

FX Positioning Family



⚠ Safety Warning
To ensure proper use of the products listed in this catalog,
please be sure to read the instruction manual prior to use.

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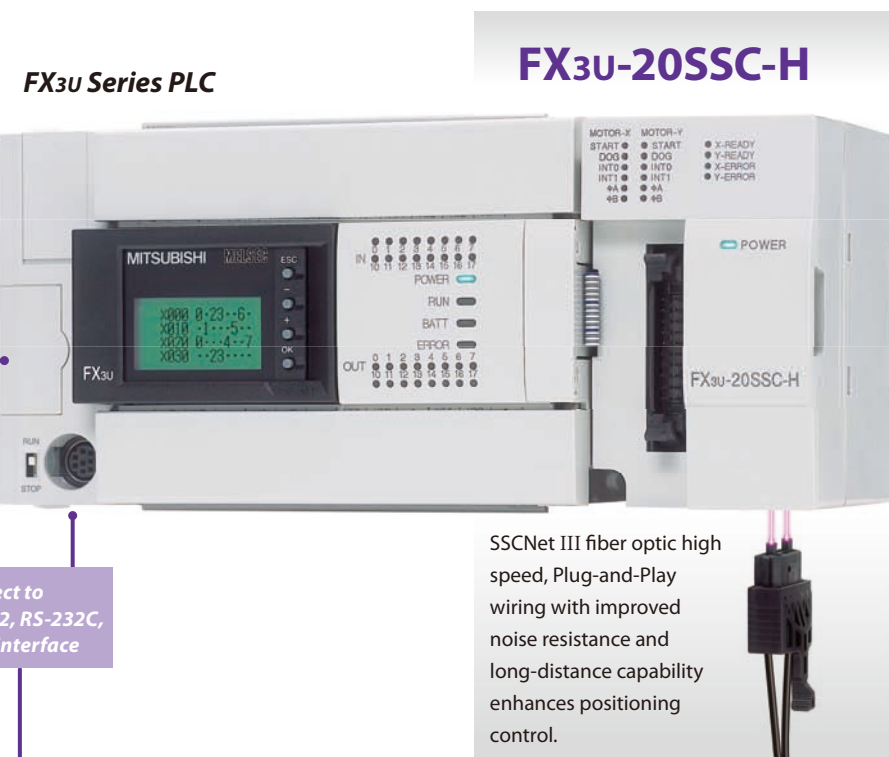


FX3U + SSCNET III

The Cost Effective Solution for High Precision, High Speed Positioning

Plug-and-Play fiber optic cabling reduces setup time and increases control distance for positioning operations in a wide range of applications. Increased control is possible with real-time monitoring of servo amplifier parameters and with new positioning commands.

Servo parameters and positioning information for the FX3U-20SSC-H are easily set up with an FX3U PLC and a personal computer.



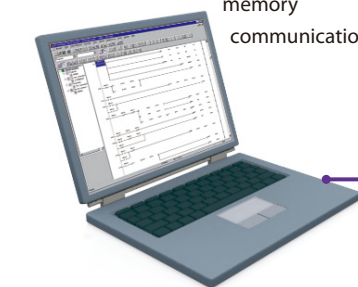
Connect to RS-422, RS-232C, USB* interface

SSCNet III fiber optic high speed, Plug-and-Play wiring with improved noise resistance and long-distance capability enhances positioning control.



GOT, GX Developer

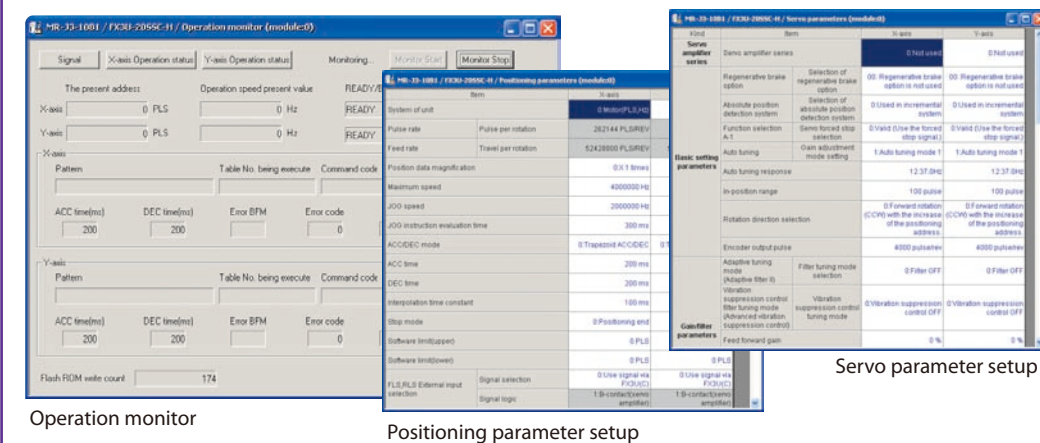
Positioning parameters, servo parameters, rotation speeds, etc. can be monitored in real-time with buffer memory communication.



The Easy Programming Software for Parameter Setting, Monitoring and Testing

FX Configurator-FP

FX Configurator-FP is beneficial for setting up table operation information, servo amplifier parameters, and positioning parameters for the FX3U-20SSC-H. Positioning operations and their associated parameters (speeds, addresses, torque limits, etc.) can be monitored and tested with the Monitor and Test functions.



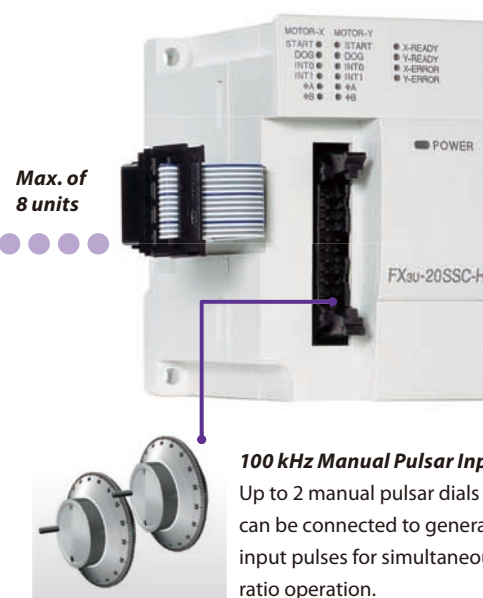
Operation monitor

Positioning parameter setup

Servo parameter setup

High Speed Positioning with High Precision Control

With the high resolution encoder on the MR-J3 servo motor, pulses may be counted for rates up to 262,144 pulses/rev. Performance is enhanced for stable control in low speed regions where precision is a must.

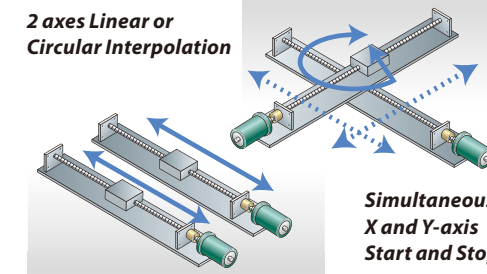


Max. of 8 units

100 kHz Manual Pulsar Input
Up to 2 manual pulsar dials can be connected to generate input pulses for simultaneous ratio operation.

2 Axes for Advanced Operation Control

High precision control on 2 axes with synchronous capability via SSCNET III optical wiring is available.



