Changes for the Better



FX Analog Family



FX3U Analog Platform - A new

With the arrival of the new FX₃U comes a new range of analog products that have been designed to enhance user functionality, system performance and ease of set-up. These new products surpass previous analog solutions and create a new benchmark for analog control in a cost effective manner.

In order to respond to the most diverse of analog problems, two product ranges have been developed. The FX3U Special Adapters deliver advanced solutions in an easy to use manner, saving the user from the frustration of complex setup routines. Whereas the FX3U Special Function Blocks provide an ideal answer to the toughest of high speed problems combining high accuracy with high speed.

The FX_{3U} analog range delivers a straightforward concept that delivers advanced solutions in a simple and easy to use package.



What is Analog Control?

Analog control is used in a broad range of industries. In simple terms, it enables a discrete signal to provide control within a PLC system. Basic examples of analog control include collection of sensory data from fluid levels and control of a motor's speed. System's can be developed and configured to each user's needs and requirements.



Digital to Analog Control

A process where the PLC system converts digital signals to analog (voltage/current) signals. For example linear control for an inverter.



Analog to Digital Control

Where analog signals are captured from the outside world and are converted to a digital format so that PLC system control can be implemented.



Temperature Input and PID Control

Temperature data can be acquired via two sensory methods – thermocouple input or PT100 sensor input.

PID control enhances system performance as it eliminates the need for continuous operator intervention. Through use of Auto-Tuning, important parameters are automatically configured to the PID function, ensuring that optimum control is achieved for a range of temperature and analog control applications.





benchmark in Analog control

FX_{3U} Special Adapters Main Unit FX30 Special Function Blocks - Straightforward setup - New high speed programming FX3U at a glance instructions - Cost effective I/O range : -Combines high Speed with accuracy Max. total 384 (with remote I/O) - Easy to use programming instructions **Program memory :** - Integral CPUs enable independent - Extremely versatile 64k steps (standard) operation from the PLC **Processing speed:** 0.065µsec/basic instruction - Perfect for high speed applications ITSUBISHI FX3U-4AD-TC-ADP FX3u-4AD-ADP FX3U-4DA FX3U-4AD FX3U-4DA-ADP FX3U-4AD-PT-ADP

Special Adapters

A major design enhancement to the FX₃U is the new Special Adapters. Special Adapters implement control through direct access data registers and setting bits. This means quicker set-up, easier use, and above all much higher processing speeds.

Special Function Blocks

Special Function Blocks

Series PLC.

With Special Function Blocks, the analog to digital and digital to analog conversion takes place internally within the unit. Digital communication is then performed between the PLC and the Special Function Block.

- Special Function blocks connect to the right side of the FX3U

- Up to 8 Special function blocks can be connected to one FX3U PLC, where a combination of analog networking and positioning

- Full compatibility with FX2N and FX0N Special Function Blocks.

Special Function Blocks can be configured.*

FX30 System Configuration

Special Adapters

- Special Adapters connect to the left side of the $\mathsf{FX3U}$ series PLC.
- An expansion board is required in the system to connect the special adapters.
- A combination of up to 4 analog / temperature Special Adapters can be connected to one FX3U PLC. (The FX3U can also support a further 2 nework adapters and 4 positioning adapters).



FX Analog Family – Solutions for

Despite the growing presence of digital systems, the world continues to provide endless analog problems. Today's product lineup has come to the foreground to tackle these problems head on.

With products that provide in-built features such as direct connection to sensors, advanced digital filtering to reduce noise or direct correlation of data for simple real-time control. The FX analog family continues to provide solutions for a diverse range of needs.

International acceptance

Compliance with CE and UL/cUL standards enables users worldwide to put faith into the FX brand. The FX range is also certified to a variety of shipping approvals that include Lloyds, German Lloyds, American Bureau of shipping, Registro Italiano Navale, DET Norse Vetaritas and Bureau Veritas.



