4. Connection with Programmable controller

1) The number of FX2N-2AD which can be connected is 4 or less in the FX2N series PLC, 8 or less in the FX3N series PLC, and 4 or less in the FX3NC series PLC per Main unit with powered extension units. However, the following limitation exists when unidirectional special function blocks are connected. FX2N: Main unit and powered extension units of I/O 32points or less. 24V DC consumption current total value of unidirectional special function blocks used ≤ 190mA FX3N: Main unit and powered extension units of I/O 48points or more. 24V DC consumption current total value of unidirectional special function blocks used ≤ 300mA FX3NC: The unidirectional special function blocks can be connected up to 4 regardless of the I/O number of Main units.

2) The blocks occupy 8 points (The 8 points can be allocated from either inputs or outputs).

3) FX2N-2AD can be connected with FX2N, FX3N, and the FX3NC series Programmable controllers.

4) The block occupies 8 I/O points which can be allocated from either inputs or outputs.

5) The data transfer with the PLC uses the FROM/TO instruction.

5. SPECIFICATIONS

5.1 Environment specification

- Dielectric withstand voltage: 500V AC 1min (Between all terminals and case)
- Environmental specifications other than the above-mentioned are the same as the main unit of the Programmable controller (Refer to the manual of the Programmable controller)

5.2 Power supply specification and others

- Analogue voltage: 0 to 10V DC, 4 to 20mA (Input resistance 250Ω)
- Processing time: 2.5ms/1 channel (sequence program and synchronization)
- Integration accuracy: ±1% (full scale 0 to 10V) ±1% (full scale 4 to 20mA)

6. Allocation of buffer memory (BFM)

- BFM 0: The current value of the input data of the channel specified with BFM 17 (subordinate position 8bit data) is stored. The current value data is stored by binary.
- BFM 1: The current value of input data (high rank 4bit data) is stored. The current value data is stored by binary.
- BFM 17: Channel (CH1, CH2) which does the analog to digital conversion is specified. b0: 0, CH1
  b1: 0 → 17, CH2
- The D/A conversion process is started.

Write/read data to above-mentioned buffer memory according to the example of programming “8. Program example”.
4. Connection with Programmable controller

1) The number of FX2n-2AD which can be connected is 4 or less in the FX2n series PLC, 8 or less in the FX3n series PLC, and 4 or less in the FX2NC series PLC per Main unit with powered extension units. However the following limitation exists when underranged special function blocks are connected.

- FX2n: Main unit and powered extension units of 8 I/O points or less.
- FX3n: Main unit and powered extension units of 16 I/O points or more.
- FX2NC: The undermentioned special function blocks can be connected up to 8 regardless of the I/O number of Main unit.

2) The analog input is selected from the voltage input or the current input by the method of connecting wires.

3) The two analog input channels can accept inputs of 0 to 10V DC, 0 to 5V DC, or 4 to 20mA. Make the input characteristic common with two channels.

4) The block occupies 8 points (The 8 points can be allocated from either inputs or outputs).

5) The data transfer with the PLC uses the FROM/TO instruction.

The capacity of DC 24V power supply which can used for extension blocks of the service power supply and I/O reaches the value by which the total value of the consumption current of the above mentioned special function block is subtracted from a service voltage source capacity the programmable controller original. For instance, the service power supply the FX2n-32MT is 250mA. When two FX2n-2AD blocks are connected, the service power supply is reduced to 150mA.

5. SPECIFICATIONS

5.1 Environment specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric withstand</td>
<td>500V AC 1min (Between all terminals and case)</td>
</tr>
</tbody>
</table>

Environmental specifications other than the above-mentioned are the same as the main unit of the Programmable controller.

5.2 Power supply specification and others

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuits</td>
<td>24V DC ±10% 50mA (Internal power supplied from the main unit)</td>
</tr>
<tr>
<td>Digital circuits</td>
<td>5V DC 20mA (Internal power supplied from the main unit)</td>
</tr>
</tbody>
</table>

5.3 Defining gain and offset

The following is the voltage input range of underranged special function blocks.

