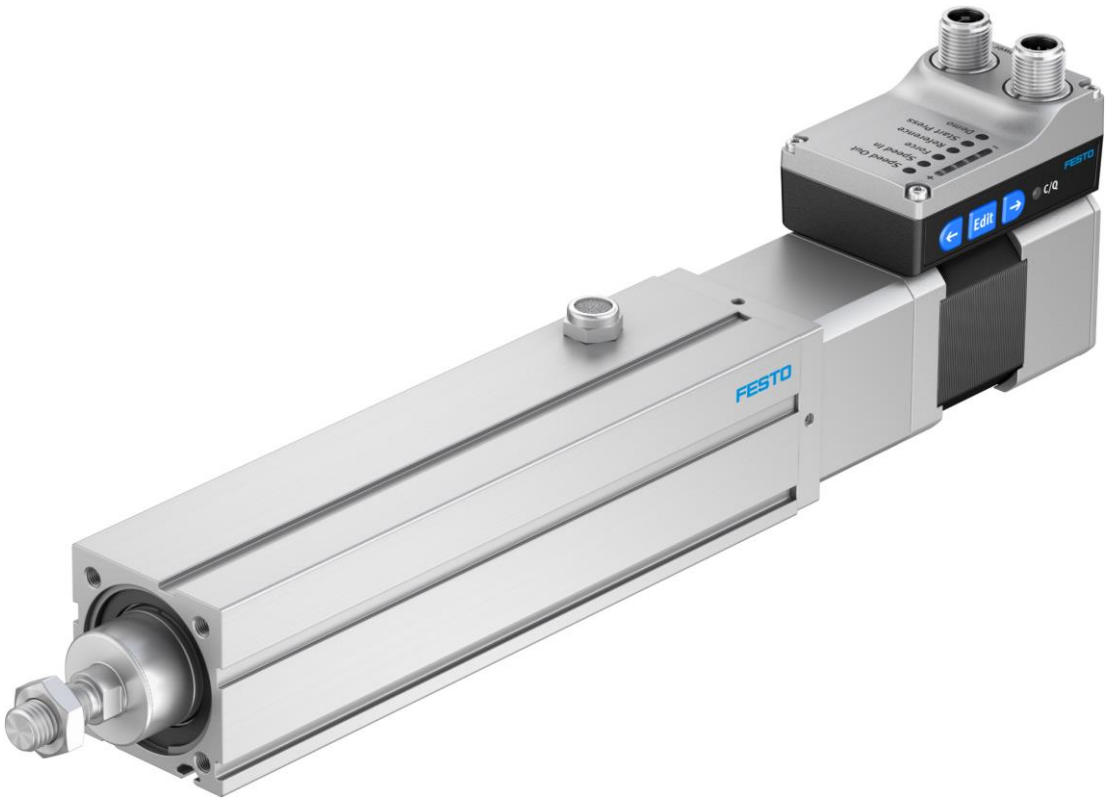
Studio5000环境下通过CPX-AP-I-4IOL控制SMS简易运动电缸



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Festo 技术支持
2022 年 1 月 3 日

关键词:
SMS 简易运动电缸，IO-LINK 协议、Studio5000

摘要：
本文介绍了如何使用 Allen-Bradley PLC 控制 SMS 简易运动系列电缸，如 EPCE、EPCS-BS、EGSS、ELGS-BS/TB、ELGE、ERMS。

目标群体：
本文仅针对有一定自动化设备调试基础的工程师，需要对 Festo SMS 简易运动控制器以及 Rockwell Studio5000 有一定了解。

声明：
本文档为技术工程师根据官方资料和测试结果编写，旨在指导用户快速上手使用 Festo 产品，如果发现描述与官方正式出版物冲突，请以正式出版物为准。
我们尽量罗列了实验室测试的软、硬件环境，但现场设备型号可能不同，软件/固件版本可能有差异，请务必在理解文档内容和确保安全的前提下执行测试。
我们会持续更正和更新文档内容，恕不另行通知。

目录

1 说明

本文介绍了如何使用 Allen-Bradley PLC 通过 IO-LINK 协议控制 SMS 简易运动系列电缸，如 EPCE、EPCS-BS、EGSS、ELGS-BS/TB、ELGE、ERMS。

1.1 硬件和软件环境

型号	说明	软件或固件版本
EPCS-BS	SMS电缸单元	V019.0.4.107_release
CPX-AP-I-4IOL-M12	费斯托IO-Link 主站模块	V1.4.13
CPX-AP-I-EP-M12	费斯托CPX-AP-I主站模块	V1.3.1
NEBC-D8G4-ES-0.3-N-S-D8G4-ET	CPX-AP模块通讯网线	——
NEBL-M8G4-E-5-N-LE4	CPX-AP模块电源线缆	——
Studio5000	PLC编程软件	V31.11
1769-L24ER-QB1B	PLC	V31.011
Festo Automation Suite	Festo调试软件	V2.3.710

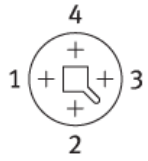
1.2 硬件接线（IO-LINK 模式）

EPCS-BS 逻辑接口的 M12 插头是 A 编码类型，只需要 1、3、4 三个针脚接线。

电源

插头

M12x1，4针，T编码，符合 EN 61076-2-111

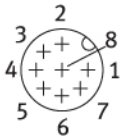


针脚	功能
1	电源 (24 V DC)
2	参考电位，电源电压 (GND)
3	保留，无需连接
4	功能接地 (FE)

逻辑接口

插头

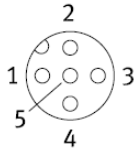
M12x1，8针，A编码，符合 EN 61076-2-101



使用 IO-Link

针脚	功能
1	L+ IO-Link 电源 (24 V DC)
2	保留，无需连接
3	C/Q 通信，连接 IO-Link 主站
4	L－参考电势，IO-Link 电源 (0 V)
5	保留，无需连接
6	保留，无需连接
7	保留，无需连接
8	L－参考电位，IO-Link 电源 (0 V)

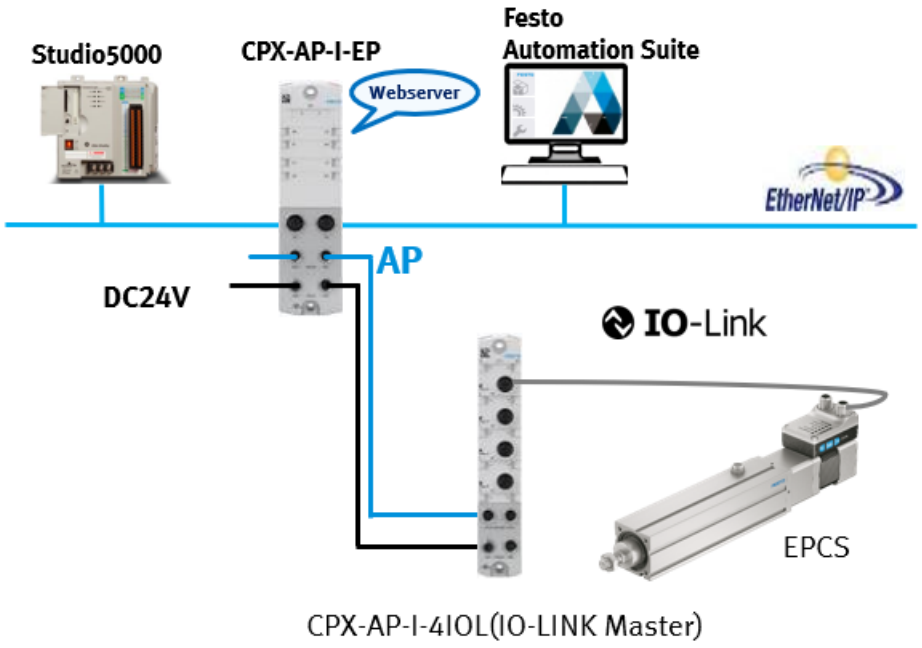
CPX-AP-I-4IOL-M12 模块的接口是 B 编码类型，接口定义如下：

IO-Link Ports [X0] … [X3] 接口			
M12 插座，5 针，B 编码		信号	
	1	L+	+24 V DC 工作电源 PS
	2	P24	+24 V DC 负载电源 PL
	3	L-	0 V DC 工作电源 PS
	4	C/Q	标准 IO（SIO 模式下）或 IO-Link 通信（IOL 模式下）
	5	N24	0 V DC 负载电源 PL

Type B 接口会比 Type A 接口的接线多出一路 24V 负载电。选型 IO-LINK 通讯线缆时只需要将两者的 1、3、4 脚连接，2、5 需要断开，否则有可能会烧坏 IO-LINK 从站硬件。

切勿选择 8080777（NEFC-M12G8-0.3-M12G5-LK）直连 CPX-AP-I-4IOL 和 SMS 驱动单元(错误示范和解决方案请见附录 A)

