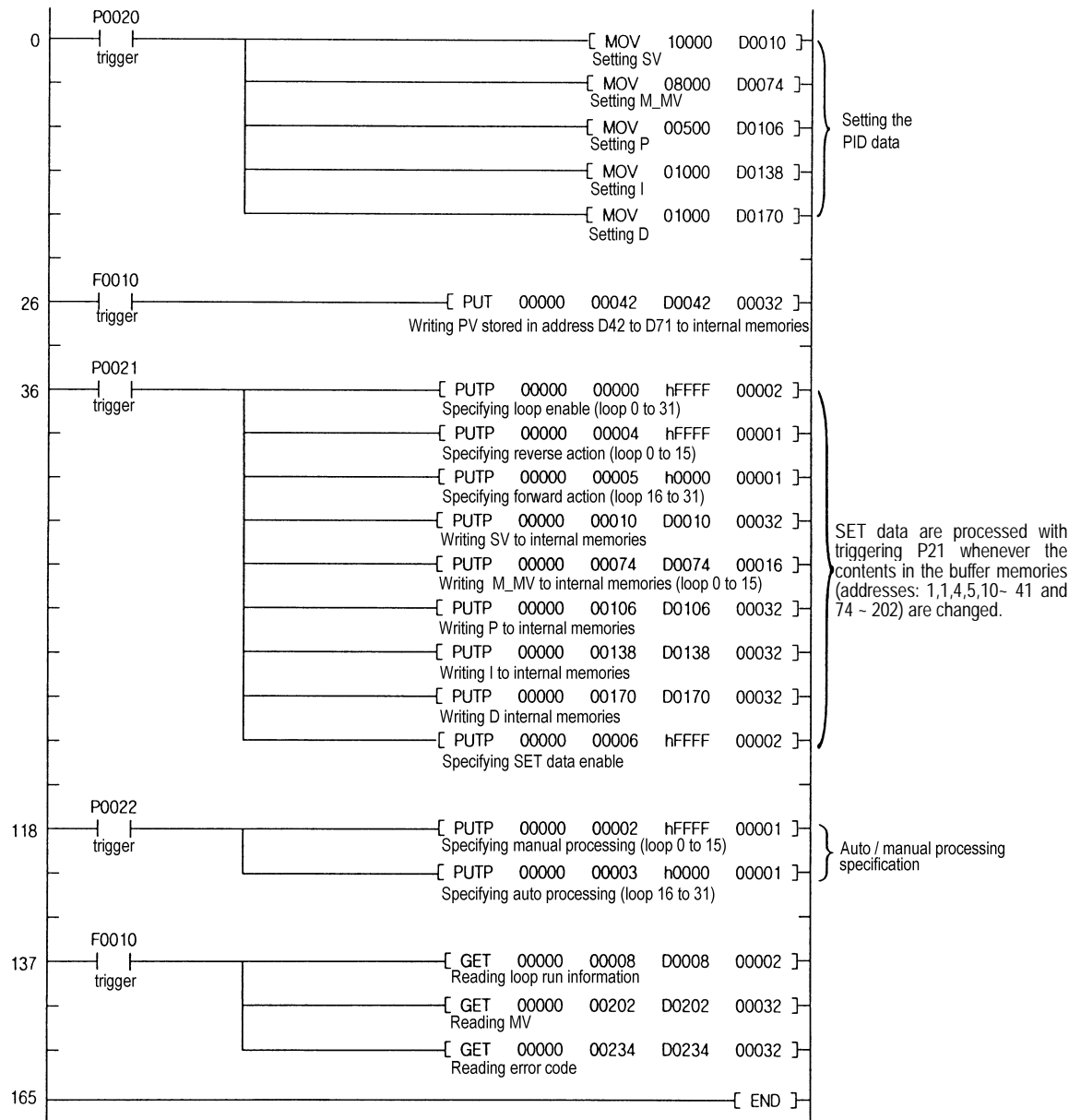


Chapter 6. PROGRAMMING

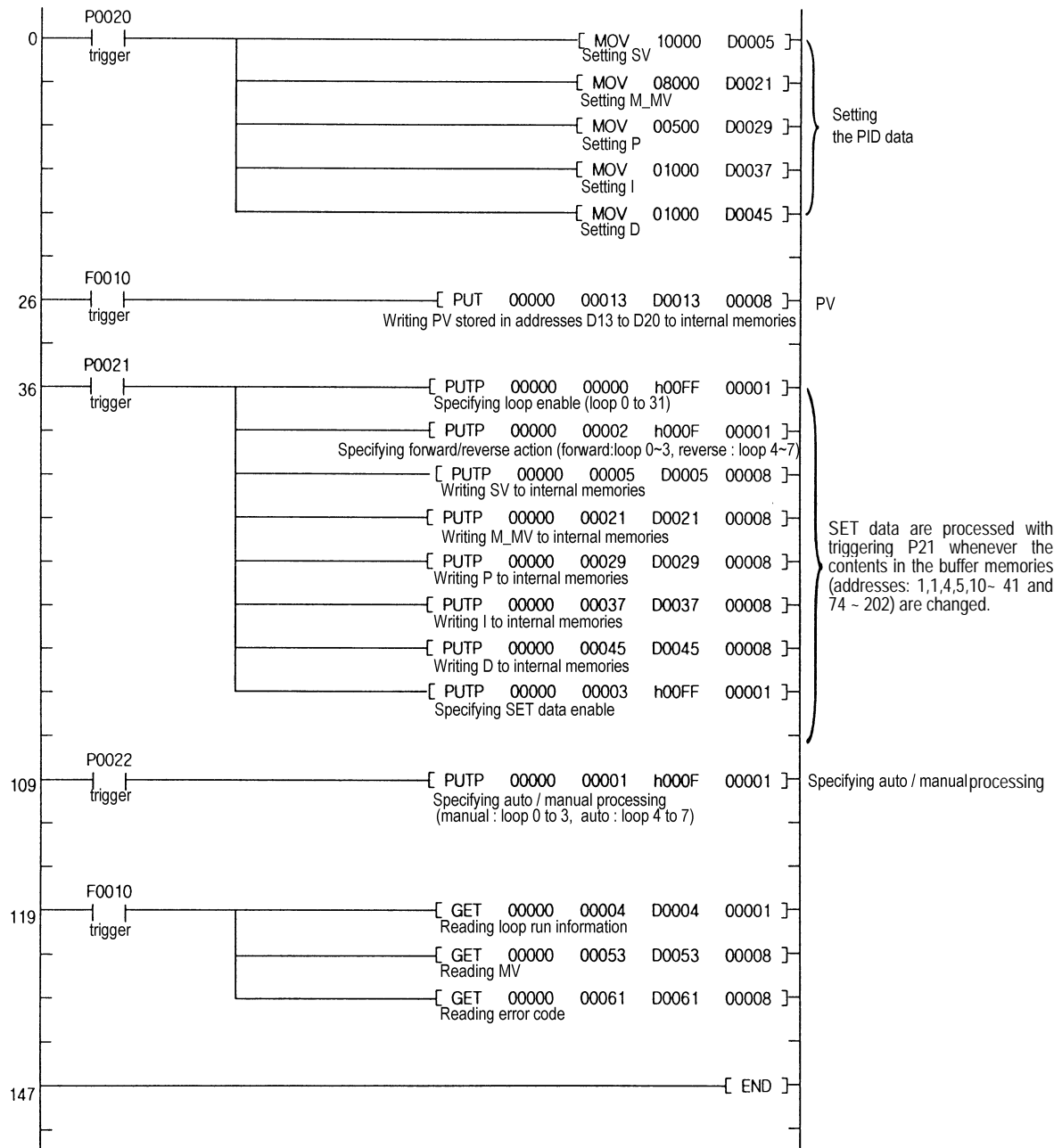
6.1 Basic Programming

- ▲ The following describes the method to set the running conditions in the buffer memories of the PID control module.
- ▲ The PID control module is already mounted on the slot 0.
- ▲ The PID control module occupies 16 I/O points.

