User's
Manual

YS100 SERIES

Model YS150
Single-Loop Multi-Function Controller
Model YS170
Single-Loop Programmable Controller

IM 1B7C1-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 1B7C1-01E
9th Edition

Introduction

This User's manual is for YS150 Single-Loop Multi-Function Controller and YS170 Single-Loop Programmable Controller.

• Checking of Package Contents

The package of model YS150 Single-Loop Multi-Function Controller or YS170 Single-Loop Programmable Controller contains the following items when delivered. Check the contents immediately after unpacking. If anything is missing, please contact the dealer at whicth you purchased this or your nearest Yokogawa servise / sales agency.

① **Single-Loop Controller**
② **Mounting Bracket** : 1 set (2 pcs)
③ **Tag Number Label** : 1 set (4 pcs)
④ **Range Entry Label** : 1 set (4 pcs)
⑤ **Instruction manual**:
IM 1B7C1-01E (This manual)
IM 1B7C8-03E Communicaion Manual (supplied only for models with RS-485 or DCS-LCS communication function)
⑥ **Ferritic core** : 1 pcs
(Supplied only for models with direct input option for CE Marking)

• Storage of Packing Box and Inner Package

Please keep the Packing box and inner package, because they are necessary to send the YS150 / YS170 to our Yokogawa sales / service office or the dealer from whom the unit was purchased in case of trouble.

• Intended Readers

This manual is intended for personnel who have enough on-the-job experience as maintenance technician in charge, party of construction execution instrumentation and control engineers, start up engineers and party of plant operation and monitoring.

9th Edition: Aug. 2004 (KP)
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• Before Reading This Manual

Two types of YS100 Series single-loop controllers are available : YS150 Single-Loop **Multi-Function Controller** and YS170 Single-Loop **Programmable Controller**. The YS150 controller runs on one of three controller modes: single-loop mode, cascade mode and selector mode, depending on your choice. The YS170 controller allows you to program control functions flexibly, and also runs on one of three controller modes in the same manner as the YS150 controller does.

This installation manual has been prepared for both two types of controllers. Explanation for the multi-function type is titled as Multi-Function Controller, and that for the programmable type is titled as Programmable Controller. Therefore, you can choose and read only necessary information on your product. (Note that information without such descriptive identification is for both types of controllers.)
When you use the YS170 controller as a multi-function type controller, read the information described under the title Multi-Function Controller.

Start-Up Process and Document Map

Figure 0.1 shows the flow chart of process of the YS100 Series Single-Loop controller.
Table 0.1, "YS100 Series Document Map," lists the documents for the YS100 series and highlights the position of this document. Refer to this map when handling this product.

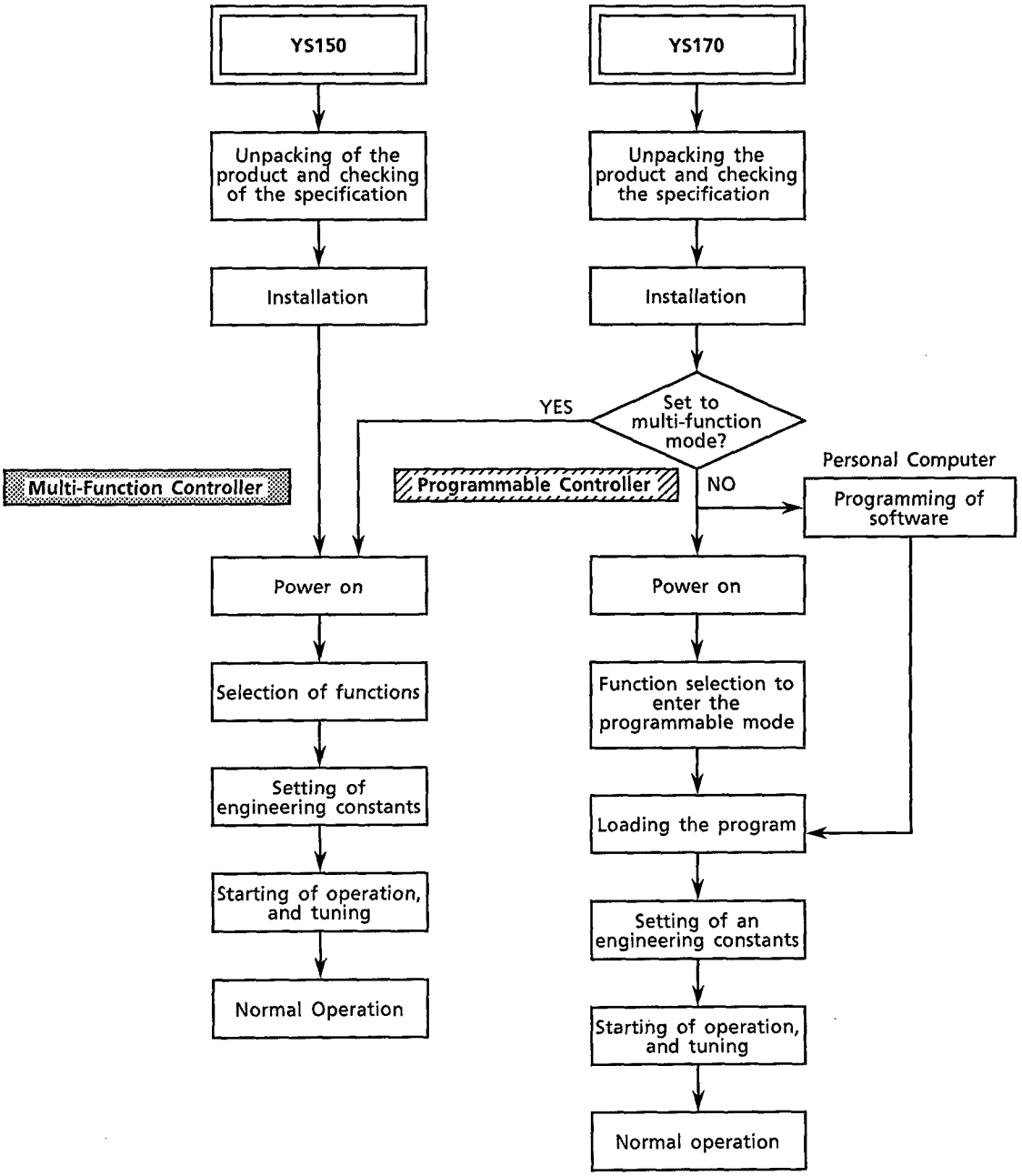

Figure 0.1 Flow Chart of Start-Up Process

Document Map

Table 0.1 lists the documents (Technical Information and User's Manual) to be read at each step of starting up process. Refer to the appropriate documents when using the YS110 Standby Manual Station.

Table 0.1 YS100 Document Map

Document Class	Document No.	Title	Usage (◎: Essential, ○ : For Reference)				
			Programming for YS170	Engineering for function selections and parameter settings	Tuning	Normal Operation	Installation and Maintenance
Technical Information	TI 1B7A1-01E	YS100 SERIES Information	○	○		○	
	TI 1B7C0-01E Note 2	Intelligent Self-tuning Controllers			◎		◎
	TI 1B7C1-01E	YS100, YS170 Single-loop Controller Control Functions	◎	◎	◎	◎	
	TI 1B7C2-03E Note 3	YS170 Programmable Functions	◎		○		
	TI 1B7C8-03E Note 1	Communication Functions (RS-485, DCS-LCS)		◎		◎	
	TI 1B7C8-04E Note 5	YS-net Peer-to-peer Communication Functions		◎			
	TI 1B7C8-05E Note 5	YS-net Personal Computer Communication Functions		◎		◎	
User's Manual	IM 1B7C1-01E	YS150 Single-loop Multi-function Controller YS170 Single-loop Programmable Controller	◎	◎	◎	◎	◎
	IM 1B7C8-03E	YSS20 Programming Package	◎				
	IM 1B7C8-03E Note 1	RS-485 Communication Functions (/A31) DCS-LCS Communication Functions (/A32)		◎		◎	◎
	IM 1B7D2-01E	YS131 Indicator with Alarm		◎	○	◎	◎
	IM 1B7D3-01E	YS135 Auto/Manual Station for SV Setting		◎	◎	◎	◎
	IM 1B7D4-01E	YS136 Auto/Manual Station for MV Setting		◎	◎	◎	◎
	IM 1B7D5-01E Note 4	YS110 Standby Manual Station				◎	

Note 1: Only when used with supervisory communication functions
Note 2: Only when using self- tuning functions
Note 3: Only for YS170 programmable controllers
Note 4: The YS110 can be a standby station only for the YS150, YS170, or YS136
Note 5: Only when using YS net communication functions

Notices

• Regarding This Manual

1. This Manual should be passed on to the end user.
2. Read this manual carefully and fully understand how to operate this product before you start operation.
3. Yokogawa makes no warranty of any kind with regard to this material, but not limited to, implied warranties of merchantability for particular purpose.
4. All rights reserved. No part of this manual may be reproduced in any from without Yokogawa's written permission.
5. The contents of this manual are subject to change without prior notice.
6. If any question arises or errors are found, or if there is any information missing from this manual, please inform Yokogawa's documentation department responsible for this manual or the nearest Yokogawa sales office, or use the form in the back of this manual to inform us accordingly.

• Regarding Protection, Safety, and Prohibition Against Unauthorized Modification

1. For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions on safety described in this manual when handling the product. In addition, if you handle the product in contradiction to these instructions, our company does not guarantee safety.
2. The following safety symbol marks are used on the product concerned and in this manual:
   Les symboles suivants touchat à la sécurité sont utilités sur le produit concerné et dans ce manuel.

⚠ **CAUTION:**

This marking on the product indicates that the operator must refer to an explanation in the instruction manual in order to avoid injury or death of personnel or damage to the instrument. The manual describes that the operator should exercise special care to avoid electric shock or other dangers that may result in injury or the loss of life.

ATTENTION:

Ce symbole marqué sur le produit indique que l'opérateur doit se reporter au manuel d'instruction pour éviter tout accident corporel ou tout dégàt matériel.

Le manuel d'instruction indique que l'opérateur doit faire particulièrement attention pour éviter tout choc électrique ou autre accident pouvant entrainer un accident ou la mort.

Protective ground terminal :

In order to provide protection against electrical shock in case of a fault. This symbol indicates that the terminal must be connected to ground prior to operation of equipment.

Borne de connexion à la terre de protection :

Ce symbole indique que la borne doit être reliée à la terre de protechon avant toute utilisation du matériel, dans le but de se protéger d'une électrocution en cas de défaillance.

Function ground terminal :

In order to provide protection against noise.
This symbol indicates that the terminal must be connected to ground prior to operation of equipment.

Borne de connexion à la terre contre le bruit :

Ce symbole indique que la borne doit être reliée à la terre sans bruit avant toute utilisation du materiel, dans le but de se protéger du bruit.

Indicates the power switch is " **ON** ".

Ce symbole indique que le commutateur de mise sous tension est en position de " **Marche** ".

Indicates the power switch is " **Stand - by** ".

Ce symbole indique que le commutateur de mise soustension est en position de " **Veille** ".

Indicates the power switch is on " **OFF** ".

Ce symbole indique que le commutateur de mise soustension est en position de " **Arret** ".

Indicates the direct current.
Indique le courant continu.

Indicates the alternating current.
Indique le courant alternatif.

CAUTION A CAUTION sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

Le symbole CAUTION annonce un risque Il désigne une procédure, une marche à suivre ou autre qui, n'étant pas correctement observée, peut entainer un dommage ou une destruction partielle ou totale du produit.

The symbolic conventions below are used only in the manual.
Les conventions suivantes sont utilisées uniquement dans le manuel d'instruction.

IMPORTANT:

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

IMPORTANT:

Indique que manipuler le matériel ou le logiciel de cette maniére peut l'endommager ou provoquer l'arrêt du système.

NOTE:

Draws attention to onformation essential for understanding the operation and features.

NOTE:

Attire l'attention sur une information essentielle pour la comprehension des opérations à effectuer ou des caractéristiques.

3. If protection / safety circuits are to be used for the product or the system controlled by it, they should be installed outside of the product.
4. When you replace parts or consumables of the product, use those spcified by our company.
5. Do not modify the product.

● Regarding Force Majeure

1. Yokogawa Electric Corporation does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
2. Yokogawa Electric Corporation assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

● Regarding Software Supplied by YOKOGAWA

1. Yokogawa makes no other warranties expressed or implied except as provided in its warranty clause for software supplied Yokogawa.
2. Use this software with one specified computer only.
   You must purchase another copy of the software for use with each additional computer.
3. Copying this software for purposes other than backup is strictly prohibited.
4. Store the streamer, tape, or floppy disk (original medium) in a secure place.
5. Reverse engineering such as the disassembly of software is strictly prohibited.
6. No portion of the software supplied by Yokogawa may be transferred, exchanged, or sublicersed or leased for use by any third party without the prior permission of Yokogawa.

Documentation Conventions

Throughout this manual, the following conventions of notation clarify the input device (keyboard, touch panel, or mouse) used.

- [Enter] represents Enter key (↵) on the keyboard.
- This manual uses the following conventional symbols.

△ **TIP:**
Gives information that complements the present topic.

See Also:
Gives the reference locations for further information on the topic.

: Indicates operation with a mouse.
: Indicates input operation from the keyboard.
: Indicates the display on a panel.

• Figures of Display Screen

- The figures that appear in this manual of display screen may sometimes be emphasized or simplified, or may fail to show the entire image for reasons of convenience in explaining them.
- These figures may sometimes differ from the real images on a screen in terms of the location at which they are displayed or the size of the characters (whether they are uppercase or lowercase letters, and so on). However, this occurs only when the difference does not interfere with due understanding of the relevant function or operation and monitoring.

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Revision Record

1. OUTLINE

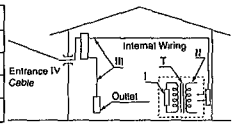
The YS150 and YS170 single-loop controllers suit various needs of users. These controllers are able to carry out fiexible control and arithmetic operations which are required for process control, and have the following features.

- Display, setting, and operation of I/O values, various constants, and built-in control functions can be controlled easily from the full-dot LCD and key switches in the front panel.
- Trend display of process variable (PV) is possible.
- The built-in EEPROM can store parameters and user programs.
- The self-tuning function aoutomatically obtains optimum values of PID parameters.
- The built-in adjustable set-point filter can provide a better response to set-point changes.
- Communication functions (optional) can be installed to enable easy connection with a distributed process control system or computer.
- The self-diagnosis function can be used to check the operation of the instrument and the status of the input and output signal lines.

CAUTION:

This equipment has Measurement category I, therefore do not use the equipment for measurements within measurement categories II, III and IV.

Measurement category		Description	Remarks
I	CAT.I	For measurements performed on circuits not directly connected to MAINS.	
II	CAT.II	For measurements performed on circuits directly connected to the low voltage installation.	Appliances, portable equipments, etc.
III	CAT.III	For measurements performed in the building installation.	Distribution board, circuit breaker, etc.
IV	CAT.IV	For measurements performed at the source of the low-voltage installation.	Overhead wire, cable systems, etc.



1.1 Standard Specifications

● **Analog Signal (Measurement category I) Input**

: 1to 5V DC, 4 points Multi-Function Controller
5points Programmable Controller
One point may be specified optionally to accept a direct input.
(One of the following : small voltage source (mV), thermocouple, resis tance temperature detector, slidewire resistance, input isolator, 2-wire transmitter, or frequency signal input)

Rated transient overvoltage :1500V (Note)

Direct input option (for /A12, /A13, /A16 and /A17)

Input : +/- 0.1V DC (for /A12)
: 17 to 333Ω (for /A13)
: 4 to 20mA DC (for /A16 and /A17)

Rated transient overvoltage :1500V (Note)

Note : It is the value for safety standards estimated in measurement category I based IEC/EN61010-1. It is not the value to guarantee its performance.

Input Resistance : 1MΩ or more

Output : 4 to 20mA, 1 point load resistance ; 0 to 750Ω
1 to 5V DC, 2points load resistance; 2kΩ or more

1 point of 1 to 5V DC outputs [Programmable Controller] can be changed to 4 to 20mA by changing the jumper connection.

● **Status Signal**

Input : 1 point [Multi-Function Controller],
6 points [Programmable Controller] (The terminals are shared with the status output signals)

Output : 5 points [Multi-Function Controller],
6 points [Programmable Controller] (The terminals are shared with the status input signals)
Transistor contact, rated output ; 30V DC / 200mA (With resistive load)

Fail Output : 1 point
Transistor contact, rated output ; 30V DC / 200mA (With resistive load)

● **Transmitter Power Supply**
: 24V DC / 30mA (Without a short-circuit protection circuit) Not insulated from the operation control circuit

● **Rated I / O Signal Conversion Accurancy**

1 - 5V Input Signal : ±0.2% of span
4 - 20mA Output Signal : ±1.0% of span
1 - 5V Output Signal : ±0.3% of span

● **Power Supply**

Rated Power Supply Voltage
: For both DC and AC
100V version ; DC drive ; 24-120V DC ⎓ (±10%), no polarity
AC drive ; 100-120V AC ~ (±10%), 50 / 60Hz (±3Hz)
200V version ; DC drive ; 135-190V DC ⎓ (±10%), no polarity
AC drive ; 220-240V AC ~ (±10%), 50 / 60Hz (±3Hz)

Under this rated voltage the instruments conform to the safety requirements in IEC/EN61010-1. On the other hand, the instruments themselves have the ability to operate under the condition as shown below which is the same as the former description of the power supply voltage.

Usable Power Supply Voltage
: For both DC and AC
100V version ; DC drive ; 20-130V DC, no polarity
AC drive ; 80-138V AC, 47- 63Hz
200V version ; DC drive ; 120-340V DC, no polarity
AC drive ; 138-264V AC, 47- 63Hz

Maximum Current Flow
: 600mA (DC drive of 100V version)
100mA (DC drive of 220V version)

Maximum Power Consumption
: 26VA (AC drive of 100V version)
29VA (AC drive of 220V version)

Current flow and power consumption at recommended voltages
: 430mA Typ. at 24V DC
19VA Typ. at 100V AC
23VA Typ. at 220V AC

● **Insulation Resistance** : Between the I/O terminals and the grounding terminal;
100MΩ / 500V DC
Between the power supply terminals and the grounding terminal;
100MΩ / 500V DC

● **Withstanding Voltage** : Between the I/O terminals and the grounding terminal;
500V AC for 1 minute
Between the power supply terminals and the grounding terminal;
1000V AC for 1 minute for power supply specification of 100V AC
1500V AC for 1 minute for power supply specification of 220V AC

● **External Circuit Breaker Rating**
: 5A (For both AC and DC drive of 100V and 220V version)
Must conform to IEC60947-1 or IEC60947-3 standard. Must install the breaker in the same room as the utilized devices, and clearly indicate that is used to de-energize the devices.

● **Noise Reduction Ratio**
Common Mode Noise : 83dB (50Hz)
Series Mode Noise : 46dB (50Hz)

● **Installation** : Direct panel-mount
Use mounting brackets (for the top and bottom)

● **Signal Connections** : Terminal connections with M4 screws (for external signal, power supply and grounding)

● **Weight** : 2.6kg

● **Installation Conditions**
Ambient Temperature : 0 to 50°C
Relative Humidity : 5 to 90%RH (No dew condensation)
Temperature gradient : Within ±10°C/h
Installation location : Room
Installation height : Altitude up to 2,000m
Installation category based on IEC 61010 : II (*1)
Pollution Degree based on IEC 61010 : 2 (*2)

*1: Installation category is the specification of the impulse withstanding voltage which is also called as overvoltage category.

*2: Pollution degree is the level of foreign body adhesion such as the solid, liquid. and gas which decrease the withstanding voltage, 2 means general indoor atmosphere.

● EMC Conformity Standards

The YS150 / YS170 with the option / CE has the EMC conformity as shown below.

Compliant with EN61326.

No	Test Item	Test Specification	Performance Criteria
1	Electric discharge	4kV (contact) 8kV (air)	B
2	Radio-frequency electromagnetic field Amplitude modulated	80MHz -1GHz 10V/m (unmodulated) 80% AM	A
3	Radio-frequency electromagnetic field Pulse modulated	900MHz 10V/m (unmodulated) Duty 50%, 200Hz REP.	A
4	Fast transients common mode	2kV, 5 / 50 (Tr / Th) ns 5kHz REP.	B
5	Radio-frequency common mode Amplitude modulated	150kHz -80MHz 10V/m (unmodulated) 80% AM (1kHz) Source Impedance 150Ω	A

Note (1) Definition of performance criterion A
This instrument continues to operate with its measurement accurancy with ±20% of range during the test.
(2) Definition of performance criterion B
This instrument continues to operate without hang-up or falling into uncontrollable conditons during the test.
No change of actual operating state or stored data is allowed.

● External Connected Equipment

The instrument with the option / CE must be connected only to devices which are conformed to IEC61010 or IEC60950.

● Safety Requirements Conformity Standards

The instrument with the option / CE conforms to the safety requirements as shown below except when with the option /Dxx.

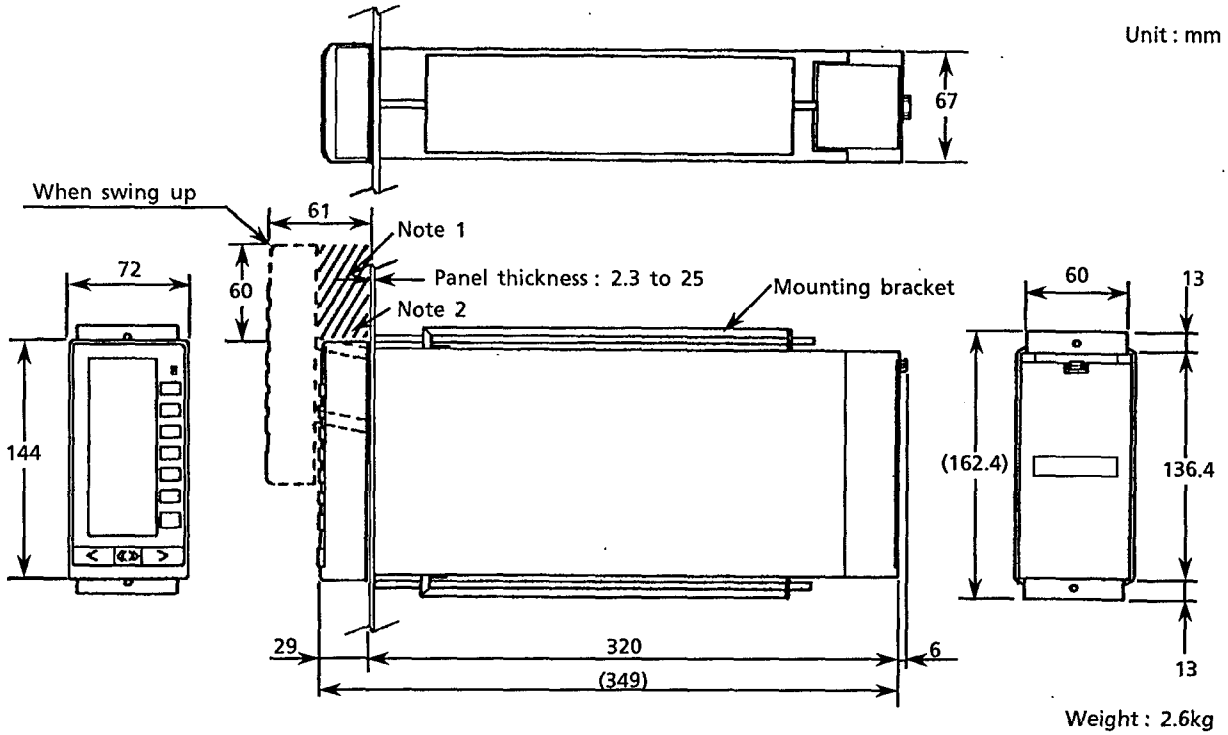
● Hazardous Area Classification

The YS150 / YS170 with the option / CSA is CSA approved as shown below.

CSA standard : CSA C22.2 No.213
(Non-incendive electrical equipment for use in hazardous locations)
Location : Class I, Division 2, Groups A, B, C, & D
Temperature Code : T4

■ Dimensions of the Controller and Panels

Unit : mm



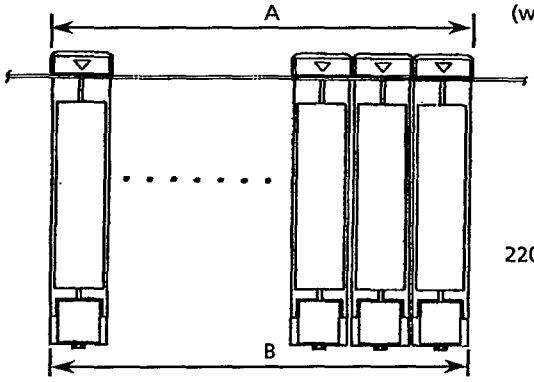
Weight : 2.6kg

Note 1 : To allow the faceplate to swing up 60mm (see above), any obstruction at the top of the panel should project no more than 29mm.

Note 2 : To allow replacement of the fluorescent tube used for back-lighting, 130mm clearance above the swinged up faceplate is required.

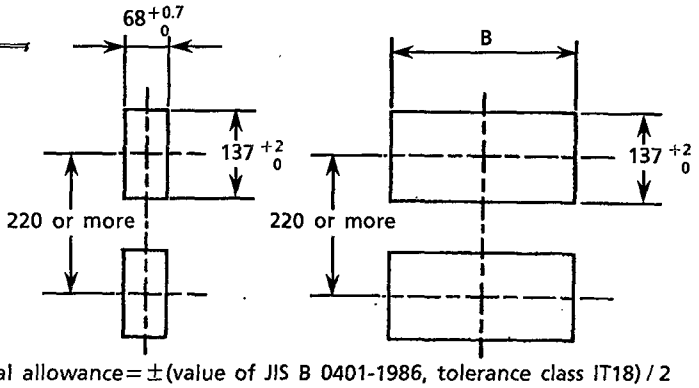
Note 3 : For good ventilation, keep space of more than 100mm in the upper and lower parts of the panel.

TOP VIEW



Panel Cutout Dimension

(when installing a single unit) (when installing multiple units)



Normal allowance = ±(value of JIS B 0401-1986, tolerance class IT18) / 2

Panel Cutout Dimension when Installing Multiple Units for Flush Mounting

Number of Units / Location	1	2	3	4	5	6	7
A	72	144	216	288	360	432	504
B	$68^{+0.7}_{0}$	$140^{+1.0}_{0}$	$212^{+1.0}_{0}$	$284^{+1.0}_{0}$	$356^{+1.0}_{0}$	$428^{+1.0}_{0}$	$500^{+1.0}_{0}$

Number of Units / Location	8	9	10	11	12	13	14
A	576	648	720	792	864	936	1008
B	$572^{+1.0}_{0}$	$644^{+1.0}_{0}$	$716^{+1.0}_{0}$	$788^{+1.0}_{0}$	$860^{+1.0}_{0}$	$932^{+1.0}_{0}$	$1004^{+1.0}_{0}$

Figure 1.1 Dimensions of the Unit and Panels

1.2 Models and Suffix Codes

Models	Suffix Codes	Option Codes	Remarks
YS150 YS170			Single-loop controller (Multi-function type) Single-loop controller (Programmable type)
Use	-0		General purpose
	0 1		Style 1 (S1) or style 2 (S2) Style 3 (S3) or style 4 (S4)
Power supply	1 2		100V version 220V version
Optional specification		/ □	Optional specification (Section 1.3)

1.3 Optional Specifications

	Option Code	Combination with /CE	Combination with /CSA	Description
	/ CE / CSA	— No	No –	CE Mark Approved CSA Non-incendive Approved
Input Option				It is possible to select one from the followings; mV Input (EM1) Thermocouple Input (ET5 / YS) (Type K, T, J, E, B, R, S) Resistance Temperature Detector Input (ER5) (Pt100, JPt100) Potentiometer (ES1) Input Isolator (EH1) 2-wire Transmitter Input (EA1) 2-wire Transmitter Input (EA9) (No isolation from the field) Frequency Input (EP3)
	/ A01 / A02 / A03 / A04 / A05 / A06 / A07 / A08	No No No No No No No No	Yes Yes Yes Yes Yes Yes Yes Yes	
Input Option for /CE				It is possible to select one from the followings; Thermocouple Input (ET5 / YS) (Type K, T, J, E, B, R, S) Resistance Temperature Detector Input (ER5) (Pt100, JPt100) 2-wire Transmitter Input (EA1) 2-wire Transmitter Input (EA9) (No isolation from the field)
	/ A12 / A13 / A16 / A17	Yes Yes Yes Yes	No No No No	
Communication				It is possible to select one from the followings; RS-485 DCS-LCS YS-net
	/ A31 / A32 / A33	Yes Yes Yes	No No No	
Construction (Note 1)				It is possible to select one from the followings; Replace for YEWSERIES 80 Internal Unit Closely Mounting for YEWSERIES 80 Housing Replace for 100 Line Internal Unit
	/ D11 / D12 / D13	No No No	No No No	

Note 1: In case of spacifying /D11, Direct input and /A 31 Communication options cannot be used.

1.4 Accessories

(1) Mounting bracket : 2 pieces
(2) Tag number seal : 4 pieces
(3) Range record seal : 4 pieces
(4) Ferritic core : 1 piece (only for models with / A12, / A13, / A16, / A17 option code)
(5) Instruction Manual : IM 1B7C1-01E (This manual)
IM 1B7C8-03E (only for models with / A31 or / A32 option code)

2. INSTALLATION

For the specifications and technical considerations of installation, refer to the separately supplied TI 1B7A8-01E "YS100 Series Installation Manual".

2.1 Installation

(1) When Installing a Single Unit

① Using a screw driver, loosen the two screws of the mounting brackets supplied with the unit.

② Insert the unit in the front of the panel (see Figure 2.1).

③ Attach the mounting brackets to the unit, and fix the unit to the back of the front panel with screws (see Figure 2.2) through top and bottom mounting brackets.

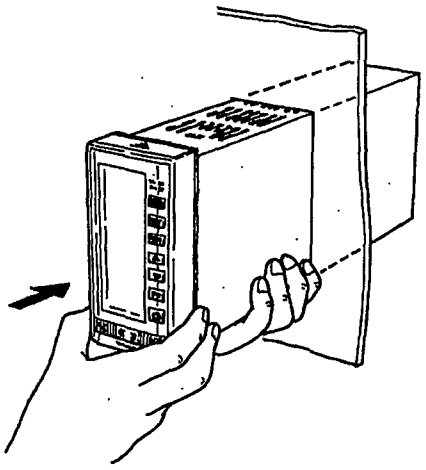


Figure 2.1 Inserting in the Panel

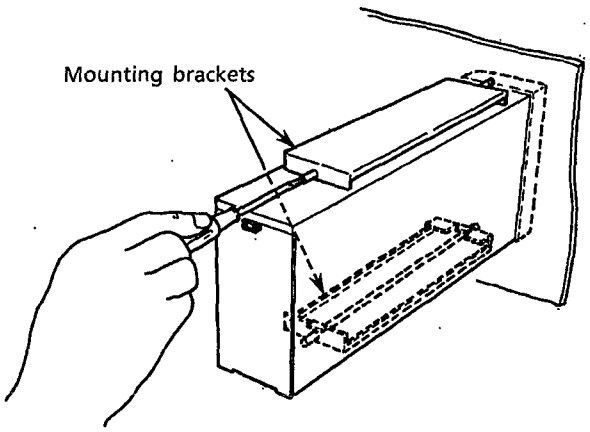


Figure 2.2 Attaching the Mounting Bracket

To remove the unit, reverse the steps (see Figure 2.3).

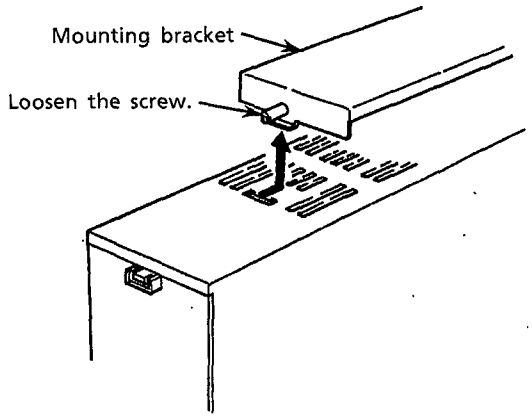


Figure 2.3 Detaching from the Panel

(2) When Installing Multiple Units for Flush Mounting

① Place the units in the order of installation, and place the side panel of the unit flush with the side panel of the next unit. Then, insert the units in the panel (see Figure 2.4).

② For installation of other units, perform the same procedure as for item (1).

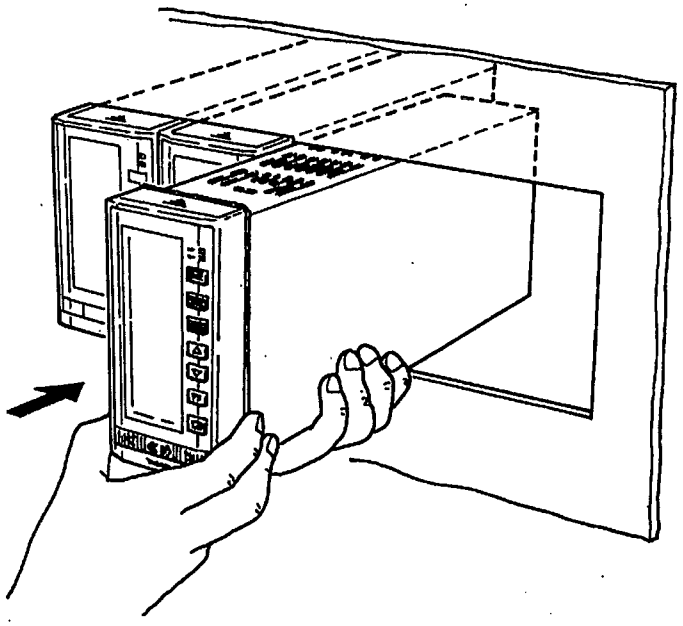


Figure 2.4 Installing Multiple Units for Flush Mounting

2.2 Terminal Assignment and wiring for Power Supply / Grounding

The terminals can be checked by removing the terminal cover at the back of the unit (see Figure 2.5). The terminal numbers are marked on the seals attached to the left and right sides in the case, and also marked on the terminal cover.

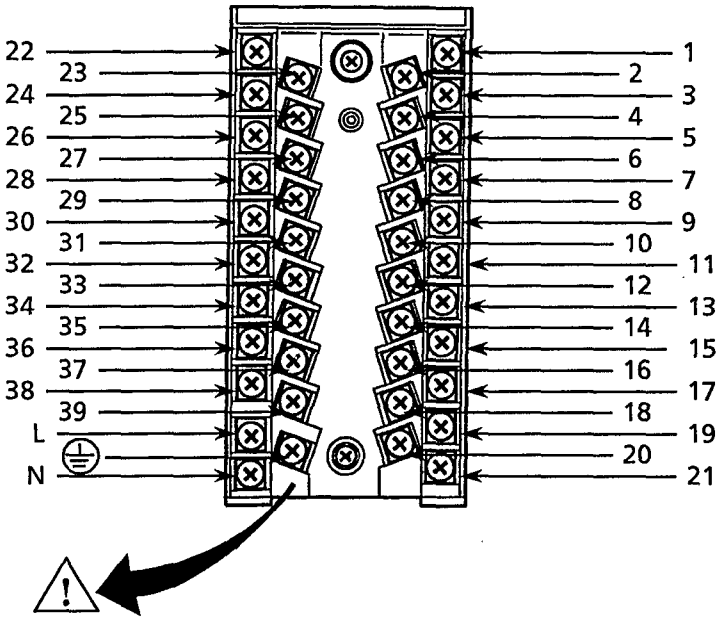


Figure 2.5 Terminal Assignment

2.2.1 Wiring to the Power Source

CAUTION

- Prior to wiring, first turn off the power supply, and use a tester to confirm that no current is flowing through the power cable.
- Be sure to keep the power cables at least 1 cm away from the other signal cables.
- Power supply cable must meet the requirements of relevant IEC standards or local installation requirements for specific details. In addtion, in Canada it must meet the Canadian Electrical Code.

Wire the power cable to the L and N terminals with crimp terminals (for M4 threads).

2.2.2 Wiring for the Grounding

CAUTION

To avoid electrical shock to operators and service engineers as well as to avoid external noise, be sure to ground the controller with a grounding resistance of 100Ω. To ground the controller, wire the grounding cable to the terminal indicated by the ⏚ mark.

Grounding must be conducted with a resistance of 100Ω or less. Be sure to connect the grounding cable to the terminal indicated by the ⏚ mark using crimp terminals for M4 threads.

After completion of wiring to the power source and for the grounding, re-mount the terminal cover to the controller.

TIP

If separate grounding cannot be conducted for each controller when you are using multiple controllers, for example on a panel, then use grounding cables of 2mm² or more to ground each controller and collect the cables from each controller to wire them to a section of the grounding bus line.

Table 2.1 Table of Terminal Assignment

	YS170 Programmable Controller	YS150 Multi-Function Controller		
Terminal Number	Programmable Mode	Single-Loop Mode	Cascade Mode	Selector Mode
1 2	+ / − > Analog input 1 (×1)	+ / − > Process Variable (PV) input (1 to 5V DC)	+ / − > Process Variable input 1 (1 to 5V DC)	+ / − > Process Variable input 1 (1 to 5V DC)
3 4	+ / − > Analog input 2 (×2)	+ / − > Cascade set-point input	+ / − > Cascade set-point input	+ / − > Cascade set-point input 1
5 6	+ / − > Analog input 3 (×3)	+ / − > Tracking input	+ / − > Process variable input 2	+ / − > Process variable input 2
7 8	+ / − > Analog input 4 (×4)	+ / − > Feedforward input	+ / − > Feedforward input	+ / − > Cascade set-point input 2
9 10	+ / − > Analog input 5 (×5) (Note 1)	+ / − > Output of the direct-input signal (1 to 5 VDC) (Note 1)	+ / − > Output of the direct-input signal (1 to 5V DC) (Note 1)	+ / − > Output of the direct-input signal (1 to 5V DC) (Note 1)
11 12	+ / − > Fail output	+ / − > Fail output	+ / − > Fail output	+ / − > Fail output
13	Transmitter power supply +(24V DC) (Note 2)	Transmitter power supply +(24V DC) (Note 2)	Transmitter power supply +(24V DC) (Note 2)	Transmitter power supply +(24V DC) (Note 2)
14	Communication terminal (SG)	Communication terminal (SG)	Communication terminal (SG)	Communication terminal (SG)
15	Communication terminal (SD(A))	Communication terminal (SD(A))	Communication terminal (SD(A))	Communication terminal (SD(A))
16	Communication terminal (SD(B))	Communication terminal (SD(B))	Communication terminal (SD(B))	Communication terminal (SD(B))
17	Communication terminal (RD(A)) or LCS+ or DA	Communication terminal (RD(A)) or LCS+ or DA	Communication terminal (RD(A)) or LCS+ or DA	Communication terminal (RD(A)) or LCS+ or DA
18	Communication terminal (RD(B)) or LCS- or DB	Communication terminal (RD(B)) or LCS- or DB	Communication terminal (RD(B)) or LCS- or DB	Communication terminal (RD(B)) or LCS- or DB
19 20 21	+ / − Terminal for the direct-input (Note 3)	+ / − Terminal for the direct-input (Note 3)	+ / − Terminal for the direct-input (Note 3)	+ / − Terminal for the direct-input (Note 3)
22 23	+ / − > Analog output 1 (4 to 20mA DC)	+ / − > Manipulated (MV) output 1 (4 to 20mA DC)	+ / − > Manipulated (MV) output 1 (4 to 20mA DC)	+ / − > Manipulated (MV) output 1 (4 to 20mA DC)
24 25	+ / − > Analog output 2 (1 to 5V DC)	+ / − > Manipulated output 2 (1 to 5V DC)	+ / − > Manipulated output 2 (1 to 5V DC)	+ / − > Manipulated output 2 (1 to 5V DC)
26 27	+ / − > Analog output 3 (Note 4) (4 to 20mA / 1 to 5V DC)	+ / − > Set-point (SV) output (1 to 5V DC)	+ / − > Set-point (SV) output (1 to 5V DC)	+ / − > Set-point (SV) output (1 to 5V DC)
28 29	+ / − > Status output 1 or status input 6	+ / − > *High-limit alarm output*	+ / − > *Primary loop alarm output*	+ / − > *Primary loop alarm output*
30 31	+ / − > Status output 2 or status input 5	+ / − > Low-limit alarm output	+ / − > Secondary loop alarm output	+ / − > Secondary loop alarm output
32 33	+ / − > Status output 3 or status input 4	+ / − > Deviation / velocity alarm output	+ / − > O / C status output	+ / − > L / R status output
34 35	+ / − > Status output 4 or status input 3	+ / − > C / AM status output	+ / − > C / AM status output	+ / − > C / AM status output
36 37	+ / − > Status output 5 or status input 2	+ / − > CA / M status output	+ / − > CA / M status output	+ / − > CA / M status output
38 39	+ / − > Status output 6 or status input 1	+ / − > Operation mode input	+ / − > Operation mode input	+ / − > Operation mode input
L N	+ / − > Power supply terminal	+ / − > Power supply terminal	+ / − > Power supply terminal	+ / − > Power supply terminal
⏚	Grounding terminal (GND)	Grounding terminal (GND)	Grounding terminal (GND)	Grounding terminal (GND)

Note 1 : These are the voltage conversion output terminals (1 to 5V DC) of the direct-input when the direct-input source is connected to the direct-input terminals (19, 20, and 21).

Note 2 : See Section 2.5 "Transmitter Power Connection" for details of the transmitter power supply.

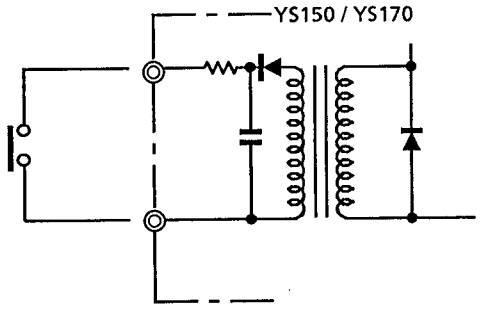
Note 3 : See Table 2.2 "Connection of the Direct-Input Terminal" to make connections of the terminals.

Note 4 : Selection of the current and voltage, 4 to 20mA / 1 to 5V DC, is carried out with a jumper wire. See Section 3.6.1 "Setting of Voltage Output and Current Output" for how to select the current and voltage.

2.3 Notes on Wiring

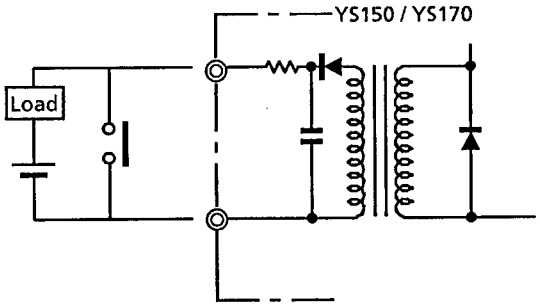
(1) To connect a wire to the terminal, use a round crimp-style terminal.

(2) A non-voltage contact and a voltage contact for status input which will be connected externally shall meet the rating specifications (see Figures 2.6 and 2.7). Allow for resistance of the wire and voltage drop caused by the wire.



CLOSE : 200Ω or less
OPEN : 100kΩ or more

Figure 2.6 Connection to Status Input (Non-Voltage Contact)



ON : −0.5 to +1V
OFF : 4.5 to 30V

Figure 2.7 Connection to Status Input (Voltage Contact)

(3) Note the following for connection and wiring when driving an external unit using the contact outputs such as fail output, alarm output, status output etc.

NOTE

- Do not connect a load which is more than the rated value of the contact.
- Be sure to connect a protective diode (surge absorber) in parallel with the load when driving an inductive load such as a relay (see Figure 2.8).
- To connect the power supply which is to be used to drive the load, match the polarity of the power supply with the polarity of the contact output (see also Figure 2.8).
- An AC load cannot be switched directly by using the contact output. To switch the AC load, use a relay (see Figure 2.9).

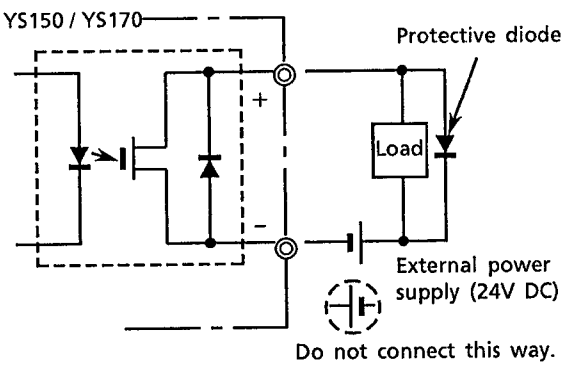


Figure 2.8 Connection Using the Status Output

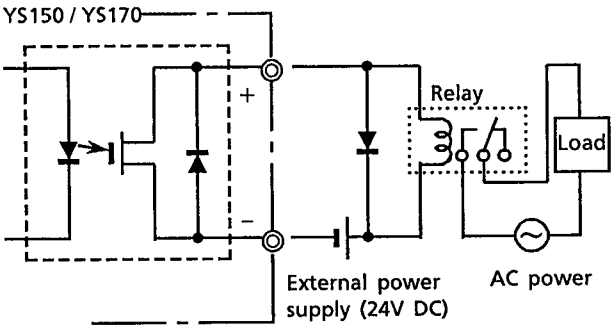


Figure 2.9 Connection of the Status Output When Driving a Load with AC Power

(4) When finished wiring, attach the terminal cover for safety and protection from dust.

