

## What components are required for an FX PLC system?

A basic FX PLC system can consist of a stand-alone base unit, with the functionality and I/O range increased by adding extension I/O and special function modules. The following section provides an overview of options available.

### Base units

The entire FX PLC range can be AC or DC powered with a mix of input and output styles. The PLCs can be programmed with the user friendly GX Works2 programming software, allowing programs to be transferred between different FX PLCs. All PLC base units include an integrated real time clock.

Base units are available with different I/O configurations from 10 to 128 points but can be expanded to 384 points depending upon the FX range selected.

### Extension boards

Except for the FX3GC and FX3UC series, extension adapter boards can be installed directly into the base unit and therefore do not require any additional installation space. For a small number of I/O (2 to 4) an extension adapter boards can be installed directly into the FX1S, FX3G, FX3GE or FX3U controller. Interface adapter boards can also provide the FX PLC with additional RS232, RS422, RS485 or USB interfaces. To connect adapter modules (e.g. Ethernet module) a communication adapter has to be installed (except FX3UC).

### Extension I/O modules

Unpowered and powered extension I/O modules can be added to the FX3G, FX3GC, FX3GE, FX3U and FX3UC PLCs.

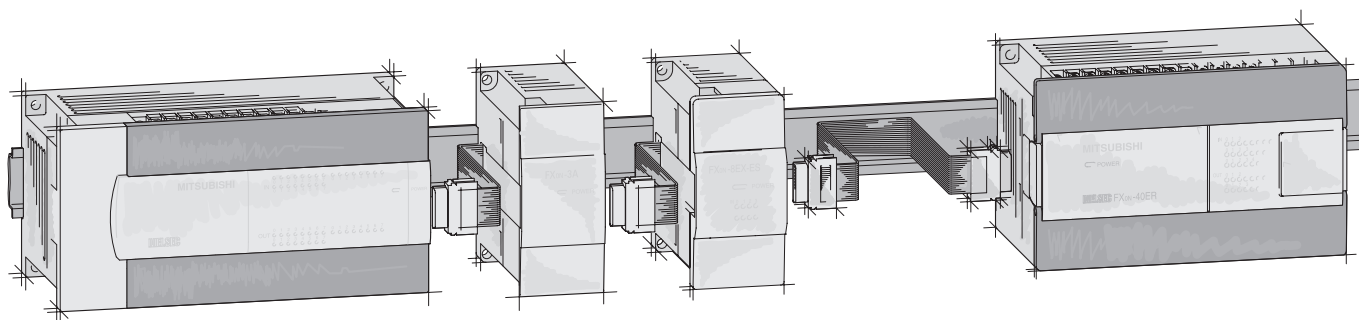
For expansion modules powered by the base unit, the power consumption has to be calculated as the 5 V DC bus can only support a limited number of expansion I/O (for further details please refer to next page – calculation of the power consumption).

### Special function modules

A wide variety of special function modules are available for the FX3G, FX3GC, FX3GE, FX3U and FX3UC PLCs. They cover networking functionality, analog control, pulse train outputs, data logging function and temperature inputs.

### Memory extension and operator terminals

Each FX family base unit (except FX3GC) can be equipped with a memory cassette. The programming unit interface enables the connection of programming tools like PC and hand held programming units as well as graphical operator terminals.



