

Panasonic[®]

PROGRAMMABLE CONTROLLER
MEWNET FP3
A/D CONVERTER UNIT
Technical Manual

MEWNET FP3 A/D CONVERTER UNIT Technical Manual
ACG-M0011-1 '91.05

Matsushita Electric Works, Ltd.

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.

To ensure that you use this product correctly, read this User's Manual thoroughly before use.

Make sure that you fully understand the product and information on safe.

This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

- To prevent abnormal exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
- Do not dismantle or remodel the product. It could lead to abnormal exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock..
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely.
The loose connection might cause abnormal exothermic heat or smoke generation
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It might cause exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on.

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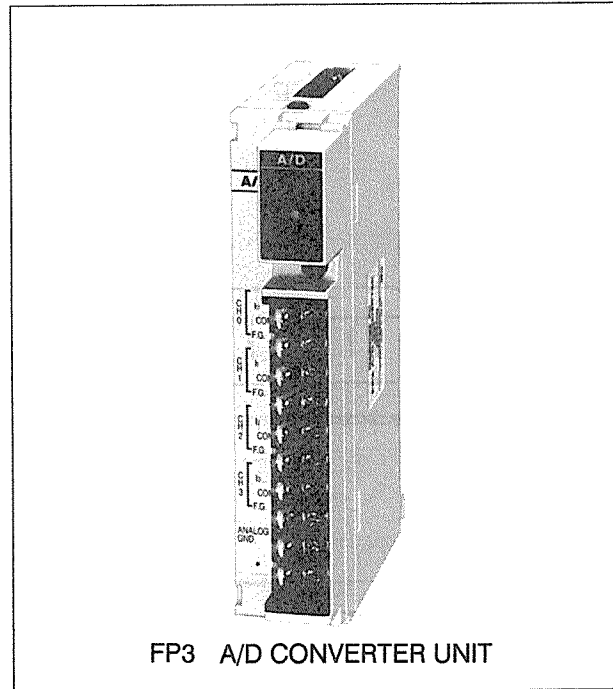
A. FEATURES

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“PC” is the abbreviation for Programmable Controller.

■ FEATURES



- There is a four-channel input channel.
- High speed conversion of 2.5 millisecon per channel
- Can respond to noisy and unstable signals by a process of averaging.
- By setting the upper and lower limit values for any four-input channels, an alarm signal can be sent to C.P.U of Programmable Controller.
- Bipolar signal input capability
With four types of analog input ranges, the device can receive bipolar signals from displacement sensors, in either voltage or current form.

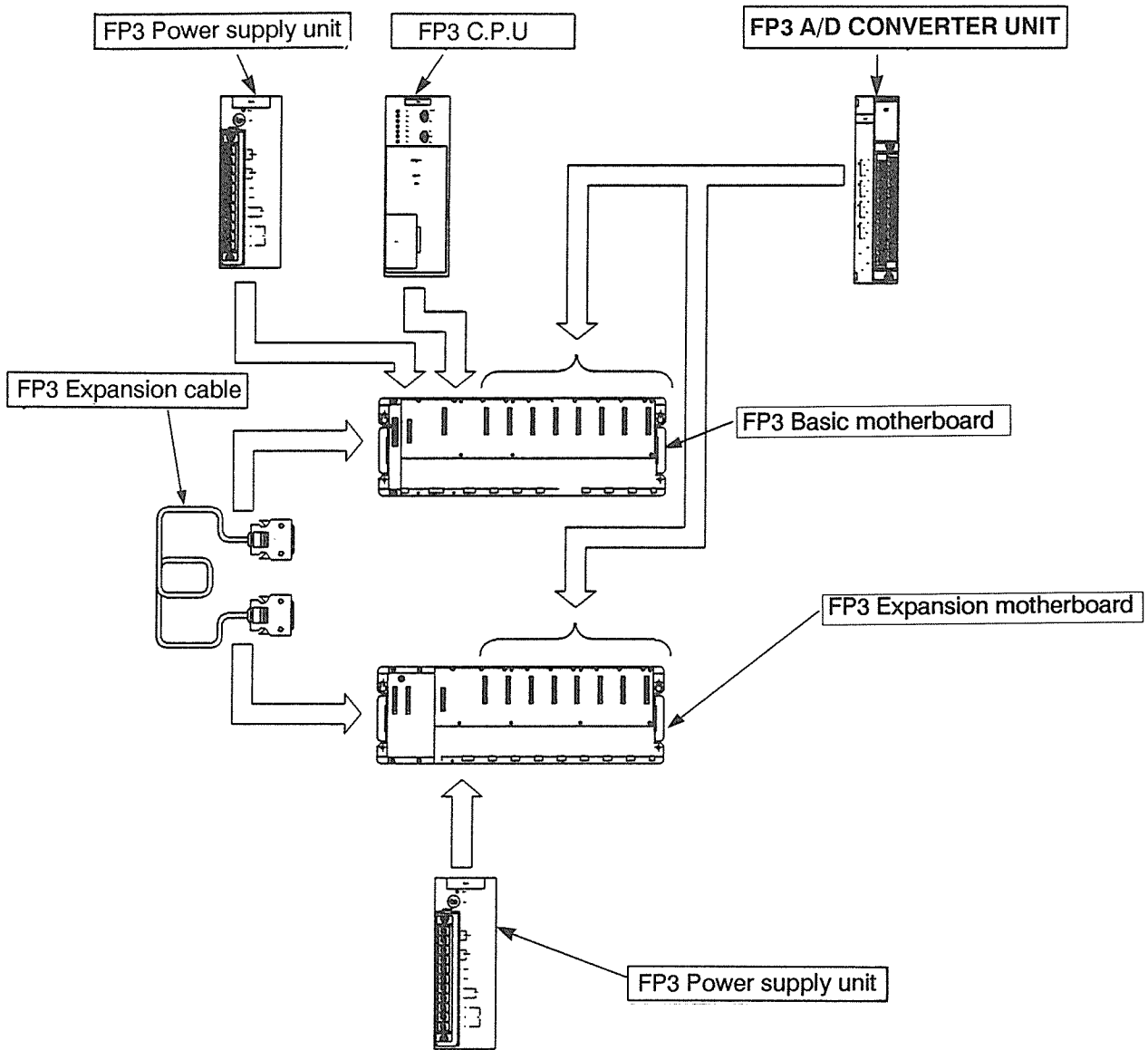
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■ SYSTEM CONFIGURATIONB-2

"PC" is the abbreviation for Programmable Controller.

SYSTEM CONFIGURATION



The figure above shows the system configuration.

The A/D converter unit can be freely mounted in any position without regard to the Basic motherboard and Expansion motherboard.

However, the number of units that can be installed is limited by capacity of the power supply unit.

C. PARTS NAMES AND FUNCTIONS

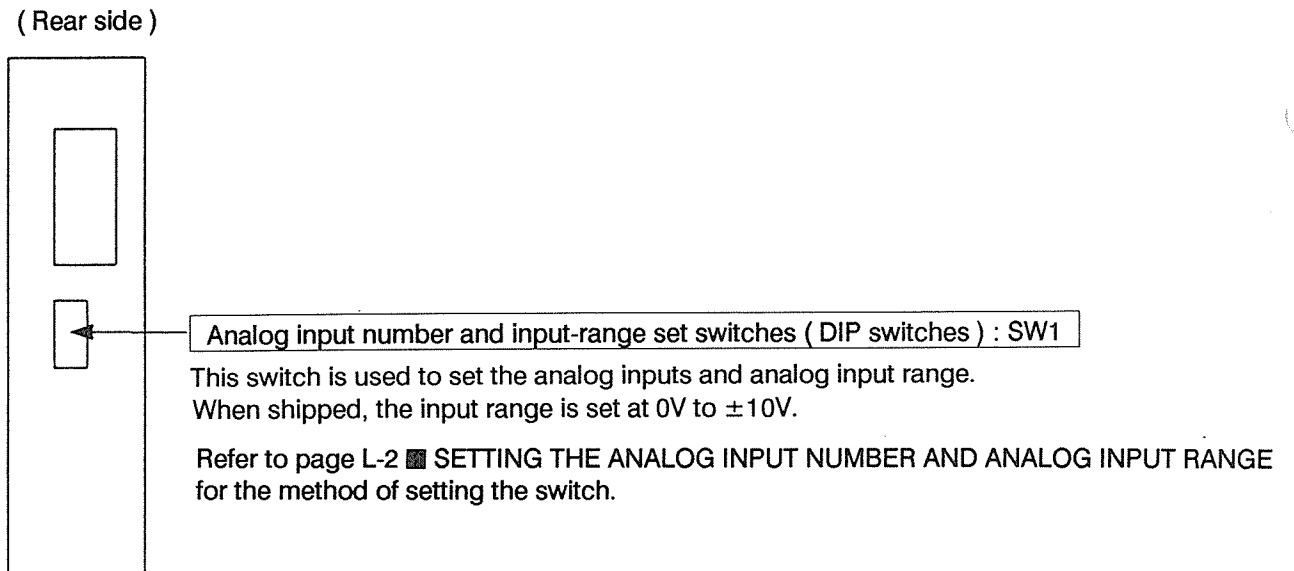
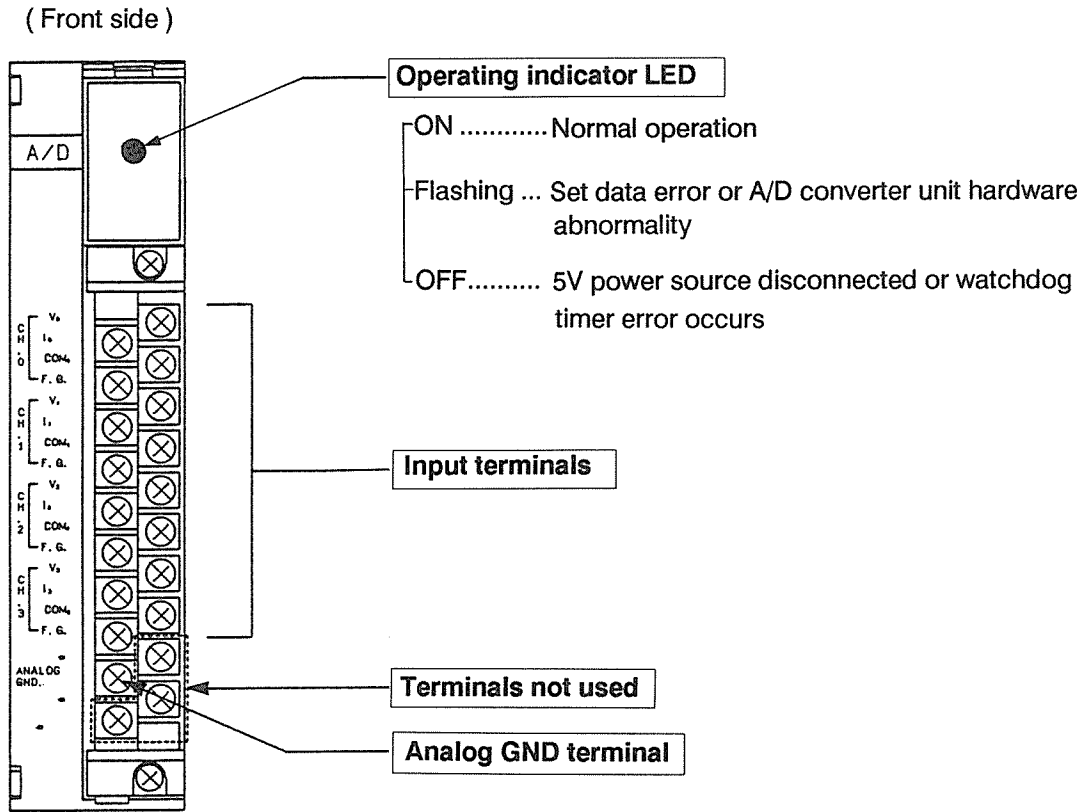
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■ PARTS NAMES AND FUNCTIONS

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"PC" is the abbreviation for Programmable Controller.