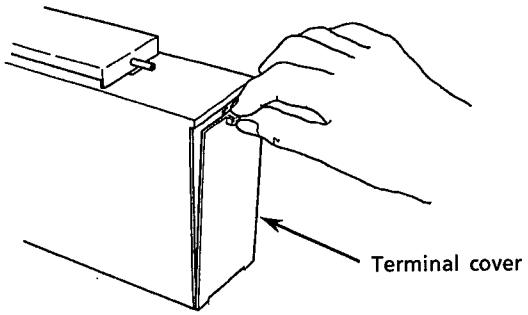


Figure 2.10 Attaching the Terminal Cover

2.4 Wiring to the Direct Input Terminals

Either small voltage (mV), thermocouple (TC), resistance temperature detector (RTD), slide resister, two-wire transmitter, or pulse signal can be connected to the direct input terminals (19, 20, and 21). Connect the signals from a sensor to the direct input terminals.

Figure 2.11 shows the circuit of the YS170 for receiving the signals from a sensor. The YS170 converts the received signals to the 1 to 5V signals in the signal conversion circuit, and then reads the converted signals as X5 analog data. The YS170 also outputs converted signals from the X5 input terminals (9 and 10) as 1 to 5V signals.

Figure 2.12 shows the circuit of the YS150 for receiving the signals from a sensor. The YS150 converts the received signals to 1 to 5V signals in the signal conversion circuit, and then outputs the signals from the output terminals for sensor signals (9 and 10). Wire between the terminals and the desired input terminals using external lead wires. By wiring to the X1 terminals, you can monitor the signals measured by the sensor using YS110 standby Manual station if the control monitoring circuit fails.

Table 2.2 Wiring to Direct Input Terminals

		Terminal Number		
		19	21	20
mV, TC, isolation		+		-
RTD (Note)		A B B		
Slide resister (Note)		100% 0%		
Frequency	Two-wire (voltage, contact)	+		-
	Power supply type 2-wire	Signal	Power	
	Power supply type 3-wire	+	Power	-
Two-wire transmitter (Power supply necessary)		+ -		
Two-wire transmitter for 4 to 20 mA signals (Power supply not necessary)		- +		

Note 1: The resistance of the wire to terminal 19 must be the same as that to terminal 21.

For input option /A12, /A13, /A16, or /A17 a ferritic core is included in the option. You must use it like shown in the Figure 2.13 when connecting the wire to the input option terminals.

For the /A08 frequency input card, the following three items can be set:

- Select the power supply for the oscillator (12V or 24V DC)
- To prevent chattering on dry contact inputs, a filter can be inserted.
- For current pulse input, load resistance can be set to 200Ω, 500Ω or 1kΩ.

Any of the three items above, can be set by jumper on the option card. For the setting procedure, refer to 3.6.2 Setting Input Specifications of /A08 Frequency Input Card".

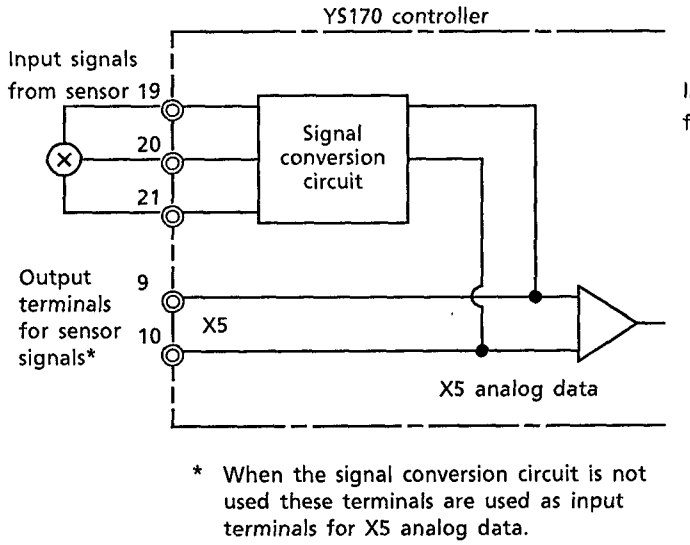


Figure 2.11 Circuit of YS170 for Receiving Signals from Sensor

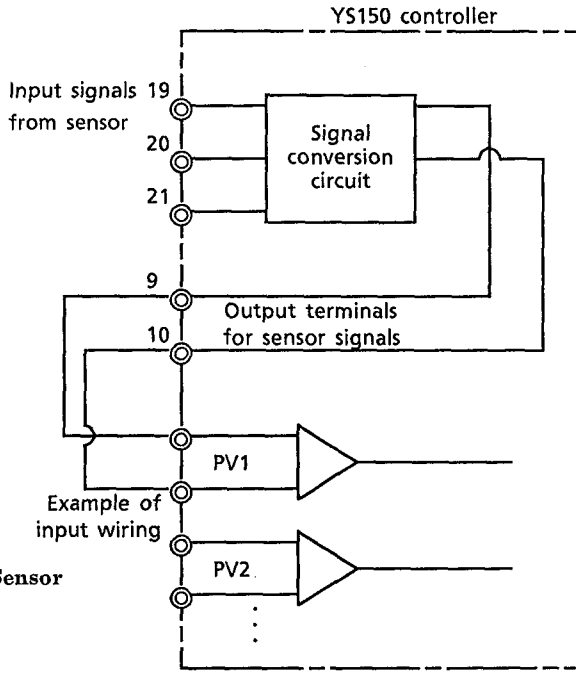


Figure 2.12 Circuit of YS150 for Receiving Signals from Sensor

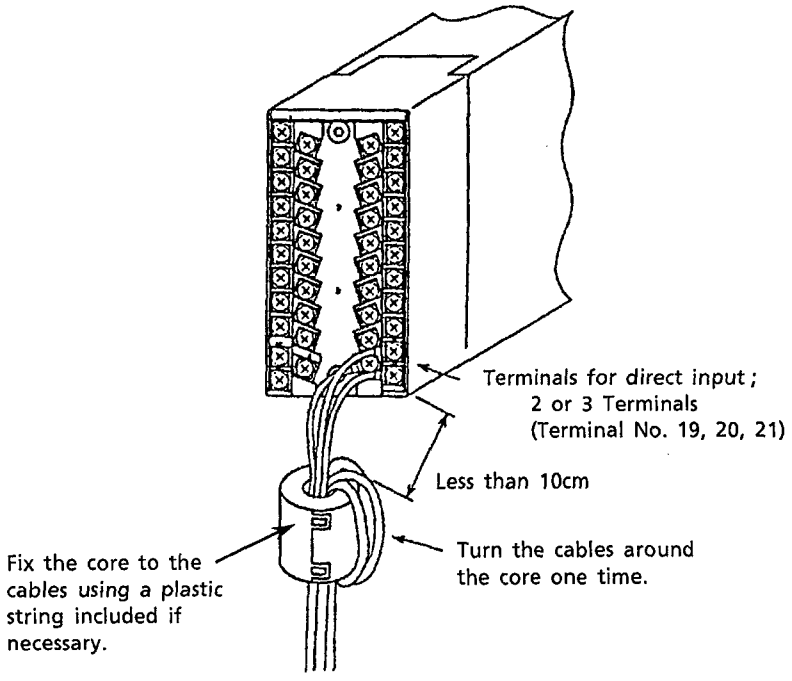


Figure 2.13 Wiring to Direct Input Terminals with a Ferritic Core

2.5 Transmitter Power Connection

When connecting 2-wire transmitter to YS150 or YS170, it is recommended that the field signals to be sent or received are insulated from the ground line of the controller to minimize the influence of a short-circuiting accident. Therefore, it is recommended to use transmitter input option (/A06 or /A16).

However, the YS150 / YS170 controller has a non-insulated transmitter power supply terminal (24V DC) to connect a 2-wire transmitter economically. Wiring shown in Figure 2.14 allows the controller to read the signal sent by the transmitter.

Current flow is following:
With transmitter input option ; 24V DC 30mA
Without transmitter input option; 24V DC 60mA
(possible to connect to 2 units two-wire transmitters)

To prevent accidental transmitter burn out due to short circuit, attach a 250Ω±0.1% 3W resistor to the input terminals (No short circuit protection).

We recommend YOKOGAWA Part No. E9760TM for this resistor.

When it is shorted the computation will stop. In other words, the instrument will operate as if it were without power supply.

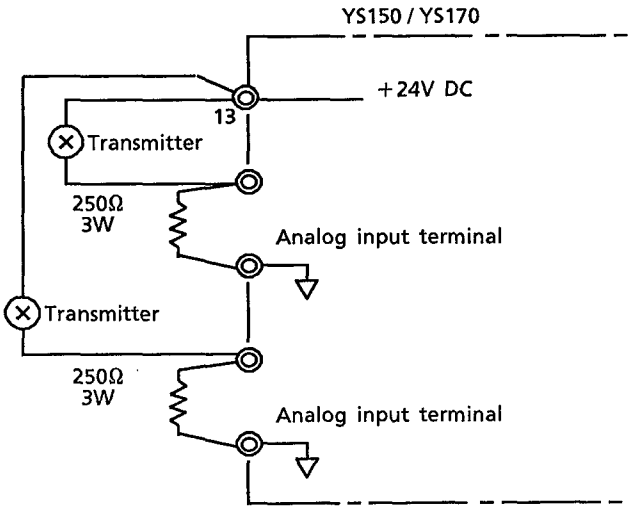


Figure 2.14 Example for Connection Case for Using Internal Distributor Terminal

2.6 RS-485 Communication Wiring to a Supervisory Computer

The YS100 instrument with the RS-485 communication interface (option /A31) allows you to communicate directly with the supervisory computer with which the same interface is provided. In addition, this controller communicates with a supervisory computer which does not have an RS-485 ↔ RS-232C converter. The personal computer is often used as a supervisory computer.

2.6.1 4-wire Communication Wiring

The figure below indicates connection of the YS100 instrument and a personal computer.

See section 3.6 "Setting Hardware Switches", for how to set the terminating resistance value.

Communication data such as communication speed and address should be set from the "configuration 1" panel in advance.

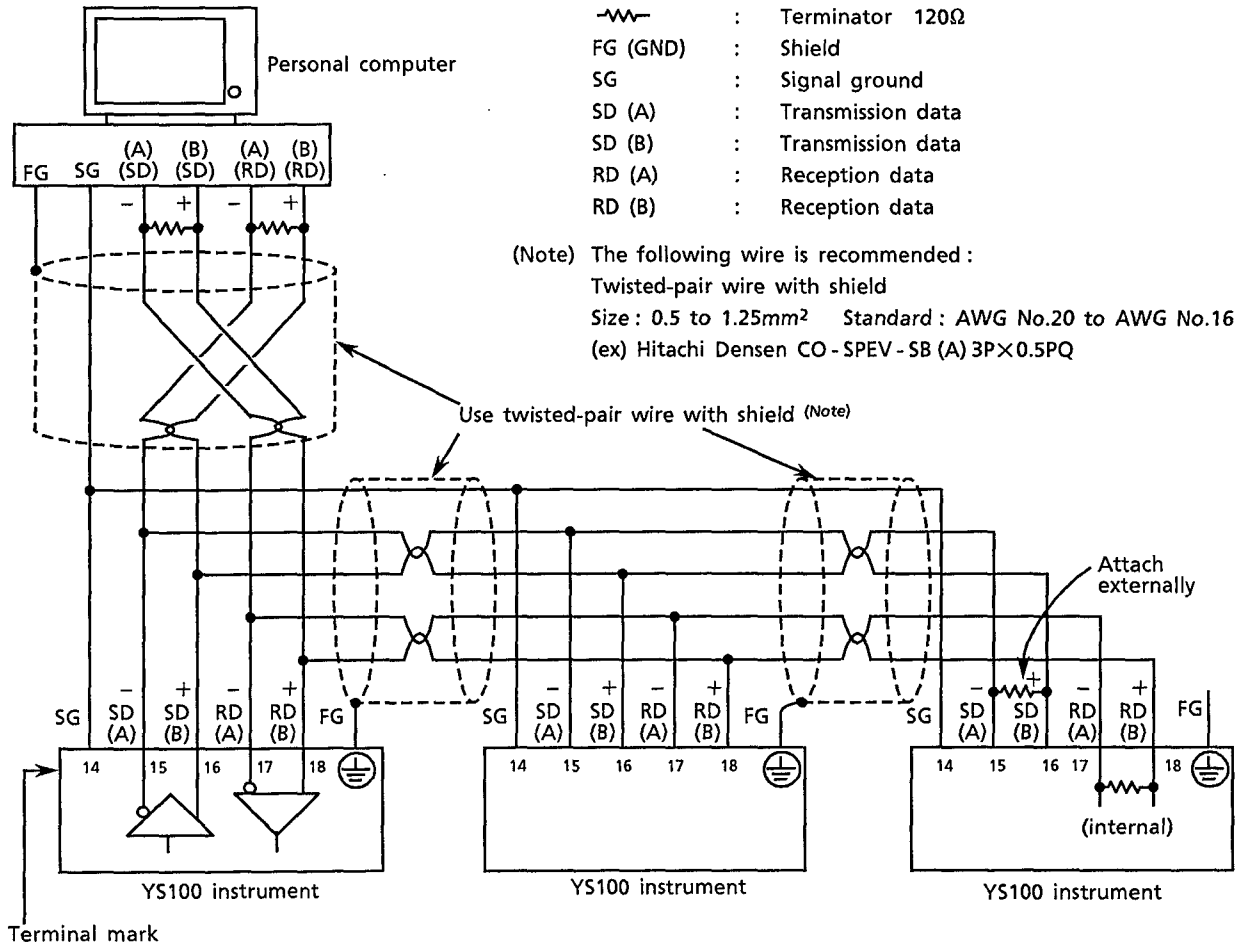


Figure 2.15 4-wire Communication Wiring

2.6.2 2-wire Communication Wiring

Case with a personal computer which can control the ON / OFF of transmission driver (RTS), 2-wire communication is also possible (transmission and reception line in common).

See section 3.6, "Setting Hardware Switches", for how to set terminating resistance value.

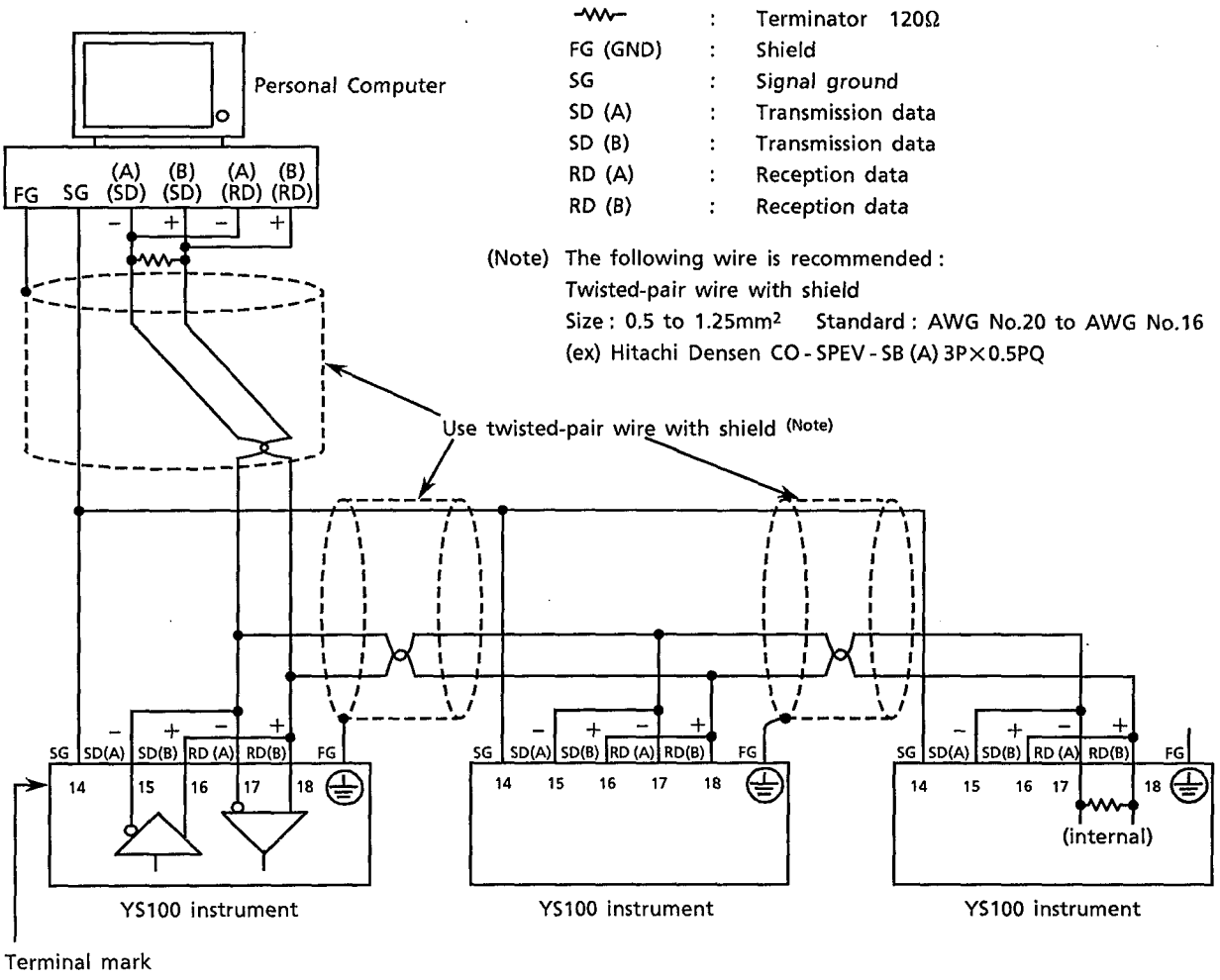


Figure 2.16 2-wire Communication Wiring

2.7 DCS Communication Wiring to CENTUM-XL or μXL

Communication between the YS100 instrument with DCS-LCS communication interface (option /A32) and YOKOGAWA distributed control system (here in after, abbreviated as DCS) is performed via an LCS card equipped in the DCS. The figure below shows the wiring of the YS100, LCS card and TE08 terminal block. See the Installation manual for the μXL or CENTUM-XL (Technical Information) for the wiring on the DCS side.

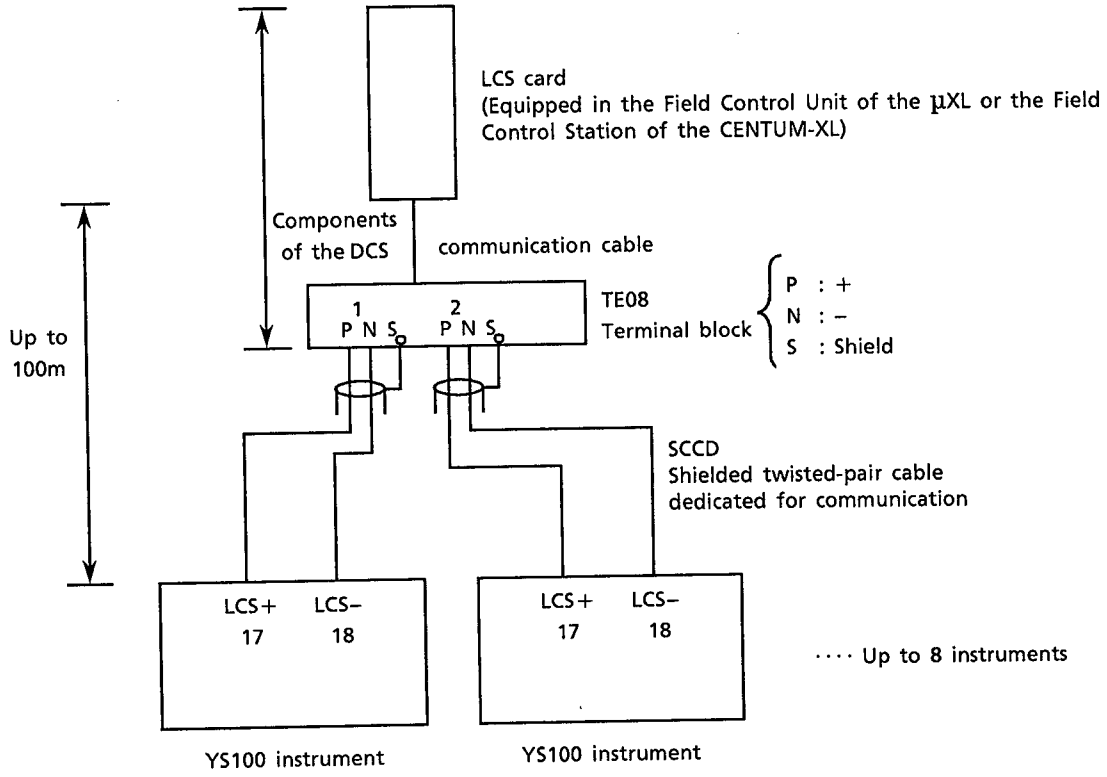


Figure 2.17 Wiring between YS100 Instruments and a Terminal Block

2.8 Y S-net Communication Wiring

The YS100 instrument with YS-net communication interface (option /A33) can be directly connected to another YS100 instrument with the same interface only when YS170 each other or a supervisory computer for communication.

The figure below shows the connection between a personal computer and the YS100 instruments. See section 3.6, "Setting Hardware Switches", for how to set the terminating resistance value.

Device numbers (communication addresses) should be set from the "configuration 1" panel in advance.

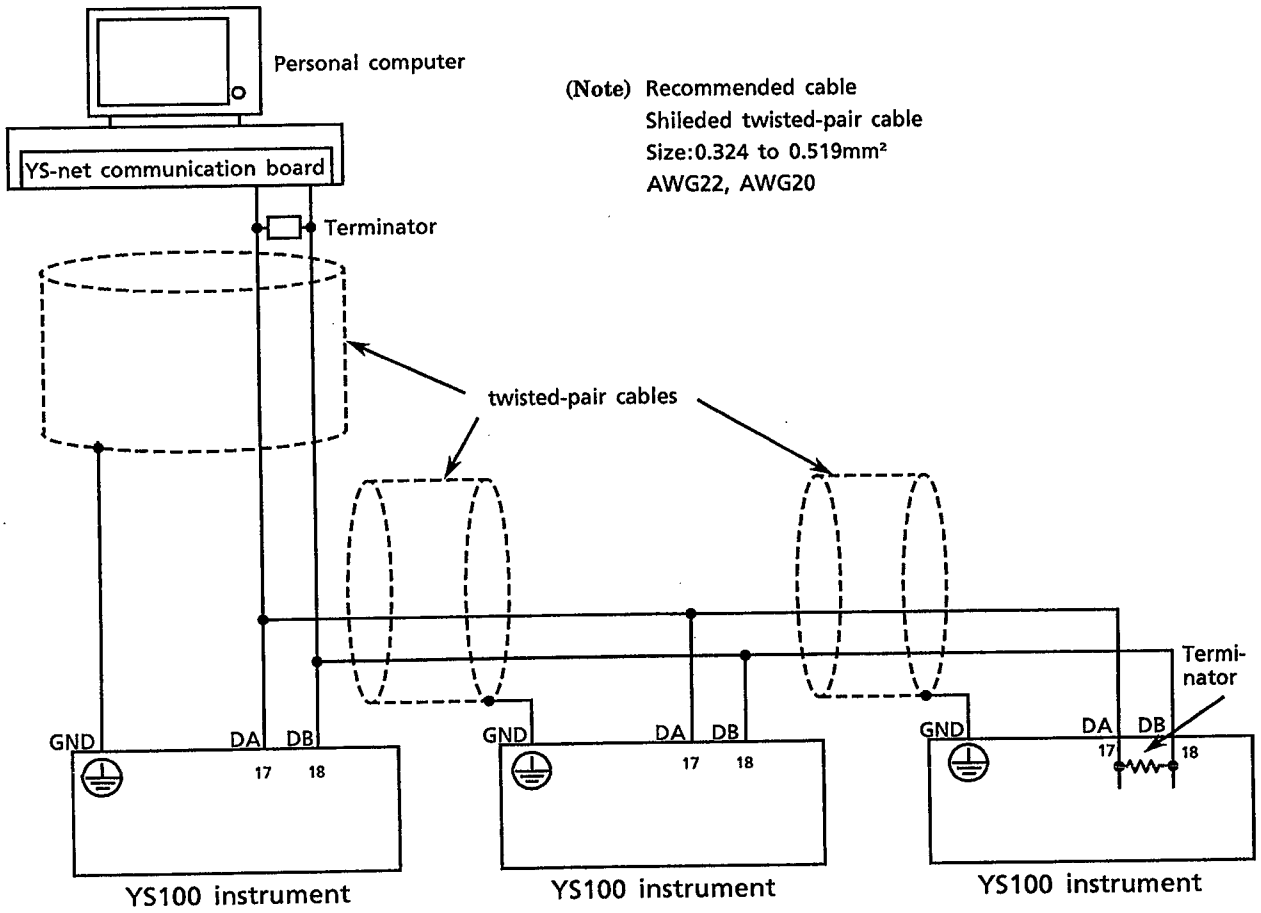


Figure 2.18 Communication Wiring

3. NAMES AND FUNCTIONS OF PARTS

3.1 Names and Functions of the Parts on the Front Panel Display

See the following figure for the name and function of the front panel display.

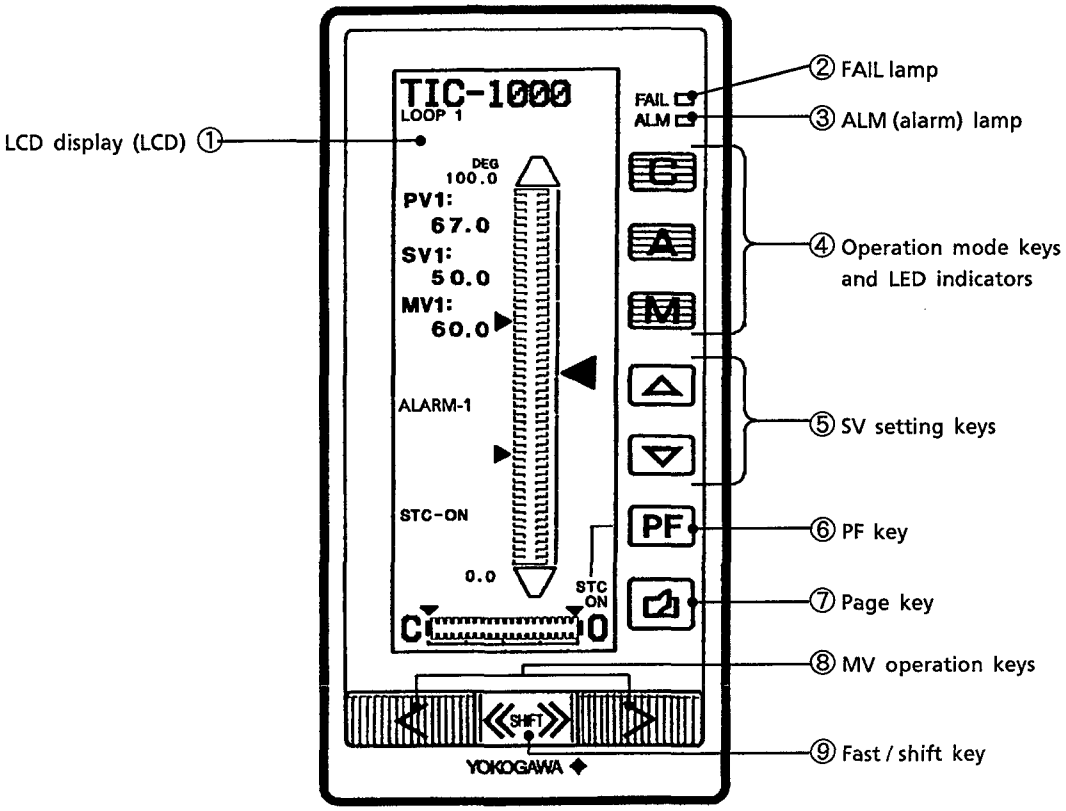


Figure 3.1 Parts of the Front Panel Display

① **LCD Display (LCD)**

This LCD display is a full-graphic dot display. It displays graphically or digitally the process variable (PV), set-point (SV), and manipulated output (MV), in addition to displaying the process variable trend and alarms. This LCD display also shows the parameter settings in order to operate the controller with ease.

② **FAIL Lamp**

This is a red LED. It is lit when a problem has occurred in the controller.

③ **ALM Lamp**

This is an yellow LED. It is lit when the high- or low-limit alarm of the controller is activated or when the input or output signal wirings open.

④ Operation Mode Keys

These keys select the desired control operation mode in the loop panel or the trend panel, or the dual loop panel. The lamp in the key which corresponds to the selected control operation mode is lit.

There are three operation mode keys as follows:

[C] : **C Mode Key**
[A] : **A Mode Key**
[M] : **M Mode Key**

In the tuning panel or the engineering panel, these keys function as software keys (as displayed on the LCD).

⑤ SV Setting Keys

These keys change the SV value in the loop panel, the trend panel or the dual loop panel.

There are two SV setting keys.

[△] : **SV Increasing Key**
[▽] : **SV Decreasing Key**

In the tuning panel or the engineering panel, these keys function as software keys (as displayed on the LCD).

⑥ PF Key

This key turns on and off STC when you use the controller with the loop, the trend panel, or the dual loop panel for Multi-Function Controller. The use of this key can be defined with the function setting features or the programming features for Programmable Controller with the loop panel, the trend panel, or the dual loop panel commonly.

In the alarm panel, the tuning panel, or the engineering panel, this key functions as software keys (as displayed on the LCD).

⑦ Page Key

This key selects the desired panel.

⑧ MV Operation Keys

These keys change the manipulated variable output (MV).

⑨ Fast / Shift Key

This key accelerates the manipulated output when it is used together with the MV operation key.

This key selects the desired panel group when it is used together with the page key.

NOTE

In the following pages, the software keys are indicated in the [ ] .
(for example, [SAV])

3.2 Swinging the Front Panel Up and Down

■ Swinging Up

① Push up the bottom center of the front panel gently (the lock is released when pushed up), and pull the front panel to the front until you feel resistance (see Figure 3.2). Then, stop there.

② Push up the front panel (see Figure 3.3).

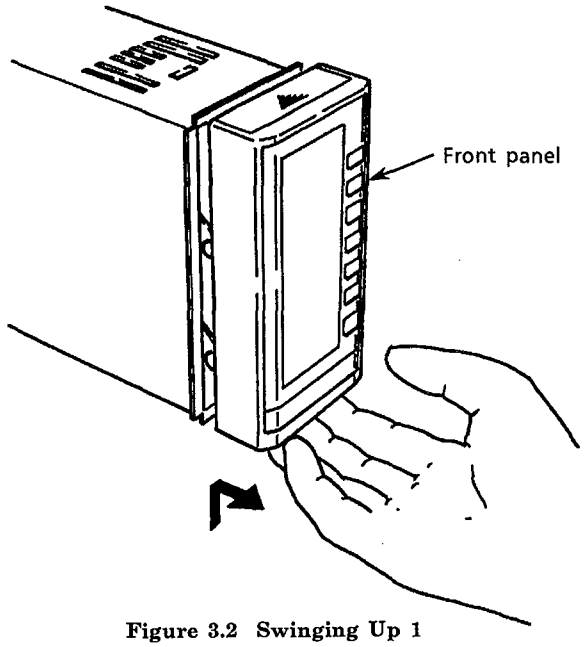


Figure 3.2 Swinging Up 1

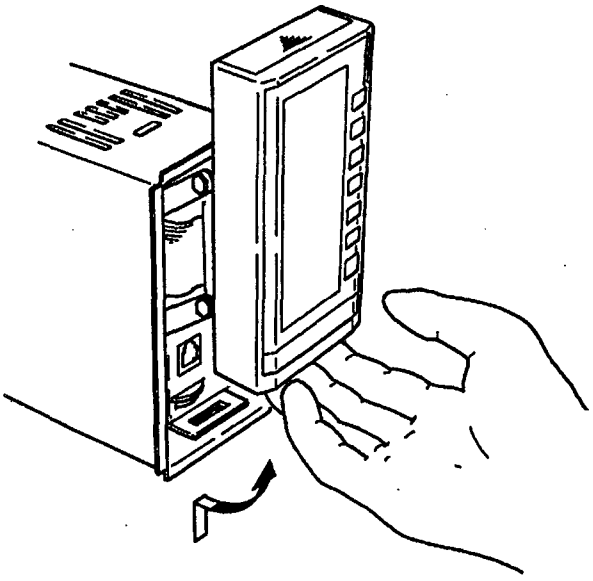


Figure 3.3 Swinging Up 2

■ Swinging Down

Push down the top center of the front panel until you feel resistance (see Figure 3.4). Then, stop there. Push the front panel back into the housing until it is locked with a click sound (see Figure 3.4).

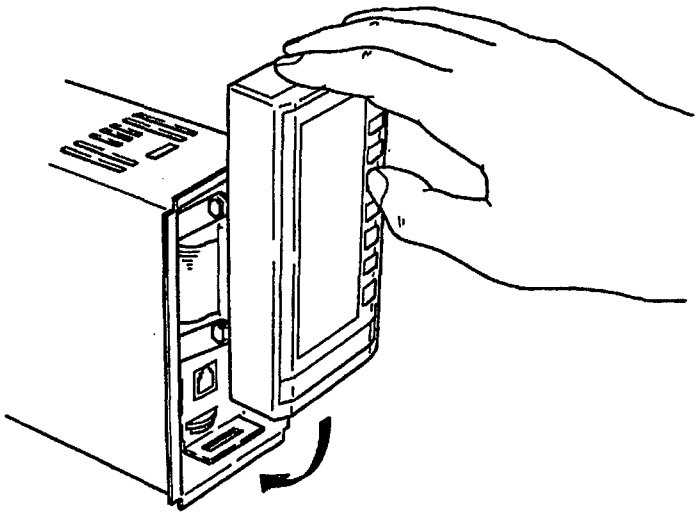


Figure 3.4 Swinging Down

3.3 Names of the Parts of the Swing Up Internal Panel

Push up the bottom center of the front panel (see Section 3.2 "Swinging Up"). Refer to the following figure for the name and function of the parts on the internal swing up panel.

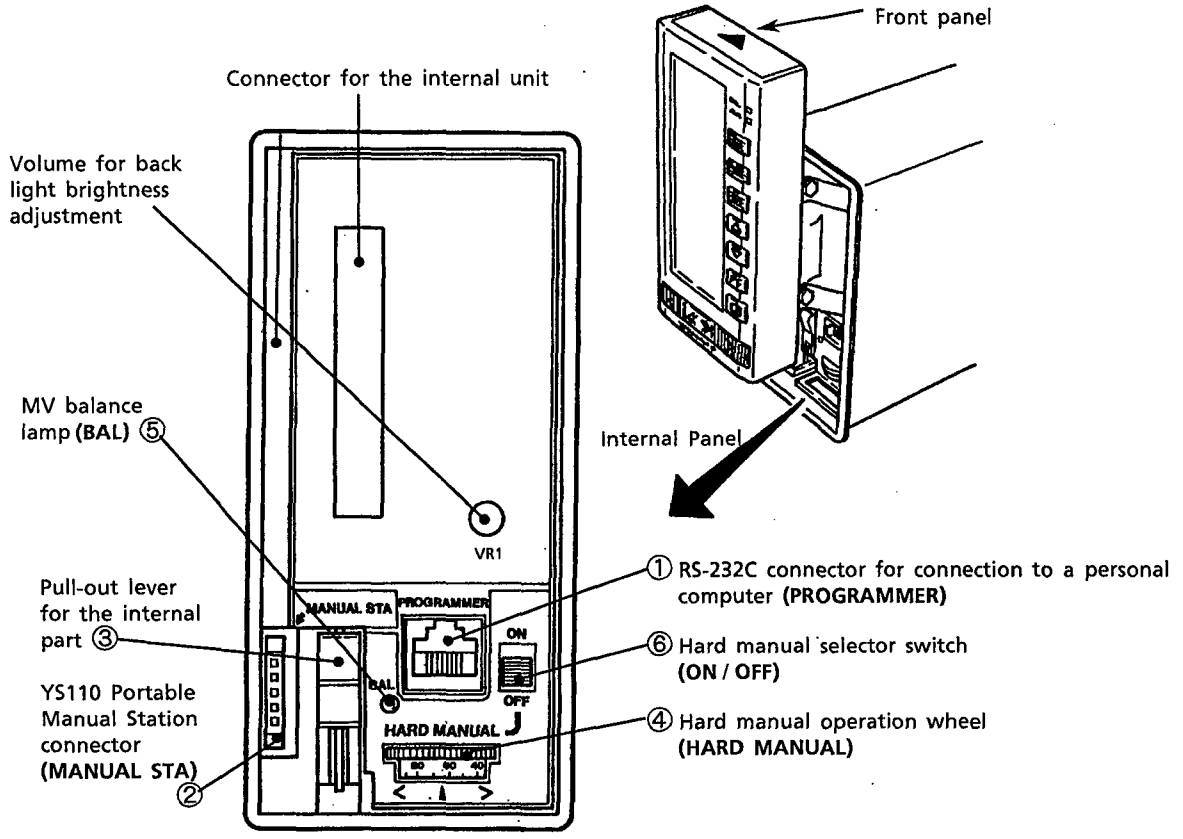


Figure 3.5 Swing Up Internal Panel

① **RS-232C Connector for Connection to a Personal Computer (for only YS170)**
This is an RS-232C interface connector which connects the controller to the personal computer for user programming.

② **Portable Manual Station Connector**
This connector is used for replacing the internal parts, for connection to the Yokogawa YS110 Portable Manual Station.

③ **Pull-out Lever for the Internal Part**
This release lever is used to remove the internal parts.

④ **Hard Manual Operation Wheel**

⑤ **MV Balance Lamp**

⑥ **Hard Manual Selector Switch**

See secttion 6.3 for the operations of ④ to ⑥

3.4 Connecting to a Personal Computer Programmable Controller

The YS170 Controller (Programmable Type) can download programs which are written and created on a personal computer. Refer to the separately supplied IM 1B7C8-01E "YSS10 YS100 Series Programming Package" for programming and downloading. This section does not explain programming and downloading, but is confined to connection of the controller to the personal computer.

■ Connecting to a Personal Computer

① Turn on the power of the personal computer, then start up the programming package. Connect them while power to this controller is turned on.

② Connect one end of the RS-232C interface cable to the personal computer (Cables are attached to the programming package). Refer to the instruction manual of the personal computer for connection.

③ Swing up the front panel (see Section 3.2 "Swinging the Front Panel Up and Down").

④ Connect the other end of the RS-232C interface cable to the RS-232C connector of the personal computer connection on this controller (see Figure 3.6).

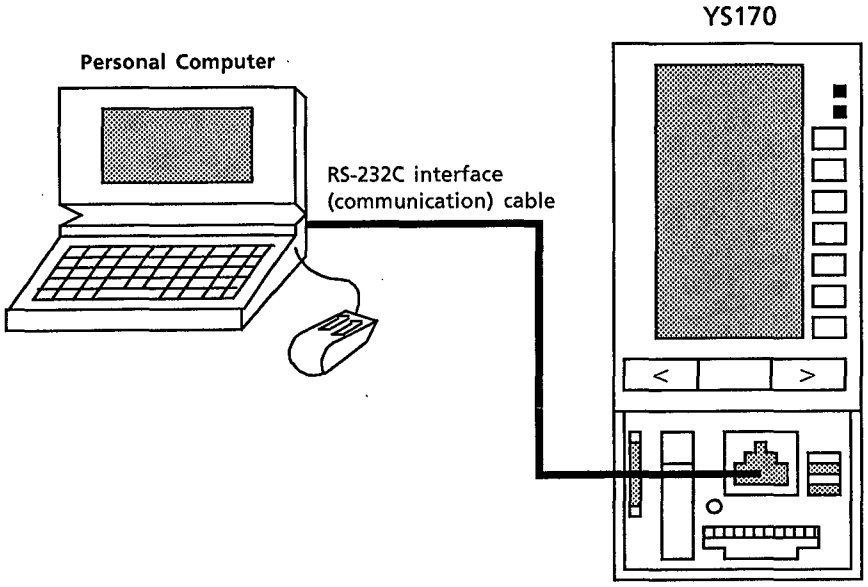


Figure 3.6 Connecting to a Personal Computer

3.5 Removing and Installing the Internal Unit

IMPORTANT

When you pull down the release lever, the connector between the internal unit and the housing is released thereby powering off the controller, and all input and output terminals are set to the open status.

Removal or installation of the internal unit shall be carried out by attaching the unit to the instrumentation panel or by placing the unit on a work bench.

IMPORTANT

Should the internal unit be removed or inserted for maintenance or similar purposes, care should be taken not to damage it by static electric discharge.
For removal and insertion of the internal unit, see Section 11.3.1 "Notes on Static Electric Discharge".

■ Removing the Internal Unit

① Swing up the front panel (see Section 3.2 "Swinging the Front Panel Up and Down").
② Pull down the release lever (see Figure 3.7). The connector part at the back comes off.
③ Hold the left and right sides of the front panel, and pull out the internal unit to the front (see Figure 3.8).

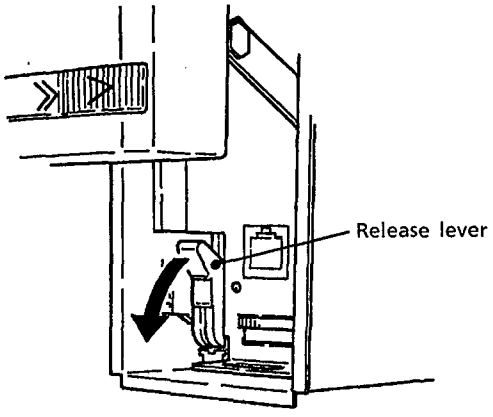


Figure 3.7 Removing the Internal Unit 1

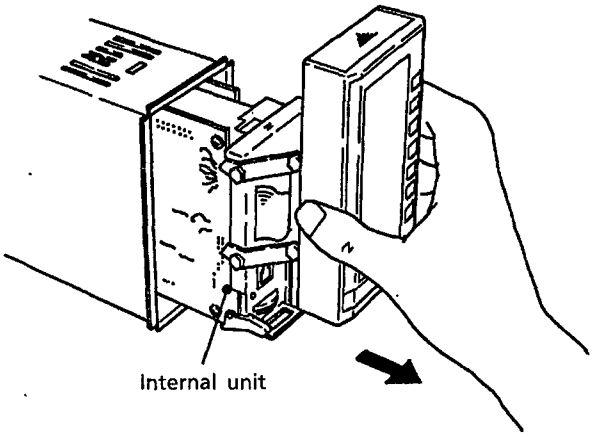


Figure 3.8 Removing the Internal Unit 2

■ Pushing in the Internal Unit

Do not install the internal unit in the wrong housing. Refer to the tag numbers for installation when the internal unit and the housing have tag numbers.

① Set the printed circuit board, which is at the left of the internal unit, in the guide rails at the left top and the left bottom in the housing (see Figure 3.9). Then, push in the internal unit until it touches the connector at the back and clicks. The release lever is set back to the hold position.

② Firmly push the release lever upwards (see Figure 3.10).

③ Swing down the front panel (see Section 3.2 "Swinging the Front Panel Up and Down").

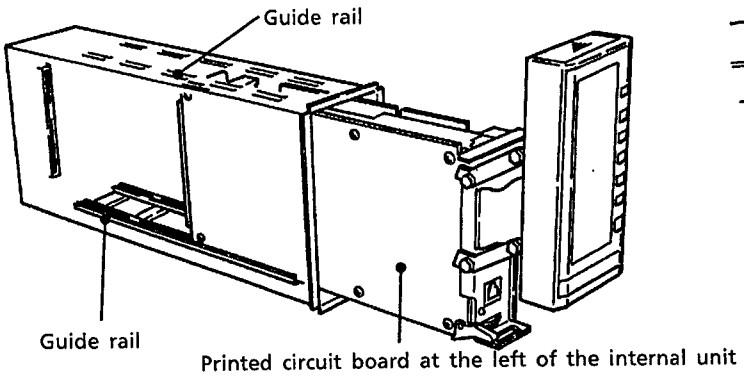


Figure 3.9 Installing the Internal Unit 1

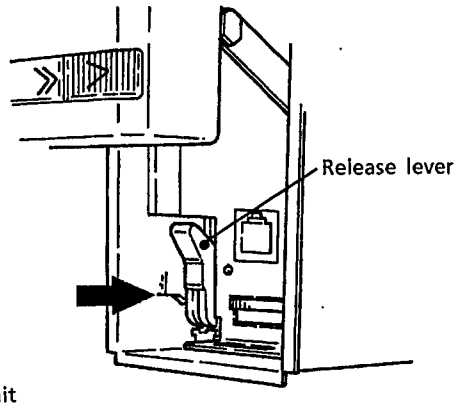


Figure 3.10 Installing the Internal Unit 2

3.6 Setting Hardware Switches

Before using the controllers, preset the items shown in Table 3.1 by changing the jumper switches to those specified in Sections 3.6.1 to 3.6.4.

Table 3.1 *Items to Be Predefined*

Location of Jumper Switches	Items to Be Predefined	Default
Main board	Whether current signal or voltage signal is output from analog output 3	Voltage output
Frequency input card (/A08)	Load resistance for current pulse Input filter Power supply voltage of the transmitter	Off Off Off
RS485 communication card (/A31)	Terminating resistance	Off
YS-net communication card (/A33)	Terminating resistance	Off.

