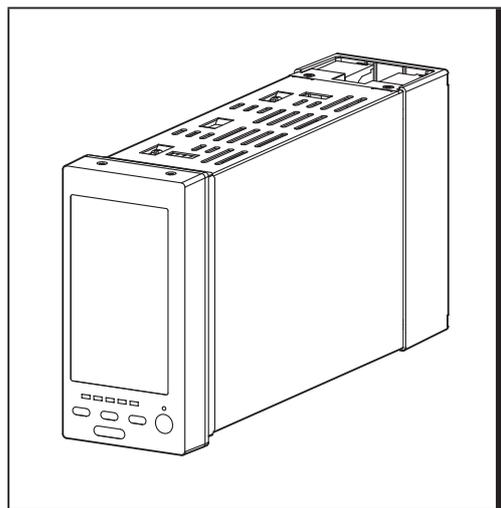


PSC100/200 Series Multi-Function PID Controller

INTRODUCTION & PROGRAMMING GUIDE



Applicable
Models

PSC100
PSC110
PSC200
PSC210

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1. INTRODUCTION

This is an elementary guide for those who use for the first time M-System's Multi-function PID Controllers ('the Controller'), models PSC100, PSC110, PSC200 and PSC210, to help understanding basic functions and programming of these units. The same software principles are applied also to the I/O module, model SML.

The following auxiliary products are used when programming the Controller:

- Loop Configuration Builder Software (model: SFEW3E) with User Manual (EM-6460-A)
- PC Configurator Software (model: SCCFG) with User Manual (EM-9192)

The following documents will also provide helpful information when using this product:

- PSC100/200 Series Users Manual (EM-6337-B)
- PSC100/200 Series Function Block List (EM-6460-B)
- PSC100/200 Series Function Block Application Manual (EM-6460-C)

The above programs and documents are downloadable at M-System's web site for free of charge.

☒ APPLICABLE FIRMWARE VERSION

Explanations given in this document conform to the SC_LCD firmware version 1.50 or later. Descriptions marked with the following symbols are applied only to the respective firmware versions.

To confirm the module's LCD firmware version, press and hold ENG button to go to Engineering View/Configuration > 36: Version.

SYMBOL	APPLICABLE FIRMWARE VERSION
1.50	SC_LCD firmware version 1.50 or later

2. FUNCTION BLOCK

2.1 GENERAL DESCRIPTION

• Common Software Functions

All four models of the PSC100/200 Series have common software functions while providing extra hardware functions such as backup/manual loading and network communication depending upon the models.

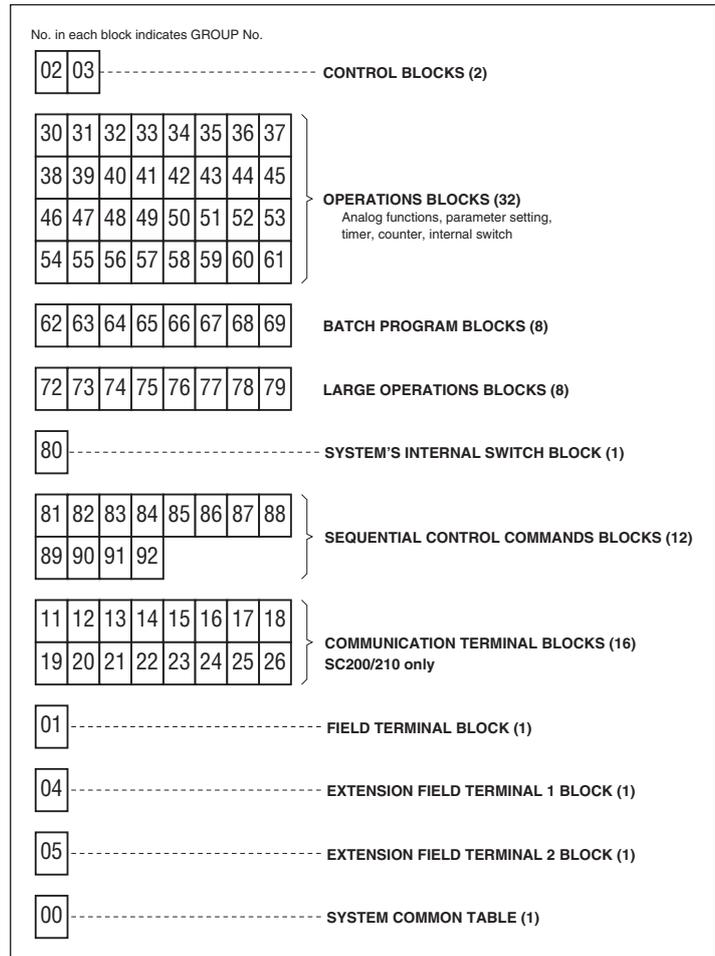
• Instrument Panel Packed in the Controller

The Controller can combine and use various software function blocks. Imagine an instrument panel containing various instruments in racks. Slot positions are identified with numbers, which are called 'Group No.' The Group No. shows the location of the instrument or 'Function Block,' ranging from 00 to 99 in decimals (not all numbers are used). 'GG' represents a Group No.

• Function Blocks

Function Blocks are grouped so that each group of functions (instruments) can be inserted into specific slots of the racks. For example, Group 02 and 03 (G02, G03) can accept only the control blocks (Refer to the table below). Other Groups receive e.g. math/computation and sequential control functions. Once all functions (instruments) are installed, you can wire between each of them on the software and set up relevant parameters to build up the complete controller functions.

MULTI-FUNCTION PID CONTROLLER AS AN INSTRUMENTPANEL



GROUPS & APPLICABLE FUNCTION BLOCKS

GROUP	CATEGORY	APPLICABLE FUNCTION BLOCK model No. in []
02, 03	Control (2 blocks)	Basic PID [21], Advanced PID [22], Manual Loader [23], Ratio Setter [24], Indicator [25]
30...61	Operations (32 blocks)	Pulse Input Discrete Contact Input/Accumulated Value Output [44], Pulse Adder [45], Pulse/Analog Multiplication [46], Pulse Accumulator [47], Pulse Input/Discrete Contact Output [48]
		Arithmetic Addition/Subtraction [51], Multiplication [52], Division [53]
		Functions Square Root Extractor [54], Absolute Value [55], Non-linear Gain, Deadband [56], Low-end Cutout [57], Temperature/Pressure Compensation [59]
		Time Functions Rate of Change Limit [17], First Order Lag [60], First Order Lag with two time constants [61], Ramp Buffer [62], Mean Average [63], Moving Average [64], Lead Time Computation [65], Dead Time Computation [66], Dead Time Compensation [67], Accumulator [68]
		Signal Limiters High/Low Limiter [70], Deviation Limiter [71]
		Signal Selectors Input Selector (with ramp control at switching) [18], Output Selector [19], Input Selector (2 points) [72], Input Selector (8 points) [85], Maximum Value Selector [73], Minimum Value Selector [74], Parameter Selector (2 points) [75], Parameter Generator (8 points) [86]
		Alarm High/Low Alarm [76], Deviation Alarm [77], Rate of Change Alarm (rate of change function) [78]
		Others Parameter Setter [79], Numeral Converter [80], Weight Totalizer (load cell input) [81], Analog/Pulse Duration Converter [82], Analog Signal Hold (max. value, momentary value or min. value) [83], ITEM Reader [84]
		Sequential Control Contact Distributor [87], Analog Comparator [88], Annunciator [89], ON-OFF Timer [90], Timer [91], Counter [92], Internal Switch [93]
62...69	Batch Program (8 blocks)	Batch Program [49]
72...79	Large Operations (8 blocks)	Segment Linearizer [58], Ramp Program Setter [69]
GROUP	CATEGORY	APPLICABLE FUNCTION BLOCK model No. in []
80 *1	System's Internal Switch (1 block)	System's Internal Switch [94]

81...92	Sequential Control (12 blocks)	Sequential Control Program [95]
11...26	Communication Terminals (16 blocks)	Di Receive Terminal [31], Do Send Terminal [32] Ai Receive Terminal [33], Ao Send Terminal [34]
01, 04, 05 *2	Field Terminals (3 blocks)	PSC100 [F70], PSC200 [F71], PSC110 [F72], PSC210 [F73]

*1. System's Internal Switch is preset at the factory.

*2. Field Terminals are preset at the factory and not modifiable by the user.

Group 00, System Common Table (See below), is an essential one used to set up basic system parameters, such as Operation Command (Stop, Hot Start and Cold Start), Computation Cycle Setting, Control Load Rate Indication, ROM Version Indication.

BLOCK NAME	
System Common Table (for PSC100/200 series)	

GROUP [00] ☒: Setting data

ITEM	MDFY	DATA INPUT	DISPLAY (e.g.)	CONTENTS
01	☒	(always modifiable)		☒ MAINTENANCE SWITCH (lock command) Switching Group 00 maintenance switch affects all other groups.
		0	MT: 0	MONITOR mode: data monitoring only
		1	MT: 1	PROGRAM mode: "☒" marked data modifiable
		S	MT: S	SIMULATION mode: "☒" marked data modifiable
02	IND			☒ CONTROL STATUS INDICATION
			RUN	Running
			STOP	Stopped
03	☒			☒ OPERATION COMMAND
		0	STOP	Stop
		1	HOT START	Hot start
		2	COLD START	Cold start
06	IND			☒ Nest Bus TRANSMISSION STATUS INDICATION
			RUN	Transmitting
			STOP	Stopped
☒ 08	☒			☒ Nest Bus TRANSMISSION MODE
		0	0	Send/Receive mode C#: 00 to 0F
		1	1	Receive only mode C#: 10 to 1E (C# upper digit is automatically set to '1')
☒ 11	☒	50 to 3000	NNNN	☒ COMPUTATION CYCLE (msec) Selectable in every 10 milliseconds
12	IND		NNN%	☒ CONTROL LOAD RATE INDICATION (%)
13	☒	0	NNN%	☒ MAX. CONTROL LOAD RATE INDICATION (%) Reset when "0" is entered.
				☒ SYSTEM STATUS INDICATION (error indication)
21	IND			• EEPROM Data Base Failed
			ALLRIGHT	All blocks proved normal
			GROUP NN	Abnormal block No. indication (NN: GROUP No.)
22	IND			• PV Abnormality (Pv 1 OR Pv 2) PV input H/L alarm status in the field terminal block indicated
			PV NORMAL	PV proved normal
			PV ABNORMAL	PV proved abnormal
23	IND			• MV Feedback Abnormality (Mv 1 OR Mv 2) deviation alarm status of MV check input and MV output in the field terminal block indicated
			MV NORMAL	MV feedback proved normal
			MV ABNORMAL	MV feedback proved abnormal
24	IND			• Block Abnormality (GROUP No. indicated)
			ALLRIGHT	All blocks proved normal
			GROUP NN	Abnormal block No. indication (NN: GROUP No.)
25	IND			• Control Overload
			LOAD: RIGHT	Appropriate control load
			LOAD: OVER	Control overload

ITEM	MDFY	DATA INPUT	DISPLAY (e.g.)	CONTENTS
26	IND		COM: NN	• Supervisory communication error Number of communication error events (NN)
30	IND		COM: PER: NN	• Supervisory communication error Number of parity error events (NN)
31	IND		COM: FER: NN	• Supervisory communication error Number of framing error events (NN)
32	IND		COM: OER: NN	• Supervisory communication error Number of overrun error events (NN)
33	IND		COM: SER: NN	• Supervisory communication error Number of sum check error events (NN)
35	IND		ALLRIGHT GROUP NN	• Abnormal FB No. hold All blocks proved normal Abnormal block No. indication (NN: GROUP No.)
36	IND		ER: NN	• Abnormality contents hold Abnormal block contents (NN)
40	<input checked="" type="checkbox"/>	0, 1	0 1	<input checked="" type="checkbox"/> COMPUTATION CYCLE SWITCHING FLAG Normal Computation cycle switched Reset when "0" is entered. Once reset, "LOAD: RIGHT" is set in ITEM 25.
<input checked="" type="checkbox"/> 51	<input checked="" type="checkbox"/>	0 – F	CD : 0	<input checked="" type="checkbox"/> CARD NO. REGISTRATION (Remark 1)
60	<input checked="" type="checkbox"/>	0, 1	RUN: 0 RUN: 1	<input checked="" type="checkbox"/> RUN CONTACT ERROR RESET MODE (Remark 2) Automatic reset Manual reset
61	<input checked="" type="checkbox"/>	0, 1	0 1	<input checked="" type="checkbox"/> RUN CONTACT ERROR RESET FLAG (Remark 2) Normal Reset (valid when ITEM 60 is set to 'manual reset')
95	<input checked="" type="checkbox"/>	1	BLOCK RELEASE (initial display *)	<input checked="" type="checkbox"/> DELETE MODEL NO. COMMAND Group 00, 01, 04, 05 or 80 are not deleted.
<input checked="" type="checkbox"/> 96	IND	00 – 99	FIELD: <u>73</u>	<input checked="" type="checkbox"/> FIELD TERMINAL MODEL IDENTIFICATION
<input checked="" type="checkbox"/> 97	<input checked="" type="checkbox"/>		<u>PSC210</u>	<input checked="" type="checkbox"/> HARDWARE MODEL NO. INDICATION (max. 8 characters, for use in the supervisory system)
99	IND		<u>DCSSC N.NN</u>	<input checked="" type="checkbox"/> ROM VERSION INDICATION

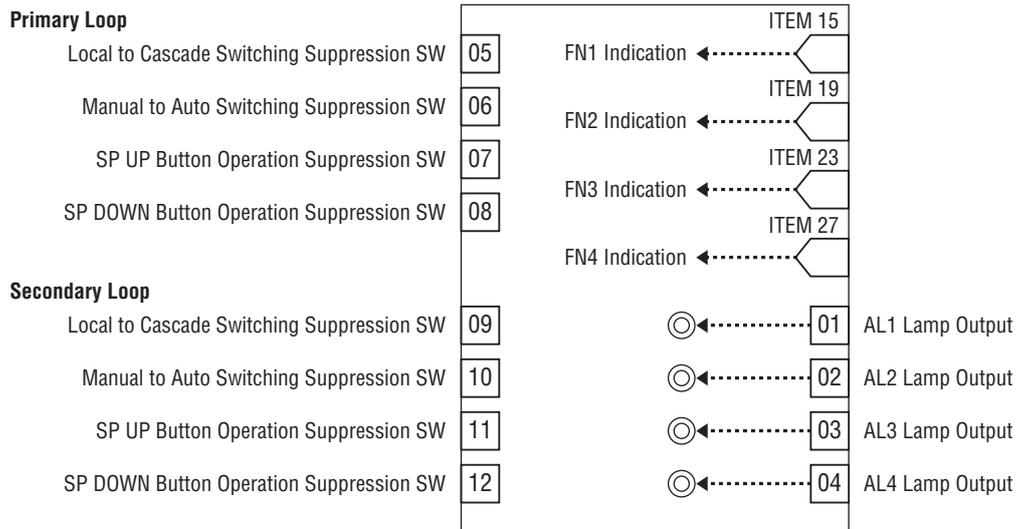
Remark 1: The controller is automatically reset when the card No. is changed.

Remark 2: ROM Version 1.50 or later

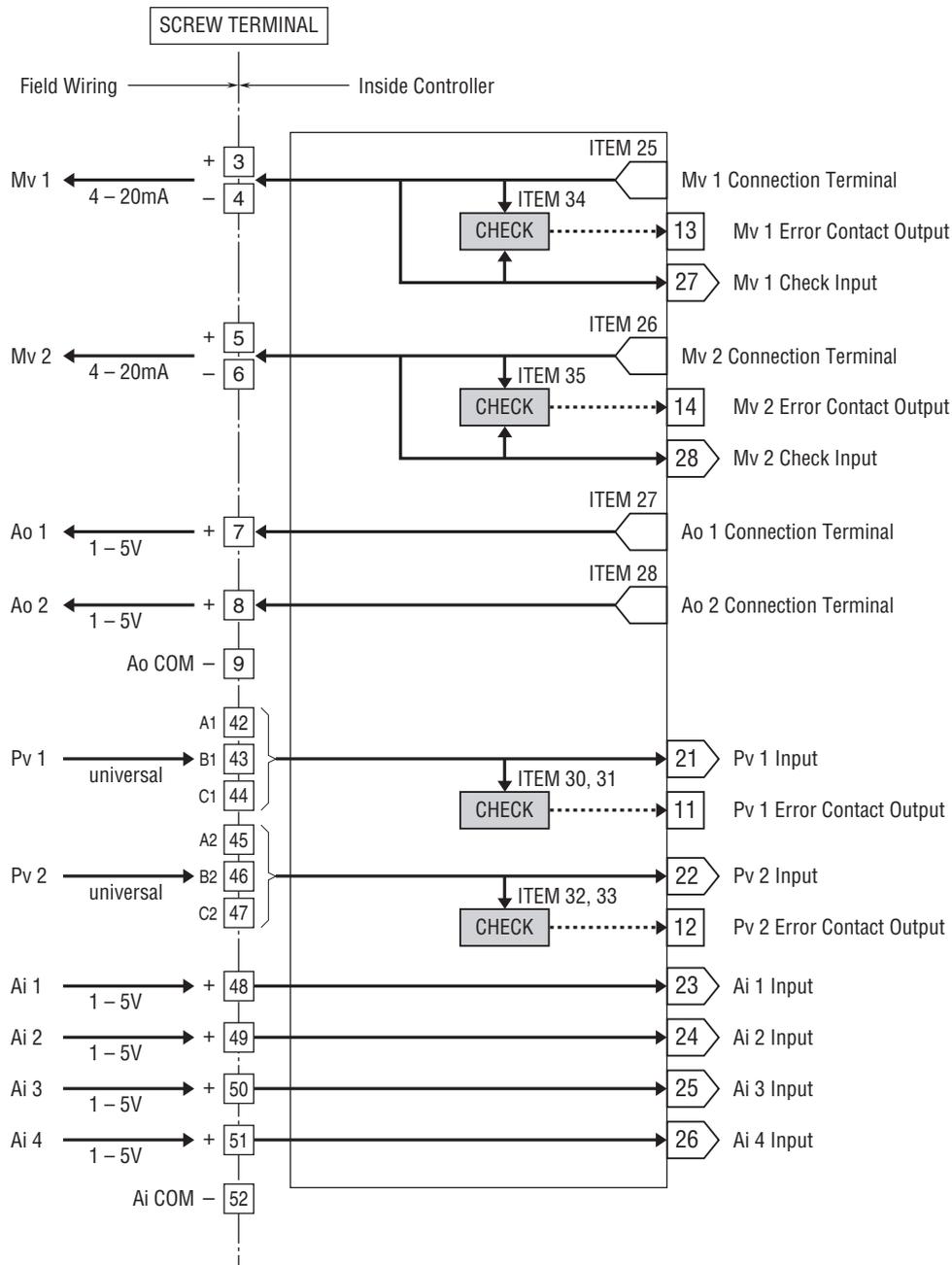
Group 01, Field Terminal (See below), is another essential group, used as interfacing for the hardware unit to send/receive external field signals, just like a terminal block taking cables into an instrument panel. Groups 04 and 05 Extension Field Terminals (See figures in the following pages) are additionally used with the PSC100/200 Series to handle greater number of signals than for the SML I/O module.

The Field Terminal has on one side physical terminals (screws) connecting I/O signals to the device and on the other software terminals connecting to function blocks. It is inherent to each hardware model, set at the factory together with analog I/O's zero and span calibration. The user cannot change the field terminal model such as F70 (PSC100), F71 (PSC200), F72 (PSC110) and F73 (PSC210) or the calibration values.

ABBR	FIELD TERMINAL	ABBR
F70	PSC100 Field Terminal	F70

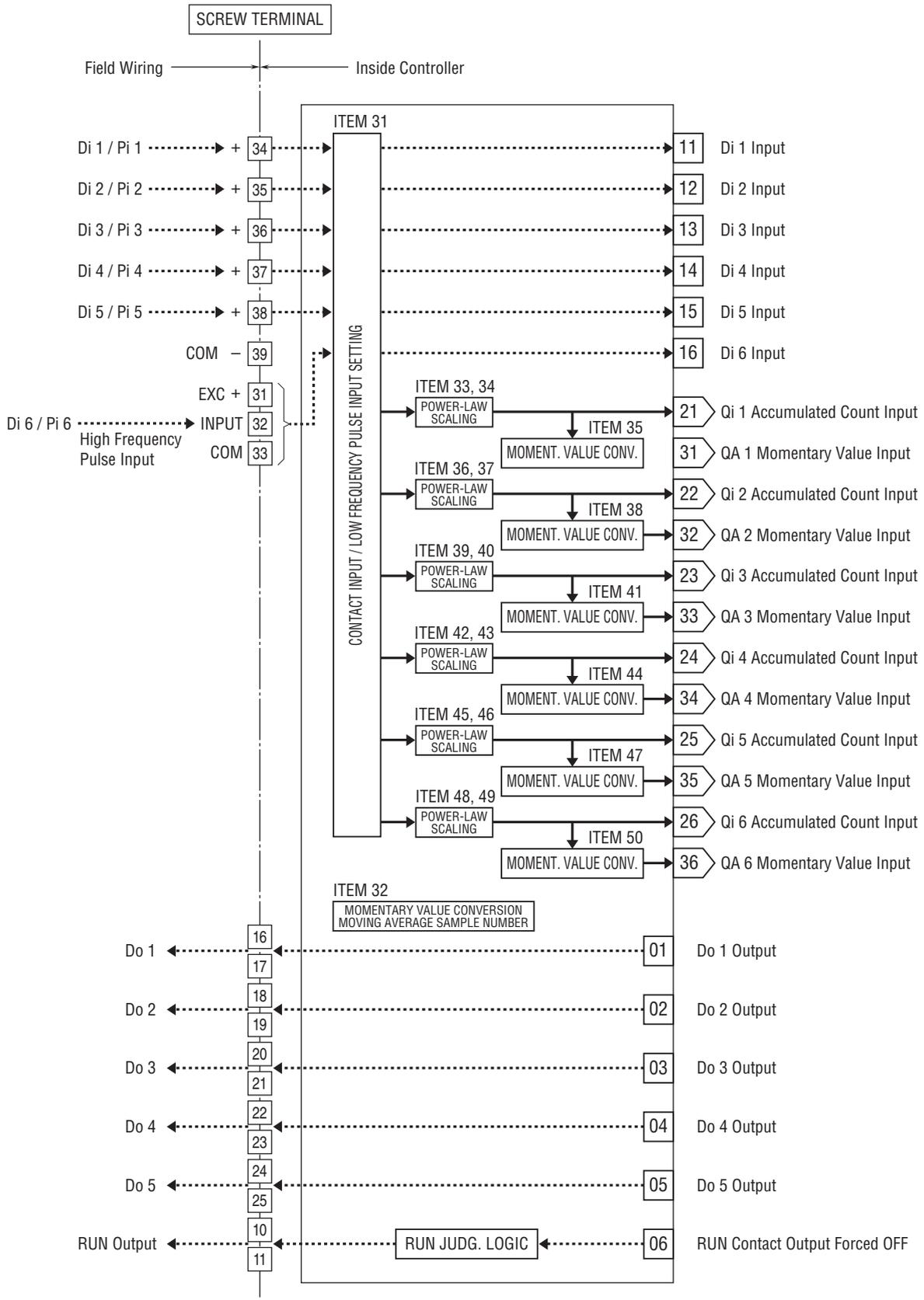


PSC100 Extension Field Terminal 1



ITEM 02 has no error indication. It is indicated in GROUP 01 (Field Terminal).

PSC100 Extension Field Terminal 2

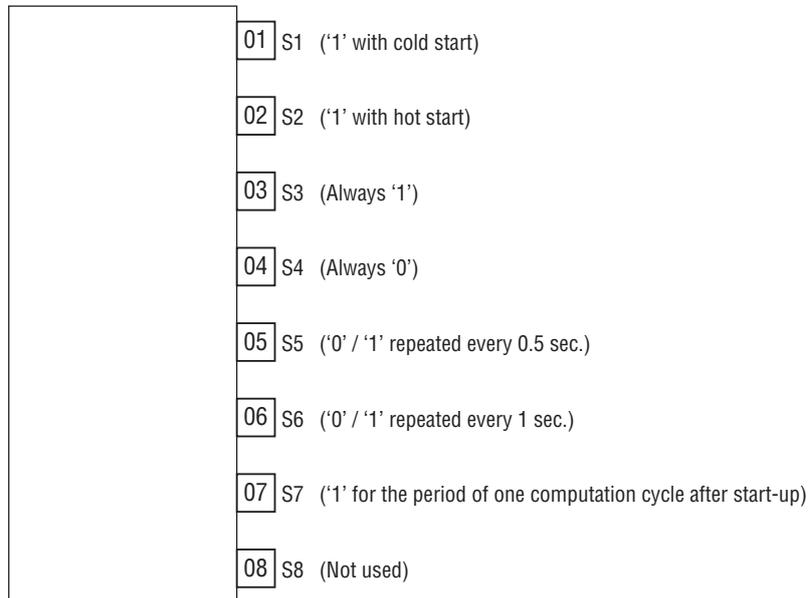


ITEM 02 has no error indication. It is indicated in GROUP 01 (Field Terminal).

Group 80, System's Internal Switch [94] (See below), is set at the factory.

MODEL NO.	BLOCK NAME	MODEL NO.
94	System's Internal Switch	94

ABBR: SSW



2.2 FUNCTION BLOCK LIST

Details of each function block are described in the document "PSC100/200 Series Function Block List (EM-6460-B)," which should be referred to when you program the software functions of the Controller.

Each function block list is presented in a fixed format with the following components (See the example in the next page):

Model No.

Each function block is identified with a model number, in two-digit numerics (decimal). For example, Basic PID is model '21,' while Ramp Program Setter is '69.' A model number is registered at ITEM 10 of each group so that the function becomes applicable, as if an instrument is inserted into a rack.

Field Terminal block model number has a prefix 'F.' For example, the PSC100 is model 'F70,' the PSC200 is model 'F71,' the PSC110 is model 'F72,' and the PSC210 is model 'F73.' As explained before, a field terminal block represents physical terminals at one end, thus the hardware determines the field terminal block type. When you order the PSC100, its field terminal has been already set to 'F70' and you cannot change it.

