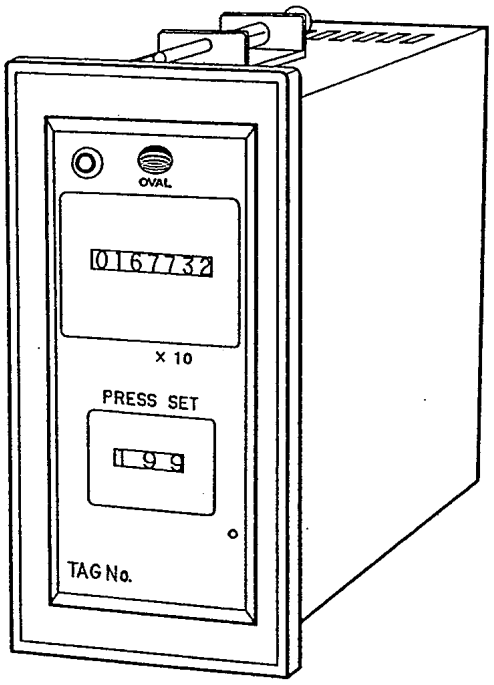
OVAL INSTRUCTIONS

Ins. No. E-822-9-E

STEAM FLOW COMPUTER

MODEL : EL4061



Every OVAL product is fabricated and shipped from our factory under stringent quality control. In order to maintain its design performance throughout its life, this manual offers the operator the necessary installation, operation and maintenance information.

Be well familiar with these instructions before you place the computer in service and keep this manual at the field location for ready reference.

We also recommended you to read the instruction manuals for the companion pulse generator (flowmeter) and receiving instrument.

CONTENTS

This manual uses the precaution words
"**NOTE**", "**CAUTION**", and "**WARNING**" as explained below:

➡ NOTE:
Notes are separated from the general text to bring the user's attention to important information.

⚠**CAUTION:**
Caution statements inform the user of hazards or unsafe practices which could result in minor personal injury or product/property damage.

⚠**WARNING:**
Warning statements inform the user of hazards or unsafe practices which could result in severe personal injury or death.

1. GENERAL

Dedicated for steam service, this computer accepts signals from a steam service delta flowmeter. It contains a microprocessor to perform steam pressure setting relative to service pressure, size (nominal bore) setting and meter error adjustment, and indicates the total flow in terms of weight for accurate, precise flow measurement.

〈FEATURES〉

(1) An inexpensive steam service computing totalizer for use with a steam service delta flowmeter.
(2) Simple pressure setting relative to the service pressure.
(3) Readily accepts size (nominal bore) alterations.
(4) A variety of self diagnostic features.
(5) Compatible with an instantaneous flow indicator (option).

