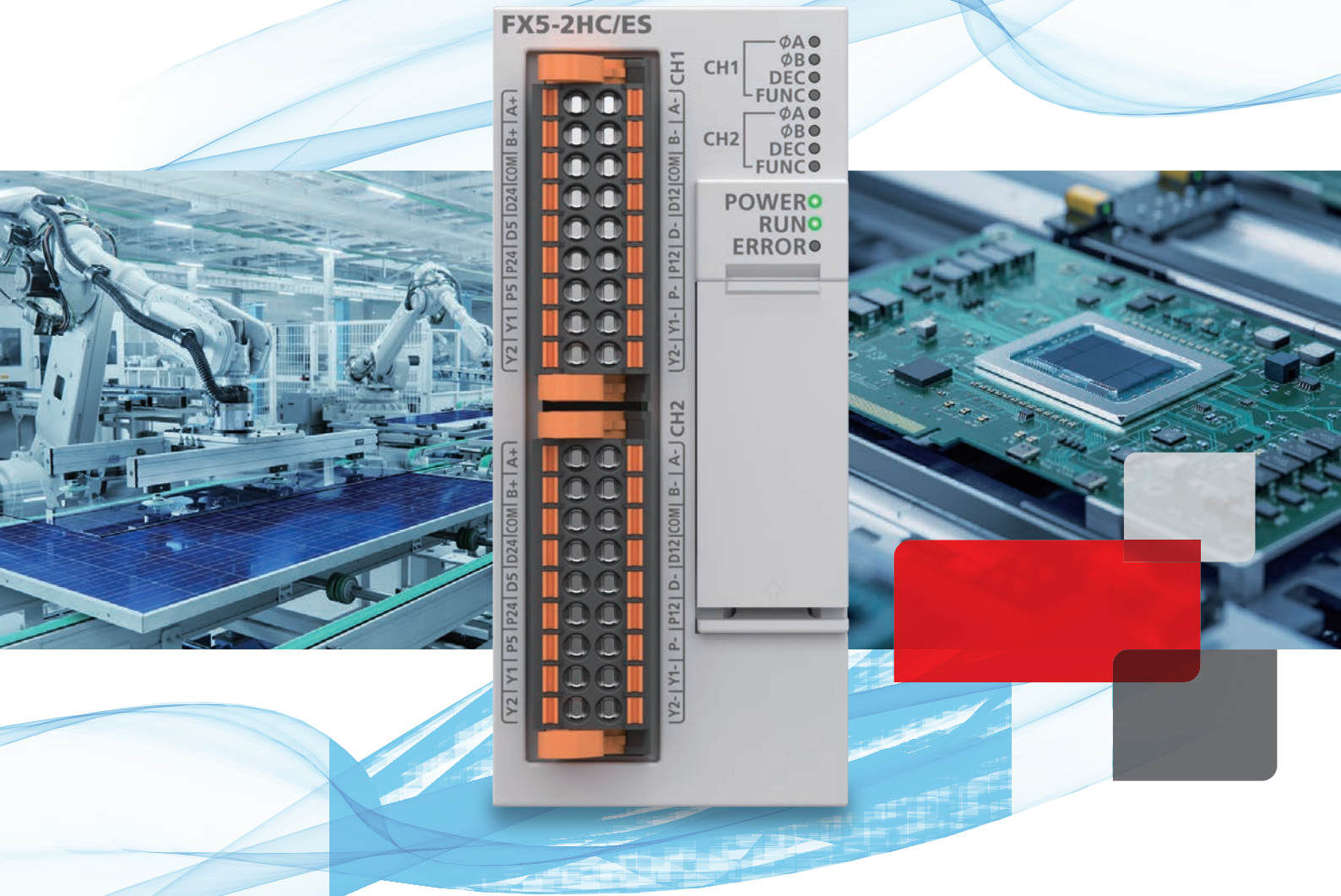FACTORY AUTOMATION

MELSEC iQ-F Series
iQ Platform-compatible PLC

FX5-2HC/ES high-speed counter module

Expands the range of applications.
Supports high-resolution encoders.

