

SF2N-4AD 模拟量输入模块用户手册

注意:

在开始使用之前, 请仔细阅读操作指示、注意事项, 以减少意外的发生。负责产品安装、操作的人员必须经严格培训, 遵守相关行业的安全规范, 严格遵守本手册提供的相关设备注意事项和特殊安全指示, 按正确的方法进行设备的各项操作。

1 接口描述

1.1 接口说明

SF2N-4AD 的扩展电缆接口和用户端子均有盖板, 外观如图 1-1 所示。打开各盖板后便露出扩展电缆接口和用户端子, 如图 1-2 所示。

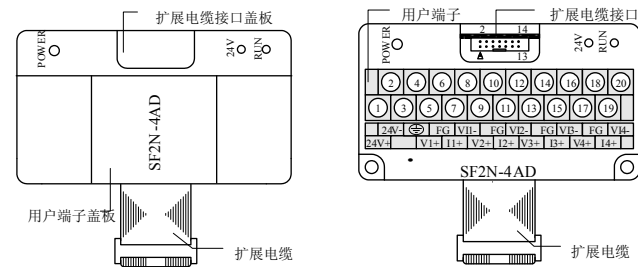


图 1-1 模块接口外观图

图 1-2 模块接口端子图

SF2N-4AD 通过扩展电缆接入系统, 扩展电缆接口用于系统其他扩展模块的连接, 具体方法参见 1.2 接入系统。

SF2N-4AD 用户端子的定义见表 1-1。

表 1-1 用户端子定义表

序号	标注	说明	序号	标注	说明
1	24V+	模拟电源 24V 正极	11	I2+	第 2 通道电流信号输入端
2	24V-	模拟电源 24V 负极	12	VI2-	第 2 通道公共地端
3	.	空脚	13	V3+	第 3 通道电压信号输入端
4	PG	接地端	14	FG	屏蔽地
5	V1+	第 1 通道电压信号输入端	15	I3+	第 3 通道电流信号输入端
6	FG	屏蔽地	16	VI3-	第 3 通道公共地端
7	I1+	第 1 通道电流信号输入端	17	V4+	第 4 通道电压信号输入端
8	VI1-	第 1 通道公共地端	18	FG	屏蔽地
9	V2+	第 2 通道电压信号输入端	19	I4+	第 4 通道电流信号输入端
10	FG	屏蔽地	20	VI4-	第 4 通道公共地端

说明: 对每个通道而言, 电压与电流信号不能同时输入, 当测量电流信号时, 请将通道电压信号输入端与电流信号输入端短接。

1.2 接入系统

通过扩展电缆, 可将 SF2N-4AD 与 SF2N 系列 PLC 主模块或其他扩展模块连结在一起。其扩展电缆接口也可用于连接 SF2N 系列的其他相同型号或不同型号的扩展模块。如图 1-3 所示。

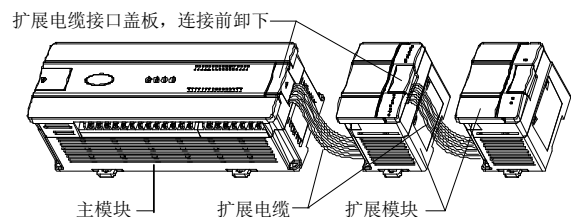


图 1-3 与主模块和其他扩展模块的连接示意图

1.3 布线说明

用户端子布线要求, 如图 1-4 所示。

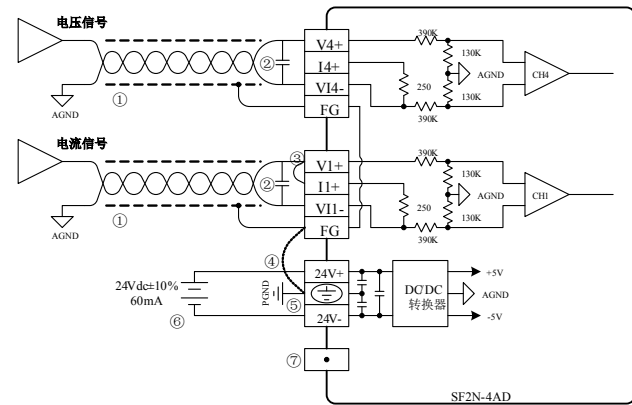


图 1-4 用户端子布线示意图

图中的①~⑦表示布线时必须注意的 7 个方面:

1. 模拟输入建议通过双绞屏蔽电缆接入。电缆应远离电源线或其他可能产生电气干扰的电线。
2. 如果输入信号有波动, 或在外部接线中有电气干扰, 建议接一个平滑电容 (0.1 μF~0.47 μF/25V)。
3. 如果当前通道使用电流输入, 请短接该通道的电压输入端与电流输入端。
4. 如果存在过多的电气干扰, 请连接屏蔽地 FG 与模块接地端 PG。
5. 将模块的接地端 PG 良好接地。
6. 模拟供电电源可以使用主模块输出的 24Vdc 电源, 也可以使用其它满足要求的电源。
7. 不要使用用户端子上的空脚。

2 使用说明

2.1 电源指标

表 2-1 电源指标

项目	说明
模拟电路	24Vdc (-15%~+20%), 最大允许纹波电压 5%, 50mA (来自主模块或外部电源)
数字电路	5Vdc、70mA (来自主模块)

2.2 性能指标

表 2-2 性能指标

项目	指标
转换速度	15ms/通道 (常速), 6ms/通道 (高速)
模拟输入量程	电压输入: -10Vdc~+10Vdc, 输入阻抗为 1MΩ 电流输入: -20mA~+20mA, 输入阻抗为 250Ω 可以同时使用 4 个通道。通过设定缓冲区可进行输入量程选择 (见表 2-5)
数字输出	默认设置: -2000~+2000 设置范围: -10000~+10000
分辨率	电压输入: 根据输入量程而定 (见表 2-5) 电流输入: 10 μA
精度	满量程的 ±1%
隔离	模拟电路和数字电路之间用光电耦合器进行隔离。模拟电路与模块输入 24Vdc 电源内部隔离。模拟通道之间不隔离