6.1.1 K7F-PIDA



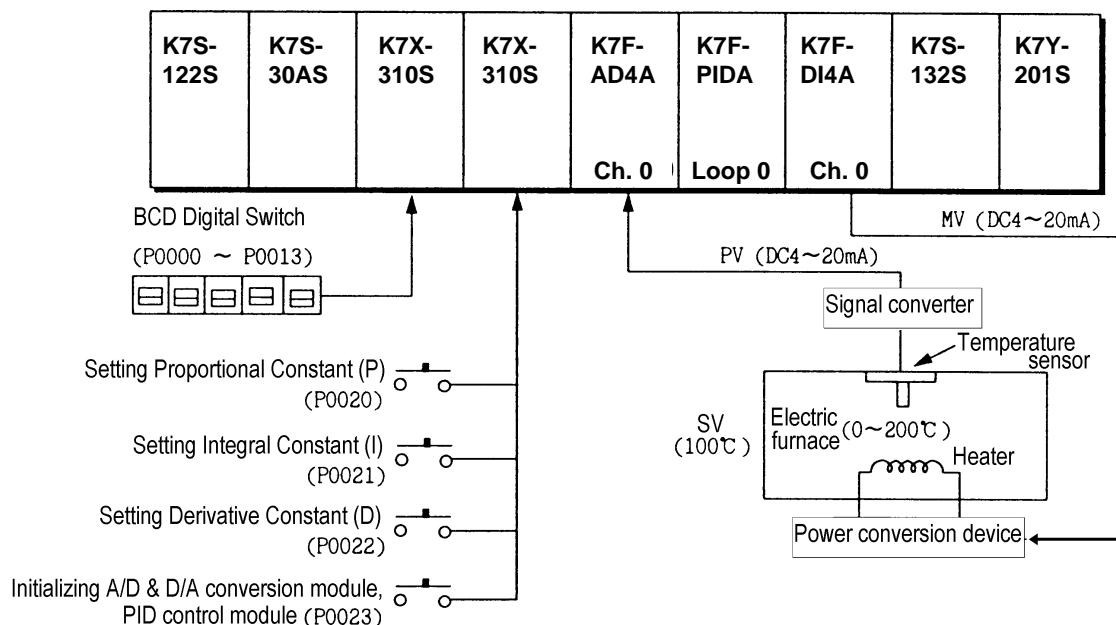
6.1.2 K4F-PIDA



6.2 Application Programming

6.2.1 A Program for Controlling an Electric Furnace (with Applying the A/D Conversion Module, PID Control Module and D/A Conversion Module)

1) System Configuration



1) Initial Settings

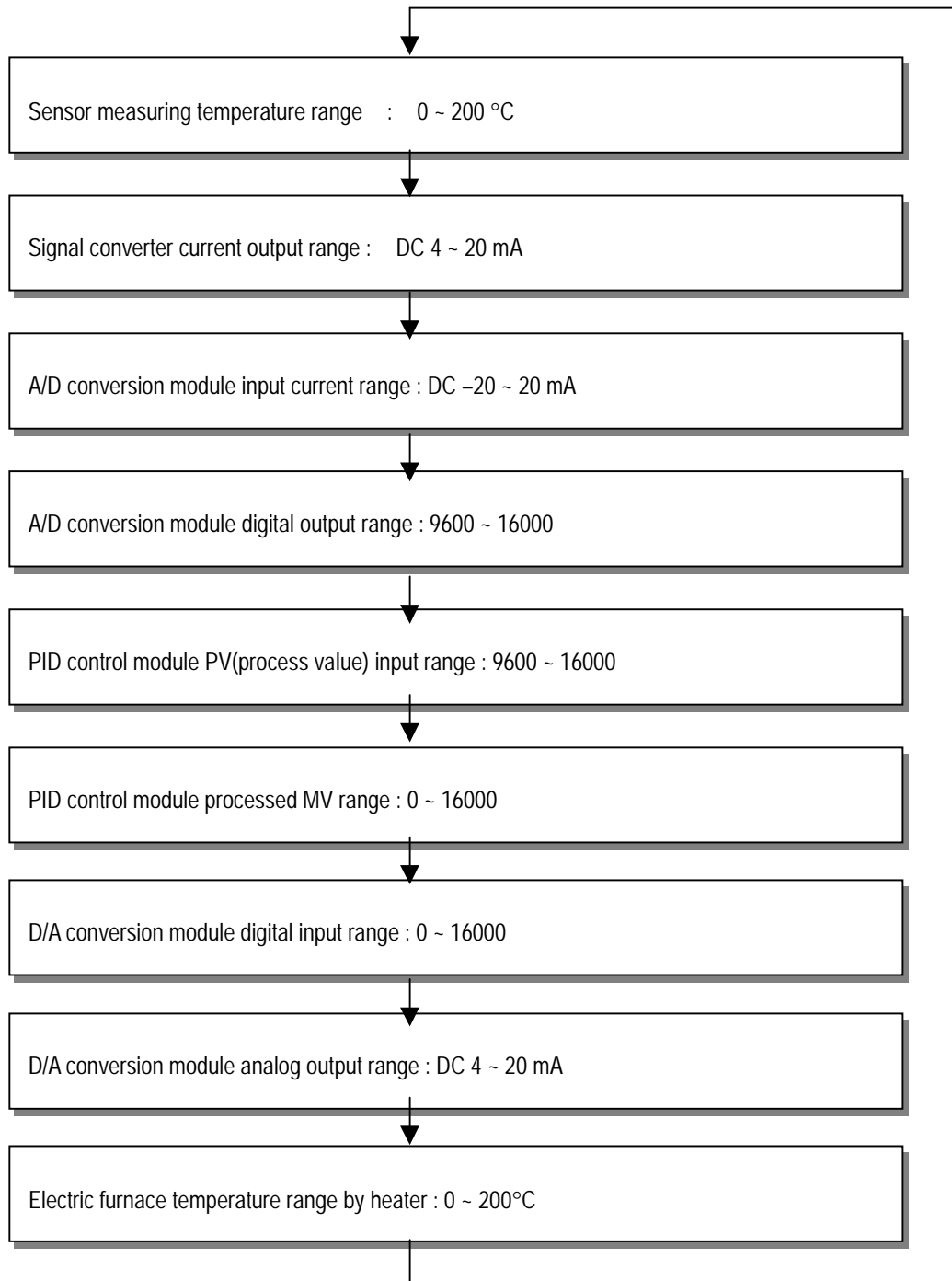
- (1) PID control module
 - A) Specifying used loop : loop 0
 - B) Specifying forward/reverse action : forward action
 - C) Setting SV: 12800
 - D) Specifying auto/manual processing : auto processing
- (2) A/D conversion module
 - A) Specifying used channel: channel 0
 - B) Specifying output data type: -192 to 16191
 - C) Setting filter constant: 50
- (3) D/A conversion module
 - A) Specifying used channel: channel 0
 - B) Specifying input data type: -192 to 16191
 - C) Output when no channel is used or the CPU module is in the stop state : The median value of the output range is output.