The operation speed and target position can change during positioning for more flexibility in positioning applications.

- **Variable Speed Operation**
Operation speeds change to user-specified speeds according to arbitrary timing intervals.
- **Override Function**
To change the operation speed at an arbitrary timing during positioning, the override function may be used for amplifying the signal from 0.1% to 3000%.
- **Target Address Change**
The target address may be changed to a new location during a positioning operation.

3 Settings for Zero Return Method

Various modes are available for setting a workpiece's mechanical zero return method including Dog type zero return, Data-type zero return, and Stopper type zero return.

- **DOG Type Zero Return**
When a workpiece stops with a DOG type mechanical zero return, the zero-point position is set.

- **Stopper Type Mechanical Zero Return**
A workpiece stops at the stopper position according to the zero return torque limit value and a new zero-point is defined.

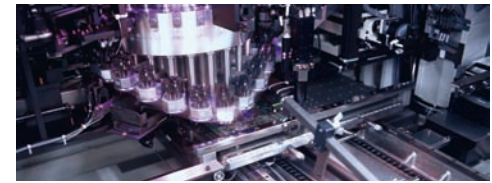
- **Data-set Type Mechanical Zero Return**
For operations without a mechanical zero-point or DOG return, the Data-set Type Mechanical Zero Return procedure is convenient for setting the zero-point of a workpiece.

Inching Operation

A pulse string of ±1 (user unit) is output when the forward/reverse rotation JOG activation time is less than the user defined JOG command determination time.

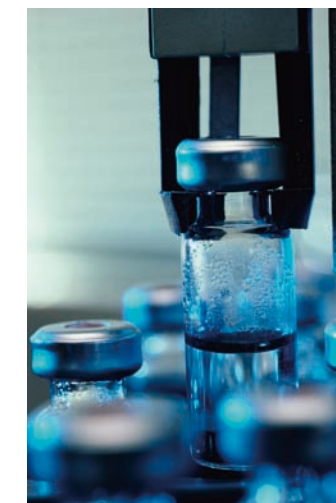
Torque Limit Change

The torque limit for stopping the servo motor when a workpiece hits a mechanical stopper can be changed with a sequence program. Depending on the mass of the device being controlled in a goods processing application, for example, the torque limit parameter can be adjusted accordingly.



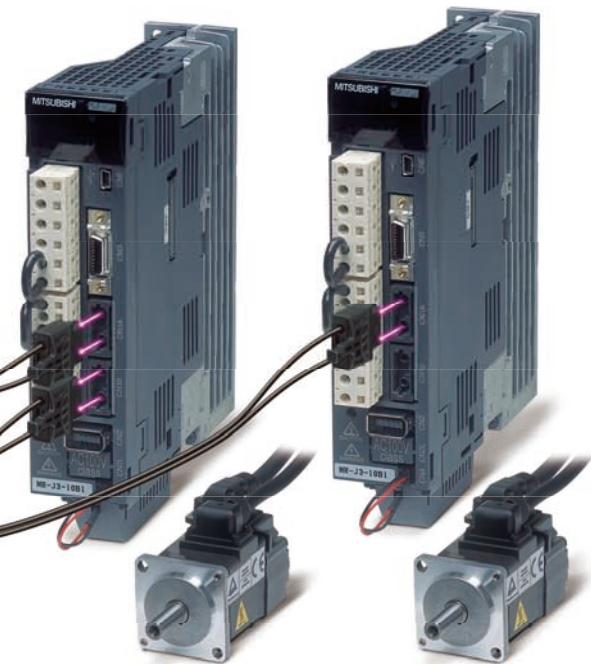
Faster FX3U FROM/TO Speeds

The new FX3U PLC controllers offer improved FROM/TO communication at speeds 4-5 times faster* than before for quickly updating parameters and buffer memory data in the FX3U-20SSC-H.



Fiber Optic Cable, Noise Reduction, Max. of 50m

MR-J3-B servo amplifier



With the new Table Operation feature, program development time is reduced.

Control patterns from simple to complicated combinations of positioning commands can easily be configured with new methods. (Communication is possible with the FX3U-20SSC-H buffer memory or with the FX Configurator-FP software.)

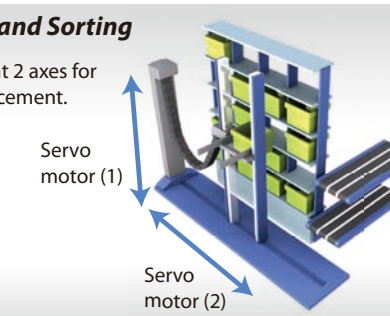
Table operation to carry out repetitive operations

No.	Command code	Contents for positioning commands		Target address		Operation speed		Waiting time	m code specification
		x	y	x	y	fx	fy		
0									
1	Circular interpolation(CNT,CW)	x: 17000000	y: 17000000	fx: 13100000	fy: 120000				-1
2	XY-axis positioning at 1-step speed	x: 8000000	y: 8000000	fx: 150000	fy: 300000				-1
3	Circular interpolation(CNT,C,CW)	x: 14000000	y: 14000000	fx: 500000	fy: 120000				-1
4	Linear interpolation	x: 80000000	y: 140000000	fx: 20000000	fy: 120000				-1
5	X-axis present address changing	x: 80000000							-1

Applications

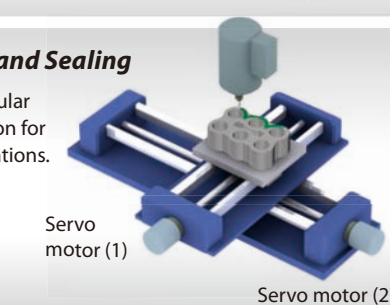
- Storage and Sorting

Independent 2 axes for product placement.



- Drilling and Sealing

Linear/Circular interpolation for table operations.



- Crane Assemblies

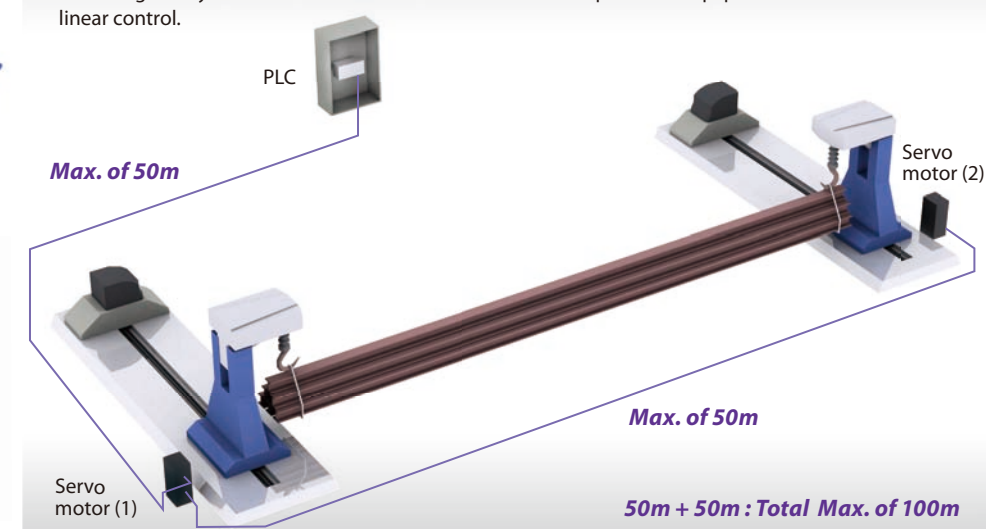
Simultaneous 2 axes Start for balancing and synchronous linear control.



