User's Manual

Model SLCC (Style E) Blending Controller

YEW**SERIES** BCS

IM 1B4E2-02E

Notices

■ Regarding This User's Manual

(1) This manual should be passed on the end user. Keep at least one extra copy of the manual in a safe place.

(2) Read this manual carefully and fully understand how to operate this product before you start operation.

(3) This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa) does not guarantee that the functions will suit a particular purpose of the user.

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(6) Every effort has been made to ensure accuracy in the preparation of this manual. Should any error or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

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IM 1B4F1-11E

IM 1B4E2-02E

1. INTRODUCTION.

1-1. Inspection.

This instrument was thoroughly tested at the factory before shipment.

However, when you receive this instrument:

1) Inspect for visible damage.
2) Confirm that the model and suffix codes shown on the shipping documents, and also on the nameplate on the instrument side panel, are the same as on your order sheet.
3) Confirm that all accessories (see section 2-4) are present.

If you have any questions about this instrument, please contact either your nearest Yokogawa Sales/ Service Office or Yokogawa Electric corporation, Tokyo, Japan.

1-2. Scope of this Manual and Associated Manuals.

This instruction manual covers the handling and operating instructions, and simple maintenance procedures for the SLCC*E Blending Controller.

In order to fully utilize the superior functions of the SLCC*E, it is first necessary to understand the functions of this controller, and then to determine various data settings and enter them onto the data label attached to the side panel.

Refer to the following manuals and materials for further details:

① TI 1B4A3-01E
"YewSeries BCS Batch Blending Control System"
② TI 1B4E1-01E
"YewSeries BCS (style E) Batch-Blending Control System Functions and Data Setting".
③ WS 1B4E2-02E
"SLCC*E Data Sheet".

2. GENERAL.

The SLCC*E blending controller controls the ratio of the totalized set signal and the totalized measured flow signal to a desired value (blending ratio), thereby providing a highly precise inline blending system.

o Scaling, pulse addition, four types of totalized values, instantaneous flow indication, flow signal repeater, analog input-output, compensating computation, communicating and self diagnosing functions are provided as standard equipment.

o This controller permits simple engineering because calculations and totalizing parameter settings can be easily made.

2-1. Standard Specifications.

Input Signals

Process Variable Pulse Input Signal: 0 to 6 kHz, minimum pulse width 50 μs, zero elevation not possible. Voltage or contact pulse input; two-wire or three-wire transmitter may also be used — distributor in SLCC supplies 12 V/24 V (switch-selectable). For two-wire transmitter, load resistance is switch selectable — 200 Ω, 510 Ω or 1 kΩ.

Voltage (Transition) Pulse: From two-wire or three-wire transmitter. Distributor voltage 12 V DC or 24 V DC ±10%, current up to 50 mA.

Voltage LOW Level (E_L): -1 V to +8 V DC.

Voltage HIGH Level (E_H): 3 V to 24 V DC.

Amplitude of Pulse Signal ($E_H - E_L$): At least 3 V.

Input Resistance: At least 10 kΩ.

Contact Input: Relay/switch contact or transistor switch.

Contact ON: Source resistance up to 200 Ω.

Contact OFF: Source resistance at least 100 kΩ.

Contact Rating: At least 30 V DC, 30 mA.

Flow Set Point Pulse Input Signal and Status Inputs:
Voltage (level) or contact signals. Minimum pulse width (auxiliary pulse input) 350 μs, (status input) 220 ms.

Voltage (level) Input (status, or flow set point pulse):

Voltage LOW Level (E_L): -1 V to +1 V DC. (status ON)

Voltage HIGH Level (E_H): 4.5 V to 25 V DC. (status OFF)

Contact Pulse: Relay/switch contact or transistor switch.

Contact (Status) ON: Source reistance up to 200 Ω.

Contact (Status) OFF: Source resistance at least 100 kΩ.
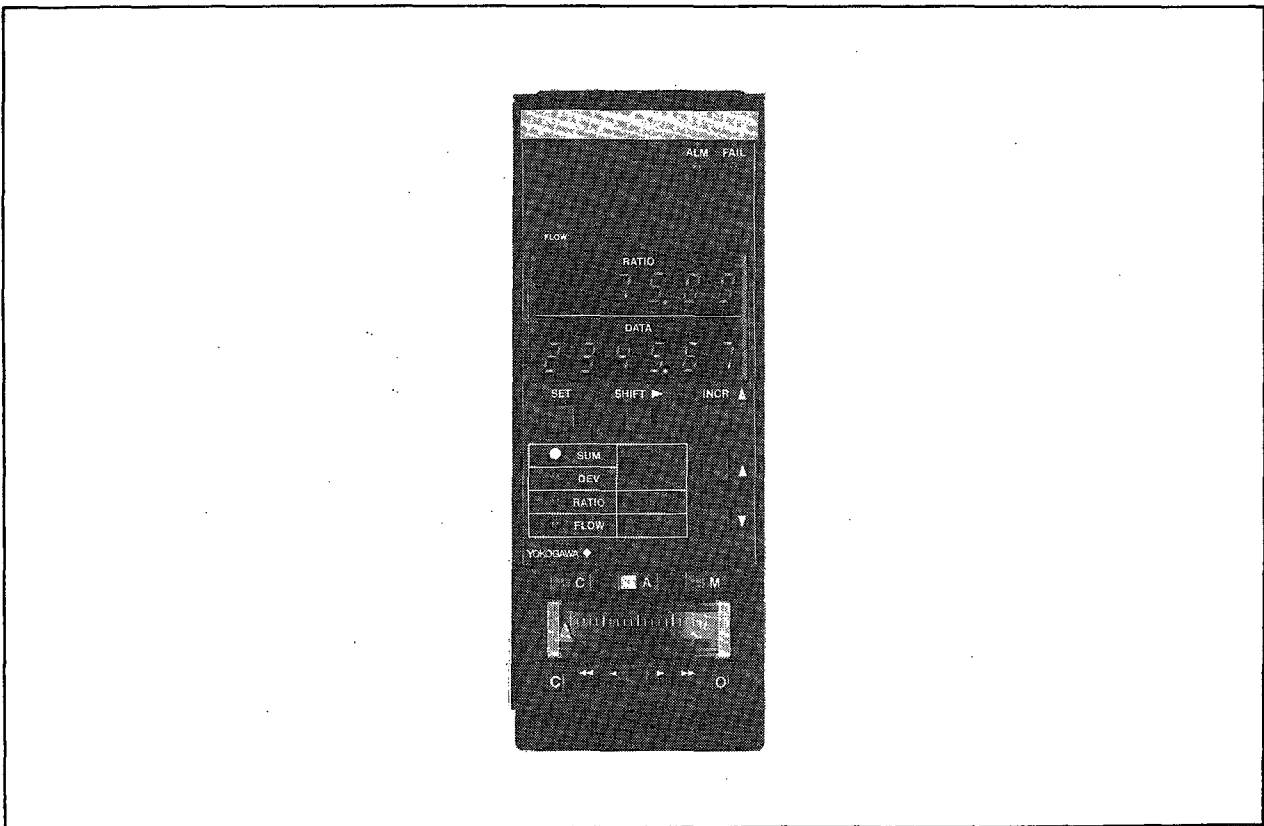

Figure 2-1-1. Front View of SLCC*E.

Contact Rating: At least 5 V DC, 20 mA.

Frequency of Flow Set Point Pulse Input Signal: 0 to 1 kHz, zero elevation not possible.

Analog Input Signals (Process Variable, Set Point and Compensation Signals): 1 to 5 V DC, input resistance 1 MΩ.

Analog Input Conversion Accuracy: ±0.2 % of span.

RTD Input Signal (for Temperature Compensation): (SLCC-301 only): JIS '89 specification JPt100 or Pt100 (DIN Pt100) 3-wire RTD, lead wire resistance up to 10 Ω/wire.

Temperature Compensation Accuracy: ±0.2 % of span.

Burnout Function: Provided; scaleout time up to 60 s.

Output Signlas

Pulse Output Signal (Flow Repeater Signal): Transistor contact signal, rating 30 V DC, 200 mA.

Frequency: 0 to 1 kHz, Duty Cycle 50% (for connecting to YewSeries BCS Instrument), or Fixed Pulse Width — selectable (one of 0.5, 1, 20, 33, 50 or 100 ms) — for electromechanical counter.

Status Output Signals (Totalizer Deviation Alarm — two points — and Fail Signal): Transistor contact signals, rating 30 V DC, 200 mA.

Analog Output Signal (Flow Repeater Signal): 1 to 5 V DC, load resistance at least 2 kΩ.

Analog Control Output Signal: 4 to 20 mA DC, load resistance 0 to 750 Ω.

Analog Output Conversion Accuracy: ±0.3 % of span.

Isolation

Contact (pulse/status) I/O signals are isolated from internal circuitry; analog signals are not. Pulse I/O signals are isolated from each other; status inputs, status outputs and analog I/O signals use separate common negative lines. Power supply is isolated from internal circuitry.

Input Processing Functions

Process variable and set point inputs may be either voltage or pulse signals, compensation input may be either a voltage or RTD signal.

Input Filter (for Process Variable Pulse Input or Auxiliary Pulse Input): First order lag filter, time constant adjustable 0 to 9999s.

Totalizer Scale Factor: Scaler for pulse or analog signal input (constant K number of pulses for every flow unit totalized). K (K_1, K_2) are 5-digit fixed point numbers, of maximum value 32767.

Voltage Flow Signal Processing: Span setting (4-digit fixed point number) corresponding ot input signal range of 1 to 5 V DC; low-input cutoff (for inputs under 1 % of span) and square root function selectable.

Compensation Computations

Can compensate the process-variable flow signal for liquid density changes with temperature.

SLCC has the following 4 ASTM compensation.

- Old ASTM No. D1250 (edit in 1952)
- New ASTM No. D1250 (edit in 1980) for crude oils, fuels & solvents and lubricating oils.

Other types of compensation are also possible (see below).

Temperature Compensation:

Temperature unti is selectable (°C or °F).

Input Signal: Platinum RTD JIS '89 JPt100 or Pt100 (DIN Pt100) or 1 to 5 V DC.

Temperature Range: For platinum RTD; −50 to +250°C.

For a 1 to 5 V DC signal: Arbitrary.

Computation Format: ASTM equation or general quadratic equation.

ASTM Equation: $V_0 = V[(1 + \alpha) \cdot f(\rho, t)]$

where $f(\rho,t) = VCF$

$$VCF = \frac{V_{15}}{V_t} = \frac{\rho_t}{\rho_{15}}$$

$$= exp\ [-\alpha\gamma\Delta t(1.0 + 0.8\alpha\gamma\Delta t)]$$

where VCF : Volume conversion coefficient (at 15°C)

V_{15} : Volume (m³) at 15°C

V_t : Volume (m³) at arbitrary temperature (t°C)

ρ_t : Density (t°C) (kg/m³)

ρ_{15} : Density (15°C) (kg/m³)

$\alpha\gamma$: Thermal expansion coefficient at 15°C (°C⁻¹)

Δt : Temperature difference [$\Delta t = t - 15$] (°C)

General Quadratic Equation:

$$V_0 = V[\ (1 + \alpha)\{1 + \beta\ (t - t_0) \times 10^{-2} + \gamma\ (t - t_0)^2 \times 10^{-6}\}\ ]$$

V_0: Volumetric flow a reference temperature t_0.

V : Volumetric flow (process variable flow signal) at temperature t.

t_0 : Reference temperature (°C), $t_0 = 15$°C for ASTM.

t : Flow sensor temperature (°C).

α : Flow transmitter compensation coefficient, (−99.99 to +99.99).

β : First order compensation coefficient, (−99.99 to +99.99).

γ : Second order compensation coefficient, (−99.99 to +99.99).

General Compensation Computations:

Computation Format: $V_0 = V[\ (C_{max} - C_{min})\ C + C_{min}]$, C ranges from 0 to 1 — its value corresponds to the compensation input signal: a voltage in the range 1 to 5 V DC. C_{max} and C_{min} are maximum and minimum compensation coefficients respectively, and may be set independently in the range 0 to 9999.

Flow Signal Repeater Function

Outputs pulse and analog signals corresponding to the flow signal process variable input.

Pulse Output: Output pulse rate may be scaled by a factor K_3, a 5-digit fixed point number, of maximum value 32767.

Pulse Output ON Time: Selectable — one of 0.5, 1, 20, 33, 50 or 100 ms — or duty cycle of 50% (for YewSeries BCS Instruments; up to ten may be connected in parallel with output).