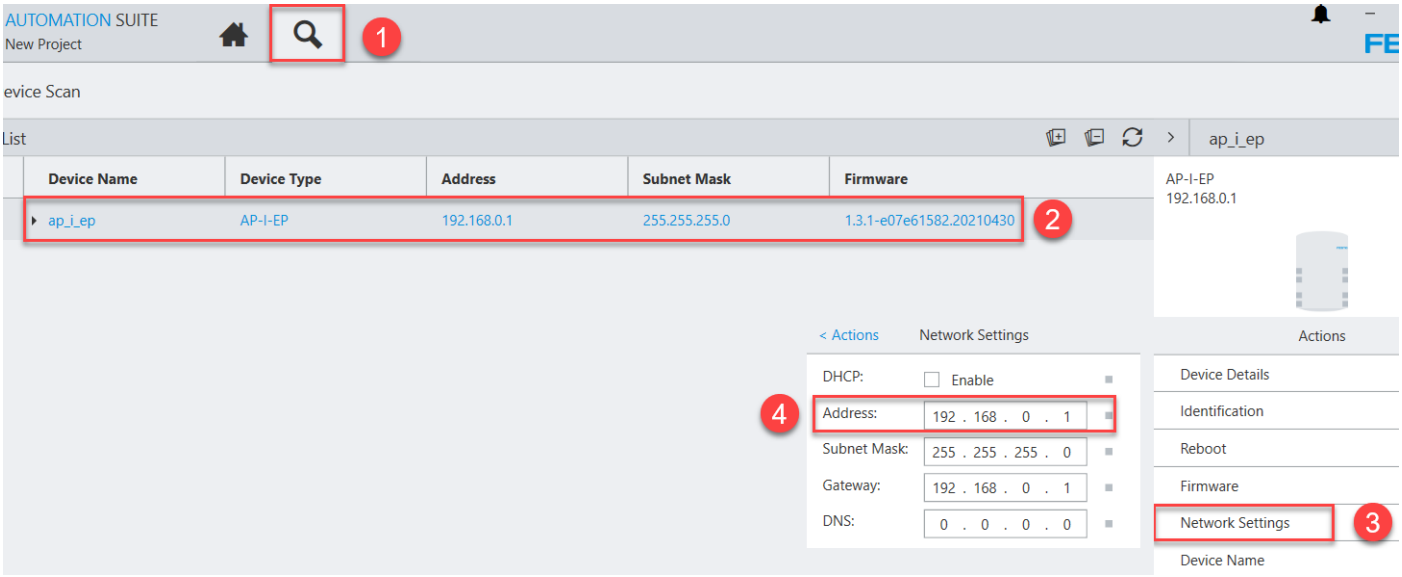
1.3 网络拓扑



2 硬件配置

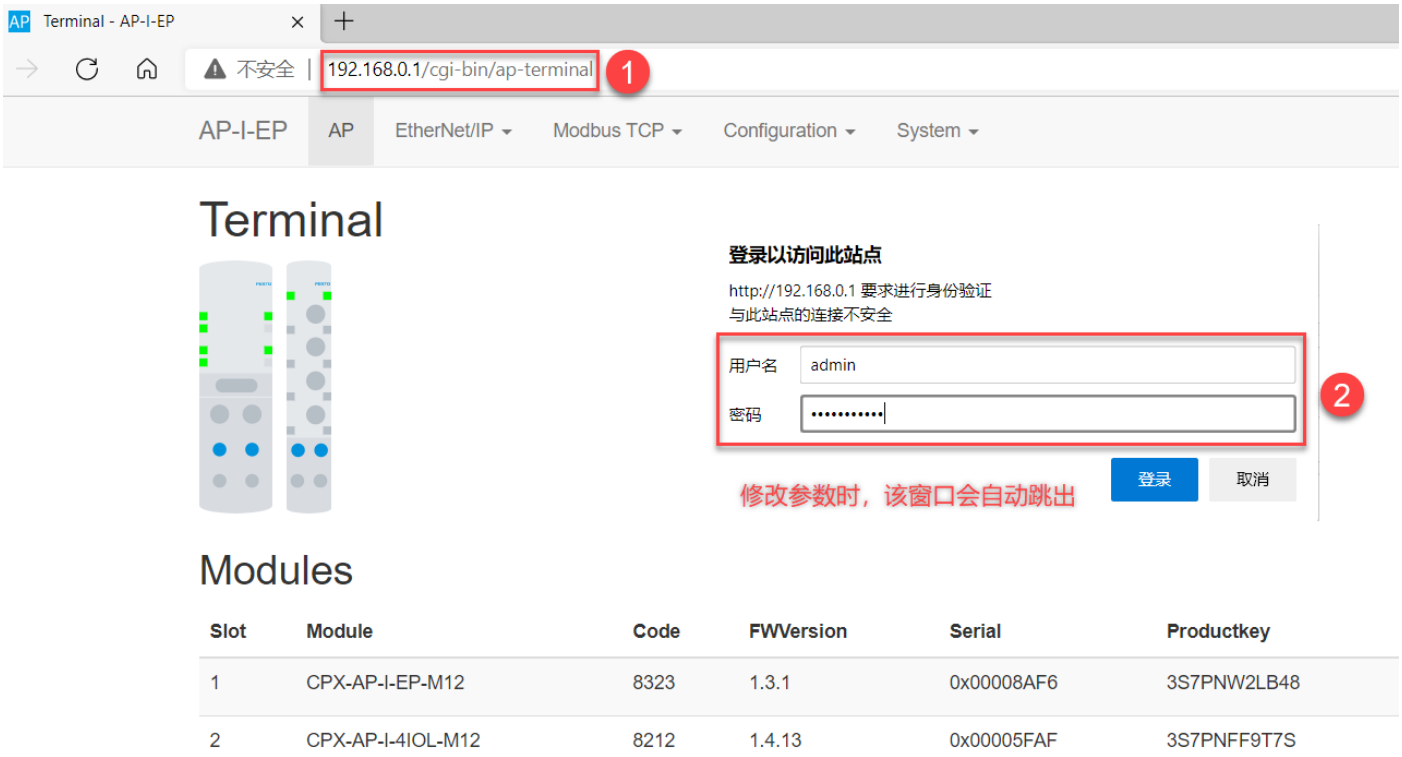
2.1 CPX-AP-I-EP 模块的 IP 地址设定

Festo Automation Suite 软件在线扫描后，可以手动修改 IP 地址



2.2 CPX-AP-I-4IO-M12 IO-Link 主站端口配置

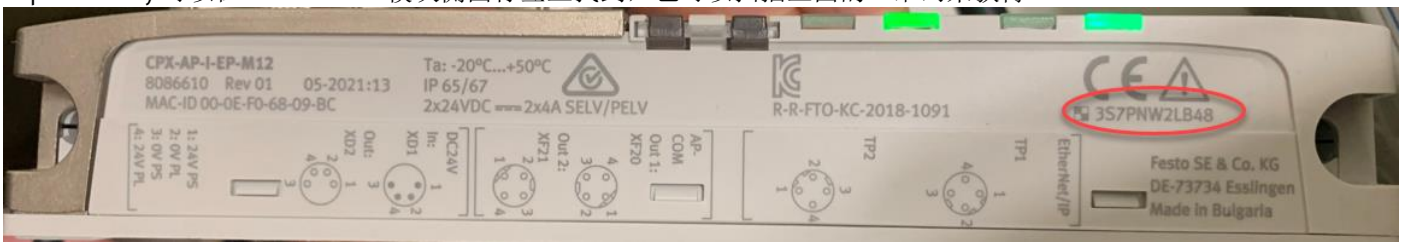
2.2.1 CPX-AP-I-EP 模块在线访问



1. 打开浏览器输入当前的 IP 地址
2. 账号登入

   账户名：**admin**；密码：初始密码为 **productkey**（区别大小写）

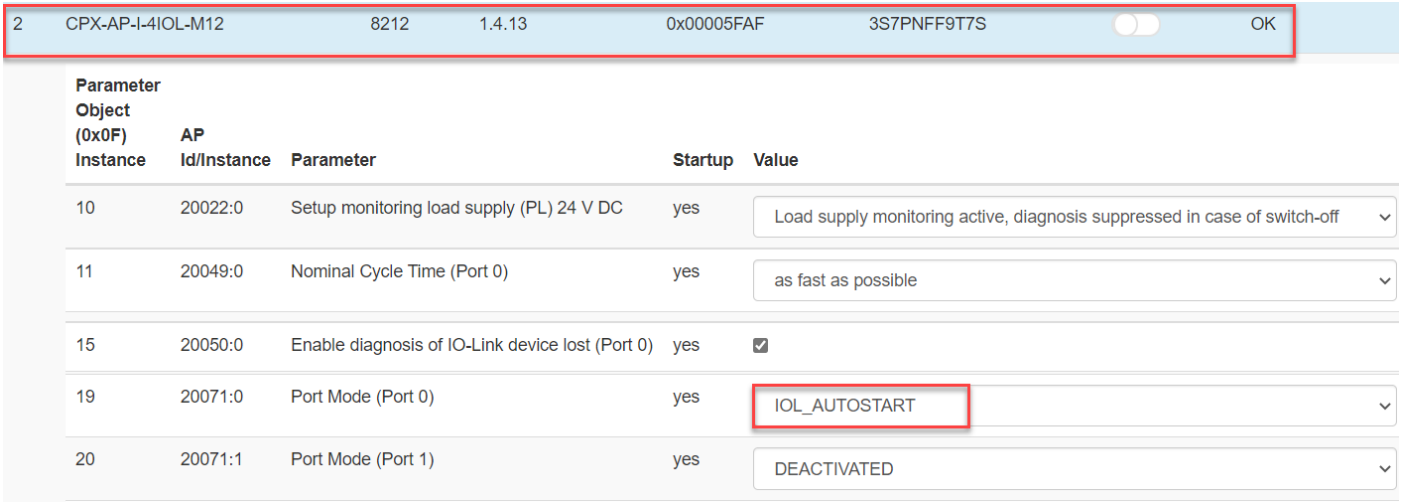
   productkey 可以在 CPX-AP-I-EP 模块侧面标签上找到，也可以扫描正面的二维码来获得。



账号登入后，网页会显示已连接模块详细信息：模块描述、固件详细信息、序列号和产品密钥。也可以进行更改参数、更新固件等操作。

2.2.2 配置连接 SMS 驱动器的 CPX-AP-I-4IOL 模块

Port Mode(Port 0)选择 IOL_AUTOSTART 模式，IO-LINK 通讯口被激活

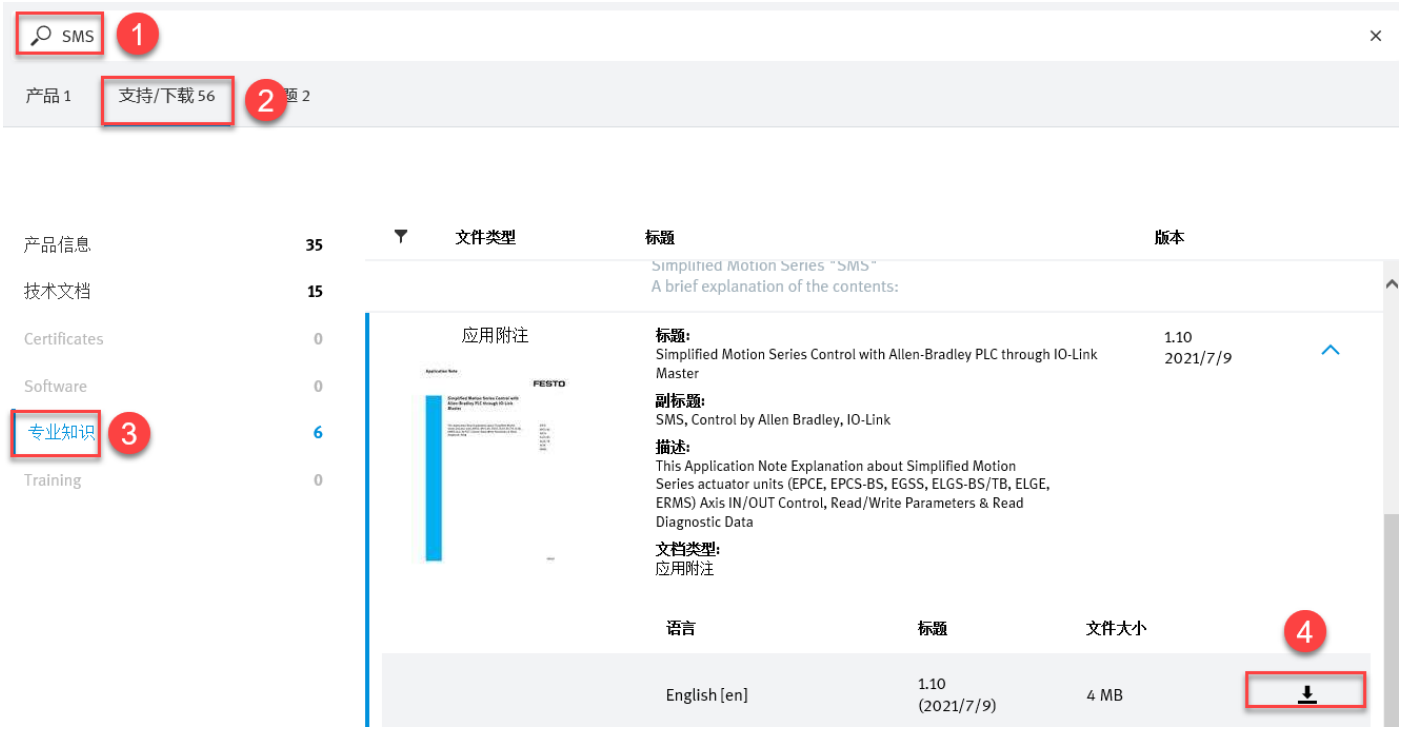


3 Studio5000 项目配置

3.1 下载 EDS 文件

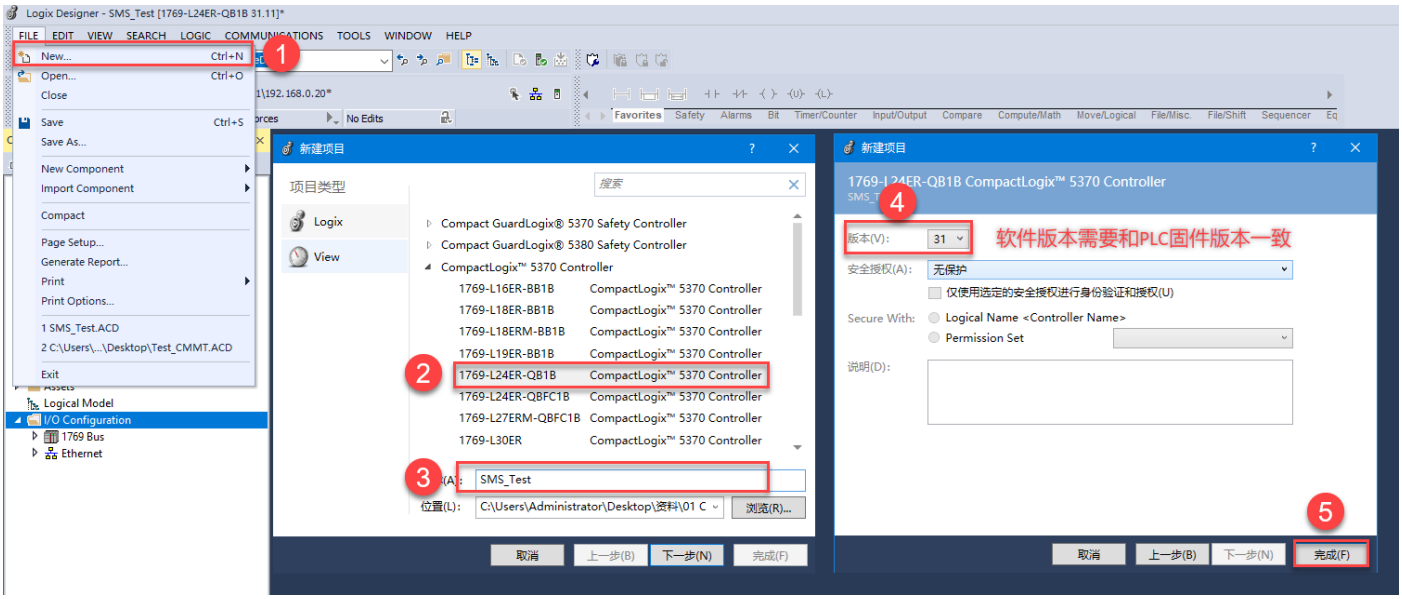
下载链接： https://www.festo.com.cn/cn/zh/search/?text=CPX-AP-I-EP&tab=DOWNLOADS