2. PART NAMES

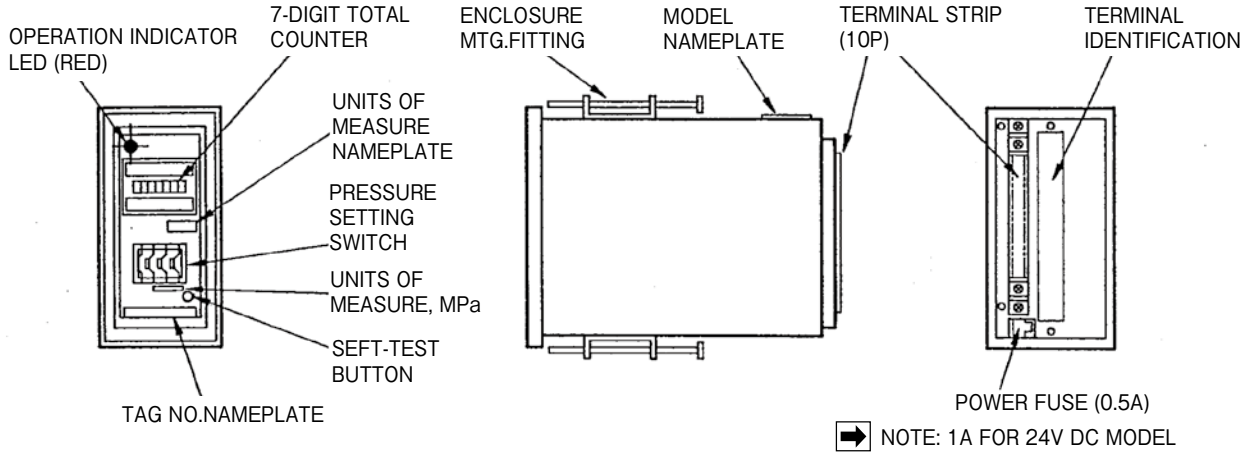


Fig. 2.1

3. OUTLINE DIMENSIONS

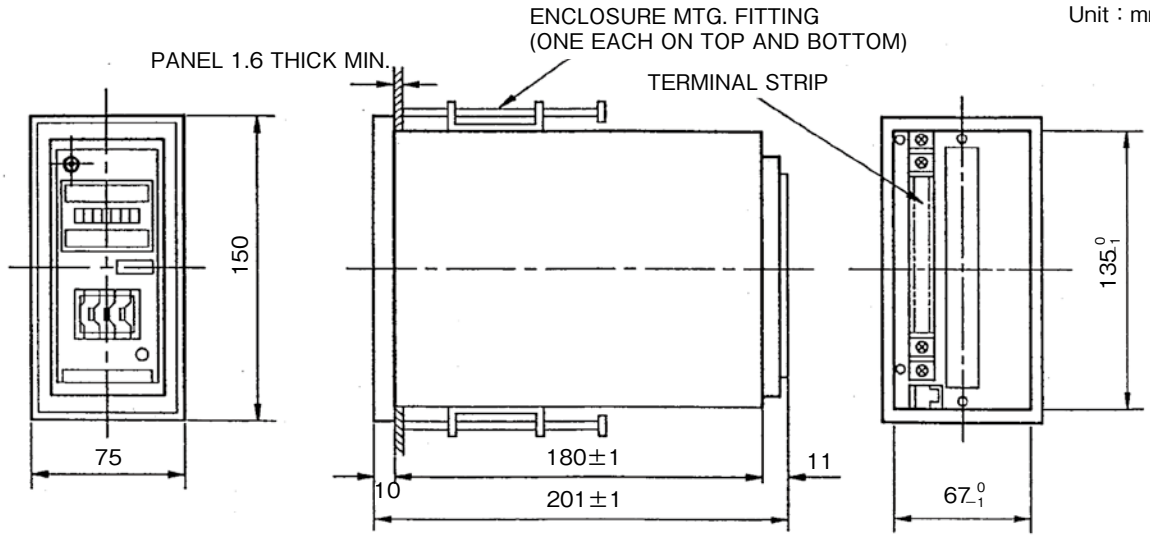


Fig. 3.1

4. INSTALLATION

4.1 Installation Location

Select an installation location where

(1) Mechanical vibration, shock and corrosive gases least exist.

(2) Air is dry and temperature at room temperature and stable.

➡ NOTE: Although the manufacturer guarantees stated performance at ambient temperatures up to 50 ℃, it is recommended that the instrument be placed in service at room temperature.

(3) Provide a sufficient working space behind the instrument - at least 50 centimeters from the back of the instrument - to facilitate wiring and maintenance.

4.2 Mounting Panel

(1) Use a rigid steel sheet with a minimum thickness of 1.6 millimeters. Suggested thickness is approximately 3.2 mm.

(2) If it is desired to mount instruments side by side, dimensions in Fig.4.1 are suggested.

(3) Recommended mounting height ranges are given in Fig.4.2.

4.3 Installation Procedure

(1) Front mount the steam flow computer through the opening cut in the panel.

(2) Pass the enclosure mounting fittings furnished through the holes at the bottom of the enclosure and, con-firming that the instrument is positioned on a level plane, secure the instrument to the panel with the mounting fittings (see Fig. 2).

