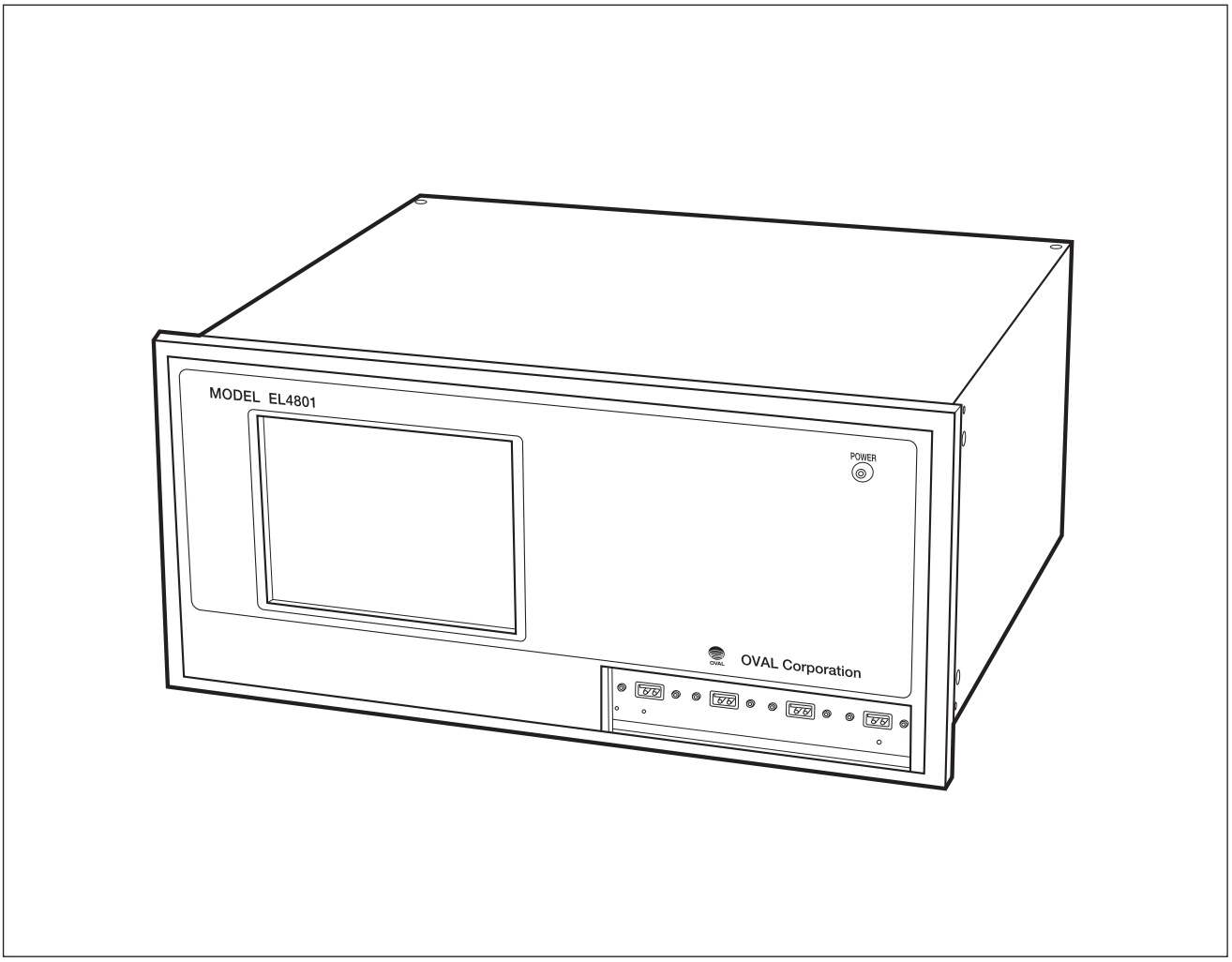
OVAL INSTRUCTIONS

Ins. No. E-889-8-E

Calorie Computer

MODEL：EL4801



Thank you very much for your purchase of the CALORIE COMPUTER.
This product was manufactured and shipped under our company's strict quality control.
This document describes necessary precautions for operating this product correctly. Please read this document thoroughly before using the product. Please keep this document in an easily accessible place.

CONTENTS

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. PRECAUTIONS FOR HANDLING

Every OVAL product goes through strict inspection at our factory before shipment. Please check the exterior of the device to make sure that there are no damages during delivery.
This section describes necessary precautions for handling this device, therefore please read this section carefully before placing this device in your operation.
If used in an inappropriate manner, protected performance of the device may be lost.
For inquires, please contact your sales representative.

➡ NOTE: On-site calibration will be required.

1.1 Precautions for Transporting

(1) To prevent damage due to accidents during transportation, transport this device to the installation location using the original packaging as long as it allows.
(2) Do not apply strong shock to the device while transporting.

1.2 Precautions for Storage

Storing this device for a long period before installation can result in unexpected and undesirable conditions. When long term storage is anticipated, take the following precautions.

(1) Store this product in the original packaging as long as it allows.
(2) Select a place of storage that satisfies the following conditions:
- Free from rain and water
- Free from vibration or shock
- At normal room temperature and humidity (approximately 25℃ , 65%)

1.3 Installation

1.3.1 Installation Location

Select an installation location where
(1) Mechanical vibration, shock or corrosive gases least exist.
(2) Temperature at stable room temperature.

➡ NOTE: Although the manufacturer guarantees stated performance at ambient temperatures of 0 to +50℃ , it is recommended that the instrument be placed in service at room temperature.

(3) Allow a proper slack to the wiring harness and provide a sufficient working space behind the instrument to facilitate maintenance and servicing.

1.3.2 Installation

(1) This instrument is of panel mount type.
(2) Although the manufacturer guarantees installation inclined to a maximum of ± 10 deg. from the horizontal or vertical, recommended physical orientation is either horizontal or vertical.

2. GENERAL

The EL4801 calorie computer is a digital instrument designed with the latest electronic technology to fulfill the demand for faster calorimetry. The EL4801 calculates the calorific value of natural gas or city gas using the sonic velocity measured by an ultrasonic flowmeter. This instrument is also capable of simultaneous flow rate calculation by the flow velocity measured with the ultrasonic flowmeter.
Densitometers are commonly used for calorimetry of city gas and natural gas that does not include inert gas by using the correlation between molecular weight (density) of the gas and calorific value. This calorie computer, however, calculates calorific value by utilizing the correlation between molecular weight and sonic velocity as well as the correlation between process temperature/pressure and calorific value as computational logic.
This calorie computer was co-developed with Osaka Gas Co., Ltd.
➡NOTE: This computer is a dedicated computer for the ultrasonic flowmeter of OVAL product.

2.1 Device Connections

This instrument loads sound speed values and flow rate values from the ultrasonic flowmeter via RS485 communication, loads temperature and pressure values from the analog input of 1 to 5V/4 to 20mA, calculates the calorie, displays calculated results such as the flow rate, and performs analog output of 1 to 5V/4 to 20mA.

● Input Signals
Temperature input (analog 1 to 5V/4 to 20mA)
Pressure input (analog 1 to 5V/4 to 20mA)
Sound speed value, flow speed value (RS485 communication)

● Output Signals
Calorie output (analog 1 to 5V/4 to 20mA)
Flowrate output (analog 1 to 5V/4 to 20mA)
Temperature output (analog 1 to 5V/4 to 20mA)
Pressure output (analog 1 to 5V/4 to 20mA)
Specific gravity output (analog 1 to 5V/4 to 20mA)

2.2 Component Names

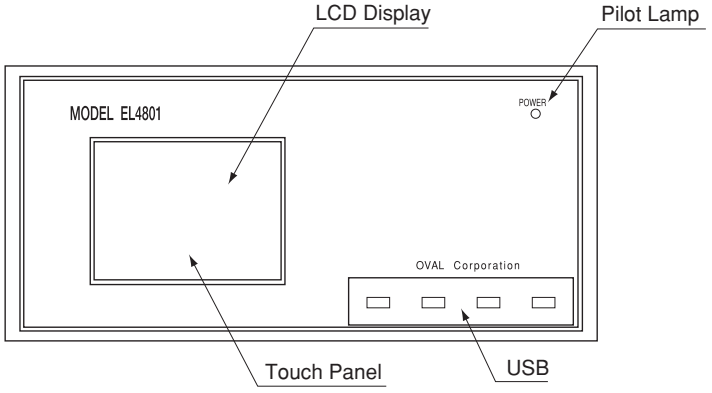


Fig. 2.2.1 Component Names (Front)

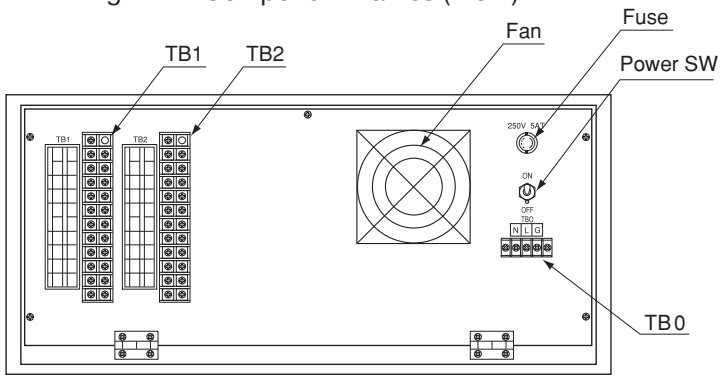


Fig. 2.2.2 Component Names (Rear)

➡ NOTE：Exchange of fuse
The fuse must be EWM 250V 5A PBF (FUJI TERMINAL INDUSTRY CO., LTD.).
Turn a fuseholder (Fuse) in the Fig.2.2.2 and replace a fuse and put it back.