Analog Output: 1 to 5 V DC.

Totalizer Functions

Four totalizers are built in — two 6-digit batch flow totalizers and two 8-digit (cumulative) totalizers:

o Flow totalizer (process variable only).

o Flow totalizer (process variable, with compensation computation).

o Cumulative flow totalizer.

o Cumulative flow totalizer (with compensation computation).

Flow totalizers are reset by reset input signal. Cumulative flow totalizer may be reset manually by entering other data for totalizer value.

Data Display and Data Setting Functions

Data Display:

Upper display is blend ratio set data, 6 digits.

Lower display is selectable data, 6 digits.

Selectable data (displayed in lower display) may be major data item or auxiliary data item:

Major Data Item: Displayed data type is indicated by a lamp next to a data item label on the front panel. Process variable value (with compensation), totalizer deviation (between process variable and set point), blend ratio and instantaneous flow may be displayed.

Auxiliary Data Item: Data type is indicated by code displayed in upper display. Uncompensated totalizer value and various control parameters may be displayed. A table of data that may be displayed is on the instrument side panel.

Instantaneous Flow Display: 5-segment bar graph.

Data Setting:

Displayed Data Selection: Selected by push buttons. One switch (on side panel) changes from major data display to auxiliary data display.

Data Setting: Uses push button switches. Data setting may be inhibited (disabled) by an inhibit/enable switch on the side panel.

Flow Ratio Control Functions

This Blending Controller separately totalizes both a set point signal and the process variable signal, and performs PI control such as to keep the ratio of the two totalized values constant at a preset blen ratio. When batch end input turns off, output is set to −20%.

Blend Ratio Set Point: 5 digit fixed point number, maximum 327.67%.

Totalizer Deviation: 4 digit display.

Control Modes: A (Auto), M (Manual). These correspond to SPC and DDC respectively in computer (remote setting) mode.

Auto mode: PI control.
Proportional band 6.3 to 999.9%.
Integration time constant 1 to 9999 sec.

Manual mode: Two speed operation.
Slow — 40 sec./full span change.
Fast — 4 sec./full span change.

Control Mode Transfer: A/M transfer, using front-panel switch or contact input (contact status OFF: Manual mode), is bumpless and balanceless.

Manipulated Variable Output Indication: Horizontal scale 39 mm long, one pointer, with two memory indexes and valve open/close direction marks.

Indicator Accuracy: ±2.5% of span.

Control Period: 0.2 sec.

Alarm Functions

Totalizer Deviation Limit Alarm: ALM lamp lights, alarm output contact openes. Two (4-digit) deviation set points are provided; there is a single contact output for each deviation alarm. The 1st stage totalizer deviation alarm output can be used as master pacing input to SBSD or SLBC instruments.

Communication Functions

The SLCC can communicate (vice LCS card in field control station/unit) with a central YEWPACK/μXL CENTUM CRT-display operator station and supervisory computer. Maximum length of (SCCD) cable to LCS card is 100 m (328 ft).

Data Transmitted: Instantaneous flow, flow totalizer value (with compensation computation), blend ratio set value, totalizer deviation, manipulated variable output, control mode, totalizer deviation alarm status, compensation coefficients.

Data with Remote Setting: Flow totalizer value (with compensation computation), blend ratio set point, manipulated variable output (in manual or DDC modes), control mode, compensation coefficients. Remote setting (from YEWPACK/μXL/CENTUM operator station or supervisory computer) can be disabled.

Computer/Auto/Manual (C/A/M) Mode Switches on SLCC Front Panel: Lamps in these switches indicate instrument mode. The mode (Computer/Auto/Manual) can be checked and changed by a supervisory computer or from a remote operator station. During SPC/DDC operation from a supervisory computer, only the "C" (Computer) lamp is lit. During local operation, or remote operation from the operator station, the "A" or "M" lamps are lit.

Mounting:
Flush panel mounting. Instruments are in housings, and may be mounted individually or side-by-side.
Rear of instrument may be up to 75° below front (indicator zero may need readjustment).

Wiring:
Signal Wiring to/from the Field: ISO M4 size (4 mm) screws on terminal block.

Power and Ground Wiring:
100 V version: JIS C 8303 two-pin plug with earthing contact. (IEC A5-15, UL498).
220 V version: CEE 7 VII (CENELEC standard) plug.
Power Cable Length: 30 cm (11.8 in).

Front Panel Finish: Dark green (Munsell 2.5GY 3/1).

Bezel: Aluminum diecast, black baked-enamel finish.

Housing: Open front, with connector for SPBD Portable Manual Station.

Housing Dimensions: 182.5 (H) x 87 (W) x 480 (D: depth behind panel) (mm) (7.2 x 3.4 x 18.9 in).

Weight:
Instrument body: 3.2 kg (7.0 lb) (excluding housing).
Housing: 2 kg (4.4 lb) (excluding mounting kit).

Normal Operating Conditions
Ambient Temperature: 0 to 50°C (32 to 122°F).
Ambient Humidity: 5 to 90% Relative Humidity (noncondensing).
Power Supply: Two versions, for "100 V" (standard) or "220 V" (option/A2ER). Both versions may use AC or DC, without change to the instrument:

Version	"100 V"	"220 V"
DC (polarity reversible)	20 to 130 V	120 to 340 V
AC (47 to 63 Hz)	80 to 138 V	138 to 264 V

2-2. Model and Suffix Codes.

Model	Suffix codes	Style	Option codes	Description
SLCC	. . . . . .	. . . . .	. . . . . .	Blending Controller with communication and compensation functions
Compensation Input	-2	. . . . .	. . . . . .	1 to 5 V DC
	-3	. . . . .	. . . . . .	Pt 100 Ω RTD
		01 . .	. . . . .	. . . . . .	Always 01
Style Code		*E	. . . . . .	Style E
Option			/DL	With data sheet
Common Options			/A2ER	220V power supply*
			/MTS	With mounting kit
			/PA	JIS '89 JPt100
			/PD	JIS '89 Pt100 (DIN Pt100)
			/SCF- /G□M	Bezel color change
			/NHS	Without housing
			/NPE	Nameplate engraving

* Specify /A2/NHS to order without housing.

2-3. Options.

/DL: With data set as per data sheet, and corresponding data label attached.

/A2ER: For "220 V version" power supply.

/PA: JIS '89 JPt100 compensation input.

/PD: JIS '89 Pt100 (DIN Pt100) compensation input.

/MTS: Supplied with kit for individual mounting. For mounting in groups, see GS 1B4F1-E.

/SCF-G□M: Mounting kit bezel color change from standard color (black). Choose color from set of optional colors (see GS 22D1F1-E). Specify color code in space □.

/NHS: No housing, plug-in instrument module only. See GS 1B4F1-E to order housing separately.

/NPE: Letters engraved on front panel nameplate.

2-4. Accessories.

1A fuse, quantity one.	Part No.: S9510VK
Engineering units label, one set.	Part No.: E9712DL
Blank label, one set. (for user filling)	Part No.: E9712DS

Note: The fuse (S9510VK) is the dedicated fuse, Do not use it for other products.

3. INSTALLATION.

For general information regarding installation of this instrument, refer to the instruction manual "Installation of Panel-Mounting Instruments" (IM IB4FI-0IE).

3-1. Wiring.

The terminal board is located on the rear of the controller housing. Remove the cover of the terminal board, and connect external signal wires to the (M4 size) screw terminals. After wiring, be sure to replace the cover. (See Figures 3-1-1 and 3-1-2.)
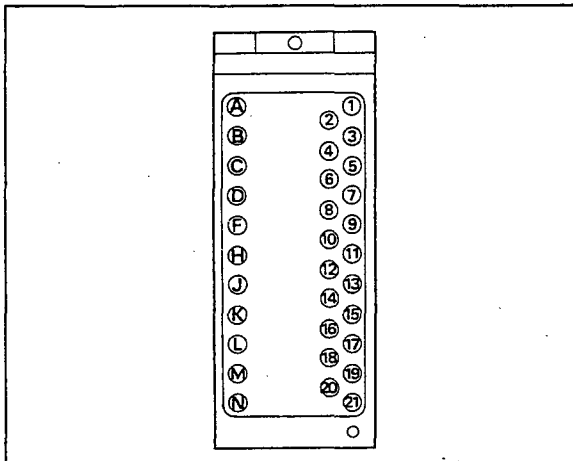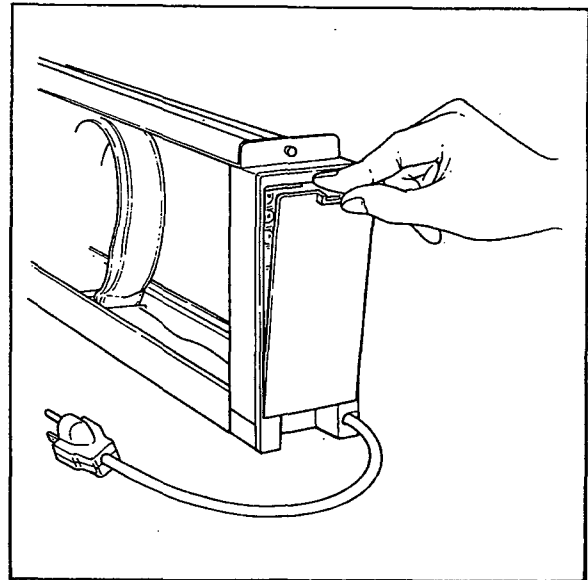

Figure 3-1-2. Terminal Cover.

Figure 3-1-1. Terminal Layout.

Tables 3-1-1 and 3-1-2 show the terminal designations and signals to be connected for the -201*E and -301*E versions of the controller respectively.

■ Terminal Wiring

Table 3-1-1. SLCC-201*E

Terminal Designation	Description	Terminal Designation	Description
1		17	+
2	Process variable input, pulse signal *1	18	— Communications *2
3		19	+
4	+	20	— Setpoint pulse input
5	Compensation input,	21	— Fail output (— terminal)
6	1 to 5 V DC	A	+
7	+	B	— Manipulated output, 4 to 20 mA DC
8	— Process variable input, 1 to 5 V DC	C	+
9	+	D	— Flow signal repeater (pulse output)
10	— Flow setpoint input, 1 to 5 V DC	F	
11	+ Reset input	H	
12	+ A/M transfer input or batch end input	J	+
13	— Common	K	— Flow signal repeater (1 to 5 V output)
14	+ Totalizer deviation alarm output (1st level)	L	
15	+ Totalizer deviation alarm output (2nd level)	M	
16	— Common	N	+ Fail output (+ terminal)

*1: Change wire connection according to the type of transmitter used.

Terminal Designation	Contact or Voltage Level Pulse	2-wire Type Power Supply	3-wire Type Power Supply
1	+	—	Sig
2	— Transmitter	Transmitter	— Transmitter
3		+	+

*2: Use shielded twisted-pair cable (SCCD see GS 34B6T1-01E).

Table 3-1-2. SLCC-301＊E

Terminal Designation	Description	Terminal Designation	Description
1		17	+ Communications *2
2	Process variable input, pulse signal *1	18	−
3		19	+ Setpoint pulse input
4	B ⌐	20	−
5	B ⌐ RTD input	21	− Fail output (− terminal)
6	A ⌐	A	+ Manipulated output, 4 to 20 mA DC
7	+ Process variable input, 1 to 5 V DC	B	−
8	−	C	+ Flow signal repeater (pulse output)
9	+ Flow setpoint input, 1 to 5 V DC	D	−
10	−	F	
11	+ Reset input	H	
12	+ A/M transfer input or batch end input	J	+ Flow signal repeater (1 to 5 V output)
13	− Common	K	−
14	+ Totalizer deviation alarm output (1st level)	L	
15	+ Totalizer deviation alarm output (2nd level)	M	
16	− Common	N	+ Fail output (+ terminal)

Notes 1 and 2: Refer to previous page.

3-1-1. Wiring Precautions.

(1) Be sure to terminate all cable connections using solderless crimp-on lugs.

(2) Each status and voltage input must be as per SLCC＊E specifications. Note the limits on conductor resistance, voltage drop in conductors, and voltage (high/low) levels.

(3) The fail and digital outputs are transistor contact signals (isolated from power supply and other internal circuitry). When connecting external devices, pay attention to the following: (See Figure 3-1-3.)

● Observe correct polarity of status output terminals.

● Most status outputs share a common negative terminal.

