This manual only describes the specifications for FX2N-20GM positioning controller. For complete operation, wiring, mounting and programming instructions please refer to the FX2NC-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL, FX PROGRAMMING MANUAL and FX SERIES HARDWARE MANUAL.

These manuals should be read and understood before attempting to install or use the unit. And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

Safety Precaution (Read these precautions before use.)

This manual classifies the safety precautions into two categories: WARNING and CAUTION.

WARNING Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by WARNING may also cause severe injury.

It is important to follow all precautions for personal safety.

PRECAUTIONS

STARTUP AND MAINTENANCE

1. Reference manual

Refer to the under mentioned manual for details about product installation, operation and programming.

1) FX-10ng, FX-20GM HARDWARE PROGRAMMING MANUAL

The installation, wiring and the instructions of the FX2N-10GM and FX2N-20GM units are explained.

2) E-20TP OPERATION MANUAL

The operation of the input of the program which uses E-20TP and the monitor and the test is explained.

3) FX-PCS-VPS/FPS SOFTWARE MANUAL

The operation program is input using the FX-PCS-VPS/FPS software. This manual explains the operation of the monitor and test functions.

4) FX-PCS-KIT-GM SOFTWARE MANUAL

The program is input via the FX-PCS-KIT-GM-E. This manual explains the operation of the monitor and test functions.

The manual in 1) is not included with the product. Please request from the shop where the unit was purchased if required.

The manuals in 2), 3) and 4) are included with the product.

2. Outline of the unit

The FX2N-20GM positioning controller (hereinafter call FX2N-20GM or 20GM) is a pulse chain output unit that enables the positioning control of a stepping motor or a servo motor via the drive unit.

- One FX2N-20GM can control 2 axes. (Linear interpolation and circular interpolation are available.)

The installation, wiring and the instructions of the FX2N-10GM and FX2N-20GM units are explained.

The operation of the input of the program which uses E-20TP and the monitor and the test is explained.

3. External dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>87(143)</td>
<td>360(763)</td>
</tr>
</tbody>
</table>

4. Product composition

4.1 Each part name

The name and description of each part of the FX2N-20GM are explained below:

a) Battery
b) Operation indicator LED
c) MANU/AUTO switch
d) Connector for programming tool
e) General-purpose I/O display
f) Display for equipment inputs
g) x axis status display
h) Lock for extension block of FX2N-20GM
i) y axis status display
j) Connector for FX2N-20GM extension block
k) Connector for PLC extension block
l) Hook for DIN rail installation
m) Connector for y axis motor amplifier: CON4
n) Connector for x axis motor amplifier: CON3
o) Connector for input equipment: CON2
p) Connector for overall-purpose I/O: CON1
q) Connector for memory board
r) Connector for PLC

4.2 Operation display

The state of FX2N-20GM is displayed by LED.

- POWER LED lights when power is supplied. If LED is not lit, check power supply voltage and current.
- READY-X LED lights when accepting a x-axis instruction. During pulse output or when an error occurs, the LED is off.
- READY-Y LED lights when accepting a y-axis drive instruction. During pulse output or when an error occurs, the LED is off.
- ERROR-X LED is lit or blinks when an error occurs in the positioning drive of x axis.
- ERROR-Y LED is lit or blinks when an error occurs in the positioning drive of y axis.
- BATT LED lights when the battery voltage drops. (Turn Power Supply On)
- CPU-E CPU error. Incompatible system configuration, excess noise, etc.

4.3 I/O connector

The pin array of the I/O connector is as follows.

All terminals with identical names are shorted internally (Ex. COM1-CON1, VIN-VIN, etc.).

Do not wire ‘‘–’’ terminals.

Refer to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL for wiring information.

4.4 Power supply connector

The power to the FX2N-20GM is supplied with the special power supply cable attached to the product.

The ground of the FX2N-20GM and the servo amplifier is a common ground. Refer to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL for detailed wiring instructions.

Install a safety circuit outside of the FX2N-20GM so that the entire system may work safely even when the external power supply fails.
FX2N-20GM HARDWARE PROGRAMMING MANUAL

This manual only describes the specifications for FX2N-20GM positioning controller.

STARTUP AND MAINTENANCE

1. Reference manual

Refer to the under mentioned manual for details about product installation, operation and programming.

