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(Not for use in Japan)

No. CP-SP-1033E

DCP552 Mark Ⅱ
DIGITRONIK
Digital Control Programmer
User's Manual

Thank you for purchasing an Azbil Corporation product.

This manual contains information for ensuring the correct use of this product.

It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses this product. Be sure to keep this manual nearby for handy reference.

Azbil Corporation

Please, read the 'Terms and Conditions' from following URL before the order and use.

http://www.azbil.com/products/bi/order.html

NOTICE

Be sure that the user receives this manual before the product is used.

Copying or duplicating this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact Azbil Corporation.

In no event is Azbil Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SAFETY REQUIREMENTS

To reduce risk of electrical shock which could cause personal injury, follow all safety notices in this documentation.

This symbol warns the user of a potential shock hazard where hazardous live voltages may be accessible.

- If the equipment is used in a manner not specified by the manufacturer, the protection protection provided by the equipment must be impaired.
- Do not replace any component (or part) not explicitly specified as replaceable by your supplier.
- All wiring must be in accordance with local norms and carried out by authorized experienced personnel.
- The ground terminal must be connected before any other wiring (and disconnected last).
- A switch in the main supply is required near the equipment.
- Mains power supply wiring requires a (T) 0.5A, 250V fuse (s).
  DCP552 models sold in September 2013 or later have a built-in fuse.

Over-voltage:Category II (IEC60364-4-443, IEC60664-1)
Specification of common mode voltage:The common mode voltages of all I/O except for main supply are less than 33Vrms, 46.7V peak and 70Vdc.

EQUIPMENT RATINGS

Supply voltages	85 to 264V AC
Frequency	50/60Hz
Power or current ratings	40VA maximum

EQUIPMENT CONDITIONS

Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Temperature:	0 to 50°C
Humidity:	10 to 90%RH
Vibration:	2m/s^2
Over-voltage category:	Category II (IEC60364-4-443, IEC60664-1)
Pollution degree:	Pollution degree 2
Installation location:	Indoors
Altitude:	2000m or less

EQUIPMENT INSTALLATION

The controller must be mounted into a panel to limit operator access to the rear terminals.

STANDARDS COMPLIANCE

EN61010-1, EN61326-1 (For use in industrial locations)
During EMC testing, the reading or output may fluctuate by ±10 %FS.
However, PV reading is within ±30 %FS.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

SAFETY PRECAUTIONS

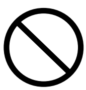
■ About Icons

The safety precautions described in this manual are indicated by various icons. Please be sure you read and understand the icons and their meanings described below before reading the rest of the manual.

Safety precautions are intended to ensure the safe and correct use of this product, to prevent injury to the operator and others, and to prevent damage to property. Be sure to observe these safety precautions.

⚠ **WARNING**	Warnings are indicated when mishandling this product might result in death or serious injury.
⚠ **CAUTION**	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

■ Examples

	Use caution when handling the product.
	The indicated action is prohibited.
	Be sure to follow the indicated instructions.

⚠WARNING

	Before removing, mounting, or wiring this module, be sure to turn off the power to the module and all connected devices. Doing so may result in an electric shock.
	Do not disassemble the controller as this could lead to electric shock or malfunction.
	Connect the FG terminal to ground with a ground resistance of maximum 100Ω before connecting other equipment and external control circuits. Failure to do so may cause electric shock or fire.
	Be sure to turn off the power supply when you connect the controller. Failure to do so may lead to electric shock or fire.
	Do not touch a live part such as a power terminal. This may result in electric shock.

⚠CAUTION

	Be sure to follow the operating requirements (regarding temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.) as stated in the specifications of the controller. Failure to heed this caution may lead to fire or malfunction.
	Do not block ventilation openings. Failure to heed this caution may lead to fire or malfunction.
	Make sure that wire scraps, chips or water do not enter inside the case of the controller. Failure to heed this caution may lead to fire or malfunction.
	Do not use pointed objects such as mechanical pencils or pins to press the keys on the controller. This may result in malfunction.
	Connect the controller as specified using designated cables and connection procedures. Failure to heed this caution may lead to electric shock, fire or malfunction.
	Current applied to current input terminals (55), (56) and (58), (59) must meet the specified range. Failure to heed this caution may lead to fire or equipment breakdown.
	All terminal screws shall be tightened to specified torque. Improperly tightened screws may lead to electric shock or fire.
	Do not use unused terminals on the instrument as relay terminals for other equipment. Failure to heed this caution may lead to electric shock, fire or equipment breakdown.

⚠CAUTION

❗	Attaching the terminal covers after completing the controller connections is highly recommended. Failure to heed this caution may lead to fire or malfunction. (Terminal covers are supplied with the controller.)
❗	If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector) to prevent fire or device failure.
❗	Be sure to turn off the power supply when you are replacing the batteries. Failure to heed this warning may lead to electric shock.
🚫	Be sure not to touch internal components during battery replacement or just after the power has been turned on. This may result in burn injuries.
🚫	• Make sure that the batteries are inserted with the plus (+) and minus (–) poles correctly oriented. • Do not use damaged batteries or batteries that leak. • Do not throw batteries into a fire, recharge, disassemble or expose them to heat. • Store batteries in a cool, dry place. Failure to heed these cautions may result in burns or battery leakage.
❗	Batteries should be kept out of reach of children, since they may swallow them. Should a child swallow a battery, contact a doctor immediately.
🚫	Do not throw used batteries into a fire or discard them as general garbage.
❗	Before you touch internal components, be sure to discharge any static electricity on your body by touching a metal ground connector. Failure to heed this caution may lead to equipment damage.

Handling Precautions

After turning on the **DCP552** Mark II, leave it on for at least 10 seconds to let it stabilize before you start using it.

Organization of This User's Manual

This manual is organized as follows.

Chapter 1. PRODUCT OUTLINE

This chapter explains the use and features of the **DCP551** and provides the basic function block and product model numbers.

Chapter 2. NAMES AND FUNCTIONS OF PARTS

This chapter gives the names and functions of parts of the **DCP551**, and input type and range number.

Chapter 3. INSTALLATION AND MOUNTINGS

This chapter describes the procedure for mounting the **DCP551** onto an operation console.
We strongly urge persons responsible for device design on the **DCP551** read this chapter.

Chapter 4. WIRING

This chapter describes the wiring procedure and precautions required for installing the **DCP551**.
We strongly urge persons responsible for device design and wiring of the **DCP551** read this chapter.

Chapter 5. FUNCTIONS

This chapter explains detailed functions of the **DCP551**.
We strongly urge persons responsible for control design on the **DCP551** read this chapter.

Chapter 6. OPERATION

This chapter gives the selections of the basic display, program selection, operation, and other information.
We strongly urge persons responsible for device design and operation on the **DCP551** read this chapter.

Chapter 7. PARAMETER SETUP

This chapter describes the parameter setting method of the **DCP551** and the meaning of settings.

Chapter 8. PROGRAM SETUP

This chapter describes the program setting method of the **DCP551** and the meaning of settings.

Chapter 9. MEMORY CARD OPERATION

This chapter describes how to use memory cards.

NOTE

This chapter is not applicable to the **DCP551B******* model.

Chapter 10. MAINTENANCE AND TROUBLESHOOTING

This chapter describes checkpoints and countermeasures when the **DCP551** is not operating normally.

Chapter 11. DISPOSAL

This chapter describes the disposal of the **DCP551**.

Chapter 12. SPECIFICATIONS

This chapter gives the general specifications, performance specifications and the external dimensions of the **DCP551**.

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Program Work Sheet

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Conventions Used in This Manual

The following conventions are used in this manual.

Handling Precautions	: Handling Precautions indicate items that the user should pay attention to when handling the **DCP552.**
Note	: Notes indicate useful information that the user might benefit by knowing.
(1), (2), (3)	: The numbers with the parenthesis indicate steps in a sequence or indicate corresponding parts in an explanation.
>>	: Controller state after an operation
DISP key, ↑ key	: Indicate the **DCP552** keys. These symbols represent keys on the **DCP552**'s console.
FUNC+PROG key	: Combinations of symbols like this indicatate that **PROG key** must be pressed while holding **FUNC key** down.
PA-01, C21	: Indicate the 7 segment display of. **DCP552** display panel 1 and display panel 2.
PV SHIFT	: Indicates messages displayed by the **DCP552** message display.

Chapter 1. PRODUCT OUTLINE

1 - 1 Features

The **DCP552** is a general purpose dual-loop control programmer for controlling temperature, pressure, flow rate, carbon potential (CP) and other parameters. The program provides a total of 49 patterns and up to 99 segments can be set for each pattern. Note, however, that the maximum number of segments is 2000 or less and that the maximum number of subfunctions for setting events is 4000 or less.

- **High accuracy in multi-range inputs**

  Featuring a multi-range format, the user can select thermocouple, resistance temperature detector, DC voltage or DC current. Accuracy is ±0.1% FS ±1 digit, the sampling cycles is 0.1 sec and some model numbers allow PV2 channel O_2 sensor inputs for carbon potential compensation.

- **Multi-control output types**

  Selection at setup allows the user to choose from among current proportional output, voltage time proportional output and open collector time proportional output.

- **Multi-communications**

  Selection at setup enables the user to switch between RS-485 and RS-232C on the rear panel terminal base.
  At setup it is also possible to switch the communications port from the rear panel loader jack to the front panel loader jack. A special cable is required to use to loader jack on the front panel.

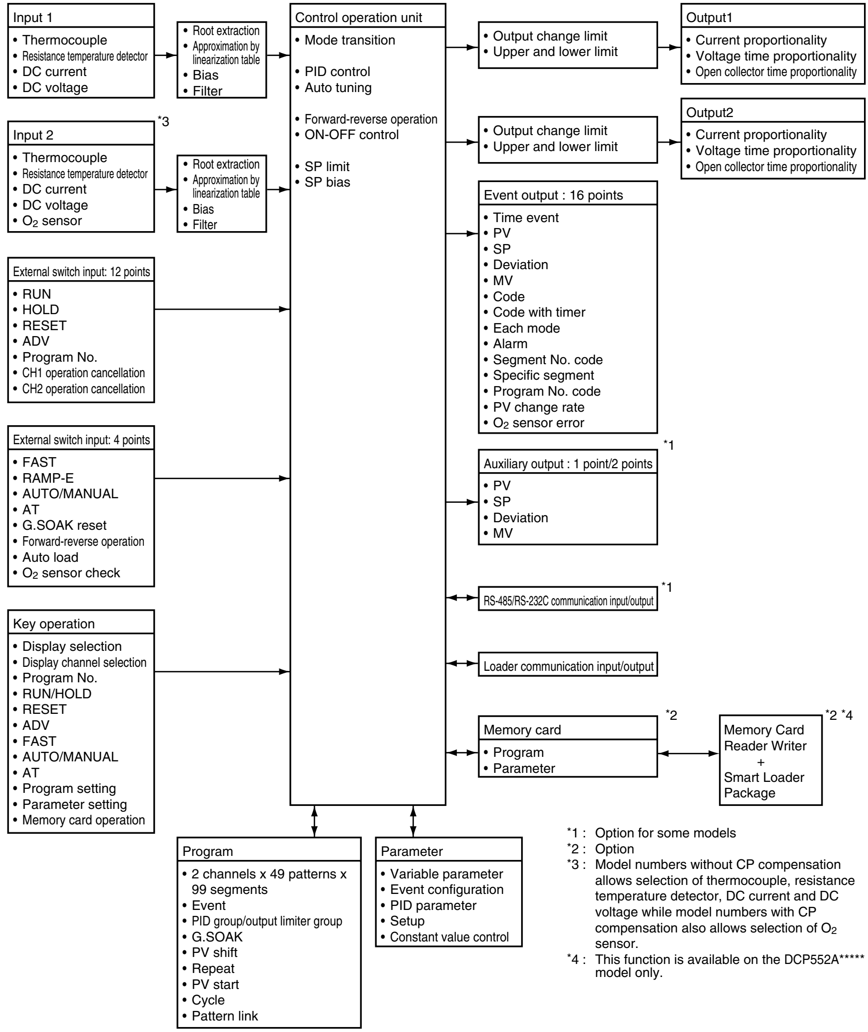
- **Improved PLC support**

  The programmer is equipped with 16 external switch inputs and 16 event outputs for flexible support of PLC based automatic systems.

- **Simple operation**

  The optional plug-in memory card makes it easy to achieve program and parameter settings for later reuse. Also, the optional smart loader package allows you to make program and parameter settings from a PC.

1 - 2 Basic Function Block Diagram



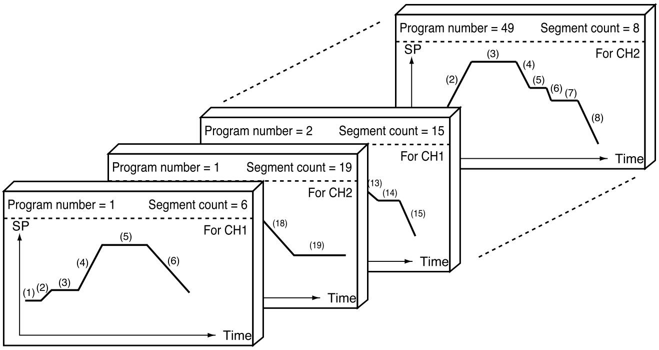
*1 : Option for some models
*2 : Option
*3 : Model numbers without CP compensation allows selection of thermocouple, resistance temperature detector, DC current and DC voltage while model numbers with CP compensation also allows selection of O_2 sensor.
*4 : This function is available on the DCP552A***** model only.

1 - 3 Data Configuration Overview

Data is comprised of parameters and the program.
Parameters are used to set the functions of the **DCP552** while the program is the software that operates the controller at run time.

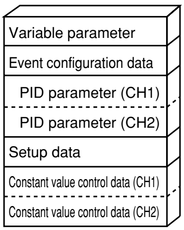
● A total of 49 patterns

It will store up to 49 programs per channel (CH1 and CH2), with up to 99 segments per program.



● Parameters

Five types of patterns are provided: variable parameters, event configuration data, PID parameters, setup data and constant value control data.



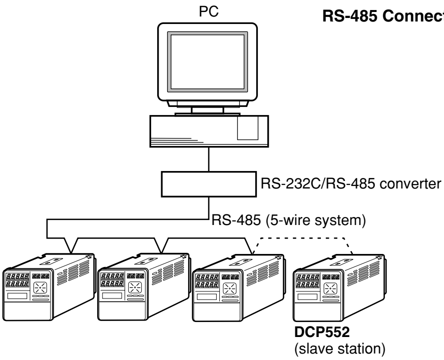
1 - 4 System Configuration

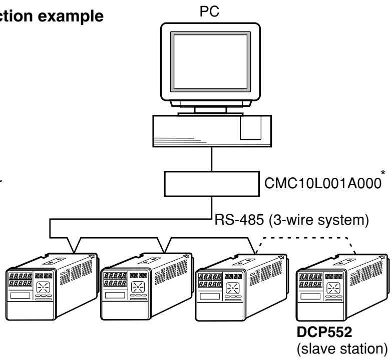
■ CPL communications network-based configuration

Models equipped with the optional communications interface can be connected as a slaved DigitroniK's controller to a CPL communications* network. In this case, the user can employ as the master station a personal computer.

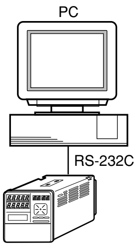
*: CPL(Controller Peripheral Link) Communications network is the host-communications.

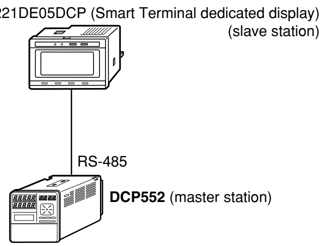
RS-485 Connection example





* "Communication controller CMC10L001A000" is RS-232C/RS-485(3-wire system) converter in Azbil corporation.





1 - 5 Model Number

Model number : **DCP552□2□□□□**

Basic model number	Memory card	PV input count	Carbon potential	Option	Additional processing	Contents
DCP552						Digital programmable controller (dual-loop control)
	A					With memory card reader/writer
	B					Without memory card reader/writer
		2				2 channels
			0			Not provided
			1			Provided
				0		Not provided
				1		Auxiliary output channel 1
				2		Auxiliary output channel 2, communications
					00	Not provided
					D0	Inspection Certificate provided

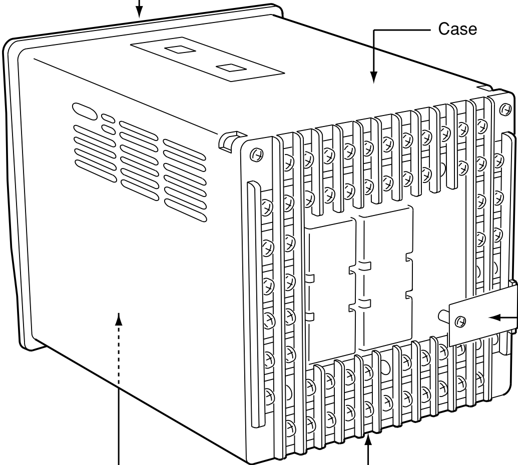
Chapter 2. NAMES AND FUNCTIONS OF PARTS

2 - 1 Structure

The **DCP552** consists of a main unit, console, case, and terminal base.

Console
Provides 7-segment displays, LEDs, operation keys, and a loader interface unit.

Case

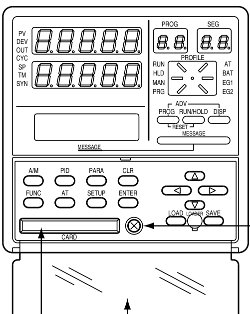


Terminal cover
Covers power supply and prevents electric shock.

Terminal base
Provides terminals to connect a power supply, input, output, event output, external switch input, and auxiliary output (optional) , etc.

Main unit
Console and electric circuit board, etc.

DCP552A model

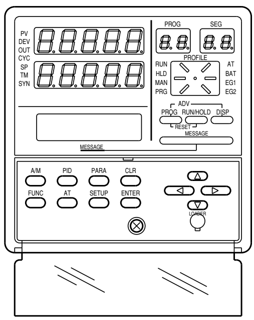


Lock screw
Secures case to main unit.

Key cover
Prevents operation errors.

Memory card slot
A memory card is inserted into this slot.

DCP552B model

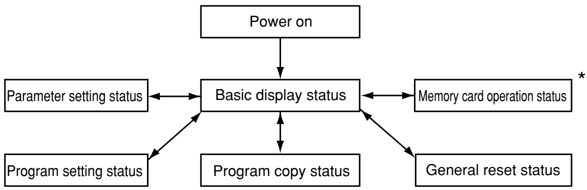


2 - 2 Console

The console consists of the operation keys, displays and LEDs (light emitting diodes).

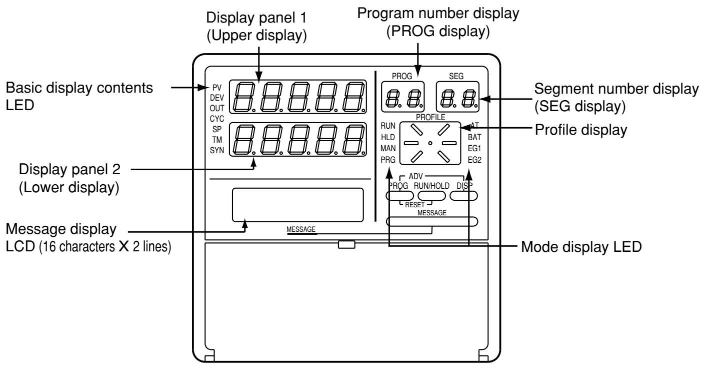
■ Basic display status

Basic display status shows the running condition of the **DCP552** on the console. The basic display status is invoked when the **DCP552** is powered up (power on). Key operations make it possible to change from the basic display status to parameter setting status, program setting status, program copy status, memory card operation status and general reset status.



Key operations can also be used to return to the basic display status.
* : This function is available on the **DCP552A******* model only.

■ Display



● Basic display LEDs

PV : Lights during PV display, otherwise off.
DEV : Lights during deviation display, otherwise off.
OUT : Lights during output display, otherwise off.
CYC : Lights during cycle display, otherwise off.
SP : Lights during SP display, otherwise off.
TM : Lights during time display, otherwise off.
SYN : Lights in CH1 and CH2 sync mode, otherwise off.

● Display panel 1

Indicates PV and other data in basic display status.
Indicates item codes in parameter setting status.
Indicates set values and item codes in program setting status.

● Display panel 2

Indicates SP, time, output and other data in basic display status.
Indicates set values in parameter setting status.
Indicates set values in program setting status.

● Message display

Indicates output graph, deviation graph, running progress graph, event status, program tag and other data in basic display status.
Displays reference messages in parameter setting status.
Displays tag settings and reference messages in program setting status.
Indicates selected operation and operation results during memory card operation.

● Program number display

Indicates a selected program number in basic display status.
Indicates a set program number in program setting status.
Off during constant value control.
Indicates the alarm code "*AL*" when an alarm occurs in basic display status.

● Segment number display

Indicates a selected segment number in basic display status.
Indicates a set segment number in program setting status.
Off during constant value control.
Indicates an alarm code number when an alarm occurs in basic display status.

● Mode display LED

RUN, HLD : Indicates the RUN, HOLD, FAST, END, and READY FAST modes (see the table below).

LED \ Mode	READY	RUN	HOLD	FAST	END	READY FAST
RUN	OFF	Lights	OFF	Flicker	OFF	Lights
HLD	OFF	OFF	Lights	OFF	Flickers	Lights

MAN : Lights in MANUAL mode. Off in AUTO mode.
PRG : Lights in program setting status, otherwise off.
AT : Flickers during auto tuning execution, otherwise off.
BAT : Flickers when battery voltage is too low, otherwise off.
EG1 : Lights when CH1 is displayed, otherwise off.
EG2 : Lights when CH2 is displayed, otherwise off.

● Profile display

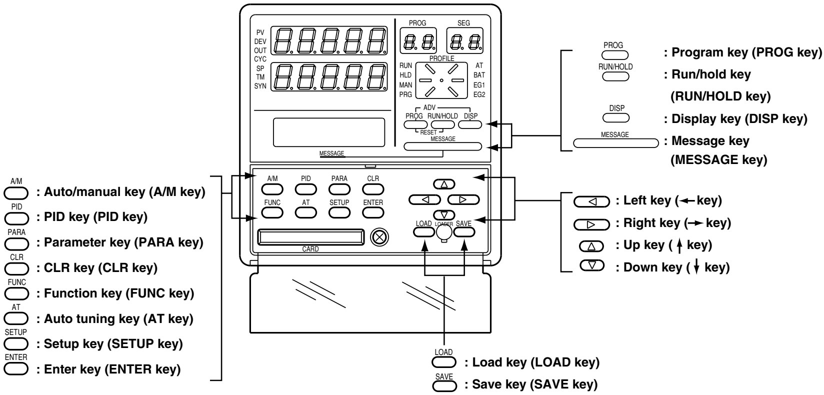
Indicates the rising, soaking, and falling trends of a program pattern.
Flickers during G.SOAK wait and lights continuously after power on.

■ Key pad

⚠ CAUTION

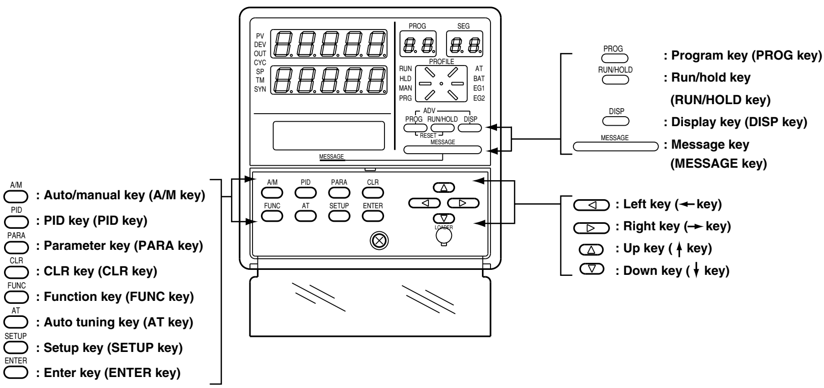
Do not use pointed objects such as mechanical pencils or pins to press the keys on the controller.
This may result in malfunction.

DCP552A model



( ) : Denotes key term used in this manual.

DCP552B model



( ) : Denotes key term used in this manual.

Classification	Function	Key operation
Basic display status	Changes the display contents.	**DISP**
	Changes display channels.	**FUNC + DISP**
	Changes the display contents on the message display.	**MESSAGE**
	Changes set program numbers in ascending order. (In READY mode)	**PROG**
	Performs RUN operation. (In READY, HOLD, FAST, or READY FAST mode)	**RUN/HOLD**
	Performs HOLD operation. (In RUN mode)	
	Performs RESET operation. (In RUN, HOLD, FAST, END, or READY FAST mode)	**PROG + RUN/HOLD**
	Performs ADV operation. (In RUN, HOLD, FAST, or READY FAST mode)	**PROG + DISP**
	Performs FAST operation. (In RUN, HOLD, or READY mode)	**FUNC + →**
	Performs MANUAL operation. (In AUTO mode)	**A/M**
	Performs AUTO operation. (In MANUAL mode)	
	Starts AUTO tuning. (When AUTO tuning is not in operation.)	**AT**
	Interrupts AUTO tuning. (When AUTO tuning is in operation.)	
	Changes numerics during MANUAL operation. (When the MV or SV display flickers.)	↑ ↓ ← →
	Changes program numbers or segment numbers. (When the program number or segment number flickers.)	
Parameter setting	Starts the variable parameter setting. (In basic display status)	**PARA**
	Starts the event configuration setting. (In basic display status)	**FUNC + PARA**
	Starts the PID parameter setting. (In basic display status)	**PID**
	Starts the setup setting. (In basic display status)	**SETUP**
	Starts the fixed command control setting. (In basic display status)	**FUNC + PID**
	Shifts each item.	↑ ↓ ← →
	Enters set values.	**ENTER**
	Completes a change in a set value. (When a set value flickers.)	
	Changes each item’s set point. (When a set value flickers.)	↑ ↓ ← →
	Stops each item’s set point. (When a set value flickers.)	**PARA**
	Ends parameter setting.	**DISP**
Program setting	Starts the program setting (programming). (In basic display status)	**FUNC + PROG**
	Shifts to program item or segment number.	↑ ↓ ← →
	Enters set values.	**ENTER**
	Completes a change in a set values. (When a set value flickers.)	
	Changes each item’s set point. (When a set value flickers.)	↑ ↓ ← →

Classification	Function	Key operation
Program setting	Erases or resets a set value. (When a set value flickers.)	**FUNC + CLR**
	Cancels change in set value. (When a set value flickers.)	**DISP**
	Inserts or delete a segment when a pattern SP setting is started.	**FUNC + ENTER**
	Changes RAMP-X ⇔ RAMP-T or RAMP-X ⇔ RAMP-E when a pattern SP setting is completed.	
	Starts a program number change.	**FUNC + PROG**
	Ends program setting.	**DISP**
Program copy	Starts program copy. (In basic display status)	↑ **+ PROG**
	Changes program number at copy destination.	↑ ↓
	Executes the copy. (When a set value flickers.)	**ENTER**
	Ends program copy.	**DISP**
Memory card operation (available on the DCP552A***** model only)	Starts a data write operation to the memory card. (In basic display status)	**SAVE**
	Writes data to the memory card.	
	Starts a data read operation from the memory card. (In basic display status)	**LOAD**
	Reads data from the memory card.	
	Changes selected memory card operation.	↑ ↓
	Enters memory card operation.	**ENTER**
	Interrupts memory card operation.	**DISP**
General reset	Returns a check status of the general reset. (In basic display status)	**FUNC + CLR + MESSAGE**
	Executes a general reset.	**ENTER**
	Interrupts a general reset.	**DISP**

■ Key chord functions

PROG + RUN/HOLD : Reset key

Press the **RUN/HOLD key** while holding down the **PROG key** in basic status display to perform a RESET.
The READY mode is invoked when a reset is performed in the RUN, HOLD, FAST, END, or READY FAST modes. This RESET operation does not work in the READY mode.

PROG + DISP : Advance key

Press the **DISP key** while holding down the **PROG key** in the program run mode in basic status display to perform an ADV (advance) operation. The next segment is displayed when this action is performed in the RUN, HOLD, FAST, or READY FAST modes. This ADV operation does not work in the READY mode.

FUNC + → : Fast key

Press the → **key** while holding down the **FUNC key** in the program run mode in basic status display to perform a FAST operation.
The system changes from the RUN or HOLD mode to the FAST mode. If the system is in the READY mode, it goes to the READY FAST mode.

FUNC + DISP : Display channel select key
Press the **DISP key** while holding down the **FUNC key** in basic display status to select display channels.
In the program setting status, press the **DISP key** while holding down the **FUNC key** to select the channel of the program to be set.

FUNC + PARA : Event configuration setting key
Press the **PARA key** while holding down the **FUNC key** in basic status display to switch to the event configuration setting status.

FUNC + PID : Constant value control setting key
Press the **PID key** while holding down the **FUNC key** in basic status display to switch to the constant value control setting status.

FUNC + PROG : Program setting (programming) key
Press the **PROG key** while holding down the **FUNC key** in the program run mode in basic status display to go to the program setting (programming) status.
When the **PROG key** is pressed while holding down the **FUNC key** in the program setting status, allows you to change the number of the program to be set.

FUNC + CLR : Program delete key
Press the **CLR key** while holding down the **FUNC key** during registration in the program setting status to delete a setting or return to a default value.

FUNC + ENTER : Segment insert/remove/RAMP/selection key
Press the **ENTER key** while holding down the **FUNC key** to go to the segment insert/delete panel during SP and time setting in the program setting status.
Pressing the **ENTER key** while the **FUNC key** is held down during SP registration in the program setting status allows you to switch between RAMP-X and RAMP-T as well as RAMP-X and RAMP-E.

↑ + PROG : Program copy key
Press the **PROG key** while holding down the **↑ key** in program run READY mode in basic display status to go to the program copy panel.

FUNC + CLR + MESSAGE : General reset key
Press the **CLR** and **MESSAGE keys** simultaneously while holding down the **FUNC key** in the READY AUTO mode in the basic display status to go to the general reset verification panel.

■ Loader jack

This jack allows the connection of a loader.
Do not insert plugs other than loader plugs.
The loader jack is not isolated from internal digital circuits.
When not in use, always replace the cap.

2 - 3 Input Type and Range Number

■ Input

● Thermocouple

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.	˚C	˚F		
K (CA)	K46	16	–200.0 to +200.0	–300.0 to +400.0	±0.1%FS	±0.3%FS at –200 to –100˚C
K (CA)	K09	0	0.0 to 1200.0	0 to 2400	±0.1%FS	
K (CA)	K08	1	0.0 to 800.0	0 to 1600	±0.1%FS	
K (CA)	K04	2	0.0 to 400.0	0 to 750	±0.1%FS	
E (CRC)	E08	3	0.0 to 800.0	0 to 1800	±0.1%FS	
J (IC)	J08	4	0.0 to 800.0	0 to 1600	±0.1%FS	
T (CC)	T44	5	–200.0 to +300.0	–300 to +700	±0.1%FS	±0.3%FS at –200 to –45˚C
B (PR30-6)	B18	6	0.0 to 1800.0	0 to 3300	±0.1%FS	±4.0%FS at 0 to 260˚C, ±0.15%FS at 260 to 800˚C
R (RR13)	R16	7	0.0 to 1600.0	0 to 3100	±0.1%FS	
S (PR10)	S16	8	0.0 to 1600.0	0 to 3100	±0.1%FS	
W (WRe5-26)	W23	9	0.0 to 2300.0	0 to 4200	±0.1%FS	
W (WRe5-26)	W14	10	0.0 to 1400.0	0 to 2552	±0.1%FS	
PR40-20	D19	11	0.0 to 1900.0	0 to 3400	±0.2%FS	±0.9%FS at 0 to 300˚C, ±0.5%FS at 300 to 800˚C
N	U13	12	0.0 to 1300.0	32 to 2372	±0.1%FS	
PL II	Y13	13	0.0 to 1300.0	32 to 2372	±0.1%FS	
Ni-Ni • Mo	Z13	14	0.0 to 1300.0	32 to 2372	±0.1%FS	
Gold, iron, chromel	Z06	15	0.0 to 300.0K (K : Kelvin)		±0.4%FS	

● Resistance temperature detector (RTD)

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.	˚C	˚F		
JIS'89Pt100	F50	64	–200.0 to +500.0	–300.0 to +900.0	±0.1%FS	
	F46	65	–200.0 to +200.0	–300.0 to +400.0	±0.1%FS	
(IEC Pt100Ω)	F32	66	–100.0 to +150.0	–150.0 to +300.0	±0.1%FS	
	F36	67	–50.0 to +200.0	–50.0 to +400.0	±0.1%FS	
	F33	68	–40.0 to +60.0	–40.0 to +140.0	±0.15%FS	
	F01	69	0.0 to 100.0	0.0 to 200.0	±0.15%FS	
	F03	70	0.0 to 300.0	0.0 to 500.0	±0.1%FS	
	F05	71	0.0 to 500.0	0.0 to 900.0	±0.1%FS	
JIS'89Pt100	P50	96	–200.0 to +500.0	–300.0 to +900.0	±0.1%FS	
	P46	97	–200.0 to +200.0	–300.0 to +400.0	±0.1%FS	
	P32	98	–100.0 to +150.0	–150.0 to +300.0	±0.1%FS	
	P36	99	–50.0 to +200.0	–50.0 to +400.0	±0.1%FS	
	P33	100	–40.0 to +60.0	–40.0 to +140.0	±0.15%FS	
	P01	101	0.0 to 100.0	0.0 to 200.0	±0.15%FS	
	P03	102	0.0 to 300.0	0.0 to 500.0	±0.1%FS	
	P05	103	0.0 to 500.0	0.0 to 900.0	±0.1%FS	

● **DC current, DC voltage**

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.				
mA (Linear)	C01	48	4 to 20mA	Programmable range –19999 to +20000 (Decimal point position is variable.)	±0.1%FS	
	Z51	52	2.4 to 20mA		±0.1%FS	
mV (Linear)	M01	49	0 to 10mV		±0.1%FS	
	L02	50	–10 to +10mV		±0.1%FS	
		51	0 to 100mV		±0.1%FS	
mA (Linear)	C01	128	4 to 20mA		±0.1%FS	
	Z51	134	2.4 to 20mA		±0.1%FS	
V (Linear)		129	0 to 1V		±0.1%FS	
		130	–1 to +1V		±0.1%FS	
	V01	131	1 to 5V		±0.1%FS	
		132	0 to 5V		±0.1%FS	
		133	0 to 10V		±0.1%FS	
O_2 sensor *		135	0 to 1250mV Carbon potential (CP value) indication range: 0.000 to 4.000% C (Note, however, that PID control is calculated over the 0.000 to 2.000% input range) Oxygen pressure indication range: 0.000 to 1.500 x 10^{-20} atm		±0.1%FS	When converted to mV values

* • The O_2 sensor is manufactured by one of the following companies: Nihon Glass (NGK), Marathon Monitors, Cambridge, Corning, AACC (Advanced Atmosphere Control Corporation), Barber Colman or Furnace Control.

• PV2 in models with carbon potential compensation is tied to the O_2 sensor.

[!] Handling Precautions

- The unit for code Z06 is “K” (kelvin).
- Code F50 and P50 do not generate the PV lower limit alarm.
- The number of decimal digits for DC current and DC voltage is programmable from 0 to 4.
- The O_2 sensor generates the PV upper limit alarm at values of 1375mV or above, but does not generate the PV lower limit alarm.
- The lower limit readout of code B18 is 20°C(68°F).

Chapter 3. INSTALLATION AND MOUNTING

3 - 1 Before Installation

⚠WARNING

!	Before removing, mounting, or wiring this module, be sure to turn off the power to the module and all connected devices. Doing so may result in an electric shock.
⊘	Do not disassemble the controller as this could lead to electric shock or malfunction.

⚠CAUTION

!	Be sure to follow the operating requirements (regarding temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.) as stated in the specifications of the controller. Failure to heed this caution may lead to fire or malfunction.
⊘	Do not block ventilation openings. Failure to heed this caution may lead to fire or malfunction.
!	Make sure that wire scraps, chips, or water do not enter inside the case of the controller. Failure to heed this caution may lead to fire or malfunction.

■ Mounting position

Do not install the **DCP552** in locations:

- exposed to high or low temperature or humidity.
- exposed to direct sunlight or to the elements such as outside.
- exposed to water, oil or chemicals.
- exposed to corrosive or inflammable gas.
- exposed to dust or smoke.
- exposed to vibrations or shocks.
- exposed to strong electric or magnetic fields.
- exposed to electric noise such as ignition devices or welding machines.
- Outdoors.

■ Sources of electrical interference and countermeasures

- The following list notes common sources of electrical interference.

  (1) Relays and contacts

  (2) Solenoid coils and valves

  (3) Power lines (especially those carrying more than 90V AC)

  (4) Inductive loads

  (5) Inverters

  (6) Motor rectifiers

  (7) Phase angle control SCR

  (8) Wireless communications equipment

  (9) Welding machines

  (10) High voltage ignition devices

- If the source of noise cannot be removed, take the following measures.
  - Use a CR filter to suppress fast-rising noise.
    Recommended CR filter : Azbil Corporation model No. **81446365-001**
  - Use a varistor to suppress high-amplitude interference.
    Recommended varistors : Azbil Corporation model No. **81446366-001** (for 100V)
    81446367-001 (for 200V)

Handling Precautions

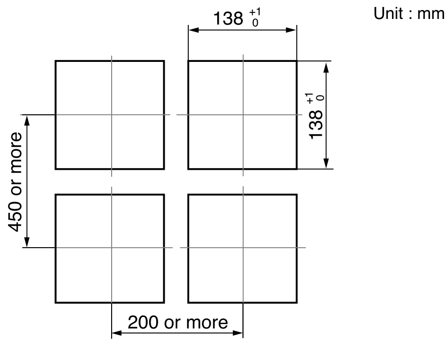
Varistors must be handled carefully as they become defective if they are short-circuited.

3 - 2 Installation

This section describes installation procedures.

■ Panel cutout dimensions

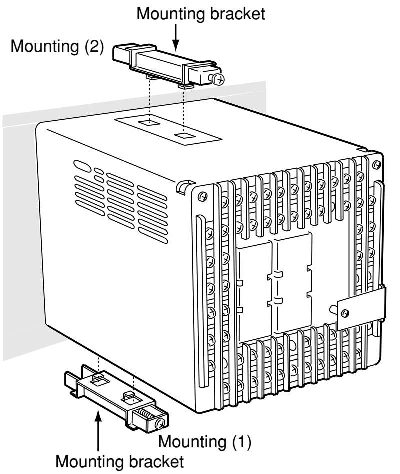
Use 2mm thick steel panels in setting up the **DCP552**.



Handling Precautions

Install the **DCP552** in a location where the lower panel is not exposed to temperatures that exceed the operating temperature range (0 to 50°C). Make sure that the temperatures above and below the controller meet specified requirements.

■ Installation procedures



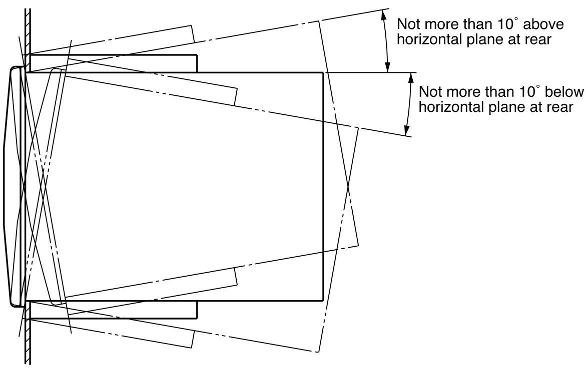
- Use the provided mounting bracket to firmly secure the upper and lower panels.

- Assemble the instrument before mounting (1).

Handling Precautions

When the provided mounting brackets are firmly secured and there is no looseness, turn the screws only one full turn. Over-tightening the screws of the brackets can deform or damage the case.

- The rear of the instrument must not be more than 10° above or below the horizontal plane.



Chapter 4. WIRING

4 - 1 Precautions on Wiring

⚠WARNING

Connect the FG terminal to ground with a ground resistance of maximum 100Ω before connecting other equipment and external control circuits.
Failure to do so may cause electric shock or fire.

Before removing, mounting, or wiring this module, be sure to turn off the power to the module and all connected devices.
Doing so may result in an electric shock.

Do not touch a live part such as a power terminal.
This may result in electric shock.

⚠CAUTION

Connect the controller as specified using designated cables and connection procedures.
Failure to heed this caution may lead to electric shock, fire or malfunction.

Make sure that wire scraps, chips or water do not enter inside the case of the controller.
Failure to heed this caution may lead to fire or malfunction.

Current applied to current input terminals (55), (56) and (58), (59) must meet the specified range.
Failure to heed this caution may lead to fire or equipment breakdown.

All terminal screws shall be tightened to specified torque.
Improperly tightened screws may lead to electric shock or fire.

Do not use unused terminals on the instrument as relay terminals for other equipment. Failure to heed this caution may lead to electric shock, fire or equipment breakdown.

Attaching the terminal covers after completing the controller connections is highly recommended.
Failure to heed this caution may lead to fire or malfunction. (Terminal covers are supplied with the controller.)

If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector) to prevent fire or device failure.

Be careful not to allow crimp terminal lugs to touch adjacent terminals.

Handling Precautions

- Before connecting the lines, verify the model number and terminal numbers on the label affixed to the side panel of the **DCP552**.
  After completing, always double check to ensure all wiring has been performed correctly before turning on the power.
- The I/O signal lines and the communications lines shall maintain at least 50cm between them and the power supply line and power supply cables. Do not route these cables through the same conduit or duct.
- Make sure that no crimp-style solderless wire connectors are touching an adjacent terminal or connector.
- When connecting a thermocouple input of the **DCP552** to another instrument, make sure the instrument's input impedance totals at least 1MΩ. If less than 1MΩ, the **DCP552** may not be able to detect sensor disconnection.
- Cautions when using data input devices in combination
  Input of the **DCP552** input or output (connected in parallel for input) to an A/D converter, analog scanner, etc., may cause dispersion of the read data. To prevent such occurrence, take one of the following corrective measures.
  (1) Use a low-speed integral A/D converter.
  (2) Insert an isolator with no switching power supply between the **DCP552** and the A/D converter.
  (3) Perform averaging with a personal computer when the data is read.
  (4) If the device permits, insert an input filter.
- Devices and systems to be connected to this unit must have the basic insulation sufficient to withstand the maximum operating voltage levels of the power supply and input/output parts.

4 - 2 Recommended Cables

To perform thermocouple input, connect a thermocouple element to the terminals. When the wiring distance is long or when connecting the thermocouple without the element to the terminals, connect via shielded compensating lead wires. To select, refer to the compensating lead wire specifications below.

- For I/O other than thermocouple, use instrument cable for JCS4364 shielded instruments or equivalent. (general name: twisted shielded cable for instrument use)
  The following cables are recommended:

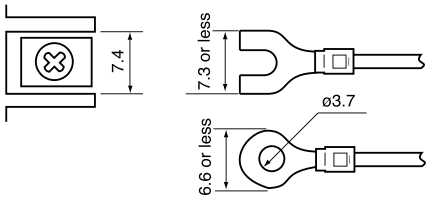
Fujikura Ltd.	2-wire	IPEV-S-0.9mm² × 1P
	3-wire	ITEV-S-0.9mm² × 1T
Hitachi Cable, Ltd.	2-wire	KPEV-S-0.9mm² × 1P
	3-wire	KTEV-S-0.9mm² × 1T

- A shielded multicore microphone cord (MVVS) may be used, if electromagnetic induction is comparatively low.

4 - 3 Making Terminal Connections

To connect a line to the terminals, use crimp-style solderless wire connectors that fit an M3.5 screw.

Unit : mm

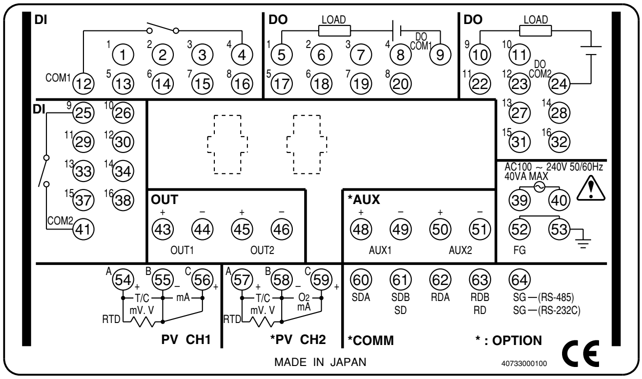


Handling Precautions

- If the **DCP552** is mounted in a location subject to noticeable vibration or impact, be sure to use round crimp-style solderless wire connectors to prevent lines from becoming disconnected from the terminals.
- Be careful not to allow any of the crimp-style solderless wire connectors to touch adjacent terminals or connectors.
- The terminal screws shall be tightened to 0.78 to 0.98 N·m torque.

4 - 4 Terminal Array

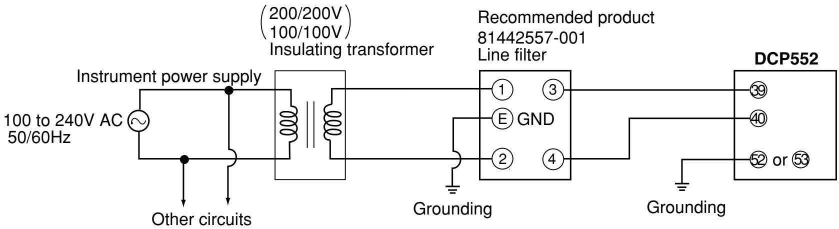
Wires are connected to the terminal base according to the layout shown below.



4 - 5 Power Supply and Grounding

■ Power supply

To supply power to the **DCP552**, use an instrument-dedicated single-phase power supply subject to minimal electrical interference.



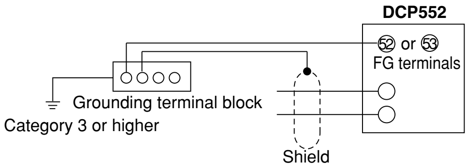
Handling Precautions

- If electrical interference proves excessive, we recommend adding an insulating transformer and/or using a line filter.
  Azbil corporation model no.: **81442557-001**
- After carrying out interference reducing measures, do not bundle the primary and secondary power supply coils together or insert them in the same conduit or duct.

■ Grounding

If grounding the shield wire or other lines proves difficult, ground them separately to a grounding terminal block.

Type : Category 3 or higher (Max: 100Ω)
Conductor : Annealed copper wire, min. $2mm^2$ (AWG14)
Max. Length : 20m



Handling Precautions

To ground the **DCP552**, connect the FG terminal (terminal (52), or (53)) to a single ground point without jumpering.

4 - 6 PV Input (Analog Input) Connection

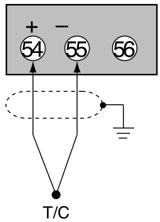
⚠CAUTION

!	Current applied to current input terminals (55), (56) and (58), (59) must meet the specified range. Failure to heed this caution may lead to fire or equipment breakdown.

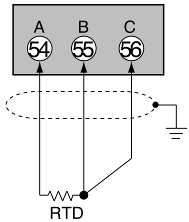
■ PV input CH1 connection

PV input CH1 is a multi-input type input for sensors. Connect as shown below, according to the type of sensor being used.

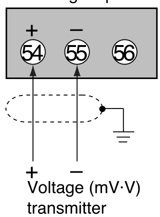
· Thermocouple input



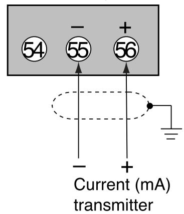
· Resistance temperature detector input



· DC voltage input



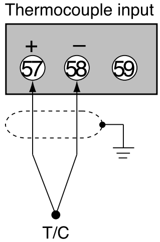
· DC current input



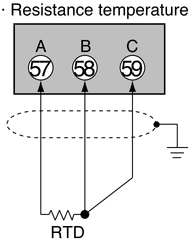
■ PV input CH2 connection

PV input CH2 is a multi-input type input for sensors. Connect as shown below, according to the type of sensor being used.

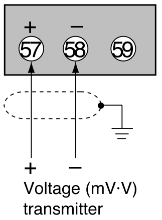
· Thermocouple input



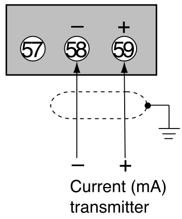
· Resistance temperature detector input



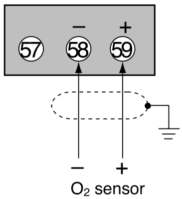
· DC voltage input



· DC current input



· O_2 sensor input



Handling Precautions

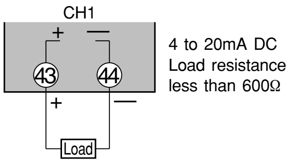
- Be careful to connect the input polarities correctly.
- Use shielded cable to connect the input.

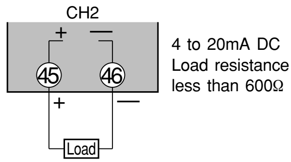
4 - 7 Control Output Connection

⚠WARNING

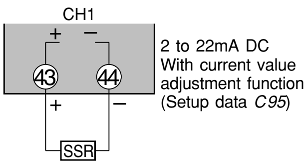
Be sure to turn off the power supply when you are installing or removing the controller.
Failure to do so may cause electric shock or fire.

