



PROGRAMMABLE CONTROLLERS
MELSEC-F

FX3U系列微型可编程控制器

硬件手册



手册编号	JY997D50401
副编号	C
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承蒙购买本产品，在此深表谢意。

本手册的内容是关于FX3U系列可编程控制器（基本单元）各部件的名称、外形尺寸、安装以及配线，从FX3U用户手册【硬件篇】中节选出来的有关内容。有关详细内容请查阅FX3U用户手册【硬件篇】。

在使用之前，请阅读FX3U用户手册【硬件篇】以及关联产品手册，在熟知了设备的知识、安全信息及注意事项等所有相关内容之后再使用本设备。此外，请妥善保管产品所附带的手册以便必要时取阅，并请务必将其交付到最终用户的手中。关于商标本手册中所记载的公司名称、产品名称为各自公司的注册商标或者商标。

该印刷品发行于2016年9月。在未告之的情况下产品的规格可能有所变更，请预先了解。

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安全方面注意事项 (使用之前请务必阅读)

在本使用说明书中，安全注意事项的等级用 **警告**、 **注意** 进行区分。

警告	错误使用时，有可能会引起危险，导致死亡或是重伤事故的发生。
注意	错误使用时，有可能会引起危险，导致中度伤害或受到轻伤，也有可能造成物品方面的损害。

此外，即使是 **注意** 中记载的事项，根据状况的不同也可能导致重大事故的发生。两者记载的内容都很重要，请务必遵守。

启动、维护保养时的 注意事项	警告
<ul style="list-style-type: none"> 在通电时请勿触碰到端子。否则有触电的危险性，并且有可能引起误动作。 进行清扫以及拧紧接线端子时，请务必在断开所有外部电源后方可操作。如果在通电的状态下进行操作，则有触电的危险。 要在运行过程中更改程序、执行强制输出、RUN、STOP 等操作前，请务必先熟读手册，在充分确认安全的情况下方可进行操作。操作错误有可能导致机械破损及事故发生。 请勿从多个外围设备（编程工具以及GOT）同时更改可编程控制器中的程序。否则可能会破坏可编程控制器的程序，引起误动作。 	

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启动、维护保养时的 注意事项	警告
<ul style="list-style-type: none"> 请按照FX3U系列用户手册【硬件篇】指定的内容，正确使用存储设备备份用电池。 <ul style="list-style-type: none"> 请勿用做指定以外的用途。 请正确连接电池。 请勿对电池进行充电、拆卸、加热、投入火中、短路、反向连接、焊接、吞咽或焚烧，过度施压（震动、冲击、掉落等）等操作。 请避免在高温或阳光直射下使用或存储电池。 请勿将漏液或其它内容物置于水中、靠近火源或直接接触。 若对电池处理不当，可能会产生由于过度发热、破裂、点火、燃烧、漏液、变形等原因，导致造成人员受伤等人身影响或发生火灾、设备、其他机器等的故障或误动作的危险。 	

启动、维护保养时的 注意事项	注意
<ul style="list-style-type: none"> 对存储设备盒进行拆装时请务必将电源切断后进行。如果在通电状态下进行拆装的话，有可能造成存储内容及存储设备盒本身的损伤。 请勿擅自拆解、改动产品。否则有可能引起故障、误动作、火灾。 * 关于维修事宜，请向三菱电机自动化(中国)有限公司维修部咨询。 对扩展电缆等连接电缆进行拆装时请在断开电源之后再进行操作。否则有可能引起故障、误动作。 在对以下的设备进行拆装时请务必将电源切断。否则有可能引起故障、误动作。 <ul style="list-style-type: none"> 外围设备、显示模块、功能扩展板 扩展单元/模块、特殊适配器 电池、存储设备盒 	

废弃时的注意事项	注意
<ul style="list-style-type: none"> 废弃产品的时候，请作为工业废品来处理。对电池进行废弃处理时，请按照各地区指定的法律单独进行处理。（有关欧盟国家详细的电池规定请参照FX3U系列用户手册【硬件篇】） 	

运输和保管注意事项	注意
<ul style="list-style-type: none"> 运输可编程控制器时，请务必在运输前对可编程控制器上电，确认「BATT的LED灯为OFF」以及「电池的寿命」。如BATT的LED处于ON时，及电池寿命过期的状态下进行运输的话，在运输过程中备份的数据有可能不能正确保存。 可编程控制器属于精密设备，因此在运输期间请避免使其遭受超过2.1节中记载的一般规格值的冲击。否则可能造成可编程控制器故障。运输之后，请对可编程控制器进行动作确认。 在运送锂电池时，必须按照运输规定进行操作。（有关规定对象机型的详细内容请参照FX3U系列用户手册【硬件篇】） 	

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获取本手册及关联手册的方法

手册的获取方法
关于产品手册（印刷品），请向销售本产品的商店询问。

关联手册

FX3U系列可编程控制器（基本单元）里面同时附有此说明书（硬件手册）。有关FX3U系列可编程控制器的详细说明、编程手册的指令说明和特殊扩展等的内容，请分别阅读各自的有关资料。

手册名称	手册编号	内容
FX3U 用户手册【硬件篇】	JY997D19801 【另册】	FX3U系列可编程控制器本体的输入输出规格、配线、安装、维护保养等的关于硬件的详细说明
FX3S・FX3G・FX3GC・FX3U・FX3UC编程手册【基本・应用指令说明篇】	JY997D19401 【另册】	关于基本指令说明・步进梯形图/SFC解说・应用指令解说・各种软元件的解说等，程序编程的有关内容说明
MELSEC-Q/L/F 结构化编程手册（基础篇）	SH-080903 【另册】	关于编写结构化程序中必要的编程方法、规格、功能等的说明
FX结构化编程手册【软元件・公共说明篇】	JY997D67701 【另册】	关于GX Works2的结构化工程中被提供软元件、参数等的说明
FX结构化编程手册【顺控指令篇】	JY997D67601 【另册】	关于GX Works2的结构化工程中被提供可编程控制器指令的说明
FX结构化编程手册【应用函数篇】	JY997D67501 【另册】	关于GX Works2的结构化工程中被提供应用函数的说明
FX用户手册【通信篇】	JY997D19701 【另册】	关于简易PLC间链接・并联链接・计算机链接・RS无协议通讯・根据FX2N-2321F的无协议通讯的有关内容说明
FX3S・FX3G・FX3GC・FX3U・FX3UC用户手册【模拟量控制篇】	JY997D19601 【另册】	关于FX3S・FX3G・FX3GC・FX3U・FX3UC系列的模拟量控制规格、编程方法的有关内容说明
FX3S・FX3G・FX3GC・FX3U・FX3UC用户手册【定位控制篇】	JY997D19501 【另册】	关于FX3S・FX3G・FX3GC・FX3U・FX3UC系列的定位控制规格、编程方法的有关内容说明

船级标准

关于船级标准及与其对应的产品类型的最新信息，请咨询三菱电机。

关于UL、cUL标准对应产品

FX3U系列基本单元、FX3U系列特殊适配器及FX2N系列输入输出扩展单元/模块的UL，cUL规格品如下所示。

UL, cUL文件编号	E95239
对应产品:	下列的MELSEC FX3U系列
FX3U-★MR/ES-A	FX3U-★MT/ES-A FX3U-★MT/ESS
★★如右所示: 16, 32, 48, 64, 80, 128	
FX3U-★MR/DS	FX3U-★MT/DS FX3U-★MT/DSS
★★如右所示: 16, 32, 48, 64, 80	
FX3U-★MR/UA1	FX3U-★MS/ES
★★如右所示: 32, 64	
FX3U-232ADP(-MB)	FX3U-485ADP(-MB)
FX3U-4AD-ADP	FX3U-4DA-ADP FX3U-3A-ADP
FX3U-4AD-PT-ADP	FX3U-4AD-PTW-ADP FX3U-4AD-PNK-ADP
FX3U-4AD-TC-ADP	
FX3U-4HSX-ADP	FX3U-2HSY-ADP
FX3U-CF-ADP	FX3U-ENET-ADP

对应产品: 下列的MELSEC FX2N系列

FX2N-★ER-ES/UL	FX2N-★ET-ESS/UL
★★如右所示: 32, 48	
FX2N-48ER-DS	FX2N-48ET-DSS FX2N-48ER-UA1/UL
FX2N-8ER-ES/UL	FX2N-8EX-ES/UL FX2N-8EYR-ES/UL
FX2N-8EYR-S-ES/UL	FX2N-8EYT-ESS/UL FX2N-8EX-UA1/UL
FX2N-16EX-ES/UL	FX2N-16EYR-ES/UL FX2N-16EYT-ESS/UL
FX2N-16EYS	

关于对应EC指令(CE标记) 事项

不保证按照本内容所生产的所有机械装置都能适用以下指令。关于对EMC指令以及低电压(LVD)指令的适用与否的判断，需要由机械装置生产厂家自身作出最终的判断。有关详细内容，请问最近的三菱电机分公司。

EMC指令适用要求

对于以下的产品，按照有关文献中的指示使用时，通过（以下的特定规格的）直接的测试以及（与技术构成文件的编制有关系的）设计分析，对于电磁相容性的欧洲指令（2014/30/EU）的适用进行演示。关于以下未记载产品的详细说明请参照各产品手册或者相关手册。

注意事项

请在一般的工业环境下使用本产品。

本产品的适用项目

类型： 可编程控制器(开放型设备)
对应产品：下述时期生产的MELSEC FX3U系列

2005年5月1日以后所制造的产品	FX3U-★MR/ES-A ★★如右所示: 16, 32, 48, 64, 80	FX3U-2HSY-ADP FX3U-FLROM-16 FX3U-7DM FX3U-232ADP FX3U-4AD-ADP FX3U-4AD-PT-ADP FX3U-232-BD FX3U-485-BD FX3U-USB-BD FX3U-FLROM-64 FX3U-★MT/ES-A ★★如右所示: 16, 32, 48, 64, 80	FX3U-2HSY-ADP FX3U-FLROM-64L FX3U-485ADP FX3U-4DA-ADP FX3U-4AD-TC-ADP FX3U-422-BD FX3U-485-BD FX3U-485ADP-MB FX3U-4AD-PTW-ADP FX3U-4AD-PNK-ADP FX3U-3A-ADP FX3U-3A-BD FX3U-★MR/UA1 FX3U-★MS/ES ★★如右所示: 32, 64
2005年6月1日以后所制造的产品			
2005年11月1日以后所制造的产品			
2006年2月1日以后所制造的产品			
2007年4月1日以后所制造的产品			
2007年12月1日以后所制造的产品			
2009年6月1日以后所制造的产品			
2010年8月1日以后所制造的产品			
2010年9月1日以后所制造的产品			
2011年5月1日以后所制造的产品			
2012年2月1日以后所制造的产品			

电磁兼容性(EMC)指令	备注
EN61131-2:2007 可编程控制器 - 设备要求事项以及测试	在以下的测试项目中对与本产品有关的项目进行了测试。 EMI • 射频辐射测量 • 传导辐射测量 EMS • 辐射电磁场 • 电快速瞬变脉冲群 • 静电放电 • 抗高能量浪涌 • 电压过低和中断 • 传导性射频 • 电源频率磁场

对应产品：以下的时间里所生产的MELSEC FX2N系列

1997年7月1日以后所制造的产品	FX2N-★ER-ES/UL ★★如右所示: 32, 48	FX2N-★ET-ESS/UL FX2N-16EX-ES/UL FX2N-16EYR-ES/UL FX2N-16EYT-ESS/UL FX2N-48ER-DS FX2N-48ER-UA1/UL FX2N-8ER-ES/UL FX2N-8EYR-ES/UL FX2N-8EYT-ESS/UL
1998年4月1日以后所制造的产品		
1998年8月1日以后所制造的产品		
2005年8月1日以后所制造的产品		
2010年9月1日以后所制造的产品		

上記产品中，
截止到2002年3月31日所生产的产品：
[符合EN50081-2(EN61000-6-4)以及EN50082-2]

2002年4月1日~2006年4月30日之内所生产的产品：
[符合EN50081-2(EN61000-6-4)以及EN61131-2:1994 +A11:1996 +A12:2000]

2006年5月1日以后所生产的产品：[符合EN61131-2:2007]

电磁兼容性(EMC)指令	备注
EN61000-6-4:2007 工业环境的放射标准 EN50081-2:1993 电磁兼容性 包括标准	在以下的测试项目中，对与本产品相关的项目进行了测试。 • 发射限值-外壳 • 发射限值-低压交流电源 • 发射限值-无线通信/网络
EN50082-2:1995 电磁兼容性 一般的工业环境标准	在以下的测试项目中，对与本产品相关的项目进行了测试。 • 辐射电磁场辐射抗扰度试验 • 快速瞬变抗扰度试验 • 静电放电抗扰度试验 • 传导干扰抗扰度试验 • 电源磁场抗扰度试验
EN61131-2:1994 /A11:1996 /A12:2000 可编程控制器 - 设备要求事项以及测试	在以下的测试项目中，对与本产品相关的项目进行了测试。 • 辐射电磁场 • 电快速瞬变脉冲群 • 静电放电 • 抗衰减震振荡波
EN61131-2:2007 可编程控制器 - 设备要求事项以及测试	在以下的测试项目中对与本产品有关的项目进行了测试。 EMI • 射频辐射测量 • 传导辐射测量 EMS • 辐射电磁场 • 电快速瞬变脉冲群 • 静电放电 • 抗高能量浪涌 • 电压过低和中断 • 传导性射频 • 电源频率磁场

低电压(LVD)指令适用要求

对于以下的产品，按照有关文献中的指示使用时，通过(以下特定规格的)直接的测试以及(与技术构成文件编制有关系的)设计分析，对于欧洲低电压指令(2014/35/EU)的适用进行演示。

类型： 可编程控制器(开放型设备)

对应产品：以下的时间里所生产的MELSEC FX3U系列

2005年5月1日以后所制造的产品	FX3U-★MR/ES-A ★★如右所示: 16, 32, 48, 64, 80	
2005年11月1日以后所制造的产品	FX3U-★MT/ES-A ★★如右所示: 16, 32, 48, 64, 80	FX3U-★MT/ESS
2006年2月1日以后所制造的产品	FX3U-128MR/ES-A FX3U-128MT/ESS FX3U-★MR/DS ★★如右所示: 16, 32, 48, 64, 80	FX3U-128MT/ES-A
2010年9月1日以后所制造的产品	FX3U-★MR/UA1 ★★如右所示: 32, 64	FX3U-★MS/ES

低电压(LVD)指令	备注
EN61131-2:2007 可编程控制器 - 设备要求事项以及测试	对于本产品，在满足EN61131-2:2007的条件下，对合适的控制柜中所放置的部件进行了测试。

对应产品：以下的时间里所生产的MELSEC FX2N系列

1997年7月1日以后所制造的产品	FX2N-★ER-ES/UL ★★如右所示: 32, 48	FX2N-★ET-ESS/UL FX2N-16EYR-ES/UL FX2N-48ER-DS FX2N-48ER-UA1/UL FX2N-8ER-ES/UL FX2N-8EYR-ES/UL FX2N-8EYR-S-ES/UL
1998年4月1日以后所制造的产品		
1998年8月1日以后所制造的产品		
2005年8月1日以后所制造的产品		
2010年9月1日以后所制造的产品		

上記产品中，
截止到2002年3月31日所生产的产品：[符合IEC1010-1]
2002年4月1日~2006年4月30日之内所生产的产品：
[符合EN61131-2:1994 +A11:1996 +A12:2000]

2006年5月1日以后所生产的产品：[符合EN61131-2:2007]

