

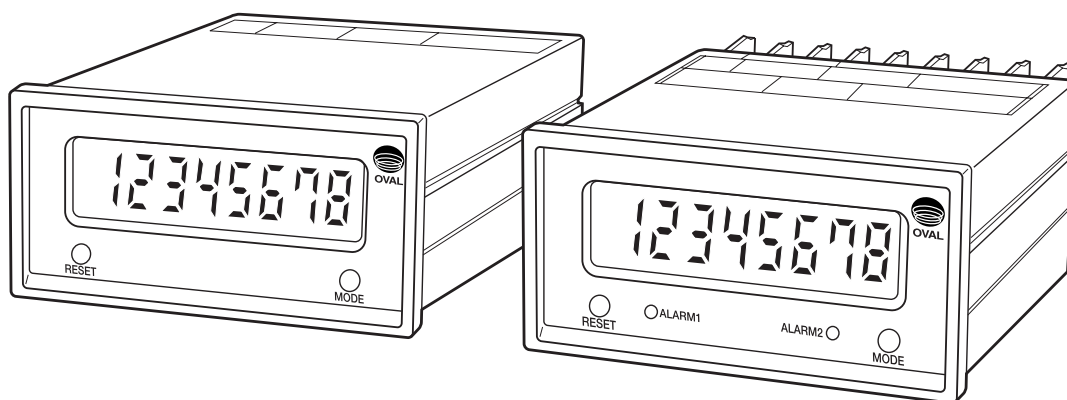


INSTRUCTIONS

Ins. No. E-122-9-E

TOTAL COUNTER

MODEL EL012²₃



Every OVAL product is manufactured under stringent quality control and thoroughly tested and inspected before shipment from our factory. To expect the stated performance throughout its service life, please familiarize yourself with the instructions contained in this manual before use.

Also keep it for ready reference. It is suggested that the instruction manuals for the companion pulse generator (flowmeter) and receiving instrument be referred to at the same time.

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The indications **NOTE**, **CAUTION**, and **WARNING** shown throughout this manual are to draw your attention to specific items:

➡ **NOTE**

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

⚠ **CAUTION**

Caution statements call attention to user about hazards or unsafe practices that could result in minor personal injury or property damage.

⚠ **WARNING**

Warning statements call attention to user about hazards or unsafe practices that could result in serious personal injury or death.

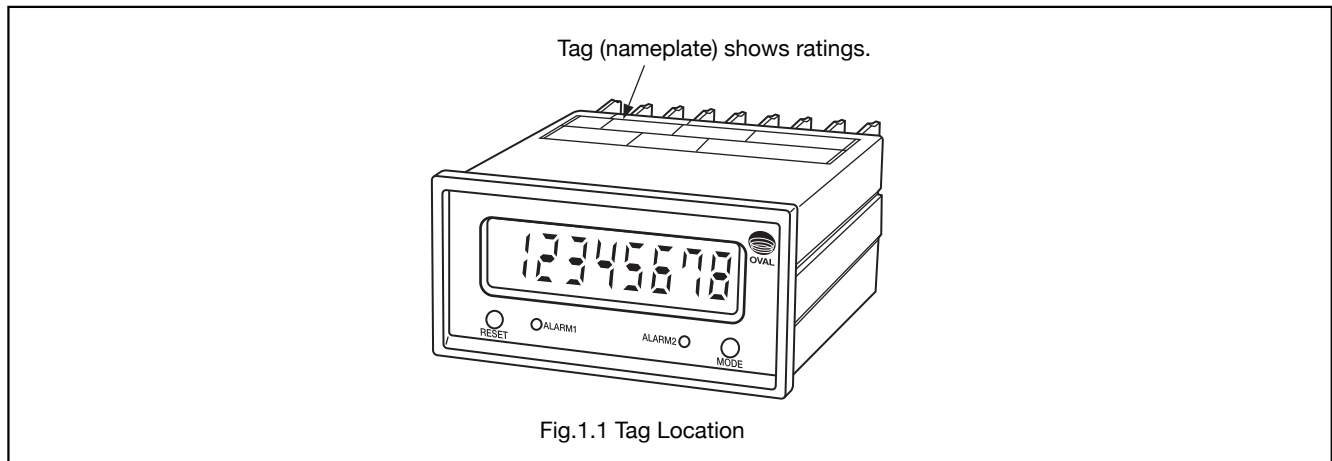
1. BEFORE YOU BEGIN

When you received, the product should be thoroughly inspected for any sign of damage by rough handling during transit.

1.1 Confirming the Tag

Product code and ratings appear on the counter tag. Make sure that the product you received complies with the specifications in your order.

General Specifications and Product Code Explanation appear on pages 24 and 25, respectively.



➡ **NOTE:** When you inquire, supply complete information as to the product name, model number, product number, ratings, etc.

1.2 Transportation Considerations

- (1) The OVAL total counter can best be transported to the installation site in the shipping container used for transit from our factory.
- (2) Avoid giving impact shocks to the total counter during transit.

1.3 Storage Considerations

If the total counter upon receipt is to be stored for extended periods of time before installation, unexpected problems could arise. If such is the case, the following considerations should be taken:

- (1) The total counter can best be stored in the original package used for transit from the factory.
- (2) Select a storage location that meets the following requirements:
 - ☆ Free from rainwater and moisture
 - ☆ Least vibration and impact shock
 - ☆ In the room temperature and humidity environment (around 25°C and 65% R.H.)

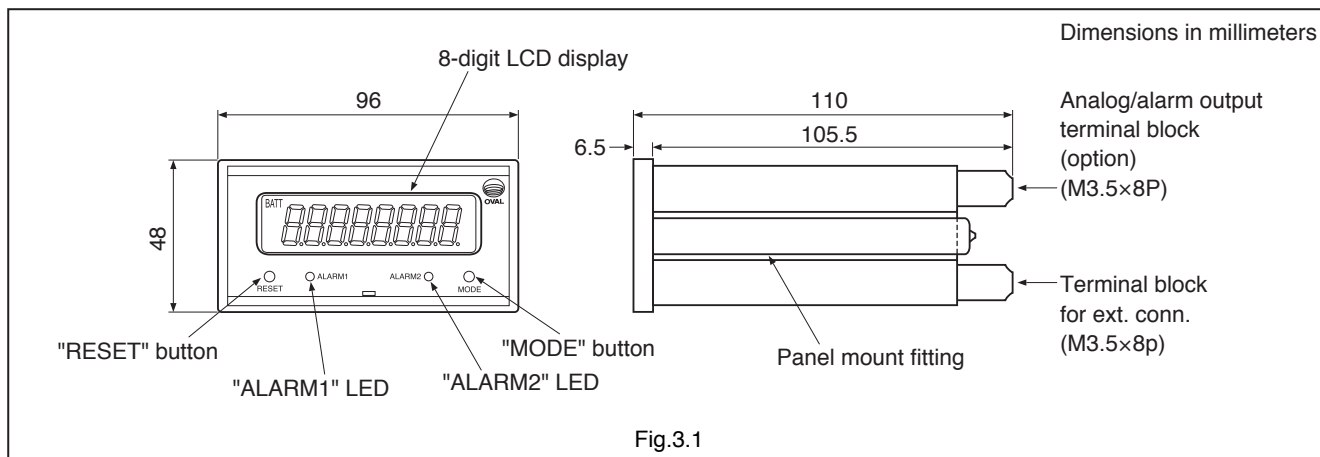
➡ **NOTE:** A total counter which has been idle for extended periods of time may possibly require internal inspection. If such is the case, consult factory.

2. GENERAL

Built around a single-chip microprocessor, this multifunction counter is designed lightweight and compact. It offers four display functions (cumulative total flow, hourly and per-minute instantaneous flowrate, and resettable total flow) in a single unit along with a factored pulse output.

A 4-20mA DC and 1-5V DC flowrate output plus high/low alarm output are available as an option (Model EL0122 only).

3. PART NAMES AND OUTLINE DIMENSIONS



4. INSTALLATION

4.1 Installation Location

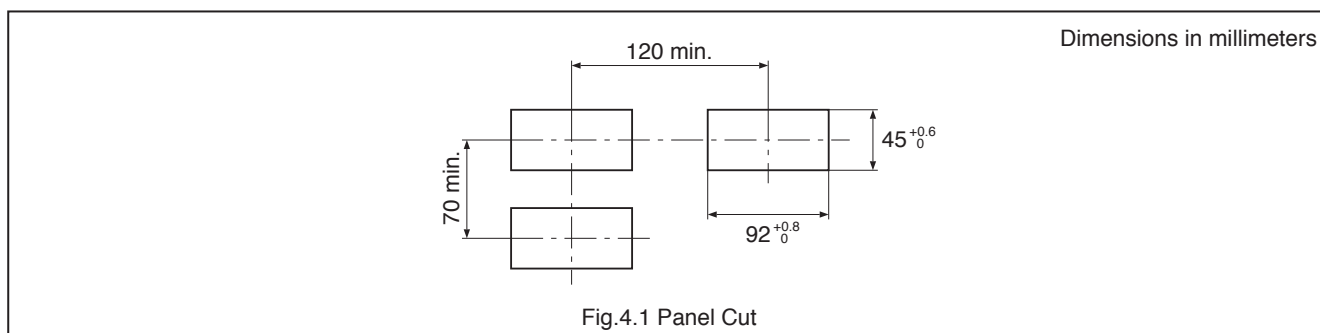
- (1) Select a location free from mechanical vibration and corrosive gases.
- (2) Select a location maintained at room temperature with least temperature variation and free from moisture.

NOTE: We guarantee that the counter is operational at ambient temperatures from -10 to +50°C, but we recommend an installation location where the temperature is controlled to the room temperature.

- (3) Provide a sufficient working space behind the counter to facilitate electrical connections and maintenance.