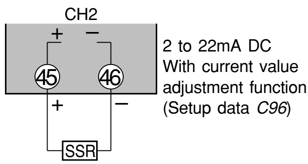
- **Current output (5G, 5S)**





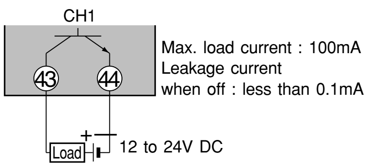
- **Voltage output (6D)**

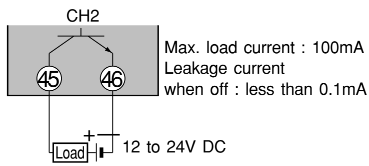




Handling Precautions

The voltage output is a constant current circuit inside. The SSR used is set to an optimum voltage to meet the requirements of the load. Enter the value in the setup data. A normal SSR voltage has been set at the factory before shipment.





- **Open collector output (8D)**

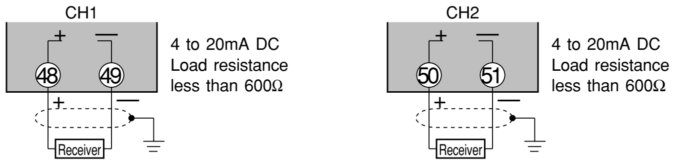
Handling Precautions

- Do not short-circuit the positive (+) terminal of the external power supply to terminal (43) on the **DCP552**. Doing so causes the open collector outputs to malfunction. (There is no short-circuit preventing circuit inside.)
- When connecting a semiconductor load such as a programmable controller (sequencer), select a module in which the current directions match.
  Use one made inoperative by the leakage current produced when the digital outputs are shut off.

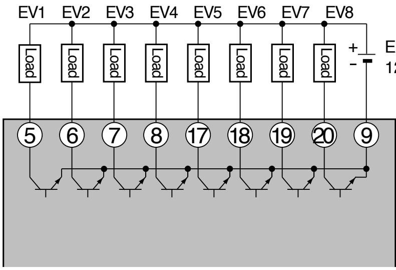
4 - 8 Auxiliary Output Connection

⚠ WARNING

Before removing, mounting, or wiring this module, be sure to turn off the power to the module and all connected devices.
Doing so may result in an electric shock.

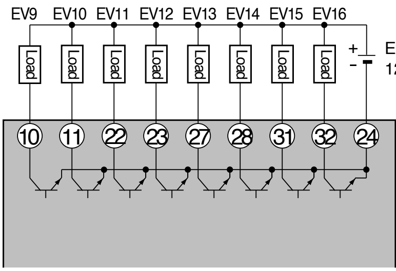


4 - 9 Event Output (Open Collector Output) Connection



External power supply
12 to 24V DC

Max. load current : 70mA/point
Max. common current : 500mA
Leakage current when OFF : less than 0.1mA



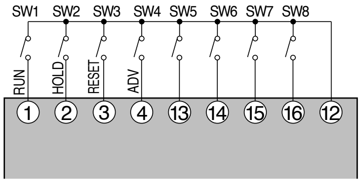
External power supply
12 to 24V DC

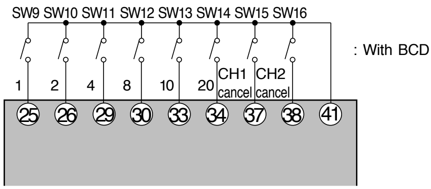
Max. load current : 70mA/point
Max. common current : 500mA
Leakage current when OFF : less than 0.1mA

Handling Precautions

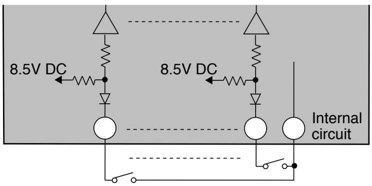
- Do not short-circuit the positive (+) terminal of the external power supply to terminals (5) to (8), (17) to (20), (10), (11), (22), (23), (27), (28), (31), and (32) on the **DCP552**. Doing so causes the open collector outputs to malfunction. (There is no short-circuit preventing circuit inside.)
- When connecting a semiconductor load such as a programmable controller (sequencer), select a module in which the current directions match.
  Use one made inoperative by the leakage current produced when the digital outputs are shut off.

4 - 10 External Switch Input Connection





● **Internal circuit diagram of the DCP552 connecting external switch input**

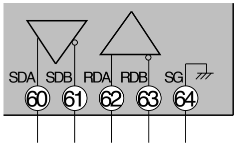


Handling Precautions

- The inputs of the **DCP552** unit are provided with a built-in power supply (open voltage type, 8.5V DC). Always use no-voltage contacts externally.
- For the no-voltage contacts, use gold contacts or other relays that switch on small currents. Other types of relay contacts may not switch. Use contacts that have ample margin over the minimum switching capacity with respect to the current and open voltage ratings of contacts provided on the **DCP552**.
- If using semiconductors (open collectors, etc.) as no-voltage contacts, use one that maintains a potential of no more than 2V across the contacts when actuated, and a leakage current of no more than 0.1mA when shut off.
- The digital inputs (remote switch inputs) of all SDC40 and SDC10 series units can be connected in parallel. If connecting them in parallel to another instrument, carefully check the requirements of the other instrument before proceeding.
- Do not connect SDC20/21, SDC30/31 series in parallel. Doing so may cause the external switch input to malfunction.
- Common terminals (12) and (41) of the external switch input are connected internally.

4 - 11 Communication Connection

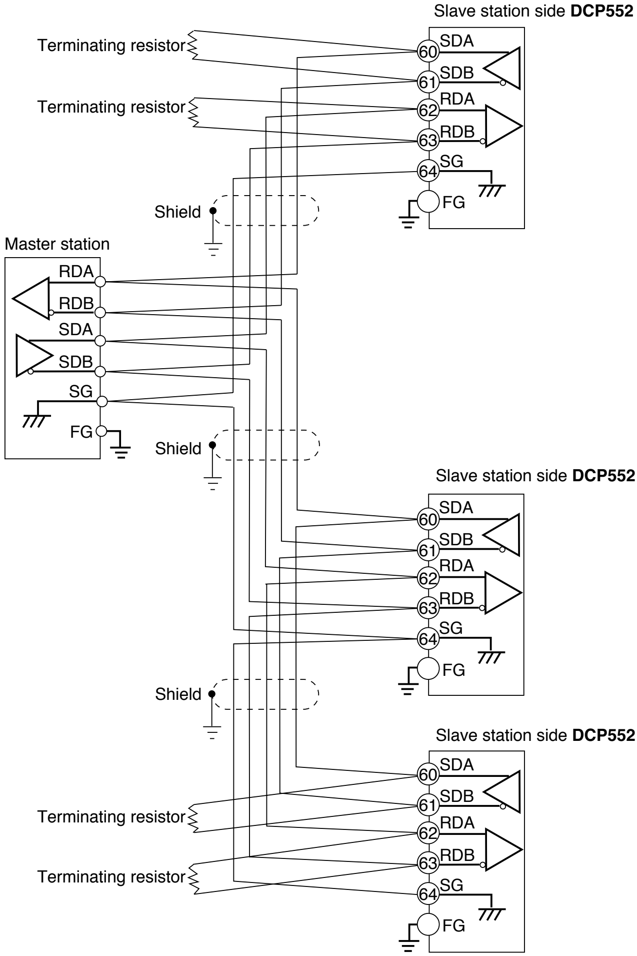
■ RS-485 connection



Handling Precautions

- The slave station can be connected in a multi-drop configuration.
- Always set a unique address to each slave station.
- Attach terminating resistances (a total of four when connecting a 5-wire system) to the ends of the communications lines. Use 1/2W or greater terminating resistances of 150Ω ±5%.
- If connecting three lines, short-circuit terminals (60), (62) and (61), (63).
- Do not short-circuit the RDA to RDB and SDA to SDB terminals.
  Doing so may cause the **DCP552** to malfunction.

● **5-wire system RS-485 connection diagram**



Handling Precautions

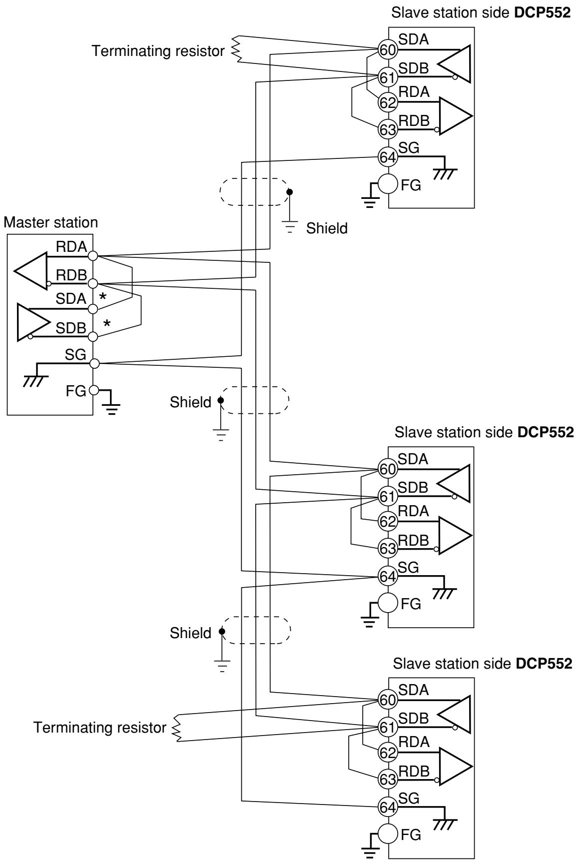
- Be sure to connect SG terminals each other.
  Failure to do so might cause unstable communications.

Attach 1/2W or greater terminating resistances of 150Ω ±5% at each end of the communications lines. Ground the shield FGs at one end in one location, not at both ends.

● **3-wire system RS-485 connection diagram**

Handling Precautions

In the 3-wire system, the Azbil Corporation **CMC10L001A000** can be used as a converter in the master station.



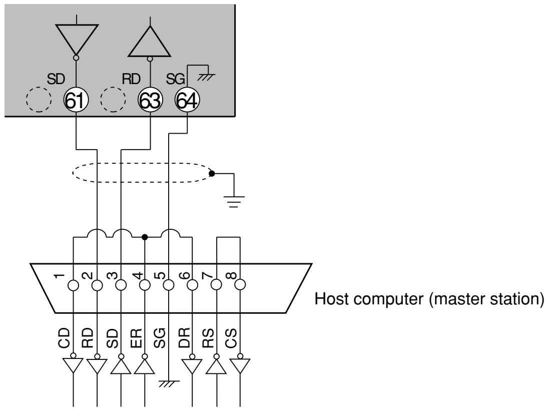
Handling Precautions

• Be sure to connect SG terminals each other.
  Failure to do so might cause unstable communications.

Attach 1/2W or greater terminating resistances of 150Ω ±5% at each end of the communications lines. Ground the shield FGs at one end in one location, not at both ends.
When only three RS-485 terminals are provided, the areas designated with an asterisk (*) are connected internally.

■ RS-232C connection

Example of connection



Handling Precautions

- Connect the slave station to the master station in a single-drop (point-to-point) configuration.
- There are three (RD, SD and SG) communications terminals on the RS-232C interface on the master station which may not output data if not short-circuited as shown above.

Note

RS-232C connector signals (9 pins)
Example : IBM and compatibles

Pin No.	JIS code	Name	Signal direction Host Instrument
1	CD	DCD	←
2	RD	RxD	←
3	SD	TxD	→
4	ER	DTR	→
5	SG	GND	
6	DR	DSR	←
7	RS	RTS	→
8	CS	CTS	←

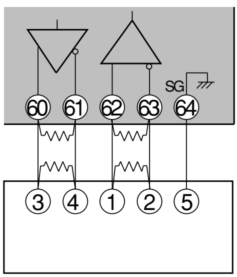
RS-232C connector signals (14 pins)
Example : PC-9821 Ne

Pin No.	JIS code	Name	Signal direction Host Instrument
1	RD	RxD	←
2	DR	DSR	←
3	CD	DCD	←
4	CS	CTS	←
9	SD	TxD	→
10	RS	RTS	→
11	ER	DTR	→
13	SG	GND	
14	SG	GND	

RS-232C connector signals (25 pins)
Example : PC9800 series

Pin No.	JIS code	Name	Signal direction Host Instrument
1	SG	GND	
2	SD	TxD	→
3	RD	RxD	←
4	RS	RTS	→
5	CS	CTS	←
6	DR	DSR	←
7	SG	GND	
8	CD	DCD	←
20	ER	DTR	→

■ Connection to ST221



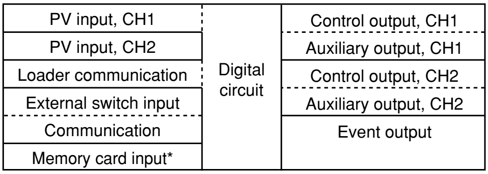
ST221DE05DCP

Handling Precautions

- Attach 1/2W or greater terminating resistances of 150Ω ±5% at each end of the communications lines.
- The **DCP552** operates as a master station when connected to an ST221 during communications.

4 - 12 Isolation During Input/Output

Isolation between inputs and outputs are shown below. In this figure, the solid lines enclose mutually-isolated sections. Those sections bounded by dashed lines are not isolated.



* : available on the DCP552A***** model only

Handling Precautions

The loader jack is not isolated from internal digital circuits.
When not in use, always replace the cap.

Chapter 5. FUNCTIONS

5 - 1 Data

■ Data types

The data types are listed below.
For further information on data types, see "Chapter 7. PARAMETER SETUP" and "Chapter 8. PROGRAM SETUP".

Data	Parameter	Variable parameter	Data changeable in RUN mode
		Event configuration data	Event type data
		PID parameter data (CH1)	PID group and output limiter group control parameters
		PID parameter data (CH2)	PID group and output limiter group control parameters
		Setup data	Basic data only changeable in the READY mode
		Constant value control data (CH1)	Constant value control SP, PID and other data
		Constant value control data (CH2)	Constant value control SP, PID and other data
	Program	Pattern	SP and time, SP and θ or SP and ΔSP data
		Event	Data for event 1 to 16
		PID group and output limiter group number	Data for PID group number used for control and output limiter group number
		G.SOAK	Data indicating whether G.SOAK is provided or not
		PV shift	PV shift data
		Repeat	Data indicating whether repeat is used or not
		PV start	Data indicating whether PV start is used or not
		Cycle	Cycle count data
		Pattern link	Pattern link destination program number data
		Tag	Tag (8 characters) data

5 - 2 Program Pattern

■ Pattern

Separate programs are set in CH1 and CH2 for each program number.
Three systems for selecting programs are provided: RAMP-X, RAMP-T and RAMP-E. The first segment of each program is always RAMP-X, but the other segments can be any system and all three types can be used in one program.

● RAMP-X system

This system, sets a segment of a pattern using SP and time, is called RAMP-X.
SP setting : within the upper and lower SP limiter range

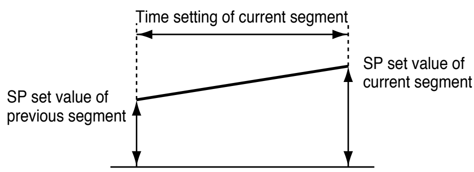
Time setting: 0 hours 00 minutes to 500 hours 00 minutes
0 minutes 00 seconds to 500 minutes 00 seconds or
0.0 seconds to 3000.0 seconds
(Time units are selected using the *C62* setup data setting.)

SP is a point on the elapsed time axis in the current segment, which is a straight line connecting the start point, the SP set value in the previous segment, and the end point, the SP set value in the current segment. Segments are classified as follows.

- Rising RAMP (or rising slope)
  Previous segment SP setting < current segment SP setting
- Falling RAMP (or descending slope)
  Previous segment SP setting > current segment SP setting
- SOAK (soaking)
  Previous segment SP setting = current segment SP setting

The start and end points of the first segment are also the SOAK segment of the SP set value for the first segment.

SP calculation (other than first segment)
SP = (current segment SP set value – previous segment SP set value)
× (current segment elapsed time ÷ current segment time setting)
+ previous segment SP setting.



● RAMP-T system (θ setting)

In the RAMP-T system, a segment is set using SP and ramp θ (theta).

SP setting : within the upper and lower SP limiter range

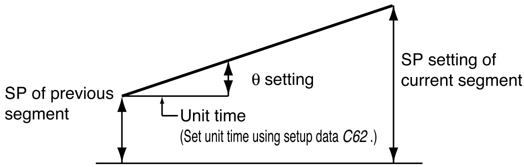
θ setting : 1 to 10000 (SPU/hour, SPU/min, SPU/sec)

(Time units are selected using the *C62* setup data setting.)

SP is a point on the elapsed time axis in the current segment which is an extended straight line, the ramp set value of the current segment when the SP set value in the previous segment is the start point.

The end point is the point where this line reaches the SP setpoint of the current segment. Note that the RAMP-T system cannot be used in the first segment.

SP calculation: SP = θ set value × segment elapsed time + previous segment SP.



● RAMP-E system (Δ SP setting)

In the RAMP-E system, segments are set using SP and Δ SP (digital SP) for each external switch input pulse.

SP setting : within the upper and lower SP limiter range

Δ SP setting: 1 to 10000 SPU

The start point is the SP set value in the previous segment.

SP is a value resulting from adding a multiple of the external switch input count to the SP set value when the SP in the previous segment is the start point.

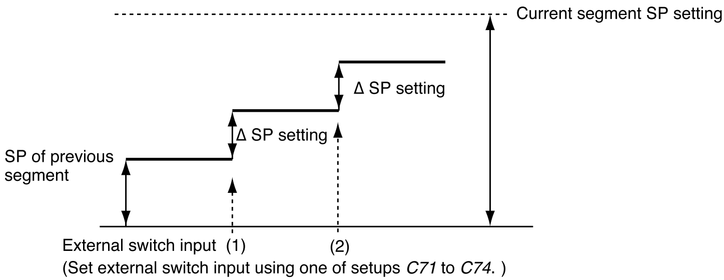
The segment ends when this SP reaches the SP setting in the current segment and the current segment SP is more than the previous segment SP or when current segment SP is less than the previous segment SP.

SP calculation: when current segment SP is more than the previous segment SP,

SP = Δ SP set value × external switch input count + the previous segment SP.

When current segment SP is less than the previous segment SP,

SP = – (Δ SP set value × external switch input count) + the previous segment SP.



Note

- Select the program pattern setting system using setup data setting *C61*.
  0: combined use of RAMP-X and RAMP-T
  1: combined use of RAMP-X and RAMP-E
- Select time setting units using setup data setting *C62*.
  0: hours and minutes
  1: minutes and seconds
  2: 0.1 seconds
- Select θ setting units using setup data setting *C62*.
  0: SPU/hour
  1: SPU/min
  2: SPU/sec
- Select SP setting and SP setting decimal position using setup data setting *C65*.
  0: XXXXX
  1: XXXX.X
  2: XXX.XX
  3: XX.XXX
  4: X.XXXX
- External switch for pulse input requires 1: RAMP-E using a setup data setting between *C71* to *C74*.
- The pulse input interval time can be checked by setting event type 93 in the event. Event type 93 is RAMP-E time monitored during a period of 0.0 to 3000.0 seconds.
  Even when a setting is exceeded and there is no pulse input, the event remains on.

■ Events

First, setup data setting *C64* is used to assign CH1 and CH2 events, then the event configuration data setting is used to set event types for event outputs 1 to 16.
Events are of the following four types: time event, PV event, code event and mode event. Settings are divided into two types of events: segment events and instrument event.

- Segment events are used to set the event operating point in a program setting and makes it possible to set different set values in different segments. But in the constant value control mode segment events are off.
- Instrument events are used to set events that do not require an event operating point or set the event operating point in the event configuration setting. It performs operations that are shared by all program operations and constant value control.

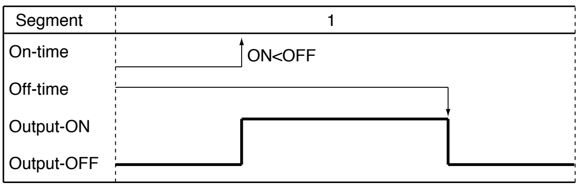
● Time events

The On Time or both the On and Off Time can be set by event number and segment. Output on/off duration are as shown below.

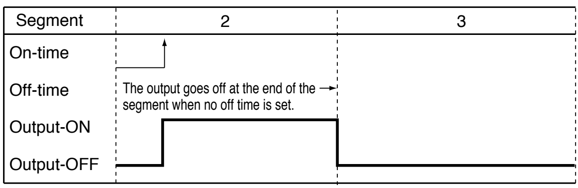
Note

- The On Time is indicated by the length of the line from the start of the segment until the upturned arrow.
- The Off Time is indicated by the length of the line from the start of the segment until the downturned arrow.

- When the On Time is less than the off time, the output is on from the on time until the off time.
  (See segments 1, 6 and 7 in the figure.)

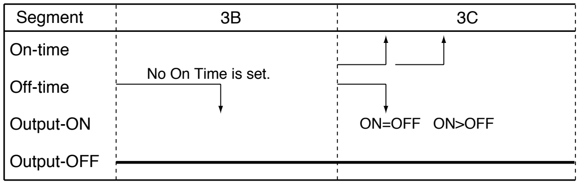


- When only an on setting is made, the output stays on until the end of the segment. (See segments 2 and 5 in the figure.)

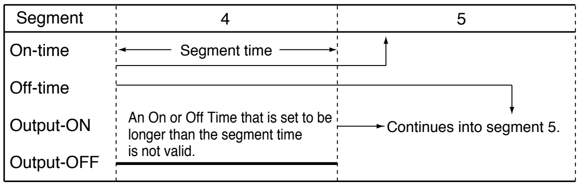


- The output is off when no On or Off Time has been set.
- An off time cannot be set without setting an on time.
  (See segment 3B in the figure.)

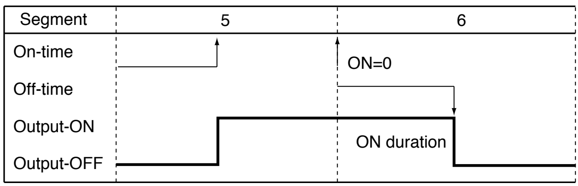
- An On Time ≥ Off Time setting cannot be made.
  (See segment 3C in the figure.)



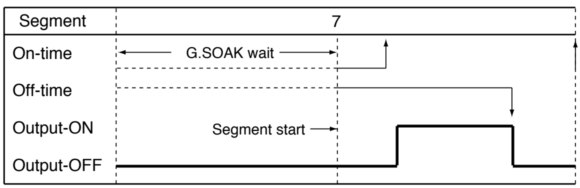
- An On Time or Off Time is valid only within a segment and cannot straddle segments. In the next segment, the On time and Off time set for that segment are valid. (See segments 4 and 5 in the figure.)
  Thus an On Time and Off Time setting made at the end of a RAMP-X segment are ignored. (Compare segment 9 with the G.SOAK wait in segment 10 in the figure.)
  Note, however, that an On Time or Off Time setting at the end of a RAMP-T segment is either valid or invalid depending on the computational error.



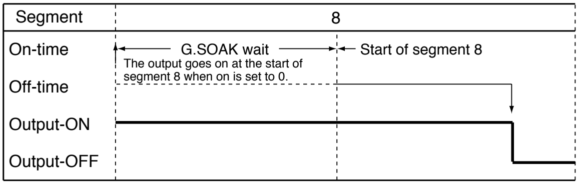
- When the On Time is set to 0 (no Off Time being set or set to more than 0), the output goes on when the On Time becomes 0. If the output was on at the end of the previous segment, it stays on and does not go off momentarily between the two segments. (See segments 5 and 6 in the figure.)



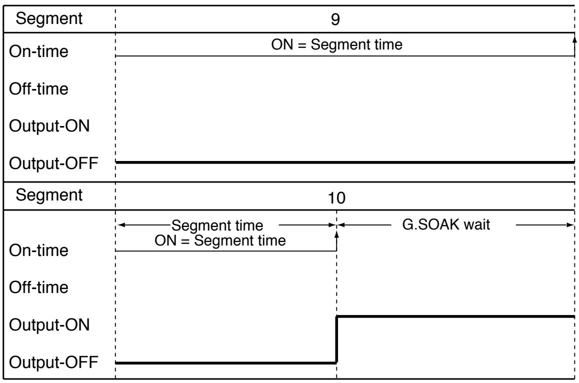
- The G.SOAK Time is not included in the On and Off Time. (See segment 7.)
  Nor is the Wait Time included for a G.SOAK that occupies an entire segment.



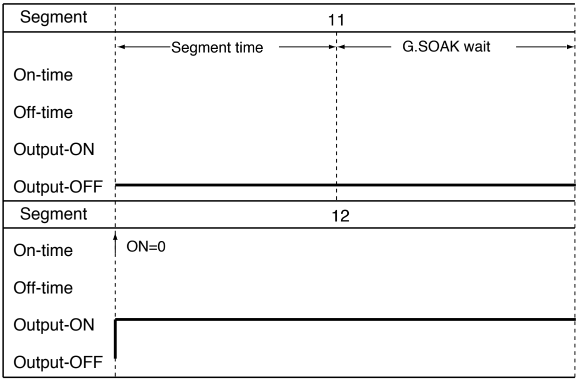
- When there is a G.SOAK wait at the start of a segment and the ON Time is set to 0, the output goes on at the start of the G.SOAK wait and the On Time starts as the G.SOAK wait ends.
  The output time = G.SOAK time + (Off Time – On Time) (See segment 8 in the figure.)



- An On Time and Off Time occurring at the end of a RAMP-X segment are valid when there is a G.SOAK wait at the end of a segment or as the end state of the final segment. (See segment 10 in the figure.)
  Note, however, that an On Time or Off Time setting at the end of a RAMP-T segment is either valid or invalid depending on the computational error.



- When there is a G.SOAK at the end of the previous segment, the On Time in the next segment is ignored if it is set to 0. (See segments 11 and 12 in the figure.)
  Thus the ON = 0 of segment 12 is not output at the end of the set time for segment 11, but when the G.SOAK wait ends.
- This function can be combined with an event ON delay set using PARA. Delay works when an event goes from off to on. A delay is not triggered when an On Time continues across two segments as shown in segments 5 and 6 in the figure.



● PV event

- Basic specifications
  The difference between PV, deviation, absolute value deviation, SP and MV for each event type is shown on the following pages. The thick lines show ON and OFF conditions. The upper line indicates ON and the lower line indicates OFF conditions.
  EV indicates the event set value and H indicates the hysteresis value. Outputs in READY mode are OFF. But normal PV1 upper and lower limit operation and normal PV2 upper and lower limit operation events run also in the READY mode.

- Event standby
  Standby events operate as described below.
  - If the event is in the gray area shown in the figure during a change from READY to RUN mode or when the power is restored after an outage, the event operates without a standby. The upturned arrows in the figures indicate ON while the downturned arrows indicate OFF.
  - If the event is outside the gray area shown in the figure during a change from READY to RUN mode or when the power is restored after an outage, it remains off until it enters the gray area .

    After entering the gray area , the upturned arrows in the figures indicate ON while the downturned arrows indicate OFF.
    A standby event is off in the READY mode.

- Event on delay

  The number of the event to be delayed and the delay time can be set regardless of event type. The delay turns on the output for the duration of the delay when the event meets the conditions for going from OFF to ON. When this function is combined with the event standby function, the event on delay operates when the standby state is cleared.

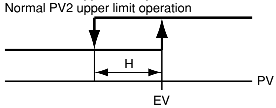
- Segment event progress

  - The output stays OFF until the program reaches a segment with an event.
  - The event goes ON or OFF according to the set value of the event.
  - Previous settings are valid until segments with other event settings are reached.
  - Previous settings are valid when the program has reached segment number 1 using the cycle function or pattern link function. The output is turned off if there is no event in segment number 1.

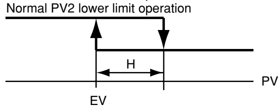
- Other functions

  Normal PV1 upper and lower limit operation event and normal PV2 upper and lower limit operation events operate in the READY mode.

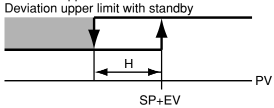
PV upper limit
Normal PV1 upper limit operation
Normal PV2 upper limit operation



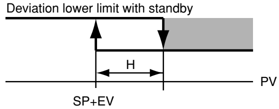
PV lower limit
Normal PV1 lower limit operation
Normal PV2 lower limit operation



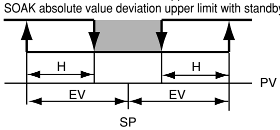
Deviation upper limit
Deviation upper limit with standby



Deviation lower limit
Deviation lower limit with standby

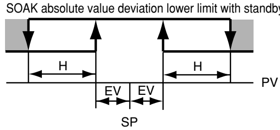


Absolute value deviation upper limit
Absolute value deviation upper limit with standby
SOAK absolute value deviation upper limit*
SOAK absolute value deviation upper limit with standby*



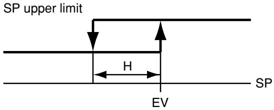
Items marked * operate only in SOAK segments.

Absolute value deviation lower limit
Absolute value deviation lower limit with standby
SOAK absolute value deviation lower limit*
SOAK absolute value deviation lower limit with standby*

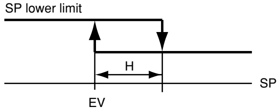


Items marked * operate only in SOAK segments.

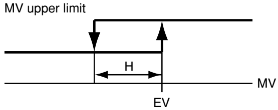
SP upper limit



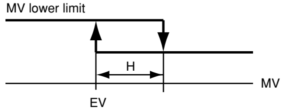
SP lower limit



MV upper limit



MV lower limit

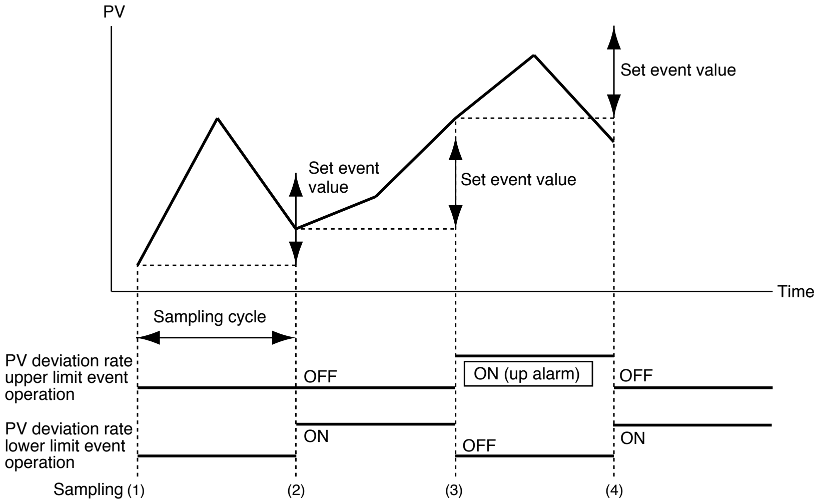


● **PV deviation rate event**

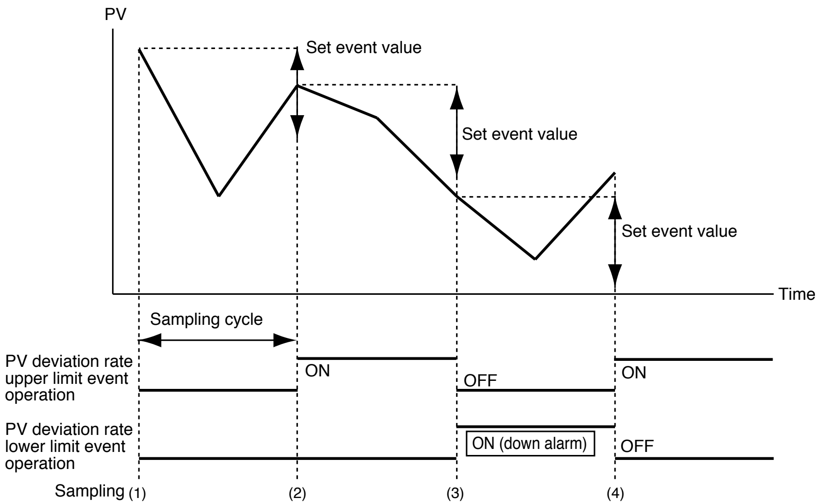
PV deviation is measured in each sampling cycle set using the event configuration data setting while on/off states are determined by comparing event setting deviation rate Δ PVs.

PV deviation between sampling cycles is ignored. Event on/off switching is performed according to the sampling cycle. This function can be combined with event on delay.

Set event value is more than 0 (using upper limit event)



Set event value is less than 0 (using lower limit event)



● Code event

Several events are used as one group and the number of output points are output as one parallel code number. Assigning code numbers to event outputs has the same effect as increasing the number of physical output points.

- Code event
  Set event type to code event and set the number of output points (1 to 8) in auxiliary setting 1. An output code value (0 to 255) can be set for each segment. A binary coded low-order bit for the set number of output points is output.
  The previous setting is valid until the program reaches a segment with a new setting.
  Note, however, that unless a setting is made in the first segment, the program will assume that a set value of 0 is set in the first segment.

Example: Setting a code event involving 3 output points in event 3

The table below shows the output state when a value of 3 is set in segment 2, a value of 6 is set in segment 4 and a value of 0 is set in segment 5.

Segment	1	2	3	4	5
Set value	Not set	3	Not set	6	0
Code value 1 in event 3	OFF	ON		OFF	OFF
Code value 2 in event 4	OFF	ON	ON	ON	OFF
Code value 4 in event 5	OFF	OFF	OFF	ON	OFF
Output code	0 (OFF,OFF,OFF 0, 0, 0)	3 (OFF,ON,ON 0, 1, 1)	3 (OFF,ON,ON 0, 1, 1)	6 (ON,ON,OFF 1, 1, 0)	0 (OFF,OFF,OFF 0 , 0, 0)

- Timed code event
  This function is a combination of a code event and a time event. The set code value is output at the set time. The number of settings that can be made in the first segment is the same as the number of output points. For example, for a 3-point output up to three settings can be made in the first segment.
  Like a time eventit, a setting within the segment period is valid and those that exceed it are ignored. When the program reaches the start time of the first segment or a new segment, the set code value is 0 (all points off) until the set time of the time event.

Example: Setting a timed code with 3 output points in event 3

The table below shows the output state when a value of 5 is set in segment 2 and set to start at the beginning of the segment, a value of 3 is set to occur 0:10 after the start of segment 2 and a value of 4 is set to occur 0:30 after the start of segment 4.

Segment	1	2		3	4		5
Set value	Not set	5	3	Not set	6		0
Set time	Not set	0.00	0.10	Not set	0.30		0.00
Time		0.10			0.30		
Code value 1 in event 3	OFF	ON	ON	OFF	OFF	OFF	
Code value 2 in event 4	OFF	OFF	ON	OFF	OFF	ON	OFF
Code value 4 in event 5	OFF	ON	OFF	OFF	OFF	ON	OFF
Output code	0 (OFF,OFF,OFF / 0, 0, 0)	5 *1	3 *2	3 (OFF,OFF,OFF / 0, 0, 0)	0 *3	6 *4	0 (OFF,OFF,OFF / 0 , 0, 0)

*1: (ON,OFF,ON / 1, 0, 1) *2: (OFF,ON,ON / 0, 1, 1) *3: (OFF,OFF,OFF / 0, 0, 0) *4: (ON,ON,OFF / 1, 1, 0)

- Program/segment number event
  A program or a binary coded segment number is set in an event type and the number of output points (1 to 7) is set in auxiliary setting 1. Or a program or a BCD code of the segment number is set in an event type and the number of output points (1 to 8) is set in auxiliary setting 1.
  A selection, a program designed for a specific operation or a coded segment number is output. A low-order bit code corresponding to the set number of output points is output.

- An event on delay can be combined with the code event.
  Note, however, that when there are several channel code events, the delay has to be entered for each channel.

Decimal binary code comparison table

Decimal	Binary code output (0: Off output 1: On output)
1	0 0 0 0 0 0 1
2	0 0 0 0 0 1 0
3	0 0 0 0 0 1 1
4	0 0 0 0 1 0 0
5	0 0 0 0 1 0 1
6	0 0 0 0 1 1 0
7	0 0 0 0 1 1 1
8	0 0 0 1 0 0 0
9	0 0 0 1 0 0 1
10	0 0 0 1 0 1 0
11	0 0 0 1 0 1 1
12	0 0 0 1 1 0 0
13	0 0 0 1 1 0 1
14	0 0 0 1 1 1 0
15	0 0 0 1 1 1 1
16	0 0 1 0 0 0 0
17	0 0 1 0 0 0 1
	⋮

Decimal BCD code comparison table

Decimal	BCD code output (0: Off output 1: On output)
1	0 0 0 0 0 0 0 1
2	0 0 0 0 0 0 1 0
3	0 0 0 0 0 0 1 1
4	0 0 0 0 0 1 0 0
5	0 0 0 0 0 1 0 1
6	0 0 0 0 0 1 1 0
7	0 0 0 0 0 1 1 1
8	0 0 0 0 1 0 0 0
9	0 0 0 0 1 0 0 1
10	0 0 0 1 0 0 0 0
11	0 0 0 1 0 0 0 1
12	0 0 0 1 0 0 1 0
	⋮
20	0 0 1 0 0 0 0 0
30	0 0 1 1 0 0 0 0
40	0 1 0 0 0 0 0 0
50	0 1 0 1 0 0 0 0
	⋮

● Mode event

This event goes on or off depending on controller mode, alarm generation and other states.
It cannot be combined with the event standby function but with the on delay function. It does not set event set values (operating points) or hysteresis.

• Basic operations

The following types are provided.

RUN + HOLD + END + FAST
HOLD
READY + READY FAST
END
G.SOAK wait
MANUAL
During auto-turning execution
FAST + READY FAST
Console setting operation
RUN
ADV (advance)
Full alarm (logical OR)
PV range alarm
Instrument alarm
O_2 sensor failure
Battery voltage drop

The event goes on when the specified instrument state is reached and is off at other times.

• Alarm

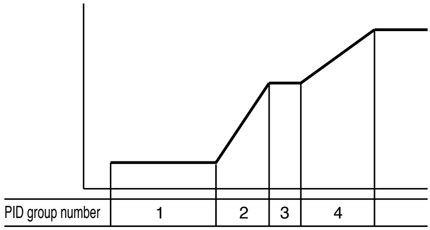
Alarms are of two types: PV range alarm group (alarm code number 01 to 04) and instrument alarm group (alarm code number 91 to 99 and battery voltage drop). When the event type is all alarm, the event goes on if one alarm occurs. When the event type is a PV range alarm, the event goes on if one alarm in the PV range alarm group goes on.
When the event type is an instrument alarm, the event goes on if one alarm in the instrument alarm group goes on.

• ADV

When ADV (advance) is executed, the event goes on for 1 second. This function is valid during on delay.

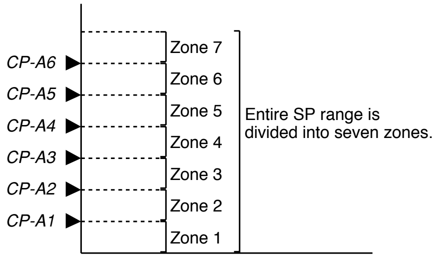
■ PID group selection

- Separate PID group selections can be set in CH1 and CH2 programs.
- PID groups can be selected in two ways: by setting a PID segment or through automatic PID group switching.
  A PID group segment and automatic PID group switching can also be combined. When a PID group number is set to 0, the setting in the previous segment is continued.



PID group segment setting

- In a PID group segment setting a PID group number is set in each segment and PID parameters are used for calculating the control output. The nine PID groups *PID1* to *PID9* can be used.
- In automatic PID group switching, the entire SP scale is divided into seven zones assigning *CP-A1* to *CP-A6* to each. The PID constants that are used according to SP values are automatically selected to calculate control output. The PID group number for each segment specifies A. Seven PID groups from *PID-A1* to *PID-A7* can be used.



Automatic PID group selection

■ Selection of ouput limiter group

- Separate output limiter groups can be set in CH1 and CH2 programs.
- Output limiter group number can be set for each segment to control the lower limit (OL) and upper limit (OH) of the control output. *oL* and *oH* groups 1 to 9 can be used.
- The output limiter can only be specified by segment; automatic selection cannot be made.
- When the output limiter is set to 0, the setting in the previous segment is continued.

■ G.SOAK (Guarantee soak)

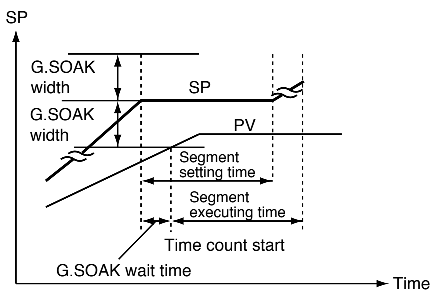
Separate G.SOAK settings can be made in CH1 and CH2 programs.
G.SOAK on/off state, type and G.SOAK width is set by the segment. G.SOAK are of three types: segment start point, segment end point and the entire segment.
G.SOAK time is set using the variable parameter *PA46* setting. Any offset between SP and PV triggers a G.SOAK wait which narrows the distance between SP and PV to guarantee the segment execution time. G.SOAK operates not only on SOAK but also on RAMP segments.
Note, however, that in FAST mode a G.SOAK setting does not trigger a G.SOAK wait.
When a G.SOAK wait occurs in one channel in sync mode (variable parameter *PA04* is set to 1), the program in the other channel is halted.
G.SOAK can be cleared with an external switch input. The following types of clearing conditions can be selected using setup data setting *C71* to *C74*.

(1) G.SOAK is cleared when an external switch contact is set to on or when PV meets the G.SOAK clearing conditions.

(2) G.SOAK is cleared when an external switch contact is set to on and PV meets the G.SOAK clearing conditions.

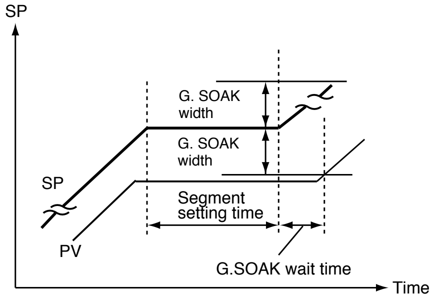
- G.SOAK at start of segment

  PV and SP are compared at the beginning of the segment. The segment starts when the absolute value of the difference continues beyond the G.SOAK time and becomes narrower than G.SOAK width.
  A G.SOAK wait state continues until these conditions are met which is announced by the flashing of the linear LED on the left of the profile display.
  The operating condition is the same as HOLD at the beginning of a segment (time = 0).



- G.SOAK at end of segment

  PV and SP are compared at the end of the segment. The operation in that segment ends when the absolute value continues beyond the G.SOAK time and becomes narrower than G.SOAK width.
  A G.SOAK wait state continues until these conditions are met which is announced by the flashing of the linear LED at the center of the profile display.
  The operating condition is the same as HOLD at the end of a segment (time = set segment time).

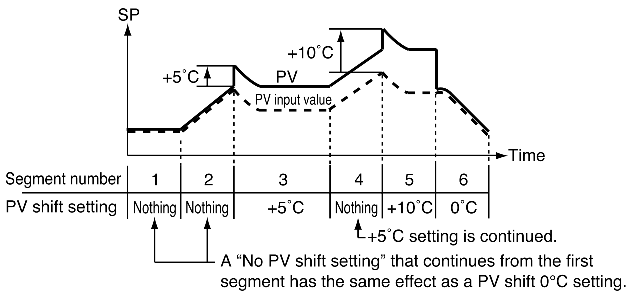


- G.SOAK for entire segment

  PV and SP are compared at across the entire segment. The operation in that segment continues when the absolute value continues beyond the G.SOAK time and becomes narrower than G.SOAK width.
  A G.SOAK wait state continues until these conditions are met which is announced by the flashing of the linear LED at the left and the center of the profile display.
  The operating condition is the same as HOLD at the continued time.

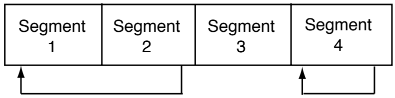
■ PV shift

Separate PV shift settings can be made in CH1 and CH2 programs.
A PV correction value can be set for each segment. PV is PV input value plus PV bias and PV shift. Note, however, that in the READY mode and the constant value control mode, PV bias but not PV shift is added to the PV input value.
The setting in the previous segment continues when PV shift is set to "-----" (nothing).



■ Repeat

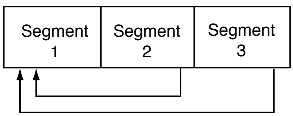
Separate repeat settings can be made in CH1 and CH2 programs.
Repeat on/off and return destination are set by the segment with the segment number and repeat count. Operation completes at the end of a segment. If there is a repeat setting, the program returns to the start of the set destination segment and operation is resumed from there. This operation is repeated the number of times specified by the repeat count.



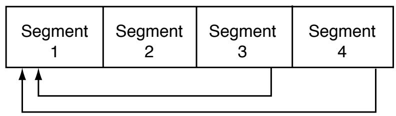
No repeat is performed when the destination segment number is larger than the current segment number. When the program returns to the first segment, PV is not started even if a PV start setting has been made.

Handling Precautions

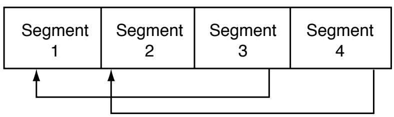
- When repeat operations involve multiple segments and the destination segment settings overlap, nest or intersect, the repeat operation will become an abnormal eternal loop. Do not make such settings.



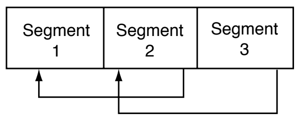
Example of a double



Example of a nest



Intersect example (1)

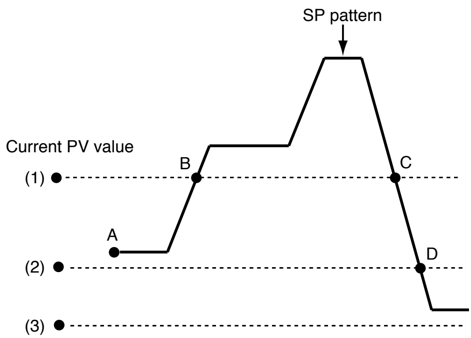


Intersect example (2)

- When the current segment does not contain a set value or the value is 0, executed values for program items (for example, set PV event values or set PID group selection values) that are sequels to settings in a previous segment are the same during the first run and the repeat run.

■ PV start

Separate PV start settings can be made in CH1 and CH2 programs.
When a PV start is set in the program setting, a PV start is performed in a normal RUN operation.
The program looks for the first point where PV and the program pattern SP are equal (both PV and SP include bias) and starts operation from there. PV starts are of three kinds: rising PV start that looks for a point where PV and SP are equal on a rising RAMP, falling PV start that looks for a point where PV and SP are equal on a falling RAMP and bi-directional PV start that looks for such a point both on rising and falling RAMPs.
Note, however, that if there is no point where PV and SP are equal, operation starts from the beginning of segment 1.
When a PV start has been implemented, the event operating point and the time event time are automatically corrected. This is described in the figure shown below. When PV is at (1) in the figure, a rising PV start or a bi-directional PV start starts from B and a falling PV start starts from C. When PV is at (2) in the figure, a falling PV start or a bi-directional PV start starts from D and a rising PV start starts from A. When PV is at (3) in the figure, any PV start starts from A.

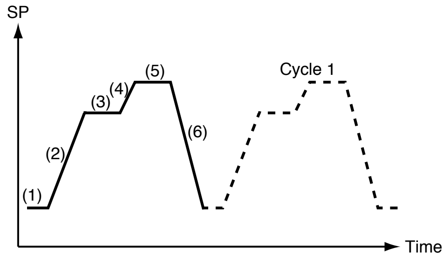


Note

PV start is valid for segments in the selected program but not for segments beyond a pattern link destination.
When a PV start is performed in one or both channels of a program whose both channels have the same segment time settings, the segment number and operating progress time of the two channels do not match.

■ Cycle

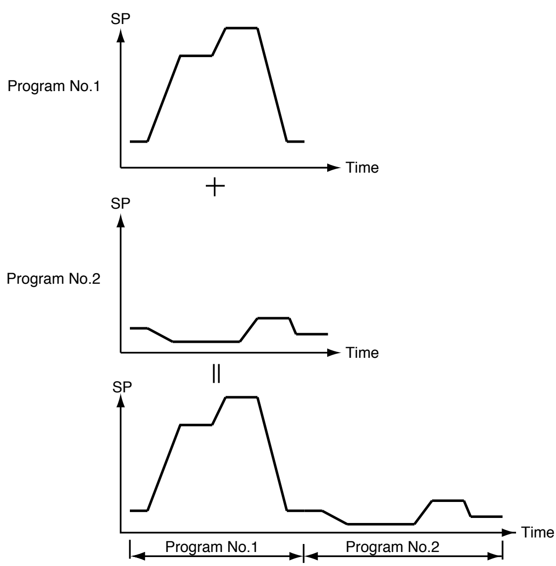
Separate cycles can be set in CH1 and CH2 programs.
The cycle function allows you to repeat operation from segment 1 to the last segment in a program pattern the number of times set in the cycle count. A total of 10,000 times can be set.
When a cycle number of n is set, the total operation count is n + 1. During cycle operation, the operation at the last point in the final segment is not performed and executed values of program items (sequels to settings in the previous segment ; for example, PV event value, pid group number) that continue from a previous segment are cleared before program restart.
When the SP start point and end point are not equal, SP changes in a step-like manner during cycle operation.