1) FX-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL
   The installation, wiring and the instructions of the FX-10GM and FX2N-20GM units are explained.

2) E-20TP OPERATION MANUAL
   The operation of the input of the program which uses E-20TP and the monitor and the test is explained.

3) FX-PCS-VPS/ WIN-E SOFTWARE MANUAL
   The program is input using the FX-PCS-VPS/ WIN-E software. This manual explains the operation of the monitor and test functions.

The FX2N-20GM positioning controller (hereinafter call FXN20GM or 20GM) is a pulse chain output unit with 2 axes and switched as required. The manual pulse generators must be an open collector output type.

2. Outline of the unit

The FX2N-20GM positioning controller is an installed call FXN20GM or 20GM) is a pulse chain output unit that enables the positioning control of a stepping motor or a servo motor via the drive unit.

- One FXN20GM can control 2 axes. (Linear interpolation and circular interpolation are available.)
- Both dedicated positioning language (cod instructions) and sequence language (basic instructions and application instructions) are available.
- A pulse generator can be connected to each axis or one pulse generator can be connected to both axes and switched as required. The manual pulse generators must be an open collector output type.
- The zero return operation at each start can be omitted with a servo amplifier with the absolute position (ABS) detection function.

The FXN20GM can be used alone.

The FXN20GM is connected with an FXN10GM/FX2N/FX3U series Programmed controller (hereafter call PLC), reading and writing the positioning data can be done.

When connecting to an FXN10 PLC, the FXN10/CON-VF must be used.

When connecting to an FXN10 PLC, the FXN10/CON-VF or FXN10-VPS-SV must be used.

3. External dimensions

- Dimensions: 360 x 360 x 87 (43) mm
- Weight: approx. 0.4 kg

4. Product composition

The pin array of the I/O connector is as follows.

I/O connector

- Name of LED
  - POWER: LED lights when power is supplied. If LED is not light, check power supply voltage and current.
  - READY-X: LED lights when accepting a x-axis instruction. During pulse output or when an error occurs, the LED is off.
  - READY-Y: LED lights when accepting a y-axis drive instruction. During pulse output or when an error occurs, the LED is off.
  - ERROR-X: LED is lit or blinks when an error occurs in the positioning drive of x-axis.
  - ERROR-Y: LED is lit or blinks when an error occurs in the positioning drive of y-axis.
  - BATT: LED lights when the battery voltage drops. (Turn Power Supply Off)

4.4 Power supply connector

The power to the FXN20GM is supplied with the power supply connector attached to the product. The ground of the FXN20GM and the servo amplifier is a common ground. Refer to the FXN10-100GM HARDWARE PROGRAMMING MANUAL for detailed wiring instructions.
**Safetv Precaution (Read these precautions before use.)**

This manual only describes the specifications for FX2N-20GM positioning controller. For complete operation, wiring, mounting and programming instructions please refer to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL, FX PROGRAMMING MANUAL and FX SERIES HARDWARE MANUAL.

These manuals should be read and understood before attempting to install or use the unit. And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

**Installation, wiring and the instructions of the FX2N-10GM and FX2N-20GM units are explained.**

**PRECAUTIONS**

- **CAUTION**
  - Install a safety circuit outside the PLC so that the entire system conservatively operates even if an abnormality occurs in the external power supply or a failure occurs in the PLC.
  - Connect the battery correctly.
  - The name and description of each part of the FX2N-20GM are explained below.

**CAUTION**

- Incorrect handling of the battery may cause heat excessive generation, bursting, ignition, liquid leakage or deformation, and lead to injury, fire or failures and malfunctions of facilities and other equipment.
- Thoroughly read the manual, sufficiently confirming safety, then perform returning to the zero point in the manual AUTO mode, jog operation, step operation or automatic operation. An operation error may damage the machinery or cause accidents.