低电压(LVD)指令	备注
IEC1010-1:1990 /A1:1992 对于计量、控制以及测试用的电气装置的安全要求事项 - 一般要求事项	对于本产品，在满足IEC1010-1:1990 +A:1992的条件下，对合适的控制柜中所放置的部件进行了测试。
EN61131-2:1994:2007 /A11:1996 /A12:2000 可编程控制器 - 设备要求事项以及测试	对于本产品，在满足EN61131-2:1994 +A11:1996 +A12:2000, :2007的条件下，对合适的控制柜中所放置的部件进行了测试。

EC指令适用的注意

控制盘内的设置

FX3U系列可编程控制器，请在导电的电屏控制盘内安装后使用。
可编程控制器为开放型设备，必须安装在导电性的控制盘内使用。请连接控制盘与其上盖(便于传导)。控制盘内的安装会很大程度上影响系统安全，正确安装有利于屏蔽外界干扰。

模拟量产品使用时的注意

模拟量产品是按照符合欧洲标准的要求制造的。
在计量及控制方面对精密度有较高要求的情况下，建议实施以下内容：
对于模拟量产品，由于是对电磁干扰很敏感的产品，因此请注意其使用方法。
在连接传感器或者执行机构的专用电缆时，请按照这些设备的生产厂家的有关连接要求进行操作。
本公司推荐使用屏蔽线。这样即使在未实施其它的EMC对策的情况下，在有干扰的环境中，其使用时的感应误差可以保持在+10%、-10%以内。
如果进一步实施以下的EMC对策的话，所产生的效果可以将感应误差减轻。

- 由于模拟量电缆易于受到影响，因此请不要将其靠近主电路线及高压电线、负荷线，更不要与这些线捆扎在一起。否则将容易受到电磁干扰及电涌感应的影响。请尽量将模拟量电缆各自分开布置。
- 对于电缆请使用屏蔽线。在将屏蔽线接地的情况下，请仅将电缆一侧进行接地。
- 在将模拟量值(AD转换后的值)用于程序中的情况下，请使用平均值数据。通过EMC可以减轻感应误差对控制所施加的影响。通过使用FX3U的编程程序或是模拟量特殊适配器以及模拟量特殊扩展模块，可获取关于平均值的数据。

对捆包搭售(附属)品的确认

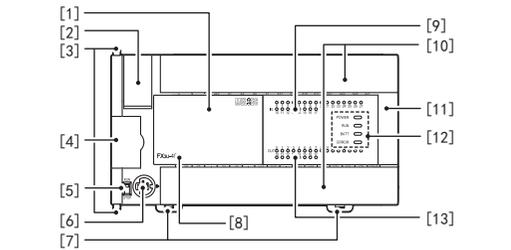
请对以下的产品以及附件是否齐备进行确认。

	附属品	
■ 基本单元		
FX3U-16M□~ FX3U-128M□	产品本体 防尘纸 手册[中文(*1)/英文]	1台 1个 1本
■ 输入输出扩展单元		
FX2N-32E□, FX2N-48E□	产品本体 扩展电缆 输入输出编号标签	1台 1根 1个
■ 输入输出扩展模块		
FX2N-8E□, FX2N-16E□	产品本体 输入输出编号标签	1台 1个

(*1) FX3U-□□M□/ES为日文。

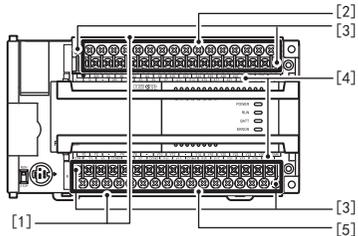
1. 产品概要

1.1 各部分的名称



No.	名称	
[1]	前盖	
[2]	电池盖	
[3]	特殊适配器连接用插孔(2处)	
[4]	功能扩展端口虚拟盖板	
[5]	RUN/STOP开关	
[6]	外部设备连接用接口	
[7]	DIN导轨安装用挂钩	
[8]	型号显示(简称)	
[9]	输入显示LED(红)	
[10]	端子台盖板	
[11]	扩展设备连接用接口盖板	
[12]	动作状态显示LED	
	POWER	绿 通电状态时亮灯
	RUN	绿 运行中亮灯
	BATT	红 电池电压过低时亮灯
	ERROR	红 程序出错时闪烁
[13]	ERROR	红 CPU出错时亮灯
	输出显示LED(红)	

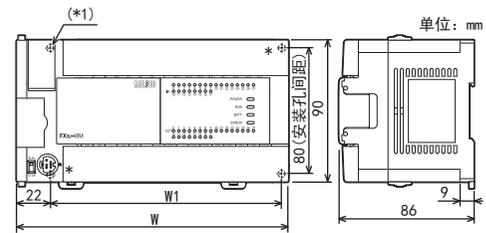
端子盖板处于打开状态



No.	名称
[1]	端子台保护盖
[2]	电源、输入(X)端子
[3]	端子台拆装用螺栓(FX3U-16M□不能拆装。)
[4]	端子名称
[5]	输出(Y)端子

"-A"产品上没有端子台保护盖。

1.2 外形尺寸及重量



- (*) 2-φ4, 5安装孔: FX3U-16M□、FX3U-32M□、FX3U-32MR/UA1(除外)
4-φ4, 5安装孔: FX3U-48M□、FX3U-64M□、FX3U-80M□、
FX3U-128M□、FX3U-32MR/UA1
在FX3U-16M□、FX3U-32M□(FX3U-32MR/UA1除外)中没有*部的
安装孔。

型号	W(mm)	W1(mm)	安装孔间距	重量(kg)
FX3U-16M□	130	103		0.6
FX3U-32M□(*2)	150	123		0.65
FX3U-48M□	182	155		0.85
FX3U-64M□(*3)	220	193		1.00
FX3U-80M□	285	258		1.20
FX3U-128M□	350	323		1.80

(*2) FX3U-32MR/UA1与FX3U-48M□相同。

(*3) FX3U-64MR/UA1与FX3U-80M□相同。

- 外壳颜色
 - 本体: 芒塞尔色0.086Y/7.64/0.81
 - 前盖板: 芒塞尔色N1.5
- 安装
 - 35mm宽DIN导轨、或者直接(螺栓)安装(M4)

2. 安装工程(一般规格)

关于输入输出扩展单元/模块、特殊适配器、功能扩展板等请参照FX3U用户手册[硬件篇]。

安装时的注意 **注意**

- 请在手册所记载的一般规格(2.1节)的环境下使用。请勿在有灰尘、油烟、导电性粉尘、腐蚀性气体(海风、Cl₂、H₂S、SO₂、NO₂等)、可燃性气体的场所、曝露在高温、结露、风雨中的场所、有振动、冲击的场所中使用。否则有可能导致触电、火灾、误动作、产品损坏以及变质。
- 请勿直接接触产品的导电部位。否则有可能引起误动作、故障。
- 产品安装时,请使用DIN导轨、或者安装螺丝牢固地固定。
- 请将产品安装在平整的表面上。安装面如果凹凸不平,会对电路板造成过度外力,从而导致故障发生。
- 在进行螺栓孔加工及配线作业时,请不要将切屑及电线头落入可编程控制器的通风孔内。否则有可能导致火灾、故障及误动作。
- 可编程控制器的通风孔上所安装的防尘罩请在施工结束之后将其拆下。否则有可能导致火灾、故障及误动作。
- 扩展电缆、外围设备连接用电缆、输入输出电缆、电池等的连接电缆请牢固地安装在所规定的连接器上。接触不良会导致误动作。
- 在对以下的设备进行拆装时请务必将电源切断。否则有可能引起故障、误动作。
 - 外部设备、显示模块、功能扩展板
 - 扩展单元/模块、特殊适配器
 - 电池、存储器盒

附录

- 对于附件中的防尘罩,请在安装配线施工中将其安装在通风孔上。
- 为了防止温度的上升,请不要将设备安装在地面、天花板上或者将其安装成垂直方向。请务必按照2.2节的图所示水平地安装在墙面上。
- 在模块本身与其它设备或者建筑物之间(A部分)请留出50mm以上的空间。此外,请尽量使其远离高压线、高压设备、动力设备。

配线时的注意事项 **警告**

- 进行安装、接线等作业时,请务必在外部将所有电源均断开后方可进行操作。否则有触电、产品损坏的危险。

2.1 一般规格

项目	规格				
环境温度	0~55°C之间动作 -25~75°C之间存放				
相对湿度	5~95%RH(防止结露)之间动作				
抗振(*1)	DIN导轨安装时	频率(Hz)	加速度(m/s ²)	单向振幅(mm)	X、Y、Z各方向10次(合计各80分)
		10~57	-	0.035	
	57~150	4.9	-		
直接安装时	10~57	-	0.075		
	57~150	9.8	-		
耐冲击(*1)	147m/s ² 、作用时间11ms、正弦半波脉冲X、Y、Z各方向3次				
抗电磁干扰	由电磁干扰电压1000Vp-p、电磁干扰幅度1μs、上升沿触发1ms、周期30~100Hz的电磁干扰模拟器				
耐电压(*2)	AC1.5kV 1分钟	各端子与接地端子之间			
	AC500V 1分钟				
绝缘电阻(*2)	经DC500V绝缘电阻计测量后5MΩ以上				
接地	D种接地(接地电阻:100Ω以下) <不允许与强电系统共同接地>(*3)				
使用环境	无腐蚀性、可燃性气体,导电性尘埃(灰尘)不严重的地点				
使用高度	2000m以下(*4)				

(*1) 以IEC61131-2为判断基准。

(*2) 耐电压和绝缘电阻如下表所示。

端子	耐电压	绝缘电阻
基本单元·输入输出扩展单元/模块的端子		
电源端子(AC电源)与接地端子之间	AC1.5kV 1分钟	经DC500V绝缘电阻计测量后5MΩ以上
电源端子(DC电源)与接地端子之间	AC500V 1分钟	
DC24V 供给电源及输入端子(DC24V)与接地端子之间	AC500V 1分钟	
输入端子(AC100V)与接地端子之间	AC1.5kV 1分钟	
输出端子(继电器)与接地端子之间	AC1.5kV 1分钟	
输出端子(晶体管)与接地端子之间	AC500V 1分钟	
输出端子(晶闸管)与接地端子之间	AC1.5kV 1分钟	
功能扩展板·特殊适配器·特殊功能单元/模块的端子		
功能扩展板的端子与接地端子之间	不可	不可
特殊适配器的端子与接地端子之间	AC500V 1分钟	经DC500V绝缘电阻计测量后5MΩ以上
特殊功能单元/模块	参照各手册	

关于不同产品的端子耐电压、绝缘电阻测试的有关内容请参照以下的手册。

→FX3U用户手册[硬件篇]

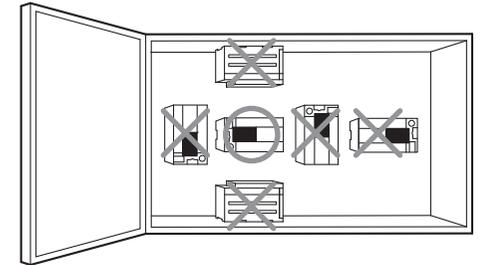
(*3) 关于共同接地请参照接地(3.3节)。

(*4) 在加压至大气压以上的环境下不能使用。否则有可能发生故障。

2.2 设置场所

请设置为一般规格(2.1节)、使用上的注意及其附注中所记载的环境。

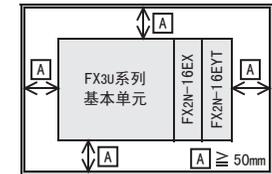
盘面的使用场所



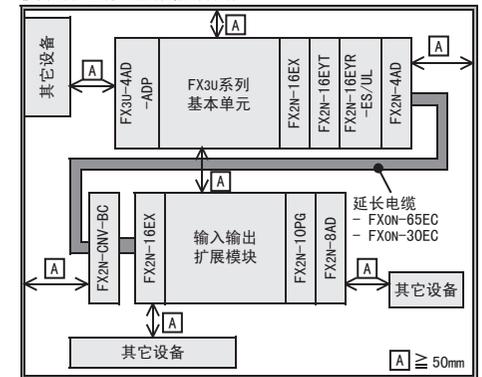
盘内空间

PLC以基本单元为中心,在其左右连接扩展单元。如有增加扩展单元预定的时候,请务必留出必要的空间。

未使用扩展延长电缆的构成



使用延长电缆配置成2段的构成



2.2.1 防尘罩的粘贴

在进行安装、配线施工之前,请将防尘罩粘贴到通风孔上。

→粘贴要领请参考防尘罩上所记载的内容。

此外,安装、配线施工结束之后,请务必将其取下。

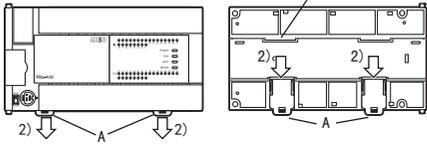
2.3 DIN导轨的安装/拆卸

产品可以安装在DIN46277 (35mm宽度)的DIN导轨上。在此,对基本单元的安装相关事项进行说明。关于输入输出扩展单元/模块、特殊适配器等有关内容,请参照以下手册。

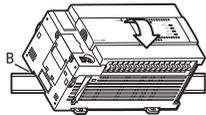
→FX3U用户手册[硬件篇]

2.3.1 安装方法

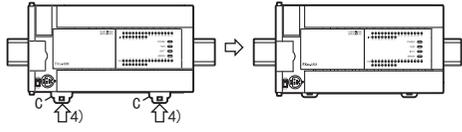
- 1) 将[功能扩展板]及[特殊适配器]连接到[基本单元]上。
- 2) 按下图所示将全部[DIN导轨安装用挂钩(下图A)]推出。



- 3) 将[DIN导轨安装用沟槽的上侧(右图B)]对准并挂到[DIN导轨]上。



- 4) 在将产品按压在[DIN导轨]上的状态下将[DIN导轨安装用挂钩(下图C)]锁住。



2.4 直接安装(M4螺栓安装)

可以将产品直接安装(螺栓)到盘面上。在此,对基本单元的安装相关事项进行说明。关于输入输出扩展单元/模块、特殊适配器的安装/拆卸的有关内容,请参照以下手册。

→FX3U用户手册[硬件篇]

2.4.1 安装孔螺距

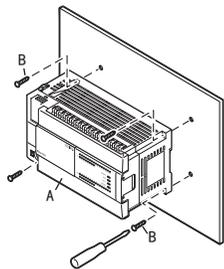
产品的安装孔螺距请参照外形尺寸(1.2节)。关于扩展单元/模块及特殊适配器的安装孔螺距的详细内容请参照以下手册。

→FX3U用户手册[硬件篇]

2.4.2 安装方法

- 1) 参考外形尺寸图,在安装面上对安装孔进行加工。

- 2) 将[基本单元(右图A)]对准到孔上,用[M4螺栓(右图B)]进行安装。安装孔螺距及个数,对于不同的产品将有所不同。请参照外形尺寸图(1.2节)。



3. 电源/输入/输出规格及外部配线示例

关于电源配线、输入输出配线的详细内容及配线请参照FX3U用户手册[硬件篇]。

设计方面的注意事项 **警告**

- 请在可编程控制器的外部设置安全回路,以便在出现外部电源异常、可编程控制器故障等情况时,也能确保整个系统在安全状态下运行。误动作、误输出有可能会发生。
 - 1) 请务必在可编程控制器的外部设置紧急停止回路、保护回路、防止正反转等相反动作同时进行的互锁回路、定位上下限等防止机械破损的互锁回路等。
 - 2) 当可编程控制器CPU通过看门狗定时器出错等的自诊断功能检测出异常时,所有的输出变为OFF。此外,当发生了可编程控制器CPU不能检测出的输入输出控制部分等的异常时,输出控制有时候会失效。此时,请设计外部回路以及结构,以确保机械在安全状态下运行。
 - 3) DC24V供给电源的输出电流会根据机型以及扩展模块的有无而有所不同。发生过载时,除了电压自动下降、可编程控制器的输入不动作以外,所有的输出也都变为OFF。此时,请设计外部回路以及结构,以确保机械在安全状态下运行。
 - 4) 由于输出单元的继电器、晶体管、晶闸管等的故障,有时会导致输出一直接通,或是一直断开。为了确保机械在安全状态下运行,请为可能导致重大事故的输出信号设计外部回路以及结构。