■ Pattern link

Separate pattern links can be made in CH1 and CH2 programs.
The pattern link function links patterns; the program number of the link at the destination is set in the pattern link item. An initial value of 0 indicates that linking is not performed.
When the number of the program is set in the pattern link item, it forms an eternal loop.
When SP at the end of the original link and SP at the destination are not equal, SP changes in a step-like manner.
When cycle operation has been set, the pattern link operates after the cycle operation has been completed.
Since operation starts from the first segment at the destination during pattern linking, executed values of program items (sequels to settings in the previous segment) that continue from a previous segment are cleared before program restart.
When a PV start has been programmed in a pattern at the destination link, the PV start function operates after the link has been made.
PID computations are not initialized but continued after a link has been established.
When the READY mode is invoked at the end of an operation or in a RESET operation, operation returns to program number 1 that is switched from READY to RUN mode (RUN to READY). If a RESET is performed when a program at the pattern link destination is reached during an ADV operation in the READY mode, operation returns to segment 1 of the link destination program number. Note, however, that program numbers selected using the external switch takes priority.

Linking program No. 1 and program No. 2



■ Tag

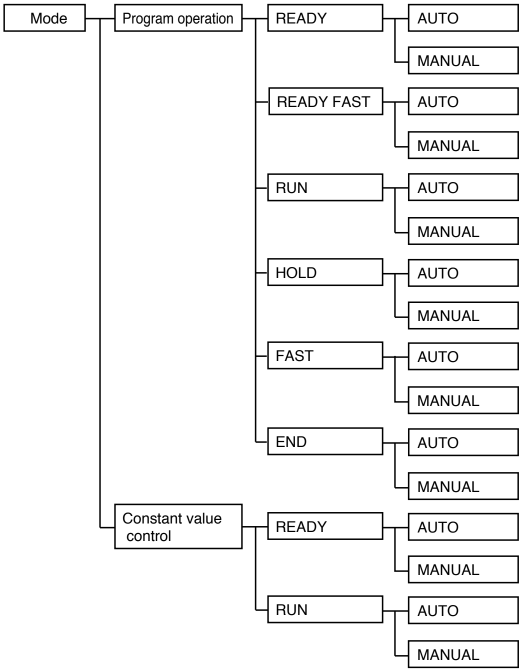
Programs that have the same number in CH1 and CH2 also share the same tag.
Tags are 8-character alphanumerics, katakana or symbols that can be entered in a program.
When segment 1 pattern item is set in a program setting, a total of eight characters consisting of PROG plus two characters in the program number and “__” two space characters.

Example: Program no. 1 : “*PROG01__*”
Program no. 19 : “*PROG19__*”

5 - 3 Mode

■ Mode types

Modes are listed below.



● Program operation

The program is run according to SP, time, events and other settings made in program patterns 1-49.

● Constant value control

The program is run according to SP and events made with the constant value controls.

● READY

READY indicates that the program is ready to run.
MV becomes fixed and events whose operation depends on values set in the segments are turned off. Note, however, that **DCP552** state dependent events still run.
Program numbers between 1 to 49 and set segment numbers can be selected during program operation.
All setup data, some event configuration data and some constant value control data parameters can be changed in the READY mode.
Memory cards can also be used in the READY mode.

- **RUN**

The RUN mode indicates that the program is run sequentially.
MV output and events operate during PID control, ON-OFF control and other types of control. In the program RUN mode, program operation progresses according as time elapses. Note, however, that G.SOAK (guaranteed soak) wait, like the HOLD mode, halts program operation.

- **HOLD**

The HOLD mode temporarily halts program operation.
Note, however, that, like the RUN mode, MV output and events operate during PID operation, ON-OFF control and other types of control. During constant value control the HOLD mode cannot be invoked.

- **FAST**

The FAST mode is essentially a speeded-up version of the RUN mode. The time factor is selected using variable parameter *PA39*. MV output and events operate during PID control, ON-OFF control and other types of control. G.SOAK (guaranteed soak) settings are ignored.
During constant value control the FAST mode cannot be invoked.

- **END**

The END mode indicates the state of a program that has run its course.
When a program stops at the end, MV output and events operate during PID control, ON-OFF control and other types of control.
During constant value control the END mode cannot be invoked.

- **READY FAST**

The READY FAST mode is a combination of the READY and FAST modes.
MV output, SP output and events operate in the same way as in the READY mode.
Program numbers and segment numbers cannot be selected. Parameters that can only be changed in the READY mode and memory card operation is not possible in this mode.
During constant value control the READY FAST mode cannot be invoked.

- **AUTO**

The AUTO mode performs automatic operation. MV outputs can be used depending on **DCP552** control.

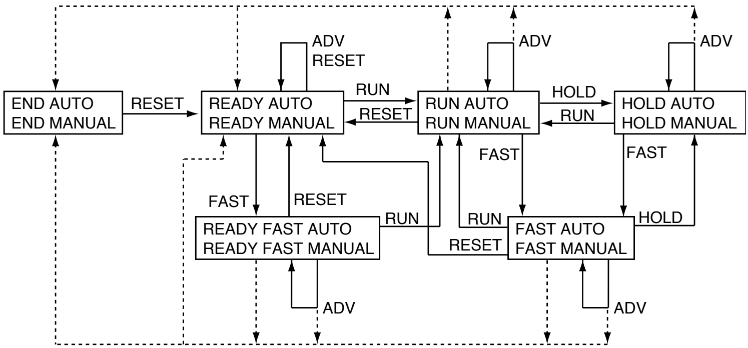
- **MANUAL**

The MANUAL mode performs manual operation.
The “↑”, “↓”, “←” and “→” console keys can be used to change communications and MV output.

■ Mode transitions

● Program operation

Mode transitions are indicated by the solid line arrows and end operation is indicated by the dashed lines in the figure below.

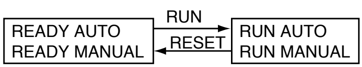


Note

- AUTO ⇔ MANUAL mode changes can be made in the boxes of each mode.
- READY and END at the end of operation can be selected using setup data *C31*.
- CH1 and CH2 mode transitions can be performed both synchronously or asynchronously.

● Constant value control

Mode transitions are indicated by the solid line arrows.



Note

- AUTO ⇔ MANUAL mode changes can be made in the boxes of each mode.
- CH1 and CH2 mode transitions can be performed both synchronously or asynchronously.

● Switching between program operation and constant value control

Constant value control data "*ConSt*" control mode item in the READY mode is used to switch between these two modes.

0: Program operation

1: Constant value control

■ Mode transition operations

Mode transitions are performed using the following operations.
Although “Operation end” is not an operation, it is described here as a factor in mode transitions.

● RUN

Switches from the READY, HOLD, FAST and READY FAST modes to the RUN mode. To go from the READY mode or READY FAST to the RUN mode using keys, external switches or transmission, the **DCP552** must be in basic display status.

● HOLD

Switches from the RUN and FAST modes to the HOLD mode. During constant value control the HOLD mode cannot be invoked.

● RESET

Switches from the RUN, HOLD, FAST, END and READY FAST modes to the READY mode.
In program operation, the reset involves returning the program to the first segment.

● ADV

Brings the program forward by one segment in the READY, RUN, HOLD, FAST and READY FAST modes. ADV (advance) operation is not available in the constant value control mode.

● FAST

The FAST mode is invoked from the RUN, HOLD, READY and READY FAST modes. During constant value control the FAST mode cannot be invoked.

● AUTO

Switches from the MANUAL mode to AUTO mode.

● MANUAL

Switches from the AUTO mode to MANUAL mode.
The basic display status shows PV and the output value (%) during this transition.
Switching from AUTO to MANUAL using external switches or transmission invokes the basic display status even when the parameter setting status or programmer setting status are in use.

● Operation end

Operation ends when all progress of program settings including cycle and pattern links reach the end in the RUN, FAST and READY FAST program operation modes or during an ADV operation. By making a setup selection, it is possible to set READY or END as the state of the controller when the program reaches its end.
Note, however, that when an operation ends in the READY FAST mode, it always ends in the READY mode. In constant value control mode, operation end is not available.

■ Mode transition restrictions

Modes can be changed using console keys, external switch inputs or through communications. The table below shows the operations that are valid for each mode.

Original mode \ Operation		RUN (To RUN mode)			HOLD (To RUN mode)			RESET (To READY mode)			ADV (To next segment)			FAST (To FAST or READY FAST mode)		
		Key	Switch	Commu-nication	Key	Switch	Commu-nication	Key	Switch	Commu-nication	Key	Switch	Commu-nication*	Key	Switch	Commu-nication
Program operation	READY	◎	◎	◎	–	–	–	–	△	□	–	◎	–	◎	◎	◎
	RUN	–	–	□	◎	○	◎	◎	○	◎	◎	○	◎	◎	○	◎
	HOLD	◎	○	◎	–	–	□	◎	○	◎	◎	○	◎	◎	○	◎
	FAST	◎	○	◎	–	○	◎	◎	○	◎	◎	○	◎	–	–	□
	END	–	–	–	–	–	–	◎	○	◎	–	–	–	–	–	–
	READY FAST	◎	◎	◎	–	–	–	◎	○	◎	◎	○	◎	–	–	□
Constant value control	READY	◎	◎	◎	–	–	–	–	–	□	–	–	–	–	–	–
	RUN	–	–	□	–	–	–	◎	○	◎	–	–	–	–	–	–

Original mode \ Operation		MANUAL (To MANUAL mode)			AUTO (To AUTO mode)		
		Key	Switch	Communication	Key	Switch	Communication
Program operation	AUTO	◎	○	◎	–	–	□
	MANUAL	–	–	□	◎	○	◎
Constant value control	AUTO	◎	○	◎	–	–	□
	MANUAL	–	–	□	◎	○	◎

○: Valid operation
◎: Operation from basic display status valid
△: Returns to the first segment remaining in the READY mode.
□: Operation is invalid, but the communication end code is normal if performed in the basic display status.
–: Invalid operation

* ADV operation performed via communications may not go to the next segment but to the segment set in the communications message.

Handling Precautions

- Mode transitions can be simultaneously performed for both CH1 and CH2 under the following conditions.
  - When key operations are performed in synchronous mode (*PA04*=1).
  - Switch operations performed when both the CH1 operation cancel switch (SW15) and the CH2 operation cancel switch (SW16) are set to OFF.
  - When a write command is used to communicate with 2001 status 1 (CH1 and CH2).
- Mode transitions can be simultaneously performed for either CH1 or CH2 under the following conditions.
  - When key operations are performed in asynchronous mode (*PA04*=0).
  - Switch operations performed when both the CH1 operation cancel switch (SW15) and the CH2 operation cancel switch (SW16) are set to ON.
  - When a write command is used to communicate with 261 status 1 (CH1) or 281W status 1 (CH2).
- If a program pattern is set for only one of the two channels, it is not possible to enter RUN mode unless the operation of the other channel is disabled. Therefore, to start RUN mode with the RUN key, first select asynchronous mode (*PA04*=0). To start RUN mode with an external switch, first disable the other channel with SW15 and SW16. For details, see "External switch input" on page 6-13.

5 - 4 Input Process Functions

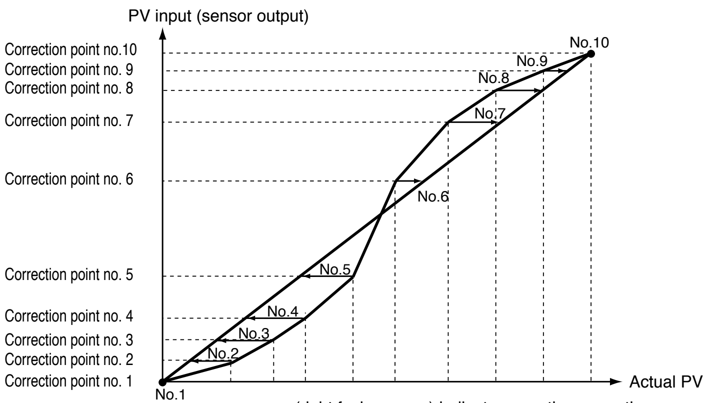
This section uses diagrams to describe input processes.

■ Model without carbon potential (CP) compensation

Analog input 1		Analog input 2	
Input range type	Setting: setup data *C01*	Input range type	Setting: setup data *C11*
A/D conversion		A/D conversion	
Wiring resistance compensation	(For resistance temperature detector)	Wiring resistance compensation	(For resistance temperature detector)
Cold junction compensation	(For thermocouple) Setting: setup data *C07*, *C10*	Cold junction compensation	(For thermocouple) Setting: setup data *C17*, *C20*)
Square-root extraction	(For DC current or voltage) Setting: setup data *C08*, *C09*	Square-root extraction	(For DC current or voltage) Setting: setup data *C18*, *C19*
Upper and lower limit value scaling	(For DC current or voltage) Setting: setup data *C04* to *C06*	Upper and lower limit value scaling	(For DC current or voltage) Setting: setup data *C14* to *C16*
Temperature unit range	(For thermocouple or resistance temperature detector) Setting: setup data *C02*, *C03*	Temperature unit range	(For thermocouple or resistance temperature detector) Setting: setup data *C12*, *C13*
Upper and lower limit alarm		Upper and lower limit alarm	
Equalizer (approximation by linearization table)	Setting: setup data *C30* Variable parameters *PA51* to *PA70*	Equalizer (approximation by linearization table)	Setting: setupdata *C30* Variable parameters *PA71* to *PA90*
Bias	Setting: variable parameter *PA13*	Bias	Setting: variable parameter *PA23*
PV shift	Setting: program setting PV shift item	PV shift	Setting: PV shift item in program setting
Digital filter	Setting: variable parameter *PA12*	Digital filter	Setting: variable parameter *PA22*
PV (PV1)		PV2	

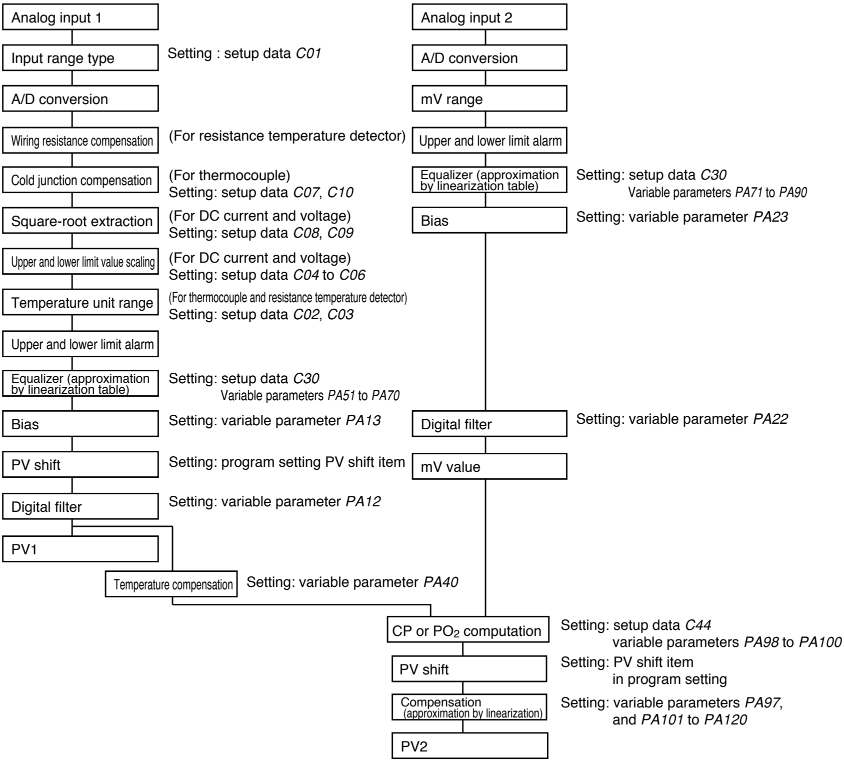
Note

The use of equalizer (approximation by linearization table) is shown in the figure below.
When a sensor with curved characteristics is used to measure PV, a linearization table is used.



→ : (right facing arrow) indicates negative correction.
← : (left facing arrow) indicates positive correction.
● : (bullet) indicates 0 correction.

■ Model with carbon potential (CP) compensation



■ O_2 sensor check (model with CP compensation)

● Objective

As the O_2 sensor starts to deteriorate, its output impedance increases. This function checks sensor output impedance and turns on the O_2 sensor error event when the impedance exceeds 130kΩ.

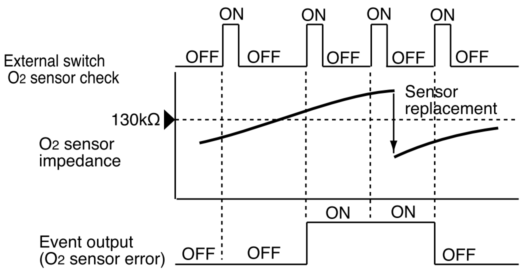
● Setting

- One of the values set for setup data *C71* to *C74* is set to 11 to assign the O_2 sensor check to an external switch.
- One of the values set for event configuration data setting *E01-t* to *E16-t* is set to 142 to assign an O_2 sensor error event.

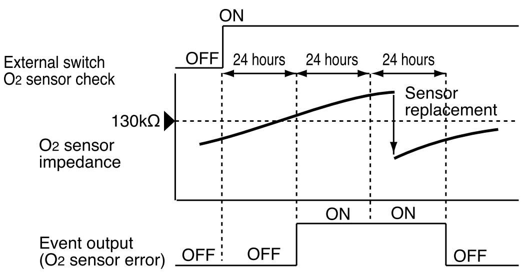
● Operation

- Two methods are used to perform an O_2 sensor check. In one method the external switch which has been assigned the O_2 sensor check function goes from OFF to ON. This is called a constant check.

  The other method the external switch is turned on each 24-hour period. This is called an automatic check.
- The impedance is checked when PV1 is 800°C or more and the O_2 input is 1000mV or higher.
- The O_2 sensor error event goes on when sensor impedance exceeds 130kΩ; otherwise it remains off.
- The constant check method is shown below.



- The automatic check method is shown below.

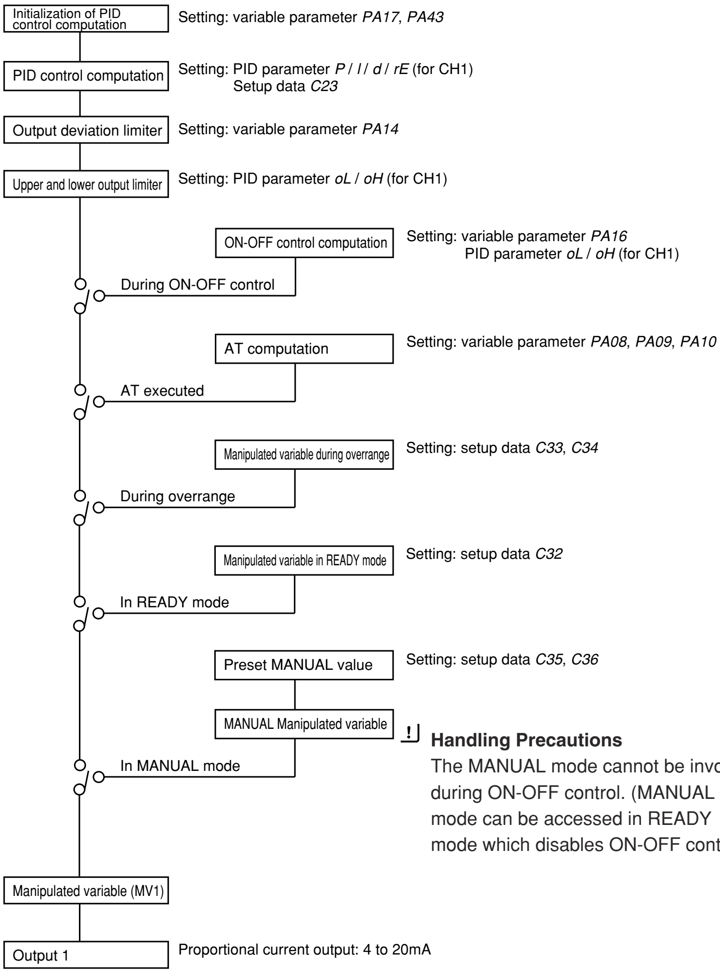


5 - 5 Output Processing Functions

■ CH1 control output

CH1 control output is processed as shown below.

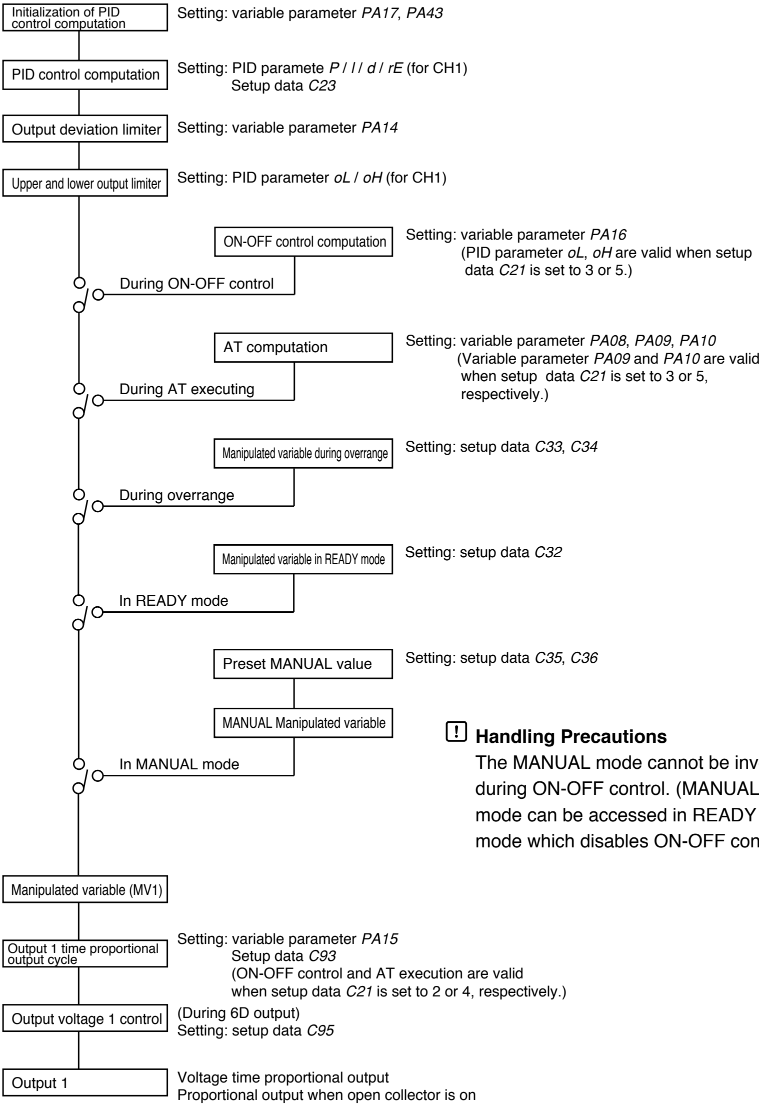
● 5G output (with setup data *C21* set to 1)



Handling Precautions

The MANUAL mode cannot be invoked during ON-OFF control. (MANUAL mode can be accessed in READY mode which disables ON-OFF control.)

● 6D, 8D output (with setup data *C21* set between 2 to 5)



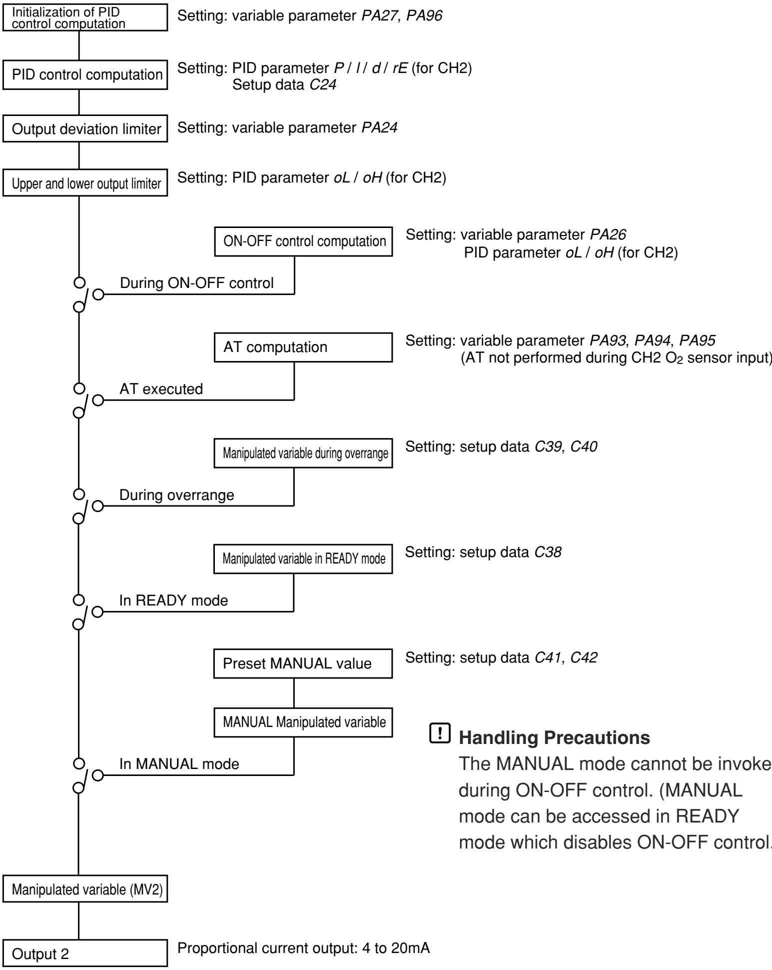
Handling Precautions

The MANUAL mode cannot be invoked during ON-OFF control. (MANUAL mode can be accessed in READY mode which disables ON-OFF control.)

■ CH2 control output

CH2 control output is processed as shown below.

● 5G output (with setup data *C22* set to 1)



Handling Precautions
The MANUAL mode cannot be invoked during ON-OFF control. (MANUAL mode can be accessed in READY mode which disables ON-OFF control.)

● 6D, 8D output (with setup data *C22* set between 2 to 5)

- **Initialization of PID control computation** — Setting: variable parameter *PA27*, *PA96*
- **PID control computation** — Setting: PID paramete *P* / *I* / *d* / *rE* (for CH2)
  Setup data *C24*
- **Output deviation limiter** — Setting: variable parameter *PA24*
- **Upper and lower output limiter** — Setting: PID parameter *oL* / *oH* (for CH2)
- During ON-OFF control: **ON-OFF control computation** — Setting: variable parameter *PA26*
  (PID parameter *oL*, *oH* are valid when setup data *C22* is set to 3 or 5.)
- During AT executing: **AT computation** — Setting: variable parameter *PA93*, *PA94*, *PA95*
  (Variable parametesr *PA94* and *PA95* are valid when setup data *C22* is set to 3 or 5, respectively.)
  (AT not performed during CH2 O_2 sensor input)
- During overrange: **Manipulated variable during overrange** — Setting: setup data *C39*, *C40*
- In READY mode: **Manipulated variable in READY mode** — Setting: setup data *C38*
- In MANUAL mode: **Preset MANUAL value** → **MANUAL Manipulated variable** — Setting: setup data *C41*, *C42*
- **Manipulated variable (MV2)**
- **Proportional output cycle during output 2** — Setting: variable parameter *PA25*
  Setup data *C94*
  (not valid during ON-OFF control and AT execution or when setup data *C22* is set to 2 or 4.)
- **Output voltage 2 adjustment** — (For 6D output)
  Setting: setup data *C96*
- **Output 2** — Voltage time proportional output
  Proportional output when open collector is on

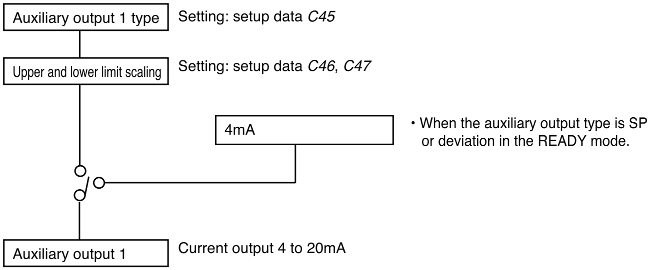
Handling Precautions

The MANUAL mode cannot be invoked during ON-OFF control. (MANUAL mode can be accessed in READY mode which disables ON-OFF control.)

■ Auxiliary output

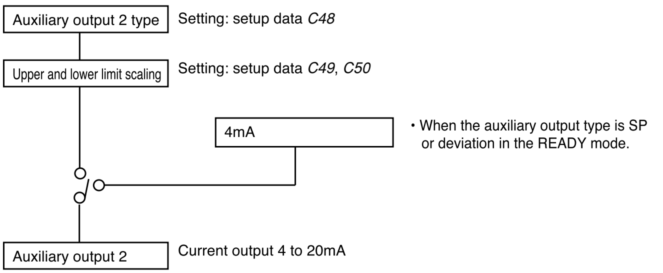
● Auxiliary output 1

Auxiliary output 1 is processed as shown below by a model with one or two auxiliary output channels.



● Auxiliary output 2

Auxiliary output 2 is processed as shown below on a model with two auxiliary output channels.

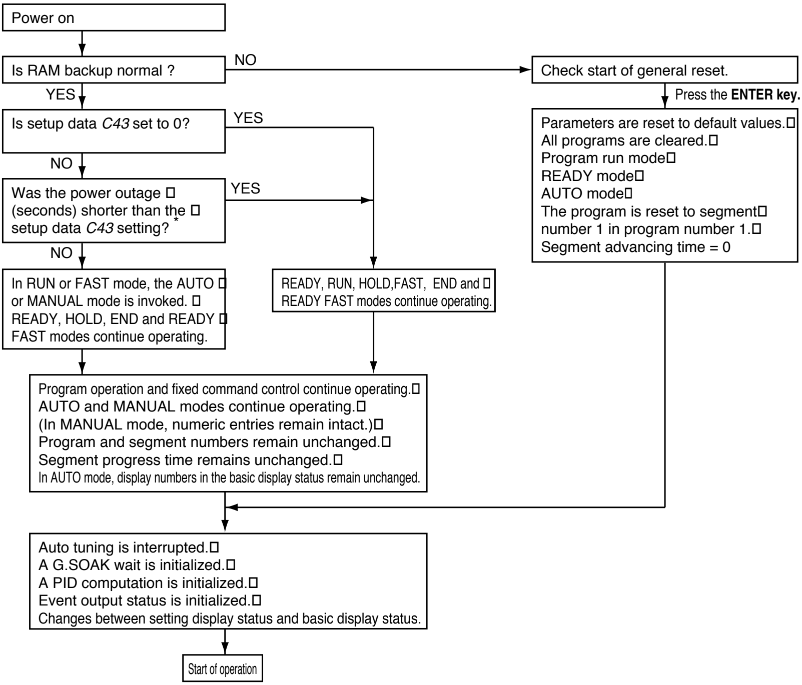


Chapter 6. OPERATION

6 - 1 Power Supply On

When 100 to 240V AC is applied across terminals (39) and (40) on the **DCP552**, the display goes on in about 10 seconds and controls and other operations start. When the controller is starting up, the LEDs on the profile display go on at irregular intervals one after the other starting from top right in clock-wise order until the controller becomes ready for operation.
The startup flow procedure is shown below.

● Startup flow procedure

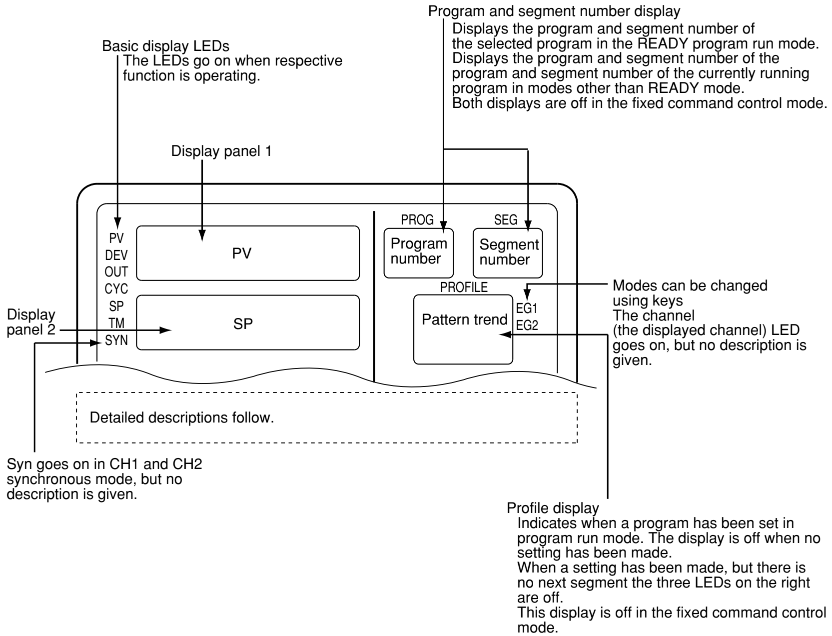


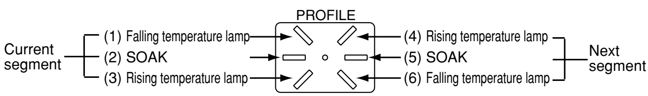
*: The measurement of a power outage may vary by about 10 seconds.

6 - 2 Basic Display Selection

The console basic display status is comprised of the program number display, segment number display, display panel 1, display panel 2, basic display LEDs and the message panel.
Use the **DISP key** or **MESSAGE key** to cycle through the different displays. The mode display LEDs perform the same functions both in the basic display status and during parameter settings and do not change by pressing the **DISP** or **MESSAGE key**.

The displays and their functions are shown in the figure below.



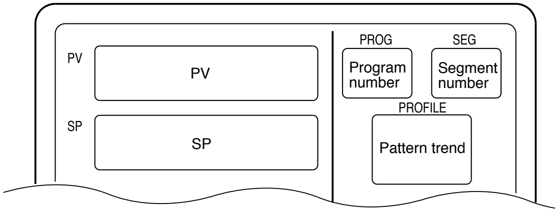


■ Program run mode displays

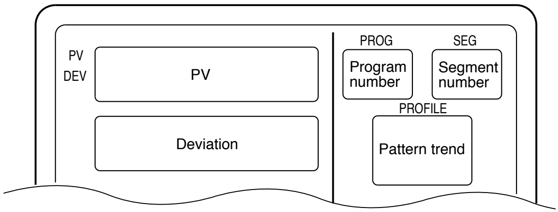
● DISP key function (When variable parametar *PA03* is set to 0)

The DISP key is used to cycle through the displays in the following order: Display A1, Display A2, Display A3, Display A4, Display A5, Display A6, Display A1.

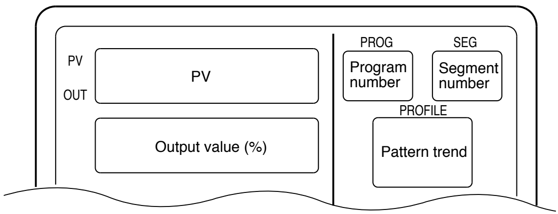
● Display A1



● Display A2

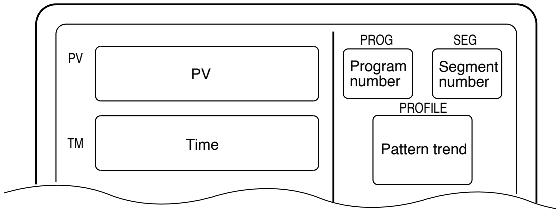


● Display A3



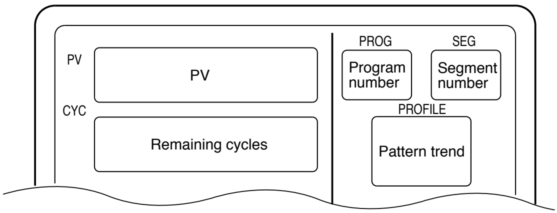
When used in MANUAL mode, the number of digits available for output values flashes.

- **Display A4**



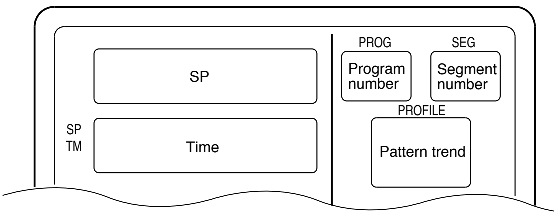
Select Hours and Minutes, Minutes and Seconds or 0.1 Seconds in the time unit setup data. In the setup data, also select Remaining Segment Time or Total Running Time.

- **Display A5**



When the remaining number of cycles is 0, cycle operation stops.

- **Display A6**

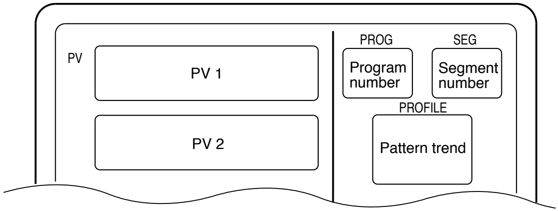


Select Hours and Minutes, Minutes and Seconds or 0.1 Seconds in the time unit setup data. In the setup data, also select Remaining Segment Time or Total Running Time.

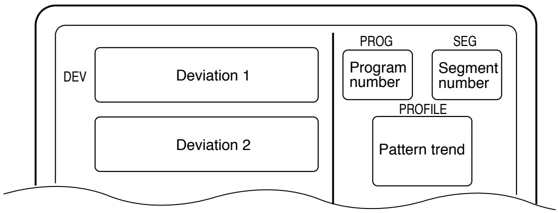
- **DISP key function (when variable parameter *PA03* to 1)**

Cycles through Display B1 → Display B2 → Display B3 → Display B4 → Display B5 → Display B6 → Display B1 →

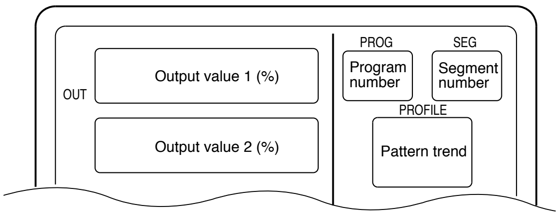
- **Display B1**



- **Display B2**

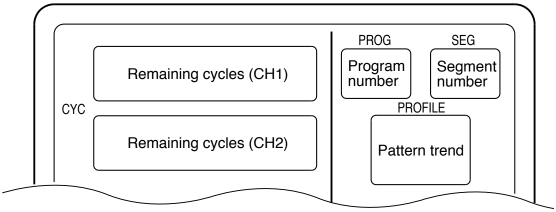


- **Display B3**



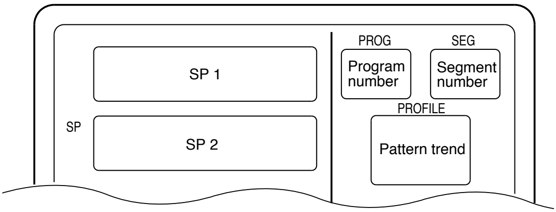
When used in MANUAL mode, the number of digits available for output values flashes.

- **Display B4**

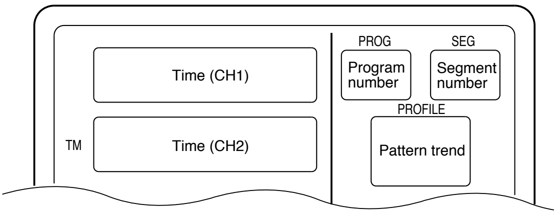


When the remaining number of cycles is 0, cycle operation stops.

- **Display B5**



- **Display B6**



Select Hours and Minutes, Minutes and Seconds or 0.1 Seconds in the time unit setup data. In the setup data, also select Remaining Segment Time or Total Running Time.

- **Message key function (when variable parameter *PA03* is set to 0)**

Cycles through the message panel displays.
- When CH1 is displayed: Display C1, Display C2, Display C3, Display C4, Display C5, Display C6, Display C1.
- When CH2 is displayed: Display C1, Display C2, Display C3, Display C4, Display C5, Display C6, Display C1.

- **Display C1**

```
OUT     ■■■■■■■___   ← 0 to 100% OUT graph
           70.5%OUT   ← –5 to 105% OUT value
```

- **Display C2**

```
DEV     ____┘■■■__   ← –5 to 5% FS graph
            3.1%FS    ← –999.9 to 999.9% FS value
```

- **Display C3**

```
TIME    ■__________  ← 0 to 100% progress graph
 019:59  ▶  180:01   ← Time display in hours and minutes
                        Elapsed time ▶ Remaining time
```

- **Display C4**

■ indicates that events are on and
_ indicates that they are off.

```
EVENT   ■■__  ■___   ← Displays events 1 to 8 from the left.
 1-16   ____  ____   ← Displays events 9 to 16 from the left.
```

- **Display C5**

```
TAG     [PROG01  ]   ← The [ ] displays the 8-character tag.
```

- **Display C6**

```
PV2     1122.3       ← CH2 PV value
SP2     1100.0       ← CH2 SP value
```

- **Display C7**

```
PV1     1010.2       ← CH1 PV value
SP1     1000.0       ← CH1 SP value
```

Handling Precautions

- Models with CP computation compensation the CH2 PV values have the following meaning depending on variable parameter *PA44* settings.
  - When *PA44* is set to 0: CP value (unit: %) or PO_2 values (unit 10^{-20} atm)
  - When *PA44* is set to 1: millivolt voltage value (unit: mV)
  - When *PA44* is set to 2: O_2 sensor impedance value (unit: kΩ)

- **Message key function (when variable parameter *PA03* is set to 1)**

Cycles through the message panel displays.

- Display D1, Display D2, Display D3, Display D4, Display D5, Display D6, Display D1.

- **Display D1**

```
OUT 1        20.4%OUT
OUT 2        70.5%OUT
```

← 5 to 105% CH1 output value
← 5 to 105% CH2 output value

- **Display D2**

```
DEV 1         8.6%FS
DEV 2         3.1%FS
```

← -999.9 to 999.9% CH1 deviation value
← -999.9 to 999.9% CH2 deviation value

- **Display D3**

```
T1  019:59 ▶  180:01
T2  019:59 ▶  180:01
```

← Time value of CH1 time unit
← Time value of CH2 time unit

- **Display D4**

■ indicates that events are on and
_ indicates that they are off.

```
EVENT   ■■__  ■___
 1-16   ____  ____
```

← Displays events 1 to 8 from the left.
← Displays events 9 to 16 from the left.

- **Display D5**

CH1 tag

```
TAG1   [PROG01    ]
TAG2   [PROG01    ]
```

← The [ ] displays the 8-character program tag.
← CH2 tag

- **Display D6**

```
PV1     1010.2
PV2     1122.3
```

← CH1 PV value
← CH2 PV value

Handling Precautions

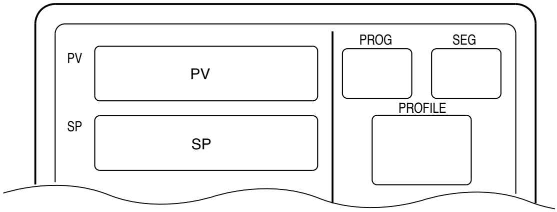
- Models with CP computation compensation the CH2 PV values have the following meaning depending on variable parameter *PA44* settings.
- When *PA44* is set to 0: CP value (unit: %) or PO_2 values (unit 10^{-20} atm)
- When *PA44* is set to 1: millivolt voltage value (unit: mV)
- When *PA44* is set to 2: O_2 sensor impedance value (unit: kΩ)

■ Fixed command control mode

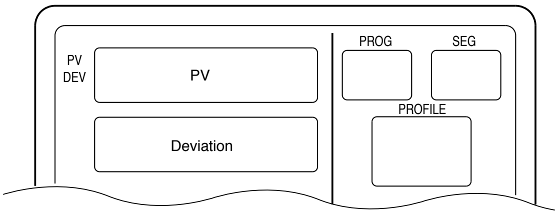
● DISP key function (when variable parameter *PA03* is set to 0)

The DISP key is used to cycle through the displays in the following order: Display E1, Display E2, Display E3, Display E1.

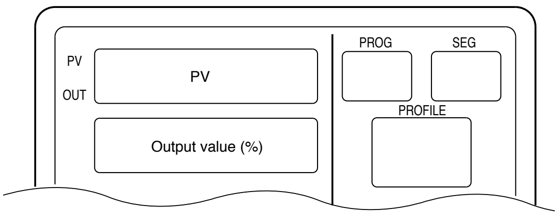
● Display E1



● Display E2



● Display E3

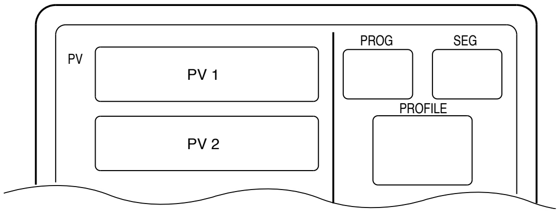


In MANUAL mode, the number of digits available for output values flash.

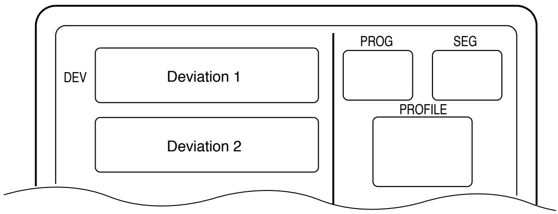
- **DISP key function (when variable parameter *PA03* is set to 1)**

The **DISP key** is used to cycle through the displays in the following order: Display F1, Display F2, Display F3, Display F4, Display F1.
When CH1 and CH2 are both in the fixed command control mode, the display show the information shown in the figures below. When only one channel is in the fixed command control mode, the displays provide the same information is shown in the program run mode. Note, however, that channel time and remaining cycle count are displayed as [-----].

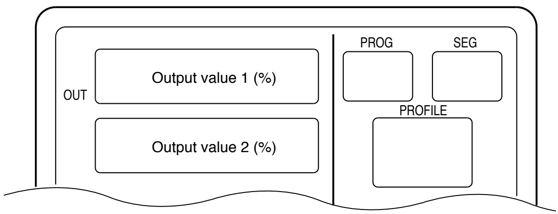
- **Display F1**



- **Display F2**

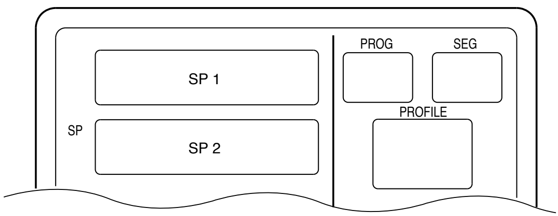


- **Display F3**



When used in MANUAL mode, the number of digits available for output values flashes.

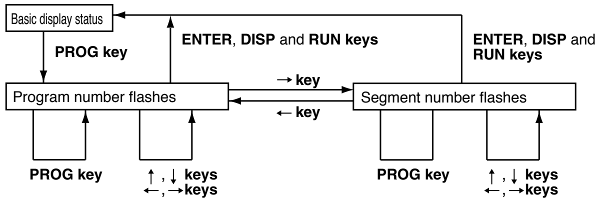
- **Display F4**



6 - 3 Selecting Programs

A total of 49 programs can be selected with the operation keys.

■ Selecting program numbers



- Press the **PROG key** in the READY program run mode and basic display status. The program number starts to flash.
- Press the **PROG key** when the program or segment number starts flashing to cycle through set program numbers when several programs have been set. The segment number is set to 1.
- Use the ↑ or ↓ **key** when the program number is flashing to select a program number regardless of whether a program has been set or not. The segment number is set to 1.
- Use the ↑ or ↓ **key** when the segment number is flashing to select a segment number. When no program has been set, only 1 can be selected. When a program has been set, any of the set segments can be selected.
- The message panel displays the program tag when a program or segment number flashes. The 8-character tag display is off when no program has been set.
- Press the **RUN key** to start RUN mode operation from the displayed segment number when the program or segment number is flashing.

Handling Precautions

- Programs cannot be selected during external switch input.
- Selections cannot be made in fixed command control mode, RUN, HOLD, END and READY FAST modes.
- When variable parameter *PA04* is set to 0, separate program numbers can be selected for CH1 and CH2 using the keys. When variable parameter *PA04* is set to 1, only the same program number can be set for CH1 and CH2 using the keys.
- When variable parameter *PA04* is set to 1, the RUN mode can be invoked with the **RUN key** only when a program with the selected number is set both in CH1 and CH2.

6 - 4 External Switch Operation

■ External switch input

A total of 16 external switch inputs are available. Each input is called SW1, SW2, etc. up to SW16. (SW: external switch input)

● Types of external switch inputs

SW1 to 4 and SW9 to 16 are tied.
SW5 to 8 functions are selected using setup data settings *C71* to *C74*.
SW9 to 14 are for program selections. Selections are made by entering BCD code or binary codes in the setup data *C75*. When two weights are given for an item, the right weight is for binary figures and the left is for BCD.

External switch number	Function	Detection way
SW1	RUN	Leading edge
SW2	HOLD	Leading edge
SW3	RESET	Leading edge
SW4	ADV	Leading edge
SW5	Selects one of the following functions using setup settings.	
SW6	RAMP-E	Leading edge
SW7	FAST	Leading edge
SW8	Clears G.SOAK using the OR condition.	Status
	Clears G.SOAK using the AND condition.	Status
	MANUAL/AUTO	Leading/trailing edge
	AT start/stop	Leading/trailing edge
	AUTO Loading (the DCP552A***** model only)	Leading edge
	O_2 sensor check	Leading edge
SW9	Selects program number, weight 1	Status
SW10	Selects program number, weight 2	Status
SW11	Selects program number, weight 4	Status
SW12	Selects program number, weight 8	Status
SW13	Selects program number, weight 10 or 16	Status
SW14	Selects program number, weight 20 or 32	Status
SW15	CH1 operation canceled	Status
SW16	CH2 operation canceled	Status

Note

- When G.SOAK is cleared using an OR condition and an external switch is on, or PV enters the G.SOAK width, a G.SOAK wait is cleared.
- When G.SOAK is cleared using an AND condition and an external switch is on and PV enters the G.SOAK width, a G.SOAK wait is cleared.