3. EXTERNAL DIMENSIONS

Unit in mm

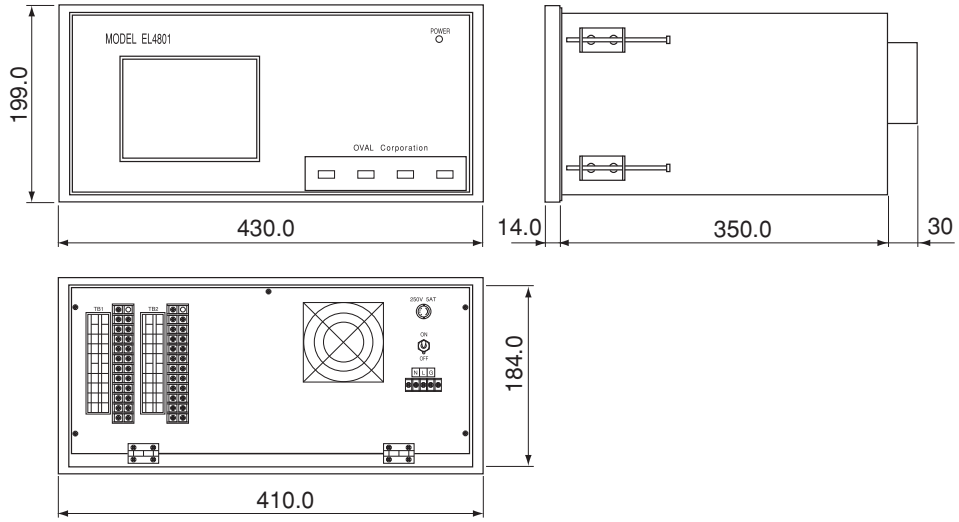


Fig. 3.1 External Dimension Diagram

4. PANEL-CUT DIMENSIONS

Unit in mm

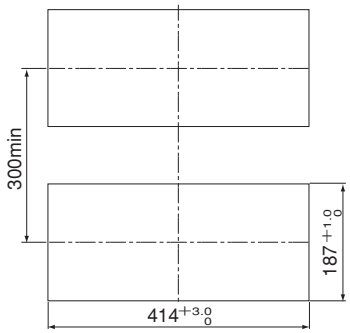


Fig. 4.1 Panel-Cut Dimension Diagram

5. WIRING

5.1 Wiring Procedure

(1) Conduit work is recommended for wiring.

➡ NOTE: In the case of conduit work, feed the power cable and other signal cables through different conduits. Failure to do so may cause conductance failure.

(2) Keep wiring away from other wiring/circuit for strong electricity, so that it will not be affected by possible conductance failure.

(3) Securely terminate wiring using terminal lugs. Connecting terminals are provided on the rear side of this device.

➡ NOTE: If precision resistance is outfitted on this device, do not remove it since this is necessary condition for delivering optimal performance.

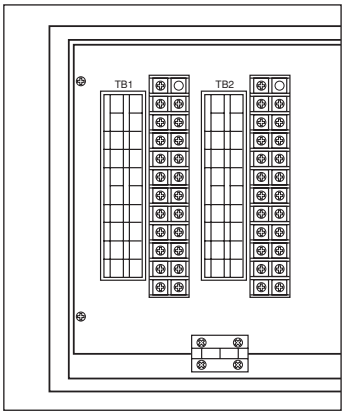


Fig. 5.1.1 Input/Output Terminals

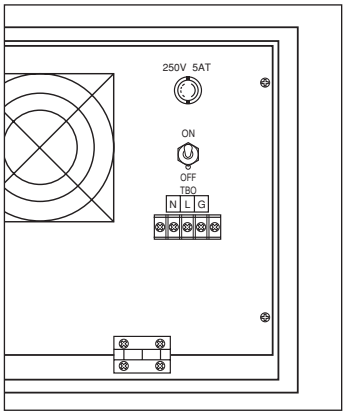


Fig. 5.1.2 Power Terminals

● Wiring Specification

Item	Description
Power supply cable	General instrumentation cable with max. 1.5mm^2 (Terminal type: round terminal M3 screw)
Analog/alarm output	General instrumentation cable with max. 1.5mm^2 (Terminal type: round terminal M4 screw)
Communication cable (RS485)	Shielded twisted pair cable (Terminal type: round terminal M4 screw)

➡ NOTE: Power of this device passed IEC instantaneous power failure test. However, problems may be caused when momentary voltage drop exceeds IEC standards. If instantaneous power failure is a concern, please reserve backup unit.

5.2 Connecting Method

TB1					
No.	Label		No.	Label	
1	+	Temperature	11	+	Analog output 1
2	–	input V/I	12	–	
3	+	Pressure	13		
4	–	input V/I	14		
5	No	Error	15	+	Analog output 2
6	polarity	(a contact point)	16	–	
7	No	Error	17		
8	polarity	(b contact point	18		
9			19		
10			20		

TB2					
No.	Label		No.	Label	
1	+	Analog	11	+	Communication
2	–	output 3	12	–	RS485
3			13		
4			14		
5	+	Analog	15		
6	–	output 4	16		
7			17		
8			18		
9			19		
10			20		

TB0		
No.	Label	
1	N	Power
2	L	
3	G	Ground

※ For the assignment of analog output 1 to 4, select up to four out of temperature, pressure, calorie, flow rate, and specific gravity.

6. SOFTWARE

The calorie computer runs on Windows Embedded Standard 2009.
Errors due to OS are not covered by the warranty.

7. SCREEN CONFIGURATION

7.1 RUN Mode Display Screen

The following items are displayed in RUN mode.

1. Temperature (℃ , etc.)
2. Pressure (MPa[abs], etc.)
3. Sound speed (m/s, etc.)
4. Calorie (MJ/Nm^3, etc.)
5. Flowrate (Nm^3/h, etc.)
6. Specific gravity
7. Error display
8. Communication status (communicating)
9. Data logging status

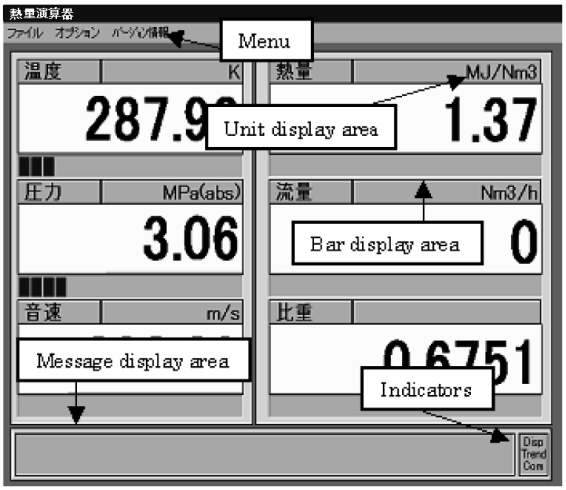


Fig. 7.1.1 RUN Mode Display

⚠ **CAUTION: The above items are displayed on full screen (resolution: 640 x 480) instead of in a window. Displayed units can be changed in Settings.**

7.1.1 Indicators

In the lower right corner of the screen, three statuses: Disp (Refresh), Trend (Record Trend) and Com (Record Communication), are displayed.

① Disp

It flashes every 1 second. Calculation and analog I/O are updated at this timing. (If communication has not been updated, only temperature and pressure will be updated.)

② Trend

This flashes at the specified frequency when Trend is checked (ON) under Options in Menu. Set the frequency (minimum 1 second) in Parameter Setting items on the Parameter Setting Screen.

③ Com

This flashes when messages are normally received during communication. It does not flash if sent messages could not be received normally. (If messages are not received, data other than temperature and pressure will not be updated.)

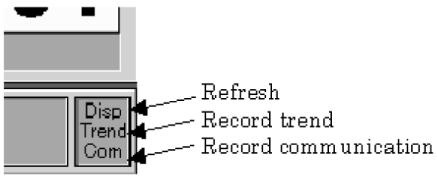


Fig. 7.1.2 Indicators

7.1.2 Progress Bar Display

The ratio of the currently displayed value to the designated range is displayed under each display item.

⚠ **CAUTION: Progress bar is not displayed if analog output is not selected.**

Fig. 7.1.3 Progress Bar

7.1.3 Error Display

The currently occurring error is displayed in the bottom of the screen. The error messages that may be displayed are listed in Table 7.1 together with their meanings.
If more than one error has occurred, error messages are displayed in the order of error numbers at every 0.5 seconds.