2.3 缓冲区

SF2N-4AD 与主模块之间通过通讯缓冲区 (BFM) 交换信息。用户在后台软件的 SF2N-4AD 配置界面上作了相应设置后, 主模块会自动将信息写入 SF2N-4AD 的缓冲区, 由此对 SF2N-4AD 的状态进行设置。主模块会自动将 SF2N-4AD 上报的信息显示在后台软件界面上, 见图 4-2~图 4-6。

SF2N-4AD 的缓冲区具体内容见表 2-3。

表 2-3 缓冲区内容

BFM	内容	缺省值	读写属性
#100	CH1 通道平均值		R
#101	CH2 通道平均值		R
#102	CH3 通道平均值		R
#103	CH4 通道平均值		R
#200	CH1 通道当前值		R
#201	CH2 通道当前值		R
#202	CH3 通道当前值		R
#203	CH4 通道当前值		R
#300	模块故障状态字 0		R
#301	模块故障状态字 1		R
#600	通道模式字	0x0000	RW
#700	CH1 平均值点数	8	RW
#701	CH2 平均值点数	8	RW
#702	CH3 平均值点数	8	RW
#703	CH4 平均值点数	8	RW
#900	CH1-D0	0 (输入模式 0)	RW
#901	CH1-A0	0 (输入模式 0)	R
#902	CH1-D1	2000 (输入模式 0)	RW
#903	CH1-A1	10000 (输入模式 0)	R
#904	CH2-D0	0 (输入模式 0)	RW
#905	CH2-A0	0 (输入模式 0)	R
#906	CH2-D1	2000 (输入模式 0)	RW
#907	CH2-A1	10000 (输入模式 0)	R
#908	CH3-D0	0 (输入模式 0)	RW
#909	CH3-A0	0 (输入模式 0)	R
#910	CH3-D1	2000 (输入模式 0)	RW
#911	CH3-A1	10000 (输入模式 0)	R
#912	CH4-D0	0 (输入模式 0)	RW
#913	CH4-A0	0 (输入模式 0)	R
#914	CH4-D1	2000 (输入模式 0)	RW
#915	CH4-A1	10000 (输入模式 0)	R
#2000	AD 转换速度切换命令	0 (15ms/通道)	RW
#4094	模块软件版本信息	0x1000	R
#4095	模块的识别码	0x1041	R

说明:

1. CH1 表示第 1 通道, CH2 表示第 2 通道, CH3 表示第 3 通道, CH4 表示第 4 通道。
2. 读写属性意义: R 表示只读属性, 向只读单元进行写操作无效。RW 表示可读可写属性。若读取不存在的单元, 将会获得 0 值。
3. BFM#300 的状态信息见表 2-4。

表 2-4 BFM#300 的状态信息

BFM#300 位状态	开 (1)	关 (0)
b0: 错误	b1、b2 中任何一个为 ON, 所有通道 AD 转换停止	无错误
b1: 通道特性设置错误	在 BFM 中的通道特性数据不正常或者调整错误	通道特性数据正常
b2: 电源故障	24Vdc 电源故障	电源正常
b3: 硬件故障	AD 转换器或其它硬件故障	硬件正常
b10: 数字范围错误	AD 转换数字输出值小于-2048 或大于+2047	数字输出值正常

BFM#300 位状态	开 (1)	关 (0)
b11: 平均采样错误	平均采样数不小于 4097, 或者不大于 0 (使用原有有效值)	平均正常 (1~4096 之间)

4. BFM#600: 模式设定单元。用于设定第 1 通道到第 4 通道的输入模式。具体对应关系如图 2-1 所示。

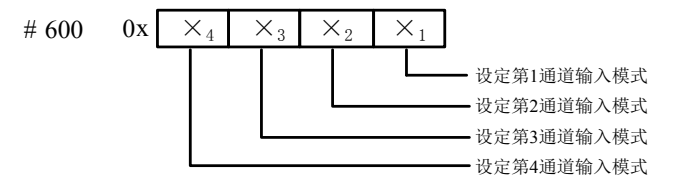


图 2-1 模式设定单元与通道对应关系

字符值所表示的信息如表 2-5 所示。

表 2-5 数值与模式对应关系

×值	对应模式
0	-10V~+10V 电压输入模式
1	-5V~+5V 电压输入模式或-20mA~+20mA 电流输入模式
3	通道关闭

举例, 若对#600 单元写入“0x0103”, 将完成如下设置:

- 1) 第 1 通道关闭。
- 2) 第 3 通道的输入量程: -5V~+5V 或-20mA~+20mA (注意电压与电流的配线不同, 参见 1.3 布线说明)。
- 3) 第 2 通道、4 的输入量程: -10V~+10V。
5. BFM#700~BFM#703 作为通道的平均采样次数的设定缓存区, 提供 1~4096 供用户选择。缺省值为 8 对应于正常速度; 高速操作可选择 1。
6. BFM#900~BFM#915 为通道特性设置数据缓存器, 使用两点法设置通道特性, D0、D1 表示通道输出的数字量, A0、A1 表示通道实际输入, A0、A1 数据的单位是 mV, 每通道占用 4 个字。考虑到方便用户的设置, 同时并不影响功能的实现, 将 A0、A1 的值固定为当前模式下, 模拟量的 0 值和最大值, 对通道模式字 (BFM#600) 进行更改时, A0、A1 会根据模式自动更改, 用户对此两项设置的写入无效。
注意: 若通道输入为电流信号 (-20mA~+20mA), 当前通道应选择模式 1, 由于通道内部测量基于电压信号, 因此, 电流信号由通道的电流输入端 250Ω 电阻转换为电压信号 (-5V~+5V), 当前通道对应的特性设置区域中的 A1 值仍然以 mV 为单位, 即 5000mV, 也就是 20mA×250Ω=5000mV。
7. 在 BFM#2000 中写入 0 或 1 就可以改变 AD 转换的速度。0 为正常速度 15ms/通道; 1 为高速 6ms/通道。当此单元被写入后, BFM#700~#703 将立即设置到缺省值, 这一操作将不考虑它们原有的数值, 这一点, 在编程时需要注意, 当更改转换速度后, 可根据需要重新设置 BFM#700~#703。