Block Name

Function name of the block.

Abbreviation Code

Each function block has an abbreviation code in three-digit alphabets. For example, Basic PID is 'BCA,' while High/Low Alarm is 'PVA.'

Function Diagram

Basic construction of the function block is illustrated. I/O signals and their terminal numbers which can be connected to the block, ITEM No. for its parameters, and internal signal flow, block functions are indicated depending on the functions.

General Description

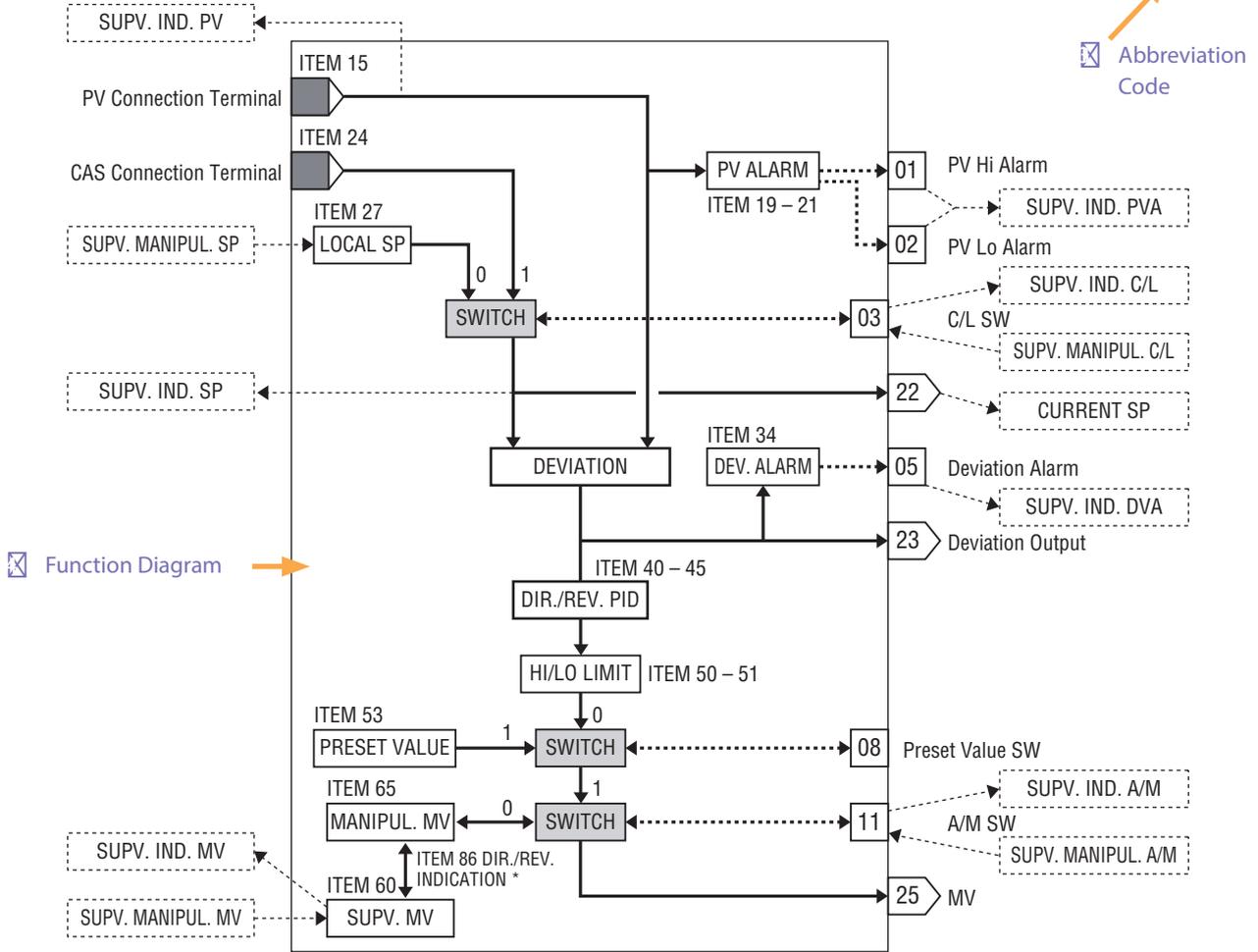
General description of the block. (not all)

Setting Table

Detailed setting parameters are listed in the table, showing GROUP No. when the function block can be registered, ITEM No. and parameter and their options.

<input checked="" type="checkbox"/> Model No. 21	<input checked="" type="checkbox"/> Block Name Basic PID	MODEL NO. 21
--	--	------------------------

ABBR: BCA



*Direct action MV value is applied for internal processing regardless of ITEM 86 setting.

Setting Table

GROUP [02, 03] : Automatically changeable parameters : Setting data

ITEM	MDFY	DATA INPUT	DISPLAY (e.g.)	CONTENTS
01	<input checked="" type="checkbox"/>	(always modifiable)		<input checked="" type="checkbox"/> MAINTENANCE SWITCH (lock command)
		0	MT: 0	MONITOR mode: data monitoring only
		1	MT: 1	PROGRAM mode: "☒" marked data modifiable
02	IND	No input	ER: NN	Error indication (00: normal, 01 – 90: error)
<input checked="" type="checkbox"/> 10	<input checked="" type="checkbox"/>	21	MD: <u>21</u>	BASIC PID (model) '-' to clear.

ITEM 01 of every function block is assigned with 'Maintenance Switch,' which is a lock command. Setting data (Items marked with ☒) can be modified when the switch is turned on (set to '1'; except some of them are always modifiable).

The Maintenance Switch for Group 00 is a special one which can force the switches of all groups to be turned on. All of them are turned off when you switch GROUP 00, ITEM 01 to '0.'

Caution

Groups with their Maintenance Switch turned on do not function properly until they are turned off. Be sure to set it to '0' whenever a modification is performed.

ITEM 02 shows 'Error Code.' Once Group No. in which an error is occurring presently is identified, you can access error information in ITEM 02 of the GROUP.

Table 2-2 Function block error codes.

ERROR ID	CONTENTS
ER : 00	Normal
ER : 01	Connection terminal 1 undefined
ER : 02	Connection terminal 2 undefined
ER : 03	Connection terminal 3 undefined
ER : 04	Connection terminal 4 undefined
ER : 05	Connection terminal 5 undefined
ER : 06	Connection terminal 6 undefined
ER : 07	Connection terminal 7 undefined
ER : 08	Connection terminal 8 undefined
ER : 09	Connection terminal 9 undefined
ER : 10	Computation error: Divided by '0'
ER : 11	Computation error: Result out of range *1
ER : 20	Communication terminal: Not received
ER : 21	Communication terminal: Connected external device error
ER : 22	Connected internal device error
ER : 70	Illegal block combination
ER : 80	Sequence error: Illegal command
ER : 81	Sequence error: Undefined connection terminal
ER : 87	Sequence error: Non-registered step
ER : 88	Sequence error: Register overflow
ER : 89	Sequence error: One-shot overflow
ER : 90	EEPROM data failed *2

*1. 32767 < Computation Result < -32768

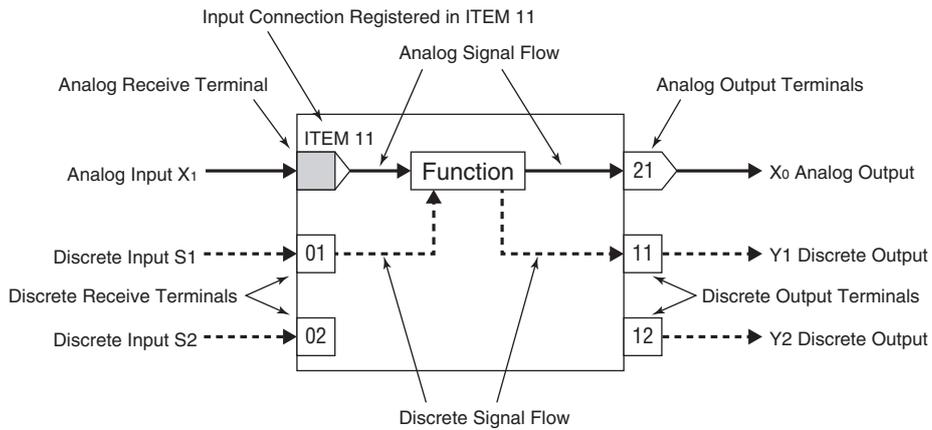
*2. Red RUN lamp turns on and error message is indicated when the EEPROM data-base is destroyed. When this happens, process either of the following:

- (1) In PROGRAM mode, write '1' in GROUP 00 / ITEM 95 to execute BLOCK RELEASE.
- (2) Connect the Loop Builder Software (model: SFEW3E).
Execute EEPROM Clear and download a new loop configuration.

ITEM 10 is registered with 'Function Block Model Number.' Once a function block model number is set, all Items (ITEM 00...99) specific to it are shown and ready to be modified.

3. CONNECTING BETWEEN FUNCTION BLOCKS

3.1 GENERAL DESCRIPTION



As introduced in the previous section, “PSC100/200 Series Function Block List (EM-6460-B)” is containing various functions, and each function block list is accompanied with a function diagram.

The above figure shows an example of function diagram that shows signal flows, signal conditioning function, connecting terminals, and terminal numbers.

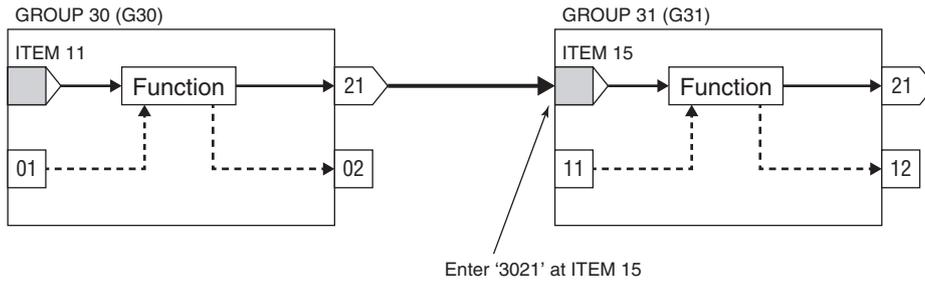
• Analog Signal Terminal

Analog signal terminals are in pentagonal shape. Receive terminals are with its pointed corner inwards, while output terminals are with the corner outwards. Output terminals are numbered while receive terminals are not. They are instead provided with a description of connected input terminal. Analog signal flows are represented with solid lines.

• Discrete Signal Terminal

Discrete signal terminals are shown as square boxes. Receive terminals are inside the block, while output terminals are outside one. Both receive and output terminals are numbered, however, their connection information is described in the sequential control program, thus there is no Item such as ITEM 11 for analog signal. Discrete signal flows are represented with broken lines.

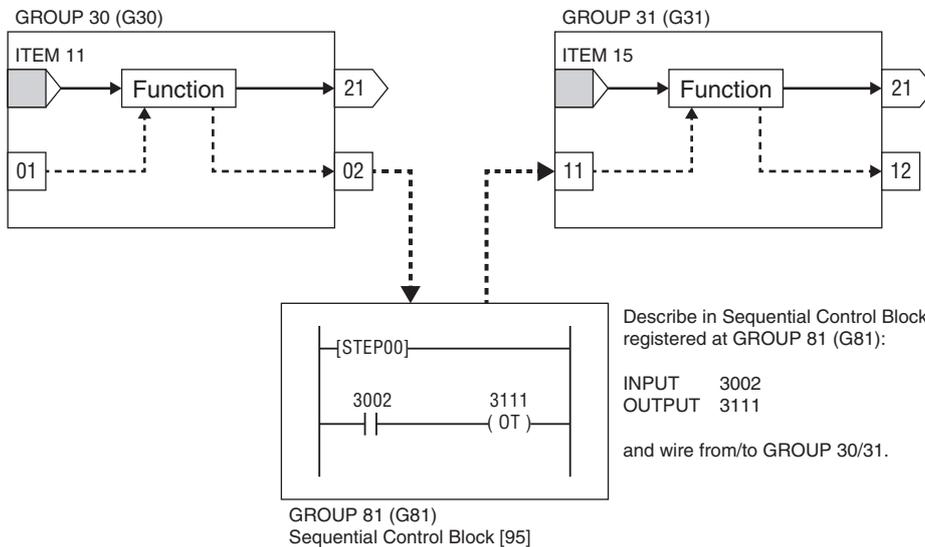
3.2 CONNECTING ANALOG SIGNALS



Analog signal wiring information is set at the receiver terminal which describes where (group 'GG' and terminal 'NN') the signal is originated. GGNN is registered at the Item used for the input of the receiver block.

In the above example, enter GROUP 31, ITEM 15, DATA 3021 to provide the output of GROUP 30 function block to GROUP 31.

3.3 CONNECTING DISCRETE SIGNALS



Discrete I/O signals are wired via relay logic programs in Sequential Control Program block [95].

Register necessary number of Sequential Control Blocks at Group 81 through 92 and describe ST00 (Start Command), INPUT GGNN ('3002' in the above example) and OUTPUT GGNN ('3111'), and ED (End Command).

3.4 EX-FACTORY SETTING

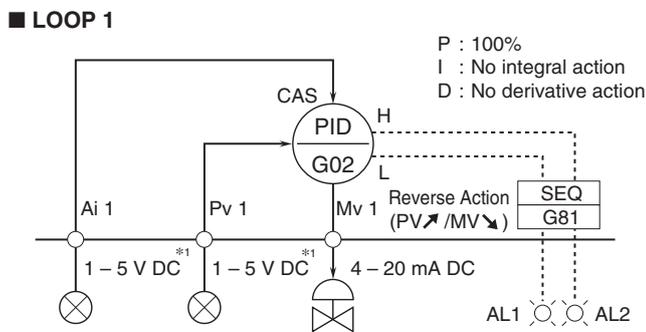
The Controller is preset at the factory with basic PID loop configurations with the following registered groups and software wiring between them.

- Group 00: System Common Table
- Group 01: Field Terminal
- Group 02: Basic PID [21]
- Group 03: Basic PID [21]
- Group 04: Extension Field Terminal 1
- Group 05: Extension Field Terminal 2
- Group 80: System's Internal Switch [94]
- Group 81: Sequential Control Block [95]

• Loop 1: Basic PID

Measured input (Pv 1) is provided to PID block. MV output from the PID block is connected to the external Mv 1 terminal. Analog input (Ai 1) is assigned to CAS terminal of the PID block. The setting method '0' (LOCAL) is set, therefore SP value can be changed only on the front panel control.

When CASCADE/LOCAL setting mode '1' is selected, cascade control with Ai 1 value is available. High and low alarms for Pv 1 are displayed at AL1 and AL2 lamp on the LCD.



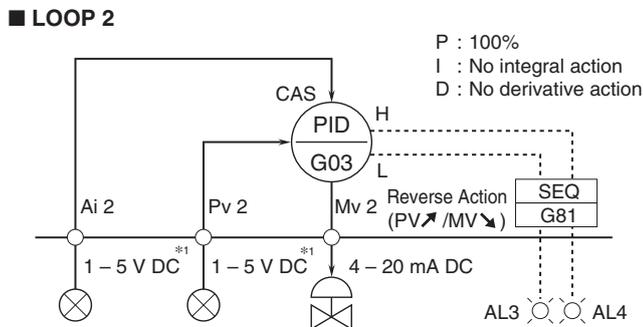
*1. Factory default

Note: Use the Loop Configuration Builder Software (model: SFEW3E) for loop configuration.

• Loop 2: Basic PID

Measured input (Pv 2) is provided to PID block. MV output from the PID block is connected to the external Mv 2 terminal. Analog input (Ai 2) is assigned to CAS terminal of the PID block. The setting method '0' (LOCAL) is set, therefore SP value can be changed only on the front panel control.

When CASCADE/LOCAL setting mode '1' is selected, cascade control with Ai 2 value is available. High and low alarms for Pv 2 are displayed at AL3 and AL4 lamp on the LCD.



*1. Factory default

Note: Use the Loop Configuration Builder Software (model: SFEW3E) for the loops configuration.

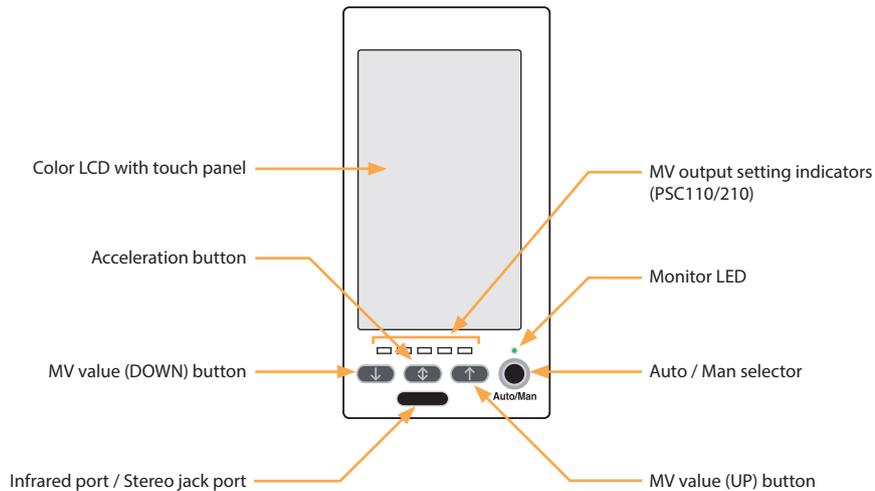
MAIN PARAMETER DEFAULT SETTING

GROUP	ITEM	DATA	PARAMETER
01	10	11	Field Terminal
	43	AL1	AL1 message
	44	AL2	AL2 message
	45	AL3	AL3 message
	46	AL4	AL4 message
02	10	21	Basic PID
	15	0421	G04 (SC) Pv 1 is assigned to Basic PID PV connection terminal.
	19	115	PV high alarm setpoint
	20	-15	PV low alarm setpoint
	24	0423	G04 (SC) Ai 1 is assigned to Basic PID CAS connection terminal.
	29	0	Setting method (0: LOCAL)
	40	1	Control direction (reverse: MV decreases with PV increasing)
	82	10000	Upper range (in engineering unit)
	83	0	Lower range (in engineering unit)
	84	2	Decimal point position (from rightmost digit)
03	10	21	Basic PID
	15	0422	G04 (SC) Pv 2 is assigned to Basic PID PV connection terminal.
	19	115	PV high alarm setpoint
	20	-15	PV low alarm setpoint
	24	0424	G04 (SC) Ai 2 is assigned to Basic PID CAS connection terminal.
	29	0	Setting method (0: LOCAL)
	40	1	Control direction (reverse: MV decreases with PV increasing)
	82	10000	Upper range (in engineering unit)
	83	0	Lower range (in engineering unit)
	84	2	Decimal point position (from rightmost digit)
04	10	12	Extension Field Terminal
	25	0225	G02 (Basic PID) MV output is assigned to Mv 1 connection terminal of SC Field Terminal.
	26	0325	G03 (Basic PID) MV output is assigned to Mv 2 connection terminal of SC Field Terminal.
81	10	95	Sequential Control
	11	13 : 0000	Step command
	12	01 : 0202	G02 (Basic PID) PV low alarm is assigned to G01 (SC) AL1 lamp input terminal.
	13	07 : 0101	
	14	01 : 0201	G02 (Basic PID) PV high alarm is assigned to G01 (SC) AL2 lamp input terminal.
	15	07 : 0102	
	12	01 : 0302	G03 (Basic PID) PV low alarm is assigned to G01 (SC) AL3 lamp input terminal.
	13	07 : 0103	
	14	01 : 0301	G03 (Basic PID) PV high alarm is assigned to G01 (SC) AL4 lamp input terminal.
	15	07 : 0104	
	16	00 : 0000	End

Note: Refer to PSC100/PSC200 Function Block List.

4. DISPLAY OPERATIONS

4.1 FRONT PANEL COMPONENTS



Color LCD with touch panel

TFT color display; various display modes available with the touch panel operability.

Infrared communication port / stereo jack port

Used to communicate with PC to program and change parameters in Programming view using the Loop Configuration Builder Software (model: SFEW3E) or to program and change parameters in Configuration view using the PC Configurator Software (model: SCCFG).

MV value (DOWN) button

Decreases the MV in 40 sec. per full-scale when the control mode is set to manual. Decrements by digit in one-shot is also possible. The MV decreases in 4 seconds per full-scale when the acceleration button is pressed at once.

Acceleration button

Accelerates MV signal's changing speed by pressing simultaneously with MV value button.

MV value (UP) button

Increases the MV in 40 sec. per full-scale when the control mode is set to manual. Increments by digit in one-shot is also possible. The MV increases in 4 seconds per full-scale when the acceleration button is pressed at once.

AUTO / MAN selector

Changes the control mode from auto to manual and vice versa.

Monitor LED

Indicates control operation mode. *1

'Auto' mode: Green

'Man' mode: Orange

Manual loading or indication only mode (No PID): Amber

Communicating with the SFEW3E: Slow blinking

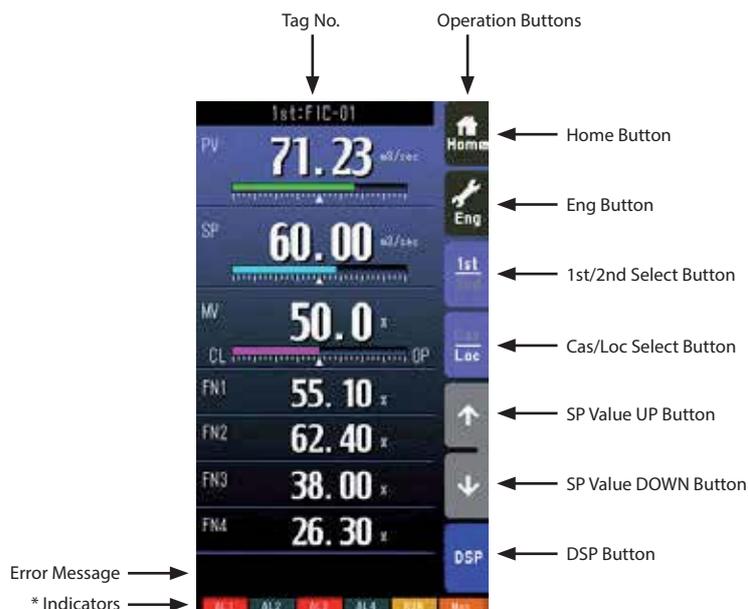
Communicating with the SCCFG: Fast blinking

*1. Operation view: Status of the loop specified in 'Loop display (MV/OP)' setting.
Engineering view: Status of the lopp indicated on the screen.

MV output setting indicators **PSC110/210**

Approximate MV2 output status is indicated by the number of lights during the backup mode.

4.2 TOUCH PANEL COMPONENTS



Home button

Used to switch the view to the one registered as Home operation view.
Pressing/holding the button for approx. 1 second registers the view as Home view (including the 1st/2nd choice).

Eng button

Pressing/holding the button for approx. 1 second switches the view to Engineering view.
Once the view is switched, it is used to switch among the engineering views.

1st/2nd select button

Used to switch between the primary and the secondary loops. Valid only when the secondary is set.

Cas/Loc select button

Pressing/holding the button for approx. 1 second switches the control mode between cascade (Cas) and local (Loc). Valid only when 'Set mode Cas/Loc' setting under the tuning parameters is set to 'Cascade/Local'.

SP value UP button *1

Used to increase SP value in the speed of 40 seconds per full-scale. Touching it briefly increases the value digit by digit.

SP value DOWN button *1

Used to decrease SP value in the speed of 40 seconds per full-scale. Touching it briefly decreases the value digit by digit.

DSP button

Used to switch among the operation views.

*1. SP buttons are locked in CAS mode.

* Indicators

INDICATOR	EXPLANATIONS
AL1 to AL4	Background color turns red during alarm.
RUN / STOP	RUN: Green in normal conditions; Amber in an abnormality. STOP: Grey when the Controller operation is stopped; Red when the memory is failed.
Auto / Man	Auto: Green Auto indicator turns on. Man: Orange Man indicator turns on. The lamp indicates the status of the loop specified in 'Loop display (MV/OP)' setting.

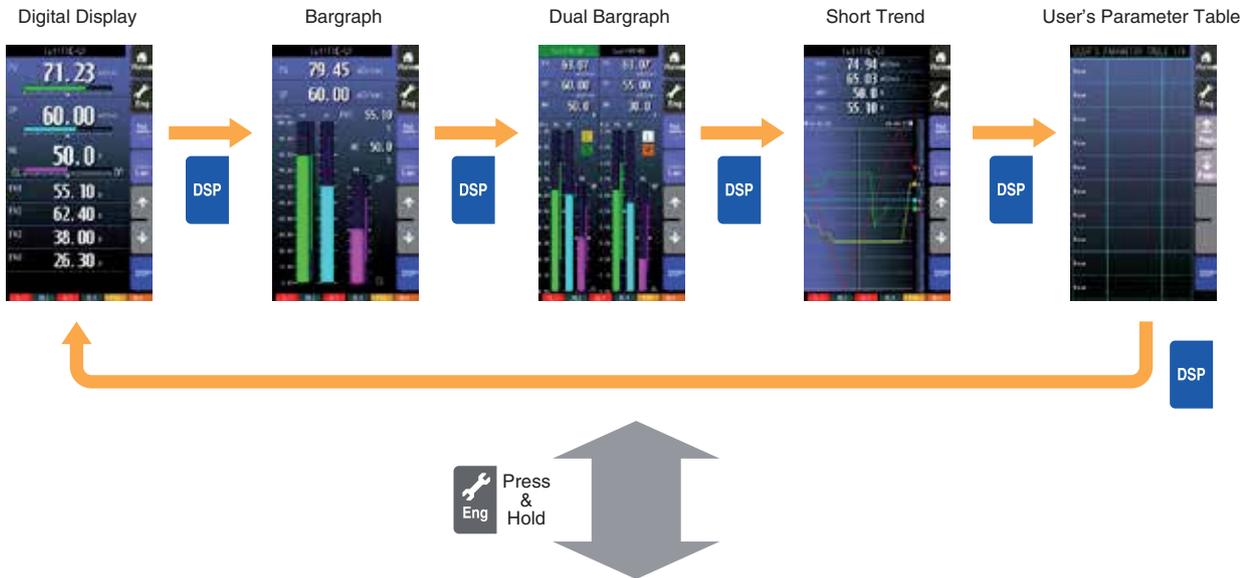
4.3 SWITCHING SCREEN VIEWS

The Controller has two main screen groups, "Operation view" and "Engineering view." Views switch with touch panel operation. Unnecessary operation views can be skipped by presetting.