Unit : mm

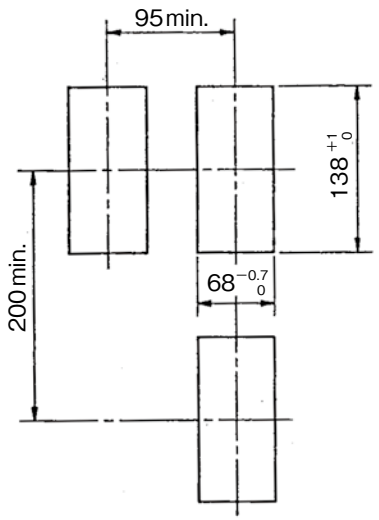


Fig. 4.1 Panel Cutout

Unit : mm

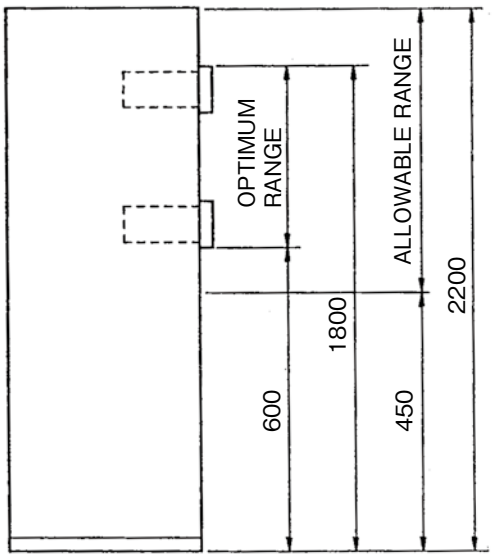


Fig. 4.2 Mounting Height

5. WIRING

5.1 Cables for Field Wiring

(1) Use electrostatically-shielded, polyethylene-insulated, vinyl-sheathed control cables, or equivalent, for input signal cables (CEVS 1.25-2.00mm^2, 2-conductor). For signal cables, vinyl-insulated, vinyl-sheathed cables (CVV, CVS, JIS C 3401) are recommended.

(2) Ground the cable shielding to terminal "G" of the instrument. All circuitry on the detector side must be "floated" from ground.

5.2 Wiring Connections

(1) Conduit work is recommended for field wiring.

➡ NOTE: In conduit work, use separate conduit for power cable and signal cables to eliminate the possibility of stray current pickup.

(2) Separate field wiring from other power lines and power circuits to minimize the possibility of inductive interference.

(3) Using crimp-style terminals for wiring connections, ensure good electrical connections. Terminals are found on the back of the computer.

(4) Good practice is to provide an allowance of 30 centimeters approx. to the wirings to facilitate internal assembly withdrawal during servicing.

5.3 Terminal Block for External Connections

NAME		TERMINAL No.	DESCRIPTION
Power		9 (hot) 10 (neut)	100V, 110V/115V, 200V, 220V/230V AC, 50/60Hz
Ground		8	Earth ground terminal
Flow Input	PA15, 25	1, 2	1：＋24V, 2：SIG
Weight Output		4, 5	4(＋), Width 5(－), Open collector output Width:1 to 4ms(reduction 1/1), 40 to 60ms(reduction 1/10 or 1/100)
Weight Analog Output*		6, 7	6(＋), 7(－) 0 to 100 μA, 0 to 10mA 4 to 20mA, 10 to 50mA, 1 to 5V DC

➡ NOTE*: Analog output is option.

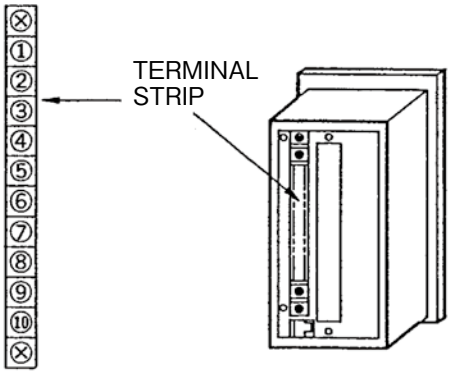


Fig. 5.1 Terminal Strip

⚠ CAUTION

Make electrical connections upon confirmation of valid combinations of flowmeter (pulse generator) and receiving instrument by their model No., serial No., etc.