● When connecting a relay or other such inductive device, connect a surge absorber (protective diode — Figure 3-1-3, CR circuit, etc.) in parallel with the load.

● Note that status outputs cannot be connected directly to an AC circuit. Use a relay to switch an AC circuit.

● Do not connect any load which exceeds the contact rating. (Max. 30V DC, 200 mA).

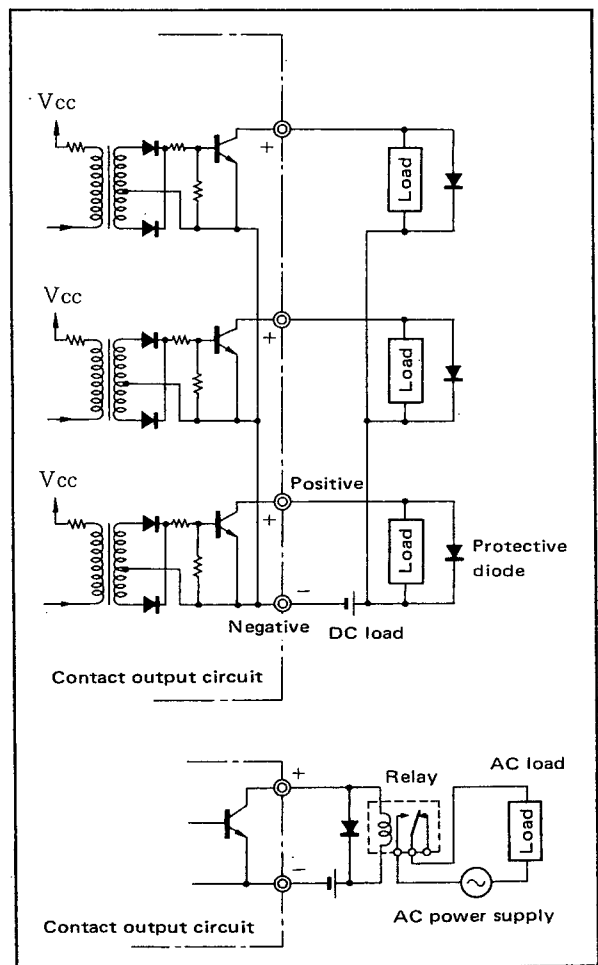(4) Use shielded twisted-pair SCCD cable for communication lines (terminals 17, 18).

Figure 3-1-3. Connection of Contact Outputs.

4. PRINCIPLES OF OPERATION.

This chapter outlines some major features of the SLCC∗E Blending Controller that are used daily in operating the system. For further details, read TI 1B4A3-01E "YewSeries BCS Batch-Blending Control System".

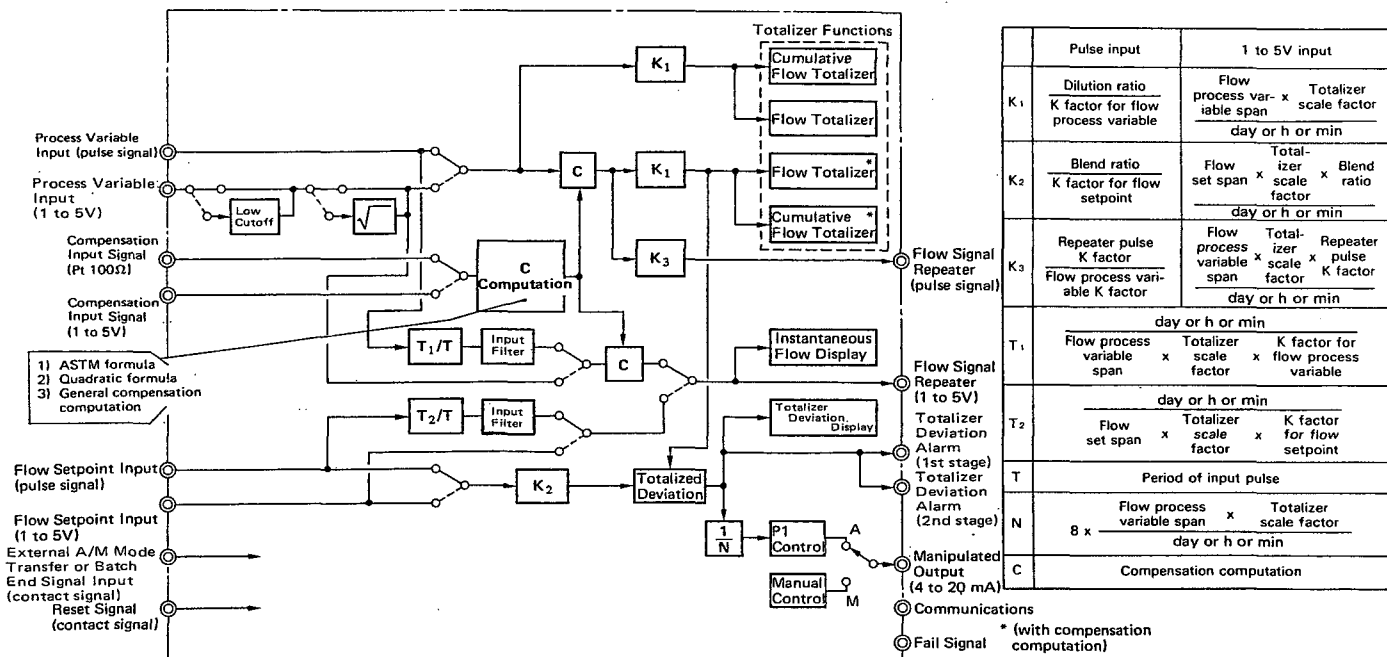Refer to the SLCC∗E functional block diagram in Figure 4-1-1.

	Pulse input	1 to 5V input
K_1	$\dfrac{\text{Dilution ratio}}{\text{K factor for flow process variable}}$	$\dfrac{\text{Flow process var-iable span} \times \text{Totalizer scale factor}}{\text{day or h or min}}$
K_2	$\dfrac{\text{Blend ratio}}{\text{K factor for flow setpoint}}$	$\dfrac{\text{Flow set span} \times \text{Totalizer scale factor} \times \text{Blend ratio}}{\text{day or h or min}}$
K_3	$\dfrac{\text{Repeater pulse K factor}}{\text{Flow process variable K factor}}$	$\dfrac{\text{Repeater process variable span} \times \text{Totalizer scale factor} \times \text{Repeater pulse K factor}}{\text{day or h or min}}$
T_1		$\dfrac{\text{day or h or min}}{\text{Flow process variable span} \times \text{Totalizer scale factor} \times \text{K factor for flow process variable}}$
T_2		$\dfrac{\text{day or h or min}}{\text{Flow set span} \times \text{Totalizer scale factor} \times \text{K factor for flow setpoint}}$
T	Period of input pulse	
N	$8 \times \dfrac{\text{Flow process variable span} \times \text{Totalizer scale factor}}{\text{day or h or min}}$	
C	Compensation computation	

Figure 4-1-1. SLCC∗E Functional Block Diagram.

4-1. Totalizer Functions.

The totalized value is the data most essential to precision batch blending control. The SLCC∗E is capable of displaying the following four types of totalizer values: (See Figure 4-1-1.)

(1) Measured flow totalizer value
  Totalizer value of uncompensated measured flow.

(2) Measured flow totalizer value (with compensation)
  Totalizer value of compensated measured flow.

(3) Cumulative measured flow totalizer value
  Cumulative totalizer value of uncompensated measured flow.

(4) Cumulative measured flow totalizer value (with compensation)
  Cumulative totalizer value of compensated measured flow.

Totalizer values (1) and (2) are reset by the reset status input, while cumulative values (3) and (4) are not reset.

Totalizer values (1) and (2) are displayed with six digits, while cumulative values (3) and (4) are displayed with a total of eight digits by using both the upper and lower display sections.

The measured flow totalizer value (with compensation) is displayed as main data in the item SUM on the front panel, while the other three totalizer values are treated as auxiliary data.

4-2. Flow Ratio Control Function.

This Blending Controller separately totalizes both a set point signal and the process variable signal, and performs PI control such as to keep the ratio of the two totalized values constant at a preset blend ratio.

This PI control based on totalizer deviation permits highly precise blending.

Some of the data settings required for this controller are the blend ratio which is set and displayed as RATIO in main data, and the PI constant which is set and displayed as auxiliary data. The totalizer deviation can also be displayed on main data as DEV, and this can be utilized to monitor the control state.

<Major specifications>

Blending ratio settings: 5-digit with decimal point setting (Max. 327.67%)

Totalizer deviation: Displayed in four digits

Proportional band (P): 6.3 to 999.9%

Integral time (I): 1 to 9999 s.

Control mode transfer: A/M transfer, using front-panel switch or contact input, is bumpless and balanceless.

Provided with A/M changeover function by external contact: Manual (M) mode when contact input is open/batch end input (turns off manipulated output tightly when contact input is open).

Provided with a direct/reverse action switching function.

4-3. Alarm Functions.

The SLCC*E blending controller is provided with a two-stage totalizer deviation alarm function which is novel to this controller. This alarm signal is used as the master pacing command signal in the SBSD*E batch set station.

When the totalizer deviation value exceeds the alarm set point, the ALM lamp lights and the alarm output contact opens.

The totalized deviation alarm set value is set in the auxiliary data section.

4-4. Example of System Configuration.

These are two main types of blending control systems:

The blending control system can be roughly classified into the following two systems:

(1) Master oscillator based system (blending set unit based system).

The total flow is set by the batch set station. The blending controllers receive the master demand pulse signal (set signal) from this batch set station, and control the flow in each component line flow at a specified ratio of the demand pulse signal.
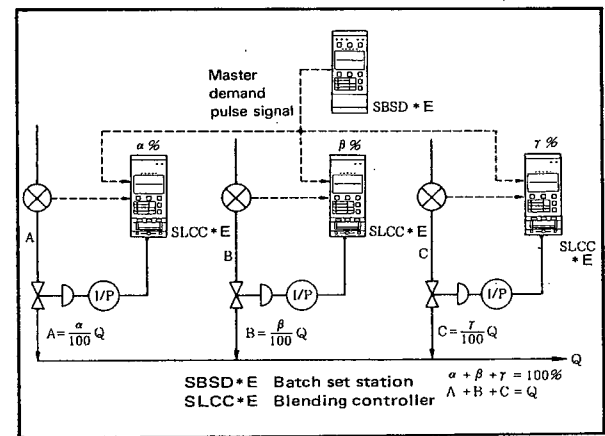

Figure 4-4-1. Master Oscillator Based Type.

(2) Master line based system.

One of the component lines is taken as the master line, and the flows in all the other lines are controlled at constant ratios of the flow in this master line.
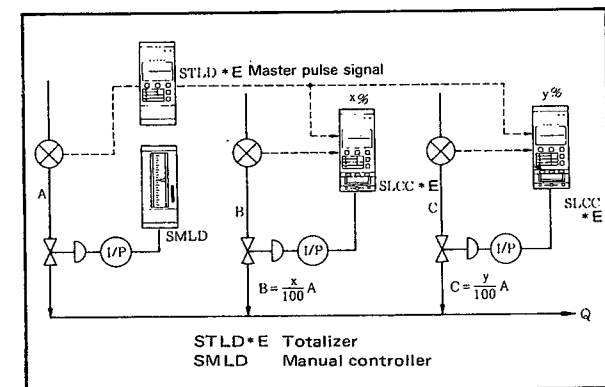

Figure 4-4-2. Master Line Based System.

5. OPERATION.

5-1. Front- and Side-Panel Features.

5-1-1. Front Panel.

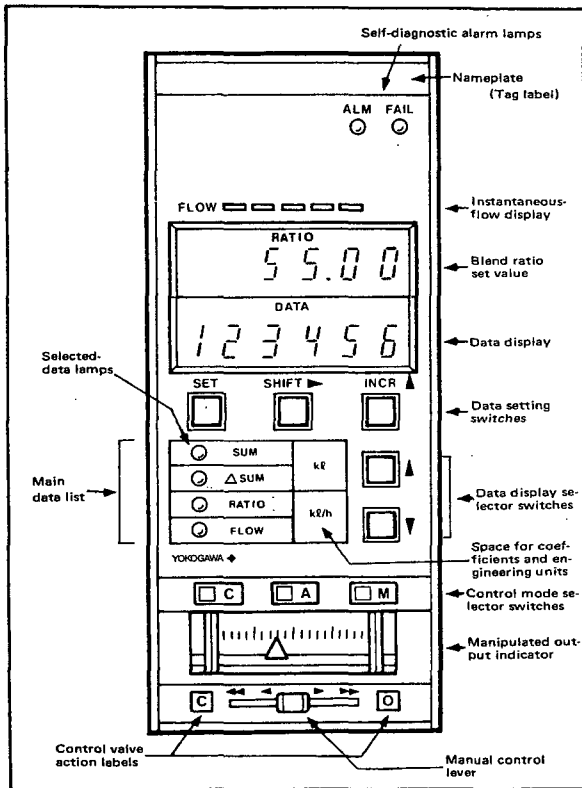Figure 5-1-1 shows the front panel of the SLCC*E Blending Controller.

