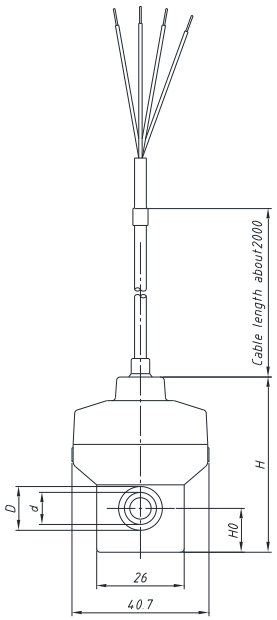
Input/output line



4． External View

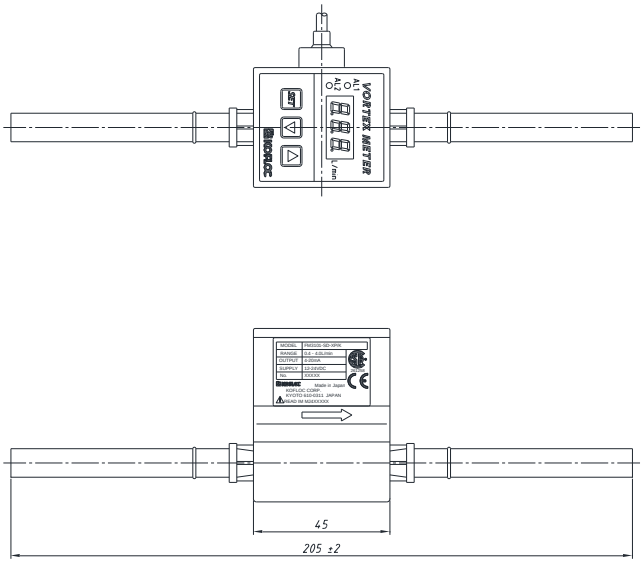
Without indicator

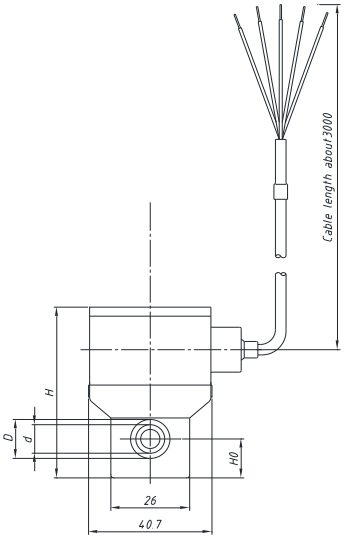




Model	Tube Size	Dimensions			
		D	d	H	H0
FM3101	3/8インチ	9.52	6.35	52.0	13.0
FM3102	1/2インチ	12.70	9.52	52.0	13.0
FM3103	3/4インチ	19.05	15.87	54.0	12.0
FM3104	1インチ	25.40	20.20	62.7	15.7