Visual Solutions

Mitsubishi Electric offers a comprehensive range of visual solutions. From simple data displays such as the FX3U-7DM, advanced Graphic Operator Terminals like the GOT1000 Series, along with a wide choice of software solutions from the MELSOFT software suite.



GX Developer

GX Developer is the standard Windows based programming software for all MELSEC PLC series. Sequence programs for a range of applications are comfortably created in Ladder

Logic or Instruction List. There are also several options available for monitoring, debugging and testing user code.









Simplified Programs with Special Adapters

The FX₃U analog Special Adapters simplify program code by providing automatic transfer of data to and from the PLC. This has a major benefit for the user as Special Adapters no longer require the use of the traditional To/From instructions to configure and operate. This enables programming code to be dramatically simplified.





diverse analog needs

FX3U Special Analog Adapters NEW

The FX_3U-4AD-ADP and the FX_3U-4DA-ADP are equipped with 4 input / 4 output channels respectively. These analog adapters provide complete versatility, where each channels can be independently configured for either voltage or current control signals.*



	FX3U-4/	AD-ADP	FX3U-4DA-ADP		
Channels	4 In	puts	4 Outputs		
Range	0 to 10V	4 to 20mA	0 to 10 V	4 to 20mA	
Resolution	2.5mV	10µA	2.5mV	4μΑ	
Digital Signal	12 bit	11 bit	12	bit	
Annlicable PLC	FX20				

FX3U Temperature Adapters NEW

For temperature sensor input, the FX_{3U} range provides two great solutions. The versatile FX_{3U}-4AD-TC-ADP provides the user with 4 inputs that can be configured for either J or K type thermocouples. Alternatively, the user can opt for the FX_{3U}-4AD-PT-ADP which features four PT100 sensors per adapter.*



	FX3U-4AI	FX3U-4AD-PT-ADP	
Channels	4 Inputs	4 Inputs	4 Inputs
	(K type thermocouple)	(J type thermocouple)	(PT100 sensor)
Compensated	-100 to +1000°C/	-100 to +600°C/	-50 to +250°C/
Range	-148 to +1832°F	-148 to +1112°F	-58 to +482°F
Resolution	0.4°C/0.72°F	0.3°C/0.54°F	0.1°C/0.18°F
Digital Signal	-1000 to +10000 (°C) /	-1000 to +6000 (°C) /	-500 to +2500 (°C) /
	-1480 to +18320 (°F)	-1480 to +11120 (°F)	-5800 to +4820 (°F)
Applicable PLC		FX3U	

FX3U Special Function Blocks NEW

For high speed requirements the FX3U range delivers the FX3U-4AD and the FX3U-4DA.

Each Special Function Block is equipped with 4 high resolution channels, where the FX3U-4AD provides 4 A/D inputs and the FX3U-4DA provides 4 D/A outputs.*

	FX3U	I-4AD	FX3U-4DA		
Channels	4 In	puts	4 Outputs		
Range	-10 to +10V	-20 to +20mA, 4 to 20mA	-10 to +10 V	0 to 20mA, 4 to 20mA	
Resolution	0.32mV	1.25µA	0.32mV	0.63µA	
Digital Signal	Signed 16 bit	Signed 15 bit	Signed 16 bit	15 bit	
Applicable PLC	FX3U				

FX_{2N}-5A - Hybrid Converter

The FX2N-5A delivers extremely high resolution combined with 4 independently configurable inputs and 1 output. Independent channel configuration enables the FX2N-5A to work harmoniously with the most diverse of analog devices.*



	FX2n-5A						
Channels	4 Inputs				1 Output		
Range	-100 to +100mV -10 to +10 V -20 to +20mV 4 to 20m				-10 to +10V	0 to 20mV, 4 to 20 mA	
Resolution	50µV	0.32mV	1.25µA	10µA	5mV	20µA	
Digital Signal	Signed 12 bit	Signed 16 bit	Signed 15 bit		Signed 12 bit	10 bit	
Applicable PLC	FX1N, FX2N, FX2NC, FX3U						

Functional Expansion Boards

Through use of expansion boards analog control can easily be implemented via the FX1s and FX1N PLCs.