■ PARTS NAMES AND FUNCTIONS



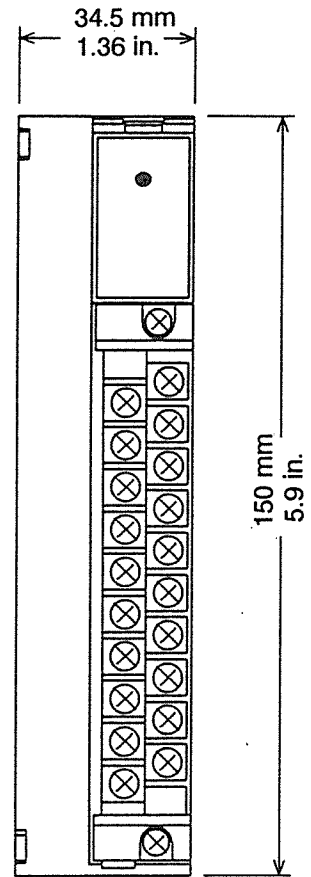
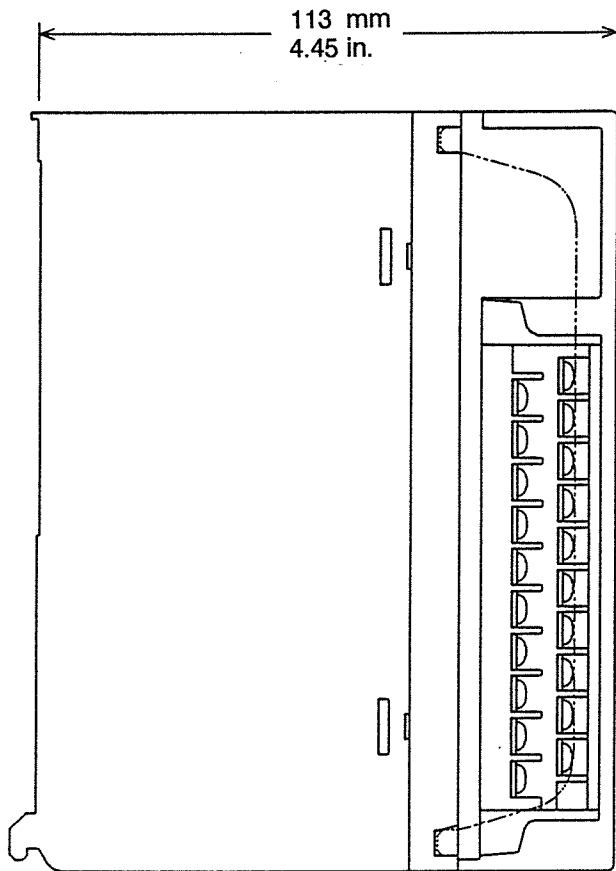
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"PC" is the abbreviation for Programmable Controller.

DIMENSIONS



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"PC" is the abbreviation for Programmable Controller.

SPECIFICATIONS

1. General Specifications

Items	Specifications
Ambient operating temperature	0°C to 55°C (32°F to 131°F) (see note.)
Ambient storage temperature	-20°C to 70°C (-4°F to 158°F)
Ambient operating humidity	30 to 85%RH (non-condensing)
Ambient storage humidity	30 to 85%RH (non-condensing)
Breakdown voltage	Between DC external terminal block and ground, 500V AC, 1 minute
Insulation resistance	Between DC external terminal block and ground, Over 100M ohm (with 500V DC mega)
Vibration resistance	10Hz to 55Hz, 1 cycle per minute; double amplitude 0.75mm, 10 minutes in each of the X, Y and Z axes.
Shock resistance	Min.98 m/s ² , 4 times in each of the X, Y and Z axes.
Noise resistance	1000V, 50 nanosec. 1 microsec. pulse widths (based on in-house measurements)
Operating condition	Free of corrosive gases and excessive dust

Notes :

- Do not mount the A/D converter unit adjacent to the output unit or the power supply unit.
- In case you need to mount the A/D converter unit adjacent to the output unit or the power supply unit. Ambient temperature is 0°C to 50°C (32°F to 122°F).

2. Performance Specifications

Analog input	Voltage: DC -10 to 0 to +10V 1V to 5V] DIP switch selects range * 1						
	Current: DC -20 to 0 to +20mA 4mA to 20mA] DIP switch selects range						
Digital output	-2000 to 2000 or 0 to 4000						
I/O characteristics	Range :	Analog input	+10 V	+5 V	±0V	-5V	-10 V
	0 V to ± 10 V	Digital output	+2000	+1000	0	-1000	-2000
	Range :	Analog input	+5 V	+4 V	+3 V	+2 V	+1 V
	1 V to 5 V	Digital output	+4000	+3000	+2000	+1000	± 0
	Range :	Analog input	+20 mA	+10 mA	± 0mA	-10mA	-20 mA
	0 mA to ±20 mA	Digital output	+1000	+500	0	-500	-1000
	Range :	Analog input	+20 mA	+16 mA	+12 mA	+8 mA	+4 mA
	4 mA to 20 mA	Digital output	+4000	+3000	+2000	+1000	± 0
Maximum resolution	Voltage: 5mV (1/4000)---- 0V to ±10V 1mV (1/4000)---- 1V to 5V Current: 20 microampere (1/2000)---- 0mA to ±20mA 4 microampere (1/4000)---- 4mA to 20mA						
Overall accuracy	±0.5 % per F.S. [at 25°C(77°F)], ±1.0 % per F.S. [at 0°C to 55°C(32°F to 131°F)]						
Conversion speed	2.5 millisecc per channel						
External input impedance	Input voltage: 1MΩ or more						
	Input current: 250 Ω						
Maximum input	(Range: 0V to ±10V) (Range: 1V to 5V)						
	Voltage	±15V	+7.5 V				
Current :	±30mA	+30 mA					
Number of analog input points	4 channels per unit						
Insulation method	Photocoupler between input terminal and power supply (Not insulated between channels)						
Number of I/O exclusive points	16 input points						
Digital output scaling function	Scaling of digital conversion values in the range of -32768 to 32767						
Averaging	Average number of times 3 to 4000						
Alarm signal function	Setting of upper / lower value for any input						
Internal consumption current	5V 0.5A or less						
External connection method	Terminal board connection (Terminal screws: M3.5 thread)						
Applicable wire size	0.5mm ² to 1.25mm ²						
Weight	Approx. 400g (0.88 lbs.)						

Notes :

- *1 It is not possible to set the range for each channel.
- The input voltage and input current can be select for each channels.



F. INPUT/OUTPUT CONVERSION CHARACTERISTICS

page

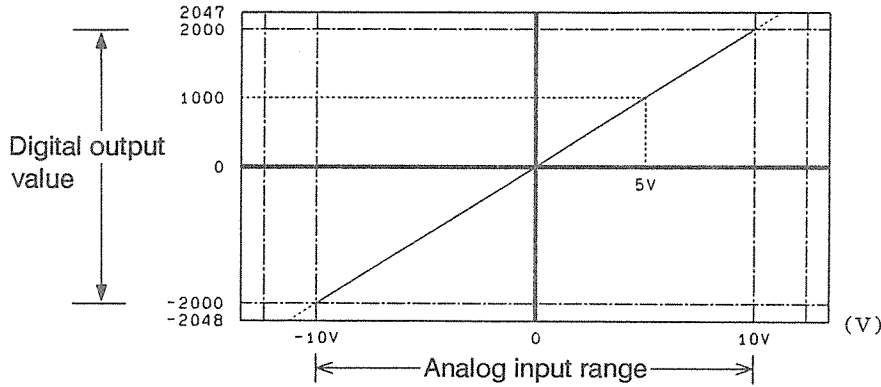
■ INPUT/OUTPUT CONVERSION CHARACTERISTICS F-2

"PC" is the abbreviation for Programmable Controller.

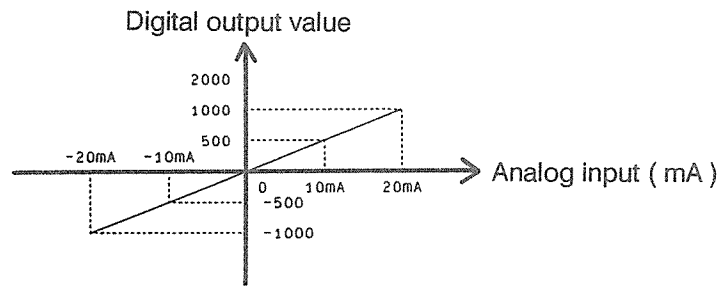
INPUT/OUTPUT CONVERSION CHARACTERISTICS

The basic conversion characteristics are shown below with the range set by the DIP switches.

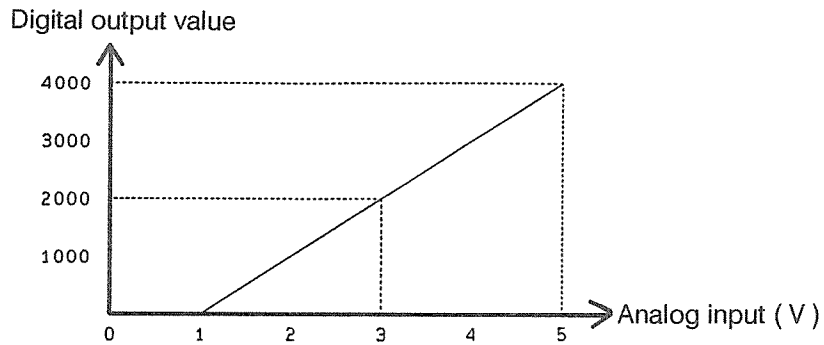
- Using analog input voltage (When range is 0 V to ± 10 V)



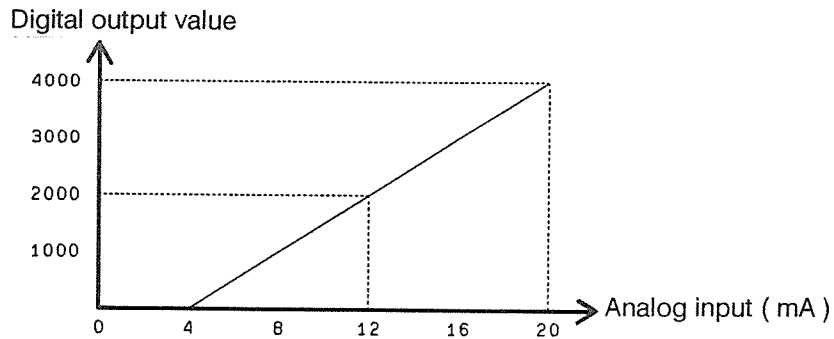
- Using analog input current (When range is 0 mA to ± 20 mA)



- Using analog input voltage (When range is 1 V to 5 V)



- Using analog input current (When range is 4 mA to 20 mA)



G. A/D CONVERSION DIGITAL OUTPUT PROCESSING FUNCTIONS

■ A/D CONVERSION DIGITAL OUTPUT PROCESSING FUNCTIONS	G-2
1. Sampling Function	G-2
2. Averaging Function	G-2
3. Digital Scaling Function	G-2
4. Alarm Signal Function	G-4

"PC" is the abbreviation for Programmable Controller.

