

READ ALL INSTRUCTIONS THOROUGHLY

I N S T R U C T I O N S

KARMAN VORTEX FLOW SENSOR

TYPE RLK - \*\*16P\*

**SAGInoMIYA**

## PREFACE

- Failure to read and follow all instructions carefully before installing or operating this KARMAN VORTEX FLOWSENSOR (Type RLK) could cause personal injury and/or property damage.
- This instruction covers RLK standard models. Model numbers with suffix "Q\*\*" are not included in standard model lineup. If there are differences between your drawing and this instruction, follow the spec on your drawing.

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## 1 . NOTE FOR SAFETY

### WARNING

- Failure to read and follow instructions or improper handling will make it out of warranty and it may cause diminish of reliability.
- Do not disassemble the device since it is strictly calibrated in factory.
- Display case is not drip proof construction. Do not splash water directly to the case, or it may cause short circuit of electronic parts.
- When piping installation, tighten the nut with adequate torque. In case of over tightening it may cause damage of the body or leakage.
- Be sure to definitely connect after checking the color of the wiring the wires, or it may cause damage, over heat or ignition.
- Do not apply other Voltage than 12 to 24 V DC, or it may cause damage, over heat or ignition.

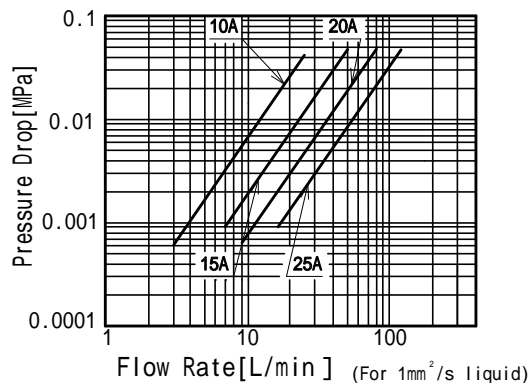
### CAUTION

- Do not pull the cable nor carrying by the cable, or it may cause breaking of the cable.
- Use the fitting correctly based on the manufacturer's manual, and ensure that there are no leaks. Over-tightening the fitting can cause damage to the device.  
(SEKISUI CHEMICAL CO., LTD. Ethlon Clean Fitting)
- Do not use pipe wrench because it could damage body, and could cause fluid leakage.
- Do not install this product to metal piping units because thermal expansion of metal pipes could cause breakings of body, and fluid leakages.

## 2 . FEATURES

- High reliability and durability with simple mechanism and no moving parts.
- Small pressure loss construction which exists only vortex generator and vortex detector in the fluid path. Note 1)
- The display uses high visibility LEDs, and can display instantaneous flow volume and total volume. The display can also be inverted according to the orientation of the attachments.
- Features current output, pulse output, and switch output.

Note 1) PRESSURE DROP

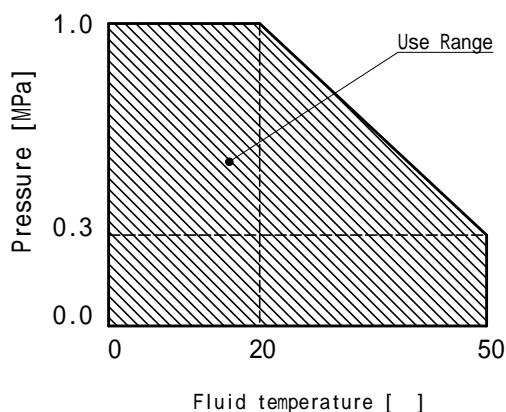


### 3 . SPECIFICATIONS ( In case of special models, a part of these specifications may be changed. )

Catalog Number		RLK -						
		1016P*151S	1516P*151S	1516P*201S	2016P*201S	2016P*251S	2516P*251S	2516P*321S
Connection *1		Union type connection (TS socket)						
Nominal bore of PVC made connection piping *2		16		20		25		32
Main body I.D.		10	14		18		23	
Cv VALUE		2.6	5		8		12	
Material at fluid contact surface		Material quality of main body and union : PVC-U Material quality of O-ring : EPDM or FKM						
Max. working pressure		1 MPa at 20 *3						
Applicable fluid		Pure water, City water, Various liquids (must not be harmful to the device or O-ring material) *4						
Allowable fluid temperature		0~50 (No frozen)						
Ambient temperature at body		0~50 (No frozen and no dew condensation)						
Ambient humidity at body		95 %RH or less						
Storage temperature		-10~50 (No frozen and no dew condensation)						
Power supply voltage range		12~24 V DC ±10 %						
Vibration		4.9m/s <sup>2</sup> or less						
Allowable kinematic viscosity		2mm <sup>2</sup> /s or less	3mm <sup>2</sup> /s or less		4mm <sup>2</sup> /s or less		5.5mm <sup>2</sup> /s or less	
Measurable flow range	With water	3~25 L/min	7~50 L/min		9~80 L/min		16~130 L/min	
	Max. kinematic viscosity	4~25 L/min	9~50 L/min		12~80 L/min		20~130 L/min	
Largest total volume *5		9,999,999.9 L						
Kinetic viscosity adjustment value (factory setting) *6		1.0						
Accuracy		±3 %FS ( In case of water ) *7						
Responsiveness (factory setting) *6		approx. 1 second						
Full scale output (factory setting) *6*8		25L/min	50L/min		80L/min		130L/min	
Analog output		4~20mA DC *9 Max load resistance rate: 250 (at 12V DC)~500 (at 24V DC)						
Pulse output	Each port size common specification	NPN open collector output Pulse width: 2 msec Max. current withstood 100mADC, Max apply voltage:30VDC Residual voltage: 1 V or less						
	Pulse rate (factory setting)*6	2 mL/Pulse	5 mL/Pulse		10 mL/Pulse			
Switch output		NPN open collector output 1 or 2 (depending on input/output mode selection) Max. current withstood 100mADC, Max apply voltage: 30VDC Residual voltage: 1 V or less						
Reset input (for resetting total volume)		Detected time 0.1 seconds or greater Detected voltage 1V or less (with open collector) Connection point resistance 100 or less (during input from connection point)						
Display		Instantaneous volume display/total volume display/scroll display: 7 segment LED Unit display [L/min] section illuminated: instantaneous volume display [L] section illuminated: total volume display Switch output 1 [I] illuminated: ON, extinguished: OFF Switch output 2 [II] illuminated: ON, extinguished: OFF						
Display resolution capability	Instantaneous volume display	0.1 L/min				1 L/min		
	Total volume display	0.1 L				1 L		
Operation Switch		2 pcs.						
Input/output selection	FSPA mode	Analog output: 1, Pulse output: 1, Switch output (Instantaneous flow alarm): 1						
	FSPR mode	Pulse output: 1, Switch output (Total flow alarm): 1, Reset input: 1						
	FSSA mode	Analog output: 1, Switch output (Instantaneous flow alarm): 2						
Wiring	Each port size common specification	5 wires (with insulation shield wire) Brown: Vcc, Blue: GND						
	FSPA mode	Black: Switch output 1, White: Pulse output, Gray: Analog output						
	FSPR mode	Black: Switch output 1, White: Pulse output, Gray: Reset input						
	FSSA mode	Black: Switch output 1, White: Switch output 2, Gray: Analog output						
Consumption current		100mA or less						
Protective construction		An equivalent for IP65 standard						
Installation		Exept electronic components should be located above the axis of piping.						
Face to face distance		120mm	130mm		165mm		175mm	

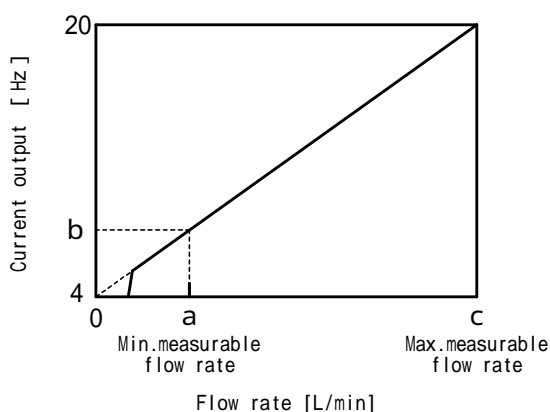
- \*1) This product has no problem in performance if there is visible bond or a gap at the connecting point.
- \*2) Choose the PVC pipe to be connected based on the specifications of the fixing's manufacturer.  
(SEKISUI CHEMICAL CO., LTD. Ethlon Clean Fitting)

\*3) Max. working pressure



- The pressure is the gauge pressure.
- Ensure that water hammer pressure is not included.  
If it is unavoidable that water hammer pressure be included, set the water hammer pressure to 0.14 MPa or less and use the device at less than the maximum usage pressure including the water hammer pressure.