Fig. 7.1.4 Error Message Display 1

Table 7.1 Error Display List

Error message	Error message
温度入力が異常です。	When the temperature input is 1V (4mA) or less
温度入力が上限を超えています。	When the temperature input is 5V (20mA) or more
圧力入力が異常です。	When the pressure input is 1V (4mA) or less
圧力入力が上限を超えています。	When the pressure input is 5V (20mA) or more
温度値が出力の上限を超えています。	When the temperature value exceeds the output 5V (20mA)
温度値が出力の下限を超えています。	When the temperature value less than the output 1V (4mA) or less
圧力値が出力の上限を超えています。	When the pressure value exceeds the output 5V (20mA)
圧力値が出力の下限を超えています。	When the pressure value less than the output 1V (4mA) or less
流量値が出力の上限を超えています。	When the flow rate value exceeds the output 5V (20mA)(※)
流量値が出力の下限を超えています。	When the flow rate value less than the output 1V (4mA) or less(※)
熱量値が出力の上限を超えています。	When the heat quantity value exceeds the output 5V (20mA)
熱量値が出力の下限を超えています。	When the heat quantity value less than the output 1V (4mA) or less
比重値が出力の上限を超えています。	When the specific gravity value exceeds the output 5V (20mA)
比重値が出力の下限を超えています。	When the specific gravity value less than the output 1V (4mA) or less
超音波流量計との通信が異常です。	When the data in incorrect format is received at the communication with ultrasonic flowmeter
通信タイムアウト	When there is no response for five seconds at the communication with ultrasonic flowmeter
A/D変換異常(CH1)	In case of failure of A/D board or contact failure of A/D board
A/D変換異常(CH2)	
A/Dボード異常	
D/A変換異常	In case of failure of D/A board or contact failure of D/A board
DAボード異常	

➡ NOTE: ※ At the "measurement of forward / backward flow rate", the message "The flow rate value exceeds the output range" is displayed.

The error messages for the operating system are in accordance with the operating system. Figure 7.1.5 below shows an example of error message display.

Fig. 7.1.5 Error Message Display 2

8. PARAMETER SETTINGS

8.1 Configuration of Parameter Settings

The configuration of parameter settings for this computer is as shown below.

Table 8.1.1

Item		Description
[Tab1] Analog input-output/Unit settings		
Analog input unit	Temperature input unit	Determine the unit of analog input.
	Pressure input unit	
Analog input	Temperature input range	Determine the range of analog input.
	Pressure input range	
Display & Analog output	Temperature display unit	Determine the unit displayed in RUN mode and analog output.
	Pressure display unit	
	Calorie display unit	
	Flow rate display unit	
	Sound speed display unit	
Analog output	Temperature output range	Determine the range of analog output. Select and determine the analog output and output number.
	Pressure output range	
	Calorie output range	
	Flow rate output range (※1)	
	Specific gravity output range	
Display option		Unused
Watchdog timer		Unused
Communication port		Determine the communication port to be connected. Standard: COM4
Meter selection		Determine the meter to be connected.
Approximate calculation		Determine the method for approximate calculation of calorie and specific gravity.
Analog output		Determine the state of analog output during parameter setting. Standard: maintain
Status output		Unused
[Tab2] Flowmeter setting & Smoothing		
Meter diameter		Determine the meter diameter for instantaneous flow rate calculation.
Flow rate correction (a)		Determine the correction coefficient for instantaneous flow rate calculation. Standard: (a)-1, (b)-0. (a) is used for compression correction of fixed value. (before ver. 4.0.7)
Flow rate correction (b)		
Reference temperature		Reference temperature and pressure for calculation. (to be adjusted on-site)
Reference pressure		
Deviation correction		
Sound speed coefficient correction (pressure)		Parameters for calorie calculation (fixed value)
Sound speed coefficient correction (temperature)		
Sampling frequency		Determine the frequency for trend (data saving) operation. Min. 1 second.
Smoothing (input)		Determine the format of smoothing, number and time of calculation for each output.
Smoothing (calorie)		
Smoothing (flow rate)		
Smoothing (specific gravity)		
Bi-directional flow measurement		Enable/disable bi-directional flow measurement.
Low-cut function		Check if the low-cut function of flow rate display is enabled or disabled.
Temperature correction coefficient Ac to Bd		Unused
Sound speed correction setting		
[Tab3] Compression coefficient correction <flow rate>		
Compression coefficient correction <flow rate>		Enable/disable real-time compression coefficient correction.
Correction coefficient Pa to Pc, Ta to Tc, B, C, Z		Used to calculate the compression coefficient.
[Tab4] Other		
Compression coefficient calculation correction <calorie>		Unused
Communication warning OFF		Function to display and output communication errors. Standard: unchecked
Calorie calculation parameter		Switch parameters according to specified pressure.

※1: The lower limit that can be set for the flowrate output range is “0” or higher.

8.2 Transition from RUN Mode Display Screen to Parameter Settings Screen

Transition from the RUN Mode Display screen to the Parameter Settings screen is performed according to the following procedure.

1. Click [ファイル] [File].
2. When the screen as shown in Fig. 8.2.1 appears, click [パラメータ設定 Ctrl+P] [Parameter Settings Ctrl+P].
3. The message box as shown in Fig. 8.2.2 appears.
4. Here, click [はい(Y)] [Yes] to transit to the Parameter Settings screen. When not transiting, click [いいえ (N)] [No].
5. When [はい(Y)] [Yes] is clicked, the screen transits to the Parameter Settings screen.

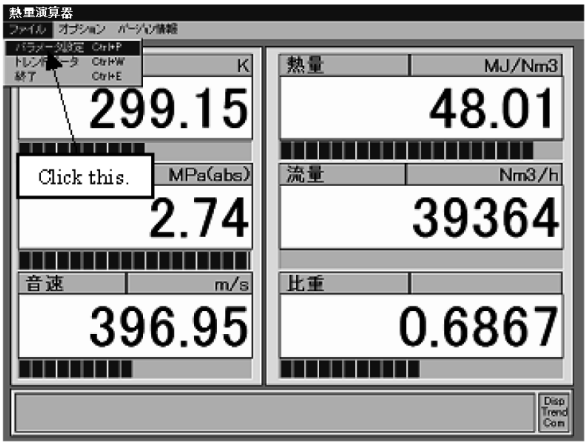


Fig. 8.2.1 Transiting to the Parameter Settings Screen

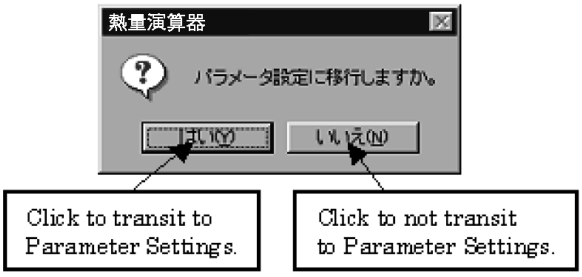


Fig. 8.2.2 Message Box

8.3 Transition from Parameter Settings Screen to RUN Mode Display Screen

Transition from the Parameter Settings screen to the RUN Mode Display screen is performed according to the following procedure.

1. Click [ファイル] [File].
2. When the screen as shown in Fig. 8.3.1 appears, click [終了Ctrl+E] [Exit Ctrl+E] in File or [終了] [Exit] in the lower right of the screen.
3. The message box as shown in Fig. 8.3.2 appears.
4. Here, click [はい (Y)] [Yes] to transit to the RUN Mode Display screen. To cancel transition, click [いいえ(N)] [No].
5. When [はい(Y)] [Yes] is clicked, the screen transits to the RUN Mode Display screen.

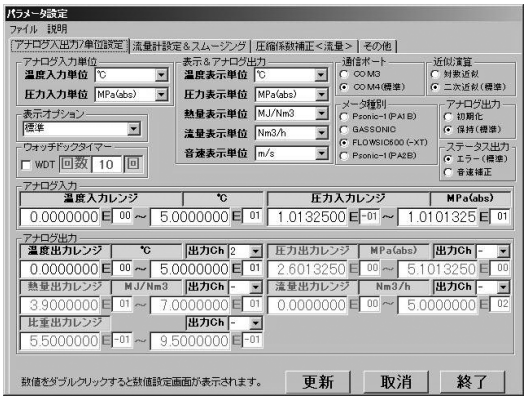


Fig. 8.3.1 Transiting to the RUN Mode Display Screen

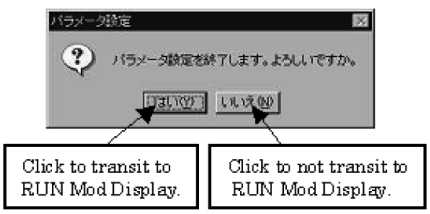


Fig. 8.3.2 Message Box

8.4 Transitions to the Parameter Settings Screens

The method for transiting to the various parameter setting screens is described here.

1. Open the Parameter Settings screen by performing the operation in Section 8.2.
2. When the screen as shown in Fig. 8.4.1 appears, click the item (tab) you want to transit to.

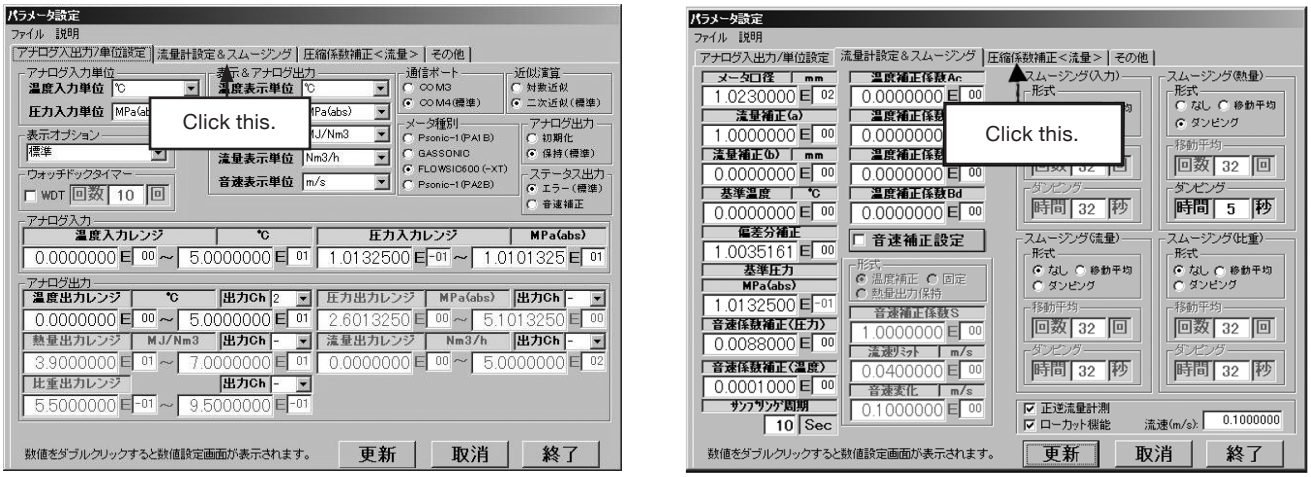


Fig. 8.4.1 Transiting to the Parameter Setting Screens

8.5 Unit Settings

On this screen, set the units for input signals and the display units for the computer.