Expansion boards permit an additional 2 inputs or 1 output respectively to be integrated to the PLC.*





	FX2N-2	AD-BD	FX2N-1DA-BD			
Channels	2 Inj	puts	1 Output			
Range	0 to 10V	4 to 20mA	4 to 20mA 0 to 10 V			
Resolution	2.5mV	8μA	2.5mV	8μΑ		
Digital Signal	12 bit					
Applicable PLC	FX1N, FX1s					



* For further product information see specifications table on next page or respective product manual

Specifications

DA

	Expansion Board 2CH		Н				4CH		
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	FX1N-IL	ла-вр	FX2N-	ZDA	FX2N	-4DA	FX2NC-4DA		
Output Channel	IC	н		H	4	LH 0 to 20m A	4 CH 0 to 20m 4		
Analog Output Range	0 to 10V DC	4 to 20mA	0 to 3V DC,	4 to 20mA	-10 to +10V DC		-10 to +10V DC 4 to 20mA		
(External load resistance)	(2k to 1MΩ)	(500Ω or less)	(2k to 1MO)	(400Ω or less)	(2k to 1MΩ)	(5000 or less)	(2k to 1MΩ)	(5000 or less)	
Resolution	2.5mV	8uA	2.5mV	4uA	5mV	20uA	5mV	20uA	
Digital Input	12 k	bit	121	pit	Signed 12 bit	10 bit	Signed 12 bit	10 bit	
Overall Accuracy *1	±10	%	±1	%	±	1%	±0.5% (20 to 30°C), ±1.0% (0 to 55°C)	
Conversion Time	one sca	n time	4ms/ 1 c	hannel	2.1ms / 4	channels	2.1 ms / 4	channels	
Isolation	Nor	ne	See Notes be	low: *3 & *4	See Notes below: *3, *4 & *6		See Notes below: *3, *4 & *6		
No. of Occupied I/O	0 poi	ints	8 I/O p	oints	8 I/O points		8 I/O points		
Applicable PLC	FX15 /	FX1N	FX1N / FX2N / FX	К2NC / FX3U *5	FX1N / FX2N / FX2NC / FX3U *5		FX2NC		
Certifications *2	CE	1	CE, UL	/cUL	CE, U	L/cUL	CE, U	L/cUL	
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input Channel	20	п		.H	4	20 to 120 mA	41	20 to 120mA	
Analog Input Range	0 to 10VDC	4 to 20mA	0 to 30 DC,	4 to 20mA	-10 to +10 V DC	-20 to +20 mA,	-10 to +10V DC	-20 to +20mA,	
(Input resistance)	(300kΩ)	(250Ω)	(200kO)	(250Ω)	(200kΩ)	(2500)	(200kΩ)	(2500)	
			(200111)			(20012)		(25012)	
Resolution	2.5mV	8μΑ	2.5mV	4μΑ	5mV	20μΑ	0.32mV	1.25µA	
Digital Output	12 k	bit	12 1	pit	Signed 12 bit	Signed 11 bit	Signed 16 bit	Signed 15 bit	
Overall Accuracy *1	+10	26	+104		+1%		±0.3%(20 to 30°C),	±0.5%(20 to 30°C),	
overall Accuracy	±1.	/0	±1	/0	2170		±0.5% (0 to 55°C) ±1.0% (0 to 55°C)		
Conversion Time	one sca	n time	2.5 ms / 1	channel	Normal speed: 15ms / number of used channel,		1ms / Number	of used channel	
					High speed: 6ms / r	umber of used channel			
Isolation	Nor	ne	See Notes be	See Notes below: *3 & *4		See Notes below: *3, *4 & *6		low: *3, *4 & *6	
No. of Occupied I/O	Оро	ints	8 I/O p	8 I/O points		8 I/O points		8 I/O points	
	FX1S/	FX1N -	FX1N / FX2N / FX2NC / FX3U *5		FXIN / FX2N / FX2NC / FX3U "5				
Certifications "2	C	1	CE, UL	./CUL	CE, UL/cUL		CE, U	L/CUL	
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			H=BC						
erature			FX2N-2LC		FX2N-4AD-TC		FX2N-4AD-PT		
Channel			2CH (Temperat	ure input 2CH,	4 CH Input		4 CH Input		
channel			Transistor output 2CH	and CT input 2CH*11)	401	input	401	input	