4.2 Installation

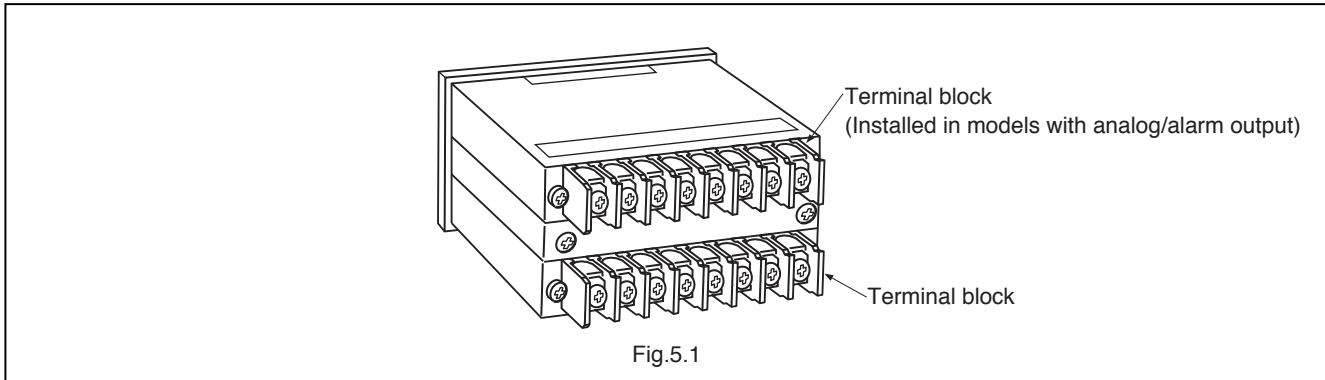
- (1) This counter is designed for panel mount.
- (2) Mount the counter as follows:
 - ① Remove panel-mount fittings from the counter and front mount the counter through the opening cut in the panel.
 - ② Secure the counter to the panel with panel-mount fittings from inside the panel, slightly forcing them outwardly at first.



5. WIRING

5.1 Cables for Field Wiring

Use electrostatically-shielded, polyethylene-insulated, vinyl-sheathed control cables (CEVS 0.75 to 2mm², 2- or 3-conductor), or equivalent, for input and output signal cables.



5.2 Field Wiring and Electrical Connections

(1) It is recommended that cables be routed through conduits.

NOTE: Be sure to route the power cable separate from the input and output signal cables.

(2) Keep the cables away from other power cables or power circuits if any, to prevent stray current pickup.If inductive interference is suspected, use a capacitor or surge suppressor where necessary.

(3) Use crimp-style terminals to ensure good electrical connections. Terminals for connections are located on the back of this instrument.

1	2	3	4	5	6	7	8
+		-		+		-	
A		V		ALARM1 OUT		ALARM2 OUT	
ANALOG OUT							
⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

1	2	3	4	5	6	7	8
SUP		SIG.		0V			
+		-		L1(+)		L2(-)	
FLOW INPUT		PULSE OUT		POWER			
⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

NOTE: The upper terminal block at back of the counter is provided only in models with analog/alarm output.

Fig.5.2 External Conn. Terminal Blocks

5.3 Terminal Block for External Connections

Before connecting the cables, ensure that the flowmeter (pulse generator) is compatible with this counter. Acceptable combinations of these units can be determined by identifying their model number and instrument number.

CAUTION: Invalid equipment combination can lead to a costly downtime. Be sure to reconfirm validity following wiring connections.

◎ **Terminal Block Identification for External Connections**

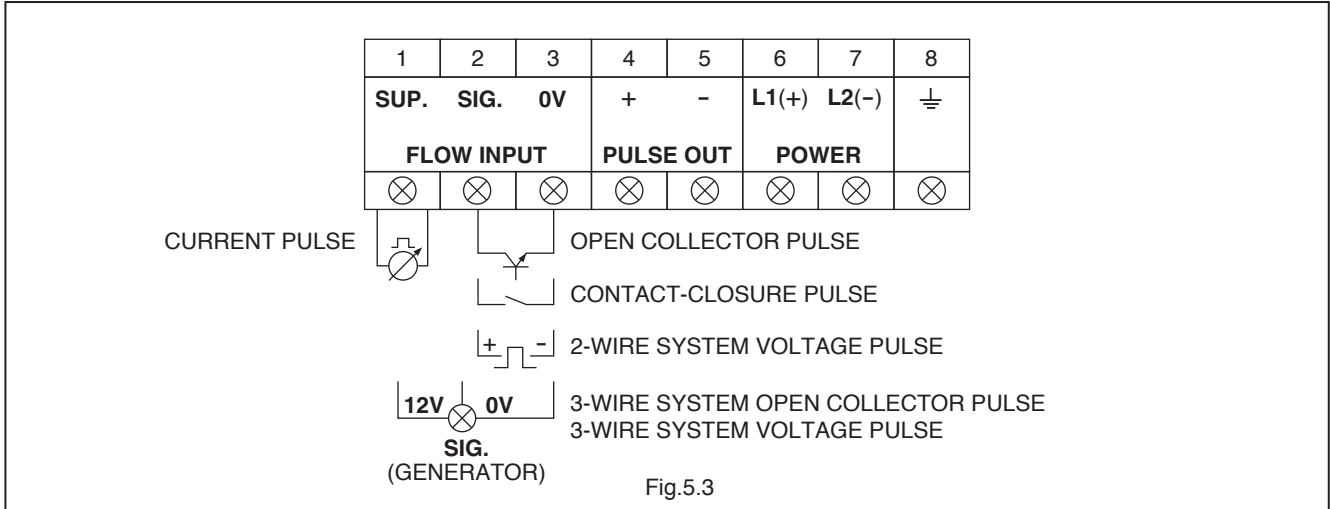
Name			Terminals		Description	
Power			6 L1	7 L2	85-264V AC, 50/60Hz (Model EL0122 only)	
			(+)	(-)	or 12-24V DC±10% (Model EL0123 only)	
Ground			(8)		To be earth grounded	
Pulse Input	Contact-closure or open collector	PG20 Flowpet - 5G, (N)PG60A(E3)	1, 2, 3		EL0122	1: 12V DC 2: SIG.(+) 3: 0V (-)
			2, 3		EL0123	2: SIG.(+) 3: 0V (-)
	Voltage pulse	PG30 (N)PG60A(F)	1, 2, 3		EL0122	1: 12V DC 2: SIG. 3: 0V
			2, 3		EL0123	2: SIG. 3: 0V
	Current pulse	PA14, 15, 25 (N)PG60A(E), PG30S	1, 2		EL0122	1: + (+24 or 12V DC) 2: -
			2		EL0123	2: - Load 510Ω(*)
Pulse Output	Open collector		4, 5		4: + 5: - (Isolated only in Model EL0122)	
Analog Output	4-20mA DC		1, 2		1: + 2: -	Optional feature (Model EL0122 only) ⚠ CAUTION:
	1-5V DC		3, 4		3: + 4: -	If ① and ② are not used, do not fail to short them out. Unless so shorted out, no analog voltage output appears across terminals 3 and 4.
Alarm Output	Alarm 1		5, 6		Output signal: Non-contact relay x2 points Capacity: 230V AC/340V DC, 200mA	
	Alarm 2		7, 8		"ON" resistance: 16Ωmax. (Leak current 1μA min. at "OFF")	

➡ **NOTES:** 1. Power cannot be supplied to the transmitters of certain flowmeters, such as the Thermistor Type Vortex Flowmeter, DC Power Type Coriolis Flowmeter, etc. Prepare a power source separately, or relay it using another device.

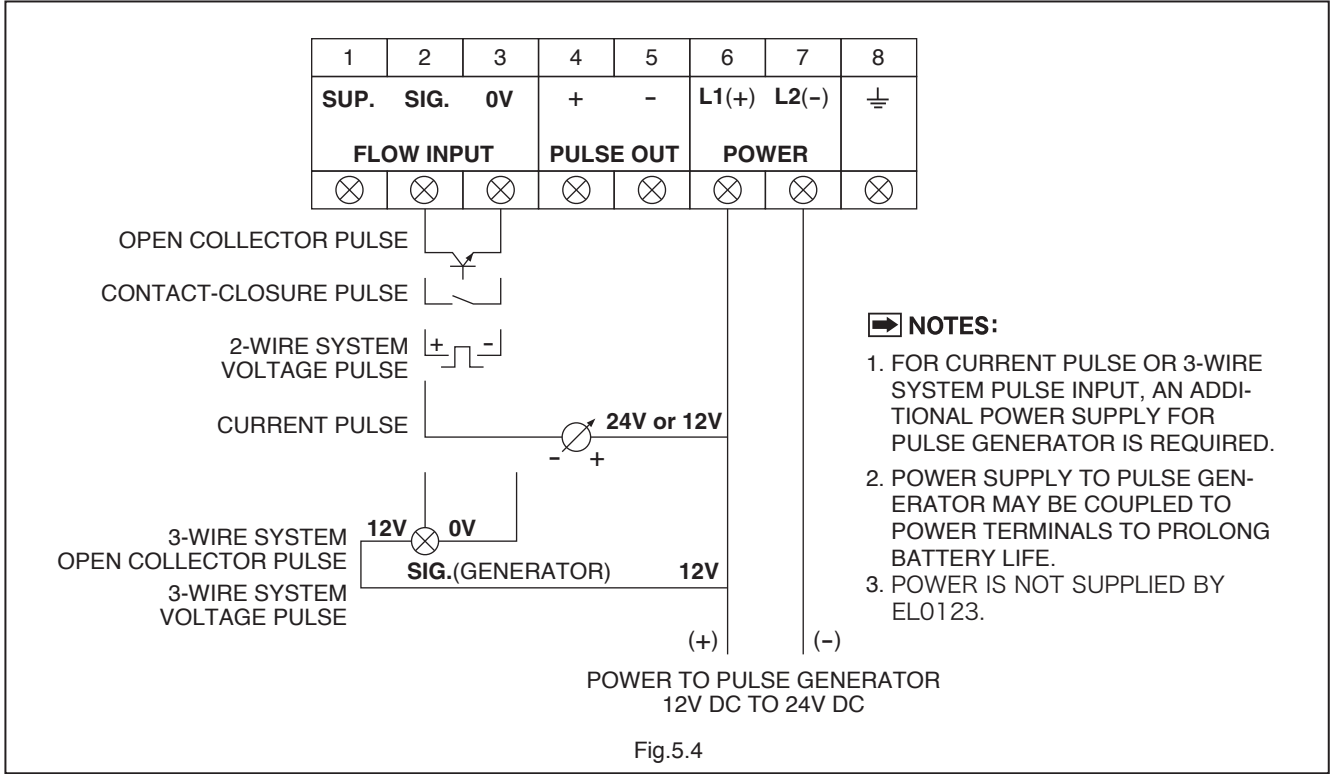
2. An asterisk (*) indicates requirement for a separate power source.

