FIRED UP KILNS

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PZ 400 Controller
User Manual

Every effort has been made to select practical programs for your needs.

Before you attempt to fire any projects, please confirm with your material supplier that the programs are appropriate.

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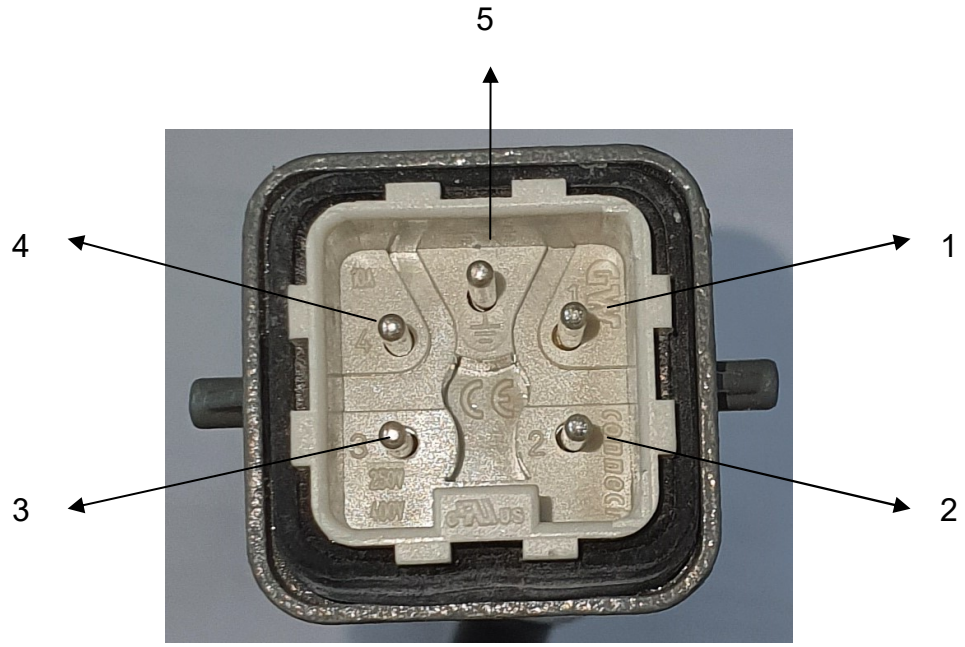
CONGRATULATIONS on your purchase of this simple controller. With a little practice, it wont be long before you are enjoying the ease of a programmable controller.

You can either bolt your controller to the side of the kiln (holes provided) or on a wall at a convenient height. The controller is fitted with a plug.

The plug has a 5-pin assignment and is fitted with a pre-wired cable as shown:
Plug (male connection) pin configuration (looking towards the plug).



Plug your controller into the socket at the top back, right hand side of the kiln.

Pin no.	Wire use	Wire Colour
4	Control output (phase) Load	Blue
1	Power supply (phase) Live 240 volts	Brown
2	Neutral	Black
3	Spare	
5	Earth	Yellow/Green

Note the above wiring details may change from time to time, so please check with your installer.

Ensure your thermocouple is secure in the bush on the side of the kiln and protrudes at least 40 mm inside the kiln.

Note : *If you misstep press the RESET button once to start at the beginning again.*

To Enter a Program

1. Switch on panel toggle switch
2. Press RESET once
3. Press PTN/END sequentially to select program number 1 to 16.
4. Press SET to prog Seg 1 - Top screen display = level. SV = 000000
5. To Set the level Press the <MODE key sequentially to highlight the digit you wish to change. Use the ^/v to change the value. Press the < MODE key again to select the next digit you want to change.
6. Once your programme temperature is complete press SET.
7. This then enters the Set Value (SV) into memory and changes the screen to enter the time integer.
8. NOTE : the time is 00:00 being hours & minutes. The time interval is the time you are programming the kiln to fire from its previous step eg. 200 to 500 C take 3 hours = 100 degrees/ hour.
   Use the MODE key to select the time digit you wish to change use the ^/v to change the value.
   Press the MODE key to select the next digit to change. Once done press SET to confirm your entry.
9. Repeat step 5-8 to enter remaining steps.
10. Press the PROG/END key. Prog/End will display this instructs the controller to stop firing after the last segment programmed.
11. Press RESET to return to the home screen.