Max. of 50m

- Conveyor Control

Long-distance, precision control for wide load transportation equipment.



Max. of 50m

50m + 50m : Total Max. of 100m

*1: USB connection is possible between the FX3U PLC and a personal computer via an interface converter.

*When using FX2N special function blocks, the speed is limited respectively.

MR-J3-B servo amplifier

SSCNET III Offers NEW Advantages

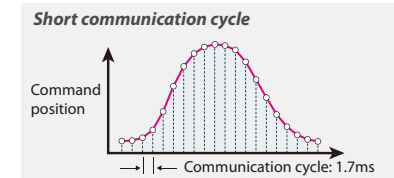
Smooth, high speed, high accuracy operations are now attainable with the new generation SSCNET III synchronous communication network.

Plug-and-Play Fiber Optic Wiring

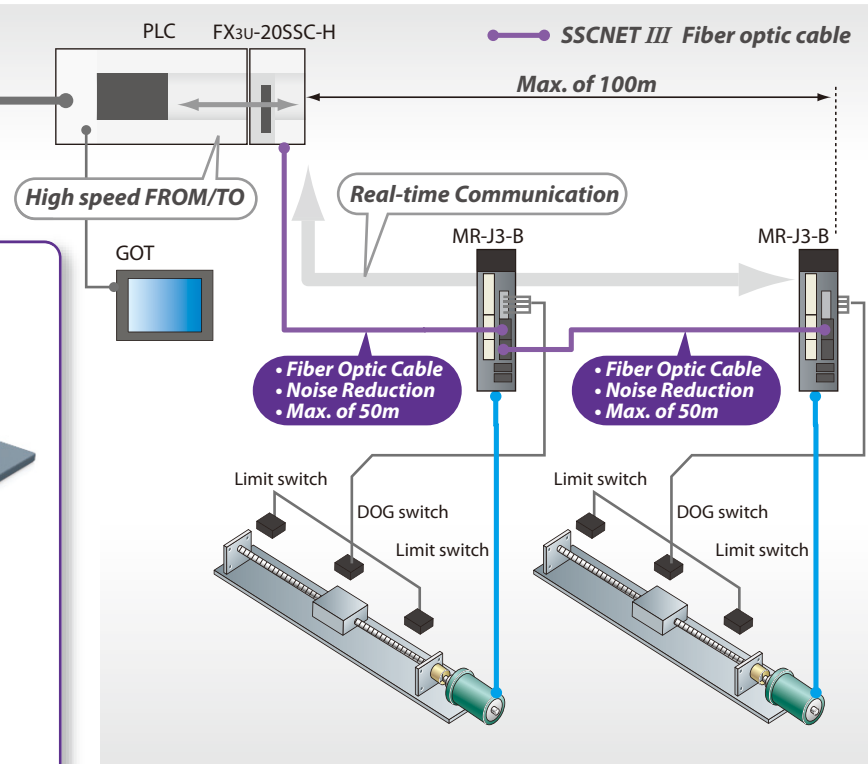
Cabling setup time is reduced with direct, Plug-and-Play connectivity to servo equipment. Absolute system control eliminates the need for re-wiring, and advanced synchronous control on SSCNET III is achievable for distances up to 50 m*. Additionally, fiber optic wiring enhances data transfer reliability, improves noise resistance and simplifies wiring diagrams.

High Speed with High Accuracy

Smooth control with high speed serial communication cycle times up to 1.7ms improve positioning accuracy. Synchronous control on high-performance devices is realized with 50 Mbps communication speeds.



Read/Write to FX3U-20SSC-H from a PLC



Central Networking Management

From one location, large volumes of data can be monitored and effectively managed in real-time. Positioning addresses, speeds and servo amplifier parameters are displayed for diagnostic monitoring and testing during data transfer between the controller (FX3U-20SSC-H) and servo amplifier.

FX Configurator-FP GX Developer

- FX3U-20SSC-H positioning parameters

- MR-J3-B servo amplifier parameters

- Table operation information

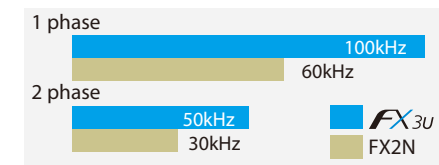
- Monitor/Control data

*FX3U-20SSC-H to Servo Amplifier

FX3U + High Speed I/O

The FX3U is designed with six high speed counter inputs that can simultaneously count pulses up to 100kHz.

This, combined with three 100kHz pulse train outputs, means users can directly configure simple 3-axis positioning systems without the use of additional modules.



The new high speed counter and pulse train ADPs provide the FX3U with maximum positioning performance. Each unit can process signal speeds of up to 200kHz.

200kHz High Speed Input/Output

Adapter modules allow direct processing of positioning application data*.

The FX3U-4HSX-ADP provides high speed counter input up to 200kHz while the FX3U-2HSY-ADP delivers 2 channels of pulse train outputs up to 200kHz.

* The main unit terminals are rerouted to the special ADP unit.

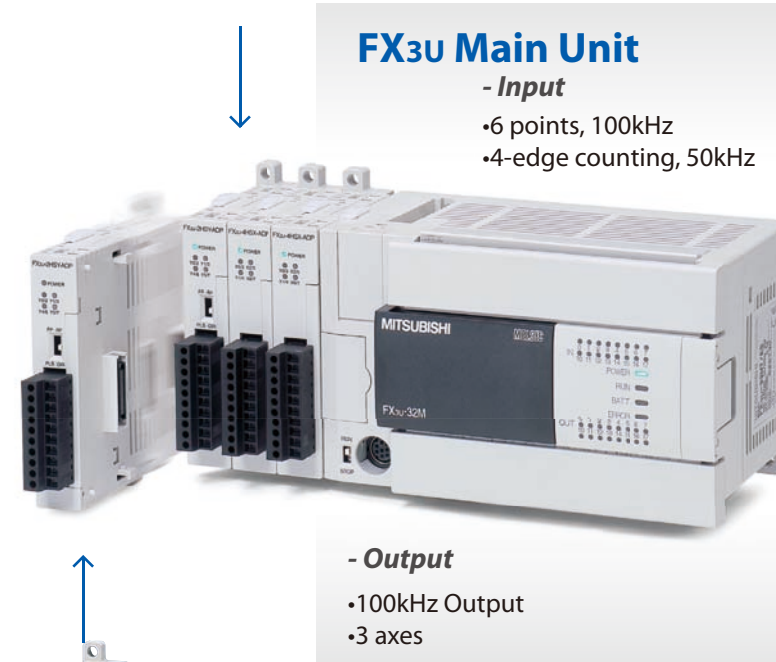
FX3U-4HSX-ADP

- 4 channel High Speed Input Adapter
- 200kHz High Speed Counter
- Max. of 8 channels (1-phase) with 2 ADPs
- Differential line receiver
- 2-phase (A/B) at 100kHz, 4-edge counting



FX3U Main Unit

- Input
- 6 points, 100kHz
- 4-edge counting, 50kHz



- Output

- 100kHz Output
- 3 axes

FX3U-2HSY-ADP

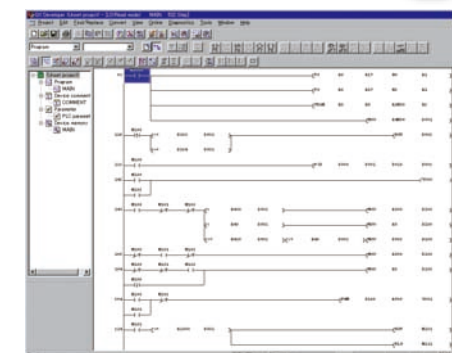
- 2 channel High Speed Output Adapter
- 200kHz pulse output
- Differential line driver
- Max. of 4 independent axes with 2 ADPs



GX Developer



GX Developer is the standard Windows based programming software for all MELSEC PLC series. Sequence programs are comfortably created in Ladder Logic or Instruction List and several options are available for monitoring, debugging and testing user code.