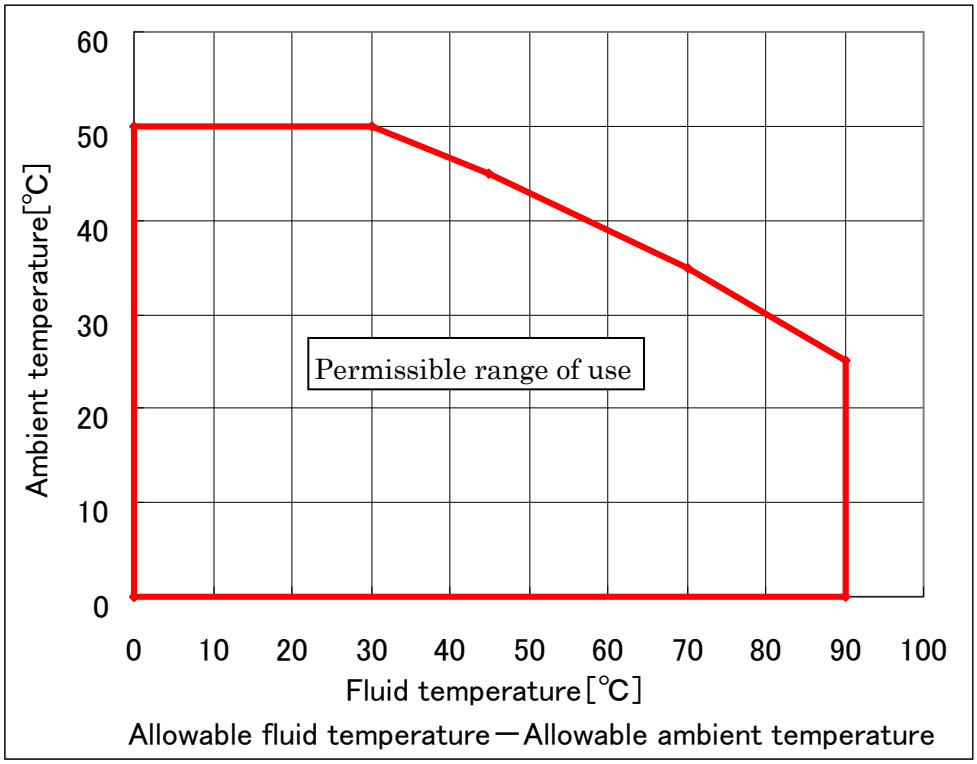
With indicator



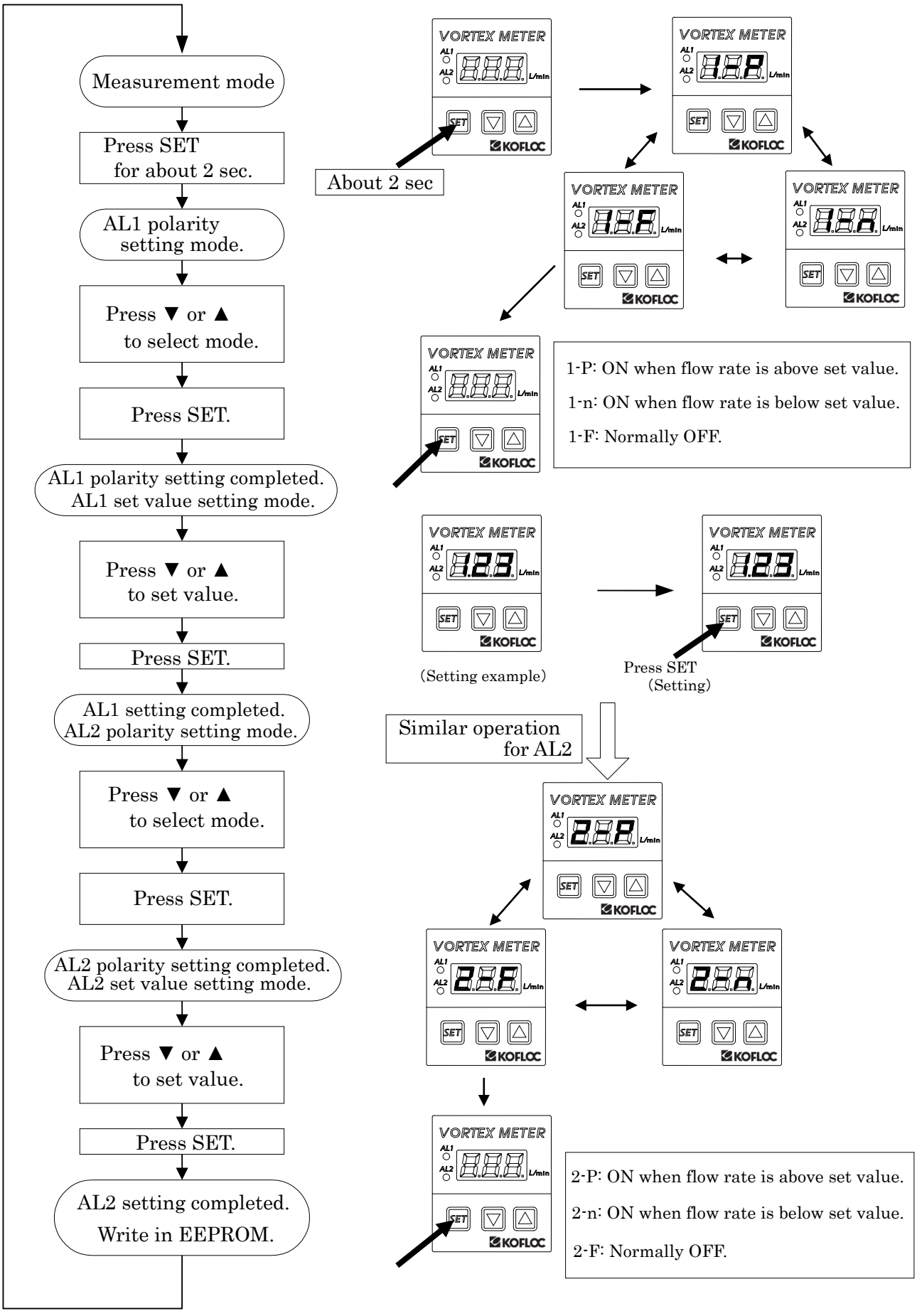


Model	Tube Size	Dimensions			
		D	d	H	H0
FM3101	3/8インチ	9.52	6.35	58.2	13.0
FM3102	1/2インチ	12.70	9.52	58.2	13.0
FM3103	3/4インチ	19.05	15.87	60.2	12.0
FM3104	1インチ	25.40	20.20	68.9	15.7