NB : When entering a program, allow a realistic amount of time to reach your final temperature.

There are 3 additional programmable items that end of a firing program.

If by accident you change these, these are the settings that they must be confirmed and set.

EV1 = 0 (this is normal setting)
RPT.PN = 1 (this is normal setting)
LNK.PN = 0 (this is normal setting)

TO FIRE A PROGRAM

1. Press RESET.
2. To select your pattern / program press PTN / END key sequentially until your pattern number displays.
3. Press RUN

"GAIT" may display during a firing. This will happen if the kiln cannot follow the program, such that the rise in temperature of the kiln falls behind the SV. After the temperature interval has expired for the segment and the PV (temperature in the kiln) is more than 10°C below the SV displayed. The controller flashes "GAIT" in the time panel. It will continue to flash until such time as the temperature is within 10C of the SV at which point the controller will switch to the next segment and continue firing.

1. Press RESET to cancel a firing
2. Press RESET after the kiln has completed its firing.
3. Press STEP and hold it until the next segment displays to advance to the next segment in your program. NB . Only after RUN is first pressed to start the firing.
4. Press HOLD (+/- 5 sec – hold will display) to pause a firing at a desired temperature. To cancel press HOLD down again until hold is replaced with time ramping.
5. To modify a program – from the home screen press the RESET key – select the pattern/program you wish to modify (press PTN/END key sequentially). Then press the SET key through each setting until you get to the setting you with to change, make the change and then confirm with SET. Then press RESET to return to the home screen.
6. There are 3 additional programmable items the end of a firing program. If by accident you change these, these are the settings that they must be confirmed and set.
   EV1 = 0 (this is normal setting)
   RPT.PN = 1 (this is normal setting)
   LNK.PN = 0 (this is normal setting)

ENGINEERING SETTINGS NOTES.

The controller has been programmed to match your thermocouple type.

The engineering mode and setup setting mode have been locked to avoid accidental changes to parameters.

The controller has been set to restart in the event of a power interruption/failure. Also known as a hot start.

WARNING

Compensating cables and communications cable linking controller to the kiln should be placed in such a manner that they are not in contact with the kiln skin.

Please ventilate room well.

OVER TEMPERATURE CONTROLLER

Only fitted onto Industry 15, 18, 25 and 35 Models

The over-temperature controller is linked to the mains isolator situated below the controller.

When the process value PV (kiln temperature) matches the set value (SV) of the over temp controller (OTC) it will electrically switch the isolator off and thereby cut power to the kiln.

The OTC is used primarily to protect the kiln from over firing in the unlikely event of the kiln's contactor or the controller's relay failing in the **on** position and causing the kiln to continue heating up. This can result in severe damage to the kiln bricks and any ware inside. **ALWAYS REGULARY CHECK ON A FIRING KILN**

Should the thermocouple tip not be in the chamber of the kiln (not pushed in far enough), this will prevent the controller from operating correctly as it will read a lower temperature than what is actually inside the kiln.

The overtemperature controller should be set at least 5°C **above** the **maximum** temperature of the programme selected on the PZ400 controller. If you set it less, it risks switching off the kiln off prematurely, stopping the firing cycle before its finished.

The OTC has four buttons. Press the "F" (function) button sequentially to select the digit you want to change in the SV display. Using the UP and DOWN arrow buttons modify the temperature. Press the "M" button to confirm the change.

Notes: If the OTC has been set up correctly and you still find the mains isolator being tripped, there are likely causes:

1. Either the Contactor or the Relay on the Controller has failed. Both will require the attention of an electrician.

2. The thermocouple has failed. The controller is programmed to pick up this issue and display a series of dashes '----' in the top display, along the top of the screen. You will need to replace the thermocouple.