<table>
<thead>
<tr>
<th>Item</th>
<th>Voltage input</th>
<th>Current input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of analog input</td>
<td>0 to 10V DC, 0 to 5V DC (input resistance 250Ω)</td>
<td>Warning: the unit may be damaged by input currents in excess of -2mA, +60mA</td>
</tr>
</tbody>
</table>

6. Allocation of buffer memory (BFM)

<table>
<thead>
<tr>
<th>BFM number</th>
<th>b15 to b6</th>
<th>b7 to b4</th>
<th>b3</th>
<th>b2</th>
<th>b1</th>
<th>b0</th>
</tr>
</thead>
<tbody>
<tr>
<td>#0</td>
<td>Reserved</td>
<td>Current value of input data (subordinate position 8bit data)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td>Reserved</td>
<td>Current value of input data (high rank 4bit data)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 to #16</td>
<td>Reserved</td>
<td>Analog to digital conversion beginning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#17</td>
<td>Reserved</td>
<td>Analog to digital conversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#18 or more</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BFM#17:b0: Channel (CH1,CH2) which does the analog to digital conversion is specified.

Write/read data to above-mentioned buffer memory according to the example of programming “8.Program example”.

6.1 Buffer memory

- BFM#0: The current value of the input data of the channel specified with BFM#17 (subordinate position 8bit data) is stored. The current value data is stored by binary.
- BFM#17: The current value of input data (high rank 4bit data) is stored. The current value data is stored by binary.

Reference:

1. The FX2n-2AD cannot have 1 channel as an analog voltage input and one channel as a current input because both channels use the same offset and gain values. For current input please short circuit VIN and IN as shown in the diagram.

2. Connect a 0.1 to 0.47 Ohm 25V DC capacitor with the position of "2" when there is voltage ripple in the voltage input or there will be a lot of noise.
This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX2N-2AD special function block and should be read and understood before attempting to install or use the unit. Further information can be found in the FX SERIES PROGRAMMING MANUAL, FX2N SERIES HARDWARE MANUAL.

1. INTRODUCTION

The FX2N-2AD type analog input block (hereafter referred to as the FX2N-2AD) is used to convert the analog input of two points (voltage input and current input) into a digital value of 12 bits, and to forward the values to the Programmable controller (hereafter referred to as a PLC). FX2N-2AD blocks are connected, the service power supply is reduced to 150mA. The capacity of DC 24V power supply which can used for extension blocks of the service power supply and I/O reaches the value by which the total value of the consumption current of the above mentioned special function block is subtracted from a service voltage source capacity the programmable controller original. For instance, the service power supply the FX2N-32MT is 250mA. When two FX2N-2AD blocks are connected, the service power supply is reduced to 150mA.

2. EXTERNAL DIMENSIONS AND PARTS

3. WIRING

4. Connection with Programmable controller

- The number of FX2N-2AD which can be connected is 4 or less in the FX2N series PLC, 8 or less in the FX2NC series PLC per Main unit with powered extension units. However the following limitation exists when undermentioned special function blocks are connected.

<table>
<thead>
<tr>
<th>Mode</th>
<th>FX2N-2AD number</th>
<th>FX2N Main unit</th>
<th>FX2N-2AD powered extension unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current input</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Voltage input</td>
<td>8</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

5. SPECIFICATIONS

5.1 Environment specification

- Dielectric withstand voltage: 500V AC 1min (between all terminals and case)

5.2 Power supply specification and others

- Analog circuits: 24V DC ±10% 50mA (internal power supplied from the main unit)
- Digital circuits: 5V DC 20mA (internal power supplied from the main unit)

6. Allocation of buffer memory (BFM)

BFM#0: The current value of the input data of the channel specified with BFM#17 (subordinate position 8bit data) is stored. The current value data is stored by binary.

BFM#17: The current value of input data (high rank 4bit data) is stored. The current value data is stored by binary.

BFM#17: Channel (CH1, CH2) which does the analog to digital conversion is specified.

b0 = 0: CH1
b0 = 1: CH2
b1 = 0 → i: The A/D conversion process is started.

With/Read data to above-mentioned buffer memory according to the example of programming “8. Program example”.
7. Adjustment of offset and gain

The offset value and the gain value when from shipped the factory is adjusted for a digital value of 0 to 4000 for the voltage input 0 to 10V. It is necessary to readjust the offset value and the gain value when FX2N-2AD is used by current input, the 0 to 5V DC voltage input, or with an input characteristic other than the factory setting. The adjustment of the offset value and the gain value sets a digital value to the analog value actually input by using the voltage generator and the current generator according to the volume of FX2N-2AD.

7.1 Offset and gain

The offset value can be set to an arbitrary digital value. However, to demonstrate the resolution of 12bit to its maximum, a digital range of 0 to 4000 is available.