8. BFM#4094: 模块软件版本信息单元。自动显示在后台软件的 SF2N-4AD 配置界面上的**模块版本**栏, 见图 4-2。

9. BFM#4095 为模块识别码。SF2N-4AD 的识别码是 0x1041。PLC 中的用户程序可以使用这个号码, 以在传输和接收数据之前确认此扩展模块。

3 特性设置

SF2N-4AD 的输入通道特性为通道模拟输入量 A 与通道数字输出量 D 之间的线性关系, 可由用户设置, 每个通道可以理解为图 3-1 中所示的模型, 由于其为线性特性, 因此只要确定两点 P0 (A0, D0)、P1 (A1, D1), 即可确定通道的特性, 其中, D0 表示模拟量输入为 A0 时通道输出数字量, D1 表示模拟量输入为 A1 时通道输出数字量。

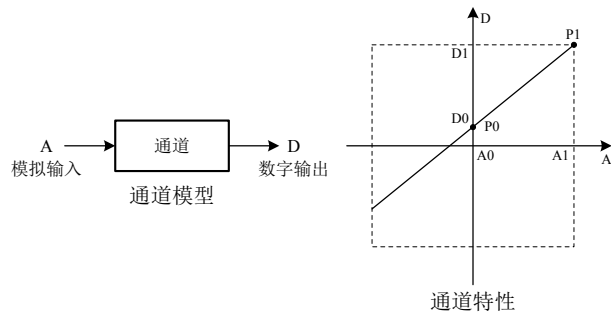


图 3-1 SF2N-4AD 的通道特性示意图

考虑到用户使用的简便性，且不影响功能的实现，将 A0、A1 的值固定为当前模式下，模拟量的 0 值和最大值，也就是说图 3-1 中 A0 为 0，A1 为当前模式下的模拟输入的最大值，对通道模式字（BFM#600）进行更改时，A0、A1 会根据模式自动更改，用户对此两项设置的写入无效。

若不更改各通道的 D0、D1 值，仅设置通道的模式（BFM#600），那么，每种模式对应的特性如图 3-2 所示。其中，图 3-2 中的 A 为出厂设定。

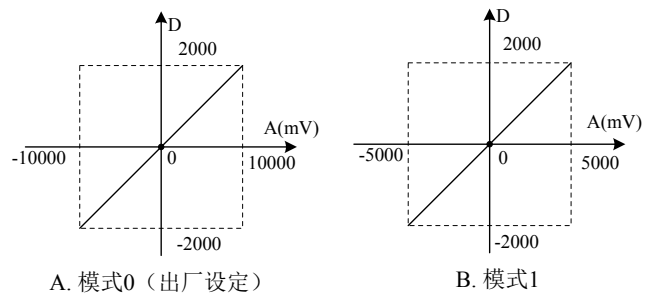


图 3-2 不更改各通道的 D0、D1 值，各种模式对应通道特性

若更改通道的 D0、D1 数值，即可更改通道特性，D0、D1 可在-10000~+10000 之间任意设定，若设定值超出此范围，SF2N-4AD 不会接收，并保持原有有效设置，图 3-3 为特性更改举例，请参考。

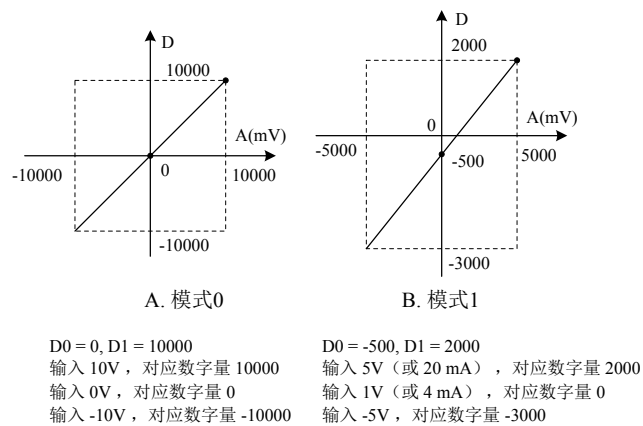


图 3-3 特性更改举例

4 应用示例

4.1 基本应用

例：SF2N-4AD 模块地址为 1（扩展模块的编址方法，参见《SF2N 系列可编程控制器用户手册》），使用其第 1、3 通道输入电压信号（-10V~+10V），第 2 通道输入电流信号（-20mA~+20mA），关闭第 4 通道，平均值点数设为 4，并且用数据寄存器 D1、D2、D3 接收平均值转换结果。设置的方法如图 4-1 至图 4-3 所示。