Figure 5-1-1. Front Panel.

(1) Self-diagnostic alarm lamps.
   FAIL lamp (red): Lights if the controller fails.
   ALM lamp (yellow): Lights to indicate alarm status.
   This lamp flashes if the data memory backup battery is not installed, or when its voltage is low.

(2) Instantaneous-flow display.
   The instantaneous flow is displayed on a bar graph consisting of five LEDs.

(3) Data display.
   The data display is divided into two sections, upper and lower, each of which displays six digits.
   Frequently-used "main data" (data items — such as set value and process variable value —

shown in the main data list on the front panel), and "auxiliary data" (data items — such as computational constants and control constants — shown on the side panel data label) are displayed on this data display according to the setting of the main data/auxiliary data selector switch (FRONT P./SIDE P.) located on the side panel. (See item (6) of 5-1-2.)

During ordinary operation, set this selector switch to FRONT P. (main data). With this setting, the upper section of the display contains the blend ratio set value, and the lower section of the display contains one of the main data items as selected by the data display selector switches ▲ ▼. A selected-data lamp lights to indicate which data item is selected. (See Figure 5-1-2.)

To display auxiliary data items, set the FRONT P./SIDE P. selector switch to SIDE P. (auxiliary data). With this setting, the upper section of the display contains an auxiliary data item no., and the lower section contains the corresponding data. The desired item can be selected using the data display selector switches ▲ ▼ . (See Figure 5-1-3.)

The lower data display section can be used for displaying data, and also for setting computational constants, control constants and other values.

(4) Data setting switches (SET , SHIFT▶ , INCR▲).
   These switches are used for setting data.

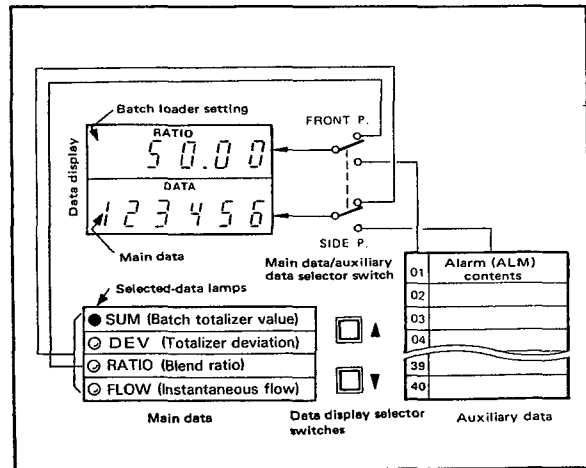**Figure 5-1-2. Functions of Data Display
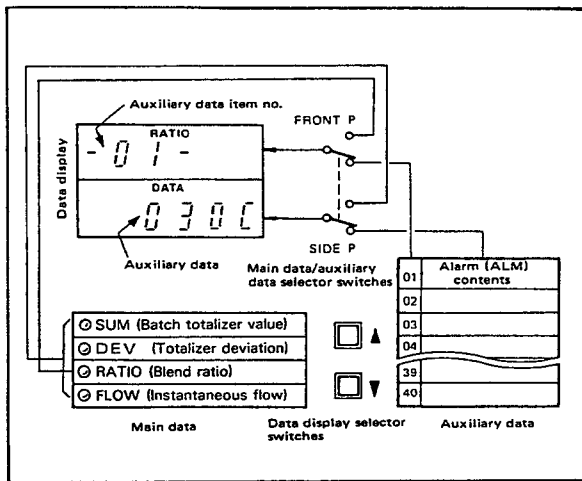(Main data display shown.)**

Figure 5-1-3. Functions of Data Display
(Auxiliary Data Display Shown.)

(5) Data display selector switches ([▲],[▼]).
Used to select data to be displayed in the data display.

(6) Main data list.
Contains the most-often-used data. A desired data item can be selected using the data display selector switches.
Main data:

SUM .... Batch totalizer value
DEV .... Totalized deviation
RATIO .... Blend ratio
FLOW .... Instantaneous flow

(7) Selected-data lamps.
One of these lamps lights to indicate the main data item selected by the data display selector switches.

(8) Space for displaying coefficients and engineering units.
The "coefficients/engineering-units label" provided as an accessory is attached here.

(9) C-A-M operation mode selector pushbuttons
Operation mode can be selected by pressing the corresponding pushbutton. The lamp at the selected switch position is illuminated.

C mode: Automatic control. The C mode status signal enabling data setting and operation from a supervisory system is transmitted.

M mode: Automatic control.

M mode: Manual operation. The control signal may be increased/decreased by using this manual control lever.

(10) Manipulated variable output indicator.
Indicates the current output signal.
Left end 4 mA DC; right end 20 mA DC.

(11) Manual control lever.
Used for adjusting the control output signal of the controller in manual (M) mode.
Action:
Signal output decreases as lever is moved toward left.
Signal output increases as lever is moved toward right.
Rate of change:
◄ , ►   40 s./full scale.
◄◄ , ►►   4 s./full scale.
Fine adjustment:
Momentary (approx. 0.2 s) movement of the lever left ◄ or right ► from the neutral position changes the control signal by 0.1%.

5-1-2. Instrument Side Panel.
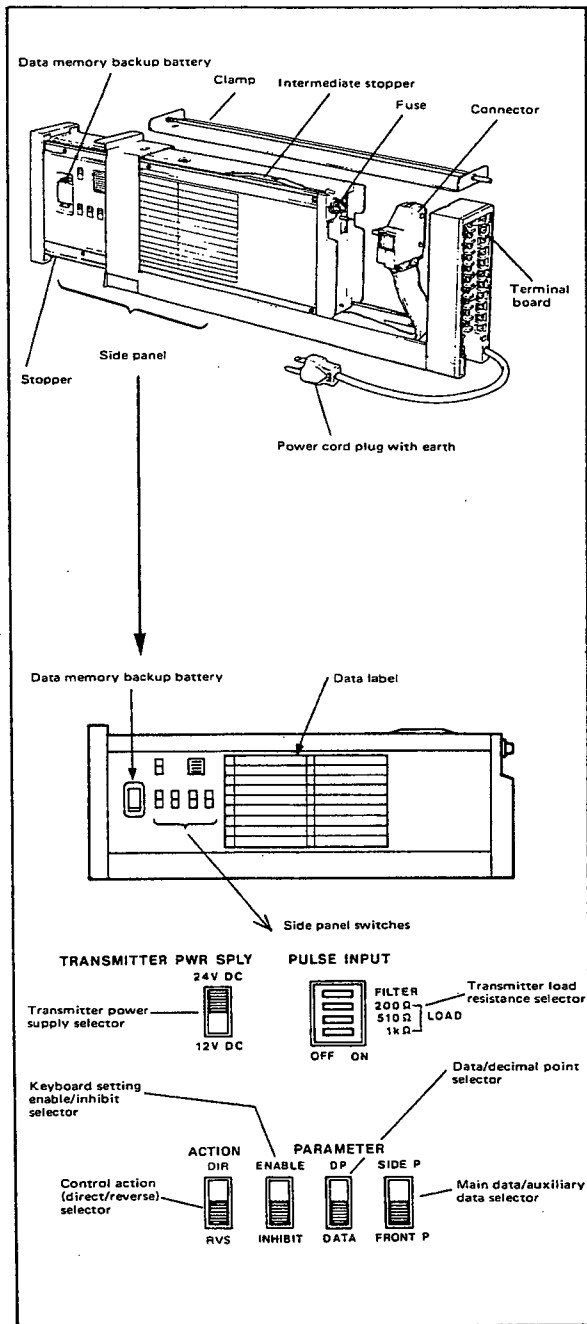
Figure 5-1-4 shows details of the SLCC*E side panel.

Figure 5-1-4. Details of Side Panel.

(1) Transmitter power supply selector switch (TRANSMITTER PWR SPLY).

For pulse type process variable input signals (two-wire distributor type or three-wire distributor type, see Table 3-1-1, note *1) 12 or 24V DC is supplied from the SLCC*E unit.

(2) Transmitter load resistance selector switches (PULSE INPUT).

When a two-wire pulse transmitter is used with SLCC*E internal power supply distributor (see (1) above), the load resistance (200Ω, 510Ω or 1 kΩ) is selected by these switches. One of these switches turns the input filter On or Off.

(3) Control action selector switch (ACTION).

This switch is used to select the control action:

DIR (Direct action):

DEV (totalized deviation) > 0 → MV (control output) increases.

RVS (Reverse action):

DEV (totalized deviation) > 0 → MV (control output) decreases.

(4) Keyboard enable/inhibit switch (ENABLE/INHIBIT).

This switch is used to enable or inhibit data setting by the front panel switches.

ENABLE: Data setting is allowed.

INHIBIT: Data setting is not allowed.

(5) Data/decimal point selector switch (D.P./DATA).

This switch is used for setting the decimal point position of the set data. With this switch set to DP, the decimal point can be set using the front panel switches (SHIFT, SET).

(6) Main data/auxiliary data selector switch (FRONT P./SIDE P.)

This switch designates the data to be displayed on the front panel data display as either main data or auxiliary data.

FRONT P.: Main data is displayed

SIDE P.: Auxiliary data is displayed

(7) Data label.

The data label lists auxiliary data such as K factors and other computational constants, control constants and function-specifying data.

Write data values in the data field.

Table 5-1-1 shows the data label, and Table 5-1-2 shows details of the auxiliary data function specification items (item Nos. 21, 22 and 23).

For further details of the data label, refer to TI 1B4E1-01E "YewSeries BCS (style E) Batch-Blending Control System Functions and Data Setting" and TI 1B4A3-01E "YewSeries BCS Batch-Blending Control System".

Table 5-1-1. SLCC Data Label.

SLCC*E Blending Controller	TAG No.						
01	Alarm (ALM) code		11				
02	Flow totalizer value (uncompensated)		12				
03			13	Blend ratio			
04	Cumulative totalizer value (uncompensated)		14	Integral time		S	
05	Cumulative totalizer value (compensated)		15	Proportional band		%	
06	Deviation alarm 1st stage set value		16	Measured temperature/compensation coefficient input			
07	Deviation alarm 2nd stage set value		17	Measured pulse input filter			
08			18	Pulse set point input filter		S	
09			19				
10			20				
21	Function specification (1)		31	Dilution ratio			
22	Function specification (2)		32	Compensation reference temperature			
23	Function specification (3)		33	Manual set temperature/Manual compensation coefficient			
24			34	Maximum value of measured temperature/ Maximum value of compensation coefficient			
25	Flow process variable span		35	Minimum value of measured temperature/ Minimum value of compensation coefficient			
26	Flow setpoint span		36	Compensation factor			
27	K factor for flow process variable		37	Flow transmitter error compensation coefficient α			
28	K factor for flow setpoint		38	First order compensation coefficient β/density or specific gravity ρ			
29	K factor for repeater pulse		39	Second order compensation coefficient γ			
30	Totalizer scale factor		40				

Table 5-1-2. Function-specifying Data.

Note: Fill in the blanks of 21. Function specification (1) and 22. Function specification (2) and 23. Function specification (3) according to the following.