- The on and off states of SW15 and SW16 determine whether external SW1 to SW14 operations are enabled or disabled. Note, however, that the autoload function and the O_2 sensor check function cannot be disabled by SW15 and SW16.

SW15	SW16	External switch operation
OFF	OFF	Enabled in both CH1 and CH2
ON	OFF	Enabled in CH2, but disabled in CH1
OFF	ON	Enabled in CH1, but disabled in CH2
ON	ON	Disabled in both CH1 and CH2

- The settings of SW15 and 16 determine whether external switch inputs SW1 to SW14 are enabled or disabled. The two-channel synchronous operation setting (parameter PA04) is ignored in the operation of external switches SW1 to SW14. If the program pattern of either channel is not set, RUN operation is not possible unless the unset channel is disabled by SW15 and 16.

■ Selecting programs

- Programs can be selected using the external switches in the READY program run mode.

- Programs are selected using the external switches and the BCD system or the binary system, and are set in setup data *C75*. In the BCD system, four switches SW9 to 12 are used to set the one digit and the two switches SW13 to 14 are used to set the ten digit. In the binary system, six switches SW9 to 14 are used to set. Settings made with these systems are shown in the tables below.

● BCD system

BCD system (the one digit)		Status									
External switch number	Weight										
SW9	1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
SW10	2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF
SW11	4	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF
SW12	8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
Number selection		0	1	2	3	4	5	6	7	8	9

BCD system (the ten digit)		Status			
External switch number	Weight				
SW13	10	OFF	ON	OFF	ON
SW14	20	OFF	OFF	ON	ON
Number selection		0	10	20	30

● **Binary system**

Binary system		Status											
External switch number	Weight												
SW9	1	OFF	ON	OFF	ON	OFF	ON		ON	OFF	ON	OFF	ON
SW10	2	OFF	OFF	ON	ON	OFF	OFF		OFF	ON	ON	OFF	OFF
SW11	4	OFF	OFF	OFF	OFF	ON	ON		ON	ON	ON	OFF	OFF
SW12	8	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON	ON	OFF	OFF
SW13	16	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF	OFF	ON	ON
SW14	32	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF	OFF	OFF	OFF
Number selection		0	1	2	3	4	5	• • •	13	14	15	16	17

Binary system		Status							
External switch number	Weight								
SW9	1		ON	OFF	ON		ON	OFF	ON
SW10	2		ON	OFF	OFF		ON	OFF	OFF
SW11	4		ON	OFF	OFF		ON	OFF	OFF
SW12	8		ON	OFF	OFF		ON	OFF	OFF
SW13	16		ON	OFF	OFF		OFF	ON	ON
SW14	32		OFF	ON	ON		ON	ON	ON
Number selection		• • •	31	32	33	• • •	47	48	49

Handling Precautions

- When a program number of 0 is set using the external switch inputs, programs can be selected using the console keys and by transmission.
- Program numbers 1 to 39 can be selected in the BCD system.

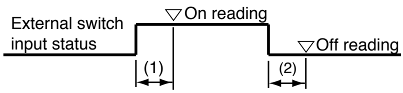
■ Read timing

● SW1 to 8 and 15 to 16 timing

SW1 to 8 and 15 to 16 are read according to the timing in the figure shown below.

(1) When the input changes from OFF to ON, reading starts within less than 0.2 seconds.

(2) When the input changes from ON to OFF, reading starts within less than 0.2 seconds.



● SW9 to 14 and RUN, FAST (READY FAST) timing

Selecting SW9 to 14 program numbers takes less than 0.4 seconds after a change in input status.
Thus the following timings (1) to (4) must be observed during RUN operations.
FAST (READY FAST) operations should follow the same timings.

(1) Time from number selection to leading edge of the RUN signal
: 0.4 seconds or more

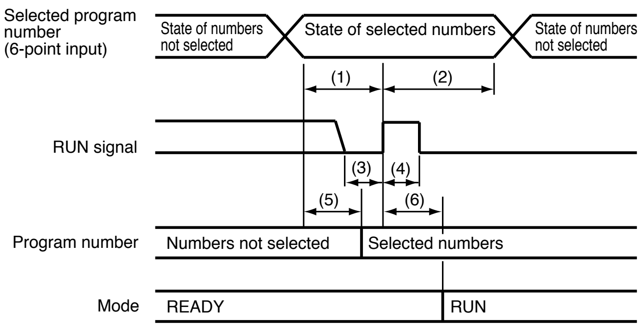
(2) Time from the leading edge of the RUN signal to number selection hold
: 0.2 seconds or more

(3) Time from RUN signal OFF to leading edge of RUN signal
: 0.2 seconds or more

(4) Time from leading edge of RUN signal to RUN signal ON hold
: 0.2 seconds or more

(5) Time from entry of selected number to program number change
: 0.4 seconds or less

(6) Time from leading edge of RUN signal to start of RUN signal
: 0.4 seconds or less



Handling Precautions

To ensure correct operation, the above read timings should be regarded as minimum time settings in external switch operations.

6 - 5 Manual Operation and Auto-Tuning

■ Manual operation

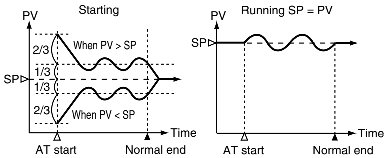
When outputs are indicated in the basic display status, only one digit in the output value flashes. Increasing or decreasing the output value using ↑ and ↓ **keys** causes the actual output to change accordingly. Unlike setting registration, there is no need to press the **ENTER key**.
Use the ← and → **keys** to move the flashing digit.
Setup data *C35* is used to select smooth and preset output changes when going from AUTO to MANUAL modes.
Changes from MANUAL to AUTO are smooth.
(Note, however, that when the integral time setting for a PID group PID parameter of 0 may cause abrupt changes.)

■ Auto-tuning (AT)

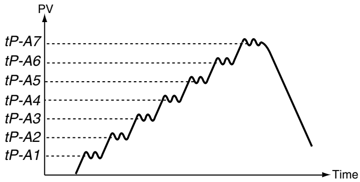
Set values can automatically be written when using auto-tuning (AT) in the RUN, HOLD, FAST and END modes during AUTO mode operation and PID groups (1 to 9, A1 to A7 or fixed command control) are being used.
In READY AUTO mode, the tuning points of PID parameters *tP-A1* to *tP-A7* settings can be used as SP to perform auto-tuning of PID groups A1 to A7 values.
Variable parameter *PA08* (CH1) and *PA93* (CH2) allow the following selections:
0 : AT is not performed.
1 : A general AT operation of a PID group used in a mode other than READY mode
2 : AT of PID values that do not easily overshoot can be written to a PID group used in a mode other than READY mode.
3 : A standard AT operation is repeatedly performed on PID groups A1 to A7 in READY mode.
4 : Repeated AT of PID values that do not easily overshoot can be written to PID groups A1 to A7 used in READY mode.

- During auto-tuning, program run time stops. Thus the RUN and FAST modes are changed to the HOLD mode.
- Auto-tuning always calculates the excess time and limit sensitivity of thread for two limit cycles and calculates PID values using characteristics equations, then automatically writes the results.
- The setup data *C21* setting (CH1) and *C22* setting (CH2) change the upper and lower output limit used during auto-tuning.
  A setting of 1, 3 or 5 causes the lower output limit to be determined by variable parameter *PA09* and the upper output limit to be determined by *PA10*.
  A setting of 2 or 4, lower output limit is off and the upper output limit is on.

- The point at which output reverses (lower limit ⇔ upper limit) during auto-tuning is determined from the SP and PV values at AT startup as follows.



- Auto-tuning performed using a variable parameter *PA08* setting of 3 or 4 and a *PA93* setting of 3 or 4 cause auto-tuning to be performed on SP, PID parameters *tP-A1* to *tP-A7*, in order.



- Auto-tuning can be started by the **AT key**, external switch input and by transmission. The AT LED flashes during auto-tuning.
- Auto-tuning terminates without writing PID constants and the AT LED goes off when any of the following conditions occur.
  - Operation is terminated by pressing of the **AT key**.
  - Operation is terminated by an external switch input.
  - Operation is terminated by transmission.
  - Mode change occurs. (When the MANUAL mode is invoked; the READY mode is invoked by setting *PA08* and *PA93* to 1 or 2, the RUN mode is invoked by setting *PA08* and *PA93* to 3 or 4.)
  - When PV goes outside the range.

Handling Precautions

- Auto-tuning is not possible in CH2 on a model with CP compensation.
- Auto-tuning does not operate normally when the equipment to be controlled is not connected.
- The time required for auto-tuning depends on the equipment controlled.
- When auto-tuning is executed, control is terminated , lower and higher limit outputs are repeated several times and PV fluctuates. When equipment failure may be caused by PID fluctuations, set the PID value manually.
  If just PID value can not be got in case of control object, sets PID value with manual.
- Variable parameter *PA08* and *PA93* settings make values set at the start of auto-tuning valid. A change in the *PA08* and *PA93* settings made during auto-tuning execution is ignored. The new value is valid in the next auto-tuning operation.

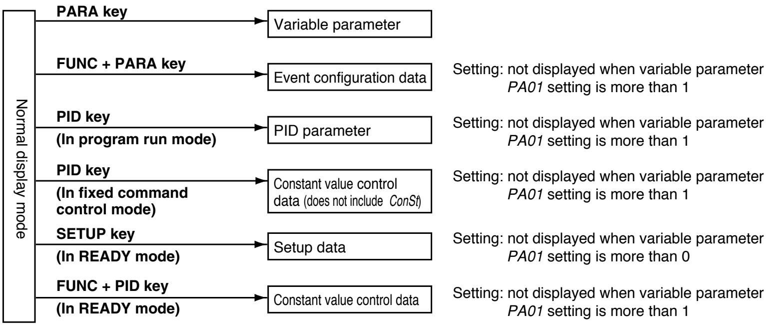
Chapter 7. PARAMETER SETUP

7 - 1 Parameter Setup

Parameter settings can be changed when the **DCP552** is in the normal display mode.
When not in the normal display mode, press the **DISP key** to invoke it.

■ Selecting parameter settings groups

In the normal display mode, the keys listed in the table below can be used to select settings groups and individual items in these groups.



Individual items in each settings group are listed below.

Variable parameter	: *PA01*
Event configuration data	: *E01-t*
PID parameters	: *P-1* in READY mode Use *P* setting in the used PID group in modes other than READY mode.
Setup data	: *C01*
Constant value control data	:*ConSt* when using **FUNC + PID key** *SP* when using the **PID key** in constant value control mode

■ Progression of individual items in parameter settings

The item codes for individual (specific) items are shown on display panel 1, their set values are shown on display panel 2 and their mnemonic codes are shown on the message panel.
Individual items are displayed in the vertical-horizontal matrix shown on page 7-3, with matrix sizes varying according to settings group. The ↑ **key**, ↓ **key**, ← **key** and → **key** are used to cycle through individual items.
The **PARA key** (valid for variable parameters and event configuration data), **PID key** (valid for PID parameters and constant value control data) or the **SETUP key** (valid for setup data) allow you to search for displayable items in ascending order of item number.

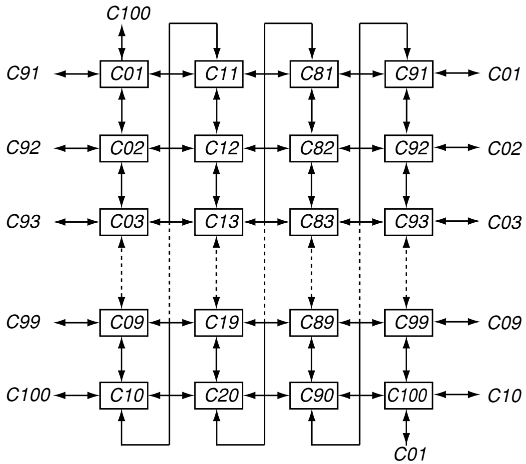
■ Modifying individual items and exiting the setting mode

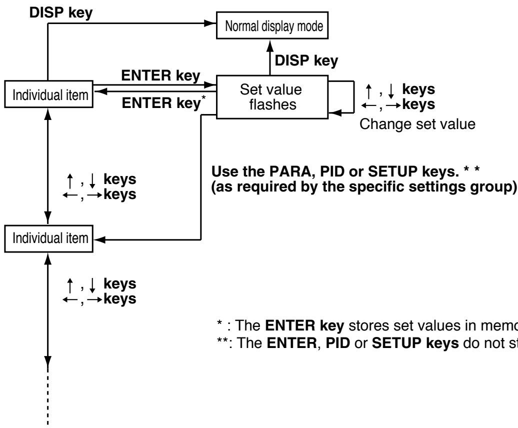
Pressing the **ENTER key** while an individual item is displayed causes the set value to flash and enables the registration state. At this point, the ↑ **key** and ↓ **key** allow you to increase or decrease the values, while the ← **key** and → **key** move the digit positions on the display at which the values flash.
Pressing the **ENTER key** after the flashing number has been changed to the desired value stops the flashing, the number reverts to the on state and the new setting is stored in internal memory.
Modification of settings is terminated by pressing either the **PARA key** (valid for variable parameters and event configuration data), **PID key** (valid for PID parameters and constant value control data), **SETUP key** (valid for setup data) or **DISP key**. Pressing the **PARA key**, **PID key** or **SETUP key** moves the cursor to the next item stops the flashing and the number reverts to its normal on state.
Pressing the **DISP key** enables the normal display mode.
Should display panel 2 show "-----" during display of an individual item or pressing the **ENTER key** not enable the registration state, it means that settings cannot be made or modified for that item.

Handling Precautions

- When *PA01* is set to more than 1 in a variable parameter setting, *PA03* and items beyond are not displayed. *PA03* and items beyond cannot be changed when *PA02* is set to 1 or more.
- Event configuration data settings cannot be changed when *PA02* is set to a value more than 1. Also, when *PA02* is set to 0 or 1, the event type setting and some auxiliary settings (output points of code events) cannot be changed.
- PID parameter settings cannot be changed when *PA02* is set to 4 or 5.
- Setup data settings cannot be changed when *PA02* is set to a value more than 1 and cannot be displayed in modes other than the READY mode.
- The fixed control data setting cannot be changed when *PA02* is set to 4 or 5. And, since the **FUNC** and **PID keys** are invalid in modes other than the READY mode, a *ConSt* setting cannot be displayed or changed.

• Example of individual item matrix (setup data)





* : The **ENTER key** stores set values in memory.
: The **ENTER, **PID** or **SETUP keys** do not store set values in memory.

7 - 2 Parameter Setting List

Note

"PVU (PV1)", "PVU (PV2), "SPU (CH1)" and "SPU (CH2)" used in the "Factory Default Settings" and "User Settings" columns in the lists on the following pages have the following meaning.

PVU (PV1): When the PV1 range type (setup data setting *C01*) is a thermocouple or resistance temperature detector, the PV1 decimal point position (setup data setting *C03*) causes the decimal point position to change.
When the PV range type is linear, the PV1 linear decimal point position (setup data setting *C04*) causes the decimal point position to change.
For example, in a decimal point position of 1,
–19999 PVU (PV1) becomes –19999.9 and +20000 PVU (PV1) becomes +2000.0.

PVU (PV2): Like PVU (PV1), a PV2 range type (setup data setting *C11*), a PV2 decimal point position (setup data setting *C13*) and a PV2 linear decimal point position (setup data setting *C14*) causes the decimal point position to change.

SPU(CH1) : The SPU decimal point position (setup data setting *C65*) causes the decimal point position to change.
For example a decimal point position of 2,
–19999 SPU becomes –199.99 and +20000 SPU becomes +200.00.

SPU(CH2) : The SPU decimal point position (setup data setting *C68*) causes the decimal point position to change.

■ Variable parameter setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*PA 01*	Keylock	0		0: Keylock disabled 1: Display of setup data settings disabled 2: Display of all settings disabled 3: Display of all settings disabled. Operation keys disabled [Description:] *PA01* can be displayed and changed regardless of *PA01* and *PA02* settings.
2	*PA 02*	Memory protect	0		0: Disabled 1: Program settings are protected 2: Setup, variable parameters and event configurations are protected. 3: Setup, variable parameters and event configurations are protected. 4: Setup, variable parameters and event configurations are protected. 5: Program settings and all parameter settings are protected. [Description:] *PA02* can be displayed and changed regardless of *PA01* and *PA02* settings.
3	*PA 03*	Display channel setting	0		0: 2 items are displayed for the selected CH 1: Simultaneous 2CH display of the same item
4	*PA 04*	Synchronous 2 channel operation	1		0: asynchronous 1: synchronous
5	*PA 05*	Program auto load *	0		1: ON 2: OFF
6	*PA 06*	Unused	–		[Description:] “-----”is displayed and setting is not possible.
7	*PA 07*	Unused	–		
8	*PA 08*	Auto-tuning (CH1)	0		0: AT not performed 1: Standard AT performed on currently used PID group in mode other than READY mode. 2: AT writing overshoot-proof PID values to currently used PID groups in mode other than READY mode performed. 3: Standard AT performed on PID groups A1 to A7 in READY mode. 4: AT writing overshoot-proof PID values to PID groups A1 to A7 in READY mode continuously performed.
9	*PA 09*	Auto-tuning MV lower limit (CH1)	0.0		–5.0 to upper limit % [Description:] Valid when setup data *C21* setting is set to 1, 3, 5.
10	*PA 10*	Auto-tuning MV upper limit (CH1)	100.0		Lower limit to +105% [Description:] Valid when setup data *C21* setting is set to 1, 3, 5.
11	*PA 11*	SP bias (CH1)	0 SPU		–10000 to +10000 SPU (CH1)
12	*PA 12*	PV digital filter (CH1)	0.0		0.0 to 120.0sec
13	*PA 13*	PV bias (CH1)	0 PVU		–1000 to +1000 PVU (PV1)
14	*PA 14*	Manipulated variable deviation limit (CH1)	110.0		0.1 to 110.0% OUT/0.1sec
15	*PA 15*	Time proportional output cycle (CH1)	10		1 to 240sec
16	*PA 16*	On-off control differential (CH1)	50 SPU		0 to +1000 SPU (CH1)
17	*PA 17*	PID computation initialize manipulated variable (CH1)	0.0		–5.0 to +105.0%
18	*PA 18*	Unused	-----		[Description:] “-----”is displayed and setting is not possible.
19	*PA 19*	Unused	-----		
20	*PA 20*	Unused	-----		
21	*PA 21*	SP bias (CH2)	0 SPU		–10000 to +10000 SPU (CH2)
22	*PA 22*	PV digital filter (CH2)	0.0		0.0 to 120.0sec
23	*PA 23*	PV bias (CH2)	0 PVU		–1000 to +1000 PVU (PV2)

* : This function is available on the DCP552A***** model only.

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
24	*PA 24*	Manipulated variable deviation limit (CH2)	110.0		0.1 to 110.0% OUT/0.1 sec
25	*PA 25*	Time proportional output cycle (CH2)	10		1 to 240 sec
26	*PA 26*	ON-OFF control Differential (CH2)	50		0 to 1000 SPU (CH2)
27	*PA 27*	PID computation initialize manipulated variable (CH2)	0.0		-5.0 to 105.0%
28	*PA 28*	Unused	-----		[Description:] “-----”is displayed and setting is not possible.
29	*PA 29*	Unused	-----		
30	*PA 30*	Unused	-----		
31	*PA 31*	Event on delay Group 1 event number	0		0 to 16 [Description:] A setting of 0 generates no delay.
32	*PA 32*	Event on delay Group 1 delay time	0.0		0.0 to 3000.0sec [Description:] When *PA31* is set to 0, “-----” is displayed and setting is not possible.
33	*PA 33*	Event on delay Group 2 event number	0		0 to 16 [Description:] A setting of 0 generates no delay.
34	*PA 34*	Event on delay Group 2 delay time	0.0		0.0 to 3000.0sec [Description:] When *PA33* is set to 0, “-----” is displayed and setting is not possible.
35	*PA 35*	Event on delay Group 3 event number	0		0 to 16 [Description:] A setting of 0 generates no delay.
36	*PA 36*	Event on delay Group 3 delay time	0.0		0.0 to 3000.0sec [Description:] When *PA35* is set to 0, “------” is displayed and setting is not possible.
37	*PA 37*	Event on delay Group 4 event number	0		0 to 16 [Description:] A setting of 0 generates no delay.
38	*PA 38*	Event on delay Group 4 delay time	0.0		0.0 to 3000.0sec [Description:] When *PA37* is set to 0, “-----” is displayed and setting is not possible.
39	*PA 39*	FAST X	0		0 : 2X 1 : 10X 2 : 60X 3 : 120X [Description:] When setup data *C62* is set to 1 (program time unit: minutes, seconds), settings 3 and 4 produce a speed of 10 X. When *C62* is set to 2 (program time unit: 0.1sec), the FAST mode is not available.
40	*PA 40*	CP computation temperature compensation	0		-1000 to +1000 PVU (CH1) [Description:] “-----” is displayed for models without CP compensation and setting can not be performed.
41	*PA 41*	Unused	0		[Description:] “-----”is displayed and setting is not possible.
42	*PA 42*	Unused	0		
43	*PA 43*	PID computation initialize (CH1)	0		0: No initialization during advance processing and PID group change. 1: Initializes during advance processing but not during PID group change. 2: No initialization during advance processing but initializes during PID group change 3: Initializes both during advance processing and PID group change
44	*PA 44*	PV2 message display mode	0		0: CP or PO_2 value display 1: mV value display 2: O_2 sensor impedance value display
45	*PA 45*	G.SOAK time (CH1)	2.0		0.1 to 60.0sec
46	*PA 46*	G.SOAK time (CH2)	2.0		0.1 to 60.0sec

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
47	*PA 47*	Unused	----		[Description:] "-----" is displayed and setting can not be performed.
48	*PA 48*	Unused	----		
49	*PA 49*	Unused	----		
50	*PA 50*	Unused	----		
51	*PA 51*	PV1 equalizer compensation point No. 1	Range lower limit value		Compensation point No. 1 : PV1 range lower limit value (tied) Compensation points No. 2 to 9 : –19999 to +20000 PVU (PV1) Compensation point No. 10 : PV1 range upper limit value (tied) Compensation amount No. 1 to 10: –1000 to +1000 PVU (PV1) [Description:] When setup data *C30* is set to 0, 2, "-----" is displayed and setting is not possible. Compensation point No. 1 and No. 10 are automatically changed during a PV1 range change.
52	*PA 52*	PV1 equalizer compensation amount No. 1	0 PVU		
53	*PA 53*	PV1 equalizer compensation point No. 2	500 PVU		
54	*PA 54*	PV1 equalizer compensation amount No. 2	0 PVU		
55	*PA 55*	PV1 equalizer compensation point No. 3	1000 PVU		
56	*PA 56*	PV1 equalizer compensation amount No. 3	0 PVU		
57	*PA 57*	PV1 equalizer compensation point No. 4	1500 PVU		
58	*PA 58*	PV1 equalizer compensation amount No. 4	0 PVU		
59	*PA 59*	PV1 equalizer compensation point No. 5	2000 PVU		
60	*PA 60*	PV1 equalizer compensation amount No. 5	0 PVU		
61	*PA 61*	PV1 equalizer compensation point No. 6	2500 PVU		
62	*PA 62*	PV1 equalizer compensation amount No. 6	0 PVU		
63	*PA 63*	PV1 equalizer compensation point No. 7	3000 PVU		
64	*PA 64*	PV1 equalizer compensation amount No. 7	0 PVU		
65	*PA 65*	PV1 equalizer compensation point No. 8	3500 PVU		
66	*PA 66*	PV1 equalizer compensation amount No. 8	0 PVU		
67	*PA 67*	PV1 equalizer compensation point No. 9	4000 PVU		
68	*PA 68*	PV1 equalizer compensation amount No. 9	0 PVU		
69	*PA 69*	PV1 equalizer compensation point No. 10	Range upper limit value		
70	*PA 70*	PV1 equalizer compensation amount No. 10	0 PVU		
71	*PA 71*	PV2 equalizer compensation point No. 1	Range lower limit value		Compensation point No. 1 : PV2 range lower limit value (tied) Compensation points No. 2 to 9 : –19999 to +20000 PVU (PV2) Compensation point No. 10 : PV2 range upper limit value (tied) Compensation amount No. 1 to 10 : –1000 to +1000 PVU (PV2) [Description:] When setup data *C30* is set to 0, 1, "-----" is displayed and setting is not possible. Compensation point No. 1 and No. 10 are automatically changed during a PV2 range change.
72	*PA 72*	PV2 equalizer compensation amount No. 1	0 PVU		
73	*PA 73*	PV2 equalizer compensation point No. 2	500 PVU		
74	*PA 74*	PV2 equalizer compensation amount No. 2	0 PVU		
75	*PA 75*	PV2 equalizer compensation point No. 3	1000 PVU		
76	*PA 76*	PV2 equalizer compensation amount No. 3	0 PVU		
77	*PA 77*	PV2 equalizer compensation point No. 4	1500 PVU		
78	*PA 78*	PV2 equalizer compensation amount No. 4	0 PVU		
79	*PA 79*	PV2 equalizer compensation point No. 5	2000 PVU		
80	*PA 80*	PV2 equalizer compensation amount No. 5	0 PVU		
81	*PA 81*	PV2 equalizer compensation point No. 6	2500 PVU		
82	*PA 82*	PV2 equalizer compensation amount No. 6	0 PVU		
83	*PA 83*	PV2 equalizer compensation point No. 7	3000 PVU		
84	*PA 84*	PV2 equalizer compensation amount No. 7	0 PVU		
85	*PA 85*	PV2 equalizer compensation point No. 8	3500 PVU		
86	*PA 86*	PV2 equalizer compensation amount No. 8	0 PVU		
87	*PA 87*	PV2 equalizer compensation point No. 9	4000 PVU		
88	*PA 88*	PV2 equalizer compensation amount No. 9	0 PVU		
89	*PA 89*	PV2 equalizer compensation point No. 10	4500 PVU		
90	*PA 90*	PV2 equalizer compensation amount No. 10	0 PVU		
91	*PA 91*	Unused	-----		[Description:] "-----"is displayed and setting is not possible.
92	*PA 92*	Unused	-----		

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
93	*PA 93*	Auto-tuning (CH2)	0		0: AT not performed 1: standard AT performed on currently used PID group in mode other than READY mode. 2: AT writing overshoot-proof PID values to currently used PID groups in mode other than READY mode performed. 3: Standard AT performed on PID groups A1 to A7 in READY mode. 4: AT writing overshoot-proof PID values to PID groups A1 to A7 in READY mode continuously performed. [Description:] "-----" is displayed for models with CP compensation and setting is not possible.
94	*PA 94*	Auto-tuning MV lower limit (CH2)	0.0		-5.0 to upper limit % [Description:] "-----" is displayed for models with CP compensation and setting is not possible. Valid when setup data *C22* setting is set to 1, 3 or 5.
95	*PA 95*	Auto-tuning MV upper limit (CH2)	100.0		Lower limit to +105% [Description:] "-----" is displayed for models with CP compensation and setting is not possible. Valid when setup data *C22* setting is set to 1, 3 or 5.
96	*PA 96*	PID computation initialize (CH2)	0		0: No initialization during advance processing and PID group change 1: Initializes during advance processing but not during PID group change 2: No initialization during advance processing but initializes during PID group change 3: Initializes both during advance processing and PID group change
97	*PA 97*	CP computation compensation	0		0: No compensation 1: compensates [Description:] "-----" is displayed for models without CP compensation and setting is not possible.
98	*PA 98*	CP value (PV) display lower limit value	0.000		0 to upper limit SPU (CH2) [Description:] "-----" is displayed for models without CP compensation and setting is not possible.
99	*PA 99*	CP value (PV) display upper limit value	4.000		lower limit to 4000 SPU (CH2) [Description:] "-----" is displayed for models without CP compensation and setting is not possible.
100	*PA 100*	Gas constant	23.5		10.0 to 50.0% [Description:] "-----" is displayed for models without CP compensation and setting is not possible.
101	*PA 101*	CP computation compensation No. 1 compensation point	0.000		No. 1 compensation point : 0 SPU (CH2) (tied) No. 2 to 9 compensation point : 0 to +2000 SPU (CH2) NO. 10 compensation point : 2000 SPU (CH2) (tied) NO. 1 to 10 compensation amount : -1000 to +1000 SPU (CH2) [Description:] •"-----" is displayed for models without CP compensation and setting is not possible. •"-----" is displayed when *PA97* is set to 0 and setting is not possible.
102	*PA 102*	CP computation compensation No. 1 compensation amount	0.000		
103	*PA 103*	CP computation compensation No. 2 compensation point	0.200		
104	*PA 104*	CP computation compensation No. 2 compensation amount	0.000		
105	*PA 105*	CP computation compensation No. 3 compensation point	0.400		
106	*PA 106*	CP computation compensation No. 3 compensation amount	0.000		
107	*PA 107*	CP computation compensation No. 4 compensation point	0.600		
108	*PA 108*	CP computation compensation No. 4 compensation amount	0.000		
109	*PA 109*	CP computation compensation No. 5 compensation point	0.800		
110	*PA 110*	CP computation compensation No. 5 compensation amount	0.000		
111	*PA 111*	CP computation compensation No. 6 compensation point	1.000		
112	*PA 112*	CP computation compensation No. 6 compensation amount	0.000		
113	*PA 113*	CP computation compensation No. 7 compensation point	1.200		
114	*PA 114*	CP computation compensation No. 7 compensation amount	0.000		
115	*PA 115*	CP computation compensation No. 8 compensation point	1.400		
116	*PA 116*	CP computation compensation No. 8 compensation amount	0.000		
117	*PA 117*	CP computation compensation No. 9 compensation point	1.600		
118	*PA 118*	CP computation compensation No. 9 compensation amount	0.000		
119	*PA 119*	CP computation compensation No. 10 compensation point	2.000		
120	*PA 120*	CP computation compensation No. 10 compensation amount	0.000		

■ Detailed information on variable parameters

● *PA01* (keylock)

0: keylock disabled
1: display of setup data setting disabled
2: display of all settings disabled
3: display of all settings disabled. Operation keys disabled

- The following keys are disabled when *PA01* is set to 1.
  Normal display mode:

SETUP key	(setup data setting)
FUNC + CLR + MESSAGE keys	(general reset)

- The following keys are disabled when *PA01* is set to 2.
  Normal display mode:

SETUP key	(setup data setting)
FUNC + CLR + MESSAGE keys	(general reset)
FUNC + PARA keys	(event configuration data setting)
PID key	(PID parameter setting/constant value control data setting)
FUNC + PID keys	(constant value control data setting)
FUNC + PROG keys	(program setting)
↑ + PROG keys	(program copy)
LOAD key	(memory card load)
SAVE key	(memory card save)

- The following keys are disabled when *PA01* is set to 3 or to 2.
  Normal display mode:

FUNC + DISP key	(display channel switching)
PROG key	(program selection)
RUN/HOLD key	(RUN operation/HOLD operation)
PROG + RUN/HOLD keys	(RESET operation)
PROG + DISP keys	(ADV operation)
FUNC + → keys	(FAST operation)
A/M key	(AUTO operation/MANUAL operation)
AT key	(AT start, AT cancel)

Note, however, that in the normal display mode in MANUAL mode MV can be changed.

● *PA02* (memory protect)

0 : disabled
1 : program settings are protected
2 : setup, variable parameters and event configuration settings are protected
3 : setup, variable parameters, event configuration settings and program settings are protected
4 : setup, variable parameters, event configuration settings and PID parameter settings are protected
5 : program settings and all parameter settings are protected

•When *PA02* is set to ≠ 0 (protect on), a general reset is not possible.

- When program settings are protected, it is not possible to copy programs or load programs from a memory card.
- When PID parameters are protected, constant value control data is also protected.
- When settings are protected by setup data, variable parameters, event configurations and PID parameters, they cannot be loaded from a memory card.

● ***PA04*** **(2-channel synchronous operation)**

0 : asynchronous

1 : synchronous

- If the *PA04* setting is 0, mode transitions and program selection by key operation are possible only on the one channel indicated by the EG1/EG2 LED.
- If the *PA04* setting is 1, mode transitions and program selection by key operation are possible on both channels at the same time. If a program pattern is set for only one channel, changeover from READY to RUN cannot be done by key operation.
- The *PA04* setting does not affect external switch operation. For details, see "External switch input" on page 6-13.

● ***PA05*** **(program autoload)**

0 : OFF

1 : ON

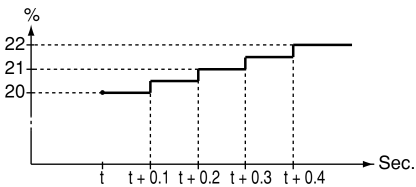
- This function is available on the **DCP552A******* model only.
- When *PA05* is set to 1 and a memory card is inserted and press **LOAD key**, display panel 1 shows "*AUtO* ", display panel 2 shows "*LOAd* " and program file No. 1 is read to program No. 1 in the **DCP552**. This operation is called "program autoload".
- A load operation other than a program autoload that is started using the **LOAD key** can only be performed when *PA05* is set to 0.
- A program autoload using the external switches can be performed when *PA05* is set to 0 or 1.

● ***PA14*** **(manipulated variable deviation rate limit)**

● ***PA24*** **(manipulated variable deviation rate limit)**

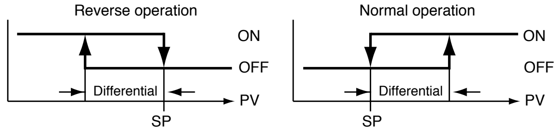
When output deviation (%) after a PID computation is larger than the set limit value, the controller limits the output deviation both of the increase or decrease to the set value.

The following example shows the actual deviation change when the deviation limit is set to 0.5% and the manipulated variable changes from 20% to 22%. When the set value is 0.5% per 0.1 sec, the output becomes 22% after 0.4 sec.



- ***PA16*** **(ON-OFF control differential)**
- ***PA26*** **(ON-OFF control differential)**

When the PID group number is set to ON-OFF or *P* is set to 0.0, ON-OFF control is on and a value for the differential between the two operations is set.



- ***PA17*** **(PID computation initialize manipulated variable)**
- ***PA27*** **(PID computation initialize manipulated variable)**

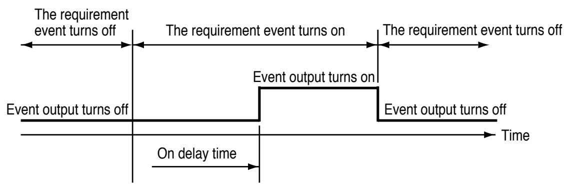
Under the conditions listed below, a PID computation starts using the value set in *PA17*.

- When there is a mode change from READY AUTO to RUN AUTO.
- When the controller is powered up in RUN (or HOLD, FAST, END) AUTO mode.
- When auto-tuning ends.

Since the PV, SP and PID parameters affect a PID computation, the first manipulated variable of a PID computation may not be the same as the value set in *PA17* and *PA27*.

- ***PA31*** **to** ***PA38*** **(event on delay groups 1 to 4, event/delay time)**

- On delay can be performed on up to 4 events.
- *PA31*, *PA33*, *PA35* and *PA37* determine which events are to be processed.
- In a code event involving several event outputs, event on delay has to be set separately for each output.
- All processes including event output standby on/off are processed before on delay processing. When the event output ON condition remains on for longer than the on delay time, the event output stays on.
- This is shown in the diagram below.



- ***PA43*** **(PID computation initialize)**
- ***PA96*** **(PID computation initialize)**

When SP changes abruptly due to ADV, the derivative action of a PID computation, may cause an excessive change in the manipulated variable of the computation.
For this reason, the initialization of a PID computation is performed to suppress an excessive change.
But the initialization of a PID computation means that PID computation continuity is lost which may affect operating conditions. *PA43* and *PA96* settings allow the user to turn on or off initialization and determine its conditions.

■ Event configuration data settings

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*E01-t*	Event 1 event type	0		The event type setting of each event determines whether auxiliary setting 1 or auxiliary setting 2 is on or off, their meaning, unit and range. For details, see □■ Settings by event type□ on the following pages.
2	*E01-1*	Event 1 auxiliary setting 1	----		
3	*E01-2*	Event 1 auxiliary setting 2	----		
4	*E02-t*	Event 2 event type	0		
5	*E02-1*	Event 2 auxiliary setting 1	----		
6	*E02-2*	Event 2 auxiliary setting 2	----		
7	*E03-t*	Event 3 event type	0		
8	*E03-1*	Event 3 auxiliary setting 1	----		
9	*E03-2*	Event 3 auxiliary setting 2	----		
10	*E04-t*	Event 4 event type	0		
11	*E04-1*	Event 4 auxiliary setting 1	----		
12	*E04-2*	Event 4 auxiliary setting 2	----		
13	*E05-t*	Event 5 event type	0		
14	*E05-1*	Event 5 auxiliary setting 1	----		
15	*E05-2*	Event 5 auxiliary setting 2	----		
16	*E06-t*	Event 6 event type	0		
17	*E06-2*	Event 6 auxiliary setting 1	----		
18	*E06-3*	Event 6 auxiliary setting 2	----		
19	*E07-t*	Event 7 event type	0		
20	*E07-1*	Event 7 auxiliary setting 1	----		
21	*E07-2*	Event 7 auxiliary setting 2	----		
22	*E08-t*	Event 8 event type	0		
23	*E08-1*	Event 8 auxiliary setting 1	----		
24	*E08-2*	Event 8 auxiliary setting 2	----		
25	*E09-t*	Event 9 event type	0		
26	*E09-1*	Event 9 auxiliary setting 1	----		
27	*E09-2*	Event 9 auxiliary setting 2	----		
28	*E10-t*	Event 10 event type	0		
29	*E10-1*	Event 10 auxiliary setting 1	----		
30	*E10-2*	Event 10 auxiliary setting 2	----		
31	*E11-t*	Event 11 event type	0		
32	*E11-1*	Event 11 auxiliary setting 1	----		
33	*E11-2*	Event 11 auxiliary setting 2	----		
34	*E12-t*	Event 12 event type	0		
35	*E12-1*	Event 12 auxiliary setting 1	----		
36	*E12-2*	Event 12 auxiliary setting 2	----		
37	*E13-t*	Event 13 event type	0		
38	*E13-1*	Event 13 auxiliary setting 1	----		
39	*E13-2*	Event 13 auxiliary setting 2	----		
40	*E14-t*	Event 14 event type	0		
41	*E14-1*	Event 14 auxiliary setting 1	----		
42	*E14-2*	Event 14 auxiliary setting 2	----		
43	*E15-t*	Event 15 event type	0		
44	*E15-1*	Event 15 auxiliary setting 1	----		
45	*E15-2*	Event 15 auxiliary setting 2	----		
46	*E16-t*	Event 16 event type	0		
47	*E16-1*	Event 16 auxiliary setting 1	----		
48	*E16-2*	Event 16 auxiliary setting 2	----		

■ Settings by event type

For information on event operations, see "■ Events" (pages 5-5 to 5-14).

Event type	0	1	2	3
Meaning Message	Event off OFF	Time event TIME	PV upper limit PV-H	PV lower limit PV-L
Range of auxiliary setting 1 Message	Unused	Unused	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	– –	Segment type Time type	Segment type PV type	Segment type PV type

Event type	4	5	6	7
Meaning Message	Upper deviation limit DEV-H	Lower deviation limitt DEV-L	Deviation rate upper limit wait DEV-H-W	Deviation lower limit with standby DEV-L-W
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Segment type PV type	Segment type PV type	Segment type PV type	Segment type PV type

Event type	8	9	10	11
Meaning Message	Absolute value deviation upper limit A-DEV-H	Absolute value deviation lower limit A-DEV-L	Absolute value deviation rate upper limit with standby A-DEV-H-W	Absolute value deviation lower limit with standby A-DEV-L-W
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Segment type PV type	Segment type PV type	Segment type PV type	Segment type PV type

Event type	12	13	14	15
Meaning Message	PV deviation rate upper limit D-PV-H	PV deviation rate lower limit D-PV-L	SP upper limit SP-H	SP lower limit SP-L
Range of auxiliary setting 1 Message	Sampling cycle 0.1 to 600.0sec sampling rate	Sampling cycle 0.1 to 600.0sec sampling rate	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Segment type PV type	Segment type PV type	Segment type PV type	Segment type PV type

Event type	16	17	18	19
Meaning Message	MV upper limit MV-H	MV lower limit MV-L	Code event CODE	SOAK absolute value deviation upper limit S-A-DEV-H
Range of auxiliary setting 1 Message	Hysteresis 0.0 to 100.0% hysteresis	Hysteresis 0.0 to 100.0% hysteresis	Number of output points 1 to 8 *1 channels	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Segment type PV type	Segment type PV type	Segment type Code type	Segment type PV type

*1: Code event auxiliary setting 1 (number of output points) can be changed only in the READY mode.

Event type	20	21	22	23
Meaning Message	SOAK absolute value deviation lower limit S-A-DEV-L	SOAK absolute value deviation upper limit with standby S-A-DEV-H-W	SOAK absolute value deviation lower limit with standby S-A-DEV-L-W	Timer code event T-CODE
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Number of output points 1 to 8 *2 channels
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Segment type PV type	Segment type PV type	Segment type PV type	Segment type Time type, code type

*2: Auxiliary setting 1 (number of output points) can be changed only in the READY mode.

Event type	24 to 63	64	65	66
Meaning Message	Event off OFF	Normal PV1 upper limit operation PV1-H	Normal PV1 lower limit operation PV1-L	Normal PV2 upper limit operation PV2-H
Range of auxiliary setting 1 Message	Unused	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Unused	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point
Setting category Operation category	— —	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	67	68	69	70
Meaning Message	Normal PV2 upper limit operation PV2-L	PV upper limit PV-H	PV lower limit PV-L	Deviation upper limit DEV-H
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Operating pointt -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point
Setting category Operation category	Instrument type PV type	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	71	72	73	74
Meaning Message	Deviation lower limit DEV-L	Deviation upper limit wait DEV-H-W	Deviation lower limit wait DEV-L-W	Absolute value deviation upper limit A-DEV-H
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point 0 to 20000 SPU set point
Setting category Operation category	Instrument type PV type	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	75	76	77	78
Meaning Message	Absolute value deviation lower limit A-DEV-L	Absolute value deviation upper limit with standby A-DEV-H-W	Absolute value deviation lower limit with standby A-DEV-L-W	PV deviation rate upper limit D-PV-H
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Sampling cycle 0.1 to 600.0 sec sampling rate
Range of auxiliary setting 2 Message	Operating point 0 to 20000 SPU set point	Operating point 0 to 20000 SPU set point	Operating point 0 to 20000 SPU set point	Operating point -19999 to +20000 SPU set point
Setting category Operation category	Instrument type PV type	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	79	80	81	82
Meaning Message	PV deviation rate lower limit D-PV-L	SP upper limit SP-H	SP lower limit SP-L	MV upper limit MV-H
Range of auxiliary setting 1 Message	Sampling cycle 0.1 to 600.0sec sampling rate	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0.0 to 100.0% hysteresis
Range of auxiliary setting 2 Message	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -19999 to +20000 SPU set point	Operating point -5.0 to +105.0% set point
Setting category Operation category	Instrument type PV type	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	83	84	85	86
Meaning Message	MV lower limit MV-L	SOAK absolute value deviation upper limitt S-A-DEV-H	SOAK absolute value deviation lower limit S-A-DEV-L	SOAK absolute value deviation upper limit with standby S-A-DEV-H-W
Range of auxiliary setting 1 Message	Hysteresis 0.0 to 100.0% hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis	Hysteresis 0 to 1000 SPU hysteresis
Range of auxiliary setting 2 Message	Operating point -5.0 to +105.0% set point	Operating point 0 to 20000 SPU set point	Operating point 0 to 20000 SPU set point	Operating point 0 to 20000 SPU set point
Setting category Operation category	Instrument type PV type	Instrument type PV type	Instrument type PV type	Instrument type PV type

Event type	87	88	89	90
Meaning Message	SOAK absolute value deviation lower limit with stanby S-A-DEV-L-W	Program number binary code PROG-BIN	Segment number binary code SEG-BIN	Program number BCD code PROG-BCD
Range of auxiliary setting 1 Message	Hysteresis 0 to 1000 SPU hysteresis	Number of output points 1 to 7 channels	Number of output points 1 to 7 channels	Number of output points 1 to 8 channels
Range of auxiliary setting 2 Message	Operating point 0 to 20000 SPU set point	Unused	Unused	Unused
Setting category Operation category	Instrument type PV type	Instrument type Code type	Instrument type Code type	Instrument type Code type

Event type	91	92	93	94
Meaning Message	Segment number BCD code SEG-BCD	Special segment SEG SEQUENCE	RAMP-E time monitoring RAMP-E TIME OUT	Segment time SEG TIME
Range of auxiliary setting 1 Message	Number of output points 1 to 8 channels	Segment specification -2 to +2 *1 segment	Operating point 0.0 to 3000.0sec *2 time out	On Time 0:00 to 500:00 *3 on-time
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Off Time 0:00 to 500:00 *3 off-time
Setting category Operation category	Instrument type Code type	Instrument type Mode type	Instrument type Time type	Instrument type Time type

Event type	95	96 to 127	128	129
Meaning Message	Program time PROG TIME	Event off OFF	RUN, HOLD, END, FAST RUN, HOLD, END, FAST	HOLD HOLD
Range of auxiliary setting 1 Message	On Time 0;00 to 500;00 *3 on-time	Unused	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels
Range of auxiliary setting 2 Message	Off Time 0:00 to 500:00 *3 off-time	Unused	Unused	Unused
Setting category Operation category	Instrument type Time type	–	Instrument type Mode type	Instrument type Mode type

*1: The meaning of auxiliary setting 1 for special segment is shown below.
–2: Two segments before the final segment 1: First segment
–1: One segment before the final segment 2: Second segment
0: Final segment

*2: When auxiliary setting 1 of RAMP-E time monitoring is set to 0.0 sec, event output is off.