IMPORTANT

To remove the internal unit from the housing or to dismount an option card, be sure to follow the procedure described in Section 11.3, "Parts Replacement".

3.6.1 Setting of Voltage Output / Current Output

Programmable Controller

When you use the programmable type controller, you can switch the analog output 3 from the voltage output to the current output and vice versa.

Select the two jumper switches, JP1 and JP2 on the main board in the following procedure.

① When the internal unit has an SC card installed, remove the SC card (see Section 11.3 "Replacing the SC Card").

② Remove the jumper connector with tweezers or like (see the figure below).

③ Connect the removed jumper connector to the desired setting side.
To select the voltage output (1 to 5V DC), connect the JP1 to the J1 side, and the JP2 to the J3 side.
To select the current output (4 to 20mA), connect the JP1 to the J2 side, and the JP2 to the J4 side.

④ Attach the SC card (see Section 11.3 "Replacing the SC Card").

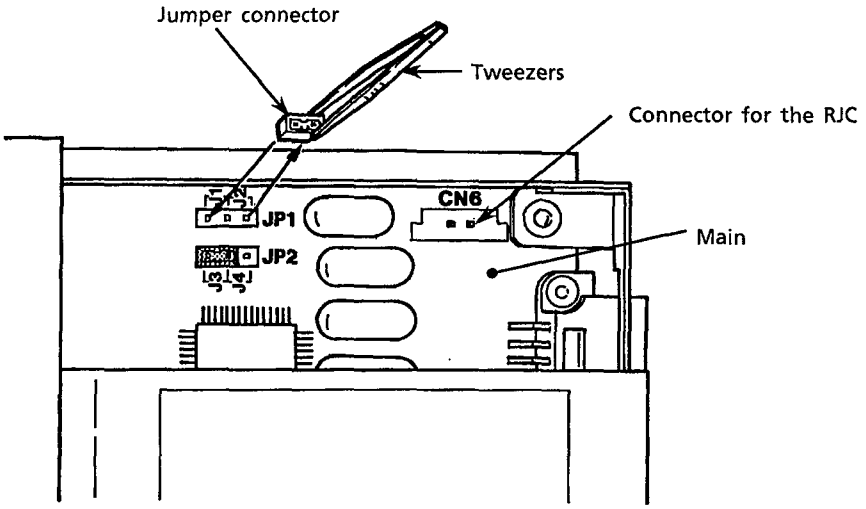


Figure 3.11 Setting the Jumper Switch

3.6.2 Setting Input Specifications of /A08 Frequency Input Card

Insert the jumper into appropriate two of the pins for setting to connect.

(1) Changing of Transmitter Power Supply Voltage (12V / 24V DC)

Insert the jumper into the "ON" side for 12V, and "OFF" side for 24V (see the figure below).

(2) To Insert Filter

To prevent chattering of dry contact inputs (mechanical relay, etc.) if pulse input rate is 10Hz or less. Insert the jumper to the "ON" side of the appropriate pin.

(3) To Set the Load Resistance for the Current Pulse Input

Insert the jumper into the "ON" side of the pin to set resistor value (200Ω, 500Ω, or 1kΩ)

NOTE

- If setting is unnecessary, insert the jumper into appropriate pin on the "OFF" side.
- Take care not to bend the pin after setting.
  Use tweezer, etc., when detaching the jumper.

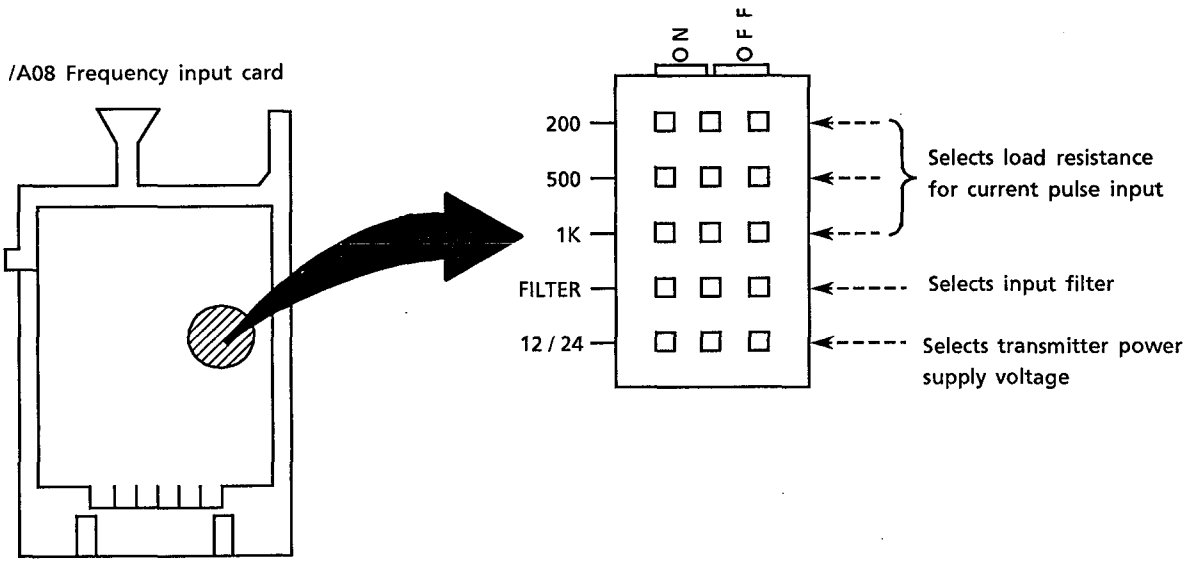


Figure 3.12 Jumper Block for Setting Input Specifications of /A08 Frequency Input Card

3.6.3 Setting Terminating Resistance of the RS-485 Communication Card

Terminating resistors must be connected at both ends of RS-485 cable (twisted-pair).

Use the terminating resistor on JP1 jumper of RS-485 communication card as trminator of receiving side for two-wire and four-wire cabling, (between RD (A) and RD (B)).

Install JP1 jumper on RS-485 communication board to ON (J2) side to terminate, and install the jumper to OFF (J1) side not to terminate.

Attach a terminating resistor (120Ω±1%, 1 / 2W, 100ppm / °C) to the sending side (between SD (A) and SD (B)) at the instrument panel, in the four-wire case.

Refer to computer instruction manual for terminating registor for computer side.

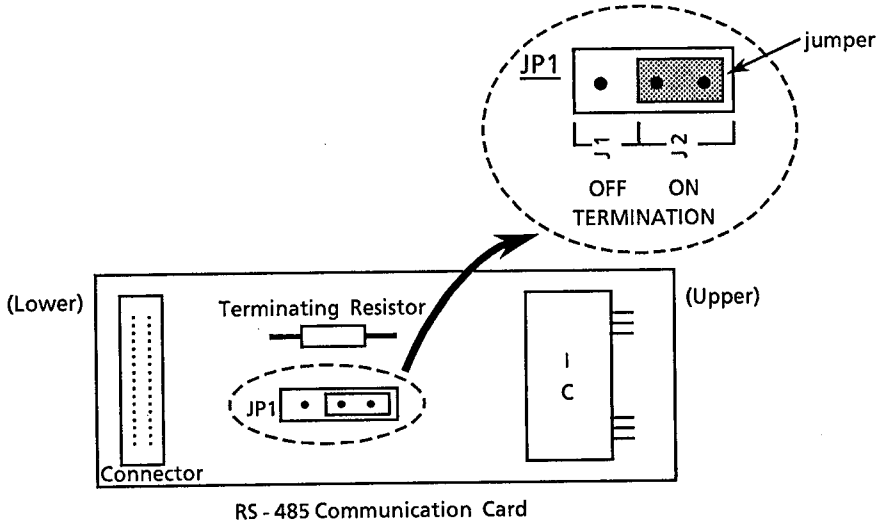


Figure 3.13 Seting Terminating Resistor on Communication Card

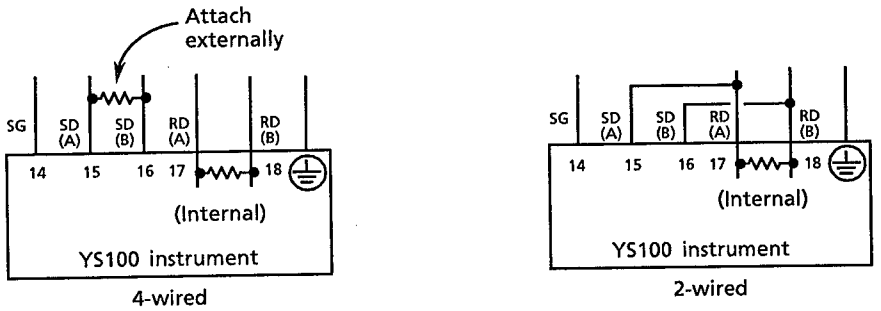
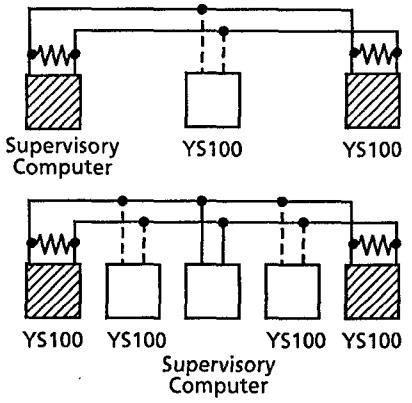


Figure 3.14 Attaching Terminating Resistor

(1) Two-wire Send / Receive

Set the terminating resistors at each terminal of the hatched apparatus in the figures to the right. The same applies to the case when the YS100 instruments connected with dotted lines are removed.

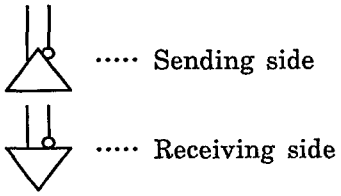
For the YS100 instruments shown connected with dotted lines, makes sure that the internal terminating registor is OFF.



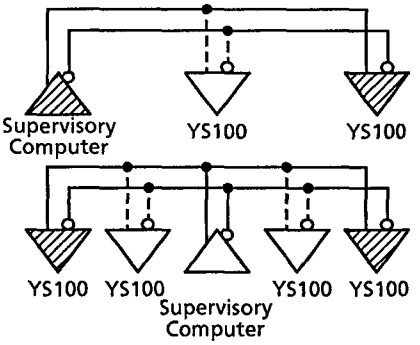
(2) Four-wire Send / Receive

Set the terminating resistors at each terminal of the hatched apparatus in the figures to the right. The same applies to the case when the YS100 instruments connected with dotted lines are removed.

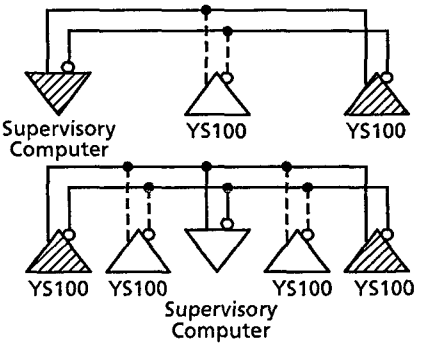
For the YS100 instruments shown connected with dotted lines, makes sure that the internal terminating registor is OFF.



- YS100 Receive Line



- YS100 Send Line



3.6.4 Setting Terminating Resistance of the YS-net Communication Card

When connecting the YS100 instrument to the terminal of the YS-net, be sure to set a terminator. To set the terminator, slide the JP1 jumper (See Figure3.15) to the ON side on the YS net communications card. To disconnect the terminator, slide the jumper to the OFF side. Note that the default is OFF.

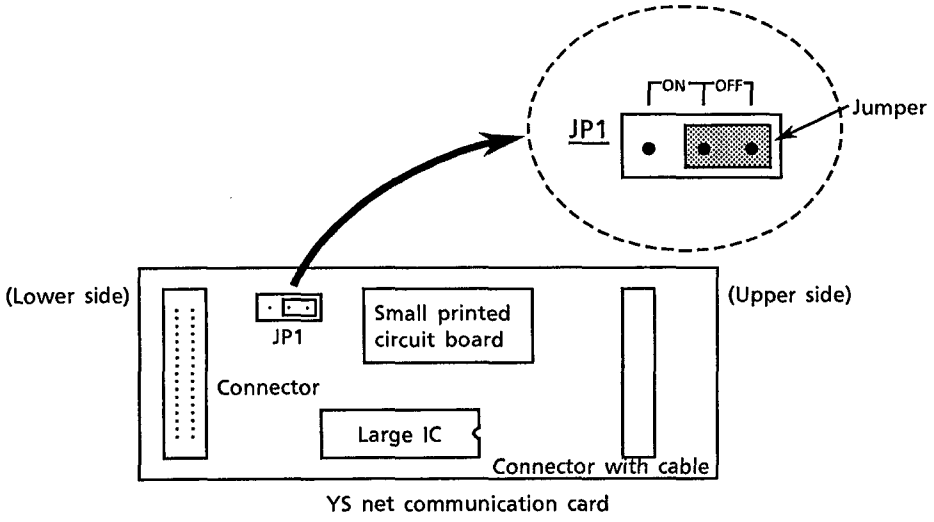


Figure 3.15 Setting of Terminating Resistance on YS-net Communication Card

4. TYPES AND OPERATION OF THE DISPLAY PANELS

4.1 Display Panel Groups

The following three display panel groups, which are grouped by operation, are available with the controller.

(1) Operation Panel Group (for Normal Operation)

includes the following panels used to:

- select the operation mode during control operation, set SV, and operate MV,
- display the PV trend panel,
- display the alarm panel indicating the detail information of alarm, and
- display the dual loop panel (with operation for either loop).

(2) Tuning Panel Group

includes the following panels used to:

- set and display the control parameters, and
- monitor the input and output signals.

(3) Engineering Panel Group

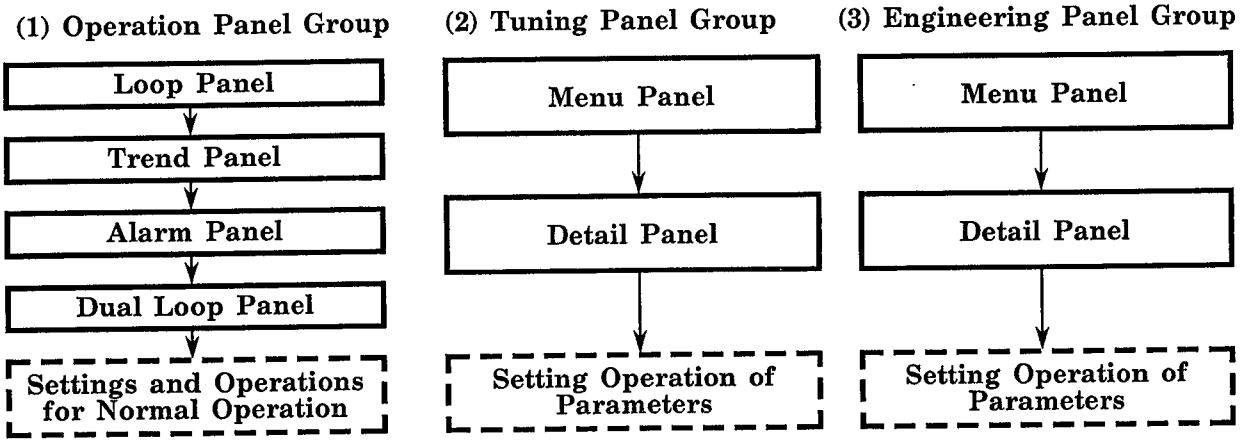
includes the following panels used to:

- set the controller functions of the unit,
- set and display the registers and tables,
- set direct input specifications, and
- set the password.

Note: In the following sections, "group" of each panel group may be omitted when there is no doubt of confusion.

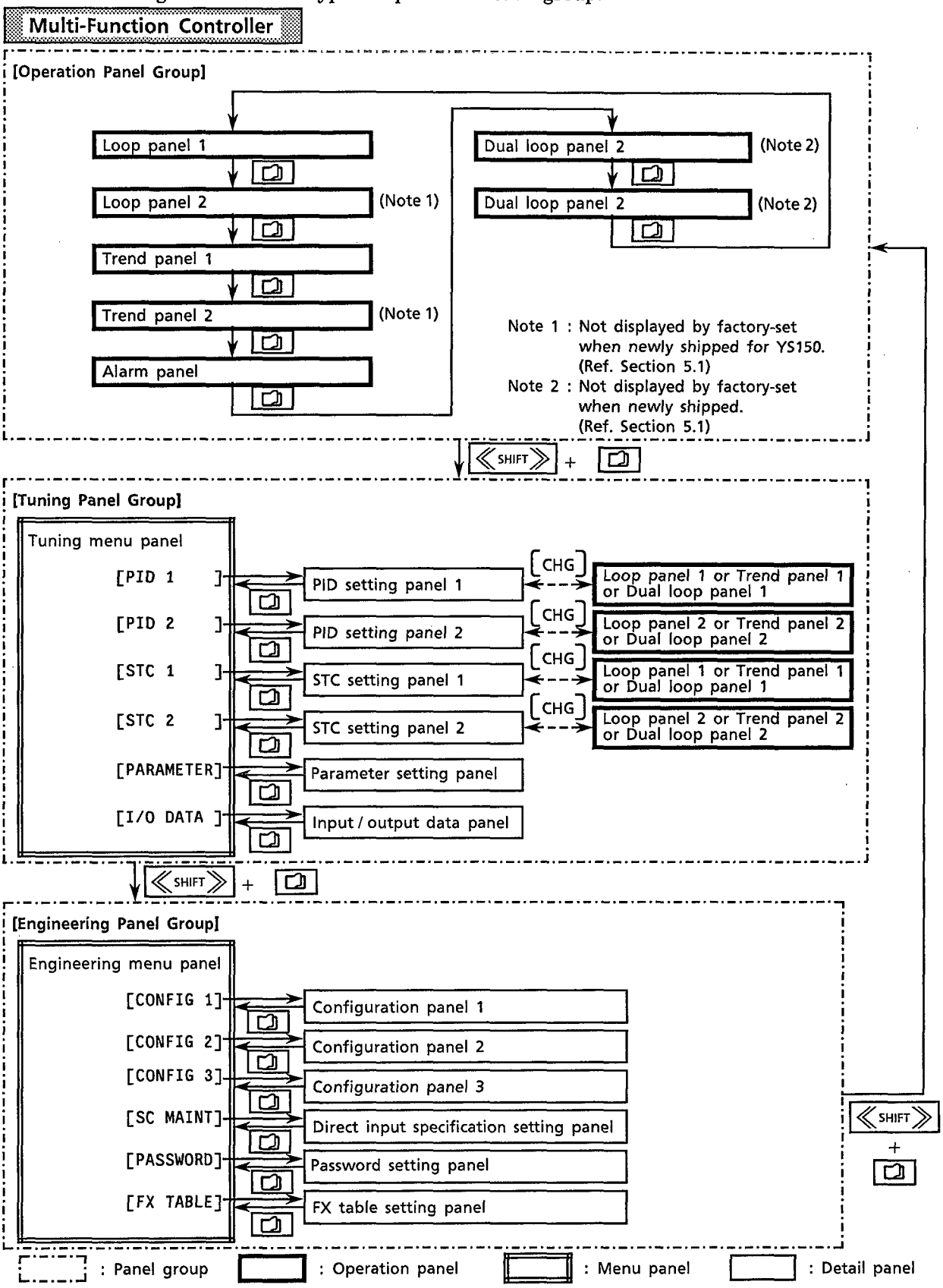
4.2 Construction of the Display Panel Groups

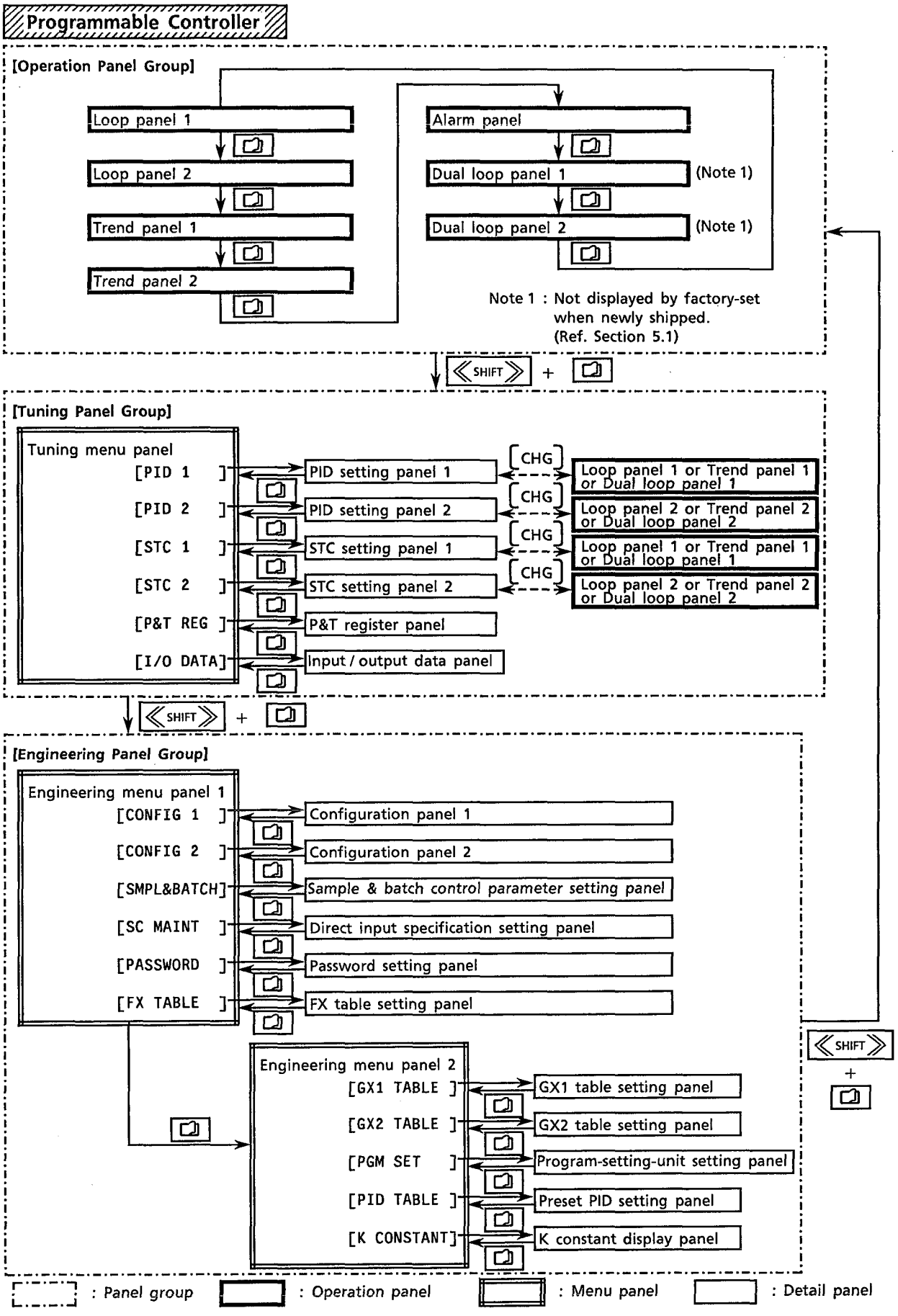
Each panel group is constructed as follows:



4.3 Panel - Switching Flow Charts

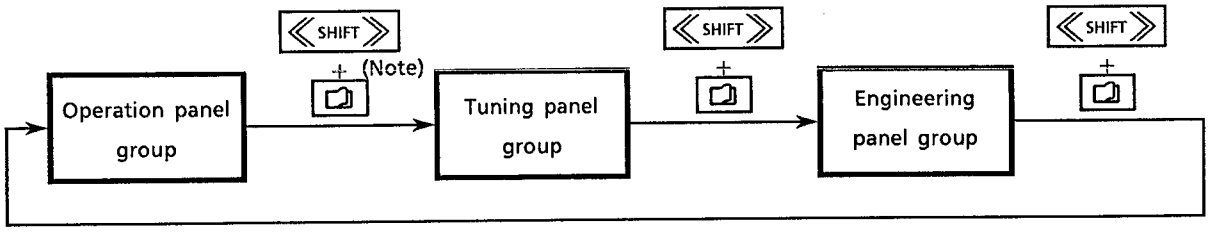
The following describes the types of panels in each group.




Programmable Controller
[Operation Panel Group]
Loop panel 1
Loop panel 2
Trend panel 1
Trend panel 2
Alarm panel
Dual loop panel 1
(Note 1)
Dual loop panel 2
(Note 1)
Note 1 : Not displayed by factory-set when newly shipped. (Ref. Section 5.1)
SHIFT +
[Tuning Panel Group]
Tuning menu panel
[PID 1]
[PID 2]
[STC 1]
[STC 2]
[P&T REG]
[I/O DATA]
PID setting panel 1
PID setting panel 2
STC setting panel 1
STC setting panel 2
P&T register panel
Input / output data panel
CHG
Loop panel 1 or Trend panel 1 or Dual loop panel 1
Loop panel 2 or Trend panel 2 or Dual loop panel 2
Loop panel 1 or Trend panel 1 or Dual loop panel 1
Loop panel 2 or Trend panel 2 or Dual loop panel 2
SHIFT +
[Engineering Panel Group]
Engineering menu panel 1
[CONFIG 1]
[CONFIG 2]
[SMPL&BATCH]
[SC MAINT]
[PASSWORD]
[FX TABLE]
Configuration panel 1
Configuration panel 2
Sample & batch control parameter setting panel
Direct input specification setting panel
Password setting panel
FX table setting panel
Engineering menu panel 2
[GX1 TABLE]
[GX2 TABLE]
[PGM SET]
[PID TABLE]
[K CONSTANT]
GX1 table setting panel
GX2 table setting panel
Program-setting-unit setting panel
Preset PID setting panel
K constant display panel
SHIFT +
: Panel group
: Operation panel
: Menu panel
: Detail panel

4.3.1 Panel Selection Operation from the Panel Groups

The following shows the flow of the panel group selection sequence.



① When power is turned on, initialization of the controller is carried out. Then, the controller shows the operation panel group.

② Every time you press the [ ] key while holding down the [SHIFT] key, the panel group is selected one after another in the following sequence: the operation panel group to the tuning panel group to the engineering panel group. The controller shows the operation panel group again by pressing the [ ] key while holding down the [SHIFT] key.

NOTE

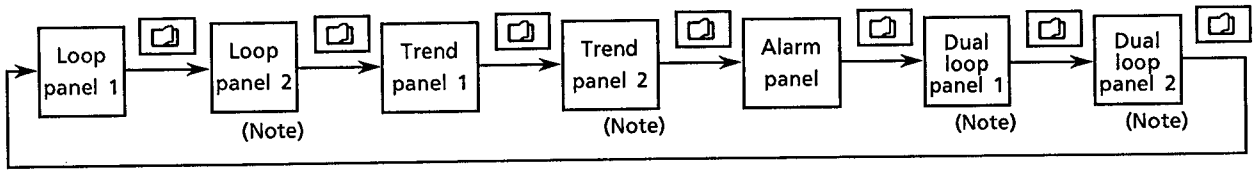
[SHIFT] + [ ] operation indicates that you have to press the [ ] key while holding down the [SHIFT] key. If you press these keys in the reverse order, the panel group does not appear as described above.

5. NORMAL OPERATION

5.1 Selection Operation of the Operation Panel

[SHIFT] + [ ] operation displays the operation panel group.
There are seven types of operation panels in the operation panel group.

The following shows the flow of the operation panel selection sequence.



① An operation panel is displayed when you select the operation panel group.
② The operation panel changes from current to next one every time you press the [ ] key as shown above.

Note: The YS150 controller is factory-set to the single-loop mode. In this mode it shows only the loop panel 1, the trend panel 1, and the alarm panel. If you change the controller mode at the configuration panel 1 of the engineering panel, loop panel 2 and trend panel 2 will be shown.
Also, the YS150 and YS170 controller is factory-set so that they don't show the dual loop panel 1 and dual loop panel 2.
To show these panels you change the panel display selection for the dual loop panels at the configuration panel 1 of the engineering panel.

5.2 Display and Operation of the Loop Panel

This section explains how to display and operate the loop panel.

5.2.1 Display of the Loop Panel

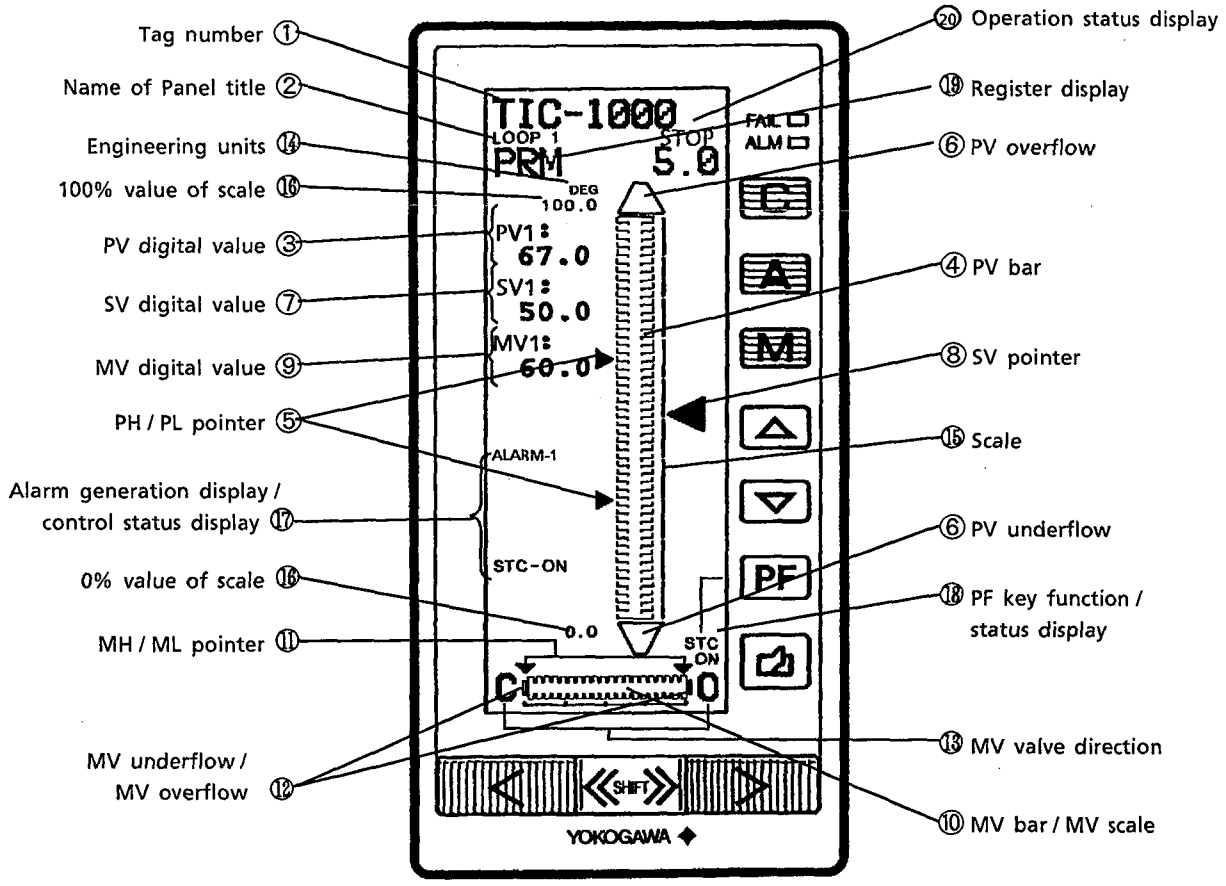


Figure 5.1 Display of the Loop Panel

① Tag Number

Up to 8 digits of tag number composed of alphanumeric characters and symbols are displayed for each loop.

The tag number (TAG) can be set in the configuration panel 2.

② Name of the Panel Title

This shows the name of the panel displayed at present.

③ PV Digital Value

A PV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).

④ PV Bar

A PV value is displayed with a bar. The bar has a total of 200 elements for full-scale (100%). The display is divided in 50 segments (2%), and increases or decreases in 1-element unit (0.5%).

⑤ **PH / PL Pointer**

A PH value (PV-value-high-limit alarm set value) and a PL value (PV-value-low-limit alarm set value) are displayed with a triangular pointer. The PH value and the PL value are to be set in the PID setting panel.

⑥ **PV Underflow / PV Overflow**

The PV underflow is displayed when the PV value is less than 0%. The PV overflow is displayed when the PV value is more than 100%.

⑦ **SV Digital Value**

An SV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).

⑧ **SV Pointer**

An SV value is displayed with a triangular pointer. The pointer moves up or down with resolution of 0.5% unit.

⑨ **MV Digital Value**

An MV value is displayed in 4-digit digital value in % (5 digits including decimal point and codes).

⑩ **MV Bar / MV Scale**

An MV value is displayed with a bar. The bar has a total of 80 elements for full-scale (100%). The display is divided in 20 segments (5%), and increases or decreases in 1-element unit (1.25%). The scale divided by four (25%) is also displayed.

⑪ **MH / ML Pointer**

An MH value (MV-high-limit value) and an ML value (MV-low-limit value) is displayed with a triangular pointer. The MH value and the ML value are to be set in the PID setting panel.

⑫ **MV Underflow / MV Overflow**

The MV underflow is displayed when the MV value is less than 0%. The MV overflow is displayed when the MV value is more than 100%.

⑬ **MV Valve Direction**

The direction of the MV valve is displayed with "C" (for closing direction) or "O" (for open direction). The direction of the opening of the valve (VDIR) is set in the configuration panel 2.

⑭ **Engineering Units**

Up to 6-digit engineering unit is displayed. The engineering unit is selected in the configuration panel 2.

⑮ **Scale**

The scale divided by up to 10 divisions (10%) is displayed. The number (scale) of divisions (SCDV) is to be set in the configuration panel 2.

⑯ 0% / 100% Value of Scale

The 0% value and the 100% value of the scale are displayed in 4-digit digital value of engineering unit (6 digits including decimal point and codes). The 0% value (SCL) and the 100% value (SCH) of the scale are to be set in the configuration panel 2.

⑰ Alarm Generation Display / Control Status Display

Abbreviations representing the alarm and control statuses are displayed ; they differ between the controller modes when you use the multi-function type, and also differ between the control modules when you use the programmable type.

Multi-Function Controller

Display Item \ Controller Mode	Single-Loop	Cascade	Selector
Alarm Generation Display (Note 1)	SYS-ALM STC-ALM ALARM-1	SYS-ALM STC-ALM ALARM-1 ALARM-2	SYS-ALM STC-ALM ALARM-1 ALARM-2
Control Status Display (Note 2)	CAS, SPC, DDC, BUA, BUM	CAS, SPC, DDC, BUA, BUM	CAS, SPC, DDC, BUA, BUM
Control Sub-Status Display 1 (Note 3)	EXT-MAN, EXT-AUT EXT-PMV, EXT-TRK	None	None
Control Sub-Status Display 2 (Note 4)	SV TRK, PV TRK	OPEN, CLOSE	SV2-RMT, SV2-LCL SEL1, SEL2
Control Sub-Status Display 3 (Note 3)	STC-ON, STC-DSP, ATSTUP	STC-ON, STC-DSP, ATSTUP	STC-ON, STC-DSP

Programmable Controller

Display Item \ Control Module	Single-Loop	Cascade	Selector	2-Loop
Alarm Generation Display (Note 1)	SYS-ALM STC-ALM ALARM-1	SYS-ALM STC-ALM ALARM-1 ALARM-2	SYS-ALM STC-ALM ALARM-1 ALARM-2	SYS-ALM STC-ALM ALARM-1 ALARM-2
Control Status Display (Note 2)	CAS, SPC, DDC, BUA, BUM	CAS, SPC, DDC, BUA, BUM	CAS, SPC, DDC, BUA, BUM	CAS, SPC, DDC, BUA, BUM
Control Sub-Status Display 1	None	None	None	None
Control Sub-Status Display 2 (Note 4)	None	OPEN, CLOSE	SV2-RMT, SV2-LCL SEL1, SEL2	None
Control Sub-Status Display 3 (Note 3)	STC-ON, STC-DSP, ATSTUP	STC-ON, STC-DSP, ATSTUP	STC-ON, STC-DSP	STC-ON, STC-DSP, ATSTUP

Note 1 : Displayed in inverse characters only when an alarm is generated. Multiple-line-display when multiple alarms are generated.
Note 2 : One item is displayed exclusively when the operation mode is set to C mode. There is no display for other modes.
Note 3 : One item is displayed for each status. There is no display when there is no status.
Note 4 : One of these items is always displayed.

■ Description of the Abbreviated Names of the Display Items

SYS-ALM : System alarm occurred
STC-ALM : STC alarm occurred
ALARM-1 : Primary control loop process alarm occurred
ALARM-2 : Secondary control loop process alarm occurred

CAS : During remote operation by the external SV input
SPC : During remote operation by the SV input from the supervisory system computer
DDC : During MV remote operation from the supervisory system
BUA : A shift to the backup automatic status
BUM : A shift to the backup manual status

EXT-MAN : A shift to the manual mode by the external status input
EXT-AUT : A shift to the automatic mode by the external status input
EXT-PMV : During preset MV output by the external status input
EXT-TRK : During output tracking by the external status input

SV TRK : During SV tracking
PV TRK : During PV tracking

OPEN : Open status of the internal cascade
CLOSE : Close status of the internal cascade

SV2-RMT : SV2 remote setting of secondary control element
SV2-LCL : SV2 local setting of secondary control element

SEL1 : Selection of primary loop 1
SEL2 : Selection of secondary loop 2

STC-ON : During operation under STC control
STC-DSP : Computed optimum PID setting value display with STC
ATSTUP : During automatic start-up with STC

⑱ PF Key Function / Status Display

The function and status of the PF key are displayed. The function and status display of the PF key differ between the multi-function type and the programmable type as follows:

Multi-Function Controller

When you use the multi-function type, the function of the PF key is defined with PFKEY of the configuration panel 3 (P. 9 - 13).

- When you do not define the PF key function, the function and status are not displayed.
- When you define the PF key function, the function display is "STC", and the status display is "ON" or "OFF".

Programmable Controller

When you use the programmable type, the function and display label of the PF key can be defined by a user program.

- No function and status display are available for a user program which does not define the function and display label of the PF key.
- The function display is "PF" and the status display is either "ON" or "OFF" for the user program which defines the function and display label of the PF key.

⑲ P Register Display

Programmable Controller only

When display is set effective in the configuration panel 1, the register display will appear on loop 1 and loop 2 independently.

⑳ Operation Status Display

Operation status of the controller is displayed.

(no display) : Operating
STOP : Operation stopped
(ex: configuration is being changed from the engineering panel)
TEST : Under test run (only for the programmable controller)
H. MAN : Hard manual selector switch is ON.

5.2.2 Meaning of Signals in Each Controller Mode

Multi-Function Controller

There are three modes as following: single-loop, cascade, and selector. For each mode the display labels on the loop panel for signals and the meaning of the signals (which depends on key operations) are the same as ① to ③ below.

Programmable Controller

The mode is the same as "single-loop mode ①" below when the program uses the control module of BSC1 (basic control). It is the same as "cascade mode ②" below when the program uses the control module of CSC (cascade control). It is the same as "selector mode ③" below when the program uses the control module of SSC (selector control). It is the same as "two-loop control ④" below when the same programs use the control modules of BSC1 (basic control module) and BSC2.

Example	: Signal Name .	"Display",	Meaning of the Signal (subject to the key operation)
① Single-Loop Mode			
Loop panel 1	: PV	"PV",	Process variable of primary control loop
	SV	"SV",	Set-point variable of primary control loop
	MV	"MV",	Manipulated variable to the process
Loop panel 2	: There is no loop panel 2.		
② Cascade Mode			
Loop panel 1	: PV	"PV1",	Process variable of primary control loop
	SV	"SV1",	Set-point variable of primary control loop
	MV	"MV",	Manipulated variable to the process
Loop panel 2	: PV	"PV2",	Process variable of secondary control loop
	SV	"SV2",	Set-point variable of secondary control loop
	MV	"MV",	Manipulated variable to the process

Note: The SV setting key in the loop panel 2 can be set when the control sub-status is set to "OPEN" (the internal cascade is open).

③ Selector Mode			
Loop panel 1	: PV	"PV1",	Process variable of primary control loop
	SV	"SV1",	Set-point variable of primary control loop
	MV	"MV",	Manipulated variable to the process
Loop panel 2	: PV	"PV2",	Process variable of secondary control loop
	SV	"SV2",	Set-point variable of secondary control loop
	MV	"MV",	Manipulated variable to the process

Note: The SV setting key in the loop panel 2 can be set when the control sub-status is set to "SV2-LCL."

④ 2-Loop Control of the Programmable Type			
Loop panel 1	: PV	"PV1",	Process variable of primary control loop
	SV	"SV1",	Set-point variable of primary control loop
	MV	"MV1",	Manipulated variable to primary loop (process)
Loop panel 2	: PV	"PV2",	Process variable of secondary control element
	SV	"SV2",	Set-point variable of primary control element
	MV	"MV2",	Manipulated output variable to secondary loop (process)

5.2.3 Operation of the Loop Panel

The following describes key operations for setting and control of the loop panels.

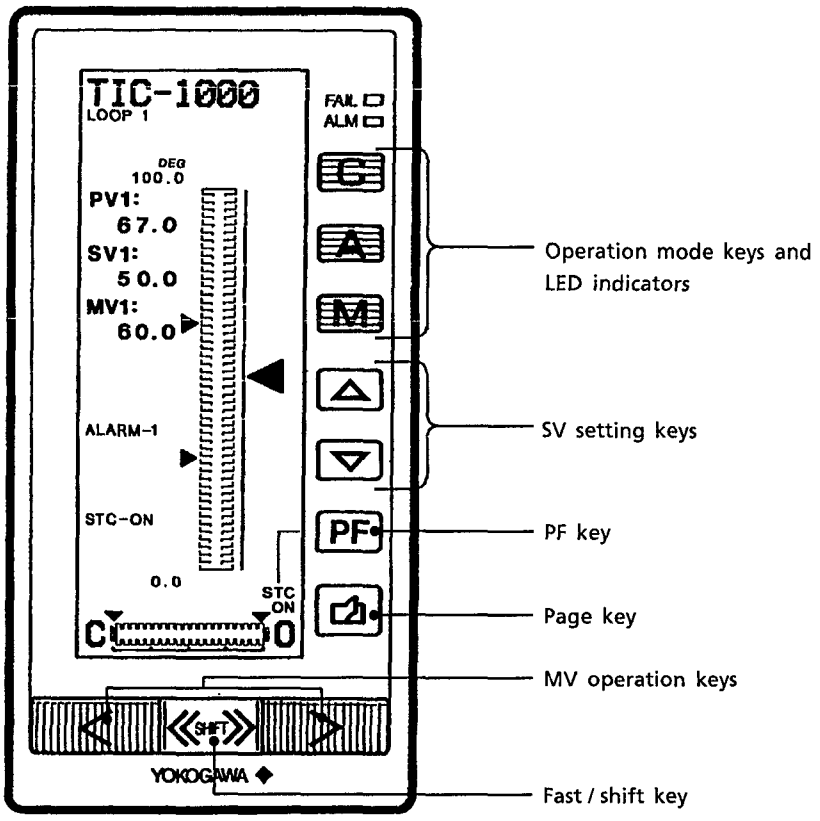


Figure 5.2 Operation of the Loop Panel

■ Selecting the Desired Operation Mode

There are three operation mode keys. They are used to select the desired control operation mode.

NOTE

Operation mode cannot be changed to operation mode C if the cascade input signals do not fall within the range between −6.3% and 106.3%.

: **C Mode Key**
Selects the C (cascaded by external analog signals or computer) control operation mode.

: **A Mode Key**
Selects the A (automatic) control operation mode.

: **M Mode Key**
Selects the M (manual) control operation mode.

The LED indicator in the key which corresponds to the selected operation mode key is lit.

■ Setting the SV Value

The SV setting key changes the setting value (SV) of the control loop.
This function is available in the A or M control operation mode.
There are two SV setting keys. They are used to change the SV value.

[△] : **SV Increasing Key**
Increases the SV value.

[▽] : **SV Decreasing Key**
Decreases the SV value.

■ Using the MV Operation Key

Use this key to operate the manipulated output (MV) manually.
This function is available in the M control operation mode.
There are two MV operation keys. They are used to change the MV value.

 : **MV Operation Increasing Key**
Increases the MV value.

 : **MV Operation Decreasing Key**
Decreases the MV value.

An increase or decrease of the MV value can be accelerated by holding down the [≪SHIFT≫] key (Fast/shift key) then pressing the MV operation key.

■ Using the PF Key

The function of the PF key **differs between the multi-function type and the programmable type.**

Multi-Function Controller

When you use the multi-function type, the function of the PF key is designated from the configuration panel 3. The two following parameters are used.

① **No Function**
The PF key does not function.

② **Turn STC ON or OFF**
The PF key switches the STC operation on and off.

Programmable Controller

When you use the programmable type, set the function of the PF key by defining it with the user program (see 5.2.1 ⑱ above).

5.3 Display and Operation of the Trend Panel

The trend panel displays the trend of the PV in addition to the functions of the loop panel. This section explains the display and operation of the trend panel.