- \*4) Designed largest specific gravity is 2.0. If used with liquid that exceeds the largest specific gravity, this may cause damage to the vortex detector.
- \*5) The total volume is reset when the power is switched off.
- \*6) Setting values can be changed with the keys.  
See pages 9 to 16 regarding the setting method, and pages 17 to 18 regarding the setting range. If you change the settings, be sure to perform a test run to confirm that the entire system is completely functional.
- \*7) In the allowed kinetic viscosity range, by correctly setting the kinetic viscosity adjustment value, an accuracy of  $\pm 3\%FS$  can be achieved.
- \*8) Even if the full scale output setting is changed, the accuracy is  $\pm 3\%$  of the largest value of the measured volume range.
- \*9) FLOW RANGE - CURRENT OUTPUT(With water, factory setting)



R L K -		1016P*151S	1516P*151S	1516P*201S	2016P*201S	2016P*251S	2516P*251S	2516P*321S
Min.measurable flow rate	a [L/min]	3	7		9		16	
Analog output at " a L/min "	b [mA]	5.92	6.24		5.8		5.97	
Max.measurable flow rate	c [L/min]	25	50		80		130	

## 4 . INSTALLATION

### ⚠ CAUTION

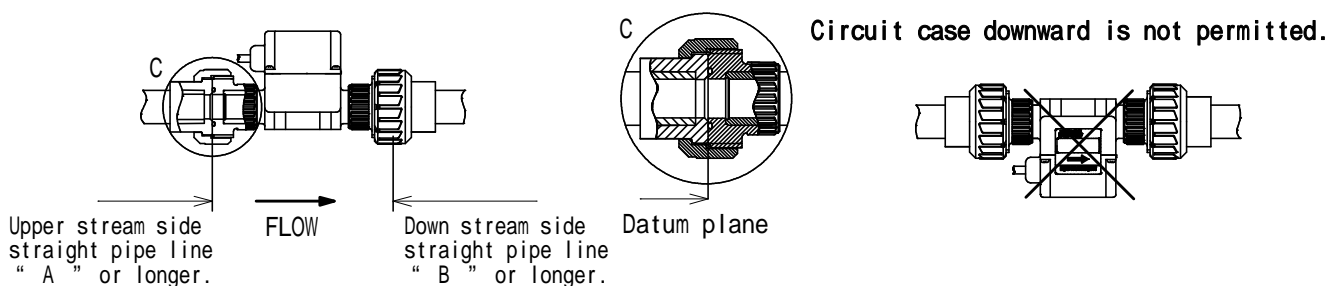
- The flow direction must accord with the direction of the arrow mark on the flow sensor body label.
- When connecting piping, connect properly based on the manual of the fixing manufacturer.  
(SEKISUI CHEMICAL CO., LTD. Ethlon Clean Fitting)
- When installing this product, hold the connection tightly and twist the nut.
- When the initial test running, open the valves slowly and let fluids flow gradually. Execute air release sufficiently. Bubbles in the piping may interfere measurement of the flow amount.

## 5 . PIPING INSTRUCTION

### ⚠ CAUTION

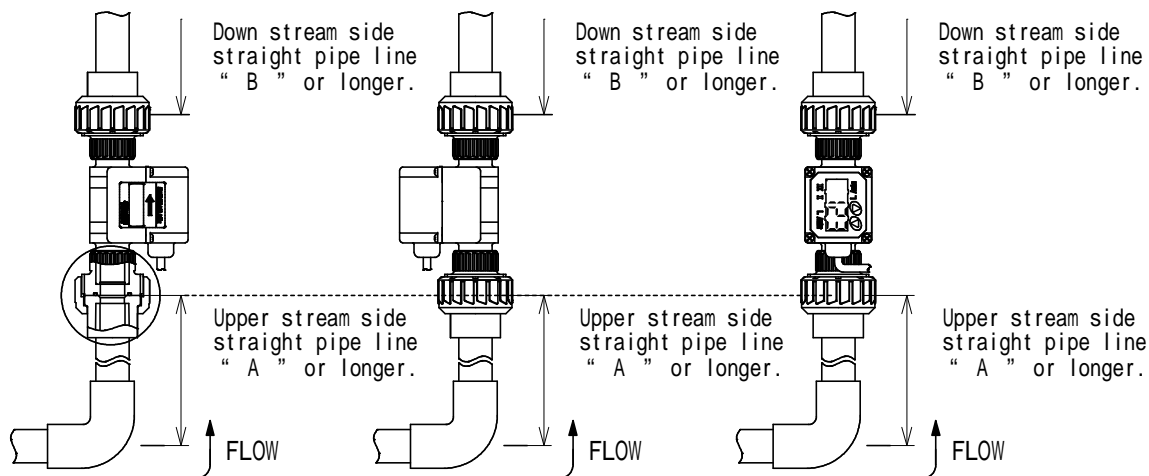
- Installing place : **Do not install at following places.**
  - 1) Outdoor, Place where exposed to direct sunlight.
  - 2) Place where large mechanical vibration/impact exist.
  - 3) Place where large electric noises exist.
- This product detects fluid vibration caused by Karman vortex. In the case of malfunction due to vibration or shock when there is no flow, take anti-vibration measures for your system.
- Please install it so as not to cause the water hammer pressure. Take care of valve operation in order not to apply excessive pressure. If use is unavoidable, use a damper or other component so that the water hammer pressure is 0.14 MPa or less, or it may cause damage of the vortex detector.
- Flash the pipe inside before installation to prevent foreign particles from entering.
- Install a strainer (60 mesh or finer) at upper stream of the flow sensor in case foreign particles are expected.
- If it is installed with a throttle valve, distribute valve or temp. sensor etc., it should be placed on down stream of the flow sensor, or it may affect its accuracy.
- For large pulsating flow, install a damper in order to avoid measuring error.
- Install where no noise affects. Noise may cause its malfunction.
- To avoid affection to measuring accuracy by drift stream, swirling stream etc., be sure to have straight piping at inlet and outlet side as below.
- Avoid attachment orientation where the display case faces downward.

### HORIZONTAL PIPING



**VERTICAL PIPING** In case of vertical piping, it is recommendable to install in direction of the flow coming up from lower side to avoid air bubbles becoming mixed in fluid.

Perform sufficient air flushing as bubbles in the piping may interfere with measurement.



R L K -	1016P*151S	1516P*151S	1516P*201S	2016P*201S	2016P*251S	2516P*251S	2516P*321S
dimension A(mm)	100	140					165
dimension B(mm)	70		90	95	115		

## 6 . WIRING METHOD

### ⚠ WARNING

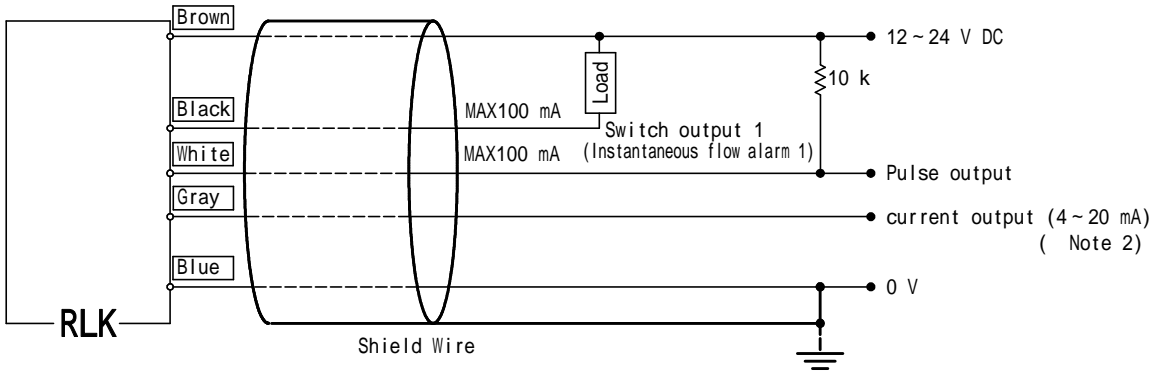
- Before performing settings with the keys, remove the input/output lines (white, black, grey lines). Failure to do so may cause this product or connected devices to break down. See page 9 for details of the key operations and setting methods.
- Be sure to connect a shield wire to power source's GND together with this product's 0 V. Otherwise malfunction may occur by effect of noise.
- Be sure for connection only to NEC class 2 power source.
- In case of connecting other instrument to this product, be sure to use a instrument of low voltage, low current and conforming to EN61010-1. EN61010-1 is a safetyrequirement standard for electric equipment which is intended to use in measurement, control and test.
- Do not apply any voltage on the reset input wire, or it may cause a breakdown, over heat or ignition.

### ⚠ CAUTION

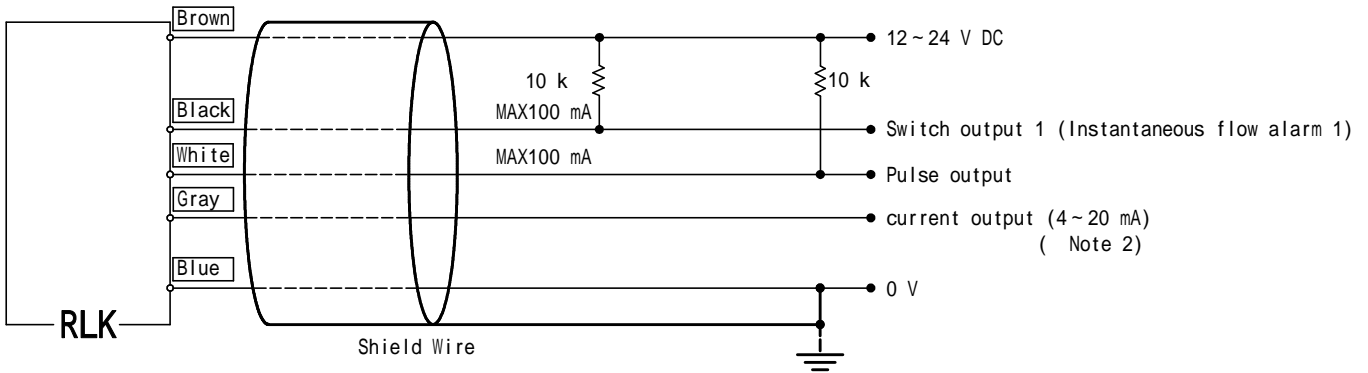
- Do not tie up nor place in parallel with power line.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless the length.
- Do not install near to the source of noise.
- Make sure to insulate any unused output line as contact with the electric power supply can cause burnout of the internal electronic components.