2) Descriptions of the Program

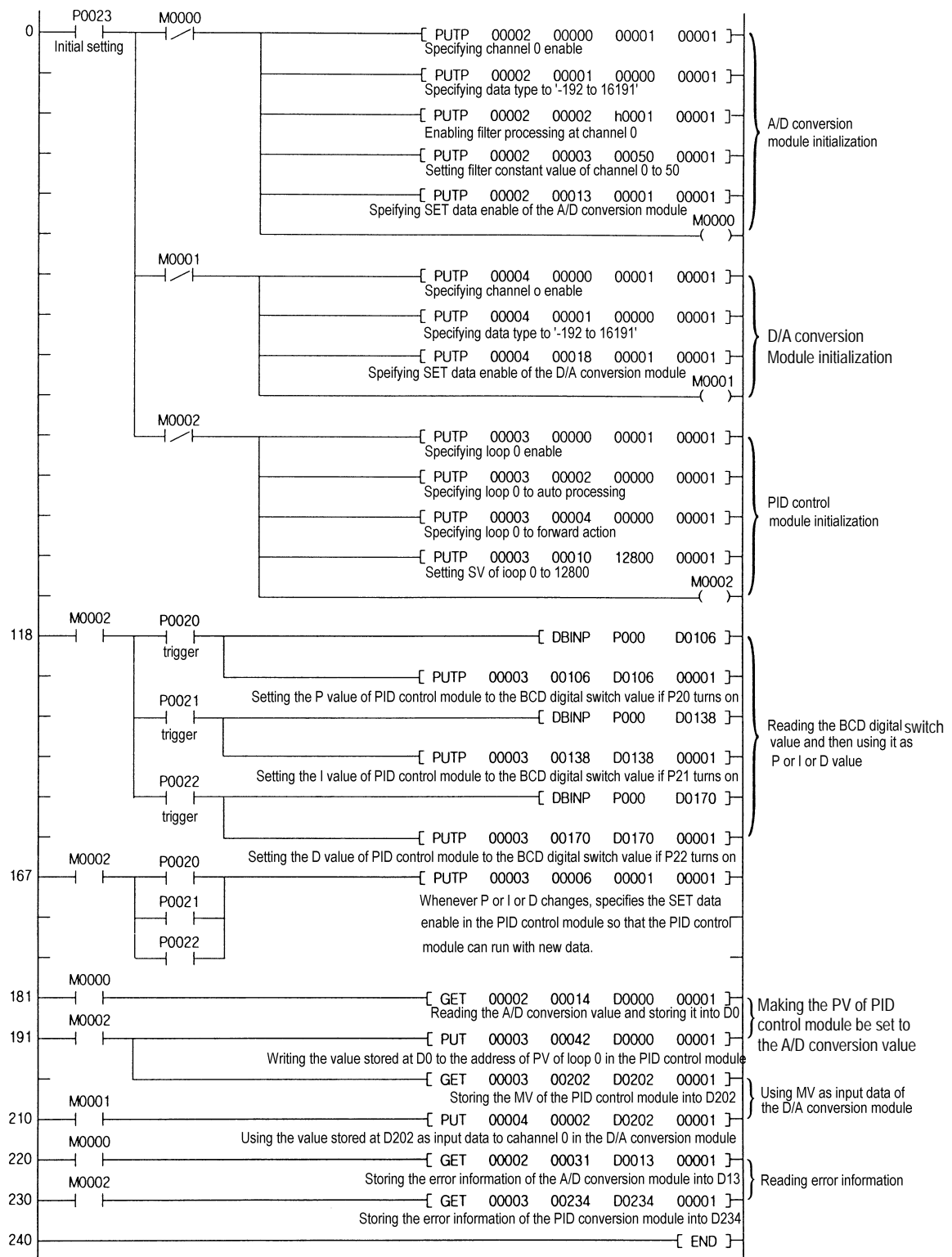
- (1) A temperature 0 to 200°C from the temperature sensor is converted into an analog signal 4 to 20 mA and then the signal is input to the channel 0 of the A/D conversion module channel and converted into a digital value 9600 to 16000.