设计方面的注意事项 **注意**

- 控制线请勿与主回路或动力线等捆在一起接线,或是靠近接线。原则上请离开100mm以上或者远离主回路。否则会因噪音引起误动作。
- 使用时,请确保连接外围设备用的连接器不受外力。否则会导致断线以及故障。

附注

- 对于基本单元与扩展设备的电源,请同时投入或切断。
- 即使AC电源型电源发生了不足10ms的瞬间停电,可编程控制器也将继续动作。
- 即使DC电源型电源发生了不足5ms的瞬间停电,可编程控制器也将继续动作。
- 在发生了长时间停电及电压异常低下时,可编程控制器将会停止,输出也将OFF。但是,电源恢复后将自动重新启动。(RUN输入ON时)

配线时的注意事项 **警告**

- 进行安装、接线等作业时,请务必在外部将所有电源均断开后方可进行操作。否则有触电、产品损坏的危险。

配线时的注意事项 **注意**

- 电源的配线请与本手册记载的专用端子连接。如果将AC电源连接到直流的输出输入端子及DC电源端子,可编程控制器将被烧毁。
- 请不要在外部对空端子进行配线。有可能会损坏产品。
- 对基本单元及扩展单元的接地端子请使用2mm²以上的电线进行D种接地(接地电阻:100Ω以下)。但是请勿与强电流共同接地(参照3.3节)。
- 在进行螺栓孔加工及配线作业时,请不要将切屑及电线屑落入可编程控制器的通风孔内。否则有可能导致火灾、故障及误动作。
- 端子排进行接线时,请遵照以下的注意事项操作。否则有可能导致触电,故障,短路,断线,误动作,损坏产品。
 - 请依据手册中记载的尺寸对电线的末端进行处理。
 - 紧固扭矩请依照手册中记载的扭矩。

附录

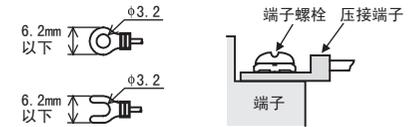
- 虽然输入输出的配线长度在50~100m范围内在抗电磁干扰方面几乎没有问题,但在通常的情况下,从安全的方面考虑,请将配线长度控制在20m以内为佳。
- 扩展电缆是易于受到电磁干扰的部分。请将可编程控制器的输入输出线与其它的动力线分开30~50mm以上进行配线。

3.1 接线

3.1.1 使用电缆的末端处理及扭紧力矩

FX3U可编程控制器的端子螺栓使用的是“M3”。对于电线的末端处理请参照以下内容:请将扭紧力矩控制在0.5~0.8N·m范围以内。拧紧端子螺丝时,请注意扭矩不要在规定值以上。否则可能导致故障、误动作。

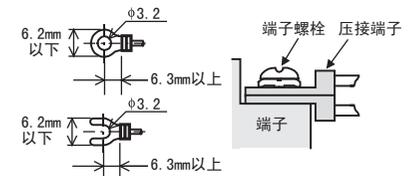
- 在1个端子上连接1根电线的情况下



<参考>

生产厂商	型号	对应规格	压接工具
JAPAN SOLDERLESS TERMINAL MFG CO LTD (JST)	FV1.25-B3A	UL Listed	YA-1 (JST)
	FV2-MS3		

- 在1个端子上连接2根电线的情况下



<参考>

生产厂商	型号	对应规格	压接工具
JAPAN SOLDERLESS TERMINAL MFG CO LTD (JST)	FV1.25-B3A	UL Listed	YA-1 (JST)

3.1.2 端子排的拆除和安装

拆除 旋出端子安装螺丝,移去端子

安装 把端子放入规定位置,旋紧安装螺丝。

拧紧力矩0.4~0.5N·m
拧紧端子排的拆装螺丝时,请注意扭矩不要在规定值以上。否则可能导致故障、误动作。
* 注意确保端子中心不要拱起

3.2 电源规格及外部配线示例

关于电源规格和外部接线的详细内容，请参照以下手册。
→请参照FX3U用户手册[硬件篇]

3.2.1 电源规格[基本单元/输入输出扩展单元]

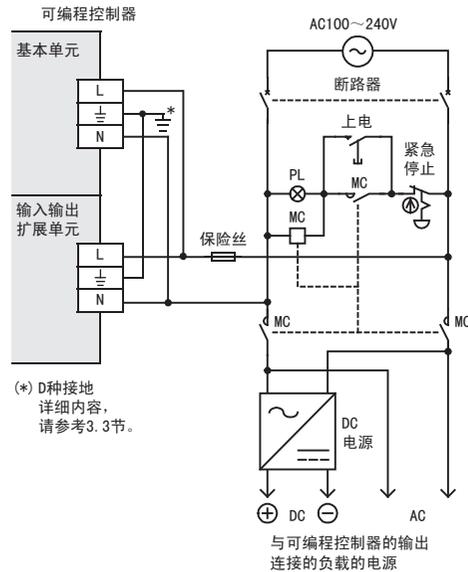
项目	规格		
	AC电源型	DC电源型(*6)	
电源电压	AC100~240V	DC24V	
电压允许范围	基本单元 FX2N-32E□, FX2N-48E□	AC85~264V	
		DC24V +20%, -30%	
额定频率	50/60Hz	-	
瞬间断电范围	在10ms以内发生瞬间停电时,将不会影响本体运转。(*4)	在5ms以内发生瞬间停电时,将不会影响本体运转。	
电源保险丝	FX3U-16M□ ~32M□(*7)	250V 3.15A	
	FX3U-48M□ ~128M□	250V 5A	
	FX2N-32E□	250V 3.15A	
	FX2N-48E□	250V 5A	
突入电流	基本单元	最大30A 5ms以下/AC100V 最大65A 5ms以下/AC200V	最大35A 0.5ms以下/DC24V
	FX2N-32E□, FX2N-48E□	最大40A 5ms以下/AC100V 最大60A 5ms以下/AC200V	-
消耗功率(*1)	FX3U-16M□	30W	25W
	FX3U-32M□	35W	30W
	FX3U-48M□	40W	35W
	FX3U-64M□	45W	40W
	FX3U-80M□	50W	45W
	FX3U-128M□	65W	-
	FX2N-32E□	30W	-
	FX2N-48E□	35W	30W
DC24V 供给电源(*2)	FX3U-16M□ ~32M□	400mA以下	-
	FX3U-48M□ ~128M□	600mA以下	-
	FX2N-32E□	250mA	-
	FX2N-48E□	460mA	-
DC5V内置电源(*3)	基本单元	500mA以下	
	FX2N-32E□	690mA以下	
	FX2N-48E□		

- (*1) 扩展模块 / 特殊扩展模块与其相连接的扩展块 / 特殊扩展块的电量消耗未包含在内。
对于输入输出扩展单元 / 模块的电量(电流)消耗,请参照FX3U用户手册[硬件篇]。
关于特殊扩展单元 / 模块的电量消耗,请参照各自的手册。不能将其用于向外部供电。
- (*2) 对于DC24V外部电源,在连接了输入输出扩展模块等的情况下,将被消耗掉一部分,可使用的电流也将减少。
但是,AC电源(AC输入)型及DC电源型,没有DC24V外部电源。

- (*3) 其电源容量只能满足向输入输出扩展模块、特殊扩展模块、特殊适配器及功能扩展板的电源供给。
→请参照FX3U用户手册[硬件篇]
- (*4) 在电源电压为AC200V系统的情况下,通过用户程序可以在、10~100ms的范围内进行修改。
→请参照FX3U用户手册[硬件篇]
- (*5) 在使用电源电压DC16.8~19.2V时,可连接的扩展机器台数将会减少。关于详细内容请参考下记手册。
→请参照FX3U用户手册[硬件篇]
- (*6) 在增设高速输入输出特殊适配器(FX3U-4HSX-ADP, FX3U-2HSY-ADP),特殊扩展模块(只限定FX0N-3A, FX2N-2AD, FX2N-2DA)时,当启动后,内部DC24V将产生额定电流,其限制可增设的台数。关于详细内容请参考下记手册。
→请参照FX3U用户手册[硬件篇]
- (*7) FX3U-32MR/UA1为250V 5A。

3.2.2 外部配线示例[AC电源型]

向基本单元、输入输出扩展单元所供给的电源为AC100~240V。
有关配线作业的详细内容,请参照3.1节。

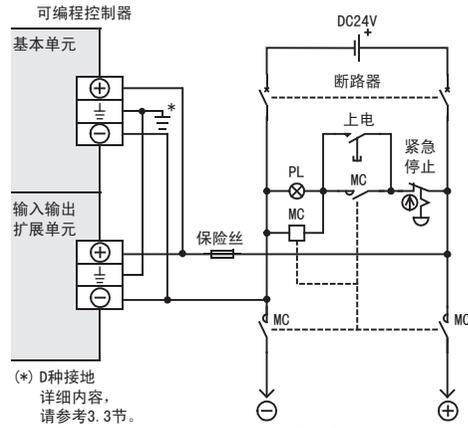


(*) D种接地
详细内容,
请参考3.3节。

与可编程控制器的输出
连接的负载的电源

3.2.3 外部配线示例[DC电源型]

向基本单元、输入输出扩展单元所供给的电源为DC24V。
有关配线作业的详细内容,请参照3.1节。



(*) D种接地
详细内容,
请参考3.3节。

3.3 接地

- 对于接地请实施以下的项目
 - 对于接地请实施D种接地。(接地电阻:100Ω以下)
 - 对于接地请尽量使用专用接地。在未采用专用接地时,请按下图进行“共用接地”。
-
- 对于接地线请使用AWG14 (2mm²)以上尺寸的接地线。
 - 请将接地点尽量靠近可编程控制器,接地线的长度尽量缩短。

3.4 输入规格及外部配线示例

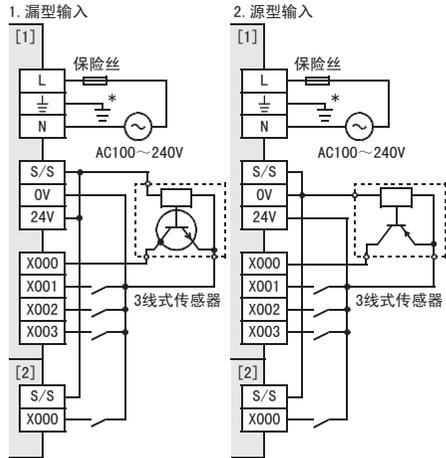
关于输入规格和外部接线的详细内容,请参照以下手册。
→请参照FX3U用户手册[硬件篇]

3.4.1 输入规格[DC24V输入型]

项目	规格	
输入点数	FX2N-8ER□	4点(8点)(*1)
	FX3U-16M□, FX2N-8EX□	8点
	FX3U-32M□, FX2N-16EX□, FX2N-32E□	16点
	FX3U-48M□, FX2N-48E□	24点
	FX3U-64M□	32点
	FX3U-80M□ FX3U-128M□	40点 64点
输入连接规格	请参考FX3U用户手册[硬件篇]	
输入方式		
输入信号电压	基本单元	AC电源型 DC24V ±10%
	输入输出扩展单元	DC电源型 DC24V +20%, -30%
输入阻抗	基本单元	X000~X005 3.9kΩ
		X006, X007 3.3kΩ
		X010以后 4.3kΩ (FX3U-16M□为对象以外。)
输入输出扩展单元/模块	4.3kΩ	
输入信号电流	基本单元	X000~X005 6mA/DC24V
		X006, X007 7mA/DC24V
		X010以后 5mA/DC24V (FX3U-16M□为对象以外。)
输入输出扩展单元/模块	5mA/DC24V	
ON输入灵敏度电流	基本单元	X000~X005 3.5mA以上
		X006, X007 4.5mA以上
		X010以后 3.5mA以上 (FX3U-16M□为对象以外。)
输入输出扩展单元/模块	3.5mA以上/DC24V	
OFF输入灵敏度电流	1.5mA以下	
输入响应时间	约10ms	
输入信号形式	<ul style="list-style-type: none"> 漏型输入时: 无电压触点输入 NPN开路集电极晶体管 源型输入时: 无电压触点输入 PNP开路集电极晶体管 	
输入回路隔离	光耦隔离	
输入动作的显示	光耦驱动时面板上的LED灯亮	

(*1) () 内的数字代表占有点数。

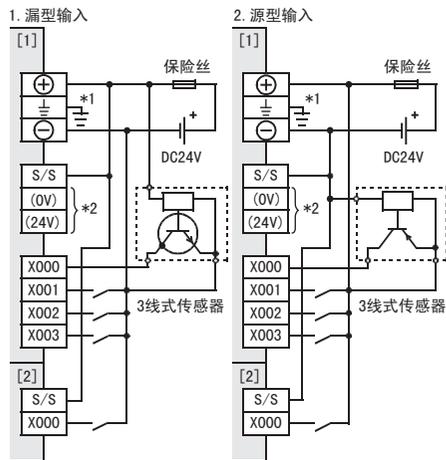
3.4.2 DC24V输入的连接示例[AC电源型]



(*) D种接地
详细内容，请参考3.3节。

[1]: 基本单元/输入输出扩展单元
(漏型/源型输入通用型)
[2]: 输入输出扩展模块
(漏型/源型输入通用型)

3.4.3 DC24V输入的连接示例[DC电源型]



(*1) D种接地
详细内容，请参考3.3节。

(*2) 不能使用(0V)、(24V)端子。
请别进行线路。请勿接线。

[1]: 基本单元/输入输出扩展单元
(漏型/源型输入通用型)
[2]: 输入输出扩展模块
(漏型/源型输入通用型)

3.4.4 输入设备连接时的注意事项

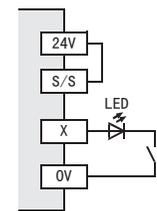
- 1) 无电压触点的情况下
此可编程控制器的输入电流为5~7mA/DC24V。
对于输入设备请使用适合于这种微小电流的设备。
使用大电流用的无电压触点(开关等)的话，有可能会发生接触不良的情况。

《例》欧姆龙股份有限公司生产

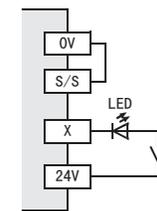
种类	型号	种类	型号
微型开关	Z型、V型、D2RV型	操作开关	A3P型
接近开关	TL型	光电开关	E3S型

- 2) 内置串联二极管输入设备的情况下
请将串联二极管电压设为4V以下。在使用附有串联发光二极管的磁导线开关时其串联使用不要超过2个。另外，在开关处于ON时，请将输入电流保持在灵敏度电流以上。