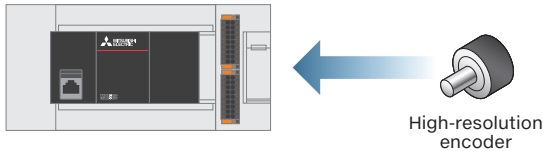# The MELSEC iQ-F series now includes a high-speed counter module that supports differential line drivers.

FX5-2HC/ES high-speed counter module FX5-2HC/ES

Supports differential input signals up to 2 MHz*1. It can receive high-speed differential signals from servo amplifiers or external encoders and accurately determine the current position or detect the length or speed of workpieces. In addition to performance improvements from previous products, high maintainability can be achieved by linking with GX Works3.
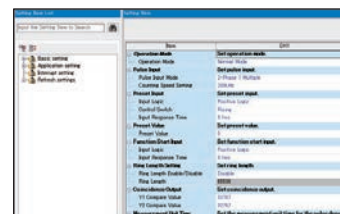
1 Performance improvements

Support for higher speeds

Since it supports reading of 2 MHz differential driver signals, even finer position measurement is possible.

High-resolution encoder

No program required.
Various counter functions can be used by simply setting parameters.

- ✔ Pulse density measurement function
- ✔ Rotational speed measurement function
- ✔ Pulse width measuring function
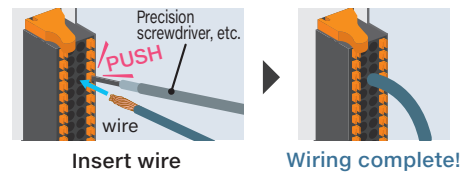 etc.

Improved noise resistance

Digital filters are used to prevent malfunctions due to noise and to improve equipment functionality.

Digital filter

Error! ▶ Operation
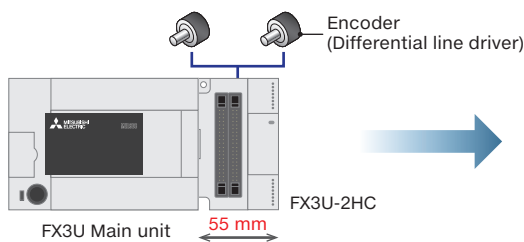
Recommended

Uses spring-clamp terminal blocks

Easy wiring by simply inserting the wire. No crimp connectors or crimp tool needed. Improved wiring when using multi-channel counters.

Precision screwdriver, etc.
PUSH
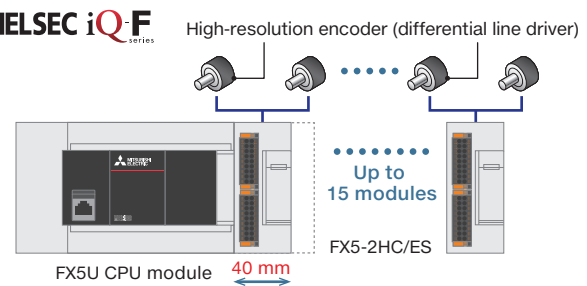wire

Insert wire ▶ **Wiring complete!**

2 Reduced size

The MELSEC iQ-F series is an evolution of the MELSEC-F series, with high basic performance and abundant built-in functions. They are more compact than previous products, helping to reduce equipment size and achieve control with more channels.

FX3 series

Encoder (Differential line driver)

FX3U Main unit 55 mm FX3U-2HC

MELSEC iQ-F

High-resolution encoder (differential line driver)

Up to 15 modules

FX5U CPU module 40 mm FX5-2HC/ES

Up to 30 ch of differential line drivers can be input.