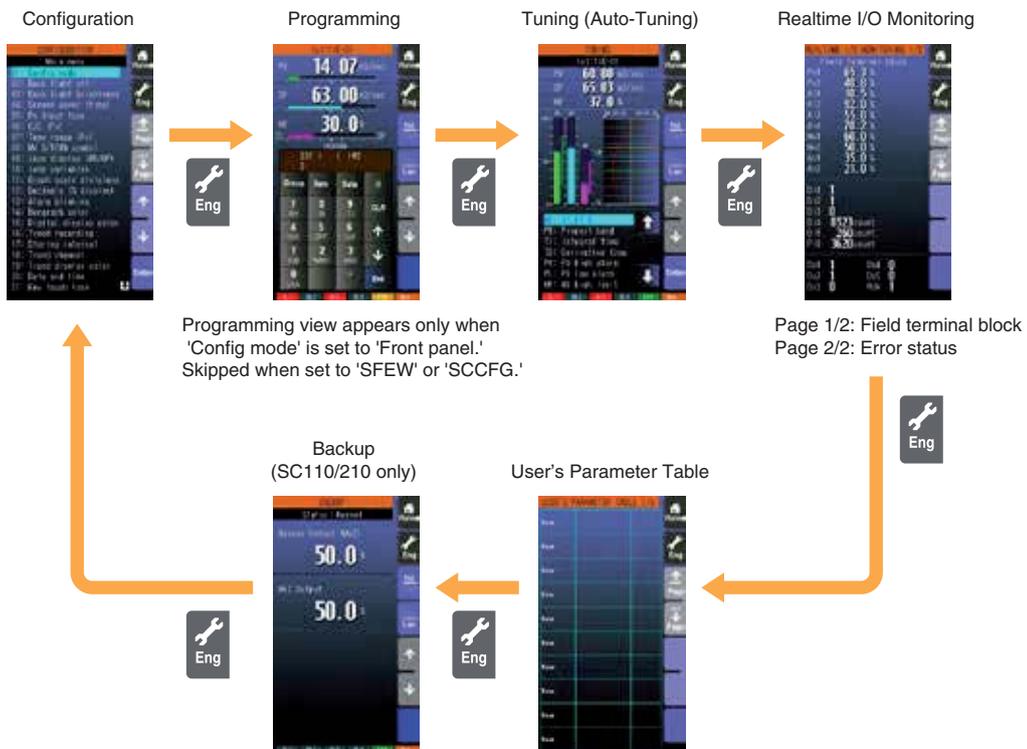
In digital displays, PV and SP have 7 digits (the 5th decimal digit is rounded down when the number of decimal places is set to 5). The MV also has 7 digits. (Sign and decimal point included)

■ OPERATION VIEWS

1.50



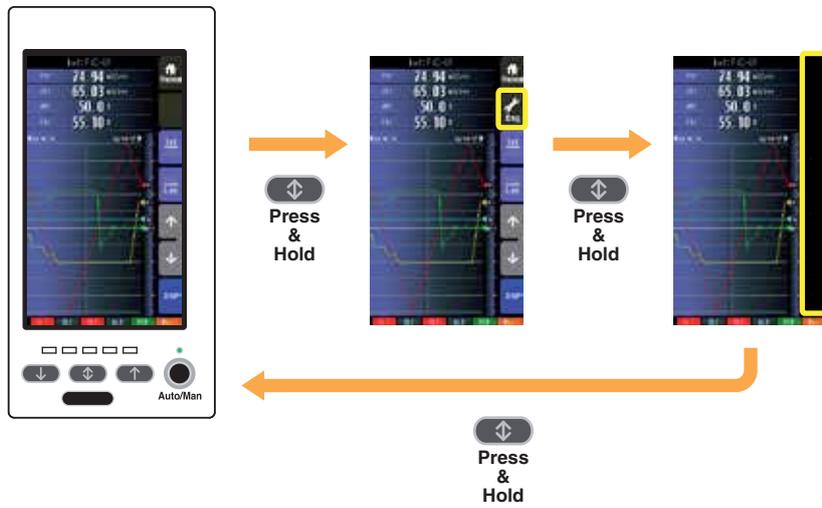
■ ENGINEERING VIEWS



Operation Buttons Lock Out

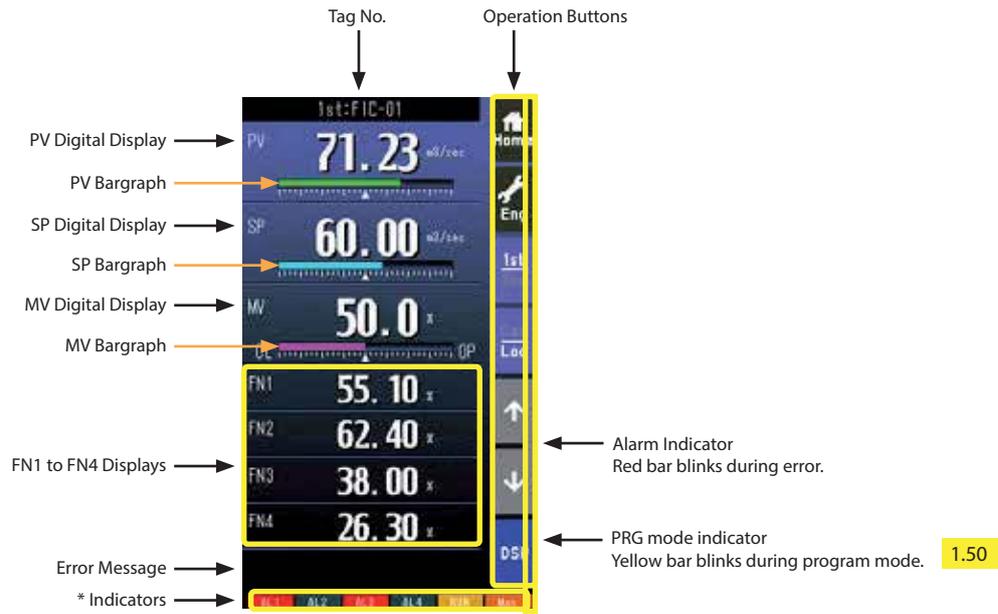
Pressing/holding the acceleration button for approx. 5 seconds activates [Eng] button on the screen. Then repeating the action at this state locks out the touch panel operation buttons. (Hardware buttons are not locked.)

In order to release them, press/hold it again for approx. 5 seconds.



4.4 OPERATION VIEWS

4.4.1 DIGITAL DISPLAY VIEW



- Pressing on '1st/2nd' button switches between the primary and secondary loops.
- Bargraphs represent respective signals in percentage.
- PV and SP digital displays can be switched between engineering unit data and percentage.
- When error is detected, the error message is displayed on the ERROR code area.
- Tag No. (FN1 to FN4) can be displayed maximum 4 characters. **1.50**

PV display

Touching on the display field switches the PV value in engineering unit and in %. Valid only when 'Selectable' under 'Select unit mode' selection is specified.

SP display

Touching on the display field opens a numerical pad to directly enter SP value. (Numerical pad is not available in CAS mode.)

MV display

Touching on the display field opens a numerical pad to directly enter MV value. (Numerical pad is not available in AUTO mode.)

Error Message

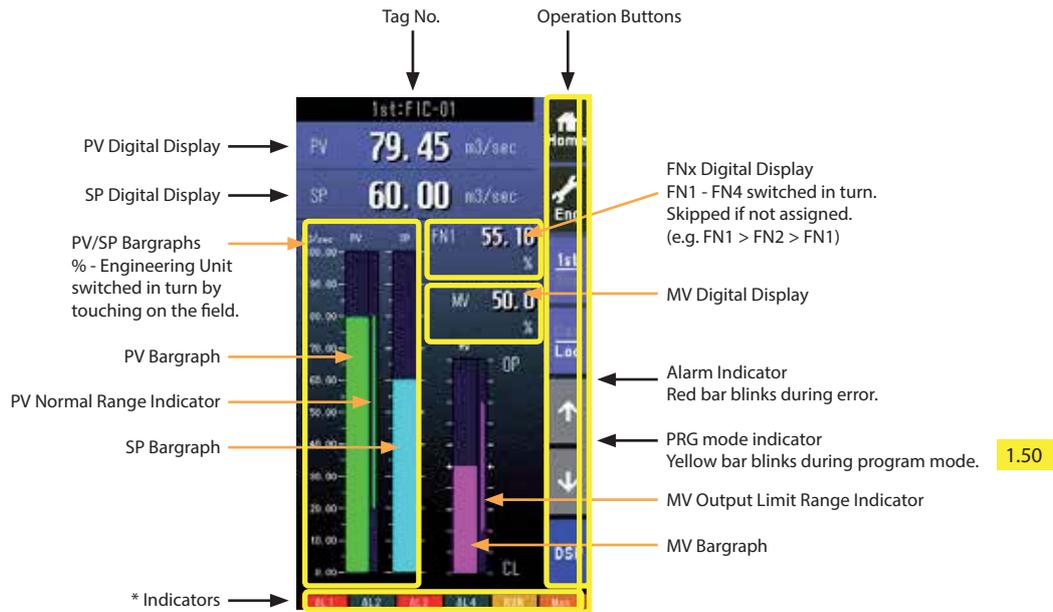
When more than one error has occurred at once, the most critical error is indicated.

MESSAGE	DESCRIPTION	PRIORITY
ERROR: EEPROM database	Equivalent to GROUP 00 ITEM 21	HIGH
ERROR: PV	Equivalent to GROUP 00 ITEM 22	
ERROR: MV feedback	Equivalent to GROUP 00 ITEM 23	
ERROR: Function block	Equivalent to GROUP 00 ITEM 24	☒
ERROR: Control overload	Equivalent to GROUP 00 ITEM 25	LOW
ERROR: Modbus communication	Modbus communication module error (PSC200/210)	
ERROR: Backup module	Backup error (PSC110/210)	

* Indicators

INDICATOR	EXPLANATIONS
AL1 to AL4	Background color turns red during alarm.
RUN / STOP	RUN: Green in normal conditions; Amber in an abnormality. STOP: Grey when the Controller operation is stopped; Red when the memory is failed.
Auto / Man	Auto: Green Auto indicator turns on. Man: Orange Man indicator turns on. The lamp indicates the status of the loop specified in 'Loop display (MV/OP)' setting.

4.4.2 BARGRAPH DISPLAY VIEW



- Pressing on [1st/2nd] button switches between the primary and secondary loops.
- PV and SP values are shown in engineering unit value.
- Engineering unit and % scale can be switched with PV and SP bargraphs.

PV & SP bargraphs

Touching on the display field switches the PV value in engineering unit and in %. Valid only when 'Selectable' under 'Select unit mode' selection is specified.

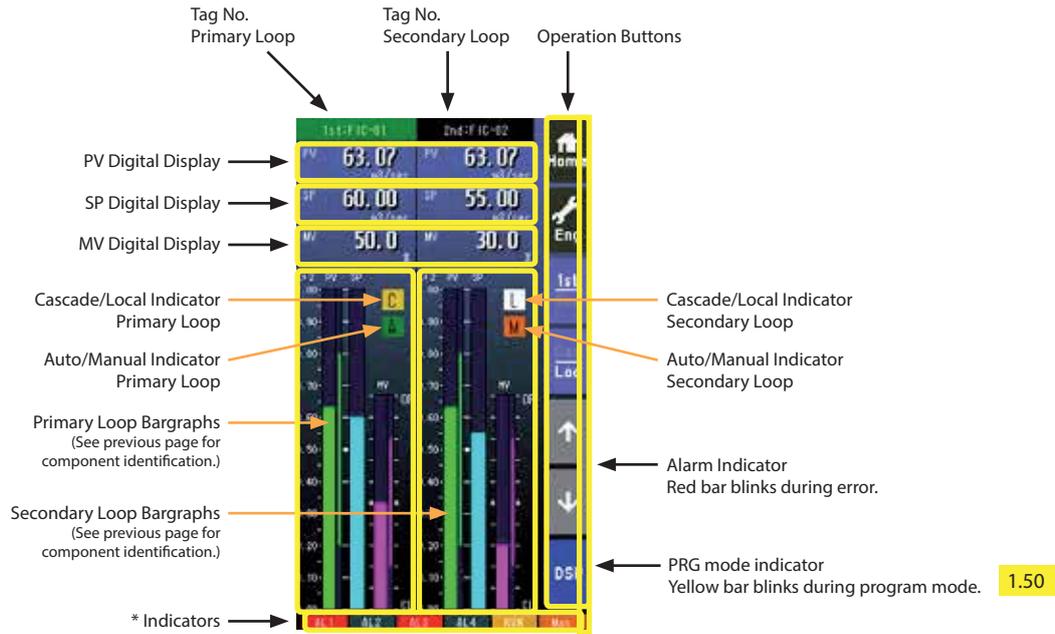
FNx digital display

Touching on the display field switches the FN1 through FN4 in turn. Those not assigned are skipped (e.g. FN1 > FN2 > FN1).

* Indicators

INDICATOR	EXPLANATIONS
AL1 to AL4	Background color turns red during alarm.
RUN / STOP	RUN: Green in normal conditions; Amber in an abnormality. STOP: Grey when the Controller operation is stopped; Red when the memory is failed.
Auto / Man	Auto: Green Auto indicator turns on. Man: Orange Man indicator turns on. The lamp indicates the status of the loop specified in 'Loop display (MV/OP)' setting.

4.4.3 DUAL LOOP BARGRAPH VIEW

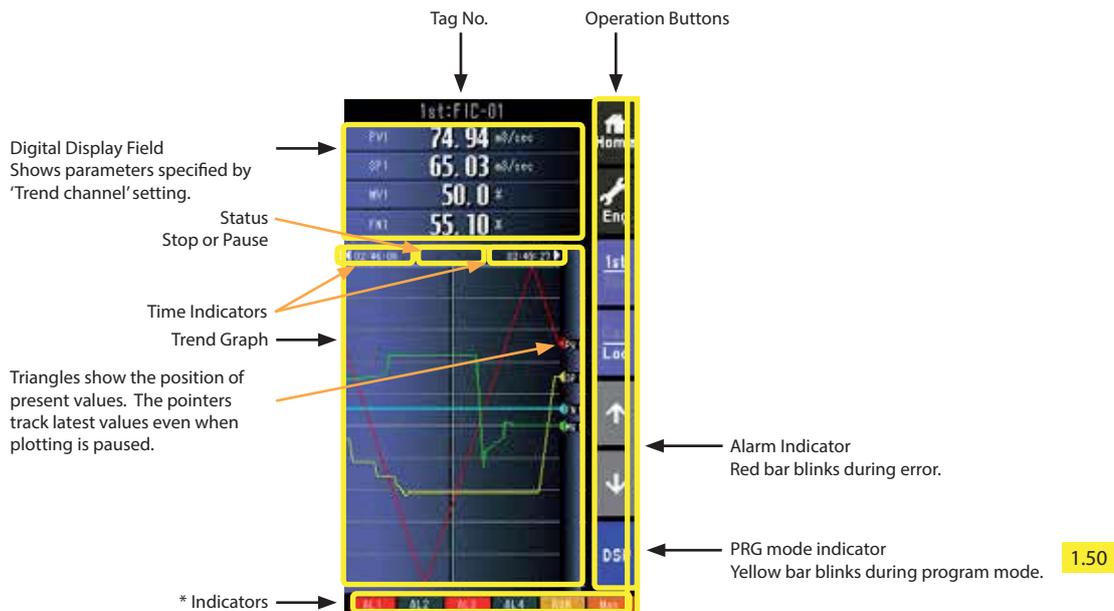


- Pressing on [1st/2nd] button switches between the primary and secondary loops.
- The secondary loop bargraph field is blank with only the background color when the secondary loop is not assigned.
- The background color of the tag field for the selected loop turns to the color specified in 'Selected loop color' setting.

* Indicators

INDICATOR	EXPLANATIONS
AL1 to AL4	Background color turns red during alarm.
RUN / STOP	RUN: Green in normal conditions; Amber in an abnormality. STOP: Grey when the Controller operation is stopped; Red when the memory is failed.
Auto / Man	Auto: Green Auto indicator turns on. Man: Orange Man indicator turns on. The lamp indicates the status of the loop specified in 'Loop display (MV/OP)' setting.

4.4.4 SHORT TREND VIEW



- Pressing on [1st/2nd] button switches between the primary and secondary loops.
- 200 samples are plotted on the chart.
- The graph operation is linked with that on Tuning view.
- Graph plotting is reset to restart in either of the following conditions:
 - When the power supply is turned on with 'Trend recording' set to 'Start.'
 - When 'Trend recording' setting is changed from 'Stop' to 'Start.'
 - When 'Storing interval' setting is changed.
 - When 'Trend channel' setting is changed.
 - When setting is initialized.

Trend graph

Plotting is frozen by touching on the chart. The screen shows 'Pause' while it is stopped. Plotting is restarted at the point of latest data sampling when the chart is touched again.

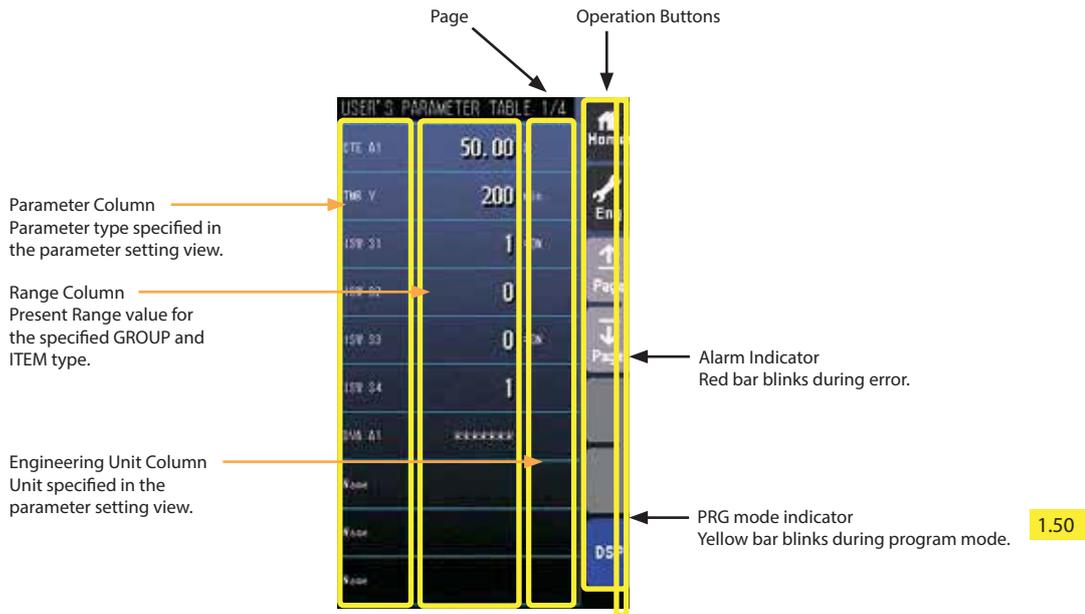
Time indicators

The chart can be scrolled by half the screen chart span when time indicator is touched (max. two chart spans). It moves to the directions indicated with arrows beside the time indication. Scrolling is available when the arrows are yellow.

* Indicators

INDICATOR	EXPLANATIONS
AL1 to AL4	Background color turns red during alarm.
RUN / STOP	RUN: Green in normal conditions; Amber in an abnormality. STOP: Grey when the Controller operation is stopped; Red when the memory is failed.
Auto / Man	Auto: Green Auto indicator turns on. Man: Orange Man indicator turns on. The lamp indicates the status of the loop specified in 'Loop display (MV/OP)' setting.

4.4.5 USER'S PARAMETER TABLE VIEW 1.50



- Parameters types (parameter column in the above figure) cannot be changed in the Operation view mode, but can be registered in the same view in the Engineering views mode. Refer to: 4.5.5 USER'S PARAMETER TABLE VIEW for details.
- Only the parameter type identification is displayed when it is disabled in the Parameter Setting view.
- '*****' is indicated in Range cell when illegal GROUP and/or ITEM No. are set for the parameter.

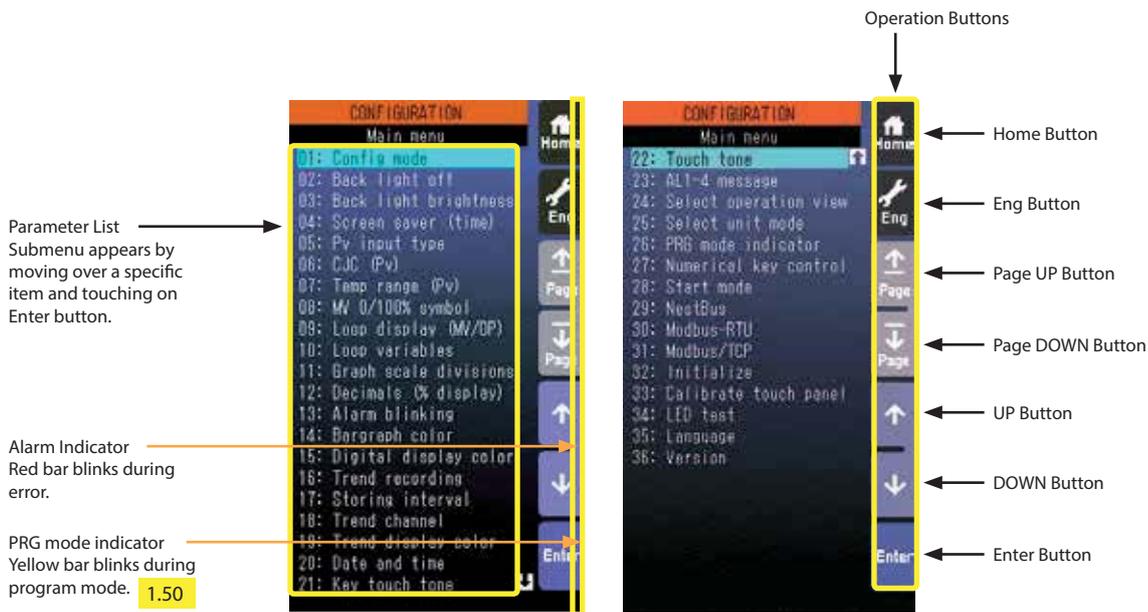
Range value

Touching over a Range cell opens a numeric keypad.

The numeric keypad is not available (1) when '*****' is indicated in Range cell for which illegal GROUP and/or ITEM No. are set, or (2) when the Config. mode is set to 'SFEW'.

4.5 ENGINEERING VIEWS

4.5.1 CONFIGURATION VIEW



Home button

Used to switch the view to the one registered as Home operation view.

Eng button

Used to switch among the engineering views.

Pressing/holding the button for approx. 1 second switches the view to Operation view.

Page UP button

Used to go to the previous page of the main menu.

Page DOWN button

Used to go to the next page of the main menu.

UP button

Used to go up to next item among listed selections.

DOWN button

Used to go down to next item among listed selections.

Enter button

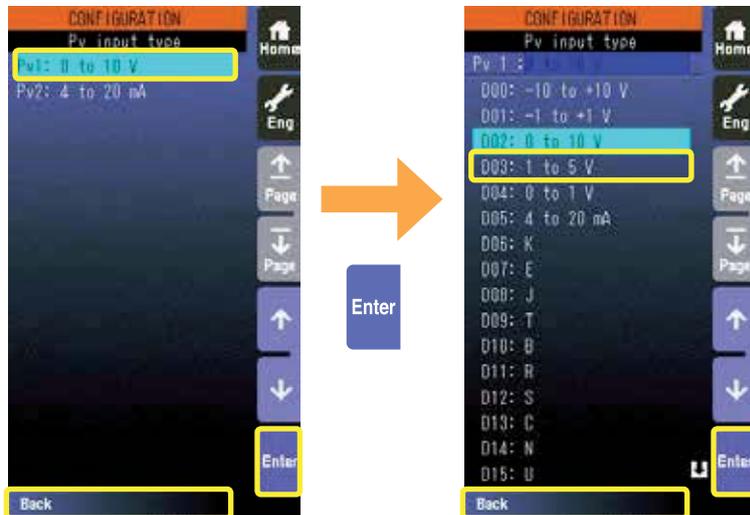
Used to apply the data indicated on the display.

SETTING EXAMPLES

Choosing from multiple selections (e.g. changing Pv1 input type from 0-10 V to 1-5 V)

- 1) Choose "PV input type" in Configuration view menu and touch [Enter].
- 2) Choose PV input (Pv1 in this example) you want to change, and touch [Enter].
- 3) Choose input type (D03: 1 to 5 V in this example) you want to set, and touch [Enter].

Note: Touch [Back] at the bottom to go back to previous view.



Choosing colors (e.g. changing Pv1 normal range bargraph color from green to blue)

- 1) Choose "Bargraph color" in Configuration view menu and touch [Enter].
- 2) Choose signal type ("PV1" in this example) you want to change, and touch [Enter].
- 3) Touch color indicator (green section to the right of "Norm" in this example) you want to change, and touch [Enter].
- 4) Color chart appears on the screen. Touch new color (blue) and touch [Enter].

Note: Touch [Back] at the bottom to go back to previous view.



Entering alphanumeric characters (e.g. changing AL1 message)

- 1) Choose "AL1-4 message" in Configuration view menu and touch [Enter].
- 2) Choose AL message (AL1 in this example) you want to change, and touch [Enter].
- 3) Enter characters you want to set, and touch [Enter].

Use [] [] to shift the cursor position.