■ A/D CONVERSION DIGITAL OUTPUT PROCESSING FUNCTIONS

1. Sampling Function

The analog input values are converted point by point and the digital values are stored in shared memory.

2. Averaging Function

The average of the total values, excluding the maximum value and minimum value, is calculated and stored in shared memory.

When the number of time is 2 or less, sampling is used.

The time needed to store in memory the average value from the average of the number of times varies with the number of channels used.

(Averaging time : 2.5 millise. × Number of inputs used × average number of times)

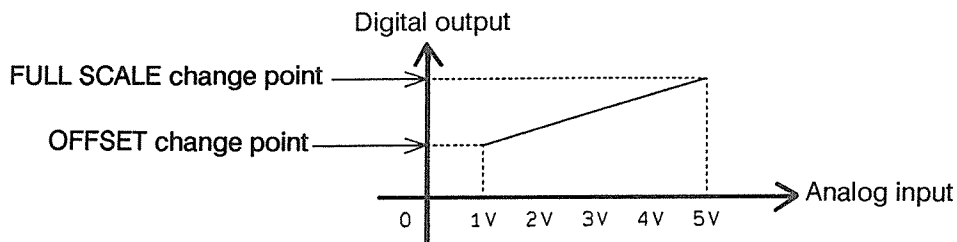
When the number of average setting is outside the range, sampling is used.

3. Digital Scaling Function

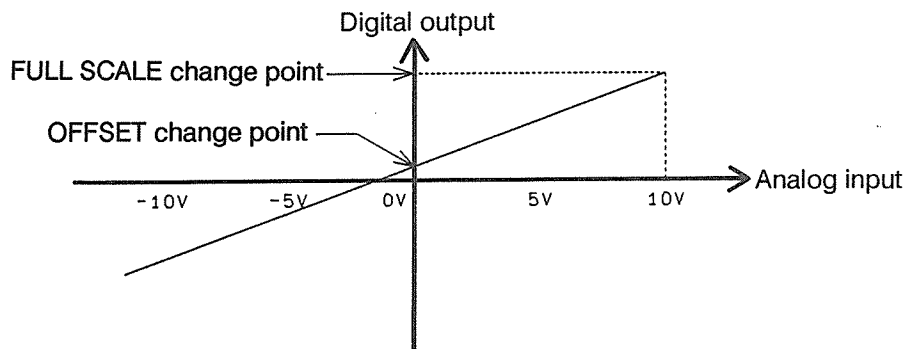
This is a scaling function that converts the numerical values of the A/D conversion digital output (Default is -2000 to +2000 or 0 to +4000) to the values easy to use in a user's program, according to the OFFSET and FULL SCALE conversion point set up in shared memory.

Maximum resolution capacity is rescribed in performance specifications.

● OFFSET change point and FULL SCALE change point in 1 V to 5 V range



● OFFSET change point and FULL SCALE change point in 0 V to ± 10 V range



Notes :

- At 0 V to ± 10 V range
 - OFFSET point : K 0
 - FULL SCALE point : K 2000
- At 1 V to 5 V range
 - OFFSET point : K 0
 - FULL SCALE point : K 4000
- FULL SCALE change point > OFFSET change point

Method of setting

- Set the OFFSET and FULL SCALE conversion point of each of the analog input channels, CH. 0 to CH. 3, in the specified addresses in shared memory.
- It is possible to set from -32768 to +32767 with 16-bit binary code in shared memory.

Processing contents

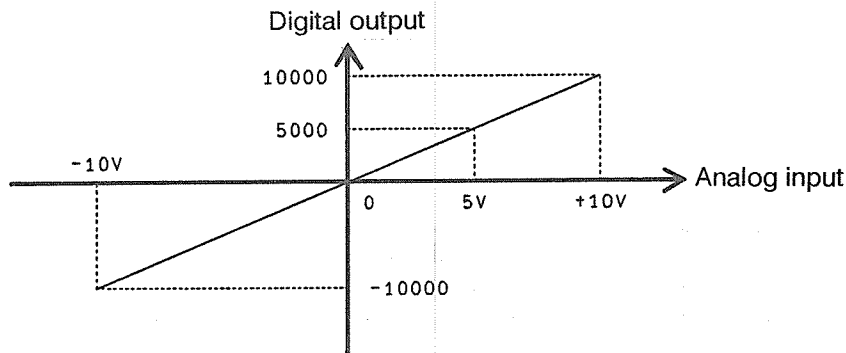
Scaling is calculated using the following formula.
Numbers are rounded.

$$\text{SCALING DATA} = \text{Basic conversion data} \times \frac{(\text{FULL SCALE change point} - \text{OFFSET change point})}{(\text{FULL SCALE point} - \text{OFFSET point})} + \text{OFFSET change point}$$

Example 1

Analog input range : 0 V to ± 10 V
 OFFSET change point : K 0
 FULL SCALE change point : K 10000
 Input value : 5 V \rightarrow K 1000 (Basic conversion data)

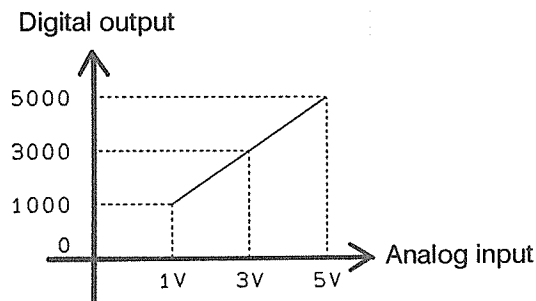
$$\begin{aligned} \text{SCALING DATA} &= 1000 \times \frac{10000 - 0}{2000 - 0} + 0 \\ &= 5000 \end{aligned}$$



Example 2

Analog input range : 1 V to 5 V
 OFFSET change point : K 1000
 FULL SCALE change point : K 5000
 Input value : 3 V \rightarrow K 2000 (Basic conversion data)

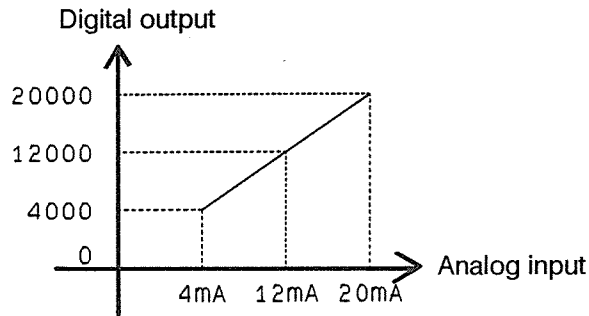
$$\begin{aligned} \text{SCALING DATA} &= 2000 \times \frac{5000 - 1000}{4000 - 0} + 1000 \\ &= 3000 \end{aligned}$$



Example 3

Analog input range : 4 mA to 20 mA
OFFSET change point : K 4000
FULL SCALE change point : K 20000
Input value : 12 mA → K 2000 (Basic conversion data)

$$\begin{aligned} \text{SCALING DATA} &= 2000 \times \frac{20000 - 4000}{4000} + 4000 \\ &= 12000 \end{aligned}$$



4. Alarm Signal Function

This is the function for setting the upper/lower limit values for A/D conversion values obtained from sampling and for sending information as a contact signal (Input X \square 8 to X \square F) to C.P.U when the upper limit is exceeded or the value falls below the lower limit.

However, possible setting of the upper/lower limit values are limited to values within the digital output range.

- When digital output scaling is not performed :
 - Range of 0 to 4000 in 1 V to 5V range (4 mA to 20 mA)
 - Range of 0 to \pm 2000 in 0 V to \pm 10V range (0 mA to \pm 20 mA)
- Performing digital scaling is limited within the range of processed digital output.

H. SHARED MEMORY

page

■ SHARED MEMORYH-2

"PC" is the abbreviation for Programmable Controller.

■ SHARED MEMORY

The A/D converter unit has shared memory for reading from and writing to the FP3 C.P.U.

Assigning shared memory

Address

0	Averaging Channel designation	} Write only from FP3 C.P.U
1	CH. 0 Average times	
2	CH. 1 Average times	
3	CH. 2 Average times	
4	CH. 3 Average times	
5	Alarm signal generation Channel designation	
6	CH. 0 Upper limit value	
7	CH. 0 Lower limit value	
8	CH. 1 Upper limit value	
9	CH. 1 Lower limit value	
10	CH. 2 Upper limit value	
11	CH. 2 Lower limit value	
12	CH. 3 Upper limit value	
13	CH. 3 Lower limit value	
14	Scaling Channel designation	
15	CH. 0 OFFSET change point	
16	CH. 0 FULL SCALE change point	
17	CH. 1 OFFSET change point	
18	CH. 1 FULL SCALE change point	
19	CH. 2 OFFSET change point	
20	CH. 2 FULL SCALE change point	
21	CH. 3 OFFSET change point	
22	CH. 3 FULL SCALE change point	
23	CH. 0 conversion value	} Read only from FP3 C.P.U
24	CH. 1 conversion value	
25	CH. 2 conversion value	
26	CH. 3 conversion value	
27	Error code	

I. CONTENTS OF SHARED MEMORY AND DATA CONFIGURATION

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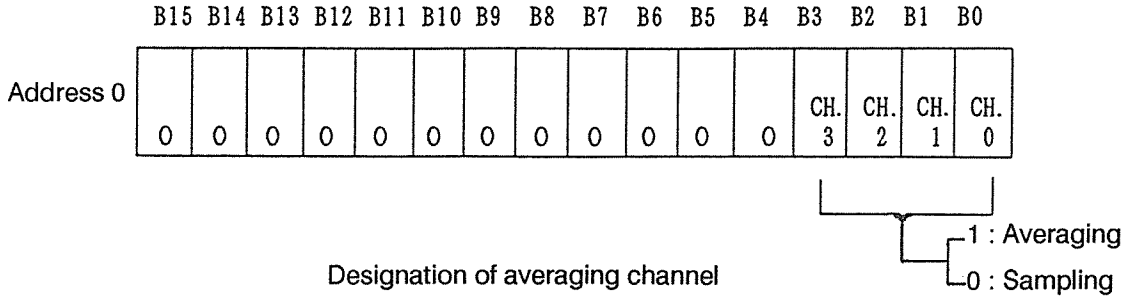
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3. Alarm Signal generation channel designation (Address 5)	I-3
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8. Error code (Address 27)	I-6

"PC" is the abbreviation for Programmable Controller.

CONTENTS OF SHARED MEMORY AND DATA CONFIGURATION

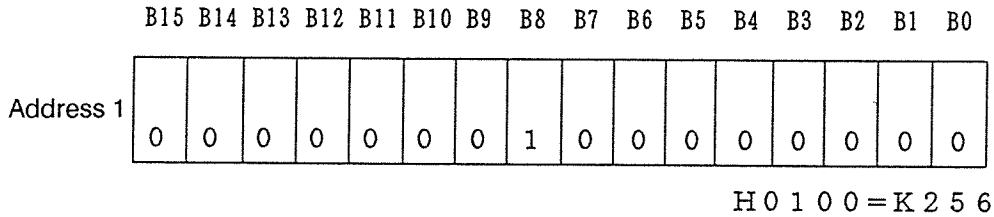
1. Averaging channel designation (Address 0)

- Selects sampling or averaging of the channel whose channel select switch is ON.
- Even if averaging is specified when the power is turned on and the A/D converter unit system starts up, the input set channel is sampled once.
(It's the same when A/D conversion preparation end flag X0 is ON.)