6. OVERALL BLOCK DIAGRAM

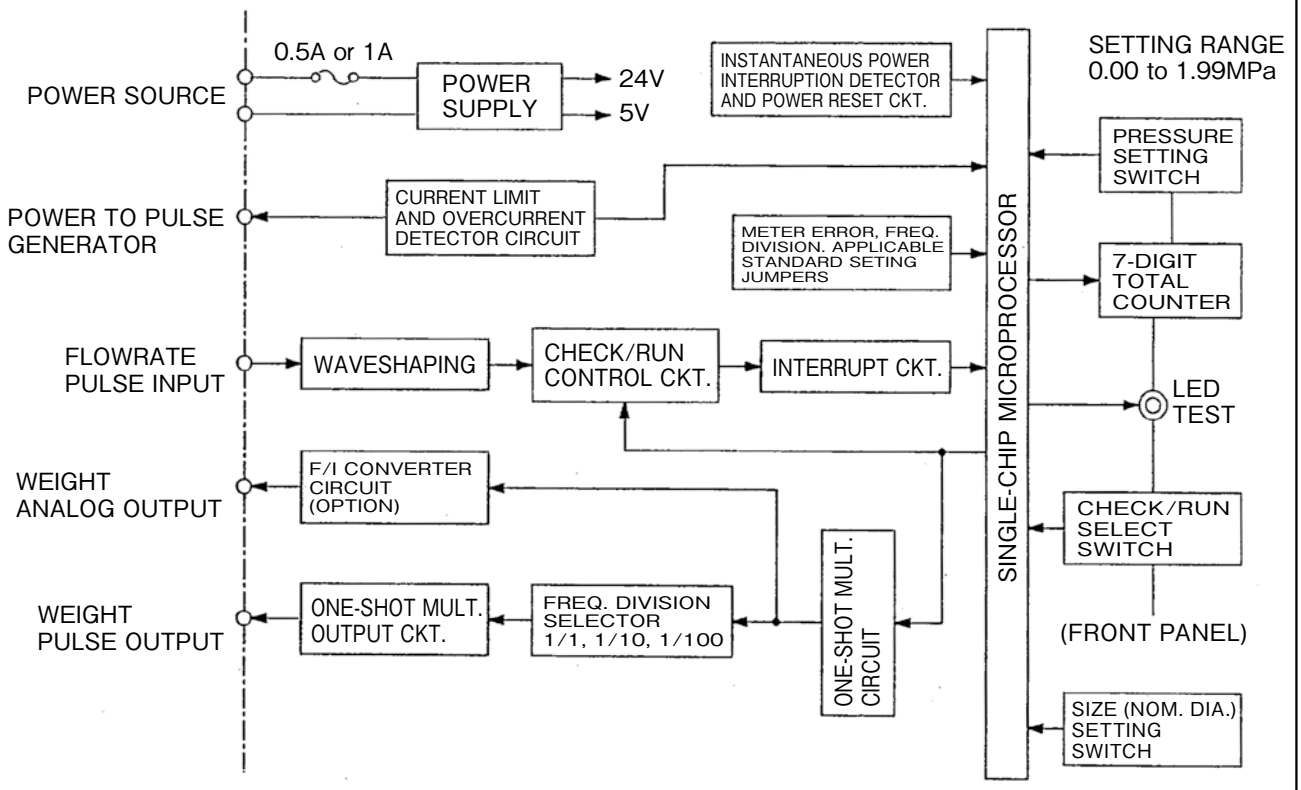


Fig. 6.1

7. CONVERSION FORMULA

In response to the incoming flowrate signal from a delta meter, the computer performs weight conversion of saturated steam according to the setpoints established on the front panel preset switches.

$$\langle \text{Conversion Formula} \rangle = \frac{(\text{Input pulse factor}) \times (\text{Specific weight}) \times \varepsilon\ t}{(\text{Output unit})}$$

$$\varepsilon\ t = 1 + 3\alpha\ (t - 20)$$

where t : Temperature

3α : 4.8×10^{-5} (stainless steel)

The specific weight is thus determined in approximation as a function of the second degree.

8. CHANGING THE PULSE GENERATOR TYPE, SIZE (nominal bore), METER FRROR, AND SCALER SETTINGS

(They are correctly set in the factory before shipment and normally require no further alterations.)

(1) Input Settings Relative to Pulse Generator Type

Flowmeter Pulse Generator Type	R1	R4	R21	J_8 (jumper)
Preamplifier PA15 or 25	Eliminated	240 Ω、1W	39 Ω、1/4W	Shorted

(2) Selection of Size (nominal bore)

With S4 (hexadecimal rotary switch). set up the value which agrees with the meter size, referring to the table below.

Rotary Switch	Nominal Size, mm	Nominal Meter Factor	Rotary Switch	Nominal Size, mm	Nominal Meter Factor
0	15	0.005338	8	50 ②	0.1001
1	—	—	9	—	—
2	25 ①	0.01613	A	80	0.3328
3	25 ②	0.01650	B	100	0.7567
4	—	—	C	150	2.422
5	40 ①	0.04363	D	200	7.021
6	40 ②	0.04556	E	250	13.54
7	50 ①	0.09655	F	300	23.24

➡ NOTE: Separate rotary switch positions are allocated because positions 2 and 3; 5 and 6; 7 and 8 have different nominal meter factors.

(3) Selection of Meter Error

A compensation range of ± 7.5% is covered with jumper J_1 in increments of 0.5%.

(4) Selection of Scaler Setting (for total counter)

J_2 (jumper): Open → 1/100; shorted → 1/10

➡ NOTE: In totalizer scaler setting, a 1/10 scale may, under certain conditions, not be available depending on given operating conditions.
For details, see Section "13. Total Counter and Output Units".

(5) Power Source Selection

Power Source	J_3	J_4	J_5	J_6	J_7
100V AC, 50/60Hz	C-2	Open	Open	Shorted	Shorted
110/115V AC, 50/60Hz	C-1	Open	Shorted	Open	Shorted
200V AC, 50/60Hz	C-2	C-1	Open	Open	Open
220/230V AC, 50/60Hz	C-1	C-2	Open	Open	Open

(6) Selection of Scaler Setting (for pulse output)

Frequency Division	J_{13}	J_{14}	Output Width
1/1	C-10	C-1	1 to 4 ms
1/10	C-10	C-2	40 to 60 ms
1/100	C-100	C-2	40 to 60 ms

(7) Miscellaneous

In the standard specification, J_9 through J_{12} are shorted out across "1-C".