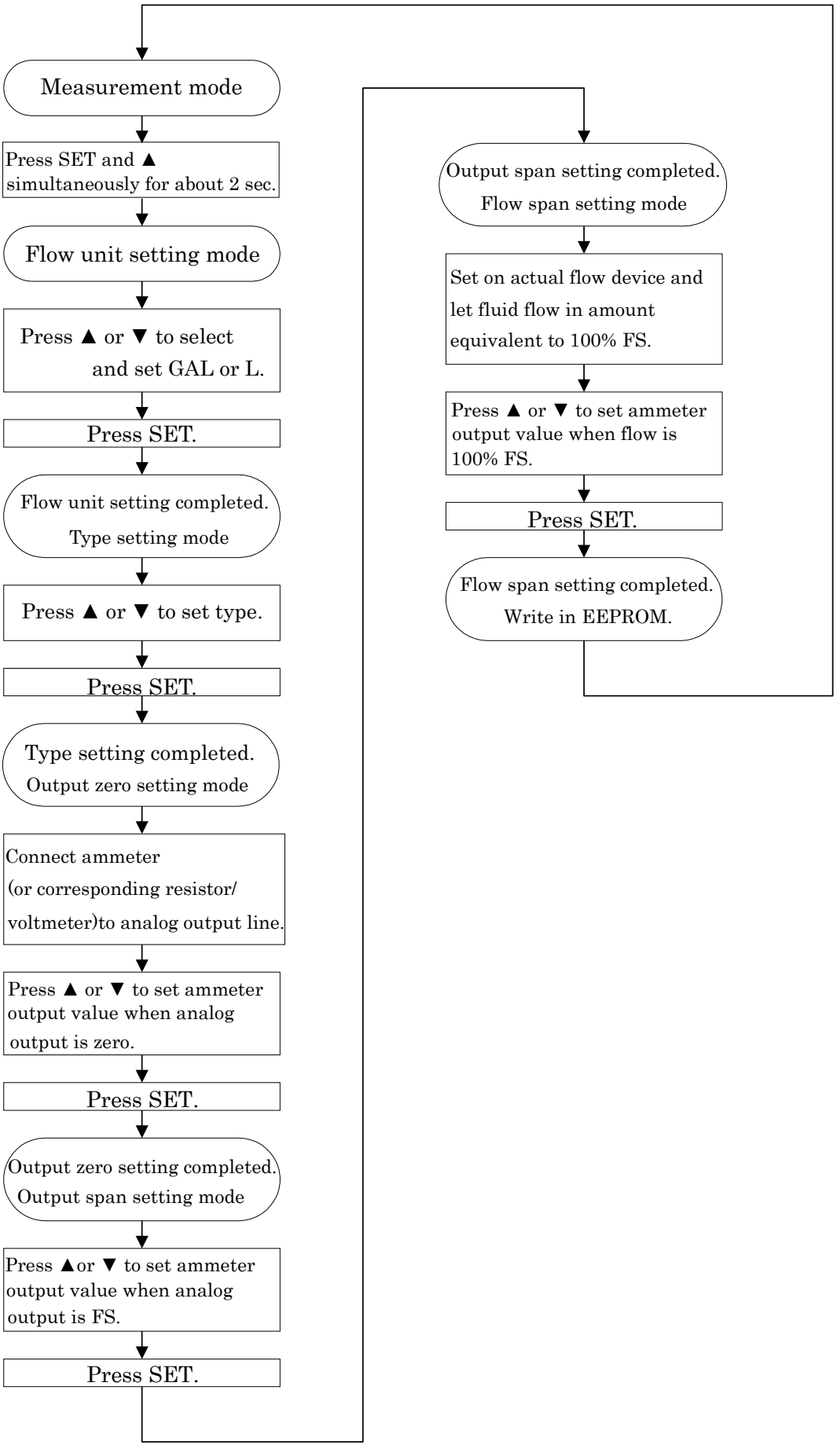
5． Permissible Range of Use



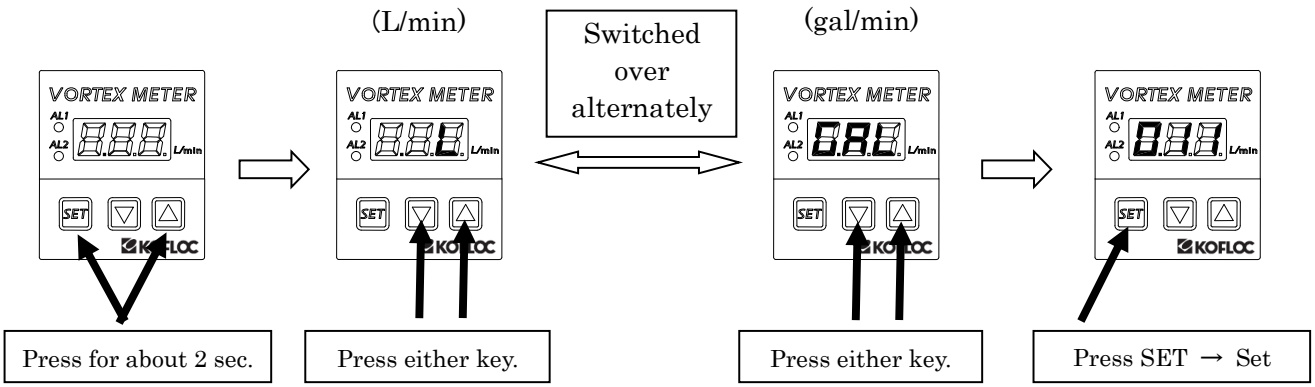
6 . Alarm Setting



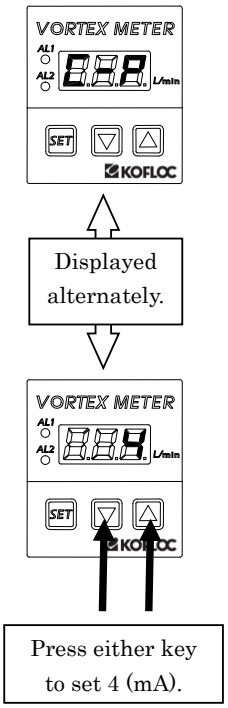
7．Other Setting



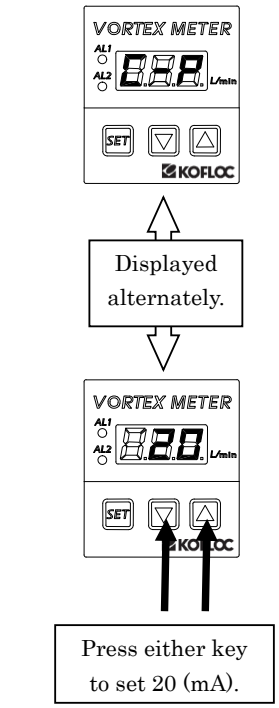
(1) Setting the flow unit



(2) Setting the output zero

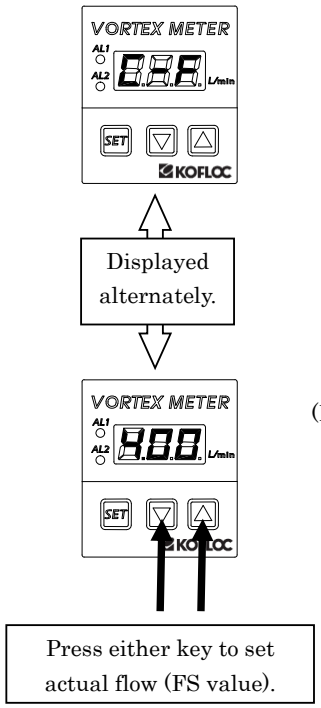


(3) Setting the output span



(4) Setting the flow span

*Let fluid of FS rate flow with actual flow device.



(Example)

L range

KOFLOC Corp.
URL：http://www.kofloc.co.jp