3.2 下载功能块

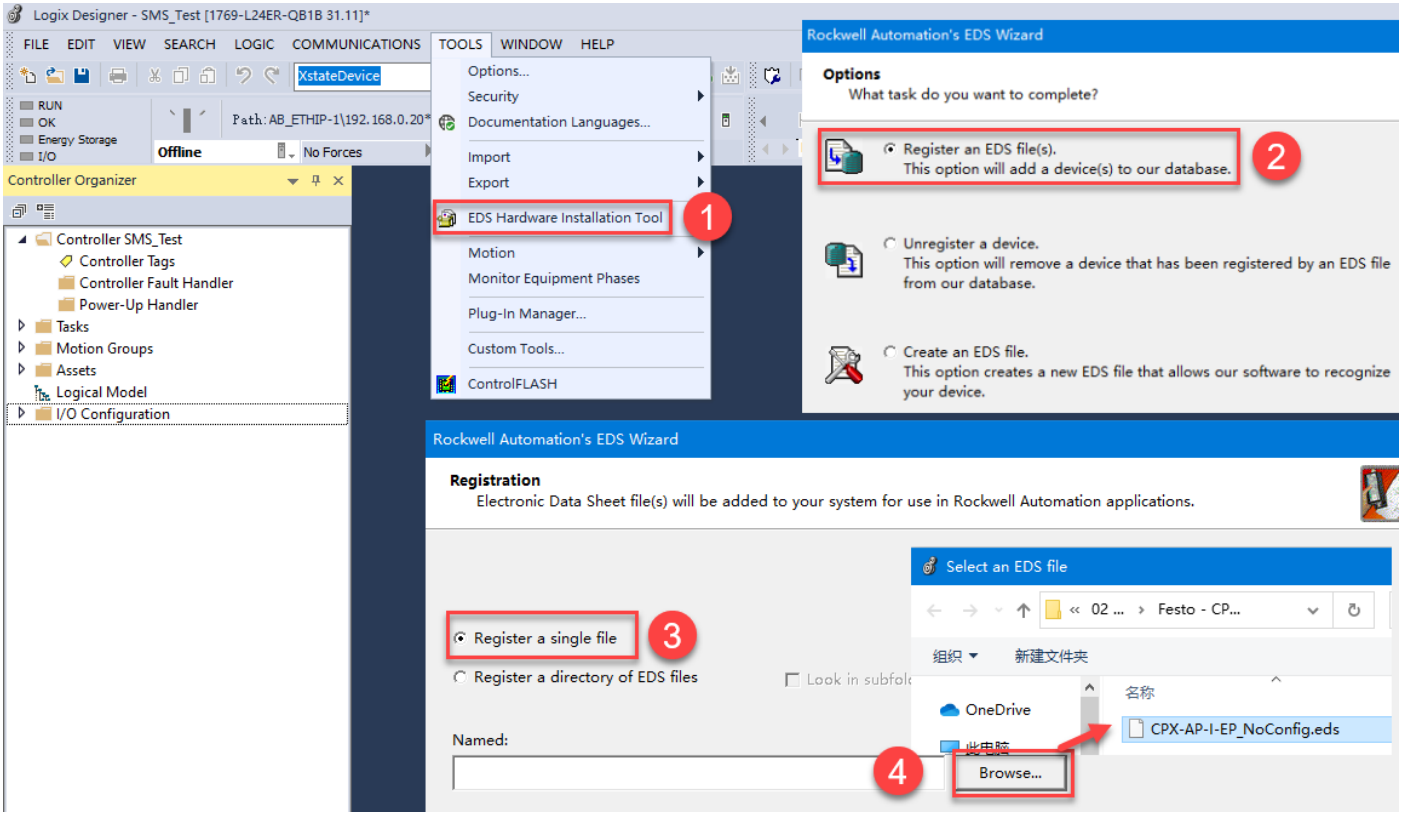


下载连接：https://www.festo.com.cn/cn/zh/search/?text=SMS&tab=DOWNLOADS

3.3 新项目文件

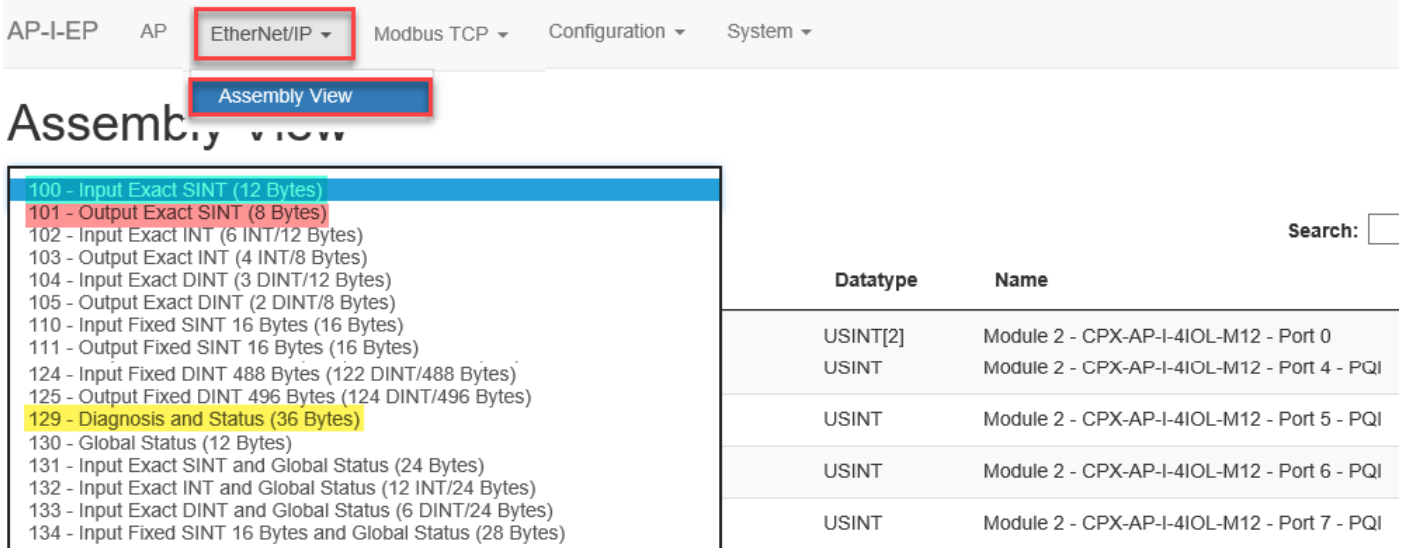


3.4 安装 CPX-AP-I-EP 的 EDS 文件

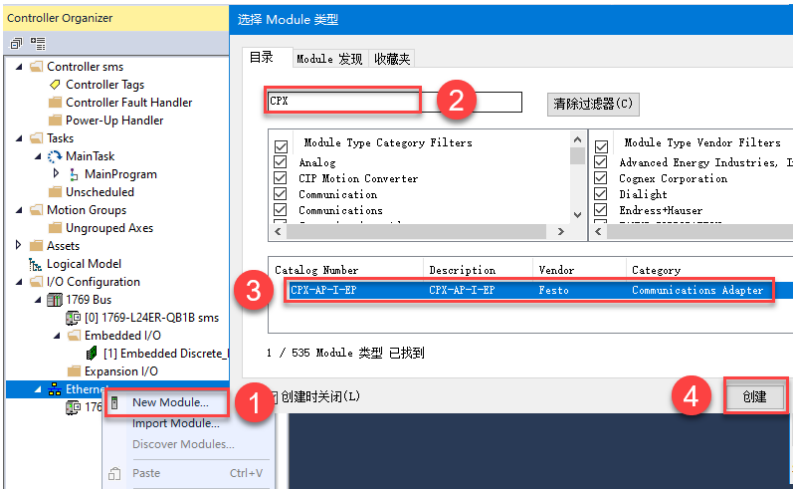


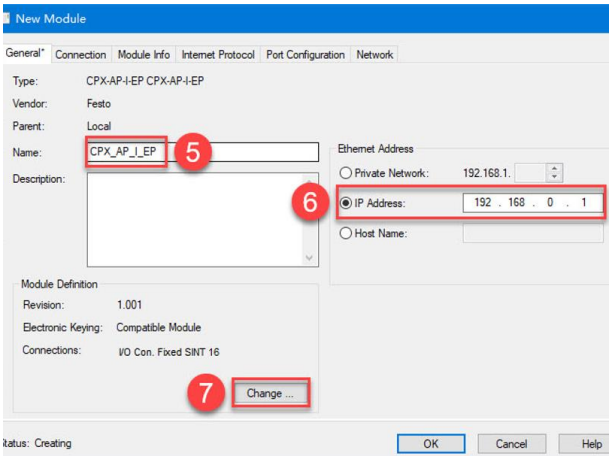
3.5 组态 CPX-AP-I-EP 模块

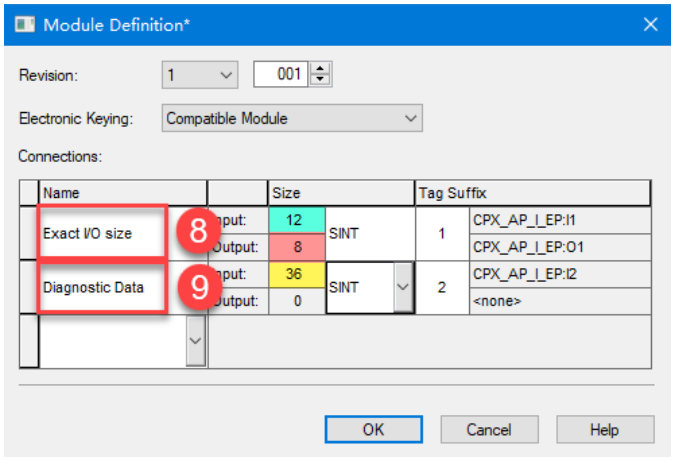
第一步：网页查看数据长度


AP-I-EP
AP
EtherNet/IP
Modbus TCP
Configuration
System
Assembly View
Assembly View
100 - Input Exact SINT (12 Bytes)
101 - Output Exact SINT (8 Bytes)
102 - Input Exact INT (6 INT/12 Bytes)
103 - Output Exact INT (4 INT/8 Bytes)
104 - Input Exact DINT (3 DINT/12 Bytes)
105 - Output Exact DINT (2 DINT/8 Bytes)
110 - Input Fixed SINT 16 Bytes (16 Bytes)
111 - Output Fixed SINT 16 Bytes (16 Bytes)
124 - Input Fixed DINT 488 Bytes (122 DINT/488 Bytes)
125 - Output Fixed DINT 496 Bytes (124 DINT/496 Bytes)
129 - Diagnosis and Status (36 Bytes)
130 - Global Status (12 Bytes)
131 - Input Exact SINT and Global Status (24 Bytes)
132 - Input Exact INT and Global Status (12 INT/24 Bytes)
133 - Input Exact DINT and Global Status (6 DINT/24 Bytes)
134 - Input Fixed SINT 16 Bytes and Global Status (28 Bytes)
Search:
Datatype
Name
USINT[2]
Module 2 - CPX-AP-I-4IOL-M12 - Port 0
USINT
Module 2 - CPX-AP-I-4IOL-M12 - Port 4 - PQI
USINT
Module 2 - CPX-AP-I-4IOL-M12 - Port 5 - PQI
USINT
Module 2 - CPX-AP-I-4IOL-M12 - Port 6 - PQI
USINT
Module 2 - CPX-AP-I-4IOL-M12 - Port 7 - PQI

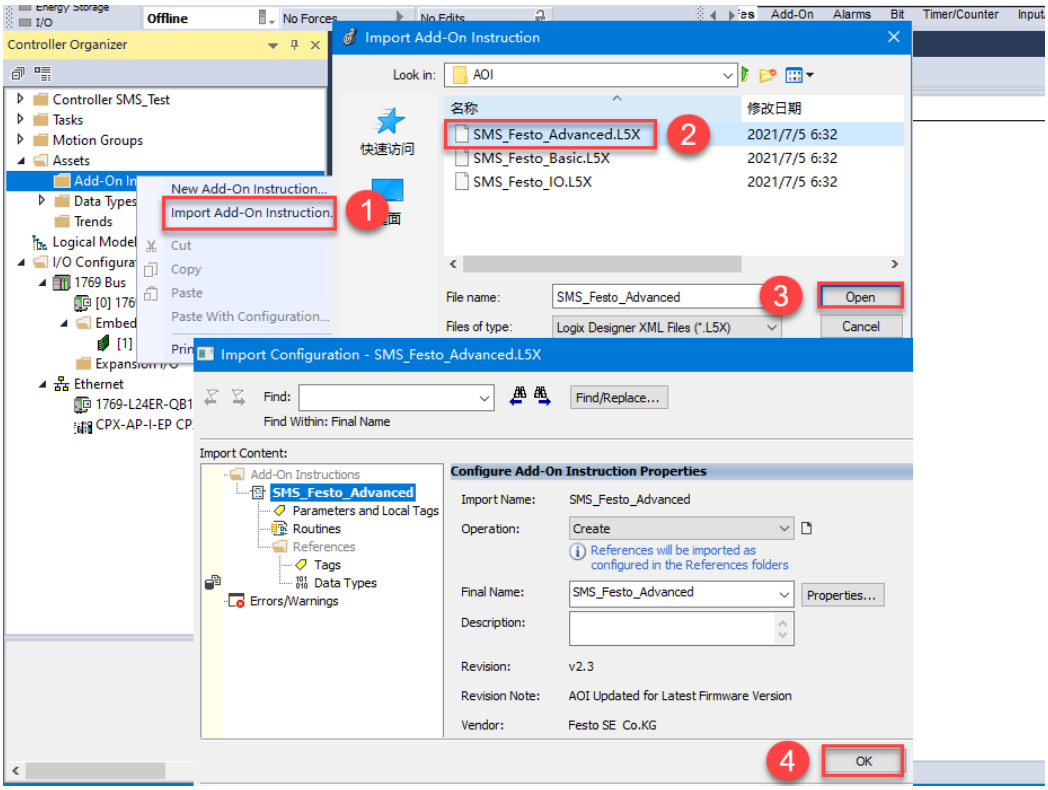
第二步：软件组态


Controller Organizer
Controller sms
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Unscheduled
Motion Groups
Ungrouped Axes
Assets
Logical Model
I/O Configuration
1769 Bus
[0] 1769-L24ER-QB1B sms
Embedded I/O
[1] Embedded Discrete_
Expansion I/O
New Module...
Import Module...
Discover Modules...
Paste Ctrl+V
选择 Module 类型
目录
Module 发现
收藏夹
CPX
清除过滤器(C)
Module Type Category Filters
Analog
CIP Motion Converter
Communication
Communications
Module Type Vendor Filters
Advanced Energy Industries, I
Cognex Corporation
Dialight
Endress+Hauser
Catalog Number
Description
Vendor
Category
CPX-AP-I-EP
CPX-AP-I-EP
Festo
Communications Adapter
1 / 535 Module 类型 已找到
创建时关闭(L)
创建
1
2
3
4


New Module
General*
Connection
Module Info
Internet Protocol
Port Configuration
Network
Type:
CPX-AP-I-EP CPX-AP-I-EP
Vendor:
Festo
Parent:
Local
Name:
CPX_AP_I_EP
Description:
Ethernet Address
Private Network:
192.168.1.
IP Address:
192 . 168 . 0 . 1
Host Name:
Module Definition
Revision:
1.001
Electronic Keying:
Compatible Module
Connections:
I/O Con. Fixed SINT 16
Change ...
Status: Creating
OK
Cancel
Help
5
6
7

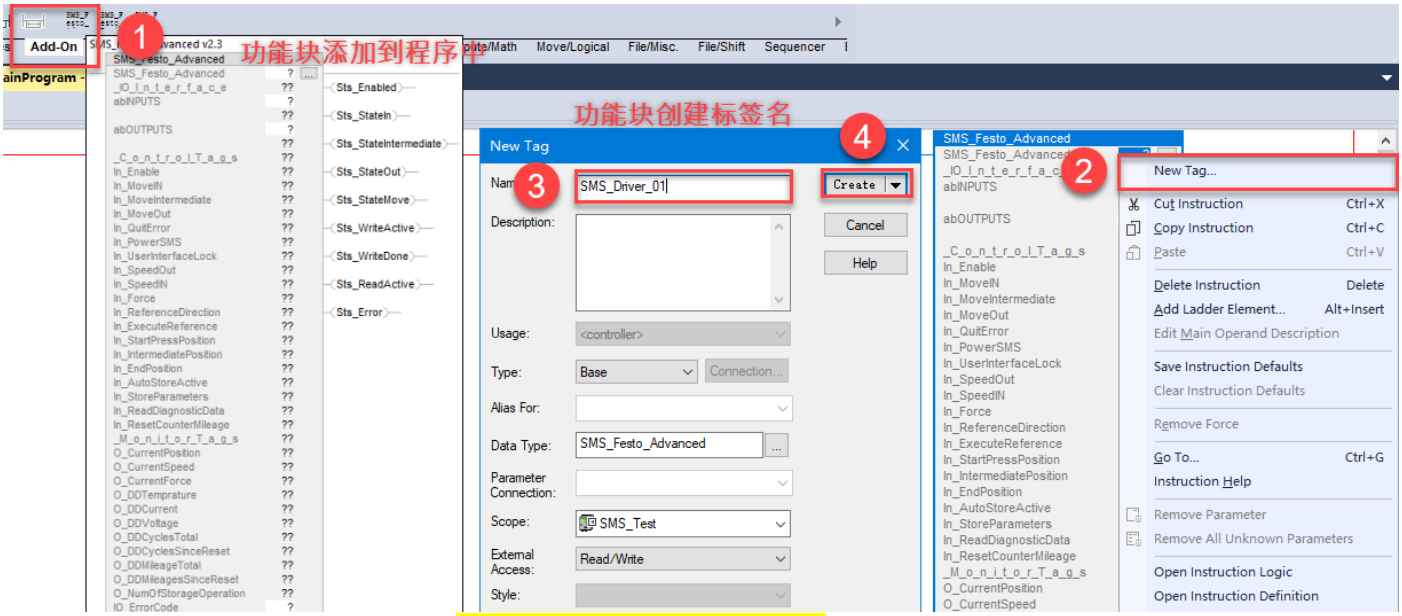

Module Definition*
Revision:
1
001
Electronic Keying:
Compatible Module
Connections:
Name
Size
Tag Suffix
Exact I/O size
Input:
12
SINT
1
CPX_AP_I_EP:I1
Output:
8
CPX_AP_I_EP:O1
Diagnostic Data
Input:
36
SINT
2
CPX_AP_I_EP:I2
Output:
0
<none>
OK
Cancel
Help
8
9