• In FSPA mode

Direct Drive of Load

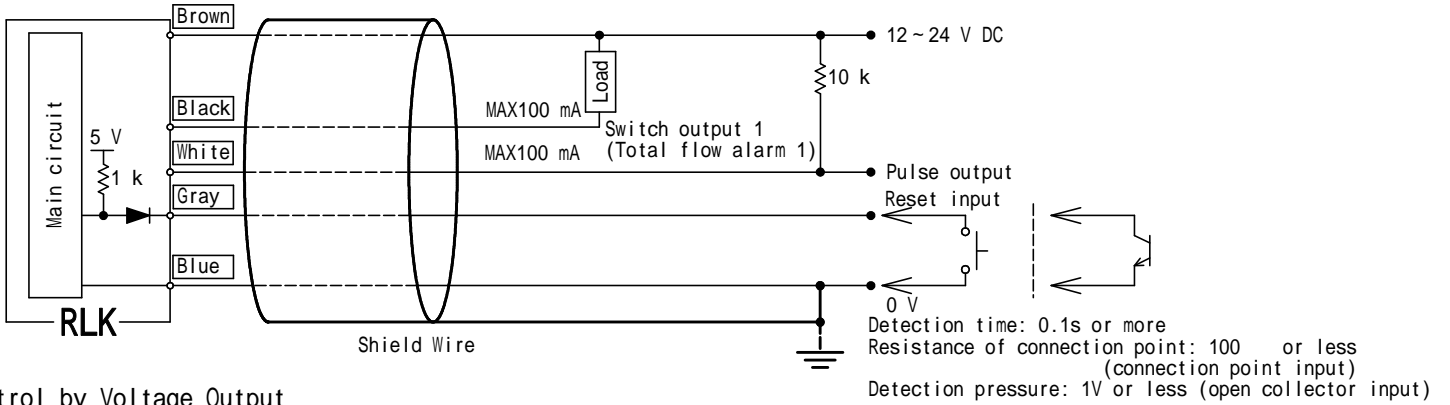


Control by Voltage Output

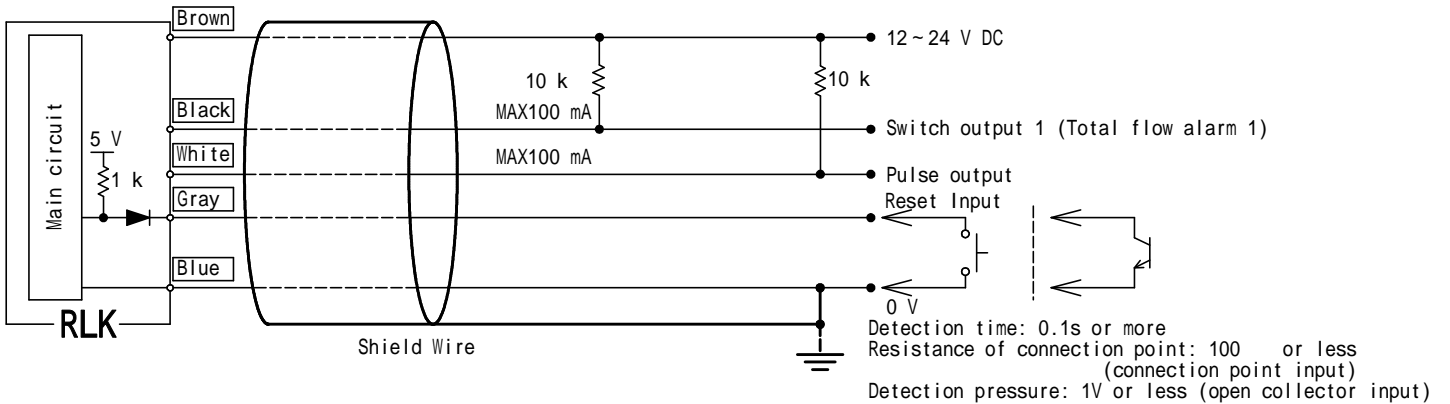


• In FSPR mode

Direct Drive of Load



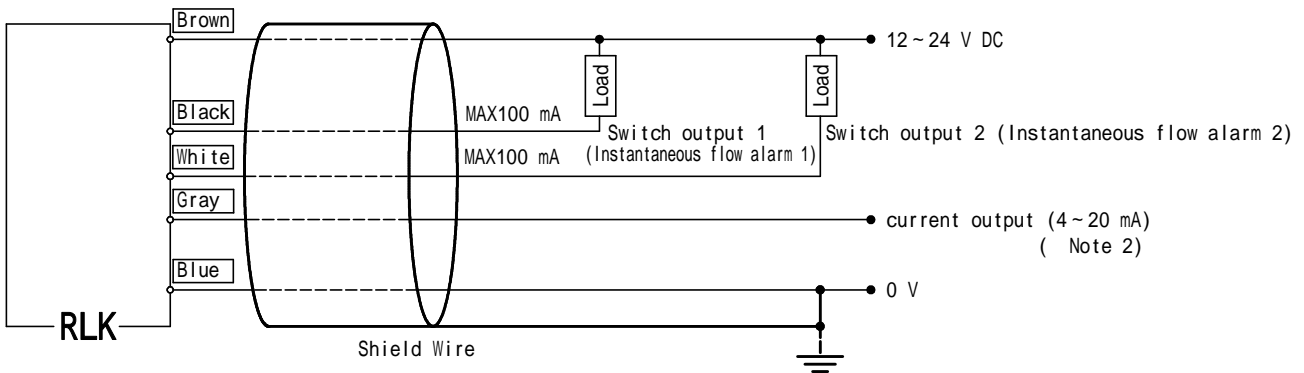
Control by Voltage Output



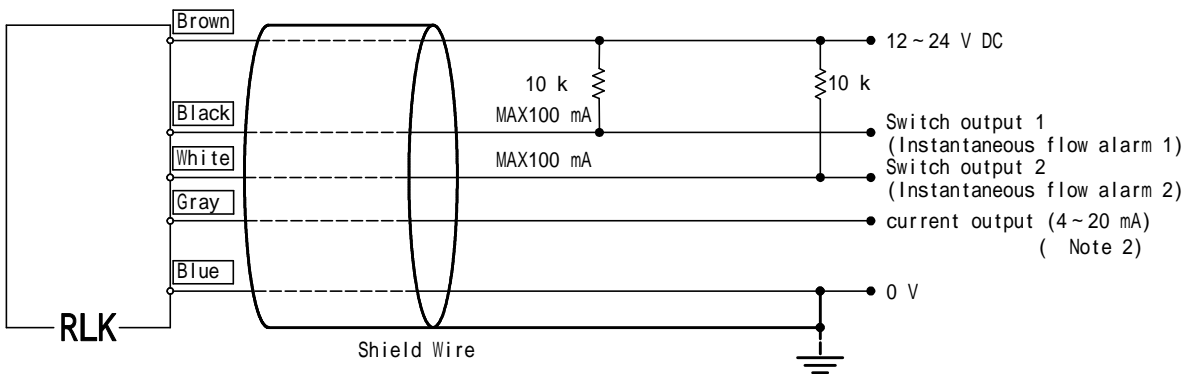


• In FSSA mode

Direct Drive of Load



Control by Voltage Output



**CAUTION**

( Note 2)

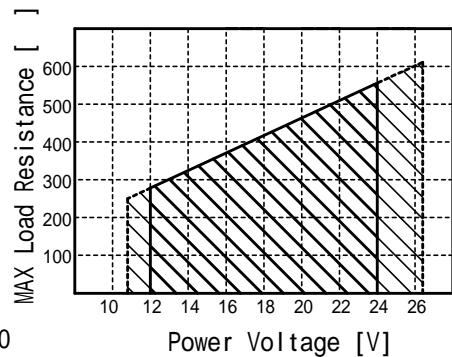
- Set the load resistance and power supply voltage so that this product's total largest fall voltage from the resistance load of the lowest operating voltage (12 V DC) and things such as the recorder does not exceed the voltage of the power supply.
- When extending wiring, consider the resistance of the wiring extension as load resistance.

(Wiring extensions of 10 m or less are recommended.)