BISQUE

PTN 1	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	100	100	650	650	1000	1000	END									
TIME	0.30	1.00	6.30	0.10	2.45	0.30										

EARTHENWARE GLAZE

PTN 2	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	200	1080	1080	END												
TIME	2.00	6.00	0.10													

LOW STONEWARE GLAZE/ MID FIRE

PTN 3	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	200	1000	1220	1220	END											
TIME	2.00	5.30	2.00	0.10												

STONEWARE GLAZE

PTN 4	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	200	1000	1260	1260	END											
TIME	2.00	5.00	3.00	0.30												

LUSTRE

PTN 5	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	750	750	END													
TIME	5.00	0.05														

PTN 6	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 7	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 8	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 9	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 10	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 11	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 12	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 13	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

PTN 14	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP																
TIME																

SHORT TEST FIRING – 4 minutes

PTN 15	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	100	100	END													
TIME	0.03	0.01														

OXIDATION FIRING

PTN 16	SEG 1	SEG 2	SEG 3	SEG 4	SEG 5	SEG 6	SEG 7	SEG 8	SEG 9	SEG 10	SEG 11	SEG 12	SEG 13	SEG 14	SEG 15	SEG 16
TEMP	1100	1100	END													
TIME	5.00	3.00														

PARTS DESCRIPTION AND ENGINEERING SETUP FOLLOWS.

This chapter describes name of parts, setting and modifying values and other basic operations.

4.1 Parts Description 4-2
4.2 Changing Set Value 4-5
4.3 Segment No. Selection 4-6
4.4 Selection of Program Pattern Number Used for Control 4-7

Additional notes to the pages.

Page : 4-3	Note 5	not fitted
	Note 6	available from RKC – optional extra
Page : 4-4	Note 15	OUT1 to 3 lamp – only OUT1 DO1 to 4 lamp – not fitted ALM lamp – not fitted
	Note 21	TS lamp – not fitted\
Page 11-8	Time signal 1	no time signal relay fitted
	Pattern end output time – Set always to 00:00	
Page 11-9	EV1	no EV1 relay fitted set to 0
	Pattern link number	Normally 0 unless more than 16 steps required in program. If you require more than 16 steps, you can link a pattern to another pattern to extend the length of the program.
	Number of repeating Patterns	Normally set to 1 for a single operation of the same program. In ceramics programs do not cycle more than once.