3.6 导入功能块文件

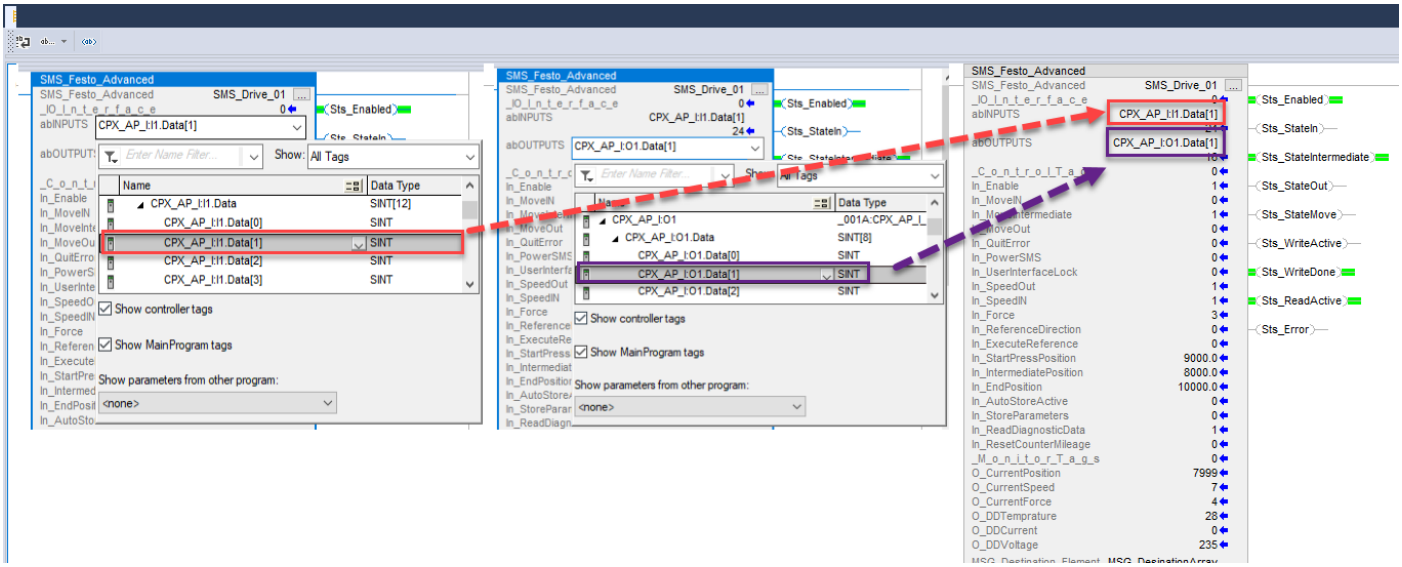


3.7 功能块调用与配置

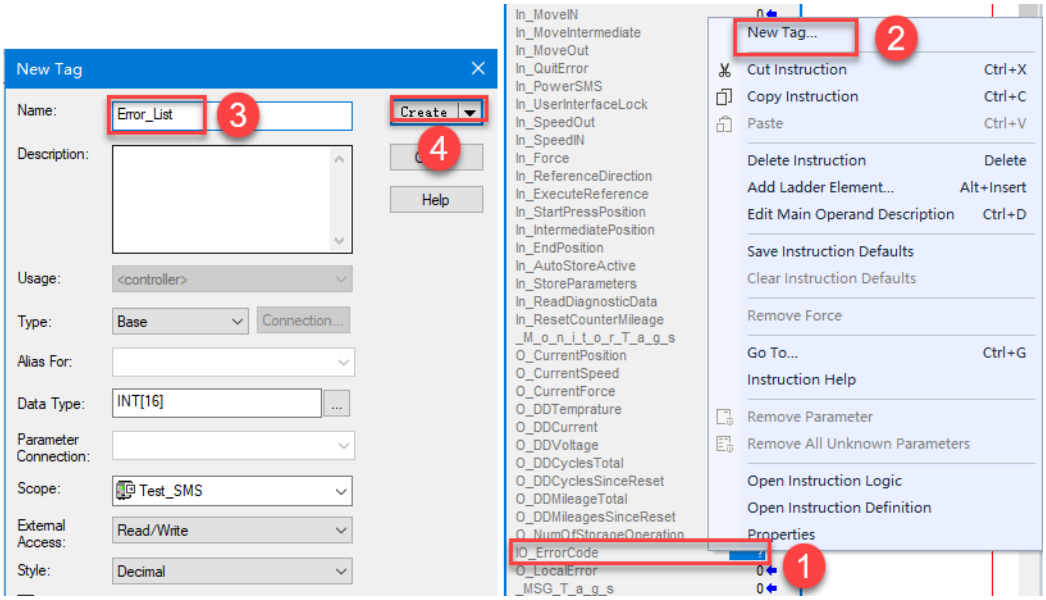
第一步：添加功能块



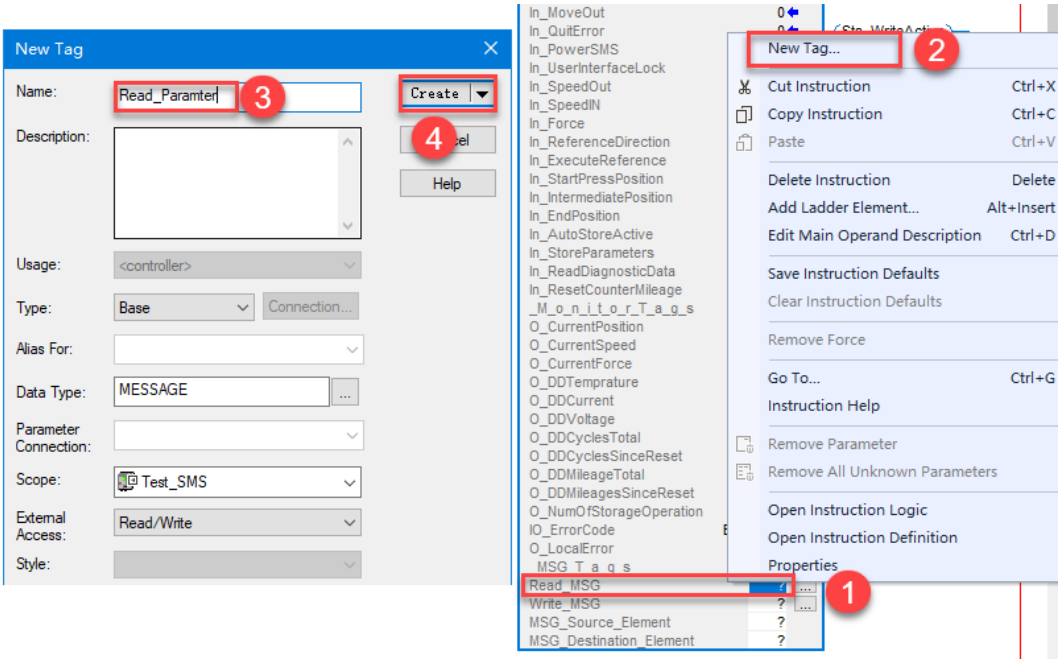
第二步：输入输出硬件接口地址映射（如何映射正确的地址，见附录 B）



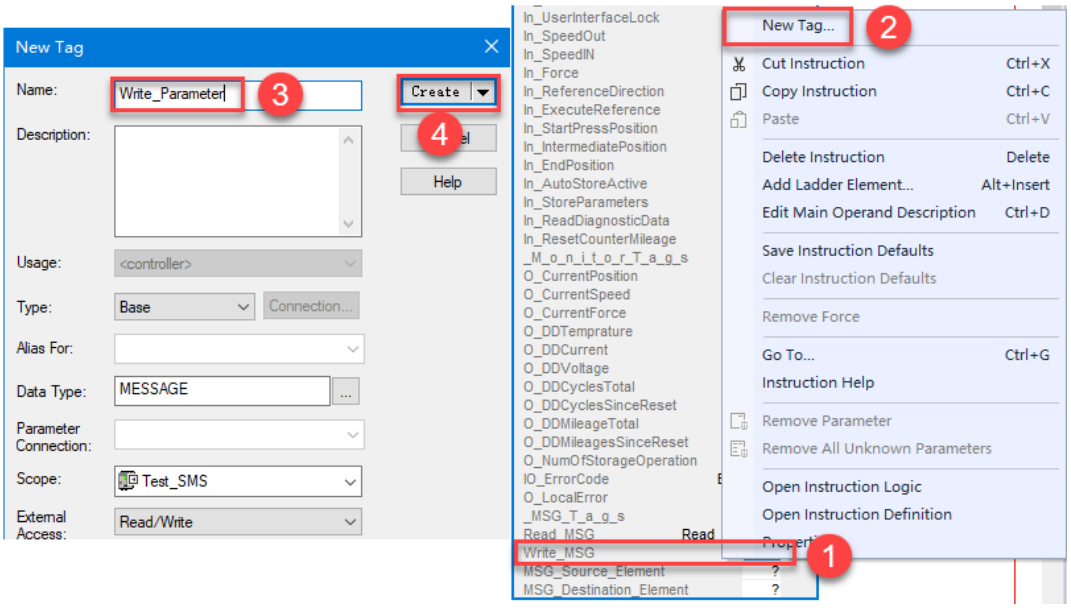
第三步：IO_ErrorCode 创建标签名



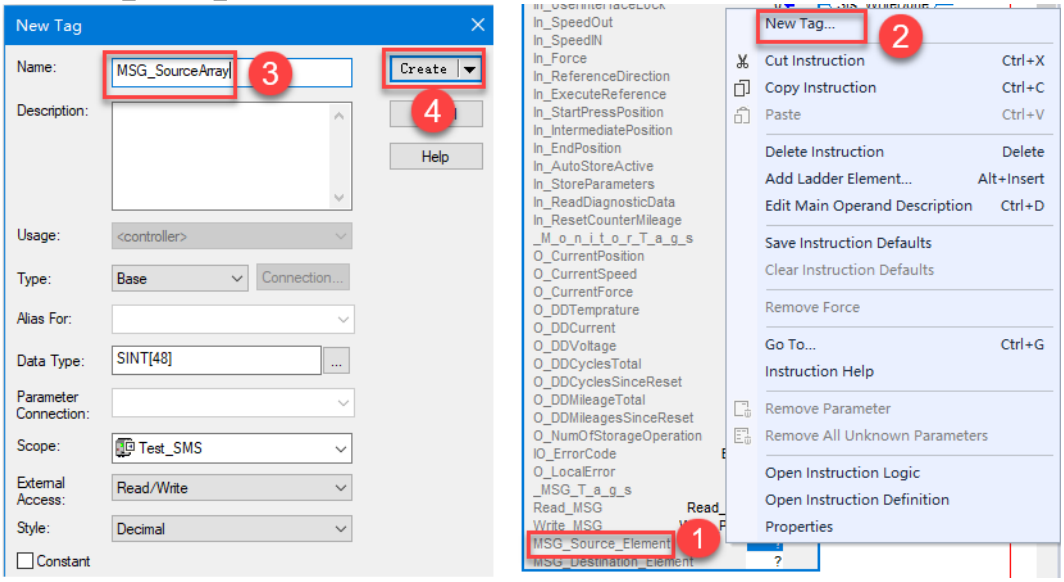
第四步：Read_MSG 创建变量名



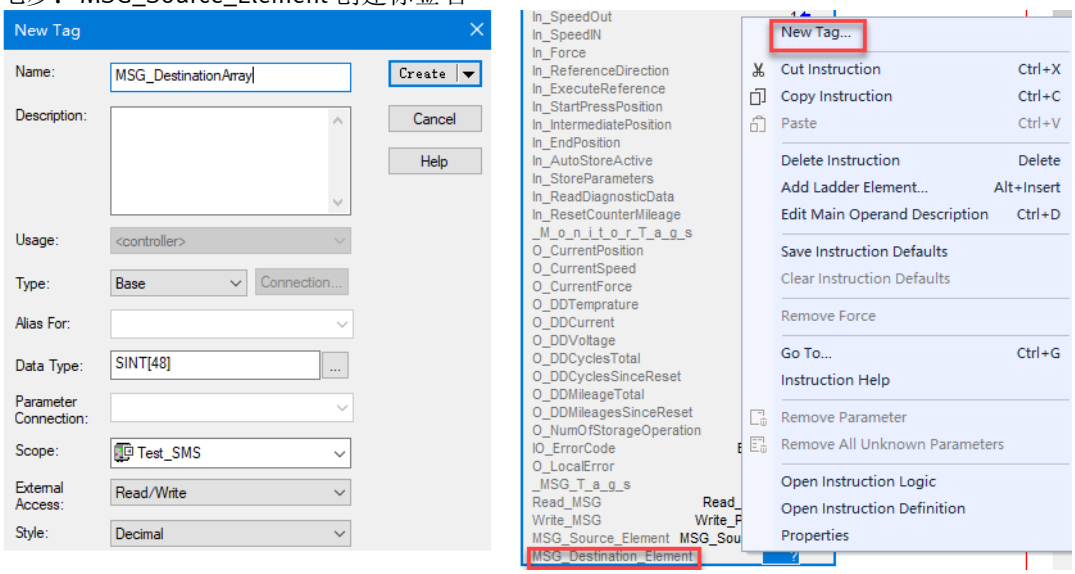
第五步：Write_MSG 创建变量名



第六步：MSG_Source_Element 创建标签名

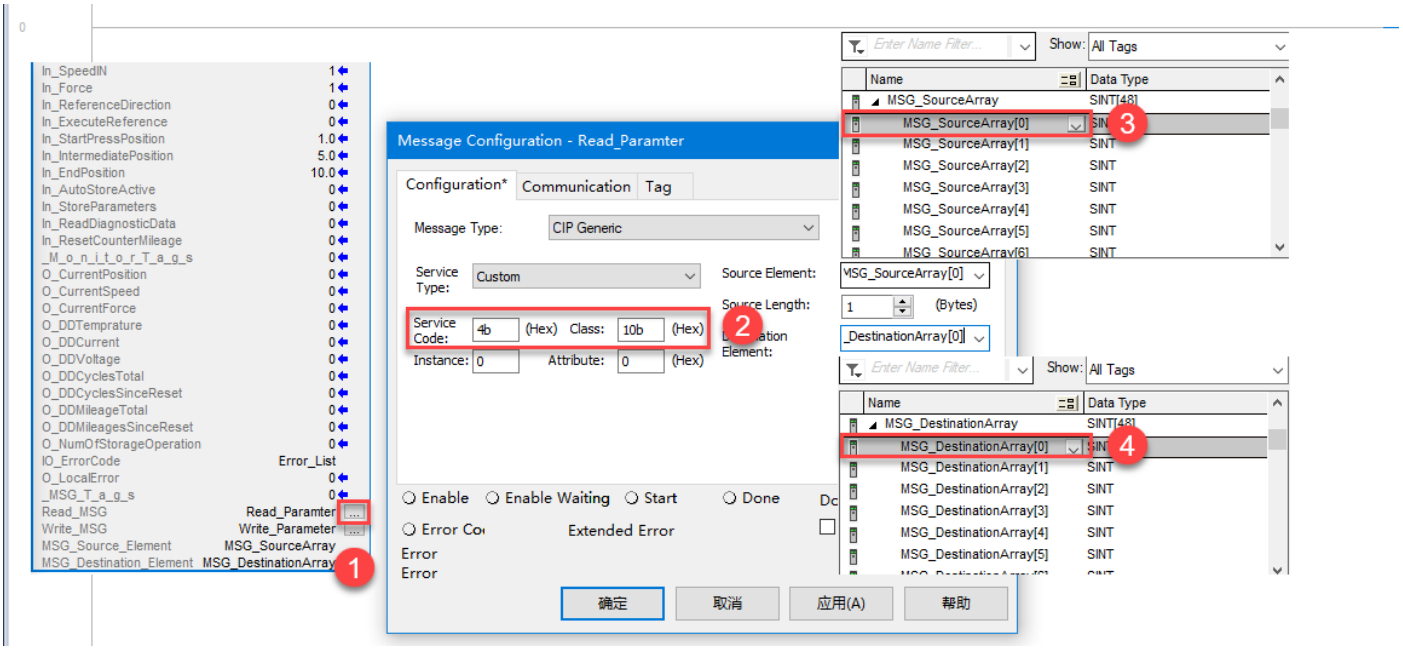


第七步：MSG_Source_Element 创建标签名

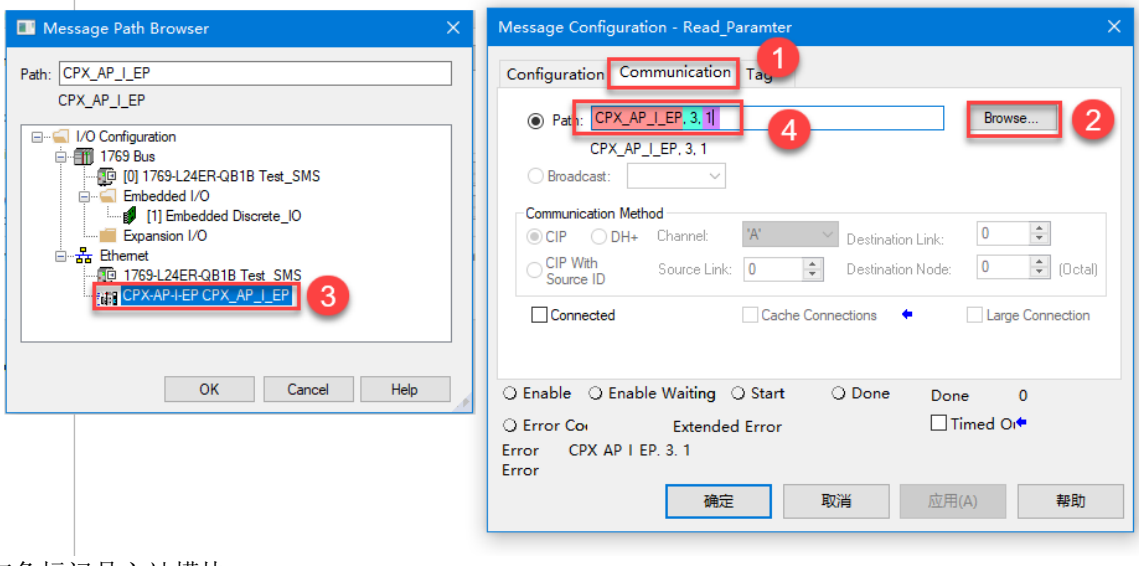


3.8 Read_MSG 指令组态

单击 Read_Parameter 组态按钮，进入组态界面：



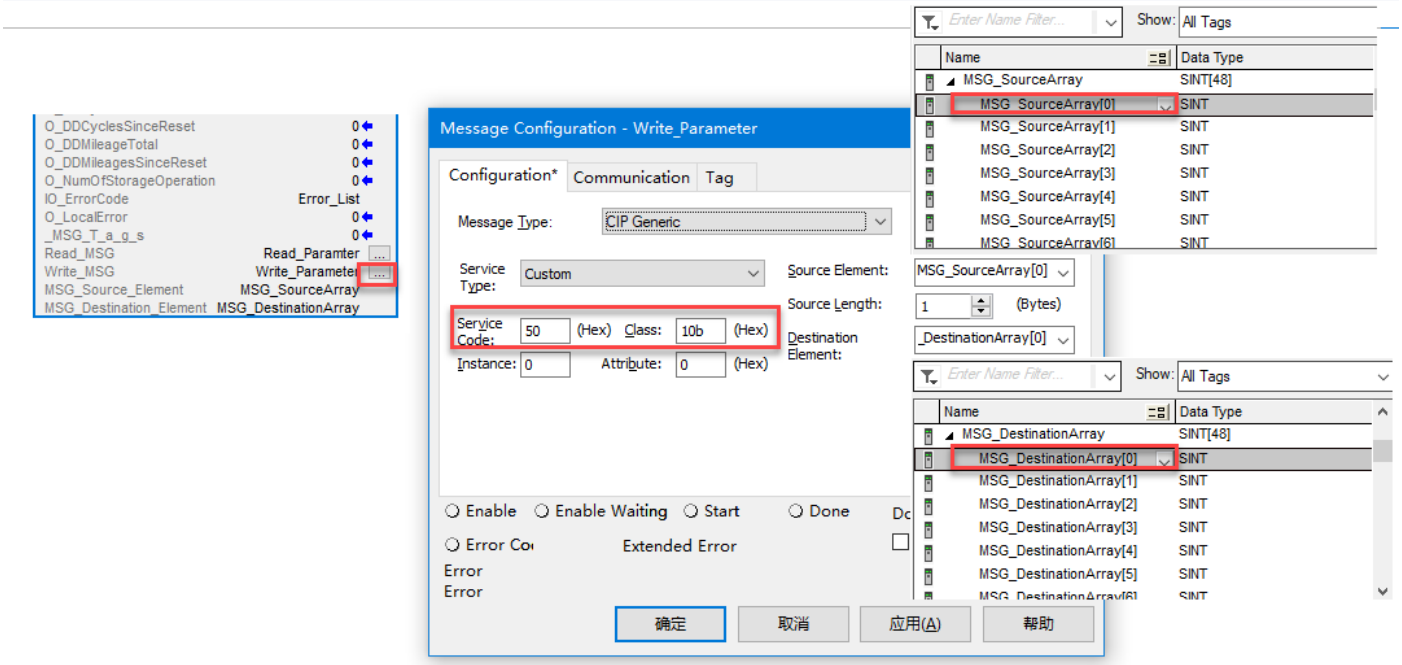
建立通讯路径



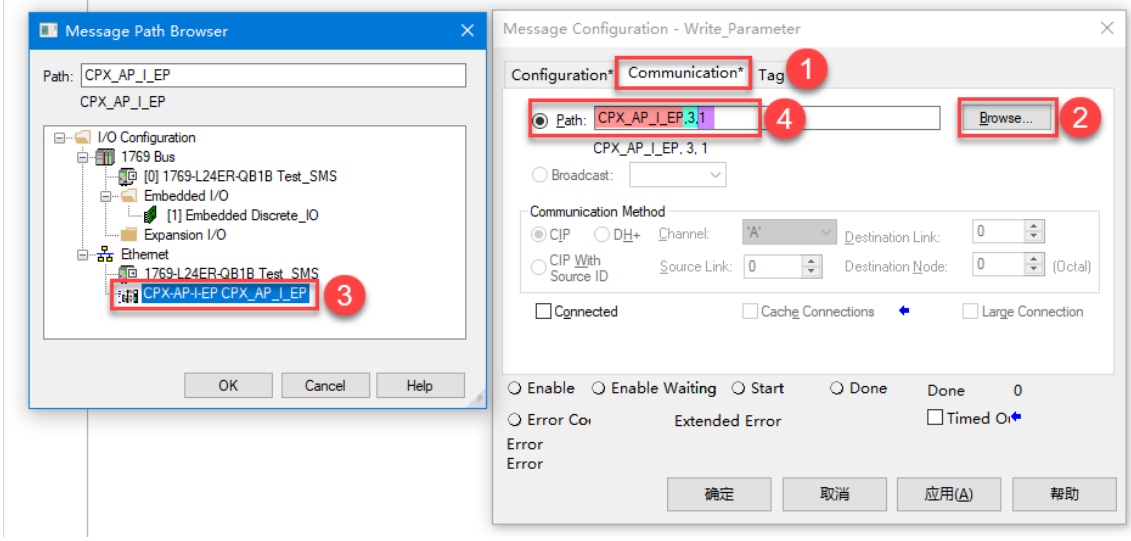
红色标记是主站模块
绿色标记 3 为固定值
紫色标记 1 为 CPX-AP-I-4IOL 模块的第 1 个端口号（中间使用逗号隔开）
举例：
如果有两个 CPX-AP-I-4IOL,则第一个模块号是 1 到 4，第二个模块号是 5 到 8。

3.9 Write_MSG 指令组态

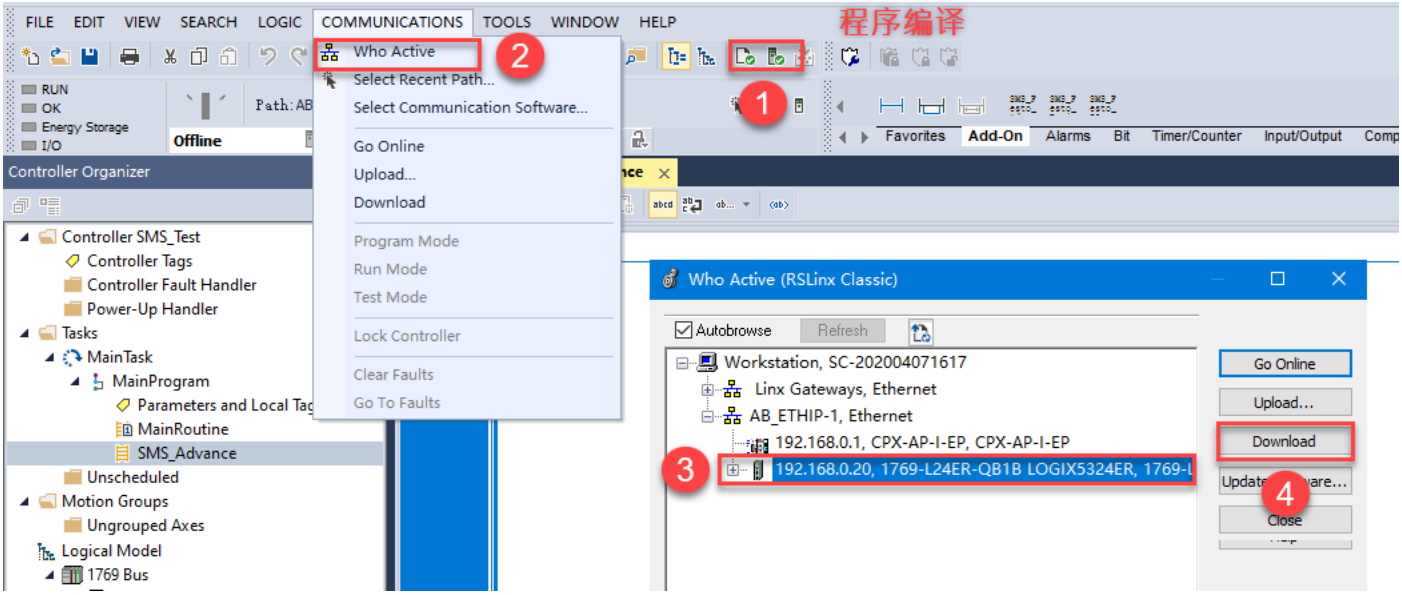
单击 Write_Parameter 组态按钮，进入组态界面：



建立通讯路径



3.10 编译及下载程序



4 SMS_Festo_Advanced 功能块变量说明

4.1 IO_Interface 变量说明

变量名称	数据类型	功能描述
abINPUT	INT	SMS 发送到 PLC 的数据
abOUTPUT	INT	PLC 发出的数据到 SMS

4.2 Control 变量说明

变量名称	数据类型	功能描述
In_Enable	BOOL	**True** - Enable AOI function
In_MoveIN	BOOL	Control command for executing the motion "MovIn" to the inner (reference) end position "LimIn(Ref)" **TRUE** - Actuator unit moves to inner end position "LimIn(Ref)" **FALSE** - Actuator unit stops Note: The control command only works in combination with the bits MoveOUT and MoveIntermediate.
In_MoveIntermediate	BOOL	Control command for executing the movement "MovImp" to the in-termediate position "PosImp" **TRUE** - Actuator unit moves to Intermediate Position "PosImp" **FALSE** - Actuator unit stops Note: The control command only works in combination with the bits MoveIN and MoveOUT.
In_MoveOut	BOOL	Control command for executing the motion "MovOut" to the outer end position "LimOut" **TRUE** - Actuator unit moves to outer end position "LimOut" **FALSE** - Actuator unit stops Note: The control command only works in combination with the bits MoveIN and MoveIntermediate.