●漏型输入



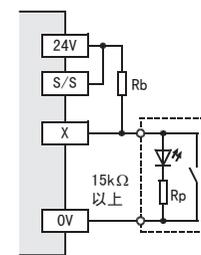
●源型输入



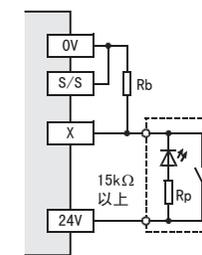
- 3) 在内置式并联电阻输入设备的情况下
请使用并联电阻 R_p 为15kΩ以上电阻。
在不到15kΩ时，请将通过以下公式所求得的分泄电阻 R_b 按下图所示进行连接。

$$R_b \leq \frac{4R_p}{15-R_p} \text{ (k}\Omega\text{)}$$

●漏型输入



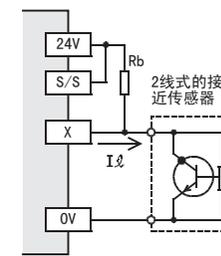
●源型输入



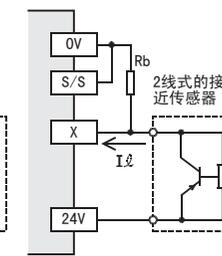
- 4) 2线式的接近传感器(开关)的情况下
请使用OFF时的漏电流 I_L 为1.5mA以下的2线式接近传感器。
在1.5mA以上时请按下图所示的方式，连接一个由以下公式所求得的分泄电阻 R_b 。

$$R_b \leq \frac{6}{I_L - 1.5} \text{ (k}\Omega\text{)}$$

●漏型输入



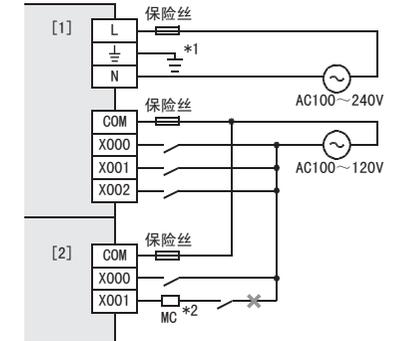
●源型输入



3.4.5 输入规格[AC100V输入型]

项目	规格	
输入点数	FX2N-8EX-UA1/UL	8点
	FX3U-32MR-UA1	16点
	FX2N-48ER-UA1/UL	24点
	FX3U-64MR-UA1	32点
输入的连接规格		
输入形式	请参考FX3U用户手册[硬件篇]	
输入信号电压	AC100~120V +10%, -15% 50/60Hz	
输入阻抗	约21kΩ/50Hz 约18kΩ/60Hz	
输入信号电流	4.7mA/AC100V 50Hz 6.2mA/AC110V 60Hz (同时ON率70%以下)	
ON输入灵敏度电流	3.8mA以上	
OFF输入灵敏度电流	1.7mA以下	
输入响应时间	约25~30ms (不能高速读取)	
输入信号形式	触点输入	
输入回路隔离	光耦隔离	
输入动作的显示	光耦驱动时面板上的LED灯亮	

3.4.6 AC100V输入的连接示例



(*1) D种接地
详细内容，请参考3.3节。

(*2) 请不要从发生浪涌的负载获取输入信号。

[1]: 基本单元/输入输出扩展单元(AC100V输入型)
[2]: 输入扩展模块(AC100V输入型)

3.5 继电器输出规格及外部配线示例

关于继电器输出规格和外部接线的详细内容,请参照以下手册。

→请参照FX3U用户手册[硬件篇]

3.5.1 继电器输出规格

项目	规格	
输出点数	FX2N-8ER□	4点(8点)(*)1
	FX3U-16MR□, FX2N-8EYR□	8点
	FX3U-32MR□/ FX2N-32ER□, FX2N-16EYR□	16点
	FX3U-48MR□, FX2N-48ER□	24点
	FX3U-64MR□	32点
	FX3U-80MR□	40点
	FX3U-128MR/ES	64点
输出连接规格	请参考FX3U用户手册[硬件篇]	
输出形式	继电器	
外部电源	DC30V以下 AC240V以下(与CE、UL、cUL标准不对应时为AC250V以下)	
最大负载	电阻负载 2A/1点(*2) 感应负载 80VA	
最小负载	DC5V 2mA(参考值)	
开路泄漏电流	-	
响应时间	OFF→ON 约10ms ON→OFF 约10ms	
输出回路隔离	机械隔离	
输出动作的显示	继电器线圈通电时面板上的LED灯亮	

(*1) ()内的数字代表占有点数。

(*2) 每个公共端的合计负载电流请如下所示。

- 输出1点/1个公共端: 2A以下
 - 输出4点/1个公共端: 8A以下
 - 输出8点/1个公共端: 8A以下
- 关于1个公共端的输出点数,请参照第4章的分隔线解读方法及以下手册。

→请参照FX3U用户手册[硬件篇]

3.5.2 继电器输出触点的寿命

继电器触点的寿命与负载类型有关。请注意,负载产生的反电势或冲击电流可能会导致触点接触失败或触点下陷,致使触点寿命减少。

1) 感性负载

感性负载停止瞬间会在触点间产生很大的反向电动势,负载电流固定时,功率因数(电流和电压之间相位差)越小,电弧能量越大。

对于接触器及电磁阀等的感应负载标准寿命为20VA时50万次。根据本公司的寿命测试,继电器触点的大致寿命如下表所示。

	负载容量		触点寿命
	20VA	35VA	
20VA	0.2A/AC100V	0.17A/AC200V	300万次
	0.1A/AC200V		
35VA	0.35A/AC100V	0.17A/AC200V	100万次
	0.17A/AC200V		
80VA	0.8A/AC100V	0.4A/AC200V	20万次
	0.4A/AC200V		

当切断冲击过电流时,继电器触点寿命会比以上情况显著降低。

→使用感性负载时可采取的措施请参考3.5.4节

有些感性负载启动时会产生相当于5~15倍额定电流的冲击电流。要保证此电流不会超过最大额定阻性负载时允许的电流。

2) 灯负载

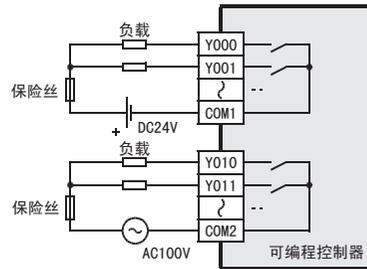
灯负载会产生相当于10~15倍额定电流的冲击电流。要保证此电流不会超过最大额定阻性负载时允许的电流。

3) 容性负载

容性负载会产生相当于20~40倍稳定电流的冲击电流。要保证此电流不会超过最大额定阻性负载时允许的电流。电容,包括变频器这样的容性负载在电路中都有可能出现。

→最大额定负载请参考3.5.1节

3.5.3 继电器输出的连接示例



3.5.4 外部配线时的注意事项

关于外部接线的注意事项,请参照以下手册。

→请参照FX3U用户手册[硬件篇]

负载短路时的保护电路

当连接在输出端子上发生负载短路的情况下,印刷电路板有可能被烧坏。请在输出中插入保护保险丝。

使用感性负载时的触点保护电路

继电器输出电路中并没有内置继电器浪涌吸收回路。推荐使用内置浪涌吸收的感性负载。

使用没有内置浪涌吸收的负载时,可外接浪涌吸收回路,延长触点寿命。

1) DC电路

请连接一个与负载并联的二极管。
请使用如下所示规格的二极管(续流用)。

项目	刻度
反向耐压	负载电压的5~10倍
正向电流	负载电流以上

2) AC电路

如下所示,浪涌吸收回路(组合的OR元件,如浪涌抑制器,电火花抑制器等)与负载并联。根据输出回路来确定浪涌吸收装置的耐压。其他详情请参考以下表格。

项目	刻度
静电容量	0.1μF程度
电阻值	100~200Ω程度

互锁电路

对于同时ON时危险的正反转用接触器等负载,请实施可编程控制器内的程序中的互锁以及可编程控制器的外部的互锁。

同相

对于可编程控制器的输出点,请在同相的状态下使用

3.6 晶体管输出规格及外部配线示例

关于晶体管输出和外部接线的详细内容,请参照以下手册。

→请参照FX3U用户手册[硬件篇]

3.6.1 晶体管输出规格

项目	规格	
输出点数	FX3U-16MT□, FX2N-8EY□	8点
	FX3U-32MT□, FX2N-32ET□, FX2N-16EY□	16点
	FX3U-48MT□, FX2N-48ET□	24点
	FX3U-64MT□	32点
	FX3U-80MT□	40点
	FX3U-128MT/ES(S)	64点
输出连接规格	请参考FX3U用户手册[硬件篇]	
输出形式	FX3U-□□MT/□S, FX2N-□ET, FX2N-48ET-D, FX2N-□EY□, FX2N-8EY□-H	晶体管(漏型)
	FX3U-□□MT/□SS, FX2N-□ET-ESS/UL, FX2N-48ET-DSS, FX2N-□EY□-ESS/UL	晶体管(源型)

项目	规格	
外部电源	DC5~30V	
最大负载	电阻负载 FX3U-□□MT□/ FX2N-□ET□, FX2N-□ET-□, FX2N-□EY□, FX2N-□EY□-ESS/UL	0.5A/1点(*1)
	FX2N-8EY□-H	1A/1点(*2)
	FX2N-16EY□-C	0.3A/1点(*3)
	电感性负载 FX3U-□□MT□/ FX2N-□ET□, FX2N-□ET-□, FX2N-□EY□, FX2N-□EY□-ESS/UL	12W/DC24V(*4)
FX2N-8EY□-H	24W/DC24V(*5)	
FX2N-16EY□-C	7.2W/DC24V(*6)	
最小负载	-	
开路泄漏电流	0.1mA以下/DC30V	
ON电压	1.5V以下	
响应时间	OFF → ON	基本单元 Y000~Y002 5μs以下/10mA以上(DC5~24V) Y003以后 0.2ms以下/200mA以上(DC24V)
	ON → OFF	输入输出扩展单元/模块(*7) 0.2ms以下/200mA以上(DC24V)
	ON → ON	基本单元 Y000~Y002 5μs以下/10mA以上(DC5~24V) Y003以后 0.2ms以下/200mA以上(DC24V)
	OFF → OFF	输入输出扩展单元/模块(*7) 0.2ms以下/200mA以上(DC24V)
输出回路隔离	光耦隔离	
输出动作的显示	光耦驱动时面板上的LED灯亮	

(*1) 每个公共端的合计负载电流请如下所示。

- 输出1点/公共端: 0.5A以下
 - 输出4点/公共端: 0.8A以下
 - 输出8点/公共端: 1.6A以下
- 关于1个公共端的输出点数,请参照第4章的分隔线解读方法及以下手册。

→请参照FX3U用户手册[硬件篇]

(*2) 每个公共端的合计负载电流请如下所示。

- 输出4点/1个公共端: 2A以下
- 关于1个公共端的输出点数,请参照以下手册。

→请参照FX3U用户手册[硬件篇]

(*3) 每个公共端的合计负载电流请如下所示。

- 输出16点/1个公共端: 1.6A以下
- 关于1个公共端的输出点数,请参照以下手册。

→请参照FX3U用户手册[硬件篇]

(*4) 每个公共端的合计负载电流请如下所示。

- 输出1点/公共端: 12W以下/DC24V
 - 输出4点/公共端: 19.2W以下/DC24V
 - 输出8点/公共端: 38.4W以下/DC24V
- 关于1个公共端的输出点数,请参照第4章的分隔线解读方法及以下手册。

→请参照FX3U用户手册[硬件篇]

(*5) 每个公共端的合计负载电流请如下所示。

- 输出4点/公共端: 48W以下/DC24V
- 关于1个公共端的输出点数,请参照以下手册。

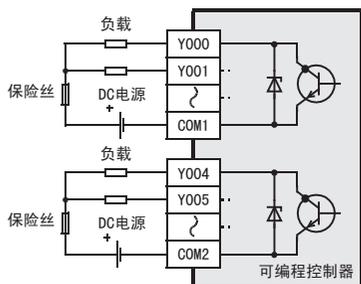
→请参照FX3U用户手册[硬件篇]

(*6) 每个公共端的合计负载请如下所示。
 - 输出16点/公共端: 38.4W以下/DC24V
 关于1个公共端的输出点数, 请参照以下手册。
 →请参考FX3U用户手册[硬件篇]

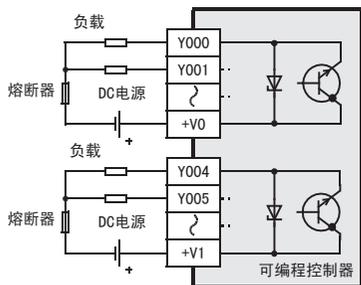
(*7) FX2N-8EYT-H的响应时间如下。
 - OFF→ON: 0.2ms以下/1A
 - ON→OFF: 0.4ms以下/1A

3.6.2 晶体管输出的连接示例

1. 漏型输出型的连接示例



2. 源型输出型的连接示例



3.6.3 外部配线时的注意事项

关于外部接线的注意事项, 请参照以下手册。
 →请参考FX3U用户手册[硬件篇]

负载短路时的保护电路

当连接输出端子的负载在发生短路时, 输出单元和电路板会有被烧坏的可能。请在输出中插入保护保险丝。另外, 负载驱动电源的容量请使用2倍左右的负载电流。

使用感性负载时的触点保护电路

连接引导负荷时, 必须要注意的是请在负荷和并联上连接二极管。(续流用)

请使用如下所示规格的二极管

项目	刻度
反向耐压	负载电压的5~10倍
正向电流	负载电流以上

互锁电路

对于同时ON时危险的正反转用接触器等的负载, 请实施可编程控制器内的程序中的互锁以及可编程控制器的外部的互锁。

3.7 晶闸管输出规格及外部接线示例

关于晶闸管输出规格和外部接线的详细内容, 请参照以下手册。
 →请参考FX3U用户手册[硬件篇]

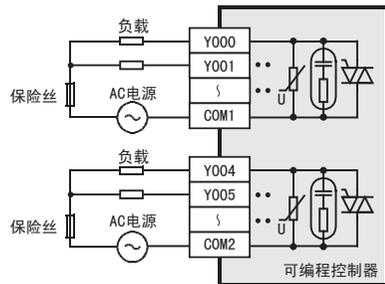
3.7.1 晶闸管输出规格

项目	规格
输出点数	FX3U-32MS/ES, FX2N-16EYS, FX2N-32ES: 16点 FX3U-64MS/ES: 32点
输出的连接规格	请参考FX3U用户手册[硬件篇]
输出形式	晶闸管 (SSR)
外部电源	AC85~242V
最大负载	电阻负载: 0.3A/1点(*1) 电感性负载: 15VA/AC100V, 30VA/AC200V
最小负载	0.4VA/AC100V, 1.6VA/AC200V
开路漏电	1mA/AC100V, 2mA/AC200V
响应时间	OFF→ON: 1ms以下 ON→OFF: 10ms以下
输出回路隔离	光电晶闸管隔离
输出动作的显示	光电晶闸管驱动时面板上的LED灯亮

(*1) 每个公共端的合计负载电流请如下所示。

- 输出4点/公共端: 0.8A以下
 - 输出8点/公共端: 0.8A以下
- 关于1个公共端的输出点数, 请参照第4章的分隔线解读方法及以下手册。
 →请参考FX3U用户手册[硬件篇]

3.7.2 晶闸管输出的连接示例



3.7.3 外部接线上的注意事项

关于外部接线的注意事项, 请参照以下手册。
 →请参考FX3U用户手册[硬件篇]

针对负载短路的保护回路

当连接在输出端子上的负载短路时, 有可能会烧坏输出元器件或者印刷线路板。请在输出中加入起保护作用的保险丝。

微小电流负载

在可编程控制器的晶闸管输出回路中, 内置了断开用的C-R吸收器。连接[0.4VA/AC100V以下, 1.6VA/AC200V以下的负载]等微小电流负载时, 请务必在负载上并联浪涌吸收器。
 关于浪涌吸收器的额定电压, 请选择适合所用输出的产品。其它规格请参考下表。

项目	刻度
静电容量	0.1μF左右
电阻值	100~200Ω左右

互锁电路

对于同时ON时危险的正反转用接触器等的负载, 请实施可编程控制器内的程序中的互锁以及可编程控制器的外部的互锁。

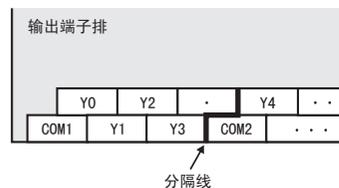
4. 端子排列

关于端子排列的有关内容, 请参照以下手册。
 →请参考FX3U用户手册[硬件篇]

分隔线解读方法

端子排型产品, 通过输出端子分隔线(下图)表示在同一公共端上所连接的输出范围。

例: FX3U-48MT/ES



5. 「电器电子产品有害物质限制使用标识要求」的表示方式

Note: This symbol mark is for China only.