7.1.1 Adjustment of gain

The high rank 4 bits of CH2 are moved to the subordinate position 8 bits, and it is stored in D101.

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: X001
A/D input data CH1: D100 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
A/D input data CH2: D101 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit.

Reading of digital value of CH1
Reading of digital value of CH2

Analog value
Digital value
Analog value
Digital value
Analog value
Digital value

Digital value
Analog value

4mA
Digital value
Analog value

A digital value is adjusted to 4000 at 10V in the analog input value when the voltage input is input.
A digital value is adjusted to 4000 at 25mA in the analog input value when the current is input.

7.1.2 Adjustment of offset

The offset value can be set to an arbitrary digital value. However, it is advisable to set the analog value when the digital value is set at the following.

4mA 0.1mV

For instance, when a digital range of 0 to 4000 is used with the analog range 0 to 10V, a digital value of 40 is equal to an analog input of 100mV (40 x 10V/4000 digital points)

1) The offset adjustment and the gain adjustment are for CH1 and CH2 are accomplished at the same time. When the offset value/gain value of one channel is adjusted, the other value is automatically adjusted.
2) Repeat the offset adjustment and gain adjustment alternately until a stable value is reached.
3) Each channel is common to the analog input circuit. There are the few differences between channels. However, check each channel individually for maximum accuracy.
4) Adjust offset / gain by using subsection 8.2 "Example of programming making average value data" when a digital value is not steady.
5) Do in order of the gain adjustment and the offset adjustment when you adjust offset/gain.

8. Program example

The following program examples (8.1 and 8.2) are formula circuits.

8.1 Example of programming analog input

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: X001
A/D input data CH1: D100 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
A/D input data CH2: D101 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit.

Reading of digital value of CH1
Reading of digital value of CH2

Analog value
Digital value
Analog value
Digital value
Analog value
Digital value

Digital value
Analog value

4mA
Digital value
Analog value

A digital value is adjusted to 4000 at 10V in the analog input value when the voltage input is input.
A digital value is adjusted to 4000 at 25mA in the analog input value when the current is input.

8.2 Example of programming making average value data

Add the undermentioned program after ‘8.1 Example of programming analog input’ and use the average value data when you can not read a stable digital value.

A/D input data of CH1: D100
A/D input data of CH2: D102
Sampling frequency: D116
Agreement flag of sampling frequency and average frequency: D105
Average value of CH1: D111, D110
Average value of CH2: D113, D112

1) The above-mentioned program example has gone in the average value by 20 times. Make the average frequency within the range of 1 to 26244.

9. Notes in drive

1) Confirm whether the input wiring of FX2N-2AD and the connection of the extension cable is correctly done.
2) Confirm whether the "4. Connection with programmable controller" condition is satisfied.
3) When shipped from the factory, the input characteristic is adjusted to 0 to 10V DC. If a different input characteristic is desired, please adjust as required.
   When the input characteristic is adjusted, the input characteristics of CH1 and CH2 are changed.
4) The coexistence use for the current input and the voltage input cannot be done with two channels.

10. Error check

Confirm the following items when it is thought that the FX2N-2AD does not operate normally.

1) Confirm the state of POWER LED.
2) Confirm the external wiring per section 3.
3) Confirm whether the load resistance of the equipment connected with the analog input terminal is the one corresponding to the internal resistance of FX2N-2AD (In the voltage input, 200kΩ, and the current input are 250Ω).
4) Confirm the voltage and input Current values with a voltage generator and a current generator. Confirm the analog to digital conversion from the input characteristic.
5) Adjust the offset and gain by "Adjustment of offset and gain" when the analog to digital conversion is not suitable for the input characteristic.

The input characteristic when shipped from the factory is 0 to 10V DC.

Guidelines for the safety of the user and protection of the FX2N-2AD SPECIAL FUNCTION BLOCK

- This manual has been written to be used by trained and competent personnel. This is defined by the European directives for machinery, low voltage and EMC.
- If in doubt at any stage during the installation of the FX2N-2AD always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX2N-2AD please consult the nearest Mitsubishi Electric distribution.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.
7. Adjustment of offset and gain

The offset value and the gain value when from shipped the factory is adjusted for a digital value of 0 to 4000 for the voltage input 0 to 10V. It is necessary to readjust the offset value and the gain value when FX2N-2AD is used by current input, the 0 to 5V DC voltage input, or with an input characteristic that is set at variable setting. The adjustment of the offset and the gain value sets a digital value to the analogue value actually input by using the voltage generator and the current generator according to the volume of FX2N-2AD.