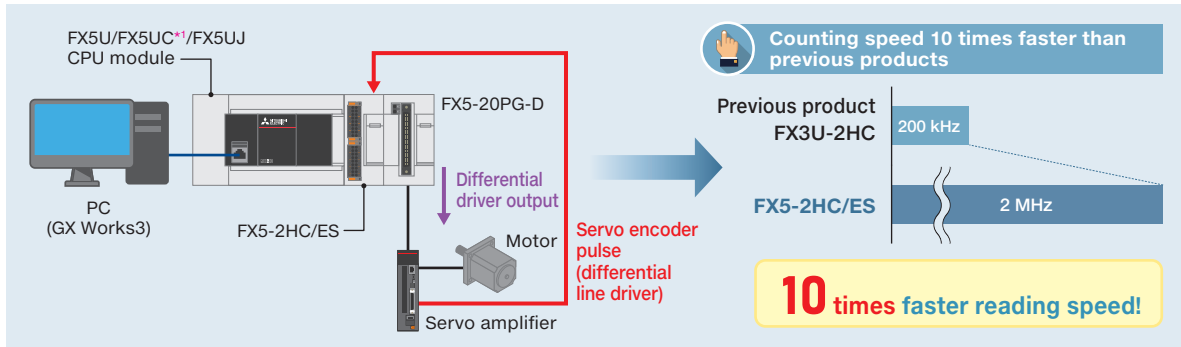| Item	FX3U-2HC	FX5-2HC/ES NEW
Counting speed	200 kHz	2 MHz Function upgrade
Number of channels	2 ch	2 ch
Number of connectable modules	FX3U: Up to 8 modules FX3UC: Up to 4 modules FX5U, FX5UC: Up to 2 modules	FX5U: Up to 15 modules*2 FX5UC: Up to 13 modules FX5UJ: Up to 8 modules — Increased number of connected modules

*1: For 1-phase/2-phase input multiplied by 1.
*2: For details, refer to the manual.
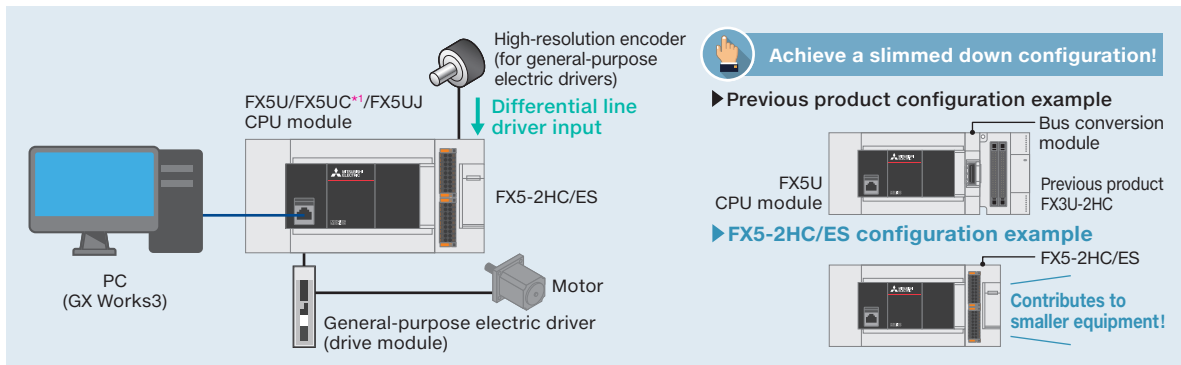
3 Wider range of applications

Compatible with high-resolution encoders enables use in a wide range of applications, including position measurement applications that require both high speed and noise resistance, etc.

Supports 2 MHz signal acquisition. Detailed position measurement is possible.

When using servo encoder

- FX5U/FX5UC*1/FX5UJ CPU module
- FX5-20PG-D
- Differential driver output
- FX5-2HC/ES
- Motor
- Servo encoder pulse (differential line driver)
- Servo amplifier
- PC (GX Works3)

Counting speed 10 times faster than previous products

Previous product FX3U-2HC	200 kHz
FX5-2HC/ES	2 MHz

10 times faster reading speed!