9. PULSE/ANALOG CONVERTER BOARD (OPTION)

An F/I converter board to provide an analog output proportional to the pulse frequency after weight conversion may be added as an option.

(1) 0 to 100 μ A or 0 to 10mV output
★ Output adjustment is made with VRI.
(2) In cases of 4 to 20mA, 10 to 50mA or 1 to 5V output

Output	J_9	J_{10}
4 to 20 mA	2 — C	2 — C
10 to 50 mA	2 — C	2 — C
1 to 5 V	1 — C	1 — C

➡ NOTE: J9 and J10 are jumpers on the computing board.
Fine output adjustment is made with VR2 (zero adjust) and VRI (span adjust).

10. OPERATION

10.1 Preparation Before Operation

(1) Inspect that your instrument and related equipment are correctly installed and wired with no points left unfinished (including size, meter error and frequency division settings).

⚠ **WARNING:** Make sure to see that the power terminals are connected to a power source of the rated voltage. Applying a power source of incorrect voltage could ruin your instrument.

(2) Preoperational Checks
Check to see whether or not the computer registers counts with no flow.
(3) How to Check
① Turn on power and make sure that the front panel LED lights at intervals of two or three seconds.
② Depress the CHECK button and confirm individual settings in the CHECK mode. (CHECK mode operation is described on Sec.12.)

10.2 Operation

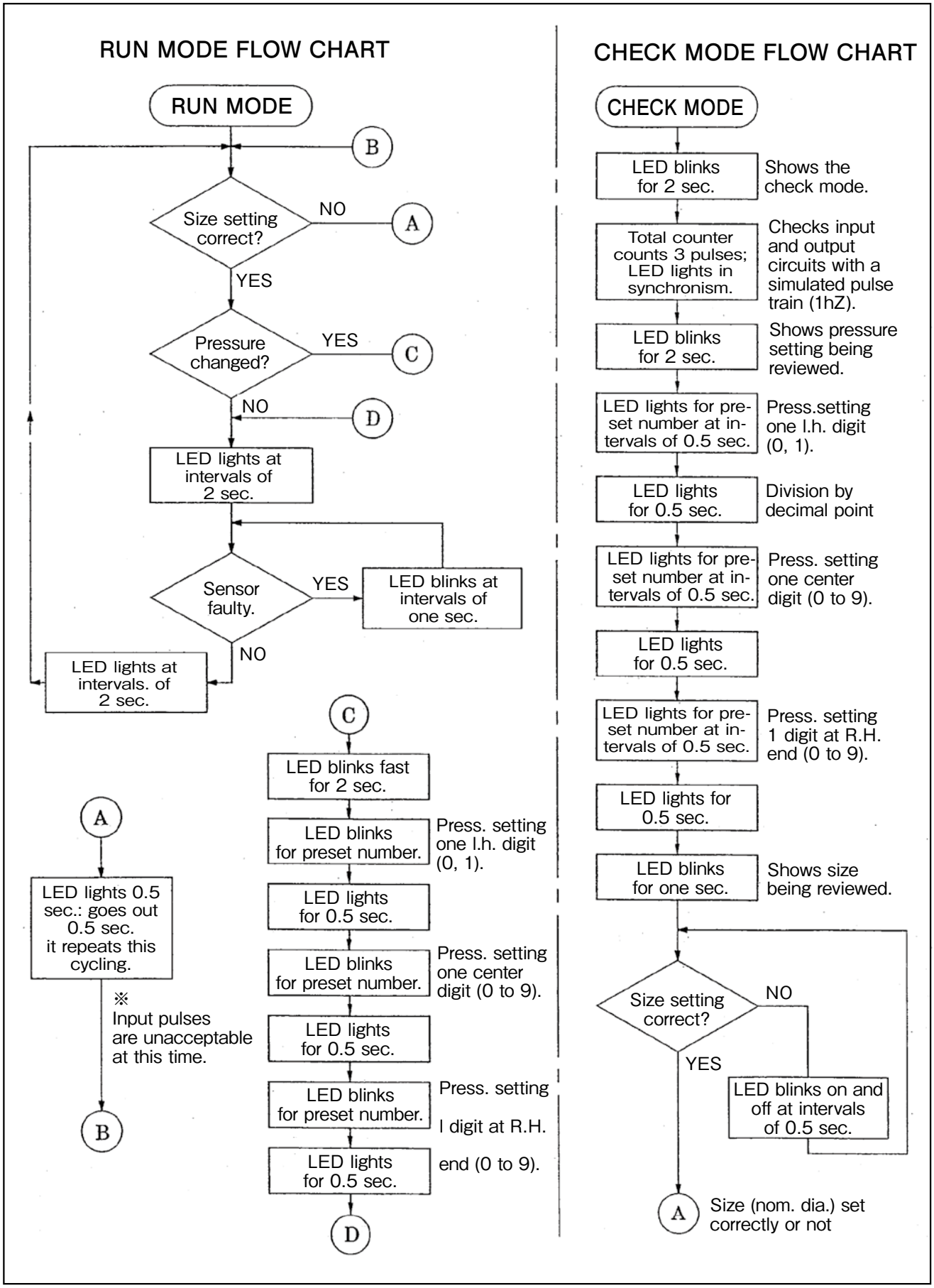
(1) Turning on power
The LED will light up about a second later and stays on for about two seconds before the RUN mode is indicated.
(2) Allow steam to flow to initiate service operation.