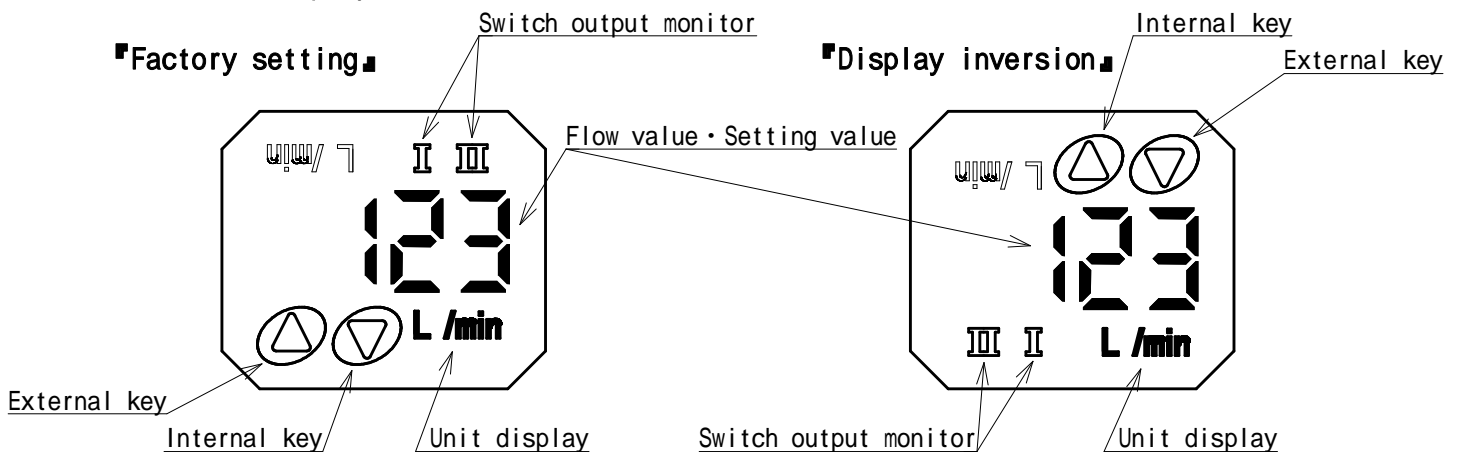
Power supply voltage: 12 V DC-10%...largest load resistance: 250

Power supply voltage: 24 V DC-10%...largest load resistance: 500

The graph on the right shows the permissible range of load resistance.



7 . Name of the display



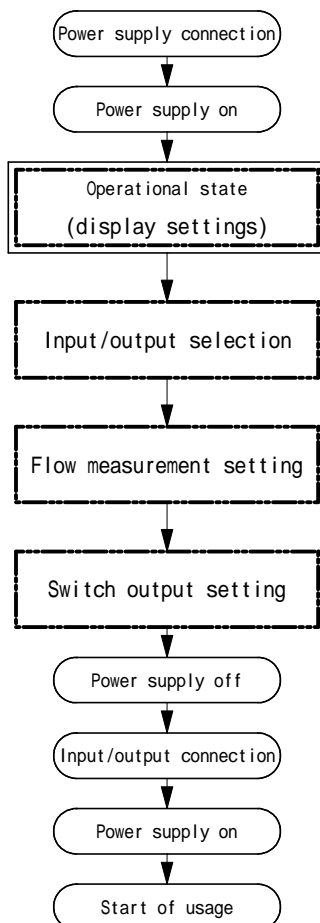
## 8 . Key operation and setting method

### 8 - 1 . Setting Procedure and Precautions

#### Warning

- If an error is made in the setting procedure, the setting value may be invalid and this product or connected devices may break down.  
Follow the procedure below to perform setting correctly.

#### • Setting procedure

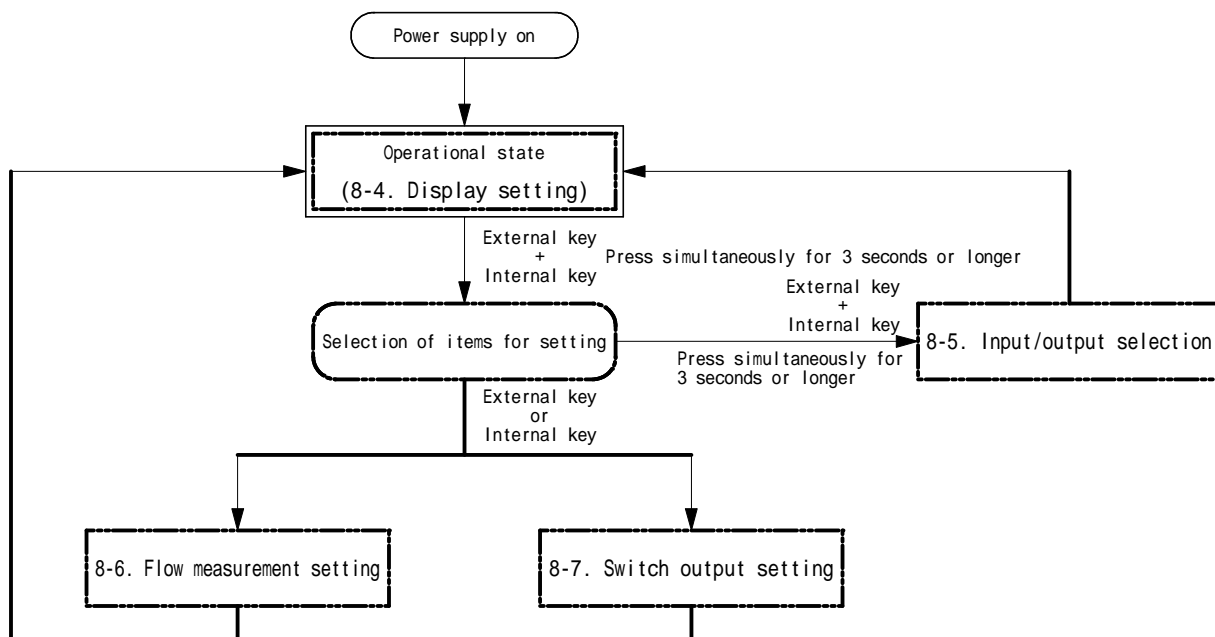


Before selecting input/output, setting flow measurement, and switch output setting, ensure that the input/output connection is disconnected. Failure to do so may cause this product or connected devices to break down. See pages 6 to 8 for wiring connection method.

If you change the full scale output "FLSC" settings in the flow volume measurement settings, re-set the pulse rate. Automatic re-setting in accordance with the setting value for full scale output will be performed. See page 13 about the setting method, and page 18 about the re-set value.

If flow measurement setting has been performed, re-set the switch output setting. The ON and OFF points for the instantaneous flow alarm are re-set according to full scale output. See page 18 for re-set values.