- Analog input:
  Enter the units for the thermometer or pressure gauge to be used.
- Display & analog output:
  Enter the units to be displayed on the computer and the units for analog output.

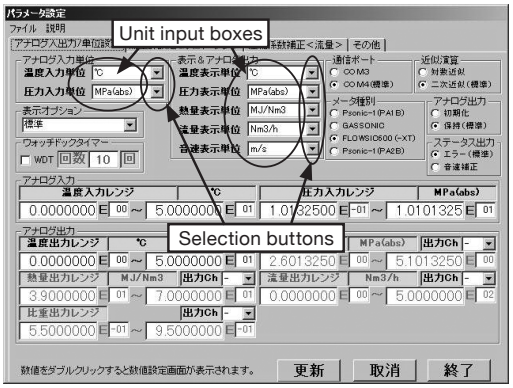


Fig. 8.5.1 Unit Settings

8.5.1 Input Procedure

1. Transit to [パラメータ設定] [Parameter Settings] by performing the operation in Section 8.2.
2. The screen as shown in Fig. 8.5.1 Unit Settings, appears.
3. When the button at the right of each item is clicked, a selection list appears. Select the unit you want to set, and click it.
4. After all values are entered, click [更新] [Update] button.
5. When the message box as shown in Fig. 8.5.2 appears, click [はい (Y)] [Yes] to confirm the changes you made. Click [いいえ (N)] [No] if you are not confirming.
6. When [取消] [Cancel] button is clicked before confirming the changes, the status reverts to the status before change.
7. To exit parameter settings, click [終了] [Exit] button. Screen display returns to the RUN Mode Display screen.

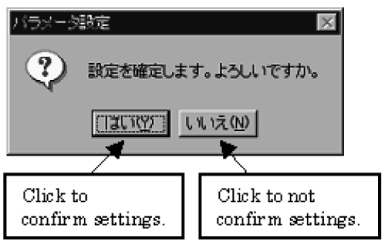


Fig. 8.5.2 Message Box

8.6 Analog Input/Output Settings

Here, set analog input and analog output.

● Input:

Enter values for analog input (4 to 20mA/1 to 5V).

Enter a value for 4mA (1V) in the lower limit value input box, and a value for 20mA (5V) in the upper limit input box.

● Output:

Enter values for analog output (4 to 20mA/1 to 5V).

Enter a value for 4mA (1V) in the lower limit value input box, and a value for 20mA (5V) in the upper limit input box.

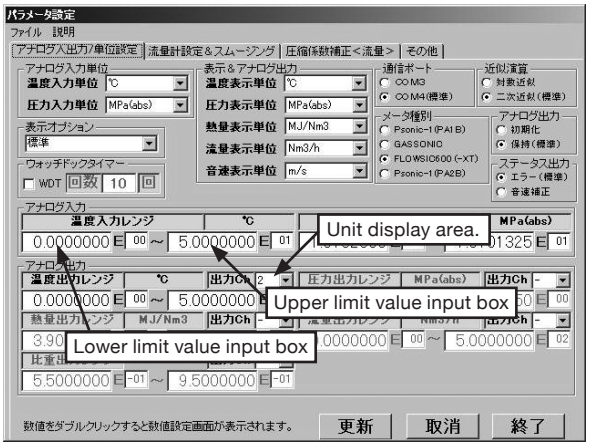


Fig. 8.6.1 Analog Input/Output

8.6.1 Input Procedure

1. Transit to [パラメータ設定] [Parameter Settings] by performing the operation in Section 8.2.
2. Click [アナログ入出力設定] [Analog Input/Output Settings]. The screen as shown in Fig. 8.6.2 appears.
3. Enter an appropriate value in each input box. ※1 (Related to section 8.10.) The left side of the screen shows the lower limit values (values for 4mA or 1V), and the right side shows the upper limit values (values for 20mA or 5V).
   Click each item with the mouse button, and enter a numeric value. Note that the index method is used for input.
4. After all values are entered, click [更新] [Update] button.
5. When the message box as shown in Fig. 8.6.3 appears, click [はい (Y)] [Yes] to confirm the changes you made. Click [いいえ(N)] [No] if you are not confirming.
6. When [取消] [Cancel] button is clicked before confirming the changes, the status reverts to the status before change.
7. To exit parameter settings, click [終了] [Exit] button. Screen display returns to the RUN Mode Display screen.

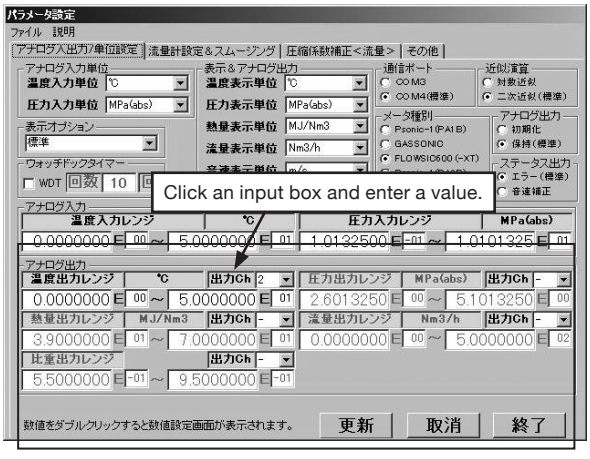


Fig. 8.6.2 Input Procedure for Analog Input/Output Settings

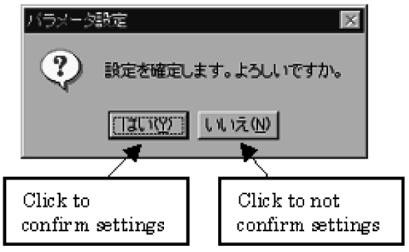


Fig. 8.6.3 Message Box

8.7 Other Parameter Settings

The parameter settings shown in Fig. 8.7.1 are as shown below.

- Meter selection: Select the type of the ultrasonic flowmeter to be used.
- Approximate equation selection: Select the approximate equation to be used.
- Communication port selection: Select the communication port to be used.
- Analog output settings: Select the status of analog output on the Parameter Settings screen.

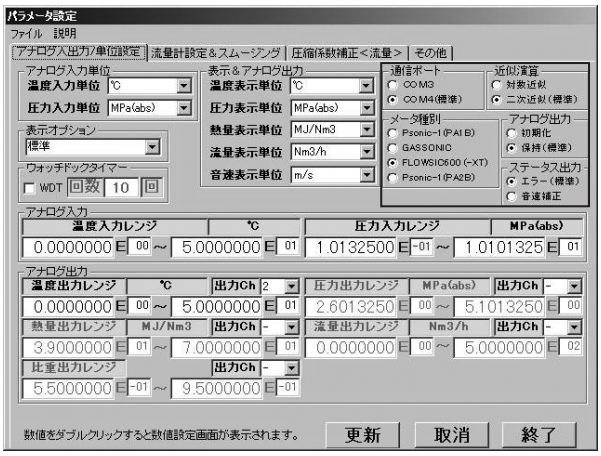


Fig. 8.7.1 Other Parameters

8.8 Parameter Settings

On this screen, set parameters related to the flowmeter, the parameters related to correction and the parameters related to trend data collection.

- Meter diameter: Enter the diameter of the ultrasonic flowmeter to be connected.
- Flowrate corrections a, b: Enter coefficients a and b for correcting the instantaneous flowrate.
- Sound speed coefficient correction (pressure): Enter the coefficient for correcting the pressure of the sound speed transmitted from the ultrasonic flowmeter. (Fixed value)
- Sound speed coefficient correction (temperature): Enter the coefficient for correcting the temperature of the sound speed transmitted from the ultrasonic flowmeter. (Fixed value)
- Deviation correction: Enter the coefficient for correcting the deviation. (adjusted on-site)
- Reference temperature: Enter the reference temperature value for correcting the flow rate.
- Reference pressure: Enter the reference pressure value for correcting the flow rate.
- Sampling frequency: Set the sampling time for collecting trend data. The minimum value that can be entered is 1 second.
- Bi-directional flow rate measurement: By checking the checkbox, settings of bi-directional flow measurement and low-cut range become available.
- Low-cut function: Enter a value for low-cut flow velocity (m/s) after clicking the input box. (max. 9.9m/s)

(Do not change the unused parameters such as temperature correction coefficient Ac to Bd, and sound speed correction settings.)