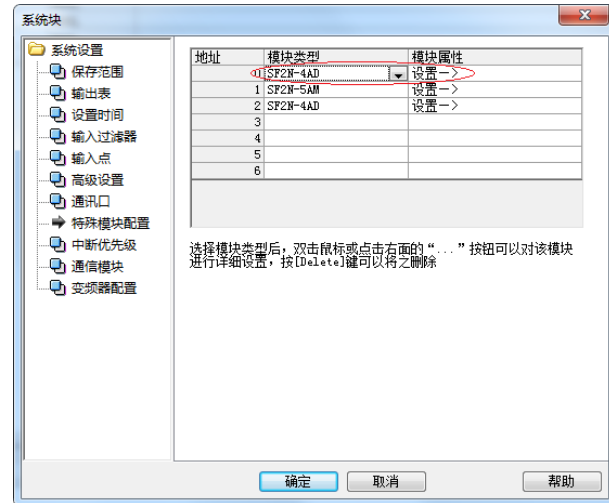
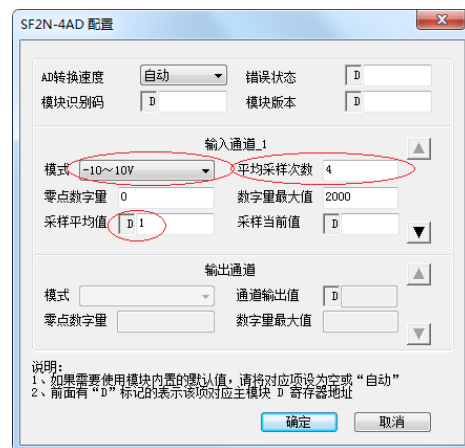


图 4-1 设置模块地址为 1



4-2 一号通道设置界面

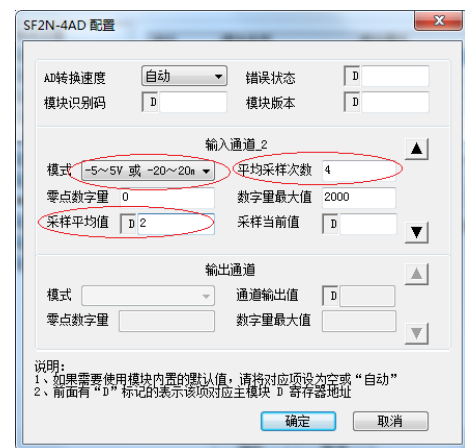


图 4-3 二号通道设置界面

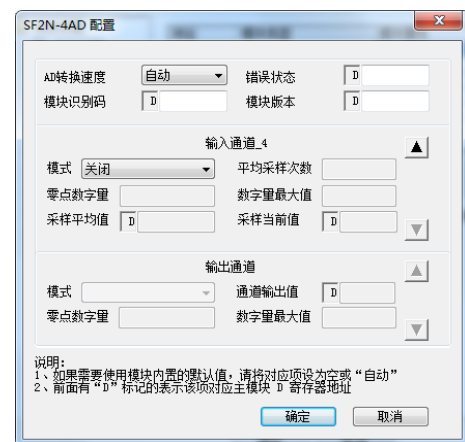


图 4-4 四号通道设置界面

4.2 特性更改

例：SF2N-4AD 模块地址为 3（扩展模块的编址方法，参见《SF2N 系列可编程控制器用户手册》），平均值点数设为 4，下例实现图 3-3 中的特性更改，其中第 1 通道实现图中 A 特性，第 2 通道实现图中 B 特性，第 3、4 通道关闭，并且用数据寄存器 D1、D2 接收平均值转换结果。通道设置方法如图 4-5 和图 4-6 所示。进一步详细说明参见《SF2N 系列可编程控制器编程参考手册》。

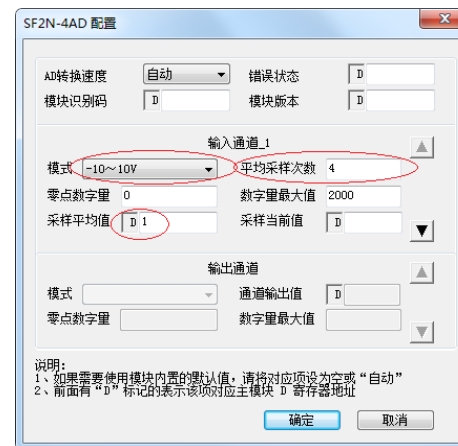


图 4-5 通道一属性设置

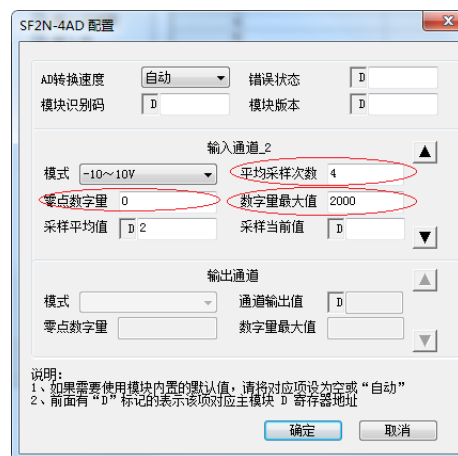


图 4-6 通道二属性设置

5 运行检查

5.1 例行检查

1. 检查模拟输入布线是否满足要求（参见 1.3 布线说明）。
2. 检查 SF2N-4AD 扩展电缆是否可靠插入扩展电缆接口。
3. 检查 5V 及 24V 电源是否过载。注意：SF2N-4AD 数字部分的电源来自自主模块，通过扩展电缆供应。
4. 检查应用程序，确保应用中选择的是正确的操作方法及参数范围。
5. 置 SF2N 主模块为 RUN 状态。