### 8 - 2 . Moving to the setting screen

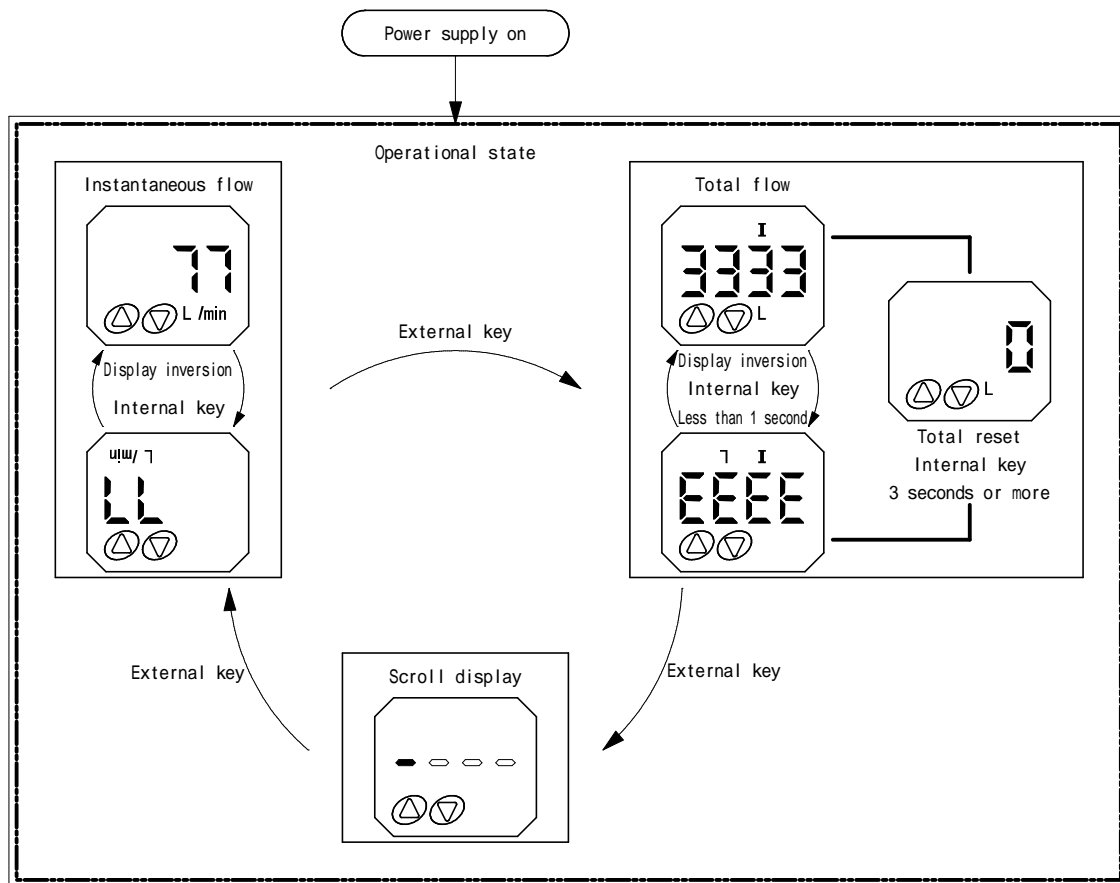


### 8 - 3 . List of characters

Category	Name	Characters	Alphabet	Remarks column
Setting parameter	Responsiveness	MSrC	MSRC	-----
	Responsiveness of instantaneous flow display	dSPC	DSPC	-----
	Kinetic viscosity adjustment value	Cr-r5	CRRS	CoRRection Setting
	Full scale output	FLSC	FLSC	FuLI SCale
	Pulse rate	PLSr	PLSR	PuLSe Rate
	Total flow alarm [first 4 characters]	INSH	INSH	INtegrated Setting High
	Total flow alarm [last 4 characters]	INSL	INSL	INtegrated Setting Low
	Instantaneous flow alarm ON	Fon	FON	Flow ON
	Instantaneous flow alarm OFF	FoFF	FOFF	Flow OFF
	Delay time ON	don	DON	Delay ON
	Delay time OFF	doFF	DOFF	Delay OFF
	FSPA mode	FSPA	FSPA	Func. Switch(1) + Pulse + Analog
	FSPR mode	FSPr	FSPR	Func. Switch(1) + Pulse + Reset
	FSSA mode	FSSA	FSSA	Func. Switch(1) + Switch(2) + Analog
Command	Input/output selection	FUnC	FUNC	-----
	Flow measurement setting	ConF	CONF	-----
	Switch output setting	ouTtP	OUTP	OUTPut
	Setting completion	End	END	-----
	Setting memory	oK	OK	-----
	Setting disposal	CnCL	CNCL	CaNCeL