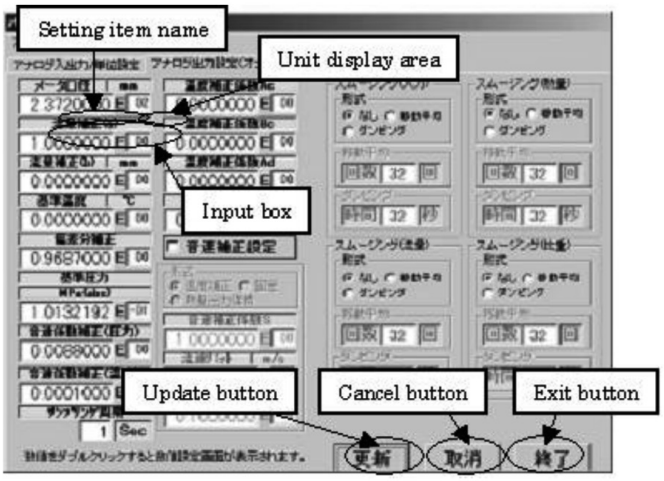


Fig. 8.8.1 Parameter Settings

8.8.1 Input Procedure

1. Transit to [パラメータ設定] [Parameter Settings] by performing the operation in Section 8.2.
2. Click [パラメータ設定] [Parameter Settings]. The screen as shown in Fig. 8.8.2 appears.
3. Enter an appropriate value in each input box. ※1 (Related to section 8.10.) Click each item with the mouse button, and enter a numeric value. Note that the index method is used for input, except for the sampling frequency.
4. After all values are entered, click [更新] [Update] button.
5. When the message box as shown in Fig. 8.8.3 appears, click [はい(Y)] [Yes] to confirm the changes you made. Click [いいえ(N)] [No] if you are not confirming the changes.
6. When [取消] [Cancel] button is clicked before confirming the changes, the status reverts to the status before change.
7. To exit parameter settings, click [終了] [Exit] button. Screen display returns to the RUN Mode Display screen.

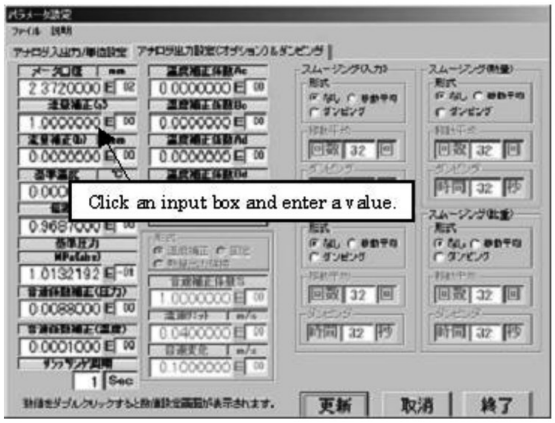


Fig. 8.8.2 Input Procedure for Parameter Settings

Fig. 8.8.3 Message Box

8.9 Smoothing

Here, enter the smoothing settings for data collection, the type of the flowmeter to be used, communication port setting and the approximation calculation method.

● Smoothing

None: Smoothing is not performed.

Moving average: Data is averaged from the newest measurement data to the data immediately before the designated time constant (count).

If the number of data is less than the time constant (count), the data is averaged by the number of measured data. The maximum is 60 seconds.

Damping: The new calculated value is obtained by adding the value, which is obtained by multiplying the difference between the newest measured value and the immediately previous calculated value by the smoothing coefficient, to the immediately previous calculated value.

$Gn = Gn\text{-}1 + (G - Gn\text{-}1) \times R$

Gn: New calculated value

Gn-1: Immediately previous calculated value

G: Current calculated value

R: Smoothing coefficient; R = Cycle/time constant

Note that the value set for damping time is used as time constant.
(Update cycle of calculation is 1 second.)

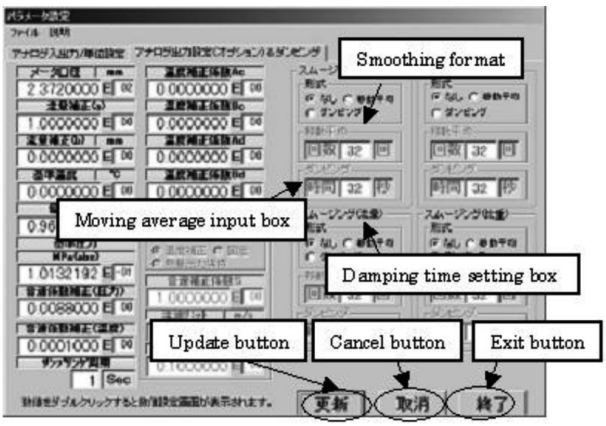


Fig. 8.9.1 Parameter Settings

8.9.1 Input Procedure

1. Transit to [パラメータ設定] [Parameter Settings] by performing the operation in Section 8.2.
2. Click [ダンピング] [Damping].
3. Enter an appropriate value in each input box. ※1 (Related to section 8.10.) Click each item with the mouse button, and enter a numeric value. For items not requiring to enter a numeric value, select an appropriate value and then click.
4. After all values are entered, click [更新] [Update] button.
5. When the message box as shown in Fig. 8.9.2 appears, click [はい(Y)] [Yes] to confirm the changes you made. Click [いいえ (N)] [No] if you are not confirming the changes.
6. When [取消] [Cancel] button is clicked before confirming the changes, the status reverts to the status before change.
7. To exit parameter settings, click [終了] [Exit] button. Screen display returns to the RUN Mode Display screen.

Fig. 8.9.2 Message Box

8.10 ※1 Other Input Procedure

In addition to directly entering values, the following parameter input procedure is also available.
An example of analog input/output is explained below.

1. On the Analog Input/Output Settings screen, double-click in the numeric input box shown in Fig. 8.10.1.
2. Then, the window as shown in Fig. 8.10.2 appears.
3. On the screen shown in Fig. 8.10.2, align the cursor (highlight) on the digit you want to change using the mouse or the tab button.
4. Then, change the parameters with the numeric buttons on the screen or by entering a value from the keyboard.
5. The sign switch button switches between [+] and [-] each time the button is clicked.
6. When you finish entering a value, click [確定] [Confirm] button.
7. When the window (Fig.8.10.2) disappears, click [更新] [Update] button.
8. If [取 消] [Cancel] button is clicked before [確定] [Confirm] button is selected, the value will revert to the previous setting.

The procedure is the same for the items in which numeric values are entered in other parameter settings.

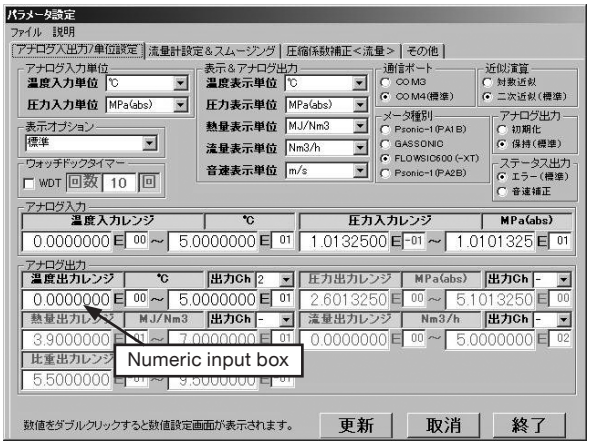


Fig. 8.10.1

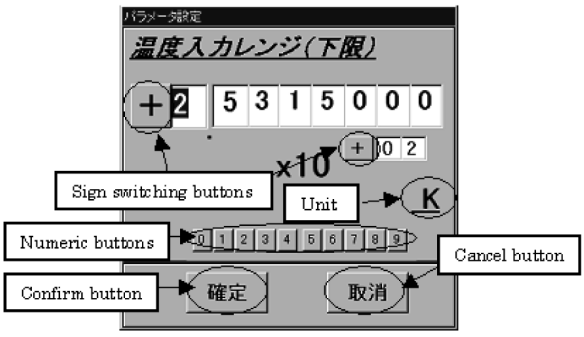


Fig. 8.10.2 Numeric Input

9. OPERATING PROCEDURE

9.1 When Turning Off the Power (Program Exit Procedure)

To turn off the power of the computer, follow the procedure below.

⚠**CAUTION: Even if the power switch is turned off while the computer is in operation, it will not damage the computer, but its data may be damaged.**

9.1.1 Transiting to the RUN Mode Display Screen

The program can only be exited on the RUN Mode Display screen.
If Parameter Settings is being displayed, it is necessary to transit to the RUN Mode Display screen. For more information about how to transit to the RUN Mode Display screen, see Section 8.3.

9.1.2 Exiting the Program

On the RUN Mode Display screen, click [ファイル][File]. The screen as shown in Fig. 9.1.1 appears. Here, click [終了] [Exit].

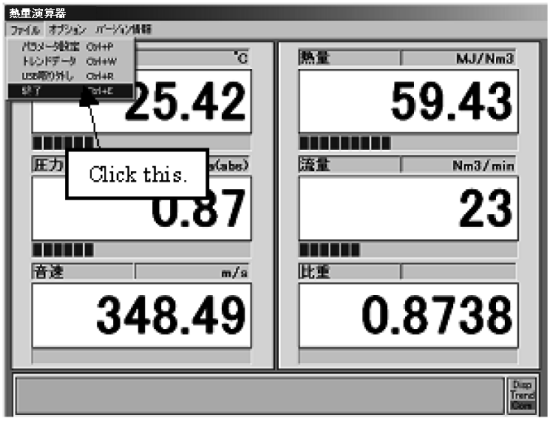


Fig. 9.1.1 Exiting the Program

When the message box as shown in Fig. 9.1.2 appears, click [はい (Y)] [Yes] to exit the program. If you are not exiting the program, click [いいえ (N)] [No].

