Safety Warning
To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.
The FX Series allows the designer to select a model suitable to the positioning application, from simple reciprocating motion with one speed to complicated simultaneous control of two axes.

**Control items**

<table>
<thead>
<tr>
<th>Function</th>
<th>FX1S/FX1N</th>
<th>FX2N-1PG</th>
<th>FX2N-10GM</th>
<th>FX2N-20GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero return</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Jog operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>One-speed positioning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Two-speed positioning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Multi-speed positioning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interrupt one-speed positioning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interrupt two-speed positioning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Linear interpolation operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Circular interpolation operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Variable speed operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Absolute position detection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Manual pulse generator operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*1: When performing positioning control using a PLC main unit, select a transistor output type.
*2: When using an FX2N-1PG, make sure to connect it to an FX2N / FX2NC Series PLC.
*3: Can be executed using incremental positioning instructions.
*4: When using an FX2N-1PG, absolute positions can be detected using sequence programs.

**FX-PCS-VPS/WIN-E**

Windows-based software for positioning control. Visual programming with flow charts allows you to create programs for complicated control effectively and effortlessly.
Cost effective system configuration with built-in positioning instructions!

**FX1S, FX1N Series PLC**

**Excellent cost performance**
Built-in positioning functions mean no need for additional positioning modules.

**Number of controlled axes**
One PLC can control two axes independently of each other.

**Absolute position detection**
A PLC can detect absolute positions when connected to Mitsubishi MR-H, MR-J2 or MR-J2 Super servo amplifier with absolute position detection function.

---

Dedicated software, **FX-PCS-VPS/WIN-E** provides an effortless programming environment!

**FX2N-10GM Position controller**

**Complex control**
The FX2n-10GM enables not only one-speed positioning and interrupt positioning but also multi-speed operation.

**Independent use**
The FX2n-10GM can work independently or as an extension units of a connected PLC.

**Number of controlled axes**
One FX2n-10GM unit controls one axis. (Up to eight FX2n-10GM units can be connected to one FX2n Series PLC. Up to four FX2n-10GM units can be connected to one FX2nc Series PLC.)

**Absolute position detection**
The FX2n-10GM can detect absolute positions when connected to Mitsubishi MR-H, MR-J2 or MR-J2 Super servo amplifier with absolute position detection function.

**Manual pulse generator**
The FX2n-10GM can be connected to a manual pulse generator.

**Dedicated programming tool**
Together with the dedicated programming software, VPS, the FX2n-10GM realizes outstanding programming, monitoring and teaching facilities.

Two-speed positioning and interrupt positioning at low cost.

**Pulse output block FX2N-1PG**

**Multiple operation patterns**
The FX2n-1PG offers not only one-speed positioning but also two-speed positioning and one-speed interrupt positioning.

**Number of controlled axes**
One FX2n-1PG unit controls one axis. (Up to eight FX2n-1PG units can be connected to one FX2n Series PLC. Up to four FX2n-1PG units can be connected to one FX2nc Series PLC.)

**No additional software**
Positioning control and absolute position detection is performed by sequence programs in the connected PLC.

---

Dedicated software, **FX-PCS-VPS/WIN-E** provides advanced functions to achieve exceptional results!

**FX2N-20GM Position controller**

**Interpolation control**
The FX2n-20GM facilitates both linear and circular interpolation.

**Independent use**
The FX2n-20GM can work independently or as an extension unit of a connected PLC.

**Number of controlled axes**
One FX2n-20GM unit can control two axes (simultaneously or independently to each other). (Up to eight FX2n-20GM units can be connected to one FX2n Series PLC. Up to four FX2n-20GM units can be connected to one FX2nc Series PLC.)

**Absolute position detection**
The FX2n-20GM can detect absolute positions when connected to Mitsubishi MR-H, MR-J2 or MR-J2 Super servo amplifier with absolute position detection function.

**Manual pulse generator**
The FX2n-20GM can be connected to a manual pulse generator.

**Dedicated programming tool**
Together with the dedicated programming software, VPS, the FX2n-20GM realizes outstanding programming, monitoring and teaching facilities.
Through specialized instructions, the FX1S/FX1N Series PLC performs positioning control using a stepping motor or servo motor. Special blocks, special units or peripheral units dedicated to positioning are not required, thus the FX1S/FX1N Series PLC offers the most cost effective system configuration. (For positioning control, use transistor output type PLCs.)

**Major functions**

- **Positioning instructions**
  Through specialized positioning instructions, the FX1S/FX1N Series PLC performs zero return, one-speed positioning, variable speed operation and absolute position detection.

- **Program capacity**
  FX1S Series PLC: 2k steps (EEPROM)
  FX1N Series PLC: 8k steps (EEPROM)

- **Two-axis control (independently to each other)**
  One PLC can control two axes independently to each other (Y000, Y001).