**STARTUP AND MAINTENANCE PRECAUTIONS**

- Do not touch any terminal while the FX2N-20GM positioning controller’s power is on. Doing so may cause electric shock or malfunctions.
- Before cleaning or neighboring terminals externally cut off all phases of the power supply. Failure to do so may cause electric shock.
- Do not touch the battery for memory backup, conformity in correspondence to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.
- Use the battery only for the specified purpose.
- Connect the battery correctly.
- Do not charge, disassemble, heat, put in fire, short-circuit, connect reversely, weld, swallow or burn the battery, or apply excessive forces (vibration, impact, drop, etc.) to the battery.
- Do not store or use the battery at high temperatures or expose to direct sunlight.
- Do not expose to water, bring near fire or torch, liquid leakage or other contents directly.
- Incorrect handling of the battery may cause heat excessive generation, burning, ignition, liquid leakage or deformation, and lead to injury, fire or failures and malfunctions of facilities and other equipment.
- Thoroughly read the manual, sufficiently confirming safety, then perform returning to the zero point in the manual AUTO mode, jog operation, step operation or automatic operation. An operation error may damage the machinery or cause accidents.

**PRODUCT COMPOSITION**

- The FX2N-20GM can be used alone.
- A pulse generator can be connected to each axis or one pulse generator can be connected to both axes and switched as required. The manual pulse generators must be an open collector output type.
- One FX2N-20GM can control 2 axes. (Linear interpolation and circular interpolation are available.)
- Both dedicated positioning language (cod instructions) and sequence language (basic instructions and application instructions) are available.
- The program is input via the FX-PCS-KIT-GM-EE. The manual explains the operation of the monitor and functions.
- The installation, wiring and the instructions of the FX2N-10GM and FX2N-20GM units are explained.

**3. External dimensions**

- **CAUTION**
  - Do not touch any terminal while the FX2N-20GM positioning controller’s power is on. Doing so may cause electric shock or malfunctions.
  - Before cleaning or neighboring terminals externally cut off all phases of the power supply. Failure to do so may cause electric shock.

**DESIGN PRECAUTIONS**

- Installing a safety circuit outside the PLC so that the entire system conservatively operates even if an abnormality occurs in the external power supply or a failure occurs in the PLC.
- Connect the battery correctly.
- The name and description of each part of the FX2N-20GM are explained below.
### 5.5 Output specification

**Input from drive unit**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOG</td>
<td>PDI</td>
</tr>
<tr>
<td>SVRDY, SVEND</td>
<td></td>
</tr>
</tbody>
</table>

**Output to drive unit**

<table>
<thead>
<tr>
<th>Channel name</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital output 1</td>
<td>LED is high when output is ON</td>
<td>LED is low when output is ON</td>
</tr>
<tr>
<td>Digital output 2</td>
<td>LED is high when output is OFF</td>
<td>LED is low when output is OFF</td>
</tr>
</tbody>
</table>

**ON current**

- 1mA (max. 100mA)
- 1mA (max. 100mA)
- 1mA (max. 100mA)
- 1mA (max. 100mA)
- 1mA (max. 100mA)
- 1mA (max. 100mA)
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- 1mA (max. 100mA)
- 1mA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
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- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100mA)
- 1MA (max. 100MA)
5.5 Output specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>General-purpose output</td>
<td></td>
</tr>
<tr>
<td>Output to drive unit</td>
<td></td>
</tr>
<tr>
<td>Signal name</td>
<td>1mA to 10mA</td>
</tr>
<tr>
<td>Cutoff capacitance</td>
<td>0.01μF to 0.1μF</td>
</tr>
<tr>
<td>Operation indicator</td>
<td>LED is white when output is ON</td>
</tr>
<tr>
<td>LED is white when output is OFF</td>
<td></td>
</tr>
<tr>
<td>Operation power supply</td>
<td>5 to 24V DC ± 10%</td>
</tr>
<tr>
<td>5 to 24V DC ± 10%</td>
<td></td>
</tr>
<tr>
<td>Load voltage</td>
<td>50mA or less</td>
</tr>
<tr>
<td>20mA or less</td>
<td></td>
</tr>
<tr>
<td>Output ON voltage</td>
<td>0.5V max</td>
</tr>
<tr>
<td>0.9V max</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0.2ms max for both ON and OFF, 0.1ms for OFF</td>
</tr>
<tr>
<td>Turning ON rate of I/O simultaneously</td>
<td>50% or less</td>
</tr>
</tbody>
</table>