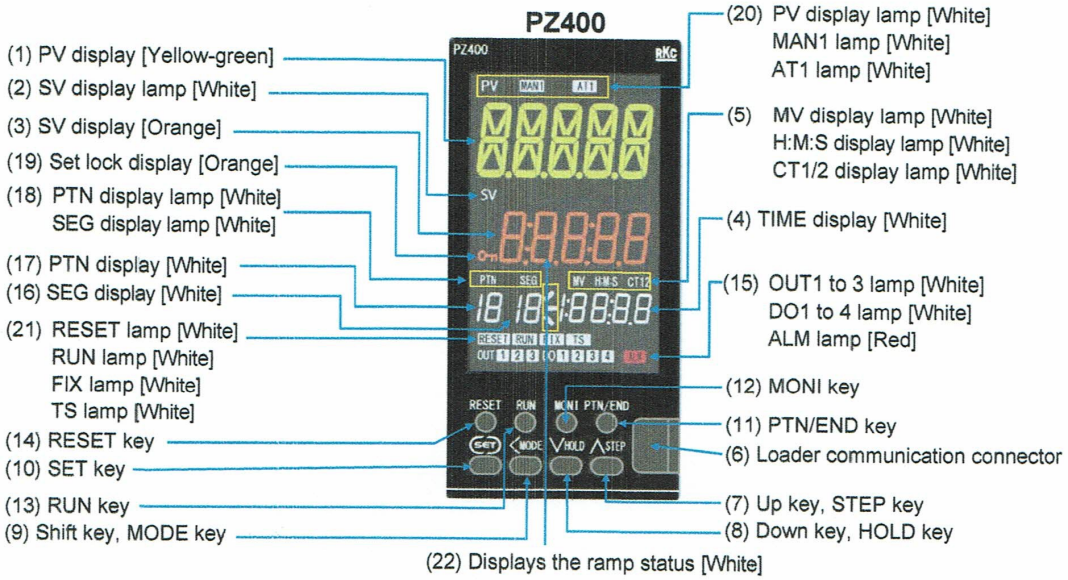
4.1 Parts Description

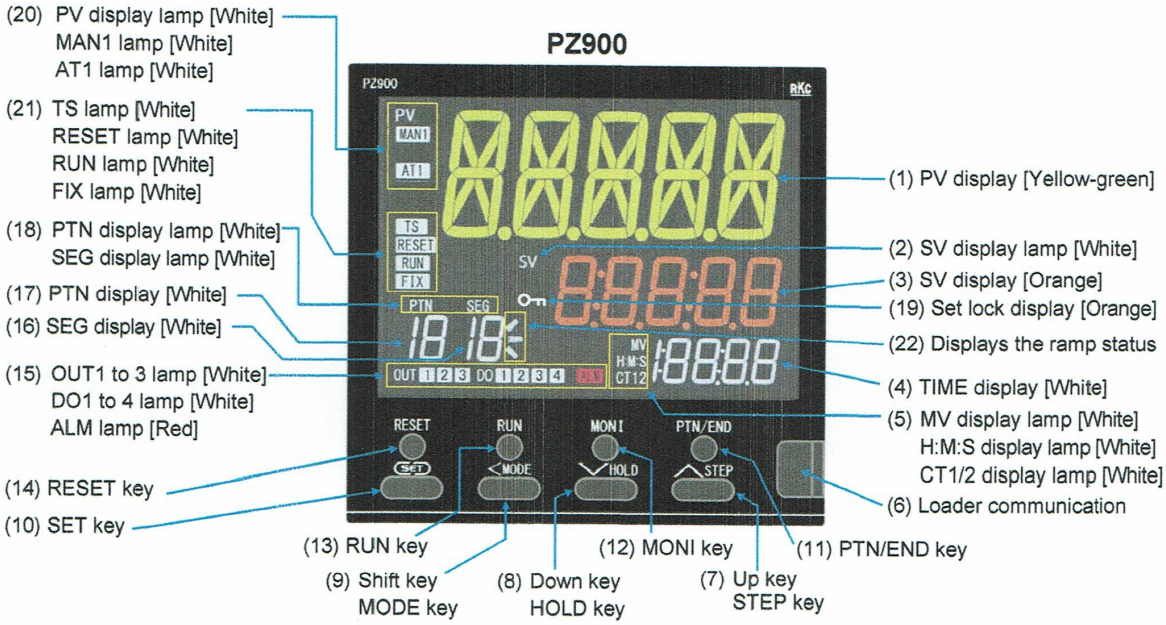
This section describes various display units and the key functions.

NOTE

To avoid damage to the instrument, never use a sharp object to press keys.

■ Front panel view





Display Functions:

(1)	PV display [Yellow-green]		Displays Measured value (PV) or various parameter symbols.
(2)	SV display lamp [White]		Lights while the Segment level or the Set value (SV) in Fixed set point control mode is displayed on the SV display.
(3)	SV display [Orange]		Displays a Segment level, a Set value (SV) in Fixed set point control mode or a set value of the various parameters.
(4)	TIME display [White]		Displays the Segment time, the Remaining segment time, the Manipulated output (MV) value or the input value from the current transformer (CT).
(5)	MV display lamp [White]		Lights when Manipulated output value (MV) is displayed on the TIME display.
	H:M:S display lamp [White]		Lights when time (hour: minute: second) is displayed on the TIME display.
	CT1/2 display lamp [White]		• CT1 lights when the Current transformer 1 (CT1) input value is displayed on the TIME display. • CT2 lights when the Current transformer 2 (CT2) input value is displayed on the TIME display.
(6)	Loader communication connector		Setting and monitoring on a computer (PC) is possible if the controller is connected with our cable to a PC via our USB communication converter COM-K2 (sold separately) [a]. Our communication software [b] must be installed on the PC. [a] For the COM-K2 *, refer to the official RKC website. * A previous version of COM-K (version 1) can be also connected. [b] Only available as a download from the official RKC website (https://www.rkcinst.com).
(7)	∧	Up key	Increases numerals. Used to switch the group of each modes.
	STEP	STEP key	During the Program control mode (RUN), segments in the program pattern now in execution can be advanced.
(8)	∨	Down key	Decreases numerals. Used to switch the group of each modes.
	HOLD	HOLD key	During the Program control mode (RUN), the program progress can be suspended (held temporarily). When this key is pressed during the Hold, the Hold function is released.
(9)	<	Shift key	Shifts digits when settings are changed.
	MODE	MODE key	Used to switch the modes.
(10)	SET	SET key	Used to switch the modes, for calling up parameters and set value registration.
(11)	PTN/END	PTN/END key	• During the Reset mode (RESET), the pattern to be executed can be selected. The pattern number increases by one every time PTN/END key is pressed. When the pattern number is already the maximum, the pattern number returns to 1. When the PTN/END key is pressed for 2 seconds or more, the screen is switched to the Execution pattern selecting display. • This key is used to set/release the program pattern end at the time of program pattern setting. • The End segment No. can be checked in the Program control mode (RUN). The End segment No. will be displayed on the SEG display unit only while the PTN/END key is pressed.
(12)	MONI	MONI key	Used to switch screens. When the MONI key is pressed while any screen other than Monitor & Program setting mode is displayed, the screen returns the PV/SV monitor.
(13)	RUN	RUN key	The mode is switched to the Program control mode (RUN) to execute the program.
(14)	RESET	RESET key	The mode is switched to the Reset (RESET) mode and the control is stopped.