- **Maximum output frequency of 100 kHz**
  A PLC can output pulse trains at 100 kHz maximum to each of the two axes (Y000, Y001).

**System configuration**

- **FX1S/FX1N Series PLC (transistor output type)**
  ![Diagram of a PLC system configuration]

**Applicable programming tools**

- Positioning instructions in the FX1S/FX1N Series PLC can be input using any of the programming tools shown below.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Applicable version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX Developer</td>
<td>V.5SW5 or later</td>
</tr>
<tr>
<td>FX-PCS/WIN-E</td>
<td>V.3.00 or later</td>
</tr>
<tr>
<td>FX-20P-E (FX-20P-E-MFXD-E memory cassette)</td>
<td>V.4.00 or later *2</td>
</tr>
<tr>
<td>FX-10P-E</td>
<td>V.4.00 or later</td>
</tr>
</tbody>
</table>

*2 With regard to existing FX-20P units, upgrade to memory cassette.

**Application example 1**

- **One-speed positioning**
  - **DRVI** (incremental positioning)
  - **DRVA** (absolute positioning)

- **Variable speed operation**
  - **PLSV**

- **Absolute position detection**
  - **ABS**

- **Application example 2**
  - **Positioning instruction list**
    - **Zero return**
      - **ZRN**
    - **One-speed positioning**
      - **DRVI** (incremental positioning)
      - **DRVA** (absolute positioning)
    - **Variable speed operation**
      - **PLSV**
    - **Absolute position detection**
      - **ABS**

**Positioning instruction list**

<table>
<thead>
<tr>
<th>Operation pattern</th>
<th>Frequency (100 kHz max.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero return</td>
<td></td>
<td>ZRN</td>
</tr>
<tr>
<td>One-speed positioning</td>
<td></td>
<td>DRVI</td>
</tr>
<tr>
<td>Variable speed operation</td>
<td></td>
<td>PLSV</td>
</tr>
<tr>
<td>Absolute position detection</td>
<td></td>
<td>ABS</td>
</tr>
</tbody>
</table>

- **Frequency (100 kHz max.)**
- **Start**
- **Stop**
- **Frequency change**
- **Rotation direction output**
  - ON: Forward rotation
  - OFF: Reverse rotation

- **Servo motor or stepping motor**

- **Application unit for FX Series PLC**
  - **GX Developer (Windows based)**
  - **FX-PCS/WIN-E (Windows version: FX Series)**
  - **FX-20P-E-SET0**
  - **FX-10P-E**

- **Applicable version**
  - **GX Developer**: V.5SW5 or later
  - **FX-PCS/WIN-E**: V.3.00 or later
  - **FX-20P-E (FX-20P-E-MFXD-E memory cassette)**: V.4.00 or later *2
  - **FX-10P-E**: V.4.00 or later

- **When a positioning instruction shown above is used, the current value address is controlled by D8140 to D8143.**
- **Never use a positioning instruction shown above and a PLSY (or PLSR) instruction at the same time. If they are used at the same time, the current value cannot be controlled.**
- **Jog operation can be achieved by execution/non-execution of the incremental positioning instruction (DRVI).**

- **Independent use of an FX1S/FX1N Series PLC is ideal for the control of a one-speed constant feed, in a cutter for example.**
  - The simplest system configuration offers excellent cost performance.
Two-speed positioning and interrupt positioning.

Pulse output block FX2N-1PG

The FX2N-1PG outputs pulse trains to a servo amplifier or drive unit of a servo motor or stepping motor to achieve easy one-axis positioning. When connected to an FX2N/FX2NC Series PLC, the FX2N-1PG performs positioning operations in accordance with a program in the PLC.

Major functions

- **Multiple operation patterns**
  The FX2N-1PG offers not only one-speed positioning but also two-speed positioning and one-speed interrupt positioning.

- **One-axis control**
  One FX2N-1PG can control one axis.

- **Up to 8 units in a system**
  Up to eight FX2N-1PG units can be connected to one FX2N Series PLC. Up to four FX2N-1PG units can be connected to one FX2NC Series PLC. (When an FX2N-1PG is connected to an FX2NC Series PLC, an FX2NC-CNV-IF is required.)

- **100 kHz output frequency**
  The FX2N-1PG can output pulse trains at a maximum of 100 kHz.

- **Driven by PLC program**
  All programs for positioning control are created in the PLC. Accordingly, dedicated programming units for the FX2N-1PG are not required.

System configuration

- **Deviation counter clear**
  Pulse trains
  Forward rotation pulse (FP)/reverse rotation pulse (RP) or pulse (PLS)/direction (DIR)

- **Zero point signal**
  (Servo ready signal and positioning completion signals are taken in PLC input.)