Built-in Functionality Dedicated Positioning Instruction Library Set

New Counting Commands

HSCT High Speed Counter Table Compare

With the use of a data comparison table, high speed counters can simultaneously switch the state of multiple outputs (up to 16 points) for advanced device control during high speed counting.

HCMOV High Speed Counter Move

The current value of a specified high speed counter can now be transmitted to a data register for immediate comparison. With faster current value update timing, counter values may be used in high priority input interrupt commands. Combined with general comparison instructions, the HCMOV provides improved comparison accuracy.

Improved High Speed Comparison Capability

Up to 32 high speed comparison instructions may be used simultaneously with: DHSCS – Comparison Set, DHSCR – Comparison Reset, and DHSZ – Zone Comparison.

4-Edge Counting (2-Phase Counter)

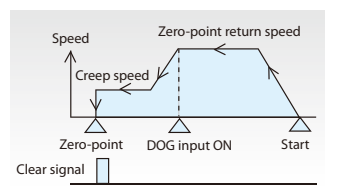
It is now possible to change the edge count of a 2-phase 2-counting input counter from 1 to 4 with special auxiliary relays (M8388, M8198, M8199).

New Positioning Commands

Positioning control is easier than before with the use of the following instructions: DSZR: Zero Point Return with Dog Search, DVIT: Interrupt Positioning, and DTBL: Batch Data Positioning.

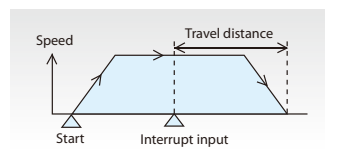
DSZR DOG Search Zero Return **-NEW-**

Additional control with a DOG search function enables a motor to safely return to its zero-point from any position. With new zero-phase signal detection, a motor can be stopped at the zero-point immediately.



DVIT Interrupt positioning **-NEW-**

A switch or sensor input interrupt can be used to offset a machine's target distance and move a workpiece to a new location when necessary.



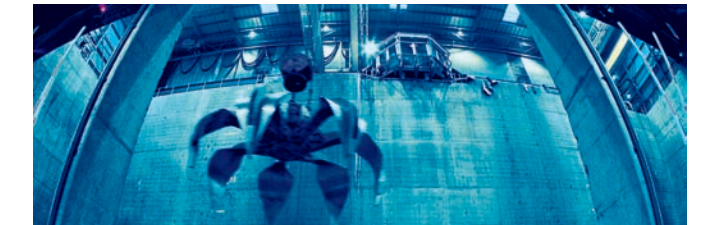
DTBL Batch Data Positioning Mode **-NEW-**

This convenient new feature allows for a fast and easy setup of positioning instructions for basic motor control applications. A simple table layout is used to enter machine pulses and frequencies to reduce program code and decrease engineering project time.

Old Positioning Commands

PLSV Variable Speed Pulse Output

A workpiece can be controlled in different directions at variable speeds for built-in control from the main PLC.

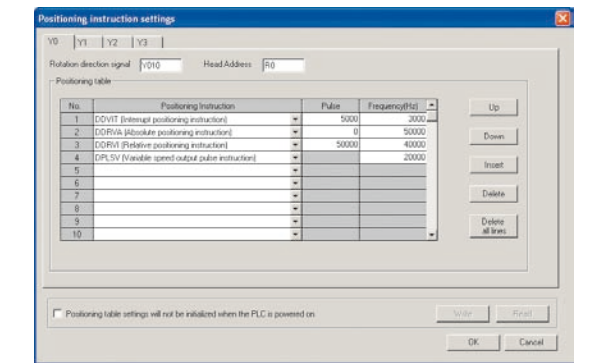


Easy positioning programming with the "DTBL" instruction. **-NEW-**

Positioning operations are conveniently set up in a table format using GX Developer software. They are executed by specifying table numbers to use with the new DTBL instruction.

-Example of controlling 3 types of positioning operations on one axis (Y000).

Input	FNC152 DTBL	Y0	K1	Y000 is positioned by the operation in table number 1
Input	FNC152 DTBL	Y0	K2	Y000 is positioned by the operation in table number 2
Input	FNC152 DTBL	Y0	K3	Y000 is positioned by the operation in table number 3
	Axis	Table No.		

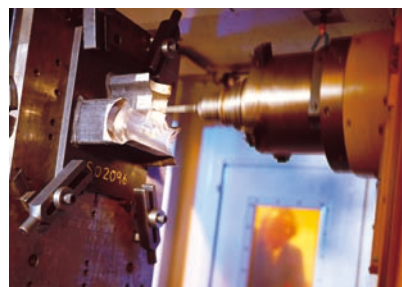


Positioning Instructions
 DRVI (FNC158) Relative positioning DVIT (FNC151) Interrupt positioning
 DRVA (FNC159) Absolute positioning PLSV (FNC157) Variable speed pulse output

FX Positioning Family

Simple positioning solution

Starting with the simplest applications that require the positioning of a workpiece to the more advanced handling during the interpolation of two axes, the products offered in the FX Positioning Family lineup will meet the requirements of most low-end applications.



Positioning Controllers with Independent Control

FX2N-20GM

- 2-axes, 1Hz to 200kHz*1
- Stand-Alone Operation
- Linear/Circular Interpolation



FX2N-10GM

- 1-axis, 1Hz to 200kHz
- Stand-Alone Operation

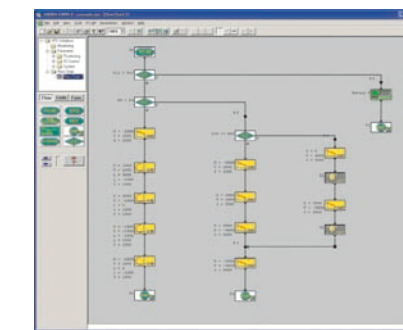


Features

- Multi-speed operation and interrupt positioning
- Optional connection to PLC
- Pulse trains of up to 200kHz max.
- Equipped with absolute position detection
- Connection to a manual pulse generator is available
- FX-PCS-VPS/WIN-E software package for creating positioning profiles
- Electrical zero point return method
- Connection to FX3U/FX2N/FX2NC PLCs

Complex Positioning Applications

Both the FX2N-10GM and FX2N-20GM units can be used as stand-alone positioning units or connected to an FX3U/FX2N/FX2NC Series PLC.