In_QuitError	BOOL	Control command for acknowledging errors **TRUE** - Start error acknowledgement **FALSE** - Do not start error acknowledgement
In_PowerSMS	BOOL	Control command for switching on the power stage. **TRUE** - Enable power stage of actuator unit **FALSE** - Disable power stage of actuator unit
In_UserInterfaceLock	BOOL	**TRUE** - Access to display and operating components (HMI) on control unit locked **FALSE** - Access to display and operating components (HMI) on control unit enabled
In_SpeedOut	SINT	Speed for movement "MovOut" towards inner outer end position "LimOut" **1** - 10% (default) **…** **10** - 100%
In_SpeedIN	SINT	Speed for movement "MovIn" towards inner (reference) end posi-tion "LimIn(Ref)" **1** - 10% (default) **…** **10** - 100%
In_Force	SINT	Force for force controlled movement "MovOut" from position "PosS-tartPress" towards outer end position "LimOut" **1** - 10% (default) **…** **10** - 100%
In_ReferenceDirection	BOOL	Position of the reference end position "Ref" after homing has been carried out Linear drive systems: **TRUE**: Facing away from motor **FALSE**: Facing motor Rotary drive systems (ERMS: view of the rotating plate) TRUE: Right FALSE: Left
In_ExecuteReference	BOOL	Command for executing the homing with end position detection (detection of the mechanical end positions) **TRUE** - Start homing **FALSE** - Do not start homing Note: Take effect only when falling to raising edge when AOI is enable state.
In_StratPressPosition	REAL	Stroke or angle of rotation distance from the "Start Press" posi-tion to the reference end position "Ref". Defines point on stroke, actuator starts force controlled move-ment. **Linear actuator unit**:-unit: [mm]-gradient: 0.01 **Rotative actuator unit**:-unit: [°]-gradient: 0.1
In_IntermediatePosition	REAL	Stroke or rotation angle distance of the intermediate position "PosImp" to the reference end position "Ref".