- **Servo motor or drive unit**

- **Servo amplifier or drive unit**

- **Variable speed operation**
  - While a variable speed operation command input is ON, the machine moves at the operation speed.
  - The operation speed can be freely changed within the range from 10 to 100,000 Hz.

Operation pattern list

<table>
<thead>
<tr>
<th>Operation pattern</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jog operation</td>
<td>-While a forward rotation/reverse rotation command input is ON, the motor performs forward rotation/reverse rotation.</td>
</tr>
<tr>
<td>Zero return</td>
<td>-When a zero return start command is given, the machine starts to move at the zero return speed. After return to the zero point is finished, the clear signal is output.</td>
</tr>
<tr>
<td>One-speed positioning</td>
<td>-When a start command is given, the machine starts to move at the operation speed, then stops at the target position.</td>
</tr>
<tr>
<td>Two-speed positioning</td>
<td>-When a start command is given, the machine moves at the operation speed (1), the distance (1), then moves at the operation speed (2), the distance (2).</td>
</tr>
<tr>
<td>Interrupt one-speed positioning</td>
<td>-When a start command is given, the machine moves at the specified distance, then stops.</td>
</tr>
<tr>
<td>Interrupt two-speed positioning (External command positioning)</td>
<td>-When a start command is given, the machine starts to move at the operation speed (1). When a deceleration command is given, the machine starts deceleration. The machine continues to move at the operation speed (2) until a stop command is given.</td>
</tr>
<tr>
<td>Variable speed operation</td>
<td>-While a variable speed operation command input is ON, the machine moves at the operation speed set by the PLC.</td>
</tr>
</tbody>
</table>

- The target position in each operation pattern can be specified as an incremental or absolute address.
When a carrier unit feeds workpieces at random, the system detects the existence of a workpiece, feeds it through a constant distance, then stops it. For such an application, positioning can be easily controlled by interrupt one-speed positioning operation offered by the FX2N-1PG.

The FX1S/FX1N Series PLCs introduced so far, offer a cost effective system configuration for an application of one-speed constant feed positioning. However, the number of I/O points in the PLC and the number of controlled axes are restricted. (In the FX1S Series PLC, the number of I/O points is up to 30. In the FX1N Series PLC, the number of I/O points is up to 128 and the number of controlled axes is up to 2.)

When an FX2N-1PG is connected to an FX2N/FX2NC Series PLC, the maximum number of I/O points in the FX2N/FX2NC Series PLC is 256. (One FX2N-1PG unit occupies 8 I/O points.) One FX2N-1PG unit can control only one axis. However, because up to eight FX2N-1PG units can be connected to one FX2N Series PLC, or up to four FX2N-1PG units to one FX2NC Series PLC, it can be regarded that one PLC can control up to 8 axes (FX2NC up to 4 axes).

When three or more axes should be controlled independently to each other in a processing unit or carrier unit, a cost effective solution can be achieved with the FX2N-1PG.

**Application example 2**

**FX2N-1PG, interrupt one-speed positioning**

When a start input is given, the conveyor starts moving. The sensor detects existence of a workpiece. When the sensor input is given, the conveyor moves a constant distance, then stops.

**Application example 3**

**FX2N-1PG can achieve it!**

The FX2N/FX2NC Series PLCs introduced so far, offer a cost effective system configuration for an application of one-speed constant feed positioning. However, the number of I/O points in the PLC and the number of controlled axes are restricted. (In the FX1S Series PLC, the number of I/O points is up to 30. In the FX1N Series PLC, the number of I/O points is up to 128 and the number of controlled axes is up to 2.)

When an FX2N-1PG is connected to an FX2N/FX2NC Series PLC, the maximum number of I/O points in the FX2N/FX2NC Series PLC is 256. (One FX2N-1PG unit occupies 8 I/O points.) One FX2N-1PG unit can control only one axis. However, because up to eight FX2N-1PG units can be connected to one FX2N Series PLC, or up to four FX2N-1PG units to one FX2NC Series PLC, it can be regarded that one PLC can control up to 8 axes (FX2NC up to 4 axes).

When three or more axes should be controlled independently to each other in a processing unit or carrier unit, a cost effective solution can be achieved with the FX2N-1PG.
For advanced positioning control, the FX2N-10GM, FX2N-20GM and FX-PCS-VPS/WIN-E combination is exemplary!

The positioning controllers FX2N-10GM and FX2N-20GM are equipped with both a language dedicated to positioning and sequence control instructions, and for achieving enhanced positioning control. Each of the FX2N-10GM and FX2N-20GM units can be used independently, or connected to an FX2N/FX2NC Series PLC. In addition, by combining the Windows version software for position controllers, program creation and monitoring can be performed with ease.