5.4 Electrical Connections by Type of Input Signal

(1) Model EL0122

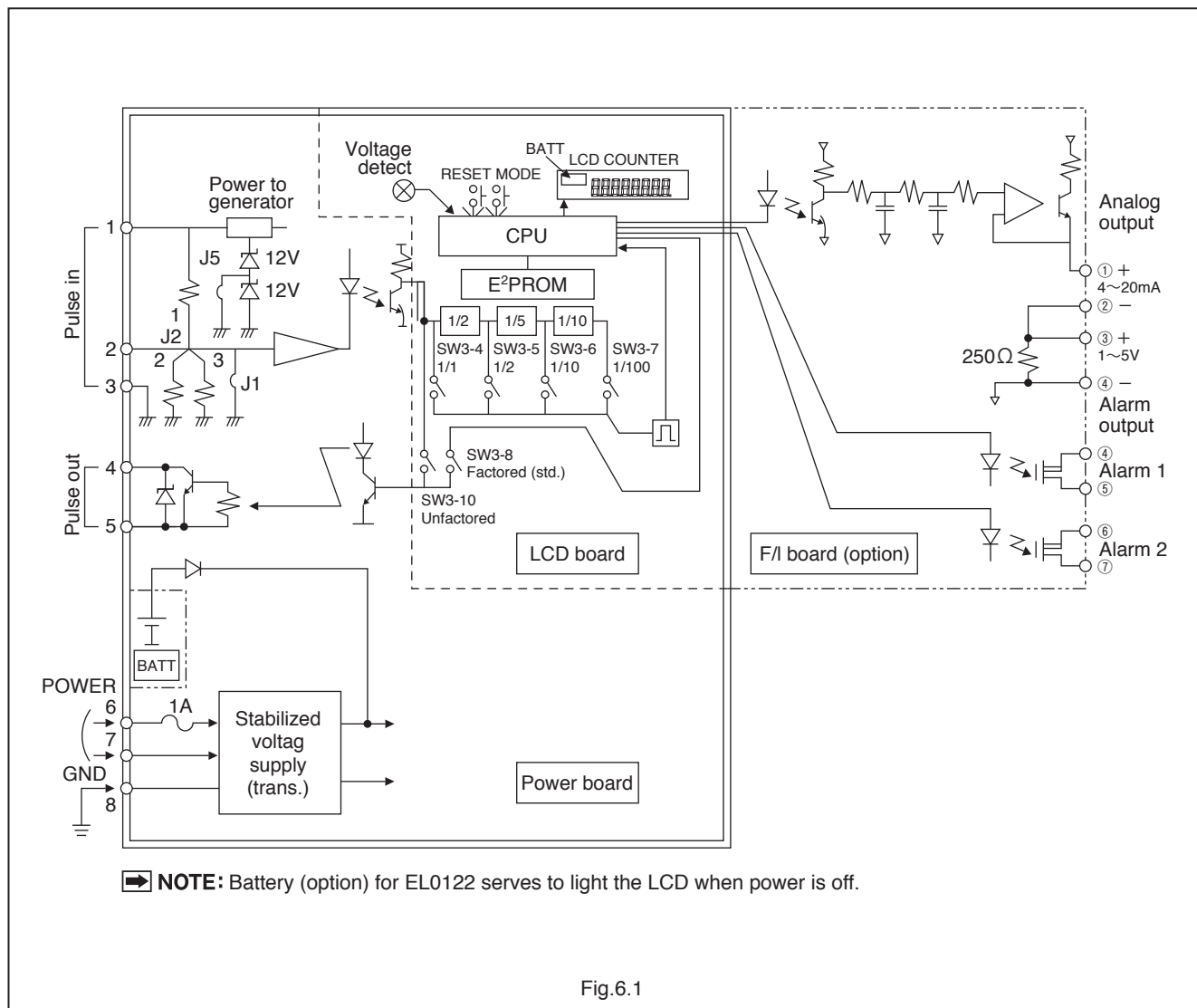


(2) Model EL0123



6. BLOCK DIAGRAM

(1) Model EL0122



(2) Model EL0123

In the Model EL0122 overall block diagram above, the following circuits are eliminated:

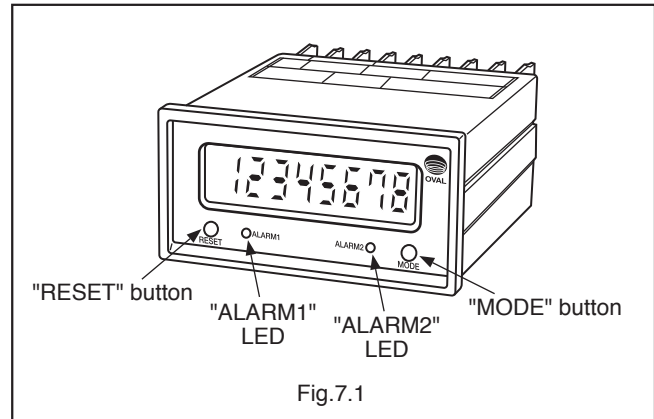
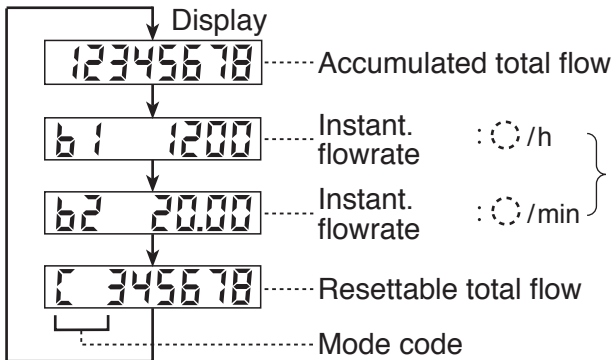
- ① Regulated voltage supply (transformer) circuit and power circuit to the pulse generator because it operates on the battery.
- ② Isolation circuit and F/I board (option).

7. FUNCTIONS AND OPERATION

The counter is designed to show the following variables on the display using "MODE" and "RESET" pushbuttons.

7.1 LCD Counter Display

Upon each depression of "MODE" button, the LCD display scrolls through available variables as shown



➡ **NOTE:** Only incoming pulses having small periodic variation produce meaningful readings. (See section 7.3.)

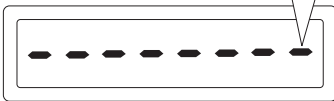
➡ **NOTE:** RESET button is operative only in this mode. The counter resets to zero upon "RESET" button depression. C 0

7.2 About the Displayed Messages during Operation

(1) Ordinary operation

"MODE" switch is turned "ON"
⇒ 8 bars appear.

Indicates that the switch is turned "ON."

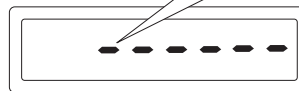


⇒ Immediately turning "OFF" scrolls the window to the next one.

(2) Prolonged operation

"MODE" switch is held turned ON without turning "OFF" immediately by removing the fingers.
⇒ Bars begin to disappear from the leftmost one.

Indicates a countdown before "prolonged depression" processing takes place.



⇒ Holding turned ON until the last bar disappears results in "prolonged depression" processing (Turning OFF before the last bar disappears results in the same behavior as in ① to take place.)

※ Prolonged operation: An operation required for Normal mode ⇔ Parameter review mode selection, finalizing the parameter setting, etc.

➡ **NOTE:** When the RESET switch is pressed in a mode where the RESET switch is valid, the display behaves the same as described above. (There is no distinction between ordinary operation and prolonged operation, however.)

7.3 Total Flow and Instantaneous Flowrate Calculation and About Factored Pulse Output

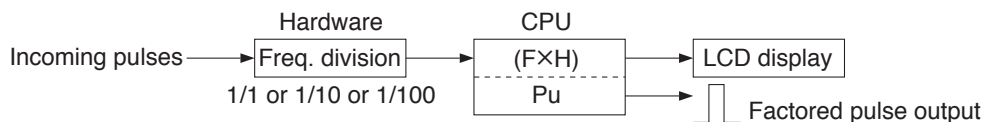
(1) Total flow

Each time a single pulse (after frequency division by hardware means) arrives at the CPU, "Parameter F×Parameter H" is added up to the current reading of total flow.

- The LCD shows a reading down to the decimal places set at "Parameter SP" menu.
- When the reading has reached its maximum reading (99999999), the reading returns to zero.

(2) Factored pulse output

Produces a pulse output to read in the unit set at "Parameter Pu" menu.



(3) Instantaneous flowrate

When the CPU accepts count (Parameter A) of pulses sampled within sampling time (Parameter At) [sec], its period or the interval of occurrence T [sec] is measured. The instantaneous flowrate is then determined by the following equations:

$$\text{Hourly flowrate } b1 = 3600 \times F \times H \times A / T$$

$$\text{Per-minute flowrate } b2 = 60 \times F \times H \times A / T$$

- ➡ **NOTES:**
- 1.b1 shows a reading down to the decimal places set at "Parameter bP" menu.
 - 2.b2 shows a reading down to the decimal places of b1 + 2 additional places.
 - 3.In the absence of any incoming pulses within sampling time At [sec], the instantaneous flowrate reads "0".
 - 4.If the instantaneous flowrate exceeds 99999, the reading remains at "99999".

7.4 Jumper, Switch, Potentiometer Setup and Adjustment

⊙ **The counter is configured to customer specifications at the factory and no further adjustment is required except for later changes or adjustment.**

➡ **NOTE:** Alteration and adjustment above requires removal of internal electronics.

7.4.1 Construction of Internal Electronics Assembly

In the pulse type, the internal assembly consists of a display board and a power supply board. The analog type (option) has three boards with an additional F/I board. The power supply board and F/I board connect to the display board. At the back, a terminal block for external connections is found. See "How to Remove Internal Electronics Assembly" outlined on the next page.