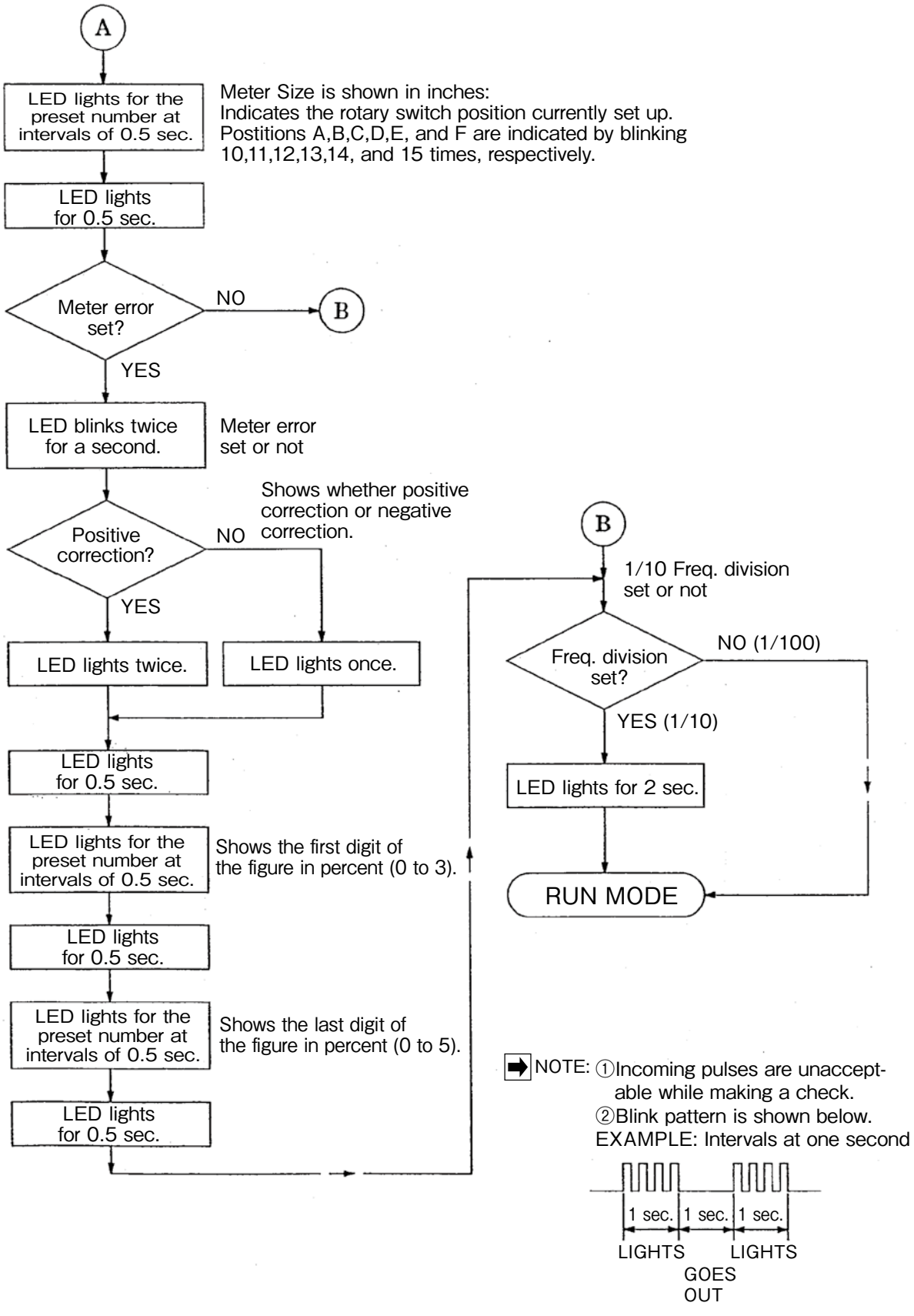
11. TROUBLESHOOTING

SYMPTOM	CHECK	POSSIBLE CAUSES
1. The LED fails to come on.	1. Inspect fuse. 2. Make sure of power source voltage.	1. Fuse is blown. 2. Line voltage is improper. 3. A fault in internal power supply.
2. The LED shows RUN mode but fails to count incoming pulses.	1. Input signal lines. 2. Signal coming in?	1. Incorrect input wiring. 2. Flowmeter preamlifier is at fault. 3. A fault in the input circuitry.
3. The LED indicates a fault in the probe.	1. Input signal lines.	1. Incorrect input wiring. 2. Flowmeter preamplifier is at fault.
4. Erratic accumulated total reading.	1. Size (nominal dia.) and pressure settings (see "CHECK Mode").	1. A fault in the internal assembly.

If the trouble is suspected to be internal to the steam flow computer, seek our service.

12. OPERATION FLOW CHART




A
LED lights for the preset number at intervals of 0.5 sec.
Meter Size is shown in inches:
Indicates the rotary switch position currently set up.
Postitions A,B,C,D,E, and F are indicated by blinking 10,11,12,13,14, and 15 times, respectively.
LED lights for 0.5 sec.
Meter error set?
NO
B
YES
LED blinks twice for a second.
Meter error set or not
Shows whether positive correction or negative correction.
Positive correction?
NO
YES
LED lights twice.
LED lights once.
LED lights for 0.5 sec.
LED lights for the preset number at intervals of 0.5 sec.