含有有害6物质的名称, 含有量, 含有部品
 本产品中所含有的有害6物质的名称, 含有量, 含有部品如下表所示。

产品中有害物质的名称及含量

部件名称	有害物质			
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))
可编程控制器	外壳	○	○	○
	印刷基板	×	○	○

部件名称	有害物质	
	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
可编程控制器	外壳	○
	印刷基板	○

本表格依据SJ/T 11364的规定编制。

○: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。

×: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

在本书中, 并没有对工业知识产权及其它权利的执行进行保证, 也没有对执行权进行承诺。对于因使用本书中所记载的内容而引起的工业知识产权上的各种问题, 本公司将不负任何责任。

关于质保

机会损失和间接损失不在质保责任范围内
 无论是否在免费质保期内, 凡以下事由三菱电机将不承担责任。

- (1) 任何非三菱电机责任原因而导致的损失。
- (2) 因三菱电机产品故障而引起的用户机会损失、利润损失。
- (3) 无论三菱电机能否预测, 由特殊原因而导致的损失和间接损失、事故赔偿、以及三菱电机产品以外的损伤。
- (4) 对于用户更换设备、现场机械设备的再调试、运行测试及其它作业等的补偿。

安全使用注意事项

- 本产品是以一般工业为对象, 作为通用产品所制造的产品, 不可以用于关系到人身安全的状况下所使用的设备或者系统为目的而设计、制造的产品。
- 在计划将本产品应用于原子能、电力、航空航天、医疗、载人运载工具的设备或者系统等的特殊用途时, 在对此进行研究商讨之际, 请照会本公司的营业窗口。
- 虽然本产品是在严格的质量管理体系下进行制造的, 但是在计划将本产品应用于由于本产品的故障有可能导致重大事故或者损失的设备上时, 请在系统上设置备用及失效安全系统。

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN



PROGRAMMABLE CONTROLLERS
MELSEC-F

FX3U SERIES PROGRAMMABLE CONTROLLERS

HARDWARE MANUAL



Manual Number	JY997D50401
Revision	C
Date	September 2016

This manual describes the part names, dimensions, mounting, cabling and specifications for the product. This manual is extracted from FX3U Series User's Manual - Hardware Edition. Refer to FX3U Series User's Manual - Hardware Edition for more details. Before use, read this manual and manuals of relevant products fully to acquire proficiency in the handling and operating the product. Make sure to learn all the product information, safety information, and precautions.

And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

Registration

The company name and the product name to be described in this manual are the registered trademarks or trademarks of each company.

Effective September 2016

Specifications are subject to change without notice.

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Safety Precaution (Read these precautions before use.)

This manual classifies the safety precautions into two categories:

⚠ WARNING and ⚠ CAUTION .

⚠ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by

⚠ CAUTION may also cause severe injury.

It is important to follow all precautions for personal safety.

STARTUP AND MAINTENANCE PRECAUTIONS	⚠ WARNING
<ul style="list-style-type: none"> Do not touch any terminal while the PLC's power is on. Doing so may cause electric shock or malfunctions. Before cleaning or retightening terminals, cut off all phases of the power supply externally. Failure to do so may cause electric shock. Before modifying or disrupting the program in operation or running the PLC, carefully read through this manual and the associated manuals and ensure the safety of the operation. An operation error may damage the machinery or cause accidents. Do not change the program in the PLC from two or more peripheral equipment devices at the same time. (i.e. from a programming tool and a GOT) Doing so may cause destruction or malfunction of the PLC program. Use the battery for memory backup correctly in FX3U Series User's Manual - Hardware Edition. <ul style="list-style-type: none"> Use the battery only for the specified purpose. Connect the battery correctly. Do not charge, disassemble, heat, put in fire, short-circuit, connect reversely, weld, swallow or burn the battery, or apply excessive forces (vibration, impact, drop, etc.) to the battery. Do not store or use the battery at high temperatures or expose to direct sunlight. Do not expose to water, bring near fire or touch liquid leakage or other contents directly. Incorrect handling of the battery may cause heat excessive generation, bursting, ignition, liquid leakage or deformation, and lead to injury, fire or failures and malfunctions of facilities and other equipment. 	

STARTUP AND MAINTENANCE PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Turn off the power to the PLC before attaching or detaching the memory cassette. If the memory cassette is attached or detached while the PLC's power is on, the data in the memory may be destroyed, or the memory cassette may be damaged. Do not disassemble or modify the PLC. Doing so may cause fire, equipment failures, or malfunctions. For repair, contact your local Mitsubishi Electric distributor. Turn off the power to the PLC before connecting or disconnecting any extension cable. Failure to do so may cause equipment failures or malfunctions. Turn off the power to the PLC before attaching or detaching the following devices. Failure to do so may cause equipment failures or malfunctions. <ul style="list-style-type: none"> Display module, peripheral devices, expansion boards, and special adapters Connector conversion adapter, extension blocks, and FX Series terminal blocks Battery and memory cassette 	
DISPOSAL PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device. When disposing of batteries, separate them from other waste according to local regulations. (For details of the Battery Directive in EU countries, refer to FX3U Series User's Manual - Hardware Edition.) 	

TRANSPORTATION AND STORAGE PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Before transporting the PLC, turn on the power to the PLC to check that the BATT LED is off. If the PLC is transported with the BATT LED on or the battery exhausted, the battery-backed data may be unstable during transportation. The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in Section 2.1. Failure to do so may cause failures in the PLC. After transportation, verify the operations of the PLC. When transporting lithium batteries, follow required transportation regulations. (For details of the regulated products, refer to FX3U Series User's Manual - Hardware Edition.) 	

Associated manuals

How to obtain manuals
For the necessary product manuals or documents, consult with your local Mitsubishi Electric representative.

Associated manuals

FX3U Series PLC (main unit) comes with this document (hardware manual).

For a detailed explanation of the FX3U Series hardware and information on instructions for PLC programming and special extension unit/block, refer to the relevant documents.

Manual name	Manual No.	Description
FX3U Series User's Manual - Hardware Edition	JY997D16501 MODEL CODE: 09R516	Explains FX3U Series PLC specification details for I/O, wiring, installation, and maintenance.
FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition	JY997D16601 MODEL CODE: 09R517	Describes PLC programming for basic/applied instructions STL/SFC programming and devices.
MELSEC-Q/L/F Structured Programming Manual (Fundamentals)	SH-080782 MODEL CODE: 13JW06	Programming methods, specifications, functions, etc. required to create structured programs.
FXCPU Structured Programming Manual [Device & Common]	JY997D26001 MODEL CODE: 09R925	Devices, parameters, etc. provided in structured projects of GX Works2.
FXCPU Structured Programming Manual [Basic & Applied Instruction]	JY997D34701 MODEL CODE: 09R926	Sequence instructions provided in structured projects of GX Works2.
FXCPU Structured Programming Manual [Application Functions]	JY997D34801 MODEL CODE: 09R927	Application functions provided in structured projects of GX Works2.
FX Series User's Manual - Data Communication Edition	JY997D16901 MODEL CODE: 09R715	Explains N:N link, parallel link, computer link, no protocol communication by RS instructions/FX2N-232IF.

Manual name	Manual No.	Description
FX3S/FX3G/FX3GC/FX3U/FX3UC Series User's Manual - Analog Control Edition	JY997D16701 MODEL CODE: 09R619	Describes specifications for analog control and programming methods for FX3S/FX3G/FX3GC/FX3U/FX3UC Series PLC.
FX3S/FX3G/FX3GC/FX3U/FX3UC Series User's Manual - Positioning Control Edition	JY997D16801 MODEL CODE: 09R620	Explains the specifications for positioning control of FX3S/FX3G/FX3GC/FX3U/FX3UC Series and programming procedures

Marine standard

Please consult with Mitsubishi Electric for the information on marine standard practices and the corresponding types of equipment.

Certification of UL, cUL standards

FX3U series main units, FX3U series special adapters and FX2N series input/output extension units/blocks supporting UL, cUL standards are as follows:

UL, cUL file number: E95239

Models: MELSEC FX3U series manufactured

FX3U-**MR/ES(-A) FX3U-**MT/ES(-A)
FX3U-**MT/ESS

Where ** indicates: 16, 32, 48, 64, 80, 128

FX3U-**MR/DS FX3U-**MT/DS

FX3U-**MT/DSS

Where ** indicates: 16, 32, 48, 64, 80

FX3U-**MR/UA1 FX3U-**MS/ES

Where ** indicates: 32, 64

FX3U-232ADP(-MB) FX3U-485ADP(-MB)

FX3U-4AD-ADP FX3U-4DA-ADP

FX3U-3A-ADP FX3U-4AD-PT-ADP

FX3U-4AD-PTW-ADP FX3U-4AD-PNK-ADP

FX3U-4AD-TC-ADP

FX3U-4HSX-ADP FX3U-2HSY-ADP

FX3U-CF-ADP FX3U-ENET-ADP

Models: MELSEC FX2N series manufactured

FX2N-**ER-ES/UL FX2N-**ET-ESS/UL

Where ** indicates: 32, 48

FX2N-48ER-DS FX2N-48ET-DSS

FX2N-48ER-UA1/UL

FX2N-8ER-ES/UL FX2N-8EX-ES/UL

FX2N-8EYR-ES/UL FX2N-8EYR-S-ES/UL

FX2N-8EY-ESS/UL FX2N-8EX-UA1/UL

FX2N-16EX-ES/UL FX2N-16EYR-ES/UL

FX2N-16EY-ESS/UL FX2N-16EYS

Compliance with EMC directive (CE Marking)

This document does not guarantee that a mechanical system including this product will comply with the following standards. Compliance to EMC directive and LVD directive of the entire mechanical system should be checked by the user/manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Requirement for Compliance with EMC directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European

Directive for Electromagnetic Compatibility (2014/30/EU) when used as directed by the appropriate documentation.

Attention

This product is designed for use in industrial applications.

Type: Programmable Controller (Open Type Equipment)
Models: MELSEC FX3U series manufactured

from May 1st, 2005	FX3U-★MR/ES(-A) Where ★★ indicates: 16, 32, 48, 64, 80 FX3U-4HSX-ADP FX3U-2HSY-ADP FX3U-FLROM-16 FX3U-FLROM-64L FX3U-7DM
from June 1st, 2005	FX3U-232ADP FX3U-485ADP FX3U-4AD-ADP FX3U-4DA-ADP FX3U-4AD-PT-ADP FX3U-4AD-TC-ADP FX3U-232-BD FX3U-422-BD FX3U-485-BD FX3U-USB-BD FX3U-FLROM-64 FX3U-CNV-BD
from November 1st, 2005	FX3U-★MT/ES(-A) FX3U-★MT/ESS Where ★★ indicates: 16, 32, 48, 64, 80 FX3U-128MR/ES(-A) FX3U-128MT/ES(-A) FX3U-128MT/ESS FX3U-★MR/DS FX3U-★MT/DS FX3U-★MT/DSS
from April 1st, 2007	FX3U-232ADP-MB FX3U-485ADP-MB
from December 1st, 2007	FX3U-4AD-PTW-ADP FX3U-4AD-PNK-ADP
from June 1st, 2009	FX3U-3A-ADP FX3U-CF-ADP
from August 1st, 2010	FX3U-8AV-BD
from September 1st, 2010	FX3U-★MR/UA1 FX3U-★MS/ES Where ★★ indicates: 32, 64
from May 1st, 2011	FX3U-FLROM-1M
from February 1st, 2012	FX3U-ENET-ADP

Standard	Remark
EN61131-2: 2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

Models: MELSEC FX2N series manufactured

from July 1st, 1997	FX2N-★ER-ES/UL FX2N-★ET-ESS/UL Where ★★ indicates: 32, 48 FX2N-16EX-ES/UL FX2N-16EYR-ES/UL FX2N-16EYT-ESS/UL
from April 1st, 1998	FX2N-48ER-DS FX2N-48ET-DSS
from August 1st, 1998	FX2N-48ER-UA1/UL
from August 1st, 2005	FX2N-8ER-ES/UL FX2N-8EX-ES/UL FX2N-8EYR-ES/UL FX2N-8EYT-ESS/UL
from September 1st, 2010	FX2N-8EYR-S-ES/UL

For the products above, PLCs manufactured before March 31st, 2002 are compliant with EN50081-2 (EN61000-6-4) and EN50082-2
from April 1st, 2002 to April 30th, 2006 are compliant with EN50081-2 (EN61000-6-4) and EN61131-2: 1994 +A11: 1996 +A12: 2000
after May 1st, 2006 are compliant with EN61131-2: 2007

Standard	Remark
EN61000-6-4: 2007 - Generic emission standard Industrial environment EN50081-2: 1993 Electromagnetic compatibility	Compliance with all relevant aspects of the standard. • Emission-Enclosure port • Emission-Low voltage AC mains port • Emission-Telecommunications/network port
EN50082-2: 1995 Electromagnetic compatibility - Generic immunity standard Industrial environment	Compliance with all relevant aspects of the standard. • RF immunity • Fast transients • ESD • Conducted • Power magnetic fields
EN61131-2: 1994 /A11: 1996 /A12: 2000 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • Damped oscillatory wave
EN61131-2: 2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

Requirement for Compliance with LVD directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Low Voltage (2014/35/EU) when used as directed by the appropriate documentation.

Type: Programmable Controller (Open Type Equipment)

Models: MELSEC FX3U series manufactured

from May 1st, 2005	FX3U-★MR/ES(-A) Where ★★ indicates: 16, 32, 48, 64, 80
from November 1st, 2005	FX3U-★MT/ES(-A) FX3U-★MT/ESS Where ★★ indicates: 16, 32, 48, 64, 80
from February 1st, 2006	FX3U-128MR/ES(-A) FX3U-128MT/ES(-A) FX3U-128MT/ESS FX3U-★MR/DS Where ★★ indicates: 16, 32, 48, 64, 80
from September 1st, 2010	FX3U-★MR/UA1 FX3U-★MS/ES Where ★★ indicates: 32, 64

Standard	Remark
EN61131-2: 2007 Programmable controllers - Equipment requirements and tests	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of EN61131-2: 2007

Models: MELSEC FX2N series manufactured

from July 1st, 1997	FX2N-★ER-ES/UL FX2N-★ET-ESS/UL Where ★★ indicates: 32, 48 FX2N-16EYR-ES/UL
from April 1st, 1998	FX2N-48ER-DS
from August 1st, 1998	FX2N-48ER-UA1/UL
from August 1st, 2005	FX2N-8ER-ES/UL FX2N-8EYR-ES/UL
from September 1st, 2010	FX2N-8EYR-S-ES/UL

For the products above, PLCs manufactured before March 31st, 2002 are compliant with IEC1010-1
from April 1st, 2002 to April 30th, 2006 are compliant with EN61131-2: 1994 +A11: 1996 +A12: 2000
after May 1st, 2006 are compliant with EN61131-2: 2007

Standard	Remark
IEC1010-1: 1990 /A1: 1992 Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of IEC 1010-1: 1990 +A1: 1992
EN61131-2: 1994 /A12: 2000 /A11: 1996 Programmable controllers - Equipment requirements and tests	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of EN61131-2: 1994 +A11: 1996 +A12: 2000, : 2007

Caution for compliance with EC Directive

Installation in Enclosure

Programmable logic controllers are open-type devices that must be installed and used within conductive control boxes. Please use the FX3U Series programmable logic controllers while installed in conductive shielded control boxes. Please secure the control box lid to the control box (for conduction). Installation within a control box greatly affects the safety of the system and aids in shielding noise from the programmable logic controller.