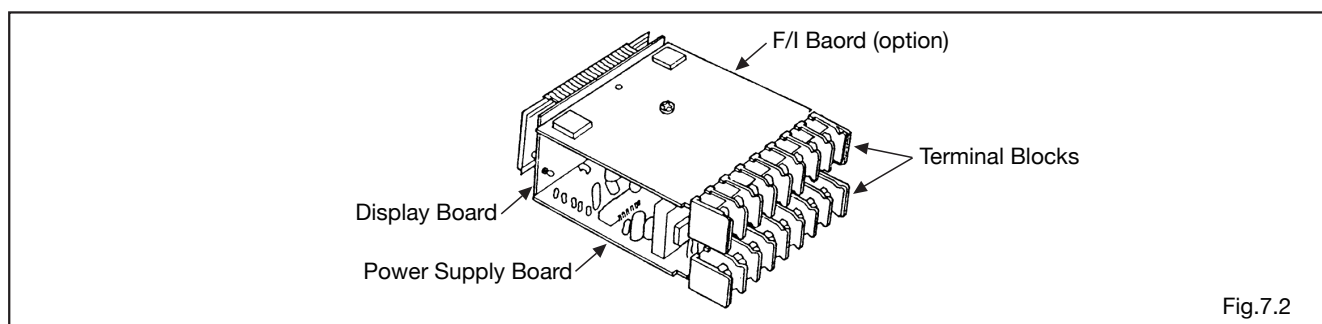
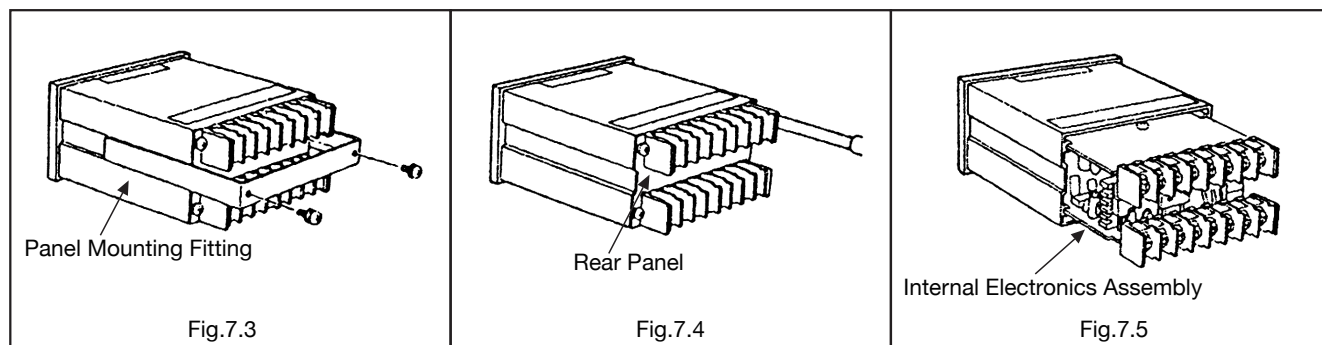


Fig.7.2

7.4.2 How to Remove Internal Electronics Assembly

⚠ **CAUTION:** Do not fail to turn off power before removal.

➡ **NOTE:** Remove wiring connections with this assembly.



- ① Remove panel mounting fitting and draw the assembly out from the panel rear panel opening.
- ② Taking off rear panel fitting screws, remove the rear panel.
- ③ Extract the internal electronics assembly to the rear.

7.4.3 Waveshaping Functions

(1) EL0122 (power supply board)

Table 7.1 Pulse Input Types and Input Setup Specifications

Pulse input type	OVAL pulse generator model	Jumper settings			Power to generator	Input impedance
		J2	J5	J1		
Contact-closure	PG20	1-C	Shorted	* 1	13.5VDC	5 kΩ
Open collector	(N) PG60A(E3), Flowpet-EG					
Voltage pulse	PG30, (N) PG60A (F)	2-C	Shorted	* 1	13.5VDC	22 kΩ
Current pulse	PA14, 15, 25 (N) PG60A (E)	3-C	Open	* 1	24 VDC	510 Ω
	PG30S	3-C	Shorted	* 1	13.5VDC	510 Ω

(2) EL0123 (power supply board)

Table 7.2 Pulse Input Types and Input Setup Specifications

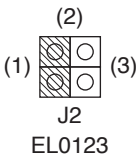
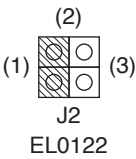
Pulse input type	OVAL pulse generator model	Jumper settings		Input impedance
		J2	J1	
Contact-closure or open collector	PG20	1-C	* 1	20 kΩ
Voltage pulse	PG30, (N) PG60A (F)	2-C	* 1	100 kΩ
Current pulse	PA14, 15, 25 (N) PG60A (E)	3-C	* 1	510 Ω
	PG30S	3-C	* 1	510 Ω

➡ NOTE: * 1: Short out if it is desired to increase the waveshaping filtering by tenfold approx.

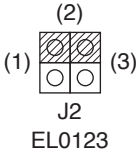
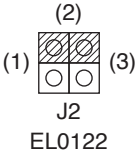
◆ Install a jumper in the shadowed sockets on the power supply board shown below according to your particular specifications.

Jumper settings in selecting the pulse input spec.: J2

① 1-C



② 2-C



③ 3-C

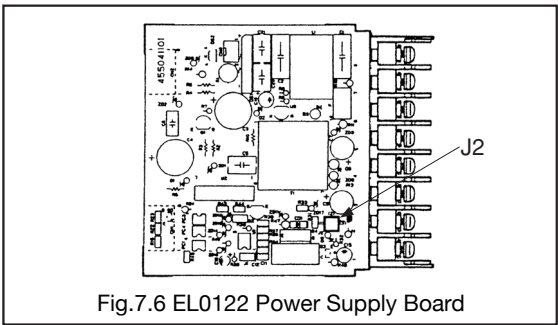
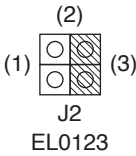
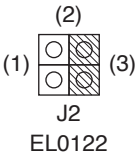


Fig.7.6 EL0122 Power Supply Board

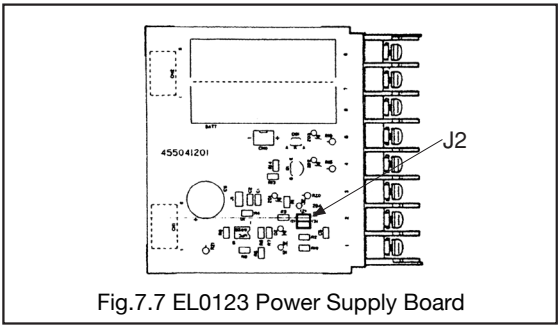


Fig.7.7 EL0123 Power Supply Board

7.4.4 Configuration of other Functions (common to EL0122/0123): LCD board SW3

SW3	Auxiliary Functions
1	ON:Write-protect <input type="checkbox"/> OFF: Rewritable
2	ON→OFF resets accumulated total flow. Normally <input type="checkbox"/> OFF
3	No functions. <input type="checkbox"/> (Always OFF)

➡ **NOTE:** ☐ : Default setting

SW3	Hardware frequency division settings			
	<input type="checkbox"/> 1/1	1/2	1/10	1/100
4	ON	OFF	OFF	OFF
5	OFF	ON	OFF	OFF
6	OFF	OFF	ON	OFF
7	OFF	OFF	OFF	ON

SW3	Output pulse settings	
	<input type="checkbox"/> Factored	Unfactored (sync with input)
8	ON	OFF
9	OFF	OFF
10	OFF	ON

7.4.5 How to Change Output Signal and Pulse Width

Output pulse width of this counter is set to a default of 1ms., and if the customer's option is B5 or B9 in supplementary code ⑪ and ⑫ of in Product Code Explanation on page 25 and 26 the product is adjusted to the specified pulse width before shipment. But if later changes are desired in the field, you can change it to a new setpoint at the parameter Pon setup menu.

⚠ CAUTION: Select a pulse width appropriate for the flow range to ensure that pulses will not overlap.

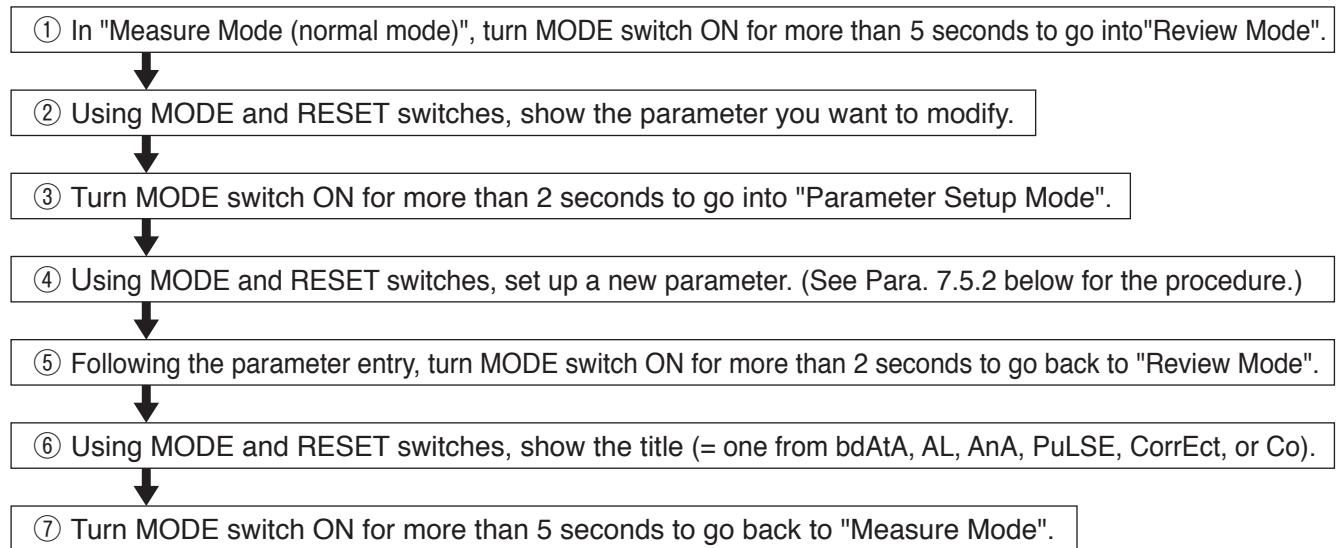
7.4.6 Procedure to Set up and Change Analog Output (option) and Adjustment

- By changing setpoints at parameter AF menu, you can change the full scale flowrate (flowrate to produce a 20mA output).
- In the mode at parameter A04 and A20 menus, you can also trim the 4mA/20mA.