Function specification (1) | A | B | C | D | E | F |

A Supervisory system backup function
  0: Manual backup
  1: Automatic backup

B Flow signal repeater pulse width
  0: DUTY 50% (For YS-BCS instrument)
  1: 0.5 ms
  2: 1 ms
  3: 20 ms
  4: 33 ms
  5: 50 ms
  6: 100 ms

C Communications write and Keyboard setting enable/inhibit selector
  0: Enable/whole data
  1: Inhibit/whole data
  2: Enable/main data SUM
      aux. data No. 2 to 6, after No. 21
  3: Inhibit/main data SUM
      aux. data No. 2 to 6, after No. 21

D Reset totalized deviation when manual to auto transfer
  0: Not provided
  1: Provided

E External A/M Mode transfer/Batch end
  0: Inhibit
  1: External A/M Mode transfer input
  2: Batch end input

F Instantaneous flow display and analog repeater signal.
  0: Process variable
  1: Set point

Function specification (2) | G | H | I | J | K | L |

G Time unit of flow
  0: */h
  1: */min
  2: */day

H Flow signal/simulation specification
  0: Pulse flow signal
  1: Analog flow signal
  2: Simulation MV inhibit D/O inhibit
  3: Simulation MV inhibit D/O enable
  4: Simulation MV enable D/O inhibit
  5: Simulation MV enable D/O enable

I Flow setpoint signal specification
  0: Pulse
  1: Analog

J Analog input signal specification

	Low cutoff	Square root extraction
0	1% or less	Not provided
1	0% or less	Not provided
2	1% or less	Provided
3	0% or less	Provided

K Resetting of stored totalizer and repeater pulse values:
  0: All values reset.
  1: Repeater & non-displayed totalizer digits preserved.
  2: Like 1, but least-significant totalizer display digit also preserved.
  3: Like 1, but two least-significant totalizer display digits also preserved.

L Compensation computation
  0: Non provided
  1: Provided

Function specification (3) | M | N | O | – | Q | – |

M Compensation computation
  0: ASTM method
  1: General quadratic formula
  2: General compensation

N Temperature/compensation coefficient data
  0: Process variable
  1: Manual setpoint

O Temperature unit
  0: °C
  1: °F

Q Selection of ASTM compensation equation (Effective when M=0 in function specification(3))
  0: Old ASTM (ASTM-52)
  1: New ASTM (ASTM-80, ISO 91/1) Crude oil
  2: New ASTM (ASTM-80, ISO 91/1) Fuel oil
  3: New ASTM (API, ISO) Lubricating oil

5-2. Preparation of Data Label.

Before using the SLCC*E controller, the required values of auxiliary data items — such as function specifying data, K factors and other computational and control constants — must be decided and input, and these values should also be written on the data label (see note).

When preparing the data label, refer to TI 1B4E1-01E "YewSeries BCS (style E) Batch-Blending Control System Functions and Data Setting" and TI 1B4A3-01E "YewSeries Batch-Blending Control System".

```
┌─────────────── NOTE ───────────────┐
│  If option/DL is specified at order time, the fac- │
│  tory will write data values on the data label    │
│  before shipping the controller.                  │
└──────────────────────────────────────┘
```

5-3. Preparation for Operation.

Perform preparation with the controller installed in the panel, or removed and placed on a work table.

(Suppose that the instrument module is in the housing).

Removing the instrument module from the housing:

① Push up the stopper, located below the front panel of the instrument module, to remove it. When it is drawn out halfway, the instrument module is stopped by an intermediate stopper. (Figure 5-3-1).
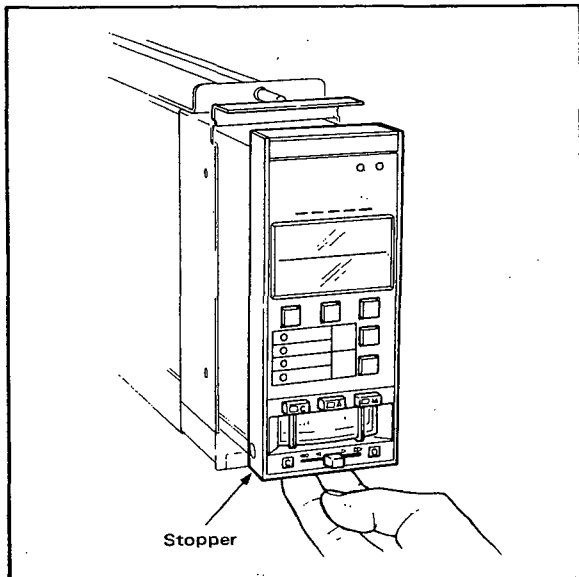

Figure 5-3-1. Removing Instrument Module.

② To remove the instrument module from the housing, push down on the intermediate stopper while pulling the instrument out of the housing as shown in Figure 5-3-2.
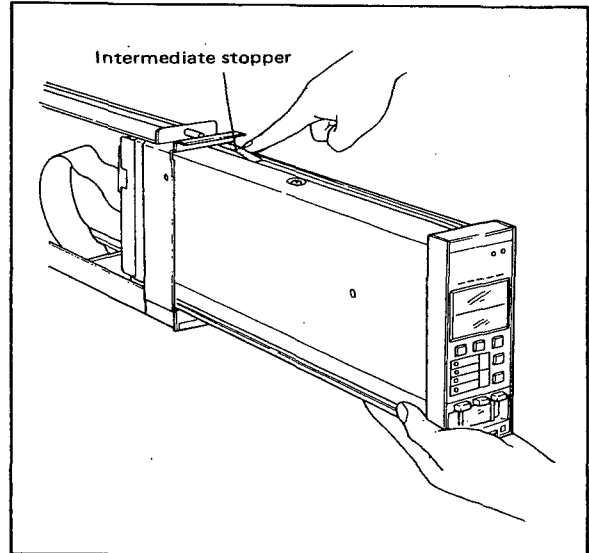

Figure 5-3-2. Removing Instrument Module.

③ Detach the connector from the instrument module. The instrument module is now separated from the housing. (Figure 5-3-3).
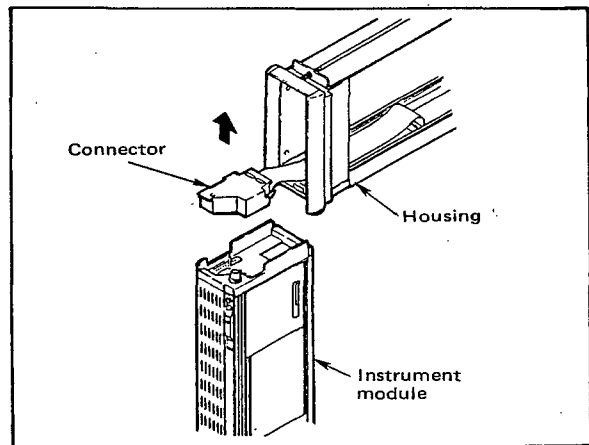

Figure 5-3-3. Detaching the Connector.

5-3-1. Check Special Parts are Installed

Check to see that the fuse and data memory backup battery are installed. If not, refer to Chapter 6 "Maintenance" for installation procedure.

5-3-2. Setting Side Panel Switches.

(1) Transmitter power supply selector switch (TRANSMITTER PWR SPLY).

For pulse type process variable input signals (two-wire distributor type or three-wire distributor type, see Table 3-1-1, note *1) a distributor in the SLCC*E unit supplies 12 or 24V DC.

The switch setting is irrelevant for two-wire voltage level or contact pulse inputs (left side of Table 3-1-1, note *1).

(2) Transmitter load resistance selector switch (PULSE INPUT).

● When using a two-wire pulse transmitter with the distributor in the SLCC*E unit, the switch corresponding to the desired load resistance should be turned ON. When using any other type of transmitter, be sure to turn all of the resistance switches OFF.

● If input filtering is needed, turn the FILTER switch ON. Further, when the repeater pulse from a YEWSERIES BCS instrument is applied as the input signal, be sure to turn the input filter swtich OFF.

```
┌─────────────────NOTE─────────────────┐
│ Select an appropriate time-constant from 0 to │
│ 9999 seconds and set it into the auxiliary data │
│ items 17 and 18 "Pulse Input Filter", when the │
│ displayed value of instantaneous flow (or │
│ analog flow repeater signal) wavers owing to │
│ the irregularity of input pulse signal. │
│ As for setting operation to instrument, refer to │
│ Chapter 5-3-4 (Setting Auxiliary Data). │
└───────────────────────────────────────┘
```

(3) Control action selector switch (ACTION).
   Set to the desired control action position.

(4) Data setting enable/inhibit switch (ENABLE/INHIBIT)
   Set this switch to INHIBIT during normal operation.

(5) Data/decimal point selector switch (D.P./DATA).
   Set this switch to DATA during normal operation. Set this switch to D.P when decimal point is to be set.

(6) Main data/auxiliary data selector switch (FRONT P./SIDE P.)
   Set this switch to FRONT P. (main data) during normal operation and set this switch to SIDE P. when setting auxiliary data.
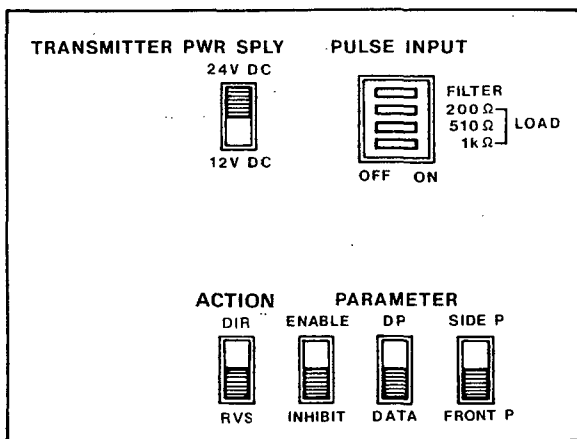

Figure 5-3-4. Side Panel Switches.

5-3-3. Setting Main Data.

The following main data must be set before commencing operation.

   Blending ratio (RATIO)

(1) Setting the data.
   Turn on the power, set the main data/auxiliary data selector switch on the side panel to FRONT P. (main data) position, set the data/decimal point selector switch to DATA, then select the data item to be set and display it on the lower section of the display using the data display selector switches $\boxed{\blacktriangle}\boxed{\blacktriangledown}$. Next, perform the following operations.
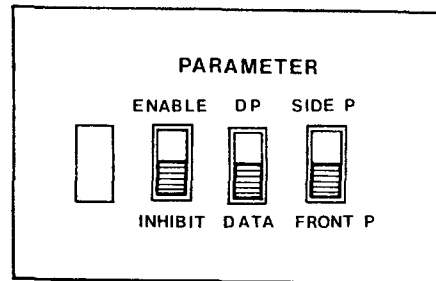
Figure 5-3-5.

[Example of display and setting (blend ratio)]

Switch operation	Display (lower)	Description
		The initial value of the blending ratio value or an already set value is indicated.
SHIFT ▶		The most significant digit that may be set flashes.
INCR ▲		Set the desired data. If setting is not needed, go to the next step.
SHIFT ▶		The next most significant digit flashes.
INCR ▲		Set the desired data. If setting is not needed, go to the next step.
INCR ▲		Repeat the above setting operation to the least significant digit.
SET		The whole data thus set flashes.
SET		Data setting is completed.

Note: The shaded portion ▒ indicates flashing of data display.

(2) Setting the decimal point.

Set the decimal point for the blending ratio setting as auxiliary data item 13.

5-3-4. Setting Auxiliary Data.

As described below, the auxiliary data values must be set to correspond with the data on the data label prepared in section 5-2:

NOTE

If this controller has been ordered with data label (option /DL), the data has already been set at the factory according to the data label prepared by YEW.

Before starting operation, be sure to check that each data item has been set correctly (to correspond with the label).

If any error is found, correct the data setting as explained below.

NOTE

Auxiliary data should be set in the sequence items 21 thru 40, items 04 thru 20.

---

(1) Setting the decimal point.

Set the main data/auxiliary data selector switch on the side panel to SIDE P. (auxiliary data) position, set the data/decimal point selector switch to the DP position, then set the data setting enable/inhibit switch to ENABLE. Using the data display selector switches $\boxed{\blacktriangle}\boxed{\blacktriangledown}$, select the data whose decimal point is to be set, and display it on the lower section of the display. Next perform the following operations:

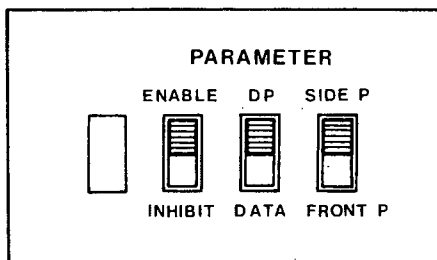**PARAMETER**

ENABLE   DP   SIDE P

INHIBIT   DATA   FRONT P

Figure 5-3-6.

[Decimal point position setting example]

Switch operation	Display (lower)	Description
SHIFT▶	(Note 1)	The initial value is displayed.
		The decimal point of the initial value flashes.
SHIFT▶	*	When the SHIFT switch is held depressed, the decimal point position changes digit by digit and the decimal point position flashes. When the decimal point reaches the desired position, release the switch.
SET	(Note 2)	The entire display flashes.
SET		Decimal point setting completed.