5.4 Input specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input from general-purpose equipment</td>
<td></td>
</tr>
<tr>
<td>Input from drive unit</td>
<td></td>
</tr>
<tr>
<td>Input signal name</td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>START, STOP, 2N, 1D, 1O, ROV, LSF, LSR</td>
</tr>
<tr>
<td>Group 2</td>
<td>DOO</td>
</tr>
<tr>
<td>Group 3</td>
<td>Manual pulse generator, interruption input</td>
</tr>
<tr>
<td>Manual pulse generator</td>
<td></td>
</tr>
<tr>
<td>Interrupt capacitance</td>
<td>by photocoupler</td>
</tr>
<tr>
<td>LSF (reverse rotation), LSR (forward rotation)</td>
<td></td>
</tr>
<tr>
<td>Interrupt time</td>
<td>4 points</td>
</tr>
<tr>
<td>Servo system</td>
<td>SVRDY (servo ready), SVEND (servo end), PG0 (zero-point signal)</td>
</tr>
<tr>
<td>General purpose: The main body has Y0 to X10 to X16 to be input by using the extension block. (max I/O point: 48 points)</td>
<td></td>
</tr>
<tr>
<td>General purpose: The main body has Y0 to Y10 to Y16 to be output by using the extension block. (max I/O point: 48 points)</td>
<td></td>
</tr>
<tr>
<td>Input control outputs</td>
<td></td>
</tr>
<tr>
<td>Servo system</td>
<td>FP (forward rotation pulse), RP (reverse rotation pulse).</td>
</tr>
<tr>
<td>General purpose: The main body has Y0 to Y10 to Y16 to be output by using the extension block. (max I/O point: 48 points)</td>
<td></td>
</tr>
</tbody>
</table>

4.5 I/O extension connector

The FX2N-20GM can connect the following extension block.

- FX2NC series extension block
  - FX2NC-16E-D
  - FX2NC-16EYT-DSS
  - FX2NC-32E-D
  - FX2NC-32EYT-DSS
  - FX2NC-16E-DS
  - FX2NC-16EYT-DS

- FX2NC series extension block (FX2NC-CNIV-IF needs to be used)
  - FX2NC-CNIV-IF

- FX2N-20GM can connect the following extension block.
  - FX2NC-16EX-T-DS
  - FX2NC-16EX-D/UL
  - FX2NC-16EYT-D/UL

The increase point is 48 points or less. Assume the turning on rate to be 50% or less simultaneously. 48 points may be added to the system if 50% or less are used simultaneously.

4.6 Connection with PLC

Refer to the FX2N-10GM and the FX2N-20GM HARDWARE PROGRAMMING MANUAL for details concerning the system configuration.

4.7 Detaching the memory board

1. Turn off the power supply to the FX2N-20GM.
2. Remove the cover of the memory board.
3. Install the memory board in the connector.
4. Replace the cover before turning on the power supply.
5. When detaching the memory board, begin by carefully detaching it from the bottom side.

4.8 Procedure of battery exchange

1. Detach the extension cover on the right side of the FX2N-20GM.
2. Insert the hooks of the extension blocks into the lock holes, and gently press the units together.
3. Lower the lock to the units in place.
4. Attach other extension blocks in the same manner.

5. Specification

5.1 Power supply specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24V DC ± 10% to ± 15%</td>
</tr>
<tr>
<td>Allowance power/ output</td>
<td></td>
</tr>
<tr>
<td>The operation is continued to the momentary power failure is 5ms or less.</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>10W</td>
</tr>
<tr>
<td>Fuse</td>
<td>125V 1A</td>
</tr>
</tbody>
</table>

5.2 General specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0 to 55°C (operation), -20 to 70°C (storage)</td>
</tr>
<tr>
<td>Surrounding humidity</td>
<td>30 to 80% (non-condensation)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Frequency 16 to 57Hz, Half 0.05mm amplitude, 50g to 500g, 4 m/s² Acceleration, Sweep count for X, Y, Z: 10 times (80 min in each direction)</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>147ms² acceleration, Action time: 11ms, 3 times in each direction X, Y, Z.</td>
</tr>
</tbody>
</table>

5.3 Performance specification

- FX2N-20GM can connect the following extension block.
  - FX2NC series extension block
  - FX2NC-16E-D
  - FX2NC-16EYT-DSS
  - FX2NC-32E-D
  - FX2NC-32EYT-DSS
  - FX2NC-16E-DS
  - FX2NC-16EYT-DS

- FX2NC series extension block (FX2NC-CNIV-IF needs to be used)
  - FX2NC-CNIV-IF

- FX2N-20GM can connect the following extension block.
  - FX2NC-16EX-T-DS
  - FX2NC-16EX-D/UL
  - FX2NC-16EYT-D/UL

5.4 Input specification

4.8 Procedure of battery exchange

1. The power supply of FX2N-20GM is turned off.
2. Remove side cover from the FX2N-20GM.
3. Remove battery from holler-disscotor and replace. (This must be carried out within 30 sec. if the current data held in the FX2N-20GM’s RAM is to be saved.)
4. Refill battery and cover.