*3: Auxiliary setting 1 and auxiliary setting 2 of segment time and program time that determine display unit and range of segment are set by setup data *C62* settings as follows.
When *C62* is set to 0: 0 hours 00 min to 500 hours 00 min
When *C62* is set to 1: 0 min 00 sec to 500 min 00 sec
When *C62* is set to 2: 0.0 sec to 3000.0 sec

Event type	130	131	132	133
Meaning Message	READY, READY FAST, READY, READY FAST	END END	G.SOAK wait G.SOAK	MANUAL MANUAL
Range of auxiliary setting 1 Message	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type

Event type	134	135	136	137
Meaning Message	AT executing AT	FAST, READY FAST FAST, READY FAST	Console settings are being made CONSOLE	RUN RUN
Range of auxiliary setting 1 Message	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Unused	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type

Event type	138	139	140	141
Meaning Message	Advance ADV	All alarm (logical OR) ALL ALARMS	PV range alarm PV ALARMS	Instrument alarm DCP ALARMS
Range of auxiliary setting 1 Message	Conditions assessed for each channel 0: only assigned channel 1: OR condition for both channels 2: AND conditions for both channels	Unused	Unused	Unused
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type	Instrument type Mode type

Event type	142	143	144	145 to 253
Meaning Message	O_2 sensor error SENSOR CHECK	Event off OFF	Battery voltage drop BATTERY LOW	Event off OFF
Range of auxiliary setting 1 Message	Unused	Unused	Unused	Unused
Range of auxiliary setting 2 Message	Unused	Unused	Unused	Unused
Setting category Operation category	Instrument type Mode type	– –	Instrument type Mode type	– –

■ PID parameter (CH1) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*P-1*	Proportional band (PID group 1)	100.0		*P* : 0.0 to 1000.0% ON-OFF control when set to 0.0 *I* : 0 to 3600sec No integral operation when set to 0 *d* : 0 to 1200sec No derivative operation when set to 0 *rE* : 0.0 to 100.0% *oL* : –5.0 to manipulated variable upper limit % *oH* : Manipulated variable lower limit to +105.0% *CP* : –19999 to +20000 SPU *tP* : –19999 to +20000 SPU [Description:] • When *P* is set to 0.0, ON-OFF control is on and *I*, *d* and *rE* settings display "-----" and setting cannot be performed. • When the I setting is not equal to 0, "-----" is displayed for *rE* and setting cannot be performed. • Although a low *P* setting improves control, overshoot and hunting is more likely to occur. • Although a low *I* setting improves tracking, cycling caused by integral operation occurs more often. • Although a low *d* setting makes it easier to suppress overshoot, hunting is more likely to occur due to reactions to minute PV action. In normal temperature control, derivative time should be between 1/3 to 1/4 of the integral time. Since derivative operation is a cause of hunting in pressure and flow control, set *d* to 0.0 to turn off derivative action or set a low value. • The *rE* setting is used to eliminate offset caused by proportional action (no integral action) and sets a suitable deviation of 0. • The *oL* and *oH* settings also operate as integral limiters. When *oL* or *oH* manipulated variable reaches the upper or lower limit, they turn off integral action and prevents reset windup that occurs when PV has not risen for a long time. • The *CP* setting is the point where switching occurs between PID groups A1 to A7. • *tP* is the tuning point where *P*, *I* and *D* settings in groups A1 to A7 are automatically tuned starting from A1. [Note:] CH1 PID parameter settings are described on this page. CH1 PID parameters are set when the PID key is pressed when CH1 is selected (when the EG1 LED is on) during program operation in the normal display mode.
2	*I-1*	Integral time (PID group 1)	0		
3	*d-1*	Derivative time (PID group 1)	0		
4	*rE -1*	Manual reset (PID group 1)	50.0		
5	*oL-1*	Manipulated variable lower limit (Output limiter group 1)	0.0		
6	*oH-1*	Manipulated variable upper limit (Output limiter group 1)	100.0		
7	*P-2*	Proportional band (PID group 2)	100.0		
8	*I-2*	Integral time (PID group 2)	0		
9	*d-2*	Derivative time (PID group 2)	0		
10	*rE-2*	Manual reset (PID group 2)	50.0		
11	*oL-2*	Manipulated variable lower limit (Output limiter group 2)	0.0		
12	*oH-2*	Manipulated variable upper limit (Output limiter group 2)	100.0		
13	*P-3*	Proportional band (PID group 3)	100.0		
14	*I-3*	Integral time (PID group 3)	0		
15	*d-3*	Derivative time (PID group 3)	0		
16	*rE-3*	Manual reset (PID group 3)	50.0		
17	*oL-3*	Manipulated variable lower limit (Output limiter group 3)	0.0		
18	*oH-3*	Manipulated variable upper limit (Output limiter group 3)	100.0		
19	*P-4*	Proportional band (PID group 4)	100.0		
20	*I-4*	Integral time (PID group 4)	0		
21	*d-4*	Derivative time (PID group 4)	0		
22	*rE-4*	Manual reset (PID group 4)	50.0		
23	*oL-4*	Manipulated variable lower limit (Output limiter group 4)	0.0		
24	*oH-4*	Manipulated variable upper limit (Output limiter group 4)	100.0		
25	*P-5*	Proportional band (PID group 5)	100.0		
26	*I-5*	Integral time (PID group 5)	0		
27	*d-5*	Derivative time (PID group 5)	0		
28	*rE-5*	Manual reset (PID group 5)	50.0		
29	*oL-5*	Manipulated variable lower limit (Output limiter group 5)	0.0		
30	*oH-5*	Manipulated variable upper limit (Output limiter group 5)	100.0		
31	*P-6*	Proportional band (PID group 6)	100.0		
32	*I-6*	Integral time (PID group 6)	0		
33	*d-6*	Derivative time (PID group 6)	0		

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
34	*rE-6*	Manual reset (PID group 6)	50.0		[Note:] CH1 PID parameter settings are described on this page. CH1 PID parameters are set when the PID key is pressed when CH1 is selected (when the EG1 LED is on) during program operation in the normal display mode.
35	*oL-6*	Manipulated variable lower limit (Output limiter group 6)	0.0		
36	*oH-6*	Manipulated variable upper limit (Output limiter group 6)	100.0		
37	*P-7*	Proportional band (PID group 7)	100.0		
38	*I-7*	Integral time (PID group 7)	0		
39	*d-7*	Derivative time (PID group 7)	0		
40	*rE-7*	Manual reset (PID group 7)	50.0		
41	*oL-7*	Manipulated variable lower limit (Output limiter group 7)	0.0		
42	*oH-7*	Manipulated variable upper limit (Output limiter group 7)	100.0		
43	*P-8*	Proportional band (PID group 8)	100.0		
44	*I-8*	Integral time (PID group 8)	0		
45	*d-8*	Derivative time (PID group 8)	0		
46	*rE-8*	Manual reset (PID group 8)	50.0		
47	*oL-8*	Manipulated variable lower limit (Output limiter group 8)	0.0		
48	*oH-8*	Manipulated variable upper limit (Output limiter group 8)	100.0		
49	*P-9*	Proportional band (PID group 9)	100.0		
50	*I-9*	Integral time (PID group 9)	0		
51	*d-9*	Derivative time (PID group 9)	0		
52	*rE-9*	Manual reset (PID group 9)	50.0		
53	*oL-9*	Manipulated variable lower limit (Output limiter group 9)	0.0		
54	*oH-9*	Manipulated variable upper limit (Output limiter group 9)	100.0		
55	*P-A1*	Proportional band (PID group A1)	100.0		
56	*I-A1*	Integral time (PID group A1)	0		
57	*d-A1*	Derivative time (PID group A1)	0		
58	*rE-A1*	Manual reset (PID group A1)	50.0		
59	*CP-A1*	Changeover point (PID group A1)	1000 SPU		
60	*tP-A1*	Tuning point (PID group A1)	500 SPU		
61	*P-A2*	Proportional band (PID group A2)	100.0		
62	*I-A2*	Integral time (PID group A2)	0		
63	*d-A2*	Derivative time (PID group A2)	0		
64	*rE-A2*	Manual reset (PID group A2)	50.0		
65	*CP-A2*	Changeover point (PID group A2)	2000 SPU		
66	*tP-A2*	Tuning point (PID group A2)	1500 SPU		
67	*P-A3*	Proportional band (PID group A3)	100.0		
68	*I-A3*	Integral time (PID group A3)	0		
69	*d-A3*	Derivative time (PID group A3)	0		
70	*rE-A3*	Manual reset (PID group A3)	50.0		
71	*CP-A3*	Changeover point (PID group A3)	3000 SPU		
72	*tP-A3*	Tuning point (PID group A3)	2500 SPU		
73	*P-A4*	Proportional band (PID group A4)	100.0		
74	*I-A4*	Integral time (PID group A4)	0		
75	*d-A4*	Derivative time (PID group A4)	0		
76	*rE-A4*	Manual reset (PID group A4)	50.0		
77	*CP-A4*	Changeover point (PID group A4)	4000 SPU		
78	*tP-A4*	Tuning point (PID group A4)	3500 SPU		
79	*P-A5*	Proportional band (PID group A5)	100.0		
80	*I-A5*	Integral time (PID group A5)	0		

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
81	*d-A5*	Derivative time (PID group A5)	0		[Note:] CH1 PID parameter settings are described on this page. CH1 PID parameters are set when the PID key is pressed when CH1 is selected (when the EG1 LED is on) during program operation in the normal display mode.
82	*rE-A5*	Manual reset (PID group A5)	50.0		
83	*CP-A5*	Changeover point (PID group A5)	5000 SPU		
84	*tP-A5*	Tuning point (PID group A5)	4500 SPU		
85	*P-A6*	Proportional band (PID group A6)	100.0		
86	*I-A6*	Integral time (PID group A6)	0		
87	*d-A6*	Derivative time (PID group A6)	0		
88	*rE-A6*	Manual reset (PID group A6)	50.0		
89	*CP-A6*	Changeover point (PID group A6)	6000 SPU		
90	*tP-A6*	Tuning point (PID group A6)	5500 SPU		
91	*P-A7*	Proportional band (PID group A7)	100.0		
92	*I-A7*	Integral time (PID group A7)	0		
93	*d-A7*	Derivative time (PID group A7)	0		
94	*rE-A7*	Manual reset (PID group A7)	50.0		
95	*CP-A7*	Changeover point (PID group A7)	20000 SPU (fixed)		
96	*tP-A7*	Tuning point (PID group A7)	6500 SPU		

■ PID parameter (CH2) setting

No.	Item code	Item	Factory default settings	User settings
1	*P-1*	Proportional band (PID group 1)	100.0	
2	*I-1*	Integral time (PID group 1)	0	
3	*d-1*	Derivative time (PID group 1)	0	
4	*rE -1*	Manual reset (PID group 1)	50.0	
5	*oL-1*	Manipulated variable lower limit (Output limiter group 1)	0.0	
6	*oH-1*	Manipulated variable upper limit (Output limiter group 1)	100.0	
7	*P-2*	Proportional band (PID group 2)	100.0	
8	*I-2*	Integral time (PID group 2)	0	
9	*d-2*	Derivative time (PID group 2)	0	
10	*rE-2*	Manual reset (PID group 2)	50.0	
11	*oL-2*	Manipulated variable lower limit (Output limiter group 2)	0.0	
12	*oH-2*	Manipulated variable upper limit (Output limiter group 2)	100.0	
13	*P-3*	Proportional band (PID group 3)	100.0	
14	*I-3*	Integral time (PID group 3)	0	
15	*d-3*	Derivative time (PID group 3)	0	
16	*rE-3*	Manual reset (PID group 3)	50.0	
17	*oL-3*	Manipulated variable lower limit (Output limiter group 3)	0.0	
18	*oH-3*	Manipulated variable upper limit (Output limiter group 3)	100.0	
19	*P-4*	Proportional band (PID group 4)	100.0	
20	*I-4*	Integral time (PID group 4)	0	
21	*d-4*	Derivative time (PID group 4)	0	
22	*rE-4*	Manual reset (PID group 4)	50.0	
23	*oL-4*	Manipulated variable lower limit (Output limiter group 4)	0.0	
24	*oH-4*	Manipulated variable upper limit (Output limiter group 4)	100.0	
25	*P-5*	Proportional band (PID group 5)	100.0	
26	*I-5*	Integral time (PID group 5)	0	
27	*d-5*	Derivative time (PID group 5)	0	
28	*rE-5*	Manual reset (PID group 5)	50.0	
29	*oL-5*	Manipulated variable lower limit (Output limiter group 5)	0.0	
30	*oH-5*	Manipulated variable upper limit (Output limiter group 5)	100.0	
31	*P-6*	Proportional band (PID group 6)	100.0	
32	*I-6*	Integral time (PID group 6)	0	
33	*d-6*	Derivative time (PID group 6)	0	

Settings and descriptions

P : 0.0 to 1000.0%
ON-OFF control when set to 0.0
I : 0 to 3600sec
No integral operation when set to 0
d : 0 to 1200sec
No derivative operation when set to 0
rE : 0.0 to 100.0%
oL : -5.0 to manipulated variable upper limit %
oH : Manipulated variable lower limit to +105.0%
CP : -19999 to +20000 SPU
tP : -19999 to +20000 SPU

[Description:]

- When *P* is set to 0.0, ON-OFF control is on and *I*, *d* and *rE* settings display “-----” and setting cannot be performed.
- When the I setting is not equal to 0, “-----” is displayed for *rE* and setting cannot be performed.
- Although a low *P* setting improves control, overshoot and hunting is more likely to occur.
- Although a low *I* setting improves tracking, cycling caused by integral operation occurs more often.
- Although a low *d* setting makes it easier to suppress overshoot, hunting is more likely to occur due to reactions to minute PV action.
  In normal temperature control, derivative time should be between 1/3 to 1/4 of the integral time.
  Since derivative operation is a cause of hunting in pressure and flow control, set *d* to 0.0 to turn off derivative action or set a low value.
- The *rE* setting is used to eliminate offset caused by proportional action (no integral action) and sets a suitable deviation of 0.
- The *oL* and *oH* settings also operate as integral limiters. When *oL* or *oH* manipulated variable reaches the upper or lower limit, they turn off integral action and prevents reset windup that occurs when PV has not risen for a long time.
- The *CP* setting is the point where switching occurs between PID groups A1 to A7.
- *tP* is the tuning point where *P*, *I* and *D* settings in groups A1 to A7 are automatically tuned starting from A1.

[Note:]
CH2 PID parameter settings are described on this page. CH2 PID parameters are set when the PID key is pressed when CH2 is selected (when the EG2 LED is on) during program operation in the normal display mode.

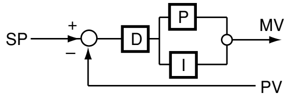
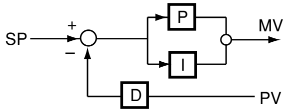
No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
34	*rE-6*	Manual reset (PID group 6)	50.0		[Note:] CH2 PID parameter settings are described on this page. CH2 PID parameters are set when the PID key is pressed when CH2 is selected (when the EG2 LED is on) during program operation in the normal display mode.
35	*oL-6*	Manipulated variable lower limit (Output limiter group 6)	0.0		
36	*oH-6*	Manipulated variable upper limit (Output limiter group 6)	100.0		
37	*P-7*	Proportional band (PID group 7)	100.0		
38	*I-7*	Integral time (PID group 7)	0		
39	*d-7*	Derivative time (PID group 7)	0		
40	*rE-7*	Manual reset (PID group 7)	50.0		
41	*oL-7*	Manipulated variable lower limit (Output limiter group 7)	0.0		
42	*oH-7*	Manipulated variable upper limit (Output limiter group 7)	100.0		
43	*P-8*	Proportional band (PID group 8)	100.0		
44	*I-8*	Integral time (PID group 8)	0		
45	*d-8*	Derivative time (PID group 8)	0		
46	*rE-8*	Manual reset (PID group 8)	50.0		
47	*oL-8*	Manipulated variable lower limit (Output limiter group 8)	0.0		
48	*oH-8*	Manipulated variable upper limit (Output limiter group 8)	100.0		
49	*P-9*	Proportional band (PID group 9)	100.0		
50	*I-9*	Integral time (PID group 9)	0		
51	*d-9*	Derivative time (PID group 9)	0		
52	*rE-9*	Manual reset (PID group 9)	50.0		
53	*oL-9*	Manipulated variable lower limit (Output limiter group 9)	0.0		
54	*oH-9*	Manipulated variable upper limit (Output limiter group 9)	100.0		
55	*P-A1*	Proportional band (PID group A1)	100.0		
56	*I-A1*	Integral time (PID group A1)	0		
57	*d-A1*	Derivative time (PID group A1)	0		
58	*rE-A1*	Manual reset (PID group A1)	50.0		
59	*CP-A1*	Changeover point (PID group A1)	1000 SPU		
60	*tP-A1*	Tuning point (PID group A1)	500 SPU		
61	*P-A2*	Proportional band (PID group A2)	100.0		
62	*I-A2*	Integral time (PID group A2)	0		
63	*d-A2*	Derivative time (PID group A2)	0		
64	*rE-A2*	Manual reset (PID group A2)	50.0		
65	*CP-A2*	Changeover point (PID group A2)	2000 SPU		
66	*tP-A2*	Tuning point (PID group A2)	1500 SPU		
67	*P-A3*	Proportional band (PID group A3)	100.0		
68	*I-A3*	Integral time (PID group A3)	0		
69	*d-A3*	Derivative time (PID group A3)	0		
70	*rE-A3*	Manual reset (PID group A3)	50.0		
71	*CP-A3*	Changeover point (PID group A3)	3000 SPU		
72	*tP-A3*	Tuning point (PID group A3)	2500 SPU		
73	*P-A4*	Proportional band (PID group A4)	100.0		
74	*I-A4*	Integral time (PID group A4)	0		
75	*d-A4*	Derivative time (PID group A4)	0		
76	*rE-A4*	Manual reset (PID group A4)	50.0		
77	*CP-A4*	Changeover point (PID group A4)	4000 SPU		
78	*tP-A4*	Tuning point (PID group A4)	3500 SPU		
79	*P-A5*	Proportional band (PID group A5)	100.0		
80	*I-A5*	Integral time (PID group A5)	0		

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
81	*d-A5*	Derivative time (PID group A5)	0		[Note:] CH2 PID parameter settings are described on this page. CH2 PID parameters are set when the PID key is pressed when CH2 is selected (when the EG2 LED is on) during program operation in the normal display mode.
82	*rE-A5*	Manual reset (PID group A5)	50.0		
83	*CP-A5*	Changeover point (PID group A5)	5000 SPU		
84	*tP-A5*	Tuning point (PID group A5)	4500 SPU		
85	*P-A6*	Proportional band (PID group A6)	100.0		
86	*I-A6*	Integral time (PID group A6)	0		
87	*d-A6*	Derivative time (PID group A6)	0		
88	*rE-A6*	Manual reset (PID group A6)	50.0		
89	*CP-A6*	Changeover point (PID group A6)	6000 SPU		
90	*tP-A6*	Tuning point (PID group A6)	5500 SPU		
91	*P-A7*	Proportional band (PID group A7)	100.0		
92	*I-A7*	Integral time (PID group A7)	0		
93	*d-A7*	Derivative time (PID group A7)	0		
94	*rE-A7*	Manual reset (PID group A7)	50.0		
95	*CP-A7*	Changeover point (PID group A7)	20000 SPU (fixed)		
96	*tP-A7*	Tuning point (PID group A7)	6500 SPU		

■ Setup data setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*C 01*	PV1 range number	0		0 to 16 : t/c 48 to 52 : linear (DC current, DC voltage) 64 to 71 : RTD 96 to 103 : RTD 128 to 134: linear (DC current, DC voltage) [Description:] For details see range numbers listed in "Section 2-3 Input Type and Range Number" (page 2-8)
2	*C 02*	PV1 temperature unit	0		0: °C Celsius 1: °F Fahrenheit [Description:] When setting *C01* is set to linear, "-----" is displayed and setting cannot be performed.
3	*C 03*	PV1 decimal point position	1		0 to 2 A setting of 0 means no decimal point and a setting of 1 and 2 indicates the number of decimal digits. [Description:] When setting *C01* is set to linear, "-----" is displayed and setting cannot be performed. The setting range varies with the *C01* and *C02* setting. • A setting between 0 and 2 can be made when *C01* is set to: 5, 15, 65 to 69, 97 to 101 and *C02* is set to 0. *C01* settings: 66, 68, 69, 98, 100, 101 and *C02* is set to 1. • A setting of 0 and 1 can be made when *C01* is set to: 0 to 4, 6 to 14, 16, 64, 70, 71, 96, 102, 103 and *C02* is set to 0. *C01* settings: 0 to 5, 7, 8, 10, 12 to 14, 16, 64, 65, 67, 70, 71, 96, 97, 99, 102, 103 and *C02* is set to 1. • Only a setting of 0 is possible when *C01* is set to: 6, 9, 11 and *C02* is set to 1 When the *C01* setting is set to t/c or RTD, this setting is reflected in PVU (PV1) units.
4	*C 04*	PV1 linear decimal point position	1		0 to 4 A setting of 0 means no decimal point and a setting between 1 and 4 indicates the number of decimal digits. [Description:] *C01* settings for t/c and RTD display "-----" and setting cannot be performed. When the *C01* setting is set to linear, this setting is reflected in PVU (PV1) units.
5	*C 05*	PV1 linear range lower limit	0 PVU		-19999 to +20000 PVU (PV1) [Description:] When the *C01* settingis set to t/c and RTD display "-----" and setting cannot be performed. Reversing the lower limit and upper limit makes it possible to reverse analog inputs and specified values.
6	*C 06*	PV1 linear range upper limit	10000PVU		
7	*C 07*	PV1 cold junction compensation	0		0: Provided (compensated internally) 1: Not provided (compensated externally) [Description:] When the *C01* setting is set to t/c and RTD display "-----" and setting cannot be performed.
8	*C 08*	PV1 square root extraction	0		0: Not provided 1: Provided [Description:] When the *C01* setting is set to t/c and RTD display "-----" and setting cannot be performed.
9	*C 09*	PV1 square root extraction dropout	0.2		0.2 to 10.0% (ratio depends on input range) [Description:] When the *C01* setting is set to t/c and RTD display "-----" and setting cannot be performed.
10	*C 10*	PV1 cold junction bias	0.0		-1.0 to +1.0°C [Description:] When the *C01* setting is set to t/c and RTD display "-----" and setting cannot be performed. Use 0.0 for normal settings.

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
11	*C 11*	PV2 range number	0		0 to 16 : T/C 48 to 52 : linear (DC current, DC voltage) 64 to 71 : RTD 96 to 103 : RTD 128 to 134: linear (DC current, DC voltage) 135 : O_2 Sensor [Description:] Setting 135 cannot be made on a model without CP compensation. A model with CP compensation is tied to setting 135. For details see range numbers listed in Section 2-3, "Input Types and Range Numbers" (page 2-8).
12	*C 12*	PV2 temperature unit	0		0: ˚C Celsius 1: ˚F Fahrenheit [Description:] When the *C01* setting is set to linear or O_2 sensor, [----] is displayed and setting is not possible.
13	*C 13*	PV2 decimal point position	1		0 to 2 A setting of 0 means no decimal point and a setting of 1 and 2 indicates the number of decimal digits. [Description:] When the *C11* setting is set to linear or O_2 sensor, [----] is displayed and setting is not possible. The setting range varies with the *C11* and *C12* setting. • A setting between 0 and 2 can be made when *C11* is set to: and *C12* is set to 0. *C11* settings: 66, 68, 69, 98, 100, 101 and *C12* is set to 1. • A setting of 0 and 1 can be made when *C11* is set to: 0 to 4, 6, to 14, 16, 64, 70, 71, 96, 102, 103 and *C12* is set to 0, when *C11* is set to: 0 to 5, 7, 8, 10, 12 to 14, 16, 64, 65, 67, 70, 71, 96, 97, 99, 102, 103 and *C12* is set to 1. • Only a setting of 0 is possible when *C11* is set to: 6, 9, 11 and *C12* is set to 1 . • When the *C11* setting is for t/c or RTD, this setting is reflected in PVU (PV2) units.
14	*C 14*	PV2 linear decimal point position	1		0 to 4 A setting of 0 means no decimal point and a setting between 1 and 4 indicates the number of decimal digits. [Description:] When the *C11*setting is set to t/c, RTD, or O_2 sensor, [----] is displayed and setting is not possible. When setting *C11* is linear, this setting is reflected in PVU (PV2) units.
15	*C 15*	PV2 linear range lower limit	0 PVU		–19999 to +20000 PVU (PV2) [Description:] When the *C11*setting is set to t/c, RTD, or O_2 sensor, [----] is displayed and setting is not possible. Reversing the lower limit and upper limit makes it possible to reverse analog inputs and specified values.
16	*C 16*	PV2 linear range upper limit	10000PVU		
17	*C 17*	PV2 cold junction compensation	0		0: Yes (compensated internally) 1: No (compensated externally) [Description:] When the *C11*setting is set to RTD, linear or O_2 sensor, [----] is displayed and setting is not possible.
18	*C 18*	PV2 square root extraction	0		0: No 1: Yes [Description:] When the *C11*setting is set to T/C RTD, or O_2 sensor [----] is displayed and setting is not possible.
19	*C 19*	PV2 square root extraction dropout	0.2		0.2 to 10.0 % (ratio depends on input range) [Description:] When the *C11*setting is set to T/C, RTD or O_2 sensor, [----] is displayed and setting is not possible.
20	*C 20*	PV2 cold junction bias	0.0		-1.0 to +1.0ºC [Description:] When the *C11*setting is set to RTD, linear or O_2 sensor, [----] is displayed and setting is not possible. Use 0.0 for normal settings.

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
21	*C 21*	Control output system (CH1)	1		0 : 5S output (current proportional SP output) 1 : 5G output (current proportional control output) 2 : 6D output (voltage time proportional control output) system A 3 : 6D output (voltage time proportional control output) system B 4 : 8D output (open collector time proportional control output) system A 5 : 8D output (open collector time proportional control output) system B [Description:] The difference between system A and system B is in the output system of ON-OFF control and auto-tuning. System A: Output ON-OFF is performed regardless of time proportional output cycles and output limits. System B: The output limit upper limit value is output instead of on and the output limit lower value is output instead of off according to time proportional output cycles.
22	*C 22*	Control output system (CH2)	1		
23	*C 23*	Control operation (CH1)	0		0: PID-A reverse operation 1: PID-A normal operation 2: PID-B reverse operation 3: PID-B normal operation [Description:] PID-A: deviation derivative PID (system where SP changes are affected by derivative action)  PID-B: derivative-based PID (system where SP changes are not affected by derivative action) 
24	*C 24*	Control operation (CH2)	----		
25	*C 25*	Unused	----		[Description:] "------" is displayed and setting is not possible.
26	*C 26*	Unused	----		
27	*C 27*	Unused	----		
28	*C 28*	Unused	----		
29	*C 29*	Unused	----		
30	*C 30*	PV equalizer	0		0: No 1: PV1 only 2: PV2 only 3: PV1 and PV2
31	*C 31*	End of operation (CH1)	0		0: READY mode 1: END mode
32	*C 32*	Manipulated variable in READY mode (CH1)	0.0		-5.0 to +105.0 %
33	*C 33*	Manipulated variable setting in PV overrange (CH1)	0		0: No 1: Yes
34	*C* 34	Manipulated variable in PV overrange (CH1)	0.0		-5.0 to +105.0 %
35	*C* 35	Manual change mode (CH1)	0		0: bias 1: preset
36	*C* 36	Preset MANUAL value (CH1)	0.0		-5.0 to +105.0 %
37	*C* 37	End of operation (CH2)	0		0: READY mode 1: END mode
38	*C* 38	Manipulated variable in READY mode (CH2)	0.0		-5.0 to +105%

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
39	*C 39*	Manipulated variable setting in PV overrange (CH2)	0		0: No 1: Yes
40	*C 40*	Manipulated variable in PV overrange (CH2)	0.0		-5 to +105%
41	*C 41*	Manual change mode (CH2)	0		0: smooth 1: preset
42	*C 42*	Preset manual value (CH2)	0.0		-5 to +105%
43	*C 43*	Length of outage permitting continuous operation	0		0 to 3600sec When set to 0, operation continues regardless of outage time. [Description:] The HOLD mode is invoked when the outage is longer than set time. The measurement of a power outage may vary by about 10 seconds.
44	*C 44*	CP computation type (varies with sensor manufacturer)	1		0: oxygen pressure (PO_2) computation 1: CP computation for NKG sensor 2: CP computation for Marathon monitors and Cambridge sensors 3: CP computation for Corning sensors 4: CP computation for AACC sensors 5: CP computation for Barber-Coleman sensors 6: CP computation for Furnace Control sensors [Description:] "------" is displayed for a model without CP compensation and setting is not possible.
45	*C 45*	Auxiliary output type 1	0		0: SP1 1: PV1 2: Deviation (DEV1) 3: Manipulated variable 1 (MV1) 4: SP2 5: PV2 6: Deviation 2 (DEV2) 7: Manipulated variable 2 (MV2) 8: O_2 sensor mV input value [Description:] "-----" is displayed and setting is not possible on model without auxiliary output.
46	*C 46*	Auxiliary output 1 lower limit (4mA)	0 SPU		–19999 to +20000 SPU (*C45* not equal to 3, 7) –1999.9 to +2000.0 SPU (*C45* set to 3, 7) [Description:] "-----" is displayed and setting is not possible on model without auxiliary output.
47	*C 47*	Auxiliary output 1 upper limit (20mA)	10000SPU		
48	*C 48*	Auxiliary output type 2	0		0: SP1 1: PV1 2: Deviation (DEV1) 3: Manipulated variable 1 (MV1) 4: SP2 5: PV2 6: Deviation 2 (DEV2) 7: Manipulated variable 2 (MV2) 8: O_2 sensor mV input value [Description:] "-----" is displayed and setting is not possible on model without auxiliary output or with one auxiliary output.
49	*C 49*	Auxiliary output 2 lower limit (4mA)	0 SPU		–19999 to +20000 SPU (*C48* not equal to 3, 7) –1999.9 to +2000.0% (*C48* set to 3, 7) [Description:] "-----" is displayed and setting is not possible on model without auxiliary output or with one auxiliary output.
50	*C 50*	Auxiliary output 2 upper limit (20mA)	10000SPU		
51	*C 51*	Unused	----		[Description:] "-----" is displayed and setting is not possible.
52	*C 52*	Unused	----		
53	*C 53*	Unused	----		
54	*C 54*	Unused	----		
55	*C 55*	Unused	----		
56	*C 56*	Unused	----		

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
57	*C 57*	Programming item event	0		0: Displayed 1: Not displayed
58	*C 58*	Programming item PID group, output limiter group	0		0: Displayed 1: Not displayed
59	*C 59*	Programming item G.SOAK, PV shift, repeat	0		0: Displayed 1: Not displayed
60	*C 60*	Programming item PV start, cycle, pattern link	0		0: Displayed 1: Not displayed
61	*C 61*	Programming system	0		0: RAMP-X and RAMP-T (θ)˚combined 1: RAMP-X and RAMP-E (˘SP) combined
62	*C 62*	Programming time unit	0		0: hours, min (SPU/hour for RAMP-T) 1: min, sec (SPU/min for RAMP-T) 2: 0.1 sec (SPU/sec for RAMP-T)
63	*C 63*	Time display (display panel 1 and 2)	0		0: remaining segment time 1: total operation time (after READY → RUN start)
64	*C 64*	Event no. division (first CH2 number)	0		0 to 16 0 indicates no CH2 event [Description:] When a change in set values cause multiple output points for a code event to overlap the CH1 and CH2 division, the event configuration setting output points is changed so that only CH1 is used.
65	*C 65*	SP decimal point position (CH1)	1		0 to 4 A setting of 0 means no decimal point and a setting between 1 and 4 indicates the number of decimal digits. [Description:] This setting is reflected in PVU (SPU (CH1)) units.
66	*C 66*	SP limit lower limit (CH1)	PV1 range lower limit		-19999 to +20000 SPU (CH1) [Description:] When *C01* to *C06* are set, *C66* and *C67* are automatically set as the upper limit and lower limit of the range.
67	*C 67*	SP limit upper limit (CH1)	PV1 range upper limit		
68	*C 68*	SP decimal point position (CH2)	1 or 3		0 to 4 on a model without CP compensation 0 to 3 on a model with CP compensation A setting of 0 means no decimal point and a setting between 1 and 4 indicates the number of decimal digits. [Description:] This setting is reflected in PVU (SPU (CH2)) units. The factory default setting for models without CP compensation is 1. The factory default setting for models without CP compensation is 3.
69	*C 69*	SP limit lower limit (CH2)	PV2 range lower limit		-19999 to +20000 SPU (CH2) on a model without CP compensation 0 to 2000 SPU (CH2) on a model with CP compensation [Description:] When *C11* to *C16* are set, *C69* and *C70* are automatically set as the upper limit and lower limit of the PV1 range. □The factory default setting for models with CP compensation is *C69*=0.000, *C70*=2.000.
70	*C 70*	SP limit upper limit (CH2)	PV2 range upper limit		
71	*C 71*	External switch input RSW5	0		0 : NOP (does not function) 1 : RAMP-E 2 : FAST 3 : G.SOAK is cleared using OR 4 : G.SOAK is cleared using AND 5 : MANUAL/AUTO 6 : AT start/stop 7 : NOP (does not function) 8 : Auto load 9 : NOP (does not function) 10: NOP (does not function) 11: O_2 sensor check
72	*C 72*	External switch input RSW6	0		
73	*C 73*	External switch input RSW7	0		
74	*C 74*	External switch input RSW8	0		
75	*C 75*	External switch input RSW9 to 14 (program selection)	0		0: BCD4 bits + BCD2 bits 1: binary 7 bits

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
76	*C 76*	Communication address	0		0 to 127 [Description:] “----” is displayed for model without communications and when *C97* is set to a value that is not equal to 0 and setting is not possible. When *C76* is set to 0, the communication function is not activated.
77	*C 77*	Transmission rate	0		0: 9600bps 1: 4800bps 2: 2400bps 3: 1200bps [Description:] “----” is displayed for model without communications and when *C97* is set to a value that is not equal to 0 and setting is not possible.
78	*C 78*	Transmission code	0		0: 8 bits, even parity, 1 stop bit 1: 8 bits, no parity, 2 stop bits [Description:] “----” is displayed for model without communications and when *C97* is set to a value that is not equal to 0 and setting is not possible.
79	*C 79*	Communication	0		0: CPL 1: ST221 (no PV trend) 2: ST221 (PV trend) [Description:] “----” is displayed for model without communications and when *C97* is set to a value that is not equal to 0 and setting is not possible.
80	*C 80*	Communication method	0		0 : RS-485 1 : RS-232C [Description:] “----” is displayed for model without communications and when *C97* is set to a value that is not equal to 0 and setting is not possible.
81	*C 81*	ROM ID	–		[Description:] Can only be referenced for mechanical service use.
82	*C 82*	ROM ITEM	–		
83	*C 83*	ROM revision	–		
84	*C 84*	Data version	–		
85	*C 85*	CPU board ID	–		
86	*C 86*	I/O board ID	–		
87	*C 87*	Unused	----		[Description:] “-----” is displayed and setting is not possible.
88	*C 88*	Unused	----		
89	*C 89*	Unused	----		
90	*C 90*	PID type	1		0: Improved 1: Compatible with Mark I
91	*C 91*	PV1 burnout	0		0: Yes 1: No
92	*C 92*	PV2 burnout	0		0: Yes 1: No
93	*C 93*	Time proportional output	0		0: Does not go on a second time off in time proportional cycle. 1: Goes on a second time in time proportional cycle.
94	*C 94*	Time proportional output	0		0: Does not go on a second time off in time proportional cycle 1: Goes on a second time in time proportional cycle
95	*C 95*	Voltage output control (CH1)	15		2 to 22mA
96	*C 96*	Voltage output control (CH2)	15		2 to 22mA
97	*C 97*	Communications port	0		0 to 15 The backplate terminal is used when set to 0. The loader jack is used for settings 1 to 15. [Description:] When set to 0, communications is not possible on model without communications. When set to 0, communications conditions are selected using *C76* to *C80*. The communication address is used for settings 1 to 15. 4800bps, 8 bits, even parity, 1 stop bit
98	*C 98*	Special function	0		0 to 255 [Description:] A setting of 0 is normally used.

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
99	*C 99*	Unused	----		[Description:] "-----" is displayed and setting is not possible.
100	*C100*	Unused	----		[Description:] "-----" is displayed and setting is not possible.

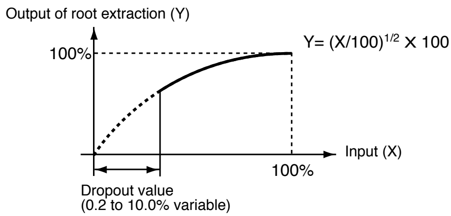
■ Detailed descriptions of setup data settings

- ***C07* (PV1 cold junction compensation)**
- ***C17* (PV2 cold junction compensation)**

  - This is a selection for cold junction compensation for thermocouples.
  - When set to 1, perform 0°C compensation using a cold junction compensation device outside the **DCP552.**

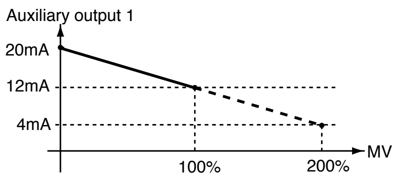
- ***C08* (PV1 square root extraction)**
- ***C09* (PV1 square root extraction dropout)**
- ***C18* (PV2 square root extraction)**
- ***C19* (PV2 square root extraction dropout)**

  - Flow pressure detected by the orifice of a normal differential pressure type flowmeter is proportional to the power 2 of the flow rate signal. Consequently, square root extraction is used when a uniform signal is needed.
    When the input in the square root extraction is *C09* or less than the dropout set in *C19*, an output of 0% can be obtained in the square root process.
  - Square root extraction is not performed when *C08* and *C18* are set to 0.



- ***C46* (auxiliary output 1 lower limit)**
- ***C47* (auxiliary output 1 upper limit)**
- ***C49* (auxiliary output 2 lower limit)**
- ***C50* (auxiliary output 2 upper limit)**

  - This is the scaling setting of the auxiliary output. The high and low values for the upper and lower limits can be reversed.
  - The example below shows that the output from auxiliary output 1 is 12mA when MV is 100% and 20mA when MV is 0%. As shown, a 200% MV value is required to generate an output of 4mA.
    Thus *C46* is set to 200.0 and *C47* is set to 0.0.



● ***C63*** **(time display)**

0: remaining segment time
1: total operation time

- These are selections for display panel 1 and 2 in the normal display mode in the program run mode.
- In the READY mode a setting of 0 displays the set time values for the selected segments.
- In the RUN, HOLD, FAST and END modes a setting of 0 displays the remaining time in rounded hours.
  For example, when the time unit hours/min is selected a remaining time of 1 hour 30 minutes and 59 seconds is displayed as "*1.30* ".
- In the READY mode a setting of 1 displays the time as "*0.00* ".
- In the RUN, HOLD, FAST and END modes a setting of 1 means that the time is displayed in rounded hours after a change from the READY mode to the RUN mode. In G.SOAK wait, repeat, cycle and pattern link, time is displayed as integrated values.
  When the time unit is hours/min or min/sec, the display returns to "*0.00* " after "*499.59* ". When the time unit is 0.1 sec, the display returns to "*0.0* " after "*2999.9* ".
  When the time unit is hour/min, a total operating time of 501 hours 30 minutes and 59 seconds is displayed as "*1.30* ".
- In FAST mode a setting of 0 or 1 displays the time according to FAST X.

● ***C66*** **(SP limit lower limit)**
● ***C67*** **(SP limit upper limit)**
● ***C69*** **(SP limit lower limit)**
● ***C70*** **(SP limit upper limit)**

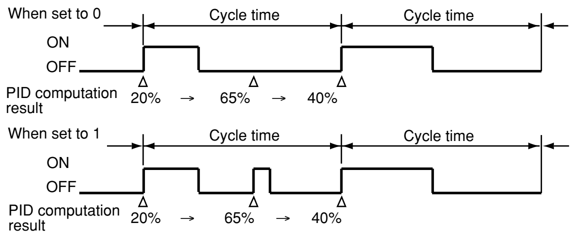
- These settings operate as limiters when SP is set or changed in the program setting pattern items.
- In the program run mode these settings operate as limiters when SP and SP bias (variable parameter) set in a program are added to produce the resulting SP.
- These settings operate as limiters when SP is set or changed in constant value control data settings.
- In the constant value control mode these settings operate as limiters when SP and SP bias (variable parameter) set in constant value control data settings are added to produce the resulting SP.

- **C93 (time proportional output system)**
- **C94 (time proportional output system)**

0: Does not go on again within time proportional cycle

1: Goes on again within time proportional cycle

- This setting determines whether the output is to go on again after the result of a PID computation has changed in a time proportional cycle (cycle time) and the output has been turned off.
- The difference between the two settings is illustrated below.



- **C95 (voltage output control)**
- **C96 (voltage output control)**

[Constant current type]

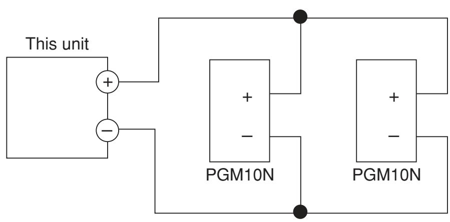
- Input current (maximum): Check that the input current is within the maximum allowable current or less, then the parallel connection can be made.
- Operating voltage range (input): Check that the voltage between the terminals of the voltage pulse output is within the specified range.

This example shows the calculation for the connection of this unit and the PGM10N015.

(Note: For connection with other model number, check the specifications of each model.)

- Input current(maximum): Since the input current is 10mA or less, up to two units (10mA X 2 = 20mA < 24mA [maximum allowable current]) can be connected in parallel.
- Operating voltage range (input): The rating voltage is 3.5 to 30Vdc. Therefore, terminal voltage when terminals are opened, is within the range.

Connection diagram



Example: Number of connectable units and settings

SSR to be used \ Settings		Model:6D(in case of C21,C22=2 or 3)	
		C95	C96
PGM10N	1unit	10 or more	10 or more
	2units(Parallel)*	20 or more	20 or more
PGM10F	1unit	12 or more	12 or more

*: Connectable units for each channel

[Resistor type]

In a voltage time proportional output driven by SSR, the **DCP552** must enter the SSR rated input voltage (optimum striking voltage of arc).

The **DCP552** employs a newly developed variable output system that can output optimum striking voltage of arc to accommodate multiple SSR drives. A suitable current value is set on the **DCP552** to obtain optimum striking voltage of arc for the internal impedance of the SSR. An equivalent circuit with related equations is shown below.

- Description of symbols

  (1)Settings

  I_0 : set **DCP552** output current (range: 2 to 22mA)

  V_0 : end-to-end load voltage (13.2V)

  $V_{SSR'}$: actual voltage input to SSR

  V_{SSR} : rated input voltage range for SSR ($V_{SSR/MIN}$ to $V_{SSR/MAX}$)

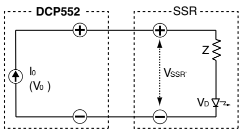
  $V_{SSR/MIN}$: minimum SSR rated input voltage

  $V_{SSR/MAX}$: maximum SSR rated input voltage

  Z : internal SSR impedance

  V_D : internal SSR voltage drop (normally about 1 to 2V)

  (2)Equivalent circuit showing connection of one SSR



Equations (1) and (2) below must be satisfied.

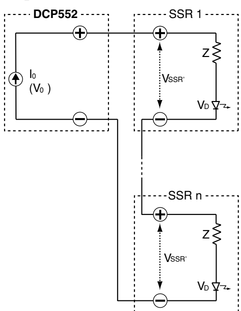
$V_{SSR/MIN} \leq I_0 \times Z + V_D \leq V_0$ Equation (1)

$V_{SSR'} \leq V_{SSR/MAX}$ Equation (2)

$(V_{SSR'} = I_0 \times Z + V_D)$

(3)Equivalent circuit showing connection of n SSRs

Equations (3) and (4) below must be satisfied.

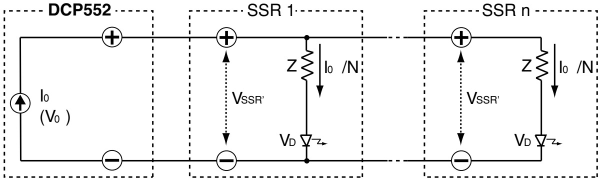


$V_{SSR/MIN} \leq I_0 \times Z + V_D \leq V_0 /N$ Equation (3)

$V_{SSR'} \leq V_{SSR/MAX}$ Equation (4)

$(V_{SSR'} = I_0 \times Z + V_D)$

(4)Equivalent circuit showing parallel connection of n SSRs



Equations (5) and (6) below must be satisfied.

$V_{SSR/MIN} \leq I_0 /N \times Z + V_D \leq V_0$ Equation (5)

$V_{SSR'} \leq V_{SSR/MAX}$ Equation (6)

$(V_{SSR'} = I_0 /N \times Z + V_D)$

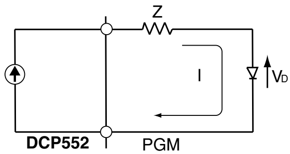
(5)Example showing use of Azbil Corporation PGM

V_{SSR}: 3 to 6V

Z : 260Ω ± 5%

V_D : 0.8 to 1.3V

- Io required in connecting one PGM
  As shown in the figure below, a constant current system is employed in the voltage output of the **DCP552**. The input voltage range of the PGM is as follows.
  "8.9mA ≤ I ≤ **17.2**mA" can be established:
  $I_{MIN} \times Z_{MIN} + V_{D/MIN} > 3$
  $I_{MIN} > 8.9mA$
  $I_{MAX} \times Z_{MAX} + V_{D/MAX} < 6$
  $I_{MAX} < 17.2mA$



- Each PGM requires 8.9mA; the maximum output current of the **DCP552** is 22mA. Thus two PGMs can be connected in parallel.
  When connected in series, the maximum output current of the **DCP552** is 22mA, the allowable load resistance is 600Ω and the maximum voltage that can be applied to a load is 13.2V (22mA × 600Ω). When 8.9mA is applied to a PGM, the maximum voltage of the input terminals end-to-end is 3.7V.
  $0.0089 \times 260 \times 1.05 + 1.3 = 3.7V$
  Since 13.2 ÷ 3.7 = 3.5, three PGMs can be connected in series.
  The calculation above is a "worst case scenario." For example, assuming that 3V or more is applied to each PGM, four PGMs should operate normally.

■ Constant value control data (CH1) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*ConSt*	Control mode	0		0: Program run mode 1: Constant value control mode
2	*SP*	Setpoint	0		Within the range of setup *C66* to *C67* (SP limit)
3	*P*	Proportional band	100.0		0.0 to 1000.0% A setting of 0.0 turns on ON-OFF control
4	*I*	Integral time	0		0 to 3600sec No integral operation when set to 0. [Description:] When *P* is set to 0.0, “-----” is displayed and setting is not possible.
5	*d*	Derivative time	0		0 to 1200 sec No integral operation when set to 0. [Description:] When *P* is set to 0.0, “-----” is displayed and setting is not possible.
6	*rE*	Manual reset	50.0		0.0 to 100.0% [Description:] When *P* is set to 0.0, “-----” is displayed and setting is not possible.When *I* is not equal to 0, “-----” is displayed and setting is not possible.
7	*oL*	Manipulated variable lower limit	0.0		-5.0 to upper limit %
8	*oH*	Manipulated variable upper limit	100.0		Lower limit to +105%

■ Constant value control data (CH2) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*ConSt*	Control mode	0		0: Program run mode 1: Constant value control mode
2	*SP*	Setpoint	0		Within the range of setup *C69* to *C70* (SP limit)
3	*P*	Proportional band	100.0		0.0 to 1000.0% A setting of 0.0 turns on ON-OFF control
4	*I*	Integral time	0		0 to 3600 sec No integral operation when set to 0. [Description:] When *P* is set to 0, [----] is displayed and setting is not possible.
5	*d*	Derivative time	0		0 to 12600 sec No integral operation when set to 0. [Description:] When *P* is set to 0.0, [----] is displayed and setting is not possible.
6	*rE*	Manual reset	50.0		0.0 to 100% [Description:] When *P* is set to 0.0, [----] is displayed and setting is not possible. When *I* is not equal to 0, [----] is displayed and setting is not possible.
7	*oL*	Manipulated variable lower limit	0.0		-5.0 to upper limit %
8	*oH*	Manipulated variable upper limit	100.0		Lower limit to +105%

Chapter 8. PROGRAM SETUP

8 - 1 Program Setup

Programming is enabled in the normal display mode. When the **DCP552** is not in the normal mode display, press the **DISP key** to invoke it. Programming is simpler if you set down the objectives of the program on a program work sheet before you start programming.

Note

For ease of use, please enlarge the copy of the **DCP551/552 Program Work Sheet** located after page 12-8.

■ Selecting number of program to operate

Numbers can be selected in one of two ways.

- before programming
- during programming

● Selecting program number before programming

Press the **PROG key** in the normal display mode in the READY mode. When the program number starts flashing, use the **PROG key** or the ↑, ↓ , ←, or → **key** to select a number.

Handling Precautions

Program numbers cannot be selected during external switch input.
See “Section 6-3 Selecting Programs” (page 6-11) for details.

● Selecting program number during programming

Press the **FUNC** and **PROG keys** in program setting state so that the program number starts to flash. Use the ↑, ↓ , ←, or → **key** to make the desired changes and press the **ENTER key** to enter them. Note, however, that you must after exiting the registration state (when set values flash) with the **ENTER key**, press the **FUNC** and **PROG keys**. When programs are selected in this way, the pattern items are displayed on the programming map.
This allows you to select a program number of a program other than the one processed in the RUN mode. It also allows you to select the number of another program using the external switches.

■ Selecting channel of program to operate

Channels can be selected in one of two ways.

- before programming
- during programming

● Selecting channel before programming

Press the **FUNC** and **DISP keys** in the normal display mode to change channels.

● Selecting channel during programming

Press the **FUNC** and **DISP keys** in the program setting mode, to change channels. The system is set to the program setting mode for a different channel with the same program number and the pattern item in the first segment is displayed.

■ Starting programming

● Key operations

Start programming by pressing the **FUNC** and **PROG keys** in the normal display mode.

In the program setting state, PRG LED on the console lights and the decimal points in the program number display and the segment number display lights.

Note, however, that the program setting state cannot be entered in the following cases.

- In the constant value control mode (and the constant value control data *ConSt* is set to 1)
- When keylock is engaged (and variable parameters *PA01* is set to 2 or 3)

In the following condition changes cannot be made in the program setting state.

- When a program is protected (and variable parameter *PA02* is set to 1, 3 or 5)

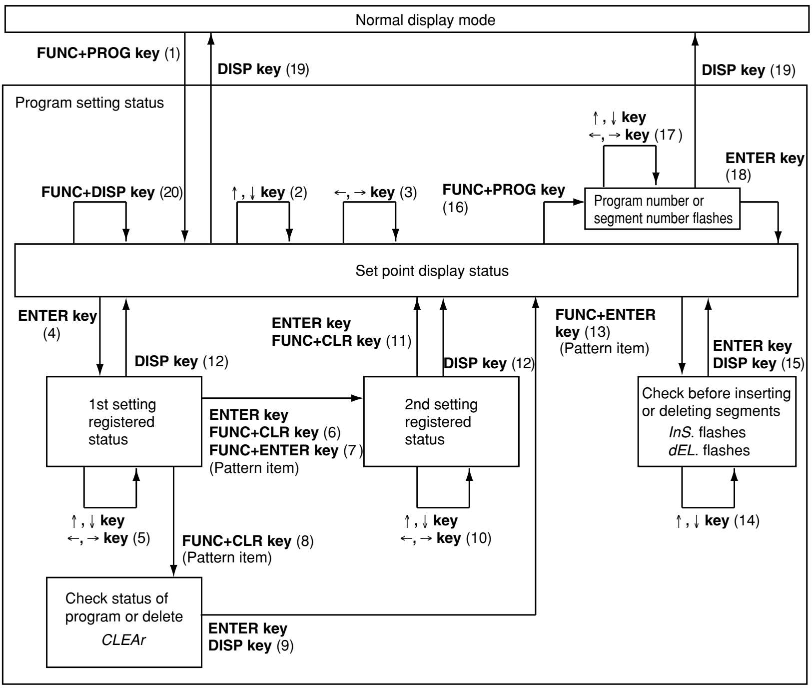
● Start of display items

When programming is started, the number of the started program and its segment are displayed.

■ State transition

The figure below shows the transition of states during programming.

The numbered items (1) to (20) are described on the following page.



● Description of numbered items in the figure illustrating the program setting state

(1) Programming is started. Up to about 1 second after the programming state is entered, the remaining number of segments is displayed in display panel 1 and the remaining number of subfunctions is displayed in display panel number 2. The display can be held by pressing the **FUNC key**.

(2) Move the setting items on the programming map.

(3) Move the segments on the programming map.

(4) Register the first setting.

(5) Increase or decrease the values in the first setting and move the flashing digits.