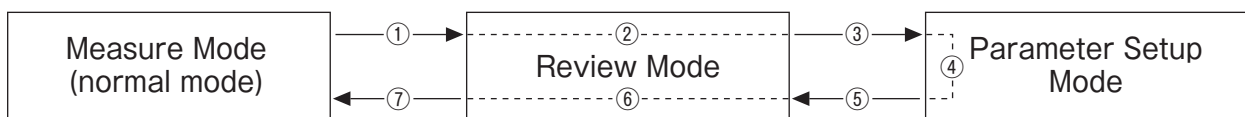
7.5 Parameter Setup Procedure

7.5.1 Procedure to modify a parameter

Given below is the parameter setup procedure:



A diagram to show parameter setup flow



➡ **NOTE:** For complete detail of MODE and RESET switch operations in steps ①, ②, ⑥ and ⑦, see "Table 7.5 Menu Trees and Switch Operation" on page 19.

7.5.2 Procedure to Enter a Parameter

The procedure to enter a parameter (switch operations sequence in "Parameter Setup Mode") comes in three ways (numerical setup, decimal point location setup, and analog 4/20mA trim) that follows:

➡ **NOTE:** Meanings and functions of individual parameters appear in the Parameter List on pages 20 and 21.

Kind 1 Numerical setup parameters (F, H, Pu, At, A, AF, dAn, Pon)

The blinking digit in the parameter setup mode is the place of interest.

MODE... Each time the switch is turned on, the place of interest moves one place to the left ("E").

RESET... Each time the switch is turned on, the figure in the blinking place increases by one.

Or exponential sign toggles ("E", "-", etc.).

→ Following the parameter setup, hold the MODE switch turned ON for more than 2 seconds (the new setting is established and the screen returns to the review mode).

Example: Parameter "F" (meter factor)



(The screen left reads $F=1.2345 \times 10^{+2}$ L.)

Digit of interest (blinking)

Exponential sign (E: 10^{+n} , -: 10^{-n})

- Turning MODE "ON" moves the blinking digit one place to the left ("E").
- Turning RESET "ON" increases the figure by one ("2" → "3").

Kind 2 Decimal point setup parameters (bP, SP)

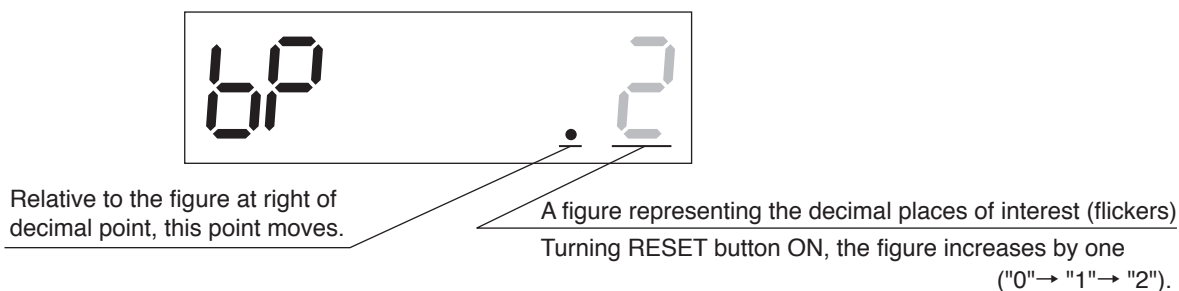
In the parameter setup mode, a figure representing the decimal places of interest flickers.

MODE ... Not used in the setup process.

RESET ... Each time the switch is turned ON, the decimal point moves one place to the left and the figure increases by one.

→ When the decimal point appears at the desired location, hold MODE turned ON for more than 2 seconds. (This establishes the setting and the window returns to the review mode.)

Example: Parameter "bP" (decimal place in instantaneous flowrate)



If a setting above (bP=2) is chosen, the instantaneous flowrate reads [b1 □□□ . □□].

Kind 3 Analog output 4/20mA trim

● During the analog trim, keep on monitoring the analog output with a milliammeter or voltmeter.

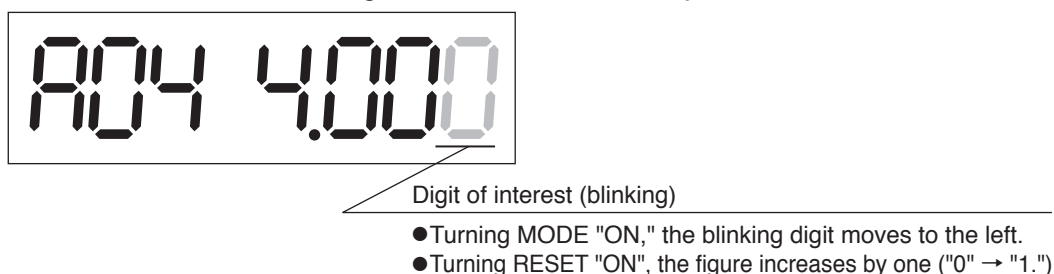
Given below is the 4mA trim procedure (the same holds true with 20mA trim).

- (1) At "A04 4.000," hold "MODE" turned ON for 2 seconds to go into the parameter setup mode; the least significant digit "0" at rightmost blinks on and off and a 4mA simulated output from the register appears.
- (2) Set the milliammeter reading in the procedure below.
(If it reads 3.988mA, for example, set to "A04 3.988.")

Example: Parameter "A04" (4mA trim)

MODE ... Each time the switch is turned ON, the digit of interest moves one place to the left.

RESET ... Each time the switch is turned ON, the figure of interest increases by one.



Following entering the setting, MODE turned ON for more than 2 seconds to establish the setting.

- (3) Analog output is trimmed: make sure of the milliammeter reading once again.

(The indicated reading returns to "A04 4.000" (the least significant digit at extreme right blinking) now.)

- If the reading is within the tolerance with respect to 4mA, by holding MODE turned ON for 2 seconds the second time, you can exit the setup mode. → Adjustment is complete. Returns to the review mode.
- If the reading is still outside the tolerance, repeat step (2) above.

7.5.3 About Dummy Output Features (special functions)

By the following steps, a 1Hz or 10Hz **simulated factored pulse** train can be furnished irrespective of flowmeter measurement.

➡ **NOTE:** This feature is not available with the unfactored pulse output specification.
(Dummy output is not featured for unfactored pulse output.)

● 1Hz simulated output mode (dummy output 1 mode Code: Pd1)

① According to the Table 7.5 "Menu Trees and Switch Operation" (page 19), show dummy output 1 ("Pd1 1") on the LCD.

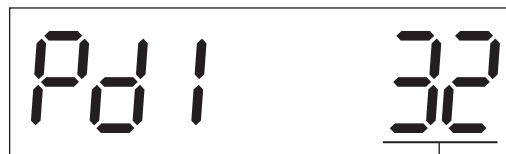


② Turn MODE button ON for more than 2 seconds to go to the dummy output run mode.
(The display shows "Pd1 0".)



③ Operation within the dummy output run mode

- Turn RESET button ON → Dummy output appears and the counter counts in sync with the pulse output produced.
- Turn MODE button ON → Dummy output stops.
- Hold MODE button turned ON for more than 2 seconds → Dummy output run mode is terminated, returning to the state ①.



Number of output pulses

➡ **NOTES:** 1. The procedure above also applies to the 10Hz simulated output mode (dummy output 2 mode Code: Pd2).

2. Pulse width is set by parameter "Parameter Pon".

7.5.4 Parameter Initialization

- ① Remove the external power source. (If provided with the battery, take the battery out as well.)
- ② While pressing the MODE switch, turn the external power on. (If provided with the battery, put the battery in.)
- ③ The LCD lights up in all figure places. (Keep the MODE switch pressed.)
- ④ When the screen shows "PA. rESet", release the MODE switch to turn "OFF" → Initialization is complete.
(Holding the MODE switch pressed after "PA. rESet" is shown causes the modes to go to the measure mode without initialization.)

➡ **NOTE:** Parameter initialization is the step to be taken upon detection of a parameter error "PA.Err. 1" or other erratic condition. Do not take this step unless absolutely necessary.

7.5.5 About Alarm Output (option)

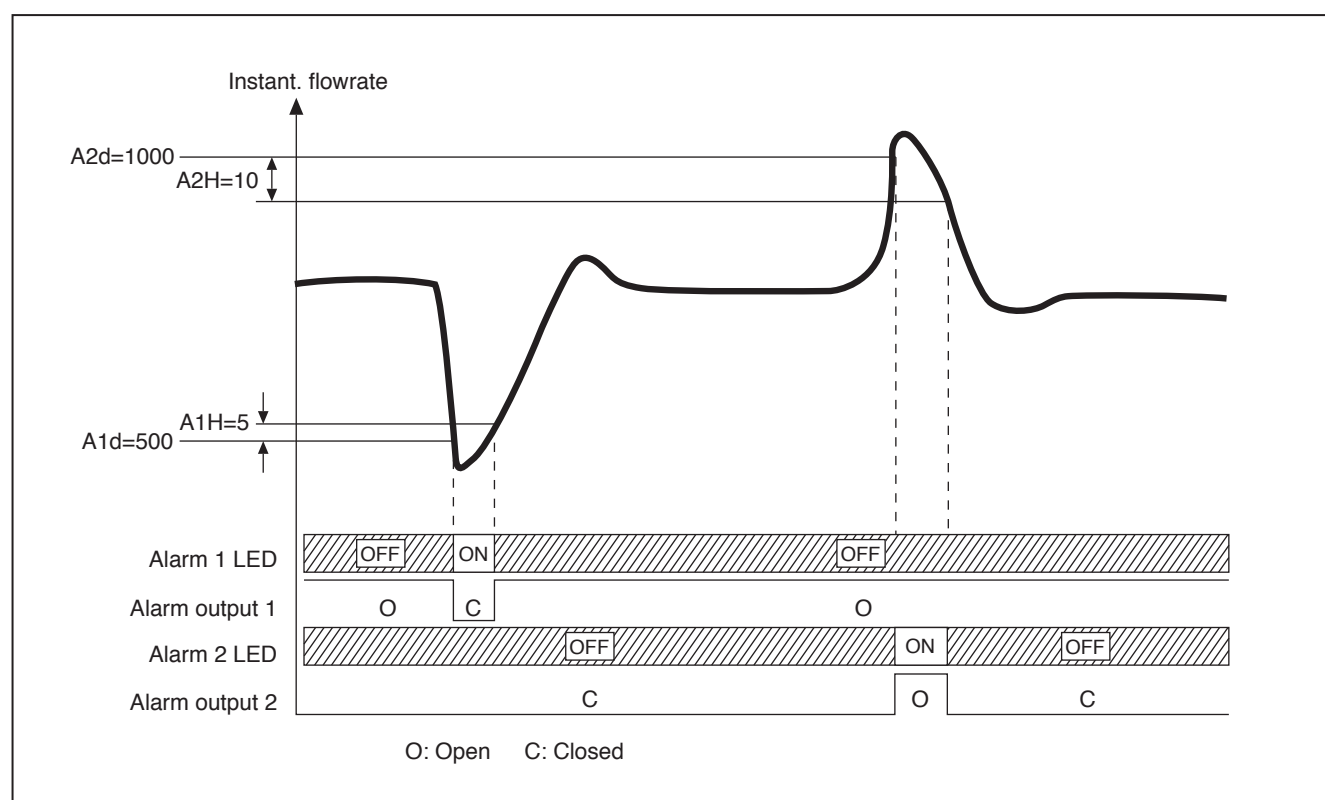
- When the instantaneous flowrate exceeds (or falls below) a preselected setpoint, the counter lights up a front-panel LED and, at the same time, produces a remote alarm output (non-contact relay).
- Alarm comes in Alarm 1 and Alarm 2 which can independently be established.