5.3.1 Display of the Trend Panel

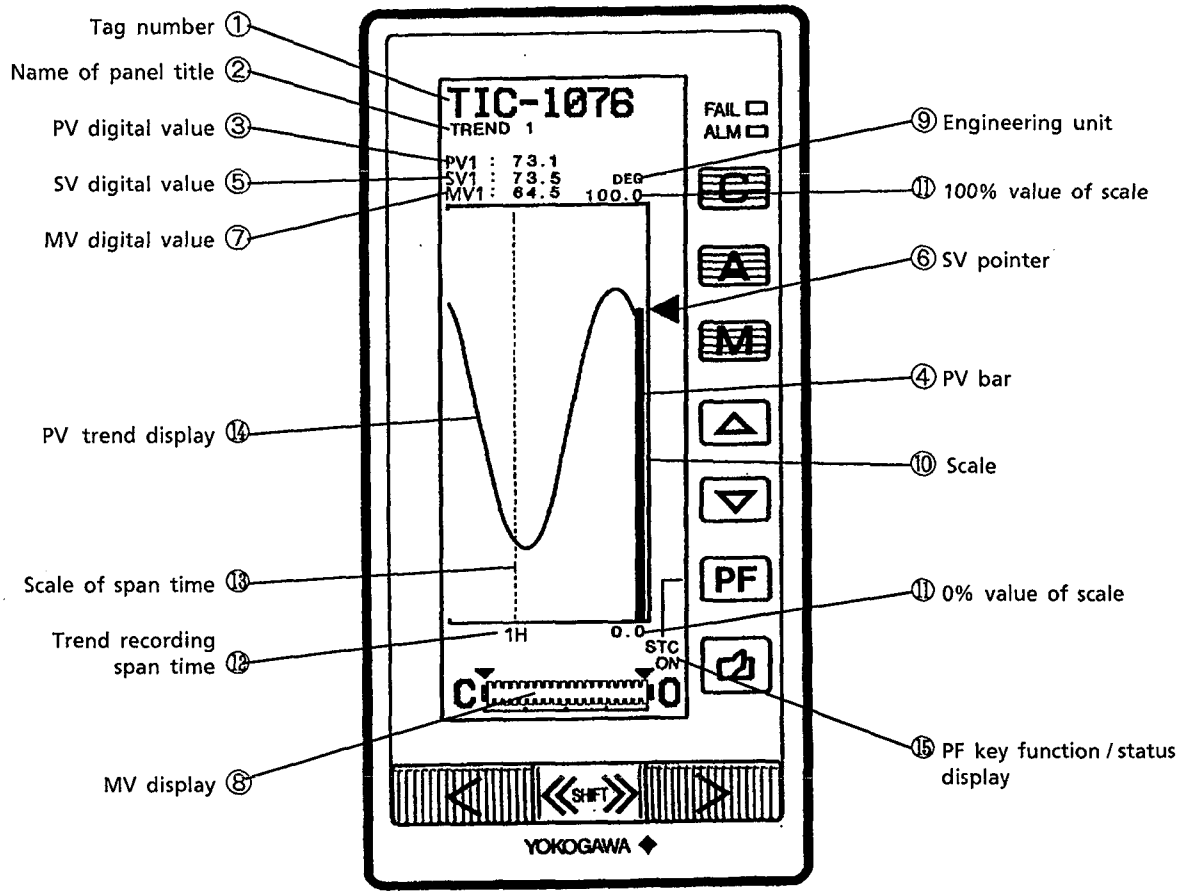


Figure 5.3 Display of the Trend Panel

① Tag Number

Up to 8 digits of tag number composed of alphanumeric characters and symbols are displayed for each loop.
The tag number (TAG) can be set in the configuration panel 2.

② Name of the Panel Title

This shows the name of the panel displayed at present.

③ PV Digital Value

A PV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).

④ PV Bar

A PV value is displayed with a bar. The bar has a total of 200 elements for full-scale (100%), and increases or decreases in 1-element unit (0.5%).

⑤ **SV Digital Value**

An SV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).

⑥ **SV Pointer**

An SV value is displayed with a triangular pointer. The pointer moves up or down with resolution of 0.5% unit.

⑦ **MV Digital Value**

An MV value is displayed in 4-digit digital value in % (5 digits including decimal point and sign).

⑧ **MV Display**

The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed. The display contents in the panel are the same as those in the loop panel.

⑨ **Engineering Unit**

Up to six characters representing engineering unit is displayed. The engineering unit to be displayed is selected in configuration panel 2 for each trend panel.

⑩ **Scale**

A scale divided into up to 10 divisions (10%) is displayed. The horizontal lines which correspond to the division of the scale are displayed with dotted lines. The number (scale) of divisions (SCDV) is set in configuration panel 2 for each trend panel.

⑪ **0% / 100% Value of Scale**

The 0% value and the 100% value of the scale are displayed as 4-digit digital values in engineering units (6 digits including decimal point and sign). The 0% value (SCL) and the 100% value (SCH) of the scale are set in the configuration panel 2 for each trend panel.

⑫ **Trend Recording Span Time**

The set value of the trend recording span time is displayed. Although the trend recording span is 90 lines, this trend recording span displays up to 60 lines of span time. The trend recording span time (TRDT) is set in the configuration panel 2 for each trend panel.

The position of line 0 shows the current time of the trend recording, and that of line 90 shows the maximum past time. Changing the trend recording span time deletes the previously recorded data.

⑬ **Scale of Span Time**

The span time scale (vertical line) is displayed at the position of line 60 with a dotted line. When the scale ⑩ above is divided by four or more, the delay time scale is also displayed at the position of line 30 with a dotted line.

⑭ **PV Trend Display**

The trend recording span time (TRDT) is divided into 60 divisions, and minimum and maximum PV values within the one division of span time are displayed with a vertical line width of one element.

The PV value is displayed as 0% when it is less than 0%. The PV value is displayed as 100% when it is more than 100%.

⑮ **PF Key Function / Status Display**

The function and status of the PF key is displayed. The contents of the display are the same as those of the loop panel.

5.3.2 Operation of the Trend Panel

The following four types of operations are available on the trend panel.

(1) Changing the operation mode
(2) Setting of the SV
(3) Operation for MV
(4) Operation for the PF key

Operate the trend panel in the same manner as do the loop panel (see Section 5.2.3 Operation of the Loop Panel").

5.4 Display and Operation of the Alarm Panel

The alarm panel displays all the detail information when an alarm occurs. The user can check an unacknowledged alarm. This section explains display and operation of the alarm panel.

5.4.1 Display of the Alarm Panel

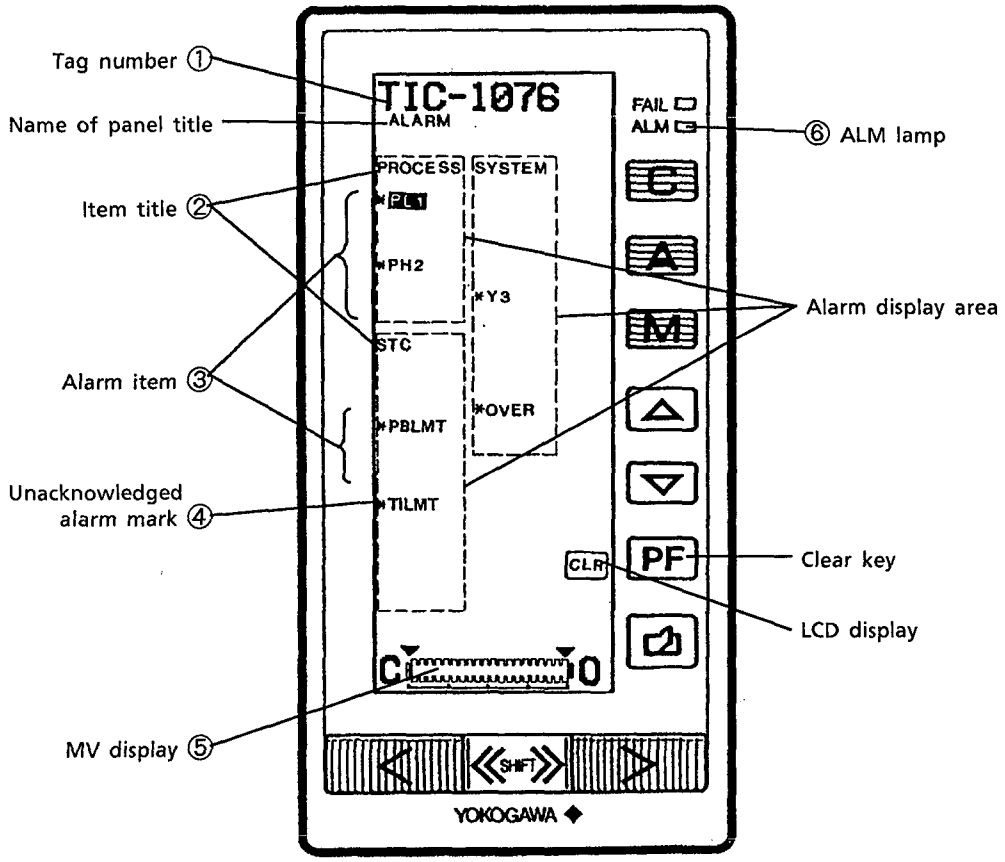


Figure 5.4 Display of the Alarm Panel

① Tag Number

The tag number of primary loop is displayed when 2-loop control is carried out. Operation for MV is also carried out for primary loop.

② Item Title

Any of the types of alarm that occur are displayed. There are three types of alarms as follows:

- PROCESS : Process alarm
- STC : STC alarm
- SYSTEM : System alarm

③ Alarm Item

There are two typs of display for the alarm items that occur as follows:

- **Reverse Display of Items** : means the alarm is current.

- **Normal Display of Items** : means the alarm occurred in the past, and recovered automatically.

The alarm items to be displayed are as follows:

- **Process Alarm** (This uses the parameter names for alarm setting.)

PH1	: Process variable high-limit alarm 1	PH2	: Process variable high-limit alarm 2
PL1	: Process variable low-limit alarm 1	PL2	: Process variable low-limit alarm 2
DL1	: Deviation alarm 1	DL2	: Deviation alarm 2
VL1	: Velocity alarm 1	VL2	: Velocity alarm 2

Hysteresis bands for PH, PL, DL alarms are 2%.

- **STC Alarm**

SYSALM	: System alarm	PWRDWN	: Power supply abnormal
PVOVR	: PV alarm	PBLMT	: PB alarm
MVLMT	: MV alarm	TILMT	: TI alarm
OPERR	: Operation abnormal	TDLMT	: TD alarm
IDERR	: Identification impossible	RTALM	: RT alarm

- **System Alarm**

X1 to X5 : Input overrange
The register names of X1 to X5 assigned to each input terminal are displayed.

Y1 and Y3 : Output open
The register names of Y1 and Y3 are displayed.

RAM : RAm contents destroyed (volatile).

CALC : Operation overflow
OVER : Control period over
} Only for the YS170 programmable controller

See Also

See Table 6.1 and Table 6.2 in Section "6.1 If the ALM Lamp Lights" for causes of each alarm.

④ Unacknowledged Alarm Mark

Unacknowledged alarms are displayed with "＊" appearing at the head of each item.

⑤ MV Display

The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed.
The contents of the display are the same as those of the loop panel.

⑥ ALM Lamp

This lamp lights when an alarm occurs.

5.4.2 Operation of the Alarm Panel

The operation of the alarm panel is as follows:

(1) Operation for MV (same as the loop panel. See Section 5.2.3 "Operation of the Loop Panel").

(2) Checking of the unacknowledged alarm

■ Checking Unacknowledged Alarms

On the alarm panel, [CLR] (the PF soft key label) appears on the LCD at the left of PF key. In this case, the PF key functions as a clear key. The clear key is used to acknowledge alarms. Pressing this key acknowledge the alarm and deletes "*" (which means the alarm has not been acknowledged yet).

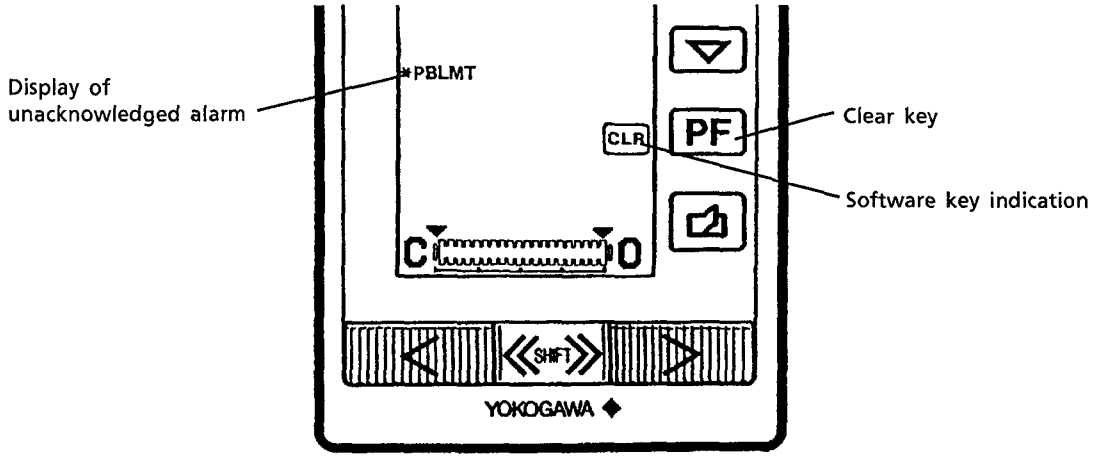


Figure 5.5 Checking the Unacknowledged Alarms

5.5 Display and Operation of the Dual Loop Panel

This section explains how to display and operate the dual loop panel.

There are two panels Dual 1 and Dual 2. Dual 1 is for the loop 1 operation and Dual 2 is for the loop 2 operation. Both Dual 1 and Dual 2 display loop 1 information in the left side and loop 2 information in the right side.

5.5.1 Display of the Dual Loop Panel

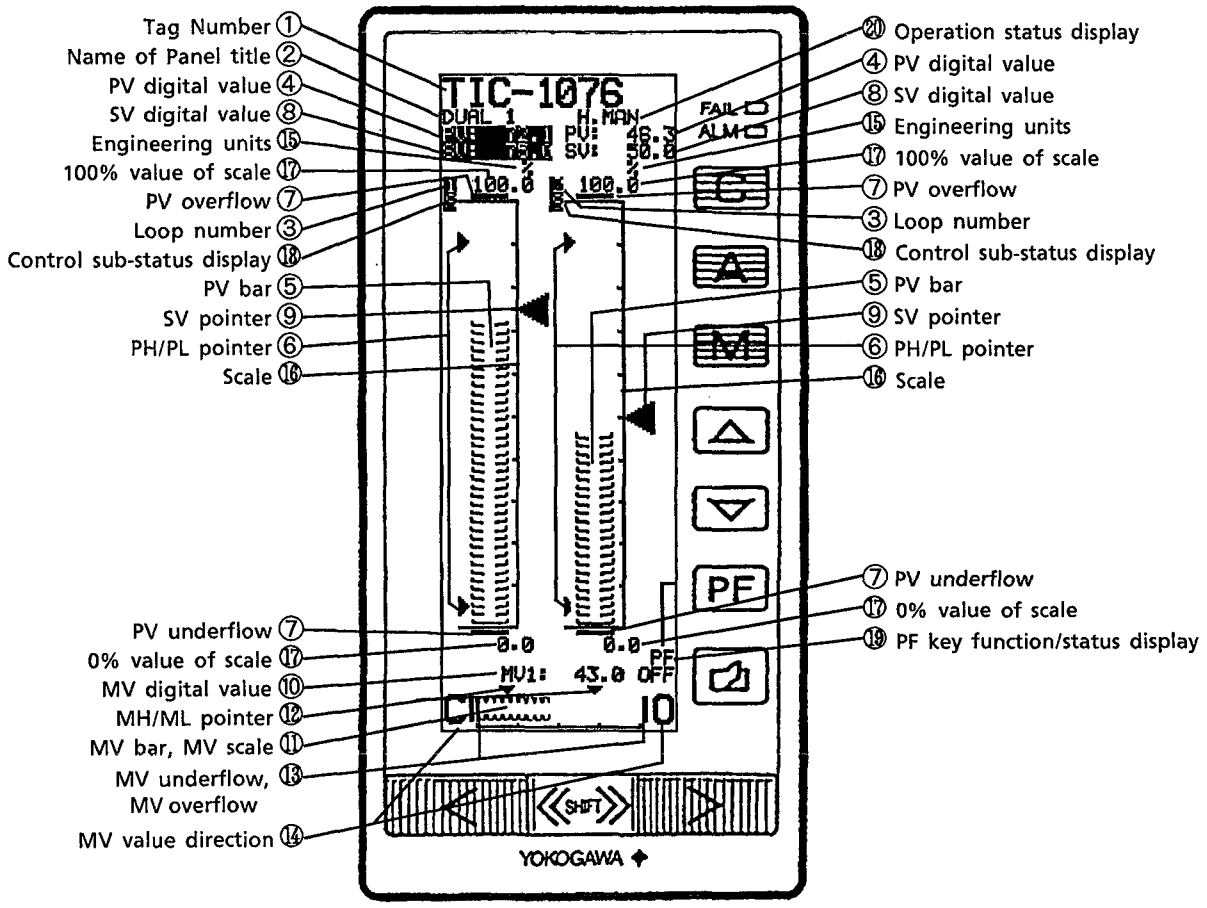


Figure 5.6 Display of the Dual Loop Panel

① Tag Number

Up to 8 digits of tag number composed of alphanumeric characters and symbols are displayed for each loop.

The tag number (TAG) can be set in the configuration panel 2.

② Name of the Panel Title

This shows the name of the panel displayed at present.

③ Loop Number

Loop number 1 in the left side and 2 in the right side is always displayed.

④ **PV Digital Value**

A PV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).
The one for operatable loop is displayed in the reversed display mode.

⑤ **PV Bar**

A PV value is displayed with a bar. The bar has a total of 200 elements for full-scale (100%). The display is divided in 50 segments (2%), and increases or decreases in 1-element unit (0.5%).

⑥ **PH / PL Pointer**

A PH value (PV-value-high-limit alarm set value) and a PL value (PV-value-low-limit alarm set value) are displayed with a triangular pointer. The PH value and the PL value are to be set in the PID setting panel.

⑦ **PV Underflow / PV Overflow**

The PV underflow is displayed when the PV value is less than 0%. The PV overflow is displayed when the PV value is more than 100%.

⑧ **SV Digital Value**

An SV value is displayed in 4-digit digital value of engineering units (6 digits including decimal point and codes).
The one for operatable loop is displayed in the reversed mode.

⑨ **SV Pointer**

An SV value is displayed with a triangular pointer. The pointer moves up or down with resolution of 0.5% unit.

⑩ **MV Digital Value**

An MV value is displayed in 4-digit digital value in % (5 digits including decimal point and codes). The title will be MV, MV1 or MV2 according to the controller mode. Refer to section 5.2.2 as to what is displayed in each case.

⑪ **MV Bar / MV Scale**

An MV value is displayed with a bar. The bar has a total of 80 elements for full-scale (100%). The display is divided in 20 segments (5%), and increases or decreases in 1-element unit (1.25%). The scale divided by four (25%) is also displayed.

⑫ **MH / ML Pointer**

An MH value (MV-high-limit value) and an ML value (MV-low-limit value) is displayed with a triangular pointer. The MH value and the ML value are to be set in the PID setting panel.

⑬ **MV Underflow / MV Overflow**

The MV underflow is displayed when the MV value is less than 0%. The MV overflow is displayed when the MV value is more than 100%.

⑭ MV Valve Direction

The direction of the MV valve is displayed with "C" (for closing direction) or "O" (for open direction). The direction of the opening of the valve (VDIR) is set in the configuration panel 2.

⑮ Engineering Units

Up to 6-digit engineering unit is displayed. The engineering unit is selected in the configuration panel 2.

⑯ Scale

The scale divided by up to 10 divisions (10%) is displayed. The number (scale) of divisions (SCDV) is to be set in the configuration panel 2.

⑰ 0% / 100% Value of Scale

The 0% value and the 100% value of the scale are displayed in 4-digit digital value of engineering unit (6 digits including decimal point and codes). The 0% value (SCL) and the 100% value (SCH) of the scale are to be set in the configuration panel 2.

⑱ Control Sub-status Display

Control sub-status is displayed just under the 'Loop Number' in single character in the reversed display mode.

Display items are as shown below according to the controller mode for the nulti-function type and the control module for the programmable type. In other status than listed below no sub-status is displayed.

Controller Mode or Control Module	Control Sub-status Display	Staus	Equivalent Control Sub-status Display in the Single Loop Panel
Cascade	O	Open status of the internal cascade	OPEN
Selector	S	Selection of the corresponding loop	SEL1 (when 'S' is displayed under the '1'.) or SEL2 (when 'S' is displayed under the '2'.)

⑲ PF Key Function / Status Display

The function and status of the PF key are displayed. The function and status display of the PF key differ between the multi-function type and the programmable type as follows:

Multi-Function Controller

When you use the multi-function type, the function of the PF key is defined with PFKEY of the configuration panel 3 (P. 9 - 13).

- When you do not define the PF key function, the function and status are not displayed.
- When you define the PF key function, the function display is "STC", and the status display is "ON" or "OFF".

Programmable Controller

When you use the programmable type, the function and display label of the PF key can be defined by a user program.

- No function and status display are available for a user program which does not define the function and display label of the PF key.

- The function display is "PF" and the status display is either "ON" or "OFF" for the user program which defines the function and display label of the PF key.

⑳ **Operation Status Display**

Operation status of the controller is displayed.

(no display) : Operating
STOP : Operation stopped
(ex: configuration is being changed from the engineering panel)
TEST : Under test run (only for the programmable controller)
H. MAN : Hard manual selector switch is ON.

5.5.2 Operation of the Dual Loop Panel

The following four types of operations are available on the dual loop panel.

(1) Changing the operation mode
(2) Setting of the SV
(3) Operation for MV
(4) Operation for the PF key

Operate the dual loop panel in the same manner as do the single loop panel (see Section 5.2.3 Operation of the Loop Panel").

In the DUAL1 panel you can operate loop 1, and DUAL 2 loop 2.

PV and SV digital values are displayed in the reversed mode so that you can easily understand which loop is operatable.

6. ALARM LAMP AND FAIL LAMP DISPLAYS

The controller tells you of abnormal conditions of signals or malfunction of the controller with the ALM lamp or the FAIL lamp, located on the front display panel. Should the lamps light, take appropriate countermeasures.

6.1 If the ALM Lamp Lights

The ALM (alarm) lamp lights up when the high- or low-limit alarms of the controller are activated, or when the input or output signals to the controller are disconnected. When the ALM lamp lights, check the cause by referring to the alarm items in the alarm panel of the operation panel (see the following tables and Section 5.4.1 "Display of the Alarm Panel").

Appropriate action is required according to the type of cause.

Table 6.1 List of Causes when the ALM Lamp Lights (System / Process alarm)

Name of Alarm Item	Alarm Display	Alarm Name	Cause	Remark
SYSTEM	X1, X2, X3, X4, X5	Input rangeover	Input value is −6.25% or less, or +106.25% or more	The operation mode of the instrument (C, A, or M) will not change with this alarm.
	Y1, Y3	Current output connection open	Detects the output open of manipulated output 1 or 3 (current)	
	RAM	RAM volatile	RAM pattern does not match when starting after power failure of 2 seconds or longer.	Invalid when start mode is TIM2.
	CALC	Computing overflow	With YS170 in programmable mode, computing data of the user program exceeds ±8.000	Compute with the limited value.
	OVER	Control period over	With YS170 in programmable mode, when test run of the user program, control computation takes longer than control period	
PROCESS	PH1, PH2	Process variable high-limit alarm	Process abnormal. PV1 or PV2 is more than the high-limit-alarm set point.	Hysteresis band is 2%.
	PL1, PL2	Process variable low-limit alarm	Process abnromal. PV1 or PV2 is less than the low-limit-alarm set point.	Hysteresis band is 2%.
	DL1, DV2	Deviation alarm	Deviation abnormal. |PV1−SV1| or |PV2−SV2| is more than the deviation-alarm set point.	Hysteresis band is 2%.
	VL1, VL2	Velocity alarm	Sudden changes in process. Velocity of change in PV1 or PV2 is more than velocity-alarm-change-value set point / velocity-alarm-change-time set point.	

Table 6.2 List of Causes when the ACM Lamp Lights (STC alarm)

Name of Alarm Item	Alarm Display	Alarm Name	Cause	STC Action	How to Clear Alarm
STC	SYSALM	System alarm	• Attempt to execute an illegal combination of control elements. • The control function is not executed every period. • Current output open.	STC stops. (Automatic start-up is disabled or stops.)	• Remove the cause of alarm. • Set STC=OFF
	PVOVR	PV alarm	• PV value is out of range. (PV≦-6.3% or PV≧ 106.3%)	STC continues. (Automatic start-up is disabled or stops.)	
	MVLMT	MV alarm	• MV value is limited by the output limiter. • Setting range for the MV applied signal before automatic start-up begins is inappropriate. • MV value is (manually) changed or reaches an output limit after automatic start-up begins.		
	OPERR	Operation abnormal	Operation is abnormal when automatic start-up begins.		
	IDERR	Identification impossible	The change in PV is too small when automatic start-up begins.		
	PWRDWN	Power supply abnormal	Power fails after automatic start-up begins.		
	PBLMT	PB alarm	Proportional band exceeded high- or low-limit.	STC continues. (These do not occur during automatic start-up.)	• Remove the cause of alarm. • Set STC=OFF • Execute automatic start-up.
	TILMT	TI alarm	Integral time exceeded high- or low-limit.		
	TDLMT	TD alarm	Derivative time exceeded high- or low-limit.		
	RTALM	RT alarm	Signal distribution ratio RT>2 or RT<0.5.		

6.2 If the FAIL Lamp Lights

The lit FAIL lamp tells you that a problem has occurred with the controller.

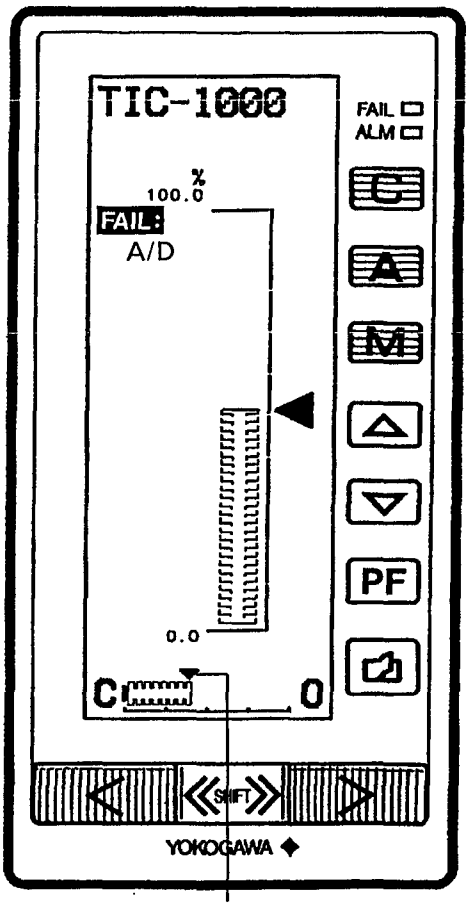
When the FAIL lamp lights up, the cause of failure is displayed at the PV, SV, or MV digital display position in the loop panel. However, the entire panel display may be disabled when the failure is caused by causes other than the items shown in the table below.

The table below shows the FAIL items.

Table 6.2 List of Alarm Items when the FAIL Lamp Lights

Item of Defect	FAIL Display	Operation when Failure Occurs	
Clock stops.	——	Computation Stops	• Fail contact opens. • Manipulated output hold (in MAN mode) • Output may be varied in MAN mode. • Communication (RS-485, DCS, YS-net) stops.
Main microprocessor (MCU) abnormal	——		
Display processor (DCU) defective	——		• Fail contact opens. • Manipulated output hold (in MAN mode) • Hard manual operation possible. • Communication (RS-485, DCS, YS-net) stops.
A / D error	A/D		
D / A error	D/A		• Fail contact opens. • Manipulated output hold (in MAN mode) • Output operation is available in MAN mode. • Communication (RS-485, DCS, YS-net) stops.
RAM error	RAM		
ROM error	ROM		
EEPROM error	EEPROM		

■ Screen for the FAIL Status (except when the display block has an error)



PV Bar : displays the raw data (1 to 5 V) of 1st input in a range of 0% to 100%.

SV Pointer : displays the value just before the failure.

MV Bar : displays the value of manipulated output 1 or analog output 1 just before the failure in a range of 0% to 100%.

Hard Manual Pointer: Indication is associated with the hard manual output.

Scale : 0% to 100% in any conditions with scale division just before the failure

C, A, M etc. : M lamp lights.

MH and ML pointer: none

PH and PL pointer : none

Valve Direction: displays C-O or O-C just before the failure.

PV, SV, and MV Digital Display: none

TAG Number : displays the tag number immediately before the failure.

FAIL Cause : displays the cause of the failure. If there are multiple causes of A/D, D/A, RAM, EEPROM, and ROM, all are displayed.

Key Input : all the input operations disabled except for the one from the MV operation keys. MV fast key disabled. (If the display processor fails, do not operate the MV operation keys as you can not see the MV bar in the display.)

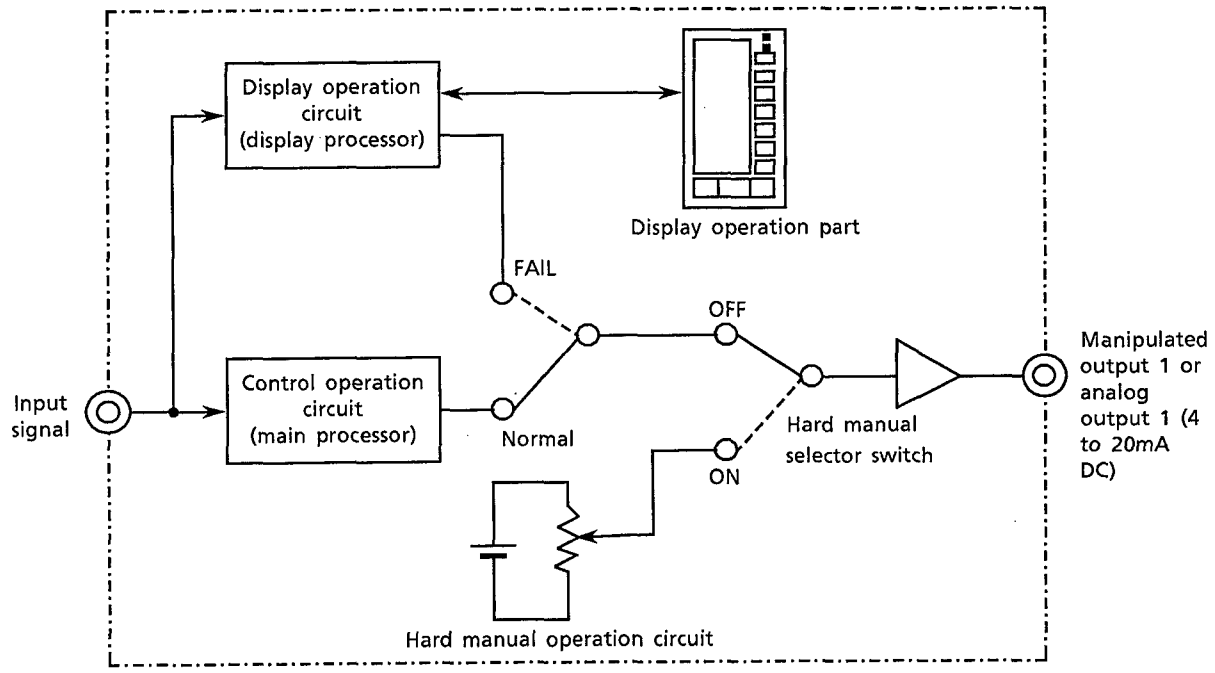


Figure 6.1 Screen for the FAIL Status, and Block Diagram for Input/Output Processing

6.3 Back Up Operation If Equipment Malfunctions

The FAIL lamp lights up if the controller goes into FAIL status. At the same time, the control mode is set to the M mode automatically.

6.3.1 Hard Manual Operation

You can find the hard manual operation part (manual output manipulated by analog circuitry) on the internal panel by swinging up the front panel (see Figure 6.2).

If the controller goes into FAIL status and operation must be carried out urgently, use the hard manual operation part to set a safe output.

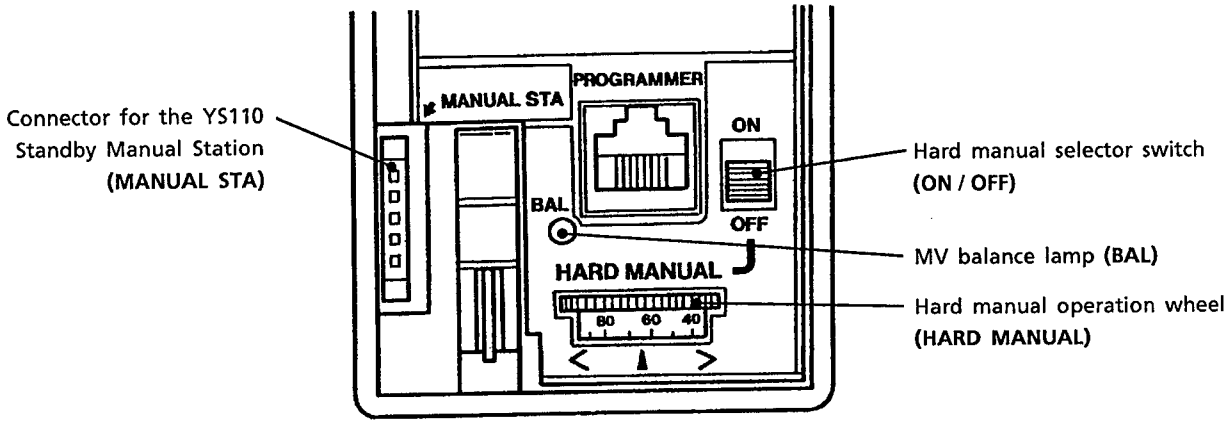


Figure 6.2 Hard Manual Operation

① Using the hard manual operation wheel, adjust the MV value (manipulated output from the hard manual analog circuitry) so that the value matches the MV value before FAIL occurred (manipulated output from the digital control circuit). Turn this wheel clockwise to increase the backup manual output and turn it counterclockwise to decrease.

② When the MV values match, the MV balance lamp (green) lights up.

③ Set the hard manual selector switch to ON. The manipulated output is switched from the digital control circuitry to the analog circuitry of the hard manual without interruption. In this condition, operation of MV is possible with the hard manual operation wheel.
Note that the MV balance lamp remains lit when the hard manual selector switch is set to ON.

④ Adjust the hard manual operation wheel for safe output.

When you replace the internal unit, use the Yokogawa YS110 Standby Manual Station (see Section 6.3.2 "On-Line Replacement of the Controller").

6.3.2 On-Line Replacement of the Controller

If the controller fails, it can be replaced without interrupting the manipulated output of 4 to 20 mA (Y1), by using the Yokogawa YS110 Standby Manual Station.

① Swing up the front panel.
② Connect the YS110 Standby Manual Station to the connector for the Standby Manual Station (see Figure 6.3).
③ Enable MV operation using the YS110 Standby Manual Station.
④ Remove the internal unit.
⑤ Connect YS110 Standby Manual Station. The YS110 Standby Manual Station is operated with the external power supply when it is connected to the connector at the rear.

See Also

For details of functions, connections, and operations of the YS110 Standby Manual Station, refer to the separately supplied IM 1B7D5-01E "YS110 Standby Manual Station".

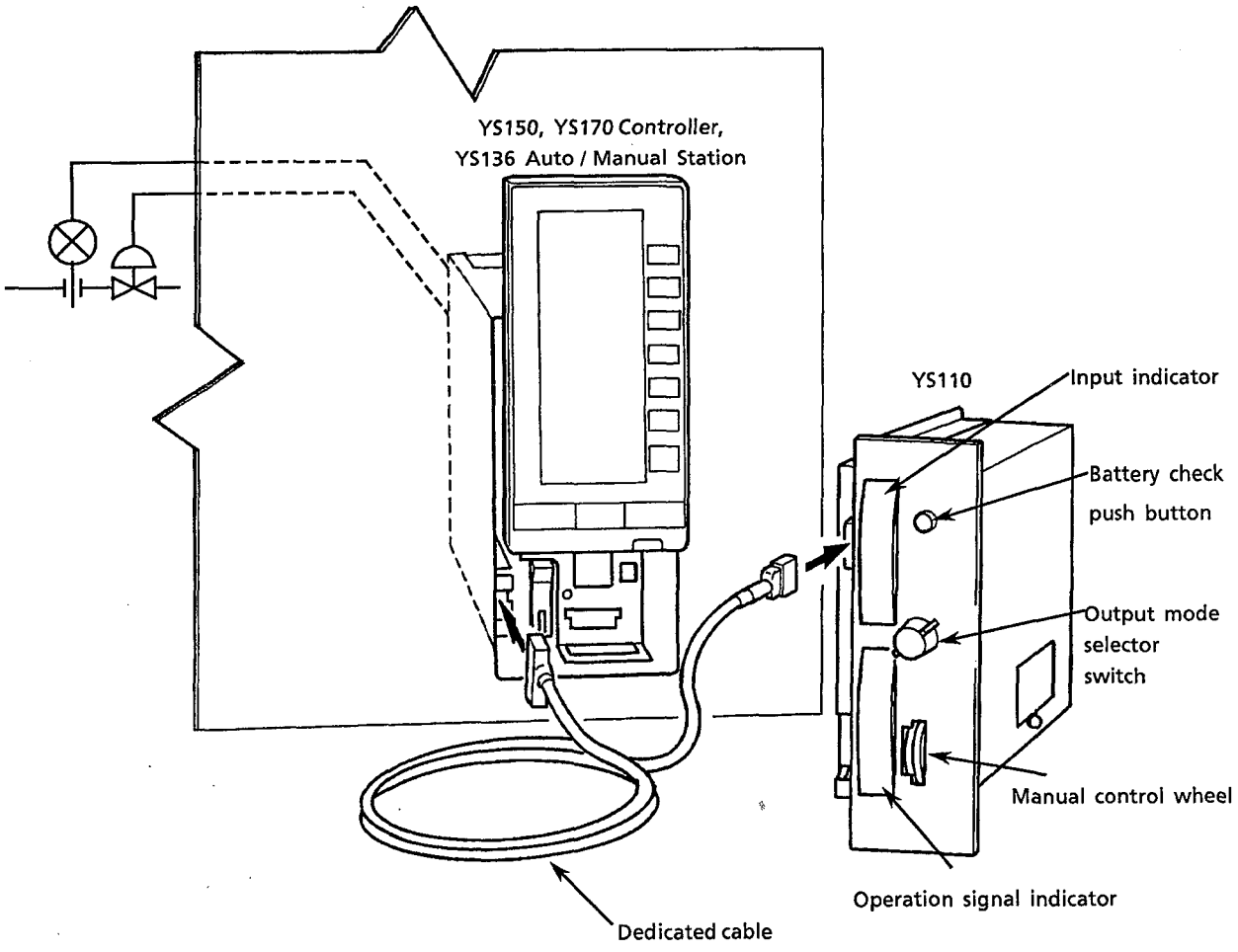


Figure 6.3 On-line Replacement of the controller

7. POWER FAIL RESTART OPERATION

The YS150 / YS170 controller enters power down status if the 100V AC power supply fails for 20 ms or more or the 24V DC power supply fails for 1 ms or more. You can set the mode for controller recovery from power failure (TIM1, TIM2, and AUT modes).

Even if power fails when the EEPROM (non-volatile memory) has not been written with the [SAV] key, set-points SV, manipulated variables MV, and parameters set from the front panel which are stored in the RAM will not be lost for at least 48 hours (lost in one week on average).

If power failure continues for a long time, and the RAM contents evaporate, the controller starts using the parameters written into the EEPROM as initial values for power recovery (so-called initial start).

Saved trend data on the trend panel will be lost if the power holdup time (1 or 20mS) is exceeded.

7.1 Restart Mode at Power Recovery from Failure

Select power-failure restart mode by specifying one of the following three modes from the engineering panel.

① **TIM1 Mode** : HOT start when power failure is less than 2 seconds. COLD start when power failure is two or more seconds. Initial start when the RAM memory contents have evaporated.

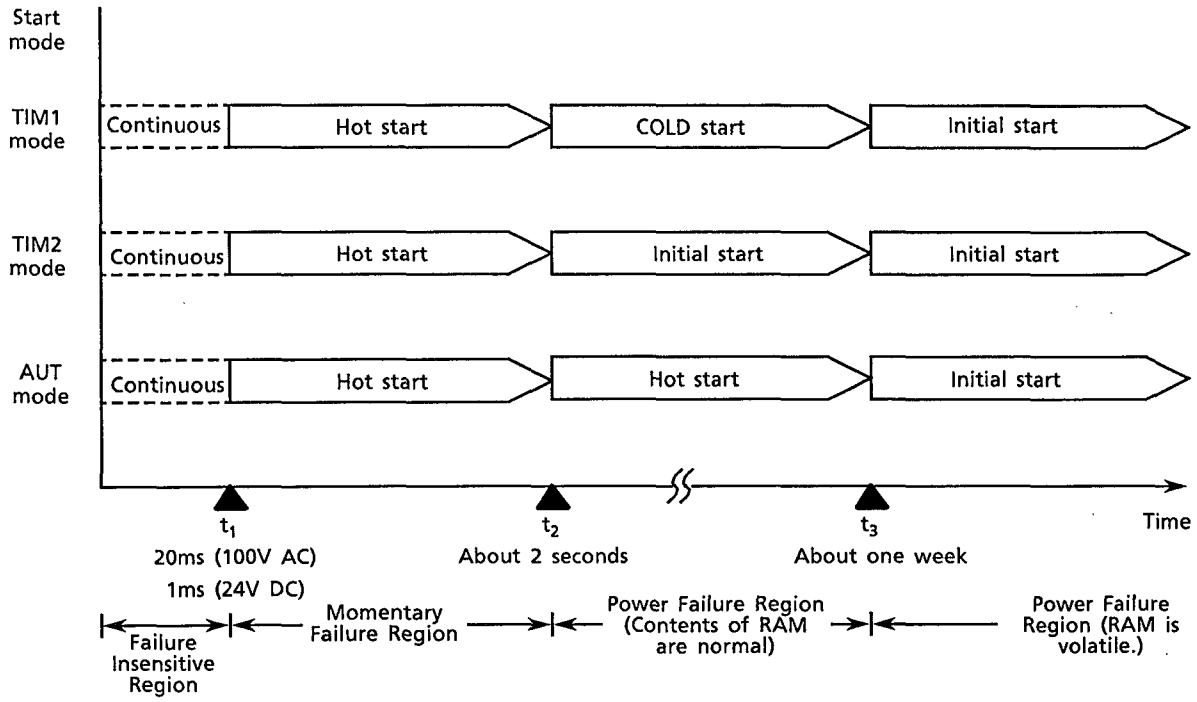
② **TIM2 Mode** : HOT start when power failure is less than 2 seconds. Initial start when power failure is two or more seconds.

③ **AUT Mode** : Always HOT start. Initial start when the RAM memory contents have evaporated.

Table 7.1 lists restart mode after power recovery, and Figure 7.1 shows the relationship between power failure duration and start mode.

Table 7.1 Start Mode Operation at Power Recovery

	Hot Start	Cold Start	Initial Start
Control mode	Same as before power failure	MAN	MAN
Manipulated variables (MV)	Same as before power failure	-6.3%	-6.3%
Set-points (SV)	Same as before power failure	Same as before power failure	Parameters revert to initial values stored in EEPROM
Parameters such as PID	Same as before power failure	Same as before power failure	
Temporary register (T)	Same as before power failure	0	0
Time-dependent computations such as first-order lag, dead time	Operation continues.	Initialize	Initialize



[Failure Insensitive Region (power failure duration) $<t_1$)] : t_1=Approx. 1ms (24V DC supply)
t_1=Approx. 20 ms (100V AC supply)
Operates in the same manner as power on status.

[Momentary Failure Region (t_1<power failure duration<t_2)] : t_2=Approx. 2 seconds
The controller stops operation during this period.

[Power Failure Region (Contents of RAM are normal) (t_2 <power failure duration<t_3)]
: t_3=48 hours or more (average one week)
The controller stops operation during this period.

[Power Failure Region (RAM contents lost) (t_3 < power failure duration)] :
The controller stops operation during this period.

Figure 7.1 Power Failure and Start Mode

8. TUNING OPERATION

The tuning panel group is displayed by [≪SHIFT≫] + [□].

NOTE

■ Entering a Password
This controller allows you to set a password. When you set a password, enter the password on the password setting panel described in Section 9.3.5 "Password Setting Panel", then perform tuning operation. When finishing tuning operation, set the password again.

8.1 Selection Operation from the Tuning Detail Panel

The menu panel will be displayed at first in the tuning panel group. The menu panel is used to select the desired detail panel. The six types of detail panel (four types for single-loop control) can be selected from one menu panel. Tuning is available on the detail panel. The following describes how to select the desired detail panel.

① Press the key at the right of the name of the desired detail panel. The detail panel will be displayed.