		Defines intermediate point on stroke, actuator movement stops and waits for next motion command. **Linear actuator unit**:-unit: [mm]-gradient: 0.01 **Rotative actuator unit**:-unit: [°]-gradient: 0.1
In_EndPosition	REAL	Stroke or rotation angle distance of the "LimOut" end position to the reference end position "Ref" Defines end point on stroke, actuator movement stops and waits for next motion command. **Linear actuator unit**: -unit: [mm] -gradient: 0.01 **Rotative actuator unit**:-unit: [°] -gradient: 0.1
In_AutoStoreActive	BOOL	Control command for activating automatic and permanent saving of parameters in the flash memory **TRUE** - Automatic saving activated (default) **FALSE** - Automatic saving deactivated Note: When changing parameters frequently, make sure to deac-tive auto store to avoid damages to the flash memory by exceed-ing 100.000 write cycles.
In_StoreParameters	BOOL	Control command for single and conscious permanent saving of parameters in the flash memory **TRUE** - Manually stores the last downloaded parameters in the flash memory **FALSE** - Parameters are temporarily saved in RAM. Note: Take effect only when falling to raising edge when AOI is enable state.
In_ReadDiagnosticData	BOOL	**TRUE** - Update value of outputs: O_DDTemperature O_DDCurrent O_DDVoltage O_DDCyclesTotal O_DDCyclesSinceReset O_DDMileageTotal O_DDMileageSinceReset
In_ResetCounterMileage	BOOL	**TRUE** - Resets values of parameters “O_DDCyclesSinceReset”

4.3 Monitor 变量说明

变量名称	数据类型	功能描述
Sts_Enabled	BOOL	**TRUE** - AOI function enabled.
Sts_WriteDone	BOOL	**TRUE** - Last parameter wrote successfully.
Sts_WriteActive	BOOL	**TRUE** - Executing parameter write function.
Sts_ReadActive	BOOL	**TRUE** - Parameter read function is active.
Sts_Error	BOOL	**TRUE** - Actuator unit in error state.
Sts_StateIn	BOOL	Status at inner (reference) end position "LimIn(Ref)" **TRUE** - Inner (reference) end position “LimIn(Ref)” reached **FALSE** - Inner (reference) end position “LimIn(Ref)” not reached
Sts_StateIntermediate	BOOL	Status at intermediate position “PosImp” **TRUE** - Intermediate position “PosImp” reached **FALSE** - Intermediate position “PosImp” not reached
Sts_StateOut	BOOL	Status at outer end position “LimOut” **TRUE** - Outer end position "LimOut" reached **FALSE** - Outer end position "LimOut" not reached
Sts_StateMove	BOOL	Status of the actuator unit **TRUE** - Actuator unit in moving condition **FALSE** - Actuator unit in standstill condition
O_CurrentPosition	DINT	Actuator unit current position feedback **Linear actuator unit**: - unit: [mm] - gradient: 0.01 **Rotative actuator unit**: - unit: [°] - gradient: 0.1
O_CurrentSpeed	DINT	Actuator unit current speed feedback **Linear actuator unit**: - unit [mm/s] -gradient: 0.01 **Rotative actuator unit**: - unit [rpm] -gradient: 0.1
O_CurrentForce	DINT	Actuator unit current feed force feedback **Linear actuator unit**: - unit [N] -gradient: 0.01 **Rotative actuator unit**: - unit [Nm] -gradient: 0.1
O_DDTemperature	INT	Actuator unit current temperature feedback **Unit: [° C].**
O_DDCurrent	DINT	Actuator unit present value of current **Unit: [A].**
O_DDVoltage	DINT	Actuator unit present voltage feedback **Unit: [V].**
O_DDCyclesTotal	DINT	Number (dec) of completed movement cycles of the actuator unit since delivery
O_DDCyclesSinceReset	DINT	Number (dec) of completed movement cycles of the actuator unit since last reset command

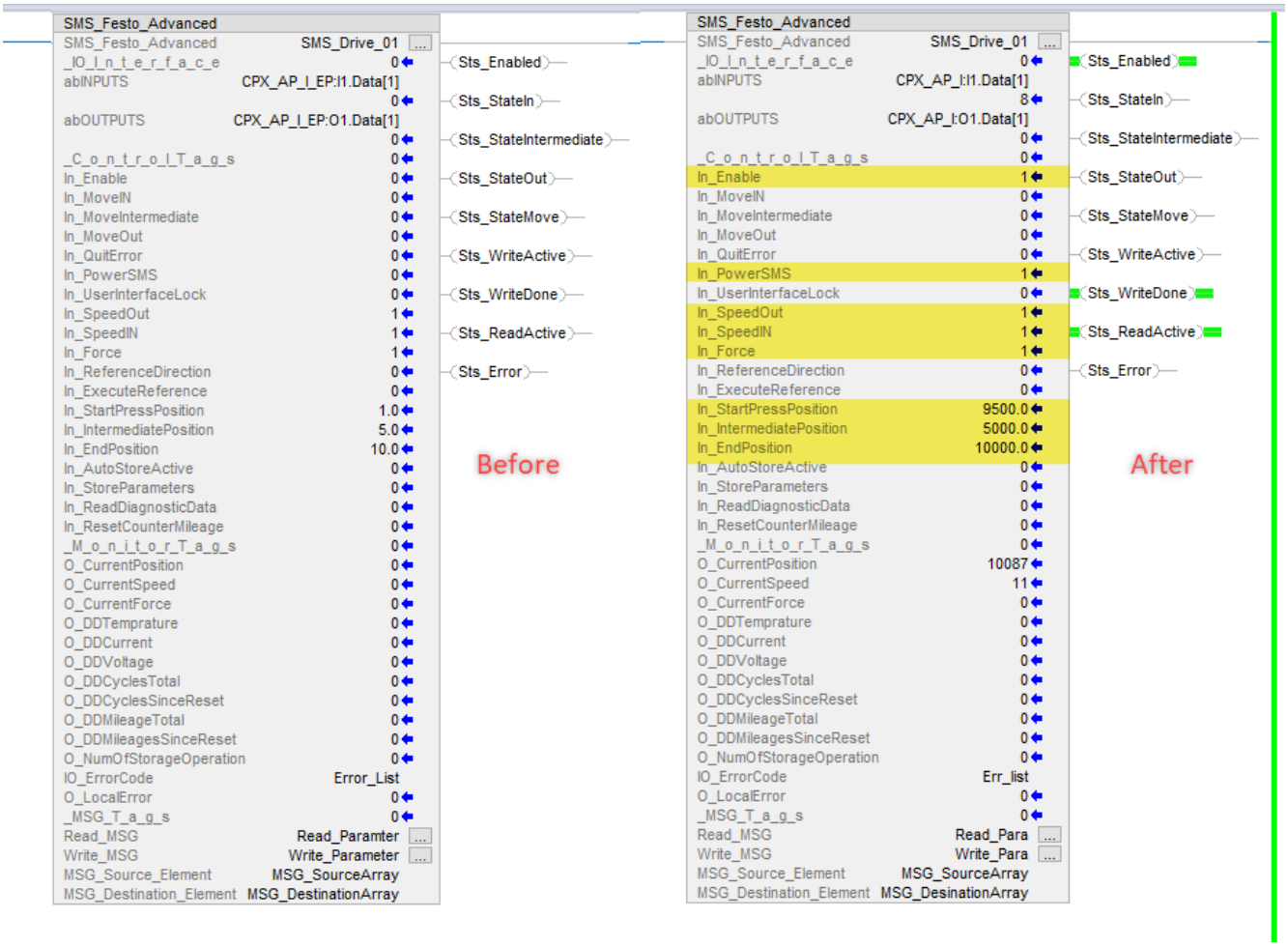
O_DDMileageTotal	DINT	Mileage of the actuator unit since delivery **Linear actuator unit**: unit [km], 0.000001. **Rotative actuator unit**: unit [r], 0.001.
O_DDMileageSinceReset	DINT	Mileage of the actuator unit since last reset command **Linear actuator unit**: unit [km], 0.000001. **Rotative actuator unit**: unit [r], 0.001.
O_NumOfStorageOperation	DINT	Total number of permanent storage processes in the flash memory since delivery
O_ErrorCode	INT[16]	Error code of actuator unit
O_LocalError	INT	AOI Local Error 1001 – "In_SpeedIN" Parameter limit out of range error. 1002 – "In_SpeedOut" Parameter limit out of range error. 1003 – "In_Force" Parameter limit out of range error. 1004 – "Read_MSG" Error. Check read message error code. 1005 – "Write_MSG" Error. Check write message error code.

4.4 MSG 变量说明

变量名称	数据类型	功能描述
Read_MSG	INT	Read message instruction.
Write_MSG	INT	Write message instruction.
MSG_Source_Element	SINT[48]	Message instruction source elements array.
MSG_Destination_Elements	SINT[48]	Message instruction destination elements array.

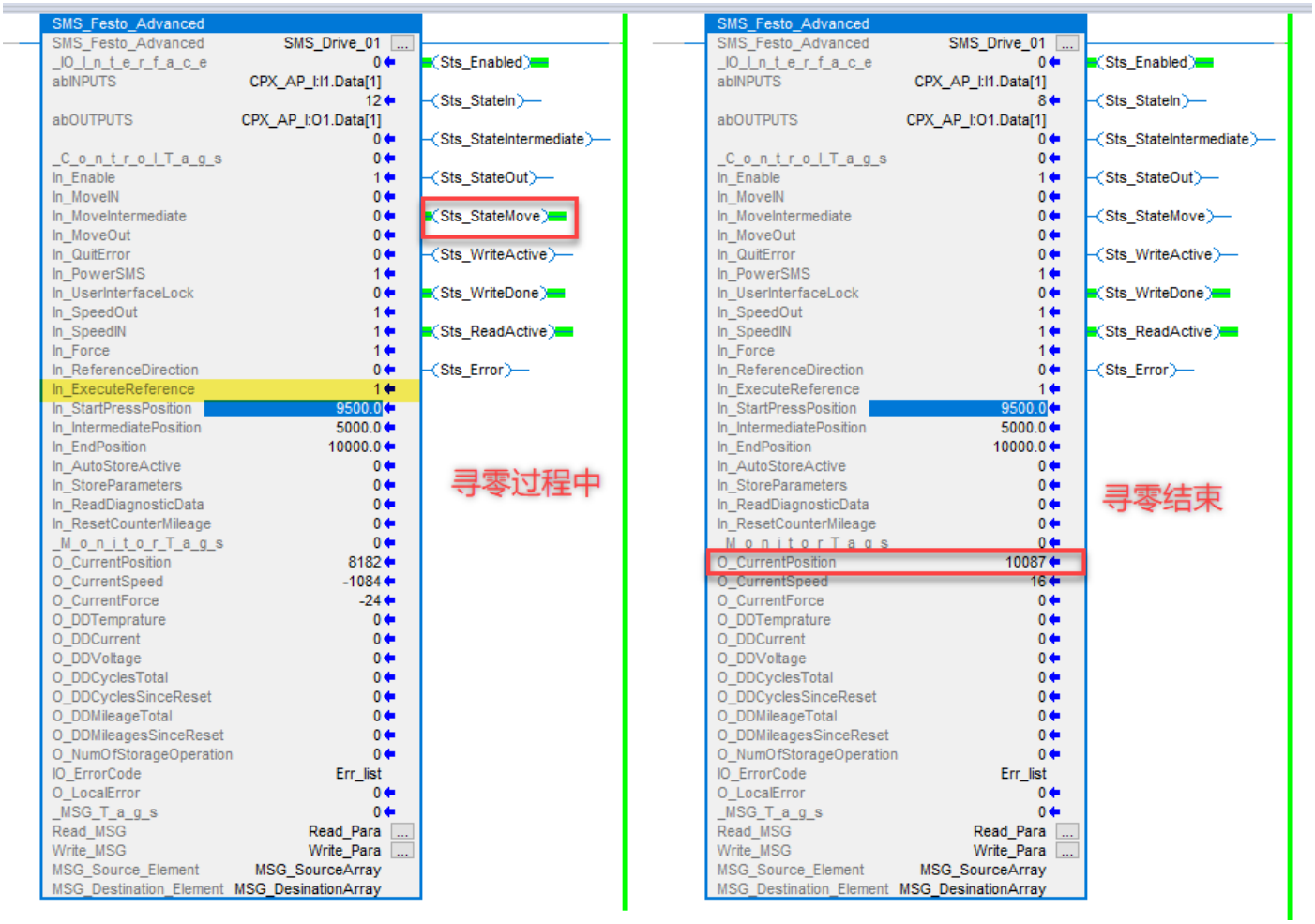
5 样例程序

5.1 初始设置



- In_Enable 从 False 切换到 True，功能块使能。
- In_PowerSMS 从 False 切换到 True,SMS 驱动单元使能。
- In_SpeedOut,、In_SpeedIN、In_Force、In_StartpressPosition 、 In_EndPosition 填入设定值
- 上述参数写入成功后，Sts_WriteDone 变为 Ture。