➡ **NOTE:** For parameter menu trees associated with alarms, see "Table 7.5 Menu Trees and Switch Operation" on page 19.

Table 7.3 Parameters Associated with Alarm Functions and their Meanings

Parameter Symbol	Name	Description
A1d <input type="text"/>	Alarm 1 setup	Sets flowrate at alarm output 1 (in hourly flowrate).
A1H <input type="text"/>	Alarm 1 hysteresis	Hysteresis at alarm output 1 (set in hourly flowrate) ... the width or lag from alarm setpoint to alarm cancellation
A1S <input type="text"/>	Alarm 1 status	Alarm 1 output status △: High alarm or low alarm setup "H" set → high alarm "L" set → low alarm ○: Remote output at an alarm (non-contact relay) "S" set → shorted (... contacts "closed") "O" set → open (... contacts "open")
A2d <input type="text"/>	Alarm 2 setup	Alarm output 2 flowrate (similar to A1S in meaning)
A2H <input type="text"/>	Alarm 2 hysteresis	Alarm output 2 hysteresis (similar to A1S in meaning)
A2S <input type="text"/>	Alarm 2 status	Output status of alarm output 2 (similar to A1S in meaning)

Example: A1d=500, A1H=5, A1S=LS, A2d=1000, A2H=10, A2S=H0



7.5.6 About Error Messages

The electronics unit can be reconfigured for new parameters at your option. However, if some parameters you set up conflict, or when an erratic condition arises, the LCD display will tell you with an error message from Table 7.5 below.

Table 7.5

Message	Name	Description	Coping action
PA. Err.	Parameter setup error	An attempt is made to rewrite a parameter while parameters are write-protected. (In the standard model, write-protect feature is set in OFF and will not appear.)	Can be reset by placing No.1 of display board SW3 in OFF. (This enables you to change parameters.)
PA. Err. 1	Parameter error 1	Backup data retained for parameters has been damaged.	CPU initialization and then reconfiguration of parameters are required.
PA. Err. 2	Parameter error 2	Some of the backup data retained for the display mode, accumulate total flow reading, or resettable total flow reading have been damaged.	Can be restored with MODE switch, but the accumulated total flow and resettable total reading will be reset to 0.
PA. Err. Pu	Pulse weight error	Pulse weight "Pu" setting is too small with respect to meter factor "F" and conversion factor "H."	Change the setting to an appropriate value that the relationship between F, H, and Pu satisfies the following formula: $\frac{F \times H}{2} \leq P_u \leq F \times H \times 10000$
AnA. Err.	Analog output error	Analog output level is exceeded 120% of full scale for either reason: ① Flowrate excessive ② Analog full scale setting too small	①:Reduce flowrate. ②:Select an appropriate analog full scale setting relative to the flowmeter specification.
Out. Err.	Pulse output error	Pulse "OFF" width in the factored pulse output falls short of 1 msec for either reason: ① Flowrate excessive ② Factored pulse width setting too great	①:Reduce flowrate. ②:Choose an appropriate factored pulse width "Pon" relative to the flowmeter specification.
BATT	Battery life	Supply voltage has dropped.	Replace the battery with a new one.