Fig. 9.1.2 Message Box

9.1.3 Exiting Windows

After exiting the program, exit Windows according to the following procedure.

Click スタート. The menu as shown in Fig. 9.1.3 appears.

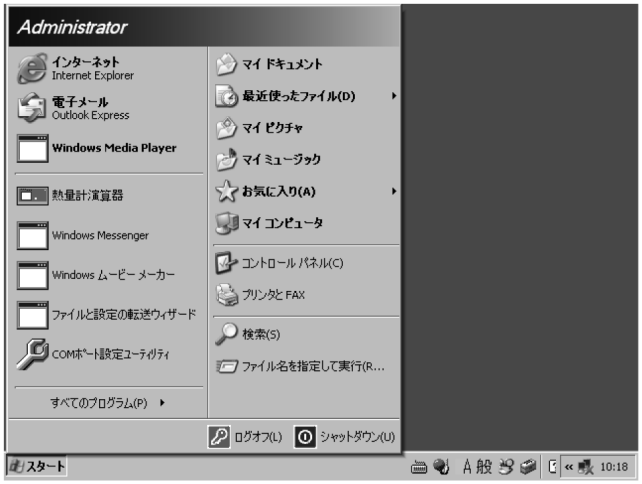


Fig. 9.1.3 Start Menu

Click [シャットダウン][Shutdown]. The message as shown in Fig. 9.1.4 appears.

Select [シャットダウン][Shutdown], and then click [OK].

After a while, Display Screen disappears. Then after a long while, turn off the power.

Fig. 9.1.4 Shutting Down

9.2 Removing USB Devices

To remove USB devices, select [メニュー] [Menu] and then [ファイル] [File]. Then select [USB取り外し] [Remove USB].
The menu screen as shown below appears. For example, in the case of USB memory, select [USB Mass Storage Device] and then click [停止] [Stop].

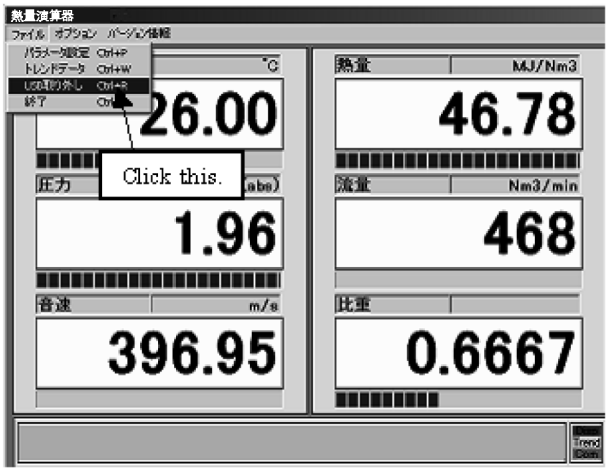


Fig. 9.2.1 Removing USB Devices

Fig. 9.2.2 Removing Hardware Safely

9.3 Turning On the Power

When the computer is powered on, the program is automatically started. Therefore, no special operation is required when turning on the power.
When the program is started, the RUN Mode Display screen appears.

9.4 Parameter File Operation

On this computer, it is possible to save the parameters used for measuring as a file. Also, by loading the file, the saved parameter values can be changed in a batch.

9.4.1 Saving a File

The following is the procedure for saving the specified parameters as a file.

1. Open [パラメータ設定] [Parameter Settings].
   For more information about how to shift from RUN mode display to parameter settings, see Section 8. 2.
2. Click [ファイル] [File]. The screen as shown in Fig. 9.4.1 appears. Then, click [セーブ] [Save].
3. When the window as shown in Fig. 9.4.2 appears, enter the name of the file, and then click [保存 (S)] [Save].
4. When [保存(S)] [Save] is clicked, the message box as shown in Fig. 9.4.3 appears. Here, click [はい (Y)] [Yes]. The contents of the currently set parameters are saved as a file.
5. Note that if a file having the same name exists, the message box as shown in Fig. 9.4.4 appears. If you want to overwrite, click [はい(Y)] [Yes]. If you do not want to overwrite, click [いいえ(N)] [No], and enter a different file name.

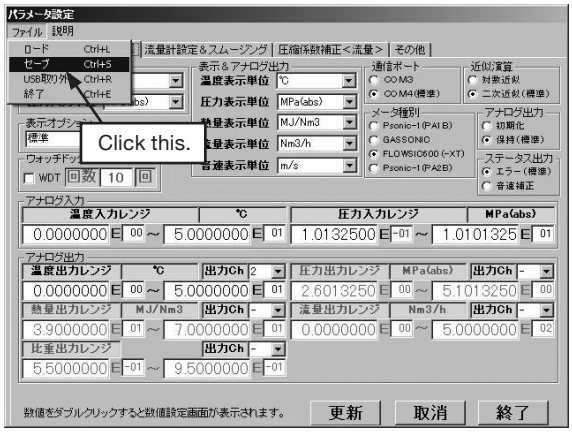


Fig. 9.4.1

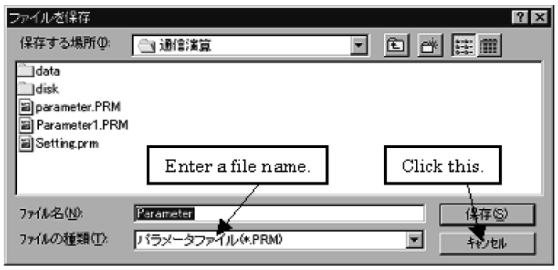


Fig. 9.4.2

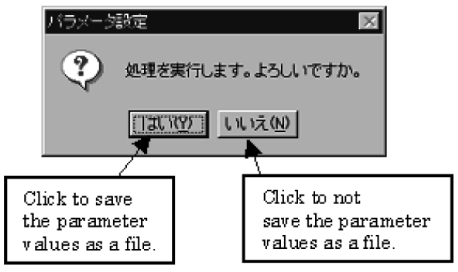


Fig. 9.4.3 Message Box

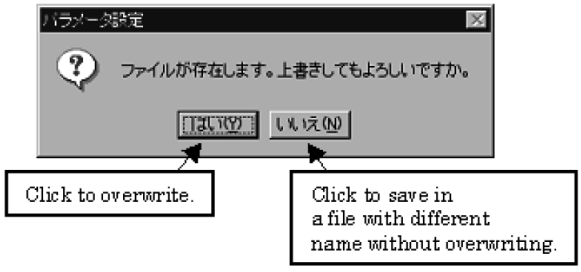


Fig. 9.4.4 Message box

9.4.2 Loading a File

Load a saved parameter file, and change the parameters in a batch.

1. Open [パラメータ設定] [Parameter Settings].
   For more information about how to shift from RUN mode display to parameter settings, see Section 8.2.
2. Click [ファイル] [File]. The screen as shown in Fig. 9.4.5 appears. Then, click [ロード] [Load].

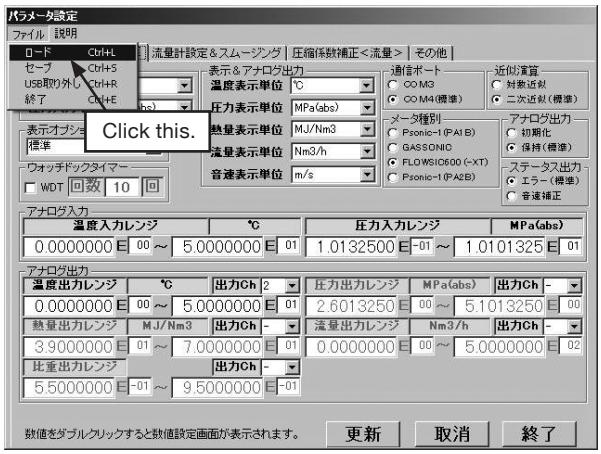


Fig. 9.4.5 Loading a File

3. When the window as shown in Fig. 9.4.6 appears, enter the name of the file you want to load, and then click [開く(O)] [Open].

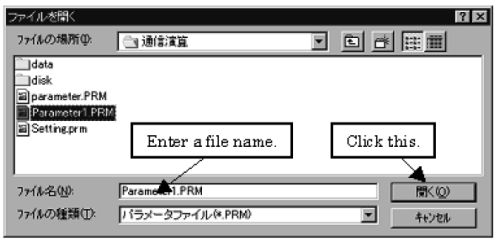


Fig. 9.4.6 Opening a File

4. When [開く(O)] [Open] is clicked, the message box as shown in Fig. 9.4.7 appears. Here, click [はい(Y)] [Yes]. The values of the currently set parameters are changed to the values saved in the file.

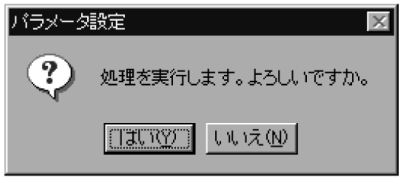


Fig. 9.4.7 Message Box

9.5 Trend Data

On this computer, the data being displayed on the RUN Mode Display screen can be saved as trend data. The data is collected at every "sampling frequency". The amount of data that can be stored depends on the storage size of the external memory (USB memory).

9.5.1 Collecting and Saving Data

⚠CAUTION: Before collecting (saving) the trend data, make sure to isolate this computer from the process line.