Expansion possibilities		ALPHA 2	FX1S	FX3G	FX3GC	FX3GE	FX3U	FX3UC
Extensions for inside PLC installation	Digital	●	●	—	—	—	—	—
	Analog	●	●	●	—	●	—	—
Extension modules (installation outside the PLC)	Digital	—	—	●	●	●	●	●
	Analog	—	—	●	●	●	●	●
	Temperature	●	—	●	●	●	●	●
	Ethernet	—	●	●	●	●	●	●
	CC-Link	—	—	●	●	●	●	●
	CANopen	—	—	●	●	●	●	●
	Profibus DP	—	—	●	●	●	●	●
	DeviceNet	—	—	●	●	●	●	●
	Modbus RTU/ASCII	—	—	●	●	●	●	●
	SSCNET	—	—	—	—	—	●	●
	J1939	—	—	●	●	●	●	●
	RS232	●	●	●	—	●	●	—
	RS422	—	●	●	—	●	●	—
Communications boards	RS485	—	●	●	—	●	●	—
	USB	—	—	—	—	—	●	—
Communications modules	RS232	—	●	●	●	●	●	●
	RS485	—	●	●	●	●	●	●
Dedicated function modules	High speed counter	—	—	—	—	—	●	●
	Positioning	—	—	—	—	—	●	●
Memory cassettes	●	●	●	—	●	●	●	●
External display	—	—	●	—	—	●	—	—

## Calculation of the power consumption

The power consumption figures on the 5 V DC bus for the special function modules are shown in the specifications tables on the following pages.

The maximum permissible currents on the 5 V DC and 24 V DC bus are shown in the table below.

Modules	Max. current	
	5 V bus	24 V bus
FX3G-14/24M□-ES(ESS)	—	400 mA
FX3G-40/60M□-ES(ESS)	—	400 mA
FX3U-16/32M□-ES(ESS)	500 mA	400 mA
FX3U-48-128M□-ES(ESS)	500 mA	600 mA
FX3UC-16MT/D(DSS)	600 mA	—
FX3UC-32MT/D(DSS)	560 mA	—
FX3UC-64MT/D(DSS)	480 mA	—
FX3UC-96MT/D(DSS)	400 mA	—

The residual currents for the 24 V DC service voltage at different input/output configurations are shown in the tables on the right.

A maximum of 256 I/Os are possible for FX3U/ FX3UC (128 I/Os for FX3G).

Max. residual current values (in mA) for FX3U-16M□/E□□ through FX3U-32M□/E□□ for the permissible configuration

Number of additional outputs	40	25																	
	32	100	50	0															
	24	175	125	75	25														
	16	250	200	150	100	50	0												
	8	325	275	225	175	125	75	25											
	0	400	350	300	250	200	150	100	50	0									
		0	8	16	24	32	40	48	56	64									
		Number of additional inputs																	

Max. residual current values (in mA) for FX3U-48M□/E□□ through FX3U-128M□/E□□ for the permissible configuration

Number of additional outputs	64	0																																							
	56	75	25																																						
	48	150	100	50	0																																				
	40	225	175	125	75	25																																			
	32	300	250	200	150	100	50	0																																	
	24	375	325	275	225	175	125	75	25																																
	16	450	400	350	300	250	200	150	100	50	0																														
	8	525	475	425	375	325	275	225	175	125	75	25																													
	0	600	550	500	450	400	350	300	250	200	150	100	50	0																											
			0	8	16	24	32	40	48	56	64	72	80	88	96																										
		Number of additional inputs																																							

## Sample calculations

The tables below and on the right show different examples for sample power calculation for a PLC system.

The current values for the special function modules can be found in the specifications on the following pages.

Comparison with the current value tables show that the calculated figures for the 5 V bus lie within the allowable ranges.

In the example below all units can be supplied sufficiently with the internal 24 V power supply.

Module	No.	24 V DC calculation		5 V DC calculation	
		Current/module	Calculation	Current/module	Total current
FX3U-80MR/ES	1	600 mA	+600 mA	+500 mA	+500 mA
FX3U-4AD	2	90 mA	-180 mA	110 mA	-220 mA
FX3U-4DA	2	160 mA	-320 mA	120 mA	-240 mA
FX3U-ENET	1	240 mA	-240 mA	—	—
			-140 mA !!!		500-460 mA
					Result: 40 mA (OK!)

An external 24 V power supply has to be added in the example above.