2. Average times (Address 1 to 4)

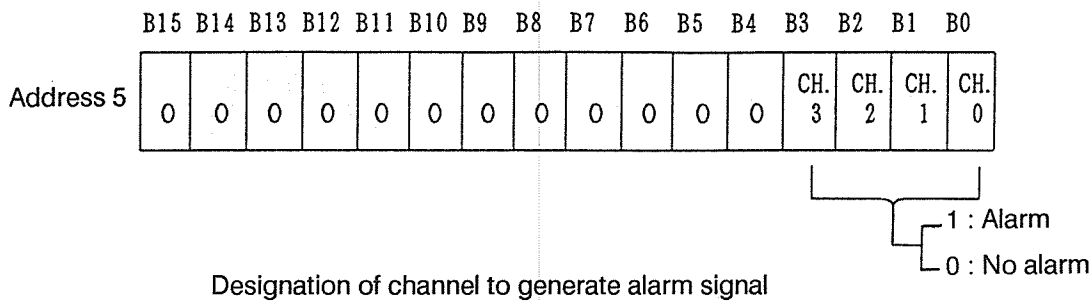
- The setting range is 3 to 4000 times.
- Sampling begins when there is an error averaging the times data.



As shown above, the average times for CH. 0 is 256 times.

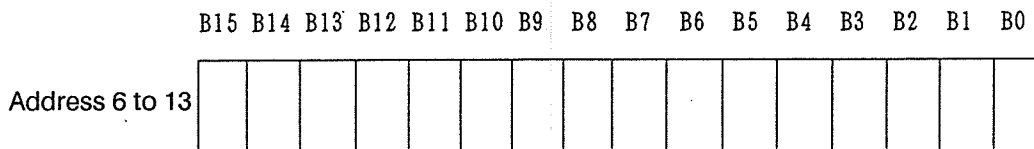
3. Alarm Signal generation channel designation (Address 5)

- This assigns channels which generate the alarm signals among the sampling input channels.
- At the time of shipping (default value), no channel generates an alarm signal.
- If the alarm signal generation channel is not assigned, no alarm is generated even if the upper/lower limit values are set. (X8 to XF are OFF.)



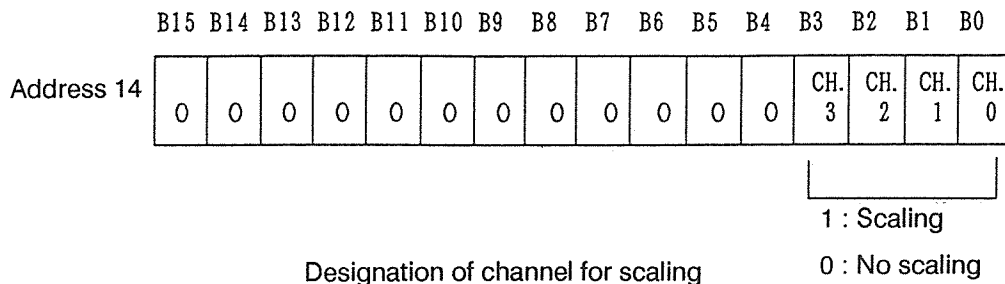
4. A/D conversion output upper/lower limit values (Address 6 to 13)

- Set the upper/lower limit values for the channel generating an alarm signal among the input channels performing sampling.
- When setting the desired upper limit/lower limit values, set by the digital value (-32768 to + 32767) according to the A/D conversion output characteristics of that channel.
- No alarm signal is generated when there is an upper/lower limit value data error.



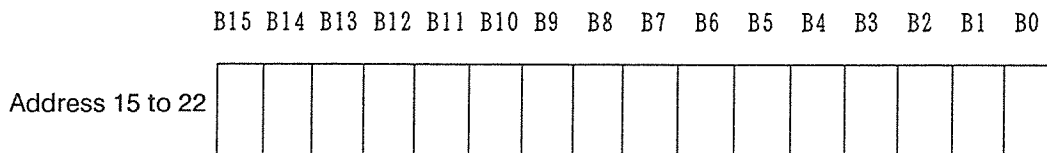
5. Scaling channel designation (Address 14)

- Designate the input channel to perform scaling of the digital output values.
- When shipped (default value), there is no scaling of any channel.
- If there is no designation of a scaling channel, there is no scaling even if the OFFSET change point and FULL SCALE change point are set.



6. Scaling OFFSET change point and FULL SCALE change point (Address 15 to 22)

- Set the OFFSET change point and FULL SCALE change point for each input channel for its scaling.
- Set the OFFSET/FULL SCALE change points with a 2-byte binary including sign bit (-32768 to +32767).
- The basic A/D conversion characteristics are in effect (OFFSET point and FULL SCALE points) when there is a data error at OFFSET/FULL SCALE change point.



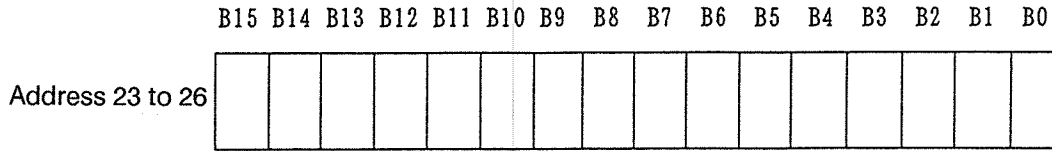
Notes :

The default values for the OFFSET change point and FULL SCALE change point are as follows.

- At 0 V to ± 10 V range
 - OFFSET point : K 0
 - FULL SCALE point : K 2000
- At 1 V to 5 V range
 - OFFSET point : K 0
 - FULL SCALE point : K 4000

7. A/D conversion digital output values (Address 23 to 26)

A/D conversion digital output values are displayed by a 2-byte (16-bit) binary, including sign bit (2 Complement).



When there is no scaling(default), they are as follows:

At 0 V to ± 10 V range : -2000 to $+2000$

At 1 V to 5 V range : 0 to 4000

They become -32768 to $+32767$ when there is scaling.

8. Error code (Address 27)

- **Error code for averaging times data (Address 27 B0 to B3)**
It checks the data range of the averaging times written from the C.P.U and sets an error code in B0 to B3 in binary when it is outside the range.
- **Error code for upper limit/lower limit values data (Address 27 B4 to B7)**
It checks the data range of the upper limit value or lower limit value written from the C.P.U and sets an error code in B4 to B7 in binary when outside the range.

Meaning of range:

The scale conversion of -2000 to +2000 and 0 to +4000 depending on the OFFSET and FULL SCALE change points, is called the range.

- **Error code for OFFSET/FULL SCALE change point data (Address 27 B8 to B11)**
It checks the range of the OFFSET change point and FULL SCALE change point written from the C.P.U and sends the error code in B8 to B11 in binary when outside the range.
- **Error code for generation of A/D converter abnormality (Address 27 Most significant bit)**
It sets the error code in the most significant bit (B15) when there is an abnormality the A/D converter unit.
- When the averaging times data, upper/lower limit values data and OFFSET/FULL SCALE change points are outside the range, or when there is an abnormal condition in the A/D converter, an error code is sent and the operation display LED changes from constant illumination to flashing.

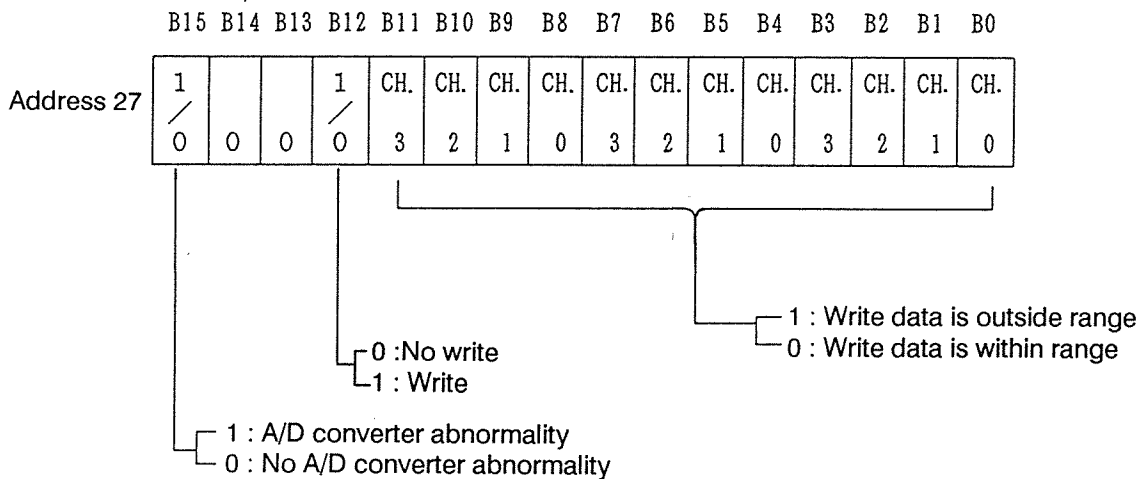
It goes into sampling for a channel where the averaging times data is outside the range.

There is no alarm for a channel where the upper limit value or lower limit value data are outside the range.

Where there is an A/D converter abnormality, the A/D conversion preparation end flag (X0 to X4) alarm signal (X8 to XF) is turned OFF.

- **FP3 C.P.U write address code (Address 27 B12)**
When there is a write from FP3 C.P.U to shared memory in the A/D converter unit and from the FP3 C.P.U to an address outside the addresses that can be accessed, an error code is set in address 27, B12.

If there is a Write, the operation display LED changes from constant illumination to flashing.



J. INPUTS FOR C.P.U

page

■ INPUTS FOR C.P.U J-2

"PC" is the abbreviation for Programmable Controller.

■ INPUTS FOR C.P.U

The description below details the input number when mounted in the slot No.0 on the Basic motherboard. and the number of the other Input / Output units.

The description below details the input number when mounted in the slot No.0 on the Basic motherboard.

- There are 16 points, X0 to XF, for the input signal for an A/D converter unit.

Input signal	Contents
X0	A/D conversion preparation end flag when setting digital output processing conditions By starting operation of the C.P.U, digital output processing conditions are written from the C.P.U, A/D conversion of CH. 0 to CH. 3 inputs are performed once (except when averaging) according to those conditions, and X0 is turned ON when the conversion values are stored in shared memory. It is used with a sequence program as the conditions for executing conversion read of the channel performing digital output processing.
X1	A/D conversion preparation end flag when setting CH. 0 output processing conditions By starting operation of the C.P.U, digital output processing conditions are written from the C.P.U, A/D conversion of CH. 0 input is performed once (including averaging) according to those conditions, and X1 is turned ON when the conversion values are stored in shared memory.
X2	A/D conversion preparation end flag when CH. 1 output processing conditions are set
X3	A/D conversion preparation end flag when CH. 2 output processing conditions are set
X4	A/D conversion preparation end flag when CH. 3 output processing conditions are set
X5 to X7	Not used
X8	CH. 0 X8 is ON only when A/D conversion value > upper limit value
X9	CH. 0 X9 is ON only when A/D conversion value < lower limit value
XA	CH. 1 XA is ON only when A/D conversion value > upper limit value
XB	CH. 1 XB is ON only when A/D conversion value < lower limit value
XC	CH. 2 XC is ON only when A/D conversion value > upper limit value
XD	CH. 2 XD is ON only when A/D conversion value < lower limit value
XE	CH. 3 XE is ON only when A/D conversion value > upper limit value
XF	CH. 3 XF is ON only when A/D conversion value < lower limit value

When digital output processing conditions have been written to X8 to XF, or by setting the number of inputs of the A/D conversion unit, X equivalent to the unused channels is turned OFF.
Also, X0 to XF are OFF when there is an A/D converter abnormality.

- The A/D converter unit does not have an output signal (Y) for the C.P.U.