FX-PCS-VPS/WIN-E

FX-PCS-VPS/WIN-E* offers an easy to use visual programming environment for positioning control applications. The Windows based software is convenient for creating Flow Charts, Function Blocks or Traditional Code and includes a Monitoring Window for additional operation control.

*Only to be used with the stand-alone GM controllers.

Pulse Output Blocks for High-Speed Positioning

FX2N-10PG

- 1-axis, 1Hz to 1MHz
- Fast start up time, 1ms



FX2N-1PG-E

- 1-axis, 10Hz to 100kHz



Features

- One unit dedicated to the control of one axis
- Programs for positioning control are driven by PLC program
- Positioning profile may be changed on interrupt
- Built-in operation modes for easy positioning control
- Connection to FX3U/FX2N/FX2NC PLCs

Easy Positioning Applications

A PLC is used to perform positioning operations via buffer memory exchanges with the FX2N-1PG-E and FX2N-10PG.



Programmable Logic Controllers for Simple Positioning

FX3U Series PLC

- 3-axes, 10Hz to 100kHz
- New program commands



FX1S/FX1N Series PLC

- 2-axes, 10Hz to 100kHz



Features

- Excellent cost performance
- Requires no additional modules
- Equipped with absolute position detection
- Options for expansion
- Additional simple I/O control

Easy Positioning with PLCs

Special modules are not required when performing positioning operations with the FX3U/FX1S/FX1N PLCs. Dedicated instructions are provided in PLC programming.



*1: Max.100kHz during interpolation operation.

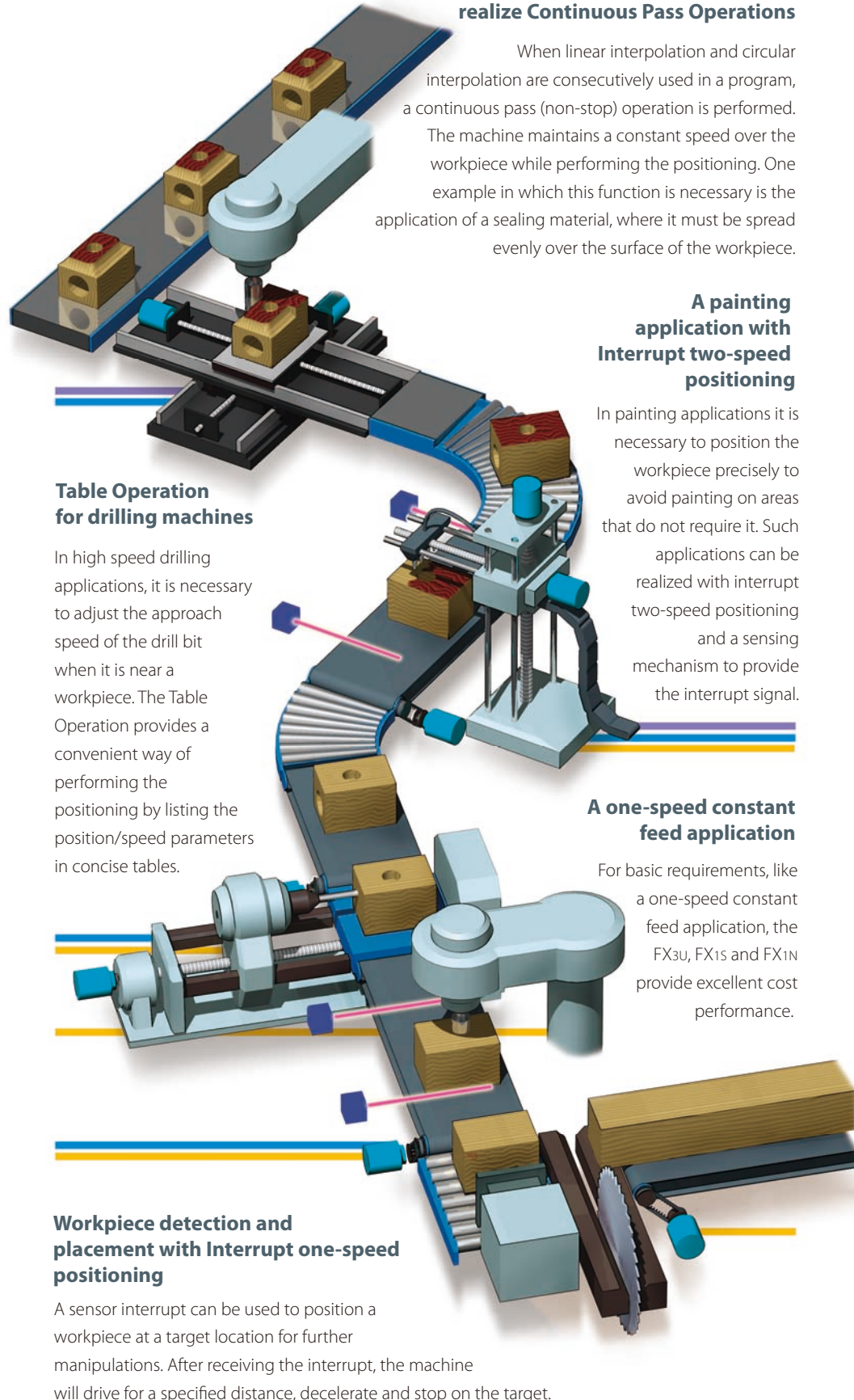
Applications and Instructions

Using simple positioning solutions can help increase the accuracy of the work process, reduce waste and rework as well as provide a higher quality of production.

Typical applications

Simple positioning applications typically involve independently controlled operational axes and can sometimes have many requirements. In the example of an X-Y table, a relative position is achieved by driving each axis until its target position is achieved, regardless of what happens with the other axis. There are two main elements to achieve this type of positioning control.

Simple positioning solutions can be effectively managed within a standard FX PLC.



The interpolation instruction can realize Continuous Pass Operations

When linear interpolation and circular interpolation are consecutively used in a program, a continuous pass (non-stop) operation is performed. The machine maintains a constant speed over the workpiece while performing the positioning. One example in which this function is necessary is the application of a sealing material, where it must be spread evenly over the surface of the workpiece.

A painting application with Interrupt two-speed positioning

In painting applications it is necessary to position the workpiece precisely to avoid painting on areas that do not require it. Such applications can be realized with interrupt two-speed positioning and a sensing mechanism to provide the interrupt signal.

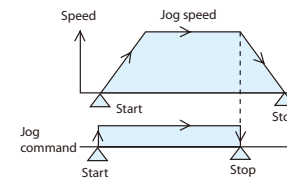
A one-speed constant feed application

For basic requirements, like a one-speed constant feed application, the FX3U, FX1S and FX1N provide excellent cost performance.

Workpiece detection and placement with Interrupt one-speed positioning

A sensor interrupt can be used to position a workpiece at a target location for further manipulations. After receiving the interrupt, the machine will drive for a specified distance, decelerate and stop on the target.

Jog operation

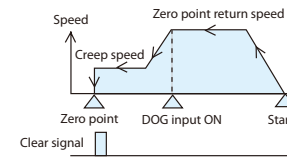


At START, the JOG operation begins. The machine decelerates to STOP when the JOG command is disabled.

20SSC-H FX3U*
FX1S/FX1N* 10GM/20GM 1PG-E/10PG

* Drive and stop the one-speed positioning instruction for this functionality.