Display Functions:

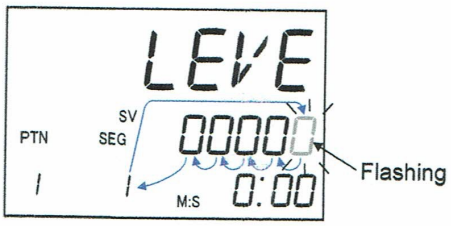
(15)	OUT1 to 3 lamp [White]	Lights when Outputs 1 to 3 (OUT1 to 3)* are turned on.
	DO1 to 4 lamp [White]	Lights when Digital outputs 1 to 4 (DO1 to 4)* are turned on.
	ALM lamp [Red]	Lights when any of the following occurs. • Event 1 to 4 • Heater break alarm (HBA) 1 or 2 • Control loop break alarm (LBA) • Input error
(16)	SEG display [White]	Displays the segment number. Reset mode (RESET): Segment No. before operation start Program control mode (RUN): Segment No. in execution
(17)	PTN display [White]	Displays the Program pattern number Reset mode (RESET): Program pattern No. currently selected Program control mode (RUN): Program pattern No. in execution
(18)	PTN display lamp [White]	Lights when Program pattern No. is displayed on the PTN display unit.
	SEG display lamp [White]	Lights when Segment No. is displayed on the SEG display unit.
(19)	Set lock display [PZ400: Orange PZ900: White]	Lights when the settings are locked. Lights when the settings are locked or when "Parameter select direct registration" is on.
(20)	PV display lamp [White]	PV Lights when the Measured value (PV) is displayed on the PV display unit.
	MAN1 lamp [White]	Lights when Input is in Manual control mode (MAN). When lit, the SV display shows a Manual manipulated output value.
	AT1 lamp [White]	• Flashes when Autotuning (AT) is activated. (After AT is completed: AT lamp will go out) • Lights when Startup tuning (ST) is activated. (After ST is completed: AT lamp will go out)
(21)	TS lamp [White]	Lights during the Time signal (TS) operation.
	RESET lamp [White]	Lights during the Reset mode (RESET).
	RUN lamp	Lights during the Program control mode (RUN).
	FIX lamp	Lights during the Fixed set point control mode (FIX).
(22)	Displays the ramp status [White]	Displays the segment level ramp status (up, soak, down) during the Program control (RUN) mode. Rise: Soak: Fall:

* Outputs, such as control output, retransmission output, event output, are assigned to Outputs 1 to 3 (OUT1 to 3) and Digital outputs 1 to 4 (DO1 to 4). (Control output can be assigned to OUT1 to 3 only.) Outputs are assigned in Engineering mode.