5. Output specification

<table>
<thead>
<tr>
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<th>Contents</th>
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<tbody>
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<td>Signal name</td>
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<td>Cutoff capacitance</td>
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</tr>
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</tr>
<tr>
<td>5 to 24V DC ± 10%</td>
<td></td>
</tr>
<tr>
<td>Load voltage</td>
<td>50mA or less</td>
</tr>
<tr>
<td>20mA or less</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0.2ms max for both ON and OFF, 0.1ms for OFF</td>
</tr>
<tr>
<td>Turning ON rate of I/O simultaneously</td>
<td>50% or less</td>
</tr>
</tbody>
</table>

For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, machine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or failures could occur if the product fails, install appropriate backup or failsafe functions in the system.
4.5 I/O extension connector
The FX2N-20GM can connect the following extension block.

1) FX2N series extension block
   - FX2N-16EX-ES/UL - FX2N-16EYT-ESS/UL
   - FX2NC-16EX-DS - FX2NC-16EYT-DSS - FX2NC-32EX-DS - FX2NC-32EYT-DSS
   - FX2NC-32EX-D/UL - FX2NC-32EYT-D/UL
2) FX2N series extension block (FX2NC-CNIF required to be used)
   - FX2NC-18ES-ESUL - FX2NC-18EYT-ESUL
3) FX2N series extension block (FX2NC-CNIF-IF needed to be used)
   - FX2NC-24ES-ESUL - FX2NC-24EYT-ESUL
4) FX2N series extension block (FX2NC-CNIF-IF-IF needed to be used)
   - FX2NC-32ES-ESUL - FX2NC-32EYT-ESUL

The increase point is 48 points or less. Assume the turning on rate to be 50% or less simultaneously. 48 points may be added to the system if 50% or less are used simultaneously.

4.6 Connection with PLC
Refer to the FX2N-10GM and the FX2N-20GM HARDWARE PROGRAMMING MANUAL for details concerning the system configuration.

4.7 Detaching the memory board
7.8k step of RAM is built into the FX2N-20GM. In addition, the optional memory board (FX2NC-EEPROM-16) can be used. (Program capacity is 7.8k steps)

1) Turn off the power supply to the FX2N-20GM.
2) Remove the side cover from the FX2N-20GM.
3) Remove battery from holder-disconnect and replace. (This must be carried out within 30 sec if the current data held in the FX2N-20GM’s RAM is to be saved.)
4) Reattach other extension blocks in the same manner.

5. Specification
5.1 Power supply specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24V DC, 10% to 15%</td>
</tr>
<tr>
<td>Allowance power/ failure time</td>
<td>The operation is continued to the momentary power failure is 5ms or less.</td>
</tr>
<tr>
<td>Power consumption</td>
<td>10W</td>
</tr>
<tr>
<td>Fuse</td>
<td>125V 1A</td>
</tr>
</tbody>
</table>

5.2 General specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0 to 55°C (operation),-20 to 70°C (storage)</td>
</tr>
<tr>
<td>Surrounding humidity</td>
<td>35 to 85% (no condensation)</td>
</tr>
</tbody>
</table>
| Vibration resistance  | Frequency 10 to 50Hz, 0.003m acceleration amplitude, 557 to 100Hz, 4.97 m/s² Acceleration sweep count for X, Y, Z: 10 steps (80 min in each direction)
| Shock resistance      | 147m/s² acceleration, Action time: 11ms, 3 times in each direction X, Y, Z |

4.8 Procedure of battery exchange

1) Detach the extension cover on the right side of the FX2N-20GM.
2) Insert the hooks of the extension blocks into the lock holes, and gently press the units together.
3) Lower the lock to fix the units in place.
4. Procedure of battery exchange

1) Turn off the power supply to the FX2N-20GM.
2) Remove the cover of the memory board.
3) Install the memory board in the connector.
4) Replace the cover before turning on the power supply.
5) When detaching the memory board, begin by carefully detaching it from the bottom side.