K. OPERATING PROCEDURE

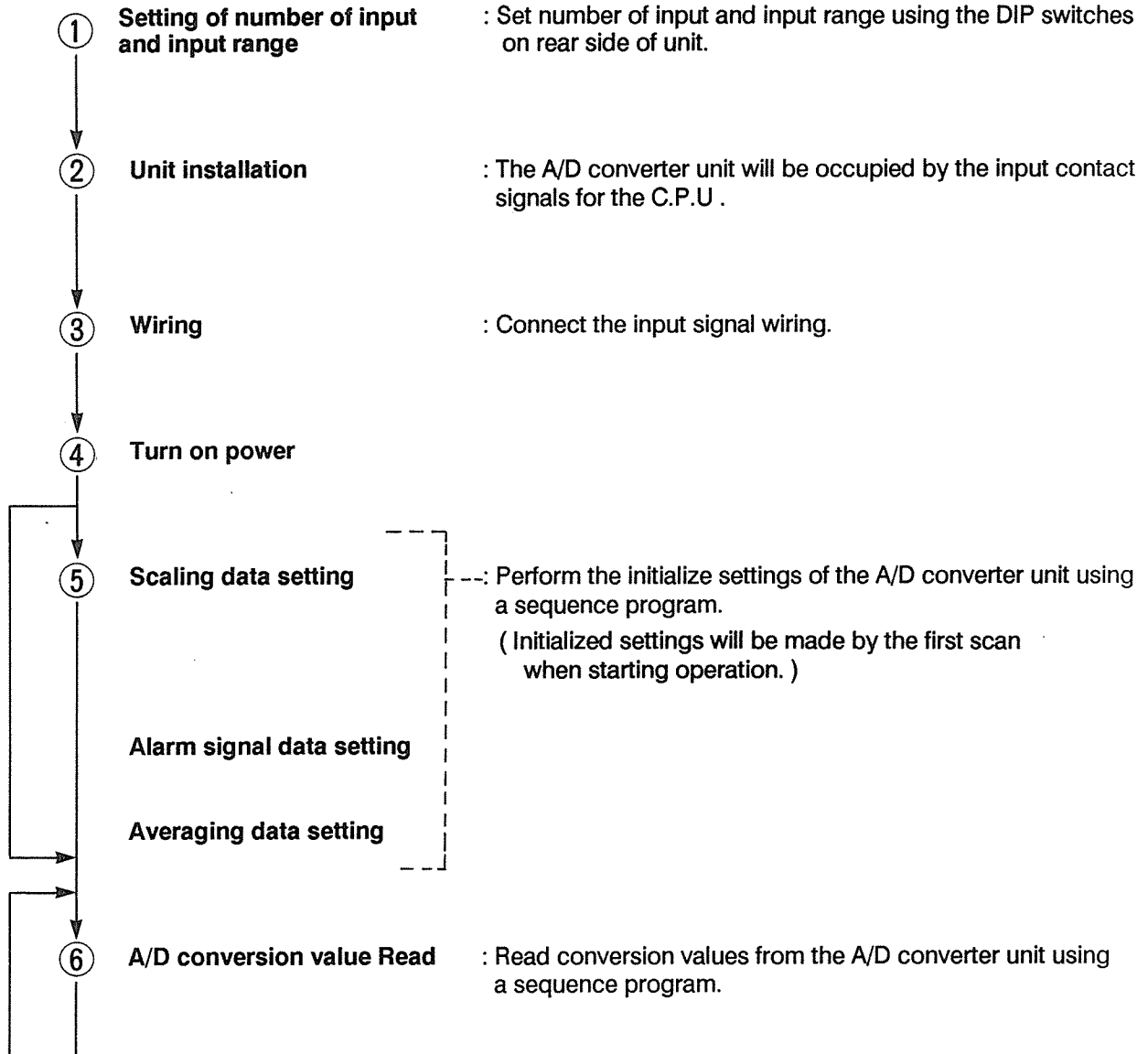
page

■ OPERATING PROCEDUREK-2

"PC" is the abbreviation for Programmable Controller.

■ OPERATING PROCEDURE

● The procedure for handling the FP3 A/D converter unit is as follows.



L. SETTING THE ANALOG INPUT NUMBER AND ANALOG INPUT RANGE

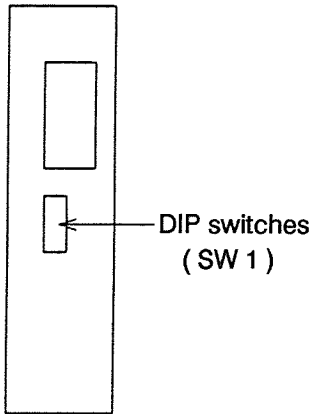
page

■ SETTING THE ANALOG INPUT NUMBER AND ANALOG INPUT RANGE L-2

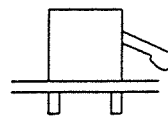
SETTING THE ANALOG INPUT NUMBER AND ANALOG INPUT RANGE

Set the number of analog inputs and analog input range using the DIP switches on rear side of A/D converter unit.

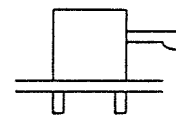
Rear side of
A/D converter unit



The input range is set at 0 V to ± 10 V when shipped.



ON position



OFF position

Setting of Inputs Number	SW1-1	SW1-2	SW1-3	SW1-4
CH. 0	OFF	OFF	Not used	——
CH. 0, 1	ON	OFF		——
CH. 0, 1, 2	OFF	ON		——
CH. 0, 1, 2, 3	ON	ON		——
Setting of input range	SW1-1	SW1-2	SW1-3	SW1-4
0 V to ± 10 V (0 mA to ± 20 mA)	——	——	Not used	OFF
1 V to 5V (4 mA to 20 mA)				ON

Note :

Four inputs are possible for one unit and the range is the same for all four inputs. At this time, input voltage and input current can be set for each channels.

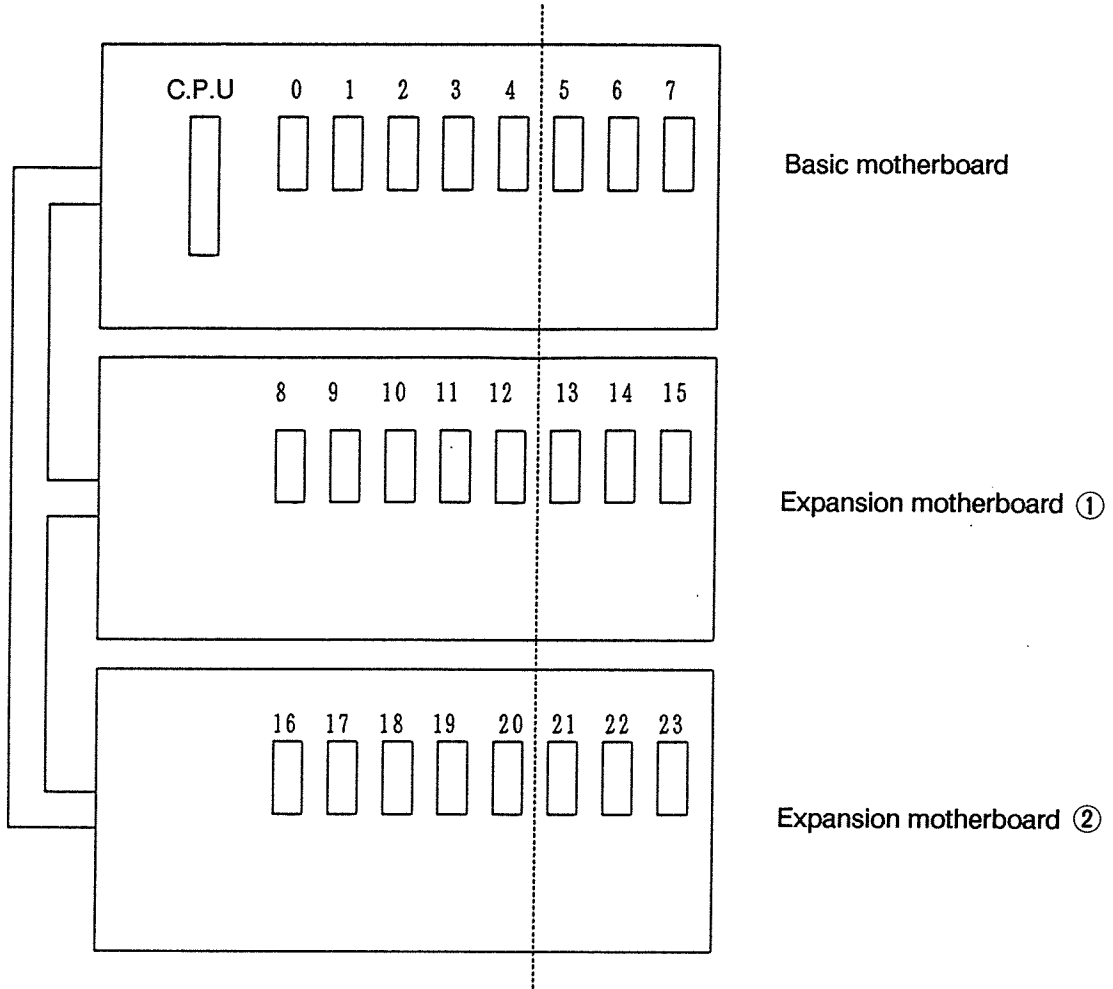
M. I/O SLOT NUMBERING

page

■ I/O SLOT NUMBERING M-2

"PC" is the abbreviation for Programmable Controller.

I/O SLOT NUMBERING



- The broken line (- - -) is for a Basic motherboard with five points base. In this case also, the numbers are normally as shown above.

N. MOUNTING METHOD

page

■ MOUNTING METHODN-2

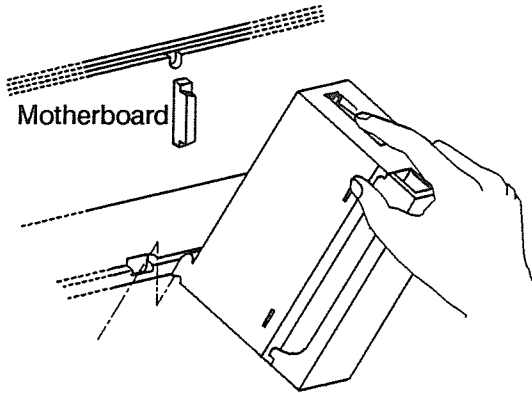
"PC" is the abbreviation for Programmable Controller.

■ MOUNTING METHOD

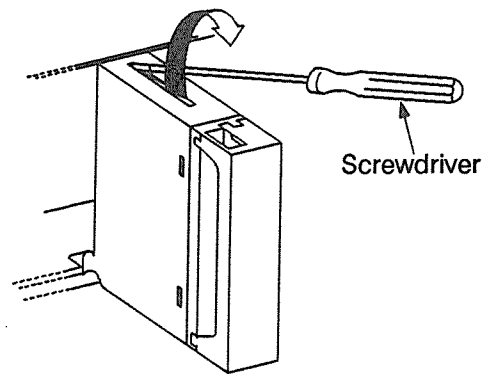
Notes :

- Before mounting the unit, remove the connector cover on the motherboard.
- Do not mount A/D converter unit adjacent to the output unit or the power supply unit. However, in case you need to mount A/D converter unit adjacent to the output unit or power supply unit. Ambient temperature should be 50°C(122°F) or lower.
- Select and combine the units so that consumption current by each units mounted motherboard does not exceed the capacity of each power supply unit.