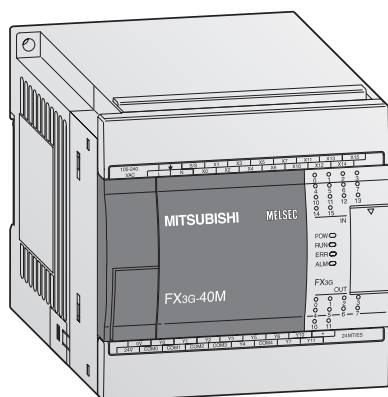


Module	No.	Number of I/Os			24 V DC calculation		5 V DC calculation		
		X	Y	X/Y	Total ①	Total current ②	Current/module	Total current	
FX3U-48MR/ES	1	24	24	—	X = 8 Y = 24 →	+325 mA	500 mA	+500 mA	
FX2N-16EYR-ES/UL	1	—	16	—			—	0 mA	
FX2N-8EX-ES/UL	1	8	—	—			—	0 mA	
FX2N-8EYR-ES/UL	1	—	8	—			—	0 mA	
FX3U-4AD-PT-ADP	1	—	—	—			-50 mA	30 mA	-15 mA
						<b>+275 mA (OK!)</b>		<b>+485 mA (OK!)</b>	
FX2N-32ER-ES/UL	1	16	16	—	X = 16 Y = 0 →	+150 mA residual current for extension unit FX2N-32ER-ES/UL	690 mA	+690 mA	
FX2N-16EX-ES/UL	1	16	—	—			—	0 mA	
FX2N-10PG	1	—	—	8			0 mA	120 mA	-120 mA
FX2N-32CCL	1	—	—	8			-50 mA	130 mA	-130 mA
Result: 64 + 64 + 16 = 144! (< 256) OK!						<b>+100 mA (OK!)</b>		<b>+440 mA (OK!)</b>	

① Total no. of I/Os which are connected to a base unit to calculate the max. residual current values (see tables)

② see tables above (max. residual current values)

## FX3G series



The FX3G series base units are available with 14 to 60 input/output points.

It is possible to choose between relay and transistor output types.

- Integrated USB interface for communication between PLCs and PC
- Integrated serial interface for communication between PCs and HMI
- LEDs for indicating the input and output status
- Detachable terminal blocks for all units
- Slot for memory cassettes
- Integrated real-time clock
- Integrated positioning control
- Exchangeable interface and extension adapters for direct mounting into a base unit
- Expandable with digital I/O modules, special function modules and ADP modules
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3) compatible programming software, HMIs and hand-held programming units

## Base units with 14–24 I/Os

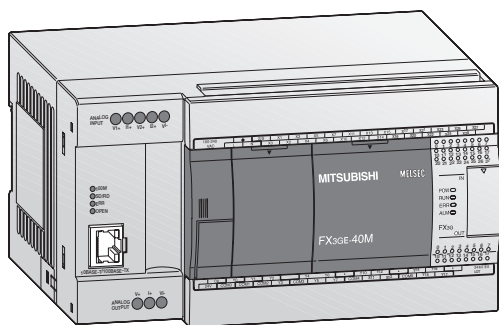
Specifications	FX3G-14 MR/ES	FX3G-14 MT/ESS	FX3G-14 MR/DS	FX3G-14 MT/DSS	FX3G-24 MR/ES	FX3G-24 MT/ESS	FX3G-24 MR/DS	FX3G-24 MT/DSS
Integrated inputs/outputs	14	14	14	14	24	24	24	24
Power supply	100–240 V AC	100–240 V AC	24 V DC	24 V DC	100–240 V AC	100–240 V AC	24 V DC	24 V DC
Integrated inputs	8	8	8	8	14	14	14	14
Integrated outputs	6	6	6	6	10	10	10	10
Output type	Relay	Transistor (source)*	Relay	Transistor (source)*	Relay	Transistor (source)*	Relay	Transistor (source)*
Power consumption W	31	31	19	19	32	32	21	21
Weight kg	0.50	0.50	0.50	0.50	0.55	0.55	0.55	0.55
Dimensions (WxHxD) mm	90x90x86	90x90x86	90x90x86	90x90x86	90x90x86	90x90x86	90x90x86	90x90x86
<b>Order information</b>	Art. no. 231466	231470	231474	231478	231467	231471	231475	231479