Note 1: The * mark indicates a flashing decimal point.
Note 2: The shaded portion ▒ indicates flashing digit.

(2) Setting data.

Set the main data/auxiliary data selector switch to SIDE P. (auxiliary data), set the data/decimal point selector switch to DATA, and set the data setting enable/inhibit switch to ENABLE. Then select the data item to be set and display it on the lower display section using the data display selector switches $\boxed{\blacktriangle}\boxed{\blacktriangledown}$. Next set the data. The data is set in the same way as for main data. Refer to the main data setting example of par. 5-3-3.

PARAMETER

ENABLE   DP   SIDE P
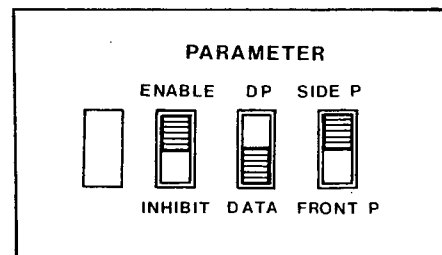
INHIBIT   DATA   FRONT P

Figure 5-3-7.

After completing data setting, set the data setting enable/inhibit switch to INHIBIT so as to prevent accidental (erroneous) setting.

Unused Auxiliary Data

Auxiliary data that is not being used — according to the function specification — is skipped.

5-3-5. Simulation.

After setting the main and auxiliary data, check the operation of the control function using the simulation function of SLCC*E. (Refer to TI 1B4A3-01E.)

Set auxiliary data item 22 [function specification (2)] H Process variable flow signal/simulation specification to simulation mode, and check the operation (refer to 5-4-1 "Start-up procedure" and Table 5-3-1 below).

In simulation mode, if set pulse input signal is applied externally, a process variable corresponding to the preset blending ratio is generated to carry out blending ratio control action.

In simulation mode, contact outputs (D/O) and control output (MV) can be inhibited if so specified. (Refer to Table 5-3-1.)

Table 5-3-1. Auxiliary Data Simulation Specifying Item.

22. Function specification (2)

G H I J K L

H Process variable flow signal/simulation specification
0: Pulse flow signal
1: Analog flow signal
2: Simulation, MV inhibit, D/O inhibit
3: Simulation, MV inhibit, D/O enable
4: Simulation, MV enable, D/O inhibit
5: Simulation, MV enable, D/O enable

5-3-6. Other Preparations.

(1) Attach coefficient/units label.

Choose suitable coefficient and engineering units labels from those supplied with the controller, and stick them in the appropriate place on the front panel. (See Figure 5-3-8.)

If a suitable label is missing, use a blank label and write the necessary coefficient or units on it.
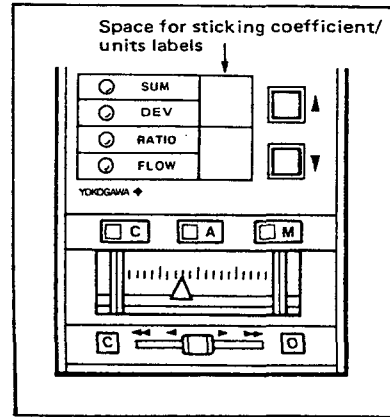

Figure 5-3-8.

(2) Mounting control valve action labels (Figure 5-3-9).

Match the label location with the action (normal or reverse action) of the control valve.

The labels can be removed using tweezers or finger nails.

C: CLOSE (Control valve closing direction).
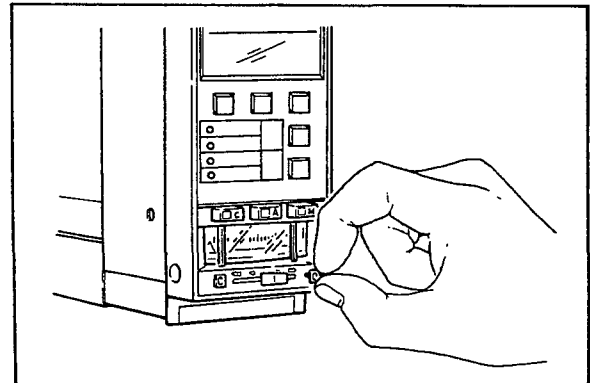
O: OPEN (Control valve opening direction).

Figure 5-3-9. Mounting Control Valve Action Labels.

5-4. Operation.

After setting main data and auxiliary data, start up the controller as described below. If the integral time and proportional band have already been set (that is, for daily start up), steps ① and ⑥ are unnecessary.

Step ③ is not needed except when changing the preset blend ratio.

Note that the operations required to start pumps and other devices are not described in this manual.

5-4-1. Start Up.

① Set the control mode to $\boxed{M}$, and set the integral time to 9999s. Set the proportional band to a sufficiently large value.

② Set the control mode to $\boxed{A}$, or — to enable setting and control from a supervisory system — set the control mode to $\boxed{C}$.

③ Set the main data blending ratio to the desired value. (Refer to 5-3-3 "Setting Main Data".)

④ Turn ON the reset signal (reset status input).

The totalized measured flow and the totalized deviation are reset, and the controller begins operating.

The RESET status input uses non-locking contact which is "reset" in the ON state (minimum on time at least 220 ms).

⑤ If the system is a master oscillator based system (blending set unit based system), perform system operation as described in SBSD*E Batch Set Station. Refer to the instruction manual for SBSD*E Batch Set Station (IM 1B4E1-02E).

If the system is a master line based system, the system starts operating when the flow starts in the master line.

⑥ Set the integral time and proportional band according to 5-4-2 "Automatic Control".

5-4-2. Automatic Control

The procedure for setting controller integral time and proportional band is explained below. In general, if a small change in the controller output causes a large fluctuation in the process variable value, the width of the proportional band must be increased (the gain must be reduced) to assure stability. In the converse case, the proportional band must be narrowed.

For a process which responds quickly to a change in the controller output, the integral time constant must be small. For a process having a long recovery time, the integral time constant must be large.

Set the integral time and proportional band as follows:

(1) Set the control mode to $\boxed{M}$, and the integral time to 9999s. Set the proportional band to a sufficiently large value, and then set the control mode to $\boxed{A}$.

(2) To obtain the optimum value for the proportional band, perform the following operations:

Decrease the value of proportional band from its initial large value in steps (for example, from 100% to 50% to 20%). Take a sufficiently long time for each step, so that the state of control can be observed fully. Continue this operation until the control loop begins cycling. (Cycling means periodic oscillation of the process variable pointer around the set point; this phenomenon is caused by setting the proportional band narrower (setting the gain higher) than the optimum value for the process.)

If cycling occurs, increase the width of the proportional band until the meter indication stabilizes.

(3) Decrease the integral time in steps. Up to a point, decreasing the integral time improves the speed of response of the controller, but if the integral time is shortened too far, cycling is caused due to dead time in the process. In such a case, increase the integral time gradually until the cycling disappears.

5-4-3. Transferring between Control Modes.

(1) Control mode transfer.

The controller mode can be freely selected by pressing the $\boxed{C}$, $\boxed{A}$ or $\boxed{M}$ pushbutton. (Figure 5-4-1)

(Note that a direct changeover from $\boxed{M}$ to $\boxed{C}$ is prohibited.)

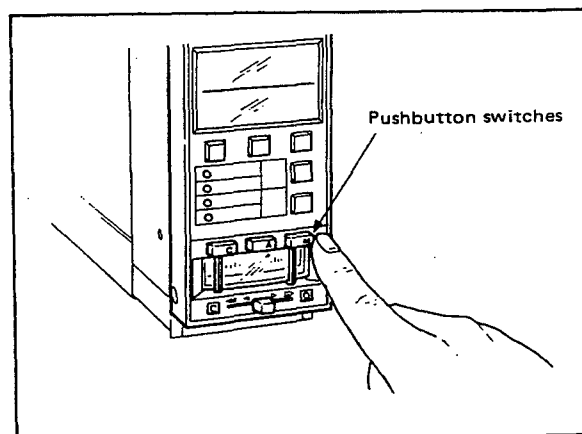These changes require no balancing operation, and can be changed bumplessly.

Figure 5-4-1. Transfer between Control Modes.

(2) Resetting the totalizer deviation during a manual $\boxed{M}$ to automatic $\boxed{A}$ transfer.

The totalizer deviation can be reset automatically when the mode is changed from $\boxed{M}$ to $\boxed{A}$ with an auxiliary data function specification.

Table 5-4-1 shows how the function specification is set.

Table 5-4-1.

---

21. Function specification (1)

A	B	C	D	E	F

└─D Operation mode
    0: Batch blending controller
    1: Flow ratio controller

If this controller is to be used as a batch-blending controller, set this function to "0". In this case, the totalizer deviation is not reset during the changeover from $\boxed{M}$ to $\boxed{A}$.

If this controller is to be used as a flow ratio controller, set the above-listed function to "1". This causes the totalizer deviation to be reset automatically during the changeover from $\boxed{M}$ to $\boxed{A}$. However, if it is unnecessary or undesirable to reset the totalizer deviation when using this instrument for flow ratio control, be sure this function is set to "0".

5-4-4. Manual.

(1) Select the $\boxed{M}$ mode switch. (The lamp inside the pushbutton lights.) (Figure 5-4-1).

(2) Move the manual control lever to left (or right) to adjust the output signal until the totalizer deviation is zero. (Figure 5-4-2).
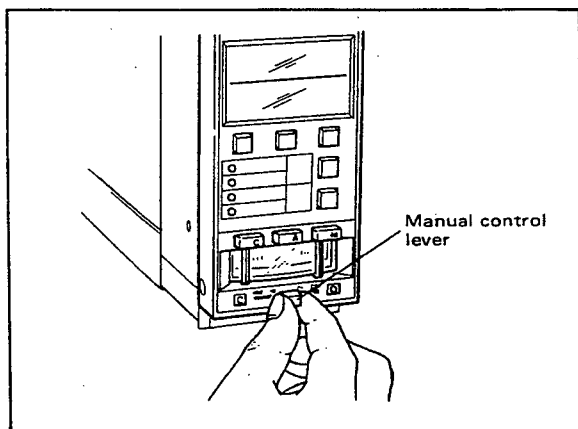

Manual control lever

Figure 5-4-2. Manual Output Control.

5-4-5. Resetting Cumulative Totalizer Value.

The cumulative totalizer values contained in auxiliary data items 04 and 05 are not reset by the reset signal. If resetting is needed, set this auxiliary data to zero using the data setting switches. For the setting procedure, refer to 5-3-4 "Setting auxiliary data".

5-5. Action to be Taken when FAIL or ALM Lamps Light.

Any faults in the controller or in the signal connections are indicated by the FAIL or ALM lamps lighting. If either of these lamps lights (or begins flashing), please take appropriate action (as described below) without delay.

5-5-1. Action to be Taken when FAIL Lamp Lights.

When the FAIL lamp lights and the FAIL contact output opens, this indicates that a serious fault has occurred inside the instrument.

(1) Monitor the current output signal, and set it to a safe level using the manual control lever.
    (In FAIL status, the current output can be directly controlled by the manual control lever. The value of other analog and digital output signals depends on the type of fault.)

(2) Set the main data/auxiliary data selector switch to the auxiliary data position to indicate the alarm (ALM) contents of auxiliary data item 01 on the data display, and check the cause of the fault. (See Figure 5-5-4). Take appropriate action to correct the fault.

(3) If the data display does not function normally, it can be presumed that the microprocessor is not operating.

5-5-2. Action to be Taken when ALM Lamp Lights.

The ALM lamp lights if the high or low limit alarms of the controller operate, or when input-output signals are disconnected.

Display the alarm (ALM) contents of auxiliary data item 01 on the data display, and examine the cause of the fault. (See 5-5-4.) Take appropriate action corresponding to the cause of the fault.

5-5-3. Action to be Taken when ALM Lamps Flashes.

The ALM lamp begins flashing if the voltage of the data memory backup battery is low. Replace the battery with a new one. (See section 6-4 for replacement procedure.)

```
─────────── NOTE ───────────
(1) If the ALM lamp begins to flash during
    normal operation, replace the battery within
    one month.
(2) A flashing ALM lamp takes precedence
    over a continuously illuminated alarm lamp.
    Thus, other alarms cannot be displayed
    while this lamp is flashing.
```

5-5-4. Alarm (ALM) Codes, their Meanings and Control Actions when Abnormal.

The alarm codes and their meaning are listed below.