5.2 回零操作（自带行程检测）



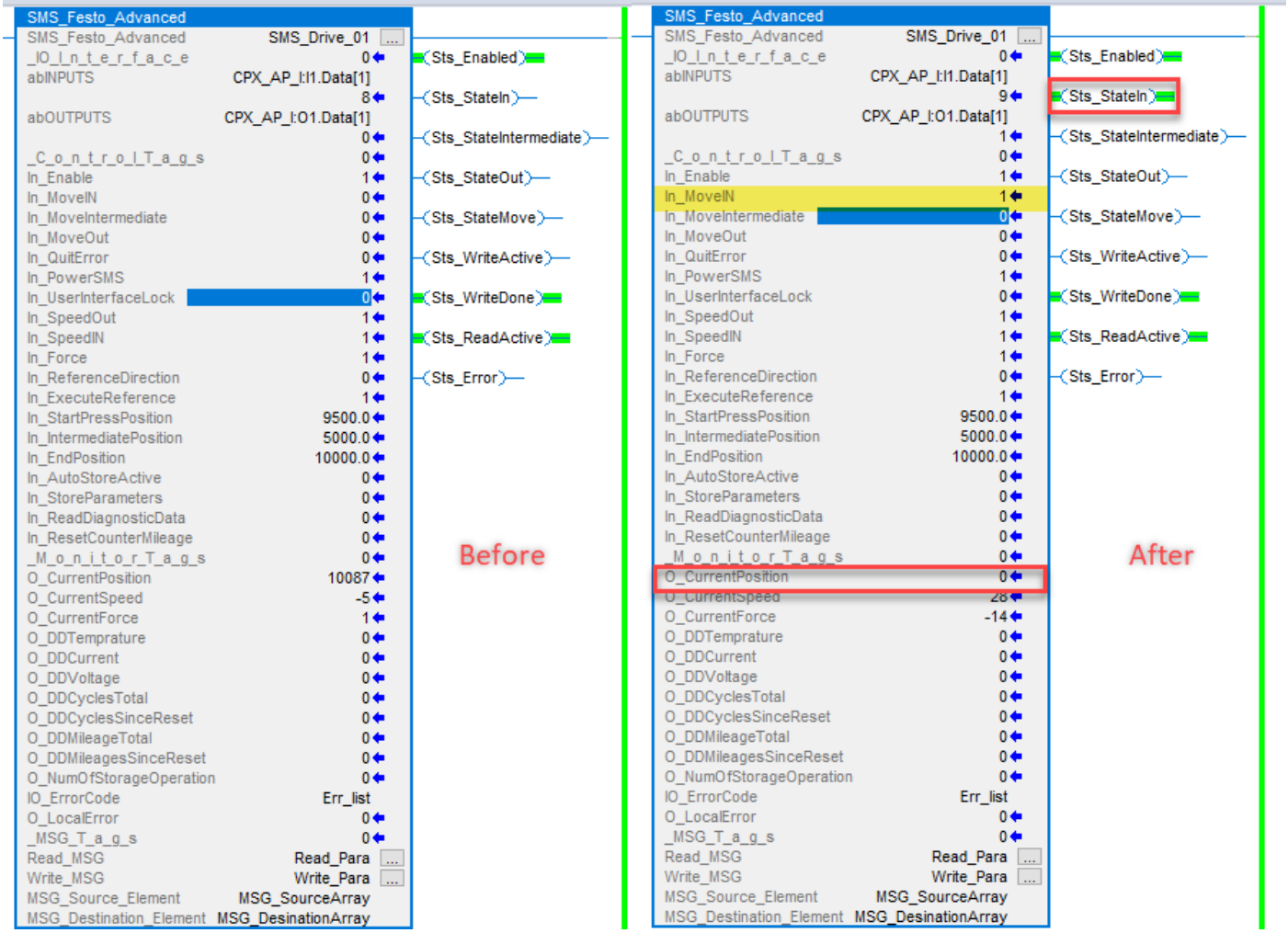
In_ExecuteReference 从 False 切换到 True,SMS 驱动单元开始执行回零动作且 Sts_StateMove 为 True，第一次撞击确定参考零点，然后反方向继续移动直到第二次撞击行程终点,第一次撞击和第二次撞击之间行走的距离就是整个工作行程。寻零结束后 Sts_StateOut 为 Ture,然后很快变为 False。

- 可以通过 In_ReferenceDirection 变量修改寻零方向
- 上图样例显示行程范围是 100.87mm
- 撞击点可以由客户定义（外部加硬挡块也行），不一定是电缸的起始端和完全伸出端

注：不需要每次上电寻零

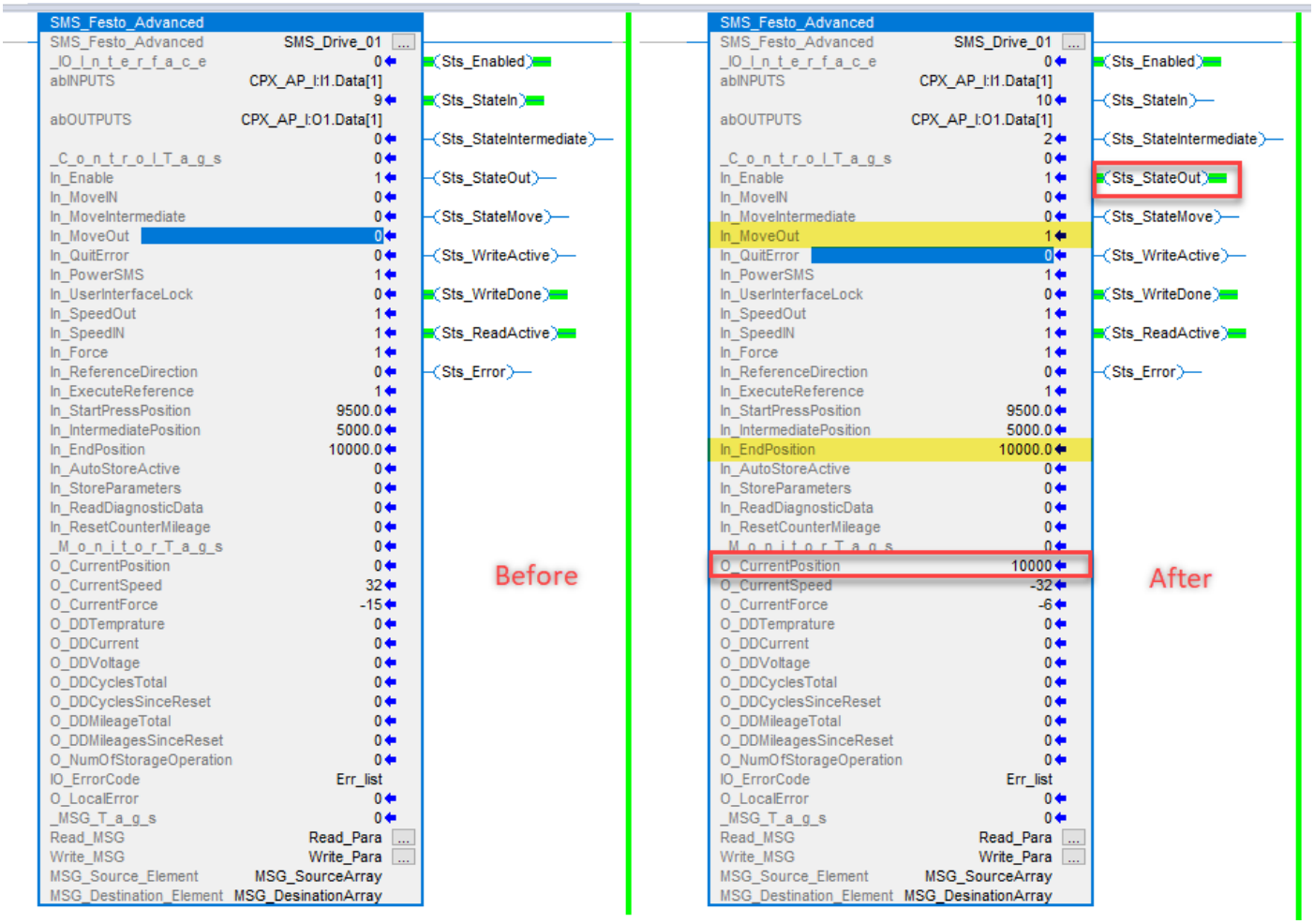
假设设备断电时，电缸停在中间位置 50mm，设备上电后 SMS 驱动单元会自动控制电缸从 50mm 走到参考零点位置，然后在反方向走 50mm 距离停下。

5.3 定位到参考零点“Lim$_{In}$(Ref)”



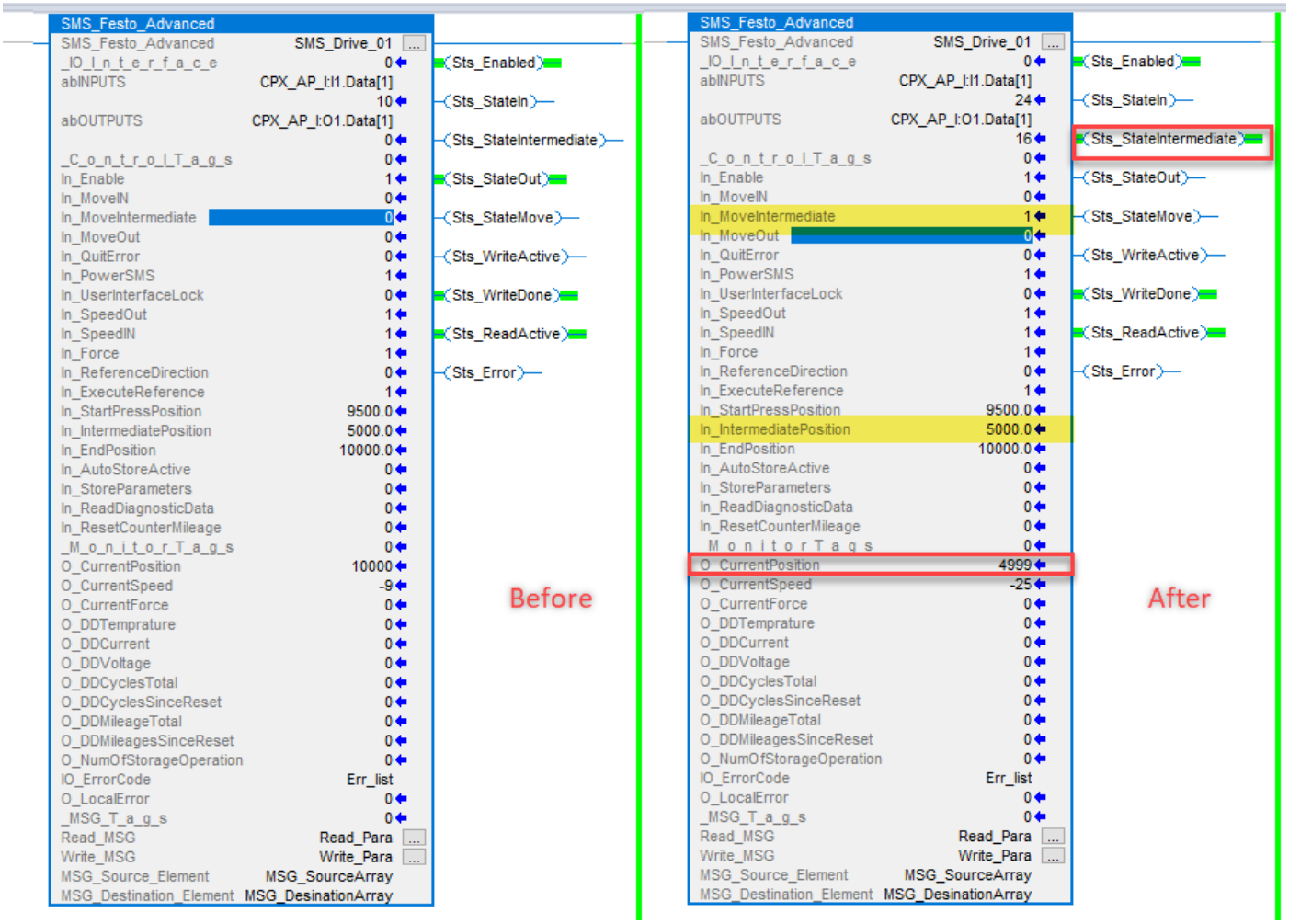
将“In_MoveIN”从 False 切换为 True，SMS 驱动单元往零点方向移动。到达位置后 Sts_StatusIn”将为 True。

5.4 定位到行程终点“LimOut”



将 “In_MoveOut”从 False 切换为 True，SMS 驱动单元向外伸出。到达位置后“O_StateOut”将为 True。

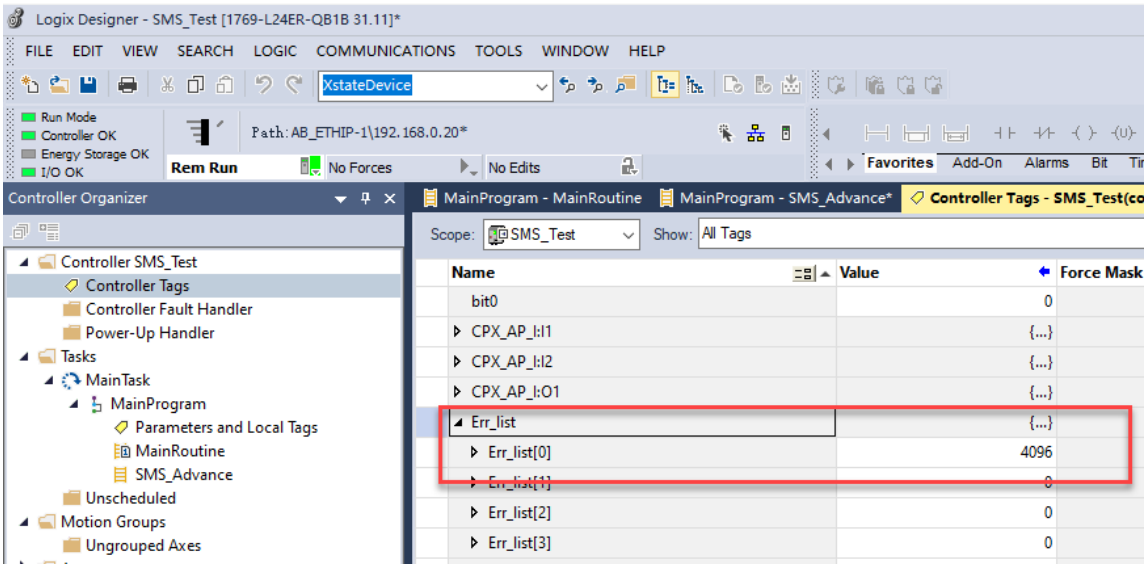
5.5 定位到中间位置“PosImp”