5.2 故障检查

如果 SF2N-4AD 运行不正常，请检查下列项目。

●检查“POWER”指示灯状态

点亮：扩展电缆连接正确；
熄灭：检查扩展电缆连接情况及主模块情况。

●检查模拟布线。

●检查“24V”指示灯状态

点亮：24Vdc 电源正常；
熄灭：24Vdc 电源可能有故障，若 24Vdc 电源正常，则是 SF2N-4AD 故

障。

●检查“RUN”指示灯状态

高速闪烁：SF2N-4AD 运行正常；

慢速闪烁或熄灭：检查后台软件中 SF2N-4AD 配置界面中**错误状态**一栏中的信息。

用户须知

1. 保修范围指可编程控制器本体。
2. **保修期为十八个月**，保修期内正常使用情况下，产品发生故障或损坏，我公司免费维修。
3. **保修期起始时间为产品制造出厂日期**，机器编码是判断保修期的唯一依据，无机器编码的设备按过保处理。
4. 即使在保修期内，如发生以下情况，将收取一定的维修费用：
 - 不按用户手册操作导致的机器故障；
 - 由于火灾、水灾、电压异常等造成的机器损坏；
 - 将可编程控制器用于非正常功能时造成的损坏。
5. 服务费按实际费用计算，如另有合同，以合同优先的原则处理。
6. 请您务必保留此卡，并在保修时出示给维修单位。
7. 如您有问题可与代理商联系，也可直接与我公司联系。

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技术支持：400-812-6621

质量反馈：400-812-0778

投 诉：400-812-6125

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SF2N-4AD Analog Input Module

User Manual

Note:

To reduce the chance of accident, please carefully read the operating instructions and safety precautions prior to use. Only adequately trained personnel shall install or operate this product. In operation, strict compliance with applicable safety rules in the industry, the operating instructions and safety precautions in this book is required.

1 Port Description

1.1 Port

The extension port and user port of SF2N-4AD are both protected by a cover, as shown in Figure 1-1. Removing the covers reveals the extension port and user port, as shown in Figure 1-2.

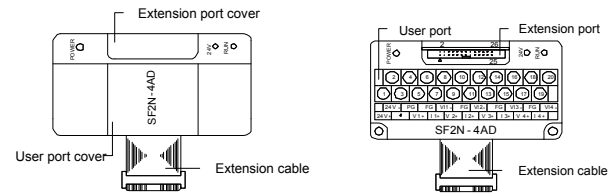


Figure 1-1 SF2N-4AD appearance Figure 1-2 SF2N-4AD ports

The extension cable connects SF2N-4AD to the system, while the extension port connects SF2N-4AD to another extension module of the system. For details on connection, see 1.2 Connecting Into System. The user port of SF2N-4AD is described in Table 1-1.

Table 1-1 User port description

Terminal	Name	Description
1	24V+	Analog power supply 24V+
2	24V-	Analog power supply 24V-
3	.	NC
4	PG	GND
5, 9, 13, 17	V1+	Voltage input of CH1 ~ CH4
6, 10, 14, 18	FG	Shielding ground
7, 11, 15, 19	I1+	Current input of CH1 ~ CH4
8, 12, 16, 20	V11-	Common GND of CH1 ~ CH4

Note: an input channel cannot receive both voltage signals and current signals at the same time. If you intend to use a channel for current signal measurement, please short its voltage signal input terminal and current signal input terminal.

1.2 Connecting Into System

Through the extension cable, you can connect SF2N-4AD to SF2N series basic module or other extension modules. While through the extension port, you can connect other SF2N series extension modules to SF2N-4AD. See Figure 1-3.

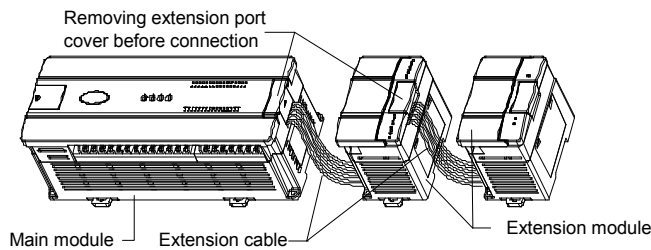


Figure 1-3 Connecting into system

1.3 Wiring

Figure 1-4 shows the wiring of the user port.

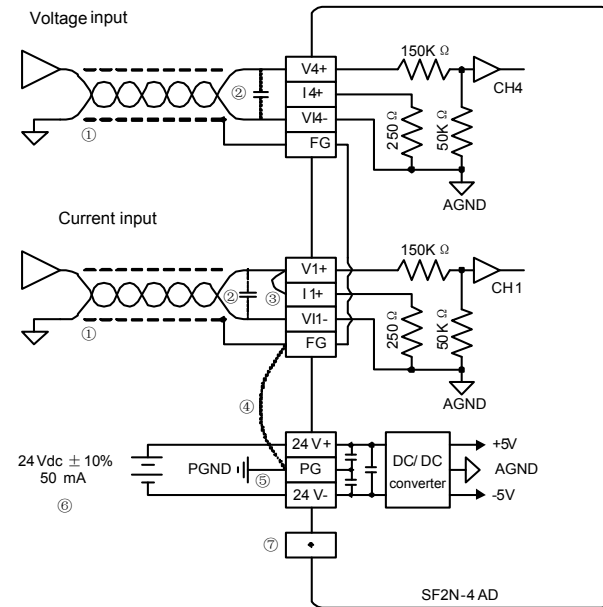


Figure 1-4 Wiring of SF2N-4AD user port

The circled 1~7 stands for the seven points to be observed during wiring.

- It is recommended to use shielded twisted pair for the analog input. Route them separate from power cables and any cable that may generate EMI.
- If input signal fluctuates or there is strong EMI in external wiring, it is advisable to use a smoothing capacitor (0.1μF~0.47μF/25V).
- If a channel is used for current input, short its voltage input terminal and current input terminal.
- If strong EMI exists, connect the FG terminal and PG terminal.
- Properly ground the module's PG terminal.
- The basic module's 24Vdc auxiliary power or other qualified external power supply can be used as the power source of the module's analog circuit.
- Do not use the NC terminal of the user port.