## Base units with 40–60 I/Os

Specifications	FX3G-40 MR/ES	FX3G-40 MT/ESS	FX3G-40 MR/DS	FX3G-40 MT/DSS	FX3G-60 MR/ES	FX3G-60 MT/ESS	FX3G-60 MR/DS	FX3G-60 MT/DSS
Integrated inputs/outputs	40	40	40	40	60	60	60	60
Power supply	100–240 V AC	100–240 V AC	24 V DC	24 V DC	100–240 V AC	100–240 V AC	24 V DC	24 V DC
Integrated inputs	24	24	24	24	36	36	36	36
Integrated outputs	16	16	16	16	24	24	24	24
Output type	Relay	Transistor (source)*	Relay	Transistor (source)*	Relay	Transistor (source)*	Relay	Transistor (source)*
Power consumption W	37	37	25	25	40	40	29	29
Weight kg	0.70	0.70	0.70	0.70	0.85	0.85	0.85	0.85
Dimensions (WxHxD) mm	130x90x86	130x90x86	130x90x86	130x90x86	175x90x86	175x90x86	175x90x86	175x90x86
<b>Order information</b>	Art. no. 231468	231472	231476	231480	231469	231473	231477	231481

\* Units with sink transistor outputs on request.

## FX3GE series



The FX3GE series base units are available with 24 or 40 input/output points.

All base units are equipped with relay outputs.

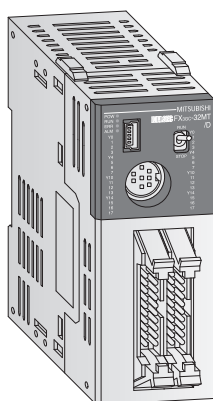
- Integrated analog input (2ch)
- Integrated analog output (1ch)
- Integrated Ethernet interface
- Integrated USB interface for communication between PLC and PC
- Integrated serial interface for communication between PLC and HMI
- LEDs for indicating the input and output status

- Connection of inputs and outputs via terminals.
- Slot for memory cassettes
- Integrated positioning control
- Expandable with special function modules and ADP modules
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3) compatible programming software, HMIs and hand-held programming units

### Base units with 24/40 I/Os

Specifications	FX3GE-24MR/ES	FX3GE-40MR/ES
Integrated inputs/outputs	24	40
Power supply	100–240 V AC	100–240 V AC
Integrated inputs	14	24
Integrated outputs	10	16
Output type	Relay	Relay
Power consumption	W 32	37
Weight	kg 0.6	0.8
Dimensions (WxHxD)	mm 130x90x86	175x90x86
<b>Order information</b>	Art. no. 264869	264870

## FX3GC series



The FX3GC series base units are available with 32 input/output points.

All base units are equipped with transistor outputs.

- Integrated USB interface for communication between PLC and PC
- Integrated serial interface for communication between PLC and HMI
- LEDs for indicating the input and output status
- Connection of inputs and outputs via connectors.
- Integrated positioning control

- Expandable with digital I/O modules, special function modules and ADP modules
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3) compatible programming software, HMIs and hand-held programming units

### Base units with 32 I/Os

Specifications	FX3GC-32MT/D	FX3GC-32MT/DSS
Integrated inputs/outputs	32	32
Power supply	24 V DC	24 V DC
Integrated inputs	16	16
Integrated outputs	16	16
Output type	Transistor (sink type)	Transistor (source type)
Power consumption	W 8	8
Weight	kg 0.2	0.2
Dimensions (WxHxD)	mm 34x90x87	34x90x87
<b>Order information</b>	Art. no. 251545	251546