Multi-Function Controller

- C key : PID setting panel 1
- A key : PID setting panel 2
- M key : STC setting panel 1
- △ key : STC setting panel 2
- ▽ key : Parameter setting panel
- PF key : Input and output data panel

Programmable Controller

- C key : PID setting panel 1
- A key : PID setting panel 2
- M key : STC setting panel 1
- △ key : STC setting panel 2
- ▽ key : P&T register panel
- PF key : Input and output data panel

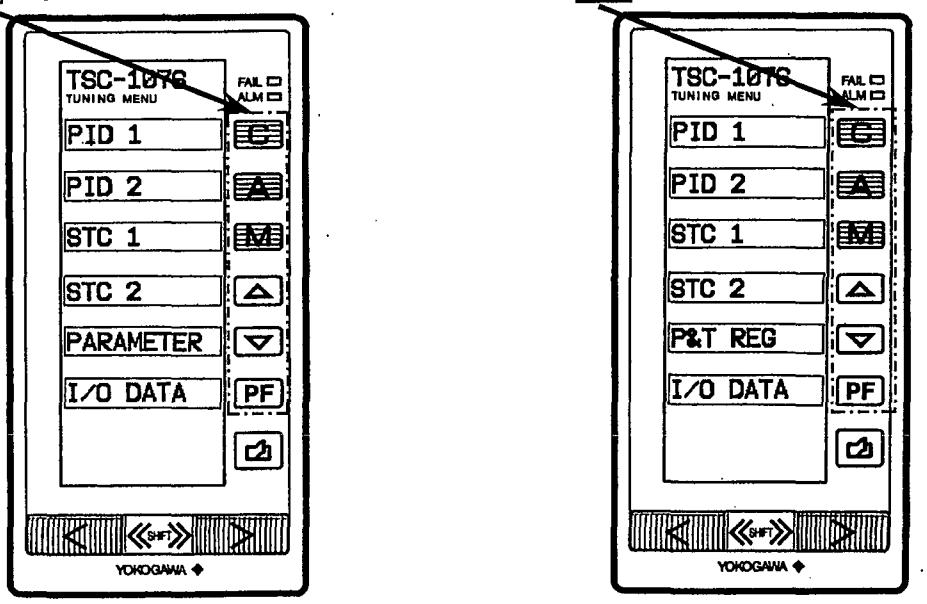


Figure 8.1 The Tuning Menu Panel

8.2 Tuning Parameter Setting Operation

Parameters can be set from the tuning detail panel. MV operation is also available from this panel in manual operation mode.

■ Using the Software Key

On the detail panel, several keys which are called "soft keys" are displayed on the right of the detail panel, in addition to the parameters and the setting values. This means that the operation keys to the right of the displayed keys function as they are displayed on the detail panel.

- [↑] key : Parameter selection key
- [↓] key : Parameter selection key
- [SAV] key : Save (SAVE) key
- [△] key : Parameter increasing key
- [▽] key : Parameter decreasing key
- [CHG] key : Change key

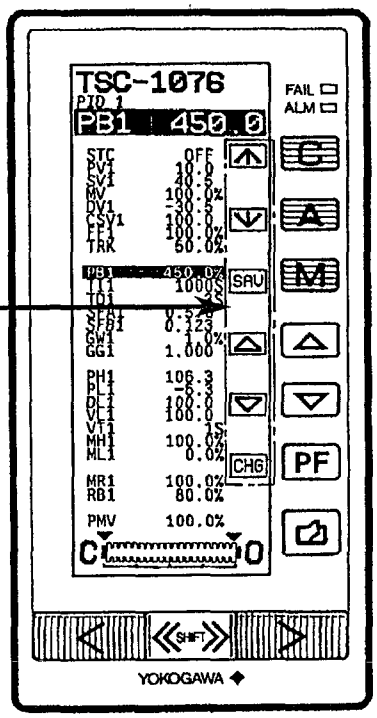


Figure 8.2 Using the Software Key

■ Setting Parameters

① Select the Desired Parameter to be Set.

- Some parameters shown on the detail panel cannot be set (or setting is disabled) while others can be set.
- In order to prevent incorrect setting, no parameters are selected (reverse display) when the detail panel is opened. Pressing the [↑] key or the [↓] key selects the changable parameters. The item name and the value of the selected parameter is displayed with black and white reversed, and it is also enlarged and displayed below the panel title.

② Set (or Change) the Parameter.

- Set (or change) the value of the parameter by pressing the [△] key or the [▽] key.
- Pressing the [△] key increases the value of the parameter while pressing the [▽] key decreases it.
- If you hold down the [△] key or the [▽] key, the rate of change of the parameter increases.

■ [SAV] Key Operation

- When the [SAV] key is displayed on the right of the detail panel, the parameter displayed on the detail panel can be written to the EEPROM.
- The parameters which are not the same as those written to the EEPROM are displayed with "＊" at the left of their item names.
- Press the [SAV] key for more than two seconds to write the parameters to the EEPROM. When the parameters on the panel are the same as those written to the EEPROM, the " * " mark disappears.

IMPORTANT

When initial start is designated, if the parameter values have not been written to the EEPROM, the changed parameter values will be destroyed and the parameter values will be set with those already written to the EEPROM.

■ [CHG] Key Operation

- The [CHG] key can be used from the PID setting panel 1, the PID setting panel 2, the STC setting panel 1, and the STC setting panel 2 of the tuning panel group.
- By holding down the [CHG] key, the loop panel, trend panel, or dual loop panel of the operation panel group is displayed. When the operation panel immediately before opening to the tuning panel is the loop panel 1 or 2, either of the loop panel appears. When it is the trend panel 1 or 2, either of the trend panel appears. When it is the dual loop panel 1 or 2, either of the dual loop panel appears. When it is the alarm panel, the loop panel appears since it has higher priority. However, the trend panel or the dual loop panel appears when the loop panel display is not set to be displayed in the configuration panel 1 of the engineering panel.
- By holding down the [CHG] key in the PID setting panel 1 or the STC setting panel 1, loop panel 1, trend panel 1, or dual loop panel 1 appears. By holding down the [CHG] key in PID setting panel 2 or STC setting panel 2, loop panel 2, trend panel 2, or dual loop panel 2 appears.
- By holding down the [CHG] key, the operation mode key and the SV setting key can be used.

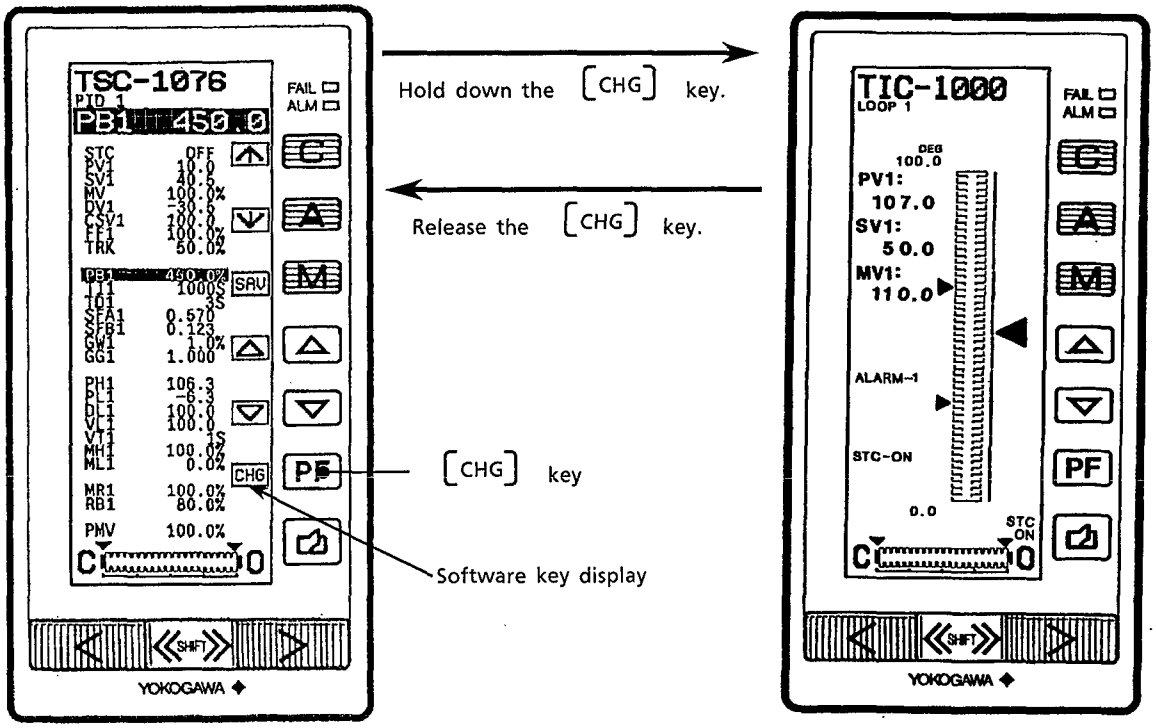


Figure 8.3 [CHG] Key Operation

■ Return Operation to the Menu Panel

After completing the parameter setting in the detail panel, press the [ ] key. This operation returns the display back to the menu panel.

Note: Pressing the [ ] key while holding down the [SHIFT] key can change the panel from the detail panel to another type of panel.

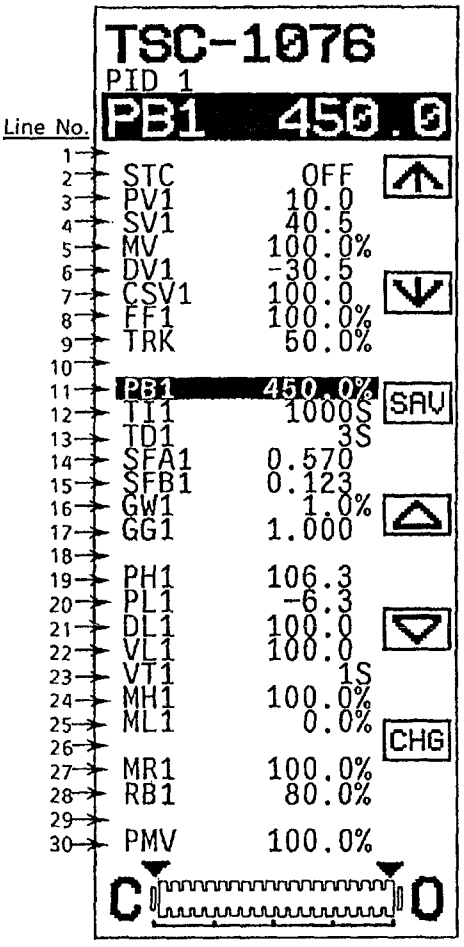
8.3 Function, Display and Operation of Each Tuning Detail Panel

8.3.1 PID Setting Panel 1

■ **Function** The setting and display of the PID parameters of primary loop are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to set parameters
(3) Operation of MV
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 8.1 PID Setting Panel 1

① **Display of unit**
Units ("%" or "S" [second]) are displayed corresponding to the parameters.

② **MV Display**
The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed.
The contents of the display are the same as those of the loop panel.

△ **TIP**

The "Default Value" in the display parameter lists on the following pages means the value which is predefined prior to delivery from the factory. To change the default to another desired value, first modify the default in the parameter setting operations and then write the changed value in the EEPROM by pressing the [SAV] key.

■ Display Parameter List

(1) PID Setting Panel 1 Multi-Function Controller

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	STC	STC mode	—	OFF	OFF, DISP, ON, ATSTUP	×
3	PV1	Process variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 4)	×
4	SV1	Set-point variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 4)	○
5	MV	Manipulated output variable 1	%	−6.3	−6.3 to 106.3	× (Note 1)
6	DV1	Deviation value 1	Engineering unit		PV1-SV1	×
7	CSV1	Cascade setting value 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 4)	×
8	FF1 (Note 2)	Feed-forward input value 1	%	0.0	−100.0 to 200.0	×
9	TRK (Note 3)	Tracking output	%	−6.3	−6.3 to 106.3	×
10						
11	PB1	Proportional band 1	%	999.9	2.0 to 999.9	○
12	TI1	Integral time 1	Second	1000	1 to 9999	○
13	TD1	Derivative time 1	Second	0	0 to 9999 (Note 8)	○
14	SFA1	Adjustable set-point filter α1	—	0.000	0.000 to 1.000	○
15	SFB1	Adjustable set-point filter β1	—	0.000	0.000 to 1.000	○
16	GW1	Non-linear-control-gap width 1	%	0.0	0.0 to 100.0	○
17	GG1	Non-linear control gain 1	—	1.000	0.000 to 1.000	○
18						
19	PH1	High-limit-alarm-set-point for process variable 1	Engineering unit	106.3	In engineering unit equivalent to −6.3 to 106.3% (Note 4, 5)	○
20	PL1	Low-limit-alarm-set-point for process variable 1	Engineering unit	−6.3	In engineering unit equivalent to −6.3 to 106.3% (Note 4, 6)	○
21	DL1	Deviation-alarm-set-point for process variable 1	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 4, 5)	○
22	VL1	Velocity-alarm-change-value set-point of process variable 1	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 4, 5)	○
23	VT1	Velocity-alarm-change-time set-point of process variable 1	Second	1	1 to 9999	○
24	MH1	High-limit of output signal 1	%	106.3	−6.3 to 106.3 (Note 7)	○
25	ML1	Low-limit value of output signal 1	%	−6.3	−6.3 to 106.3 (Note 7)	○
26						
27	MR1 (Note 3)	Manual reset 1	%	−6.3	−6.3 to 106.3	○
28	RB1	Reset bias 1	%	0.0	0.0 to 106.3	○
29						
30	PMV	Preset output	%	−6.3	−6.3 to 106.3	○

Note 1: MV can be set only with the MV operation key located at the bottom front of the panel.
Note 2: Displayed only in the single-loop mode / cascade mode.
Note 3: Displayed only in the single-loop mode.
Note 4: These are the engineering units set with scale SCH1, SCL1, and SCDP1.
Note 5: Alarm will not occur if set at a maximum value.
Note 6: Alarm will not occur if set at a minimum value.
Note 7: There should be set so as to be MH1 > ML1.
Note 8: Action range is 2 to 9999 sec. (0 & 1 : OFF)

(2) PID Setting Panel 1 Programmable Controller

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	STC	STC mode	—	OFF	OFF, DISP, ON, ATSTUP	×
3	PV1	Process variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	×
4	SV1	Set-point variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	○
5	MV1	Manipulated output variable 1	%	−6.3	−6.3 to 106.3	(Note 1) ×
6	DV1	Deviation value 1	Engineering unit		PV1-SV1	×
7						
8						
9						
10						
11	PB1	Proportional band 1	%	999.9	2.0 to 999.9	○
12	TI1	Integral time 1	Second	1000	1 to 9999	○
13	TD1	Derivative time 1	Second	0	0 to 9999 (Note 6)	○
14	SFA1	Adjustable set-point filter α1	—	0.000	0.000 to 1.000	○
15	SFB1	Adjustable set-point filter β1	—	0.000	0.000 to 1.000	○
16	GW1	Non-linear-control-gap width 1	%	0.0	0.0 to 100.0	○
17	GG1	Non-linear control gain 1	—	1.000	0.000 to 1.000	○
18						
19	PH1	High-limit-alarm-set-point for process variable 1	Engineering unit	106.3	In engineering unit equivalent to −6.3 to 106.3% (Note 2, 3)	○
20	PL1	Low-limit-alarm-set-point for process variable 1	Engineering unit	−6.3	In engineering unit equivalent to −6.3 to 106.3% (Note 2, 4)	○
21	DL1	Deviation-alarm-set-point for process variable 1	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 2, 3)	○
22	VL1	Velocity-alarm-change-value set-point of process variable 1	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 2, 3)	○
23	VT1	Velocity-alarm-change-time set-point of process variable 1	Second	1	1 to 9999	○
24	MH1	High-limit of output signal 1	%	106.3	−6.3 to 106.3 (Note 5)	○
25	ML1	Low-limit of output signal 1	%	−6.3	−6.3 to 106.3 (Note 5)	○
26						
27	MR1	Manual reset 1	%	−6.3	−6.3 to 106.3	○
28	RB1	Reset bias 1	%	0.0	0.0 to 106.3	○
29						
30	PMV1	Preset output	%	−6.3	−6.3 to 106.3	○

Note 1 : MV1 can be set only with the MV operation key located at the bottom front of the panel.
Note 2 : These are the engineering units set with scale SCH1, SCL1, and SCDP1.
Note 3 : Alarm will not occur if set at a maximum value.
Note 4 : Alarm will not occur if set at a minimum value.
Note 5 : There should be set so as to be MH1 > ML1.
Note 6 : Action range is 2 to 9999 sec. (0 & 1 : OFF)

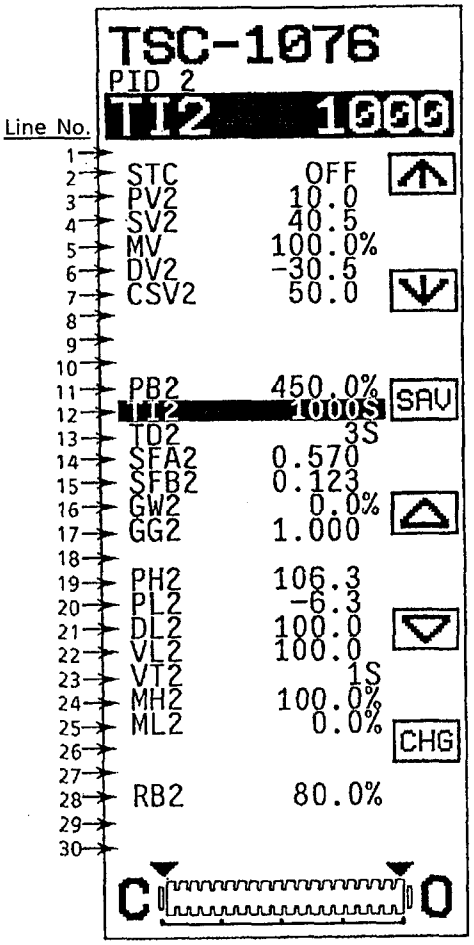
8.3.2 PID Setting Panel 2

Note: When you use the Multi-Function Controller set in the single-loop mode, this panel does not appear.

■ **Function** The display and setting of the PID parameter etc. of secondary loop are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to change parameters
(3) Operation of MV
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 8.2 PID Setting Panel 2

① **Display of unit**
Units ("%" or "S" [second]) are displayed corresponding to the parameters.

② **MV Display**
The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed.
The contents of the display are the same as those of the loop panel.

■ Display Parameter List

(1) PID Setting Panel 2 Multi-Function Controller

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	STC	STC mode	—	OFF	OFF, DISP, ON, ATSTUP	×
3	PV2	Process variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 4)	×
4	SV2	Set-point variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 4)	○
5	MV	Manipulated output variable 2	%	−6.3	−6.3 to 106.3	(Note 1) ×
6	DV2	Deviation value 2	Engineering unit		PV2-SV2	×
7	CSV2	Cascade setting value 2	Engineering unit	−6.3	In engineering unit equivalent to −6.3 to 106.3% (Note 4)	×
8						
9	SSW (Note 2)	Selector control switch	—	AUT	AUT, 1, 2	○
10						
11	PB2	Proportional band 2	%	999.9	2.0 to 999.9	○
12	TI2	Integral time 2	Second	1000	1 to 9999	○
13	TD2	Derivative time 2	Second	0	0 to 9999 (Note 8)	○
14	SFA2	Adjustable set-point filter $\alpha 1$	—	0.000	0.000 to 1.000	○
15	SFB2	Adjustable set-point filter $\beta 1$	—	0.000	0.000 to 1.000	○
16	GW2	Non-linear-control-gap width 2	%	0.0	0.0 to 100.0	○
17	GG2	Non-linear-control gain 2	—	1.000	0.000 to 1.000	○
18						
19	PH2	High-limit-alarm-set-point for process variable 2	Engineering unit	106.3	In engineering unit equivalent to −6.3 to 106.3% (Note 4, 5)	○
20	PL2	Low-limit-alarm-set-point for process variable 2	Engineering unit	−6.3	In engineering unit equivalent to −6.3 to 106.3% (Note 4, 6)	○
21	DL2	Deviation-alarm-set-point for process variable 2	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 4, 5)	○
22	VL2	Velocity-alarm-change-value set-point of process variable 2	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 4, 5)	○
23	VT2	Velocity-alarm-change-time set-point of process variable 2	Second	1	1 to 9999	○
24	MH2	High-limit of output signal 2	%	106.3	−6.3 to 106.3 (Note 7)	○ (Note 3)
25	ML2	Low-limit of output signal 2	%	−6.3	−6.3 to 106.3 (Note 7)	○ (Note 3)
26						
27						
28	RB2	Reset bias 2	%	0.0	0.0 to 106.3	○
29						
30						

Note 1 : MV can be set only with the MV operation key located at the bottom front of the panel.
Note 2 : "SSW" is displayed when the controller mode is set to the selector mode.
Note 3 : MH2 and ML2 can be set only when the controller mode is set to the cascade mode.
Note 4 : These are the engineering units set with scale SCH2, SCL2, and SCDP2.
Note 5 : Alarm will not occur if set at a maximum value.
Note 6 : Alarm will not occur if set at a minimum value.
Note 7 : There should be set so as to be MH2 > ML2.
Note 8 : Action range is 2 to 9999 sec. (0 & 1 : OFF)

(2) PID Setting Panel 2 Programmable Controller

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	STC	STC mode	—	OFF	OFF, DISP, ON, ATSTUP	×
3	PV2	Process variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	×
4	SV2	Set-point variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	○
5	MV2	Manipulated output variable 2	%	−6.3	−6.3 to 106.3	(Note 1) ×
6	DV2	Deviation value 2	Engineering unit		PV2-SV2	×
7						
8						
9						
10						
11	PB2	Proportional band 2	%	999.9	2.0 to 999.9	○
12	TI2	Integral time 2	Second	1000	1 to 9999	○
13	TD2	Derivative time 2	Second	0	0 to 9999 (Note 6)	○
14	SFA2	Adjustable set-point filter $\alpha 2$	—	0.000	0.000 to 1.000	○
15	SFB2	Adjustable set-point filter $\beta 2$	—	0.000	0.000 to 1.000	○
16	GW2	Non-linear-control-gap width 2	%	0.0	0.0 to 100.0	○
17	GG2	Non-linear control gain 2	—	1.000	0.000 to 1.000	○
18						
19	PH2	High-limit-alarm-set-point for process variable 2	Engineering unit	106.3	In engineering unit equivalent to −6.3 to 106.3% (Note 2, 3)	○
20	PL2	Low-limit-alarm-set-point for process variable 2	Engineering unit	−6.3	In engineering unit equivalent to −6.3 to 106.3% (Note 2, 3)	○
21	DL2	Deviation-alarm-set-point for process variable 2	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 2, 3)	○
22	VL2	Velocity-alarm-change-value set-point of process variable 2	Engineering unit	106.3	In engineering unit equivalent to 0.0 to 106.3% (Note 2, 3)	○
23	VT2	Velocity-alarm-change-time set-point of process variable 2	Second	1	1 to 9999	○
24	MH2	High-limit of output signal 2	%	106.3	−6.3 to 106.3 (Note 5)	○
25	ML2	Low-limit of output signal 2	%	−6.3	−6.3 to 106.3 (Note 5)	○
26						
27	MR2	Manual reset 2	%	−6.3	−6.3 to 106.3	○
28	RB2	Reset bias 2	%	0.0	0.0 to 106.3	○
29						
30	PMV2	Preset output 2	%	−6.3	−6.3 to 106.3	○

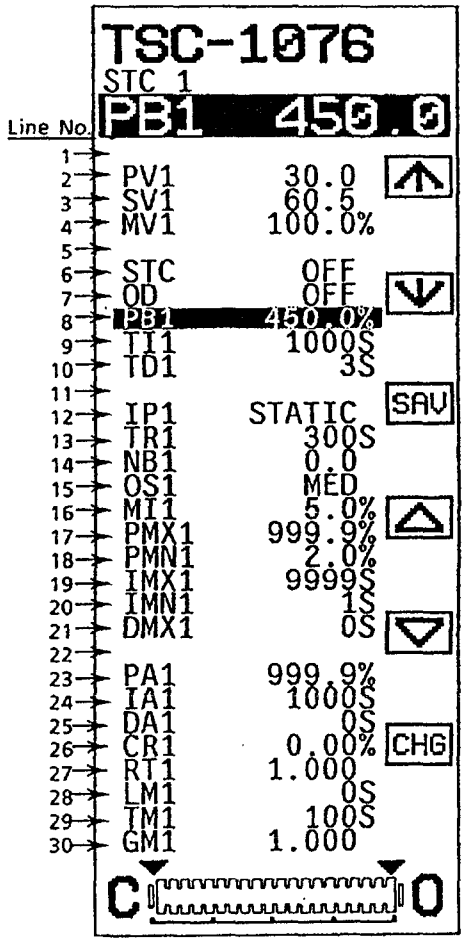
Note 1 : MV2 can be set only with the MV operation key located at the bottom front of the panel.
Note 2 : These are the engineering units set with scale SCH2, SCL2, and SCDP2.
Note 3 : Alarm will not occur if set at a maximum value.
Note 4 : Alarm will not occur if set at a minimum value.
Note 5 : There should be set so as to be MH2 > ML2.
Note 6 : Action range is 2 to 9999 sec. (0 & 1 : OFF)

8.3.3 STC Setting Panel 1

■ **Function** The display and setting of the STC parameter etc. of primary loop are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to change parameters
(3) Operation of MV
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 8.3 STC Setting Panel 1

① **Display of unit**
Units ("%" or "S" [second]) are displayed corresponding to the parameters.

② **MV Display**
The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed.
The contents of the display are the same as those of the loop panel.

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	PV1	Process variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	×
3	SV1	Set-point variable 1	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	○
4	(Note 1) MV1	Manipulated output variable 1	%	−6.3	−6.3 to 106.3	(Note 1) ×
5						
6	STC	STC mode designation	—	OFF	OFF, DISP, ON, ATSTUP	(Note 3) ○
7	OD	On-demand tuning start	—	OFF	OFF, ON	○
8	PB1	Proportional band 1	%	999.9	2.0 to 999.9	○
9	TI1	Integral time 1	Second	1000	1 to 9999	○
10	TD1	Derivative time 1	Second	0	0 to 9999 (Note 4)	○
11						
12	IP1	Process type 1	—	STATIC	STATIC, DYNAM	○
13	TR1	Process response time 1	Second	300	4 to 9999	○
14	NB1	Noise band 1	Engineering unit	0.0	In engineering unit equivalent to 0.0 to 20.0% (Note 2)	○
15	OS1	Calculated control type 1	—	MED	ZERO, MIN, MED, MAX	○
16	MI1	MV applied signal span 1	%	5.0	0.0 to 20.0%	○
17	PMX1	High-limit for proportional band 1	%	999.9	2.0 to 999.9	○
18	PMN1	Low-limit for proportional band 1	%	2.0	2.0 to 999.9	○
19	IMX1	High-limit for integral time 1	Second	9999	1 to 9999	○
20	IMN1	Low-limit for integral time 1	Second	1	1 to 9999	○
21	DMX1	High-limit for derivative time 1	Second	2000	0 to 9999	○
22						
23	PA1	Calculated 1 for new proportional band	%	999.9	2.0 to 999.9	×
24	IA1	Calculated value 1 for new integral time	Second	1000	1 to 9999	×
25	DA1	Calculated value 1 for new derivative time	Second	0	0 to 9999	×
26	CR1	Presumed accuracy error 1	%	0.00	0.00 to 99.99	×
27	RT1	Signal distribution ratio 1	—	1.000	0.000 to 9.999	×
28	LM1	Equivalent loss time 1	Second	0	0 to 9999	×
29	TM1	Equivalent time constant 1	Second	0	0 to 9999	×
30	GM1	Equivalent process gain 1	—	0.000	0.000 to 9.999	×

Note 1 : Displayed as "MV" when it is Multi-Function Controller. MV1 (MV) can be set only with the MV operation key located at the bottom front of the panel.

Note 2 : These are the engineering units set with scale SCH1, SCL1, and SCDP1.

Note 3 : ATSTUP can not be selected when using selector mode in Multi-Function Controller or selector module in Programmable Controller.

Note 4 : Action range is 2 to 9999 sec. (0 & 1 : OFF)

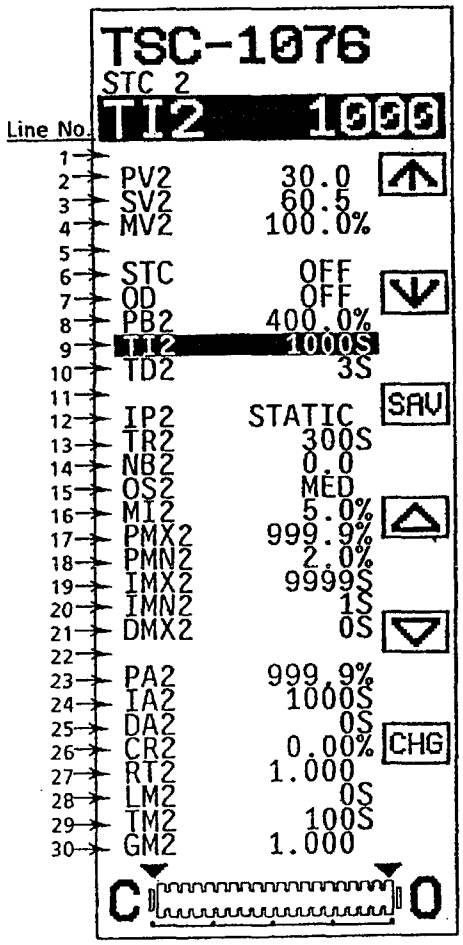
8.3.4 STC Setting Panel 2

Note: When you use the Multi-Function Controller set in the single-loop mode, this panel does not appear.

■ **Function** The display and setting of the STC parameter etc. of the secondary loop are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to change parameters
(3) Operation of MV
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 8.4 STC Setting Panel 2

① **Display of unit**
Units ("%" or "S" [second]) are displayed corresponding to the parameters.

② **MV Display**
The MV bar, the MV scale, the MH pointer, the ML pointer, the MV underflow, the MV overflow, and the direction of the MV valve are displayed.
The contents of the display are the same as those of the loop panel.

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display	Setting Possible
1						
2	PV2	Process variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	×
3	SV2	Set-point variable 2	Engineering unit		In engineering unit equivalent to −6.3 to 106.3% (Note 2)	○
4	(Note 1) MV2	Manipulated output variable 2	%	−6.3	−6.3 to 106.3	(Note 1) ×
5						
6	STC	STC mode designation	—	OFF	OFF, DISP, ON, ATSTUP	(Note 3) ○
7	OD	On-demand tuning start	—	OFF	OFF, ON	○
8	PB2	Proportional band 2	%	999.9	2.0 to 999.9	○
9	TI2	Integral time 2	Second	1000	1 to 9999	○
10	TD2	Derivative time 2	Second	0	0 to 9999 (Note 4)	○
11						
12	IP2	Process type 2	—	STATIC	STATIC, DYNAM	○
13	TR2	Process response time 2	Second	300	4 to 9999	○
14	NB2	Noise band 2	Engineering unit	0.0	In engineering unit equivalent to 0.0 to 20.0% (Note 2)	○
15	OS2	Calculated control type 2	—	MED	ZERO, MIN, MED, MAX	○
16	MI2	MV applied signal span 2	%	5.0	0.0 to 20.0%	○
17	PMX2	High-limit for proportional band 2	%	999.9	2.0 to 999.9	○
18	PMN2	Low-limit for proportional band 2	%	2.0	2.0 to 999.9	○
19	IMX2	High-limit for integral time 2	Second	9999	1 to 9999	○
20	IMN2	Low-limit for integral time 2	Second	1	1 to 9999	○
21	DMX2	High-limit for derivative time 2	Second	2000	0 to 9999	○
22						
23	PA2	Calculated value 2 for new proportional band	%	999.9	2.0 to 999.9	×
24	IA2	Calculated value 2 for new integral time	Second	1000	1 to 9999	×
25	DA2	Calculated value 2 for new derivative time	Second	0	0 to 9999	×
26	CR2	Presumed accuracy error 2	%	0.00	0.00 to 99.99	×
27	RT2	Signal distribution ratio 2	—	1.000	0.000 to 9.999	×
28	LM2	Equivalent loss time 2	Second	0	0 to 9999	×
29	TM2	Equivalent time constant 2	Second	0	0 to 9999	×
30	GM2	Equivalent process gain 2	—	0.000	0.000 to 9.999	×

Note 1 : Displayed as "MV" when it is Multi-Function Controller . MV2 (MV) can be set only with the MV operation key located at the bottom front of the panel.

Note 2 : These are the engineering units set with scale SCH2, SCL2, and SCDP2.

Note 3 : ATSTUP can not be selected when using selector mode in Multi-Function Controller or selector module in Programmable Controller .

Note 4 : Action range is 2 to 9999 sec. (0 & 1 : OFF)

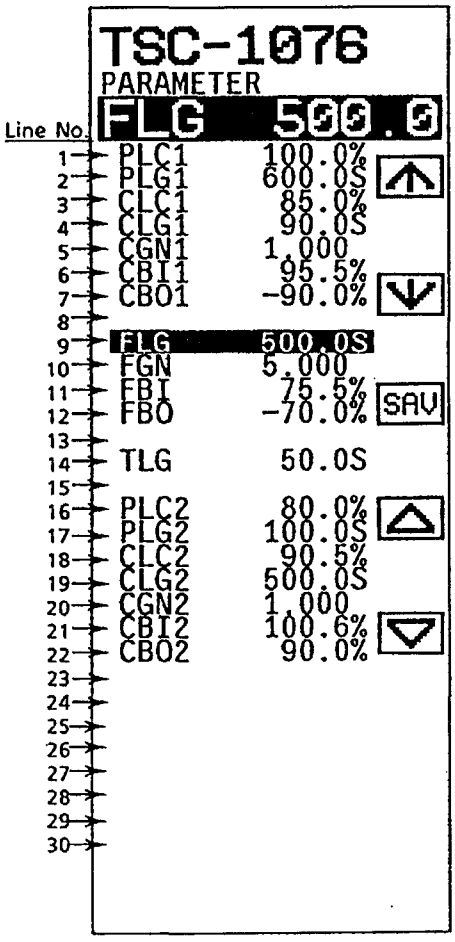
8.3.5 Parameter Setting Panel

Multi-Function Controller

■ **Function** The display and setting of the input signal computation parameters in each control function mode are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to change parameters
(3) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 8.5 Parameter Setting Panel

① **Display of unit**
Units ("%" or "S" [second]) are displayed corresponding to the parameters.

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	PLC1	Square root extraction low cutoff setting for process variable 1	%	1.0	0.0 to 100.0
2	PLG1	First order lag time constant of process variable 1	Second	0.0	0.0 to 800.0
3	CLC1	Square root extraction low cutoff setting for cascade set-point variable 1	%	1.0	0.0 to 100.0
4	CLG1	First order lag time constant for cascade set-point variable 1	Second	0.0	0.0 to 800.0
5	CGN1	Ratio gain for cascade set-point variable 1	—	1.000	-8.000 to 8.000
6	CBI1	Ratio input bias value for cascade set-point variable 1	%	0.0	-106.3 to 106.3
7	CBO1	Ratio output bias value for cascade set-point variable 1	%	0.0	-800.0 to 800.0
8					
9	(Notes 1, 2) FLG	Feedforward lag time constant	Second	0.0	0.0 to 800.0
10	(Notes 1, 2) FGN	Feedforward gain	—	0.000	-8.000 to 8.000
11	(Notes 1, 2) FBI	Feedforward input bias	%	0.0	-106.3 to 106.3
12	(Notes 1, 2) FBO	Feedforward output bias	%	0.0	-800.0 to 800.0
13					
14	(Notes 1, 2) TLG	Tracking input lag time constant	Second	0.0	0.0 to 800.0
15					
16	(Notes 2, 3) PLC2	Square root extraction low cutoff setting for process variable 2	%	1.0	0.0 to 100.0
17	(Notes 2, 3) PLG2	First order lag time constant of process variable 2	Second	0.0	0.0 to 800.0
18	CLC2 (Note 3)	Square root extraction low cutoff setting for cascade set-point variable 2	%	1.0	0.0 to 100.0
19	CLG2 (Note 3)	First order lag time constant for cascade set-point variable 2	Second	0.0	0.0 to 800.0
20	CGN2 (Note 3)	Ratio gain for cascade set-point variable 2	—	1.000	-8.000 to 8.000
21	CBI2 (Note 3)	Ratio input bias for cascade set-point variable 2	%	0.0	-106.3 to 106.3
22	CBO2 (Note 3)	Ratio output bias for cascade set-point variable 2	%	0.0	-800.0 to 800.0
23					
24					
25					
26					
27					
28					
29					
30					

Note 1: Displayed in the single-loop mode
Note 2: Displayed in the cascade mode
Note 3: Displayed in the selector mode

8.3.6 P & T Register Panel

Programmable Controller

■ **Function**

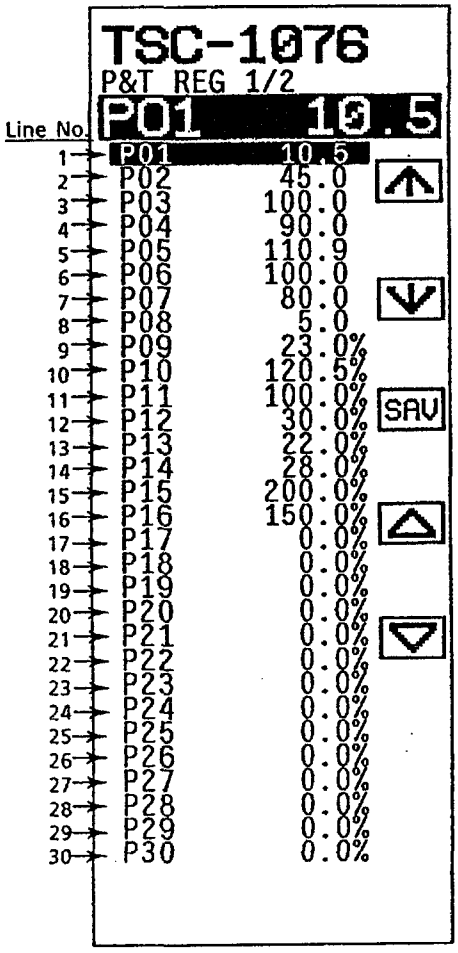
The display and setting of the P parameters are carried out.
The display of the T registers is carried out.

■ **Operation**

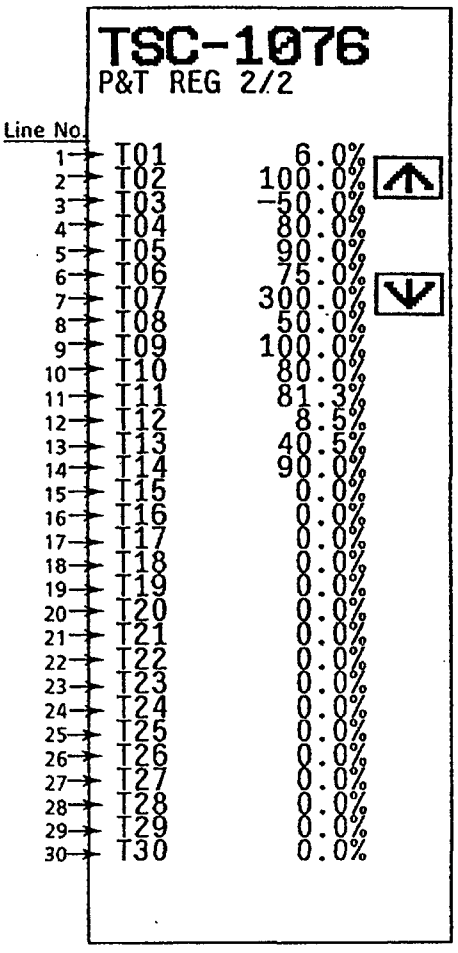
(1) Operation of the soft keys
(2) Operation to change parameters
(3) Operation to switch panels
(4) P parameter panel and T register panel
The P parameter panel is displayed immediately after opening the P&T register panel. The T register panel can be displayed by pressing the [↓] key after selecting the variable parameter "P30". Selecting "T01" and pressing the [↑] key sets the panel back to the P parameter panel.

■ **Display**

The following shows an example of the panel display.



Display 8.6 P Parameter Panel



Display 8.7 T Register Panel

■ Display Parameter List

(1) P Parameter Panel

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	P01	Variable parameter 1	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
2	P02	Variable parameter 2	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
3	P03	Variable parameter 3	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
4	P04	Variable parameter 4	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
5	P05	Variable parameter 5	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
6	P06	Variable parameter 6	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
7	P07	Variable parameter 7	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
8	P08	Variable parameter 8	Engineering units	0.0	In engineering unit equivalent to −800.0 to 800.0% (Note)
9	P09	Variable parameter 9	%	0.0	−800.0 to 800.0
10	P10	Variable parameter 10	%	0.0	−800.0 to 800.0
11	P11	Variable parameter 11	%	0.0	−800.0 to 800.0
12	P12	Variable parameter 12	%	0.0	−800.0 to 800.0
13	P13	Variable parameter 13	%	0.0	−800.0 to 800.0
14	P14	Variable parameter 14	%	0.0	−800.0 to 800.0
15	P15	Variable parameter 15	%	0.0	−800.0 to 800.0
16	P16	Variable parameter 16	%	0.0	−800.0 to 800.0
17	P17	Variable parameter 17	%	0.0	−800.0 to 800.0
18	P18	Variable parameter 18	%	0.0	−800.0 to 800.0
19	P19	Variable parameter 19	%	0.0	−800.0 to 800.0
20	P20	Variable parameter 20	%	0.0	−800.0 to 800.0
21	P21	Variable parameter 21	%	0.0	−800.0 to 800.0
22	P22	Variable parameter 22	%	0.0	−800.0 to 800.0
23	P23	Variable parameter 23	%	0.0	−800.0 to 800.0
24	P24	Variable parameter 24	%	0.0	−800.0 to 800.0
25	P25	Variable parameter 25	%	0.0	−800.0 to 800.0
26	P26	Variable parameter 26	%	0.0	−800.0 to 800.0
27	P27	Variable parameter 27	%	0.0	−800.0 to 800.0
28	P28	Variable parameter 28	%	0.0	−800.0 to 800.0
29	P29	Variable parameter 29	%	0.0	−800.0 to 800.0
30	P30	Variable parameter 30	%	0.0	−800.0 to 800.0

Note : Scales for displaying P01 to P08 in engineering units are set by the programming package YSS10.

(2) T Register Panel

Line No.	Dis-play	Name	Unit	Default Value	Range of Setting and Display
1	T01	Temporary memory register 1	%	0.0	-800.0 to 800.0
2	T02	Temporary memory register 2	%	0.0	-800.0 to 800.0
3	T03	Temporary memory register 3	%	0.0	-800.0 to 800.0
4	T04	Temporary memory register 4	%	0.0	-800.0 to 800.0
5	T05	Temporary memory register 5	%	0.0	-800.0 to 800.0
6	T06	Temporary memory register 6	%	0.0	-800.0 to 800.0
7	T07	Temporary memory register 7	%	0.0	-800.0 to 800.0
8	T08	Temporary memory register 8	%	0.0	-800.0 to 800.0
9	T09	Temporary memory register 9	%	0.0	-800.0 to 800.0
10	T10	Temporary memory register 10	%	0.0	-800.0 to 800.0
11	T11	Temporary memory register 11	%	0.0	-800.0 to 800.0
12	T12	Temporary memory register 12	%	0.0	-800.0 to 800.0
13	T13	Temporary memory register 13	%	0.0	-800.0 to 800.0
14	T14	Temporary memory register 14	%	0.0	-800.0 to 800.0
15	T15	Temporary memory register 15	%	0.0	-800.0 to 800.0
16	T16	Temporary memory register 16	%	0.0	-800.0 to 800.0
17	T17	Temporary memory register 17	%	0.0	-800.0 to 800.0
18	T18	Temporary memory register 18	%	0.0	-800.0 to 800.0
19	T19	Temporary memory register 19	%	0.0	-800.0 to 800.0
20	T20	Temporary memory register 20	%	0.0	-800.0 to 800.0
21	T21	Temporary memory register 21	%	0.0	-800.0 to 800.0
22	T22	Temporary memory register 22	%	0.0	-800.0 to 800.0
23	T23	Temporary memory register 23	%	0.0	-800.0 to 800.0
24	T24	Temporary memory register 24	%	0.0	-800.0 to 800.0
25	T25	Temporary memory register 25	%	0.0	-800.0 to 800.0
26	T26	Temporary memory register 26	%	0.0	-800.0 to 800.0
27	T27	Temporary memory register 27	%	0.0	-800.0 to 800.0
28	T28	Temporary memory register 28	%	0.0	-800.0 to 800.0
29	T29	Temporary memory register 29	%	0.0	-800.0 to 800.0
30	T30	Temporary memory register 30	%	0.0	-800.0 to 800.0

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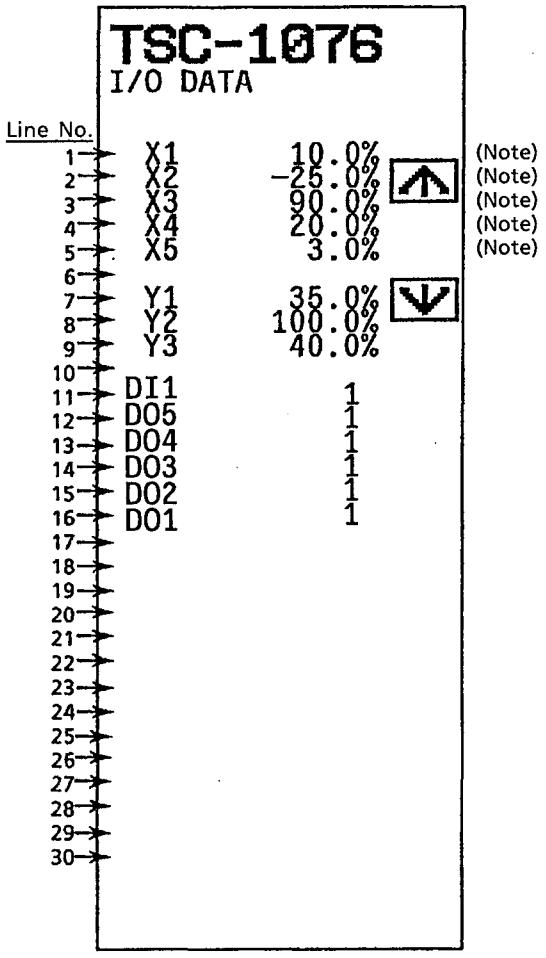
8.3.7 Input and Output Data Panel

■ **Function** The display of the input and output signals at each terminal on the rear panel is carried out.