5.3 Performance specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>1,000V/p.μA, 30 to 100Hz, tested by noise simulator</td>
</tr>
<tr>
<td>Static threshold voltage</td>
<td>800V AC ± 1%, tested between all points, terminal and ground.</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>500 to 5000 DC, tested between all points, terminal and ground.</td>
</tr>
<tr>
<td>Ground conductance</td>
<td>Class G (dissipation 100μA or less)</td>
</tr>
<tr>
<td>Environment resistance</td>
<td>Independent resistance is to be free of corrosive gases. Dust should be minimal.</td>
</tr>
<tr>
<td>Working altitude</td>
<td>20°C ± 1°C</td>
</tr>
</tbody>
</table>

*1 Do not use the PLC under pressure higher than the atmospheric pressure. Doing so may damage the PLC.

5.4 Input specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Input from general/purpose equipment</th>
<th>Input from drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal name</td>
<td>Group 1: START, STOP, ZN, FX0, ROS, LSF, LSR</td>
<td>Group 1: DOG</td>
</tr>
<tr>
<td></td>
<td>Group 2: Manual pulse generator, interruption input</td>
<td>Group 2: PDI</td>
</tr>
<tr>
<td>Manual pulse generator</td>
<td>by photocoupler</td>
<td>by photocoupler</td>
</tr>
<tr>
<td>Operation indication</td>
<td>LED is lit when input is ON</td>
<td>LED is lit when input is ON</td>
</tr>
<tr>
<td>Pulse width</td>
<td>40μsec to 20μsec</td>
<td>40μsec to 20μsec</td>
</tr>
<tr>
<td>Input current</td>
<td>15mA to 24V DC</td>
<td>15mA to 24V DC</td>
</tr>
<tr>
<td>Input ON current</td>
<td>5mA or less</td>
<td>5mA or less</td>
</tr>
<tr>
<td>Input OFF current</td>
<td>5mA or less</td>
<td>5mA or less</td>
</tr>
<tr>
<td>Inverter format</td>
<td>Constant input or IPM open collector transistor input</td>
<td>Approx. 3.6msec</td>
</tr>
<tr>
<td>Response time</td>
<td>Approx. 3.6msec</td>
<td>Approx. 3.6msec</td>
</tr>
<tr>
<td>Turning ON rate of I/O simultaneously</td>
<td>Approx. 0.4ms</td>
<td>Approx. 0.4ms</td>
</tr>
</tbody>
</table>

*1 The selection of general purpose inputs, manual pulse generator inputs or interrupt inputs in the parameter settings automatically adjusts the input filters.

5.5 Output specification

<table>
<thead>
<tr>
<th>Item</th>
<th>General-purpose output</th>
<th>Drive output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal name</td>
<td>T1/2 to T12, T13, T14</td>
<td>T1 to T12, T13, T14</td>
</tr>
<tr>
<td>Circuit operation</td>
<td>by phototransistor</td>
<td>by phototransistor</td>
</tr>
<tr>
<td>Operation indication</td>
<td>LED is lit when input is ON</td>
<td>LED is lit when input is ON</td>
</tr>
<tr>
<td>Power supply</td>
<td>5 to 24V DC ± 10%</td>
<td>5 to 24V DC ± 10%</td>
</tr>
<tr>
<td>Output ON voltage</td>
<td>0.5V max</td>
<td>0.9V max</td>
</tr>
<tr>
<td>Response time</td>
<td>0.2ms max. for both ON and OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Turning ON rate of I/O simultaneously</td>
<td>50% or less</td>
<td>50% or less</td>
</tr>
</tbody>
</table>

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

Warranty
Exclusion of loss in opportunity and secondary loss from warranty liability
Regardless of the grants warranty term, Mitsubishi shall not be liable for compensation to:
(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
(2) Loss in opportunity, lost profit incurred to the user by failures of Mitsubishi products.
(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
(4) Replacement by the user, maintenance of on-site equipment, startup-test run and other tasks.