**Major functions**

- **Number of controlled axes and interpolation function**
  The FX2N-10GM controls 1 axis. The FX2N-20GM controls 2 axes (independently each other or simultaneously). In simultaneous two-axis control with the FX2N-20GM, linear interpolation and circular interpolation are available.

- **Independent use or connection to PLC**
  The FX2N-10GM and FX2N-20GM can be used independently, or connected to the FX2N/FX2NC Series PLC. (When the FX2N-10GM/20GM is connected to an FX2NC Series PLC, an FX2NC-CNVI-F is required.)

- **Absolute position detection**
  The FX2N-10GM/20GM can detect absolute positions when connected to Mitsubishi MR-H, MR-J2 or MR-J2 Super servo amplifier.

- **Manual pulse generator**
  The FX2N-10GM/20GM can be connected to a manual pulse generator.

- **Output frequency of 200 kHz maximum**
  Both the FX2N-10GM and FX2N-20GM can output pulses at a maximum of 200 kHz. (During interpolation operations in the FX2N-20GM, the maximum allowable frequency is restricted to 100 kHz.)

- **Programming using FX-PCS-VPS/WIN-E**
  In the FX2N-10GM and FX2N-20GM, a language dedicated to positioning (cod instruction) and a sequence language are available. In creating programs, the Windows version software FX-PCS-VPS/WIN-E for positioning controllers offers graphical flowchart or list programming.

**System configuration**

- **Deviation counter clear**
- **Forward rotation pulse (FP) or reverse rotation pulse (RP) or pulse (PLS)/direction (DIR)** (Dedicated cable is available.)
- **Zero point signal**
- **Servo ready signal**
- **Positioning completion signal**

- **Programming tool**
  - E-20TP-E
  - FX-PCS-VPS/WIN-E (for Windows)

- **Memory board**
  FX2NC-EEPROM-16 (FX2n-20GM) (Program capacity is fixed to 7.8K steps.)
  Memory boards equipped with RTC functionality are not available.
  The FX2N-10GM cannot use additional memory boards.
  An EEPROM (3.8K steps) is adopted as built-in memory for the FX2N-10GM.

- **An E-20TP-E or personal computer can be used as a programming tool.**
  In either case only changing the communications cable is required. The E-20TP-E does not need to be upgraded.

- **Cables offered to connect servo amplifier or drive unit**
  - E-GMC-200CAB cable for servo amplifier MR-C
  - E-20TP-CAB0 (3m) or FX-20P-CAB0 (1.5m)
  - E-232CAB (with D-sub, 25-pin connector)
  - E-232CAB-1 (with D-sub, 9-pin connector)

- **Manual pulse generator input**
  E-20TP-CAB0 (3m) or FX-20P-CAB0 (1.5m)
  FX2NC-EEPROM-16 (FX2n-20GM) (Program capacity is fixed to 7.8K steps.)
  Memory boards equipped with RTC functionality are not available.
  The FX2N-10GM cannot use additional memory boards.
  An EEPROM (3.8K steps) is adopted as built-in memory for the FX2N-10GM.

- **E-20TP-E or personal computer can be used as a programming tool.**
  In either case only changing the communications cable is required. The E-20TP-E does not need to be upgraded.

- **Cables offered to connect servo amplifier or drive unit**
  - E-GMC-200CAB cable for servo amplifier MR-C
  - E-20TP-CAB0 (3m) or FX-20P-CAB0 (1.5m)
  - E-232CAB (with D-sub, 25-pin connector)
  - E-232CAB-1 (with D-sub, 9-pin connector)
### Operation pattern list

#### Jog operation
- **(FX2N-10GM)**
- **(FX2N-20GM)**

The machine moves at a specified peripheral speed to the target position (x, y) by the interpolation instruction. If a program is created using consecutive interpolation instructions, the machine proceeds to the next operation without stopping (continuous pass function).

#### Zero return - mechanical
- **(FX2N-10GM)**
- **(FX2N-20GM)**

When a mechanical zero return start command is given, the machine starts to move at the specified maximum speed. After the zero finished, a clear signal is output.

#### Zero return - electrical
- **(FX2N-10GM)**
- **(FX2N-20GM)**

The machine returns to the electrical zero point stored by the SETR instruction.

#### One-speed positioning
- **(FX2N-10GM)**
- **(FX2N-20GM)**

The target position in each operation pattern can be specified as an incremental or absolute address.

#### Multi-speed operation
- **(FX2N-10GM)**

If the linear interpolation instruction is used consecutively in the FX2N-10GM, multi-speed operation is performed. The figure on the left shows a case in which the linear interpolation instruction is used consecutively three times.

#### Interrupt stop
- **(FX2N-10GM)**
- **(FX2N-20GM)**

When the interrupt input turns on during linear interpolation operation at the vector speed to the target position (x, y), the positioning operation is interrupted and the machine decelerates and stops.