When using external encoder

- High-resolution encoder (for general-purpose electric drivers)
- FX5U/FX5UC*1/FX5UJ CPU module
- Differential line driver input
- FX5-2HC/ES
- Motor
- General-purpose electric driver (drive module)
- PC (GX Works3)

Achieve a slimmed down configuration!

▶ Previous product configuration example
- Bus conversion module
- FX5U CPU module
- Previous product FX3U-2HC

▶ FX5-2HC/ES configuration example
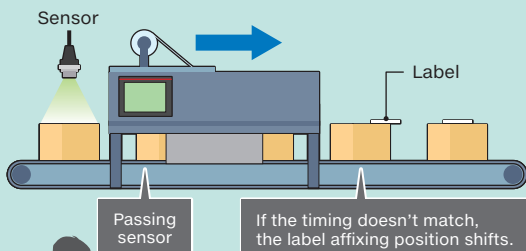- FX5-2HC/ES
- Contributes to smaller equipment!

■ Performance comparison

Item	High-speed counter module	High-speed pulse input/output module	Built-in high-speed counter functions of CPU module			
	FX5-2HC/ES **NEW**	FX5-16ET/ES(S)-H	FX5U	FX5UC	FX5UJ	FX5S
Number of channels	Max. 2 ch	Max. 2 ch	Max. 8 ch		Max. 8 ch	
Input format	Differential line driver (5 V DC)	Open collector (24 V DC)	Open collector (24 V DC)			
Max. frequency	2 MHz	200 kHz	200 kHz*2		100 kHz	
External interface	Spring clamp terminal block	Screw terminal block	Screw terminal block	• MIL connector • Spring clamp terminal block	Screw terminal block	

＼ Improved CPU functions ／

Is this something you are concerned about?

- Sensor
- Label
- Passing sensor
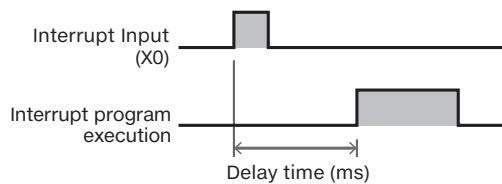- If the timing doesn't match, the label affixing position shifts.

Fine-tuning the sensor position is difficult! It would be nice if I could delay the timing in the program.

Solved with "Input interrupt delay function"!

| FX5S F/W 1.010 or later | FX5UJ F/W 1.050 or later | FX5U/5UC F/W 1.290 or later |

When adjusting the mounting position of a sensor that uses the input interrupt, the adjustment can be performed in the program without shifting the actual position.

- Interrupt Input (X0)
- Interrupt program execution
- Delay time (ms)

Delay in 1 ms units possible

PROGRAMMABLE CONTROLLERS
MELSEC iQ-F Series

■ General Specifications

The items other than the following are equivalent to those of the CPU module.
For the general specification, refer to the following manual.
→MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

Items	Specifications	
Dielectric withstand voltage	500 V AC for 1 minute	Between all terminals and ground terminal
Insulation resistance	10 MΩ or higher by 500 V DC insulation resistance tester	

■ Power Supply Specifications

Items		Specifications
Internal power supply	Power supply voltage	Bus 5 V DC
	Current consumption	210 mA

■ Performance Specifications

Items		Specifications
Number of input points	Differential input (phase A, phase B)	2 points (1 point × 2 channels)
	Function start input	2 points (1 point × 2 channels)
	Preset input	2 points (1 point × 2 channels)
Number of output points	4 points (2 points × 2 channels)	
Maximum input frequency	2 MHz	
Number of occupied I/O points	8 points	

