

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.

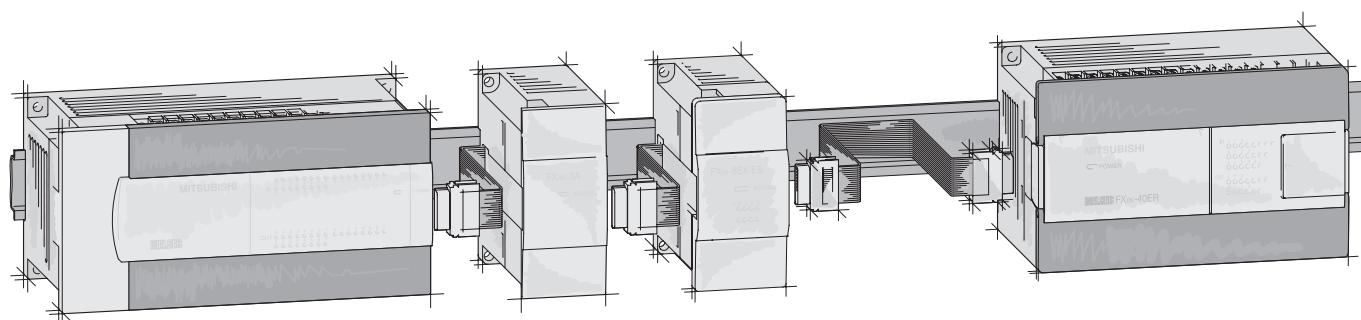
For expansion modules powered by the base unit, the power consumption has to be calculated as the 5 V DC bus can only support a limited number of expansion I/O (for further details please refer to next page – calculation of the power consumption).

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					

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					

5 Compact PLCs

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!)

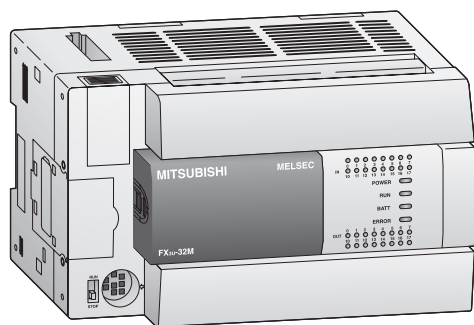
An external 24 V power supply has to be added in the example above.

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
						+275 mA (OK!)		+485 mA (OK!)	
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
						+100 mA (OK!)		+440 mA (OK!)	

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)

FX3U series



The FX3U series base units are available with 16, 32, 48, 64, 80 or 128 input/output points expandable to 384 points.

Models are available for selection with relay or transistor outputs.

- Integrated serial interface for communication between PCs and HMI
- Integrated positioning control
- Exchangeable interface modules for direct mounting into a base unit
- LEDs for indicating the input and output status
- Slot for memory cassettes
- Integrated real-time clock
- 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 16–128 I/Os

Specifications	FX3U-16 MR/ES	FX3U-32 MR/ES	FX3U-32 MS/ES	FX3U-48 MR/ES	FX3U-64 MR/ES	FX3U-64 MS/ES	FX3U-80 MR/ES	FX3U-128 MR/ES
Integrated inputs/outputs	16	32	32	48	64	32	80	128
Power supply	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC
Integrated inputs	8	16	16	24	32	32	40	64
Integrated outputs	8	16	16	24	32	32	40	64
Output type	Relay	Relay	Triac	Relay	Relay	Triac	Relay	Relay
Power consumption W	30	35	35	40	45	45	50	65
Weight kg	0.6	0.65	0.65	0.85	1.0	1.0	1.2	1.8
Dimensions (WxHxD) mm	130x90x86	150x90x86	150x90x86	182x90x86	220x90x86	220x90x86	285x90x86	350x90x86
Order information	Art. no. 231486	231487	237263	231488	231489	237264	231490	231491