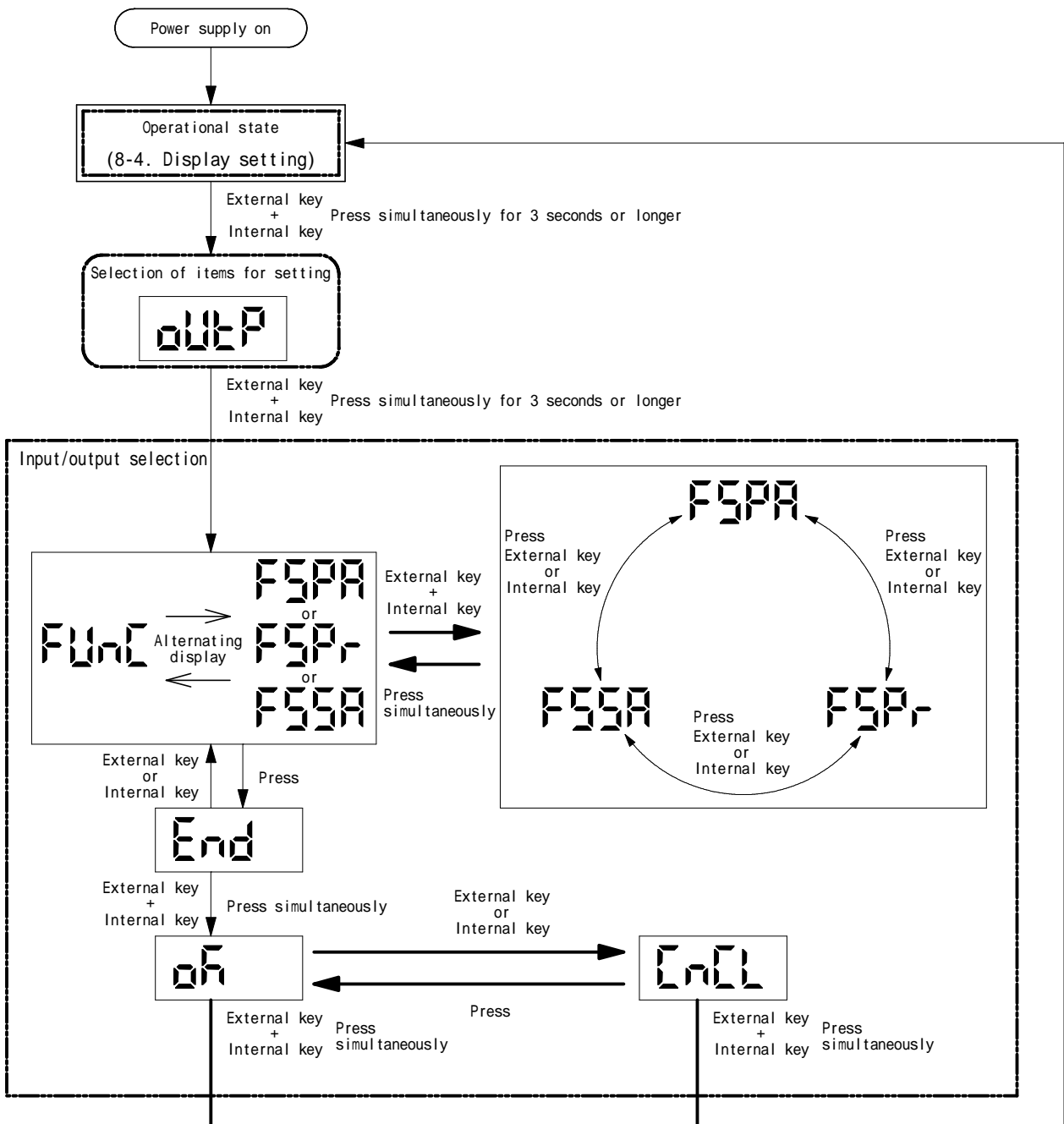
## 8 - 4 . Display setting

• Flow of the setting



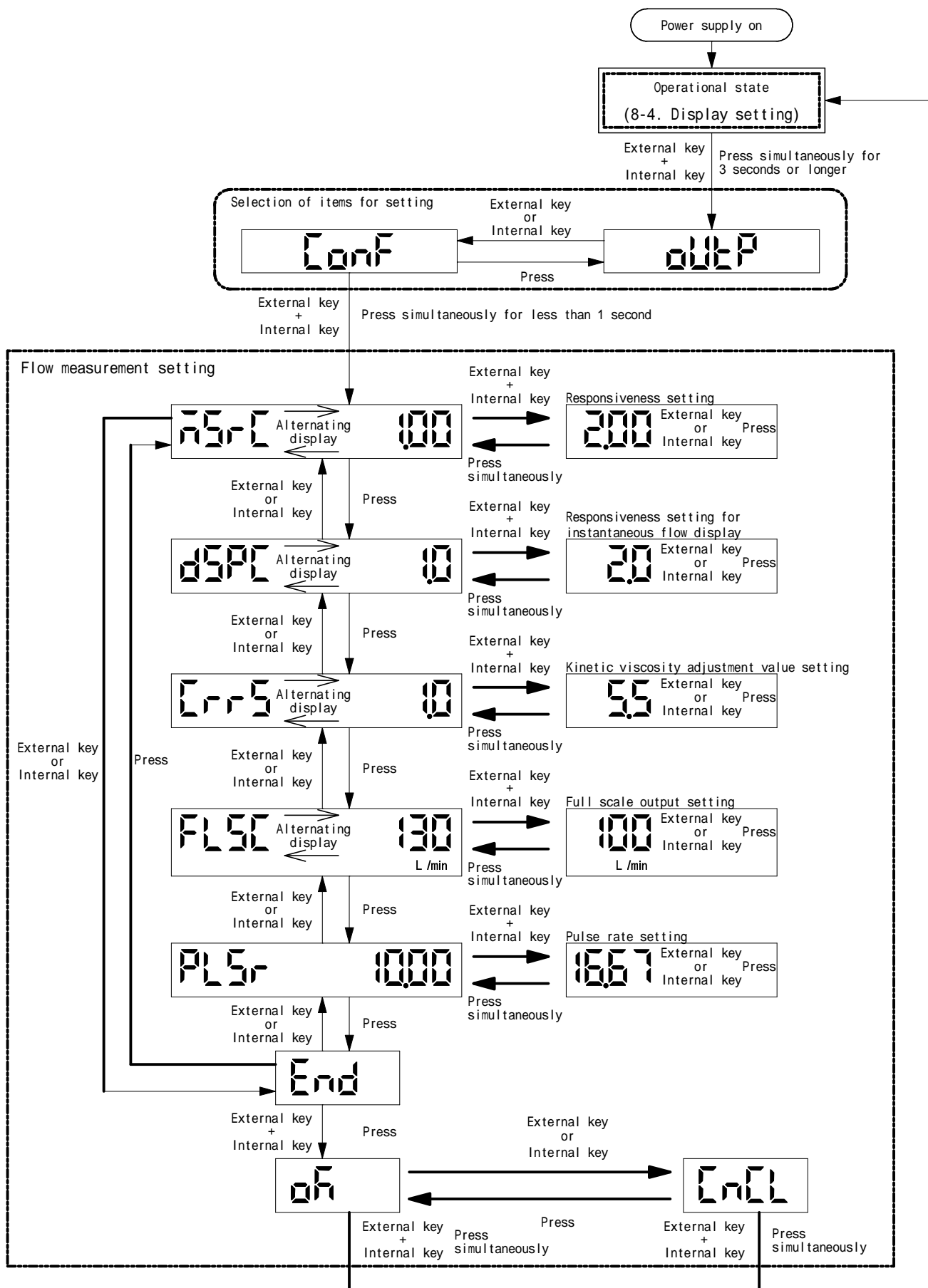
## 8 - 5 . Input/output selection

· Flow of the setting



## 8 - 6 .Flow measurement setting

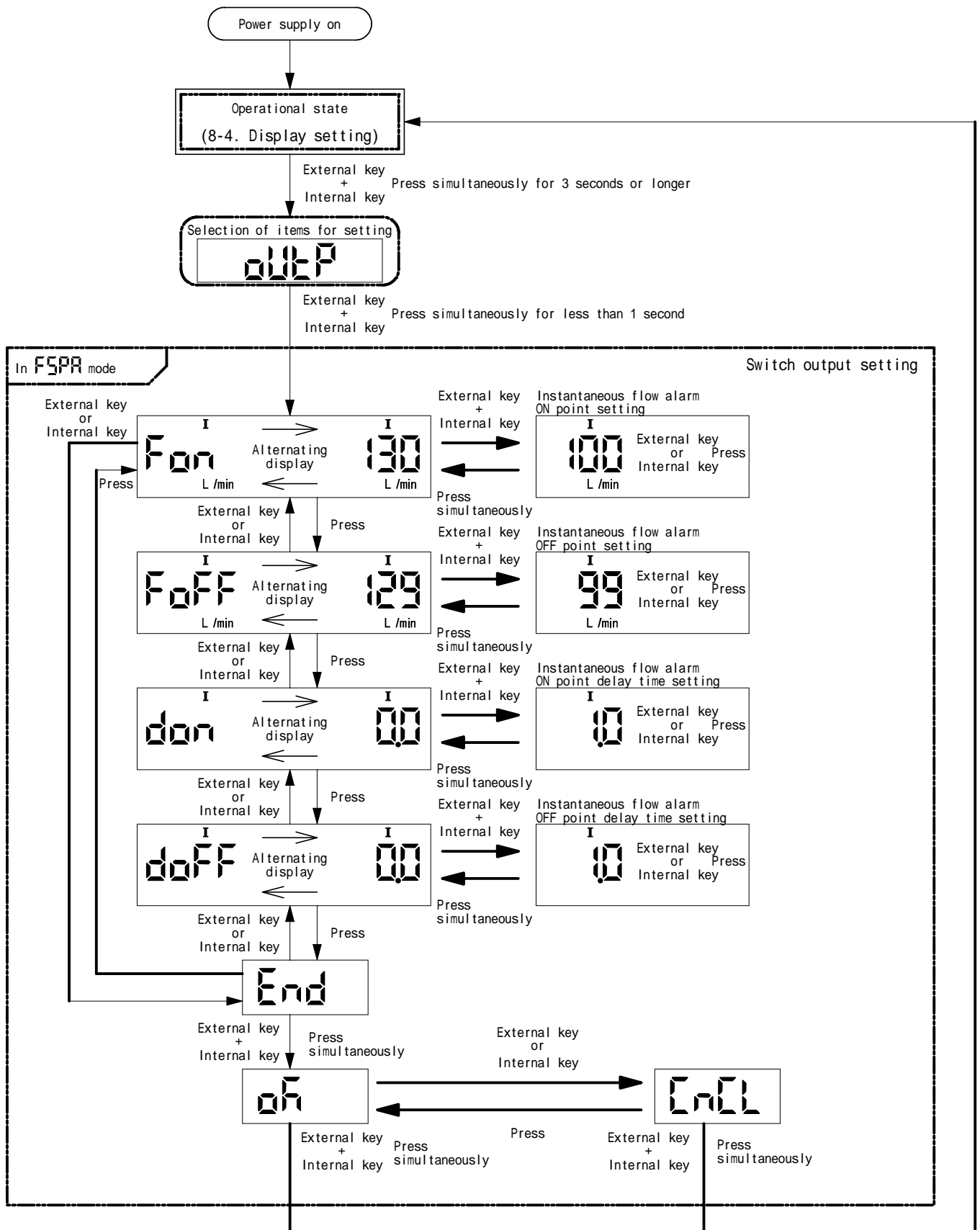
• Flow of the setting



# 8 - 7 . Switch output setting

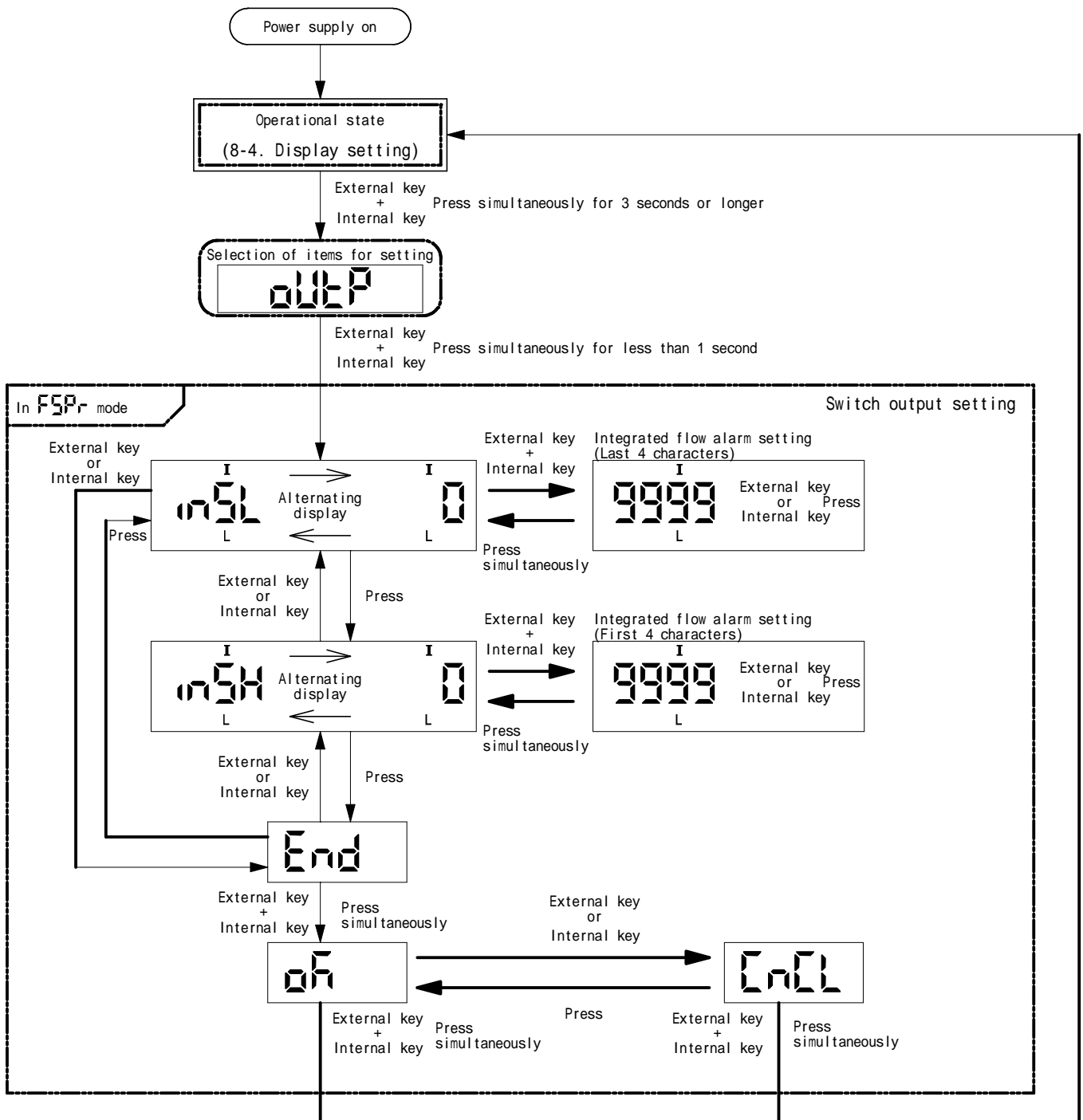
## 8 - 7 - 1 . In FSPA mode

· Flow of the setting



## 8 - 7 - 2 . In FSPR mode

· Flow of the setting







## 8 - 8 . List of setting conditions

List of setting conditions for flow measurement parameters

Catalog number		RLK -							
		1016P*151S	1516P*151S	1516P*201S	2016P*201S	2016P*251S	2516P*251S	2516P*321S	
Instantaneous flow alarms	ON point	Range	0.0 ~ 25.0	0.0 ~ 50.0	0.0 ~ 80.0		0 ~ 130		
		Resolution capability	0.1					1	
	OFF point	Range	0.0 ~ 25.0	0.0 ~ 50.0	0.0 ~ 80.0		0 ~ 130		
		Resolution capability	0.1					1	
Total flow alarms	Last 4 characters	Range	0.0 ~ 999.9				0 ~ 9999		
		Resolution capability	0.1					1	
	First 4 characters	Range	0 ~ 9999						
		Resolution capability	1						
Kinetic viscosity adjustment value setting	Range	1.0 ~ 2.0	1.0 ~ 3.0	1.0 ~ 4.0		1.0 ~ 5.5			
	Resolution capability	0.1							
Full scale output	Range	12.5 ~ 25.0	25.0 ~ 50.0	40.0 ~ 80.0		65 ~ 130			
	Resolution capability	0.1					1		
Pulse rate	Range	0.834 ~ 16.70	1.67 ~ 33.40	2.67 ~ 53.40		4.34 ~ 86.70			
	Resolution capability	0.001 or 0.01	0.01						

) The following restrictions apply depending on the setting value of full scale output.