Note: In the computation of basic equation (see page 2-2) of volume conversion coefficient, if $|\alpha_\gamma \Delta t| >$ 0.5, "0010" alarm occurs also.
At this time, computation is continued with the value limited at 0.5 or −0.5. This processing is executed to prevent the internal data overflow if improper input or set value is applied.

If two or more faults occur simultaneously, the hexadecimal sum of their code numbers is displayed.

[Example]

```
┌─────────────────────┐
│        030C         │
└─────────────────────┘
```
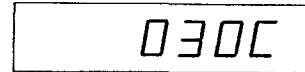
030C = 0004 + 0008 + 0100 + 0200 (computation range overflow, temperature input/compensation coefficient input signal out of range, process variable input signal out of range, setting input signal out of range)

The diagnostic alarm code display reverts to zero and the ALM lamp turns off when the cause of the fault is removed, except for the following items.

Select these items using the data selector switches ▲ ▼ and reset them using the [SET] key.

The items to be reset by the [SET] push botton switch.

● RAM memory data initialization
● Repeater internal data overflow

Code	Lamp	Meaning	Control actions when abnormal
0000	—	Normal.	—
—	FAIL	Fault in CPU.	FAIL contact: Open
0001	FAIL	Fault in A/D converter.	
0002	FAIL	Fault in D/A converter.	
0004	ALM	Computation range ouverflow.	Computation using limit value.
0008	ALM	Temperature input/compensation coefficient input signal out of range.	Computation using manual set value/ manual compensation coefficient.
0010 (Note)	ALM	Error in compensation computation.	● Computation is performed with limit value. ● Control is continued.
0020	ALM (flashing)	Data memory backup battery not installed, or low battery voltage.	Operates normally unless power failure occurs.
0040	ALM	Control output open circuit.	Control continues.
0080	ALM	RAM memory data initialization.	Computation using initial value.
0100	ALM	Process variable input signal out of range.	Computation using limit value. Control continues. Alarm contact open if deviation alarm.
0200	ALM	Setting input signal out of range.	
0800	ALM	1st stage totalizer deviation alarm.	
1000	ALM	2nd stage totalizer deviation alarm.	
2000	ALM	Repeater internal data overflow.	
4000	ALM	Data setting out of range.	

6. MAINTENANCE.

This chapter explains the indicator adjustment and parts replacement procedures.

6-1. Adjusting Zero Point of Control Output Indicator.

Pull the instrument module about 80 mm out of the housing. The zero point adjustment is located under the module, approximately 60 mm from the front panel.

Adjust the zero using a standard screwdriver. (See Figure 6-1-1).
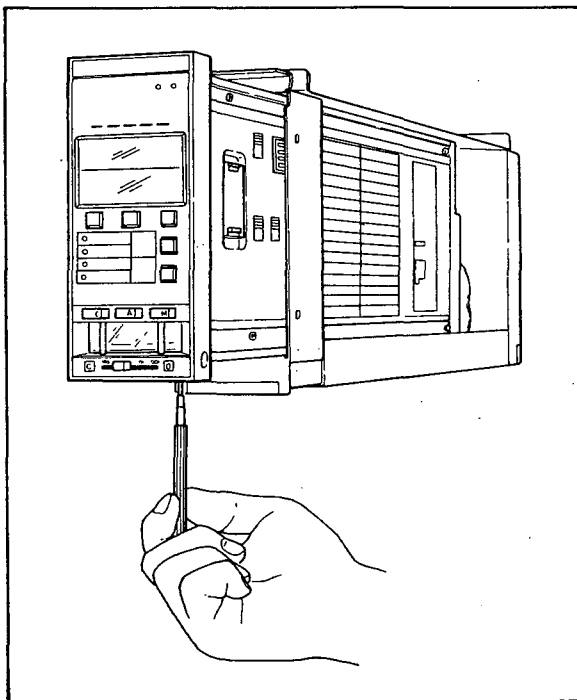

Figure 6-1-1. Adjusting Zero Point of Control Output Indicator.

6-2. Replacing Nameplate (Tag Label).

Draw out the instrument module a little from its housing, and open the lid located on the top of the front panel. Remove the nameplate, and install a new one. (Figure 6-2-1).
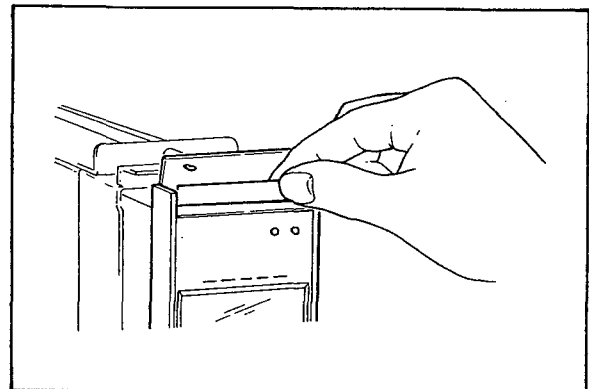

Figure 6-2-1. Replacing Nameplate.

6-3. Replacing Fuse.

If it seems that the fuse may be faulty, check the inside of the fuse holder for contamination or poor contact with fuse.

Recommended replacement interval: About 3 years.

(1) To remove the fuse, unscrew the fuseholder cap (turn it in the direction of the arrow marked on the cap — counterclockwise); the cap and fuse may then be removed.

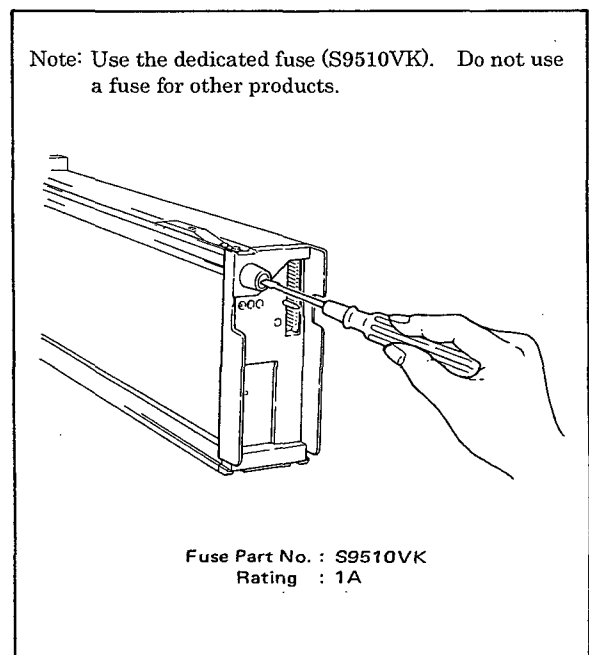(2) Install a new fuse of the correct rating. Tighten the cap firmly.

Note: Use the dedicated fuse (S9510VK). Do not use a fuse for other products.

Fuse Part No. : S9510VK
Rating   : 1A

Figure 6-3-1. Replacing Fuse.

6-4. Replacing Data Memory Backup Battery.

If the ALM lamp on the front panel of the instrument begins flashing, please replace the battery without delay.
Recommended replacement intervals:
About 5 years (charging, at ambient temperatures below 45°C)
About 1 year (shelf-life, at ambient temperatures below 45°C)

```
———————————— NOTE ————————————
Leave power applied to the instrument while
replacing the battery. If the battery is removed
while the power is off, data (parameter) set-
tings may be lost.
```

(1) Draw out the controller module a little from the housing, and remove the battery cover and battery. (See Figures 6-4-1 and 6-4-2.)
(2) Install a new battery, and fit the battery cover securely.
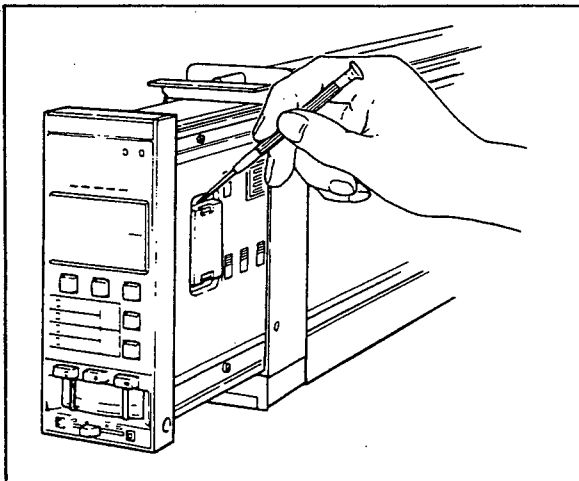(3) Make sure that the ALM lamp on the front panel has stopped flashing.

Figure 6-4-1. Removing Battery Cover.

[Precautions for storage and handling of data memory backup batteries]
(1) Storage conditions
Ambient temperature: −10 to 60°.
Ambient humidity: 5 to 95% RH (non-condensing).
Location free from corrosive gases.
(2) Replace the complete battery assembly (battery in plastic plug-in package).
(3) When measuring the battery voltage, be sure to use a high impedance voltmeter. Do not attempt to measure the voltage using a circuit tester or the like.
(4) Cautions in handling batteries
● Do not charge the batteries.
● Do not heat or put into a fire.
● Do not short the positive and negative poles together.
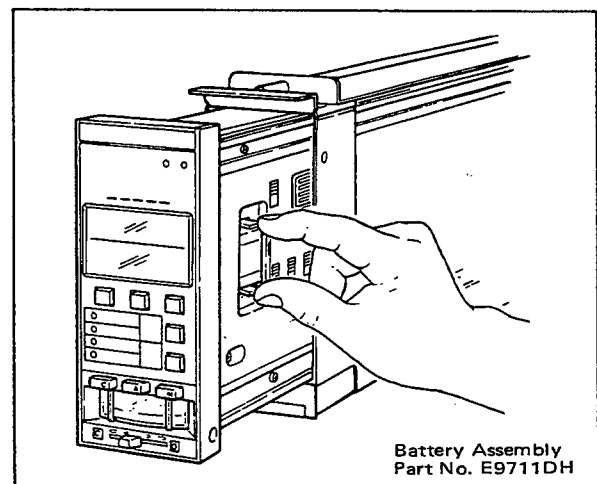● Do not apply shock, do not attempt to disassemble.

Battery Assembly
Part No. E9711DH

Figure 6-4-2. Removing Battery.

YEWSERIES BCS

SLCC*E BLENDING CONTROLLER DATASHEET

Spec. No.			
YOKOGAWA Order No.	SEC.	Loop	Item

Customer:

Equipment:

Instrument No.

Model and Suffix Codes
SLCC-

SLCC*E Blending Controller	TAG No.					
01	Alarm (ALM) code			11		
02	Flow totalizer value (uncompensated)			12		
03				13	Blend ratio	
04	Cumulative totalizer value (uncompensated)			14	Integral time	S
05	Cumulative totalizer value (compensated)			15	Proportional band	%
06	Deviation alarm 1st stage set value			16	Measured temperature/compensation coefficient input	
07	Deviation alarm 2nd stage set value			17	Measured pulse input filter	
08				18	Pulse set point input filter	S
09				19		
10				20		

21	Function specification (1)			31	Dilution ratio	
22	Function specification (2)			32	Compensation reference temperature	
23	Function specification (3)	– –		33	Manual set temperature/Manual compensation coefficient	
24				34	Maximum value of measured temperature/ Maximum value of compensation coefficient	
25	Flow process variable span			35	Minimum value of measured temperature/ Minimum value of compensation coefficient	
26	Flow setpoint span			36	Compensation factor	
27	K factor for flow process variable			37	Flow transmitter error compensation coefficient α	
28	K factor for flow setpoint			38	First order compensation coefficient β/density or specific gravity ρ	
29	K factor for repeater pulse			39	Second order compensation coefficient γ	
30	Totalizer scale factor			40		

△	NO.	Revised by	CH.	CH.	K	USER		D		E		K
△		/	/	/	/	DR.	CH.	DR.	CH.	DR.	CH.	
△		/	/	/	/							
△		/	/	/	/.							