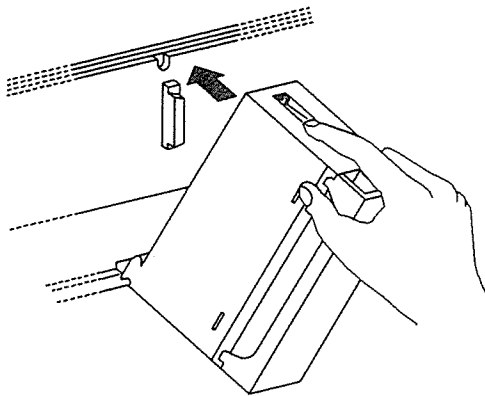
1. Fit the two unit tabs into the unit holes on the motherboard.
 - An attempt to mount the unit without aligning the tab may damage the connector.



3. After properly mounting the unit to the motherboard, secure the mounting screw at the top.



2. Push the unit in the direction of the arrow and mount onto the motherboard.



Reverse the procedure to remove the unit.

O. CONNECTION

page

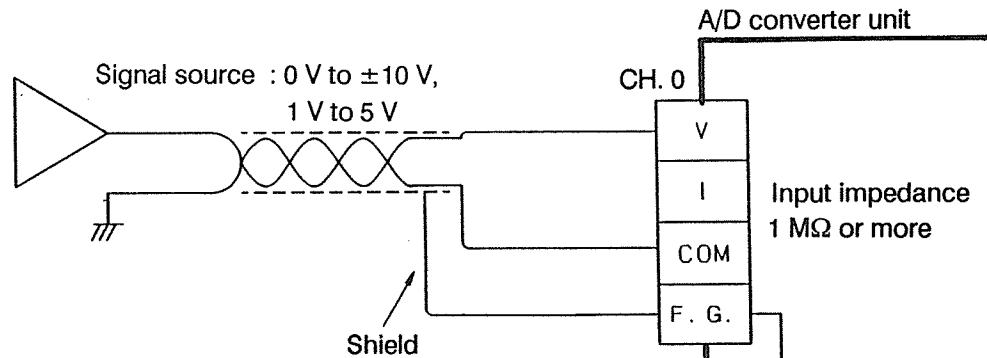
■ CONNECTION O-2

"PC" is the abbreviation for Programmable Controller.

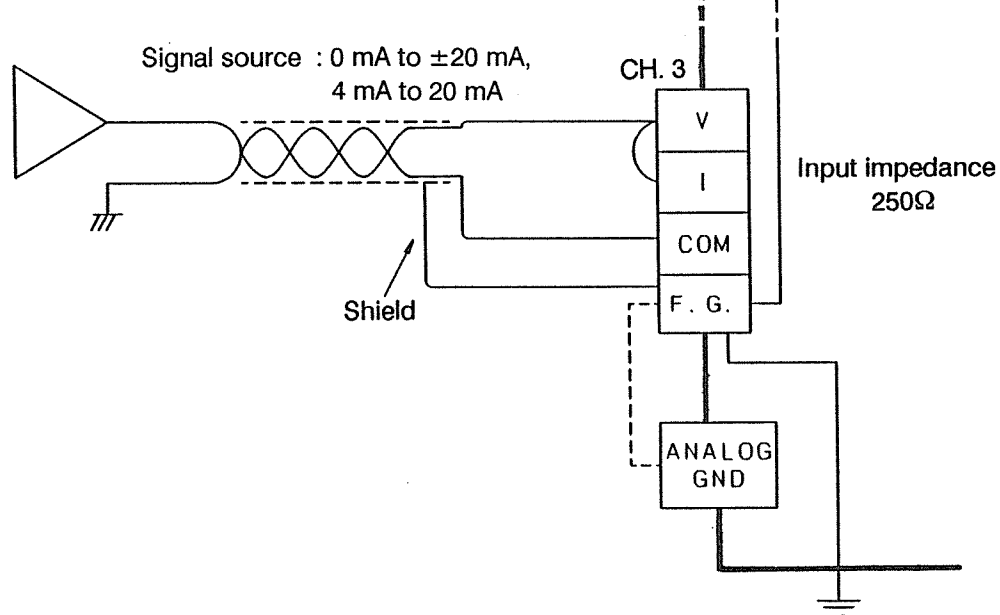
CONNECTION

This shows the connection of the voltage input and current input in the A/D converter unit.

(1) Voltage input



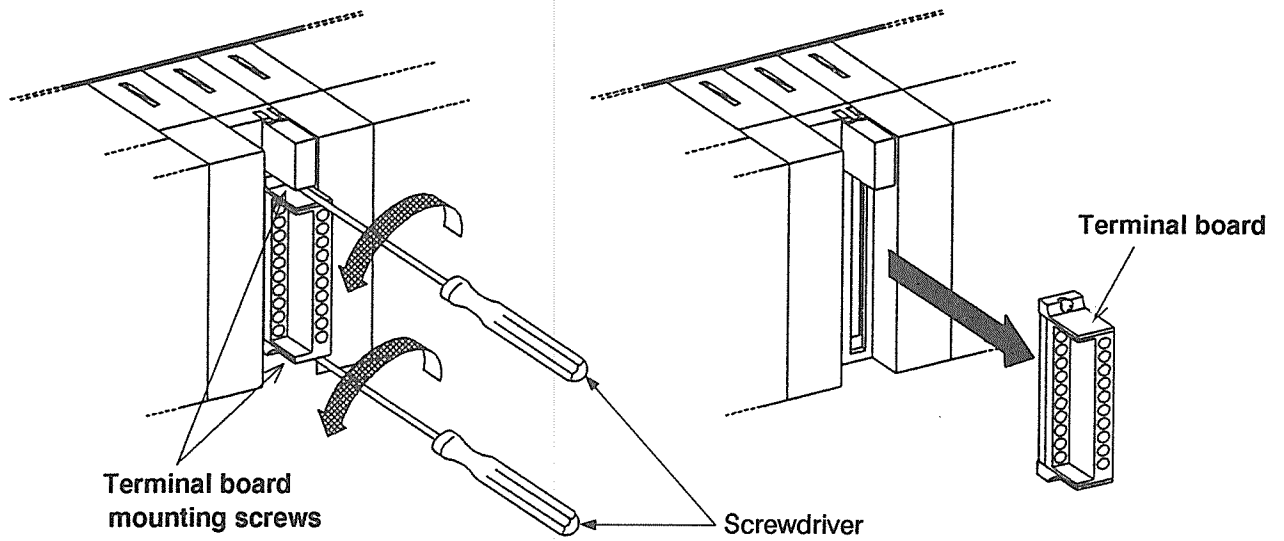
(2) Current input



Notes:

- Use a 2-core twisted pair, shielded wire for the analog input signal wiring.
- Do not put the analog input signal wire close to the AC power cable, high-tension wire and load wires except those for the Programmable Controller and don't bundle them with those lines.
- Connect the shield of the shielded wiring to the F.G. on the A/D converter unit to ground it. However, sometimes it may be better to ground it externally depending on the external noise environment.
- Connect the V and I terminals for current input.
- If noise is a special problem, please connect F.G. to ANALOG GND on testing.
- F.G. is connected to the F.G. of the Programmable Controller inside the A/D converter unit.

- When making connections on the terminal board, remove the board as shown below to make the procedure easier.
- Remount the terminal board after the connection is completed.



P. INITIALIZATION AND DIGITAL OUTPUT READ PROCEDURE

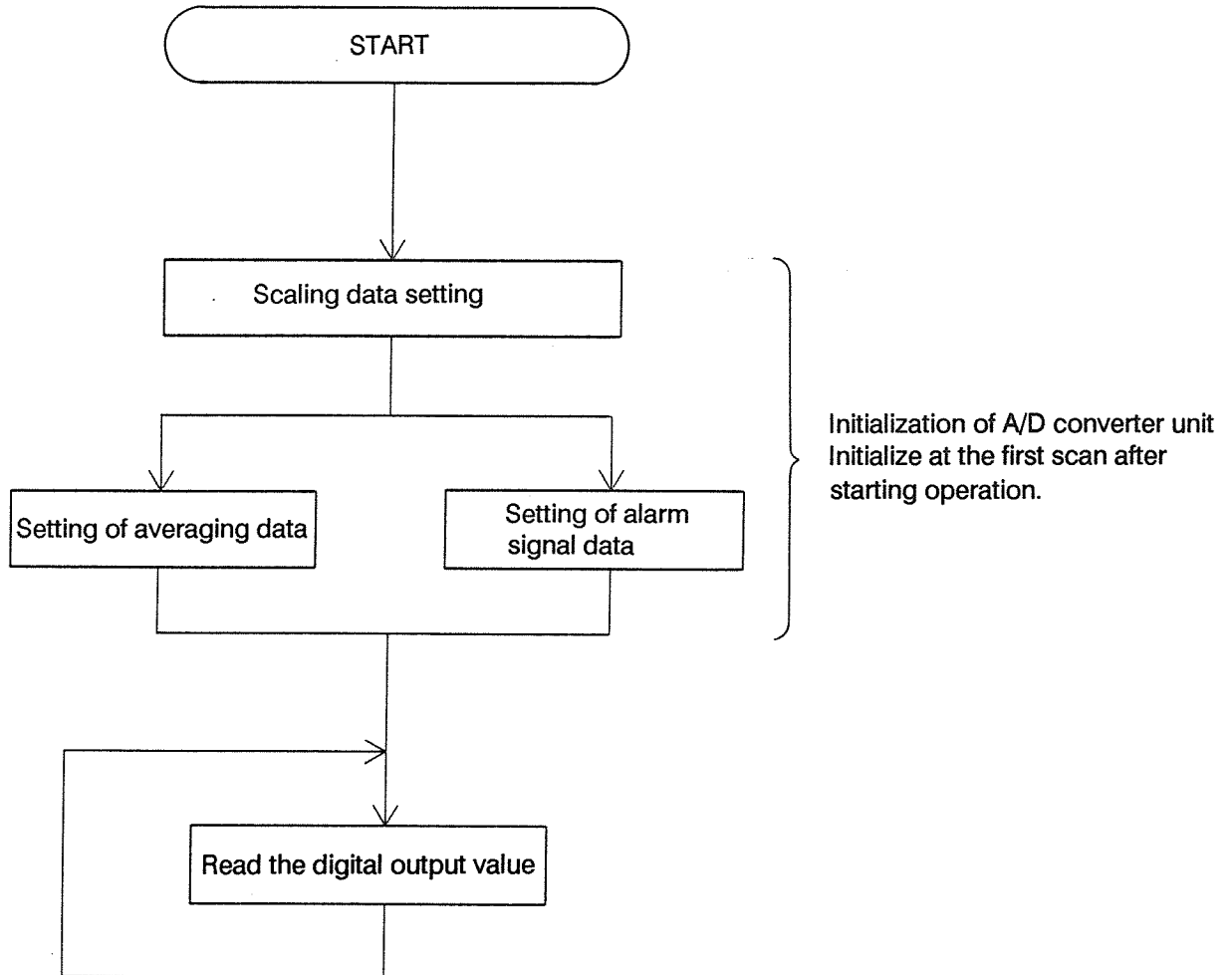
page

■ INITIALIZATION AND DIGITAL OUTPUT READ PROCEDURE P-2

"PC" is the abbreviation for Programmable Controller.

■ INITIALIZATION AND DIGITAL OUTPUT READ PROCEDURE

- Initialize and read the digital output through the sequence program for the C.P.U according to the procedure below.