Catalog number	Setting parameters	The threshold value
Common for each port size	Instantaneous flow alarms Setting value for ON point/OFF point	Setting value
		Full scale output setting value
Common for each port size	Pulse rate setting value	Smallest setting value = $\frac{\text{Full scale output setting value}}{15}$
		Largest setting value = Smallest setting value × 10
1016P*151S	Pulse rate resolution capability	Full scale output setting value 15.0 or more : 0.01, 14.9 or less : 0.001

Example) For 1016P\*151S

		Full scale output	25.0	12.5
Instantaneous flow alarms	ON point/OFF point Largest setting value		25.0	12.5
	Smallest setting value		1.67	0.834
Pulse rate	Largest setting value		16.70	8.340
	Resolution capability		0.01	0.001

## List of conditions for response time setting

Catalog number			RLK -				
			1016P*151S	1516P*151S	1516P*201S	2016P*201S	2016P*251S
Instantaneous flow alarms	ON point Delay time	Range	0.0 ~ 999.9				
		Resolution capability	0.1				
	OFF point Delay time	Range	0.0 ~ 999.9				
		Resolution capability	0.1				
Responsiveness		Range	0.4 ~ 5.0	0.5 ~ 5.0	0.8 ~ 5.0	0.9 ~ 5.0	
		Resolution capability	0.1				
Responsiveness of instantaneous flow display		Range	0.1 ~ 10.0				
		Resolution capability	0.1				

## List of factory settings

Catalog number RLK -	Full scale output	Pulse rate	Kinetic viscosity adjustment value	Responsiveness	Responsiveness of instantaneous flow display	Instantaneous flow alarm ON point	Instantaneous flow alarm OFF point	ON point Delay time	OFF point Delay time
1016P*151S	25.0	2.00	1.0	1.0	1.0	25.0	24.9	0.0	0.0
1516P*151S 1516P*201S	50.0	5.00				50.0	49.9		
2016P*201S 2016P*251S	80.0	10.00				80.0	79.9		
2516P*251S 2516P*321S	130					130	129		

## Automatic re-set value

### Instantaneous flow alarms ON point / OFF point

Catalog number	Instantaneous flow alarm ON point	Instantaneous flow alarm OFF point
Common for each port size	Full scale output	Full scale output - Display resolution capability

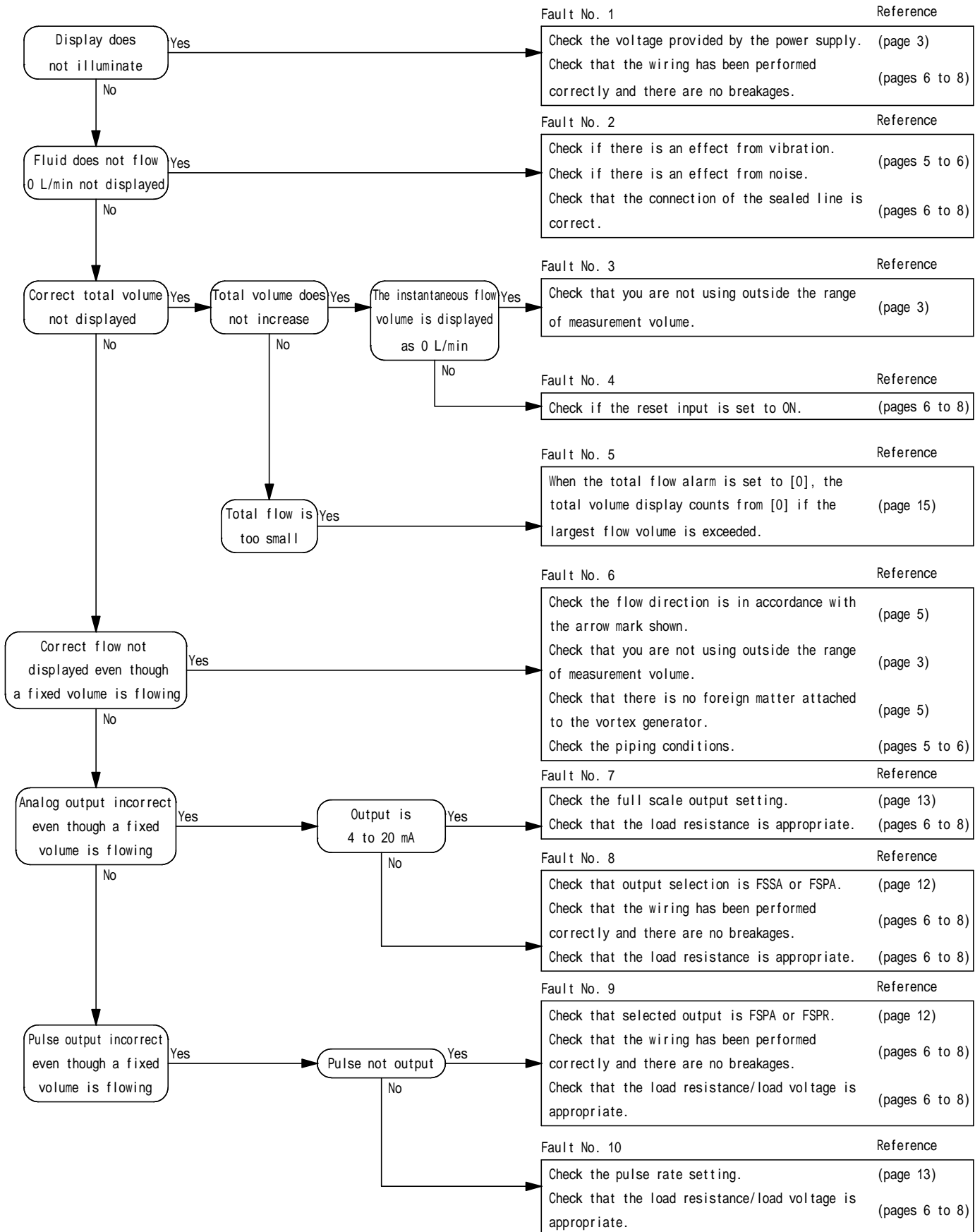
### Pulse rate

Catalog number	Full scale output : FS	Pulse rate
Common for each port size	F S 15	1
	15 < F S 30	2
	30 < F S 75	5
	75 < F S 130	10

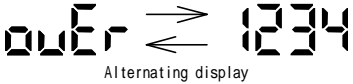
## 9 .Points to check when a fault occurs

If this product develops a fault, please follow the following flowchart and table to identify the cause. If the fault does not correspond to the faults noted in the flowchart or table, or if the cause cannot be identified with the confirmation process, please consult Saginomiya.

Flowchart for faults relating to flow display/analog output/pulse output



Fault No.	Problem	Check	Reference
11	Response is too slow	<ul style="list-style-type: none"> <li>• Check the responsiveness setting.</li> </ul>	Page 13
12	Response is too fast	<ul style="list-style-type: none"> <li>• Check the responsiveness setting.</li> <li>• Check if there is an effect from pulsing.</li> <li>• Check that you are not using outside the range of measurement volume.</li> <li>• Check the piping conditions.</li> </ul>	Page 13 Page 5 Page 3 Pages 4 to 5
13	Display response is too slow	<ul style="list-style-type: none"> <li>• Check the responsiveness setting.</li> <li>• Check the instantaneous flow responsiveness setting.</li> </ul>	Page 13
14	Display response is too fast	<ul style="list-style-type: none"> <li>• Check the responsiveness setting.</li> <li>• Check the instantaneous flow responsiveness setting.</li> <li>• Check if there is an effect from pulsing.</li> <li>• Check that you are not using outside the range of measurement volume.</li> <li>• Check the piping conditions.</li> </ul>	Page 13 Page 5 Page 3 Pages 4 to 5
15	Unit display is different	<ul style="list-style-type: none"> <li>• Check that the display mode is correct.</li> </ul>	Page 11
16	Output switch does not turn ON/OFF	<ul style="list-style-type: none"> <li>• Check that the load resistance/load voltage is appropriate.</li> <li>• Check that the wiring has been performed correctly and there are no breakages.</li> <li>• Check the output selection setting.</li> <li>• Check the delay time setting.</li> </ul>	Pages 6 to 8 Pages 6 to 8 Page 12 Pages 14 to 16
17	Chattering occurs at the output switch	<ul style="list-style-type: none"> <li>• Check if there is an effect from pulsing.</li> <li>• Check the responsiveness setting.</li> <li>• Check that the differential is appropriate.</li> <li>• If chattering occurs even after setting the differential appropriately, check the setting for delay time.</li> </ul>	Page 5 Page 13 Page 14 Page 16 Pages 14 to 16
18	Reset input does not turn ON/OFF	<ul style="list-style-type: none"> <li>• Check the resistance, voltage between connections, and time of reset input.</li> <li>• Check that the wiring has been performed correctly and there are no breakages.</li> <li>• Check that the output selection is FSPR.</li> </ul>	Page 3 Pages 6 to 8 Page 12
19	Display returns to original state	<ul style="list-style-type: none"> <li>• Switching the power off or pressing keys within 10 seconds of altering the display settings returns the display to its original state.</li> <li>Wait 10 seconds after re-setting the display, and then switch the power off and back on before checking the display state.</li> </ul>	Page 11
20	The value of the ON and OFF points for instantaneous flow alarms is different from the set value	<ul style="list-style-type: none"> <li>• Storing the value of the flow measurement setting automatically re-sets the flow ON and OFF points of the instantaneous flow alarm according to the setting value of full scale output.</li> <li>Re-set after completing flow measurement setting.</li> </ul>	Pages 13 to 16,18
21	The pulse rate is different from the set value	<ul style="list-style-type: none"> <li>• When the output full scale settings are changed, the pulse rate is automatically re-set according to the setting value of full scale output. Re-set the pulse rate.</li> </ul>	Pages 9,13,18
22	Display does not invert in during setting	<ul style="list-style-type: none"> <li>• The display is not inverted in setting mode. Invert the flow display after exiting setting mode.</li> </ul>	Page 11