For safe use
- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or failures could occur if the product fails, install appropriate backup or failsafe functions in the system.
**STARTUP AND MAINTENANCE PRECAUTIONS**

- Do not touch any terminal while the FX2N-20GM positioning controller’s power is on. Doing so may cause electric shock or malfunctions.
- Before cleaning or replacing terminals externally cut off all phases of the power supply.
- Failure to do so may cause electric shock.
- Use the battery for memory backup correctly in conformance to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.
- Use the battery only for the specified purpose.
- Connect the battery correctly.
- Do not charge, disassemble, heat, put in fire, short circuit, wet, or use while the battery is in operation.
- Do not store or use the battery at temperatures higher than those specified in Section 5.2.5 of the manual.
- Do not charge, disassemble, heat, put in fire, short circuit, wet, or use while the battery is in operation.
- Do not use the battery at high temperatures or expose to direct sunlight.
- Do not expose to water, near fire or touch liquid leakage or other contents directly.
- Incorrect handling of the battery may cause hazardous conditions, resulting in death or severe injury.

**Transportation and Storage Precautions**

- When transporting the FX2N-20GM positioning controller, make sure to turn off the FX2N-20GM positioning controller before shipment, the BATT LED is OF and check the battery life.
- Do not shipped the FX2N-20GM positioning controller with the BATT LED ON.
- If the FX2N-20GM positioning controller is transported with the BATT LED on the battery is exhausted, the battery-backed data may not be usable during transportation.
- When transporting lithium batteries, follow the electrical regulations. (For details of the regulated products, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.)

**Disposal Precautions**

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.
- When disposing of batteries, separate them from other waste according to local regulations.
- For details of the Battery Directive in EU countries, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.

**SAFETY PRECAUTION (Read these precautions before use)**

This manual classifies the safety precautions into two categories: **Notice** and **Warning**.

- **Notice**: Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
- **Warning**: Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by **Notice** may also cause severe injury.

**Design Precautions**

- Install a safety circuit outside the PLC so that the entire system conservatively operates even if an abnormality occurs in the external power supply or a failure occurs in the PLC.

**Startup and Maintenance Precautions**

- Do not touch any terminal while the FX2N-20GM positioning controller’s power is on. Doing so may cause electric shock or malfunctions.
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- Connect the battery correctly.
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**Software Precautions**

- This manual only describes the specifications for FX2N-20GM positioning controller. For complete operation, wiring, mounting and programming instructions please refer to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL, FX PROGRAMMING MANUAL, and FX SERIES HARDWARE MANUAL.

**Transportation and Storage Precautions**

- When transporting the FX2N-20GM positioning controller, make sure to turn off the FX2N-20GM positioning controller before shipment, the BATT LED is OFF, and check the battery life.
- If the FX2N-20GM positioning controller is transported with the BATT LED on the battery is exhausted, the battery-backed data may not be usable during transportation.
- The FX2N-20GM is a precision instrument. During transportation, avoid impacts larger than those specified in Section 5.2.2 by using dedicated packaging boxes and shock-absorbing pallets.
- Failure to do so may cause failures in the FX2N-20GM.
- After transportation, verify operation of the product and check for damage of the mounting part, etc.
- When transporting lithium batteries, follow the electrical regulations. (For details of the regulated products, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.)

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**Startup and Maintenance Precautions**

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- Use the battery only for the specified purpose.
- Connect the battery correctly.
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- Failure to do so may cause failures in the FX2N-20GM.
- After transportation, verify operation of the product and check for damage of the mounting part, etc.
- When transporting lithium batteries, follow the electrical regulations. (For details of the regulated products, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.)

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- For details of the Battery Directive in EU countries, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.

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- Before cleaning or replacing terminals externally cut off all phases of the power supply.
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- Use the battery for memory backup correctly in conformance to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.
- Use the battery only for the specified purpose.
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- Do not expose to water, near fire or touch liquid leakage or other contents directly.
- Incorrect handling of the battery may cause hazardous conditions, resulting in death or severe injury.

**Software Precautions**

- This manual only describes the specifications for FX2N-20GM positioning controller. For complete operation, wiring, mounting and programming instructions please refer to the FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL, FX PROGRAMMING MANUAL, and FX SERIES HARDWARE MANUAL.