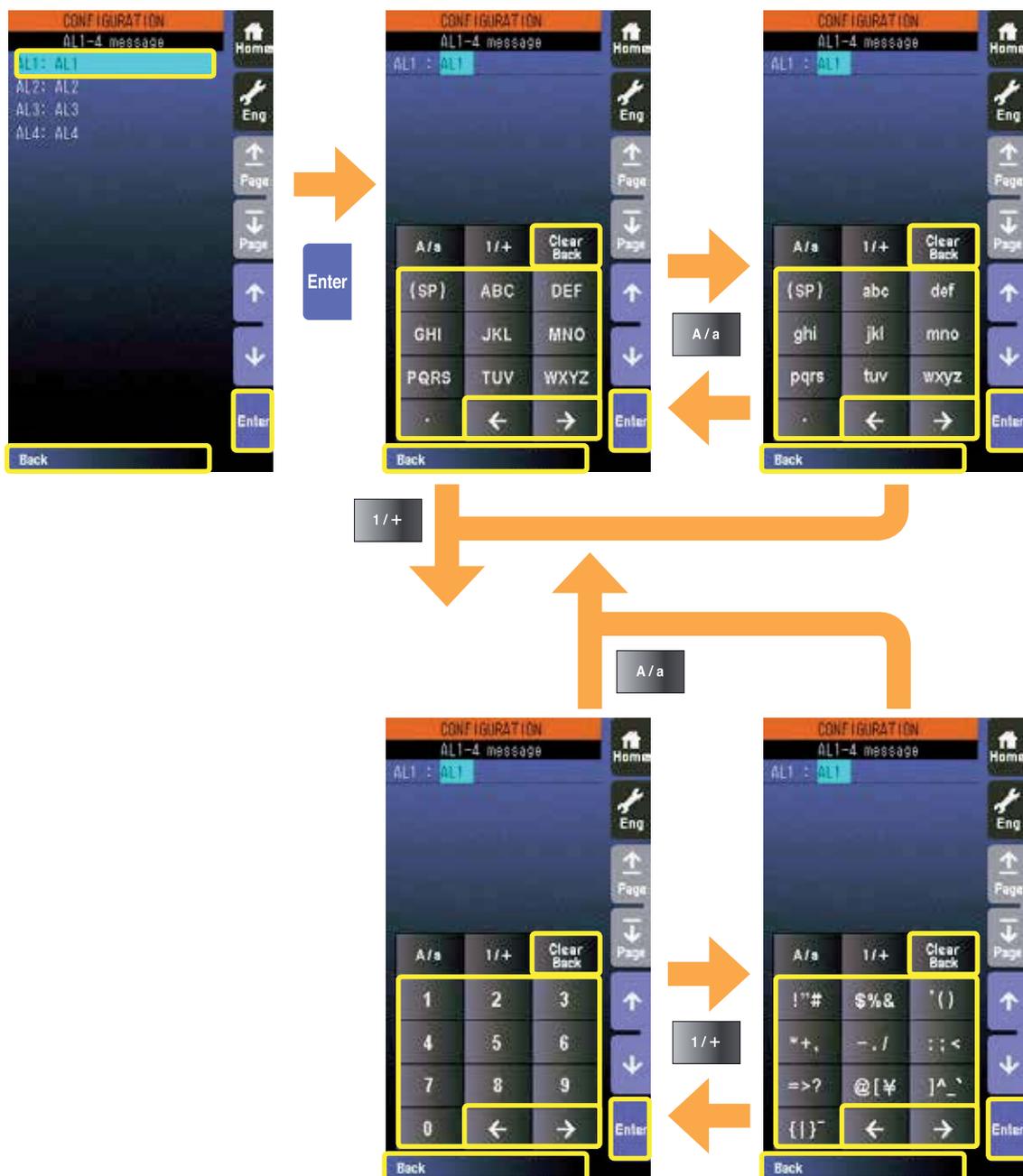
[Clear Back] deletes the character and its space at the position of the cursor.

[A/a] switches between capitals and small letters.

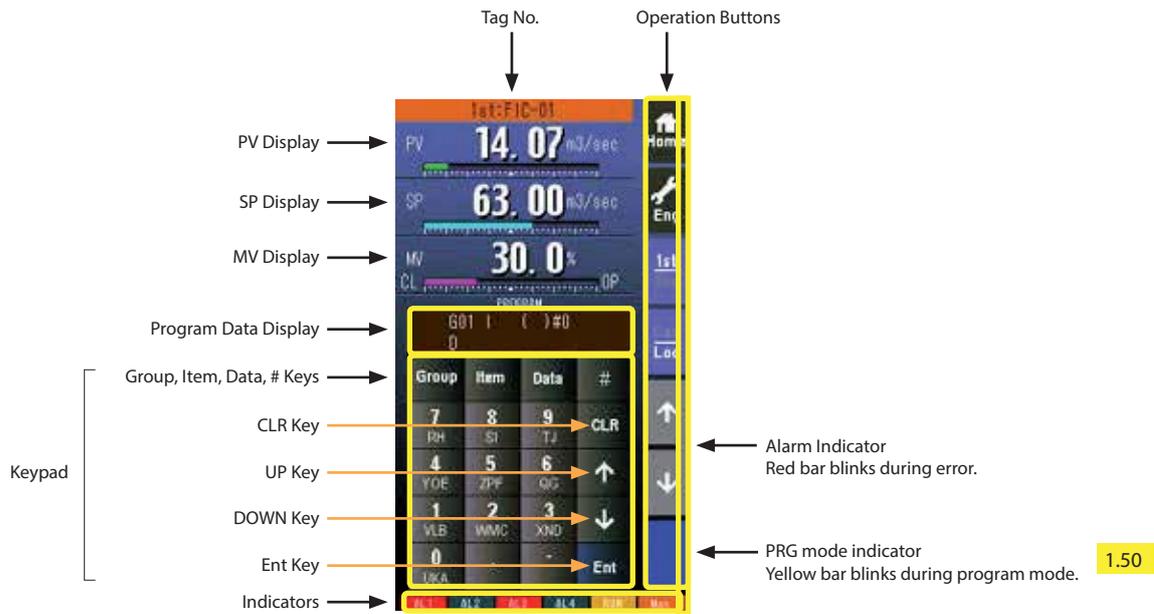
[1/+] switches between numeric and special characters.

Touching one key each time switches between the characters indicated on the key (e.g. A > B > C > A).

Note: Touch [Back] at the bottom to go back to previous view.



4.5.2 PROGRAMMING VIEW



- The Programming View appears only when the Config. mode is set to 'Front Panel' in the Configuration View. It is skipped when it is set to 'SFEW' or 'SCCFG'.
- Items marked with ☒ (setting data) and without ☒ (automatically changeable parameters) are not modifiable without setting the Maintenance Switch (ITEM 01) of the relevant group to '1' (program mode).
- Refer to the PSC100/200 Series Function Block List (EM-6460-B) for setting items and data options.

Group key

Used to choose GROUP No.

Item key

Used to choose ITEM No.

Data key

Used to choose DATA.

key

Used to shift alphanumeric input mode. (See next page)

CLR key

Used to clear the program data display.

UP key

Used to go to the previous ITEM number.

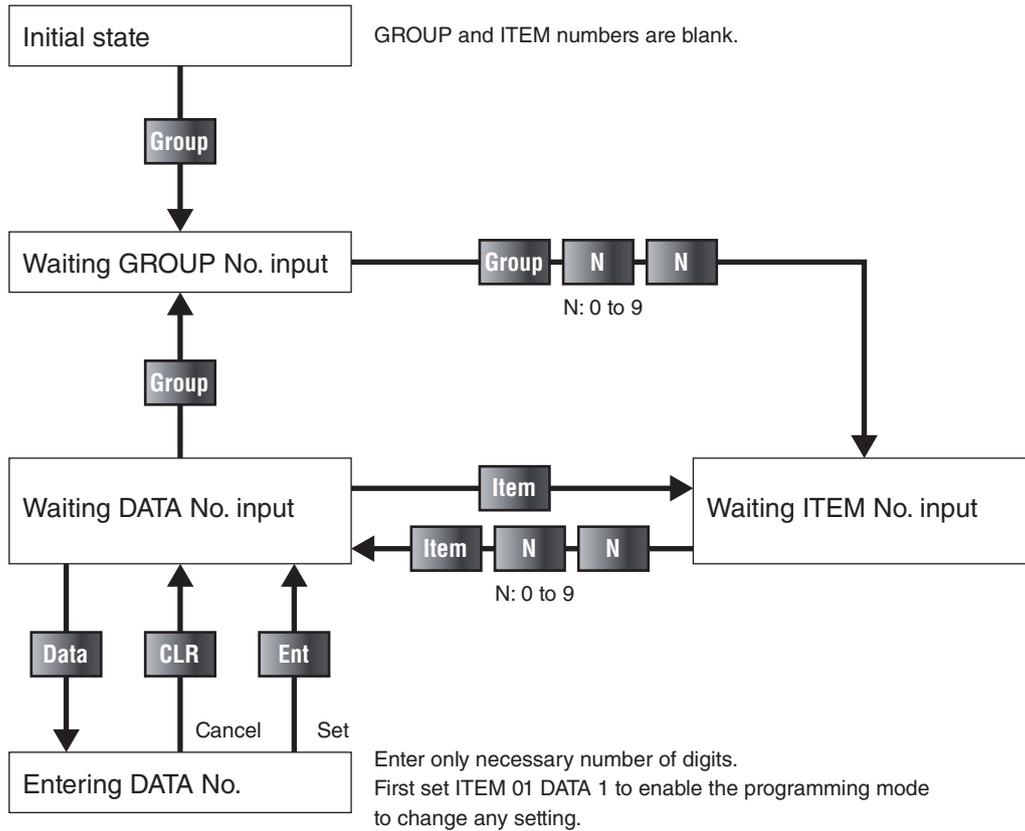
DOWN key

Used to go to the next ITEM number.

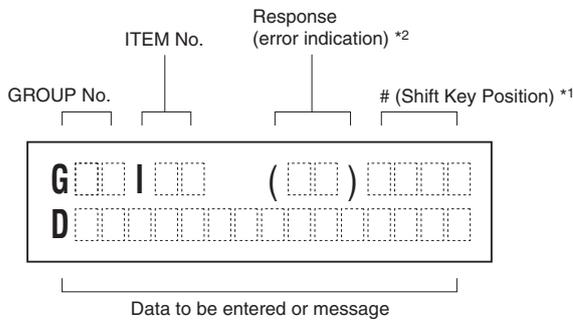
Ent key

Used to apply the data on the display.

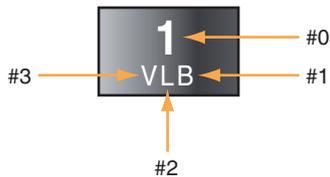
■ OPERATION FLOWCHART



■ PROGRAM DATA FIELD & KEYPAD



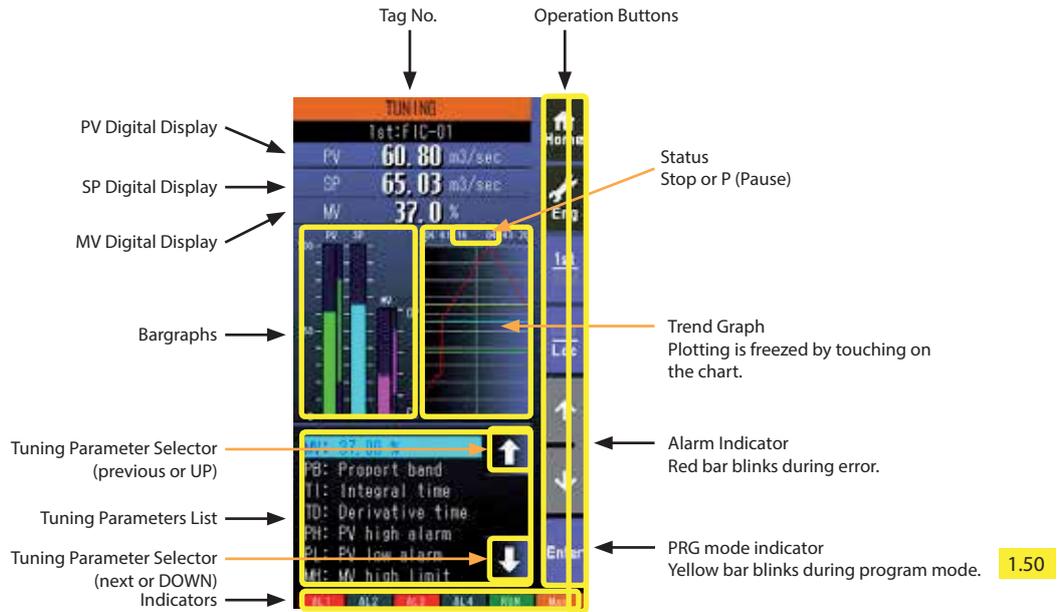
[Example]



*1. [#] key is used to enter alphabets.
Shift key position indication switches in order of #1, #2, #3, #0 ... every time the key is pressed. Level #0 is for entering numeric, and levels #1 to #3 indicate the position of alphabets (below the numeric) from the right to left.

*2. Response message after format check
OK : OK
NG : No good
ER : Communication error
OE : Operation procedure error
DE : Data syntax error
VE : Non-registered input unit table (not initialized)
WE : Input unit table writing error

4.5.3 TUNING (AUTO-TUNING) VIEW



- This view is available when the relevant control loop uses basic PID or advanced PID control.
- Specific tuning parameters can be selected not only by UP/DOWN buttons but also by directly touching them.
- 100 sample data is plotted on the trend graph.
- The trend graph is reset (cleared) and restarted when:
 - When the power supply is turned on with 'Trend recording' set to 'Start.'
 - When 'Trend recording' setting is changed from 'Stop' to 'Start.'
 - When 'Storing interval' setting is changed.
 - When 'Trend channel' setting is changed.
 - When setting is initialized.

Enter button

Used select and go to parameter setting of the selector parameter.

Tuning parameter selector (previous or UP)

Used to move up the cursor to choose tuning parameters.

Tuning parameter selector (next or DOWN)

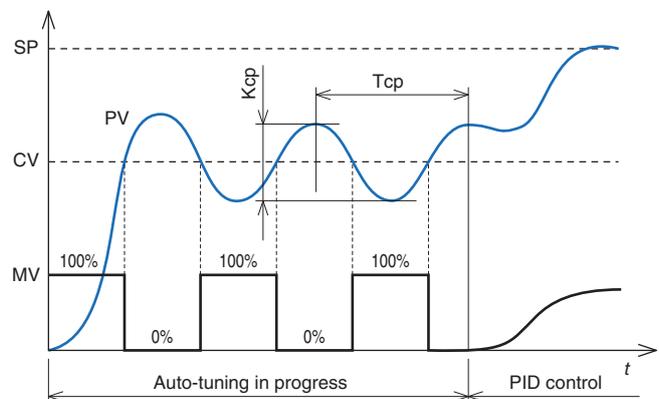
Used to move down the cursor to choose tuning parameters.

☒ AUTO TUNING

The SC Controller uses the limit cycle oscillation for auto-tuning. The control output (MV) is given with a cyclic oscillation (two cycles) at the reference tuning point (CV) where the PV behavior is observed. The most appropriate PID parameters are then computed from measured values of the amplitude and frequency of the established output limit cycle waveform.

Control output (MV) is changed in a step between 100% and 0% as default setting. Limited cycle can be selected if the degree of sudden changes to the MV is not desired.

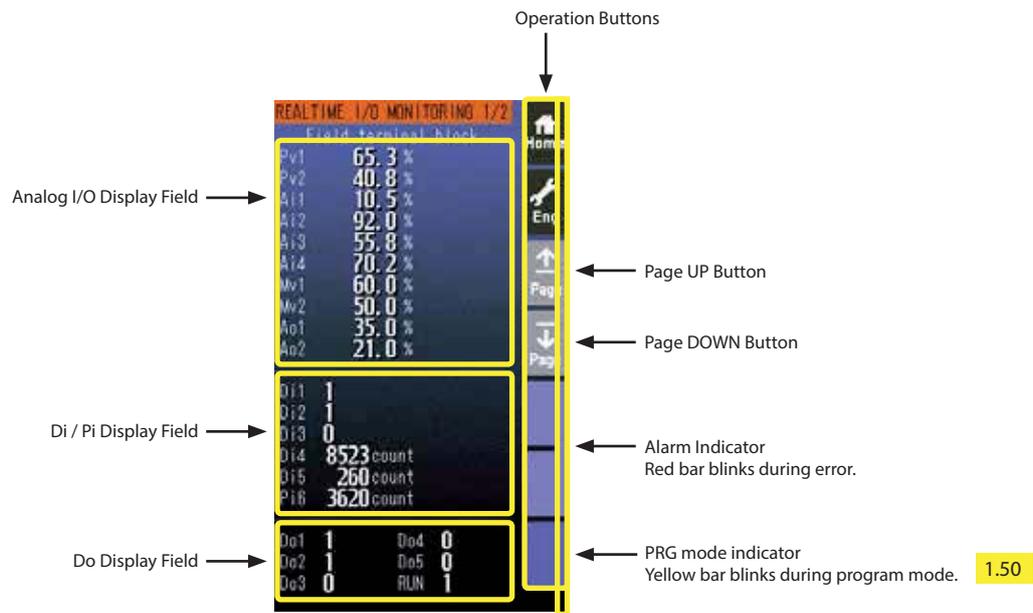
Be aware that the process may react in an unexpected way during auto-tuning procedure. Naturally the parameters obtained in this method may not be the most appropriate. Manual adjustments are recommended to tune them finely.



The above figure shows operation with reverse control action. MV cycles are inverted with direct action. Wait to start the procedure until PV is stabilized.

4.5.4 REALTIME I/O MONITORING VIEW

Page 1/2: Field Terminal Block



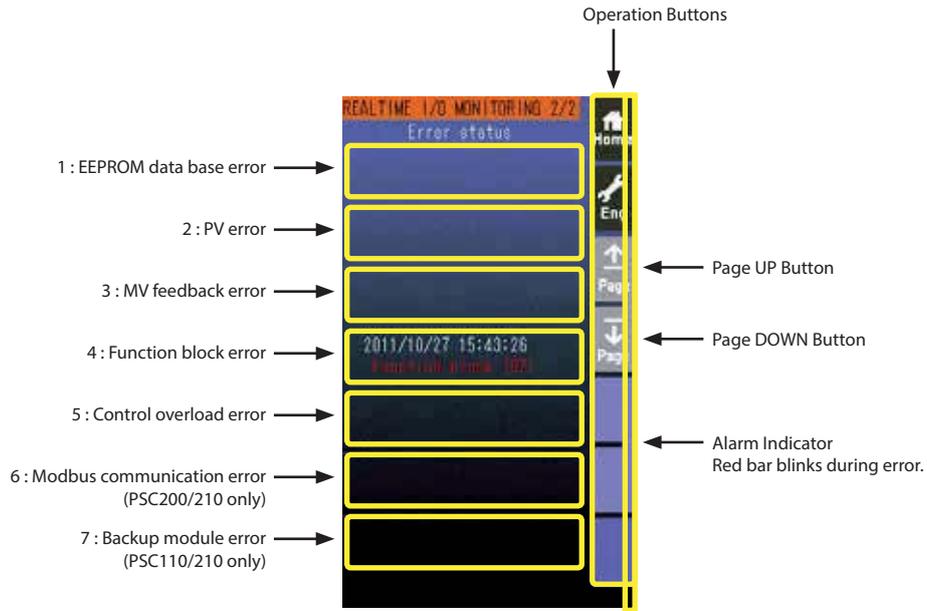
- Analog I/O values are represented in % of the field terminal block range.
- DiX and PiX display items depend upon the user's terminal assignments.
- Di / Do status is given as 1 or 0.
- Pi displays indicate accumulated counts between 0 and 9999 (unit: count).

Page UP button

Used to go to the previous page.

Page DOWN button

Used to go to the next page.



- Error status fields contain the error type and the date it occurred (YYYY/MM/DD HH/MM/SS). (See the example below.)

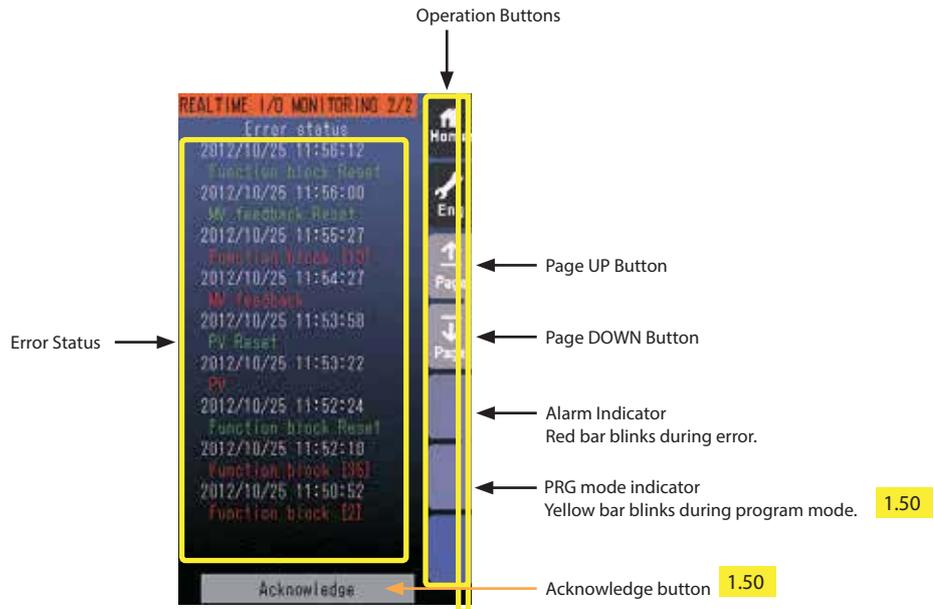


- When more than one error among the errors 1 through 5 has occurred, the only most critical error is displayed. Priority is given as in the table below.

ERROR No.	MESSAGE	PRIORITY	REMARK
1	EEPROM database	HIGH	
2	PV		
3	MV feedback	☒	
4	Function block	LOW	
5	Control overload		
6	Modbus communication	----	PSC200/210 only
7	Backup module	----	PSC110/210 only

For example, only the error 2 is displayed while both the error 2 and 3 are true. Then the error 3 is displayed after the error 2 is cancelled.

- One of the errors 1 through 5 plus the error 6 and/or 7 can be displayed at once.



Acknowledge button 1.50

Pressing/holding the button for approx. 1 second deletes errors which have been reset.

- Error status fields contain the error type in red and the date it occurred (YYYY/MM/DD HH/MM/SS). (See the example below.)

For abnormal function block and corruption of EEPROM database, also group number is displayed.



- When error is reset, the date it is reset (YYYY/MM/DD) and a message in green are displayed.

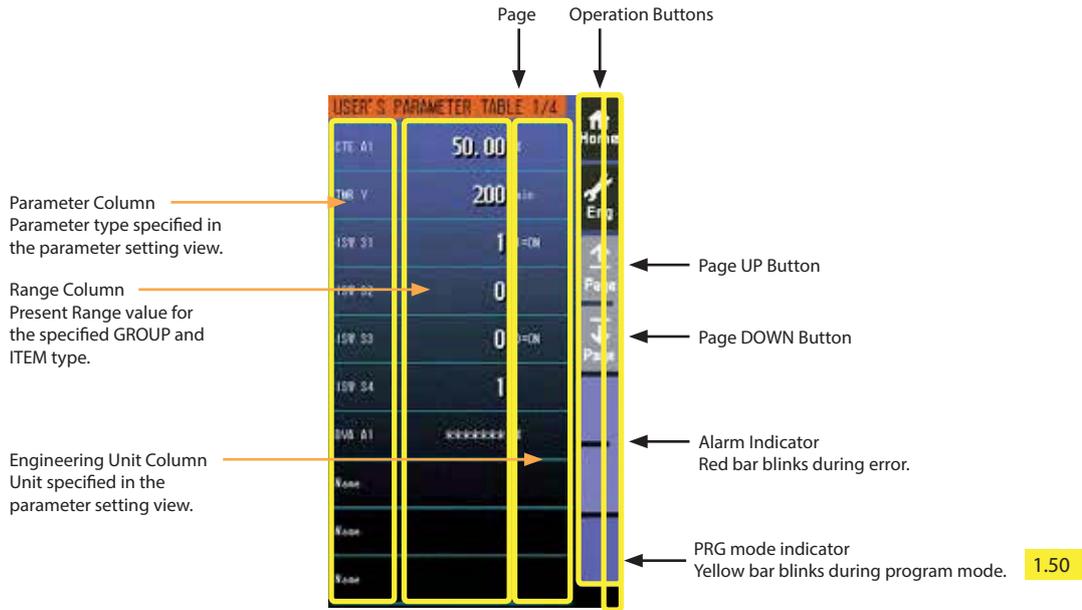


- At the maximum of 10 error statuses are displayed. When they exceed 10, oldest one is deleted. Error type is given as in the table below.

ERROR No.	MESSAGE	REMARK
1	EEPROM database	
2	PV	
3	MV feedback	
4	Function block	
5	Control overload	
6	Modbus communication	PSC200/210 only
7	Backup module	PSC110/210 only

- Error status is deleted when the power supply is reset.

4.5.5 USER'S PARAMETER TABLE VIEW



- At the maximum of 40 parameters (10 per page, 4 pages in total) can be registered for the user's convenience.
- Only the parameter type identification is displayed when it is disabled in the Parameter Setting view.
- '*****' is indicated in Range cell when illegal GROUP and/or ITEM No. are set for the parameter.
- 'Config. mode' (Configuration view) must be set to 'Front panel' to apply any changes to the parameters.

Page UP button

Used to go to the previous page.

Page DOWN button

Used to go to the next page.

Parameter

Touching over a parameter cell switches the view to the Parameter Setting View for the row.

Range value

Touching over a Range cell opens a numeric keypad.

The numeric keypad is not available (1) when '*****' is indicated in Range cell for which illegal GROUP and/or ITEM No. are set, or (2) when the Config. mode is set to 'SFEW'

Caution

Only the acceleration button among the hardware buttons at the front is usable. The MV value UP/DOWN buttons and the AUTO / MAN selector are locked.

☒ PARAMETER SETTING VIEW OPERATIONS



Page UP button
Locked

Page DOWN button
Locked

UP button
Used to go up to next item in the parameter setting field.

DOWN button
Used to go down to next item in the parameter setting field.

Enter button
Used to select an item to change its value.

Back button
Used to go back to User's Parameter Table view.