### Operation pattern list

#### Interrupt one speed positioning
- **(FX2N-10GM)**
- **(FX2N-20GM)**

Until an interrupt input turns on, the machine moves at the specified operation speed. When an interrupt input turns on, the machine moves at the same specified speed along the designated path, then decelerates and stops.

#### Interrupt two speed positioning
- **(FX2N-10GM)**
- **(FX2N-20GM)**

Until an interrupt input turns on, the machine moves at the specified operation speed. When an interrupt input turns on, the machine moves along the designated path, then decelerates and stops.

#### Linear interpolation
- **(FX2N-20GM)**

The machine moves at the specified vector speed to the target position by interpolation operation. If a program is created using consecutive interpolation instructions, the machine proceeds to the next operation without stopping (continuous pass function).

#### Circular interpolation
- **(FX2N-20GM)**

The machine moves at a specified peripheral speed to the target position (x, y) by the circular interpolation instruction. Operation by specification of the center coordinates and operation by specification of the radius are possible. In either case, the acceleration/deceleration time can be set in the system parameters.

#### Application example 4

Interpolation function realizes complicated operation patterns.

When linear interpolation and circular interpolation are consecutively used in a program, a continuous pass (non-stop) operation is performed.

In the case of an applicator for sealing material or ink, if it stops at every positioning point, the sealing material or the ink may be unevenly applied. To prevent this, the applicator should perform complicated movements at a constant speed without stopping. In such an application, the interpolation function and the continuous pass function in the FX2N-20GM can be utilized.
For both simple and complex positioning control, *FX-PCS-VPS/WIN-E* considerably improves development efficiency!!

FX-PCS-VPS/WIN-E, programming software for positioning controllers, helps to effortlessly create programs for FX2N-10GM and FX2N-20GM units, in a visual format.

**System configuration**

**Features**

- **Programming with flow charts**
  Visual programs can be created using flow charts.

- **Monitor screens easy to use and understand**
  There is a monitor screen on which display items can be freely laid out and, a screen for monitoring the actual flow charts. Current values, plotting and operation processes are displayed in formats easy to view.

- **Compatibility with FX-PCS/WIN-E**
  FX-PCS-VPS/WIN-E can display several PLC program examples with regard to the reading of m codes and current values. Such program examples can be used as circuit programs in FX-PCS/WIN-E through the clipboard.

<table>
<thead>
<tr>
<th>Cable model name</th>
<th>Communication connector in PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-232CAB</td>
<td>D-sub, 25-pin type</td>
</tr>
<tr>
<td>P2-232CAB-1</td>
<td>D-sub, 9-pin type</td>
</tr>
</tbody>
</table>

Programming with flow charts makes operations easier to understand.

In FX-PCS-VPS/WIN-E, programs for the FX2N-10GM and FX2N-20GM can be created using flow charts. As the overall operations can be understood visually and easily, program development time can be reduced.

Flow charts are available for programming, therefore overall operations can be easily understood.

Simply by selecting a desired icon on the tool bar, positioning it on the flow chart window and connecting each icon with wiring, the operator can create an overall flow chart.

A complicated program can be divided into two or more windows.

The details of each operation are set on the detailed setup screen of the instruction. The operator does not have to remember the number and sequence of operands (target position, speed, etc.) of each instruction.
In the flow chart monitor display window, the active icon shows its ON status as a red light. On the monitor screen shown above, the following eight items can be arbitrarily laid out.

- Current position: The current position of the X and Y axes is displayed.
- Plot: The locus of the X and Y axes is displayed.
- Device monitor: The status of inputs (X), outputs (Y), auxiliary relays (M), data registers (D) and index registers (V, Z) are displayed.
- Operation input: Switches to give operations from the monitor screen to the FX-2N-10GM/20GM are displayed.
- Manual input status: The status of each command input is displayed.
- FX-GM status: The status (such as ready and error) of the FX-2N-10GM/20GM is displayed.
- Programming information: The program No. being run, m codes and error codes are displayed.
- New object: An object (such as bit map file) created by other applications are displayed.

As an example, a circuit to transfer data using a PLC main unit and FROM/TO instructions is shown below. When it is copied to the clipboard, it can be pasted on the circuit program screen of FX-PCS/WIN-E.

FX-2N-10GM/20GM units are equipped with several parameters to realize enhanced positioning control. In FX-PCS-VPS/WIN-E, target parameters can be easily found and set or edited.

As the parameter setup screen is divided into different types, positioning parameters, I/O parameters and system parameters, a desired parameter can be easily found. In addition, while a program is created, relevant parameter setup screens can be displayed from the detailed setup screen of the current icon.