Q. SEQUENCE PROGRAM EXAMPLES

page

■ SEQUENCE PROGRAM EXAMPLES	Q-2
1. Basic program for reading/writing	Q-2
1) Reading from A/D converter unit	Q-2
2) Writing to A/D converter unit	Q-2
2. Setting of averaging times	Q-3
3. Averaging designation	Q-3
4. Designation of alarm signal generation channel	Q-4
5. Setting of upper limit value and lower limit value	Q-4
6. Scaling channel designation	Q-5
7. Setting of OFFSET change point and FULL SCALE change point	Q-5
8. Reading A/D conversion values	Q-6
9. Reading error codes	Q-6
10. General program example (1)	Q-7
11. General program example (2)	Q-8

“PC” is the abbreviation for Programmable Controller.

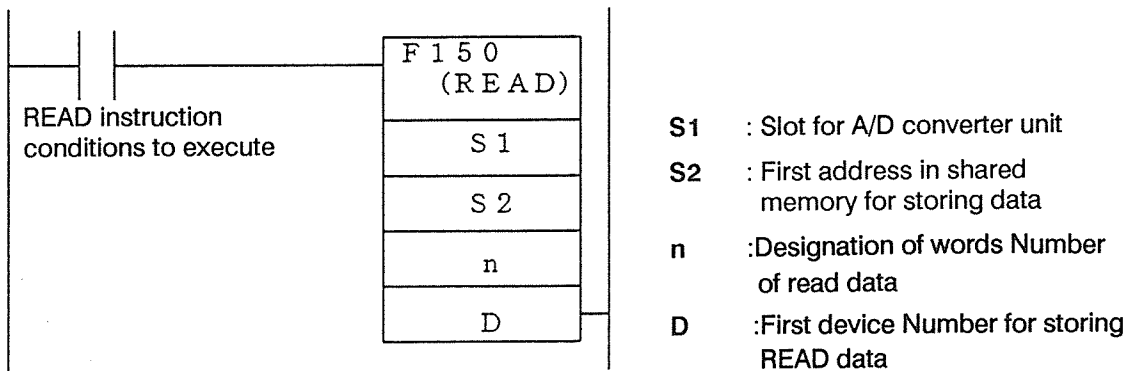
SEQUENCE PROGRAM EXAMPLES

- The following are explanation of A/D converter unit basic program (Read/Write, Averaging times setting, Averaging designation, Alarm signal channel designation, Upper limit/lower limit values setting, Scaling designation, OFFSET change point/FULL SCALE change point setting, A/D conversion value read, Error code).

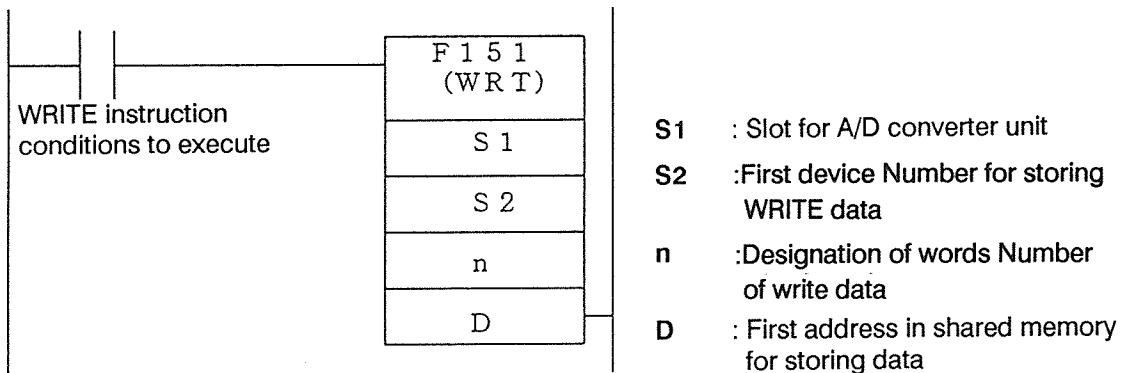
If not otherwise specified, the A/D converter unit is installed in slot No. 0 on the Basic motherboard.

1. Basic program for reading/writing

- 1) **Reading from A/D converter unit** : Use the word data READ instruction (F150) to read from advanced function unit.



- 2) **Writing to A/D converter unit** : Use the word data WRITE instruction (F151) to write to advanced function unit.

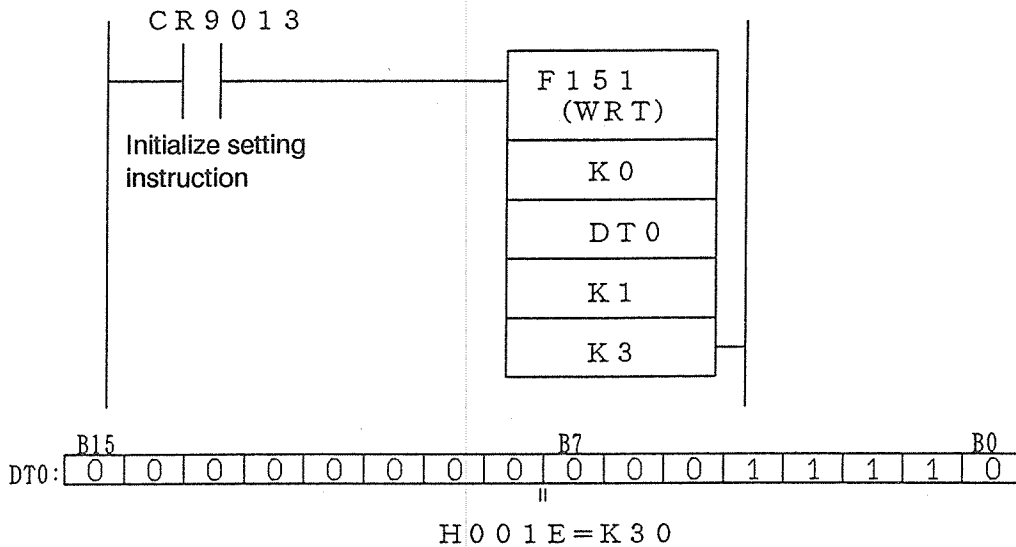


2. Setting of averaging times

- Set the averaging times for each channel used for averaging processing.
- Be sure to set the averaging no. at the same time averaging processing is designated.
- Setting values are 3 to 4000 times. (0, 1, and 2 times are settings for sampling processing.)

Program example

When 30-time is the average times on CH. 2

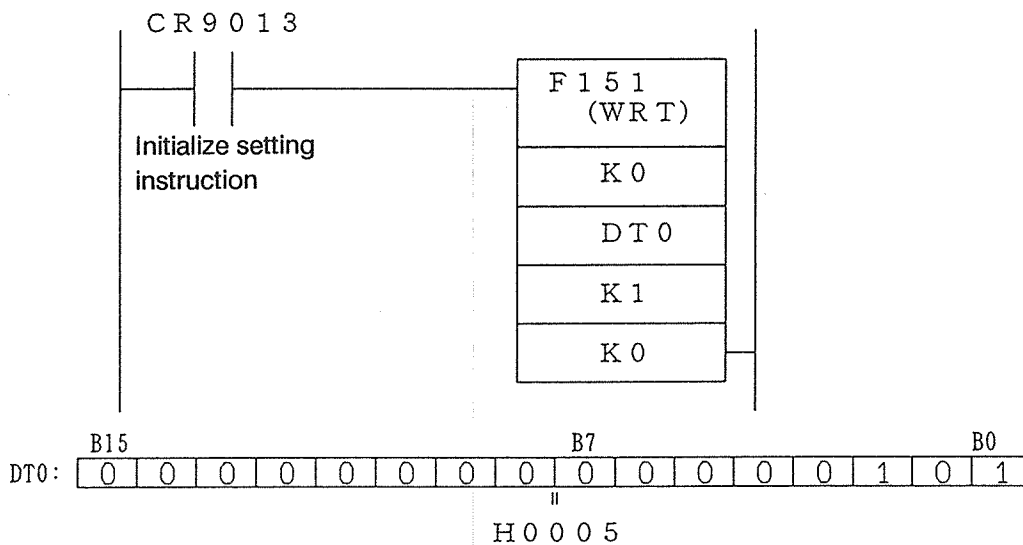


3. Averaging designation

- Designate the channel for averaging.
- Be sure to designate the averaging at the same time averaging times is set.

Program example

When averaging on CH. 0 and CH. 2

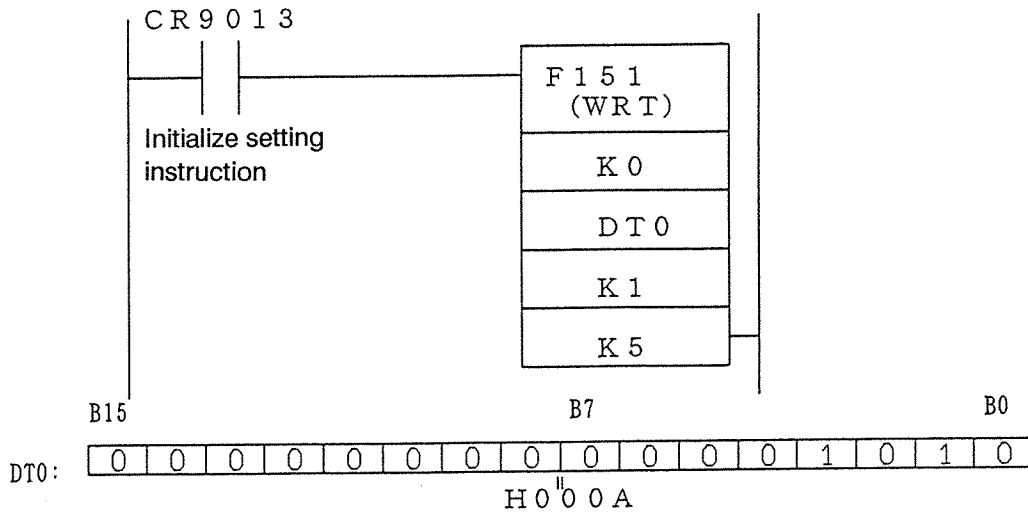


4. Designation of alarm signal generation channel

- Designation the input channel for generation of alarm signal.
- Design the channel for sampling processing channel.
- Be sure to designate the alarm signal generation channel at the same time the upper/lower limit values are set.

Program example

When generating an alarm signal for CH. 1 and CH. 3

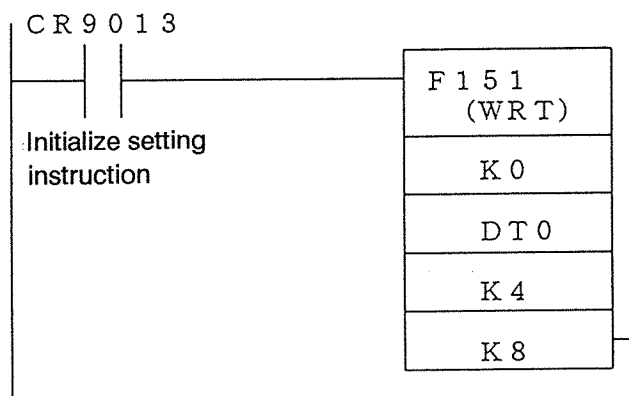


5. Setting of upper limit value and lower limit value

- Set the upper limit value and lower limit value using a 16-bit binary including sign bit.

Program example

Indicate the program in the following order when writing upper limit value and lower limit value of CH. 1 and CH. 2 from DT0 to DT3.