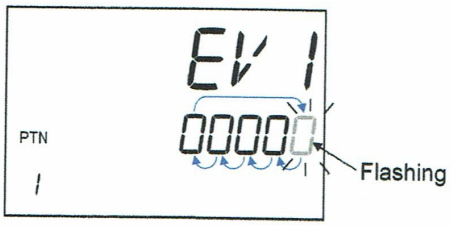
4.2 Changing Set Value

- The flashing digit indicates which digit can be set. Press <MODE key to go to a different digit. Every time the shift key is pressed, the flashing digit moves as follows.

A Monitor & Program setting mode
Reset mode (RESET)
Segment 1 to 16 level screen
Segment 1 to 16 time screen

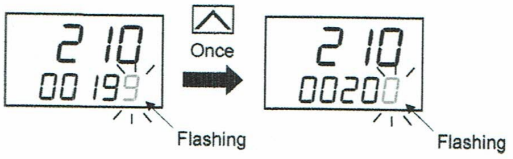


Changes in other screens except the left one.

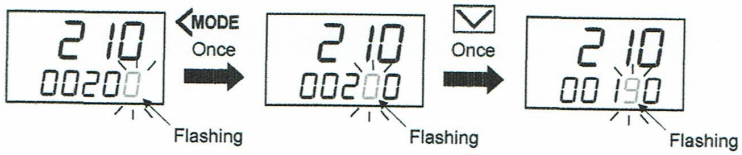


- The following is also available when changing the set value.

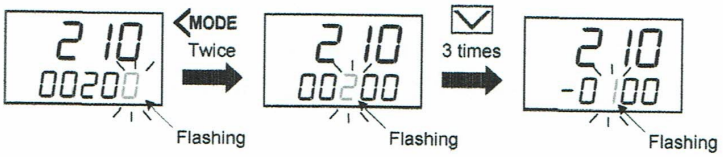
Increase SV from 199 °C to 200 °C:



Decrease SV from 200 °C to 190 °C:



Decrease SV from 200 °C to –100 °C:



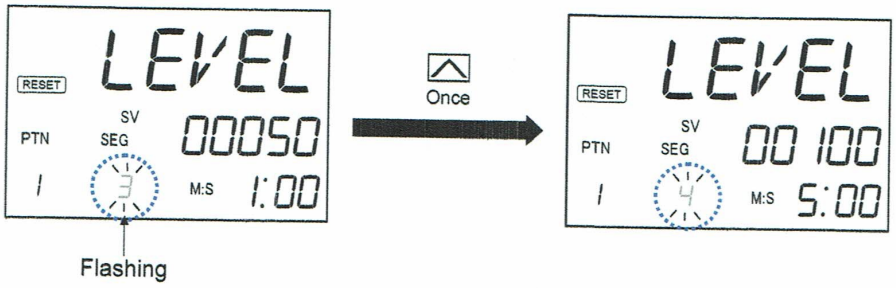
- **To store a new value for the parameter, always press the (SET) key**. The display changes to the next parameter and the new value will be stored.
  The modified data will not be stored only by operating the ∧ and ∨ keys.

- In case no operation is performed within 60 seconds after the change of the setting, the mode will return to A Monitor & Program setting mode (PV/SV monitor screen). The modified data will not be registered in this case.

4.3 Segment No. Selection

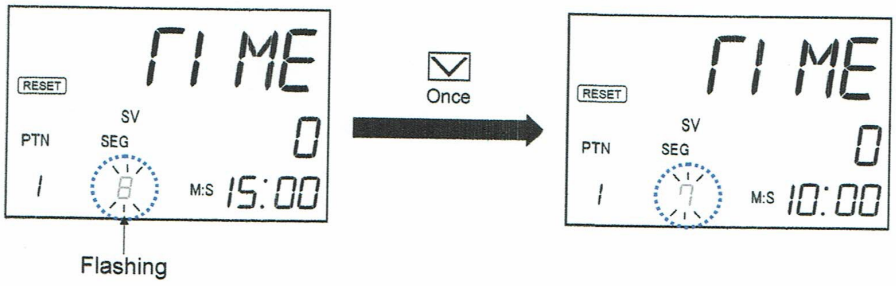
On the "Segment level 1 to 16" screens and "Segment time 1 to 16" screens the segment number can be changed using the ⌃ and the ⌄ keys while the SEG display is flashing.
To blink the SEG display unit, press the ◁MODE key several times until it starts blinking.