2 Indices

2.1 Power Supply

Table 2-1 Power supply

Item	Description
Analog circuit	24Vdc (-15%~20%), maximum allowable ripple voltage 5%, 50mA (from basic module or external power supply)
Digital circuit	5Vdc, 70mA (from basic module)

2.2 Performance

Table 2-2 Performance

Item	Specifications					
Conversion speed	15ms/channel (normal speed), 6ms/channel (high speed)					
Analog input range	<table border="1"> <tr> <td>Voltage</td> <td>-10V~10V, input impedance 1MΩ</td> <td rowspan="2">Four channels can be used at the same time, input range can be selected by setting BFM (see Table 2-5)</td> </tr> <tr> <td>Current</td> <td>-20mA~20mA, input impedance 250Ω</td> </tr> </table>	Voltage	-10V~10V, input impedance 1MΩ	Four channels can be used at the same time, input range can be selected by setting BFM (see Table 2-5)	Current	-20mA~20mA, input impedance 250Ω
Voltage	-10V~10V, input impedance 1MΩ	Four channels can be used at the same time, input range can be selected by setting BFM (see Table 2-5)				
Current	-20mA~20mA, input impedance 250Ω					
Digital output	Default: -2000~+2000 Setting range: -10000~+10000					
Resolution	<table border="1"> <tr> <td>Voltage input</td> <td>Depending on the input range (see Table 2-5)</td> </tr> <tr> <td>Current input</td> <td>10μA</td> </tr> </table>	Voltage input	Depending on the input range (see Table 2-5)	Current input	10μA	
Voltage input	Depending on the input range (see Table 2-5)					
Current input	10μA					
Accuracy	±1% of full range					

Item	Specifications
Isolation	Between analog circuit and digital circuit: photocopier. Between analog circuit and input 24Vdc power: internal isolation. Between analog channels: none

2.3 Buffer Memory

SF2N-4AD exchanges data with the basic module through Buffer Memory (BFM). After SF2N-4AD is set through the host software, the basic module will write data into SF2N-4AD BFM to set the state of SF2N-4AD, and display the data from SF2N-4AD on the host software interface. See figures 4-2 ~ 4-6.

Table 2-3 describes the contents of the BFM of SF2N-4AD.

Table 2-3 BFM Contents

BFM	Contents	Default	Property
#100	Average value of CH1		R
#101	Average value of CH2		R
#102	Average value of CH3		R
#103	Average value of CH4		R
#200	Current value of CH1		R
#201	Current value of CH2		R
#202	Current value of CH3		R
#203	Current value of CH4		R
#300	Error status 0		R
#301	Error status 1		R
#600	Input mode selection	0x0000	RW
#700	Average sampling times of CH1	8	RW
#701	Average sampling times of CH2	8	RW
#702	Average sampling times of CH3	8	RW
#703	Average sampling times of CH4	8	RW
#900	CH1-D0	0 (input mode 0)	RW
#901	CH1-A0	0 (input mode 0)	R
#902	CH1-D1	2000 (input mode 0)	RW
#903	CH1-A1	10000 (input mode 0)	R
#904	CH2-D0	0 (input mode 0)	RW
#905	CH2-A0	0 (input mode 0)	R
#906	CH2-D1	2000 (input mode 0)	RW
#907	CH2-A1	10000 (input mode 0)	R
#908	CH3-D0	0 (input mode 0)	RW
#909	CH3-A0	0 (input mode 0)	R
#910	CH3-D1	2000 (input mode 0)	RW
#911	CH3-A1	10000 (input mode 0)	R
#912	CH4-D0	0 (input mode 0)	RW
#913	CH4-A0	0 (input mode 0)	R
#914	CH4-D1	2000 (input mode 0)	RW
#915	CH4-A1	10000 (input mode 0)	R
#2000	AD conversion speed switchover	0 (15ms/CH)	RW
#4094	Module software version	0x1000	R
#4095	Module ID	0x1041	R

Explanation:

- CH1 stands for channel 1; CH2, channel 2; CH3, channel 3, and so on.
- Property explanation: R means read only. An R element cannot be written. RW means read and write. Reading from a non-existent element will get 0.
- Status information of BFM#300 is shown in Table 2-4.

Table 2-4 Status information of BFM#300

Bit status of BFM#300	ON (1)	OFF (0)
b0: error	b1 or b2 is ON, AD conversion of all channels stopped	No error
b1: channel characteristics setting	Channel characteristics setting error in BFM	Channel characteristics

Bit status of BFM#300	ON (1)	OFF (0)
error		setting normal
b2: power supply failure	24Vdc power supply failed	Power supply normal
b3: hardware fault	AD converter or other hardware faulty	Hardware normal
b10: digital range error	Digital output after AD conversion less than -2048 or greater than +2047	Digital output value normal
b11: average sampling times setting error	Setting outside normal range (in this case, the previous valid setting will be restored)	Setting within normal range: 1~4096

4. BFM#600: input mode selection, used to set the input modes of CH1 ~ CH4. See Figure 2-1 for their correspondence.

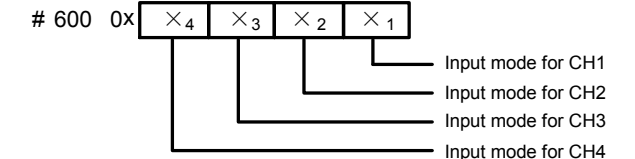


Figure 2-1 Mode setting element vs. channel

Table 2-5 shows the status information of BFM#600.

Table 2-5 BFM#600 information table

Value of X	Status information
0	-10V~10V voltage input mode
1	-5V~5V voltage input or -20mA~20mA current input mode
3	Channel closed

For example, if #600 is written as '0x0103', the setting will be like this:

CH1: closed

Input range of CH3: -5V~5V or -20mA~20mA (note the wiring difference in voltage and current, see 1.3 wiring);

Input CH2, and CH4 mode: -10V~10V.

5. BFM#700~BFM#703: average sampling times setting; setting range: 1~4096. Default: 8 (normal speed); choose 1 if high speed is needed.