Caution for Analog Products in use

The analog special adapters have been found to be compliant to the European standards in the aforesaid manual and directive. However, for the very best performance from what are in fact delicate measuring and controlled output device Mitsubishi Electric would like to make the following points;
As analog devices are sensitive by nature, their use should be considered carefully. For users of proprietary cables (integral with sensors or actuators), these users should follow those manufacturers installation requirements.
Mitsubishi Electric recommend that shielded cables should be used. If NO other EMC protection is provided, then users may experience temporary induced errors not exceeding +10 %/-10 % in very heavy industrial areas.

However, Mitsubishi Electric suggest that if adequate EMC precautions are followed with general good EMC practice for the users complete control system, users should expect normal errors as specified in this manual.

- Sensitive analog cable should not be laid in the same trunking or cable conduit as high voltage cabling. Where possible users should run analog cables separately.
- Good cable shielding should be used. When terminating the shield at Earth - ensure that no earth loops are accidentally created.
- When reading analog values, EMC induced errors can be smoothed out by averaging the readings. This can be achieved either through functions on the analog special adapter/block or through a users program in the FX3U Series PLC main unit.

Incorporated Items

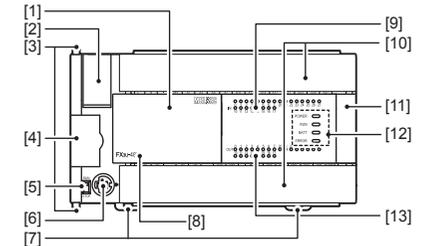
Check if the following product and items are included in the package:

	Included Items	
■ Main units		
FX3U-16M□ to FX3U-128M□	Product	1 unit
	Dust proof protection sheet	1 sheet
	Manuals [Japanese (*1)/English]	1 manual
■ Input/output extension units		
FX2N-32E□, FX2N-48E□	Product	1 unit
	Extension cable	1 cable
	Input/output number label	1 sheet
■ Input/output extension blocks		
FX2N-8E□, FX2N-16E□	Product	1 unit
	Input/output number label	1 sheet

(*1) The FX3U-□□□□/ES-A becomes Chinese version.

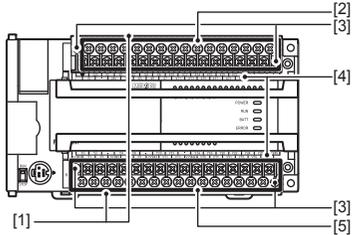
1. Outline

1.1 Part names



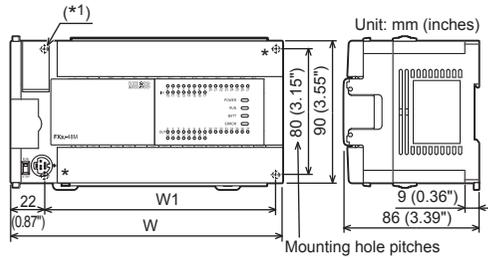
No.	Name		
[1]	Top cover		
[2]	Battery cover		
[3]	Special adapter connecting hooks (2 places)		
[4]	Expansion board dummy cover		
[5]	RUN/STOP switch		
[6]	Peripheral device connecting connector		
[7]	DIN rail mounting hooks		
[8]	Model name (abbreviation)		
[9]	Input display LEDs (Red)		
[10]	Terminal block covers		
[11]	Extension device connecting connector cover		
[12]	Operation status display LEDs		
	POWER	Green	On while power is on the PLC.
	RUN	Green	On while the PLC is running.
	BATT	Red	Lights when the battery voltage drops.
	ERROR	Red	Flashing when a program error occurs.
Red		Lights when a CPU error occurs.	
[13]	Output display LEDs (Red)		

With terminal cover open



No.	Name
[1]	Protective terminal covers (FX3U-□□□□-A is excluded)
[2]	Power supply, Input (X) terminals
[3]	Terminal block mounting screws (FX3U-16M□ terminal block cannot be installed/removed)
[4]	Terminal names
[5]	Output (Y) terminals

1.2 External dimensions and weight



(*1) 2- φ4.5-diam mounting holes: FX3U-16M□, FX3U-32M□ (except FX3U-32MR/UA1)
 4- φ4.5-diam mounting holes: FX3U-48M□, FX3U-64M□, FX3U-80M□, FX3U-128M□, FX3U-32MR/UA1
 FX3U-16M□ and FX3U-32M□ (except FX3U-32MR/UA1) do not have the (*)-marked mounting holes.

Model name	W: mm (inches)	W1: mm (inches) Direct mounting hole pitches	MASS (Weight): kg (lbs)
FX3U-16M□	130 (5.12")	103 (4.06")	0.6 (1.32lbs)
FX3U-32M□ (*2)	150 (5.91")	123 (4.85")	0.65 (1.43lbs)
FX3U-48M□	182 (7.17")	155 (6.11")	0.85 (1.87lbs)
FX3U-64M□ (*3)	220 (8.67")	193 (7.6")	1.00 (2.2lbs)
FX3U-80M□	285 (11.23")	258 (10.16")	1.20 (2.64lbs)
FX3U-128M□	350 (13.78")	323 (12.72")	1.80 (3.96lbs)

(*2) FX3U-32MR/UA1 is equivalent to FX3U-48M□.

(*3) FX3U-64MR/UA1 is equivalent to FX3U-80M□.

Installation

- 35-mm-wide DIN rail or Direct (screw) mounting (M4)

2. Installation (general specifications)

As for installation of the input/output extension units/blocks, special adapters and expansion boards, refer to FX3U Series User's Manual - Hardware Edition.

INSTALLATION PRECAUTIONS	CAUTION
<ul style="list-style-type: none"> • Use the product within the generic environment specifications described in section 2.1 of this manual. Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl₂, H₂S, SO₂ or NO₂), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur. • Do not touch the conductive parts of the product directly. Doing so may cause device failure or malfunctions. • Install the product securely using a DIN rail or mounting screws. • Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities. • When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits. Failure to do so may cause fire, equipment failures or malfunctions. • Be sure to remove the dust proof sheet from the PLC's ventilation port when installation work is completed. Failure to do so may cause fire, equipment failures or malfunctions. • Connect the extension cables, peripheral device cables, input/output cables and battery connecting cable securely to their designated connectors. Loose connections may cause malfunctions. • Turn off the power to the PLC before attaching or detaching the following devices. Failure to do so may cause device failures or malfunctions. <ul style="list-style-type: none"> - Peripheral devices, display modules, expansion boards and special adapters - Extension units/blocks and the FX Series terminal block - Battery and memory cassette 	

Notes
<ul style="list-style-type: none"> • When a dust proof sheet is supplied with an unit, keep the sheet applied to the ventilation slits during installation and wiring work. • To prevent temperature rise, do not install the PLC on a floor, a ceiling or a vertical surface. Install it horizontally on a wall as shown in section 2.2. • Keep a space of 50 mm (1.97") or more between the unit main body and another device or structure (part A). Install the unit as far away as possible from high-voltage lines, high-voltage devices and power equipment.

WIRING PRECAUTIONS	WARNING
<ul style="list-style-type: none"> • Cut off all phases of the power supply externally before installation or wiring work in order to avoid damage to the product or electric shock. 	

2.1 Generic specifications

Item	Specification				
Ambient temperature	0 to 55 °C (32 to 131 °F) when operating and -25 to 75 °C (-13 to 167 °F) when stored				
Ambient humidity	5 to 95 %RH (no condensation) when operating				
Vibration resistance (*1)	When installed on DIN rail	10 to 57 57 to 150	- 4.9	0.035 -	Sweep Count for X, Y, Z: 10 times (80 min in each direction)
	When installed directly	10 to 57 57 to 150	- 9.8	0.075 -	
Shock resistance (*1)	147 m/s ² Acceleration, Action time: 11 ms, 3 times by half-sine pulse in each direction X, Y, and Z				
Noise resistance	By noise simulator at noise voltage of 1,000 Vp-p, noise width of 1 μs, rise time of 1 ns and period of 30 to 100 Hz				
Dielectric withstand voltage (*2)	1.5 kV AC for one minute	Between each terminals and ground terminal			
	500 V AC for one minute				
Insulation resistance (*2)	5 MΩ or higher by 500 V DC insulation resistance tester				
Grounding	Class D grounding (grounding resistance: 100 Ω or less) <Common grounding with a heavy electrical system is not allowed.> (*3)				
Working atmosphere	Free from corrosive or flammable gas and excessive conductive dusts				
Working altitude	<2000 m (*4)				

(*1) The criterion is shown in IEC61131-2.

(*2) Dielectric withstand voltage and insulation resistance are shown in the following table.

Terminal	Dielectric strength	Insulation resistance
■ Main units, Input/output extension units/blocks		
Between power supply terminal (AC power) and ground terminal	1.5 kV AC for one minute	5 MΩ or higher by 500 V DC insulation resistance tester
Between power supply terminal (DC power) and ground terminal	500 V AC for one minute	
Between 24 V DC service power supply connected to input terminal (24 V DC) and ground terminal	500 V AC for one minute	
Between input terminal (100 V AC) and ground terminal	1.5 kV AC for one minute	
Between output terminal (relay) and ground terminal	1.5 kV AC for one minute	
Between output terminal (transistor) and ground terminal	500 V AC for one minute	
Between output terminal (triac) and ground terminal	1.5 kV AC for one minute	
■ Expansion boards, Special adapters, Special function units/blocks		
Between terminal of expansion board and ground terminal	Not allowed	Not allowed
Between terminal of special adapter and ground terminal	500 V AC for 1 min	5 MΩ or higher by 500 V DC insulation resistance tester
Special function unit/block	Each manual	

For dielectric with stand voltage test and insulation resistance test of each product, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

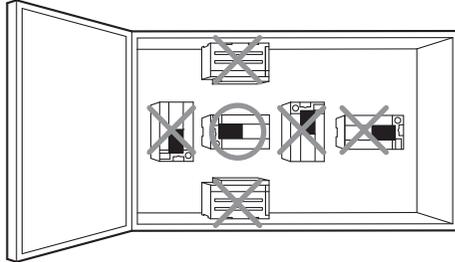
(*3) For common grounding, refer to section 3.3.

(*4) The PLC cannot be used at a pressure higher than the atmospheric pressure to avoid damage.

2.2 Installation location

Install the PLC in an environment conforming to the generic specifications (section 2.1), installation precautions and notes. For more details, refer to FX3U Series User's Manual - Hardware Edition.

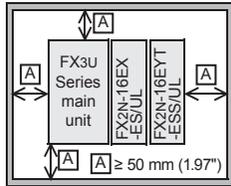
Installation location in enclosure



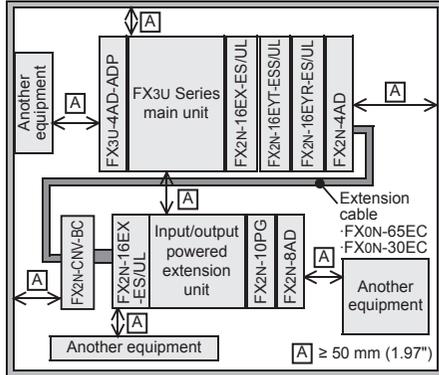
Space in enclosure

Extension devices can be connected on the left and right sides of the main unit of the PLC. If you intend to add extension devices in the future, keep necessary spaces on the left and right sides.

Configuration without extension cable



Configuration in 2 stages with extension cable



2.2.1 Affixing the dust proof sheet

The dust proof sheet should be affixed to the ventilation port before beginning the installation and wiring work.

→ For the affixing procedure, refer to the instructions on the dust proof sheet.

Be sure to remove the dust proof sheet when the installation and wiring work is completed.

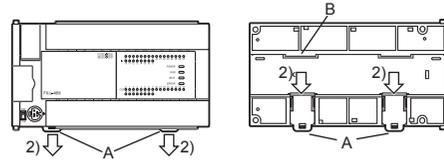
2.3 Procedures for installing to and detaching from DIN rail

The products can be installed on a DIN46277 rail [35 mm (1.38") wide]. This section explains the installations of the main units. For the input/output extension units/blocks and special adapters, refer to the following manual.

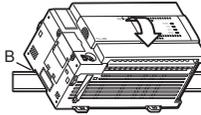
→ Refer to FX3U Series User's Manual - Hardware Edition.

2.3.1 Installation

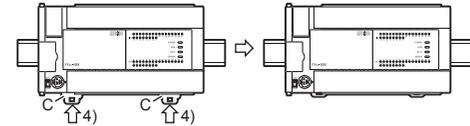
- 1) Connect the expansion boards and special adapters to the main unit.
- 2) Push out all DIN rail mounting hooks (below fig.A)



- 3) Fit the upper edge of the DIN rail mounting groove (right fig.B) onto the DIN rail.



- 4) Lock the DIN rail mounting hooks (below fig.C) while pressing the PLC against the DIN rail.



2.4 Procedures for installing directly (with M4 screws)

The product can be installed directly on the panel (with screws). This section explains the installation of the main units. As for the details of the installation/detaching for input extension units/blocks and special adapters, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

2.4.1 Mounting hole pitches

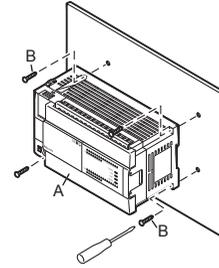
Refer to the External Dimensions (section 1.2) for the product's mounting hole pitch information.

As for the details of the mounting hole pitches for extension unit/block and special adapters, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

2.4.2 Installation

- 1) Make mounting holes in the mounting surface referring to the external dimensions diagram.
- 2) Fit the main unit (A in the right figure) based on the holes, and secure it with M4 screws (B in the right figure). The mounting hole pitches and number of screws depend on the product. Refer to the external dimensions diagram.



3. Power supply/input/output specifications and examples of external wiring

As for the details of the power supply wiring and input/output wiring, refer to FX3U Series User's Manual - Hardware Edition.

DESIGN PRECAUTIONS **WARNING**

- Make sure to have the following safety circuits outside of the PLC to ensure safe system operation even during external power supply problems or PLC failure. Otherwise, malfunctions may cause serious accidents.
 - 1) Most importantly, have the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits).
 - 2) Note that when the PLC CPU detects an error, such as a watchdog timer error, during self-diagnosis, all outputs are turned off. Also, when an error that cannot be detected by the PLC CPU occurs in an input/output control block, output control may be disabled. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
 - 3) Note that the output current of the 24 V DC service power supply varies depending on the model and the absence/presence of extension blocks. If an overload occurs, the voltage automatically drops, inputs in the PLC are disabled, and all outputs are turned off. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
 - 4) Note that when an error occurs in a relay, triac or transistor output device, the output could be held either on or off. For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.