- (2) In the PID control module, 100°C (where the signal converter output is 12 mA, 12800 as a digital value.) is set as SV. With regards to P.I.D constants, the manipulated value in the BCD digital switch is set as the proportional constant when P0020 turns on, as the integral constant when P0021 turns on, and as the Derivative constant when P0022 turns on.
- (3) MV, the result from PID processing is output at the channel 0 of the D/A conversion module.
- (4) If P0023 turns on, initial setting of the A/D conversion module, PID control module and D/A conversion module is executed.

3) Modules and their Signal Processing

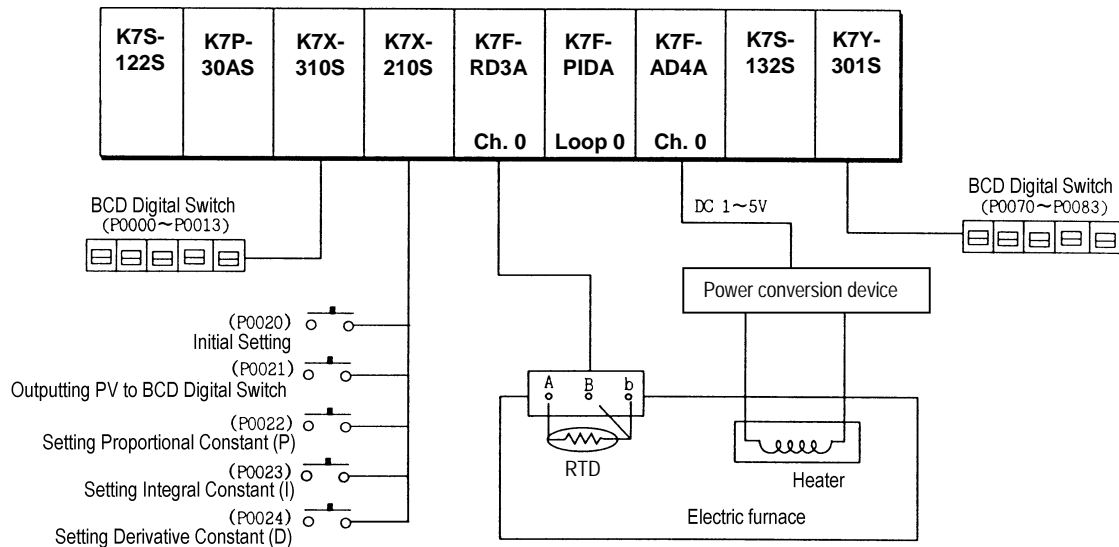


5) Program



10.2.2 A Program for Control Using a RTD (with Applying the RTD Input Module, PID Control Module and D/A Conversion Module)