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Item	Part No.	Qty	Description
1	E9711TG	1	Cover
2	Y9405LB	1	B.H. Screw, M4 x 5
7	Y9422NP	1	Tag No. Label (blank)
10	E9711DH	1	Battery Assembly
11	E9711GQ	1	Cover
12	E9714RJ	1	Data Label
13	E9712DL	1	Label
14	E9712DS	1	Label (blank)
15	E9714RP	1	Alarm Code Sheet
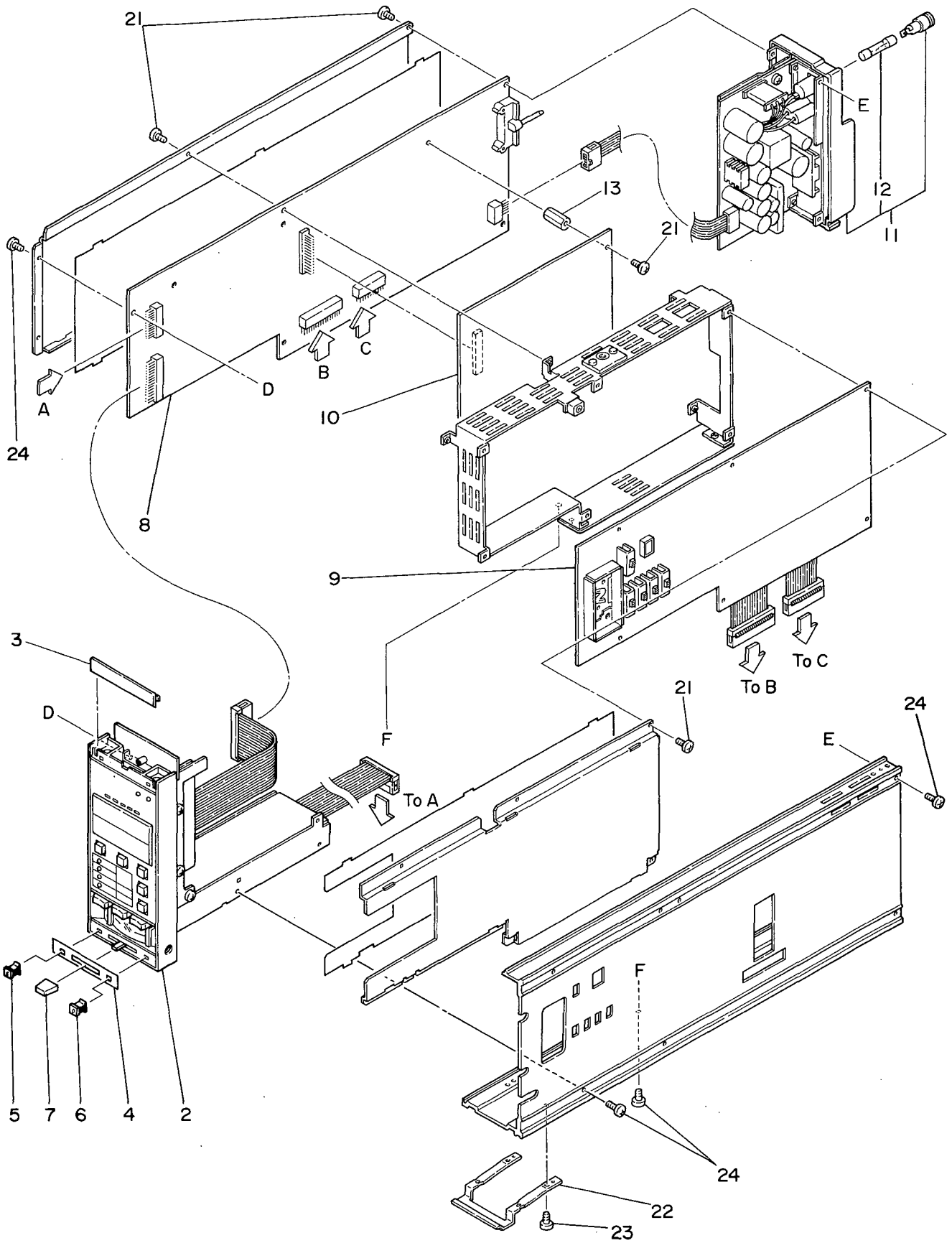
Item	Part No.	Qty	Description
2	—	1	Display Assembly (see page 4)
3	E9711FG	1	Plate (blank)
4	E9711KE	1	Plate
5	E9711KC	1	Tip — "C"
6	E9711KD	1	Tip — "O"
7	E9711KA	1	Knob
—	—	1	Control Assembly (item 8 through 21)
8	E9714TB	1	I/O Card
9	E9714WB	1	CPU Card
10	E9714XA	1	Option Card (for Model SLCC-200*E)
	E9714XB	1	Option Card (for Model SLCC-300*E)
11	E9716YB	1	Power Supply Unit (for 100 V version)
	E9716YS	1	Power Supply Unit (for 220 V version)
12	S9510VK	1	Fuse — "1A"
13	T9008ZB	2	Stud
21	Y9306JB	16	Pan H. Screw, M3 x 6
22	E9711TD	1	Stopper
23	E9711TE	2	Screw
24	Y9306JB	10	Pan H. Screw, M3 x 6

Display Assembly
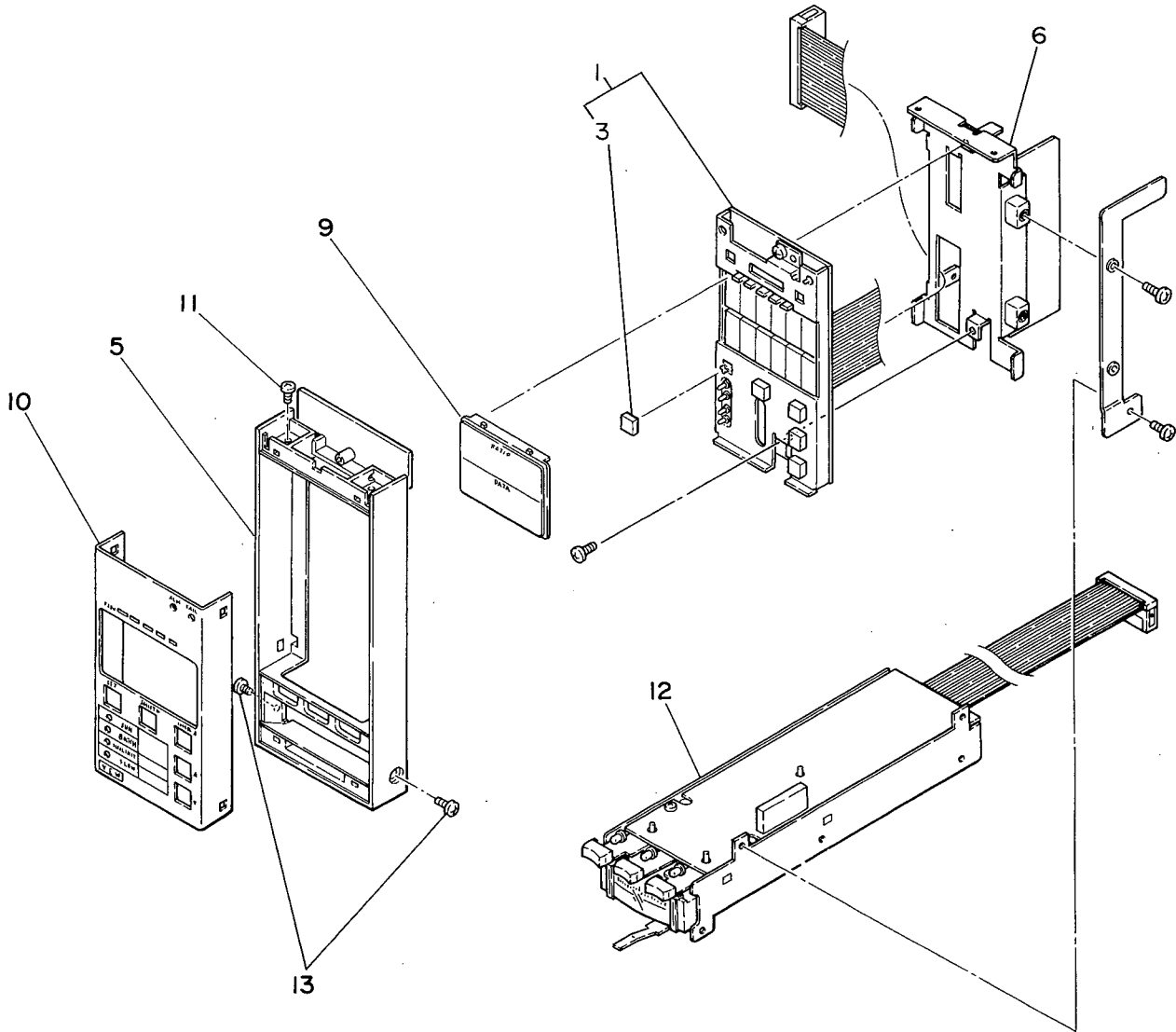
Item	Part No.	Qty	Description
—	E9714GC	1	Display Assembly (item 1 through 11)
1	E9714PF	1	Display Card Assembly
3	E9712CC	5	Key Top
9	E9711GG	1	Cover
10	E9711HD	1	Bracket
11	Y9306JB	2	Pan H. Screw, M3 x 6
12	E9711KX	1	A/M Unit
13	Y9306JB	2	Pan H. Screw, M3 x 6

Instruction Manual

/ HTB
Power Supply Terminal
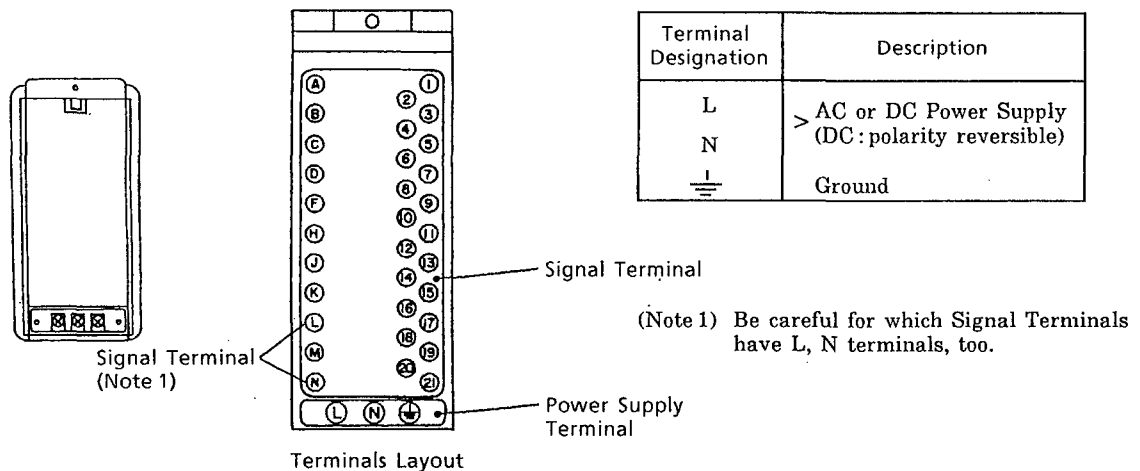Connections for Panel - mounted
Instruments (Option)

1. GENERAL.

If you specify the terminal board to which the power source is directly connected (suffix code / HTB), the external wiring to the terminal board is necessary.

2. APPLICABLE INSTRUMENTS.

Model	Description
SRVD	Strip Chart Recorder
SIHM	Indicator (With Housing)
SIHF	Bar Graph Indicator (With Alarms)
SIHK	Indicator (With Alarms)
SLCD	Indicating Controller
SLPC	Programmable Indicating Controller
SLMC	Programmable Indicating Controller with Pulse → Width Output
SMLD	Manual Station
SMST	Auto / Manual Station
SMRT	Ratio Set Station
SCMS	Programmable Computing Station
SBSD	Batch Set Station
SLCC	Blending Controller
SLBC	Batch Controller
STLD	Totalizer

3. NAME OF COMPONENTS AND TERMINAL DESIGNATION OF POWER SUPPLY

Terminal Designation	Description
L N	AC or DC Power Supply (DC: polarity reversible)
⏚	Ground

Signal Terminal

(Note 1) Be careful for which Signal Terminals have L, N terminals, too.

Power Supply Terminal

Signal Terminal (Note 1)

Terminals Layout

4. POWER SUPPLY AND GROUND WIRING.

(1) All cable ends must be furnished with crimp - on type solderless lugs (for 4mm screw).

(2) Examples of applicable cables.

Cross - sectional area of the cable conductor : 2.0mm^2.*

Note * : Power supply cables should be determined from the instrument power consumption - they must have conductors with cross - sectional area of at least 1.25mm^2.

Applicable cable : 600V vinyle insulated cable (IV), conforming to JIS C3307.

Vinyle sheathed cables for electric appliances (KIV), conforming to JIS C3316.

(3) After completing the power supply and ground wiring, mount the power terminal cover.

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wq

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