6. BFM#900 ~ BFM#915: channel characteristics settings, which are set using two-point method. D0 and D1 represent the channel's digital outputs, while A0 and A1, in mV unit, represent the channel's actual inputs. Each channel occupies 4 words. To simplify the setting operation without affecting functions, A0 and A1 are respectively fixed to 0 and the maximum analog value in the present mode. After changing the channel mode (BFM #600), A0 and A1 will change automatically according to the mode. Users cannot change them.

Note: If the channel input is current signal (-20mA~20mA), the channel mode should be set to 1. As the channel's internal measurement is based on voltage signal, current signals should be converted into voltage signals (-5V~5V) by the 250Ω resistor at the current input terminal of the channel. A1 in the channel's characteristics setting is still in mV unit, i.e., 5000mV (20mA×250Ω=5000mV).

7. BFM#2000: AD conversion speed setting. 0: 15ms/channel (normal speed); 1: 6ms/channel (high speed). Setting BFM#2000 will restore BFM#700~#703 to the default values, which should be noted in programming. If necessary, you can re-set BFM#700~#703 after you change the conversion speed.

8. BFM#4094: module software version, displayed automatically as **Module Version** in SF2N-4AD Configuration dialogue box of the host software, as shown in Figure 4-2.

8. BFM#4095 is module ID. ID of SF2N-4AD is 0x1041. The user program in PLC can use this ID to identify the module before transceiving data.

3 Setting Characteristics

The input channel characteristic of SF2N-4AD is the linear relationship between the channel's analog input A and digital output D. It can be set by the user. Each channel can be considered as the model shown in Figure 3-1. As it is of linear characteristics, the channel characteristics can be defined by just two points: P0 (A0, D0) and P1 (A1, D1), where D0 is the

channel's digital output corresponding to analog input A0, and D1 is the channel's digital output corresponding to analog input A1.

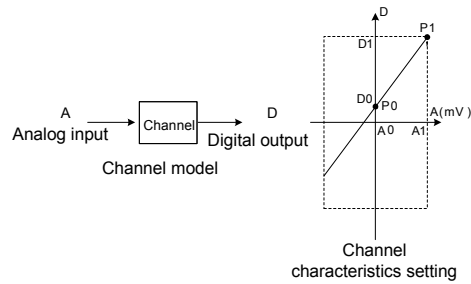


Figure 3-1 Channel characteristics of SF2N-4AD

To simplify the operation process without affecting functions, A0 and A1 are respectively fixed to 0 and the maximum analog value in the present mode. That is to say, in Figure 3-1, A0 is 0 and A1 is the maximum analog input in the present mode. A0 and A1 will change according to the mode when BFM#600 is changed. Users cannot change their values.

If you just set the channel mode (BFM#600) without changing the D0 and D1 of the corresponding channel, the channel characteristics vs. mode should be as shown in Figure 3-2. The A in Figure 3-2 is default.

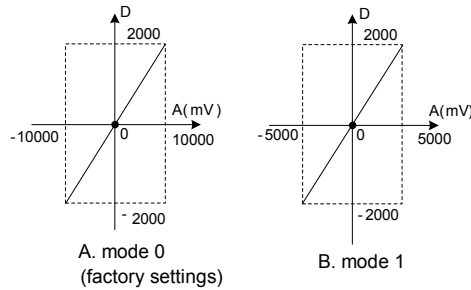
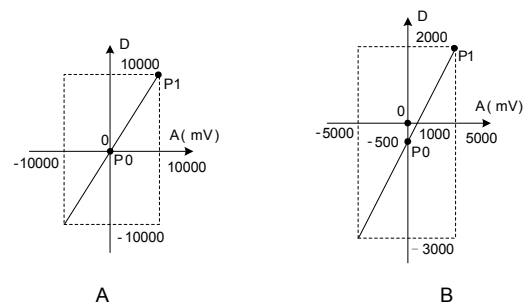


Figure 3-2 Characteristics vs. mode without changing D0 and D1

You can change the channel characteristics by changing D0 and D1. The setting range of D0 and D1 is -10000 ~ 10000. If the setting is outside this range, SF2N-4AD will not accept it, but maintain the original valid setting. Figure 3-3 provides for your reference an example of changing channel characteristics.



Mode 0, D0 = 0, D1 = 10,000
Analog input 10V outputs 10,000
Analog input 0V outputs 0
Analog input -10V outputs -10,000

Mode 1, D0 = -500, D1 = 2000
Analog input 5V (or 20mA) outputs 2000
Analog input 1V (or 4mA) outputs 0
Analog input -5V (or -20mA) outputs -3000

Figure 3-3 Changing input channel characteristics

4 Application Example

4.1 Basic Application

Example: SF2N-4AD module address is 1 (for the addressing of extension modules, see *SF2N Series PLC User Manual*). Use CH1 and CH3 for voltage input (-10V~10V), use CH2 for current input (-20~20mA), close CH4, set the average sampling times to 4, and use data registers D1, D2 and D3 to receive the average value, as shown in the following figures.