Parameter setting field
Shows Parameter setting items.

• Setting Items

ITEMS marked with ☒ in the PSC100/200 Series Function Block List are available for changes. All parameters are reset to the default values by the initialization in the Configuration view.

SETTING ITEM	DATA INPUT	DEFAULT	CONTENTS
Setting	Enable / Disable	Disable	Enable / Disable the parameter in the User's Parameter Table view.
Parameter	Max. 10 characters	Name	Parameter identification
GROUP *1	0 to 99	0	GROUP No. in the Function Block List
ITEM *1	0 to 99	0	ITEM No. in the Function Block List
Range Hi limit	1.50 ±32000	10000	Range's upper range value
Range Lo limit	1.50 ±32000	0	Range's lower range value
Decimal place	1.50 0 to 5	2	Range's decimal point position
Engineering unit	Max. 8 characters	Unit	Range's engineering unit
DATA Hi limit	±32000	10000	DATA's upper range value
DATA Lo limit	±32000	0	DATA's lower range value
DATA decimal place	0 to 5	2	DATA's decimal point position

*1. '*****' is indicated in DATA cell when illegal GROUP and/or ITEM No. are set for the parameter.

5. PROGRAMMING FUNCTION BLOCKS WITH THE SFEW3E

The Loop Configuration Builder Software (model: SFEW3E) is used to upload and download the function block data.

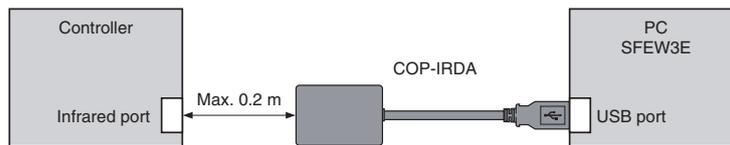
Refer to the Users Manual for the SFEW3E for detailed descriptions.

5.1 CONNECTING THE CONTROLLER TO PC

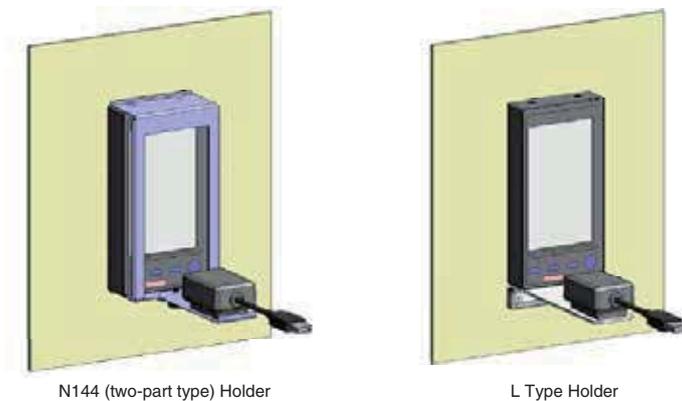
Connect the Controller to PC in order to communicate with the SFEW3E.

☒ INFRARED COMMUNICATION TYPE

- 1) Install the SFEW3E program and driver for Infrared Communication Adaptor device (model: COP-IRDA) to the PC and connect the COP-IRDA to its USB port.



Using Holders



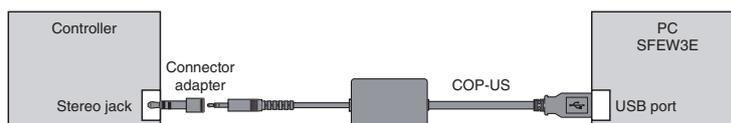
- 2) Start up the SFEW3E and set the COM port number assigned to the USB in the initial setting.
- 3) Set the infrared port in the direct line to face the COP-IRDA's send/receive window, within the maximum distance of 0.2 meter.
- 4) Go to Engineering View and choose Configuration > 01 : Config mode > 02 : SFEW. The front monitoring LED starts blinking slowly to indicate the ready state.

Caution

Only one Controller module can communicate with the SFEW3E or SCCFG when multiple modules are mounted side by side. Detecting more than one module at once in the communication mode will result in error.

☒ STEREO JACK TYPE

- 1) Install the SFEW3E program and driver for PC Configurator cable (model: COP-US) to the PC and connect the COP-US to its USB port.



- 2) Start up the SFEW3E and set the COM port number assigned to the USB in the initial setting.
- 3) Connect the COP-US to the connector adaptor and after this, to the Controller's stereo jack port.
- 4) Go to Engineering View and choose Configuration > 01 : Config mode > 02 : SFEW. The front monitoring LED starts blinking slowly to indicate the ready state.

5.2 APPLICATION EXAMPLE

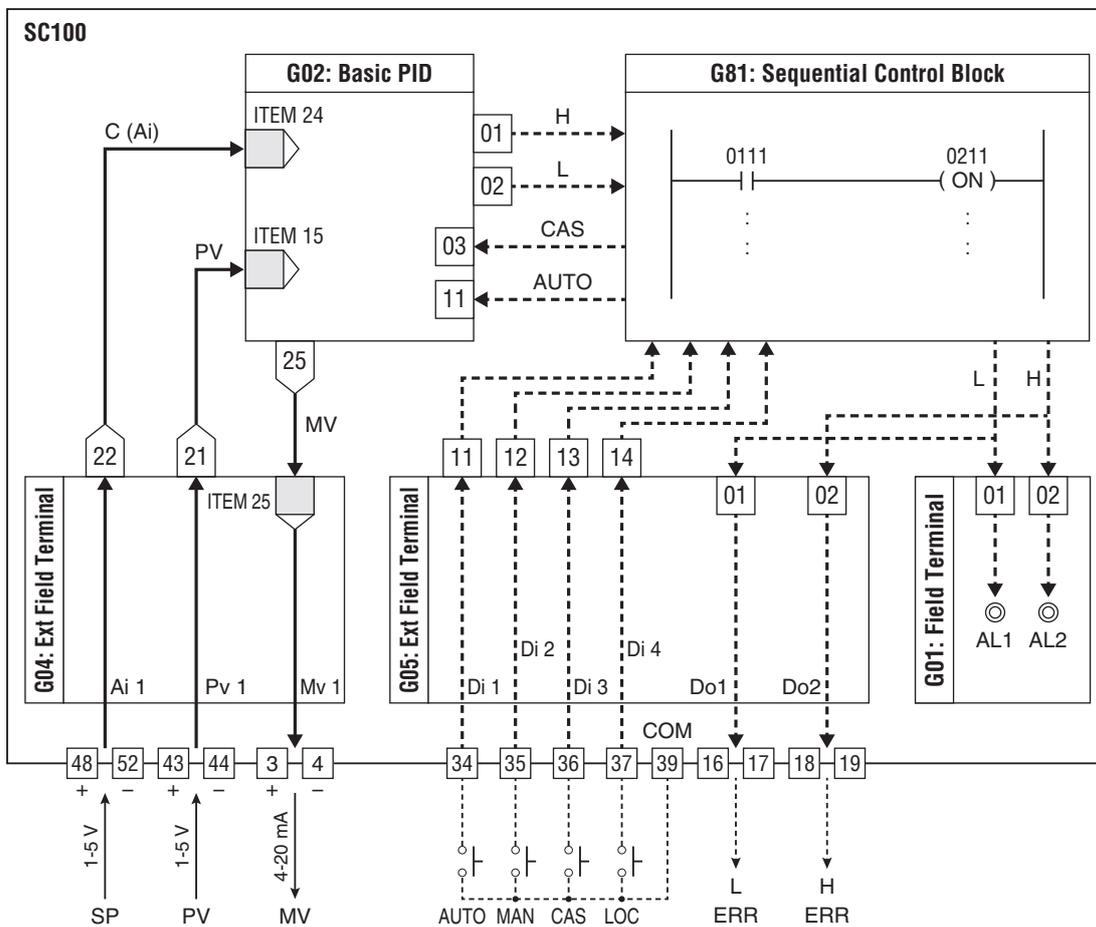
The figure below shows an application example of PID control functions.

- 1) Setpoint (SP) and measured value (PV) are supplied as analog input signals from the exterior terminals (SP is connected to Ai Input Terminal).
- 2) They are provided to the basic PID control block and the manipulated value (MV), processed result of the function block, is output as an analog signal.
- 3) AUTO (auto) momentary switch, MAN (manual) momentary switch, CAS (cascade) momentary switch and LOC (local) momentary switch are supplied as discrete input signals.
- 4) High/Low limit alarm trips for PV value are provided to discrete output signals and indicated with alarm lamps.

The setting procedure is explained in the following sub sections.

Auto/Man switching and Cas/Loc switching operations are available at the front control buttons and by the touch panel operations of the Controller.

PID control is performed using the SP value provided from the exterior terminals during Cascade control mode, while it is using that is saved in the internal memory of the Controller during Local control mode.

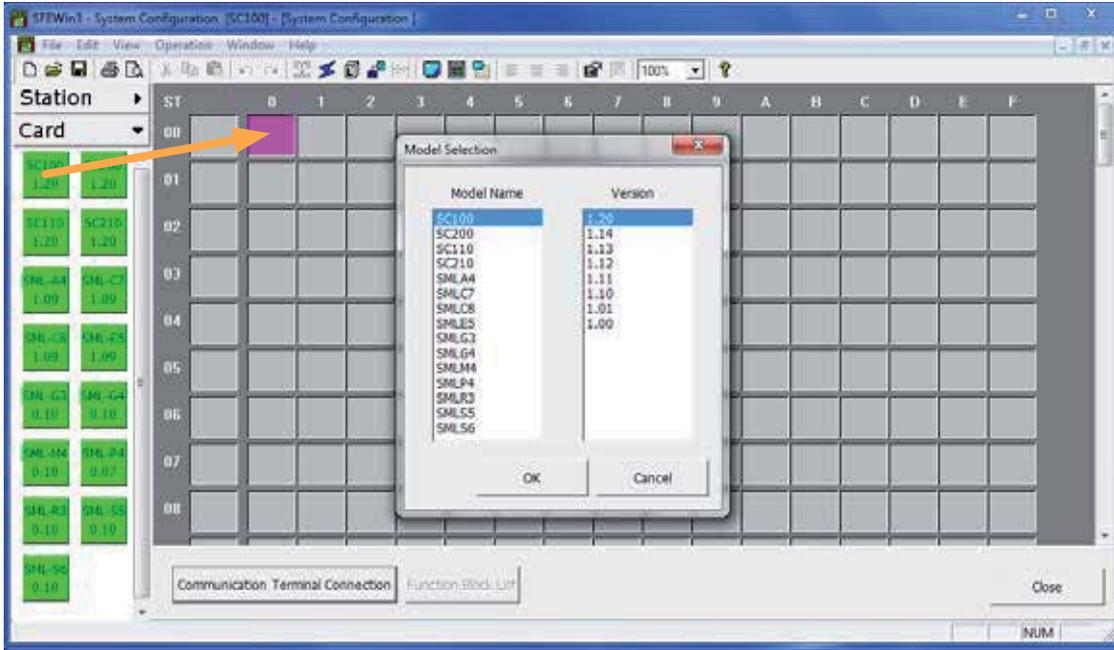


5.3 PLACING THE DEVICE

Start up the SFEW3E program. A blank System Configuration view is displayed.

Drag the PSC100 icon from the module selector window on the left and drop it at Station 00, Card No. 0 slot in the setting window on the right.

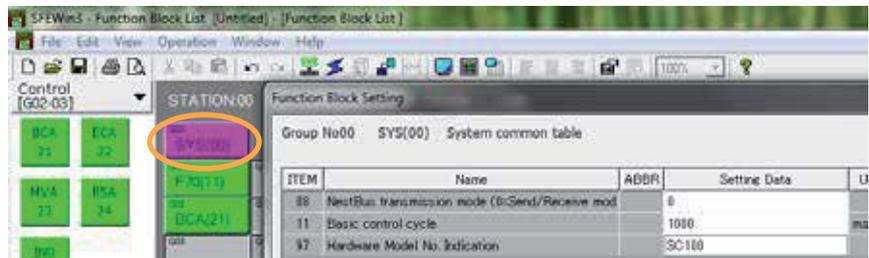
Alternatively, double-click the Station 00/Card No. 0 slot to open Model Selection dialog to specify the model and version numbers.



5.4 CHANGING BASIC CONTROL CYCLE

Double-click the placed PSC100 icon in System Configuration view to open Function Block List view.

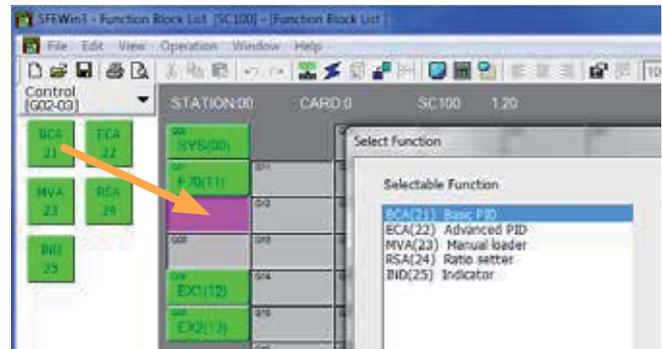
Double-click the SYS(00) icon to open the function block list, to change the basic control cycle (ITEM 11), which is set to 1000 ms (1 sec) as default.



5.5 ASSIGNING PID CONTROL BLOCK

Control function blocks can be assigned to Groups 02 and 03. Click Control [G02-03] group button in the left window and drag BCA 21 function block icon and drop it at G02 slot in the right window.

Alternatively, double-click the G02 slot to open Select Function dialog to specify the Basic PID.



5.6 CONNECTING ANALOG TERMINALS

SP, PV and MV signals are to be connected.

Click Analog Terminal Connection button in Function Block List view to open Analog Terminal Connection view.

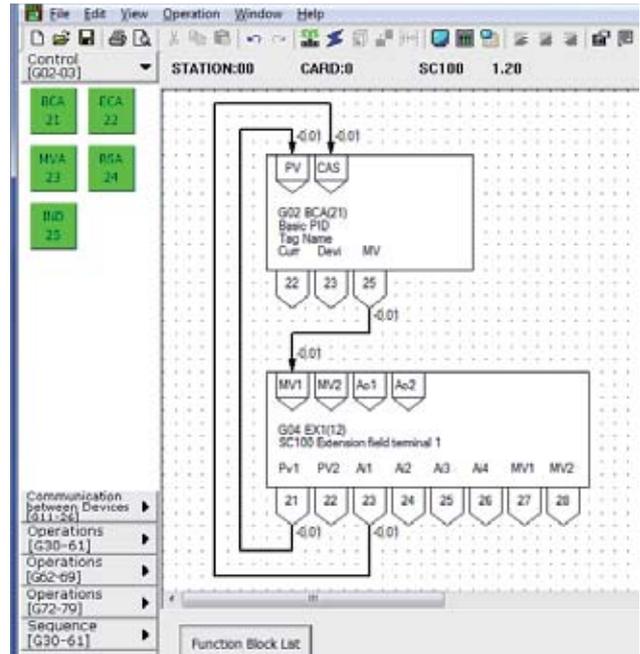
Drag/drop function blocks placed on the screen (do not hold over terminals) to rearrange their positions for ease of wiring.

Click at a terminal and a junction point to draw a line between terminals.

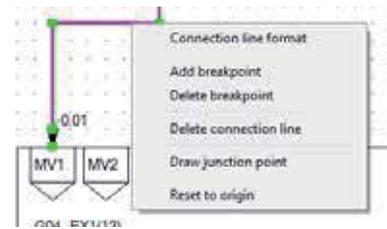
Measured input (PV) is supplied to Basic PID block. Connect PV1 analog output terminal (21) of G04 EX1 (12) PSC100 Extension field terminal 1 module to PV input terminal of G02 BCA (21) Basic PID module.

Setpoint (SP) is supplied by external cascade connection to Basic PID block. Connect Ai 1 analog output terminal (23) of G04 EX1 module to CAS input terminal of G02 BCA module.

Manipulated value (MV) is provided to PSC100 Extension field terminal 1 block. Connect MV analog output terminal (25) of G02 BCA module to MV1 input terminal of G04 EX1 module.



Right-click over a connection line to open Connection Line Format window or to add a junction point. You can change line type and color so that connections can be easily identified, e.g. red for Pv, blue for Mv.

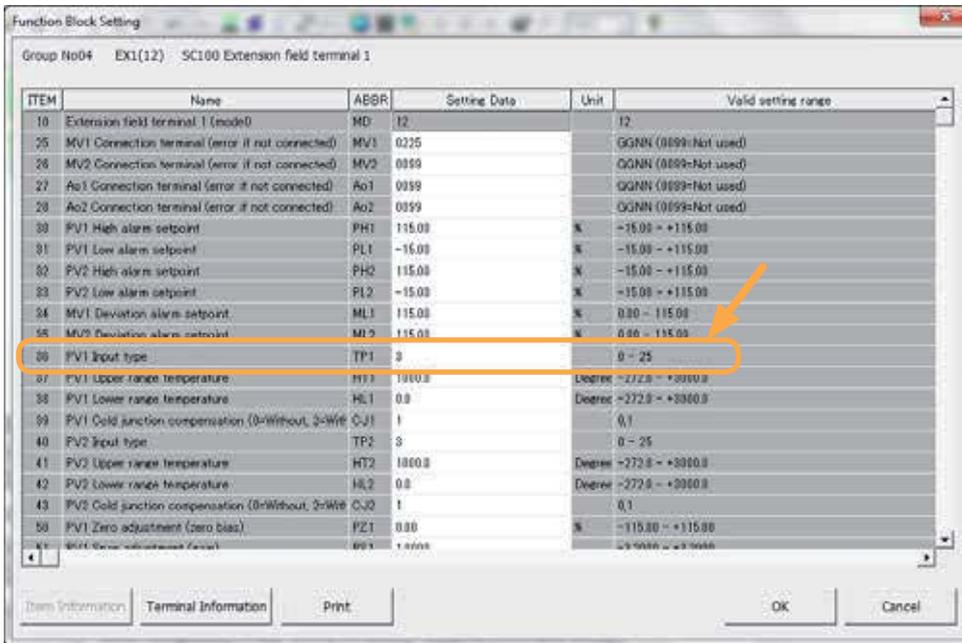


5.7 SETTING EXTENSION FIELD TERMINAL BLOCKS

Go back to Function Block List view and double-click G04 EX1 slot to open Function Block Setting view for the PSC100 Extension field terminal 1.

First specify the measured input (Pv1) signal type. Go to ITEM 36 and enter '3' (1 to 5V) in Setting Data field.

Click OK button to close the view.



Next, double-click G05 EX2 slot to open Function Block Setting view for the PSC100 Extension field terminal 2.

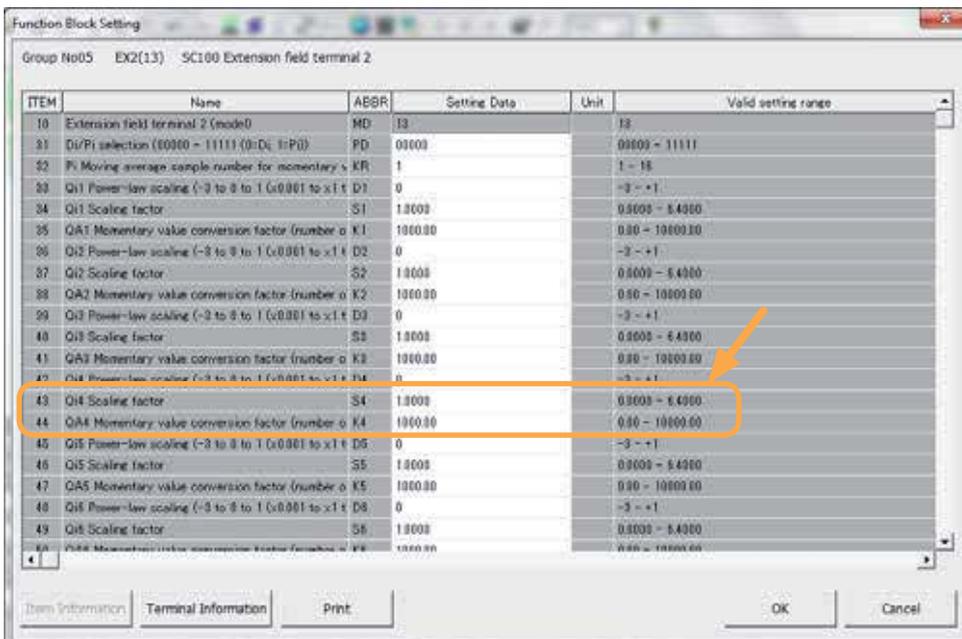
Enable discrete input signals. Discrete status or pulse train input can be selected for each discrete input. Specify as discrete input for four inputs. Go to ITEM 31 and enter '00000' in Setting Data field.

Click OK to close the view.

Next, double-click G01 F70 slot to open Function Block Setting view for the PSC100 Field terminal.

In order to indicate high/low alarm for the PV input on the PSC100 display, go to ITEM 43 and enter 'L' in Setting Data field and then go to ITEM 44 and enter 'H'.

Go through other setting items if necessary.



Relevant function blocks and ITEMS, and the setting examples are as shown below.

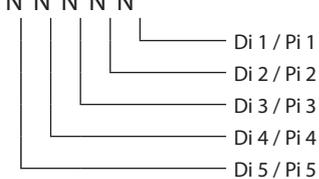
GROUP [01] PSC100 FIELD TERMINAL "☒" marked data modifiable in PROGRAM mode.

ITEM	MDFY	DATA INPUT	SETTING	CONTENTS
43	☒	alphanumeric	L1: L	AL1 comment (max. 4 characters)
44	☒	alphanumeric	L2: H	AL2 comment (max. 4 characters)

GROUP [04] EXTENSION TERMINAL 1 "☒" marked data modifiable in PROGRAM mode.

ITEM	MDFY	DATA INPUT	SETTING	CONTENTS
25	☒	GGNN	M1#: 0225	MV1 connection terminal (error if not connected) GG: Group No. NN: terminal No.
26	☒	GGNN	M2#: 0099	MV2 connection terminal (error if not connected) GG: Group No. NN: terminal No.
27	☒	GGNN	A1#: 0099	Ao1 connection terminal (error if not connected) GG: Group No. NN: terminal No.
28	☒	GGNN	A2#: 0099	Ao2 connection terminal (error if not connected) GG: Group No. NN: terminal No.
36	☒	MM	TP1: 3	Pv 1 input type [MM: input type No.] 12: S 19: Pt100 (JIS'97, IEC) 0: -10-10 V 6: K 13: C 20: Pt100 (JIS'89) 1: -1-1 V 7: E 14: N 21: JPt100 (JIS'89) 2: 0-10 V 8: J 15: U 22: Pt50 (JIS'81) 3: 1-5 V 9: T 16: L 23: Ni100 4: 0-1 V 10: B 17: P 24: MS 5: 4-20 mA 11: R 18: PR 25: DS (Set ITEM37...39 for Pv 1 input type 6...23)

GROUP [05] EXTENSION TERMINAL 2 "☒" marked data modifiable in PROGRAM mode.

ITEM	MDFY	DATA INPUT	SETTING	CONTENTS
31	☒	NNNNN	PD: 00000	Di/Pi selection (0 = Di, 1 = Pi) N N N N N 

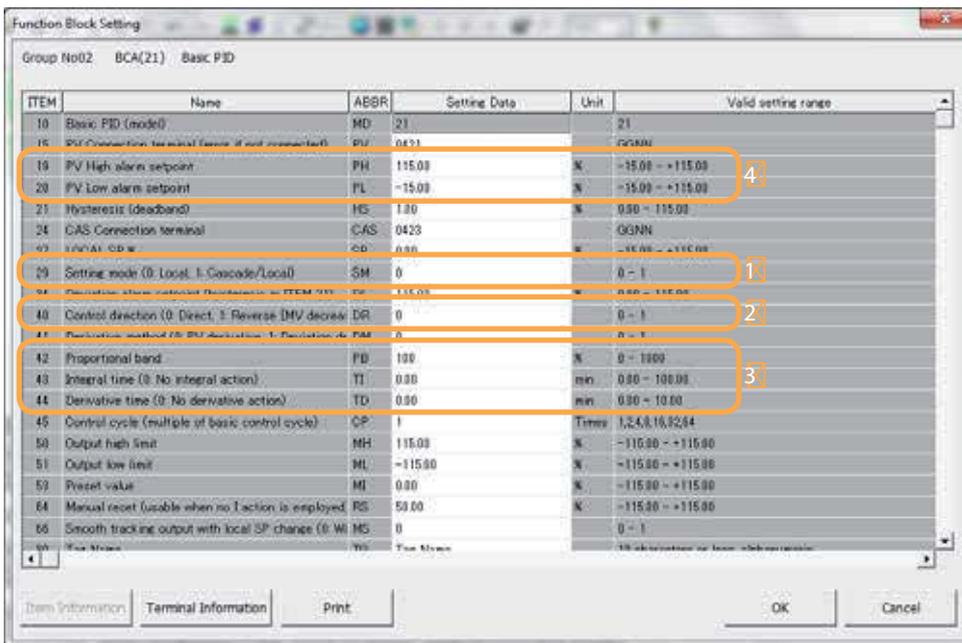
5.8 SETTING PID CONTROL BLOCK

Detailed parameters regarding the Basic PID is set in Function Block Setting view.

Go back to Function Block List view and double-click G02 BCA slot to open the Function Block Setting view.

- ☒ In order to use an external SP value provided to the CAS terminal to control the PID, go to ITEM 29 and enter '1' (Cascade/Local).
- ☒ For the control direction (ITEM 40), enter '1' to decrease MV output or '0' to increase it when PV input is greater than SP. It is set to '1' in normal use.
- ☒ For P, I and D parameters, go to ITEM 42 (proportional band, 0 to 1000%), ITEM 43 (integral time, 0.00 to 100.00 minutes) and ITEM 44 (derivative time, 0.00 to 10.00 minutes).
- ☒ In addition, set ITEM 19 for high alarm setpoint and ITEM 20 for low alarm setpoint (-15.00 to 115.00%) to provide limit alarm trips to discrete outputs.

Go through other setting items if necessary.



5.9 SETTING SEQUENTIAL CONTROL BLOCK

Discrete signals are managed on Sequential Control Blocks.

Click Sequential Control Block Setting button in Function Block List view to open Sequential Control Block Setting view.