			Thermocouple type K	, J, R, S, E, T, B, N, PL II,			3-wire platinum resistan	ce thermometer sensor	
Input Types			WRe5-26, U, and L, 3-wi	re platinum resistance	K type thermocouple	J type thermocouple	Pt'	100	
			thermometer sensor	s) Pt100, and JPt100					
			Exam	ples:	-100 to +1200°C /	-100 to +600°C /	-100 to -	+600°C/	
Compensated range			 Type K: -100°C to +1300° 	°C / -100°F to +2400°F	-1480 to +2192°F	-148 to +1112°F	-148 to	+1112°F	
Posolution			• Type J: -100.0°C to +800.0°C / -100°F to +2100°F		0.4°C / 0.72°E 0.3°C / 0.54°E		0.2 to 0.2°C / 0.26 to 0.54°C		
nesolution			0.1°C / 0.1°F 0.4°C / 0.72°F		0.4°C / 0.72°F 0.3°C / 0.54°F		0.2 to 0.3°C / 0.36 to 0.54°F		
Digital Output	mut		• Type K: -100 to +1300 (°C) / -100 to +2400 (°F)	-1000 to +1	20000 (°C) /	-1000 to +	6000 (°C) /	
J			• Type J: -100 to +8000 (°C) / -100 to +2400 (°F)		-1480 to +21920 (°F)		-1480 to -	⊦11120 (°F)	
								C 11 1	
Accuracy			±0.7% of range s	pan ± Toigit *12	±(0.5% of fullscale +1°C)		±1% of full scale		
Conversion Time			500ms (Sam	pling time)	(240ms ±2%) / Num	(240ms ±2%) / Number of used channel		channel	
Isolation			See Notes Belo	ow: *3, *4 & *6	See Notes be	ow: *3, *4 & *6	See Notes below: *3, *4 & *6		
No. of Occupied Points			8 I/O p	oints	8 I/O	points	8 I/O points		
Applicable PLC			FX1N / FX2N / F)	K2NC / FX3U *5	FX1N / FX2N / F	X2NC / FX3U *5	FX1N / FX2N / FX2NC / FX3U *5		
Notes			Control method	: Iwo-position,	-	-	_		
Certifications *2			PID(with auto-tu	ning), PI control	CE U	L/c111			
certifications z			CE, UL	CE, UL/cUL CE, U		LE, UL/CUL CE, UL/CUL		L/CUL	

Notes: (For detailed information please refer to the respective product manuals).

*1: Percentage of full scale

 $\ensuremath{^{\ast}2}\xspace$ For Shipping approvals consult with respective manual

*3: A photocoupler is used to insulate the analog input or output area from the PLC.

*4: Channels are not insulated from each other.

*5: FX2NC-CNV-IF required for FX2NC

*6: A DC/DC converter is used to insulate the power supply from the analog input or output.

*7: Data updated every PLC scan time

*8: FX3U-***-BD required. (*** represents "422", "232", "485", "CNV", or "USB")



*9: If 1 or more channels use the digital filter(s), the time required for A/D conversion will be "5 ms x number of selected channels."

*10: If 1 or more channels use the thermocouple input(s), the input voltage/current data conversion speed will be "1 ms × number of selected channels." *11: CTL-12-S36-8 or CTL-6-P-H (manufactured by U.R.D. Co., Ltd.) *12: Cold contact temperature compensation error Within $\pm 1.0^\circ C$

(within±2.0°C: -100 to -150°C, within±3.0°C: -150 to -200°C)

Dimensions

Unit : mm (inch)





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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