1. Set sampling frequency.
   Open [アナログ出力(オプション)&ダンピング][Analog output(Options) & Damping] in Parameter Settings, and enter the sampling time of data. Data is collected at every sampling time entered here as trend data.
2. Transit to the RUN Mode Display screen.
   For more information about how to shift to the RUN Mode Display screen, see Section 8.2.
3. Click [オプション] [Options]. The screen as shown in Fig. 9.5.1 appears. Here, click [トレンド] [Trend].
4. Once the window (Fig. 9.5.2) opens, specify the location to save the data. While collecting data, [トレンド] [Trend] in [メニュー] [Menu] is being checked, and [Trend] in the lower right corner of the screen flashes (Fig. 9.5.3).
5. To exit trend data collection, select [オプション] [Options] menu and then click [トレンド] [Trend] again.
6. The message box as shown in Fig. 9.5.4 appears.
   A file name is automatically generated.

⚠CAUTION: Do not save the data log of trend data to the C drive.

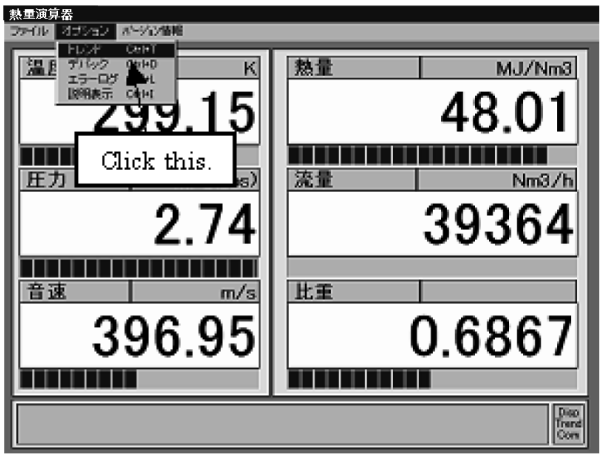


Fig. 9.5.1 Trend

Fig. 9.5.2 Saving by Entering a File Name

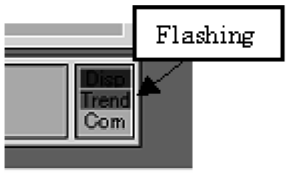


Fig. 9.5.3 Flashing

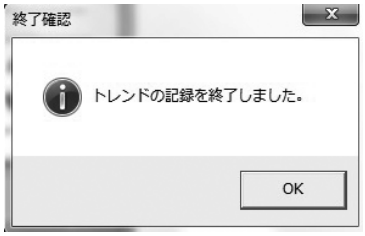


Fig. 9.5.4 Message Box

9.5.2 Data Display

1. Click [ファイル] [File]. The screen as shown in Fig. 9.5.5 appears. Here, click [トレンドデータ] [Trend data].

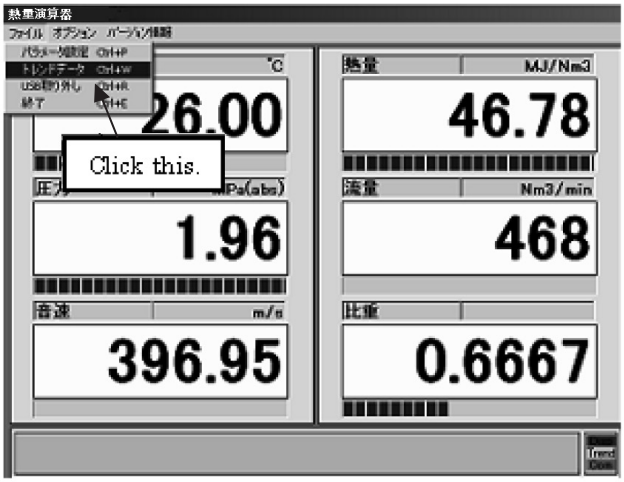


Fig. 9.5.5 Trend data

2. When the window as shown in Fig. 9.5.6 appears, select a file and click [開く(O)] [Open].

Fig. 9.5.6 Opening a File

3. Trend data of selected file as shown in Fig. 9.5.7 appears.
4. To close the Trend data window, click the ☒ button in the upper right corner of the window.

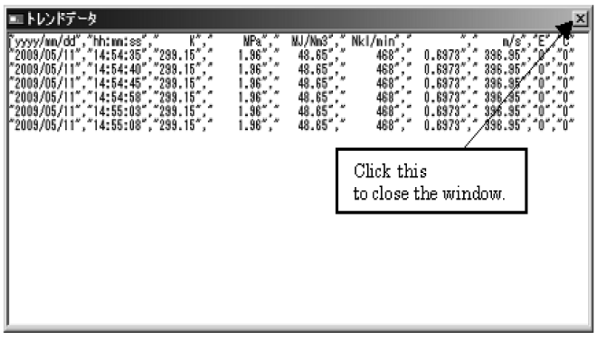


Fig. 9.5.7 Trend data Window

9.6 Event Window

The Event window displays events that occur inside the computer.

1. On the RUN Mode Display screen, click [オプション] [Option]. The menu as shown in Fig. 9.6.1 appears. Here, click [デバック] [Debug].
2. Next, the Event window as shown in Fig. 9.6.2 appears. The time when an event has occurred and its description are displayed.
3. When you click [停止] [Stop] button in the lower left corner of the Event window, event display stops. Note that the button display changes to [更新] [Update] button while event display is being stopped.
4. To restart event display, click [更新] [Update] button.
5. To close the Event window, click the ☒ button in the upper right corner of the window.

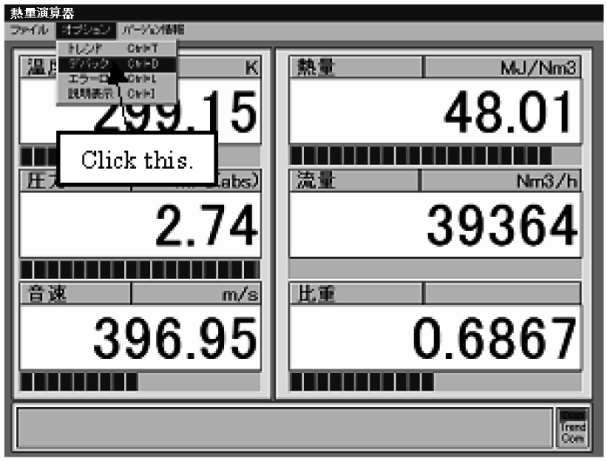
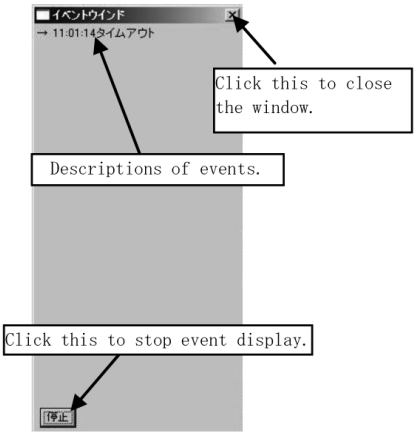


Fig. 9.6.1



Fig, 9.6.2 Event Window

9.7 Error Log

The error log displays a list of errors occurred inside the computer.

1. On the RUN Mode Display screen, click [オプション] [Option]. The menu as shown in Fig. 9.7.1 appears. Here, click [エラーログ] [Error Log].
2. Next, the Event window as shown in Fig. 9.7.2 appears. The time when an error has occurred and its description are displayed.
3. To close the Error window, click the ☒ button in the upper right corner of the window.
4. For more information about the descriptions of events that may occur, see page p.9.

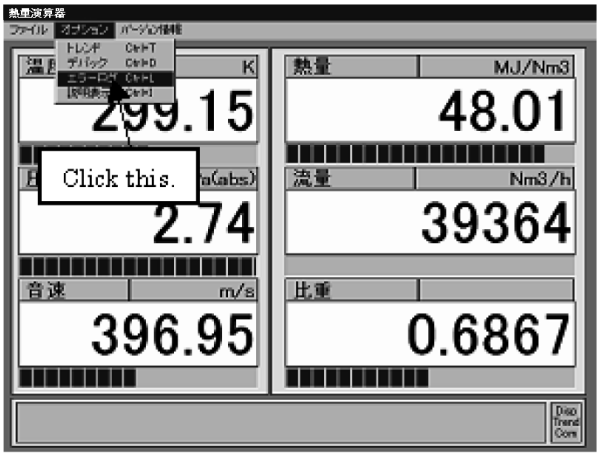


Fig. 9.7.1

Fig. 9.7.2 Error Log

9.8 Menu [Version information]

In RUN mode display, [バージョン情報] [Version information] menu displays the following items.

① [バージョン情報] [Version information]

② [自己診断] [Self check]

⚠**CAUTION: Do not select ②**

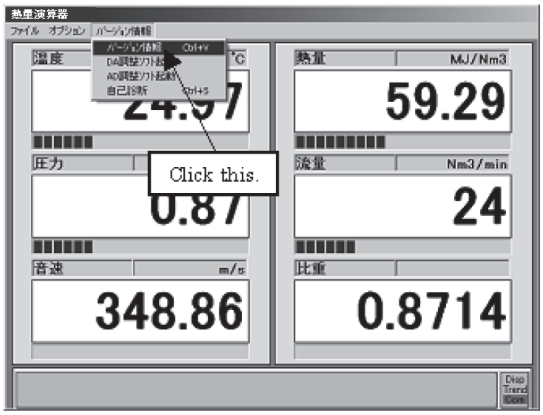


Fig. 9.8.1

9.8.1 Version information

The dialog box displays the software version.

This window can be closed by pressing [OK].

➡NOTE: Software upgrade is subject to change without notice.