Right-click Group 81 slot and choose Enable Setting, then Step00 slot appears below Group 81 slot. Double-click the Step00 slot to open Ladder Setting view.

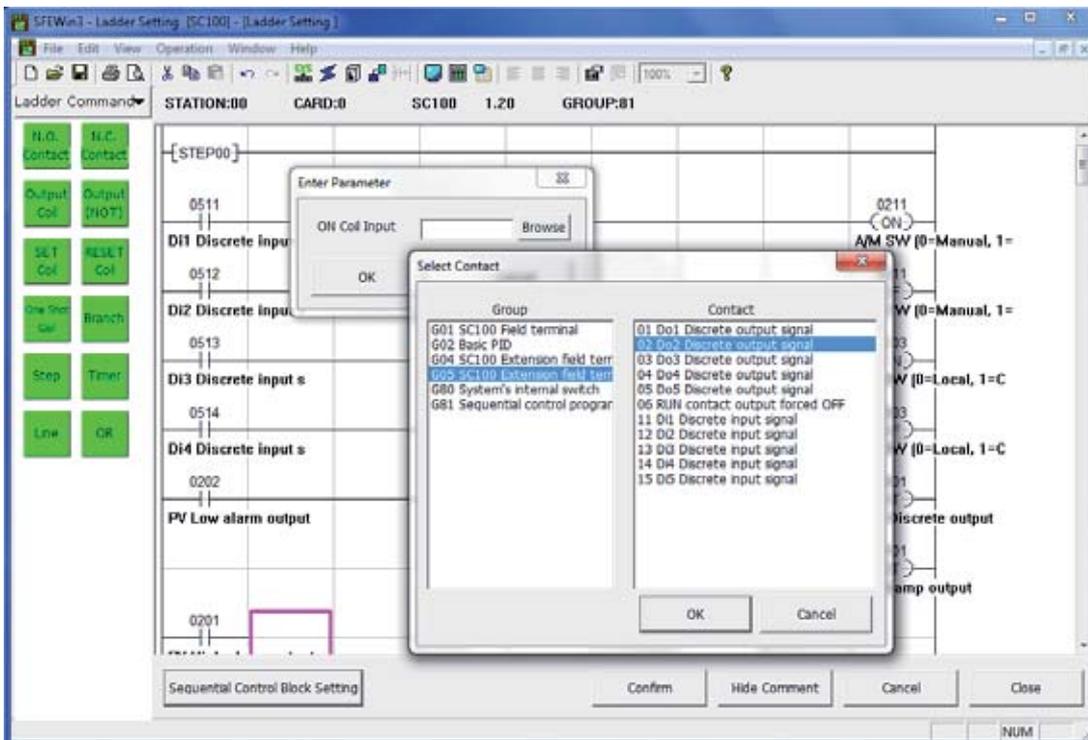
First, set Di 1 (AUTO SW) and Di 2 (MAN SW) to operate G02 BCA A/M SW. The switching is also controlled by the Controller's front button. Set Di 1 to set the A/M SW, and set Di 2 to reset it.

- 1) Drag Contact A command from the module selector window on the left and drop it in the ladder diagram setting window on the right. Enter the terminal: 0511 in Enter Parameter dialog. Alternatively click Browse button to choose Group 05 Terminal 11 (Di 1) from the lists.
- 2) Drag and drop SET Coil command. Enter the terminal: 0211 in Enter Parameter dialog. Alternatively click Browse button to choose Group 02 Terminal 11 (A/M SW).
- 3) Drag and drop Contact A command in the next rung and specify the terminal: 0512 (Di 2).
- 4) Right-click the right-end command cell of the same rung and choose RESET Coil command. Enter the terminal: 0211 (A/M SW).

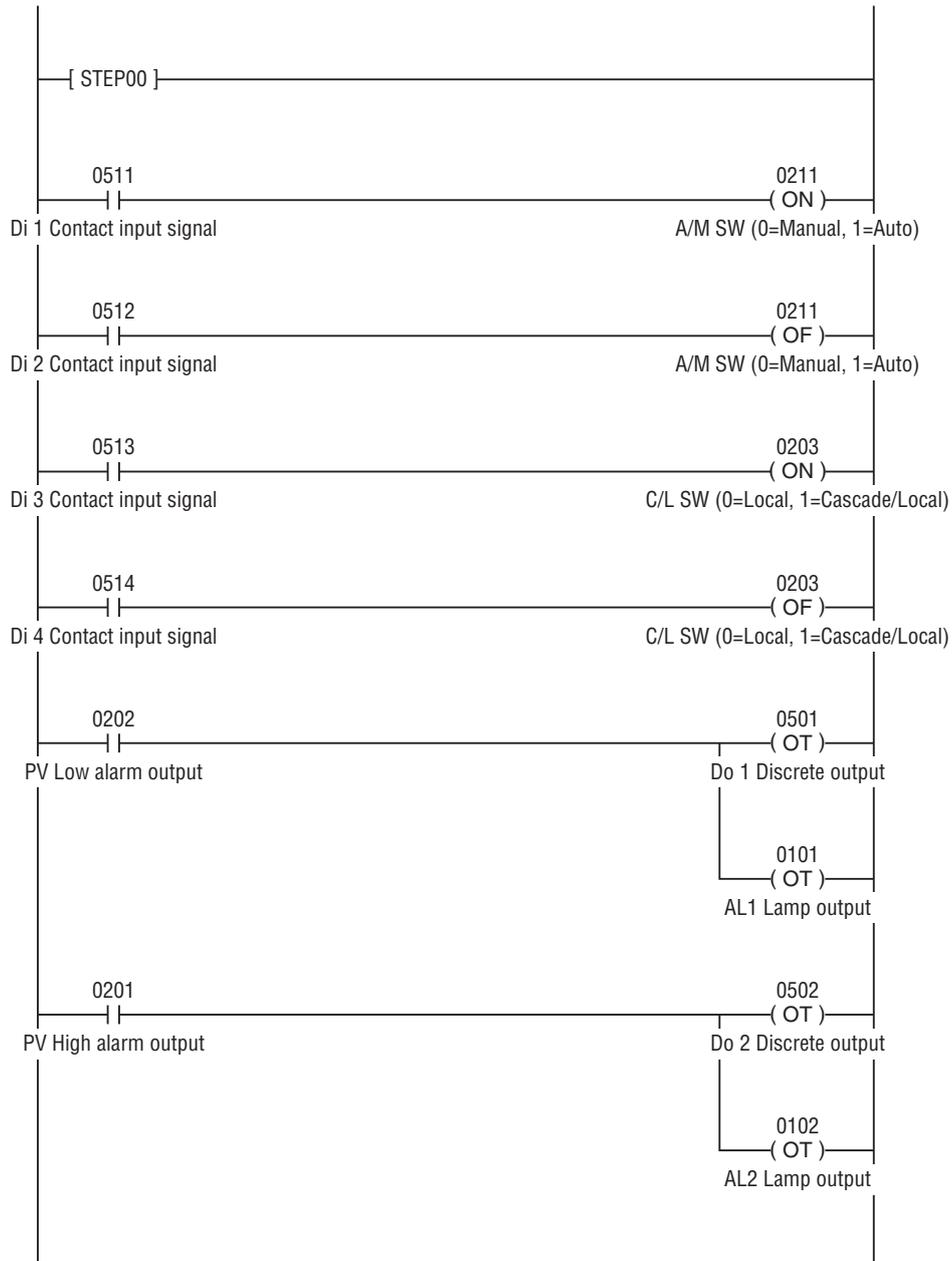
Next, set Di 3 (CAS SW) and Di 4 (LOC SW) to operate G02 BCA C/L SW. The switching is also controlled by the Controller. Set Di 3 to set the C/L SW, and set Di 4 to reset it.

- 5) Drag Contact A command from the module selector window on the left and drop it in the ladder diagram setting window on the right. Enter the terminal: 0513 in Enter Parameter dialog. Alternatively click Browse button to choose Group 05 Terminal 13 (Di 3) from the lists.
- 6) Drag and drop SET Coil command. Enter the terminal: 0203 in Enter Parameter dialog. Alternatively click Browse button to choose Group 02 Terminal 03 (C/L SW).
- 7) Drag and drop Contact A command in the next rung and specify the terminal: 0514 (Di 4).
- 8) Right-click the right-end command cell of the same rung and choose RESET Coil command. Enter the terminal: 0203 (C/L SW).

Next, set G02 BCA PV low alarm output and G02 BCA PV high alarm output to provide at discrete output terminals and at alarm lamp outputs. Direct G02 BCA PV low alarm output (GGNN: 0202) to Group 05 Terminal 01 (Do 1) and Group 01 Terminal 01 (AL1). Direct G02 BCA PV high alarm output (GGNN: 0201) to Group 05 Terminal 02 (Do 2) and Group 01 Terminal 02 (AL2).



Created ladder setting diagram is as shown below.



5.10 SETTING COM PORT

Choose Operation > Option to open Option dialog (See to the right).

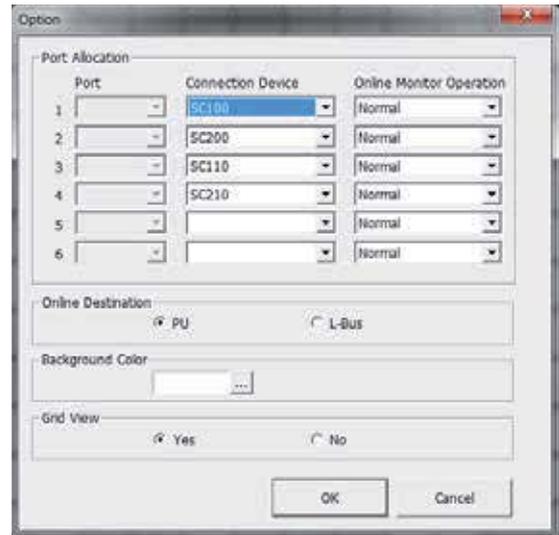
Set as follows:

Port: Port assigned with the COP-IRDA/COP-US

Connection Device: SC Series model number

Online Monitor Operation: Set as required

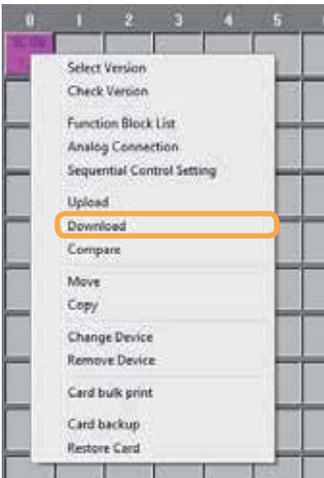
Online Destination: PU



5.11 DOWNLOADING SETTING DATA

Connect the PSC100 to the PC.

Right-click the PSC100 module in Station 00 / Card No. 0 slot, choose Download, and click Start button to start downloading.



NOTE

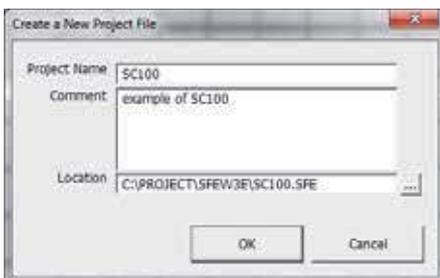
Uploading setting applied to the Controller is also available.

Connect the Controller to the PC and right-click the module as in the above, choose Upload, and click Start button to start uploading.

5.12 SAVING THE PROJECT

Save the setting data as a project file.

Choose File > Save or Save As to open Create a New Project File dialog. Enter a project (file) name and comments, and specify its location.



6. COMMUNICATING WITH THE SCCFG

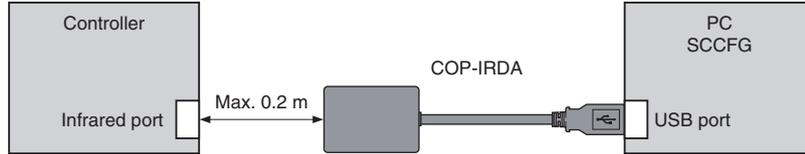
The PC Configurator Software (model: SCCFG) is used to save and transfer setting parameters.

Refer to the Users Manual for the SCCFG for detailed descriptions.

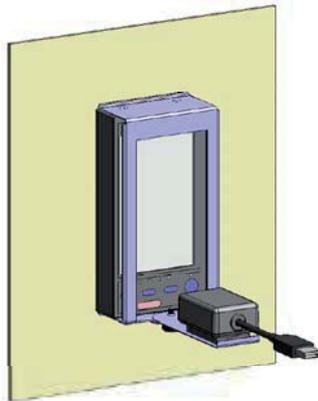
6.1 CONNECTING THE CONTROLLER TO PC

☒ INFRARED COMMUNICATION TYPE

- 1) Install the SCCFG program and driver for Infrared Communication Adaptor device (model: COP-IRDA) to the PC and connect the COP-IRDA to its USB port.



Using Holders



N144 (two-part type) Holder



L Type Holder

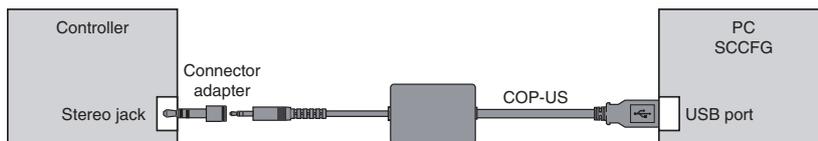
- 2) Set the COM port number assigned to the USB for use with the SCCFG.
- 3) Set the infrared port in the direct line to face the COP-IRDA's send/receive window, within the maximum distance of 0.2 meter.
- 4) Go to Engineering View and choose Configuration > 01 : Config mode > 03 : SCCFG. The front monitoring LED starts blinking rapidly to indicate the ready state.

Caution

Only one Controller module can communicate with the SFEW3E or SCCFG when multiple modules are mounted side by side. Detecting more than one module at once in the communication mode will result in error.

☒ STEREO JACK TYPE

- 1) Install the SCCFG program and driver for PC Configurator cable (model: COP-US) to the PC and connect the COP-US to its USB port.



- 2) Set the COM port number assigned to the USB for use with the SCCFG.
- 3) Connect the COP-US to the connector adaptor and after this, to the Controller's jack port.
- 4) Go to Engineering View and choose Configuration > 01 : Config mode > 03 : SCCFG. The front monitoring LED starts blinking rapidly to indicate the ready state.

6.2 SAVING SHORT TREND DATA PSC200/210

Short trend data stored in the PSC200/PSC210 can be exported in a CSV file. Exported data range depends upon the trend recording status:

- START: Max. 400 samples backward from the most recent sample
- STOP: Max. 400 samples backward from the moment of STOP command.
- PAUSE: Max. 400 samples backward from the moment of PAUSE command.

Refer to the Users Manual for the SCCFG for the CSV file format.

6.3 TRANSFERRING SETTING PARAMETERS

Setting parameters (Refer to the PSC100/200 Series Users Manual (EM-6337-B)) can be uploaded and saved in a PC file. Setting files can be downloaded to the Controller device. They can be copied to multiple devices in turn.

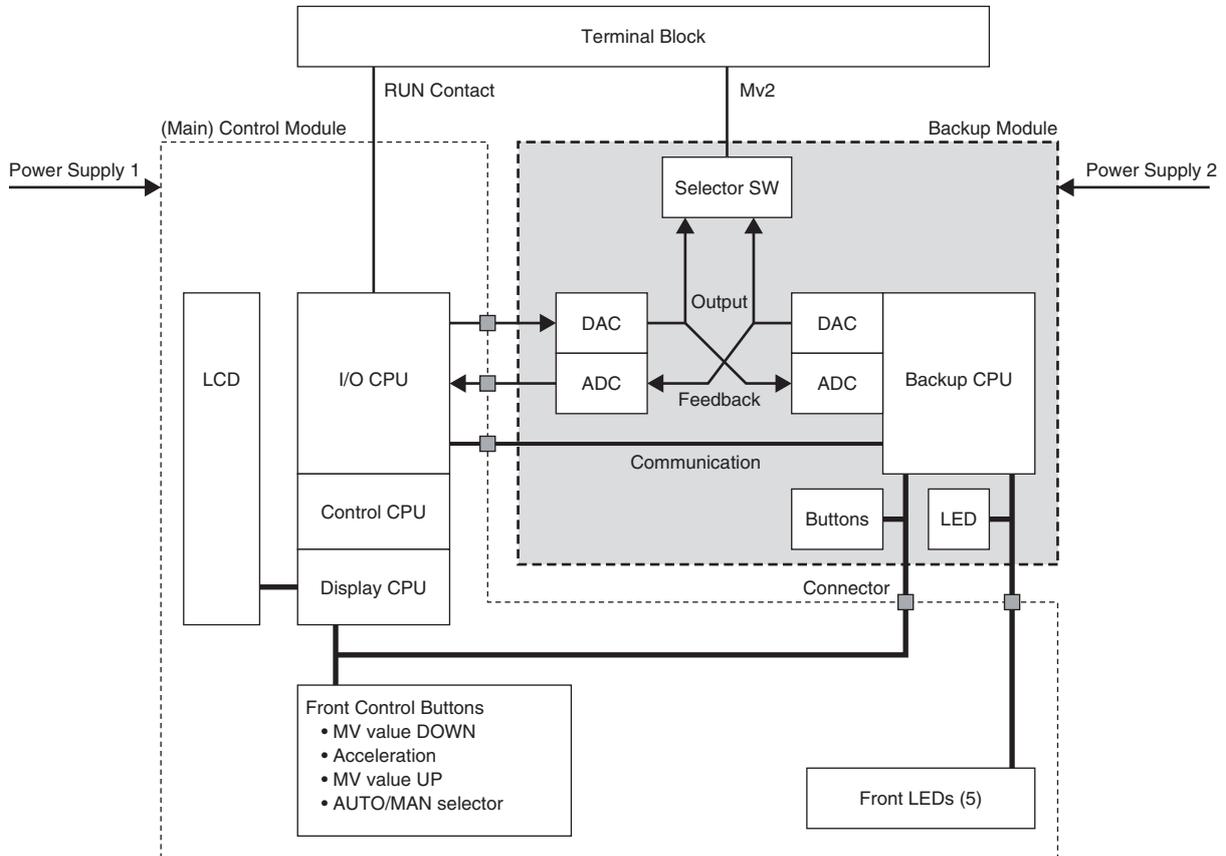
Transferred parameters become valid only after the power supply to the Controller is reset.

7. BACKUP (MANUAL LOADING) PSC110/210

If the Controller module fails, it can be replaced while the Mv 2 output is maintained.

Backup/manual loading is applicable to Mv 2 only.

7.1 HARDWARE CONSTRUCTION



- Controller module and Backup module maintain monitoring each other's status.
- The front LED indicators for Mv 2 are connected to that of the backup module; while the front UP/DOWN control buttons are connected in parallel to both modules.
- Optionally (specified when ordering), the backup module could have its own power supply circuit independent from that of the controller module.
- The backup module takes in the feedback signal (analog) of the control module output to track it for its own output.
- In normal conditions, the Mv 2 selector SW is set to the control module.
- When the control is switched to the backup module either manually or automatically, the Mv 2 selector SW is set to the backup module.
- Transition of output level in the switching is smooth as the backup module has been continuously tracking the control module output.
- The control mode is set to Manual and manual loading for Mv 2 using the front control buttons is available in this mode.

7.2 BACKUP SETTING

7.2.1 AUTO / MANUAL SWITCHING

Manual Switching

Manual switching to the backup mode is always available by the front control button operations.

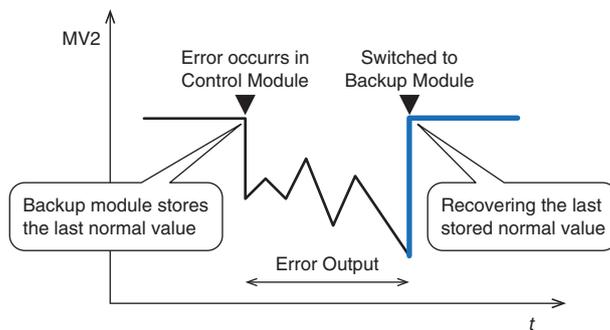
Auto Switching

Control module and Backup module continuously monitors each other's status. When an abnormality is detected at the control module (including when the Mv 2 output loop is open), the backup module automatically takes control of the Mv output. Refer to: 7.2.5 FUNCTION BLOCK SETTING for setting the auto switching.

7.2.2 BACKUP OUTPUT MODE (TRACK BACK / PRESET VALUE)

Track Back

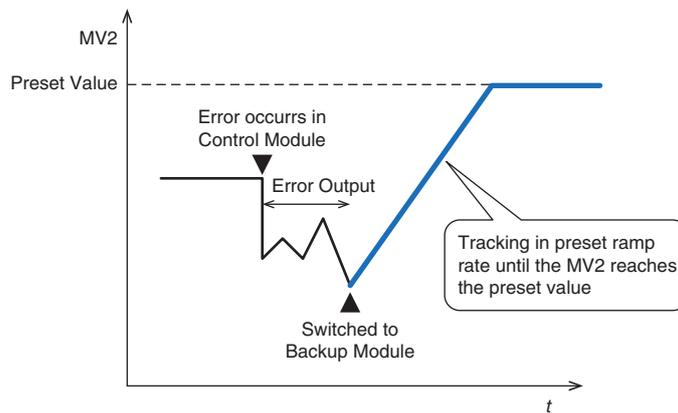
The backup module provides the most updated normal output (when both the communication and the feedback signal detected as normal) at the moment of switching.



Preset Value

The backup module provides a preset value output at the moment of switching.

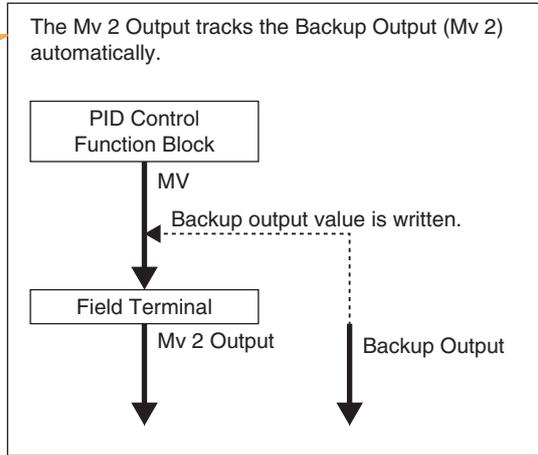
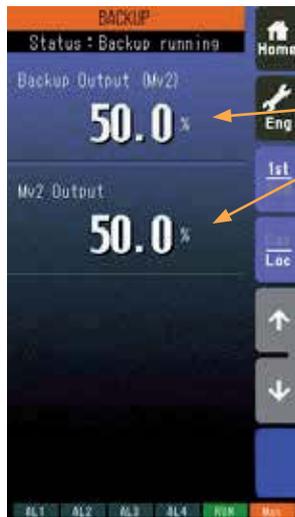
A rate-of-change limit can be applied in transition to suppress a sudden change. The ramp output is overtook by manual control if it is interrupted before the Mv 2 output reaches the preset value.



7.2.3 BACKUP RECOVERY MODE (AUTO/MANUAL TRACKING)

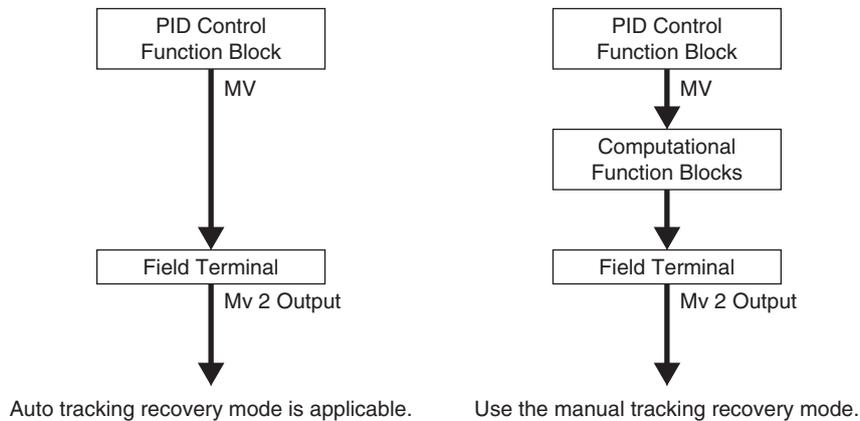
Auto Tracking

The Mv 2 output of the control module automatically tracks that of the backup module until they are equalized before the control is switched manually to the normal state.



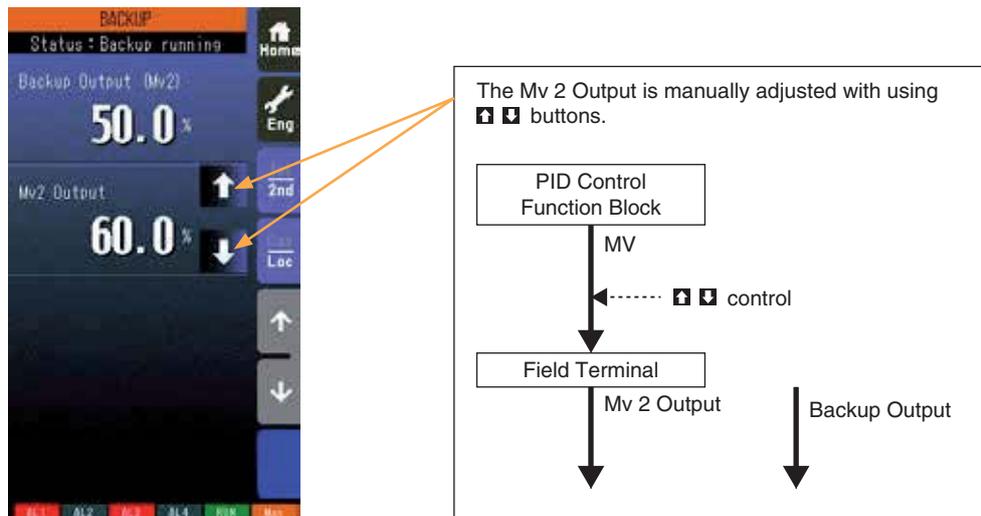
Caution!