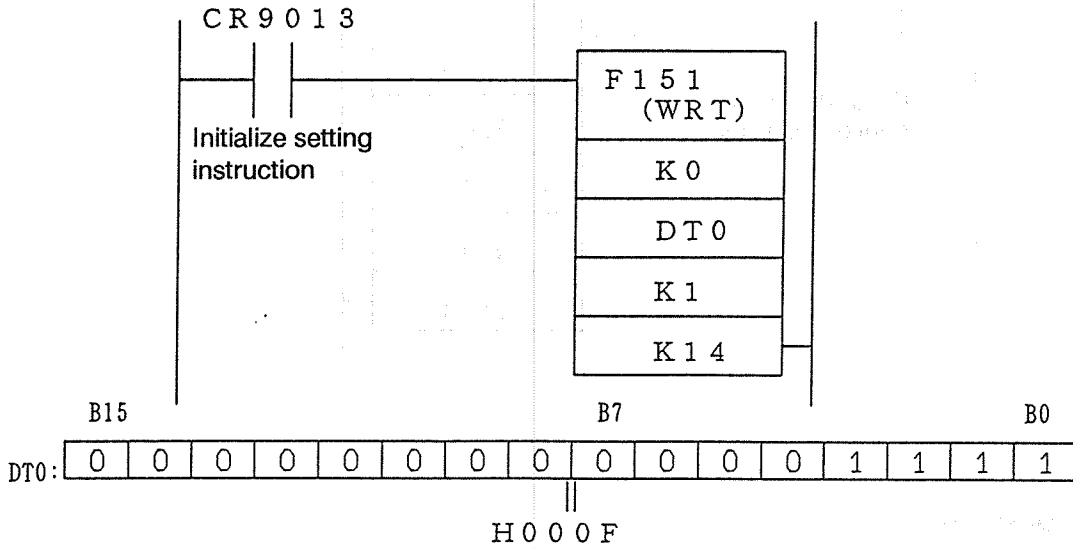


6. Scaling channel designation

- Designate the input channel for scaling.
- Designate the scaling channel at the same time OFFSET/FULL SCALE change points are set.

Program example

When performing scaling for CH. 0 to CH. 3

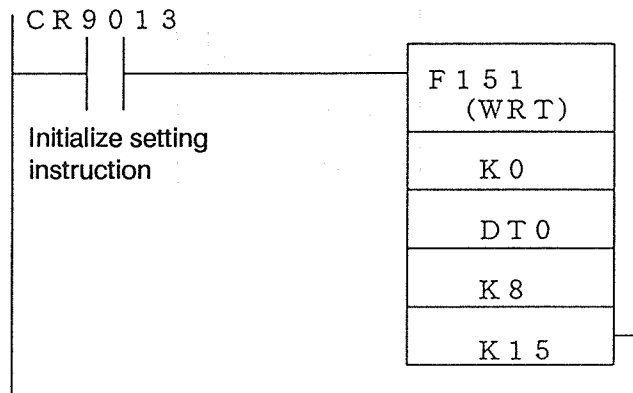


7. Setting of OFFSET change point and FULL SCALE change point

- Set both the OFFSET change point and FULL SCALE change point using a 16-bit binary including sign bit.
- Set the OFFSET change point and FULL SCALE change point at the same the scaling channel is designated.

Program example

When OFFSET/FULL SCALE change points for CH. 0 to CH. 3 are read from DT0 to DT7.

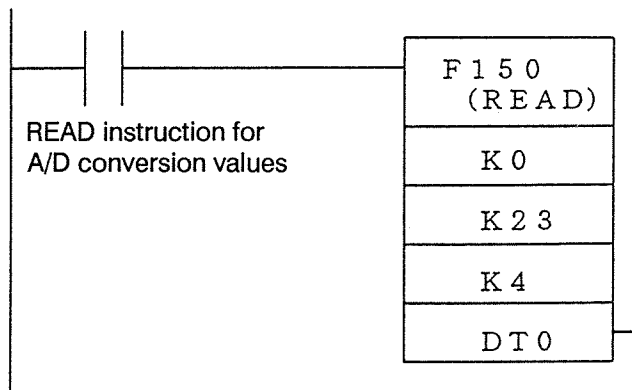


8. Reading A/D conversion values

- A/D conversion values are read using a 16-bit binary including sign bit.

Program example

When reading the conversion values for CH. 0 to CH. 3 into DT0 to DT3.

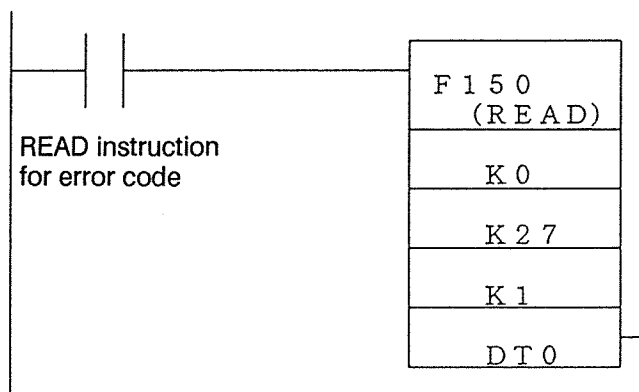


9. Reading error codes

- Error codes are set in binary at address 27 in shared memory.

Program example

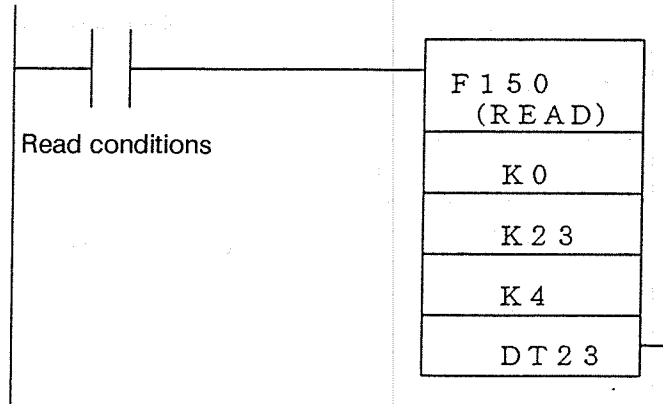
When reading the error code into DT0



10. General program example (1)

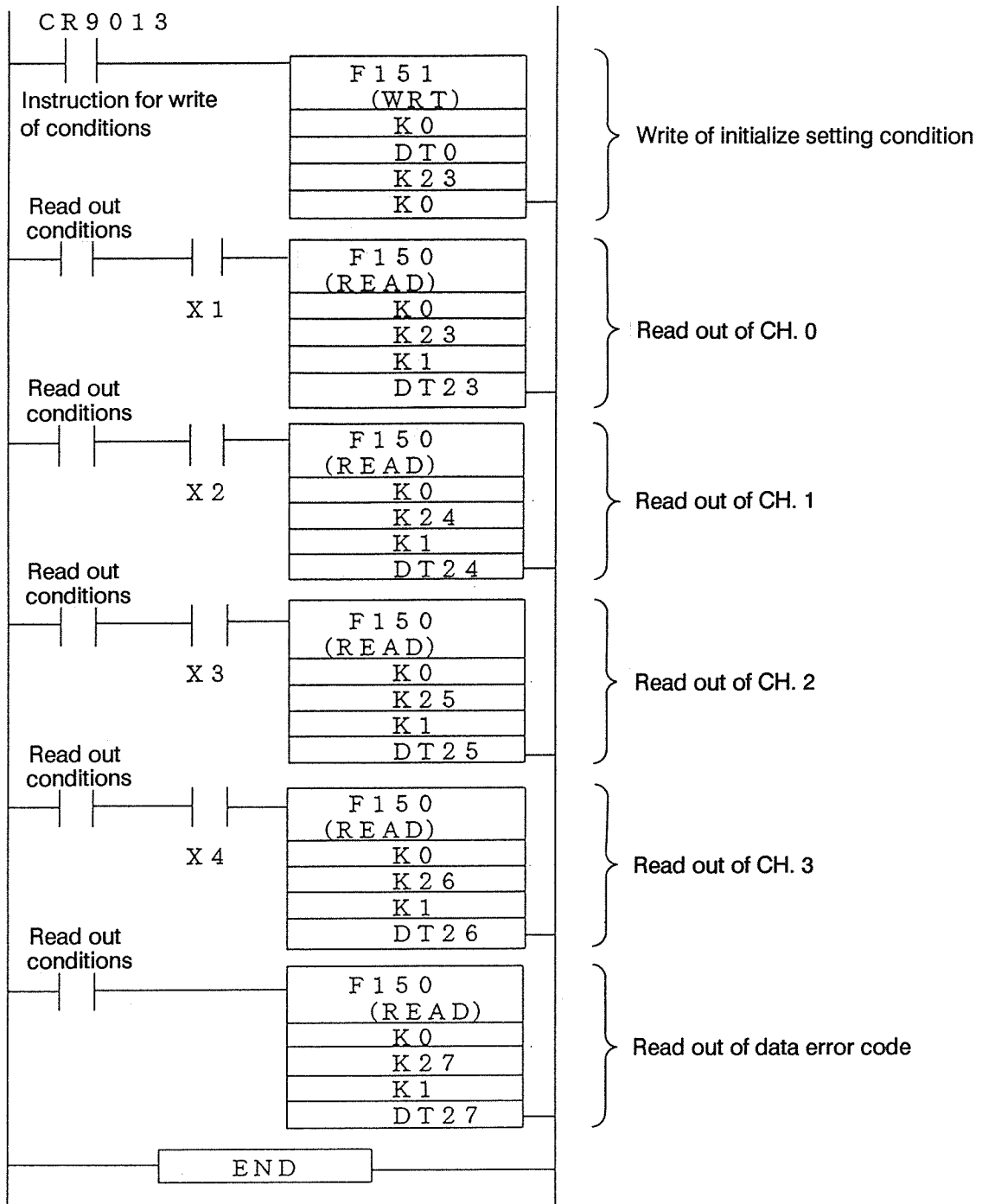
Example of A/D converter unit handling sequence program when not performing digital output processing to the input channel (scaling, averaging, alarm signal generation).

- When reading the conversion values for CH. 0 to CH. 3 into DT23 to DT26.



11. General program example (2)

Example of A/D converter unit handling sequence program when performing digital output processing to the input channels (scaling, averaging, alarm signal generation).



Note :

The program shown above is an example of write to A/D converter unit, read out of channel No.0 to No.3 conversion values to DT23 to DT26 and read out of data error code to DT27 as the initialize setting conditions set in DT0 to DT22.

R. TIMING CHART FOR A/D CONVERSION TIME

page

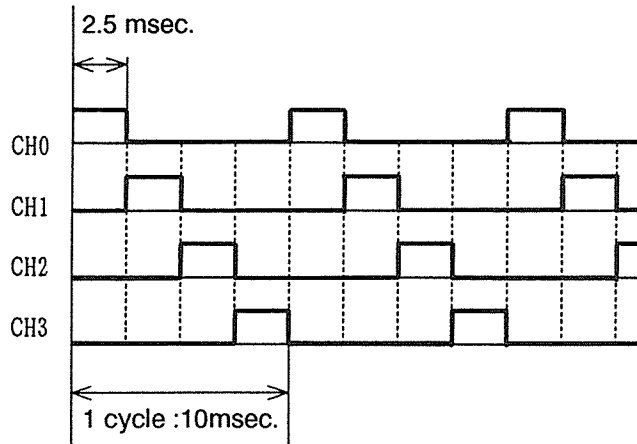
■ TIMING CHART FOR A/D CONVERSION TIME	R-2
1. When using CH. 0 to CH. 3	R-2
2. When using CH. 0, CH. 2, and CH. 3	R-2

"PC" is the abbreviation for Programmable Controller.

■ TIMING CHART FOR A/D CONVERSION TIME

1. When using CH. 0 to CH. 3

(When CH. 0 to CH. 3 are used for sampling)



2. When using CH. 0, CH. 2, and CH. 3

{ When CH. 0 and CH. 2 are used for sampling processing and CH. 3 is used for averaging (number of times : 3) }.