On the parameter setup screen, the zero return point which requires complicated operations, and the speed setting are shown in a graphic form, so that the programmer can easily grasp a concrete image.
Environmental specifications

<table>
<thead>
<tr>
<th>FX</th>
<th>FXn-IPG</th>
<th>FXn-10GM</th>
<th>FXn-20GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0 to +55°C</td>
<td>During operation</td>
<td>-20 to +70°C</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>35 to 85%RH (no condensation)</td>
<td>During operation</td>
<td>5 to 95%RH</td>
</tr>
</tbody>
</table>

Vibration resistance

In conformance to EC 96-8-6. When mounted with DIN rail 10 to 57 Hz, Single amplitude: 0.055 mm, 57 to 100 Hz, Acceleration: 4.9 m/s², 10 times in each 3 axes directions. When directly mounted: 10 to 57 Hz, Single amplitude: 0.075 mm, 57 to 150 Hz, Acceleration: 3.5 m/s², 10 times in each 3 axes directions.

Impact resistance

In conformance to IEC 60-3-27. 147 m/s² 147 m/s². Working time: 11 ms, 3 times in each X, Y and Z directions with half sine pulses.

Nose resistance

By nose simulator of voltage 1,000 Vp, nose width 1 mm, rising 1 ms, double polarity and frequency 30 to 100 Hz.

Withstand voltage

1,500 VAC for 1 min. 500 VAC for 1 min (between all external terminals and ground terminal).

Insulation resistance

5 MΩ or more by 500 VDC multimeter (between all external terminals and ground terminal).

Grounding

Class 3 grounding (100Ω or less). (Common grounding with strong electric system is not allowed.)

Operating atmosphere

Free from corrosive/gas and conductive dusts.

Power supply specifications

Supply voltage

24VDC±10%. 40 mA (for input signal) supplied from external power supply or sensor power supply of PLC. 5 VDC, 5 mA (for internal control) supplied from PLC via extension cable. Power supply for pulse output 0 to 24 V, 33 mA, supplied from servo amplifier (or from outside when stepping motor is connected).

Allowable instantaneous power interruption time

24VDC±10%-15%.

Power fuse

AC220V 1A

Power consumption

FX-10MT 19W
FX-14MT 19W
FX-20MT 20W
FX-30MT 21W

Sensor power supply

DC24V 400mA

Performance specifications

Number of controlled axes

2 (independently) 2 (independently or simultaneously) 1

Use format

Used independently Used independently or connected to FXn/FXn+ PLC. When connected to FXn/FXn+ PLC, FXn+CN2-CF/CF is required.

Number of connected PLCs

Up to eight units can be connected to FXn+ PLC. Up to four units can be connected to FXn+ PLC.

Number of occupied 10 points

8 per unit (in total including inputs and outputs)

Program language

Relay symbol method

Controlled by PLC main unit through PROGRAM TO instructions. 8 bit or 16 bit instruction execution is possible.

Program memory

Built-in EEPROM (24 steps) Memory capacity: FX 16K EEPROM (8B) is offered as option. Program capacity is fixed to 24 steps.

Command speed

1 to 100 kHz 10 to 100 kHz 1 to 200kHz 1 to 200kHz (1 to 100 kHz during interpolation operation).

Pulse output type

Pulse (PLS)/direction (DIR) Forward rotation pulse (FP)/reverse rotation pulse (RP) or pulse (PLS)/direction (DIR)

I/O device shape

Terminal block Connector

Peripheral unit

Peripheral unit to create sequence programs

Others

Absolute position detection function is provided. Sequence program is available. Manual pulse generator can be connected.

Input specifications

Number of input points

FX-10MT DIS5: 4 FX-14MT DIS5: 6 FX-20MT DIS5: 8 FX-30MT DIS5: 16 —

Signal type

Contact input or NPN open collector transistor input

Circuit insulation

Photocoupler insulation

Input signal voltage

DC 24V±10% 24V±10% (5 to 20 V for SVRDY, SVEND and PG0)

Input signal current

7 mA for X00 to X07 3 mA for X10 and later

ON current

4.5 mA or more for X00 to X07 3.5 mA or more for X10 and later

OFF current

1.5 mA or less 1.5 mA or less 0.5 mA or less for PG0 1.5 mA or less (0.3 mA or less for SVRDY and SVEND, 0.5 mA or less for PG0)

Command speed

1 to 100 kHz 10 to 100 kHz 1 to 200kHz 1 to 200kHz (1 to 100 kHz during interpolation operation).