DESIGN PRECAUTIONS **CAUTION**

- Do not bundle the control line together with or lay it close to the main circuit or power line. As a guideline, lay the control line at least 100 mm (3.94") or more away from the main circuit or power line. Noise may cause malfunctions.
- Install module so that excessive force will not be applied to peripheral device connectors. Failure to do so may result in wire damage/breakage or PLC failure.

Notes	
•	Simultaneously turn on and off the power supplies of the main unit and extension devices.
•	Even if the AC power supply causes an instantaneous power failure for less than 10 ms, the PLC can continue to operate.
•	Even if the DC power supply causes an instantaneous power failure for less than 5ms, the PLC can continue to operate.
•	If a long-time power failure or an abnormal voltage drop occurs, the PLC stops, and output is turned off. When the power supply is restored, it will automatically restart (when the RUN input is on).

WIRING PRECAUTIONS **WARNING**

- Make sure to cut off all phases of the power supply externally before installation or wiring work. Failure to do so may cause electric shock or damage to the product.

WIRING PRECAUTIONS **CAUTION**

- Connect the AC power supply to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out.
- Do not wire vacant terminals externally. Doing so may damage the product.
- Perform class D grounding (grounding resistance: 100 Ω or less) to the grounding terminal on the FX3U PLC main unit with a wire 2 mm² or thicker. Do not use common grounding with heavy electrical systems (refer to section 3.3).
- When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits. Failure to do so may cause fire, equipment failures or malfunctions.
- Make sure to properly wire to the terminal in accordance with the following precautions. Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
 - The disposal size of the cable end should follow the dimensions described in the manual.
 - Tightening torque should follow the specifications in the manual.

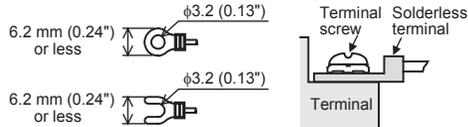
Notes	
•	Input/output wiring 50 to 100 m (164'1" to 328'1") long will cause almost no problems of noise, but, generally, the wiring length should be less than 20 m (65'7") to ensure the safety.
•	Extension cables are easily affected by noise. Lay the cables at a distance of at least 30 to 50 mm (1.19" to 1.97") away from the PLC output and other power lines.

3.1 Wiring

3.1.1 Cable end treatment and tightening torque

For the terminals of FX3U series PLC, M3 screws are used. The electric wire ends should be treated as shown below. Tighten the screws to a torque of 0.5 to 0.8 N•m. Do not tighten terminal screws exceeding the specified torque. Failure to do so may cause equipment failures or malfunctions.

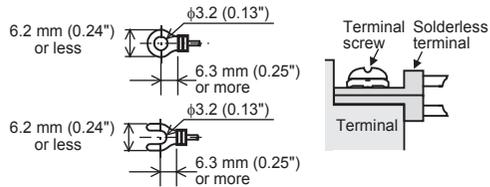
- When one wire is connected to one terminal



<Reference>

Terminal Manufacturer	Type No.	Certification	Pressure Bonding Tool
JAPAN SOLDERLESS TERMINAL MFG CO LTD (JST)	FV1.25-B3A	UL Listed	YA-1 (JST)
	FV2-MS3		

- When two wires are connected to one terminal



<Reference>

Terminal Manufacturer	Type No.	Certification	Pressure Bonding Tool
JAPAN SOLDERLESS TERMINAL MFG CO LTD (JST)	FV1.25-B3A	UL Listed	YA-1 (JST)

3.1.2 Removal and installation of quick-release terminal block

Removal Unscrew the terminal block mounting screw [both right and left screws] evenly, and remove the terminal block.
Installation Place the terminal block in the specified position, and tighten the terminal block mounting screw evenly [both right and left screws]. Tightening torque 0.4 to 0.5 N•m
 Do not tighten the terminal block mounting screws exceeding the specified torque. Failure to do so may cause equipment failures or malfunctions.
 (*) Pay attention so that the center of the terminal block is not lifted.

3.2 Power supply specifications and example of external wiring

As for the details of the power supply specifications and example of external wiring, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

3.2.1 Power supply specifications [Main unit, Input/output extension units]

Item	Specification		
	AC power type	DC power type (*6)	
Supply voltage	100 - 240 V AC	24 V DC	
Allowable supply voltage range	Main unit	16.8 to 28.8 V DC (*5)	
	FX2N-32E□, FX2N-48E□	24 V DC +20 %, -30 %	
Rated frequency	50/60 Hz	-	
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less. (*4)	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.	
Power fuse	FX3U-16M□ to 32M□ (*7)	250 V 3.15 A	
	FX3U-48M□ to 128M□	250 V 5 A	
	FX2N-32E□	250 V 3.15 A	
	FX2N-48E□	250 V 5 A	
Rush current	Main unit	30 A max. 5 ms or less/100 V AC 65 A max. 5 ms or less/200 V AC	
	FX2N-32E□, FX2N-48E□	40 A max. 5 ms or less/100 V AC 60 A max. 5 ms or less/200 V AC	
Power consumption (*1)	FX3U-16M□	30 W	25 W
	FX3U-32M□	35 W	30 W
	FX3U-48M□	40 W	35 W
	FX3U-64M□	45 W	40 W
	FX3U-80M□	50 W	45 W
	FX3U-128M□	65 W	-
	FX2N-32E□	30 W	-
	FX2N-48E□	35 W	30 W
24 V DC service power supply (*2)	FX3U-16M□ to 32M□	400 mA or less	-
	FX3U-48M□ to 128M□	600 mA or less	-
	FX2N-32E□	250 mA	-
	FX2N-48E□	460 mA	-
5 V DC builtin power supply (*3)	Main unit	500 mA or less	
	FX2N-32E□ FX2N-48E□	690 mA or less	

- (*1) Does not include the power consumption of extension units/special extension units, and of the extension blocks/special extension blocks connected to those units.

For the power (current) consumed by the extension units/blocks for input/output, refer to FX3U Series User's Manual - Hardware Edition.

For the power consumed by the special extension units/blocks, refer to the appropriate manual.

- (*2) When input/output extension blocks are connected, the 24 V DC service power supply is consumed by the blocks, and the current value to be used by the main unit is reduced. The AC power (AC input) type and DC power type do not have a service power supply.

- (*3) Cannot be used to supply power to an external destination.

The power is supplied to input/output extension blocks, special extension blocks, special adapters and expansion boards. The following manual shows further information.
 → Refer to FX3U Series User's Manual - Hardware Edition.

- (*4) When the supply voltage is 200 V AC, the time can be changed to 10 to 100 ms by editing the user program.

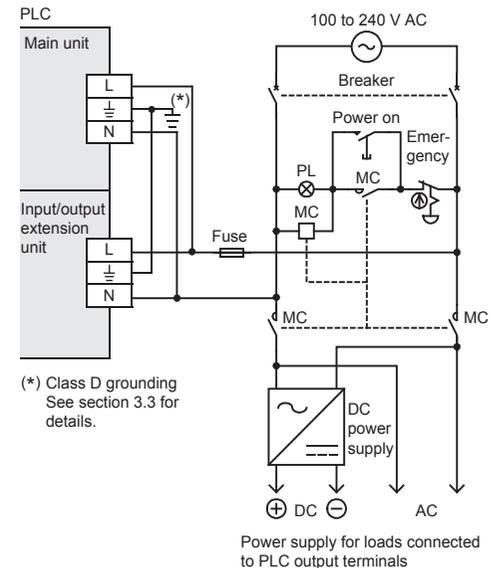
- (*5) When supply voltage is DC 16.8 to 19.2 V, the connectable extension equipment decreases. The following manual shows further information.
 → Refer to FX3U Series User's Manual - Hardware Edition.

- (*6) When attaching high-speed input/output special adapter (FX3U-4HSX-ADP, FX3U-2HSY-ADP) and special function block (FX0N-3A, FX2N-2AD, FX2N-2DA), the number of connectable modules to the main unit is limited, due to the current consumption (internal 24 V DC) at startup. The following manual shows further information.
 → Refer to FX3U Series User's Manual - Hardware Edition.

- (*7) 250 V 5 A is specified for the power fuse of FX3U-32MR/UA1.

3.2.2 Example of external wiring (AC power type)

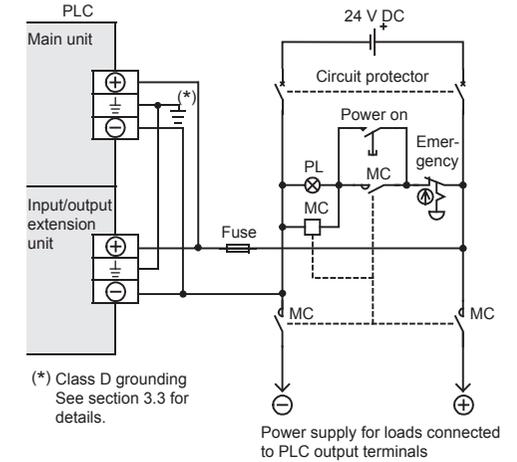
100 to 240 V AC power is supplied to the main unit and input/output extension units. For the details of wiring work, refer to section 3.1.



- (*1) Class D grounding See section 3.3 for details.

3.2.3 Example of external wiring (DC power type)

24 V DC power is supplied to the main unit and input/output extension unit. For the details of wiring work, refer to section 3.1.

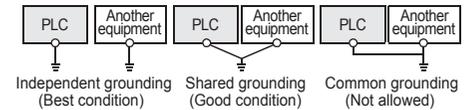


- (*1) Class D grounding See section 3.3 for details.

3.3 Grounding

Ground the PLC as stated below.

- Perform class D grounding. (Grounding resistance: 100 Ω or less)
- Ground the PLC independently if possible. If it cannot be grounded independently, ground it jointly as shown below.



- Use ground wires thicker than AWG14 (2 mm²).
- Position the grounding point as close to the PLC as possible to decrease the length of the ground wire.

3.4 Input specifications and external wiring

As for the details of the input specifications and external wiring, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

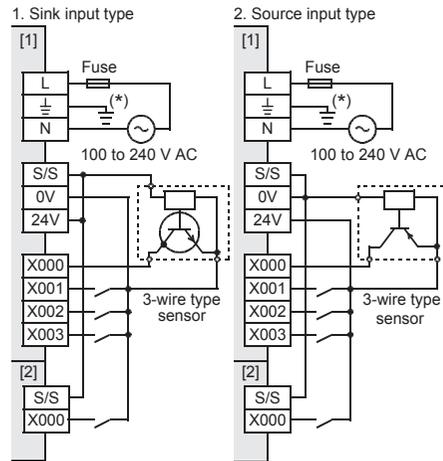
3.4.1 Input specifications (24 V DC input type)

Item	Specification	
Number of input points	FX2N-8ER□	4 points (8 points) (*1)
	FX3U-16M□, FX2N-8EX□	8 points
	FX3U-32M□, FX2N-16EX□, FX2N-32E□	16 points
	FX3U-48M□, FX2N-48E□	24 points
	FX3U-64M□	32 points
	FX3U-80M□	40 points
	FX3U-128M□	64 points

Item		Specification
Input connecting type		Refer to FX3U Series User's Manual - Hardware Edition
Input form		Hardware Edition
Input signal voltage	Main units	AC power Type 24 V DC +10 %, -10 % DC power Type 24 V DC +20 %, -30 %
	Input/output extension unit	AC power Type 24 V DC +10 %, -10 % DC power Type 24 V DC +20 %, -30 %
Input impedance	Main units	X000 to X005 3.9 kΩ
		X006, X007 3.3 kΩ
		X010 or more 4.3 kΩ (Does not apply to FX3U-16M□.)
Input/output extension unit/block		4.3 kΩ
Input signal current	Main units	X000 to X005 6 mA/24 V DC
		X006, X007 7 mA/24 V DC
		X010 or more 5 mA/24 V DC (Does not apply to FX3U-16M□.)
Input/output extension unit/block		5 mA/24 V DC
ON input sensitivity current	Main units	X000 to X005 3.5 mA or more
		X006, X007 4.5 mA or more
		X010 or more 3.5 mA or more (Does not apply to FX3U-16M□.)
Input/output extension unit/block		3.5 mA or more/24 V DC
OFF input sensitivity current	1.5 mA or less	
Input response time	Approx. 10 ms	
Input signal form	<ul style="list-style-type: none"> Sink input: No-voltage contact input NPN open collector transistor Source input: No-voltage contact input PNP open collector transistor 	
Input circuit insulation	Photocoupler insulation	
Input operation display	LED on panel lights when photocoupler is driven.	

(*1) Each value inside () indicates the number of occupied points.

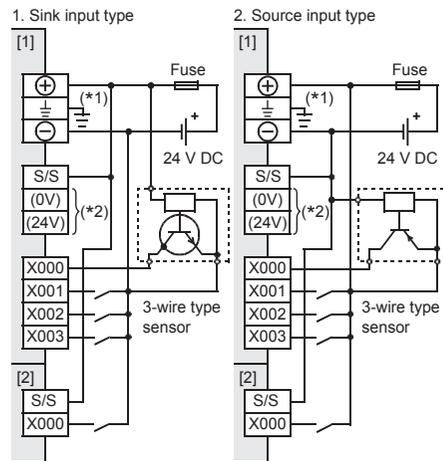
3.4.2 Examples of 24 V DC input wiring [AC power type]



(*1) Class D grounding
See section 3.3 for details.

- [1]: Main unit, Input/output extension unit (Common to both sink and source inputs)
- [2]: Input/output extension block (Common to both sink and source inputs)

3.4.3 Examples of 24 V DC input wiring [DC power type]



(*1) Class D grounding
See section 3.3 for details.

(*2) Do not connect the (0V), (24V) terminals with others, since they are not available.

- [1]: Main unit, Input/output extension unit (Common to both sink and source inputs)
- [2]: Input/output extension block (Common to both sink and source inputs)

3.4.4 Instructions for connecting input devices

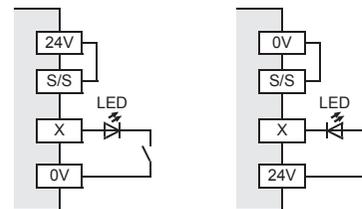
- In the case of no-voltage contact:
The input current of this PLC is 5 to 7 mA/24 V DC. Use input devices applicable to this minute current. If no-voltage contacts (switches) for large current are used, contact failure may occur.

<Example> Products of OMRON

Type	Model name	Type	Model name
Microswitch	Models Z, V and D2RV	Operation switch	Model A3P
Proximity switch	Model TL	Photoelectric switch	Model E3S

- In the case of input device with built-in series diode:
The voltage drop of the series diode should be approx. 4 V or less. When lead switches with a series LED are used, up to two switches can be connected in series. Also make sure that the input current is over the input-sensing level while the switches are ON.

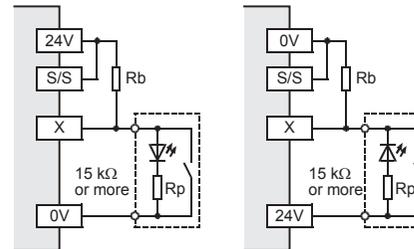
• Sink input • Source input



- In the case of input device with built-in parallel resistance:
Use a device having a parallel resistance, Rp, of 15 kΩ or more. When the resistance is less than 15 kΩ, connect a bleeder resistance, Rb, obtained from the formula as shown in the following figure.