The auto tracking recovery mode functions correctly when the MV signal of the PID Control Function Block is directly connected to the Field Terminal's Mv 2. Use the manual tracking mode if other function blocks are connected between the MV and the Mv 2.



Manual Tracking

The operator manually adjusts the Mv 2 output of the control module until it is equalized to that of the backup module before the control is switched manually to the normal state.



7.2.4 AUTO BACKUP AFTER TURNING ON THE POWER 1.50

The Controller goes to the backup mode, when the backup unit is turned on and there is no communication between the main unit for 5 seconds.

7.2.5 FUNCTION BLOCK SETTING

Control parameters regarding the backup function are programmed using the Function Block.

Mv 2 BACKUP PARAMETER SETTING

GROUP	ITEM	DATA	DISPLAY	PARAMETER
04	80	-15.00 – 115.00%	MVB: NNN.NN	Backup loading MV
	81	0, 1	BSW: N	Automatic switching (0: Disable, 1: Enable)
	82	0, 1	BWD: N	Backup output mode (0: Track back, 1: Preset value)
	83	0.00 – 115.00%/s	BFL: NNN.NN	Output rate-of-change limit (0: No limit applied)
	84	-15.00 – 115.00%	BFV: NNN.NN	Preset value (applied with ITEM 82 DATA 1)
	85	0, 1	BBL: N	Backup recovery mode (0: Auto tracking, 1: Manual tracking)
	86	0, 1	BGR: N	Backup GROUP
	87	0, 1	15: N	Backup status (0: Normal, 1: Backup Running) 1.50

ITEM 80: Backup loading MV (-15.00 – 115.00%)

Used to read the MV value provided by the backup module.

ITEM 81: Automatic switching (0: Disable, 1: Enable)

Used to enable/disable automatic switching to/from the backup mode.

ITEM 82: Backup output mode (0: Track back, 1: Preset value)

Used to select the backup output mode.

ITEM 83: Output rate-of-change limit (0: No limit applied)

Used to set the rate of MV output change with 'Preset value' backup output mode.

With the value set to 0, no ramp control is provided.

ITEM 84: Preset value (-15.00 to 115.00%)

Used to set the preset value in the backup mode.

ITEM 85: Backup recovery mode (0: Auto tracking, 1: Manual tracking)

Used to select the Mv 2 output mode before the backup control is returned to the normal state.

ITEM 86: Backup GROUP (2 or 3)

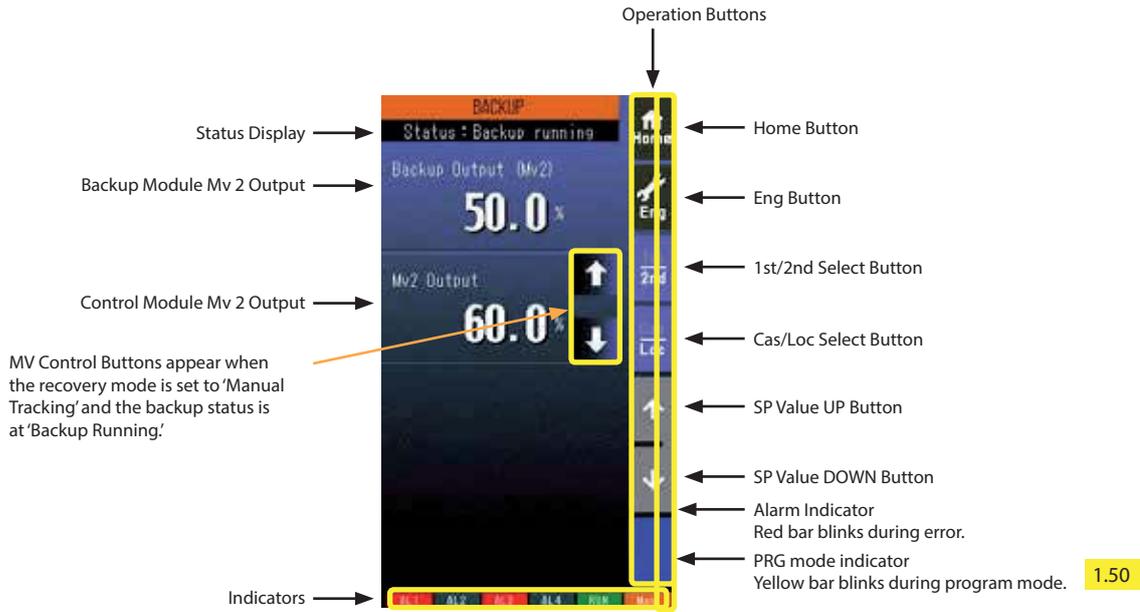
Used to select the PID control loop to be backed up.

ITEM 87: Backup status 1.50

Used to indicate backup status.

"0: Normal" means that the status is "Normal" or "Backup Standby".

7.3 BACKUP VIEW



- Status display shows either of the following: Normal / Standby backup / Backup running / Backup error.
- Mv 2 is represented in percentage with one decimal place.

Home button

Used to switch the view to the one registered as Home operating view.

Eng button

Used to switch among the engineering views.

Pressing/holding the button for approx. 1 second switches the view to Operating view.

1st/2nd selector

Used to switch between the primary and the secondary loops. Valid only when the secondary is set.

Cas/Loc selector

Pressing/holding the button for approx. 1 second switches the control mode between cascade (Cas) and local (Loc). Valid only when 'Set mode Cas/Loc' setting under the tuning parameters is set to 'Cascade/Local.'

The button operation can be locked by SC field terminal setting. Refer to PSC100/200 Series Function Block List.

SP value UP button *1

Used to increase SP value in the speed on 40 seconds per full-scale. Touching it briefly increases the value digit by digit.

The button operation can be locked by SC field terminal setting. Refer to PSC100/200 Series Function Block List.

SP value DOWN button *1

Used to decrease SP value in the speed on 40 seconds per full-scale. Touching it briefly decreases the value digit by digit.

The button operation can be locked by SC field terminal setting. Refer to PSC100/200 Series Function Block List.

MV Control Buttons

These buttons appear when the recovery mode is set to 'manual tracking' and the backup status is at 'Backup Running.'

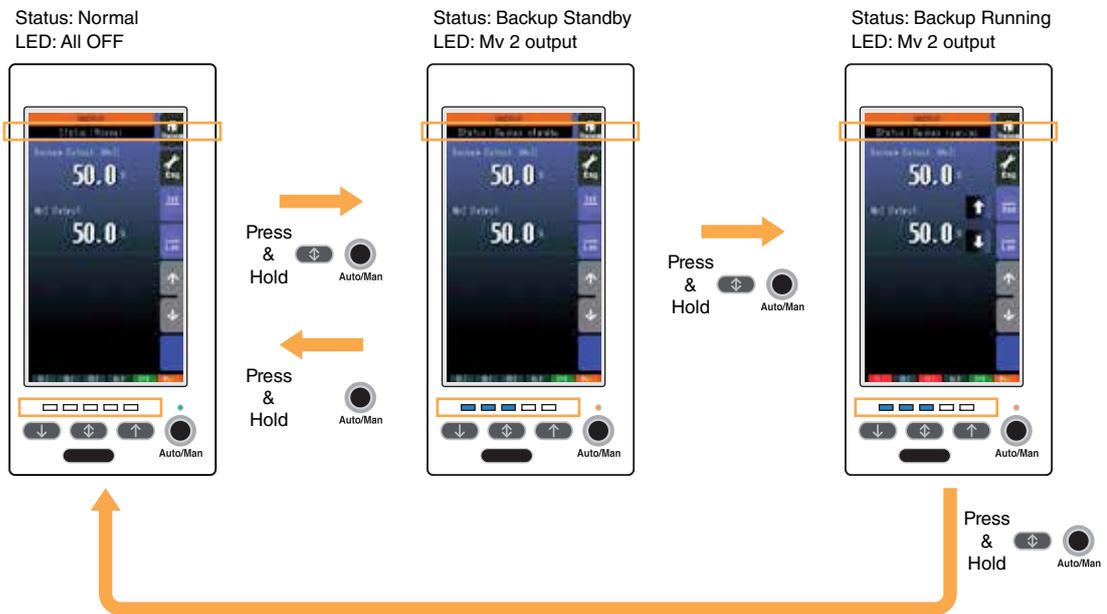
Used to control the MV signal of the PID Control Function Block.

*1. SP buttons are locked in CAS mode.

7.4 BACKUP OPERATION & DISPLAY

7.4.1 STATUS TRANSITION DIAGRAM

■ BACKUP VIEW



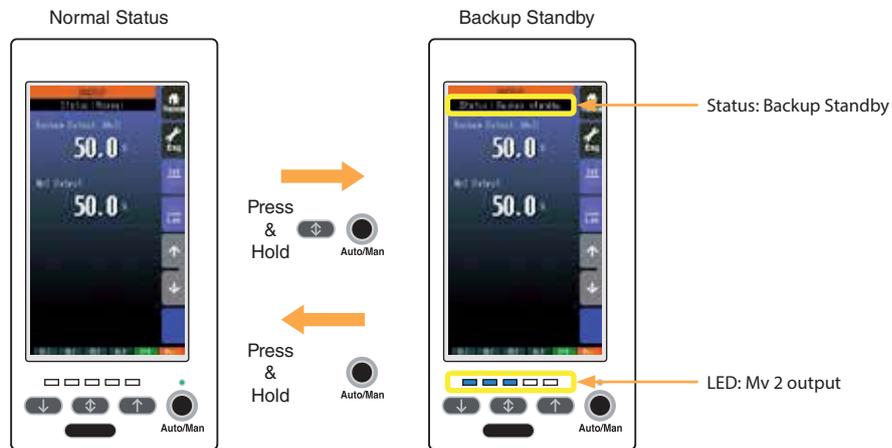
7.4.2 SWITCHING OPERATION

Normal Mode

The Backup view (Engineering view > Backup) shows 'Normal' status and all the LEDs are at off state.

Backup Standby

Pressing the front acceleration button and Auto/Man button at once during the normal mode status switches to 'Backup Standby' status.



- The Backup view (Engineering view > Backup) shows 'Backup Standby' status and the LEDs indicate the Mv 2 output value.
- The front LEDs blink according to the Mv 2 output value as shown in the table below.

LED STATUS	MV OUTPUT
□ □ □ □ □	Less than 3%
▣ □ □ □ □	$3\% \leq Mv\ 2 < 28\%$
▣ ▣ □ □ □	$28\% \leq Mv\ 2 < 53\%$
▣ ▣ ▣ □ □	$53\% \leq Mv\ 2 < 78\%$
▣ ▣ ▣ ▣ □	78% or more

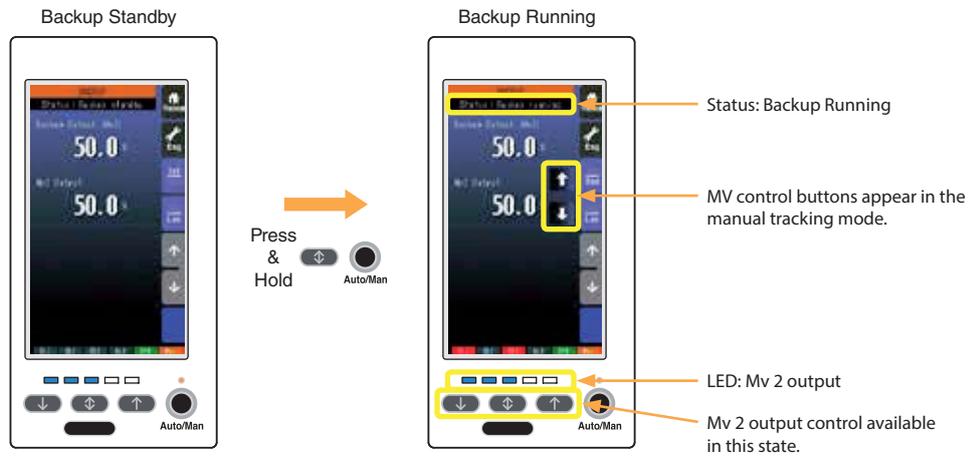
□ : OFF ▣ : Blinking

- If the standby status is not switched to 'Running' status within 1 minute, the Controller goes back to the normal status.
- Pressing and holding Auto/Man button switches back to the normal status.
- MV and Auto/Man switching controls are not functional during the standby status. Other functions such as switching views are available.

Backup Running

Pressing the front acceleration button and Auto/Man button at once during the standby status switches to 'Backup Running' status. The Mv output is provided from the backup module.

At this state, the Controller is in Manual control mode, in which Mv output is provided according to the preset backup output mode.



- The Backup view (Engineering view > Backup) shows 'Backup Running' status and the LEDs indicate the Mv 2 output value.
- MV control buttons appear on the touch panel screen if the recovery mode is set to 'manual tracking.'
- The front LEDs turn on or blink according to the Mv 2 output value as shown in the table below.

LED STATUS	MV OUTPUT
■ □ □ □ □	Less than 3%
■ □ □ □ □	$3\% \leq Mv\ 2 < 22\%$
■ ■ □ □ □	$22\% \leq Mv\ 2 < 28\%$
■ ■ □ □ □	$28\% \leq Mv\ 2 < 47\%$
■ ■ ■ □ □	$47\% \leq Mv\ 2 < 53\%$
■ ■ ■ □ □	$53\% \leq Mv\ 2 < 72\%$
■ ■ ■ □ □	$72\% \leq Mv\ 2 < 78\%$
■ ■ ■ □ □	$78\% \leq Mv\ 2 < 97\%$
■ ■ ■ ■ □	97% or more

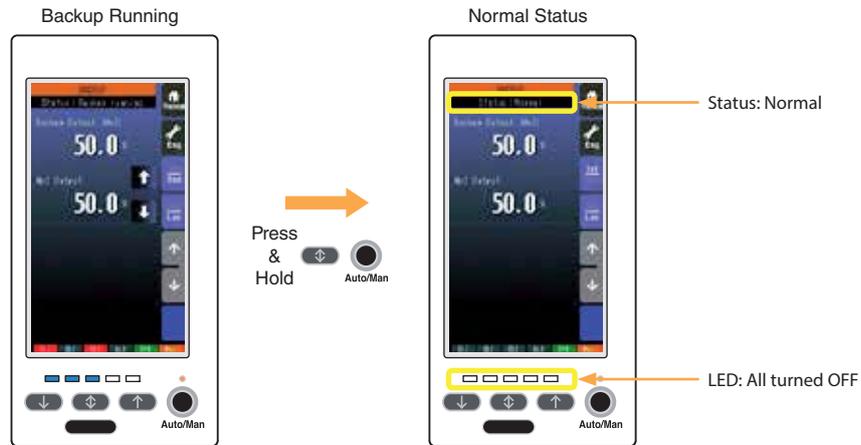
□ : OFF ■ : ON □ (with border) : Blinking

- MV2 output can be manually controlled with the hardware buttons.

7.4.3 RETURNING TO NORMAL STATUS

Pressing the front acceleration button and Auto/Man button at once during the running status switches to 'Normal' status. The Mv output is provided from the control module.

The Backup view (Engineering view > Backup) shows 'Normal' status and all the LEDs are at off state.



CAUTION !

Before returning to the normal state, confirm that the Mv 2 output of the control module and that of the backup module do not have a great deviation. If these values has too great a difference, the Mv 2 output suddenly changes at the moment of the switching.

7.5 HOW TO REPLACE THE CONTROL MODULE

Before replacing a failed control module, transfer its complete setting to the replacement module.

CAUTION !

Replacing is conducted by a personnel qualified by M-System.

Refer to Section 7.4.1 STATUS TRANSITION DIAGRAM regarding control operations to shift to/from the backup mode.

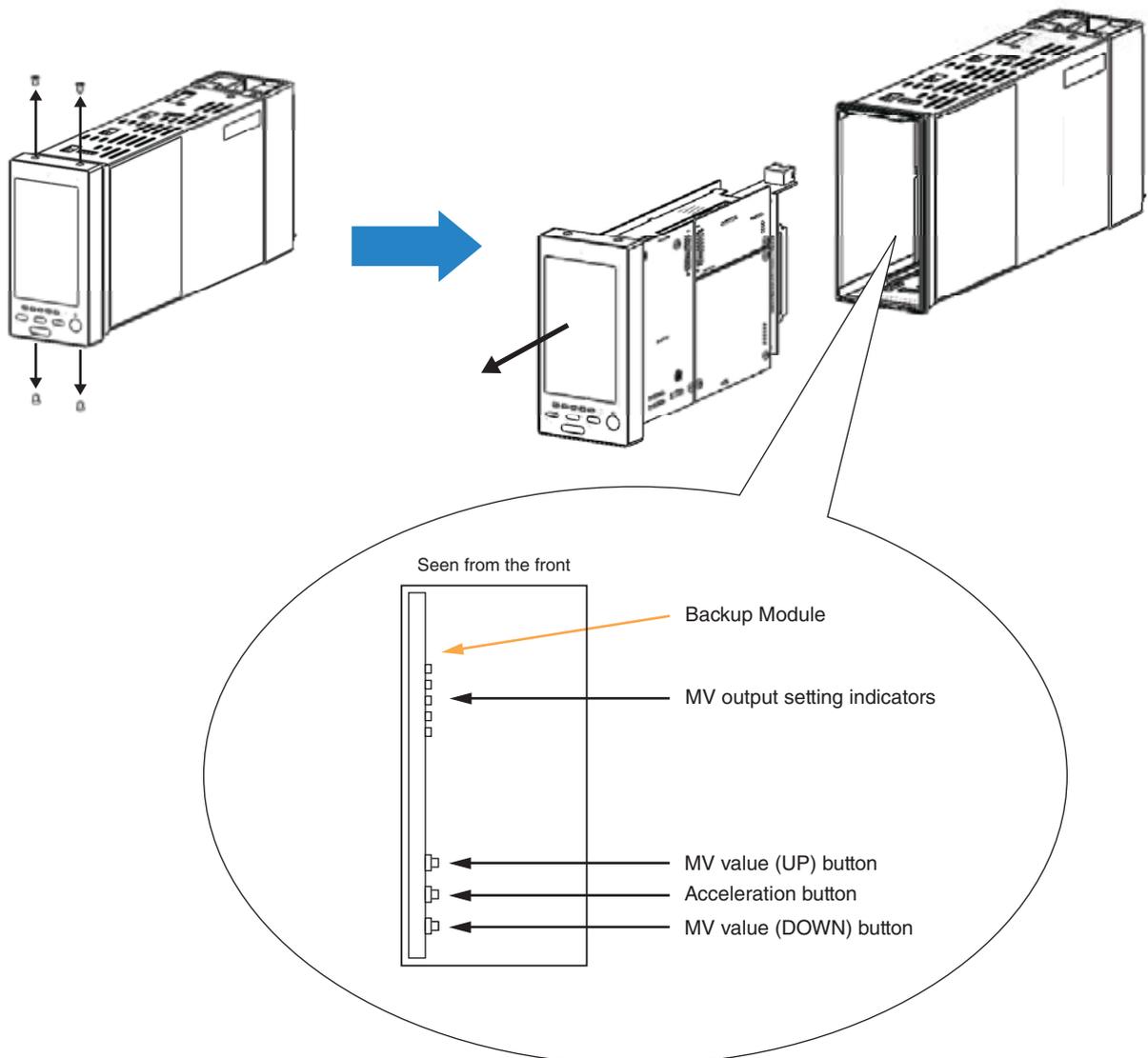
(1) Switch to the backup mode.

The front LEDs start turning on and blinking according to the Mv 2 output level. If the Controller has been automatically switched to the backup mode, the LEDs are already functioning.

The Mv 2 output can be controlled by the front control buttons with the help of LEDs in this state.

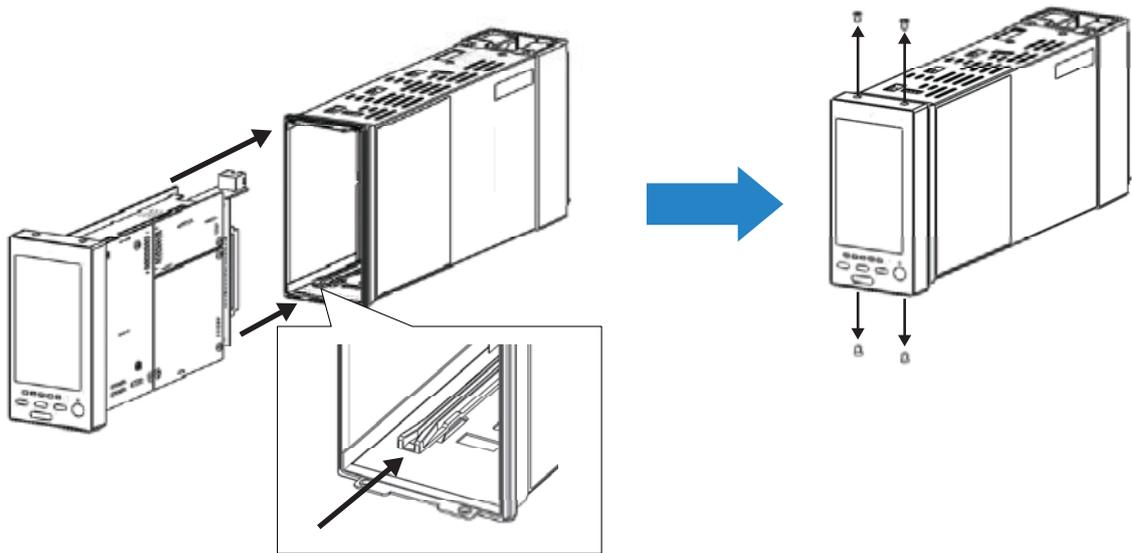
(2) Unfasten four screws at the top and bottom of the front part (See the figure below at the left) and extract the control module.

The Mv 2 output can be controlled by the relevant buttons and LEDs on the backup module at this point.



- (3) Insert a new control module along the grooves at the top and bottom inside the controller housing and tighten four screws at the front part.

The control module starts up as soon as it is connected.



- (4) Confirm on the backup view the following: (Refer to: 7.2.3 BACKUP RECOVERY MODE (AUTO/MANUAL TRACKING))

Auto tracking mode: The Mv 2 Output (bottom-row display) tracks exactly the Backup Output (Mv 2) (top-row display).

Manual tracking mode: The MV 2 Output can be controlled with the MV control buttons at the right side on the screen.

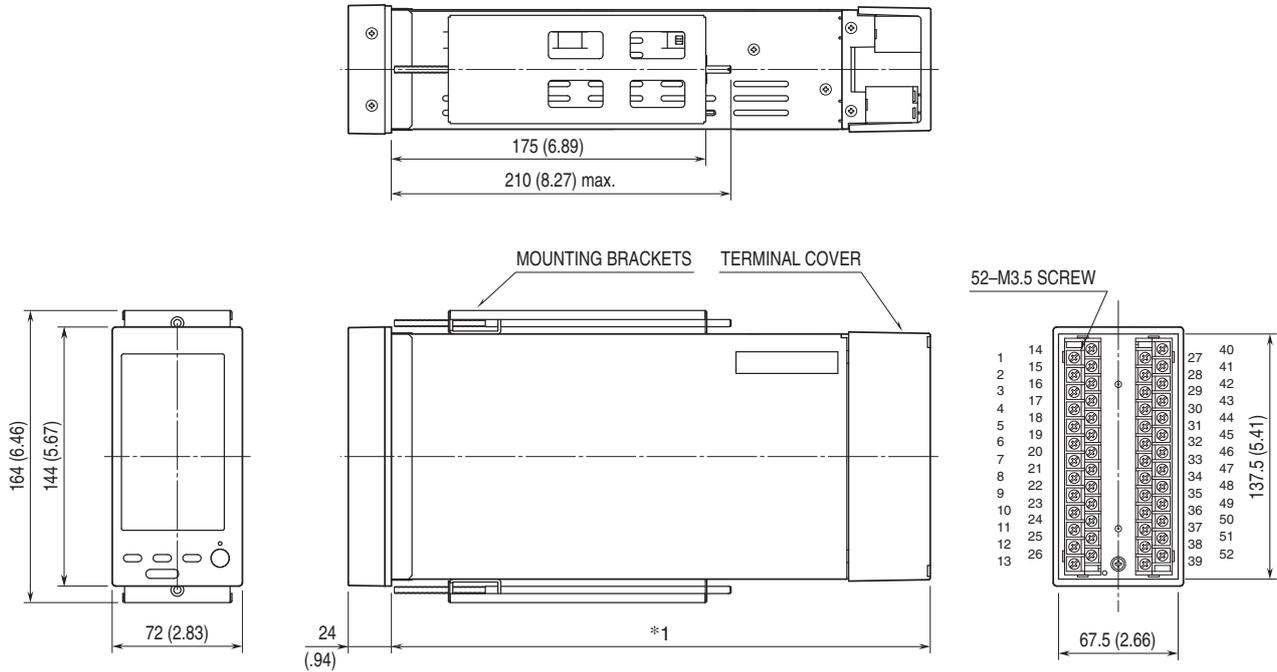
- (5) Return to the normal status. The LEDs turn off. (Refer to: 7.4.3 RETURNING TO NORMAL STATUS)
- (6) Switch to automatic control mode or normal operating mode.

8. EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS

unit: mm (inch)

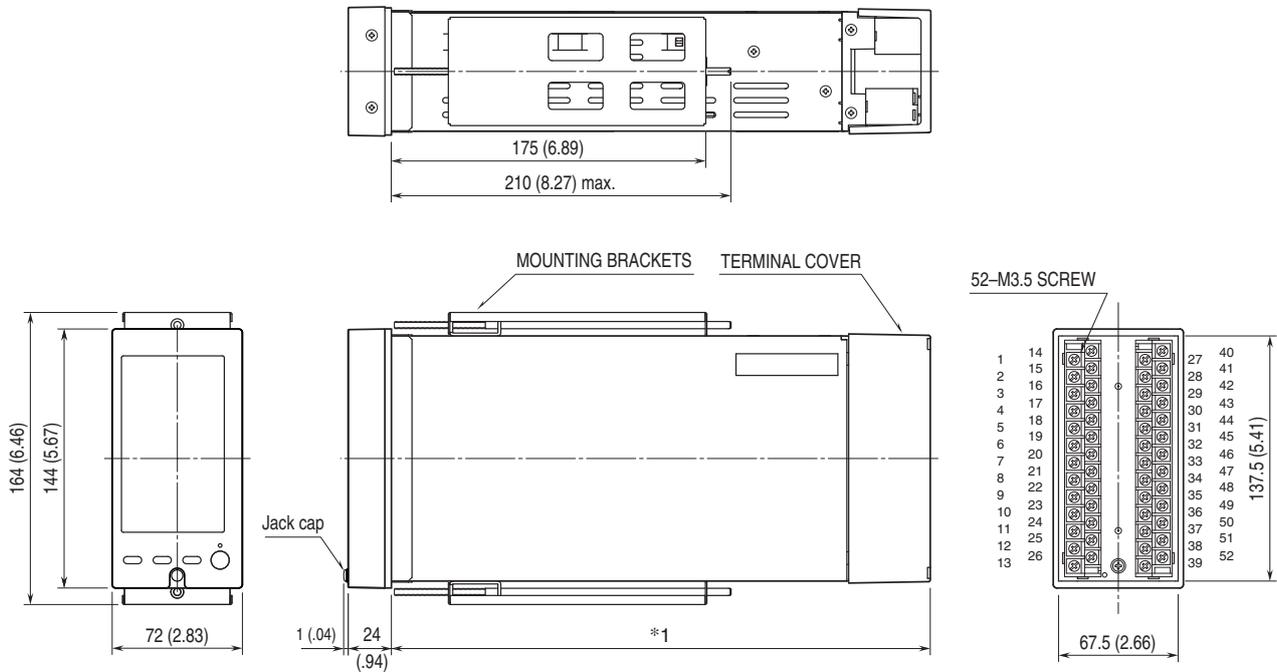
☑ PSC100/200

■ INFRARED COMMUNICATION TYPE



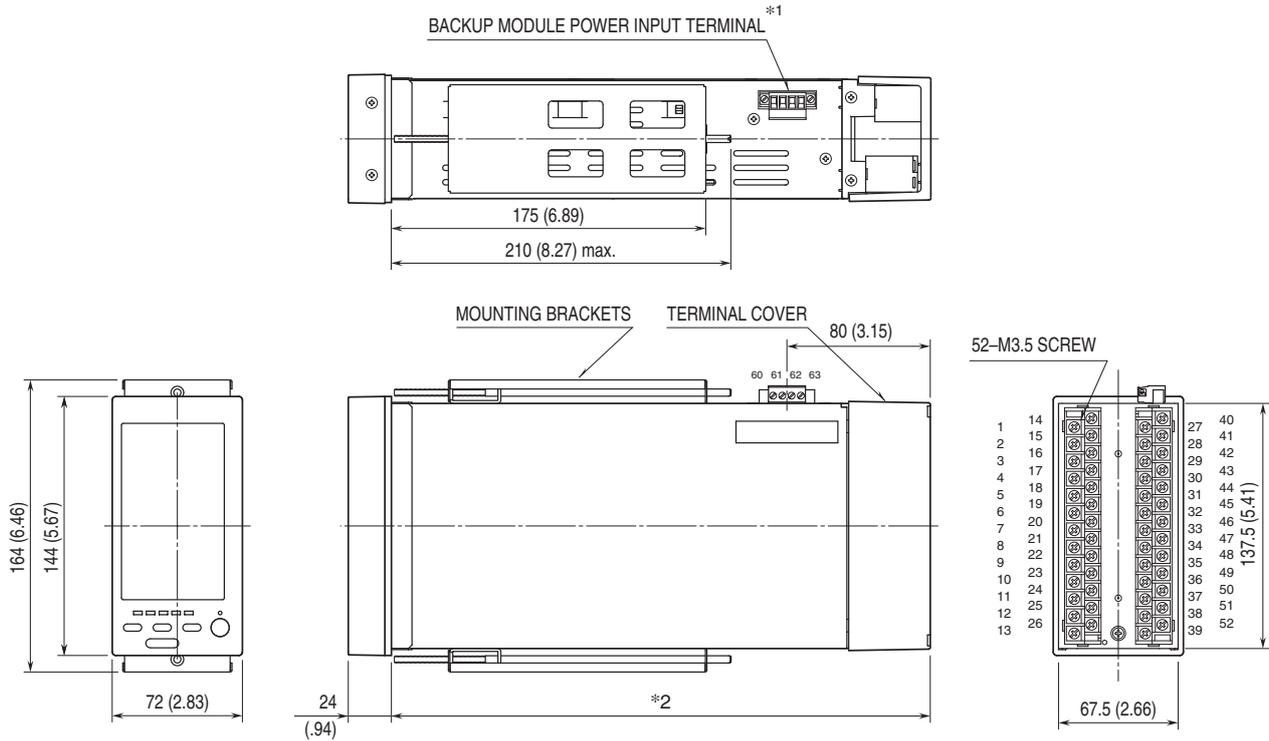
*1. Standard model: 250 mm (9.84")
 Option /300: 300 mm (11.81")
 Option /400: 400 mm (15.75")
 Option /600: 600 mm (23.62")

■ STEREO JACK TYPE



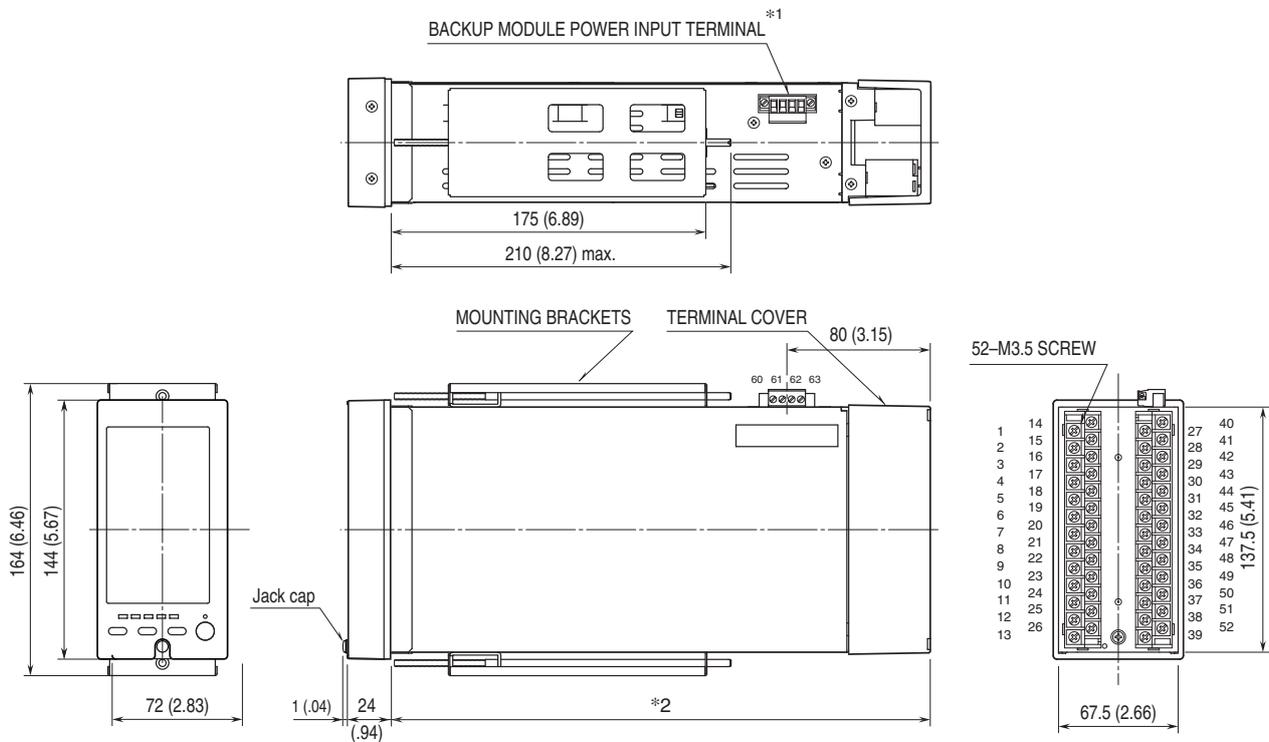
*1. Standard model: 250 mm (9.84")
 Option /300: 300 mm (11.81")
 Option /400: 400 mm (15.75")
 Option /600: 600 mm (23.62")

■ INFRARED COMMUNICATION TYPE



*1. Option /M2, /R only *2. Option /300: 300 mm (11.81")
 Option /400: 400 mm (15.75")
 Option /600: 600 mm (23.62")

■ STEREO JACK TYPE



*1. Option /M2, /R only *2. Option /300: 300 mm (11.81")
 Option /400: 400 mm (15.75")
 Option /600: 600 mm (23.62")

9. MOUNTING ON A PANEL

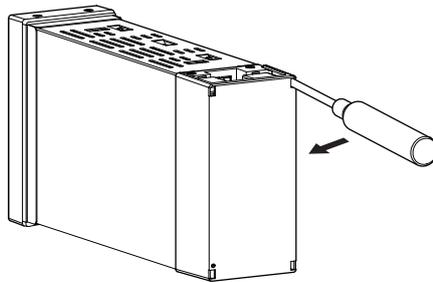
9.1 GENERAL PRECAUTIONS

- IP 55 is ensured for the front panel of the unit mounted independently to a panel. Test the sealing at the mounting surface once the unit is installed.
- Set the unit on a vertical surface with its operation buttons at the lower side. Mounting in other directions may cause heat built up inside the unit and shorten its life or degrade its performance.
- Provide enough space for ventilation. Do not install thermal generating equipment such as heaters, transformers, or large capacity resistance directly next to the Controller.
- Leave at least 30 mm of open space to all directions at the rear side for ease of maintenance.

9.2 MOUNTING PROCEDURE

- 1) Remove both mounting brackets.
- 2) Detach the terminal cover and insert it first and then the unit itself into the cutout hole. (The cover is slightly wider than the unit.)
- 3) Put and slide the brackets back into the holes at the top and the bottom and tighten them until the unit is firmly fixed.

- How to Remove the Terminal Cover

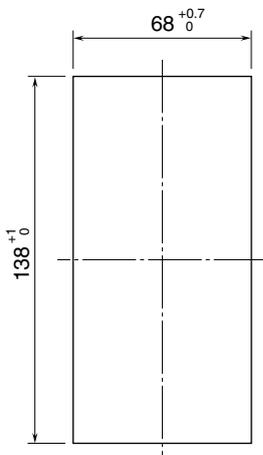


Insert the minus tip of a screwdriver into each hole at the four corners of the cover and pull it to the direction as indicated below to separate the terminal block cover.

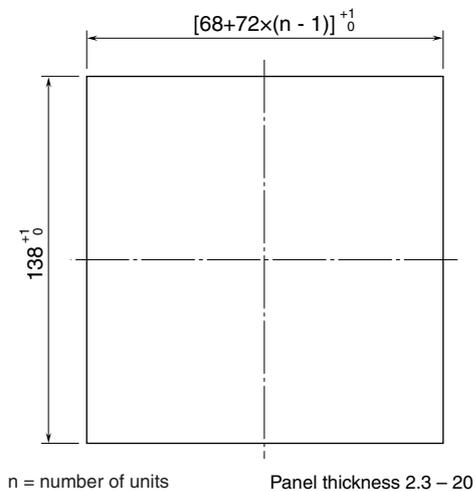
9.3 PANEL CUTOUT

unit: mm

- **Single mounting**

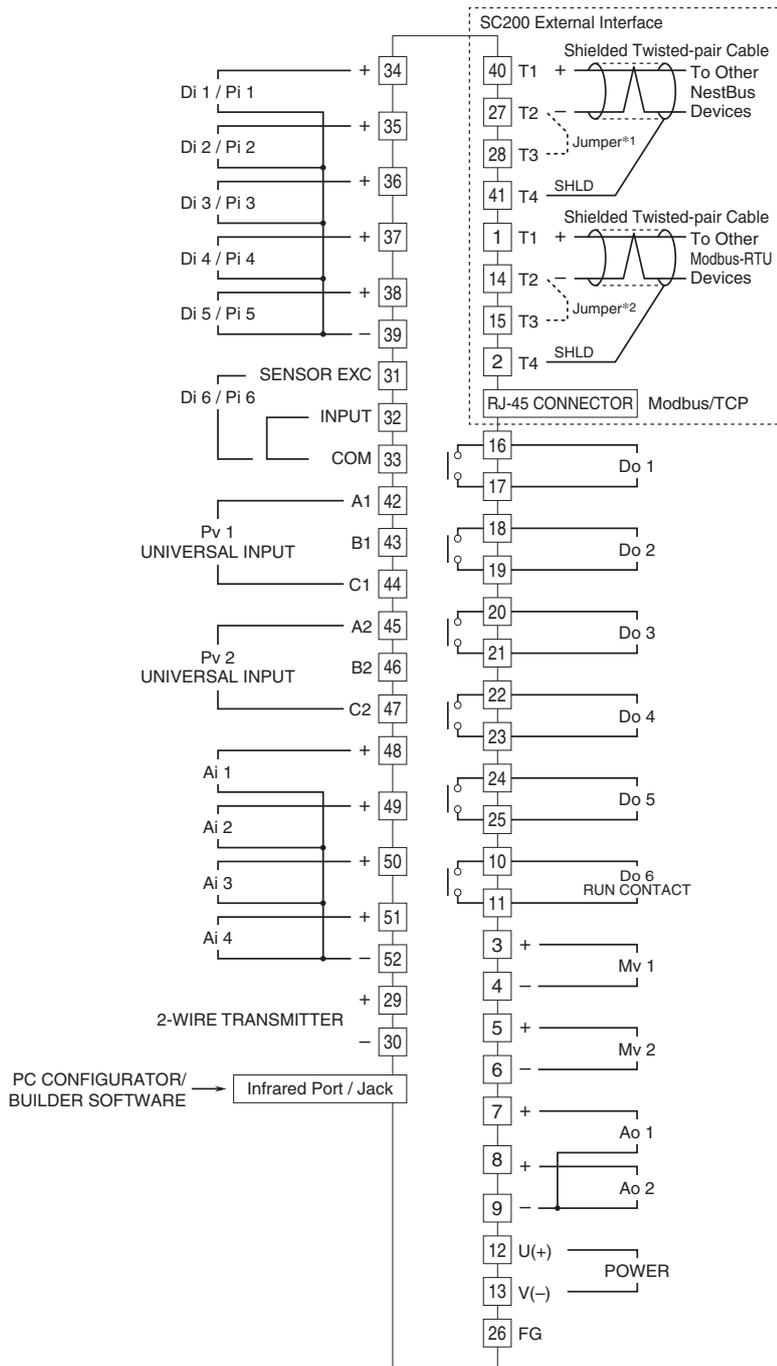


- **Clustered mounting**



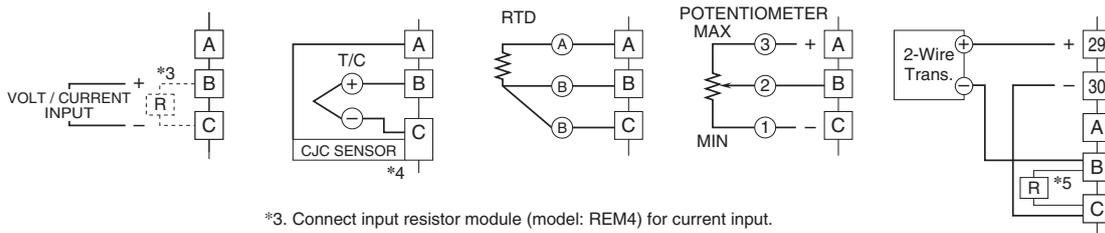
10. CONNECTION DIAGRAM

☒ PSC100/200



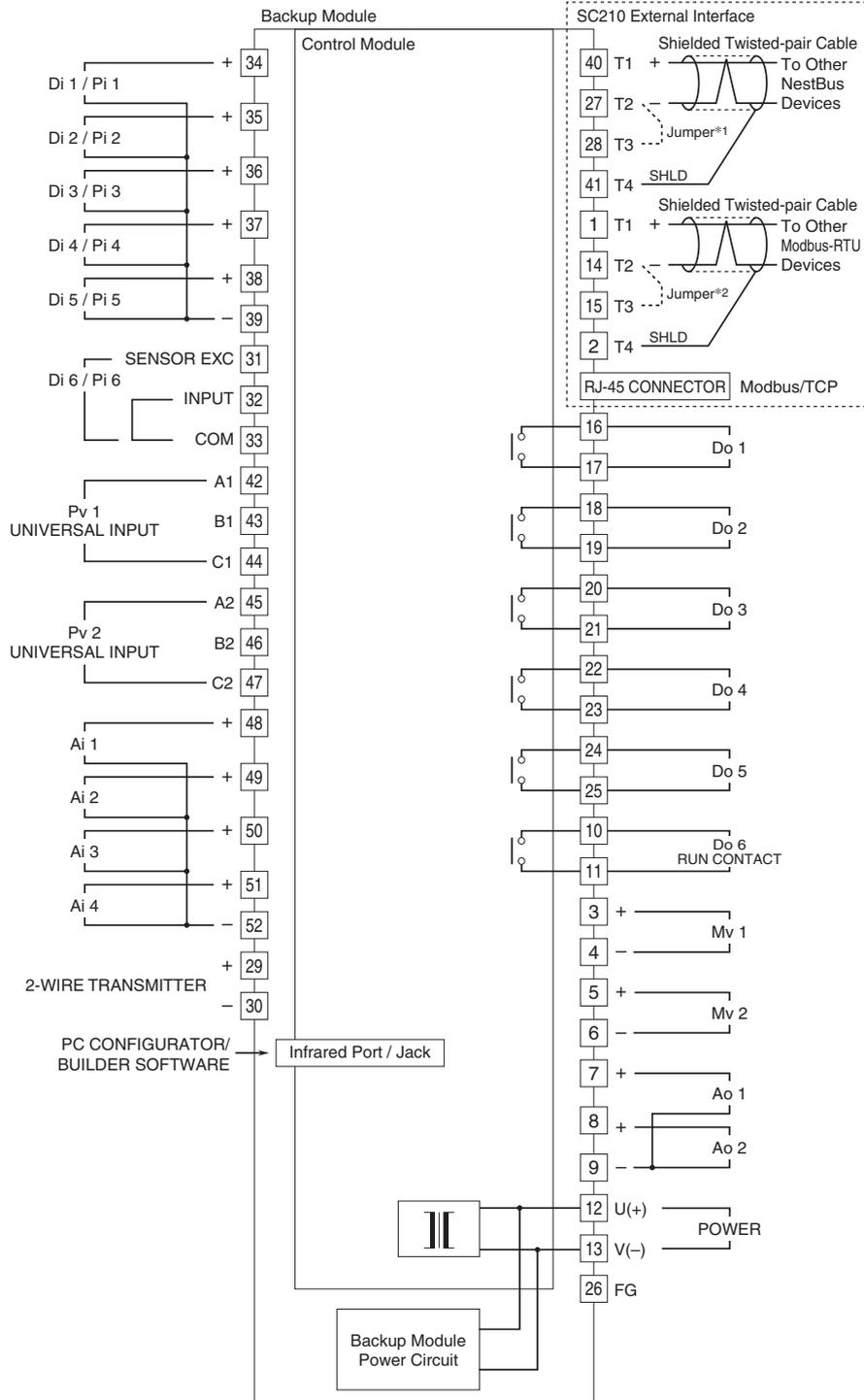
- *1. Close across the terminals 27 – 28 when the unit is located at the end of a transmission line (= no cross-wiring).
- *2. Close across the terminals 14 – 15 when the unit is located at the end of a transmission line (= no cross-wiring).

■ UNIVERSAL INPUT CONNECTION E.G.



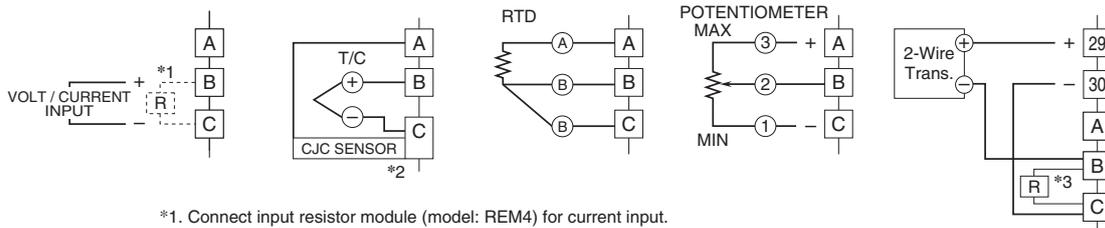
- *3. Connect input resistor module (model: REM4) for current input.
- *4. Connect CJC sensor for thermocouple input.
- *5. Connect input resistor module (model: REM4).

■ BACKUP MODULE POWER SUPPLY: SINGLE SUPPLY



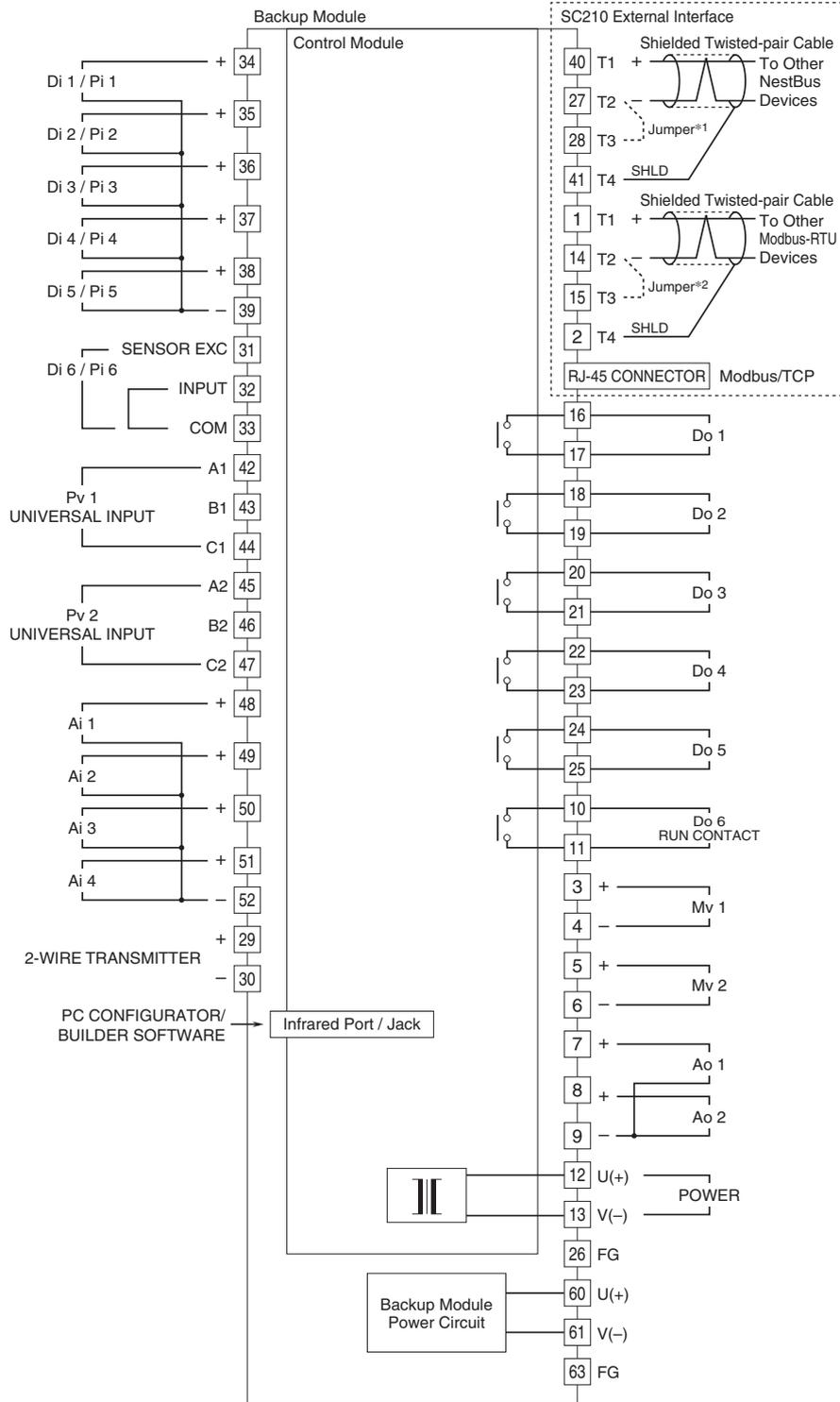
- *1. Close across the terminals 27 – 28 when the unit is located at the end of a transmission line (= no cross-wiring).
- *2. Close across the terminals 14 – 15 when the unit is located at the end of a transmission line (= no cross-wiring).

■ UNIVERSAL INPUT CONNECTION E.G.



- *1. Connect input resistor module (model: REM4) for current input.
- *2. Connect CJC sensor for thermocouple input.
- *3. Connect input resistor module (model: REM4).

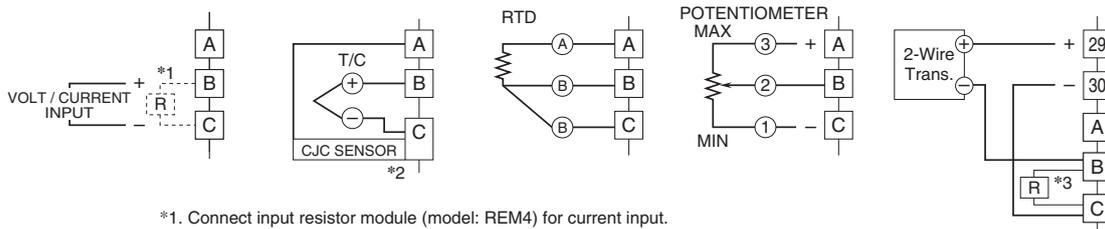
■ BACKUP MODULE POWER SUPPLY: DUAL SUPPLY



*1. Close across the terminals 27 – 28 when the unit is located at the end of a transmission line (= no cross-wiring).

*2. Close across the terminals 14 – 15 when the unit is located at the end of a transmission line (= no cross-wiring).

■ UNIVERSAL INPUT CONNECTION E.G.



*1. Connect input resistor module (model: REM4) for current input.

*2. Connect CJC sensor for thermocouple input.

*3. Connect input resistor module (model: REM4).



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