Maximum output

DC24V 400mA

Maximum input

0.1 mA or less/30 VDC 0.1 mA or less/30 VDC 0.3 mA or less for SVRDY and SVEND, 0.5 mA or less for PG0

Power consumption

FX1S-10MT 19W FX1S-14MT 19W FX1S-20MT 20W

Power fuse

AC220V 1A

Power supply specifications

Supply voltage

24VDC±10%. 40 mA (for input signal) supplied from external power supply or sensor power supply of PLC. 5 VDC, 5 mA (for internal control) supplied from PLC via extension cable. Power supply for pulse output 0 to 24 V, 33 mA, supplied from servo amplifier (or from outside when stepping motor is connected).

Allowable instantaneous power interruption time

24VDC±10%-15%.

Power fuse

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FX-30MT 21W

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Circuit insulation

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Input signal voltage

DC 24V±10% 24V±10% (5 to 20 V for SVRDY, SVEND and PG0)

Input signal current

7 mA for X00 to X07 3 mA for X10 and later

ON current

4.5 mA or more for X00 to X07 3.5 mA or more for X10 and later

OFF current

1.5 mA or less 1.5 mA or less 0.5 mA or less for PG0 1.5 mA or less (0.3 mA or less for SVRDY and SVEND, 0.5 mA or less for PG0)

Command speed

1 to 100 kHz 10 to 100 kHz 1 to 200kHz 1 to 200kHz (1 to 100 kHz during interpolation operation).

Maximum output

DC24V 400mA

Maximum input

0.1 mA or less/30 VDC 0.1 mA or less/30 VDC 0.3 mA or less for SVRDY and SVEND, 0.5 mA or less for PG0

Power consumption

FX1S-10MT 19W FX1S-14MT 19W FX1S-20MT 20W

Power fuse

AC220V 1A

Power supply specifications

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Program language

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I/O device shape

Terminal block Connector

Peripheral unit

Peripheral unit to create sequence programs

Others

Absolute position detection function is provided. Sequence program is available. Manual pulse generator can be connected.
### Product Specifications

#### FX1S, FX1N

![Diagram of FX1S/FX1N](image)

**Unit : mm**  
**Outer paint color:** (Similar to) Munsell 0.08GY 7.64/0.81

*The FX1S Series PLC will be released in June, 2000.*

#### FX2N-1PG

![Diagram of FX2N-1PG](image)

**Position controller**  
FX2N-1PG: Positioning pulse output block  
FXx-100GM: Special unit for 1-axis positioning  
FXx-105MPCB: Power cable (for position controller main unit)  
FXx-200SG: PLC connection cable (55 mm)  
FXx-105MPCB: Power cable (for position controller main unit)  
FXx-250BPCB: Power cable (for input expansion block)

#### FX1N Series PLC

| FX1N-60MT-DSS | 16 points (transistor output) |
| FX1N-40MT-DSS | 10 points (transistor output) |
| FX1N-24MT-DSS | 6 points (transistor output) |
| FX1N-14MT-DSS | 4 points (transistor output) |
| FX1S-20MT-DSS | 2 points (transistor output) |
| FX1S-10MT-DSS | 1 point (transistor output) |

#### FX2N Series PLC

| FX2N-10GM | Special unit for 1-axis positioning |
| FX2N-20GM | Special unit for 2-axis positioning |

#### Connection cable

- **FX-232CAB**: Data transfer cable (Interface to Personal computer)  
- **FX-422CAB0**: Data transfer cable (FX2N-100GM/200GM to Interface)  
- **FX-223W**: Interface for RS422/RS232C conversion (small type)  
- **FX-224CAB/GM**: Data transfer cable (FX-100GM/200GM to Interface)  
- **FX-45TP**: Data transfer cable (FX1N-100GM/200GM to E-20TP), 3 m

#### Interface

- **FX-223W**: Interface for RS422/RS232C conversion (small type)  
- **FX-224CAB/GM**: Data transfer cable (FX-100GM/200GM to Interface)  
- **E-20TP**: Data transfer cable (FX-100GM/200GM to E-20TP), 3 m

#### Extension cable

- **FX-10GM**: Extension cable (for input extension block)  
- **FX-20GM**: Extension cable (for output expansion block)

#### Battery

- **FX-50L**: Lithium battery (FX1N-200GM)

#### I/O cable

- **FX-00M**: Connection cable between FX1N-100GM/200GM and servo amplifier

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**Remarks**

- `FXC-series` for FX2N-10GM  
- `FXC-series` for FX2N-20GM

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- Windows® is expressed as an abbreviation of Microsoft® Windows® operating system.

**To assure safe use**

- This product is manufactured for general-purpose in general industry, etc. This product is not designed or manufactured to be used in equipment or system used under serious situation affecting people’s lives.
- When examining to use this product for a special application such as in equipment or system for nuclear power, electric power, aerospace use, medical use or passenger/moving body, consult our sales personnel.
- This product is manufactured under severe quality control system. However, when applying this product to a facility in which generation/occurrence of serious accident or loss is expected by failure of this product, systematically install the backup or fail-safe function.