将 “In_MoveIntermediate”从 False 切换为 True，SMS 驱动单元向中间位置移动。到达中间位置后“Sts_StateMedinteral”将为 True。

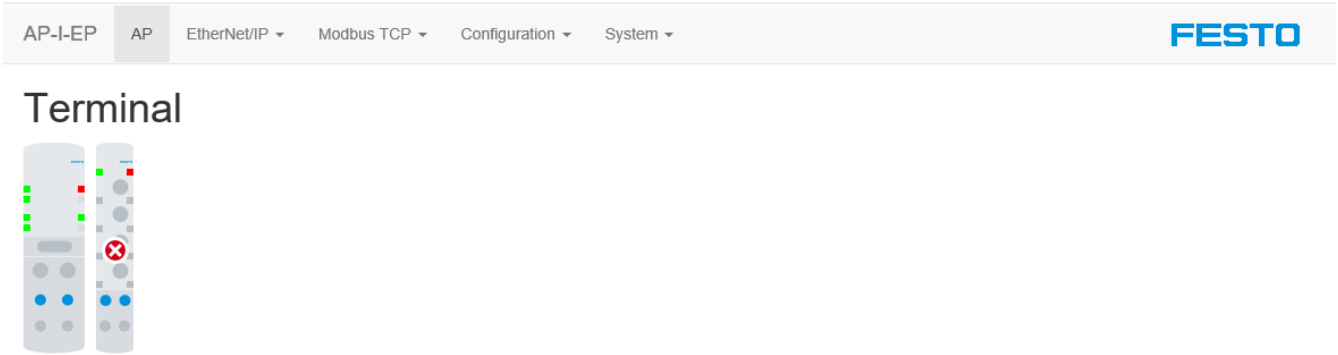
6 故障代码

SMS_Festo_Advance 功能块中 IO_ErrorCode 变量显示 SMS 驱动单元的故障代码
举例：

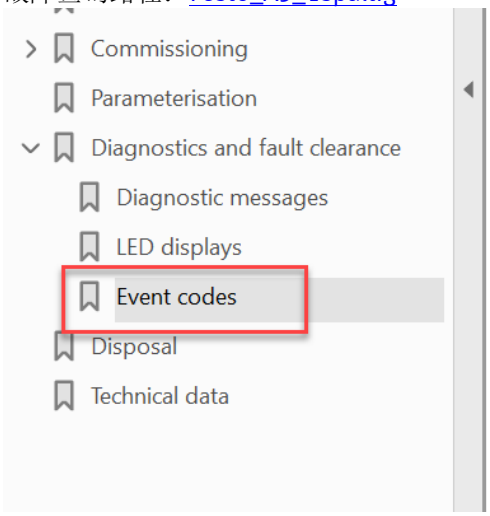


4096 换算成 16 进制：1000H

同样也可以通过网页访问查看故障代码：



故障查询路径：[Festo_A5_1spaltig]

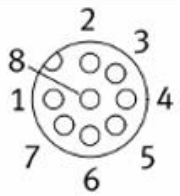
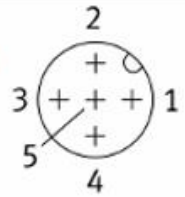


IO-Link device event codes

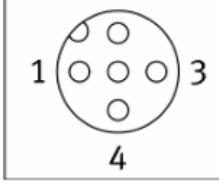
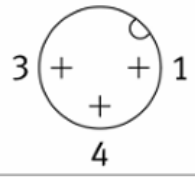
IO-Link event code hex	Diagnostics ID hex	Message	Description
1000h	0D I 00 I 0141	General malfunction of IO-Link device	General malfunction – Unknown error of the IO-Link device. Remedy – Check IO-Link device. Diagnostic status – Information
1806h 1807h	01 I 01 I 010B	Short circuit/overload in sensor supply	The connected sensor is defective or generates too much load on its channel. Remedy – Check sensor for correct function, in particular for current consumption. – Check sensor cabling.

7 附录 A

IO-LINK 通讯 CPX-AP-I-4IOL-M12 主站模块连接从站模块 EPCS-BS 单元选用 8080777（NEFC-M12G8-0.3-M12G5-LK）电缆直连，2 号脚也被连接，此时多出一路 24V 供给 SMS，有可能会烧坏 SMS 驱动单元。

Electrical connection 1 Field device side		Electrical connection 2 Controller side	
1 Socket	Pin SMS	Pin CPX-AP-I-4IOL	2 Plug connector
	1 L+	1 L+	
	2 Do not connect	2 Load voltage	
	3 C/Q	4 C/Q	
	4 L-	3 L-	
	5 ... 8 not assigned	5 not assigned	

解决方案：
如果已经选购 8080777，建议增加选购 8091511（NEBU-M12G5-K-1-N-M12G3），避开 2 号脚。

NEBU-M12G5/W5...-M12G3/W3				
	1	BN	1	
	3	BU	3	
	4	BK	4	

8 附录 B

如何映射正确的输入输出硬件接口地址?

1. 报文长度（SMS 驱动单元过程数据输入输出各占 2 个 byte（Firmware V19）

Tab. 47: Process data

'ProcessDataInput'	Bit							
	15	...	5	4[1)]	3	2	1	0
Control data	–			'State "Inter-mediate"'	'State "Device"'	'State "Move"'	'State "Out"'	'State "In"'
Index.Subindex				0x0028.5 (40.5)	0x0028.4 (40.4)	0x0028.3 (40.3)	0x0028.2 (40.2)	0x0028.1 (40.1)

1) From firmware version v19.0.4.107_release

Tab. 48: Telegram structure 'ProcessDataInput'

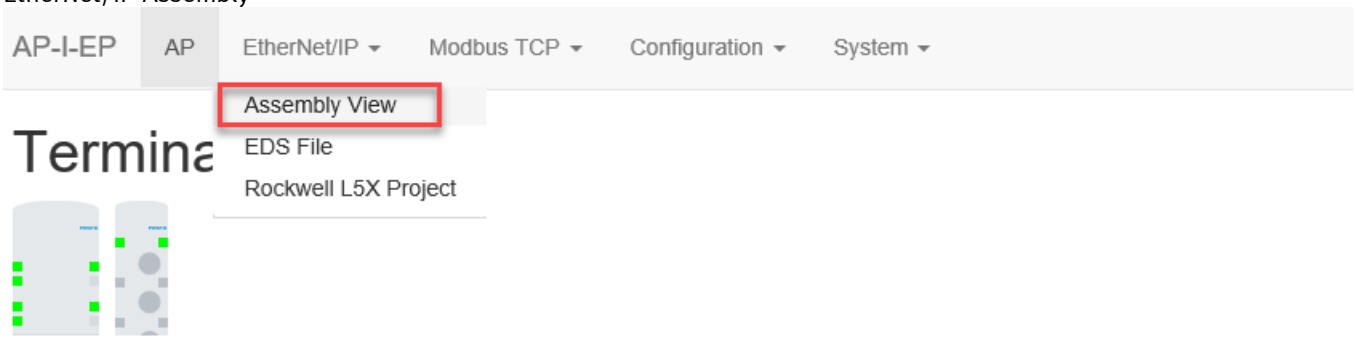
'ProcessDataOut-put'	Bit							
	15	...	5	4[1)]	3	2	1	0
Status data	–			'Move "Inter-mediate"'	–	'Quit Error'	'Move "Out"'	'Move "In"'
Index.Subindex				0x0029.5 (41.5)	–	0x0029.3 (41.3)	0x0029.2 (41.2)	0x0029.1 (41.1)

1) From firmware version v19.0.4.107_release

Tab. 49: Telegram structure 'ProcessDataOutput'

2. WEB 浏览

EtherNet/IP-Assembly



Slot	Module	Code	FWVersion	Serial	Productkey
1	CPX-AP-I-EP-M12	8323	1.3.1	0x00008AF6	3S7PNW2LB48
2	CPX-AP-I-4IOL-M12	8206	1.4.13	0x00005FAF	3S7PNFF9T7S

Assembly View

100 - Input Exact SINT (12 Bytes)

Search:

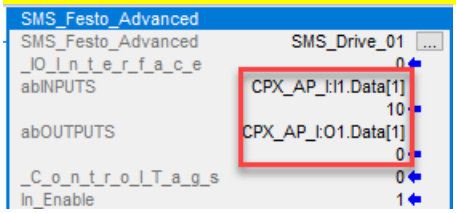
Offset (bit)	Bit length	Module	Channel	Datatype	Name
0	16	2	0	USINT[2]	Module 2 - CPX-AP-I-4IOL-M12 - Port 0
16	16	2	1	USINT[2]	Module 2 - CPX-AP-I-4IOL-M12 - Port 1
32	16	2	2	USINT[2]	Module 2 - CPX-AP-I-4IOL-M12 - Port 2
48	16	2	3	USINT[2]	Module 2 - CPX-AP-I-4IOL-M12 - Port 3
64	8	2	4	USINT	Module 2 - CPX-AP-I-4IOL-M12 - Port 4 - PQI
72	8	2	5	USINT	Module 2 - CPX-AP-I-4IOL-M12 - Port 5 - PQI
80	8	2	6	USINT	Module 2 - CPX-AP-I-4IOL-M12 - Port 6 - PQI
88	8	2	7	USINT	Module 2 - CPX-AP-I-4IOL-M12 - Port 7 - PQI

如图可以看出 CPX-AP-I-4IOL 的 Port0 占组态地址中的第一个和第二个 Byte。

3. 对应 PLC 组态

◢ CPX_AP_I:I1.Data	{...}	{...}	Decimal	SINT[12]
▷ CPX_AP_I:I1.Data[0]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[1]	10		Decimal	SINT
▷ CPX_AP_I:I1.Data[2]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[3]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[4]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[5]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[6]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[7]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[8]	-96		Decimal	SINT
▷ CPX_AP_I:I1.Data[9]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[10]	0		Decimal	SINT
▷ CPX_AP_I:I1.Data[11]	0		Decimal	SINT
◢ CPX_AP_I:O1	{...}	{...}		_001A:CPX_AP
◢ CPX_AP_I:O1.Data	{...}	{...}	Decimal	SINT[8]
▷ CPX_AP_I:O1.Data[0]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[1]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[2]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[3]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[4]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[5]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[6]	0		Decimal	SINT
▷ CPX_AP_I:O1.Data[7]	0		Decimal	SINT

测试结果 PLC 的地址高低字节和报文是相反的，但是由于实际输入输出只用到 Bit0 至 Bit4，PLC 组态时可以选择高 8 位也可以正常使用。当然也用使用移位指令进行高低字节调换。本文样例如下：



9 附录 C

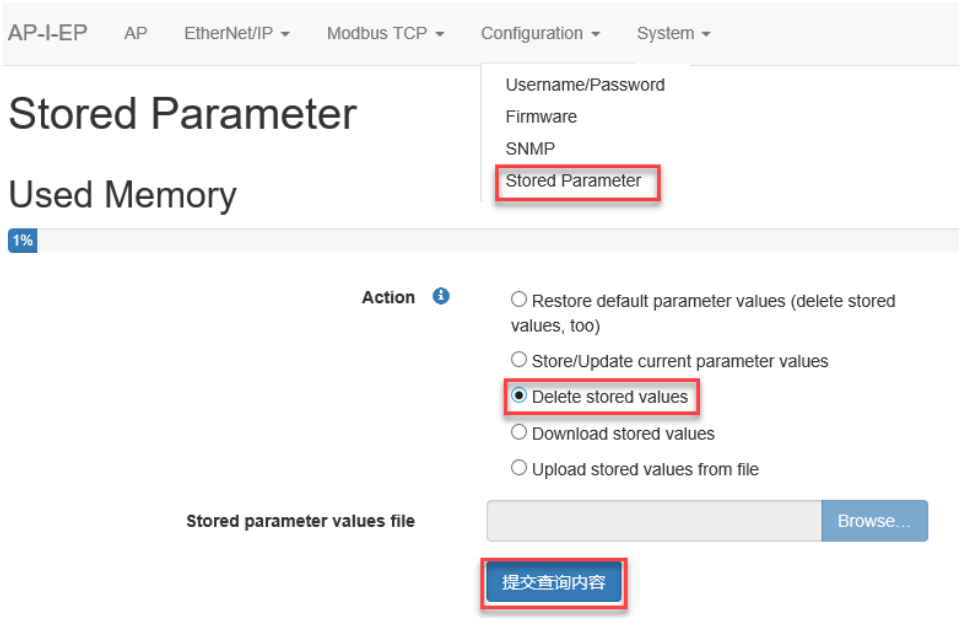
Web 网页组态 CPX-AP-I-4IOL 每个端口地址长度后无法修改怎么办？

Modules

Slot	Module	Code	FWVersion	Serial	Productkey	Identify	Diagnosis
1	CPX-AP-I-EP-M12	8323	1.3.1	0x00008AF6	3S7PNW2LB48		OK
2	CPX-AP-I-4IOL-M12	8206	1.4.13	0x00005FAF	3S7PNFF9T7S		OK

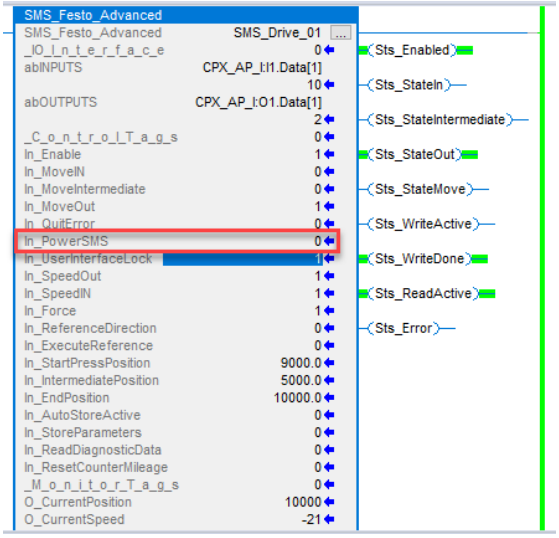
Parameter Object (0x0F) Instance	AP Id/Instance	Parameter	Startup	Value
64	20109:1	OutputDataLength (Port 1)		0
65	20109:2	OutputDataLength (Port 2)		0
66	20109:3	OutputDataLength (Port 3)		0
-	20090:0	Variant selection	yes	CPX-AP-I-4IOL-M12 Variant 2 (not changeable - Stored Parameter active)

可以进行删除存储后，重新设置参数解决。



10 附录 D

SMS 驱动单元上电后自动使能，为了保持一致，需要将 PLC 功能块中 In_PowerSMS 使能标签默认值设为 1



SMS 重新上电后，功能块需要重新使能后，读写参数才正常，否则会报 1004 故障。