Voltage input | Current input | Volume
---|---|---

*1 A digital value increases when the volume installed in FX2N-2AD is turned right (clockwise). (FX2n-4DA and FX2n-2DA can be used instead of the voltage generator and the current generator)

7.1 Adjustment of gain

The gain value can be set to an arbitrary digital value.

However, to demonstrate the resolution of 12bit to its maximum, a digital range of 0 to 4000 is available.

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: XO01
A/D input data CH1 : D100 (Replace with auxiliary relay M100 to M15. Assign these numbers only one time) A/D input data CH2 : D101 (Replace with auxiliary relay M100 to M15. Assign these numbers only one time)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit. 2.5ms / 1 channel

8. Program example

8.1 Example of programming analog input

The following program examples (8.1 and 8.2) are formula circuits.

The device numbers that have been underlined can be assigned by the user during programming.

1) Confirm whether the input wiring of FX2N-2AD and the connection of the extension cable is correctly connected. When the input characteristic is adjusted, the input characteristics of CH1 and CH2 are changed.

2) The coexistence use for the current input and the voltage input cannot be done with two channels.

3) Each channel is common to the analog input circuit. There are few differences between channels. However, check each channel individually for maximum accuracy.

4) Adjust offset / gain by using subsection 8.2 "Example of programming making average value data" when a digital value is not steady.

5) Do in order of the gain adjustment and the offset adjustment when you adjust offset/gain.

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: XO01
A/D input data CH1 : D100 (Replace with auxiliary relay M100 to M15. Assign these numbers only one time)
A/D input data CH2 : D101 (Replace with auxiliary relay M100 to M15. Assign these numbers only one time)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit. 2.5ms / 1 channel

8.2 Example of programming making average value data

Add the undermentioned program after "8.1 Example of programming analog input" and use the average value data when you can not read a stable digital value.

A/D input data of CH1 : D100
A/D input data of CH2 : D102
Sampling frequency : 0.1Hz
Agreement flag of sampling frequency and average frequency: M133
Average value of CH1 : D111, D110
Average value of CH2 : D113, D112

*1 The above-mentioned program example has gone in the average value by 20 times. Make the average frequency within the range of 1 to 262144.
7. Adjustment of offset and gain

The offset value and the gain value when shipped from the factory is adjusted for a digital value of 0 to 4000 for the voltage input 0 to 10 V. It is necessary to readjust the offset value and the gain value when Fx2n-2AD is used by current input, 0 to 5 V DC voltage input, or with an input characteristic setting. The adjustment of the offset value and the gain value sets a digital value to the analog value actually input by using the voltage generator and the current generator according to the volume of Fx2n-2AD.

7.1 Offset and gain

The offset value can be set to an arbitrary digital value. However, to demonstrate the resolution of 12bit to its maximum, a digital range of 0 to 4000 is available.

7.1.1 Adjustment of gain

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: X001
A/D input data CH1: D100 (Replace with auxiliary relay M100 to M115. Assign these numbers only one)
A/D input data CH2: D101 (Replace with auxiliary relay M100 to M115. Assign these numbers only one)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit. 2.5ms / 1 channel

For instance, when a digital range of 0 to 4000 is used with the analog range of 0 to 10 V, a digital value of 40 is equal to an analog input of 100mV. (40 = 10V/4000 digital points)

1) The offset adjustment and the gain adjustment are for CH1 and CH2 are accomplished at the same time. When the offset value/gain value of one channel is adjusted, the other value is automatically adjusted.
2) Repeat the offset adjustment and gain adjustment alternately until a stable value is reached.
3) Each channel is common to the analog input circuit. There are the few differences between channels. However, check each channel individually for maximum accuracy.
4) Adjust offset / gain by using subsection 8.2 “Example of programming making average value data” when a digital value is not steady.
5) Do in order of the gain adjustment and the offset adjustment when you adjust offset/gain.

7.1.2 Adjustment of offset

The offset value can be set to an arbitrary digital value. However, it is advisable to set the analog value when the digital value is set at the following.

For instance, when a digital range of 0 to 4000 is used with the analog range of 0 to 10 V, a digital value of 40 is equal to an analog input of 100mV. (40 = 10V/4000 digital points)

8. Program example

The following program examples (8.1 and 8.2) are formula circuits.