1) System Configuration



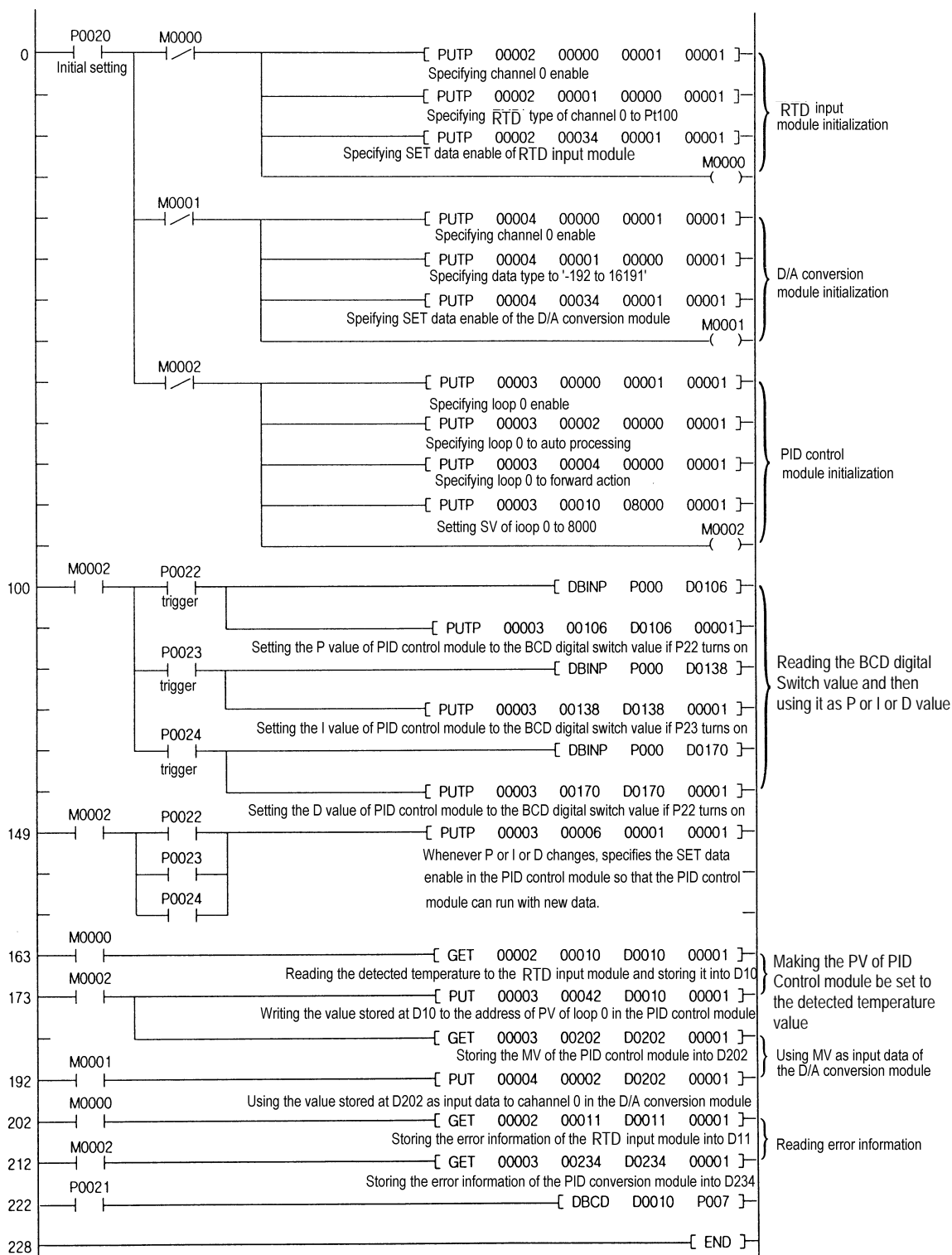
2) Initial Settings

- (1) PID control module
 - A) Specifying used loop : loop 0
 - B) Specifying forward/reverse action: forward action
 - C) Specifying the Set Value: 8000
 - D) Specifying auto/manual processing : auto processing
- (2) RTD input module
 - A) Specifying used channel: channel 0
 - B) Specifying RTD sensor type: Pt100
- (3) D/A conversion module
 - A) Setting the voltage input range to -5 to 5 DCV (offset: DC 1V, gain: DC 3V)
 - B) Specifying used channel : channel 0
 - C) Specifying input data type : 0 to 16000