Table 7.5 Menu Trees and Switch Operation

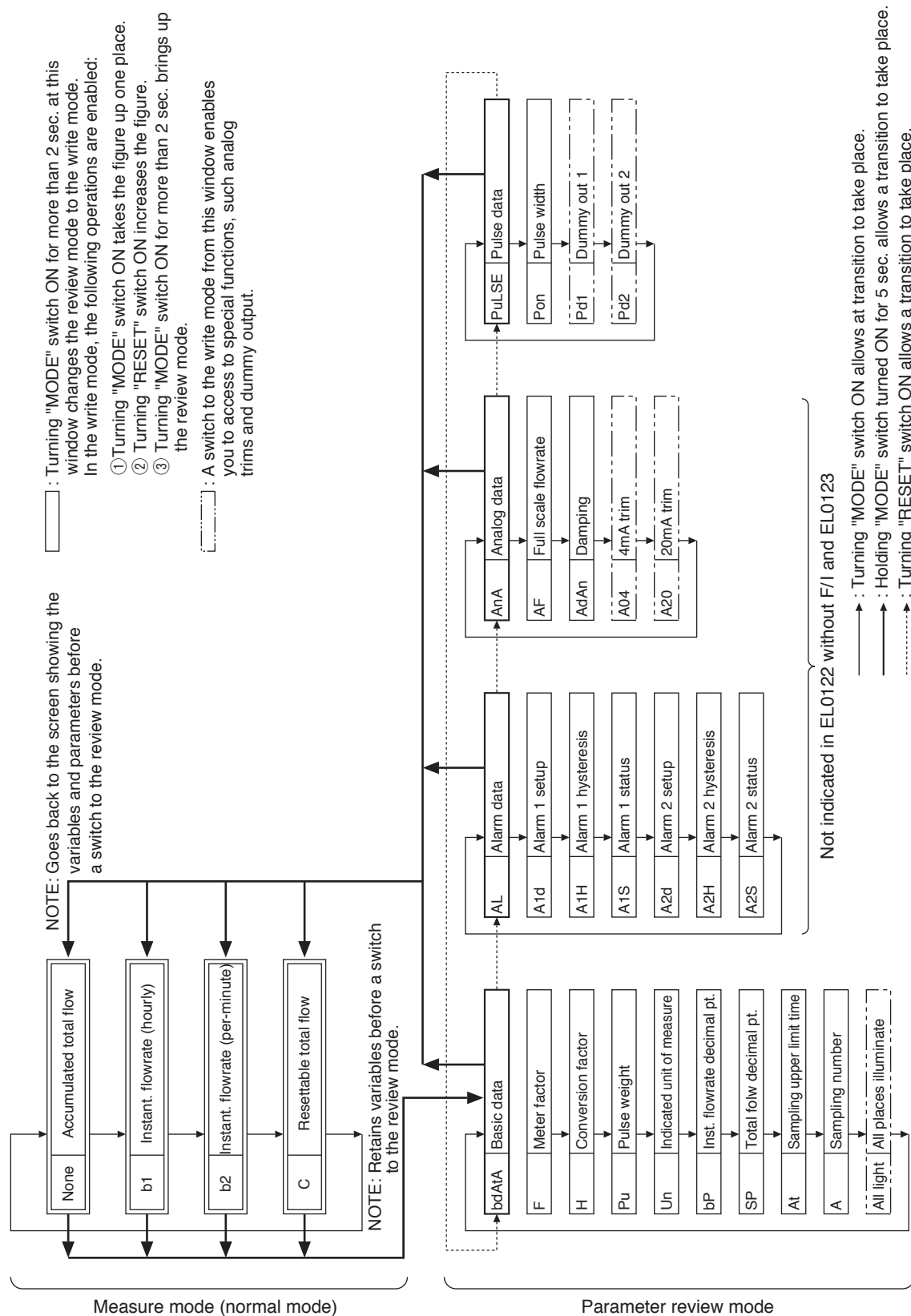


Table 7.6 Parameter List

Parameter	Code	Default Setting	Description	Remarks
Meter factor	F	Depends on specification.	<ul style="list-style-type: none"> •Meter factor (Unit: [□/Pulse]) •Setting range: 0.9999-9~9.9999E7 	Ex.: Given meter factor 9.918mL/P. To change the indicated flowrate to [L] (hardware frequency division at 1/1) → 9.918 [mL/P] = 9.918×10 ⁻³ [L/P]÷1/1 Therefore, set to "F9.918-3" (L/P).
Conversion factor	H	1.0000E0	<ul style="list-style-type: none"> •Unit conversion factor (Unit: [□/L]) △: Unit after conversion (without conversion △= □) •Setting range: 0.9999-9~9.9999E7 	Changes units of total flow and instant. flowrate to any units desired. (Without conversion, H 1.0000E0) Ex.: At 1.5kg per 1L, change the flowrate to read in kg. → Conversion factor is 1.5 [kg/L] (=1.5000×10 ⁻⁰ [kg/L]). Therefore set to "H 1.5000E0" (kg/L). (Note 1)
Pulse weight	Pu	Depends on specification.	<ul style="list-style-type: none"> •Weight of factored pulse output (Unit: [△/Pulse]) •Setting range: 0.99-9~9.99E7 	Ex.: To change the weight of factored pulse from 1L/P → 10L/P (=1.00×10 ⁺¹ [L/P]) → Set to "Pu 1.00E1" (L/P). (Note2)
Indicated unit of measure	Un	—	(Unit indicated below LCD display)	The total counter LCD is not compatible with unit indication; This param. is invalid. (Do not set.)
Decimal point in instantaneous flowrate	bP	Depends on specification.	<ul style="list-style-type: none"> •Decimal point in instantaneous flowrate b1 •Setting range: 0,1,2 	Ex.: To change the indicated min rdg. in inst. flowrate from 1L/h to 0.1L/h (=one place below decimal point) → Set to "bP .1."
Decimal point in total flow	SP	Depends on specification.	<ul style="list-style-type: none"> •Decimal point in accumulated and resettable total •Setting range: 0,1,2,3 	Ex.: To change the indicated min rdg. in total flow from 1L to 0.01L (=2 places below decimal point) → Set to "SP .2."
Sampling upper limit time	At	5	<ul style="list-style-type: none"> •Upper limit in instant. flowrate sampling (Unit: [sec]) •Setting range: 1~999 	If flow pulses fail to arrive for a duration At [sec], the instantaneous flowrate shows 0.
Sample cycle number	A	Depends on specification.	<ul style="list-style-type: none"> •Sampling frequency •Setting range: 1~999 	Instantaneous flowrate is determined by measuring the time for incoming flow pulses A times. If data spread of instant. flowrate indicated is too large, select a larger A to reduce fluctuation.
Alarm 1 setup	A1d	0	Flowrate of alarm output 1	<ul style="list-style-type: none"> •See topic "About alarm output (option) for detail. •Defaults are factory set unless otherwise specified. <p>(Note 3)</p>
Alarm 1 hysteresis	A1H	0	Hysteresis of alarm output 1	
Alarm 1 status	A1S	HS	Output status of alarm output 1	
Alarm 2 setup	A2d	0	Flowrate of alarm output 2	
Alarm 2 hysteresis	A2H	0	Hysteresis of alarm output 2	
Alarm 2 status	A2S	HS	Output status of alarm output 2	
Analog full scale (Note 3)	AF	Depends on specification. (Indicated on arameter label.)	<ul style="list-style-type: none"> •Analog full scale flowrate (unit: [△/h]) •Setting range: 0.01~99999 	Ex.: To change the analog output full scale flowrate (flowrate to produce a 20mA output) from 3600L/h to 1800L/h → Set to "AF 1800" (L/h).

Parameter	Code	Default Setting	Description	Remarks
Analog damping (Note 3)	AdAn	2.5	<ul style="list-style-type: none"> ●Analog time constant (soft) (Unit: [sec]) ●Setting range:0.0~99.9 	<p>If ripples in analog output are too large, select a larger AdAn to stabilize fluctuation of reading. Ex.: To change analog output time const. from 2.5 [sec] to 5 [sec] → Set to "AdAn 5.0[sec]".</p>
4mA trim (Note 3)	A04	—	●Analog output 4mA trim	See "Parameter Setup Procedure" for detail.
20mA trim (Note 3)	A20	—	●Analog output 20mA trim	See "Parameter Setup Procedure" for detail.
Pulse width	Pon	Depends on specification.	Factored pulse output "ON" width (Unit: [msec])	<p>Ex.: To change pulse width from 1(msec) to 50(msec) → Set to "Pon 50" (msec). (Note 4)</p>
Pulse dummy output 1	Pd1	Not a parameter to be setup	●Furnishes a 1Hz simulated factored pulse output irrespective of flowmetering.	<ul style="list-style-type: none"> ●This function is useful in loop check, etc. ●For operation in practice, see "About Dummy Output Features (special functions)."
Pulse dummy output 2	Pd2	Not a parameter to be setup	●Furnishes a 10Hz simulated factored pulse output irrespective of flowmetering.	

- ➡ **NOTES:** 1. When conversion factor (H) has been set, change pulse weight (Pu) etc.
must be changed relative to the new unit after conversion.
2. Be sure to set up a value such that $\frac{F \times H}{2} \leq Pu \leq F \times H \times 10000$.
3. Indicated only on Model EL0122 provided with F/I board.
4. Be sure to set a value such that factored pulse "OFF" width > 1 ms.
- ※ For the factory-set parameters, refer to "Default Parameter Settings" supplied with the product.

8. BATTERY REPLACEMENT

8.1 About Batteries

When the battery has nearly run out during operation, the LCD will show a low battery alarm message "BATT." Whenever this warning comes on, replace the battery with a new dedicated battery within a week or so. Variables and parameters of this counter are retained by an internal E²PROM backup.

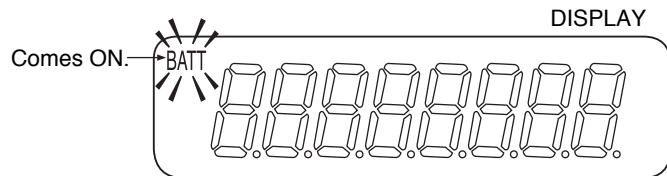


Fig.8.1

8.2 Battery Replacement

The battery pack is mounted on an internal substrate. To remove and replace the battery pack, follow the instructions given below:

- ① Referring to Paragraph 7.4.2, "How to Remove Internal Electronics Assembly," extract the internal assembly.

⚠ CAUTION: Exercise care not to allow internal component parts to bump against the housing during removal.

- ② Battery location is shown in Fig. 8.2.
- ③ Uncouple the bead bands securing the battery pack in place, uncouple the connector installed on the substrate, and replace it with a new battery pack.

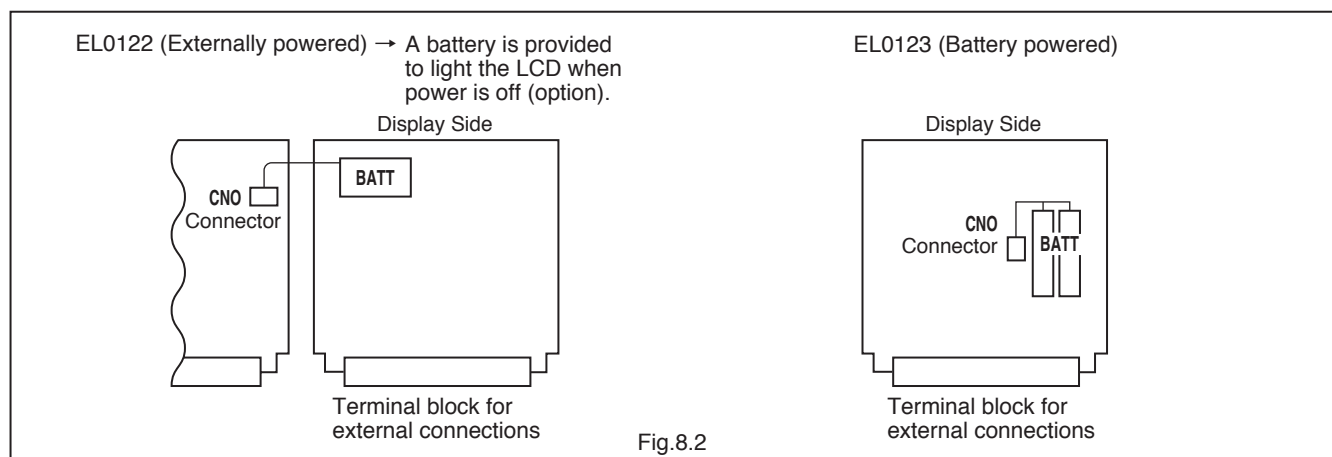


Fig.8.2

➡ NOTE: The bead band can be undone in the manner shown in Fig.8.3 ⇒

⚠ CAUTION: After battery replacement, install the board in the case, ensuring that it seats correctly in the guides of the case.

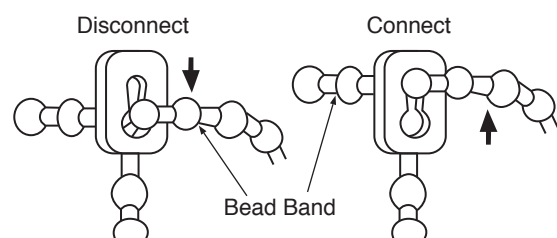


Fig.8.3

9. OPERATION

9.1 Preparation Before Operation

Inspect the total counter and associated equipment to ensure that they are correctly installed and wired and that nothing has been overlooked.

⚠ WARNING: Placing a high line voltage across them will burn out your counter.

⚠ CAUTION: Frequently repeated performance of turning on and off the power may cause erratic counting of the counter.

Next, supply a simulated pulse train of valid type of input to see if the counter does count and display a correct accumulated total flow and Instantaneous flowrate in response.

9.2 Operation

Preoperational Check

Supply power to the counter. Run a performance check with "MODE" button to check for proper counter functions.

When all preoperational checks have been made,

- (1) Turn on the power (in case of Model EL0122).
- (2) Allowing the fluid to flow, go into operation.

10. TROUBLESHOOTING

IMPORTANT: If trouble is found internal to the counter, localize the cause of trouble according to the following table and then seek our service.

Symptom	Check for	Possible Causes
The display fails to show accumulated total flow and instantaneous flowrate.	1. Power supplied? (Model EL0122) ① Check for supply voltage. ② Inspect Fuse.	① Incorrect supply voltage. ② Fuse blown (internal). ③ A fault in the power unit.
	2. Is a pulse train coming in? ① Wiring connections made correctly? ② Pulses coming in?	① Input line wired incorrectly. ② Pulse generator itself is faulty. ③ Waveshaping circuitry at fault. ④ CPU at fault.
An error message in LCD	See Paragraph 7.5.6	See Paragraph 7.5.6.

IMPORTANT: If trouble is suspected to be other than those listed above, then seek our service. Supply us with the product name, model number, symptoms and other information which will help identify the trouble.

◎ As for dedicated battery packs, order us. When you order, please state the product name, model number and other pertinent information.