Zero return - Mechanical

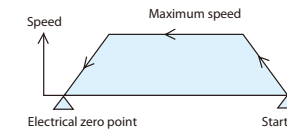


The machine moves at return speed toward the zero point. When the DOG input is triggered, the machine returns to the DOG position momentarily and proceeds to zero at creep speed.

20SSC-H FX3U*
FX1S/FX1N* 10GM/20GM 1PG-E/10PG

* Use D5ZR for FX3U and ZRN for FX1S/FX1N.

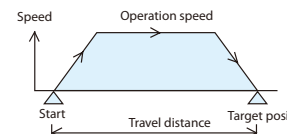
Zero return - Electrical



The machine returns at the maximum speed to the electrical zero point.

10GM/20GM

One-speed positioning

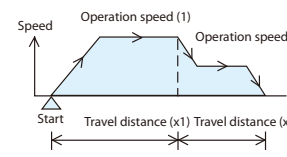


The axis is positioned at the specified operation speed. Two independent axes are available for the FX2N-20GM.

20SSC-H FX3U*
FX1S/FX1N* 10GM/20GM 1PG-E/10PG

* Use DRVI or DRVA (Use One-speed positioning instruction.)

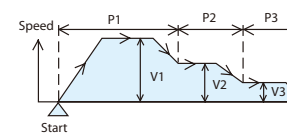
Two-speed positioning



At START, the machine moves to position, X1, at Speed (1), then moves to position, X2, at Speed (2).

20SSC-H 10GM/20GM 1PG-E/10PG

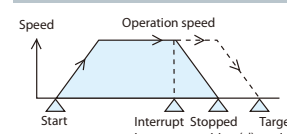
Multi-speed operation



At START, the machine moves to consecutively to positions (P1/P2/P3) at the respective operation speeds (V1/V2/V3) without stopping.

20SSC-H 10GM/20GM 10PG

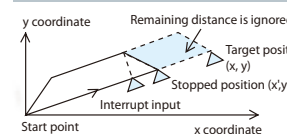
Interrupt stop



If an interrupt is received during a positioning operation, the machine will decelerate and stop immediately (x).

20SSC-H 10GM 10PG

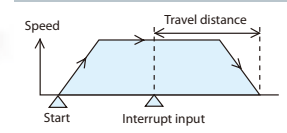
Interrupt stop -Linear Interpolation



Linear Interpolation is included for the FX2N-20GM.

20SSC-H 20GM

Interrupt one-speed positioning



At START, the machine moves at the operation speed. When the interrupt input is received the machine moves to the specified position and stops.

20SSC-H FX3U*
10GM/20GM 1PG-E/10PG

*Use DVT

Absolute Position detection

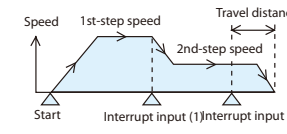
This instruction reads the absolute position from a servo amplifier equipped with absolute position detection. Occupies 6 I/O (hard-wired).

20SSC-H*1 FX3U*2
FX1S/FX1N*2 10GM/20GM 1PG-E/10PG*1*2

*1: PLC is necessary

*2: Use ABS

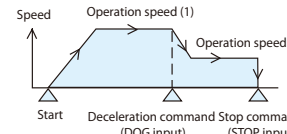
Interrupt two speed positioning (1)



At START, the machine moves at the operation speed. When the interrupt input is received, the machine decelerates to the second speed. When the second interrupt input is received, the machine travels to the target position, decelerates and stops.

20SSC-H 10GM/20GM 10PG

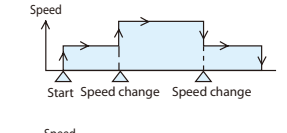
Interrupt two speed positioning (2)



In the FX2N-1PG-E variation of this instructions, the machine will stop immediately at the second interrupt. This operation is also known as External Command Positioning Operation.

1PG-E

Variable speed operation



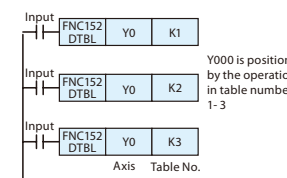
At START, this operation outputs pulses at a designated frequency. The frequency can be changed several times during the operation.

20SSC-H FX3U*1
FX1S/FX1N*1*2 1PG-E*2/10PG

*1 Use PLSV

*2 Acceleration to different speeds is approximated with the RAMP instruction

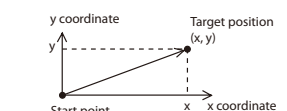
DTBL(Batch Data Positioning Mode)



This convenient new feature allows for a fast and easy setup of positioning instructions for basic motor control applications. A simple table layout is used to enter machine pulses and frequencies to reduce program code and decrease engineering project time.

FX3U

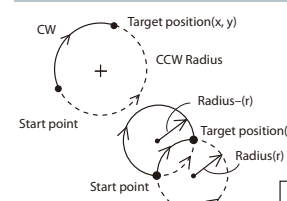
Linear interpolation



The machine moves to a specified target position at a specified vector speed. Consecutive targets can be reached without stopping (continuous pass operation).

20SSC-H 20GM

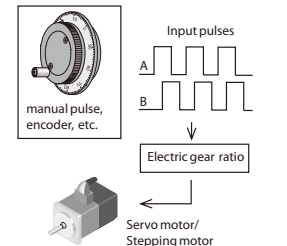
Circular interpolation



The machine moves to a specified target position at a specified peripheral speed. Consecutive targets can be reached without stopping (continuous pass operation).

20SSC-H 20GM

Manual Pulse Generator



A manual pulse generator can be connected to generate pulses manually. Simultaneous ratio operation using the manual pulse generator, encoder, etc. is possible. Maximum frequency for input pulses:

FX3U-20SSC-H: Max. 100kHz
FX2N-10PG: Max. 30kHz
FX2N-10GM: Max. 2kHz
FX2N-20GM: Max. 2kHz

20SSC-H 10GM/20GM 10PG

Table Operation

No.	Position	Speed	----
0	200	500	
1	500	1000	
2	1000	2000	

Positions and speeds can be stored in a table format. Max. points: 300/axis (FX3U-20SSC-H) Max. points: 200/axis (FX2N-10PG) Max. points: 100/axis (FX3U, FX2N-10GM)

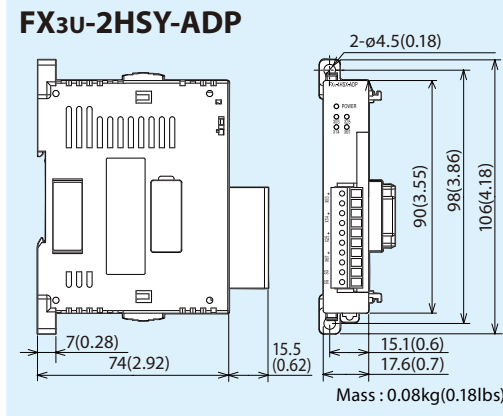
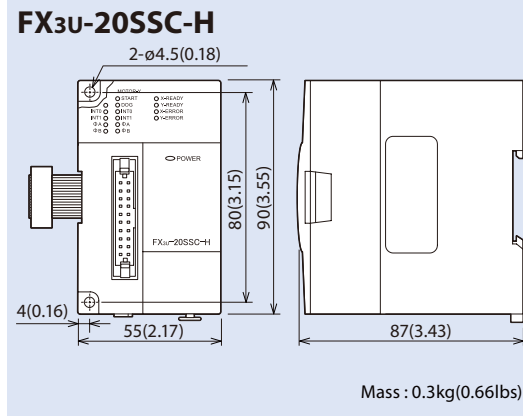
20SSC-H*1 FX3U*2
10GM 10PG