■ **Operation** (1) Operation to switch to panel

■ **Display** The following shows an example of the panel display.



Display 8.8 Input / Output Data Panel

① **The Names of the Analog Input and Analog Output Signals**
These are the names of the registers assigned to each terminal.

② **The Names of the Status Input and Output**
The terminal assignment changes according to the controller mode selected.

Note: For Programmable Controller, unit in % will not be displayed but engineering unit will be displayed.

■ Display Parameter List

(1) Display of Input / Output Data for Multi-Function Controller

Line No.	Dis-play	Name	Unit	Range of Display
1	X1	Analog input 1	%	-25.0 to 125.0
2	X2	Analog input 2	%	-25.0 to 125.0
3	X3	Analog input 3	%	-25.0 to 125.0
4	X4	Analog input 4	%	-25.0 to 125.0
5	X5	Direct input	%	-25.0 to 125.0
6				
7	Y1	Analog output 1	%	-20.0 to 106.3
8	Y2	Analog output 2	%	-6.3 to 106.3
9	Y3	Analog output 3	%	-6.3 to 106.3
10				
11	DI1	Status input	—	0 / 1
12	DO5	Status output	—	0 / 1
13	DO4	Status output	—	0 / 1
14	DO3	Status output	—	0 / 1
15	DO2	Status output	—	0 / 1
16	DO1	Status output	—	0 / 1
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

■ Display Parameter List

(2) Display of Input / Output Data for Programmable Controller

Line No.	Display	Name	Unit	Range of Display
1	X1 (Note)	Analog input 1	Engineering unit	In engineering unit equivalent to −25.0 to −125.0%
2	X2 (Note)	Analog input 2	Engineering unit	In engineering unit equivalent to −25.0 to −125.0%
3	X3 (Note)	Analog input 3	Engineering unit	In engineering unit equivalent to −25.0 to −125.0%
4	X4 (Note)	Analog input 4	Engineering unit	In engineering unit equivalent to −25.0 to −125.0%
5	X5 (Note)	Analog input 5	Engineering unit	In engineering unit equivalent to −25.0 to −125.0%
6				
7	Y1	Analog output 1	%	−20.0 to 106.3
8	Y2	Analog output 2	%	−6.3 to 106.3
9	Y3	Analog output 3	%	−20.0 to 106.3
10				
11	DI/On	Status input and output	—	0/1
12	DI/On	Status input and output	—	0/1
13	DI/On	Status input and output	—	0/1
14	DI/On	Status input and output	—	0/1
15	DI/On	Status input and output	—	0/1
16	DI/On	Status input and output	—	0/1
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Note: Scales for displaying X1 to X5 in engineering units are set by the programming package YSS10.

9. ENGINEERING OPERATION

The engineering panel group is displayed by [≪SHIFT≫] + [□].

9.1 Selection / Operation of the Engineering Detail Panel

The menu is displayed first in the engineering panel group. The menu panel is used to select the desired detail panel. The six types, or five types (for a programmable controller), of the detail panel can be selected from one menu panel. The following describes how to select the desired panel.

① Press the key at the right of the name of the desired detail panel. The detail panel will be displayed.

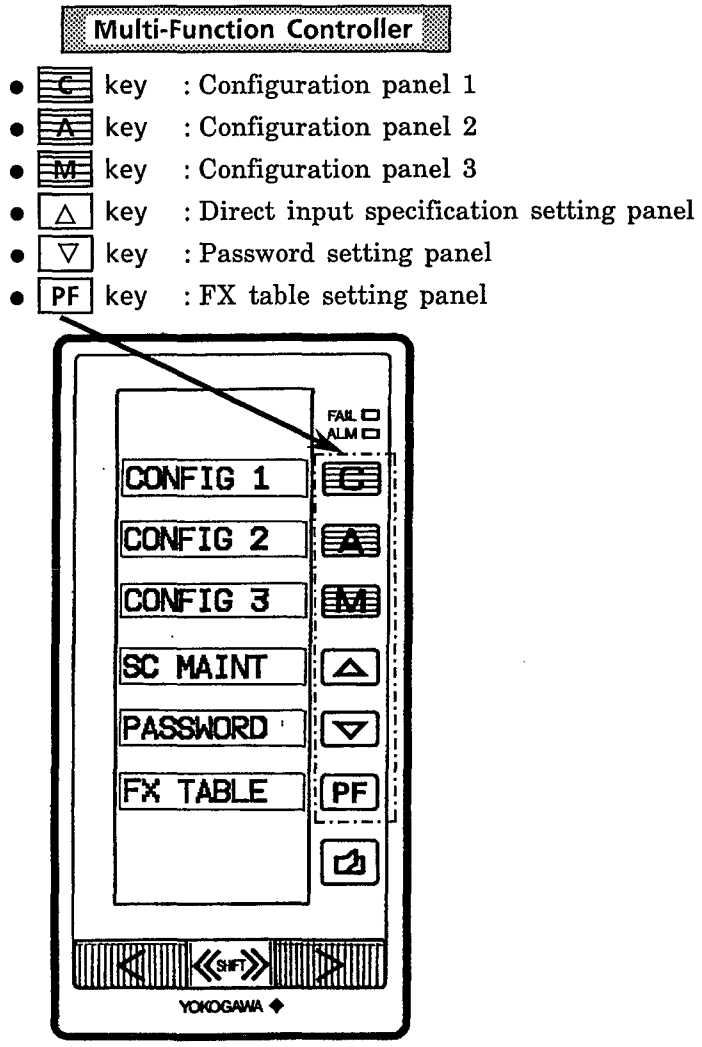
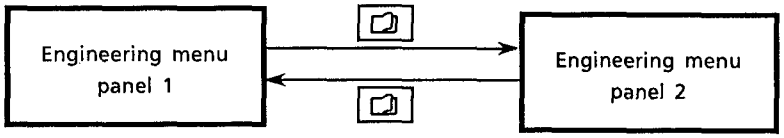


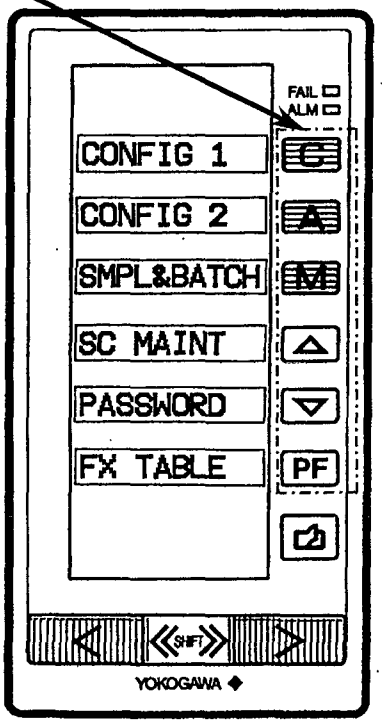
Figure 9.1(a) Engineering Detail Panel (Multi-Function Controller)

Programmable Controller

The two types of menu panels can be selected when you use the programmable type controller. You can select each panel with the [ ] key.

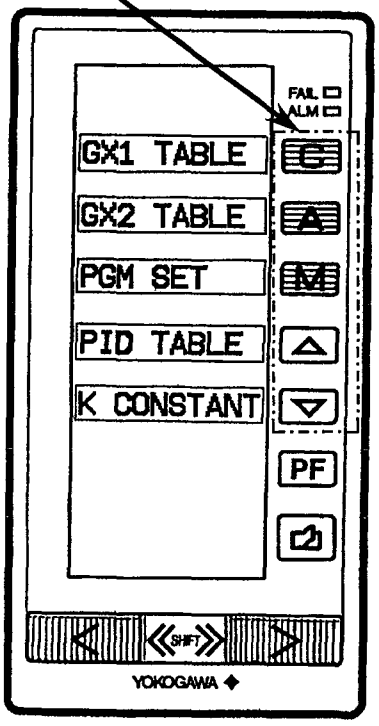


- [C] key : Configuration panel 1
- [A] key : Configuration panel 2
- [M] key : Sample & batch setting panel
- [△] key : Direct input specification setting panel
- [▽] key : Password setting panel
- [PF] key : FX table setting panel



<Engineering Menu Panel 1>

- [C] key : GX1 table setting panel
- [A] key : GX2 table setting panel
- [M] key : Program-setting-unit setting panel
- [△] key : Preset PID setting panel
- [▽] key : K constant display panel



<Engineering Menu Panel 2>

Figure 9.1(b) Engineering Detail Panel (Programmable Controller)

9.2 Engineering Parameter Setting Operation

Functions and parameters can be set from the detail panel.

■ Using the Software Key

On the detail panel, several keys are displayed on the right of the detail panel (so-called "software keys"), in addition to the items of the parameters and the setting values. This means that the operation keys to the right of the displayed keys function as they are displayed on the detail panel.

The names of these software keys are as follows:

- [↑] key : Parameter selection key
- [↓] key : Parameter selection key
- [△] key : Parameter increasing key
- [▽] key : Parameter decreasing key

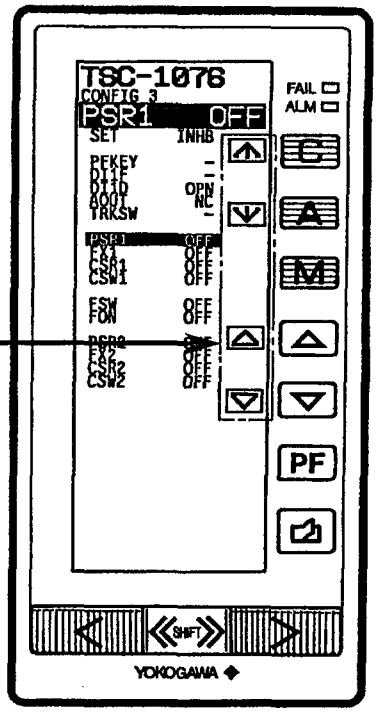


Figure 9.2 Using the Software Key

TIP

In addition to the software keys above, other software keys are available with the deirect input specification setting panel and the password setting panel of the engineering panel group. See Section 9.3.4 "Direct Input Specification Setting Panel" and Section 9.3.5 "Password Setting Panel" for the use of those keys.

NOTE

■ Entering a Password

This controller allows you to set a password. When you set a password, enter the password on the password setting panel described in Section 9.3.5 "Password Setting Panel", then perform tuning operation. When finishing tuning operation, set the password again.

■ Enabling / Disabling of Parameter Setting

- Enabling or disabling of parameter setting (SET) can be selected from the configuration panel 1, configuration panel 2, configuration panel 3, and the direct input specification setting panel of the engineering panel group.
- "Enabled" or "Disabled" parameter setting status (SET) is displayed as the top line of the parameters. This indication permits or inhibits setting (or change) of the parameters displayed below that indication.
- Permission or inhibition of parameter setting (SET) immediately after the panel is displayed set to "INHB" (setting, inhibited). Unless this setting is changed to "ENBL" (setting, enabled), the parameters below that line cannot be changed.
- When the setting is set to "ENBL" after selecting permission or inhibition of parameter setting (SET), the control operation mode changes automatically in the M mode, and the output is held. A reverse display of STOP will appear on the right of the display title.
- Permission or inhibition of parameters setting (SET) reverts automatically to "INHB" when another panel is selected.

■ Setting Parameters

① **Select the Desired Parameter to be Set.**

- Some parameters shown on the detail panel cannot be set (or setting is prohibited) while the others can be set.
- In order to prevent incorrect setting, no parameters are selected (shown by reverse display) when the detail panel is first displayed. Pressing the [↑] key or the [↓] key selects the changable parameters. The item name and the value of the selected parameter is displayed with black and white reversed, and it is also enlarged and displayed below the panel title.
- When the value to be set for the parameter is of character type (i.e. tag numbers etc.), only one character is reversed. Pressing the [↑] key moves the reverse display to the left. Pressing the [↓] key moves the reverse display to the right. Pressing the [↑] key when the far left character is reversed moves up the reverse display. Pressing the [↓] key when the far right character is reversed moves down the reverse display.

② **Set (or Change) the Parameter.**

- Set (or change) the value of the parameter by pressing the [△] key or the [▽] key.
- Pressing the [△] key increases the value of the parameter while pressing the [▽] key decreases it.

NOTE

Hold down the [△] key or the [▽] key for at least five seconds to select the controller mode in the configuration panel 1 (if you do not hold down the key for five seconds, the controller does not change the mode).

- When the setting values are of characters (engineering unit (UNIT), tag numbers (TAG), or display register (NAME)) or when the scale is set for either 100% value (SCH) or 0% value (SCL), one character can be set (or changed) at a time. The selected character changes in the order of ASCII code number. Pressing the [△] key selects the higher code number (ascending order), while pressing the [▽] key selects the lower code number (de-scending order). The range of the ASCII code which can be set is from 20H (space) to 5AH (Z) in hexadecimal notation.

[ASCII Code]

␣(Space) ! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
A B C ..... Z

■ Signal status during maintenance of engineering parameters

When you execute the maintenance of engineering parameters (during "ENBL" status), the YS170 becomes the "Function Stop" mode, indicating "STOP" at the right top of the display. The statuses of the I / O signals, internal registers, and operation mode at this time are described in the following table.

Signal / data	Status During Maintenance	Remarks
Operation mode	MAN	
SV1 and SV2 (setpoints)	The status immediately before being stopped	
MV1 and MV2 (manipulated output)	The status immediately before being stopped	
Analog outputs 1 to 3	The status immediately before being stopped	
Analog output registers Y1 to Y3	The status immediately before being stopped	
Contact outputs 1 to 6	The status immediately before being stopped	
Contact output registers DO1 to DO6	The status immediately before being stopped	
PF status display	The status immediately before being stopped	
PF status register LP01	The status immediately before being stopped	
Temporary memory registers T01 to T30	The status immediately before being stopped	
Output resistors Y4 to Y6	The status immediately before being stopped	
Contact output registers DO7 to DO16	The status immediately before being stopped	
Computation for each device number	Initialized	First order time lag and dead time, etc.

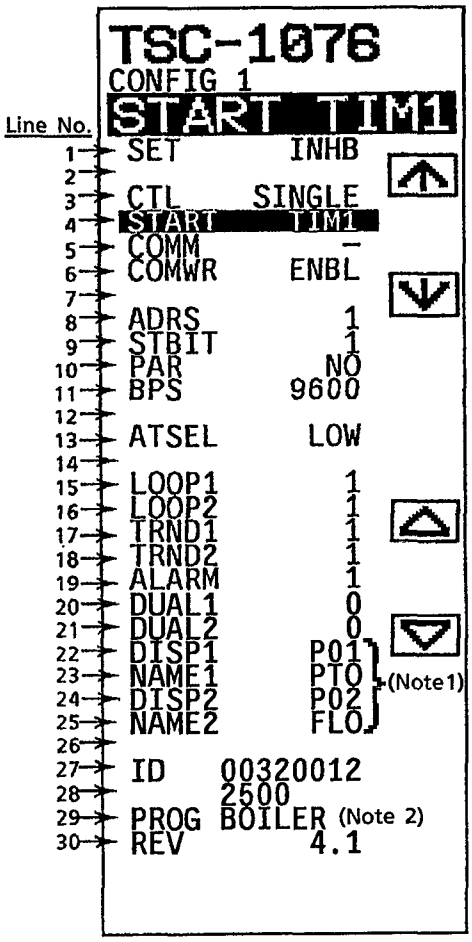
9.3 Function, Display, and Operation of Each Engineering Detail Panel

9.3.1 Configuration Panel 1

■ **Function** The setting of the configuration, communication environment, etc. is carried out.
Settings made using this panel is written to the EEPROM directly.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to enable or disable parameter setting
(3) Operation to change parameters
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 9.1 Configuration Panel 1

Note 1: Displayed with only Programmable Controller

Note 2: Only [PROG] is displayed with Multi-Function Controller

■ Display Parameter List

(1) Configuration Panel 1 Multi-Function Controller

Line No.	Display	Name	Default Value	Selection	Setting Possible
1	SET	Enable / disable setting	INHB	INHB, ENBL	○
2					
3	CTL	Selection of the controller mode (Note 3)	SINGLE	SINGLE, CAS, SELECT	○
4	START	Start mode	TIM1	TIM1, AUT, TIM2	○
5	COMM	Selection of communication	-	-, LCS, 485, YSNET (Note 1)	×
6	COMWR	Enable / disable setting through communication	ENBL	ENBL, INHB	○
7					
8	ADRS	(RS-485 or YS-net) communication address	1	1 to 16	○
9	STBIT	(RS-485) stop bit	1	1, 2	○
10	PAR	(RS-485) parity	NO	NO, ODD, EVEN	○
11	BPS	(RS-485) bit rate	1200	1200, 2400, 4800, 9600	○
12					
13	ATSEL	Autoselector selection	LOW	LOW, HIGH	○
14					
15	LOOP1	Panel display selection / loop 1	1	0, 1, 2 (Note 2)	○
16	LOOP2	Panel display selection / loop 2	1	0, 1, 2 (Note 2)	○
17	TRND1	Panel display selection / trend 1	1	0, 1, 2 (Note 2)	○
18	TRND2	Panel display selection / trend 2	1	0, 1, 2 (Note 2)	○
19	ALARM	Panel display selection / alarm	1	0, 1, 2 (Note 2)	○
20	DUAL1	Panel display selection / dual loop 1	0	0, 1, 2 (Note 2)	○
21	DUAL2	Panel display selection / dual loop 2	0	0, 1, 2 (Note 2)	○
22					
23					
24					
25					
26					
27	ID	Communication ID on the YS-net		alphnumeric-12 digits (8 digits + 4 digits) (Note1)	×
28					
29	PROG	Name of user program			×
30	REV	System Rev. No.			×

Note 1 : Automatically selected by the optional communication card.

Note 2 : The loop 1 always appears even though you set 0 for all lines.
If CTL is set to SINGLE, then set LOOP2, TRND2, DUAL2 to 0.
Reverse display selection : Displayed white in blue background when setting "1". Displayed blue in white background when setting "2". All displays other than operation display are the same as those of LOOP1. Display is set effective for new (changed) setting after new display appears by pressing the page key.

Note 3 : Each parameters will become initialized if the controller mode is changed.

(2) Configuration Panel 1 Programmable Controller

Line No.	Display	Name	Default Value	Selection	Setting Possible
1	SET	Enable / disable setting	INHB	INHB, ENBL	○
2					
3	CTL	Selection of the controller mode	PROG	PROG, SINGLE, CAS, SELECT	○
4	START	Start mode	TIM1	TIM1, AUT, TIM2	○
5	COMM	Communication	–	-, LCS, 485, YSNET (Note 1)	×
6	COMWR	Enable / disable setting through communication (Note 4)	ENBL	ENBL, INHB	○
7					
8	ADRS	(RS-485 or YS-net) communication address	1	1 to 16 (for RS-485) 0 to 16 (for YS-net)	○
9	STBIT	(RS-485) stop bit	1	1, 2	○
10	PAR	(RS-485) parity	NO	NO, ODD, EVEN	○
11	BPS	(RS-485) bit rate	1200	1200, 2400, 4800, 9600	○
12					
13	ATSEL	Autoselector selection	LOW	LOW, HIGH	○
14					
15	LOOP1	Panel display selection / loop 1	1	0, 1, 2 (Note 2)	○
16	LOOP2	Panel display selection / loop 2	1	0, 1, 2 (Note 2)	○
17	TRND1	Panel display selection / trend 1	1	0, 1, 2 (Note 2)	○
18	TRND2	Panel display selection / trend 2	1	0, 1, 2 (Note 2)	○
19	ALARM	Panel display selection / alarm	1	0, 1, 2 (Note 2)	○
20	DUAL1	Panel display selection / dual loop 1	0	0, 1, 2 (Note 2)	○
21	DUAL2	Panel display selection / dual loop 2	0	0, 1, 2 (Note 2)	○
22	DISP1	Display register selection 1	–	-, P01 to P08	○
23	NAME1	Name of display register 1	PRM	3 digits of alphanumerics	○
24	DISP2	Display register selection 2	–	-, P01 to P08	○
25	NAME2	Name of display register 2	PRM	3 digits of alphanumerics	○
26					
27	ID	Communication ID on the YS-net		alphanumeric-12 digits (8 digits + 4 digits) (Note 1)	×
28					
29	PROG	User program name			×
30	REV	System Rev. No.			×

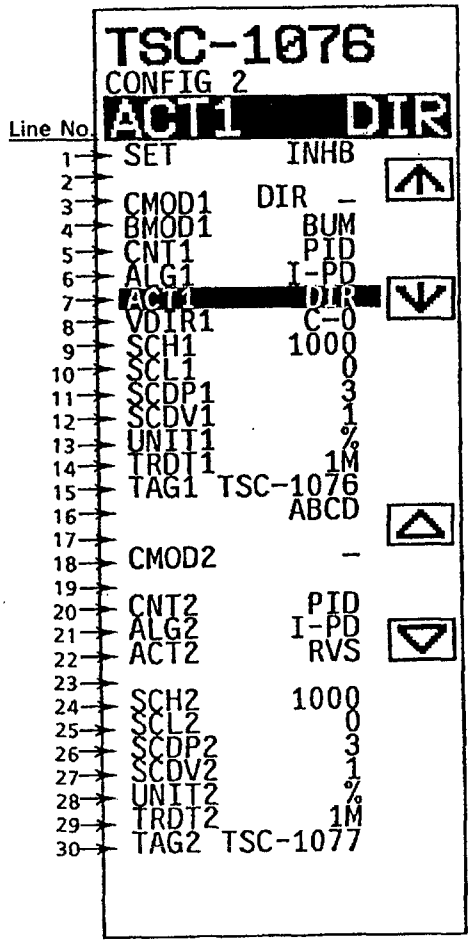
Note 1: Automatically selected by the optional communication card.
Note 2: The loop 1 always appears even though you set 0 for all lines.
If CTL is set to SINGLE, then set LOOP2, TRND2 DUAL2 to 0.
Reverse display selection: Displayed white in blue background when setting "1". Displayed blue in white background when setting "2". All displays other than operation display are the same as those of LOOP1. Display is set effective for new (changed) setting after new display appears by pressing the page key.
Note 3: Each parameters will become initialized if the controller mode is changed.
Note 4: This item is not effective for Peer-to-peer communication. Peer-to-peer communication is always enabled.

9.3.2 Configuration Panel 2

■ **Function** The setting of each control function is carried out.
Settings made using this panel are written to the EEPROM directly.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to enable or disable parameter setting
(3) Operation to change parameters
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 9.2 Configuration Panel 2

■ Display Parameter List

(1) Configuration Panel 2 Multi-Function Controller

Line No.	Display	Name	Default Value	Selection
1	SET	Permission / inhibition of setting	INHB	INHB, ENBL (Note 4)
2				
3	CMOD1	Cascade mode 1	-	-, CAS, CMP
4	BMOD1	Backup mode 1	BUM	BUM, BUA
5	CNT1	Control type 1	PID	PID, PD (Note 1)
6	ALG1	Control operation formula 1	I-PD	I-PD, PI-D, SVF
7	ACT1	Control operation direction 1	RVS	RVS, DIR
8	VDIR1	Valve opening direction 1	C-O	C-O, O-C
9	SCH1	100% value of scale 1	1000	-9999 to 9999
10	SCL1	0% value of scale 1	0	-9999 to 9999
11	SCDP1	Position of decimal point 1	3	1 to 4 (Note 5)
12	SCDV1	Scale division 1	1	1, 2, 4, 5, 10
13	UNIT1	Engineering unit 1	%	6 digits of alphanumeric characters
14	TRDT1	Trend recording time span 1	1M	1M, 5M, 10M, 30M, 1H, 5H, 10H, 30H
15	TAG1	Tag number 1	-YS150-	12 digits of alphanumeric characters (8 digits + 4 digits) (Note 6)
16				
17				
18	CMOD2	Cascade mode 2 (Note 2)	-	-, CAS
19				
20	CNT2	Control type 2	PID	Selection fixed
21	ALG2	Control operation formula 2	I-PD	I-PD, PI-D, SVF
22	ACT2	Control operation direction 2	RVS	RVS, DIR
23				
24	SCH2	100% value of scale 2	1000	-9999 to 9999
25	SCL2	0% value of scale 2	0	-9999 to 9999
26	SCDP2	Position of decimal point 2	3	1 to 4
27	SCDV2	Scale division 2	1	1, 2, 4, 5, 10
28	UNIT2	Engineering unit 2	%	6 digits of alphanumeric characters
29	TRDT2	Trend recording time span 2	1M	1M, 5M, 10M, 30M, 1H, 5H, 10H, 30H
30	TAG2	Tag number 2	-YS150-	12 digits of alphanumeric characters (8 digits + 4 digits) (Note 6)

Note 1: PD is selectable only in the single-loop mode. When you select PD, please set ALG to PI-D.
Note 2: CMOD2 appears and is selectable in the selector mode.
Note 3: Parameters whose number is 18 or more are not displayed in the single-loop mode.
Note 4: When the setting is set to "ENBL", a reverse display of STOP will appear on the right of the display title, and the manipulated output and alarm output are held.
Note 5: Decimal point is set as follows:

□. □. □. □.
↑ ↑ ↑ ↑
Setting value → 1 2 3 4 (no diaplay)

Note 6: The lower 4 digits will not be displayed at the tag number display part at the top of the panel.

(2) Configuration Panel 2 Programmable Controller

Line No.	Display	Name	Default Value	Selection
1	SET	Permission / inhibition of setting	INHB	INHB, ENBL (Note 1)
2				
3	CMOD1	Cascade mode 1	-	-, CAS, CMP
4	BMOD1	Backup mode 1	BUM	BUM, BUA
5	CNT1	Control type 1	PID	PID, S-PI, BATCH, PD (Note 4)
6	ALG1	Control operation formula 1	I-PD	I-PD, PI-D, SVF
7	ACT1	Control operation direction 1	RVS	RVS, DIR
8	VDIR1	Valve opening direction 1	C-O	C-O, O-C
9	SCH1	100% value of scale 1	1000	-9999 to 9999
10	SCL1	0% value of scale 1	0	-9999 to 9999
11	SCDP1	Position of decimal point 1	3	1 to 4 (Note 2)
12	SCDV1	Scale division 1	1	1, 2, 4, 5, 10
13	UNIT1	Engineering unit 1	%	6 digits of alphanumeric characters
14	TRDT1	Trend recording time span 1	1M	1M, 5M, 10M, 30M, 1H, 5H, 10H, 30H
15	TAG1	Tag number 1	-YS170-	12 digits of alphanumeric characters (8 digits + 4 digits) (Note 3)
16				
17				
18	CMOD2	Cascade mode 2	-	-, CAS, CMP
19	BMOD2	Backup mode 2	BUM	BUM, BUA
20	CNT2	Control type 2	PID	PID, S-PI, BATCH, PD (Note 4)
21	ALG2	Control operation formula 2	I-PD	I-PD, PI-D, SVF
22	ACT2	Control operation direction 2	RVS	RVS, DIR
23	VDIR2	Valve opening direction 2	C-O	C-O, O-C
24	SCH2	100% value of scale 2	1000	-9999 to 9999
25	SCL2	0% value of scale 2	0	-9999 to 9999
26	SCDP2	Position of decimal point 2	3	1 to 4
27	SCDV2	Scale division 2	1	1, 2, 4, 5, 10
28	UNIT2	Engineering unit 2	%	6 digits of alphanumeric characters
29	TRDT2	Trend recording time span 2	1M	1M, 5M, 10M, 30M, 1H, 5H, 10H, 30H
30	TAG2	Tag number 2	-YS170-	12 digits of alphanumeric characters (8 digits + 4 digits) (Note 3)

Note 1: When the setting is set to "ENBL", a reverse display of STOP will appear on the right of the display title, and the manipulated output and alarm output are held.

Note 2: Decimal point is set as follows:

□. □. □. □.
↑ ↑ ↑ ↑
Setting value → 1 2 3 4 (no diaplay)

Note 3: The lower 4 digits will not be displayed at the tag number display part at the top of the panel.

Note 4: When you select PD, please set ALG for the same loop to PI-D.

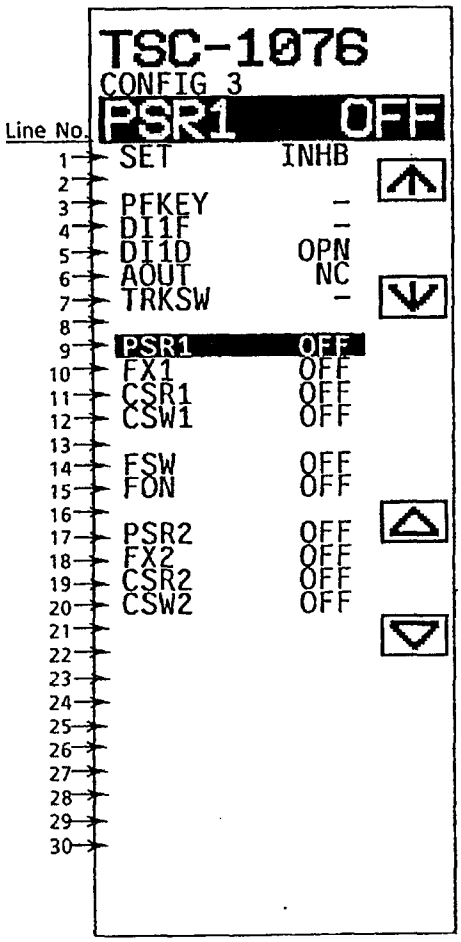
9.3.3 Configuration Panel 3

Multi-Function Controller

■ **Function** The selection of function of DI1 of the PF key, and the ON / OFF selection of each operation are carried out.

■ **Operation**
(1) Operation of the soft keys
(2) Operation to enable or disable parameter setting
(3) Operation to change parameters
(4) Operation to switch panels

■ **Display** The following shows an example of the panel display.



Display 9.3 Configuration Panel 3

■ Display Parameter List

Line No.	Display	Name	Default Value	Selection
1	SET	Enable / disable setting	INHB	INHB, ENBL
2				
3	PFKEY	Designation of the function of the PF key	-	-, STC
4	DI1F	Designation of DI1 function	-	(Note 1)
5	DI1D	Direction of DI1 operation contact	OPN	OPN, CLS
6	AOUT	Designation of alarm output contact status	NC	NC, NO
7	TRKSW	Designation of tracking function (Note 2)	-	-, SVTRK, PVTRK
8				
9	PSR1	Designation of square root extraction of process variable 1	OFF	OFF, ON
10	FX1	Designation of 10-segment characterizer function of process variable 1	OFF	OFF, ON
11	CSR1	Designation of square root extraction for cascade input value 1	OFF	OFF, ON
12	CSW1	Designation of scaling for cascade input value 1	OFF	OFF, ON
13				
14	FSW	Designation of operation of feedforward gain (Notes 2 and 3)	OFF	OFF, ON
15	FON	Designation of addition of feedforward output (Notes 2 and 3)	OFF	OFF, ON
16				
17	PSR2	Designation of square root extraction of process variable 2 (Notes 3 and 4)	OFF	OFF, ON
18	FX2	Designation of 10-segment characterizer function of process variable 2 (Notes 3 and 4)	OFF	OFF, ON
19	CSR2	Designation of square root extraction for cascade input value 2 (Note 4)	OFF	OFF, ON
20	CSW2	Designation of scaling for cascade input value 2 (Note 4)	OFF	OFF, ON
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Note 1: in the single-loop mode : -, E-MAN, E-AUT, E-PMV, E-TRK, E-STC
in the cascade mode : -, E-PMV, E-STC, E-O / C
in the selector mode : -, E-PMV, E-STC, E-L / R
Note 2: Displayed in the single-loop mode
Note 3: Displayed in the cascade mode
Note 4: Displayed in the selector mode

9.3.4 Direct Input Specification Setting Panel

■ **Function**

The maintenance of the optional SC card for direct input (except for /A05 Isolated input, /A06 2-wire transmitter input, and /A07 2-wire transmitter input (non-isolated) is carried out. The maintenance operation consists of communication with the SC card and setting of specification.
The SC card has the following six types of menus:

① **Model name** (MODEL)
② **Tag number** (TAG NO.)
③ **Self-diagnosis test result** (SELF CHK)
④ **Display item** (DISPLAY) ..... 4 parameters
⑤ **Setting item** (SET) ..... 12 parameters
⑥ **Adjustment item** (ADJUST) ..... 7 parameters

④ to ⑥ menus have the parameters to be set: ④ Display item menu has 4 parameters to be set, ⑤ Setting item menu has 12 parameters, and ⑥ Adjustment item menu has 7 parameters. You cannot change the ① to ③ menus and ④ Display item menu parameter with checking operation.

■ **Operation**

(1) Function to Prevent Accidental Setting

In order to prevent accidental setting of parameters, no parameters can be selected (not reverse display) immediately after opening this panel. Pressing the [→] key once selects the parameter "SET" at the top line (enable / disable of parameter setting) is selected.

(2) Operation to Permit Parameter Setting

"SET" displayed on the top line is the parameter which allows the SC maintenance communications. It is set to "INHB" (setting inhibited) immediately after opening this panel. The SC maintenance communications cannot be carried out unless you change this setting to "ENBL" (setting enabled).

To change the setting from "INHB" to "ENBL", first select the "SET" parameter, and then press the [△] key. Then, "STOP" is displayed in the upper right of the screen When the setting is changed to "ENBL", the control mode is changed automatically to the M mode, and the manipulated output and alarm output are held. When you select another panel, the setting is set automatically back to "INHB."

(3) Software Key

- [MNU] **Key : Menu (MENU) Change Key**

  This key enables communication with the SC to displaying the menu. Every time this key is pressed, the controller communicates with the SC. The menu of the SC is read and displayed.

- [PRM] **Key : Parameter (PARAMETER) Change Key**

  This key enables communication with the SC to display the parameters. Every time this key is pressed, the controller communicates with the SC, and the parameters of the SC are read and displayed.

- [→] **Key : Cursor Shift Key**

  This key shifts the digit for the data. When the data type is alphanumeric characters, the digit displayed in reverse is shifted to the right. From the far right digit, it is shifted to the far left position.

- [△] **Key : Data Increase Key**

  This key increases the data value. The value changes from low to high, then to low continuously.

- [▽] **Key : Data Decrease Key**

  This key decreases the data value. The value changes from high to low, then to high continuously.

- [ENT] **Key : Enter (ENTER) Key**

  This key writes the data to the SC. The following two steps are required to write data to the SC.

  ① Press the [ENT] key once. The display of all the communication data changes to reverse display.

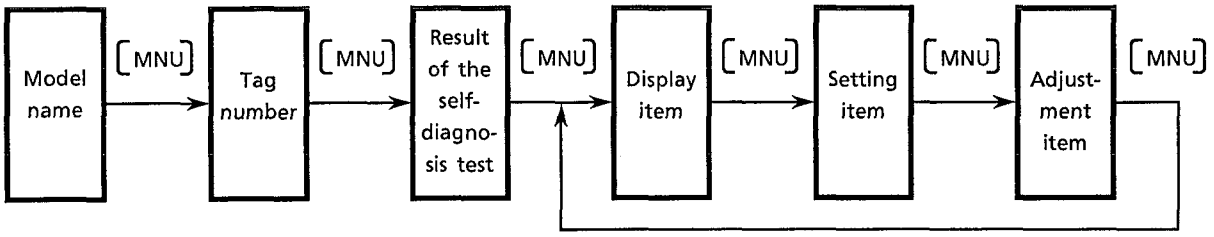
  ② Press the [ENT] key again. The data is written to the SC, and the display is set back to normal display. If you press any key other than the [ENT] key, the data will not be written to the SC but the display will also be set back to normal display.

(4) Direct Input Specification Setting Operation

- Proceed as follows to set the direct input specification:

  ① Select the SC menu.

  Press the [MNU] key to read and display the SC menu.
  Every time you press the [MNU] key, three items: model name, tag number, and the result of self-diagnosis test appear in this order. Press the [MNU] key one more time, three items: the display item, setting item, and adjustment item appear repeatedly.



  ② When you select one of the display item, setting item, and adjustment item, select a parameter.

  Press the [PRM] key to read the SC parameter and display it.
  Every time you press the [PRM] key, each parameter appears one after another. A displayed parameter is different depending on the SC card you use, so refer to the table of displayed parameter list.

  Keep pressing the [PRM] key until the parameter to be set appears.

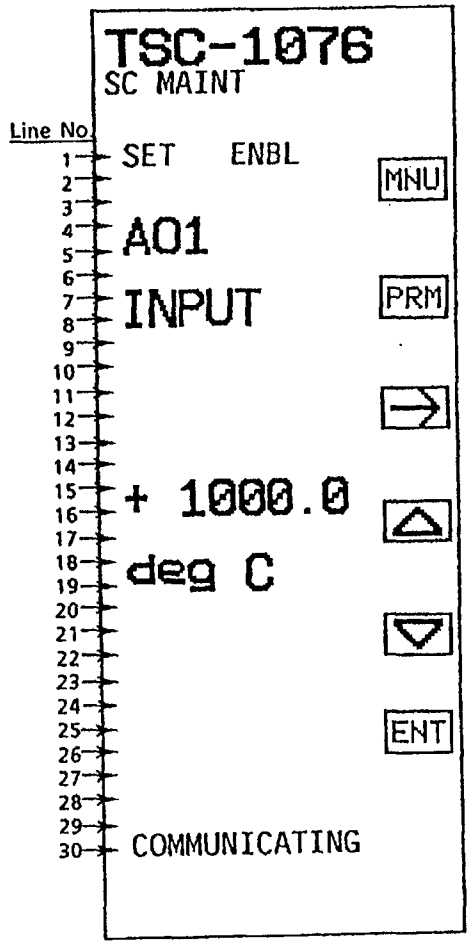
  ③ Set the parameter using the [→] (cursor shift) key, [△] (data increase) key, or [▽] (data decrease) key.

④ Press the [ENT] key. The displayed parameters you set change to reverse display.

⑤ Press the [ENT] key again. The data is written on the SC card, the displayed parameters are set back to normal display. If you do not press the [ENT] key in this step, data are not written and the displayed parameters are set back to normal display.

(5) Operation for Panel Opening

■ **Display** The following shows an example of the panel display.



Display 9.4 Direct Input Specification Setting Panel

■ Display Parameter List

Number	Item	Name Display	Data Display Depending on the SC Card to be Used				
			A01 (EM1)	A02 (ET5)	A03 (ER5)	A04 (ES1)	A08 (EP3)
01	Model name	MODEL	EM1•B	ET5•B	ER5•B	ES1•B	EP3•A
02	Tag number	TAG NO.	16 alphanumeric characters				
03	Self-diagnostic test result	SELF CHK	GOOD or ERROR				
A00	Display item	DISPLAY					
A01	Input value	INPUT	␣␣␣.␣␣mV	␣␣␣␣.␣ deg C	␣␣␣.␣ deg C	␣␣␣␣␣.␣ OHM	␣␣␣␣Hz
A02	Output value	OUTPUT	␣␣␣.␣ %				
A03	Status	STATUS	FF (2 digits of hexadecimal value)				
A04	Revision number	REV NO.	n.000 (n:Revision number)				
B00	Setting item	SET					
B01	Tag number 1	TAG NO 1	8 alphanumeric characters (First half of 8 characters of a tag number)				
B02	Tag number 2	TAG NO 2	8 alphanumeric characters (Later half of 8 characters of a tag number)				
B03	Comment 1	COMMENT 1	8 alphanumeric characters (First half 8 characters of a comment)				
B04	Comment 2	COMMENT 2	8 alphanumeric characters (Rest 8 characters of a comment)				
B05	ER5 input type	INP TYPE			PT/JPT (Note 1)		
B06	ET5 input type	INP TYPE		B/E/J/K/T/R/S/N			
B07	Low-cut	LOW CUT					␣␣␣␣Hz (Note 5)
B08	ES1 whole resistance	RESIST				␣␣␣␣␣.␣ OHM	
B09	Temperature unit	UNIT		deg C/deg F/K	deg C/deg F/K		
B10	0 point	ZERO	␣␣␣.␣␣mV	␣␣␣␣.␣ deg C	␣␣␣.␣ deg C	␣␣␣␣␣.␣ OHM	␣␣␣␣Hz (Note 5)
B11	Span (Note 2)	SPAN	␣␣␣.␣␣mV	␣␣␣␣.␣ deg C	␣␣␣.␣ deg C	(Note 4) ␣␣␣␣␣.␣ OHM	(Note 5) ␣␣␣␣ Hz
B12	Burn-out	BURN OUT	OFF/UP/DOWN	OFF/UP/DOWN	OFF/UP/DOWN	OFF/UP/DOWN	
C00	Adjustment item	ADJUST					
C01	0% output compensation (Note 7)	OUT 0%	±10.00	±10.00	±10.00	±10.00	±10.00
C02	100% output compensation (Note 7)	OUT 100%	±10.00	±10.00	±10.00	±10.00	±10.00
C03	BURN-OUT compensation	WIRING R	EXECUTE/RESET (BURN-OUT compensation) (Note 3)	EXECUTE/RESET (BURN-OUT compensation) (Note 3)			
C04	Input zero adjustment (Note 6)	ZERO ADJ	␣␣␣.␣␣␣mV RST/INC/DEC	␣␣␣.␣␣␣mV RST/INC/DEC	␣␣␣.␣␣␣OHM RST/INC/DEC		
C05	Input span adjustment (Note 6)	SPAN ADJ	␣␣␣.␣␣␣mV RST/INC/DEC	␣␣␣.␣␣␣mV RST/INC/DEC	␣␣␣.␣␣␣OHM RST/INC/DEC		
C06	Input zero adjustment (Note 6)	ZERO ADJ				␣␣␣.␣␣␣ OHM	
C07	Input span adjustment (Note 6)	SPAN ADJ				␣␣␣.␣␣␣ OHM	

Note 1: Pt100=JIS.'89. Pt100 (IEC, DIN Pt100 or compatible), JPT=JIS.'89. JPt100 (former JIS Pt100)

Note 2: Processable data is within the range described in the standard specification.

Note 3: The BURN-OUT compensation means the function to compensate the errors caused by the BURN-OUT current which occurs when the resistance of the external wire is high (This function is used with the BARD type protector).

Note 4: Up to 30kΩ is available, but the standard specification is 100 to 2,000Ω.

Note 5: Set to 4 valid integer digits or less. However, for span, it is possible to set 10,000Hz.

Note 6: Input zero adjustment and input span adjustment are for adjusting the input signals of each SC card.
For A01 (EM1), A02 (ET5), and A03 (ER5) the offset and the gain of the A/D conversion can be adjusted. Select 'INC' or 'DEC' by pressing the [△] or [▽] key and press the [ENT] key twice.
Each time you press it twice the incremental or decremental adjustment is performed. Or select 'RST' and press the [ENT] key twice. Then the adjustment is re-set.
But in case of A04 (ES1) the adjustment here is for re-setting of ZERO and SPAN. That is, the setting to ZERO (B10) and SPAN (B11) is automatically done when you perform the adjustment by pressing the [ENT] key twice for zero adjustment with 0% input and span adjustment with 100% input.

Note 7: Output compensation is for adjusting the D/A conversion output (1 to 5 V DC output).
You can adjust the offset by '0% output compensation' and the gain by '100% output compensation'. You set the value within −10.0% and +10.0% and press the [ENT] key twice. Then the value is added to the 0% output or the 100% output of the D/A conversion and is output continuously. To stop this continuous output status you select other parameters in the SC MAINT display or shut off the power supply to the instrument once.

9.3.5 Password Setting Panel

■ **Function**

The setting (change) of the parameters of the tuning panel group and of the engineering panel group is prohibited.
When a password is set, the parameter increasing key ([△] soft key), and the parameter decreasing ([▽] soft key) disappear from the tuning and engineering panels. As a result, the parameters cannot be changed. However, selection of each parameter item and opening to each panel are possible.
The following explains the details of the password.

- The password is a 4-digit number.
- The password is not factory-set when the controller is shipped.
- The password which has been set remains unchanged unless it is erased by password entering operation.
- Setting (change) of the parameters is enabled at power-on when a password has not been set yet.
- Setting (change) of the parameters is disabled at power-on when a password has already been set. In this case, setting (change) of the parameters can be enabled by entering the same number as the previously set password.

■ **Operation**

(1) Software Key

- [→] **Key : Shift Key**
  This key shift the password digit to the right.
- [SET] **Key : Password Setting Key**
  This key is used to set the password.
- [ENT] **Key : Password Entering Key**
  This key is used to enter the password.
- [△] **Key : Numeric Increasing Key**
  This key increases the data value. The value changes from low to high, and then to low continuously.
- [▽] **: Numeric Decreasing Key**
  This key decreases the data value. The value changes from high to low, and then to high continuously.