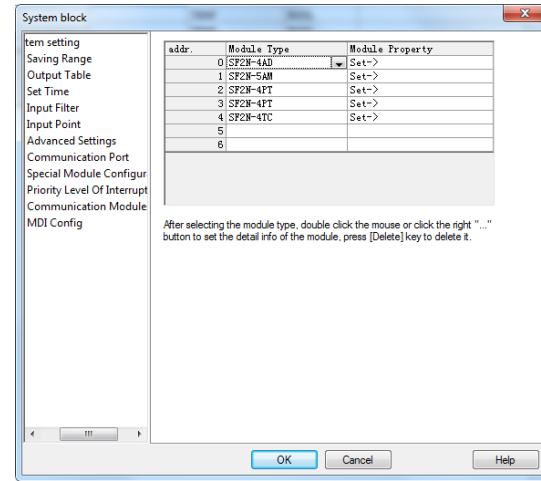


Figure 4-1 Set the module address

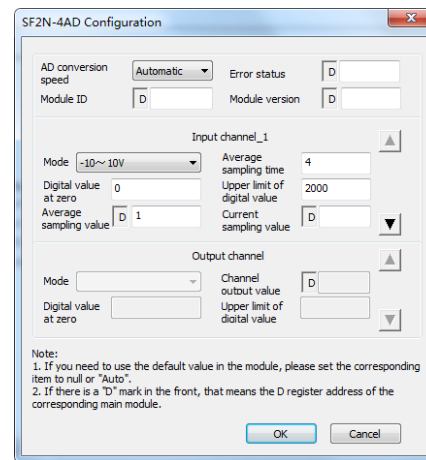


Figure 4-2 CH1 setting interface

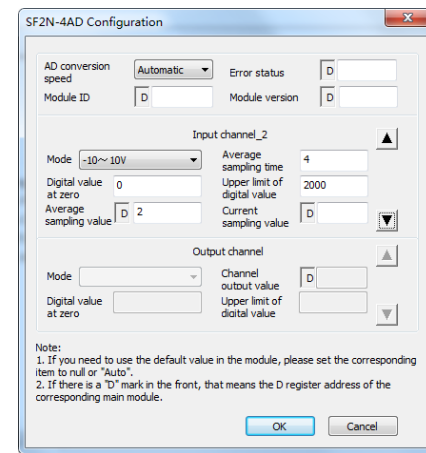


Figure 4-3 CH2 setting interface

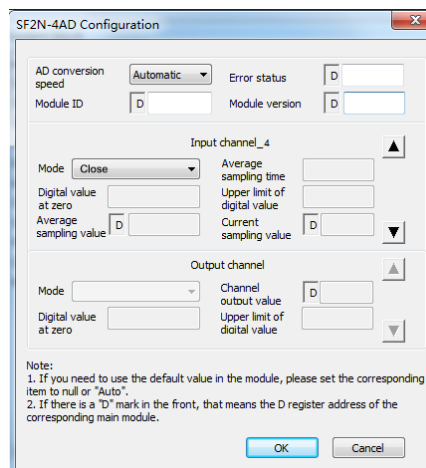


Figure 4-4 CH4 setting interface

4.2 Changing Characteristics

Example: The SF2N-4AD module address is 3 (for the addressing of extension modules, see *SF2N Series PLC User Manual*). Set the average sampling times to 4, set characteristics A and B in Figure 3-3 respectively for CH1 and CH2, close CH3 and CH4, and use data registers D1 and D2 to receive the average value, as shown in the following figures. See *SF2N Series PLC Programming Manual* for details.

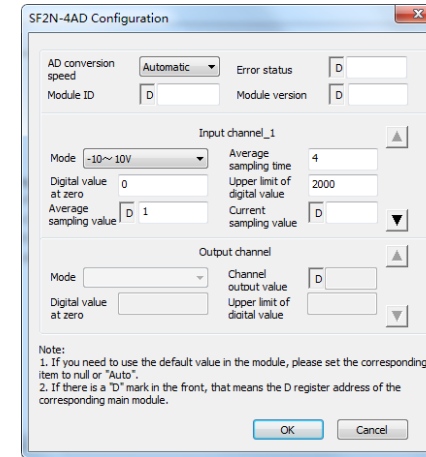


Figure 4-5 Changing CH1 characteristic

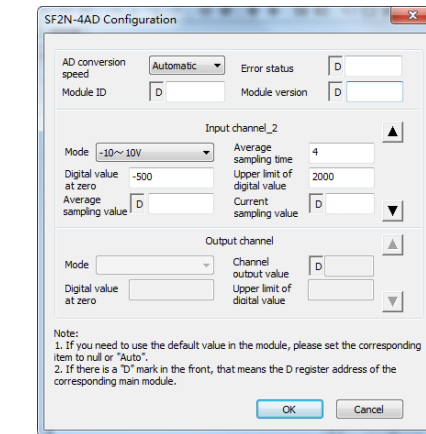


Figure 4-6 Changing CH2 characteristic

5 Operation Inspection

5.1 Routine Inspection

1. Check that the wiring of analog input meets the requirements (see 1.3 wiring).
2. Check that the extension cable of SF2N-4AD is properly inserted in the extension port.
3. Check that the 5V and 24V power supplies are not overloaded. Note: the digital circuit of SF2N-4AD is powered by the basic module through the extension cable.
4. Check the application and make sure the operation method and parameter range are correct.
5. Set the SF2N main module to RUN state.

5.2 Inspection Upon Fault

In case of abnormality, check the following items:

- The status of the POWER indicator
ON: the extension cable is properly connected;
OFF: check the extension cable connection and the basic module.
- The wiring of analog input
- The status of the 24V indicator
ON: 24Vdc power supply normal;
OFF: 24Vdc power supply possibly faulty, or SF2N-4AD faulty.
- the status of the RUN indicator
Flash quickly: SF2N-4AD in normal operation;

Flash slowly or OFF: Check the **Error Status** in **SF2N-4AD Configuration** dialogue box through the host software.

Notice

1. The warranty range is confined to the PLC only.
2. **Warranty period is 18 months**, within which period conducts, free maintenance and repairing to the PLC that has any fault or damage under the normal operation conditions.
3. **The start time of warranty period is the delivery date of the product**, of which the product SN is the sole basis of judgment. PLC without a product SN shall be regarded as out of warranty.
4. Even within 18 months, maintenance will also be charged in the following situations:
Damages incurred to the PLC due to mis-operations, which are not in compliance with the User Manual;
Damages incurred to the PLC due to fire, flood, abnormal voltage, etc;
Damages incurred to the PLC due to the improper use of PLC functions.
5. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.
6. Please keep this paper and show this paper to the maintenance unit when the product needs to be repaired.
7. If you have any question, please contact the distributor or our company directly.

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