*1 Using FX Configurator-FP

*2 Using GX Developer DTBL instruction

Dimensions

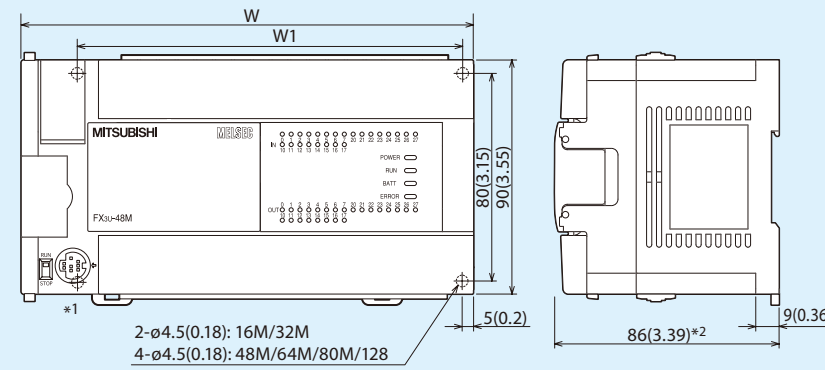
Unit : mm (inch)



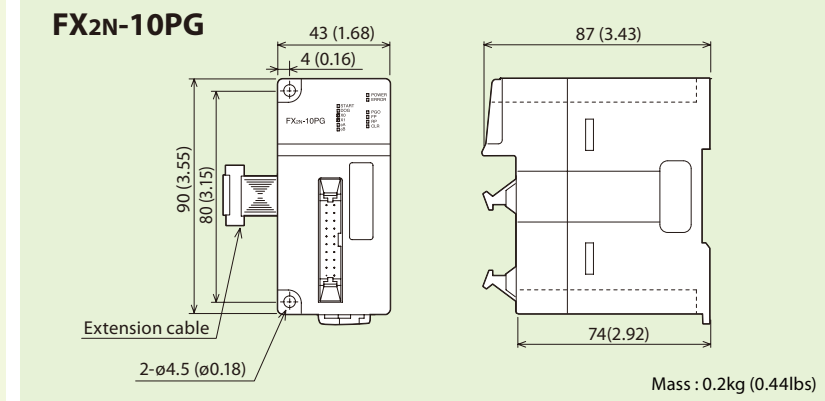
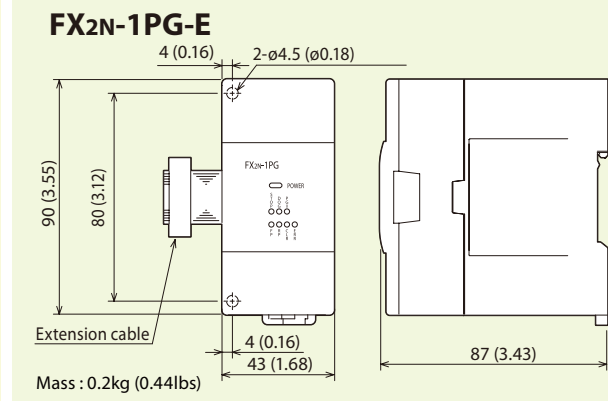
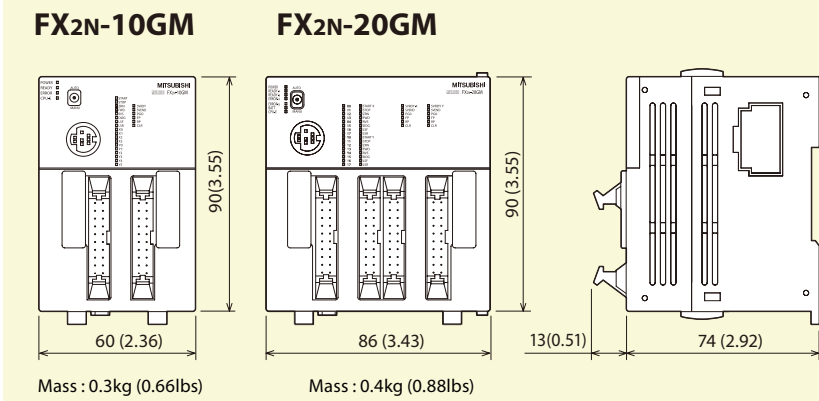
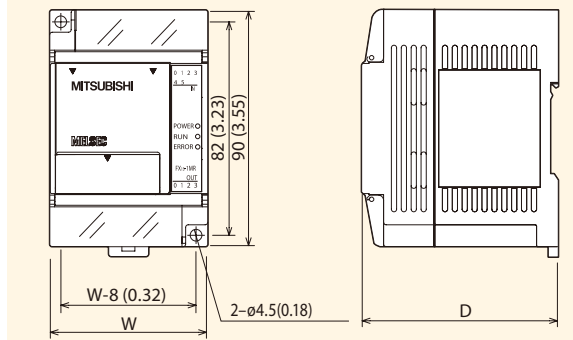
FX3u Main Units

Model	W mm(inch)	W1 mm(inch)	Mass kg(lbs)
FX3U-16MT-*	130(5.12)	103(4.06)	0.6(1.32)
FX3U-32MT-*	150(5.91)	123(4.85)	0.65(1.43)
FX3U-48MT-*	182(7.17)	155(6.11)	0.85(1.87)
FX3U-64MT-*	220(8.67)	193(7.6)	1.00(2.2)
FX3U-80MT-*	285(11.23)	258(10.16)	1.20(2.64)
FX3U-128MT-*	350(13.78)	323(12.72)	1.80(3.97)

* ES, ESS, DS or DSS
 *1: 16M/32M do not have an attachment hole.
 *2: With FX3U-7DM attached: 88.5(3.49)



FX1S, FX1N Main Unit



Model	W mm (inch)	D mm (inch)	Mass kg (lbs)
FX1S-10MT-ESS/UL	60 (2.73)	75 (2.96)	0.30(0.66)
FX1S-14MT-ESS/UL	75 (2.96)		0.40(0.88)
FX1S-20MT-ESS/UL	100 (3.94)	49 (1.93)	0.45(0.99)
FX1S-30MT-ESS/UL	100 (3.94)		0.35(0.77)
FX1S-10MT-DSS	60 (2.73)	75 (2.96)	0.22(0.48)
FX1S-14MT-DSS	75 (2.96)		0.30(0.66)
FX1S-20MT-DSS	100 (3.94)	75 (2.96)	0.35(0.77)
FX1S-30MT-DSS	100 (3.94)		0.35(0.77)
FX1N-14MT-*	90 (3.55)	75 (2.96)	0.45(0.99)
FX1N-24MT-*	130 (5.12)		0.65(1.43)
FX1N-40MT-*	175 (6.89)	75 (2.96)	0.80(1.76)
FX1N-60MT-*	175 (6.89)		0.80(1.76)