A Monitor & Program setting mode
Reset mode (RESET)
Segment 3 level screen



Flashing

A Monitor & Program setting mode
Reset mode (RESET)
Segment 8 time screen



Flashing

When registered in the Parameter select mode
"Segment level 1 to 16" and "Segment time 1 to 16" screens can be registered in the Parameter select mode. Even if Segment No. is registered in the Parameter select mode, Segment No. can be switched to the others by blinking the SEG display unit.

4.4 Selection of Program Pattern Number Used for Control

Program pattern used for the program control can be selected in the Reset mode (RESET).
Select a pattern on the following parameter screens.

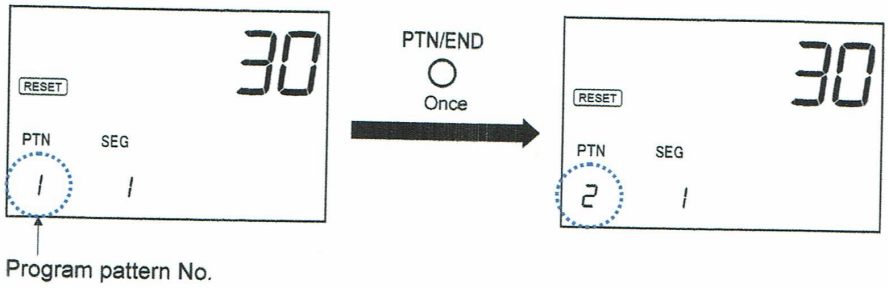
- PV/SV monitor screen of Monitor & Program setting mode
- Execution pattern selection screen of Pattern transfer mode

To switch to Reset mode (RESET) state, press the RESET key.

■ Switching pattern one by one

When the PV/SV monitor screen is displayed in the Reset mode (RESET) and the PTN key is pressed, program pattern number will be moved ahead.

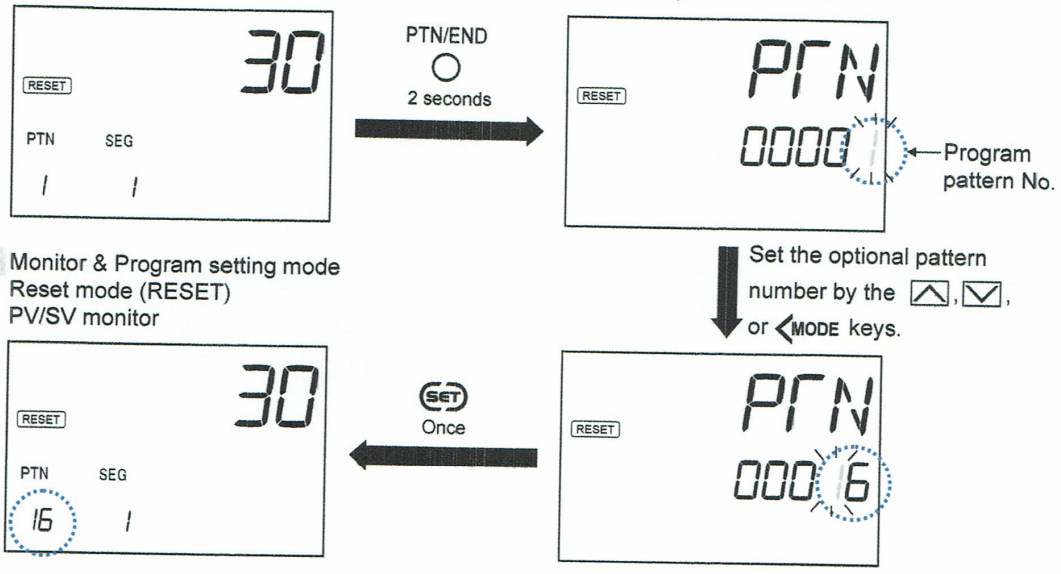
A Monitor & Program setting mode
Reset mode (RESET)
PV/SV monitor



■ Switching to the desired pattern

Switch the screen to the Execution pattern selecting display in the Pattern switching mode, and select the desired pattern.

A Monitor & Program setting mode
Reset mode (RESET)
PV/SV monitor



Notes:

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