(6) Complete the registration of the first setting.
Pressing the **ENTER key** registers the set value in memory.
For items with a second setting, the registration state for the second item is displayed. The display reverts to display set values for items without a second setting. Pressing the **FUNC** and **CLR keys** returns a segment to its initial state.

(7) Use the **FUNC** and **ENTER keys** in pattern items to go between RAMP-X ⇔ RAMP-T and RAMP-X ⇔ RAMP-E. The setting in setup data *C61* determines the changeover that is actually performed.
Note, however, that a changeover cannot be made when a segment is running.

(8) Use the **FUNC** and **CLR keys** in pattern items to display "*CLEAr*" to delete the program beyond that segment.
Note, however, that the **FUNC** and **CLR keys** are invalid when a program is running.

(9) When the **ENTER keys** is used, the program beyond the point where the key was pressed is deleted. Pressing the **DISP key** does not delete any data but causes the display to show set values.

(10)Increase or decrease the values in the second setting and move the flashing digits.

(11)Complete the registration of the second setting.
Pressing the **ENTER keys** registers the set value in memory.
Pressing the **FUNC** and **CLR keys** returns a segment to its initial state.

(12)Complete the registration without entering the value in memory.

(13)Pressing the **FUNC** and **ENTER keys** in pattern items displays the segment insertion and deletion panel "*InS.*" flashes.
Note, however, that the **FUNC** and **ENTER keys** are invalid when a program is running.

(14)Use the ↓ **key** to delete and the ↑ **key** to insert the flashing item.

(15)Pressing the **ENTER keys** when "*InS.*" is displayed inserts the segment.
Pressing the **ENTER keys** when "*dEL.*" is displayed deletes the segment.
Pressing the **DISP key** neither deletes or inserts the segment.

(16)Press the **FUNC** and **PROG keys** so that the program number starts to flash.

(17)Program numbers and segment numbers can be increased or decreased and the moving digits can be moved.

(18)Pressing the **ENTER keys** completes the registration of program and segment numbers.

(19)The normal display mode appears.

(20)Change channels.

■ Programming map

As shown below, a programming map consists of columns of segment numbers and rows of program setting items.

In the program setting state, the items in the solid lines indicated by the segment numbers and program setting items are displayed.

← **key**, → **key** : moves segments right and left

↑ **key**, ↓ **key** : moves segments up and down

The figure shows a programming map from the first to the 10th segment.

Programming map example:

Items cannot be moved to the gray area.
Settings in the gray area are shared with segment 1.

Segment number								
Program item	(1) No.1 setting (2) No.2 setting	1	2	....	10	11	12 to 99	Remarks
Pattern	(1) SP	100	100		100	- - - - -		*1
	(2) Time	0:30	3:00		10:00	- - - - -		
Event 1	(1) Operating point	1100	- - - - -		- - - - -			*2
Event 2	(1) Operating point	- - - - -	30		- - - - -			
Event 3	(1) On Time	0:00	0:00		0:00			
	(2) Off Time	0:01	0:01		0:01			
Event 4	(1) On Time	- - - - -	0:00		- - - - -			
	(2) Off Time	- - - - -	1:00		- - - - -			
Event 5	(1) Code	1	2		3			
Event 7-1	(1) Code	1	- - -		2			
	(2) Time	0:10	- - -		5:00			
Event 7-2	(1) Code	0	- - -		3			
	(2) Time	0:20	- - -		9:00			
PIG group, output	(1) PID group	3	A		1			
limiter group	(2) Output limiter group	3	1		7			
G.SOAK	(1) Type	0	2		1			
	(2) G.SOAK width	- - - - -	5		10			
PV shift	(1) Shift value	- - - - -	- - - - -		- - - - -			
Repeat	(1) Return destination segment	0	0		0			
	(2) Count	- - - - -	- - - - -		- - - - -			
PV start	(1) Type	0	0		0			*3
Cycle	(1) Count	0	0		0			
Pattern link	(1) Link destination program	0	0		0			
Tag	(1) 8 character tag	PROG9999	PROG9999		PROG9999			

*1 : Items up to segment 10 has been entered.

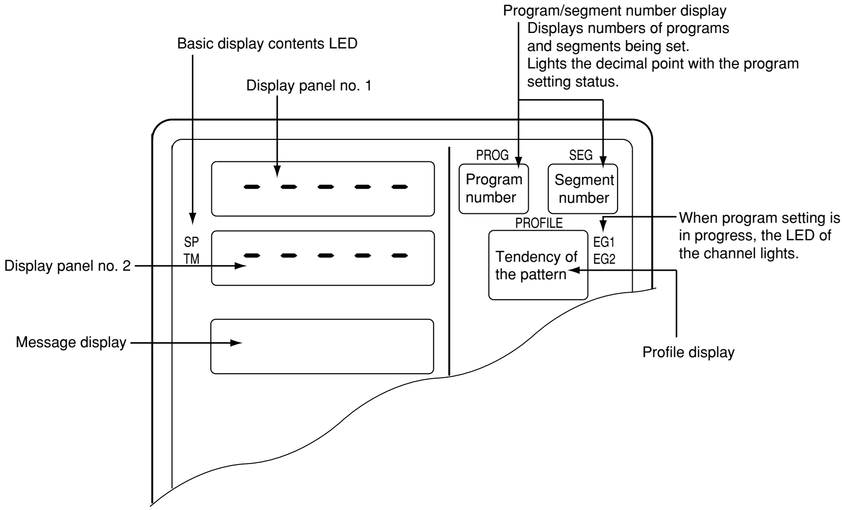
*2 : The event types of each event are listed below.

Event 1/2 : PV upper limit (event type setting 2)
Event 3/4 : time event (event type setting 1)
Event 5 : code event using two points (event type setting 18, auxiliary setting 2)
Event 7 : time code event using two points (event type setting 23, auxiliary setting 2)
Event 9 to 16: assigned to CH2 events (when setup *C64* is set to 9)

*3 : These are settings used in each program and are shared by all segments.

■ Display items

Items displayed are shown in the figure below.



■ Setting pattern items

(1) In the set value display state, move to the segment pattern item to be set on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

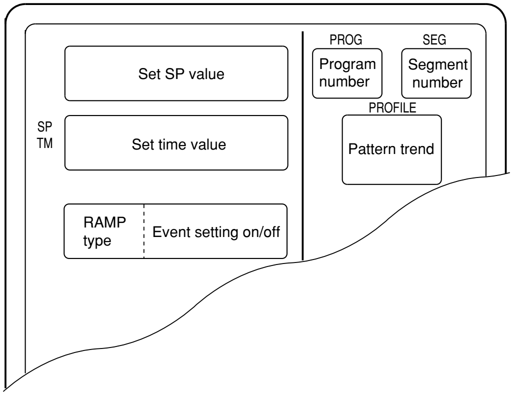
(3) Use the ↑, ↓, ←, and → **keys** to set the first setting (SP).
Setting range: SP limit lower limit to upper limit
(SP limit is set using setup data *C66*, *C67*, *C69* and *C70*.)

(4) Pressing the **ENTER key** stops display panel 1 from flashing and causes display panel 2 to start flashing. (This starts start registration of the second setting.) Instead of pressing the **ENTER key**, press the **FUNC** and **ENTER keys** to switch between RAMP types (selecting RAMP-X ⇔ RAMP-T, or RAMP-X ⇔ RAMP-E is made with setup data *C61*).

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (time).
Setting range: 0:00 to 500:00, 0.0 to 3000.0
(Time units are selected using setup data *C62* to set Hour/min, Min/sec, 0.1 sec. Since a colon ": " cannot be displayed, the decimal point is used instead.)

(6) Press the **ENTER key** to stop display panel 2 from flashing.

● **Display**



Segments that have not been set and unset values for SP and time are indicated by "-----".

Note

Event settings are displayed in the two rows of the message panel. Events 1 to 8 are displayed in the top left row and events 9 to 16 are displayed in the lower left row. The meaning of the codes used are listed below.

– : event off
T : time event
P : PV/PV deviation rate event
D : Deviation/absolute deviation
M : MV event
S : SP event
C : code/time code event

■ Setting event items

Handling Precautions

Events assigned to the selected channel can be displayed.
Note that when setup data *C57* is set to 1, event items on the programming map are skipped and not displayed.

● When the event is a PV event

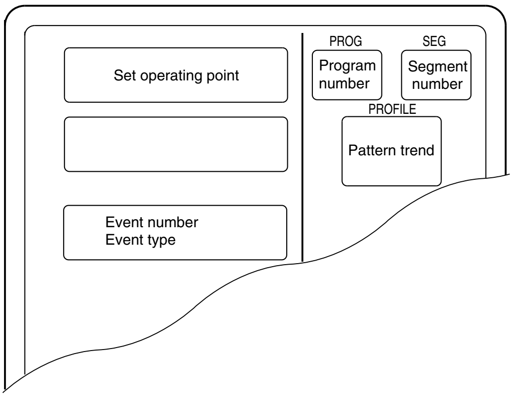
(1) In the set value display state, move to the segment event item to be set on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the event operating point.
Setting range : OFF –19999 to +20000 SPU
: OFF 0 to 20000 SPU (for absolute value deviation events)
: OFF –5.0 to +105.0% (for MV events)

(4) Press the **ENTER key** to stop the flashing on display panel 1. (Pressing the **FUNC** and **CLR keys** causes display panel 1 to return to unset state "-----" and the flashing stops.)

● Display (PV events)



Unset values are indicated as " ----- ".

Note

A PV event setting consists of a setting (including OFF) and a subfunction. A subfunction cannot be used when a setting has not been made " ----- ".

- **When the event is a time event**

(1) In the set value display state, move to the event item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

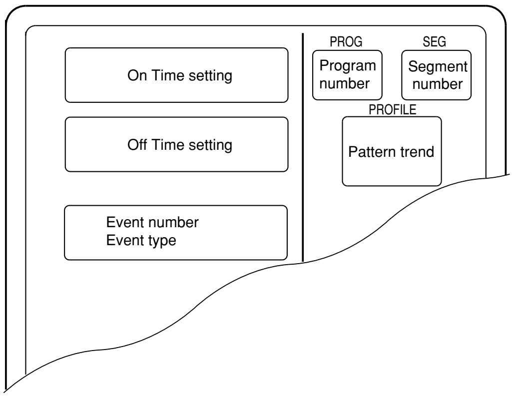
(3) Use the ↑, ↓, ←, and → **keys** to make the first setting (On Time setting).
Setting range: 0:00 to 500:00, 0.0 to 3000.0
(Time units are selected using setup data *C62* to set Hour/min, Min/sec, 0.1 sec. Since a colon "*:* " cannot be displayed, the decimal point is used instead.)

(4) Press the **ENTER key** to stop the flashing on display panel 1 and display panel 2 starts flashing. (Start of second setting)
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "-----" and the flashing stops.)

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (Off Time setting).
Setting range: On time setting +0:01 to 500:00, Off time setting +0.1 to 3000.0

(6) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 2 to return to unset state "-----" and the flashing stops.)

- **Display (time event)**



- Unset values are indicated as "-----".
- When the On Time is set to 500:00 or 3000.0, an Off Time cannot be set.

Note

A time event setting consists of one setting, an On Time, or two settings, an On Time and an Off Time. When both settings are made a subfunction can be used. In unset state "-----" a subfunction cannot be used.

Handling Precautions

In a time event, an On Time or Off Time setting that is the same as or exceeds the segment time is invalid.
Note, however, that when there is a G.SOAK wait at the end of a segment or an END mode at the end of a program, an On Time or Off Time setting that is the same as the segment time is valid.

- **When the event is a code event**

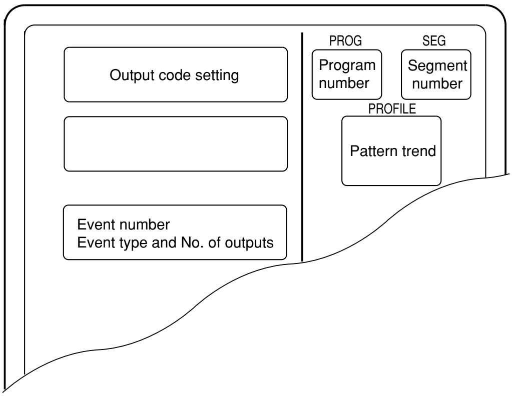
(1) In the set value display state, move to the event item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the event output code.
Setting range : 0 to $2^n – 1$
(n indicates the number of output points set in event configuration 1 auxiliary setting 1.)

(4) Press the **ENTER key** to stop the flashing on display panel 1.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 to return to unset state "-----" and the flashing stops.)

- **Display (code event)**



Unset values are indicated as "-----".

Note

Code events use one subfunction. A subfunction cannot be used when a setting has not been made "-----".
Events that follow the event number of a code event (number of output points less 1) are skipped and not displayed.

● **When the event is a timer code event**

(1) In the set value display state, move to the event item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

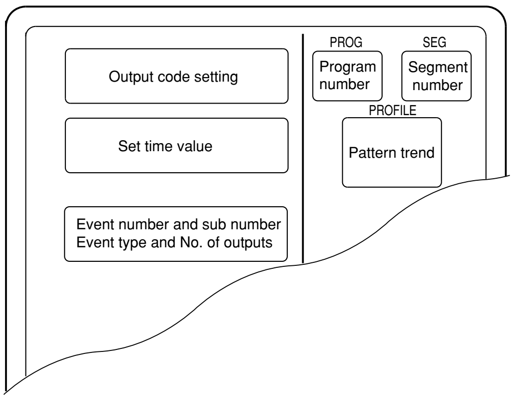
(3) Use the ↑, ↓, ←, and → **keys** to make the first setting (output code).
Setting range: 0 to $2^n - 1$
(n indicates the number of output points set in event configuration 1 auxiliary setting 1.)

(4) Press the **ENTER key** to stop the flashing on display panel 1 and display panel 2 starts flashing. (Start of second setting)
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "-----" and the flashing stops.)

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (time).
Setting range: 0:00 to 500:00, 0.0 to 3000.0
(Time units are selected using setup data *C64* to set Hour/min, Min/sec, 0.1 sec. Since a colon ":" cannot be displayed, the decimal point is used instead.)

(6) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "-----" and the flashing stops.)

● **Display (Code event with a timer function)**



Unset values are indicated as "-----".

Note

Timer code events use one subfunction. A subfunction cannot be used when a setting has not been made "-----".
Events that follow the event number of a timer code event (number of output points less 1) are skipped and not displayed.

! Handling Precautions

In a timer code event, an On Time or Off Time setting that is the same as or exceeds the segment time is invalid.
Note, however, that when there is a G.SOAK wait at the end of a segment or an END mode at the end of a program, an On Time or Off Time setting that is the same as the segment time is valid.

- **When the event is an event off**

  Such event items on the programming map are skipped and not displayed.

- **When the event is an instrument event**

  Such event items on the programming map are skipped and not displayed.

■ Setting PID groups and output limiter group number items

(1) In the set value display state, move to the PID group, output limiter group number item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

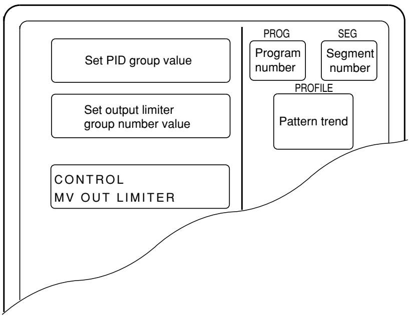
(3) Use the ↑, ↓, ←, and → **keys** to make the first setting (PID group number). Setting range: ON-OFF, PID 0 to 9, PID A

(4) Press the **ENTER key** to stop the flashing on display panel 1 and display panel 2 starts flashing. (Start of second setting)
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "*PId 0/otL 0* " and the flashing stops.)

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (output limiter group number).
Setting range: 0 to 9

(6) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 2 to return to unset state "*PId 0/otL 0* " and the flashing stops.)

● **Display**



- Unset values are indicated as "*PId 0/otL 0* ".
- When setup data *C58* is set to 1, PID groups, output limiter group number items are skipped and not displayed.

Note

When a PID group or output limiter group number is not 0 or both are something other than 0, they use a subfunction. A subfunction cannot be used when a setting has not been made "*PId 0/otL 0* ".

Handling Precautions

- When a set value for a PID group number is 0, it is a sequel to a PID number in a previous segment. When the set value for a PID group number in the first segment is 0, the set value is 1.
- When a set value for an output limiter group number is 0, it is a sequel to an output limiter group number in a previous segment. When the set value for an output limiter group number in the first segment is 0, the set value is 1.

■ Setting G.SOAK (guaranteed soak) items

(1) In the set value display state, move to the G.SOAK item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

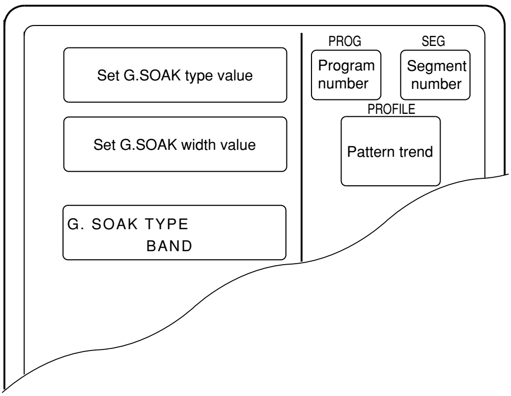
(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the G.SOAK type.
Setting range: 0 to 3
0: No G.SOAK
1: First G.SOAK segment
2: Last G.SOAK segment
3: Entire G.SOAK segment

(4) Press the **ENTER key** to stop the flashing on display panel 1 and display panel 2 starts flashing. (Start of second setting)
Note, however, that when the first setting is 0, "-----" is shown in the second panel which does not flash.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "*g.S.0/*-----" and the flashing stops.)

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (G.SOAK width).
Setting range: 0 to 1000 SPU

(6) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "*g.S.0/*-----" and the flashing stops.)

● **Display**



- Unset values are indicated as "*g.S.0/*-----".
- When setup data *C59* is set to 1, a G.SOAK item on the programming map is skipped and not displayed.

Note

When a G.SOAK setting is something other than 0, it uses a subfunction.
A subfunction cannot be used when a setting has not been made "*g.S.0/*-----".

■ Setting PV shift items

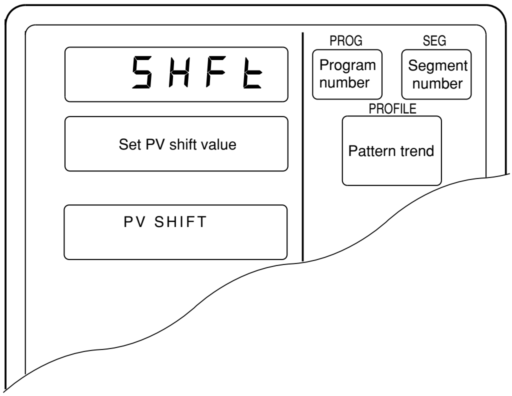
(1) In the set value display state, move to the PV shift item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 2 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the PV shift set value.
Setting range: –10000 to +10000 SPU

(4) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 to return to unset state "-----" and the flashing stops.)

● Display



- Unset values are indicated as "-----".
- When setup data *C59* is set to 1, a PV shift item on the programming map is skipped and not displayed.

Note

PV shift uses a subfunction. A subfunction cannot be used when a setting has not been made "-----".

Handling Precautions

When PV shift is not set, it is a sequel to a PV shift value in a previous segment. When PV shift is not set in the first segment, the set value is 0.

■ Setting repeat items

(1) In the set value display state, move to the repeat item to be set for the segment on the programming map.

(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting).

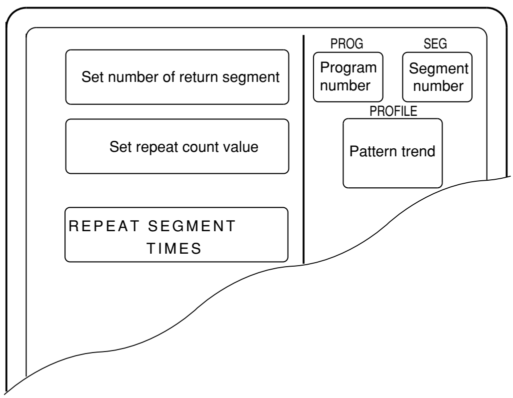
(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the number of the return segment.
Setting range: 0 to segment number in setting

(4) Press the **ENTER key** to stop the flashing on display panel 1 and display panel 2 starts flashing. (Start of second setting)
Note, however, that when the first setting is 0, "-----" is shown in the second panel which does not flash.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "*rP.0/*-----" and the flashing stops.)

(5) Use the ↑, ↓, ←, and → **keys** to make the second setting (repeat segment times).
Setting range: 1 to 10000

(6) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 1 and 2 to return to unset state "*rP.0/*-----" and the flashing stops.)

● **Display**



- Unset values are indicated as "*rP.0/*-----".
- When setup data *C59* is set to 1, a repeat item on the programming map is skipped and not displayed.

Note

When the number of return segment is something other than 0, it uses a subfunction.
A subfunction cannot be used when a setting has not been made "*rP.0/*-----".

■ Setting PV start items

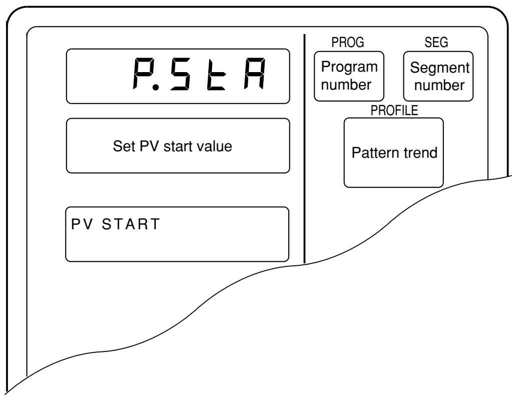
(1) In the set value display state, move to the PV start item to be set for the segment on the programming map.
(A PV start item is a program setting and is the same for each segment.)

(2) Press the **ENTER key** to make display panel 2 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the PV start value.
Setting range: 0 to 3
0: no PV start
1: descending PV start
2: ascending PV start
3: bi-directional PV start

(4) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 2 to return to unset state "*0* " and the flashing stops.)

● Display



- A PV start item is a program setting and is the same for each segment.
- When setup data *C60* is set to 1, a PV start item on the programming map is skipped and not displayed.

Note

A PV start item setting does not use subfunctions.

■ Setting cycle items

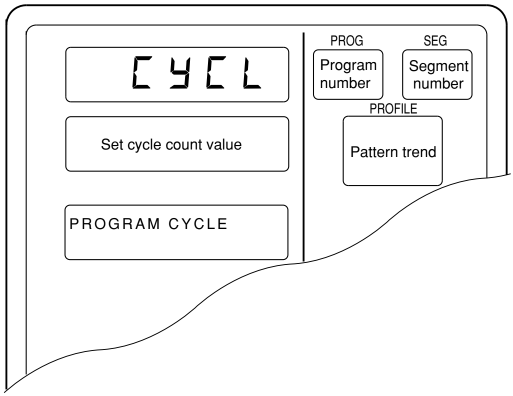
(1) In the set value display state, move to the cycle item to be set for the segment on the programming map.
(A cycle item is a program setting and is the same for each segment.)

(2) Press the **ENTER key** to make display panel 2 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the cycle value.
Setting range: 0 to 10000

(4) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 2 to return to unset state "*0*" and the flashing stops.)

● **Display**



- A cycle item is a program setting and is the same for each segment.
- When setup data *C60* is set to 1, a cycle item on the programming map is skipped and not displayed.

Note

A cycle item setting does not use subfunctions.

■ Setting pattern link items

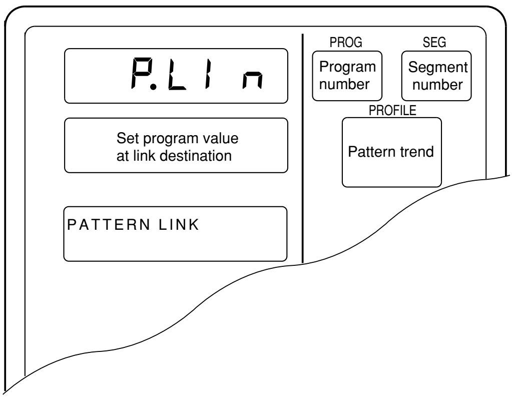
(1) In the set value display state, move to the pattern link item to be set for the segment on the programming map.
(A pattern link item is a program setting and is the same for each segment.)

(2) Press the **ENTER key** to make display panel 2 flash (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – setting the pattern link value.
Setting range: 0 to 49
0 : no pattern link
1 to 49: program number at pattern link destination

(4) Press the **ENTER key** to stop the flashing on display panel 2.
(Pressing the **FUNC** and **CLR keys** causes display panel 2 to return to unset state "*0* "and the flashing stops.)

● Display



- A pattern link item is a program setting and is the same for each segment.
- When setup data *C60* is set to 1, a pattern link item on the programming map is skipped and not displayed.

Note

A pattern link item setting does not use subfunctions.

■ Setting tag items

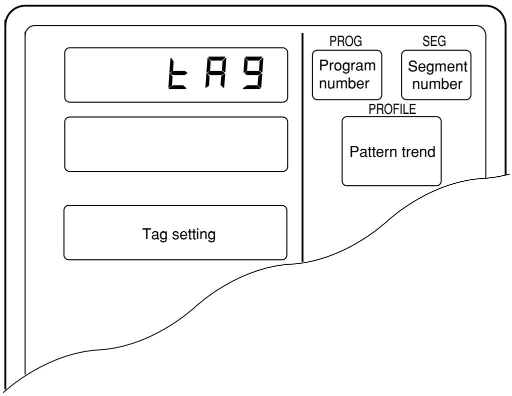
(1) In the set value display state, move to the tag item to be set for the segment on the programming map.
(A tag item is a program setting and is the same for each segment.)

(2) Press the **ENTER key** to display the cursor "__" below the leftmost of the 8 characters in the message panel "[ ]" field (registration of first setting).

(3) Use the ↑, ↓, ←, and → **keys** to make the first setting – selecting the 8 characters for the tag. The table below shows the 128 characters that can be used.

(4) Press the **ENTER key** and the cursor in the message panel disappears.
(Pressing the **FUNC** and **CLR keys** causes the message panel return to displaying an 8-character tag consisting of "*PROG* ", a two-digit program number and two space characters. The cursor is turned off.)

● Display



↓ key

’	/	7	?	G	O	W	_	ァ	ッ	キ	ソ	ヌ	マ	ラ	°
&	.	6	〉	F	N	V	ˆ	ヲ	ョ	カ	セ	ニ	ホ	ヨ	゛
%	-	5	=	E	M	U	]	・	ュ	オ	ス	ナ	ヘ	ユ	ン
$	,	4	〈	D	L	T	¥	、	ャ	エ	シ	ト	フ	ヤ	ワ
#	+	3	;	C	K	S	[	」	ォ	ウ	サ	テ	ヒ	モ	ロ
”	*	2	:	B	J	R	Z	「	ェ	イ	コ	ツ	ハ	メ	レ
!	)	1	9	A	I	Q	Y	。	ゥ	ア	ケ	チ	ノ	ム	ル
	(	0	8	@	H	P	X		ィ	ー	ク	タ	ネ	ミ	リ

↑ key

Note

A tag item setting does not use subfunctions.
The tag of CH1 program and CH2 program with same program number is common.

■ Deleting programs

(1) In the set value display state, move to the start of the segment pattern item to be deleted on the programming map.
Move to the first segment of the program to delete the entire program.

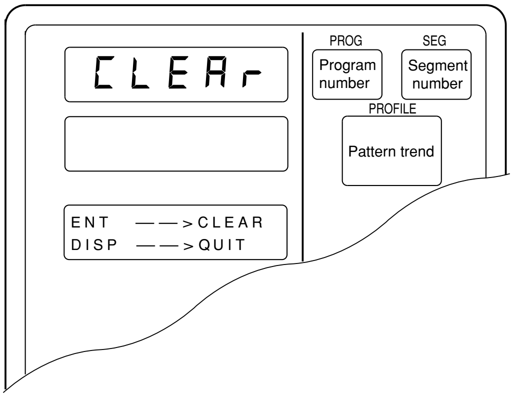
(2) Press the **ENTER key** to make display panel 1 flash (registration of first setting). (This the same as for pattern item settings.)

(3) Press the **FUNC** and **CLR keys** and you are prompted to confirm program deletion. "*CLEAr* " flashes in display panel 1.

(4) Press the **ENTER key** to delete the program.

(5) The set value display state appears and "-----" is shown in both display panel 1 and 2.

● Display



- Segments that have not been set and unset values for SP and time are indicated by "-----".
- A program that is running (in RUN, HOLD, FAST, END or READY FAST mode) cannot be deleted.

■ Inserting and deleting segments

(1) In the set value display state, move to insert segment or delete segment segment pattern item on the programming map.

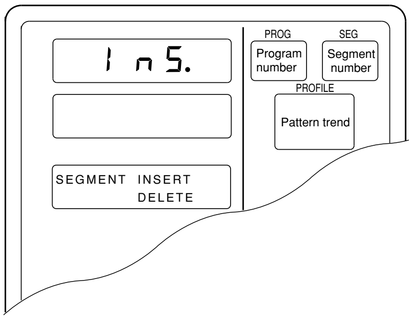
(2) Press the **FUNC** and **ENTER keys** and you are prompted to confirm segment insertion. "*InS.*" flashes in display panel 1.

(3) Press the ↑ **key** and you are prompted to confirm segment insertion. "*InS.*" flashes in display panel 1. Press the ↓ **key** and you are prompted to confirm segment deletion. "*dEL.*" flashes in display panel 1.

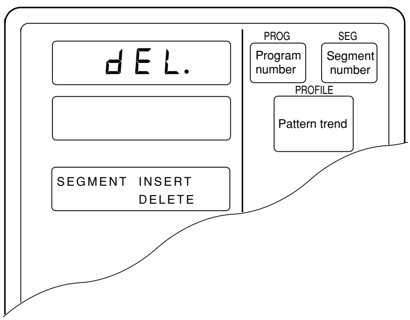
(4) Pressing the **ENTER key** when "*InS.*" is displayed in display panel 1 inserts the segment. Pressing the **ENTER key** when "*dEL.*" is displayed in display panel 1 deletes the segment.

(5) The set value display state appears.

● Display (segment insertion)



● Display (segment deletion)



- When a segment is inserted, a new segment is automatically created and the numbers of subsequent segments are incremented by one.

The set value of the inserted segment is as follows:
Set SP value : same value as the original segment before insertion
Set time value : 0:10, 1.0
Event items, PID groups, output limiter group number items, G.SOAK items, PV shift items and repeat items are not set.

- When the 99th segment has already been set, the segment insertion indication "*InS.*" is not displayed.
- When 2000 segments have already been set, pressing the **ENTER key** to execute an insertion cannot be used to insert a segment.
- When segments are deleted, the following segments are moved up and the numbers of subsequent segments are decremented by one. When the final segment is deleted, the displayed segment becomes an unset segment.
- A program that is running (in RUN, HOLD, FAST, END or READY FAST mode) cannot be deleted.

8 - 2 Copying Programs

The **DCP552** allows you to copy programs when it is in the READY program run mode. If not in this mode, press the **DISP key** to invoke the normal display mode.

■ Program copy procedures

(1) Invoke the program run READY program run mode.
Set variable parameter *PA01* to 0 or 1 and set variable parameter *PA02* to 0.

(2) Press the **PROG key** and the ↑, ↓ , ←, or → **keys** in the normal display mode to select the number of the program to be copied.
This is not possible when the program number is selected using external switch inputs.
See " Section 6-3 Selecting Programs" (page 6-11) for details.

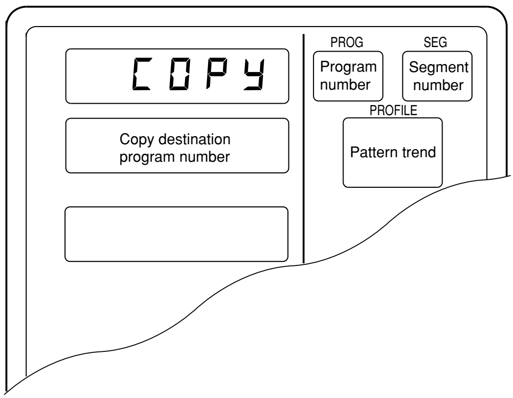
(3) Press the ↑ **key** and the **PROG key** to display "*COPY* " in display panel 1.
The number of the program to be copied starts to flash in display panel 2.

(4) Press the ↑, and ↓ **keys** and currently unset program numbers that can be used as numbers for the program to be copied start to flash.
When there are no unset numbers, "-----" is displayed in display panel 2.

(5) Press the **ENTER key** to start program copy and display panel 2 stops flashing. Programs in CH1 and CH2 are copied simultaneously. Repeat steps r and t to copy more programs.
Repeat steps (4) and (5) to copy more programs.

(6) When a program has been copied, press the **DISP key**.

● Display



8 - 3 General Reset

A general reset can be performed when the controller is in the READY AUTO mode in the normal display mode. If not in the normal display mode, press the **DISP key** to invoke it. A general reset has the following functions. Program settings such as program numbers 1 to 49 are all deleted. Parameters are reset to their factory defaults and the READY AUTO program run mode is invoked.

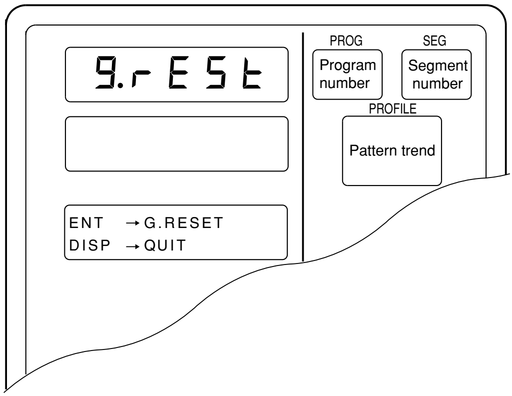
■ General reset procedures

(1) Invoke the READY AUTO mode for both CH1 and CH2. Or set variable parameters *PA01* and *PA02* to 0.

(2) Press the **FUNC**, **CLR** and **MESSAGE keys** and you are prompted to confirm a general reset. "*g.rESt*" is displayed in display panel 1.

(3) Press the **ENTER key** to execute the general reset and start startup operations that occur after a power up.
Press the **DISP key** cancels the general reset and returns the normal display mode.

● Display



In the constant value control mode, program number, segment number and profile display go off.

- When the RAM backup fails at startup, the controller automatically prompts you to confirm a general reset – no key input is required - and "*g.rESt*" flashes in display panel 1.
  Press the **ENTER key** to execute the general reset. All other keys are invalid.
- A general reset does not return the following settings to factory default values.
  C01, C02, C11, C12, C21 C22: these values are stored.
  Note, however, that a general reset resulting from a RAM failure at startup resets also these settings to factory default values.

Chapter 9. MEMORY CARD OPERATIONS

9 - 1 Memory Card Type and Functions

A memory card can be used to store the setup data, variable parameters, PID parameters (including constant value control data), event configuration data and multiple programs required by one **DCP552**.

NOTE

•This chapter is not applicable to the **DCP552B******* model.

● Memory card types

The following memory cards can be used by the **DCP552**:

Model No.	Memory type	Battery	Capacity (Byte)	No. of programs
SKM008A	RAM	Not replaceable	7.00K	Max. 10
SKM016A	RAM	Not replaceable	14.50K	Max. 26
SKM064A	RAM	Not replaceable	61.75K	Max. 49
SKM256C	RAM	Replaceable	251.00K	Max. 49
SKM008E	EEPROM	Not necessity	7.00K	Max. 10
SKM032E	EEPROM	Not necessity	29.75K	Max. 49

● Memory card functions

- Save: (write)

  Saves selected **DCP552** data on the memory card.

- Load: (read)

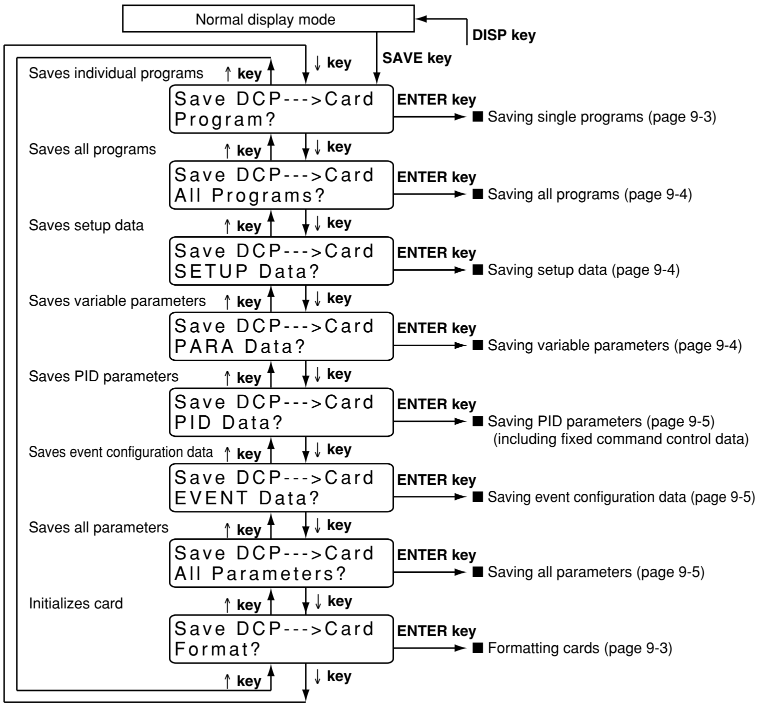
  Loads selected memory card data onto the **DCP552**.

9 - 2 Save Procedures

Insert a memory card when the **DCP552** is in the READY mode and the normal display mode. Press the **SAVE key** to start a save operation. "*CArd*" is displayed in display panel 1 and "*SAVE*" is displayed in display panel 2. An error code appears if something should go wrong during the save operation.

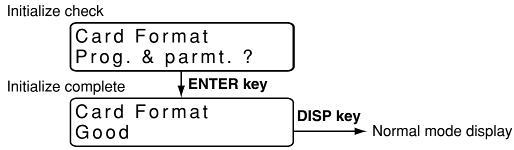
■ Save menu

When the **SAVE key** is pressed in the normal display mode, the save menu panel is displayed. Use the ↑ and ↓ **keys** to select the desired menu.
Press the **ENTER key** to display the desired menu in the message display panel.
The **DISP key** returns you to the normal display mode.



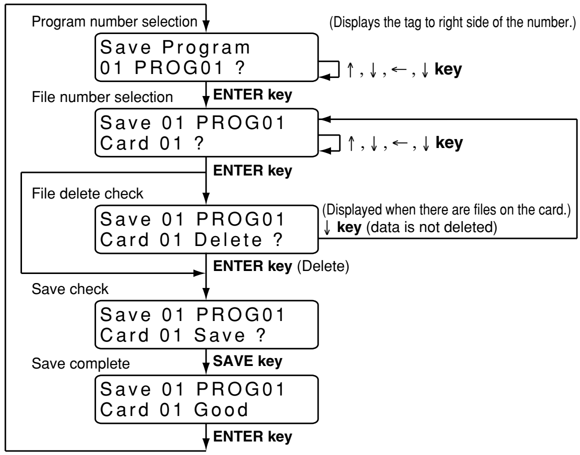
■ Formatting cards

This procedure is used to format memory cards so that they can be used with the **DCP552**. A card has to be formatted once only. Note that any programs or parameters on a card that is formatted are deleted in this process.



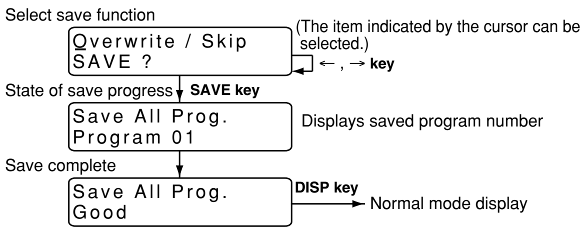
■ Saving single programs

This procedure is used to save one program on the **DCP552** to a memory card.



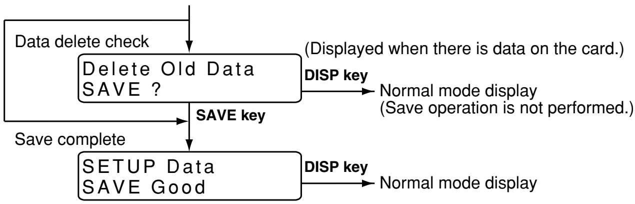
■ Saving all programs

This procedure saves all programs on the **DCP552** on a memory card. The program numbers used in the **DCP552** are converted to file names on the memory card.
When the “Overwrite” save function is selected, files on the card that have the same number as those in the **DCP552** are overwritten by the **DCP552** files.
When the “Skip” save function is selected, files on the card that have the same number as those in the **DCP552** are left as they are and the next number file is selected for processing.



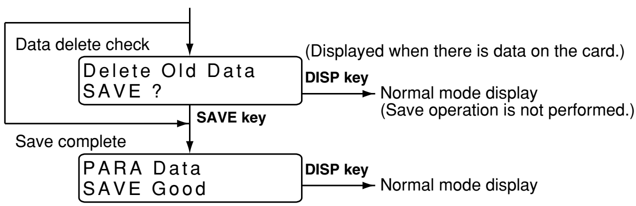
■ Saving setup data

This procedure saves the **DCP552** setup data on a memory card.



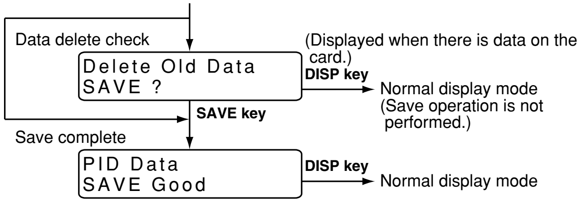
■ Saving variable parameters

This procedure saves the **DCP552** variable parameter data on a memory card.



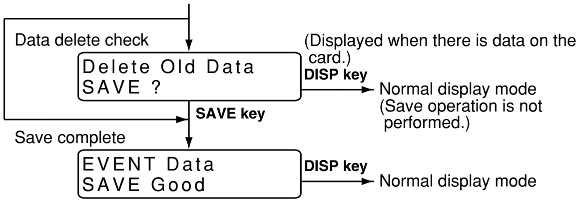
■ Saving PID parameters

This procedure saves PID parameters and constant value control data on a memory card.



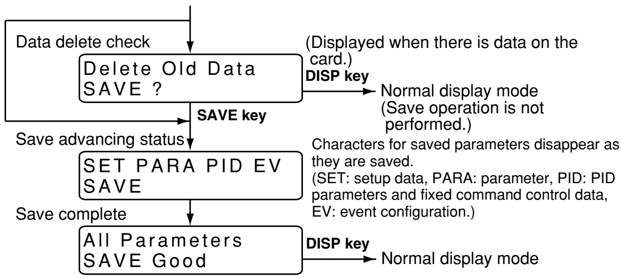
■ Saving event configuration data

This procedure saves event configuration data on a memory card.



■ Saving all parameters

This procedure saves all parameters on a memory card.

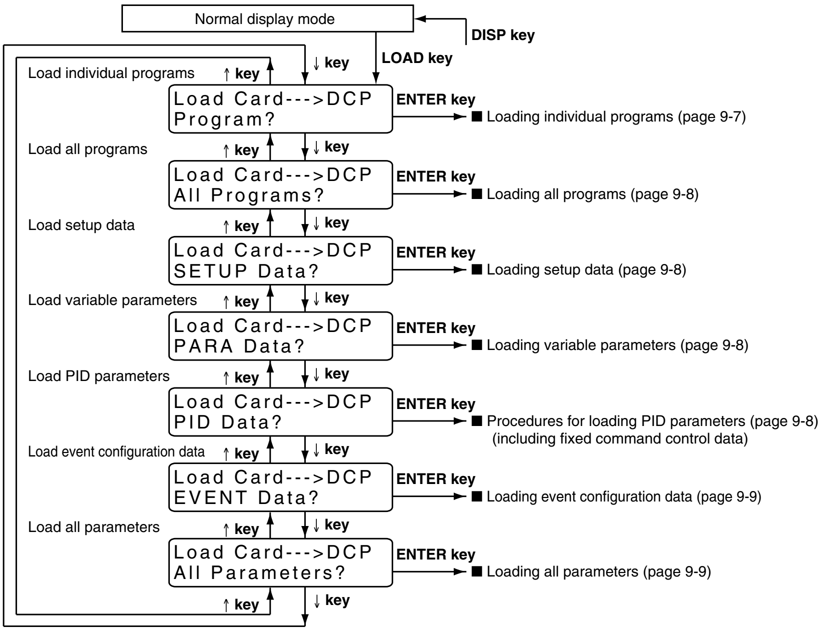


9 - 3 Load Procedures

Insert a memory card when the **DCP552** is in the READY mode and the normal display mode, and variable parameter *PA05* has been set to 0. Press the **LOAD key** to start a load operation. "*CArd*" is displayed in display panel 1 and "*LOAd*" is displayed in display panel 2. An error code appears if something should go wrong during the save operation.

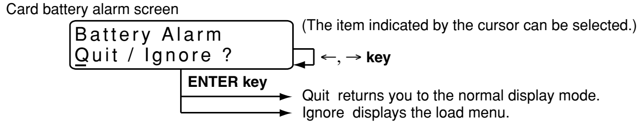
■ Load menu

When the **LOAD key** is pressed in the normal display mode, the load menu panel is displayed. Use the **ENTER key** to select the desired menu.
Press the **ENTER key** to display the desired menu in the message display panel.
The **DISP key** returns you to the normal display mode.
Note, however, that an autoload operation is performed when the **LOAD key** is pressed and variable parameter *PA05* is set to 1.
For details, see "Section 9-4 Autoload" (page 9-10).
A RAM memory card whose internal batteries are too low, cause a card battery alarm panel to be displayed before the Load menu panel is displayed.



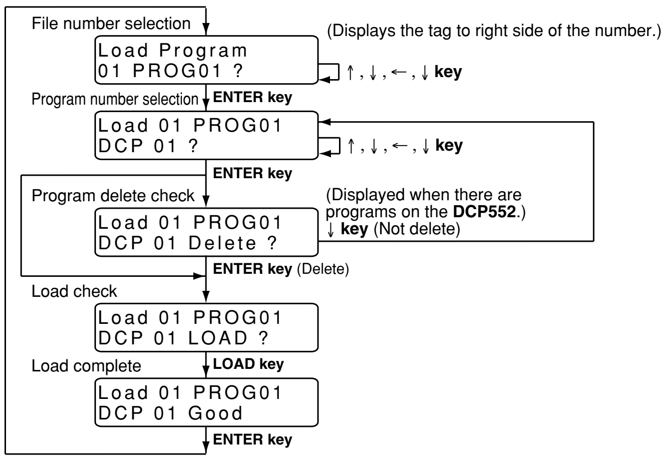
■ Card battery alarm panel

When the voltage of the internal battery in a RAM card is too low, the data saved on the disk may be corrupted. Loading corrupted data onto the **DCP552** will cause maloperation. Do not use a card whose battery voltage is too low. If you want to load the data anyway, select "Ignore" in this panel and press the **ENTER key**. This displays the load menu. To return to the normal display mode, select "Quit" or press the **ENTER key** or the **DISP key**.



■ Loading individual programs

This procedure loads single memory card files on the **DCP552**.

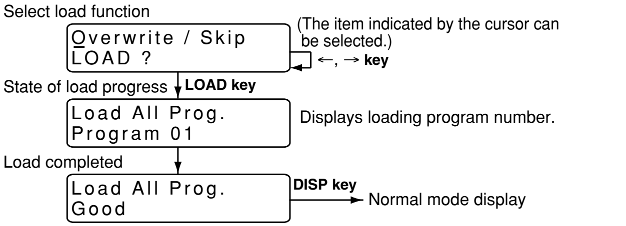


■ Loading all programs

This procedure loads all programs on the memory card in the **DCP552**. The file numbers used on the memory card are converted to file numbers used in the **DCP552**.

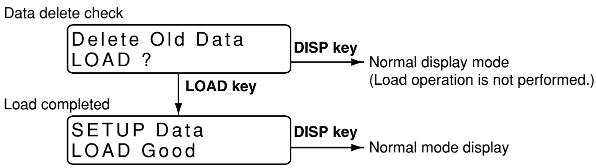
When the "Overwrite" load function is selected, programs in the **DCP552** that have the same number as those on the card are overwritten by the card programs.

When the "Skip" load function is selected, programs in the **DCP552** that have the same number as those on the card are left as they are and the next number is selected for processing.



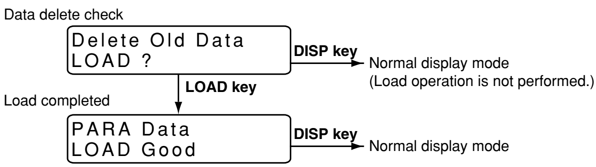
■ Loading setup data

This procedure loads setup data on the memory card onto the **DCP552**.



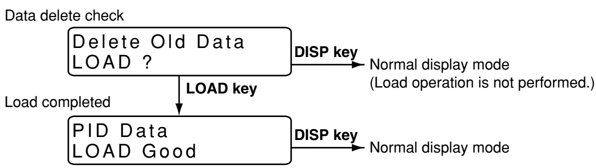
■ Loading variable parameters

This procedure loads variable parameters on the memory card onto the **DCP552**.



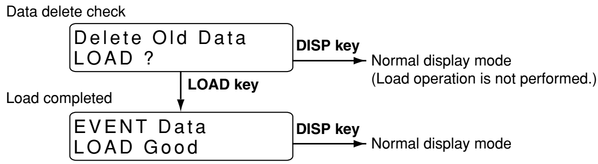
■ Procedures for loading PID parameters

This procedure loads PID parameters and constant value control data on the memory card onto the **DCP552**.