3) Descriptions of the Program

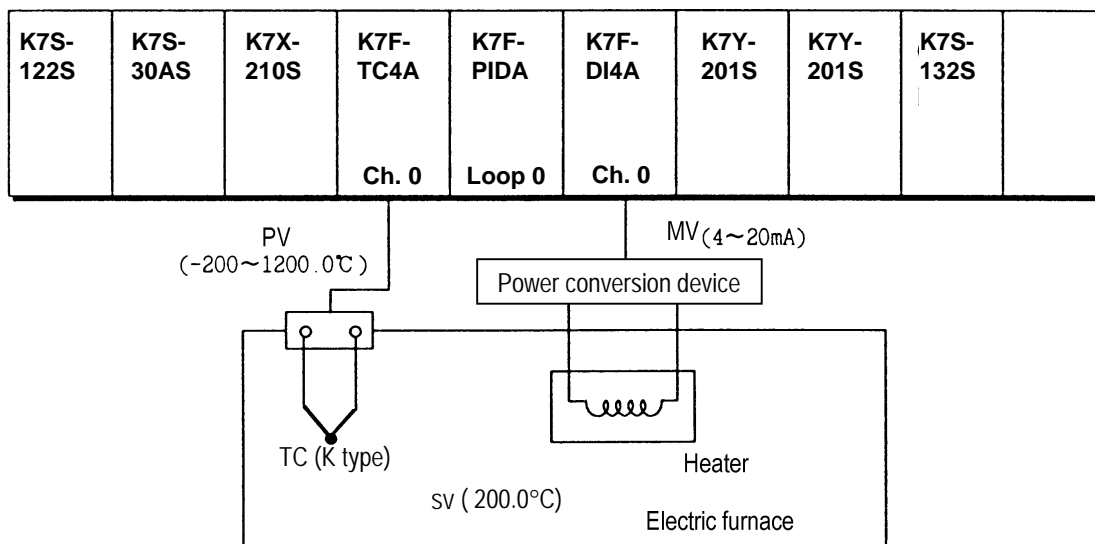
- (1) The channel 0 of the RTD input module detects a temperature of the electric furnace through Pt100 and receives it as a digital value.
- (2) The Set Value of PID control module loop 0 is set to 8000(where the temperature is 100°C). With regards to P.I.D constants, the manipulated value in the BCD digital switch is set to the proportional constant when P0022 turns on, to the integral constant when P0023 turns on, and to the Derivative constant when P0023 turns on. As the change of MV, the manipulated value in the BCD digital switch is set to a new MV.
- (3) MV, the result from PID processing is output at the channel 0 of the D/A conversion module.
- (4) If P0021 turns on, PV is displayed on the BCD digital LED.

4) Program



6.2.3 A Program for Control Using a Thermocouple (with Applying the TC Input Module, PID Control Module and D/A Conversion Module)

1) System Configuration



2) Initial Settings

- (1) TC input module
 - A) Specifying used channel : channel 0
 - B) Specifying TC type: K type
- (2) PID control module
 - A) Specifying used loop : loop 0
 - B) Specifying forward/reverse action: forward action
 - C) Specifying auto/manual processing : auto processing
 - D) Setting SV: 200°C (4571 as digital value)
 - E) Setting M_MV (Used when errors occur) : 4500
 - F) Setting P : 3000
 - G) Setting I : 100
 - H) Setting D : 100
 - I) Auto processing is changed to manual processing when errors occur.
- (3) D/A conversion module
 - A) Specifying used channel: channel 0
 - B) Specifying input data type: -192 ~ 16191
 - C) The output when no channel is used or the CPU module is in the stop state : The median value of the output range.

3) Descriptions of the Program

- 1) The temperature of the electric furnace is converted into a digital value through the channel 0 of the TC input module, and the digital value stored at address 18 is used as PV of the PID control module.
- 2) The MV of the PID control module is used as input digital data of the channel 0 of the D/A conversion module.
- 3) If an error occurs by the K type TC or the compensation wire which are connected to the TC input module (In the channel 0, it is indicated at address 19.), then the PID control module changes auto processing into manual processing.

4) Program