**Transportation and Storage Precautions**

- When transporting the FX2N-20GM positioning controller, make sure to turn off the FX2N-20GM positioning controller before shipment, the BATT LED is OFF, and check the battery life.
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- Failure to do so may cause failures in the FX2N-20GM.
- After transportation, verify operation of the product and check for damage of the mounting part, etc.
- When transporting lithium batteries, follow the electrical regulations. (For details of the regulated products, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.)

**Disposal Precautions**

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.
- When disposing of batteries, separate them from other waste according to local regulations.
- For details of the Battery Directive in EU countries, refer to FX2N-10GM, FX2N-20GM HARDWARE PROGRAMMING MANUAL.
5. Specification

5.1 Power supply specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24V DC ±10%</td>
</tr>
<tr>
<td>Allowance tolerance</td>
<td>±15%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>10W</td>
</tr>
<tr>
<td>Efficiency</td>
<td>125% TA</td>
</tr>
</tbody>
</table>

5.2 General specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0 to 55 °C (operation), -20 to 70 °C (storage)</td>
</tr>
<tr>
<td>Humidity</td>
<td>35 to 90% (non-condensation) operation</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Frequency 10 to 57Hz; Peak 0.035mm amplitude, 50 to 150Hz; 4.9 m/s² Acceleration, 10 m/s² in 0.01 seconds</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>147m/s² acceleration, Action time: 11ms, 3 times in each direction X, Y, Z</td>
</tr>
</tbody>
</table>

5.3 Performance specification

- Number of control axis: Two axes (two axes or two independent axes simultaneously)
- Interpolation function: Three axes time interpolation and a circular arc interpolation (two axes simultaneously)
- Applicable PLC: Bus connection with FX2N/ FX2NC/ FX3U/ FX3UC series PLC. The number of I/O points occupied is 8 points.
- Program memory: Built-in FX2NC-32BL type lithium battery. Lifetime: about three years.
- Absolute position detection: The absolute position detection is possible with MR-J2/ MR-J4 and the MR-J4 type servo amplifier with the ABS function.
- Control input: Output: Servo system: FF (forward rotation pulse), RP (reverse rotation pulse).

5.4 Input specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Input from generative/purpose equipment</th>
<th>Input from drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>START, STOP, 2N/1D, V0D, ROS, LSR</td>
<td>PG0, SVRDY, SVEND</td>
</tr>
<tr>
<td>Manual pulse generator</td>
<td>2MHz max, Single-step operation input</td>
<td>(Depends on the parameter setting)</td>
</tr>
<tr>
<td>Mechanical system: DOG</td>
<td>(near-point signal)</td>
<td></td>
</tr>
<tr>
<td>LSR (reverse rotation limit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupt: 4 points</td>
<td>Servo system: SVRDY (servo ready), SVEND (servo end), PG0 (zero-point signal)</td>
<td></td>
</tr>
<tr>
<td>General purpose: The main body has X0 to X7 and X10 to X17 to be input by using the extension block. (max I/O point: 48 points)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General purpose: The main body has Y0 to Y7, Y10 to Y17 to be output by using the extension block. (max I/O point: 48 points)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.5 Output specification

<table>
<thead>
<tr>
<th>Item</th>
<th>General-purpose output</th>
<th>Output to drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal name</td>
<td>T/P, R/P, T/P, R/P, T/P, R/P</td>
<td>T/P, R/P, T/P, R/P</td>
</tr>
<tr>
<td>Current direction</td>
<td>by photocoupler</td>
<td>by photocoupler</td>
</tr>
<tr>
<td>Operation indication</td>
<td>LED is lit if output is ON</td>
<td>LED is lit if output is ON</td>
</tr>
<tr>
<td>Operating power supply</td>
<td>5 to 24V DC ±10%</td>
<td>5 to 24V DC ±10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>20mA or less</td>
<td>20mA or less</td>
</tr>
<tr>
<td>Output ON voltage</td>
<td>5.0V max</td>
<td>5.0V max</td>
</tr>
<tr>
<td>Turning ON rate of I/O simultaneously</td>
<td>0.2ms max for OFF, 0ns for ON and OFF</td>
<td></td>
</tr>
</tbody>
</table>

For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, marine or passenger movement vehicles, consult with Mitsubishi Electric.
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Manual number: JY992D77601L
Manual revision: L
Date: August 2018

Effective August 2018 Specifications are subject to change without notice.