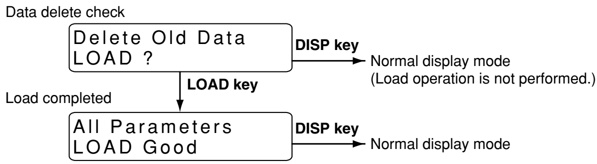
■ Loading event configuration data

This procedure loads event configuration data on the memory card onto the **DCP552**.



■ Loading all parameters

This procedure loads all parameters on the memory card onto the **DCP552**.



Handling Precautions

The **DCP552 Mark** Ⅱ and the old model, **DCP552**, differ in how some setup data items are processed and the range of variable parameter *PA15*. Thus the following changes have to be made when setup data, variable parameters or all parameters saved on a **DCP552** are loaded onto a **DCP552 Mark** Ⅱ.

- Setup data : *C21, C22, C45 to C50, C80, C90 to C97*
- Variable parameters : *PA15, PA25*

Setup data and all parameters stored on a **DCP552 Mark** Ⅱ cannot be loaded onto a **DCP552**. (A loading attempt generates card error 16.)

9 - 4 Autoload

Insert a memory card, press the **LOAD key** or use external switch inputs in the READY mode and the normal display mode to load file number 1 in CH1 and CH2 on the memory card as program 1 onto the **DCP552**.

■ Key operated autoload procedure

● Conditions

Memory card	: Program has been saved to file number 1
Variable parameter	: *PA05* set to 1
Mode	: READY mode, normal display mode

● Operation and action

Insert a memory card and press the **LOAD Key**.
The **DCP552** operates as follows.

- "*AUtO*" is displayed in display panel 1 and "*LOAd*" is displayed in display panel 1.
- When program number 1 has been loaded onto the **DCP552**, program number 1 disappears.
- File number 1 on a memory card is loaded onto the **DCP552** as program number 1.
- When a load operation is successful, the "*AUtO*" and "*LOAd*" indications go off and the normal display mode appears.
  Unless the number of a program is selected using external switch inputs, program 1 in segment 1 is selected.
- If the load operation fails, the "*AUtO*" and "*LOAd*" indications stay on and an error code is displayed in the message panel.
  When an error has occurred, press the **DISP key** to return to the normal display mode.

Handling Precautions

A normal load operation is not possible when variable parameter *PA05* is set to 1. A normal load operation requires that parameter *PA05* is set to 0.

■ Auto load using external switch inputs

● Conditions

Memory card : Program saved to file number 1
Setup data : any of *C71* to *C74* is set to 8 (autoload)
Mode : READY mode, normal display mode

● Operation and action

Insert a memory card and turn off the external switch used for autoload and turn it back on again.
The **DCP552** operates as follows.

- "*AUtO* " is displayed in display panel 1 and "*LOAd* " is displayed in display panel 2.
- When program number 1 has been loaded onto the **DCP552**, program number 1 disappears.
- File number 1 on a memory card is loaded onto the **DCP552** as program number 1.
- When a load operation is successful, the "*AUtO* " and "*LOAd* " indications go off and the normal display mode appears.
  Unless the number of a program is selected using external switch inputs, program 1 in segment 1 is selected.
- If the load operation fails, the "*AUtO* " and "*LOAd* " indications stay on and an error code is displayed in the message panel.
  When an error has occurred, press the **DISP key** to return to the normal display mode.

[!] Handling Precautions

Variable parameter *PA05* can be set to 1 or 0.

9 - 5 Error Message List

When an error occurs, error messages such as "Card Error-XX" (XX denotes error code) are displayed on the message panel during memory card operations. The table below lists the error codes and explain their meaning.
Memory card operations are aborted when an error occurs.
To return to the normal display mode, press the **DISP key**.

Code	Meaning	Remedial measures
1	Card insertion failure or card removed	Do over.
2	Card write protect	Replace the card, or reset the protect by SLP550.
3	Card read protect	Replace the card, or reset the protect by SLP550.
4	Bad card	Replace the card.
5	Invalid card format	Initialize the card.
6	Card data full	Erase unnecessary files, or initialize the card.
7	Card busy	Do over.
8	File write protect	Initialize the card.
9	Card access error	Do over.
11	Card access sequence error	Do over.
12	FAT abnormal	Initialize the card.
14	Card access sequence error (in file control)	Do over.
15	Card battery voltage drop (warning)	Replace the card, replace the card battery (If replaceable).
16	Wrong file version	Create new file, and create new data.
17	Data or file are missing.	Create new file, and create new data.
18	**DCP552** data full (program load)	Delete unnecessary programs in the **DCP552**.
19	**DCP552** hardware error (load error)	Do over.
20	Card data invalid	Do over.
21	Card data check sum error (program data)	Operate the instrument again, or check the program setting of the **DCP552**.
22 to 36	Card data check sum error (parameter data)	Operate the instrument again, or check the parameter setting of the **DCP552**.
37	Memory protect error (loading the data is protected by the variable parameter *PA02*.)	Set **DCP552** variable parameter *PA02* to 0 to cancel protection.
43	No alternate areas remain on the E^2PROM card	Replace the card.
44	Error occurred in writing to alternate area on E^2PROM card	Replace the card.
63	Card battery voltage drop (error)	Replace the card, replace the card battery (If replaceable).
64	File abnormal (card was removed)	Create new file, and create new data.

Chapter 10.MAINTENANCE AND TROUBLESHOOTING

10 - 1 Self-Diagnostic Functions and Alarm Code Displays

The **DCP552** is equipped with the self-diagnostic functions described below. Alarm codes and the result of self-diagnostics are listed on the following pages.

■ Maintenance

● Cleaning

If the device is dirty, wipe it with a soft dry cloth. Never use an organic solvent like benzene or thinner.

■ Power ON self-diagnostic routines

● RAM backup failures

This routine is designed to detect errors in the RAM backup function. When a failure is detected, a general reset is performed. No alarm code is displayed.

● Board configuration failures

This routine detects failures caused when boards (circuit boards) not designed to be used with the **DCP552**. Alarm codes are displayed when errors are detected.

■ Self-diagnostic routines performed each sampling cycle

● Analog input failures

Failures are detected when the analog input signal due to disconnection or other cause lies outside the –10.0 to +110.0% range.
Alarm codes are displayed when errors are detected.

■ Self-diagnostic routines performed continuously during operation

● PROM failures

This routine is designed to detect errors in system programs stored in the PROM. Not totally infallible, there are cases where errors go undetected and result in measuring device operation failure.
Alarm codes are displayed when errors are detected.

● Adjustment data failures

This routine detects errors in analog inputs and output adjustment data stored in non-volatile memory. Alarm codes are displayed when errors are detected.

● Program failures

This routine detects failures in program setting data stored in a backup RAM.
Alarm codes are displayed when errors are detected.

● Parameter failures

This routine detects failures in parameters stored in a backup RAM. Alarm codes are displayed when errors are detected.

● Low battery voltage

This routine detects low voltage conditions in the battery that backups RAM data.
The BAT LED on the console goes on when battery voltage is too low.

■ Alarm code display

The **DCP552** is designed to alternate display of the following alarm codes and normal display items in one-second intervals on display panel 1 when input failures or instrument system failures are detected.
In cases of multiple alarm codes, display of the codes is alternated with normal display items, starting in order from the alarm code with the smallest number.

■ Alarm classification

PV range alarm group : *AL01* to *AL04*
Measuring instrument alarm group : *AL90* to *AL99*, and battery voltage drop (In case of battery voltage drop, BAT LED of the console is flickered.)

Alarm code	Alarm name	Contents	Countermeasure
AL01	PV1 overrange	PV1 is more than 110%FS.	Check PV1.
AL02	PV1 underrange	PV1 is less than –10%FS.	
AL03	PV2 overrange	PV2 is more than 110%FS.	Check PV2
AL04	PV2 underrange	PV2 is less than –10%FS.	
AL07	Oxygen sensor impedance error	Oxygen sensor impedance exceeded 130Ω.	Replace the oxygen sensor.
AL90	Board configuration failure	Incorrect board configuration	Request the repair.
AL92	Adjustment value is abnormal.	Analog input/output adjustment data were broken.	Request the repair.
AL93	Setup data is abnormal.	Setup data were broken.	Check the setup data, and reset the data.
AL94	Variable parameter is abnormal.	Variable parameter were broken.	Check the variable parameter, and reset the data.
AL95	PID parameter is abnormal. (Fixed command control data is abnormal.)	PID parameter were broken.	Check the PID parameter, and reset the data.
AL96	Program data is abnormal.	Program data were broken.	Check the program data, and reset the data.
AL97	Event configuration data is abnormal.	Event configuration data were broken.	Check the event configuration data, and reset the data.
AL99	PROM is abnormal.	System program were corrupted.	Request the repair.

*1: When *AL90* is generated, the alarm code stays on and continued operation is disabled.

*2: Data checks performed by *AL93* and *AL97* may fail to detect corrupted data. When this happens, the alarm can be turned off by entering normal data.

■ Display behavior and alarm code upon input burnout

Display behavior (upscale/downscale) and alarm code upon input burnout differ depending on the input type.

Input type	Display behavior	Alarm code
Thermocouple	Upscale(110%)	*AL01* or *AL03*
Resistance temperature detector	Upscale(110%)	*AL01* or *AL03*
DC voltage 1V or less	Upscale(110%)	*AL01* or *AL03*
DC voltage 5V or more	Downscale(-10%)	*AL02* or *AL04*
DC current	Downscale(-10%)	*AL02* or *AL04*

10 - 2 Key Input Related Problems

Procedures to correct key input related problems are described below.

■ Normal display mode problems

● Modes and channels cannot be changed using keys

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.

● Program number does not start flashing when PROG key is pressed

Cause	Measure
Program selection of external switch input is not 0.	Turn off all external switch inputs SW9 to 14.
Not set to READY mode.	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to fixed command control mode.	Set fixed command control data *ConSt* setting to 0.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● RUN mode cannot be invoked with the RUN/HOLD key

Cause	Measure
Program selected in READY mode is unset. It is not possible to change to the RUN mode if CH1 and CH2 programs are not set in synchronous mode (variable parameter *PA04* set to 1)	Select the set program.
Set to END mode.	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● HOLD mode cannot be invoked with the RUN/HOLD key

Cause	Measure
Set to READY or FAST mode.	The HOLD mode is available from READY and FAST modes by pressing the **RUN key**. Press the **RUN/HOLD key** once again.
Set to END mode.	Perform a reset operation (press the **PROG**, **RUN** and **HOLD keys**). Invoke the READY mode and perform a RUN operation (press the **RUN/HOLD key**) to go to the RUN mode.
Set to fixed command control mode.	Set fixed command control data *ConSt* to 0.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● RESET is not possible with the PROG, RUN and HOLD keys.

RESET is available in the READY program run mode and returns operations to the first segment.

Cause	Measure
Set to READY mode.	Perform a RUN operation (press the **RUN/HOLD key**) to go to the RUN mode. (A reset operation can also be performed in the READY mode using external switch inputs or transmission.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● **ADV cannot be invoked with PROG and DISP keys**

Cause	Measure
Set to READY mode.	Perform a RUN operation (press the **RUN/HOLD key**) to go to the RUN mode. (ADV operation can be performed in the READY mode with external switches or through transmission.)
Set to END mode.	Perform a reset operation (press the **PROG**, **RUN** and **HOLD keys**). Invoke the READY mode and perform a RUN operation (press the **RUN/HOLD key**) to go to the RUN mode.
Set to fixed command control mode.	Set fixed command control data *ConSt* setting to 0.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● **FAST mode cannot be invoked with FUNC and → keys**

Cause	Measure
Set to program time unit as 0.1 sec.	Set 0 or 1 setup data *C62* setting.
Set to END mode.	Perform a reset operation (press the **PROG**, **RUN** and **HOLD keys**). Invoke the READY mode and perform a RUN operation (press the **RUN/HOLD key**) to go to the RUN mode.
Set to fixed command control mode.	Set fixed command control data *ConSt* setting to 0.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● **MANUAL mode cannot be invoked with A/M key**

Cause	Measure
On-off control is set in *P* setting = 0.0.	Set the *P* setting for a currently used PID group to something other than 0.0 to switch from ON-OFF control to PID control.
On-off control is set with segment PID group number = on-off.	Set the segment PID group number between 1 to 9 or to A to switch to PID control.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● **AUTO mode cannot be invoked with A/M key**

Cause	Measure
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

● **Autotuning (AT) cannot be started with AT key**

Cause	Measure
Set to READY mode. (With variable parameter *PA08* and *PA93* setting = 1 or 2)	Set RUN mode to execute RUN operation (**RUN/HOLD key**).
Set to except READY mode. (With variable parameter *PA08* and *PA93* setting = 3 or 4)	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to MANUAL mode.	Set AUTO mode to execute AUTO operation (**A/M key**).
PV overrange.	Connect PV input correctly to obtain normal input conditions.
AT is set to off	Set variable parameter *PA08* and *PA93* to something other than 0.
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

- **Autotuning cannot be canceled with AT key**

Cause	Measure
Set to key lock.	Set variable parameter *PA01* between 0 to 2.

- **PID parameter setting state cannot be invoked with PID key**
- **Event configuration setting state cannot be invoked with FUNC and PARA keys**

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.
Set to key lock.	Set variable parameter *PA01* to 0 or 1.
The programmer function is set.	Set setup data *C21* to any value other than 0.

- **Setup data setting state cannot be invoked with SETUP key**

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.
Mode other than READY	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to key lock.	Set variable parameter *PA01* to 0.

- **Constant value control data setting state cannot be invoked with FUNC and PID keys**

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.
Mode other than READY	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to key lock.	Set variable parameter *PA01* to 0 or 1.

- **Program setting state cannot be invoked with FUNC and PROG keys**

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.
Set to fixed command control mode.	Set fixed command control data *ConSt* setting to 0.
Set to key lock.	Set variable parameter *PA01* to 0 or 1.

- **Program copy is not possible with ↑ and PROG keys**

Cause	Measure
Mode other than READY	Press **DISP key** to invoke normal display mode.
Set to be except READY mode.	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Program selected in READY mode is unset.	Select number of a set program.
Fixed command control mode is on.	Set fixed command control data *ConSt* to 0.
Program protected	Set variable parameter *PA02* to 0, 2 or 4.
Set to key lock.	Set variable parameter *PA01* to 0.

- **General reset is not possible with FUNC, CLR and MESSAGE keys**

Cause	Measure
Normal display mode not on	Press **DISP key** to invoke normal display mode.
Mode other than READY mode	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Set to MANUAL mode.	Set AUTO mode to execute AUTO operation (**A/M key**).
Set to memory protect.	Set variable parameter *PA02* to 0.
Set to key lock.	Set variable parameter *PA01* to 0.

■ Parameter setting related problems

- **Registration state cannot be invoked with ENTER key**

Cause	Measure
----- displayed in display panel 2	This item cannot be displayed or set. To change setting connection item, it may be able to change or set.
Data displayed in display panel 2 cannot be changed.	This item is display only.
Set to memory protect.	Set variable parameter *PA02* to 0.

■ Program setting related problems

- **Registration state cannot be invoked with ENTER key**

Cause	Measure
Set to memory protect.	Set variable parameter *PA02* to 0, 2 or 4.

- **Item changes cannot be made with ↑ and ↓ keys**

Cause	Measure
Not pattern item set.	Set SP and time data.

- **SP values in program settings cannot be changed with ↑ and ↓ keys**

Cause	Measure
SP limit sets error value.	Set correct value for setup data *C66*, *C67*, *C69* and *C70*.

- **Event items cannot be displayed with ↑ and ↓ keys**

Cause	Measure
Event type is something other than segment type.	Set the event type in the event configuration data to a value between 1 and 23.
No event has been assigned to selected channel.	Set correct value for setup data *C64*.
Programming item sets no display.	Set setup data *C57* to 0.

- **PID group, output limiter group number items cannot be displayed with ↑ and ↓ keys**

Cause	Measure
Programming item display off	Set setup data *C58* to 0.

- **G.SOAK items, PV shift items and repeat items cannot be displayed with ↑ and ↓ keys**

Cause	Measure
Programming item display off	Set setup data *C59* to 0.

- **PV start items, cycle items and pattern link items cannot be displayed with ↑ and ↓ keys**

Cause	Measure
Programming item display off	Set setup data *C60* to 0.

- **Segment insertion and deletion cannot be confirmed with FUNC and ENTER keys**

Cause	Measure
Set to memory protect.	Set variable parameter *PA02* to 0, 2 or 4.
Program being set is running (in RUN, HOLD, FAST, END, READY FAST).	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).
Not set to pattern item on programming map.	Move to the pattern item on the programming map.
This segment is not set on the programming map.	Move to a set segment or set the segment.

- **Program deletion cannot be confirmed with FUNC and ENTER keys during pattern item registration**

Cause	Measure
Program being set is running (in RUN, HOLD, FAST, END, READY FAST).	Set READY mode to execute RESET operation (**PROG + RUN/HOLD keys**).

10 - 3 When the BAT LED Flashes

Handling Precautions

Batteries that have been stored for long periods have been subject to self-discharge and have a short service life. If required, buy new batteries.

■ BAT LED flashes

The BAT LED starts flashing when low battery voltage is detected. The voltage level set in memory that trigger the LED is higher than minimum level required for storing data.
Thus data loss is thus not imminent when the LED starts flashing.
Note, however, that memory data corruption has probably occurred when the BAT LED starts flashing at power up after the **DCP552** has been stored for long periods disconnected from the power line.

■ Replacing the battery

Parameter settings and program settings are stored in RAM memory. The RAM is backed up by a battery and data persist through a power down. When the battery is depleted, turning off the **DCP552** causes the data stored in RAM to be lost.

⚠CAUTION

Be sure to turn off the power supply when you are replacing the batteries. Failure to heed this warning may lead to electric shock.

Be sure not to touch internal components during battery replacement or just after the power has been turned. This may result in burn injuries.

- Make sure that the batteries are inserted with the plus (+) and minus (–) poles correctly oriented.
- Do not use damaged batteries or batteries that leak.
- Do not throw batteries into a fire, recharge, disassemble or expose them to heat.
- Store batteries in a cool, dry place.

Failure to heed these cautions may result in burns or battery leakage.

Batteries should be kept out of reach of children, since they may swallow them. Should a child swallow a battery, contact a doctor immediately.

Do not throw used batteries into a fire or discard them as general garbage.

Before you touch internal components, be sure to discharge any static electricity on your body by touching a metal ground connector. Failure to heed this caution may lead to equipment damage.

● Items to be provided by the user

- Phillips screwdriver
- New lithium battery: model number 81446140-001

● **Battery replacement procedures**

Handling Precautions

- Replace the old battery with a lithium battery (model no.:81446140-001). Batteries can be ordered from Azbil Corporation sales or service office.
- Do not use metal tools to remove or attach battery connectors as this could short-circuit electric circuits inside.
- A capacitor backs up the memory during battery replacement. To charge this capacitor, supply power to the **DCP552** for about 10 minutes. Replace the battery less than 24 hours after the power supply has been turned off.

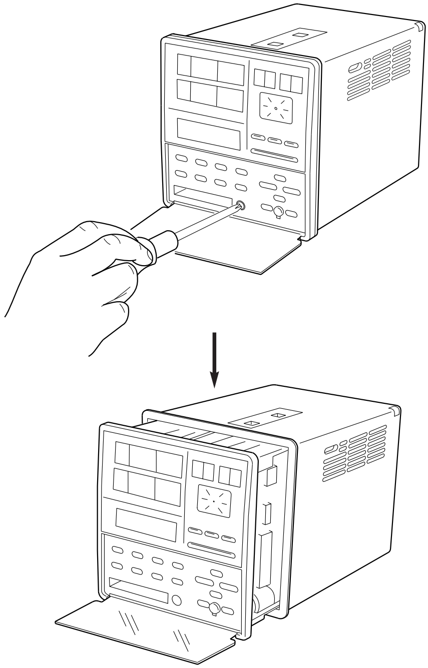
When the BAT LED starts flashing, replace the battery according to the following instructions.

(1) Leave the power on for 10 minutes.

(2) Turn off the power.

(3) Open the console key cover and remove the lock screw under the **ENTER key** using a Phillips screwdriver.

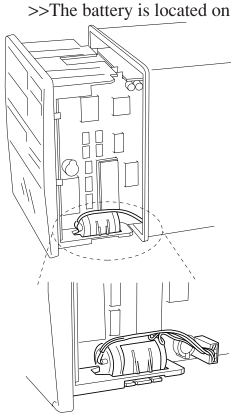
>> Slide the controller out of the case.



(4) To prevent static discharges, remove all static electricity from your body.

(5) Slide the controller completely out of the case.

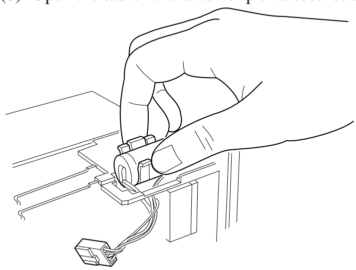
>>The battery is located on the right side as seen from the front of the controller.



(6) Place the controller on a desk upside-down so that the battery is easily accessible.

(7) Disconnect the connectors.

(8) Open the tab on the black clip that secures the battery and lift out the battery.



(9) Remove the old battery from the clip.

(10) Insert the new battery in the clip.

(11) Orient the positive pole of the battery forwards and press the clip with the battery into the square opening.

(12) Insert the connectors in the printed circuit board.

(13) Slide the controller back into the case.

(14) Open the key cover and firmly tighten the lock screw under the **ENTER key** using a Phillips screwdriver.

(15) When all procedures have been completed, affix a label giving the date when the battery should be replaced next time in an easy to see location on the controller.

(16) Turn on the power to make sure that the BAT LED does not go on.

Note

- Guidelines for battery service life are given below.
  When the **DCP552** is stored with the power off under standard conditions (ambient temperature 23±2°C): 5 years
  When the **DCP552** is stored with the power on under standard conditions (ambient temperature 23±2°C): 10 years
  Battery life is reduced when stored at higher temperatures.
- When the BAT LED is flashing, memory data is protected if the power is on.
- When the data in memory is corrupted, one of the following two conditions will occur.

  (1) "*g.rESt*" is displayed at power up and normal operation is not possible. (Press the **ENTER key** to perform a general reset and reset parameters to their factory default values and delete all program settings.)
  (2) Normal operation can be started at power up but one of the alarm codes *AL93* to *AL97* are displayed.

10 - 4 External Switch Operation Problems

● **RUN mode cannot be started with SW1**

Cause	Measure
Program pattern is not set on one channel.	Change the ON/OFF settings of SW15 and SW16 so that the unset channel is disabled. For details, see "External switch input" on page 6-12.
	Set a program pattern on both channels.

● **Program cannot be correctly selected with SW9 to SW14**

Cause	Measure
The setting for BCD/binary bits does not match the external switch operation.	Make sure the external switch input matches the C75 setup data setting. For details, see "External switch input" on pages 6-12 and 6-13.

Chapter 11. DISPOSAL

When discarding, remove the battery and dispose of both the product and the battery as industrial waste, following local regulations.

- **Battery removal method**

  See ■ Replacing the battery in Chapter 10. MAINTENANCE AND TROUBLESHOOTING of this user's manual.

Chapter 12. SPECIFICATIONS

12 - 1 Specifications

Item		Specifications
Program section	No. of programs	49 programs x 2 channels
	No. of segments	99 segments/1 program, or a total of 2000 segments
	Segment setting system	RAMP-X: Setting by set points (SP) and time. RAMP-T: Setting by set points (SP) and slope (θ). RAMP-E: Setting by set points (SP) or ΔSP per pulse of external switch input.
	Segment time	0 to 500 hours 00 min, 0 to 500 min 00sec, or 0.0 to 3000.0sec (Time unit is switchable.)
	Segment slope	1 to 10000U/hours, 1 to 10000U/min, or 1 to 10000U/sec (Time unit is switchable.)
	Segment ΔSP	1 to 10000U/1 pulse
	No. of sub-function	4000 settings
	Sub-function function	Event, PID group, output limiter group, G.SOAK, PV shift, repeat
	Event (16 point)	Operating point set as specified by event type.
	PID group setting	Group 0 (continuing from previous segment), groups 1 to 9, group A (automatic changeover) and ON-OFF control settable.
	Output limiter group	Group 0 (continuing from previous segment), groups 1 to 9 settable
	G.SOAK	Type (start point, end point, all) and G.SOAK width 0 to 1000U settable
	PV shift	–10000 to +10000U settable
	Repeat	Return segment number and repeat count settable.
	PV start	Type settable for each program (ascending, descending and bi-directional)
	Cycle	Cycle count number settable for each program
	Pattern link	Program numbers 0 to 49 (program 0 without link) settable for each program
	Tag	8 characters consisting of alphanumerics, katakana and symbols settable for each program
	Basic time accuracy	±0.01% (segment time setting = 0, repeat; each cycle and repeat slows the process by 0.1sec)
Input section	Input type	Thermocouple: K,E,J,T,B,R,S (JIS C1602-1981) WRe5-26 (Hoskins Data) PR40-20 (Johnson Matthey Data) N (N.B.S. Monograph 161) PLII (Engelhard Industries Data (IPTS68)) Ni-NiMo (General Electric Data) Gold iron chromel (Hayashidenko Data) Resistance temperature detector (RTD): Pt100,JPt100 (JIS C1604-1989) DC current: 4 to 20mA, 2.4 to 20mA DC voltage: 0 to 10mV, -10 to +10mV, 0 to 100mV, 0 to 1V, -1 to +1V, 1 to 5V, 0 to 5V, 0 to 10V O_2 sensor: PV2 in models with carbon potential compensation is tied to the O_2 sensor. Multi-range of thermocouple, resistance temperature detector, DC voltage, and DC current(see page 2-8).
	Input sampling cycle	0.1s
	Input bias current	Thermocouple, DC voltage input: Max. ± 1.3µA (peak value, under standard conditions). The range higher than 1V is Max. –3µA.
	Input impedance	DC current input: approx. 50Ω (under operating conditions)
	Measurement current	RTD input: approx. 1mA, Current input on terminal A. (under operating conditions)
	Influence of wiring resistance	Thermocouple, DC voltage input: Thermocouple : 0.5µV/Ω DC voltage (lower than 1V range) : 0.5µV/Ω DC voltage (5V range) : 3µV/Ω DC voltage (10V range) : 6µV/Ω Resistance temperature detector input: Max. ± 0.01% FS/Ω within wire resistor 0 to 10Ω The ranges of F01, F33, P01, and P33 are Max. ± 0.02% FS/Ω.
	Allowable wiring resistance (Resistance temperature detector input)	• The ranges except F01, F33, P01, and P33 are lower than 85Ω. • The ranges of F01, F33, P01, and P33 are lower than 10Ω.
	Allowable parallel resistance	Thermocouple disconnection detection allowable parallel resistance : Higher than 1MΩ
	Max. allowable input	Thermocouple, DC voltage input:–5 to +15V dc DC current input : 50mA dc, 2.5V dc

Item		Specifications
Input section	Burn out	Burnout on/off selectable
	Range over assessment	100% FS or more: upscaled –10% FS or less : downscaled (However, inputs in the F50 range are not downscaled.)
	Cold junction compensation accuracy	± 0.5˚C (under standard conditions)
	Cold junction compensation system	Internal or external compensation (at 0˚C) selectable
	Scaling	–19999 to +20000U (Only linear input settable. Reverse scaling and optional decimal point position settable.)
	Root extraction	Drop out 0.2 to 10.0%. DC current and DC voltage range settable.
	PV equalizer (linearization)	PV1: 9 brend lines (10 settings) PV2: 9 brend lines (10 settings) CP : 9 brend lines (10 settings)
	Input bias	–1000 to +1000U variable
	Digital filter	0.0 to 120.0sec variable (0.0: Filter off)
External switch input section	Number of input point	16 points
	Connectable output type	No-voltage contact (relay contact), and open collector (sink current toward 0V)
	Open terminal voltage	8.5V ± 0.5V during common terminal ((12) and (40) terminals) and every input terminal (under operating conditions)
	Terminal current in case of short circuit	Current to run every terminal is about 6mA (under operating conditions)
	Allowable contact resistance (no-voltage contact)	On condition: Lower than 250Ω (under operating conditions) Off condition: Higher than 100 kΩ (under operating conditions)
	Allowable residual current (open collector ON)	Lower than 2V (under operating conditions)
	Leakage current (open collector OFF)	Lower than 0.1mA (under operating conditions)
	Parallel connection to other instrument	Connectable with Azbil Corporation SDC40 or SDC10 series
	Allocation (fixed)	RUN, HOLD, RESET, ADV, program number, CH1 and CH2 operation canceled
	Allocation (variable)	RAMP-E, FAST, AT, AUTO/MANUAL, G.SOAK reset, auto load, O_2 sensor check
	Input sampling cycle	0.1s
	On detection Min. hold time	0.2s (program number is 0.4s)
Display and setting section	Display panel 1	Digital 5 digits, 7 segments, green Indicates PV and other data in basic display status, indicates an item code in parameter setting status.
	Display panel 2	Digital 5 digits, 7 segments, orange Indicates SP, output %, and other data in basic display status, indicates a set point of item in parameter setting status.
	Program number display	Digital 2 digits, 7 segments, green Indicates a program number in basic display status.
	Segment number display	Digital 2 digits, 7 segments, green Indicates a segment number in basic display status, indicates a item number in parameter setting status. Indicates an alarm code number when an alarm occurs.
	Message display panel	Indicates output graph, deviation graph, event status, program tag, and other data in basic display status, Displays reference messages during parameter and program settings. Indicates operations and operation results during memory card operation.
	Profile display	7 flat LED, orange Indicates the rising, soaking, and falling tendencies of program pattern.
	Each status display	22 flat LED Mode : RUN, HLD, MAN, PRG (green) Display contents: PV, SP, OUT, TM, CYC, SYN, DEV (green), EG1, EG2 (red) Battery voltage : BAT (red) (flickers when the battery voltage has dropped.) Status : AT (green)
	Operating keys	18 rubber keys (DCP552A***** model), 16 rubber keys (DCP552B***** model)
	Loader connection port	1 (Using exclusive connection cable, stereo pin jack)

Item		Specifications	
Mode	Program run mode	READY : Preparation state (control stop, select of program number is possible.) RUN : Advancing run state HOLD : Hold run state FAST : Fast feed run state END : End point run state READY FAST : Preparation and the fast feed state	
		AUTO : Automatic run state MANUAL : Manual run state (output is operatable to console)	
	Fixed command control mode	READY : Preparation state (control stop) RUN : Run state	
		AUTO : Automatic run state MANUAL : Manual run state (Enables manual output from system console.)	
Control section	PID control	Proportional band (P)	0.0 to 1000.0% (0.0: On-off control)
		Integral time (I)	0 to 3600s (0: PD control)
		Derivative time (D)	0 to 1200s (0: PI control)
		Manipulated variable limit	Low-limit : –5.0% to high-limit High-limit : Low-limit to +105.0%
		Manual reset	0.0 to 100.0%
		No. of PID groups	16 groups for program operation (9 segment specific and 7 automatic zone selecting)
		PID groups selection	Segment specified, automatic zone selectable during program run
		Manipulated variable change	0.1 to 110.0%/0.1s
		Auto tuning	Automatic setting of PID value by limit cycle method
		On-off control differential	0 to 1000U
	Normal reverse operation selection	Selection is settable	
Output section	Auxiliary output	Type	SP1, PV1, deviation 1, MV1, SP2, PV2, deviation 2, O_2 sensor mV value
		Scaling	Possible
	Current output (5G) CH1,CH2 Auxiliary output CH1, CH2	Output current : 4 to 20mA dc Allowable load resistance : Lower than 600Ω (under operating conditions) Output accuracy : Lower than ± 0.1% FS (under standard conditions) Output resolution : 1/10000 Max. output current : 21.6mA dc Min. output current : 2.4mA dc Output update cycle : 0.1s Open time terminal voltage : Lower than 25V	
	Voltage output (6D) CH1,CH2	Allowable load resistance : Lower than 600Ω (under operating conditions) Load current adjustment : 2 to 22mA variable Open time terminal voltage: Lower than 25V Off time leakage current : Lower than 100μA Output response time : Lower than 0.5ms on to off at 600Ω load Lower than 0.5ms off to on at 600Ω load Output resolution : 1/1000 Time proportional cycle : 1 to 240s variable	

Item		Specifications	
Output section	Open collector output (8D) CH1,CH2	External supply voltage : 12 to 24V dc Max. load current : 100mA/point Off time leakage current : Lower than 0.1mA On time residual voltage : Lower than 2V Output resolution : 1/1000 Time proportional cycle : 1 to 240s variable	
Event output section	Open collector output	External supply voltage : 12 to 24V dc Max. load current : 70mA/point Max. common current : 500mA Off time leakage current : Lower than 0.1mA On time residual voltage : Lower than 2V	
	Event type	PV-based	PV, deviation, deviation with standby, absolute value deviation, absolute value deviation with standby, PV deviation rate, SP, MV, G.SOAK absolute value deviation, G.SOAK absolute value deviation with standby, normal PV1 operation, normal PV2 operation
		Time-based	Time event, RAMP-E time monitoring, segment time, program time
		Code-based	Code event, timer-bearing code event, program number binary code, segment number binary code, program number BCD code, segment number BCD code
		Mode-based	Specified segment, RUN + HOLD + END + FAST, HOLD, READY + READY FAST, END, G.SOAK wait, MANUAL, AT execution, FAST + READY + FAST, console operation, RUN, advance, all alarm, PV range alarm, O_2 sensor error, voltage drop
	Event hysteresis	Set 0 to 1000U with PV-based	
	Event on delay	0.0 to 3000.0 are settable for 4 point event	
Communi-cation	RS-485	Network	Multidrop (**DCP552** provided with only slave node functionality.) 1 to 16 units max. (DIM), 1 to 32 units max. (CMC, SCM)
		Data flow	Half-duplex
		Sync. system	Start-stop sync.
		Transmission system	Balanced type (differential)
		Data line	Bit serial
		Signal line	Transmit and receive 5 lines (3 wires are connectable)
		Communication speed	1200, 2400, 4800, 9600 bps selectable
		Communication distance	Max. 500m (sum total) 300m in case of MA500 DIM connection
		Others	Conforms to RS-485 standard
		Character composition	11 bits/characters
		Format	1 start bit, even parity, 1 stop bit or 1 start bit, no parity, 2 stop bits
		Data length	8 bits
		Isolation	All inputs and outputs except external switch inputs are completely isolated.
	RS-485 communications can be performed by connecting to a computer equipped with an RS-485 interface or to Azbil Corporation's MX200, MA500 (DK link II DIM) or CMC10 controllers.		

Item		Specifications	
Communication	RS-232C	Network	Point to point; (**DCP552** provided with only slave node functionality.)
		Information direction	Half-duplex
		Sync. system	Start-stop sync.
		Transmission system	Not-balanced type
		Data line	Bit serial
		Signal line	Transmit and receive 3 lines
		Communication speed	1200, 2400, 4800, 9600 bps selectable
		Communication distance	Max. 15 m
		Others	Conforms to RS-232C standard
		Character composition	11 bits/characters
		Format	1 start bit, even parity, 1 stop bit or 1 start bit, no parity, 2 stop bits
		Data length	8 bits
		Isolation	All inputs and outputs except external switch inputs are completely isolated
Memory card (Available on the DCP552A***** model only)	Programs, PID, various parameters (SET UP, PARA, events) and other data can be saved or loaded using memory card (optional).		
	Save (SAVE)	Copies **DCP552** data into a card	
	Load (LOAD)	Loads data from a card into the **DCP552**	
	Memory card (optional)		

Model No.	Memory type	Capacity bytes	No. of programs	Battery exchange	Parameters
SKM008A	RAM	7.00K	Max. 10	Not provided	Setup data
SKM016A	RAM	14.50K	Max. 26	Not provided	Variable parameter
SKM064A	RAM	61.75K	Max. 49	Not provided	PID parameter
SKM256C	RAM	251K	Max. 49	Provided	Event configuration data
SKM008E	EEPROM	7.00K	Max. 10	Not necessity	Constant value control data
SKM032E	EEPROM	29.75K	Max. 49	Not necessity	

- No. of bytes per program is 26 + (5 x No. of segments) + (5 x No. of sub-functions)
- No. of bytes per parameters is as specified below.
  Setup data : 217 bytes (17 + 2 x 100)
  Variable parameters : 257 bytes (17 + 2 x 120)
  PID parameters +constant value control data : 565 bytes (17 + 2 x 2 x 8 x 16 + 2 x 2 x 9)
  Event configuration data : 209 bytes (17 + 2 x 3 x 32)

Item		Specifications
General specifications	Memory backup	Memory battery service life Battery backed up RAM **DCP552** power off: approx. 5 years under standard conditions **DCP552** power on: approx. 10 years under standard conditions
	Rated power supply voltage	100 to 240V ac, 50/60Hz
	Power consumption	Lower than 40VA
	Rush current when power supply turns on	Lower than 50A
	Action when power supply turns on	Reset time: 10s max. (time until normal operation possible under normal operating conditions)
	Service interruption dead time	Lower than 20ms (under operating conditions)

Item			Specifications
General specifications	Insulated resistor	Higher than 50MΩ under DC 500V megger during power supply terminal (39) or (40) and FG terminal ((52) or (53))	
	Withstand voltage	1500V AC 50/60Hz for 1 min across power terminal and frame ground terminal Note: Primary and secondary sides are capacitive coupled inside the **DCP552**. Thus disconnect the ground wire from the secondary side terminal (for example, when using a grounded thermocouple) before performing a withstand voltage test. Failure to do so may result in equipment damage.	
	Standard conditions	Ambient temperature	23 ± 2°C
		Ambient humidity	60 ± 5% RH
		Rated power supply voltage	105V AC ±1%
		Power supply frequency	50 ± 1Hz or 60 ± 1Hz
		Vibration resistance	0m/s²
		Shock resistance	0m/s²
		Mounting angle	Reference plane (vertical) ±3°
	Operating conditions	Ambient temperature range	0 to 50°C (the ambient temperature at the bottom of the case when hermetically sealed inside case)
		Ambient humidity range	10 to 90% RH (without-condensation)
		Rated power supply voltage	100 to 240V AC
		Allowable power supply voltage	90 to 264V AC
		Power supply frequency	50 ± 2Hz or 60 ± 2Hz
		Vibration resistance	0 to 1.96m/s² (10 to 60Hz in X, Y, Z directions for 2 hours)
		Shock resistance	0 to 9.80m/s²
		Mounting angle	Reference plane (vertical) ±10°
		Altitude	2000m max.
	Transportation and storage conditions	Ambient temperature range	-20 to +70°C
		Ambient humidity range	10 to +95% RH (without-condensation)
		Vibration resistance	0 to 4.90m/s² (10 to 60Hz in X, Y, Z directions for 2 hours each)
		Shock resistance	0 to 490m/s² (in vertical direction, 3 times)
		Package drop test	Drop height 60cm (Free drop at 1 corner, 3 edges, 6 faces)
	Terminal screw	M3.5 self-up screw	
	Terminal screw tighten torque	0.78 to 0.98N·m	
	Mask and case material	Mask : Multiron Case : Multiron	
	Mask and case color	Mask : Dark gray (Munsell 5Y3.5/1) Case : Light gray (Munsell 2.5Y7.5/1)	
	Mounting	Panel flush-mount	
	Mass	Approx. 1.5kg	
	Standards compliance	EN61010-1, EN61326-1 (For use in industrial locations) During EMC testing, the reading or output may fluctuate by ±10 %FS. However, PV reading is within ±30 %FS.	

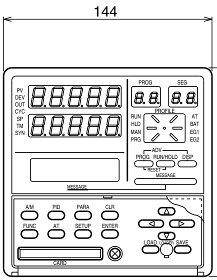
■ Attachment/auxiliary devices list

	Article name	Model No.	Quantity
Standard attachment	Engineering unit indicator label		1
	Mounting bracket	81446044-001	1 group (2 pcs.)
	Terminal cover	81446176-001	
Auxiliary devices and others (Optional)	Lithium battery set	81446140-001	
	Memory card (RAM, battery not replaceable)	SKM008A SKM016A SKM064A	Available on the DCP552A***** model only
	Memory card (RAM, battery replaceable)	SKM256C	
	Memory card (EEPROM, no battery required)	SKM008E SKM032E	
	DCP552 MarkII User's Manual	CP-SP-1033E	
	DCP551/552 program work sheet	CP-SP-1002E	

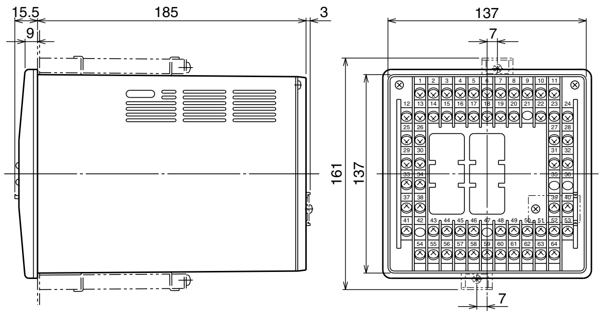
12 - 2 External Dimensions

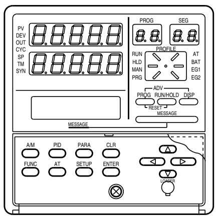
■ DCP552

Unit : mm



DCP552A***** console





DCP552B***** console

DCP551/552 Program Work Sheet   Program No.   Preparation date: Equipment name: Product name :

[Pattern graph]

SP
(Unit :   )

Time (Unit: hr-min, min-sec, 0.1sec)

[Programming Map]

Program contents	Segment item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pattern	(1)SP																				
	(2)Time,θ, SP																				
Event 1	(1)																				
( )	(2)																				
Event 2	(1)																				
( )	(2)																				
Event 3	(1)																				
( )	(2)																				
Event 4	(1)																				
( )	(2)																				
Event 5	(1)																				
( )	(2)																				
Event 6	(1)																				
( )	(2)																				
Event 7	(1)																				
( )	(2)																				
Event 8	(1)																				
( )	(2)																				
Event 9	(1)																				
( )	(2)																				
Event 10	(1)																				
( )	(2)																				
Event 11	(1)																				
( )	(2)																				
Event 12	(1)																				
( )	(2)																				
Event 13	(1)																				
( )	(2)																				
Event 14	(1)																				
( )	(2)																				
Event 15	(1)																				
( )	(2)																				
Event 16	(1)																				
( )	(2)																				
PID group or Output limiter group	(1)PID group																				
	(2)Output limiter group																				
G.SOAK	(1)Type																				
	(2)Count																				
PV shift	Shift value																				
Repeat	(1)Return segment																				
	(2)Count																				

PV start	Type	
Cycle	Count	
Pattern link	Link destination program	
Tag	8-character tag	

DCP552 Parameter Work Sheet

User name	:	Preparation date	:
Equipment name	:	Product name	:
Model No.	:**DCP552**	Tag name	:
Instrumentation staffer in charge	:	Business staffer in charge	:

■ Variable parameter setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*PA 01*	Key lock	0		0 : Keylock disabled 1 : Display of setup data settings disabled 2 : Display of all settings disabled 3 : Display of all settings disabled. Operation keys disabled.
2	*PA 02*	Memory protect	0		0 : Disabled 1 : Program settings are protected. 2 : Setup, variable parameters and event configuration settings are protected. 3 : Setup, variable parameters, event configurations and program settings are protected. 4 : Setup, variable parameters, event configurations and PID parameter settings are protected. 5 : Program settings and all parameter settings are protected.
3	*PA 03*	Display channel setting	0		0 : 2 items are displayed for the selected CH 1 : Simultaneous 2CH display of the same item
4	*PA 04*	Synchronous 2 channel operation	1		0 : asynchronous 1 : synchronous
5	*PA 05*	Program auto load *	0		0 : OFF 1 : ON
8	*PA 08*	Auto-tuning (CH1)	0		0 : AT not performed 1 : Standard AT performed on currently used PID group in mode other than READY mode 2 : AT writing overshoot-proof PID values to currently used PID groups in mode other than READY mode performed 3 : Standard AT performed on PID groups A1 to A7 in READY mode 4 : AT writing overshoot-proof PID values to PID groups A1 to A7 in READY mode continuously performed
9	*PA 09*	Auto-tuning MV lower limit (CH1)	0.0		–5.0 to upper limit %
10	*PA 10*	Auto-tuning MV higher limit (CH1)	100.0		Lower limit to +105%
11	*PA 11*	SP bias (CH1)	0 SPU		–10000 to +10000 SPU (CH1)
12	*PA 12*	PV digital filter (CH1)	0.0		0.0 to 120.0sec
13	*PA 13*	PV bias (CH1)	0 PVU		–1000 to +1000 PVU(PV1)
14	*PA 14*	Manipulated variable deviation limit (CH1)	110.0		0.1 to 110.0% OUT / 0.1sec
15	*PA 15*	Time proportional output cycle (CH1)	10		1 to 240sec
16	*PA 16*	On-off control differential (CH1)	50 SPU		0 to 1000 SPUm (CH1)
17	*PA 17*	PID computation initialize manipulated variable (CH1)	0.0		–5.0 to +105.0%
21	*PA 21*	SP bias (CH2)	0		-10000 to +10000 SPU (CH2)
22	*PA 22*	PV digital filter (CH2)	0.0		0.0 to 120.0sec
23	*PA 23*	PV bias (CH2)	0 PVU		–1000 to +1000 PVU(PV2)
24	*PA 24*	Manipulated variable deviation limit (CH2)	110.0		0.1 to 110.0% OUT/0.1 sec
25	*PA 25*	Time proportional output cycle (CH2)	10		1 to 240sec
26	*PA 26*	ON-OFF control differential (CH2)	50		0 to 1000 SPU (CH2)
27	*PA 27*	PID computation initialize manipulated variable (CH2)	0.0		-5.0 to +105.0%
31	*PA 31*	Group 1 event number	0		0 to 16 (0: No delay is specified.)
32	*PA 32*	Group 1 delay time	0.0		0.0 to 3000.0sec
33	*PA 33*	Group 2 event number	0		0 to 16 (0: No delay is specified.)
34	*PA 34*	Group 2 delay time	0.0		0.0 to 3000.0sec
35	*PA 35*	Group 3 event number	0		0 to 16 (0: No delay is specified.)

* : This function is available on the DCP552A***** model only.