Shows the first digit of the figure in percent (0 to 3).
LED lights for 0.5 sec.
LED lights for the preset number at intervals of 0.5 sec.
Shows the last digit of the figure in percent (0 to 5).
LED lights for 0.5 sec.
B
1/10 Freq. division set or not
Freq. division set?
NO (1/100)
YES (1/10)
LED lights for 2 sec.
RUN MODE
NOTE: ①Incoming pulses are unacceptable while making a check.
②Blink pattern is shown below.
EXAMPLE: Intervals at one second
1 sec.
1 sec.
1 sec.
LIGHTS
LIGHTS GOES OUT

13. TOTAL COUNTER AND OUTPUT UNITS

Delta Flowmeter Nominal Diameter mm / Scaling	Totalizer Least Significant Digit, kg		Open Collector Mass Pulse Output kg			Analog Output Min, Full Scale Flowrate,kg/h ※ 2
	1/10 ※ 1	1/100	1/1	1/10	1/100	
15	0.01	0.1	0.001	0.01	0.1	15
25	0.01	0.1	0.001	0.01	0.1	15
40	0.1	1	0.01	0.1	1	150
50	0.1	1	0.01	0.1	1	150
80	1	10	0.1	1	10	1500
100	1	10	0.1	1	10	1500
150	1	10	0.1	1	10	1500
200	10	100	1	10	100	15000
250	10	100	1	10	100	15000
300	10	100	1	10	100	15000

➡ NOTES: ※ 1：Because the max. frequency the magnetic counter can respond is 5Hz, it is necessary that a requirement $\frac{\text{Max. flowrate [kg/h]}}{3600 \times \text{Totalizer unit [kg]}} \leqq 5$ [Hz] be satisfied.

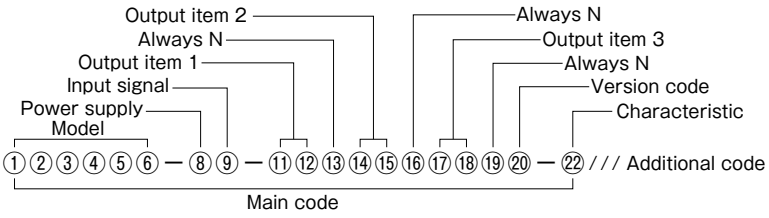
Hence, a 1/10 scale may, under certain conditions, not be available depending on given operating conditions.

※ 2：Provided with remote instantaneous flowrate output.