Fault No.	Error Display	Measure(s)	Reference
23	HIGH	<ul style="list-style-type: none"> <li>Displays [HIGH] when flow is too great during operation. Review the conditions for operation of the system. System may be unable to correctly measure flow. When flow is too great, this will be treated as outside the scope of the guarantee regardless of whether the guarantee period has expired or not.</li> </ul>	Page 3
24		<ul style="list-style-type: none"> <li>If a total flow alarm has been set, [OVER] and [Total Flow] are displayed alternately if the largest total flow is exceeded. By resetting, count of the total flow is started again and the [OVER] display disappears.</li> <li>When [HIGH] is displayed during alternating display see also fault No.23.</li> </ul>	Page 12
25	FLSC	<ul style="list-style-type: none"> <li>The threshold value of the setting range has been reached. The settable range for the instantaneous flow volume alarm ON and OFF points and the pulse rate changes according to the setting value of full scale output.</li> </ul>	Page 17

## 10 . EFFECT OF CAVITATION

### ⚠ CAUTION

- Accuracy of the flow measurement would be degraded if cavitation occurs.
- Prior to use the product, confirm that pressure at downstream of the flow sensor is higher than minimum line pressure calculated from below formula.

$$P = 2.7 P + 1.3 P_o$$

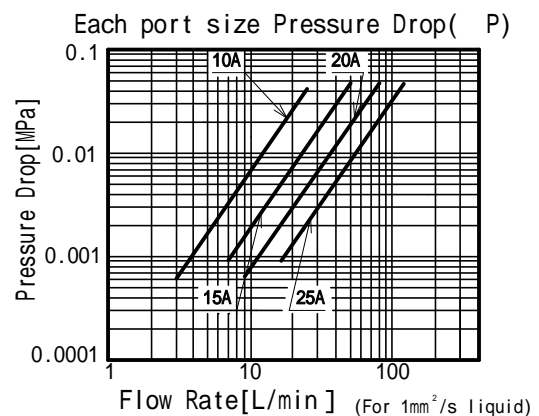
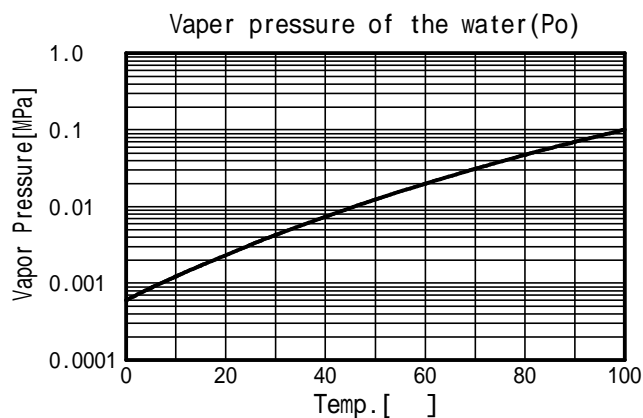
P : Pressure(abs) of 3.5D to 7.5D at downstream.

P<sub>o</sub> : Vapor Pressure(abs) of the fluid.

For vapor pressure of the water, refer the below chart.

P : Pressure Drop.

D : Main body I.D. (mm)



## 11 . HANDLING PRECAUTIONS

### ⚠ CAUTION

- Consult us when not using pure water, or city water.
- Do not introduce flows that exceed the maximum value of the measurement flow range as this may cause faults in the vortex detector.
- Do not drop or hit the product, it may cause of malfunction.
- This product is not water proofed. Do not immerse into the water.
- Do not use sharp implements (such as ballpoint pens or metal rods) to press the keys as this may lead to a fault.

## 1 2 . APPLICABLE STANDARDS

- If the following prints is found on the product label, that standard is applied.  
C E . . . EN 6 1 3 2 6 - 1

## 1 3 . CLEANING

- Be sure to check that the power supply has been turned off before cleaning the product.
- Since the display is easy to get damaged, use a soft cloth or paper for cleaning. Do not wipe with a hard material.
- Use a tightly squeezed wet cloth to wipe out stains on the case cover. Then wipe with a dried cloth for finishing.

## 1 4 . CONFIRMATION OF OPERATION

All customers using this Product (hereinafter referred to as "Customers") are requested to, after properly installing this Product, test the operation of this Product to confirm that all the systems in connection with this Product fully function.

In order to prevent the occurrence of bodily injury, fire accidents, serious damage, etc., in connection with the Customers' machinery or equipment due to improper installation of this Product, Saginomiya kindly requests the Customers to take the necessary safety measures by preparing safe designs such as a fail-safe design (\*1) and a fire spread prevention design, as well as to make the proper adjustments for product reliability necessary for fault-tolerance (\*2).

(\*1) Fail-safe design: Design to ensure safety in the event of any mechanical failure

(\*2) Fault-tolerance: Utilization of redundancy technology

Periodic Inspection of this Product

Be sure to confirm the proper operation of this Product and keep records of such operation at least once a year.

Saginomiya shall be held harmless and be indemnified by the Customers from any damages incurred due to the Customers failing to conduct the above operational procedures, provided, however, that, this shall not apply if the damages which the Customers incurred due to the defect of this Product caused by Saginomiya.

## 1 5 . RESTRICTIONS OF USE

This Product is designed and manufactured for the purpose of using them for cooling and heating and refrigerating appliances and air conditioning equipment or various industrial equipment, but is not designed and manufactured for the purpose of using this Product for any instrument or system related to human life or health purposes.

Therefore, the use of this Product in fields related to items (1) through (3) below is not intended whatsoever.

Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of this Product under item (3).

- (1) In any field related to nuclear power and radiation;
- (2) In any field related to space or seafloor equipment;
- (3) In any equipment or device requiring a high degree of reliance on such equipment or device with respect to which it is reasonably foreseeable that failure or malfunction of the equipment or device would either directly or indirectly cause serious damage to human life, health or property;

Also, when using this Product under the fields related to items (1) through (10), (except for item (3), in relation to which this Product must never be used), please be sure to notify Saginomiya's contact desk in charge of sales and obtain Saginomiya's prior written approval for such use. Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of this Product in relation to these fields if the Customers do not notify Saginomiya's contact desk and obtain Saginomiya's prior written approval.

- (4) Heating, cooling and air conditioning equipment that uses flammable and/or toxic refrigerants, or various industrial equipment that uses flammable and/or toxic fluids;
- (5) Transportation device (railroad, aviation, ship or vessel, vehicle equipment, etc.);
- (6) Disaster-prevention or crime-prevention device;
- (7) Facility or application directly related to medical equipment, burning appliances, electro thermal equipment, amusement rides and devices, facilities/applications associated directly with billing;
- (8) Equipment requiring high reliance on supply systems such as electricity, gas, water, etc., in large-scale communication system, or in transportation or air traffic control system;
- (9) Facilities that are to comply with regulations of governmental / public agencies or specific industries or
- (10) Other machineries or equipment equivalent to those set forth in the above items (4) to (9) which require for high reliability and safety.

It is recommended to replace this Product within 5 to 10 years of delivery if no other duration of use is provided in the applicable specifications or instruction manual because the conditions and environment of use also have an impact on this Product.

## 1 6 . SCOPE OF WARRANTY

Saginomiya will provide the Customers with replacement or repaired this Product delivered, free of cost, only within one year of delivery to the Customer, if failure occurs in the Customers' equipment using this Product due to a defect of this Product; provided, however, that in any event the ratio of the amount that Saginomiya bears for the damages incurred by the failure of this Product or Customers' equipment shall not exceed the price of this Product we delivered.

In addition, Saginomiya shall be held harmless and be indemnified from any and all damages incurred when the failure of the Customers' equipment occurred due to any cause set forth below.

When caused by inappropriate handling or use of this Product by the Customers (such as not complying with the conditions, environmental specifications or cautions indicated in any applicable catalogue, specifications, instruction manual, etc.);

When failure occurred due to any reason other than this Product;

When caused by modification or repair of this Product made by anyone other than Saginomiya or or designee of Saginomiya;

When caused by the use of this Product in violation of the above "CONFIRMATION OF OPERATION" or "RESTRICTIONS OF USE";

When such failure was not reasonably foreseeable at the time of Saginomiya's shipment;or

By any other cause not attributable to Saginomiya, such as an act of god, disaster, or act of any third party.

Please note that the Customers will not be entitled to any of the above warranty if the Customers purchased this Product from internet auction, etc.

## 1 7 . REFERENCE

**SAGINOMIYA**  
**SEISAKUSHO,INC.**

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