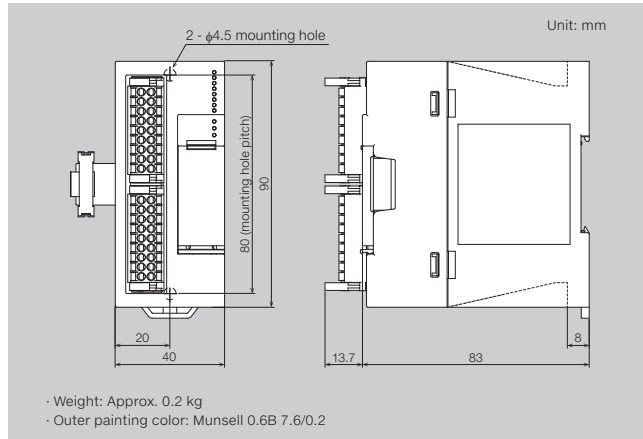## ■ Input Specifications

Items			Specifications
Input signal	Phase-A and phase-B input		5 V DC EIA Standard RS-422-A Differential line driver level (equivalent to AM26LS31)
	Function start input*	[D24]	24 V DC ±10% Current consumption 8 mA or less
		[D12]	12 V DC ±10% Current consumption 8 mA or less
		[D5]	5 V DC ±10% Current consumption 7 mA or less
	Preset input*	[P24]	24 V DC ±10% Current consumption 25 mA or less
		[P12]	12 V DC ±10% Current consumption 10 mA or less
		[P5]	2.4 to 5.5 V DC Current consumption 10 mA or less
Maximum frequency (phase A and phase B)	1-phase input	1 input	2 MHz
		2 input	
	2-phase input	Multiplication by 1	2 MHz
		Multiplication by 2	1 MHz
		Multiplication by 4	500 kHz
Pulse waveform			(waveform diagram with t1, t2, t3, t4)
	t1 (ON/OFF pulse width)		0.25 µs or more
	t2 (phase difference between phase A and phase B)		0.125 µs or more
	t3 (overlap time)		0.125 µs or more
	t4 (rise/fall)		0.12 µs or less
	Preset (phase Z) input signal width		ON width: 1.5 µs or more OFF width: 2.5 µs or more
	Function start input terminal		ON width: 100 µs or more OFF width: 100 µs or more
Measuring range	32-bit signed binary value (-2147483648 to 2147483647)		
Digital filter	Phase-A and phase-B input		When the counting speed setting is 2 MHz: None When the counting speed setting is a value other than the above: Automatically set according to the counting speed setting value
	Preset input, Function start input		None, 0.1 ms, 1 ms, 10 ms

*: Select a voltage from 5 V DC, 12 V DC, or 24 V DC and use it.

■ Output Specifications

Items	Specifications
Signal output type	Y1: Transistor output on the + side to Y1 output
	Y1-: Transistor output on the - side to Y1 output
	Y2: Transistor output on the + side to Y2 output
	Y2-: Transistor output on the - side to Y2 output
Output capacity	5 to 30 V DC, 0.5 A/point (resistive load)
Response time	Off to on: 2.5 µs or less
	On to off: 2.5 µs or less

■ External Dimensions

Unit: mm

2 - φ4.5 mounting hole
80 (mounting hole pitch)
90
20
40
13.7
83
8

· Weight: Approx. 0.2 kg
· Outer painting color: Munsell 0.6B 7.6/0.2

■ Product List

Model	Specifications
FX5-2HC/ES	FX5-2HC/ES high-speed counter module
FX5-U-HC-E	MELSEC iQ-F FX5 High-Speed Counter Module User's Manual MODEL CODE: 09R745
FX5-U-HW-E	MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware) MODEL CODE: 09R584

■ Applicable CPU Module

Model name	Applicability
FX5UJ CPU module	Ver. 1.060 or later
FX5U CPU module	Ver. 1.300 or later
FX5UC CPU module	Ver. 1.300 or later

■ Applicable Software Package

Software	Applicability
GX Works3	Version 1.100E or later

■ List of Compatible Products

○: Certified/Certification expected　-: Not applicable

Model	UL/cUL	CE (EMC)	CE (LVD)	CE (MD)	CE (RoHS)	KC
FX5-2HC/ES	○	○	-	-	○	○

⚠ Safety Warning

• To ensure proper use of the products in this document, please be sure to read the instruction manual prior to use.

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