8.1 Example of programming analog input

A/D input data CH1: D100
A/D input data CH2: D101
Agreement flag of sampling frequency and average frequency: M133
Average value of CH1: D111, D110
Average value of CH2: D113, D112

*1 The above-mentioned program example has gone in the average value by 20 times. Make the average frequency within the range of 1 to 262144.

8.2 Example of programming making average value data

Add the undermentioned program after “8.1 Example of programming analog input” and use the average value data when you can not read a stable digital value.

A/D input data of CH1: D100
A/D input data of CH2: D102
Sampling frequency: D116
Agreement flag of sampling frequency and average frequency: M133
Average value of CH1: D111, D110
Average value of CH2: D113, D112

*1 The above-mentioned program example has gone in the average value by 20 times. Make the average frequency within the range of 1 to 262144.

9. Notes in drive

1) Confirm whether the input wiring of FX2N-2AD and the connection of the extension cable is correctly done.
2) Confirm whether the "4. Connection with programmable controller" condition is satisfied.
3) When shipped from the factory, the input characteristic is adjusted to 0 to 10 V DC.
   If a different input characteristic is desired, please adjust as required.
   When the input characteristic is adjusted, the input characteristics of CH1 and CH2 are changed.
4) The coexistence use for the current input and the voltage input cannot be done with two channels.

10. Error check

Confirm the following items when it is thought that the FX2n-2AD does not operate normally.

1) Confirm the state of POWER LED.
   If the extension cable is correctly connected, the LED will turn off or blink. Confirm the proper connection of the extension cable.
2) Confirm the external wiring per section 3.
3) Confirm whether the load resistance of the equipment connected with the analog input terminal is the one corresponding to the internal resistance of FX2N-2AD (In the voltage input, 200kΩ and the current input are 250Ω).
4) Confirm the voltage and input Current values with a voltage generator and a current generator. Confirm the analog to digital conversion from the input characteristic.
5) Adjust the offset and gain by “Adjustment of offset and gain” when the analog to digital conversion is not suitable for the input characteristic.

The input characteristic when shipped from the factory is 0 to 10 V DC.

Guidelines for the safety of the user and protection of the FX2N-2AD SPECIAL FUNCTION BLOCK

- This manual has been written to be used by trained and competent personnel. This is defined by the European directives for machinery, low voltage and EMC.
- If in doubt at any stage during the installation of the FX2n-2AD always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX2n-2AD please consult the nearest Mitsubishi Electric distributor.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.
4. Connection with Programmable controller

The number of FX2N-2AD which can be connected is 4 or less in the FX0N series PLC, 8 or less in the FX2N series PLC, and 4 or less in the FX5w series PLC per Main unit with powered extension units. However the following limitation exists when the undermentioned special function blocks are connected.

\[
\text{FX2N}: \text{Main unit and powered extension units of } 4 \text{ to } 32 \text{ points or less.}
\]

Warning—this unit may be damaged by input currents in excess of -2 mA, +60 mA.

\[
\text{FX2N}: \text{Main unit and powered extension units of } 48 \text{ points or more.}
\]

Warning—this unit may be damaged by input voltage in excess of -0.5 V, +15 V.

1) The analog input is selected from the voltage input or the current input by the method of connecting wires. At this time, assume setting to be two channels common analog input (voltage input or current input).

2) The two analog input channels can accept inputs of 0 to 10 V DC, 0 to 5 V DC, or 4 to 20 mA. Make the input characteristic common with two channels.

3) The analog to digital conversion characteristics can be adjusted.

4) The block occupies 8 I/O points which can be allocated from either inputs or outputs.

5) The data transfer with the PLC uses the FROM/TO instruction.

The capacity of DC/4 V power supply which can used for extension blocks of the service power supply and I/O reaches the value by which the total value of the consumption current of the above-mentioned special function block is subtracted from a service voltage source capacity the programmable controller original. For instance, the service power supply the FX2N-32MT is 250 mA. When two FX2N-2AD blocks are connected, the service power supply is reduced to 150 mA.

The FX2N-2AD and the main unit are connected with the cable at the right of the main unit.