(2) Setting the Desired Password

(Operation to disable changes of parameters by setting the password)

① When shifting to the password panel, "SET PASSWORD" and "UNLOCK" are being displayed.
② Press the [SET] key.
③ "0000" appears. The display of the far left digit changes to reverse display.
④ Determine the password using the [→] key (digit shift), the [△] key (increasing), and the [▽] key (decreasing).
⑤ Press the [SET] key. The display of all 4 digits is set to reverse display.
⑥ Press the [SET] key again. The password disappears, "ENT PASSWORD" and "LOCK" appear, and the password has been set. Then, the display of the [SET] key disappeared, and the [ENT] key appears.

(3) Inputting the Desired Password

(Operation to enable changes of parameters by entering the password for the unit to which the password is set)

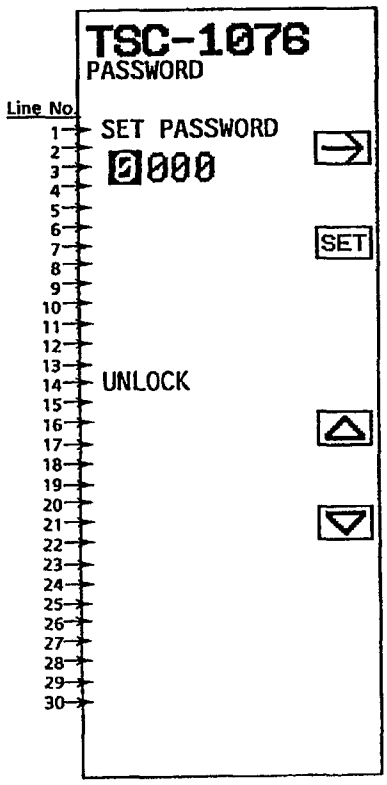
① When shifting to the password panel, "ENT PASSWORD" and "LOCK" are being displayed.
② Press the [ENT] key.
③ "0000" appears. The display of the far left digit changes to reverse display.
④ Determine the password using the [→] key (digit shift), the [△] key (increasing), and the [▽] key (decreasing).
⑤ Press the [ENT] key. The display of all 4 digits is set to reverse display.
⑥ Press the [ENT] key. When the password is correct, the password disappears, "SET PASSWORD" and "UNLOCK" appear. In this condition, the password can be changed. If the password entered is incorrect, the status is set back to step ③ above.

NOTE

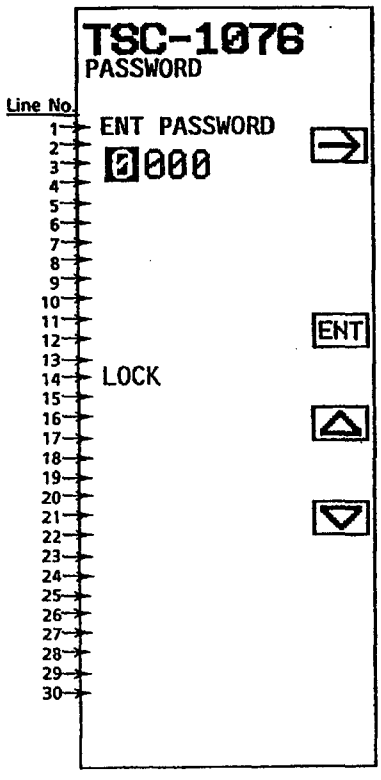
Under "UNLOCK" status, the password is disregarded and abandoned. If you want to set in inhibition status for parameter change again. Set a password again.

(4) Operation for Panel Opening

■ **Display** The following shows an example of the panel display.



Display 9.5 Password Setting Panel



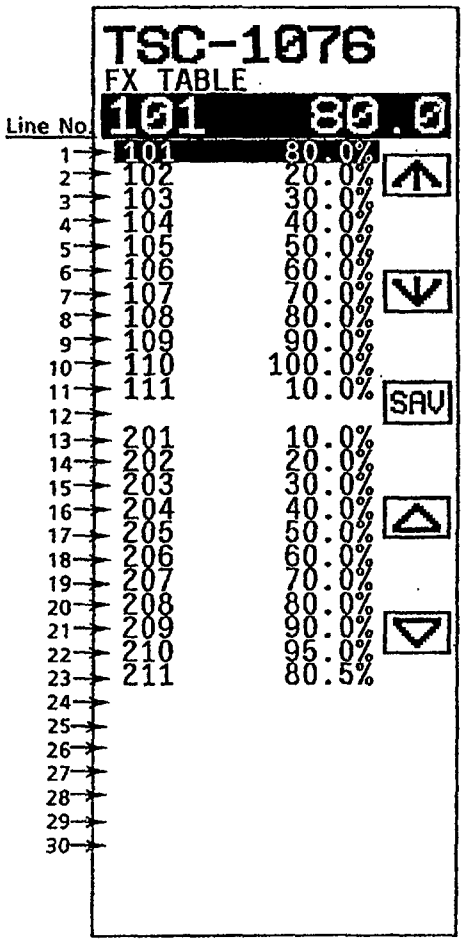
Display 9.6 Password Input Panel

9.3.6 FX Table Setting Panel

■ **Function** The display and setting of the 10-segment line-segment characterizer function table are carried out.

■ **Operation**
(1) Operation of the software key
(2) Operation to change parameters
(3) Operation to switch panel opening

■ **Display** The following shows an example of the panel display.



Display 9.7 FX Table Setting Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	101	Output setting value 1-1	%	0.0	0.0 to 100.0
2	102	Output setting value 1-2	%	10.0	0.0 to 100.0
3	103	Output setting value 1-3	%	20.0	0.0 to 100.0
4	104	Output setting value 1-4	%	30.0	0.0 to 100.0
5	105	Output setting value 1-5	%	40.0	0.0 to 100.0
6	106	Output setting value 1-6	%	50.0	0.0 to 100.0
7	107	Output setting value 1-7	%	60.0	0.0 to 100.0
8	108	Output setting value 1-8	%	70.0	0.0 to 100.0
9	109	Output setting value 1-9	%	80.0	0.0 to 100.0
10	110	Output setting value 1-10	%	90.0	0.0 to 100.0
11	111	Output setting value 1-11	%	100.0	0.0 to 100.0
12					
13	201	Output setting value 2-1	%	0.0	0.0 to 100.0
14	202	Output setting value 2-2	%	10.0	0.0 to 100.0
15	203	Output setting value 2-3	%	20.0	0.0 to 100.0
16	204	Output setting value 2-4	%	30.0	0.0 to 100.0
17	205	Output setting value 2-5	%	40.0	0.0 to 100.0
18	206	Output setting value 2-6	%	50.0	0.0 to 100.0
19	207	Output setting value 2-7	%	60.0	0.0 to 100.0
20	208	Output setting value 2-8	%	70.0	0.0 to 100.0
21	209	Output setting value 2-9	%	80.0	0.0 to 100.0
22	210	Output setting value 2-10	%	90.0	0.0 to 100.0
23	211	Output setting value 2-11	%	100.0	0.0 to 100.0
24					
25					
26					
27					
28					
29					
30					

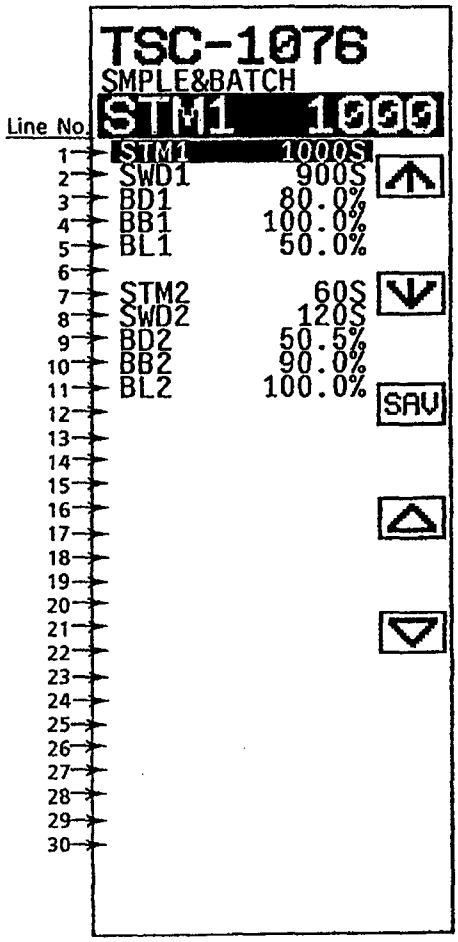
9.3.7 Sample and Batch Setting Panel

Programmable Controller

■ **Function** The display and setting of the parameters of the sample PI control and the batch PID control are carried out.

■ **Operation**
(1) Operation of the soft key
(2) Operation to change parameters
(3) Operation to switch panel

■ **Display** The following shows an example of the panel display.



Display 9.8 Sample and Batch Setting Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	STM1	Sample PI sampled time (period) 1	Second	0	0 to 9999
2	SWD1	Sample PI control time span 1	Second	0	0 to 9999
3	BD1	Batch PID deviation setting value 1	%	0.0	0 to 100.0
4	BB1	Batch PID bias value 1	%	0.0	0 to 100.0
5	BL1	Batch PID lock-up width 1	%	0.0	0 to 100.0
6					
7	STM2	Sample PI sampled time (period) 2	Second	0	0 to 9999
8	SWD2	Sample PI control time span 2	Second	0	0 to 9999
9	BD2	Batch PID deviation setting value 2	%	0.0	0 to 100.0
10	BB2	Batch PID bias value 2	%	0.0	0 to 100.0
11	BL2	Batch PID lock-up width 2	%	0.0	0 to 100.0
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

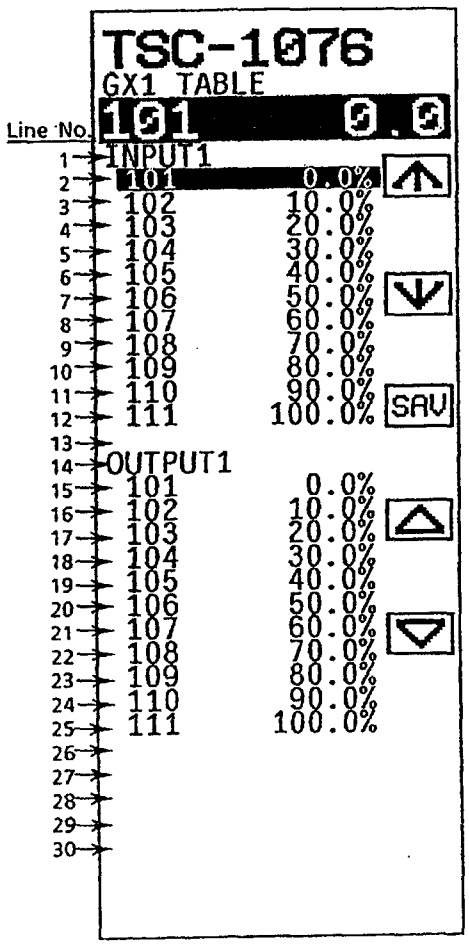
9.3.8 GX1 Table Setting Panel

Programmable Controller

■ **Function** The display and setting of the arbitrary segment line-segment characterizer function table 1 is carried out.

■ **Operation**
(1) Operation of the soft key
(2) Operation to change parameters
(3) Operation to switch panel

■ **Display** The following shows an example of the panel display.



Display 9.9 GX1 Tables Setting Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	INPUT1	(Group title)			
2	101	Input break point 1-1	%	0.0	-25.0 to 125.0
3	102	Input break point 1-2	%	10.0	-25.0 to 125.0
4	103	Input break point 1-3	%	20.0	-25.0 to 125.0
5	104	Input break point 1-4	%	30.0	-25.0 to 125.0
6	105	Input break point 1-5	%	40.0	-25.0 to 125.0
7	106	Input break point 1-6	%	50.0	-25.0 to 125.0
8	107	Input break point 1-7	%	60.0	-25.0 to 125.0
9	108	Input break point 1-8	%	70.0	-25.0 to 125.0
10	109	Input break point 1-9	%	80.0	-25.0 to 125.0
11	110	Input break point 1-10	%	90.0	-25.0 to 125.0
12	111	Input break point 1-11	%	100.0	-25.0 to 125.0
13					
14	OUTPUT1	(Group title)			
15	101	Output setting value 1-1	%	0.0	-25.0 to 125.0
16	102	Output setting value 1-2	%	10.0	-25.0 to 125.0
17	103	Output setting value 1-3	%	20.0	-25.0 to 125.0
18	104	Output setting value 1-4	%	30.0	-25.0 to 125.0
19	105	Output setting value 1-5	%	40.0	-25.0 to 125.0
20	106	Output setting value 1-6	%	50.0	-25.0 to 125.0
21	107	Output setting value 1-7	%	60.0	-25.0 to 125.0
22	108	Output setting value 1-8	%	70.0	-25.0 to 125.0
23	109	Output setting value 1-9	%	80.0	-25.0 to 125.0
24	110	Output setting value 1-10	%	90.0	-25.0 to 125.0
25	111	Output setting value 1-11	%	100.0	-25.0 to 125.0
26					
27					
28					
29					
30					

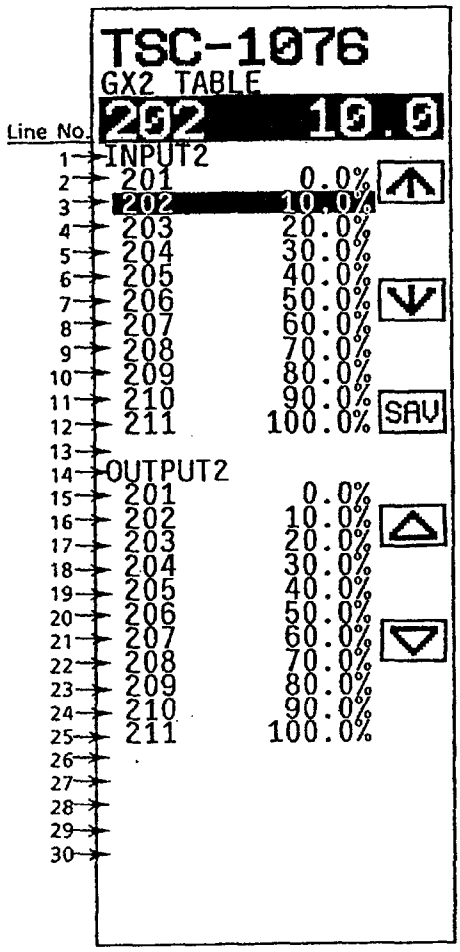
9.3.9 GX2 Table Setting Panel

Programmable Controller

■ **Function** The display and setting of the arbitrary segment line-segment characterizer function table 2 are carried out.

■ **Operation**
(1) Operation of the soft key
(2) Operation to change parameters
(3) Operation to switch panel

■ **Display** The following shows an example of the panel display.



Display 9.10 GX2 Table Setting Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	INPUT2	(Group title)			
2	201	Input break point 2-1	%	0.0	-25.0 to 125.0
3	202	Input break point 2-2	%	10.0	-25.0 to 125.0
4	203	Input break point 2-3	%	20.0	-25.0 to 125.0
5	204	Input break point 2-4	%	30.0	-25.0 to 125.0
6	205	Input break point 2-5	%	40.0	-25.0 to 125.0
7	206	Input break point 2-6	%	50.0	-25.0 to 125.0
8	207	Input break point 2-7	%	60.0	-25.0 to 125.0
9	208	Input break point 2-8	%	70.0	-25.0 to 125.0
10	209	Input break point 2-9	%	80.0	-25.0 to 125.0
11	210	Input break point 2-10	%	90.0	-25.0 to 125.0
12	211	Input break point 2-11	%	100.0	-25.0 to 125.0
13					
14	OUTPUT2	(Group title)			
15	201	Output setting value 2-1	%	0.0	-25.0 to 125.0
16	202	Output setting value 2-2	%	10.0	-25.0 to 125.0
17	203	Output setting value 2-3	%	20.0	-25.0 to 125.0
18	204	Output setting value 2-4	%	30.0	-25.0 to 125.0
19	205	Output setting value 2-5	%	40.0	-25.0 to 125.0
20	206	Output setting value 2-6	%	50.0	-25.0 to 125.0
21	207	Output setting value 2-7	%	60.0	-25.0 to 125.0
22	208	Output setting value 2-8	%	70.0	-25.0 to 125.0
23	209	Output setting value 2-9	%	80.0	-25.0 to 125.0
24	210	Output setting value 2-10	%	90.0	-25.0 to 125.0
25	211	Output setting value 2-11	%	100.0	-25.0 to 125.0
26					
27					
28					
29					
30					

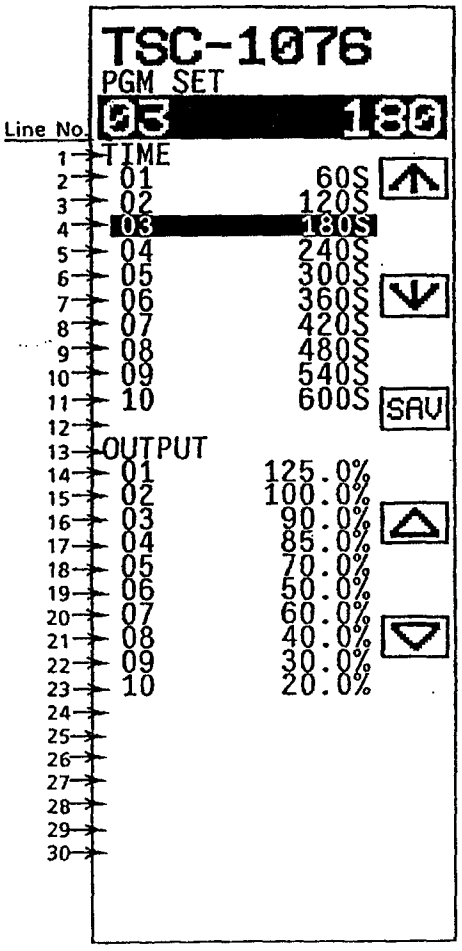
9.3.10 Program-Setting-Unit Setting Panel

Programmable Controller

■ **Function** The display and setting of the program set value (time and output value) are carried

■ **Operation**
(1) Operation of the soft key
(2) Operation to change parameters
(3) Operation to switch panel

■ **Display** The following shows an example of the panel display.



Display 9.11 Program-Setring-Unit Setting Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	TIME	(Group title)			
2	01	Time 1	Second	0	0 to 9999
3	02	Time 2	Second	0	0 to 9999
4	03	Time 3	Second	0	0 to 9999
5	04	Time 4	Second	0	0 to 9999
6	05	Time 5	Second	0	0 to 9999
7	06	Time 6	Second	0	0 to 9999
8	07	Time 7	Second	0	0 to 9999
9	08	Time 8	Second	0	0 to 9999
10	09	Time 9	Second	0	0 to 9999
11	10	Time 10	Second	0	0 to 9999
12					
13	OUTPUT	(Group title)			
14	01	Break point output 1	%	0.0	-25.0 to 125.0
15	02	Break point output 2	%	0.0	-25.0 to 125.0
16	03	Break point output 3	%	0.0	-25.0 to 125.0
17	04	Break point output 4	%	0.0	-25.0 to 125.0
18	05	Break point output 5	%	0.0	-25.0 to 125.0
19	06	Break point output 6	%	0.0	-25.0 to 125.0
20	07	Break point output 7	%	0.0	-25.0 to 125.0
21	08	Break point output 8	%	0.0	-25.0 to 125.0
22	09	Break point output 9	%	0.0	-25.0 to 125.0
23	10	Break point output 10	%	0.0	-25.0 to 125.0
24					
25					
26					
27					
28					
29					
30					

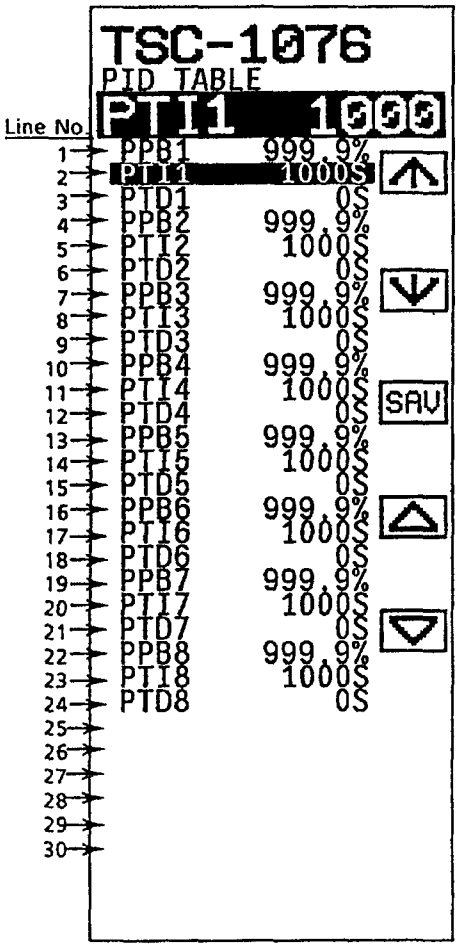
9.3.11 Preset PID Setting Panel

Programmable Controller

■ **Function** The display and setting of the preset PID table are carried out.

■ **Operation**
(1) Operation of the soft key
(2) Operation to change parameters
(3) Operation to switch panel

■ **Display** The following shows an example of the panel display.



Display 9.12 Preset PID Setting Panel

■ Display Parameter List

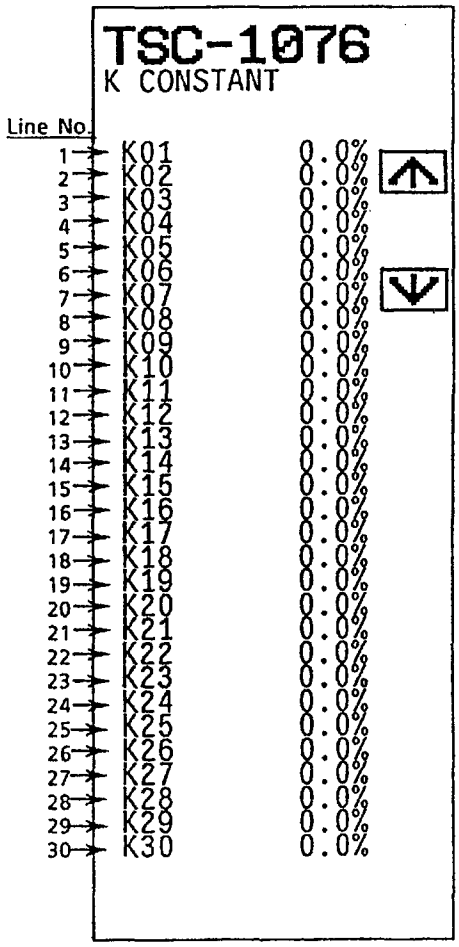
Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	PPB1	Preset proportional band 1	%	999.9	2.0 to 999.9
2	PTI1	Preset integral time 1	Second	1000	1 to 9999
3	PTD1	Preset derivative time 1	Second	0	0 to 9999
4	PPB2	Preset proportional band 2	%	999.9	2.0 to 999.9
5	PTI2	Preset integral time 2	Second	1000	1 to 9999
6	PTD2	Preset derivative time 2	Second	0	0 to 9999
7	PPB3	Preset proportional band 3	%	999.9	2.0 to 999.9
8	PTI3	Preset integral time 3	Second	1000	1 to 9999
9	PTD3	Preset derivative time 3	Second	0	0 to 9999
10	PPB4	Preset proportional band 4	%	999.9	2.0 to 999.9
11	PTI4	Preset integral time 4	Second	1000	1 to 9999
12	PTD4	Preset derivative time 4	Second	0	0 to 9999
13	PPB5	Preset proportional band 5	%	999.9	2.0 to 999.9
14	PTI5	Preset integral time 5	Second	1000	1 to 9999
15	PTD5	Preset derivative time 5	Second	0	0 to 9999
16	PPB6	Preset proportional band 6	%	999.9	2.0 to 999.9
17	PTI6	Preset integral time 6	Second	1000	1 to 9999
18	PTD6	Preset derivative time 6	Second	0	0 to 9999
19	PPB7	Preset proportional band 7	%	999.9	2.0 to 999.9
20	PTI7	Preset integral time 7	Second	1000	1 to 9999
21	PTD7	Preset derivative time 7	Second	0	0 to 9999
22	PPB8	Preset proportional band 8	%	999.9	2.0 to 999.9
23	PTI8	Preset integral time 8	Second	1000	1 to 9999
24	PTD8	Preset derivative time 8	Second	0	0 to 9999
25					
26					
27					
28					
29					
30					

9.3.12 K Constant Display Panel

■ **Function** The contents of the K register are displayed.

■ **Operation** (1) Operation for panel opening

■ **Display** The following shows an example of the panel display.



Display 9.13 K Constant Display Panel

■ Display Parameter List

Line No.	Display	Name	Unit	Default Value	Range of Setting and Display
1	K01	Constant register 1	%	0.0	-800.0 to 800.0
2	K02	Constant register 2	%	0.0	-800.0 to 800.0
3	K03	Constant register 3	%	0.0	-800.0 to 800.0
4	K04	Constant register 4	%	0.0	-800.0 to 800.0
5	K05	Constant register 5	%	0.0	-800.0 to 800.0
6	K06	Constant register 6	%	0.0	-800.0 to 800.0
7	K07	Constant register 7	%	0.0	-800.0 to 800.0
8	K08	Constant register 8	%	0.0	-800.0 to 800.0
9	K09	Constant register 9	%	0.0	-800.0 to 800.0
10	K10	Constant register 10	%	0.0	-800.0 to 800.0
11	K11	Constant register 11	%	0.0	-800.0 to 800.0
12	K12	Constant register 12	%	0.0	-800.0 to 800.0
13	K13	Constant register 13	%	0.0	-800.0 to 800.0
14	K14	Constant register 14	%	0.0	-800.0 to 800.0
15	K15	Constant register 15	%	0.0	-800.0 to 800.0
16	K16	Constant register 16	%	0.0	-800.0 to 800.0
17	K17	Constant register 17	%	0.0	-800.0 to 800.0
18	K18	Constant register 18	%	0.0	-800.0 to 800.0
19	K19	Constant register 19	%	0.0	-800.0 to 800.0
20	K20	Constant register 20	%	0.0	-800.0 to 800.0
21	K21	Constant register 21	%	0.0	-800.0 to 800.0
22	K22	Constant register 22	%	0.0	-800.0 to 800.0
23	K23	Constant register 23	%	0.0	-800.0 to 800.0
24	K24	Constant register 24	%	0.0	-800.0 to 800.0
25	K25	Constant register 25	%	0.0	-800.0 to 800.0
26	K26	Constant register 26	%	0.0	-800.0 to 800.0
27	K27	Constant register 27	%	0.0	-800.0 to 800.0
28	K28	Constant register 28	%	0.0	-800.0 to 800.0
29	K29	Constant register 29	%	0.0	-800.0 to 800.0
30	K30	Constant register 30	%	0.0	-800.0 to 800.0

9.4 Maintenance of User Programs

Carry out maintenance of user programs (for example, downloading or uploading of programs, modification of programs, and test running) by following the instructions described in the separate instruction manual, "YSS10 programming Package" (IM1B7C8-01E), which describes how to connect the YS170 to a personal computer, how to carry out maintenance, and precautions in maintenance work.

IMPORTANT

Be sure to carry out maintenance of the user programs offline after removing the YS170 controllers from the instrumentation panel. Never do maintenance work of the user programs online when the plant is being controlled.

■ Signal status during maintenance of user programs

When you execute the uploading or downloading of user programs, the YS170 becomes the "Function Stop" mode, indicating "STOP" at the right top of the display. The statuses of the I / O signals, internal registers, and operation mode at this time are described in the following table.

Signal / data	Status During Maintenance	Remarks
Operation mode	MAN	
SV1 and SV2 (setpoints)	The status immediately before being stopped	
MV1 and MV2 (manipulated output)	The status immediately before being stopped	
Analog outputs 1 to 3	The status immediately before being stopped	
Analog output registers Y1 to Y3	The status immediately before being stopped	
Contact outputs 1 to 6	The status immediately before being stopped	
Contact output registers DO1 to DO6	0	
PF status display	OFF	
PF status register LP01	0	
Temporary memory registers T01 to T30	0	
Output resistors Y4 to Y6	0	
Contact output registers DO7 to DO16	0	
Computation for each device number	Initialized	First order time lag and dead time, etc.

10. TUNING GUIDE

This chapter explains how to start and tune the control function for users who are not familiar with the controller.

10.1 Starting Operation Manually

This section explains how to start operation, with PID control as an example.

(1) Manual Operation with the MV Operation Key

① Press the M key to change the control operation mode to the M mode (see Figure 10.1). The LED in the M key lights up.

② Adjust the SV value to the desired value, by pressing the △ key or the ▽ key of the SV setting key (see Figure 10.2).

③ Adjust the output signal, by pressing the ◁ key or the ▷ key of the MV operation key (see Figure 10.2).
Check that smooth response has been obtained by manual operation, then balance PV value near the SV value.

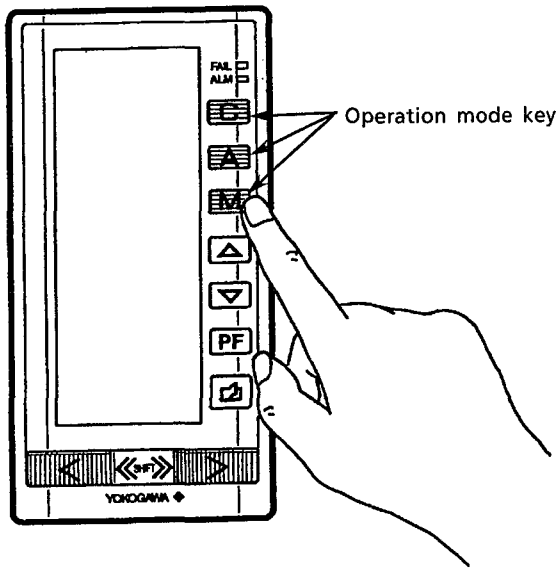


Figure 10.1 Changing the Control Operation Mode

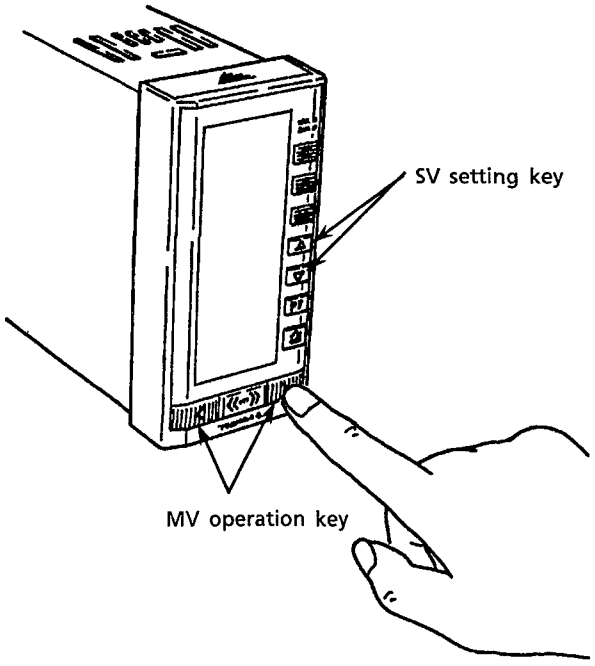


Figure 10.2 Manual Operation for Output

(2) Switching from the Manual Operation to the Automatic Operation

After performing step ③ of (1), press the A key to change the control operation mode to the A mode (see Figure 10.1). The LED in the A key lights up, the controller goes into the automatic operation mode. Mode switching is bumpless and balanceless.

(3) Alarm Check (See Figure 10.3)

When the ALM lamp on the front panel is lit, an abnormal condition has occurred. Check the alarm item and the cause by referring to the alarm panel, and take appropriate countermeasure (see Section 6.1 "If the ALM Lamp Lights").

If the FAIL lamp is lit, a serious problem has occurred in the controller (see Section 6.2 "If the FAIL Lamp Lights").

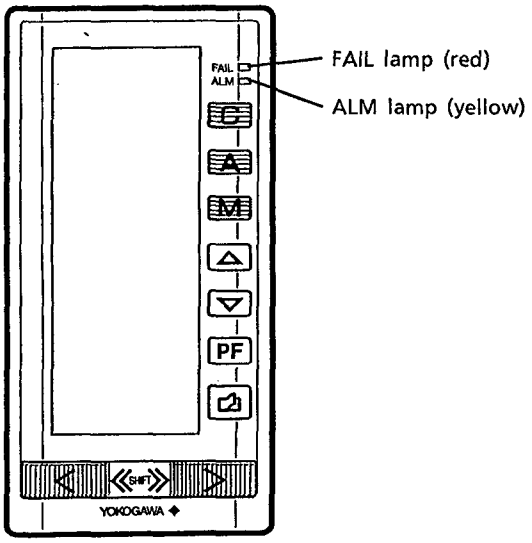


Figure 10.3 ALM Lamp and FAIL Lamp

10.2 Tuning Guide and Automatic Adjustment of PID Parameters

To use the controller with an unknown process, the conditions of manual control operation shall be checked thoroughly. This helps you determine proportional band, integral time, and derivative time for automatic control.

For example, the proportional band shall be set wide enough for safety when the process variable changes drastically by slightly changing the output of the controller. It shall be set narrow enough in the opposite case.

The integral time and the derivative time shall be set short for the process which needs a short follow-up time when the output of the controller is changed. These shall be set long for the process which has a relatively long recovery time.

(1) (Proportional+Integral) Controller

① Set the control operation mode to the M mode, and operate the controller manually so that the process variable matches the set-point. Set the integral time to 9999 seconds, set the proportional band to a large value, and set the derivative time to 0 second.

② Set the control operation mode to the A mode.

③ Perform the procedure below to obtain an optimum value for the proportional band.

- Decrease the value of the proportional band from a large value to a small value (e.g. 100% to 50% to 20%). In this case, allow enough time to pass so that the conditions of control operation at each step can be observed. Continue the operation until cycling of the control loop starts.
  (Cycling occurs when the proportional band is set smaller than the band allowed by the maximum value of the process. Start of cycling can be seen by checking the pointer of the process variable which begins to move up and down cyclically around the set-point.) The optimum proportional band is about 2.2 times of the proportional band when cycling starts.
- Next, measure the cycle time of the cycling. The integral time can be obtained by multiplying the cycle period by about 0.83. Normally, decreasing the integral time steeply changes merely the time required to balance the condition to the set-point, and it does not change the operating condition much. However, if the integral time is decreased to a certain critical value which depends on the delay characteristics of the process, cycling occurs. In this case, increase the integral time little by little until cycling stops.

(2) (Proportional+Integral+Derivative) Controller

① Set the control operation mode to the M mode, and operate the controller manually so that the process variable matches with the setting value. Set the integral time to 9999 seconds, set the proportional band to a large value, and set the derivative time to 0 second.

② Set the control operation mode to the A mode.

③ Change the proportion band in the same way as for item (1) above "(Proportional+Integral) Controller", and search for the point where cycling just starts. Measure the values of the proportional band (PBu) and of the cycling period (Pu) at that point.

④ An optimum setting value for each is to be determined as follows:

Proportional band = 1.7 PBu
Integral time = 0.5 Pu
Derivative time = 0.125 Pu

The method introduced here is called "Geglar / Nichols's Limiting Sensitivity Method" and it is used to obtain a response characteristic of 25% damping.

There are several adjustment methods including step response method. Refer to the appropriate subject series of automatic control.

10.3 Use of STC (Self-Tuning Control) Function

The STC is a function to be used to control the PID parameter to an optimum value automatically, according to the process characteristics.

For the details of the STC functions, refer to the separately supplied TI 1B7C0-01E "YS100 Series Controller Intelligent Self-Tuning Function".

10.3.1 Combination of Control Functions and STC Function

Some combinations are not recommended when using the STC function with the control function of the controller (see Table 10.1).

Table 10.1 Combination of the Control Function and the STC

Control Function		Combination
PID control with output limiter		○
PID control with reset bias function		○
PID control with non-linear gain		○
PID control with feedforward compensation		×
PD control with manual reset		—
Change of operation mode with contact input	CAS ↔ AUTO change	○
	C / A ↔ M change	○*
	Output tracking change	○*
	Preset MV	○*
Operation mode	CAS, AUTO, SPC	○
	MAN, DDC	—

Explanation of combination : ○ : Combination allowed
× : Not recommended
— : No combination possible
* : STC is not used in MAN status, DDC status, output tracking status, preset MV output status.

10.3.2 STC Mode and Parameter Setting

The parameters of the STC function are set using the STC setting panel of the tuning panel.

(1) STC (STC mode designation)

The operation mode of the STC is to be designated.

(2) **PB, TI and TD (PID parameters)**

PB (proportional band), TI (integral time), and TD (derivative time) are the PID parameters used for control operation.

When operating in the mode with STC set to ON, the setting of this section is used as the initial value, and will be up-dated automatically after the operation has been started.

(3) **IP (Process types)**

Selection of a static control system or a dynamic control system (integral system) for the process is to be determined. In a basic system, when a step input is applied to the manipulated output (MV), the process variable goes up or down infinitely.

(4) **TR (Process 95% response time)**

The rise-up time of 95% of the step response (when open loop) of the process is to be designated. The controller calculates and obtains the cycling time for the process and observation time of the process variable waveform, using that time value.

Using the TR, the controller sets the appropriate value in the procedure below (see Figure 10.4).

① **Assumption Using the Step Response Waveform of the Process:**

The time required for the process variable ΔPV to reach 95% of the set-point. When the step response can be approximated by the dead time L and the first order lag time constant T, use the formula: TR=L+3T.

② **For the Process in the Dynamic Control System (Integral system):**

The time required for the process variable ΔPV to reach 95% of the set-point when a pulse input is applied to the manipulated output.

③ **Assumption Using the Previous Conditions of Operation:**

Set TR=Tp by reading the most appropriate cycling period Tp of the damping waveform.

④ **When Change of Response Time is Expected:**

Match the response waveform to be controlled. When the process variable has a different response time between rise and fall times, such as the case of a furnace, select the higher value.

⑤ **Caution:**

The sampling period Ts for process assumption is 1 / 20 of the TR. Therefore, the response waveform which are 2Ts or smaller cannot be read correctly. Generally, setting of the TR value bigger than the correct value makes the error of the process characteristics smaller, compared to when it is smaller than the correct value.

When the TR is changed, the data file of 4TR is initialized, and the STC does not function.

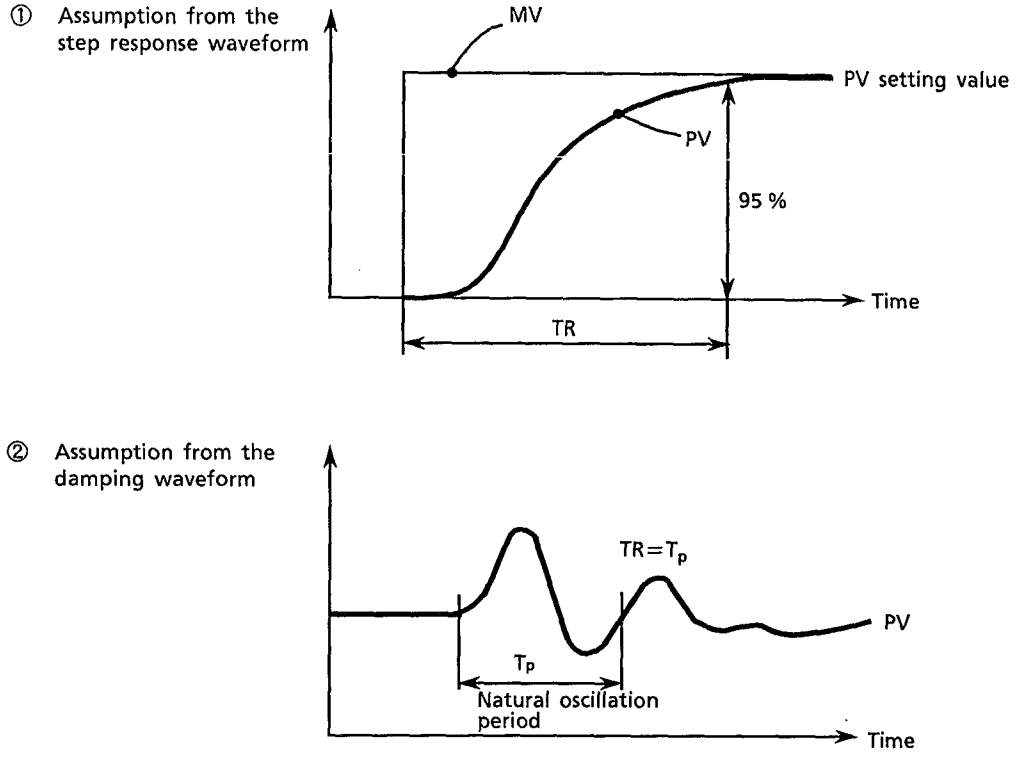


Figure 10.4 Method of Assumption of the TR

(5) NB (Noise band)

Set approximately the peak to peak value of the waveform of random noise applied to the process variable. The NB is used to prevent the process characteristics estimation from being disturbed by noise.

(6) OS (Control target types)

Set the response waveform that is the target of the self-tuning function.

Table 10.2 OS Setting

Setting	Contents
ZERO	Overshoot: zero
MIN	Overshoot: about 5%
MED	Overshoot: about 10%
MAX	Overshoot: about 15%

(7) MI (Signal defection applied to MV)

When operating with STC set to ATSTUP (see Section 10.3.3 "Automatic Starting Up"), or when operating in the on-demand mode (see Section 10.3.4 "On-Demand Tuning"), the amount of the test signal to be increased and applied to the control amount MV is to be designated. Set the value which will shift the process variable by about 5%.

When operating with the STC set to ATSTUP, the controller is set to MANUAL, the direction of the current deviation is extended. When operating in the on-demand mode, the controller is set to AUTO, and the amount is used to decrease the control deviation.

(8) PMX, PMN, IMX, IMN, DMX (PID limiting values)

This is used to limit the adjustment range of the PID parameters
When set (High-limit value Low-limit value), the parameter is fixed to the limit value.

(9) PA, IA, DA (New PID calculated values)

When operating with STC set to DISP (only new PID values are displayed), the parameters calculated by the STC function are displayed. They are not used for control operation.
When operating with STC set to OFF, the values which are the same for the PB, the TI, and the TD are displayed.

(10) CR (Estimation accuracy error)

This is the estimation accuracy error when the process characteristics are estimated. The controller calculates setting of the PID parameter when the CR is less than 5%.

(11) RT (Signal distribution ratio)

This is the ratio of the variance of the process variable PV and the model output which has been set. The controller calculates that ratio using the assumed model (the final model of STC=ON mode for STC=DISP mode), in order to detect the change of the process characteristics. When the process is the same as the model, the RT is nearly 1. When in the case of (RT>2 or RT<0.5), an alarm occurs.

(12) LM, TM, and GM (Estimated equivalent model)

The controller estimates the process model using the dead time and first order lag (in the integral system, it is the response to the pulse input).
The value when operating in the STC=DISP mode or ON mode and when the estimated accuracy error CR is 5% or less are maintained to be used for the LM (equivalent dead time), the TM (equivalent first order lag time constant), and the GM (equivalent process gain). The PID parameters calculated using the displayed value correspond to the PB, the TI, and the TD. The CR is updated with the process characteristic estimation. However, the LM, the TM, and the GM are not updated when the CR is 5% or more.

10.3.3 Automatic Starting Up

This automatic start up function is used to calculate automatically the initial values of the STC parameters (PB, TI, TD, IP, TR, NB, PMX, IMX, and DMX), using the step response method.

This function is used by setting, STC=ATSTUP mode.

(1) Application Conditions

- Multi-Function Controller When designating the single-loop mode or cascade mode (it is not effective for selector mode)
- Programmable Controller When designating the basic control BSC function or the cascade control CSC function (it is not effective for selector control SSC)

(2) Setting Parameters

Set the STC and the OS, and the MI, and the TD if necessary.

When set TD=0, the corresponding control element is set to PI control.

If PID control is selected, PI control may also be selected as a result of the automatic start.

(3) Operating Procedures

① First, check that the STC alarm (see Section 10.3.6 "Alarm Display of Self-Tuning") is not activated.

② Set the control operation mode to M mode, and set the mode as STC=ATSTUP mode.

③ Stabilize the process variable at an appropriate value with manual operation.

④ Change the control operation mode to the A mode or to the C mode (automatic startup begins).

"ATSTUP" appears on the control status display position of the loop panel (see Section 10.3.5 "Operation Display of Self-Tuning"). With the automatic start up, PID control has not been started yet. After 30 seconds, the controller applies the step variation (MI%) automatically in the safe direction (deviation is not reversed but is made larger) to the manipulated output.

⑤ When the process variable has been stabilized, the controller automatically sets the manipulated output back to the previous setting.

⑥ When all setting items are prepared, the mode is automatically set to STC=ON, and PID control is started. At the same time, the control status display of the loop panel changes to "STC-ON" (see Section 10.3.5 "Operation Display of Self-Tuning").

(4) Check List Items for Performing Automatic Start Up

① The process shall have no problem when the output variation of 5% is applied.

② When the process gain is too high, and the range of variation of the process variable exceeds 1.5MI%, the manipulated output is set automatically back to the previous value.

③ When the process gain is too low, and the range of variation of the process variable is less than 2%, the controller assumes that the automatic start up is impossible, and the mode is set back to the M mode after a maximum observation time (approximately 80 minutes) has passed. Then, the STC alarm occurs.

④ The PID limit values (PMX, IMX, and DMX) are set to four times the initial values of the PB, the TI, and the TD which have been obtained when automatic start up is initialized. 1/4 of the initial values is also initialized automatically (PMN, IMN).