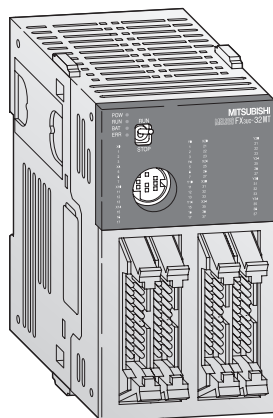
Specifications	FX3U-16 MT/ESS	FX3U-32 MT/ESS	FX3U-48 MT/ESS	FX3U-64 MT/ESS	FX3U-80 MT/ESS	FX3U-128 MT/ESS
Integrated inputs/outputs	16	32	48	64	80	128
Power supply	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC	100–240 V AC
Integrated inputs	8	16	24	32	40	64
Integrated outputs	8	16	24	32	40	64
Output type	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*
Power consumption W	30	35	40	45	50	65
Weight kg	0.6	0.65	0.85	1.0	1.2	1.8
Dimensions (WxHxD) mm	130x90x86	150x90x86	182x90x86	220x90x86	285x90x86	350x90x86
Order information	Art. no. 231492	231493	231494	231495	231496	231497

Specifications	FX3U-16 MR/DS	FX3U-32 MR/DS	FX3U-48 MR/DS	FX3U-64 MR/DS	FX3U-80 MR/DS
Integrated inputs/outputs	16	32	48	64	80
Power supply	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Integrated inputs	8	16	24	32	40
Integrated outputs	8	16	24	32	40
Output type	Relay	Relay	Relay	Relay	Relay
Power consumption W	25	30	35	40	45
Weight kg	0.6	0.65	0.85	1.0	1.2
Dimensions (WxHxD) mm	130x90x86	150x90x86	182x90x86	220x90x86	285x90x86
Order information	Art. no. 231498	231499	231500	231501	231502

Specifications	FX3U-16 MT/DSS	FX3U-32 MT/DSS	FX3U-48 MT/DSS	FX3U-64 MT/DSS	FX3U-80 MT/DSS
Integrated inputs/outputs	16	32	48	64	80
Power supply	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Integrated inputs	8	16	24	32	40
Integrated outputs	8	16	24	32	40
Output type	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*
Power consumption W	25	30	35	40	45
Weight kg	0.6	0.65	0.85	1.0	1.2
Dimensions (WxHxD) mm	130x90x86	150x90x86	182x90x86	220x90x86	285x90x86
Order information	Art. no. 231503	231504	231505	231506	231507

* Units with sink type transistor outputs on request.

FX3UC series



The base units of the FX3UC series are available in versions with 16, 32, 64 or 96 inputs/outputs (expandable to 384 I/Os).

The units are available with transistor outputs only.

- Integrated serial interface for communication between PCs and HMI
- Same instruction set as FX3U
- Integrated positioning control
- Very compact dimensions
- LEDs for indicating the input and output status

- Slot for memory cassette
- Adapter modules and system cabling sets available for units with ribbon cable connectors
- 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 16–96 I/Os

Specifications	FX3UC-16 MT/DSS	FX3UC-16 MR/D-T	FX3UC-16 MR/DS-T	FX3UC-32 MT/DSS	FX3UC-64 MT/DSS	FX3UC-96 MT/DSS	
Integrated inputs/outputs	16	16	16	32	64	96	
Power supply	24 V DC (+20 %, -15 %)	24 V DC	24 V DC	24 V DC (+20 %, -15 %)	24 V DC (+20 %, -15 %)	24 V DC (+20 %, -15 %)	
Integrated inputs	8	8	8	16	32	48	
Integrated outputs	8	8	8	16	32	48	
Output type	Transistor (source type)*	Relay	Relay	Transistor (source type)*	Transistor (source type)*	Transistor (source type)*	
Power consumption	W	6	6	8	11	14	
Weight	kg	0.2	0.25	0.25	0.3	0.35	
Dimensions (WxHxD)	mm	34x90x74	34x90x74	34x90x74	59.7x90x74	85.4x90x74	
Order information	Art. no.	231508	237305	237306	231509	231510	231511

*Units with sink type transistor outputs on request.

System cabling

A choice of terminal blocks with screw or spring terminals are available for easy wiring of the FX3UC modules with standard ribbon cable connectors.

For detailed information about the terminal blocks, please refer to the FX Family catalogue.