Fig. 9.8.2 Version information

10. STANDARD SPECIFICATIONS

● General Specifications

Item	Description
Guaranteed calorie range	39 to 50 MJ/m³ (normal)
Operating temperature range	0 to 50℃ ※ 1 (Recommended range: ±10℃ of calibration point ※ 2)
Operating pressure range	0.2 to 5 MPa [G] 5 to 10 MPa [G]
Calorimetric accuracy	±0.25 MJ/m³ (normal)
Response time	Minimum 1 Sec.

※ 1: At low temperature, measured gas may condensate. Please take necessary measures to prevent gas condensation in the process.
※ 2: "Calibration point" refers to the measuring conditions during on-site calibration, including temperature, pressure, and calorific value of the gas.

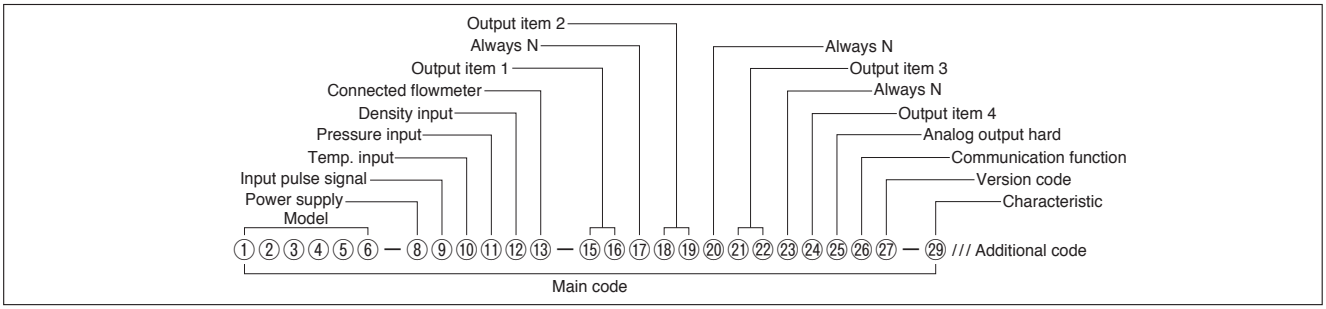
- Due to the principle of measurement, we recommend re-calibration to prevent meter error in case temperature, pressure, or gas composition fluctuates drastically from the calibration point.
- Indicated calorific value may fluctuate due to measuring error of thermometer or pressure meter, or change in gas composition. In case the fluctuation of indicated calorific value exceeds the calorimetric accuracy, please confirm the reproducibility of the process.
- Interfusion of inert gas (N_2, CO_2, etc.) may cause meter error.
- Contact OVAL in case when using at the temperature lower than 0℃.

● Computer Specifications

Item		Description	
BOX–PC	BX-710P2-AC5411 (manufactured by CONTEC)		
	CPU	Celeron (R) processor 1.06GHz (FSB533MHz)	
	Main memory	1GB (200 pin SO-DIMM ×1)	
	H D D	SATA SSD (2GB)	
	O S	Windows Embedded Standard 2009	
Input signal	Temperature input Pressure input	A/D converter board PCI–3178 (manufactured by Interface)	
		Insulation system	Channel-to-channel independent insulation input
		Input range	1 to 5V, 4 to 20mA ※ 1
		Resolution	16bit
		Input impedance	2GΩ (TYP)
		Relative accuracy	±4LSB (at 25℃)
		Error (Max.)	±0.15% of SPAN (0 to 50℃)
Output signal	Select 4 out of heat quantity output, flow output, specific gravity output, temperature output, and pressure output	D/A converter board PCI–3347 (manufactured by Interface)	
		Load resistance	when current output:450Ω Max.
		Load capacity	450pF or less
		Insulation system	Channel-to-channel insulation output
		Output range	4 to 20mA, 1 to 5V ※ 1
		Resolution	16bit
		Relative accuracy	±8LSB (Max.) (at 25℃)
		Error (Max.)	±0.10% of SPAN (Max.) (0 to 50℃)
Alarm output		Allowable load	AC250V 5A DC30V 5A 1 output a contact point, b contact point
Display mode		LCD unit 6.5 inches (640 x 480) color TFT (260 thousand colors) (touch-sensitive panel equipped)	
Display items	Temperature	2 digits after decimal point (℃ etc.)	
	Pressure	2 digits after decimal point (MPa [abs] etc.)	
	Sonic speed	2 digits after decimal point (m/s etc.)	
	Heat quantity	2 digits after decimal point (MJ/Nm³ etc.)	
	Flow rate	Nm³/h etc.	
	Specific gravity	4 digits after decimal point	
	Annunciation of abnormality	Error Messages	
	Indicator	Display update, Communication, Logging	
Operation mode	RUN MODE	Calorie computing display mode (Update interval of computation and display: 1 sec.)	
	SET MODE	Parameter setting mode	
Data logging		Interval: 1 to 600 sec. (Number of data entries: depends on the capacity of external USB memory)	
Communication		RS485 (to communicate with ultrasonic flowmeter) ※ 2	
External input		Display unit front touch-sensitive panel (touch pen equipped), USB (connectable with keyboard and/or mouse on front side)	
External storage		Connectable to USB port (USB memory, etc.)	
Fan service life		Approx. 10 years (operating 24 hours per day)	
Power supply		100 to 120VAC, 200 to 240VAC	
Ambient temperature		0 to 50℃	
Power consumption		80VA Max.	
Installation		Panel mount type	
Finish		Matte black	
Weight		Approx. 20kg	
Accessories		1 touch pen, 1 fuse, and 4 unit fittings	

※ 1: Available by connecting a 250Ω accurate resistance to the terminal block.
※ 2: Only an ultrasonic flowmeter of OVAL product is connectable.

11. PRODUCT CODE



●Main code

①	②	③	④	⑤	⑥	**Model**
E	L	4	8	0	1	Calorie computer

⑦	—

⑧	**Power supply**
E	100VAC
G	200VAC

⑨	**Input pulse signal**
N	Non

⑩	**Temp. input**
B	1 to 5V
E	4 to 20mA

⑪	**Pressure input**
B	1 to 5V
E	4 to 20mA

⑫	**Density input**
N	Non

⑬	**Connected flowmeter**
1	Psonic-1 (no version code)
P	Psonic-1 (Version code: A)
F	FLOWSIC600 or FLOWSIC600-XT
Z	Special

⑭	—

⑮	⑯	**Output item 1**
Analog output 1 assignment		
H	N	Calorie
V	N	Flow
T	N	Temperature
P	N	Pressure
Q	N	Specific gravity
Z	Z	Special

⑰	**Always N**
N	Always N

⑱	⑲	**Output item 2**
Analog output 2 assignment		
H	N	Calorie
V	N	Flow
T	N	Temperature
P	N	Pressure
Q	N	Specific gravity
Z	Z	Special

⑳	**Always N**
N	Always N

㉑	㉒	**Output item 3**
Analog output 3 assignment		
H	N	Calorie
V	N	Flow
T	N	Temperature
P	N	Pressure
Q	N	Specific gravity
Z	Z	Special

㉓	**Always N**
N	Always N

㉔	**Output item 4**
Analog output 4 assignment	
H	Calorie
V	Flow
T	Temperature
P	Pressure
Q	Specific gravity
Z	Special

㉕	**Analog output hard**
2	1 to 5V
5	4 to 20mA
Z	Special

㉖	**Communication function**
R	RS-485 (to communicate with ultrasonic flowmeter)

㉗	**Version code**
A	Version code: A

㉘	—

㉙	**Characteristic**
0	Standard
Z	Special

●Additional code

Document			
D	S	J	SPEC. & DWG (Approval Drawing) (Japanese)
D	S	E	SPEC. & DWG (Approval Drawing) (English)
D	R	0	Re-submission of SPEC. & DWG
D	C	J	Final DWG (Japanese)
D	C	E	Final DWG (English)
D	W	J	Wiring diagram (Japanese)
D	W	E	Wiring diagram (English)
S	D	J	Inspection report of electronics (Japanese)
S	D	E	Inspection report of electronics (English)
D	A	1	Compression coefficient calculation process JIS M8010-1993 (Japanese)
D	A	2	Compression coefficient calculation process JIS M8010-2020 (English)
D	T	J	Inspection procedure (Japanese)
D	T	E	Inspection procedure (English)
C	B	J	Traceability certificate: B set Only available in Japanese
Witness by customer			
V	1	1	Appearance, dimensions, quantity check
V	1	4	Appearance, dimensions, quantity check/performance (output confirmation, etc.)

《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.

Model	Code No.		Supplementary Code						Description	
	① ② ③ ④ ⑤ ⑥	–	⑦	⑧	⑨	⑩	⑪	⑫		
Model	E L 4 8 0 1								Calorie Computer	
Power Supply			1						100VAC 50/60Hz	Power consumption: 80VA Max.
			2						200VAC 50/60Hz	
Input				1					1 to 5VDC (Temperature and pressure)	
				2					4 to 20mADC (Temperature and pressure)	
Output					1				1 to 5VDC	Select 4 outputs from heat quantity, flow, specific gravity, temperature, and pressure
					2				4 to 20mADC	
Connected flowmeter						1			FLOWSIC600 or FLOWSIC600-XT	
						2			Psonic-1 (Version “none”)	
						3			Psonic-1 (Version “A”)	
						9			Special	
Communication							1		RS485 (to communicate with ultrasonic flowmeter)	
Finish								1	Matte black	

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All specifications are subject to change without notice for improvement.

OVAL Corporation
Head Office: 10-8, Kamiochiai 3-chome, Shijuku-ku, Tokyo, Japan
Phone. 81-3-3360-5121 Fax. 81-3-3365-8605