⑤ If power failure occurs during automatic startup, the mode is set to STC=DISP mode after power is recovered. The control operation mode is shifted tp the M mode.

⑥ When the STC alarm occurs during automatic startup (see Section 10.3.6 "Alarm Display of Self-Tuning"), the startup operation stops, and the mode changes to STC=DISP mode. The control operation mode is shifted to the M mode.

⑦ When changing the loop status to MAN during automatic start up ("ATSTUP" is displayed at the control status display position of the loop panel, the startup operation stops, and the mode changes to STC=DISP mode.

10.3.4 On-Demand Tuning

In the on-demand mode, when the operator requests, self-tuning is carried out using the response of the measured PV by applying the step test signal in the closed loop to the operation amount MV. This is effective when it is impossible to change the set-point.

(1) Application Conditions

This mode can be used only when all of the following conditions are met.

- Multi-Function Controller When designating the single-loop mode or cascade mode (it is not effective for selector mode)
- Programmable Controller When designating the basic control BSC function or the cascade control CSC function (it is not effective for selector control SSC)
- When setting the control operation mode to the A mode or the C mode (it is not effective for the DDC mode)
- When setting in the STC=DISP or ON mode

(2) Setting Parameters and Operation

① Set the STC=DISP or ON mode.

② MI: Designate the amplitude of the test signal to be applied. It shall move the PV up and down by about 5%.
The MI is added to the MV so that control deviation is decreased according to the current control deviation and the operation direction designation switch DIR / REV, and then output.
In the dynamic control system, a pulse signal whose time period is TR / 5 is added.

(3) Operating Procedures

① Check the value of the MI. Check also that the control operation mode is set to the A or C mode.

② Check that STC=DISP or ON mode.

③ Using the STC setting panel, set OD (on-demand tuning start-up) to ON.
On-demand tuning starts.

10.3.5 Operation Display of Self-Tuning

The operating status of the self-tuning is displayed with abbreviated words in the control sub-status display 3 of the loop panel (see Figure 10.5).

Table 10.3 Control Sub-status Display 3 of the Loop Panel

Display	Contents
Not displayed	STC is not operating.
STC-ON	STC is operating.
STC-DSP	PID setting target value is displayed with STC
ATSTUP	During STC automatic start-up

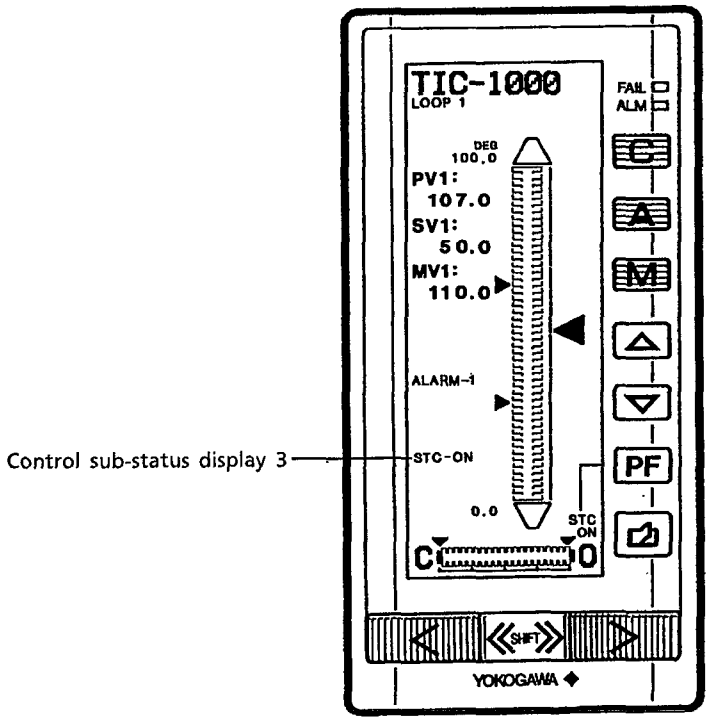


Figure 10.5 Operation Display of the Self-Tuning

10.3.6 Alarm Display of Self-Tuning

The STC alarm occurs when the self-tuning function cannot operate correctly, and it is displayed on the alarm panel. Take appropriate countermeasures by referring the alarm items and causes.

For the details of alarm, see Section 6.1 "If the ALM Lamp Lights."

10.4 Use of the Adjustable Set-Point Filter

The adjustable set-point (hereafter, abbreviated to SVF) function improves set-point follow-up characteristics, while keeping the optimum tuning condition for the variation of the process variable caused by disturbance. Two SVF parameters are to be adjusted so that the effect to the follow-up characteristics of the filters in a range from PI-D type to I-PD type can be changed.

10.4.1 Effect of the Parameters

Figure 10.6 shows the parameter SFA (α), and Figure 10.7 shows the parameter SFB (β), each of which shows the examples of the set-point follow-up waveform when the parameter is changed from 0 to 1.

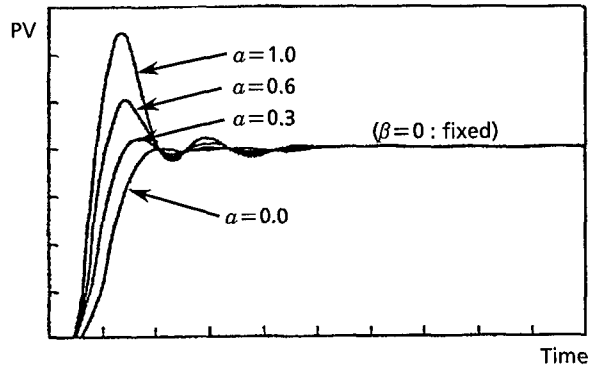


Figure 10.6 Effect of the Parameter SFA

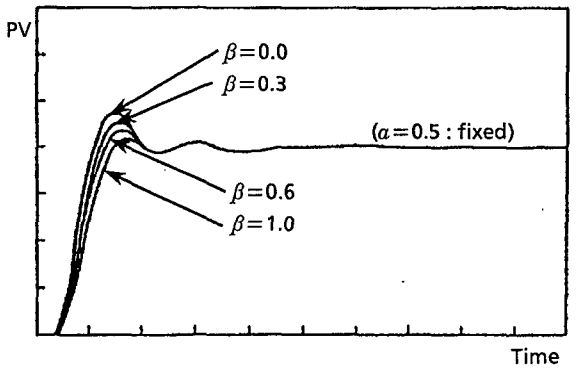


Figure 10.7 Effect of the Parameter SFB

The SFA works effectively on the adjustment of the follow-up waveform. A bigger SFA value realizes a sharp follow-up waveform.

The SFB is the parameter for fine adjustment, and it has a small effect on the waveform. Overshoot of the follow-up waveform characteristics can be decreased by increasing the SFB value.

10.4.2 Tuning Methods of SFA and SFB

(1) Without Self-Tuning Function

① Apply a variation to the manipulated output. Then, obtain the optimum PID value from the response to the variation.

② Change the set-point in steps. Then, adjust the SFA so that the desired follow-up characteristic is obtained.

③ When equipped with derivative operation function, fine adjustment is possible with the SFB.
The recommended values of the SFA and SFB are 0.5 and 0.0 respectively (SFA=0.5 and SFB=0.0).

(2) With Self-Tuning Function

① Set the values of the SFA and SFB to 0.5 and 0.0 respectively (SFA=0.5 and SFB=0.0).
Then, operate using the self-tuning function. Calculate the optimum value of the PID for suppressing disturbance, and the optimum value of the SFA for the set-point follow-up.

11. MAINTENANCE

This chapter explains adjustment and parts replacement of the controller, which are relatively simple.

CAUTION

If there is dirt or dust on the controller, wipe it with a dry soft cloth. Note that if you use any organic solvent, chemicals or chemical cloth, the case of the controller may be changed in its shape or color.

11.1 Standard Check

11.1.1 Contrast Adjustment of the LCD Panel

The contrast of the liquid-crystal display panel (LCD) can be adjusted with the [ ] key. By holding down the [ ] key for 10 seconds or more, the contrast of the front panel varies cyclically between high and low contrast settings. Release the [ ] key at the desired setting.

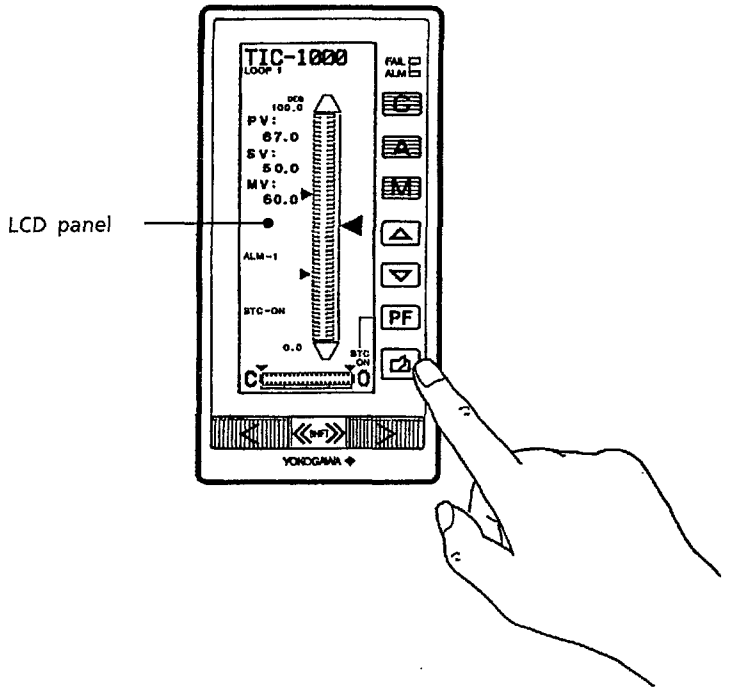


Figure 11.1 Contrast Adjustment of the LCD Panel

11.2 Check of Indication Accuracy

We recommend to check the indication accuracy once or twice a year.

11.2.1 Calibration Test Kit

DC standard voltage generator	: Yokogawa TYPE7651 or similar,	1 unit
Digital multimeter	: Yokogawa TYPE7560 Series or similar,	1 unit

11.2.2 Confirmation of Input Indication Accuracy

Only checking is possible to the input indication accuracy. Check the 4 analog inputs Multi-Function Controller , and the 5 analog inputs Programmable Controller, by following the procedure below.

① Apply 1.0V DC from the standard voltage generator to the analog input terminal.
② Check that, using the I / O data panel of the tuning panel, the subject analog input signal is set to an engineering unit equivalent to 0%±0.2%.
③ In the same manner, apply 5.0V DC, and check an engineering unit equivalent to for 100%±0.2%.

11.2.3 Confirmation of Output Indication Accuracy

Only checking is possible to the output indication accuracy. Check the 3 analog outputs, by following the procedure below.

① Connect the digital multimeter to the analog output terminal in the current mode when the terminal is set to current output, and in the voltage mode when the terminal is set to voltage output.
② Set the control operation mode to the M mode.
③ Set the subject analog output signal to 0%, using the I/O data panel of the tuning panel.
④ Check the output for 4mA DC when it is set to the current output. Check the output for 1.0V DC when it is set to voltage output (allowance is ±1.0% during the current output, and ±0.3% during the voltage output).
⑤ In the same manner, set the analog output signal to 100%. Then, check the output for 20mA DC when it is set to current output, and check the output for 5.0V DC when it is set to voltage output (allowance is ±1.0% during the current output, and ±0.3% during the voltage output).

11.3 Parts Replacement

IMPORTANT

To carry out the replacement, contact YOKOGAWA sales staff or Repair Center because the inspection is required for safety.

NOTE

■ Notes on Short-Life Parts

(1) The short-life parts means the parts whose life is expected to end within 10 years under normal condition of use or storage. Therefore, the parts whose life in design is estimated to be more than 10 years are excluded from the specification table.

(2) The recommended replacement cycle is set for the purpose of preventive maintenane of the short-life parts, and it dose not guarantee the prevention of their accidental failures.

(3) The recommended replacement interval is a standard cycle, and it may be longer or shorter depending on the actual condition of use.

(4) The recommended replacement interval may be changed on the basis of the field failure rate.

TIP

Comments on fuse:

The fuses employed in YS100 Series are free from periodically replacement because it is not a short-life part. To carry out fuse replacement, sufficient handling skill of the instrument and also soldering skill are required. In case that the fuse has burned out, please contact YOKOGAWA sales staff or Repair Center.

	Part No.	Rated Current	Rated Voltage	Fuse Characteristics	Remarks
Fuse	A1422EF	1.6A	250V	Quick acting (F)	For both 100V and 220V version

See Figure 11.5 for location of the fuse.

11.3.1 Notes on Static Electric Discharge

This controller uses many semiconductor integrated circuits. Therefore, when removing the internal unit for maintenance or when replacing an internal card of the internal unit, care must be taken for the board not to be damaged by static electric discharge.

IMPORTANT

① Put on a conducting wrist-strap which is grounded via a 1MΩ register when you remove or install the internal unit. Be sure to ground the wrist-strap to a grounding terminal close to the ground bus or to a part of the panel where not painted (this part shall be grounded).

② When you carry the internal unit with you or store the internal unit, put it in an appropriate conductive bag or a discharge protective bag.

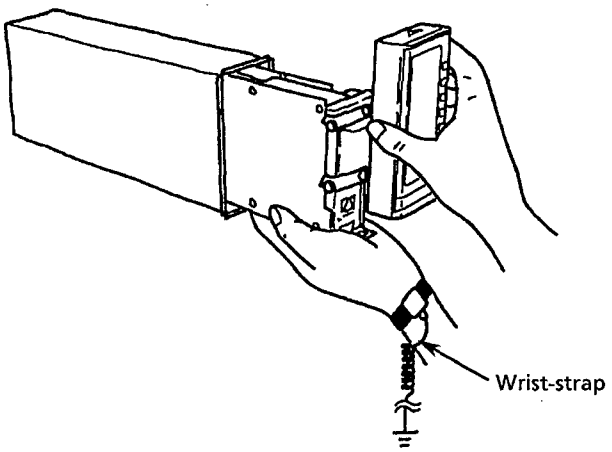


Figure 11.2 Removal and Insertion of the Internal Unit

③ To remove or install the internal card of the internal unit and / or the LCD display unit, work must be done on a conductive sheet (on a workbench) which is grounded via a 1MΩ resister. The operator shall put on the conductive wrist-strap in the same manner as shown under item ① above. Take any plastic materials which can be charged easily away from the workbench.

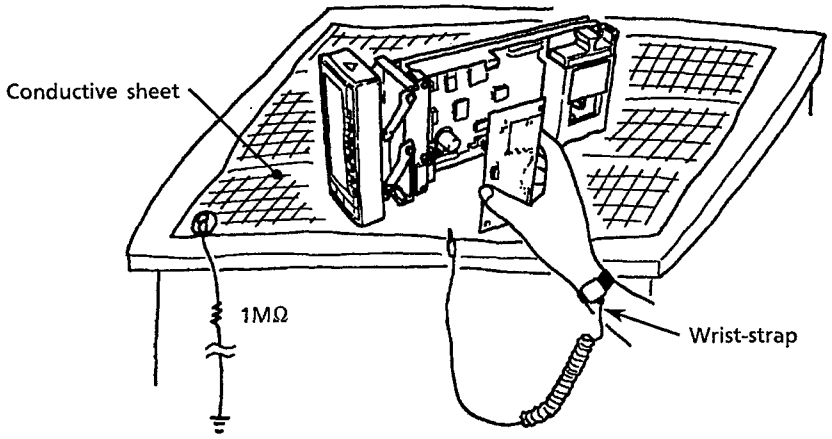


Figure 11.3 Replacement of the Internal Card

④ Do not touch components, metal patterns, connectors, pins, etc. of the internal card, by hands without wearing the wrist-strap.

If the wrist-strap and / or the conductive sheet is requied, contact Yokogawa sales staff.

11.3.2 Replacing the Fluorescent Tube (Back-Lit Tube)

Average of life time for the FL tube is above 2 years.

Part No. of Fluorescent tube is following.

Part No. : E9760GM

Former YS150 or Y170 models which 'Style' on the upper side of the instrument indicates S1, S2, or S3 may be using different type of fluorescent tube. In that case the colors of its two wires are red and black respectively. Its part number is E9760GL and use the same one.

In case of the part E9760GM the colors of its two wires are blue and black.

CAUTION

Replace the fluorescent tube in accordance with the following procedure.

(1) How to Detach

① Swing up the front panel.

② Detach the case cover at the top of the front panel.

③ Disconnect the connector of the fluorescent tube, and pull up the fluorescent tube (see Figure 11.4).

(2) How to Attach

① Attach a new fluorescent tube by performing the reverse of the steps for (1) "How to Detach" above.

One side of the connector has numbers on, plug in the connector with this side to the front.

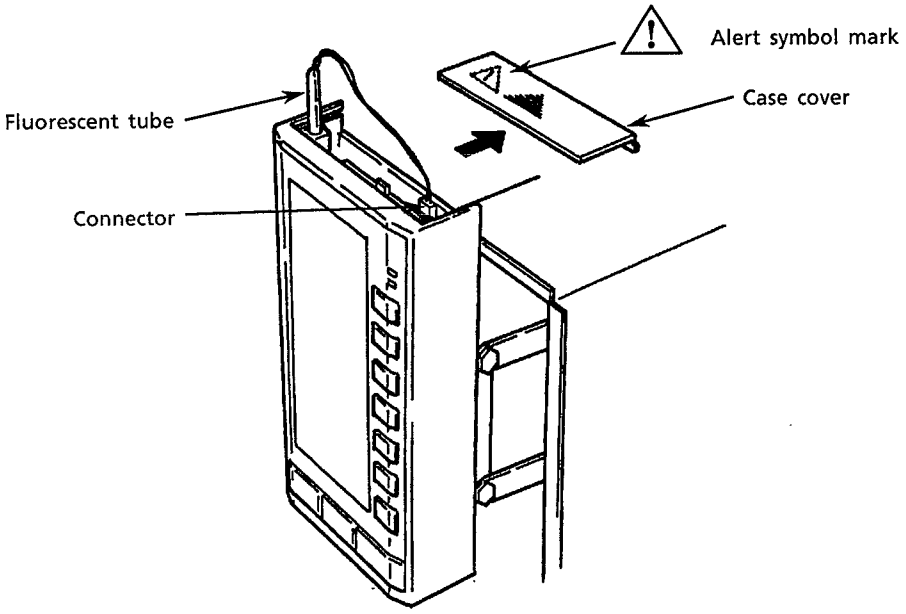


Figure 11.4 Replacing the Fluorescent Tube

11.3.3 Components and Functions of the Parts Inside the Controller

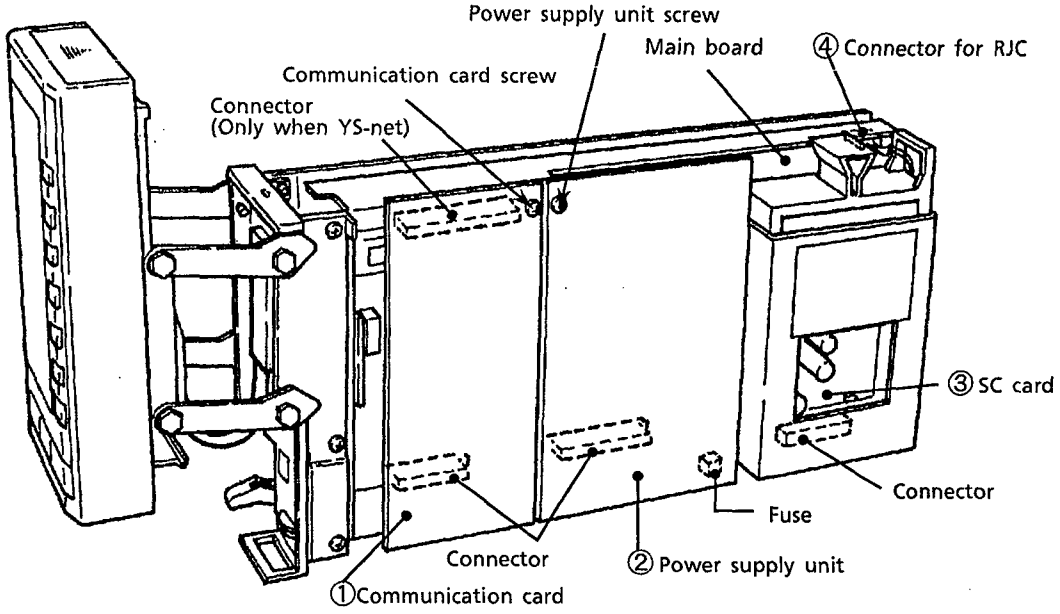


Figure 11.5 Components and Functions of the Parts Inside the Controller

① **Communication Card**

One of the three communication cards (optional) ; RS-485 communication card, DCS-LCS communication card and the YS-net Communication card, is mounted here.

② **Power Supply Unit**

The power supply unit is mounted here.

③ **SC (Signal Conditioner) Card**

One of the eight types of the SC cards (optional) ; mV input, thermocouple input, resistance temperature detector input (RTD), slide wire resistance input, isolation input, 2-wire transmitter input, 2-wire transmitter input (input is not isolated), and frequency input is mounted here.

④ **Connectors for the Reference Junction Compensator (RJC)**

These connectors are used when the thermocouple input SC card is installed.

11.3.4 Replacing the SC Card

(1) How to Detach

① Swing up the front panel, and then remove the internal unit.

② Hold the pull-up knob at the top center of the SC card, and pull up (in case of the thermocouple input SC card, with taking care of the cable for the RJC) (see Figure 11.6).

③ For the thermocouple input SC card, disconnect the connector for the RJC (see Figure 11.7).

(2) How to Attach

① Along the guides on the left and right, mount a new SC card by performing the reverse of the steps for (1) "How to Detach" above.

② When installing the thermocouple input SC card, bind and push in the cable for RJC.

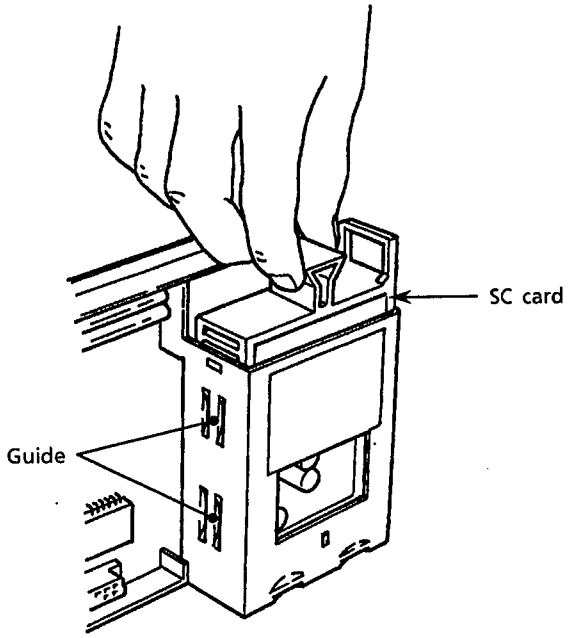


Figure 11.6 Replacing the SC Card

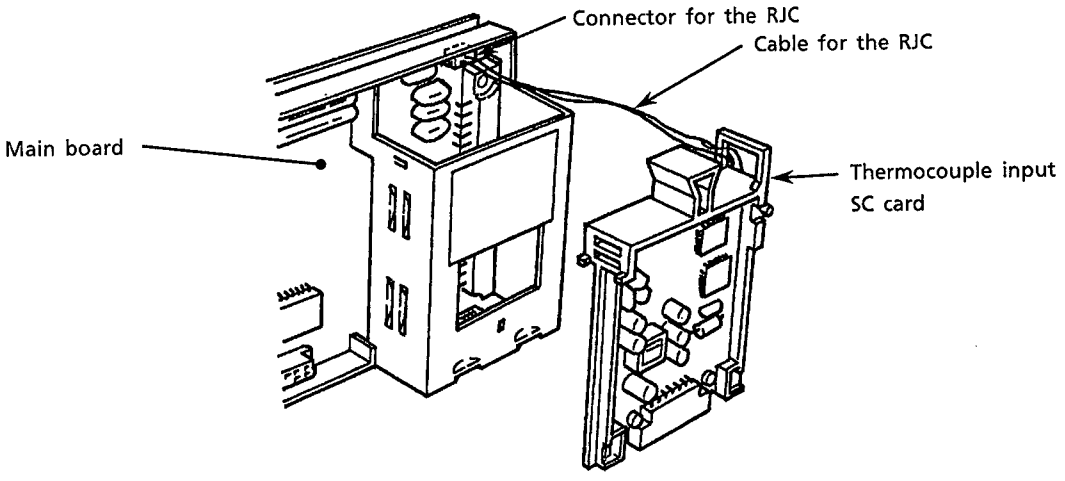


Figure 11.7 Detaching the Connector for the RJC

11.3.5 Replacing the Communication Card

(1) How to Detach

① Swing up the front panel, and remove the internal unit.
② Loosen the fixing screw with a screwdriver.
③ While pushing the communication card slightly to the left, pull the right side of the communication card to the front so that it comes to the front of the fixing screw.
④ Hold the left and right parts of the connector part, and pull out the card to the front (see the figure below).
⑤ When the card is for YS-net communication, it is still connected to the main board through a flat cable (omitted in the figure below). So disconnect the connector at the main board side.

(2) How to Attach

① Mount a new communication card by performing the reverse of the steps for (1) "How to Detach" above.

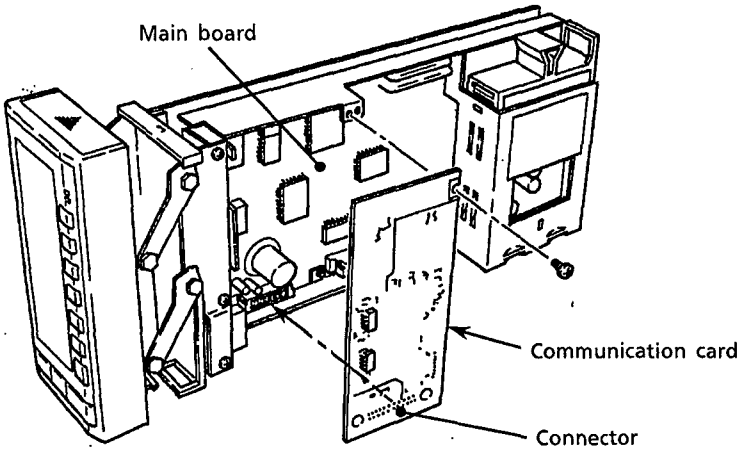


Figure 11.8 Replacing the Communication Card

11.3.6 Replacing the Power Supply Unit

(1) How to Detach

① Swing up the front panel, and then remove the internal unit.
② Remove the screw with a screwdriver.
③ Hold the left and right parts of the connector part, and pull out the card to the front (see the figure below).

(2) How to Attach

① Mount a new power supply unit by performing the reverse of the steps for ① "How to Detach" above.

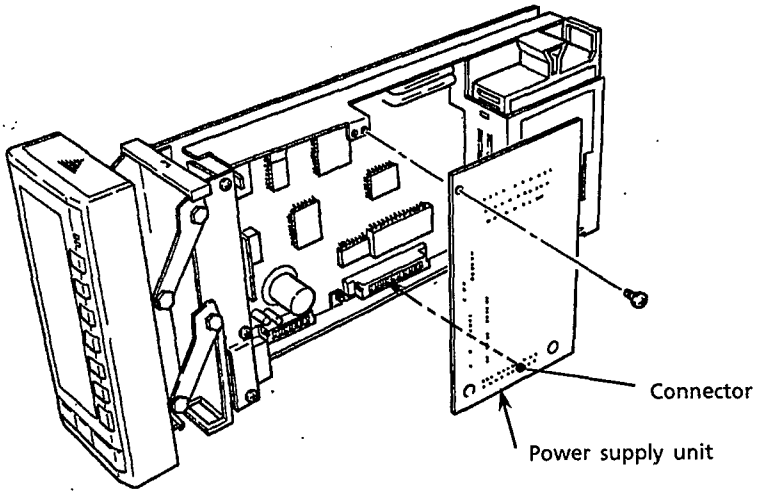


Figure 11.9 Replacing the Power Supply Unit

11.3.7 Replacing the LCD Display Unit

It is recommended that replace the LCD display unit is about every seven years of use. To replace the LCD display unit, the display assembly (which contains the LCD display unit) shall be replaced.

IMPORTANT

This replacement should be performed by an enginneer who is thoroughly skilled in this work.

Part No : E9760CF (Display assembly)

(1) How to Remove

① Swing up the front panel, and remove the internal unit.

② Remove the four bolts (four at left and right) which are used to fix the display assembly, with a box driver (8mm).

③ Disconnect the connector of the printed film connector which is used to connect electrically the display assembly to the internal unit.

(2) How to Install

① Install a new display assembly by performing the reverse of the steps for (1) "How to Remove" above.

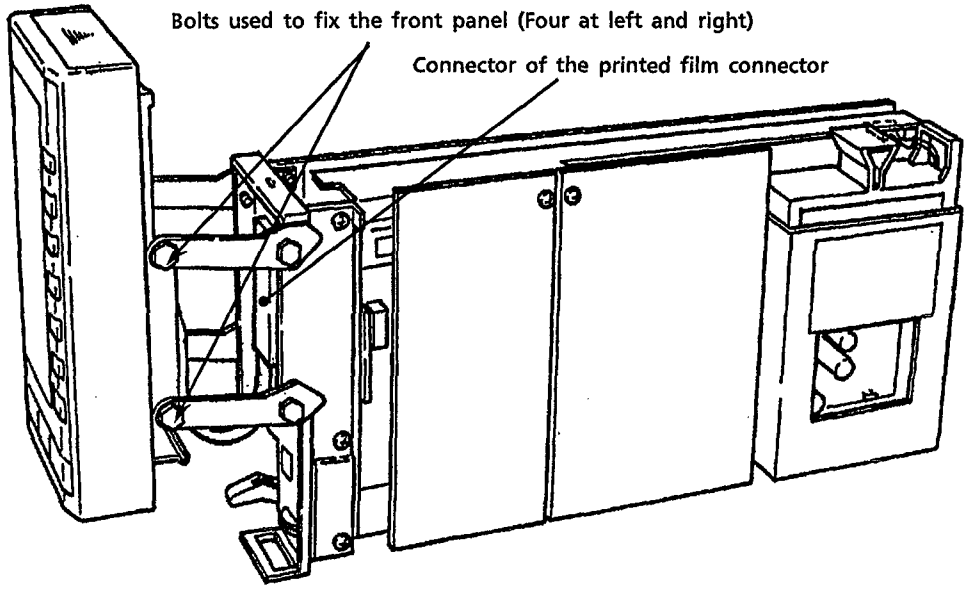


Figure 11.10 Replacement of the LCD Display Unit

11.3.8 Checking for Power-On

When you have replaced the SC card, the communication card, and / or the power supply unit, and / or the LCD display unit, or changed setting of the jumper switch on the board, be sure to perform the confirmation of the input indication accuracy (see Section 11.2.2 "Comfirmation of Input Indication Accuracy"),and the check of the output indication accuracy (see Section 11.2.3 "Confirmation of Output Indication Accuracy"), and the contrast adjustment of the LCD panel (see Section 11.1.1 "Contrast Adjustment of the LCD panel")

11.4 Packing Product to Be Sent for Repair

If you have trouble with the controller, please send it to our service office for repair in accordance with the following.

IMPORTANT

① Put the controller (in its housing) into an antistatic bag and put it into the packing box with the inner package.

② When sending only internal unit (without housing), put into antistatic bag and protect it with cushioning material such as air-bubble wrap. And put it into the packing box with the inner package.
Be sure to use an antistatic bag to protect semiconductor integrated circuits from damages caused by static electricity.

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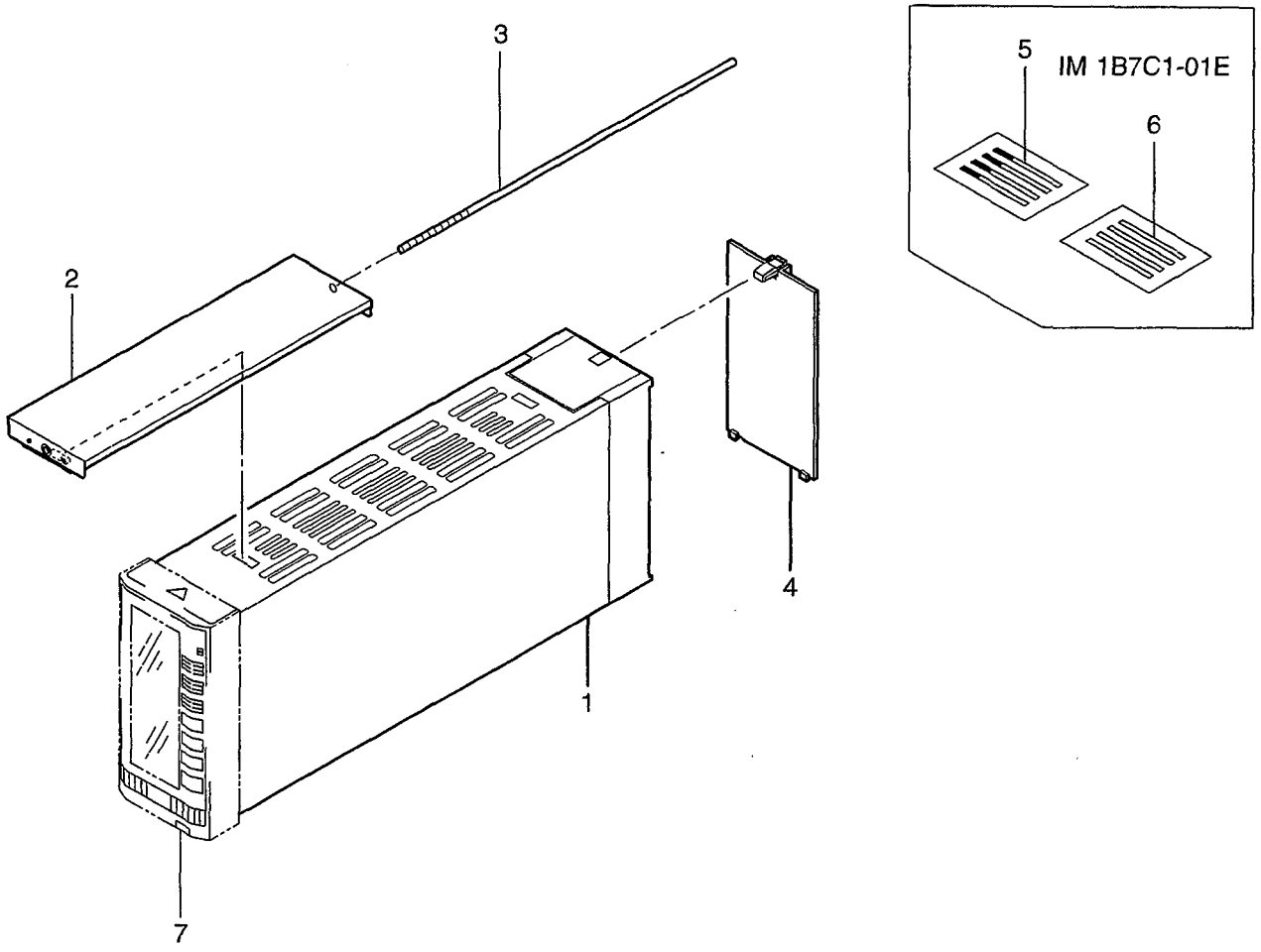
Customer Maintenance Parts List

Model YS150 (Style 4) YS100 SERIES
Single-Loop Multi-Function Controller
Model YS170 (Style 4)
Single-Loop Programmable Controller



Item	Part No.	Qty	Description
1	E9760NH	1	Case Assembly
2	E9760RJ	2	Clamp
3	E9760RN	2	Screw
4	E9760QD	1	Terminal Board Cover
5	E9760XA	4	Label (Tag No.)
6	E9760XL	4	Label
7	—	1	Main Frame Assembly (see pages 2 and 3)

CAUTION

The Customer Maintenance Parts List (CMPL) is provided as reference for when ordering maintenance parts. Do not disassemble or assemble products using the CMPL. YOKOGAWA assumes no liability to any party for damages caused through disassembly or assembly.

注　意

Customer Maintenance Parts List (CMPL)は，メインテナンスパーツをオーダする時の参考資料として提供するものです。このCMPLにより当該製品の分解・組立てを行わないでください。分解・組立を行った結果お客様が被ったいかなる損害に対しても，当社は責任を負いかねますのでご了承ください。

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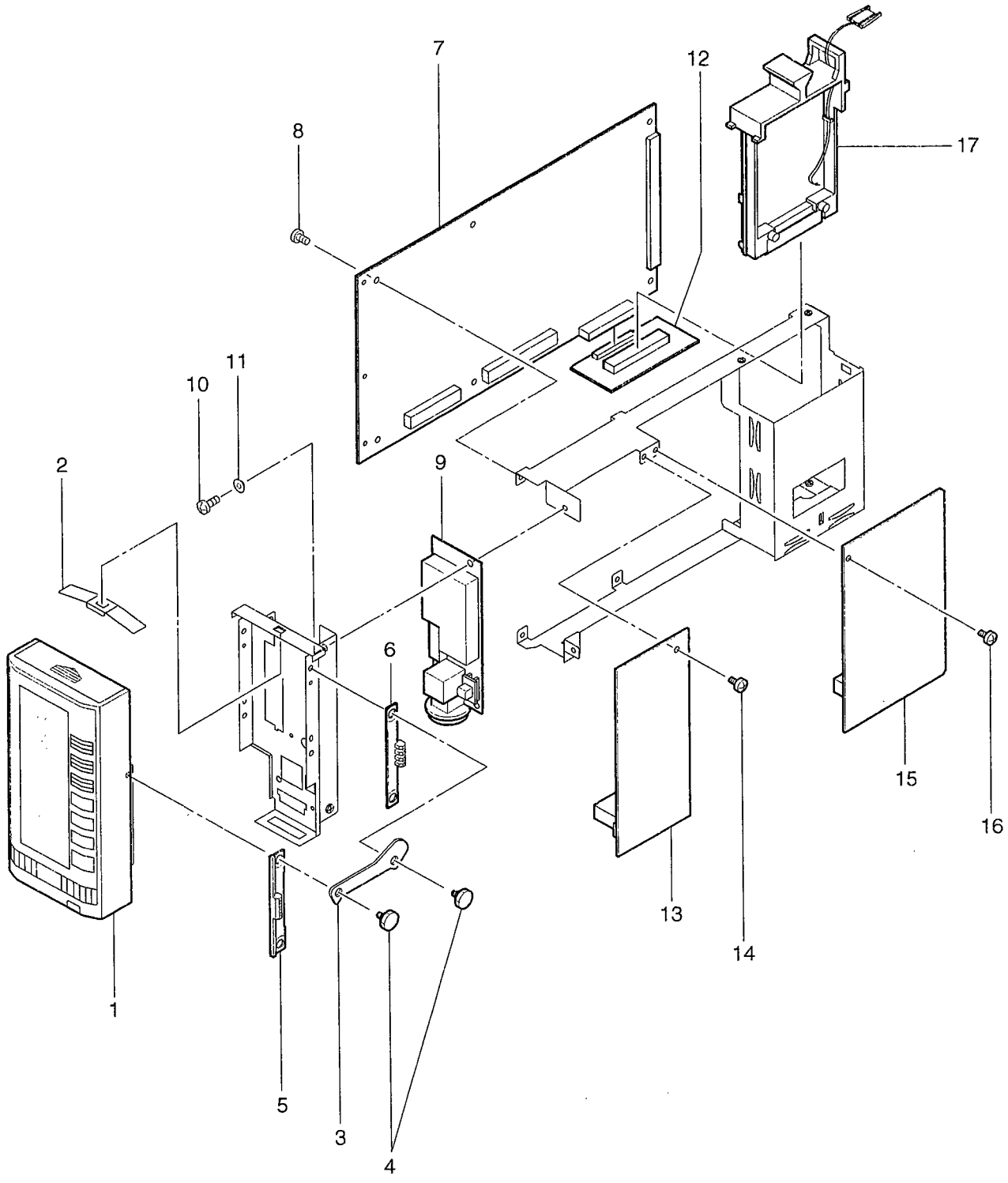
Yokogawa Electric Corporation

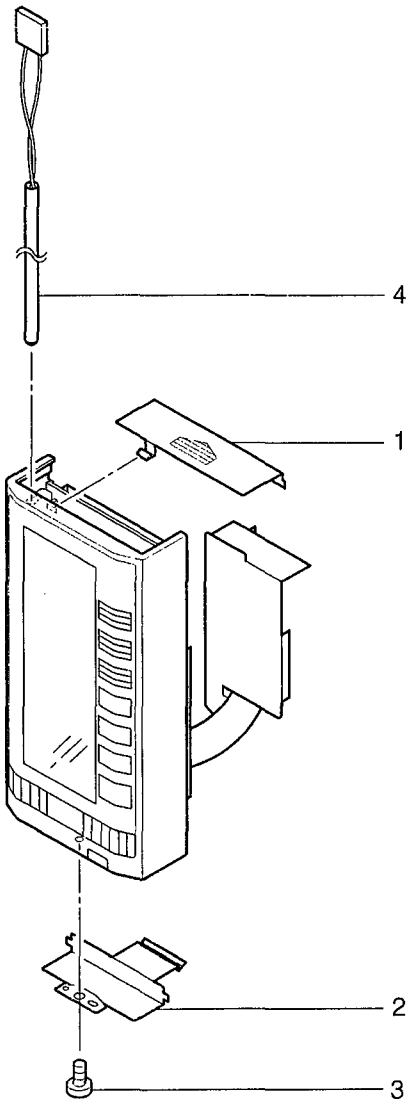
CMPL 1B7C1-04E
2nd Edition : Aug. 2004(KP)

Main Frame Assembly



Item	Part No.	Qty	Description
1	E9760CF	1	Display Assembly (see page4)
2	E9760LH	1	Spring
3	E9760LF	4	Link
4	E9760LK	8	Screw
5	E9760LT	2	Spacer
6	E9760LT	2	Spacer
7	Below	1	Main CPU Card Assembly
	E9766BH		For Model YS170
	E9766BJ		For Model YS150
8	Y9306LB	8	B.H.Screw,M3×6
9	E9766CC	1	Hard Manual and CFL Power Supply
10	Y9308LB	2	B.H.Screw,M3×8
11	G9311AD	2	Bush
12	E9766CA	1	Connector Card
13	Below	1	Option Card
	E9766EB		RS-485 Communication Card (option code:/A31)
	E9766EA		DCS-LCS Communication Card (option code:/A32)
	E9766EC		YS-net Communication Card (option code:/A33)
14	Y9306LB	1	B.H.Screw,M3×6
15	Below	1	Power Supply Unit
	E9766YB		For 100V Version
	E9766YS		For 220V Version
16	Y9306LB	1	B.H.Screw,M3×6
17	Below	1	Signal Conditioner
	EM1		mV Input Card (option code:/A01)
	ET5/YS		Thermocouple Input Card (option code:/A02 or /A12)
	ER5		Resistance Thermometer Sensor Input Card(option code:/A03 or /A13)
	ES1		Potentiometer Input Card (option code:/A04)
	EH1		Input Isolator Card (option code:/A05)
	EA1		Two-wire Transmitter Input Card (option code:/A06 or /A16)
	EA9		Two-wire Transmitter Input Card (option code:/A07 or /A17)
	EP3		Frequency Input Card(option code:/A08)
—	A1179MN	1	Ferritic Core(attachment for option code:/A12,/A13,/A16 or /A17)

Display Assembly



Item	Part No.	Qty	Description
1	E9760FX	1	Cover
2	E9760GR	1	Spring
3	Y9304LE	1	B.H.Screw,M3×4
4	E9760GM	1	Fluorescent Tube(CFL)

Subject to change without notice.

Revision Record

- Manual Number : IM 1B7C1-01E
- Manual Title : Model YS150 Single-Loop Multi-Function controller
  Model YS170 Single-Loop Programmable controller

Date	Edition	Description
January, 1992	1st	New publication
February, 1992	2nd	Maximum Power Consumption was corrected
		June, 1992 3rd / A08 option added. (P.2-6, P.9-17, P.11-7, P11-9) Transmitter power connection revised. (P.2-7)
		CMPL added.
January, 1994	4th	Revised according to style change (S2)
August, 1995	5th	Revised according to style change (S3) Model and suffix code change in section 1.2, section 2.4 to 2.6 revised. Section 2.7 and 2.8 added. Description added in section 3.6 (sections 11.3.5 and 11.3.8 in the previous edition are replaced). Table in sections 6.1 and 6.2 are revised. "Screen for the FAIL status" in section 6.2 changed. "ID" added in section 9.3.1. Description added in section 11.3. Index added.
March, 1996	6th	Revised according to the addition of the options / CE and / CSA. Chapter 1 revised (specification) Chapter 2 revised (wiring, etc.) Chapter 6 revised (alarm specification) Charter 11 revised (cautions, etc.).
January. 1997	7th	Revised according to style change (S4) Chapter 4, Chapter 5, section 8.2, section 9.3.1, and section 11.3 revised. Section 5.5 newly added.
October, 2000	8th	Revised according to the addition of the derivative time's action range. (P.8-7, P.8-8, P.8-10, P.8-11, P.8-13, P.8-15)
August. 2004	9th	Revised according to the addition of "CE mark safety standards supplement YS100 series" to the User's Manual, and the change of the company name.

Written by Products Documents
Network Solutions Business Division
Yokogawa Electric Corporation

Published by Yokogawa Electric Corporation
2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750,
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