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
36	*PA 36*	Group 3 delay time	0.0		0.0 to 3000.0sec
37	*PA 37*	Group 4 event number	0		0 to 16 (0: No delay is specified.)
38	*PA 38*	Group 4 delay time	0.0		0.0 to 3000.0sec
39	*PA 39*	FAST ×	0		0 : 2 × 1 : 10 × 2 : 60 × 3 : 120 ×
40	*PA 40*	CP computation for temperature compensation	0		-1000 to +1000 PVU (CH1)
43	*PA 43*	PID operation initialize (CH1)	0		0 : No initialization during advance processing and PID group change 1 : Initializes during advance processing but not during PID group change. 2 : No initialization during advance processing but initializes during PID group change. 3 : Initializes both during advance processing and PID group change.
44	*PA 44*	PV2 message display mode	0		0 : CP or PO_2 display 1 : mV value display 2 : O_2 sensor impedance value display
45	*PA 45*	G.SOAK time (CH1)	2.0		0.1 to 60.0sec
46	*PA 46*	G.SOAK time (CH2)	2.0		0.1 to 60.0sec
51	*PA 51*	PV1 equalizer compensation point No. 1	Range lower limit value		PV1 range lower limit value (tied)
52	*PA 52*	PV1 equalizer compensation amount No. 1	0 PVU		–1000 to +1000 PVU(PV1)
53	*PA 53*	PV1 equalizer compensation point No. 2	500 PVU		–19999 to +20000 PVU(PV1)
54	*PA 54*	PV1 equalizer compensation amount No. 2	0 PVU		–1000 to +1000 PVU(PV1)
55	*PA 55*	PV1 equalizer compensation point No. 3	1000 PVU		–19999 to +20000 PVU(PV1)
56	*PA 56*	PV1 equalizer compensation amount No. 3	0 PVU		–1000 to +1000 PVU(PV1)
57	*PA 57*	PV1 equalizer compensation point No. 4	1500 PVU		–19999 to +20000 PVU(PV1)
58	*PA 58*	PV1 equalizer compensation amount No. 4	0 PVU		–1000 to +1000 PVU(PV1)
59	*PA 59*	PV1 equalizer compensation point No. 5	2000 PVU		–19999 to +20000 PVU(PV1)
60	*PA 60*	PV1 equalizer compensation amount No. 5	0 PVU		–1000 to +1000 PVU(PV1)
61	*PA 61*	PV1 equalizer compensation point No. 6	2500 PVU		–19999 to +20000 PVU(PV1)
62	*PA 62*	PV1 equalizer compensation amount No. 6	0 PVU		–1000 to +1000 PVU(PV1)
63	*PA 63*	PV1 equalizer compensation point No. 7	3000 PVU		–19999 to +20000 PVU(PV1)
64	*PA 64*	PV1 equalizer compensation amount No. 7	0 PVU		–1000 to +1000 PVU(PV1)
65	*PA 65*	PV1 equalizer compensation point No. 8	3500 PVU		–19999 to +20000 PVU(PV1)
66	*PA 66*	PV1 equalizer compensation amount No. 8	0 PVU		–1000 to +1000 PVU(PV1)
67	*PA 67*	PV1 equalizer compensation point No. 9	4000 PVU		–19999 to +20000 PVU(PV1)
68	*PA 68*	PV1 equalizer compensation amount No. 9	0 PVU		–1000 to +1000 PVU(PV1)
69	*PA 69*	PV1 equalizer compensation point No. 10	Range lower limit value		PV1 range upper limit value (tied)
70	*PA 70*	PV1 equalizer compensation amount No. 10	0 PVU		–1000 to +1000 PVU(PV1)
71	*PA 71*	PV2 equalizer compensation point No. 1	Low-limit value of range		PV2 range lower limit value (tied)
72	*PA 72*	PV2 equalizer compensation amount No. 1	0 PVU		–1000 to +1000 PVU(PV2)
73	*PA 73*	PV2 equalizer compensation point No. 2	500 PVU		–19999 to +20000 PVU(PV2)
74	*PA 74*	PV2 equalizer compensation amount No. 2	0 PVU		–1000 to +1000 PVU(PV2)
75	*PA 75*	PV2 equalizer compensation point No. 3	1000 PVU		–19999 to +20000 PVU(PV2)
76	*PA 76*	PV2 equalizer compensation amount No. 3	0 PVU		–1000 to +1000 PVU(PV2)
77	*PA 77*	PV2 equalizer compensation point No. 4	1500 PVU		–19999 to +20000 PVU(PV2)
78	*PA 78*	PV2 equalizer compensation amount No. 4	0 PVU		–1000 to +1000 PVU(PV2)

denotes items settable only on models with CP compensation

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
79	*PA 79*	PV2 equalizer compensation point No. 5	2000 PVU		–19999 to +20000 PVU(PV2)
80	*PA 80*	PV2 equalizer compensation amount No. 5	0 PVU		–1000 to +1000 PVU(PV2)
81	*PA 81*	PV2 equalizer compensation point No. 6	2500 PVU		–19999 to +20000 PVU(PV2)
82	*PA 82*	PV2 equalizer compensation amount No. 6	0 PVU		–1000 to +1000 PVU(PV2)
83	*PA 83*	PV2 equalizer compensation point No. 7	3000 PVU		–19999 to +20000 PVU(PV2)
84	*PA 84*	PV2 equalizer compensation amount No. 7	0 PVU		–1000 to +1000 PVU(PV2)
85	*PA 85*	PV2 equalizer compensation point No. 8	3500 PVU		–19999 to +20000 PVU(PV2)
86	*PA 86*	PV2 equalizer compensation amount No. 8	0 PVU		–1000 to +1000 PVU(PV2)
87	*PA 87*	PV2 equalizer compensation point No. 9	4000 PVU		–19999 to +20000 PVU(PV2)
88	*PA 88*	PV2 equalizer compensation amount No. 9	0 PVU		–1000 to +1000 PVU (PV2)
89	*PA 89*	PV2 equalizer compensation point No. 10	Range upper limit value		PV2 range upper limit value (tied)
90	*PA 90*	PV2 equalizer compensation amount No. 10	0 PVU		–1000 to +1000 PVU(PV2)
93	*PA 93*	Auto-tuning (CH2)	0		0 : AT not performed 1 : standard AT performed on currently used PID group in mode other than READY mode. 2 : AT writing overshoot-proof PID values to currently used PID groups in mode other than READY mode performed. 3 : Standard AT performed on PID groups A1 to A7 in READY mode. 4 : AT writing overshoot-proof PID values to PID groups A1 to A7 in READY mode continuously performed.
94	*PA 94*	Auto-tuning MV lower limit (CH2)	0.0		-5.0 to upper limit %
95	*PA 95*	Auto-tuning MV upper limit (CH2)	100.0		Lower limit to +105%
96	*PA 96*	PID computation initialize (CH2)	0		0 : No initialization during advance processing and PID group change 1 : Initializes during advance processing but not during PID group change 2 : No initialization during advance processing but initializes during PID group change 3 : Initializes both during advance processing and PID group change
97	*PA 97*	CPU computation compensation	0		0 : no compensation 1 : compensates
98	*PA 98*	CP value (PV) display lower limit value	0.000		0 to upper limit SPU (CH2)
99	*PA 99*	CP value (PV) display upper limit value	4.000		lower limit to 4000 SPU (CH2)
100	*PA100*	Gas constant	23.5		10.0 to 50.0
101	*PA101*	CP computation compensation No.1 compensation point	0.000		0 SPU (CH2) (tied)
102	*PA102*	CP computation compensation No.1 compensation amount	0.000		-1000 to +1000 SPU (CH2)
103	*PA103*	CP computation compensation No.2 compensation point	0.200		0 to 2000 SPU (CH2)
104	*PA104*	CP computation compensation No.2 compensation amount	0.000		-1000 to +1000 SPU (CH2)
105	*PA105*	CP computation compensation No.3 compensation point	0.400		0 to 2000 SPU (CH2)
106	*PA106*	CP computation compensation No.3 compensation amount	0.000		-1000 to +1000 SPU (CH2)
107	*PA107*	CP computation compensation No.4 compensation point	0.600		0 to 2000 SPU (CH2)
108	*PA108*	CP computation compensation No.4 compensation amount	0.000		-1000 to +1000 SPU (CH2)
109	*PA109*	CP computation compensation No.5 compensation point	0.800		0 to 2000 SPU (CH2)
110	*PA110*	CP computation compensation No.5 compensation amount	0.000		-1000 to +1000 SPU (CH2)

denotes items settable only on models with CP compensation

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
111	*PA111*	CP computation compensation No.6 compensation point	1.000		0 to 2000 SPU (CH2)
112	*PA112*	CP computation compensation No.6 compensation amount	0.000		-1000 to +1000 SPU (CH2)
113	*PA113*	CP computation compensation No.7 compensation point	1.200		0 to 2000 SPU (CH2)
114	*PA114*	CP computation compensation No.7 compensation amount	0.000		-1000 to +1000 SPU (CH2)
115	*PA115*	CP computation compensation No.8 compensation point	1.400		0 to 2000 SPU (CH2)
116	*PA116*	CP computation compensation No.8 compensation amount	0.000		-1000 to +1000 SPU (CH2)
117	*PA117*	CP computation compensation No.9 compensation point	1.600		0 to 2000 SPU (CH2)
118	*PA118*	CP computation compensation No.9 compensation amount	0.000		-1000 to +1000 SPU (CH2)
119	*PA119*	CP computation compensation No.10 compensation point	2.000		0 to 2000 SPU (CH2) (tied)
120	*PA120*	CP computation compensation No.10 compensation amount	0.000		-1000 to +1000 SPU (CH2)

denotes items settable only on models with CP compensation

■ Event configuration data setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*E01-t*	Event 1 event type	0		0 to 253
2	*E01-1*	Event 1 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
3	*E01-2*	Event 1 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
4	*E02-t*	Event 2 event type	0		0 to 253
5	*E02-1*	Event 2 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
6	*E02-2*	Event 2 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
7	*E03-t*	Event 3 event type	0		0 to 253
8	*E03-1*	Event 3 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
9	*E03-2*	Event 3 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
10	*E04-t*	Event 4 event type	0		0 to 253
11	*E04-1*	Event 4 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
12	*E04-2*	Event 4 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
13	*E05-t*	Event 5 event type	0		0 to 253
14	*E05-1*	Event 5 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
15	*E05-2*	Event 5 auxiliary setting 2	----		–19999 to +20000 (Setting range is variable according to the event types.)
16	*E06-t*	Event 6 event type	0		0 to 253
17	*E06-1*	Event 6 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
18	*E06-2*	Event 6 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
19	*E07-t*	Event 7 event type	0		0 to 253
20	*E07-1*	Event 7 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
21	*E07-2*	Event 7 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
22	*E08-t*	Event 8 event type	0		0 to 253
23	*E08-1*	Event 8 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
24	*E08-2*	Event 8 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
25	*E09-t*	Event 9 event type	0		0 to 253
26	*E09-1*	Event 9 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
27	*E09-2*	Event 9 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
28	*E10-t*	Event 10 event type	0		0 to 253
29	*E10-1*	Event 10 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
30	E10-2	Event 10 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
31	E11-t	Event 11 event type	0		0 to 253
32	E11-1	Event 11 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
33	E11-2	Event 11 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
34	*E12-t*	Event 12 event type	0		0 to 253
35	*E12-1*	Event 12 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
36	*E12-2*	Event 12 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
37	*E13-t*	Event 13 event type	0		0 to 253
38	*E13-1*	Event 13 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
39	*E13-2*	Event 13 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
40	*E14-t*	Event 14 event type	0		0 to 253
41	*E14-1*	Event 14 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
42	*E14-2*	Event 14 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
43	*E15-t*	Event 15 event type	0		0 to 253
44	*E15-1*	Event 15 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
45	*E15-2*	Event 15 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)
46	*E16-t*	Event 16 event type	0		0 to 253
47	*E16-1*	Event 16 auxiliary setting 1	-----		–19999 to +20000 (Setting range is variable according to the event types.)
48	*E16-2*	Event 16 auxiliary setting 2	-----		–19999 to +20000 (Setting range is variable according to the event types.)

● Event type

Event type	Meaning	Setting category	Operation category	Auxiliary settings	
0	Event off	-----	-----	Auxiliary 1 : None	Auxiliary 2 : None
1	Time event	Segment	Time	Auxiliary 1 : None	Auxiliary 2 : None
2	PV upper limit	Segment	PV	Auxiliary 1 : Hysteresis	Auxiliary 2 : None
3	PV lower limit				
4	Deviation upper limit				
5	Deviation lower limit				
6	Deviation upper limit with standby				
7	Deviation lower limit with standby				
8	Absolute value deviation upper limit				
9	Absolute value deviation lower limit				
10	Absolute value deviation upper limit with standby				
11	Absolute value deviation lower limit with standby				
12	PV deviation rate upper limit	Segment	PV	Auxiliary 1 : Sampling cycle	Auxiliary 2 : None
13	PV deviation rate lower limit				
14	SP upper limit	Segment	PV	Auxiliary 1 : Hysteresis	Auxiliary 2 : None
15	SP lower limit				
16	MV upper limit				
17	MV lower limit				
18	Code event	Segment	Code	Auxiliary 1 : No. of output	Auxiliary 2 : None
19	SOAK absolute value deviation upper limit	Segment	PV	Auxiliary 1 : Hysteresis	Auxiliary 2 : None
20	SOAK absolute value deviation lower limit				
21	SOAK absolute value deviation upper limit with standby				
22	SOAK absolute value deviation lower limit with standby				
23	Code event with timer	Segment	Code time	Auxiliary 1 : No. of output	Auxiliary 2 : None

Event type	Meaning	Setting category	Operation category	Auxiliary settings
24 to 63	Event off	-----	-----	Auxiliary 1 : None Auxiliary 2 : None
64	Normal PV1 upper limit operation	Measuring instrument	PV	Auxiliary 1 : Hysteresis Auxiliary 2 : Operating point
65	Normal PV1 lower limit operation			
66	Normal PV2 upper limit operation			
67	Normal PV2 lower limit operation			
68	PV upper limit			
69	PV lower limit			
70	Deviation upper limit			
71	Deviation lower limit			
72	Deviation upper limit with standby			
73	Deviation lower limit with standby			
74	Absolute value deviation upper limit			
75	Absolute value deviation lower limit			
76	Absolute value deviation upper limit with standby			
77	Absolute value deviation lower limit with standby			
78	PV deviation rate upper limit	Measuring instrument	PV	Auxiliary 1 : Sampling cycle Auxiliary 2 : Operating point
79	PV deviation rate lower limit			
80	SP upper limit	Measuring instrument	PV	Auxiliary 1 : Hysteresis Auxiliary 2 : Operating point
81	SP lower limit			
82	MV upper limit			
83	MV lower limit			
84	SOAK absolute value deviation upper limit			
85	SOAK absolute value deviation lower limit			
86	SOAK absolute value deviation upper limit with standby			
87	SOAK absolute value deviation lower limit with standby			
88	Program No. binary code	Measuring instrument	Code	Auxiliary 1 : No. of output Auxiliary 2 : None
89	Segment No. binary code			
90	Program No. BCD code			
91	Segment No. BCD code			
92	Specified segment	Measuring instrument	Mode	Auxiliary 1 : Segment specification Auxiliary 2 : None
93	RAMP-E monitoring time	Measuring instrument	Time	Auxiliary 1 : Operating point Auxiliary 2 : None
94	Segment time	Measuring instrument	Time	Auxiliary 1 : On-time Auxiliary 2 : OFF-time
95	Program time			
96 to 127	Event off	-----	-----	Auxiliary 1 : None Auxiliary 2 : None
128	RUN, HOLD, END, FAST	Measuring instrument	Mode	Auxiliary 1 : Depends on channel conditions
129	HOLD			Auxiliary 2 : None
130	READY, READY FAST			
131	END			
132	G.SOAK wait			
133	MANUAL			
134	AT executing			
135	FAST, READY FAST			
136	Console setting operation	Measuring instrument	Mode	Auxiliary 1 : None Auxiliary 2 : None
137	RUN	Measuring instrument	Mode	Auxiliary 1 : Depends on channel conditions
138	Advance			Auxiliary 2 : None
139	All alarms (logical OR)	Measuring instrument	Mode	Auxiliary 1 : None Auxiliary 2 : None
140	PV range alarm			
141	Instrument alarm			
142	O_2 sensor error			

Event type	Meaning	Setting category	Operation category	Auxiliary settings
143	Event off	-----	-----	Auxiliary 1 : None Auxiliary 2 : None
144	Battery voltage drop	Measuring instrument	Mode	
145 to 253	Event off	-----	-----	

■ PID parameter (CH1) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*P-1*	Proportional band (PID group 1)	100.0		0.0 to 1000.0% (0.0: On-Off control)
2	*I-1*	Integral time (PID group 1)	0		0 to 3600sec (0: no integral operation)
3	*d-1*	Derivative time (PID group 1)	0		0 to 1200sec (0: no derivative operation)
4	*rE-1*	Manual reset (PID group 1)	50.0		0.0 to 100.0%
5	*oL-1*	Manipulated variable lower limit (Output limiter group 1)	0.0		–5.0 to manipulated variable upper limit %
6	*oH-1*	Manipulated variable upper limit (Output limiter group 1)	100.0		Manipulated variable lower limit to +105.0%
7	*P-2*	Proportional band (PID group 2)	100.0		0.0 to 1000.0% (0.0: On-off control)
8	*I-2*	Integral time (PID group 2)	0		0 to 3600sec (0: no integral operation)
9	*d-2*	Derivative time (PID group 2)	0		0 to 1200sec (0: no derivative operation)
10	*rE-2*	Manual reset (PID group 2)	50.0		0.0 to 100.0%
11	*oL-2*	Manipulated variable lower limit (Output limiter group 2)	0.0		–5.0 to manipulated variable upper limit %
12	*oH-2*	Manipulated variable upper limit (Output limiter group 2)	100.0		Manipulated variable lower limit to +105.0%
13	*P-3*	Proportional band (PID group 3)	100.0		0.0 to 1000.0% (0.0: On-off control)
14	*I-3*	Integral time (PID group 3)	0		0 to 3600sec (0: no integral operation)
15	*d-3*	Derivative time (PID group 3)	0		0 to 1200sec (0: no derivative operation)
16	*rE-3*	Manual reset (PID group 3)	50.0		0.0 to 100.0%
17	*oL-3*	Manipulated variable lower limit (Output limiter group 3)	0.0		–5.0 to manipulated variable upper limit %
18	*oH-3*	Manipulated variable upper limit (Output limiter group 3)	100.0		Manipulated variable lower limit to +105.0%
19	*P-4*	Proportional band (PID group 4)	100.0		0.0 to 1000.0% (0.0: On-off control)
20	*I-4*	Integral time (PID group 4)	0		0 to 3600sec (0: no integral operation)
21	*d-4*	Derivative time (PID group 4)	0		0 to 1200sec (0: no derivative operation)
22	*rE-4*	Manual reset (PID group 4)	50.0		0.0 to 100.0%
23	*oL-4*	Manipulated variable lower limit (Output limiter group 4)	0.0		–5.0 to manipulated variable upper limit %
24	*oH-4*	Manipulated variable upper limit (Output limiter group 4)	100.0		Manipulated variable lower limit to +105.0%
25	*P-5*	Proportional band (PID group 5)	100.0		0.0 to 1000.0% (0.0: On-off control)
26	*I-5*	Integral time (PID group 5)	0		0 to 3600sec (0: no integral operation)
27	*d-5*	Derivative time (PID group 5)	0		0 to 1200sec (0: no derivative operation)
28	*rE-5*	Manual reset (PID group 5)	50.0		0.0 to 100.0%
29	*oL-5*	Manipulated variable lower limit (Output limiter group 5)	0.0		–5.0 to manipulated variable upper limit %
30	*oH-5*	Manipulated variable upper limit (Output limiter group 5)	100.0		Manipulated variable lower limit to +105.0%
31	*P-6*	Proportional band (PID group 6)	100.0		0.0 to 1000.0% (0.0: On-off control)
32	*I-6*	Integral time (PID group 6)	0		0 to 3600sec (0: no integral operation)
33	*d-6*	Derivative time (PID group 6)	0		0 to 1200sec (0: no derivative operation)
34	*rE-6*	Manual reset (PID group 6)	50.0		0.0 to 100.0%
35	*oL-6*	Manipulated variable lower limit (Output limiter group 6)	0.0		–5.0 to manipulated variable upper limit %

The settings on this page are PID parameters for CH1

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
36	*oH-6*	Manipulated variable upper limit (Output limiter group 6)	100.0		Manipulated variable lower limit to +105.0%
37	*P-7*	Proportional band (PID group 7)	100.0		0.0 to 1000.0% (0.0: On-off control)
38	*I-7*	Integral time (PID group 7)	0		0 to 3600sec (0: no integral operation)
39	*d-7*	Derivative time (PID group 7)	0		0 to 1200sec (0: no derivative operation)
40	*rE-7*	Manual reset (PID group 7)	50.0		0.0 to 100.0%
41	*oL-7*	Manipulated variable lower limit (Output limiter group 7)	0.0		–5.0 to manipulated variable upper limit %
42	*oH-7*	Manipulated variable upper limit (Output limiter group 7)	100.0		Manipulated variable lower limit to +105.0%
43	*P-8*	Proportional band (PID group 8)	100.0		0.0 to 1000.0% (0.0: On-off control)
44	*I-8*	Integral time (PID group 8)	0		0 to 3600sec (0: no integral operation)
45	*d-8*	Derivative time (PID group 8)	0		0 to 1200sec (0: no derivative operation)
46	*rE-8*	Manual reset (PID group 8)	50.0		0.0 to 100.0%
47	*oL-8*	Manipulated variable lower limit (Output limiter group 8)	0.0		–5.0 to manipulated variable upper limit %
48	*oH-8*	Manipulated variable upper limit (Output limiter group 8)	100.0		Manipulated variable lower limit to +105.0%
49	*P-9*	Proportional band (PID group 9)	100.0		0.0 to 1000.0% (0.0: On-off control)
50	*I-9*	Integral time (PID group 9)	0		0 to 3600sec (0: no integral operation)
51	*d-9*	Derivative time (PID group 9)	0		0 to 1200sec (0: no derivative operation)
52	*rE-9*	Manual reset (PID group 9)	50.0		0.0 to 100.0%
53	*oL-9*	Manipulated variable lower limit (Output limiter group 9)	0.0		–5.0 to manipulated variable upper limit %
54	*oH-9*	Manipulated variable upper limit (Output limiter group 9)	100.0		Manipulated variable lower limit to +105.0%
55	*P-A1*	Proportional band (PID group A1)	100.0		0.0 to 1000.0% (0.0: On-off control)
56	*I-A1*	Integral time (PID group A1)	0		0 to 3600sec (0: no integral operation)
57	*d-A1*	Derivative time (PID group A1)	0		0 to 1200sec (0: no derivative operation)
58	*rE-A1*	Manual reset (PID group A1)	50.0		0.0 to 100.0%
59	*CP-A1*	Switching point (PID group A1)	1000 SPU		–19999 to +20000 SPU
60	*tP-A1*	Tuning point (PID group A1)	500 SPU		–19999 to +20000 SPU
61	*P-A2*	Proportional band (PID group A2)	100.0		0.0 to 1000.0% (0.0: On-off control)
62	*I-A2*	Integral time (PID group A2)	0		0 to 3600sec (0: no integral operation)
63	*d-A2*	Derivative time (PID group A2)	0		0 to 1200sec (0: no derivative operation)
64	*rE-A2*	Manual reset (PID group A2)	50.0		0.0 to 100.0%
65	*CP-A2*	Switching point (PID group A2)	2000 SPU		–19999 to +20000 SPU
66	*tP-A2*	Tuning point (PID group A2)	1500 SPU		–19999 to +20000 SPU
67	*P-A3*	Proportional band (PID group A3)	100.0		0.0 to 1000.0% (0.0: On-off control)
68	*I-A3*	Integral time (PID group A3)	0		0 to 3600sec (0: no integral operation)
69	*d-A3*	Derivative time (PID group A3)	0		0 to 1200sec (0: no derivative operation)
70	*rE-A3*	Manual reset (PID group A3)	50.0		0.0 to 100.0%
71	*CP-A3*	Switching point (PID group A3)	3000 SPU		–19999 to +20000 SPU

The settings on this page are PID parameters for CH1

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
72	*tP-A3*	Tuning point (PID group A3)	2500 SPU		–19999 to +20000 SPU
73	*P-A4*	Proportional band (PID group A4)	100.0		0.0 to 1000.0% (0.0: On-off control)
74	*I-A4*	Integral time (PID group A4)	0		0 to 3600sec (0: no integral operation)
75	*d-A4*	Derivative time (PID group A4)	0		0 to 1200sec (0: no derivative operation)
76	*rE-A4*	Manual reset (PID group A4)	50.0		0.0 to 100.0%
77	*CP-A4*	Switching point (PID group A4)	4000 SPU		–19999 to +20000 SPU
78	*tP-A4*	Tuning point (PID group A4)	3500 SPU		–19999 to +20000 SPU
79	*P-A5*	Proportional band (PID group A5)	100.0		0.0 to 1000.0% (0.0: On-off control)
80	*I-A5*	Integral time (PID group A5)	0		0 to 3600sec (0: no integral operation)
81	*d-A5*	Derivative time (PID group A5)	0		0 to 1200sec (0: no derivative operation)
82	*rE-A5*	Manual reset (PID group A5)	50.0		0.0 to 100.0%
83	*CP-A5*	Switching point (PID group A5)	5000 SPU		–19999 to +20000 SPU
84	*tP-A5*	Tuning point (PID group A5)	4500 SPU		–19999 to +20000 SPU
85	*P-A6*	Proportional band (PID group A6)	100.0		0.0 to 1000.0% (0.0: On-off control)
86	*I-A6*	Integral time (PID group A6)	0		0 to 3600sec (0: no integral operation)
87	*d-A6*	Derivative time (PID group A6)	0		0 to 1200sec (0: no derivative operation)
88	*rE-A6*	Manual reset (PID group A6)	50.0		0.0 to 100.0%
89	*CP-A6*	Switching point (PID group A6)	6000 SPU		–19999 to +20000 SPU
90	*tP-A6*	Tuning point (PID group A6)	5500 SPU		–19999 to +20000 SPU
91	*P-A7*	Proportional band (PID group A7)	100.0		0.0 to 1000.0% (0.0: On-off control)
92	*I-A7*	Integral time (PID group A7)	0		0 to 3600sec (0: no integral operation)
93	*d-A7*	Derivative time (PID group A7)	0		0 to 1200sec (0: no derivative operation)
94	*rE-A7*	Manual reset (PID group A7)	50.0		0.0 to 100.0%
95	*CP-A7*	Switching point (PID group A7)	20000SPU (fixed)		20000 SPU (tied)
96	*tP-A7*	Tuning point (PID group A7)	6500 SPU		–19999 to +20000 SPU

The settings on this page are PID parameters for CH1

■ PID parameter (CH2) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*P-1*	Proportional band (PID group 1)	100.0		0.0 to 1000.0% (0.0: On-off control)
2	*I-1*	Integral time (PID group 1)	0		0 to 3600sec (0: no integral operation)
3	*d-1*	Derivative time (PID group 1)	0		0 to 1200sec (0: no derivative operation)
4	*rE-1*	Manual reset (PID group 1)	50.0		0.0 to 100.0%
5	*oL-1*	Manipulated variable lower limit (Output limiter group 1)	0.0		–5.0 to manipulated variable upper limit %
6	*oH-1*	Manipulated variable upper limit (Output limiter group 1))	100.0		Manipulated variable lower limit to +105.0%
7	*P-2*	Proportional band (PID group 2)	100.0		0.0 to 1000.0% (0.0: On-off control)
8	*I-2*	Integral time (PID group 2)	0		0 to 3600sec (0: no integral operation)
9	*d-2*	Derivative time (PID group 2)	0		0 to 1200sec (0: no derivative operation)
10	*rE-2*	Manual reset (PID group 2)	50.0		0.0 to 100.0%
11	*oL-2*	Manipulated variable lower limit (Output limiter group 2)	0.0		–5.0 to manipulated variable upper limit %
12	*oH-2*	Manipulated variable upper limit (Output limiter group 2)	100.0		Manipulated variable lower limit to +105.0%
13	*P-3*	Proportional band (PID group 3)	100.0		0.0 to 1000.0% (0.0: On-off control)
14	*I-3*	Integral time (PID group 3)	0		0 to 3600sec (0: no integral operation)
15	*d-3*	Derivative time (PID group 3)	0		0 to 1200sec (0: no derivative operation)
16	*rE-3*	Manual reset (PID group 3)	50.0		0.0 to 100.0%
17	*oL-3*	Manipulated variable lower limit (Output limiter group 3))	0.0		–5.0 to manipulated variable upper limit %
18	*oH-3*	Manipulated variable upper limit (Output limiter group 3)	100.0		Manipulated variable lower limit to +105.0%
19	*P-4*	Proportional band (PID group 4)	100.0		0.0 to 1000.0% (0.0: On-off control)
20	*I-4*	Integral time (PID group 4)	0		0 to 3600sec (0: no integral operation)
21	*d-4*	Derivative time (PID group 4)	0		0 to 1200sec (0: no derivative operation)
22	*rE-4*	Manual reset (PID group 4)	50.0		0.0 to 100.0%
23	*oL-4*	Manipulated variable lower limit (Output limiter group 4))	0.0		–5.0 to manipulated variable upper limit %
24	*oH-4*	Manipulated variable upper limit (Output limiter group 4)	100.0		Manipulated variable lower limit to +105.0%
25	*P-5*	Proportional band (PID group 5)	100.0		0.0 to 1000.0% (0.0: On-off control)
26	*I-5*	Integral time (PID group 5)	0		0 to 3600sec (0: no integral operation)
27	*d-5*	Derivative time (PID group 5)	0		0 to 1200sec (0: no derivative operation)
28	*rE-5*	Manual reset (PID group 5)	50.0		0.0 to 100.0%
29	*oL-5*	Manipulated variable lower limit (Output limiter group 5)	0.0		–5.0 to manipulated variable upper limit %
30	*oH-5*	Manipulated variable upper limit (Output limiter group 5)	100.0		Manipulated variable lower limit to +105.0%
31	*P-6*	Proportional band (PID group 6)	100.0		0.0 to 1000.0% (0.0: On-off control)
32	*I-6*	Integral time (PID group 6)	0		0 to 3600sec (0: no integral operation)
33	*d-6*	Derivative time (PID group 6)	0		0 to 1200sec (0: no derivative operation)
34	*rE-6*	Manual reset (PID group 6)	50.0		0.0 to 100.0%
35	*oL-6*	Manipulated variable lower limit (Output limiter group 6)	0.0		–5.0 to manipulated variable upper limit %

The settings on this page are PID parameters for CH2

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
36	*oH-6*	Manipulated variable upper limit (Output limiter group 6)	100.0		Manipulated variable lower limit to +105.0%
37	*P-7*	Proportional band (PID group 7)	100.0		0.0 to 1000.0% (0.0: On-off control)
38	*I-7*	Integral time (PID group 7)	0		0 to 3600sec (0: no integral operation)
39	*d-7*	Derivative time (PID group 7)	0		0 to 1200sec (0: no derivative operation)
40	*rE-7*	Manual reset (PID group 7)	50.0		0.0 to 100.0%
41	*oL-7*	Manipulated variable lower limit (Output limiter group 7)	0.0		–5.0 to manipulated variable upper limit %
42	*oH-7*	Manipulated variable upper limit (Output limiter group 7)	100.0		Manipulated variable lower limit to +105.0%
43	*P-8*	Proportional band (PID group 8)	100.0		0.0 to 1000.0% (0.0: On-off control)
44	*I-8*	Integral time (PID group 8)	0		0 to 3600sec (0: no integral operation)
45	*d-8*	Derivative time (PID group 8)	0		0 to 1200sec (0: no derivative operation)
46	*rE-8*	Manual reset (PID group 8)	50.0		0.0 to 100.0%
47	*oL-8*	Manipulated variable lower limit (Output limiter group 8)	0.0		–5.0 to manipulated variable upper limit %
48	*oH-8*	Manipulated variable upper limit (Output limiter group 8)	100.0		Manipulated variable lower limit to +105.0%
49	*P-9*	Proportional band (PID group 9)	100.0		0.0 to 1000.0% (0.0: On-off control)
50	*I-9*	Integral time (PID group 9)	0		0 to 3600sec (0: no integral operation)
51	*d-9*	Derivative time (PID group 9)	0		0 to 1200sec (0: no derivative operation)
52	*rE-9*	Manual reset (PID group 9)	50.0		0.0 to 100.0%
53	*oL-9*	Manipulated variable lower limit (Output limiter group 9)	0.0		–5.0 to manipulated variable upper limit %
54	*oH-9*	Manipulated variable upper limit (Output limiter group 9)	100.0		Manipulated variable lower limit to +105.0%
55	*P-A1*	Proportional band (PID group A1)	100.0		0.0 to 1000.0% (0.0: On-off control)
56	*I-A1*	Integral time (PID group A1)	0		0 to 3600sec (0: no integral operation)
57	*d-A1*	Derivative time (PID group A1)	0		0 to 1200sec (0: no derivative operation)
58	*rE-A1*	Manual reset (PID group A1)	50.0		0.0 to 100.0%
59	*CP-A1*	Switching point (PID group A1)	1000 SPU		–19999 to +20000 SPU
60	*tP-A1*	Tuning point (PID group A1)	500 SPU		–19999 to +20000 SPU
61	*P-A2*	Proportional band (PID group A2)	100.0		0.0 to 1000.0% (0.0: On-off control)
62	*I-A2*	Integral time (PID group A2)	0		0 to 3600sec (0: no integral operation)
63	*d-A2*	Derivative time (PID group A2)	0		0 to 1200sec (0: no derivative operation)
64	*rE-A2*	Manual reset (PID group A2)	50.0		0.0 to 100.0%
65	*CP-A2*	Switching point (PID group A2)	2000 SPU		–19999 to +20000 SPU
66	*tP-A2*	Tuning point (PID group A2)	1500 SPU		–19999 to +20000 SPU
67	*P-A3*	Proportional band (PID group A3)	100.0		0.0 to 1000.0% (0.0: On-off control)
68	*I-A3*	Integral time (PID group A3)	0		0 to 3600sec (0: no integral operation)
69	*d-A3*	Derivative time (PID group A3)	0		0 to 1200sec (0: no derivative operation)
70	*rE-A3*	Manual reset (PID group A3)	50.0		0.0 to 100.0%
71	*CP-A3*	Switching point (PID group A3)	3000 SPU		–19999 to +20000 SPU

The settings on this page are PID parameters for CH2

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
72	*tP-A3*	Tuning point (PID group A3)	2500 SPU		–19999 to +20000 SPU
73	*P-A4*	Proportional band (PID group A4)	100.0		0.0 to 1000.0% (0.0: On-off control)
74	*I-A4*	Integral time (PID group A4)	0		0 to 3600sec (0: no integral operation)
75	*d-A4*	Derivative time (PID group A4)	0		0 to 1200sec (0: no derivative operation)
76	*rE-A4*	Manual reset (PID group A4)	50.0		0.0 to 100.0%
77	*CP-A4*	Switching point (PID group A4)	4000 SPU		–19999 to +20000 SPU
78	*tP-A4*	Tuning point (PID group A4)	3500 SPU		–19999 to +20000 SPU
79	*P-A5*	Proportional band (PID group A5)	100.0		0.0 to 1000.0% (0.0: On-off control)
80	*I-A5*	Integral time (PID group A5)	0		0 to 3600sec (0: no integral operation)
81	*d-A5*	Derivative time (PID group A5)	0		0 to 1200sec (0: no derivative operation)
82	*rE-A5*	Manual reset (PID group A5)	50.0		0.0 to 100.0%
83	*CP-A5*	Switching point (PID group A5)	5000 SPU		–19999 to +20000 SPU
84	*tP-A5*	Tuning point (PID group A5)	4500 SPU		–19999 to +20000 SPU
85	*P-A6*	Proportional band (PID group A6)	100.0		0.0 to 1000.0% (0.0: On-off control)
86	*I-A6*	Integral time (PID group A6)	0		0 to 3600sec (0: no integral operation)
87	*d-A6*	Derivative time (PID group A6)	0		0 to 1200sec (0: no derivative operation)
88	*rE-A6*	Manual reset (PID group A6)	50.0		0.0 to 100.0%
89	*CP-A6*	Switching point (PID group A6)	6000 SPU		–19999 to +20000 SPU
90	*tP-A6*	Tuning point (PID group A6)	5500 SPU		–19999 to +20000 SPU
91	*P-A7*	Proportional band (PID group A7)	100.0		0.0 to 1000.0% (0.0: On-off control)
92	*I-A7*	Integral time (PID group A7)	0		0 to 3600sec (0: no integral operation)
93	*d-A7*	Derivative time (PID group A7)	0		0 to 1200sec (0: no derivative operation)
94	*rE-A7*	Manual reset (PID group A7)	50.0		0.0 to 100.0%
95	*CP-A7*	Switching point (PID group A7)	20000SPU (fixed)		20000 SPU (tied)
96	*tP-A7*	Tuning point (PID group A7)	6500 SPU		–19999 to +20000 SPU

The settings on this page are PID parameters for CH2

■ Setup data setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*C 01*	PV1 range number	0		0 to 16 : Thermocouple 48 to 52 : Linear (DC current and DC voltage) 64 to 71 : Resistance temperature detector 96 to 103 : Resistance temperature detector 128 to 134 : Linear (DC current and DC voltage)
2	*C 02*	PV1 temperature unit	0		0 : Celsius (°C) 1 : Fahrenheit (°F)
3	*C 03*	PV1 decimal point position	1		0 to 2
4	*C 04*	PV1 linear decimal point position	1		0 to 4
5	*C 05*	PV1 linear range lower limit	0 PVU		–19999 to +20000 PVU(PV1)
6	*C 06*	PV1 linear range upper limit	10000 PVU		–19999 to +20000 PVU(PV1)
7	*C 07*	PV1 cold junction compensation	0		0 : Provided (Compensated inside the instrument) 1 : Not provided (Compensated outside the instrument)
8	*C 08*	PV1 root extraction	0		0 : Not provided 1 : Provided
9	*C 09*	PV1 root extraction dropout	0.2		0.2 to 10.0% (Ratio to input range)
10	*C 10*	PV1 cold junction bias	0.0		–1.0 to + 1.0°C
11	*C 11*	PV2 range number	0		0 to 16 : Thermocouple 48 to 52 : Linear (DC current and DC voltage) 64 to 71 : Resistance temperature detector 96 to 103 : Resistance temperature detector 128 to 134 : Linear (DC current and DC voltage) 135 : O_2 sensor (CP)
12	*C 12*	PV2 temperature unit	0		0 : Celsius (°C) 1 : Fahrenheit (°F)
13	*C 13*	PV2 decimal point position	1		0 to 2
14	*C 14*	PV2 linear decimal point position	1		0 to 4
15	*C 15*	PV2 linear range lower limit	0 PVU		–19999 to +20000 PVU(PV2)
16	*C 16*	PV2 linear range upper limit	10000 PVU		–19999 to +20000 PVU(PV2)
17	*C 17*	PV2 cold junction compensation	0		0 : Provided (Compensated inside the instrument) 1 : Not provided (Compensated outside the instrument)
18	*C 18*	PV2 root extraction	0		0 : Not provided 1 : Provided
19	*C 19*	PV2 root extraction dropout	0.2		0.2 to 10.0% (Ratio to input range)
20	*C 20*	PV2 cold junction bias	0.0		–1.0 to + 1.0°C
21	C 21	Control output system (CH1)	1		0 : 5S output (Current proportional SP output) 1 : 5G output (Current proportional control output) 2 : 6D output (Voltage time proportional control output) system A 3 : 6D output (Voltage time proportional control output) system B 4 : 8D output (open collector time proportional control output) system A 5 : 8D output (open collector time proportional control output) system B
22	*C 22*	Control output system (CH2)	1		
23	*C 23*	Control action (CH1)	0		0 : PID — A reverse operation 1 : PID — A normal operation 2 : PID — B reverse operation 3 : PID — B normal operation
24	*C 24*	Control action (CH2)	0		
30	*C 30*	PV equalizer	0		0 : None 1 : PV1 only 2 : PV2 only 3 : Both PV1 and PV2
31	*C 31*	End of operation (CH1)	0		0 : READY mode 1 : END mode
32	*C 32*	Manipulated variable in READY mode (CH1)	0.0		–5.0 to +105.0%
33	*C 33*	Manipulated variable setting in PV overrange (CH1)	0		0 : No 1 : Yes

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
34	*C 34*	Manipulated variable in PV overrange (CH1)	0.0		–5.0 to +105.0%
35	*C 35*	MANUAL change mode (CH1)	0		0 : Smooth 1 : Preset
36	*C 36*	Preset MANUAL value (CH1)	0.0		–5.0 to +105.0%
37	*C 37*	End of operation (CH2)	0		0 : READY mode 1 : END mode
38	*C 38*	Manipulated variable in READY mode (CH2)	0.0		-5.0 to +105.0%
39	*C 39*	Manipulated variable setting in PV overrange (CH2)	0		0 : No 1 : Yes
40	*C 40*	Manipulated variable in PV overrange (CH2)	0.0		-5.0 to +105.0%
41	*C 41*	Manual change mode (CH2)	0		0 : smooth 1 : preset
42	*C 42*	Preset MANUAL value (CH2)	0.0		-5.0 to +105.0%
43	*C 43*	Service interruption time when running can be continued	0		0 to 3600sec
44	*C 44*	CP computation type	1		0 : oxygen pressure (PO_2) computation 1 : CP computation for NKG sensor 2 : CP computation for Marathon monitors and Cambridge sensors 3 : CP computation for Corning sensors 4 : CP computation for AACC sensors 5 : CP computation for Barber-Coleman sensors 6 : CP computation for Furnace Control sensors
45	*C 45*	Auxiliary output 1 type	0		0 : SP1 1 : PV1 2 : Deviation (DEV1) 3 : Manipulated variable 1 (MV1) 4 : SP2 5 : PV2 6 : Deviation 2 (DEV2) 7 : Manipulated variable 2 (MV2) 8 : O_2 sensor mV input value
46	*C 46*	Auxiliary output 1 lower limit (4mA)	0 SPU		–19999 to +20000 SPU (*C45* not equal to 3) –1999.9 to +2000.0% (*C45* set to 3)
47	*C 47*	Auxiliary output 1 upper limit (20mA)	10000 SPU		–19999 to +20000 SPU (*C45* not equal to 3) –1999.9 to +2000.0% (*C45* set to 3)
48	*C 48*	Auxiliary output 2 type	0		0 : SP1 1 : PV1 2 : Deviation (DEV1) 3 : Manipulated variable 1 (MV1) 4 : SP2 5 : PV2 6 : Deviation 2 (DEV2) 7 : Manipulated variable 2 (MV2) 8 : O_2 sensor mV input value
49	*C 49*	Auxiliary output 2 lower limit (4mA)	0 SPU		–19999 to +20000 SPU (*C48* not equal to 3) –1999.9 to +2000.0% (*C48* set to 3)
50	*C 50*	Auxiliary output 2 upper limit (20mA)	10000 SPU		–19999 to +20000 SPU (*C48* not equal to 3) –1999.9 to +2000.0% (*C48* set to 3)
57	*C 57*	Programming item Event	0		0 : Displayed 1 : Not displayed
58	*C 58*	Programming item PID group, output limiter group	0		0 : Displayed 1 : Not displayed
59	*C 59*	Programming item G.SOAK, PV shift, repeat	0		0 : Displayed 1 : Not displayed
60	*C 60*	Programming item PV start, cycle, pattern link	0		0 : Displayed 1 : Not displayed

denotes items settable only on models with CP compensation

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
61	*C 61*	Programming system	0		0 : RAMP-X and RAMP-T (θ) combined 1 : RAMP-X and RAMP-E (ΔSP) combined
62	*C 62*	Program time unit	0		0 : Hours, min (SPU/hour for RAMP-T) 1 : Min, sec (SPU/min for RAMP-T) 2 : 0.1 sec (SPU/sec for RAMP-T)
63	*C 63*	Time display (display panel 1 and 2)	0		0 : Remaining segment time 1 : total operation time (after READY → RUN start)
65	*C 65*	SP decimal point position (CH1)	1		0 to 4
66	*C 66*	SP limit lower limit	PV1 range lower limit		–19999 to +20000 SPU
67	*C 67*	SP limit upper limit	PV1 range upper limit		–19999 to +20000 SPU
68	*C 68*	SP decimal point position (CH2)	1 or 3		0 to 4
69	*C 69*	SP limit lower limit (CH2)	PV2 range lower limit		-19999 to +20000 SPU (CH1)
70	*C 70*	SP limit upper limit (CH2)	PV2 range upper limit		
71	*C 71*	External switch input RSW5	0		0 : NOP (does not function) 1 : RAMP-E 2 : FAST
72	*C 72*	External switch input RSW6	0		3 : G.SOAK is cleared using OR 4 : G.SOAK is cleared using AND 5 : MANUAL/AUTO
73	*C 73*	External switch input RSW7	0		6 : AT start/stop 7 : NOP (does not function) 8 : Auto load
74	*C 74*	External switch input RSW8	0		9 : NOP (does not function) 10 : NOP (does not function) 11 : O_2 sensor check
75	*C 75*	External switch input RSW9 to 14 (program selection)	0		0 : BCD4 bit + BCD2 bit 1 : Binary 6 bits
76	*C 76*	Communication address	0		0 to 127
77	*C 77*	Transmission rate	0		0 : 9600bps 1 : 4800bps 2 : 2400bps 3 : 1200bps
78	*C 78*	Transmission code	0		0 : 8 bits, even parity, 1 stop bit 1 : 8 bits, no parity, 2 stop bits
79	*C 79*	Communication protocol	0		0 : CPL 1 : ST221 (no PV trend) 2 : ST221 (PV trend)
80	*C 80*	Communication method	0		0 : RS-485 1 : RS-232C
81	*C 81*	ROM ID	—		< Description > Can only be referenced for mechanical service use.
82	*C 82*	ROM ITEM	—		
83	*C 83*	ROM revision	—		
84	*C 84*	Data version	—		
85	*C 85*	CPU board ID	—		
86	*C 86*	I/O board ID	—		
90	*C 90*	PID type	1		0 : Improved 1 : Compatible with Mark I
91	*C 91*	PV1 burnout	0		0 : Provided 1 : Not provided
92	*C 92*	PV2 burnout	0		0 : Provided 1 : Not provided
93	*C 93*	Time proportional output system (CH1)	0		0 : Does not go on a second time in time proportional cycle. 1 : Goes on a second time in time proportional cycle.
94	*C 94*	Time proportional output system (CH2)	0		0 : Does not go on a second time in time proportional cycle 1 : Goes on a second time in time proportional cycle

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
95	*C 95*	Voltage output tuning (CH1)	15		2 to 22mA
96	*C 96*	Voltage output tuning (CH2)	15		2 to 22mA
97	*C 97*	Communication port	0		0 to 15 Uses back plate terminal to setting 0. Uses loader jack to setting 1 to 15.
98	*C 98*	Special function	0		0 to 255

■ Constant value control data (CH1) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*ConSt*	Control mode	0		0 : Program run mode 1 : Fixed command control mode
2	*SP*	Set point	0		Within setup *C66* to *C67* setting (SP limit)
3	*P*	Proportional band	100.0		0.0 to 1000.0% (0.0 : On-off control)
4	*I*	Integral time	0		0 to 3600sec (0: no integral operation)
5	*d*	Derivative time	0		0 to 1200sec (0: no derivative operation)
6	*rE*	Manual reset	50.0		0.0 to 100.0%
7	*oL*	Manipulated variable lower limit	0.0		–5.0 to upper limit %
8	*oH*	Manipulated variable upper limit	100.0		Lower limit to +105.0%

■ Constant value control data (CH2) setting

No.	Item code	Item	Factory default settings	User settings	Settings and descriptions
1	*ConSt*	Control mode	0		0 : Program run mode 1 : Fixed command control mode
2	*SP*	Set point	0		Within setup *C69* to *C70* setting (SP limit)
3	*P*	Proportional band	100.0		0.0 to 1000.0% (0.0 : On-off control)
4	*I*	Integral time	0		0 to 3600sec (0: no integral operation)
5	*d*	Derivative time	0		0 to 1200sec (0: no derivative operation)
6	*rE*	Manual reset	50.0		0.0 to 100.0%
7	*oL*	Manipulated variable lower limit	0.0		–5.0 to upper limit %
8	*oH*	Manipulated variable upper limit	100.0		Lower limit to +105.0%

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Revision History

Printed date	Manual Number	Edition	Revised pages	Description
May 1998	**CP-SP-1033E**	**1st Edition**		
Mar. 2001		**2nd Edition**		Company name changed
			v	Manual No. CP-SP-1002E deleted “Handling Precautions” deleted Illust. changed
			4-14	Deleted description of CMA50A105
			4-15	“Handling Precautions” changed
			4-16	Illust. changed, “Handling Precautions” deleted Changed description of RS-232C connection
			7-29,	C90 added
			8-1	NOTE changed
			11-4 Parameter Work Sheet 17	CMA50→CMC10 changed
Oct. 2001		**3rd Edition**		Corresponded to English fonts
			Cover, v	“DigitroniK” was changed to “DIGITRONIK”
			1-4	“CPL communications” was changed to “CPL communications (controller peripheral link: Yamatake host communications protocol)”
			1-5	“Traceability certificate” was changed to “Inspection Certificate provided”
			2-9	Accuracy unit added.
			4-16	Schematic diagram and handling precautions changed
Mar. 2004		**4th Edition**		RESTRICTION ON USE changed.
			i	SAFETY REQUIREMENTS changed based on EN revision.
			4-2	Handling Precautions 1 item added.
			4-14, 4-15	Handling Precautions added.
			6-4	●Display A6 Illust PV→SP changed.
			7-5, Parameter Work Sheet	No.4 Factory default settings 0 connected to 1.
			7-33	●C93, ●C94 setting definition 0 and 1 changed. Figures when set to 0 and when set to 1 changed each other. ●C95, ●C96 explanation about SSR, constant current type added.
			11-6	Altitude:2000m max. added.
Oct. 2004		**5th Edition**	4-3	Note 1st item polyethylene insulated vinyl sheathed cable for JCS-364→instrument cable for JCS4364 changed.
			4-9	●Voltage output(6D) Setup data C91,C92→ C95,C96 corrected.
			11-1	Input type changed.
Mar. 2005		**6th Edition**	11-7, 11-8	■Soft dust-proof cover set(optional) Model No. 81446141-001→81446141 changed.
Aug. 2006		**7th Edition**	v to xi	The Role of This Manual deleted. Old v to xii page.
			5-27	Handling Precautions: one item added.
			6-13	■External switch input: explanation added.
			7-10	●PA04 added.

Printed date	Manual Number	Edition	Revised pages	Description
Aug. 2006	**CP-SP-1033E**	**7th Edition**	10-12 11-7	Section of "10-4 External Switch Operation Problems" added. E^2PROM changed to EEPROM.
Oct. 2006		**8th Edition**	2-9	Handling Precautions 1 item added.
Sep. 2007		**9th Edition**	i ii 4-3 4-17 5-9 10-2	Applicable standards added. Explanation of the display example changed. ●Compensating lead wire specifications deleted. Note; 14pins and 25 pins added. Chart added. ■Display behavior and alarm code upon input burnout added.
Mar. 2008		**10th Edition**	1-2,1-5,2-2,2-4, 2-6,4-18,6-12,7-5, 7-10,9-1,11-2, 11-5,11-7	DCP552B***** model added.
June 2012		**11th Edition**	 i ii, 3-1, 4-1, 4-8 2-8 4-5 10-5 11-1 12-1 to 12-8 12-5 12-6	Company name changed. Power or current ratings: 25VA → 40VA was changed. Warning was changed. The thermocouple table was crrected. The label was changed. A descriotion was added. Chapter 11. DISPOSAL added. Old page 11-1 to 11-8 Power consumption: 25VA → 40VA was changed. Standard compliance added.
Dec. 2013		**12th Edition**	i 7-30 7-35, 7-36 12-1 18	Description of built-in fuse was added. "C99" and "C100" were changed. "C99 (PV1 zener barrier adjustment)" and "C100 (PV2 zener barrier adjustment)" were deleted. Specifications for "Allowable wiring resistance (Resistance temperature detector input)" were changed. "C99" and "C100" were deleted.
Mar. 2014		**13th Edition**	4-6	The line filter model No. was changed.
Feb. 2016		**14th Edition**	Cover i i, 12-6 3-1 3-2, 12-7, 12-8	A notice saying “Not for use in Japan” was added. Pollution degree, Installation location and Altitude were added. STANDARDS COMPLIANCE was changed. A location was added to Mounting position. Dust proof cover were deleted.

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Specifications are subject to change without notice. (09)

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