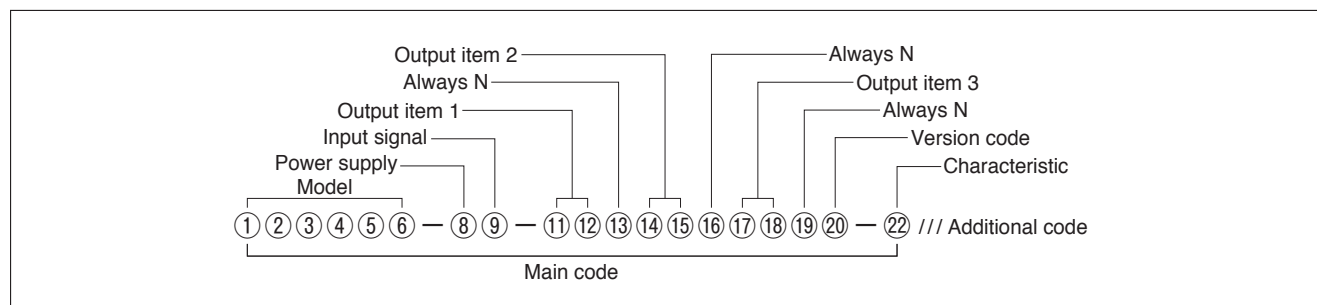
11. GENERAL SPECIFICATIONS

ITEM			DESCRIPTION	
Mode			EL0122	EL0123
Display	Display Type		LCD Characters: 12.7mm high	
	Variables Displayed		Scrolls through available variables with MODE button 8-digit nonresettable Total flow 5-digit hourly Flowrate 5-digit per-minute Flowrate 7-digit resettable Total flow	
Backup Function			Retains variables and parameters on the counter display in an internal E ² PROM.	
Battery Life			None (standard) (Model provided with a battery for lighting the LCD when power is off: One year approx.)	4 years approx.
Input Signal	Power to Pulse Generator		13.5V or 24V 50mA with overcurrent protection	None
	Trigger Level		3VDC, hysteresis 0.8VDC	2.2V, hysteresis 0.5VDC
	Pulse Response		200Hz (contact-closure input 50Hz): standard Can follow up to 2kHz by use of 1/10 or 1/100 frequency reduction.	
Output Signal	Pulse Output	Selection	Factored (synced with display)=standard, or sync with input (unfactored)	
		Output Signal	Open collector, optically isolated	Open collector
		Capacity	30V DC, 50mA max.	30V DC, 10mA max.
		"ON" Level	1.5V DC max.	
		Pulse Width	1 ms approx. (standard)	
	Analog Output	Output Signal	4 to 20mA DC and 1 to 5V DC	None
		Load Resistance	Current output: 350Ω max.	
			Voltage output shorted: 600Ω max.	
		Accuracy	± 0.1% of F.S. (temp. coeff. 0.015%/°C)	
		Ripples	Within 1% of F.S.(at 10% of F.S.flowrate)	
		Time Const.	2.5sec (standard)	
	Hi/Lo Alarm	Output Sig.	Non-contact relay × 2 points	
		Capacity	230VAC/240VDC 200mA	
"ON" Resistance		16Ω max. (Leak current 1μA min. at "OFF")		
Ambient Temperature		-10 to +50°C		
Insulation Resistance		Greater than 10MΩ at 500V DC across power terminals bundled and GND terminal	Greater than 10MΩ at 500V DC across power terminals bundled and uncharged metallic parts	
Test Voltage		1500V AC for one minute across power terminals bundled and GND terminal	1000V AC for one minute across power terminals bundled and uncharged metallic parts	
Power Consumption		16VA max.	None	
Weight		0.4 kilogram, approx.	0.2 kilogram, approx.	
Enclosure		Molded synthetic resin frame + aluminum housing		
Finish		Munsell N1.5 or equiv.		

- ➡ **NOTES:** 1. As for replacement dedicated batteries, contact the nearest OVAL sales office in your area.
 2. In Model EL0123 applications where input signal is a voltage pulse (requiring a power supply to the pulse generator), or open collector pulse (requiring a power supply to the pulse generator) and a current pulse, an additional power supply to the pulse generator is needed.

12. PRODUCT CODE EXPLANATION

12.1 Model EL0122



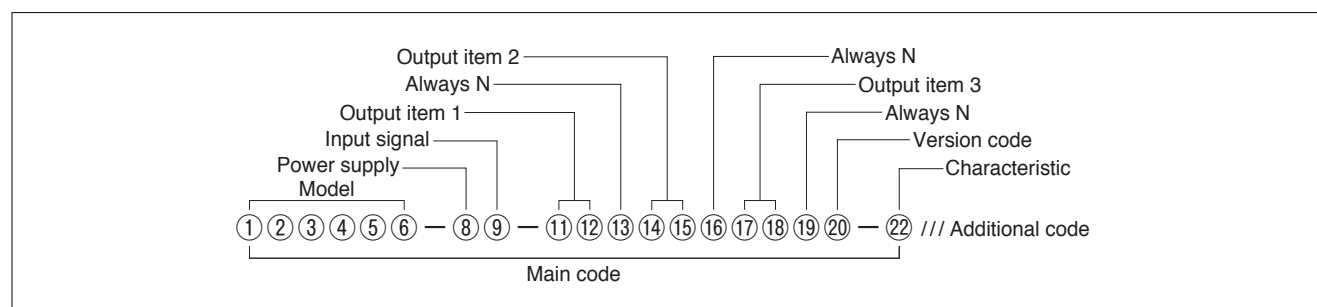
●Main code

①	②	③	④	⑤	⑥	Model
E	L	0	1	2	2	Totalizer/External power type
⑦	—					
⑧	Power supply					
J	85 to 264ACV					
T	85 to 264ACV w/Battery for LCD when power off					
⑨	Input signal					
B	Voltage pulse 12VDC 2 wires/3 wires					
C	Current pulse 12VDC (PG30S)					
D	Current pulse 24VDC (4/20mA)					
G	Open collector pulse 12VDC 2 wires/3 wires					
K	Contact pulse 12VDC 2 wires/3 wires					
Z	Special					
⑩	—					
⑪	⑫	Output item 1				
Pulse output						
B	1	Pulse width 1ms				
B	5	Pulse width 50ms				
B	9	Pulse width other than above				
S	Y	Input synchronous output				
Z	Z	Special				
⑬	Always N					
N	Always N					
⑭	⑮	Output item 2				
Pulse output						
N	N	Non				
A	L	Alarm output (upper or lower alarm). Chose one when alarm output is chosen.				
⑯	Always N					
N	Always N					
⑰	⑱	Output item 3				
Analog output						
N	N	Non				
A	2	1 to 5V				
A	5	4 to 20mA				
A	7	4 to 20mA+1 to 5V				
Z	Z	Other than above				
⑲	Always N					
N	Always N					
⑳	Version code					
A	Version A					
㉑	—					
㉒	Characteristic					
0	Standard					
Z	Special					

●Additional code

Special test			
A	1	0	Taxed custody transfer
A	3	0	Taxed alcohol
A	5	0	Specific measuring instruments
Document			
D	S	J	DWG and specifications for approval (Japanese)
D	S	E	DWG and specifications for approval (English)
D	R	0	Re-submission of DWG and specifications
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
Witnessed by customer			
V	1	0	Required

12.2 Model EL0123



● Main code

①	②	③	④	⑤	⑥	Model
E	L	0	1	2	3	Totalizer/battery drive
⑦	—					
⑧	Power supply					
V	Battery drive					
⑨	Input signal					
B	Voltage pulses					
C	Current pulse 12VDC (PG30S)					
D	Current pulse 24VDC (4/20mA)					
G	Open collector pulse					
K	Contact pulse					
Z	Special					
⑩	—					
⑪	⑫	Output item 1				
Pulse output						
B	1	Pulse width 1ms				
B	5	Pulse width 50ms				
B	9	Pulse width other than above				
S	Y	Input synchronous output				
Z	Z	Special				
⑬	Always N					
N	Always N					
⑭	⑮	Output item 2				
Pulse output						
N	N	Non				
⑯	Always N					
N	Always N					
⑰	⑱	Output item 3				
Analog output						
N	N	Non				
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	DWG and specifications for approval (Japanese)
D	S	E	DWG and specifications for approval (English)
D	R	0	Re-submission of DWG and specifications
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

13. FORMER PRODUCT CODE EXPLANATION

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.

13.1 Model EL0122

Item	Code						Supplementary Code						DESCRIPTION	
	①	②	③	④	⑤	⑥	—	⑦	⑧	⑨	⑩	⑪		⑫
Model	E	L	0	1	2	2								Totalizing Counter
Power Source								7						85 to 264VAC 50/60Hz
Input Signal								2						2-wire or 12VDC 3-wire contact-closure pulse (PG20 equivalent)
								3						2-wire or 12VDC 3-wire voltage pulse (PG30, NPG60A (F) equivalent)
								4						24VDC 2-wire current pulse 4/20mA (PA14, 15, 25, NPG60A(E) equivalent)
								5						12VDC 2-wire current pulse (PG30S equivalent)
								6						2-wire or 12VDC 3-wire open collector pulse (Flowpet-EG, 3-wire NPG60A (E3) equivalent)
								9						Other than above
Output Signal (open collector)								2						Pulse width: approx. 1 ms (standard)
								5						Pulse width: approx. 50 ms
								6						Pulse width: approx. 100 ms
								7						Pulse width: approx. 250 ms
								9						Pulse width: Other than above (2 to 999ms)
Additional Functon 1								0						None
								1						Analog output (4 to 20mA DC and 1 to 5V DC), and High/Low alarm output
Additional Functon 2								0						None (standard)
								1						Provided with a battery to light the LCD when power is off.
Painting												1		Always "1" Munsell N1.5 or equiv.

13.2 Model EL0123

Item	Code							Supplementary Code						DESCRIPTION
	①	②	③	④	⑤	⑥	—	⑦	⑧	⑨	⑩	⑪	⑫	
Model	E	L	0	1	2	3								Battery powered total counter
							0							Always "0" (lithium battery built-in)
Input Signal								2						Contact-closure pulse (PG20)
								3						Voltage pulse (PG30)
								4						24V DC 2-wire system, current pulse 4 to 20mA [PA14,15,25, (N) PG60A (E)]
								5						12V DC 2-wire system, current pulse (PG30S)
								6						Open collector pulse (Flowpet-EG)
								9						Other than above
Output Signal (open collector pulse)								2					Pulse width: approx. 1 ms (standard)	
								5					Pulse width: approx. 50 ms	
								6					Pulse width: approx. 100 ms	
								7					Pulse width: approx. 250 ms	
								9					Pulse width: Other than above (2 to 999ms)	
Additional Feature								0	0				Always "00"	
Painting												1	Always "1" Munsell N1.5 or equiv.	

⇒ NOTES: If voltage pulse (requiring pulse generator power supply) or current pulse is used for input signal, a separate power supply is necessary for the pulse generator.

All specifications are subject to change without notice for improvement.

2022.04 Revised △
E-122-9-E (1)



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