5. SPECIFICATIONS

5.1 Environment specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric withstand voltage</td>
<td>500 V AC 1 min (Between all terminals and case)</td>
</tr>
</tbody>
</table>

Environmental specifications other than the above-mentioned are the same as the main unit of the Programmable controller. (Refer to the manual of the Programmable controller)

5.2 Power supply specification and others

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuits</td>
<td>24 V DC ±10% 50 mA (Internal power supplied from the main unit)</td>
</tr>
<tr>
<td>Digital circuits</td>
<td>5 V DC 20 mA (Internal power supplied from the main unit)</td>
</tr>
</tbody>
</table>

5.3 Defining gain and offset

<table>
<thead>
<tr>
<th>Item</th>
<th>Voltage input</th>
<th>Current input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of analog input</td>
<td>0 to 10 V DC, 0 to 5 V DC</td>
<td>4 to 20 mA (input resistance 2500Ω)</td>
</tr>
</tbody>
</table>

Warning—this unit may be damaged by input currents in excess of 0.5 V, +15 V DC.

Integrated accuracy: ±1% (full scale 0 to 10 V) ±1% (full scale 4 to 20 mA)

6. Allocation of buffer memory (BFM)

6.1 Buffer memory

<table>
<thead>
<tr>
<th>BFM number</th>
<th>b15 to b6</th>
<th>b7 to b4</th>
<th>b3</th>
<th>b2</th>
<th>b1</th>
<th>b0</th>
</tr>
</thead>
<tbody>
<tr>
<td>#0</td>
<td>Reserved</td>
<td>Current value of input data (subordinate position 8bit data)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td>Reserved</td>
<td>Current value of input data (high rank 8 bit data)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 to #6</td>
<td>Reserved</td>
<td>Analog to digital conversion beginning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#7</td>
<td>Reserved</td>
<td>Analog to digital conversion end</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#8 or more</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BFM#0: The current value of the input data of the channel specified with BFM#17 (subordinate position 8bit data) is stored. The current value data is stored by binary.

BFM#1: The current value of input data (high rank 8bit data) is stored. The current value data is stored by binary.

BFM#17: The channel (CH1, CH2) which does the analog to digital conversion is specified.

b0=0: CH1
b0=1: CH2
b1=0→1: The D/A conversion process is started.

Write/read data to above-mentioned buffer memory according to the example of programming “8.Program example”.

1. The FX2N-2AD cannot have 1 channel as an analog voltage input and one channel as a current input because both channels use the same offset and gain values. For current input please short circuit VIN and IN as shown in the diagram.

2. Connect a 0.1 to 0.47 μF 25 V DC capacitor with the position of ‘a’ when there is voltage ripple in the voltage input or there will be a lot of noise.
8. Program example

The following program examples (8.1 and 8.2) are formula circuits. The device numbers that have been underlined can be assigned by the user during programming.

8.1 Example of programming analog input

Analog to digital conversion execution input of CH1: X000
Analog to digital conversion execution input of CH2: X001
A/D input data CH1 : D100 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
A/D input data CH2 : D101 (Replace with auxiliary relay M100 to M115. Assign these numbers only one time)
Processing time: Time from turning on X000 and X001 to storage of analog to digital conversion value in data register of main unit.

*1 Change the circuit of “*1” as follows when you use FX2N PLC

A/D input data of CH1 : D100
A/D input data of CH2 : D102
Sampling frequency : D118
Agreement flag of sampling frequency and average frequency : M133
Average value of CH1 : D111, D110
Average value of CH2 : D113, D112

*1 The above-mentioned program example has gone in the average value by 20 times. Make the average frequency within the range of 1 to 262144.

5) Repeat the offset adjustment and gain adjustment alternately until a stable value is reached.
6) Check each channel individually for maximum accuracy.
7) Adjust offset / gain by using subsection 8.2 ‘Example of programming analog input’ when a digital value is not steady.
8) Do in order of the gain adjustment and the offset adjustment when you adjust offset /gain.
9) Confirm whether the input wiring of FX-n-2AD and the connection of the extension cable is correctly done.
10) Confirm whether the "4. Connection with programmable controller" condition is satisfied.
11) When shipped from the factory, the input characteristic is adjusted to 0 to 10V DC.
12) If a different input characteristic is desired, please adjust as required.
13) When the input characteristic is adjusted, the input characteristics of CH1 and CH2 are changed.
14) Check the existence use for the current input and the voltage input cannot be done with two channels.

Guidelines for the safety of the user and protection of the FX-n-2AD SPECIAL FUNCTION BLOCK

- This manual has been written to be used by trained and competent personnel. This is defined by the European directives for machinery, low voltage and EMC.
- If in doubt at any stage during the installation of the FX-n-2AD always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX-n-2AD please consult the nearest Mitsubishi Electric distributor.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

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