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**Table of Product Specifications**

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<thead>
<tr>
<th>Product name</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Input</td>
<td>Output</td>
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<tr>
<td>FX1N-10MT-DSS</td>
<td>6 points</td>
</tr>
<tr>
<td>FX1N-14MT-DSS</td>
<td>8 points</td>
</tr>
<tr>
<td>FX1N-20MT-DSS</td>
<td>12 points</td>
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<tr>
<td>FX1N-30MT-DSS</td>
<td>16 points</td>
</tr>
<tr>
<td>FX1N-40MT-DSS</td>
<td>24 points</td>
</tr>
<tr>
<td>FX1N-50MT-DSS</td>
<td>36 points</td>
</tr>
<tr>
<td>FX2N-10GM</td>
<td>Special unit for 1-axis positioning</td>
</tr>
<tr>
<td>FX2N-20GM</td>
<td>Special unit for 2-axis positioning</td>
</tr>
<tr>
<td>FX-232CAB</td>
<td>Data transfer cable (Interface to Personal computer)</td>
</tr>
<tr>
<td>FX-422CAB0</td>
<td>Data transfer cable (FX2N-100GM/200GM to Interface)</td>
</tr>
<tr>
<td>FX-223W</td>
<td>Interface for RS422/RS232C conversion (small type)</td>
</tr>
<tr>
<td>FX-224CAB/GM</td>
<td>Data transfer cable (FX-100GM/200GM to Interface)</td>
</tr>
</tbody>
</table>
| FX-45TP | Data transfer cable (FX1N-100GM/200GM to E-20TP), 3 m

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** Peripheral unit**

- **E-20TP-4-SET0**: Teaching panel  
- **E-20TP-CAB0**: Transmission cable (FX1S-100GM/200GM = Teaching Panel), 3 m

**Series PLC**

- **FX1S**: Position controller connection cable  
- **FX2N**: Extension cable (Interface)

**Connection cable**

- **FX-232CAB**: Data transfer cable (Interface to Personal computer)  
- **FX-422CAB0**: Data transfer cable (FX2N-100GM/200GM to Interface)  
- **FX-223W**: Interface for RS422/RS232C conversion (small type)  
- **FX-224CAB/GM**: Data transfer cable (FX-100GM/200GM to Interface)  
- **FX-45TP**: Data transfer cable (FX1N-100GM/200GM to E-20TP), 3 m

**Interface**

- **FX-223W**: Interface for RS422/RS232C conversion (small type)  
- **FX-224CAB/GM**: Data transfer cable (FX-100GM/200GM to Interface)  
- **FX-45TP**: Data transfer cable (FX1N-100GM/200GM to E-20TP), 3 m

**Extension cable**

- **FX-50L**: Lithium battery (FX1N-200GM)

**I/O cable**

- **FX-00M**: Connection cable between FX1N-100GM/200GM and servo amplifier

**Remarks**

- FX1S-30M: 24 points  
- FX1S-20M: 14 points  
- FX1S-10M: 6 points

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**Model name**  
- **FX1S**: FX1S-10MT-DSS, FX1S-14MT-DSS, FX1S-20MT-DSS, FX1S-30MT-DSS, FX1S-40MT-DSS, FX1S-50MT-DSS
- **FX1N**: FX1N-60MT-DSS, FX1N-40MT-DSS, FX1N-24MT-DSS, FX1N-14MT-DSS, FX1N-20MT-DSS, FX1N-30MT-DSS, FX1N-40MT-DSS, FX1N-50MT-DSS

**Mass**  
- FX1S-10MT-DSS: 0.3 kg (0.66 lbs)  
- FX1S-14MT-DSS: 0.4 kg (0.88 lbs)  
- FX1S-20MT-DSS: 0.8 kg (1.76 lbs)  
- FX1S-30MT-DSS: 1.4 kg (3.08 lbs)  
- FX1S-40MT-DSS: 2.2 kg (4.85 lbs)  
- FX1S-50MT-DSS: 3.0 kg (6.61 lbs)

**Unit**  
- FX1S: 1N  
- FX1N: 1S  

**Output**  
- FX1S: 8 points  
- FX1N: 16 points

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**Table of Product Specifications**

<table>
<thead>
<tr>
<th>Model name</th>
<th>W (mm)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX1N-10MT-DSS</td>
<td>60</td>
<td>0.3 (0.66)</td>
</tr>
<tr>
<td>FX1N-14MT-DSS</td>
<td>75</td>
<td>0.4 (0.88)</td>
</tr>
<tr>
<td>FX1N-20MT-DSS</td>
<td>100</td>
<td>0.45 (0.99)</td>
</tr>
</tbody>
</table>

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**Note**

- FX1S Series PLC will be released in June, 2000.