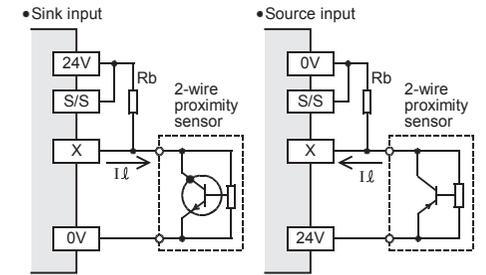
$$R_b \leq \frac{4R_p}{15 - R_p} \text{ (k}\Omega\text{)}$$

• Sink input • Source input



- In the case of 2-wire proximity switch:
Use a two-wire proximity switch whose leakage current, I_L, is 1.5 mA or less when the switch is off. When the current is 1.5 mA or more, connect a bleeder resistance, Rb, obtained from formula as shown in the following figure.

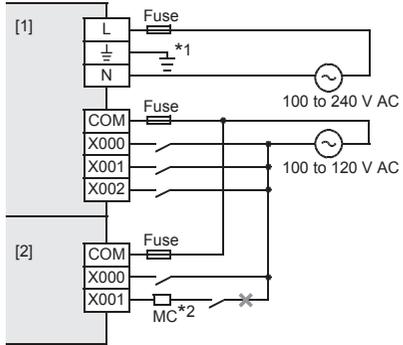
$$R_b \leq \frac{6}{I_L - 1.5} \text{ (k}\Omega\text{)}$$



3.4.5 Input specifications (100 V AC input type)

Item		Specification
Number of input points	FX2N-8EX-UA1/UL	8 points
	FX3U-32MR-UA1	16 points
	FX2N-48ER-UA1/UL	24 points
	FX3U-64MR-UA1	32 points
Input connecting type	Refer to FX3U Series User's Manual - Hardware Edition	
Input form	Hardware Edition	
Input signal voltage	100 V AC to 120 V +10 %, -15 % 50/60 Hz	
Input impedance	Approx. 21 kΩ/50 Hz Approx. 18 kΩ/60 Hz	
Input signal current	4.7 mA/100 V AC 50 Hz 6.2 mA/110 V AC 60 Hz (70 % or less when turned on simultaneously)	
ON input sensitivity current	3.8 mA or more	
OFF input sensitivity current	1.7 mA or less	
Input response time	Approx. 25 to 30 ms (A high speed receiving is improper)	
Input signal form	Contact input	
Input circuit insulation	Photocoupler insulation	
Input operation display	LED on panel lights when photocoupler is driven.	

3.4.6 Examples of 100V AC input wiring



- *1 Class D grounding See section 3.3 for details.
- *2 Do not take input signals from loads generating surge.
- [1]: Main unit, Input/output extension unit (100 V AC input type)
- [2]: Input extension block (100 V AC input type)

3.5 Relay output specifications and example of external wiring

As for the details of Instructions for connecting input devices, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

3.5.1 Relay output specifications

Item		Specification
Number of output points	FX2N-8ER□	4 points (8 points) (*1)
	FX3U-16MR□, FX2N-8EYR□	8 points
	FX3U-32MR□, FX2N-32ER□, FX2N-16EYR□	16 points
	FX3U-48MR□, FX2N-48ER□	24 points
	FX3U-64MR□	32 points
	FX3U-80MR□	40 points
	FX3U-128MR/ES	64 points
Output connecting type	Refer to FX3U Series User's Manual - Hardware Edition	
Output form	Relay	
External power supply	30 V DC or less 240 V AC or less ("250 V AC or less" if not a CE, UL, cUL compliant item)	
Max. load	Resistance load	2 A/point (*2)
	Inductive load	80 VA
Min. load	5 V DC, 2 mA (reference value)	
Open circuit leakage current	-	
Response time	OFF→ON	Approx. 10 ms
	ON→OFF	Approx. 10 ms
Output circuit insulation	Mechanical insulation	
Output operation display	LED on panel lights when power is applied to relay coil.	

(*1) Each value inside () indicates the number of occupied points.

(*2) The total load current of resistance loads per common terminal should be the following value.
 - 1 output points/common terminal: 2 A or less
 - 4 output points/common terminal: 8 A or less
 - 8 output points/common terminal: 8 A or less
 As for the number of outputs per common terminal, refer to "Chapter 4 interpretation of partition" and the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

3.5.2 Life of relay output contact

The product life of relay contacts considerably varies depending on the load type used. Take care that loads generating reverse electromotive force or rush current may cause poor contact or deposition of contacts which may lead to considerable reduction of the contact product life.

- 1) Inductive load
 Inductive loads generate large reverse electromotive force between contacts at shutdown which may cause arcing. At a fixed current consumption, as the power factor (phase between current and voltage) gets smaller, the arc energy gets larger. The standard life of the contact used for inductive loads, such as contactors and solenoid valves, is 500 thousand operations at 20 VA.
 The following table shows the approximate life of the relay based on the results of our operation life test.

Test condition: 1 sec.ON / 1 sec.OFF.

Load capacity	Contact life	
	20 VA	35 VA
0.2 A/100 V AC	3 million times	1 million times
0.35 A/100 V AC	1 million times	2 hundred thousand times
0.8 A/100 V AC	2 hundred thousand times	-

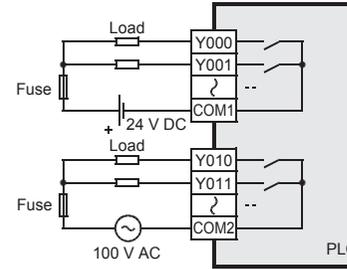
The product life of relay contacts becomes considerably shorter than the above conditions when the rush overcurrent is shut down.

→ For countermeasures while using inductive loads, refer to Subsection 3.5.4.

Some types of inductive loads generate rush current 5 to 15 times the stationary current at activation. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load.

- 2) Lamp load
 Lamp loads generally generate rush current 10 to 15 times the stationary current. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load.
- 3) Capacitive load
 Capacitive loads can generate rush current 20 to 40 times the stationary current. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load. Capacitive loads such as capacitors may be present in electronic circuit loads including inverters.
 → For the maximum specified resistance load, refer to Subsection 3.5.1.

3.5.3 Example of relay output wiring



3.5.4 Cautions in external wiring

For cautions in external wiring, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

Protection circuit for load short-circuiting

When a load connected to the output terminal short-circuits, the printed circuit board may be burnt out. Fit a protective fuse on the output circuit.

Protection circuit of contact when inductive load is used

An internal protection circuit for the relays is not provided for the relay output circuit. It is recommended to use inductive loads with built-in protection circuits. When using loads without built-in protection circuits, insert an external contact protection circuit, etc. to reduce noise and extend the product life.

- 1) DC circuit
 Connect a diode in parallel with the load.
 Use a diode (for commutation) having the following specifications.

Item	Standard
Reverse voltage	5 to 10 times the load voltage
Forward current	Load current or more

- 2) AC circuit
 Connect the surge absorber (combined CR components such as a surge killer and spark killer, etc.) parallel to the load.
 Select the rated voltage of the surge absorber suitable to the output used. Refer to the table below for other specifications.

Item	Standard
Electrostatic capacity	Approx. 0.1 μF
Resistance value	Approx. 100 to 200 Ω

Interlock

Loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

Common mode

Use output contacts of the PLC in the common mode.

3.6 Transistor output specifications and example of external wiring

As for the details of the transistor output specifications and external wiring, refer to the following manual.
 → Refer to FX3U Series User's Manual - Hardware Edition.

3.6.1 Transistor output specifications

Item		Specification	
Number of output points	FX3U-16MT/□, FX2N-8EYT□	8 points	
	FX3U-32MT/□, FX2N-32ET□, FX2N-16EYT□	16 points	
	FX3U-48MT/□, FX2N-48ET□	24 points	
	FX3U-64MT/□	32 points	
	FX3U-80MT/□	40 points	
FX3U-128MT/ES(S)		64 points	
Output connecting type	Refer to FX3U Series User's Manual - Hardware Edition		
Output form	FX3U-□□MT/□S(-A), FX2N-□ET, FX2N-48ET-D, FX2N-□EYT, FX2N-8EYT-H	Transistor (Sink)	
	FX3U-□□MT/□SS, FX2N-□ET-ESS/UL, FX2N-48ET-DSS, FX2N-□EYT-ESS/UL	Transistor (Source)	
External power supply	5 to 30 V DC		
Max. load	Resistance load	FX3U-□□MT/□, FX2N-□ET, FX2N-□ET-□, FX2N-□EYT, FX2N-□EYT-ESS/UL	0.5 A/point (*1)
		FX2N-8EYT-H	1 A/point (*2)
	FX2N-16EYT-C	0.3 A/point (*3)	
Inductive load	12 W/24 V DC (*4)	FX3U-□□MT/□, FX2N-□ET, FX2N-□ET-□, FX2N-□EYT, FX2N-□EYT-ESS/UL	12 W/24 V DC (*4)
		FX2N-8EYT-H	24 W/24 V DC (*5)
		FX2N-16EYT-C	7.2 W/24 V DC (*6)
Min. load	-		
Open circuit leakage current	0.1 mA or less/30 V DC		
ON voltage	1.5 V or less		

Item		Specification	
Response time	OFF → ON	Main unit Y000 to Y002 Y003 or more	5 μs or less/10 mA or more (5 to 24 V DC) 0.2 ms or less/200 mA or more (at 24 V DC)
		Input/output extension units/blocks (*7)	0.2 ms or less/200 mA or more (at 24 V DC)
	ON → OFF	Main unit Y000 to Y002 Y003 or more	5 μs or less/10 mA or more (5 to 24 V DC) 0.2 ms or less/200 mA or more (at 24 V DC)
		Input/output extension units/blocks (*7)	0.2 ms or less/200 mA or more (at 24 V DC)
Output circuit insulation		Photocoupler insulation	
Output operation display		LED on panel lights when photocoupler is driven.	

(*1) The total load current of resistance loads per common terminal should be the following value.

- 1 output point/common terminal: 0.5 A or less
- 4 output points/common terminal: 0.8 A or less
- 8 output points/common terminal: 1.6 A or less

As for the number of outputs per common terminal, refer to "Chapter 4 interpretation of partition" and the following manual.
→ Refer to FX3U Series User's Manual - Hardware Edition.

(*2) The total load current of resistance loads per common terminal should be the following value.

- 4 output points/common terminal: 2 A or less

As for the number of outputs per common terminal, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

(*3) The total load current of resistance loads per common terminal should be the following value.

- 16 output points/common terminal: 1.6 A or less

As for the number of outputs per common terminal, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

(*4) The total of inductive loads per common terminal should be the following value.

- 1 output point/common terminal: 12 W or less/24 V DC
- 4 output points/common terminal: 19.2 W or less/24 V DC
- 8 output points/common terminal: 38.4 W or less/24 V DC

As for the number of outputs per common terminal, refer to "Chapter 4 interpretation of partition" and the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

(*5) The total of inductive loads per common terminal should be the following value.

- 4 output points/common terminal: 48 W or less/24 V DC

As for the number of outputs per common terminal, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

(*6) The total of inductive loads per common terminal should be the following value.

- 16 output points/common terminal: 38.4 W or less

As for the number of outputs per common terminal, refer to the following manual.

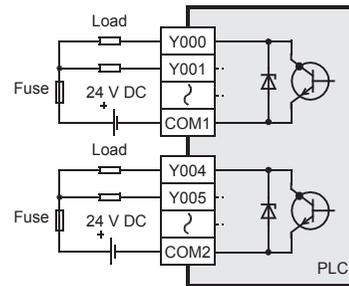
→ Refer to FX3U Series User's Manual - Hardware Edition.

(*7) The response time is as follows in the FX2N-8EYH.

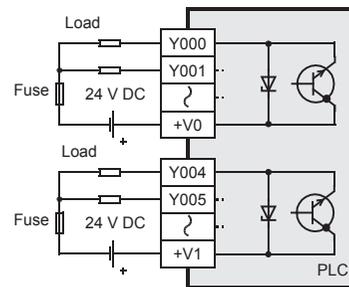
- OFF→ON: 0.2 ms or less/1 A
- ON→OFF: 0.4 ms or less/1 A

3.6.2 External wiring of transistor output

1. External wiring of sink output type



2. External wiring of source output type



3.6.3 Cautions in external wiring

For cautions in external wiring, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

Protection circuit for load short-circuits

A short-circuit at a load connected to an output terminal could cause burnout at the output element or the PCB. To prevent this, a protection fuse should be inserted at the output. Use a load power supply capacity that is at least 2 times larger than the total rated fuse capacity.

Contact protection circuit for inductive loads

When an inductive load is connected, connect a diode (for commutation) in parallel with the load as necessary. The diode (for commutation) must comply with the following specifications.

Item	Guide
Reverse voltage	5 to 10 times of the load voltage
Forward current	Load current or more

Interlock

Loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

3.7 Triac output specifications and example of external wiring

As for the details of the triac output specifications and external wiring, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

3.7.1 Triac output specifications

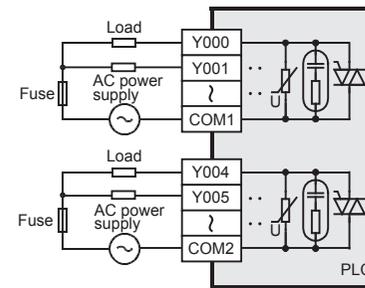
Item		Specification
Number of output points	FX3U-32MS/ES, FX2N-16EYS, FX2N-32ES	16 points
	FX3U-64MS/ES	32 points
Output connecting type		Refer to FX3U Series User's Manual - Hardware Edition
Output form		Triac (SSR)
External power supply		85 to 242 V AC
Max. load	Resistance load	0.3 A/point (*1)
	Inductive load	15 VA/100 V AC, 30 VA/200 V AC
Min. load		0.4 VA/100 V AC, 1.6 VA/200 V AC
		2 mA/100 V AC, 1 mA/200 V AC
Response time	OFF→ON	1 ms or less
	ON→OFF	10 ms or less
Output circuit insulation		Photo-thyristor insulation
Output operation display		LED on panel lights when photo-thyristor is driven.

(*1) The total load current of resistance loads per common terminal should be the following value.

- 4 output points/common terminal: 0.8 A or less
- 8 output points/common terminal: 0.8 A or less

As for the number of outputs per common terminal, refer to "Chapter 4 interpretation of partition" and the following manual.
→ Refer to FX3U Series User's Manual - Hardware Edition.

3.7.2 External wiring of triac output



3.7.3 Cautions in external wiring

For cautions in external wiring, refer to the following manual.

→ Refer to FX3U Series User's Manual - Hardware Edition.

Protection circuit for load short-circuits

A short-circuit at a load connected to an output terminal could cause burnout at the output element or the PCB. To prevent this, a protection fuse should be inserted at the output.

Micro current load

The PLC's internal Triac output circuit is equipped with a turn-off C-R absorber. When connecting a very low current load of "0.4 VA/100 V AC or less, or 1.6 VA/200 V AC or less", please connect a surge absorber parallel to the load.

Select the rated voltage of a surge absorber that is suitable for the load being used. Refer to the table below for other specifications.

Item	Guide
Static electricity capacity	Approx. 0.1 μF
Resistance value	Approx. 100 to 200 Ω

Interlock

Loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

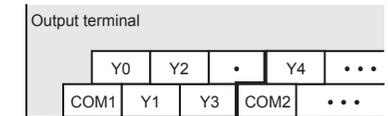
4. Terminal block layouts

For details on the terminal block layout, refer to the following manual.
→ Refer to FX3U Series User's Manual - Hardware Edition.

Interpretation of partition

The partition of the output terminals (see following figure) indicates the range of the output connected to the same common.

Example: FX3U-48MT/ES



Partition

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Exclusion of loss in opportunity and secondary loss from warranty liability
Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

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For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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