14. GENERAL SPECIFICATIONS

ITEM		DESCRIPTION
Input	Pulse Generator	Delta meter preamplifier PA15 or 25
	Signal Levels	"1": 20mA min.; "0": 4mA max.
	Overcurrent Detection	PA15 and 25: An erratic probe is indicated above 27 ± 4mA (LED flickers).
Pressure		Front-panel digital switch establishes the operating pressure (0.00 to 1.99MPa in 0.01MPa steps).
Meter Size (nominal bore)		Internal rotary switch establishes value which agrees with meter size. For rotary switch positions, see Section 8.(2) "Setting of Meter Size (nominal bore)."
Meter Error		Internal jumper establishes corrections (in a range of from 0.0 to ± 7.5% in 0.5% steps).
Scaling (totalizer)		Internal jumper establishes the factor of frequency reduction (1/10 or 1/100).
Scaling (Output)		Internal jumper establishes the factor of frequency division (1/1 or 1/10 or 1/100).
Pulse Output after Conversion in Terms of Mass		Open collector max. rating: 30V DC, 0.1A Pulse width: 1-4ms., 40-60ms. (with 1/10 or 1/100 reduction)
Analog Output after Conversion in Terms of Mass		An analog output of instantaneous flowrate in terms of mass (option)
Accumulated Total Display		7-digit electromagnetic counter
Seft-Test Function		± 0.3% of reading
Computing Accuracy		Depressing the self-test button advances the reading by 3 counts when functioning correctly.
Power Supply		100, 110/115, 200, 220/230V AC, 50/60Hz
Power Consumption		7VA max.
Ambient Temperature		−10℃ to +50℃
Insulation Resistance		Across power terminals bundled and ground terminal: Greater than 10M Ω with 500V DC Megger
Withstand Voltage		Across power terminals bundled and ground terminal: 1500V AC for one minute
Installation		Panel mount
Finish		Instrument frame (resin molding): Munsell N1.5
		Enclosure (steel sheet): Munsell N6.0
Mass		1 kilogram approx.

15. GENERAL SPECIFICATIONS



● Main code

①	②	③	④	⑤	⑥	**Model**
E	L	4	0	6	1	Steam Flow Computer
⑦	**—**					
⑧	**Power supply**					
E	100VAC 50/60Hz					
F	110/115VAC 50/60Hz					
G	200VAC 50/60Hz					
H	220/230VAC 50/60Hz					
⑨	**Input signal**					
D	Current pulse 24VDC (4/20mA)					
Z	Special					
⑩	**—**					
⑪	**⑫**	**Output item 1**				
Pulse output						
B	1	Pulse width 1 to 4ms				
B	5	Pulse width 40 to 60ms				
B	9	Pulse width other than above				
⑬	**Always N**					
N	Always "N"					
⑭	**⑮**	**Output item 2**				
Pulse output						
N	N	None				
⑯	**Always N**					
N	Always "N"					
⑰	**⑱**	**Output item 3**				
Analog output						
N	N	None				
A	2	1 to 5V				
A	5	4 to 20mA				
A	P	0 to 10mV				
A	Q	10 to 50mV				
A	R	0 to 100μA				
Z	Z	Special				
⑲	**Always N**					
N	Always "N"					
⑳	**Version code**					
A	Version A					
㉑	**—**					
㉒	**Characteristic**					
0	Standard					
Z	Special					

● Additional code

Document				
D	S	J	Delivery specification (Japanese)	
D	S	E	Delivery specification (English)	
D	R	0	Re-submission of Delivery specification	
D	C	J	Final DWG (Japanese)	
D	C	E	Final DWG (English)	
D	W	J	Wiring diagram (Japanese)	
D	W	E	Wiring diagram (English)	
D	T	J	Inspection procedure (Japanese)	
D	T	E	Inspection procedure (English)	
C	B	J	Inspection certificate: B set	Only Japanese
Witnessed by customer				
V	1	0	Required	

《PRODUCT CODE EXPLANATION OF THE OLD PRODUCT CODE》

The new product code has been implemented since April 2017.
Therefore, the product code explanation of the old product code will not be updated after April 2017.
Contact OVAL if you wish to order with the old product code for reasons such as type approval.

Item	Code No.							SUPPLEMENT. CODE						DESCRIPTION
	①	②	③	④	⑤	⑥	—	⑦	⑧	⑨	⑩	⑪	⑫	
Model	E	L	4	0	6	1	—							Steam Flow Computer
Power								1						100V AC 50/60Hz
								2						200V AC 50/60Hz
								3						110/115V AC 50/60Hz
								4						220/230V AC 50/60Hz
								9						Other than above
Input									4					Preamplifier PA15 or 25
									9					Other than above
										0				Always "0"
Analog Output											0			None
											1			F/I converter output provided (1 to 5V)
											2			F/I converter output provided (0 to 10mV)
											4			F/I converter output provided (4 to 20mA)
											5			F/I converter output provided (10 to 50mA)
											7			F/I converter output provided (0 to 100 μA)
											9			Other than above
												1		Always "1"
Instrument Frame Color													1	Munsell N1.5

2019.04 Revised △
E-822-9-E (1)