*: ESS/UL or DSS

Specifications

Model	FX1S	FX1N	FX3U	FX3U-2HSY-ADP	FX3U-20SSC-H	FX2N-1PG-E	FX2N-10PG	FX2N-10GM	FX2N-20GM
Number of controlled axes	2 (independent)		3 (independent)	2 (independent)	2 (independent or interpolation)	1		1	2 (independent or interpolation)
Power supply	ESS/UL type: 100 - 240V AC +10%-15% 50/60Hz DSS type: 24V DC +10%-15%	ESS/UL type: 100 - 240V AC +10%-15% 50/60Hz DSS type: 24V DC +20% to 12V DC-15%	ES, ESS type: 100 - 240V AC +10%-15% 50/60Hz DS, DSS type: 24V DC +20%-30%	24V DC / 60mA from main unit 5V DC / 30mA from main unit	24V DC +20%-15%; 5V DC / 100mA from main unit	24V DC ±10%; 5V DC / 55mA from main unit	24V DC ±10%; 5V DC / 120mA from main unit	24V DC +10%-15%	
Number connected to PLCs	-		-	Up to 2 can be connected to the FX3U PLC	Up to 8 can be connected to the FX3U PLC	Up to 8 can be connected to the FX2N PLC Up to 4 can be connected to the FX2NC PLC		Up to 8 can be connected to the FX2N PLC Up to 4 can be connected to the FX2NC PLC	
Number of occupied I/O points	-		-	0	8 points per unit	8 points per unit		8 points per unit	
Number of input points	FX1S-10MT-*: 6 FX1S-14MT-*: 8 FX1S-20MT-*: 12 FX1S-30MT-*: 16	FX1N-14MT-*: 8 FX1N-24MT-*: 14 FX1N-40MT-*: 24 FX1N-60MT-*: 36	FX3U-16MT-*: 8 FX3U-32MT-*: 16 FX3U-48MT-*: 24 FX3U-64MT-*: 32 FX3U-80MT-*: 40 FX3U-128MT-*: 64	-	2 interrupt inputs (INT0 and INT1) per axis 1 DOG input per axis 1 START input per axis 1 manual pulse generator (A/B-phase) per axis	3 control input points (START, DOG, PGO)	3 control input points (START, DOG, PGO) 2 interrupt points (X0, X1) 2-phase pulse input point (øA, øB)	4 general-purpose inputs 8 general-purpose inputs. Up to 48 I/O points can be extended using extension blocks (simultaneous ON ration should be 50% or less)	
Input signal	24V DC 7mA (24V DC X0 to X7) 5mA (24V DC X10 or later)		24V DC 6mA (24V DC X0 to X5) 7mA (24V DC X6, X7) 5mA (24V DC X10 or later)	-	24V DC +20%-15%, 7.0mA / 24V DC: INT0, INT1, DOG, START 3 to 5.25V DC, 3.0 to 8.5mA: øA, øB	24V DC / 7mA: STOP, DOG 5 to 24V DC / 20mA or less: PGO	24V DC ±10%, 6.5mA / 24V DC: START, DOG, X0, X1 3 to 5.5V DC / 20mA or less: PG0, øA, øB	24V DC ±10% (Internal power supply), 7mA / 24V DC: START, STOP, FWD, RVS, ZRN, LSF, LSR, DOG 5 to 24V DC ±10%, 7mA / 24V DC: SVRDY, SVEND 5 to 24V DC ±10%, 11.5mA / 24V DC: PGO 24V DC ±10% (Internal power supply), 7mA / 24V DC: X0 to X3 (general-purpose input / interruption input)	24V DC ±10% (Internal power supply), 7mA / 24V DC: START, STOP, FWD, RVS, ZRN, LSF, LSR, DOG 5 to 24V DC ±10%, 7mA / 24V DC: SVRDY, SVEND 5 to 24V DC ±10%, 11.5mA / 24V DC: PGO 24V DC ±10% (Internal power supply), 7mA / 24V DC: X0 to X7 (general-purpose input / interruption input)
Number of output points	FX1S-10MT-*: 4 FX1S-14MT-*: 6 FX1S-20MT-*: 8 FX1S-30MT-*: 14	FX1N-14MT-*: 6 FX1N-24MT-*: 10 FX1N-40MT-*: 16 FX1N-60MT-*: 24	FX3U-16MT-*: 8 FX3U-32MT-*: 16 FX3U-48MT-*: 24 FX3U-64MT-*: 32 FX3U-80MT-*: 40 FX3U-128MT-*: 64	4 outputs (shared with FX3U)	-	3 outputs (FP, RP, CLR)		6 general-purpose outputs 8 general-purpose outputs. Up to 48 I/O points can be extended using extension blocks (simultaneous ON ration should be 50% or less)	
Pulse output format	Transistor output (NPN open collector)		Transistor output (NPN open collector)	Differential line driver	SSCNET III (Servo Bus) Communication Speed: 50Mbps	Transistor output (NPN open collector)	Differential line driver	Transistor output (NPN open collector)	
	Pulse train + direction		Pulse train + direction	Pulse train + direction Forward/reverse rotation pulse train		Pulse train + direction Forward/reverse rotation pulse train		Pulse train + direction Forward/reverse rotation pulse train	
	Y0, Y1: 5 to 24V DC / 10 to 100mA, Others: 5 to 30V DC / (0.5A / 1 point)	5 to 30V DC / (0.5A / 1 point)		Y0 to Y7: 25mA or less		5 to 24V DC / 20mA or less: FP, RP, CLR	5 to 24V DC / 25mA or less: FP, RP 5 to 24V DC / 20mA or less: CLR	5 to 24V DC ±10% / 20mA or less: FP, RP, CLR	5 to 24V DC ±10% / 50mA or less: Y0 to Y5
Starting Time	-		-	1.6 ms (+ 1.7 ms SSCNET III cycle time)	approx. 10 ms	1 to 3 ms	approx. 10 to 20 ms		approx. 20 to 30 ms*6
Pulse frequency	10Hz to 100kHz		10Hz to 100kHz	10 to 200kHz	1Hz to 50MHz	10Hz to 100kHz	1Hz to 1MHz	1Hz to 200kHz	
Standalone operation	Available		Available	Not available (connected to FX3U PLC*1)	Not available (connected to FX3U PLC*3)	Not available (connected to FX3U/FX2N/FX2NC PLC*5)		Available (connection to FX3U/FX2N/FX2NC PLC is also possible*5)	
Control method	Sequence program		Sequence program*2		Sequence program, (FROM/TO instruction), FX Configurator-FP*4	Sequence program (FROM/TO instruction)		Built-in positioning instructions or sequence program (FROM/TO instruction)	

*: ESS/UL or DSS for FX1S/FX1N. ES, ESS, DS or DSS for FX3U.

*1: Up to 2 adapters can be connected to FX3U series PLC.

*2: Positioning tables may be set up in GX Developer software for DVIT, DRVI, DRVA, and PLSV commands.

*3: Up to 8 blocks can be connected to FX3U series PLC.

*4: FX Configurator-FP can be used for setting speeds, positions and positioning operations in table format.

*5: Up to 8 blocks can be connected to FX3U/FX2N series PLCs. Up to 4 blocks can be connected to FX2NC series PLC. (FX2NC-CNV-IF required)

*6: Start-up time is longer when circular or linear interpolation is selected for operation.