

# **CPU 31xT-2 DP 选型指南，典型硬件组态配置指南**

V1.1

**A&D ASBU**

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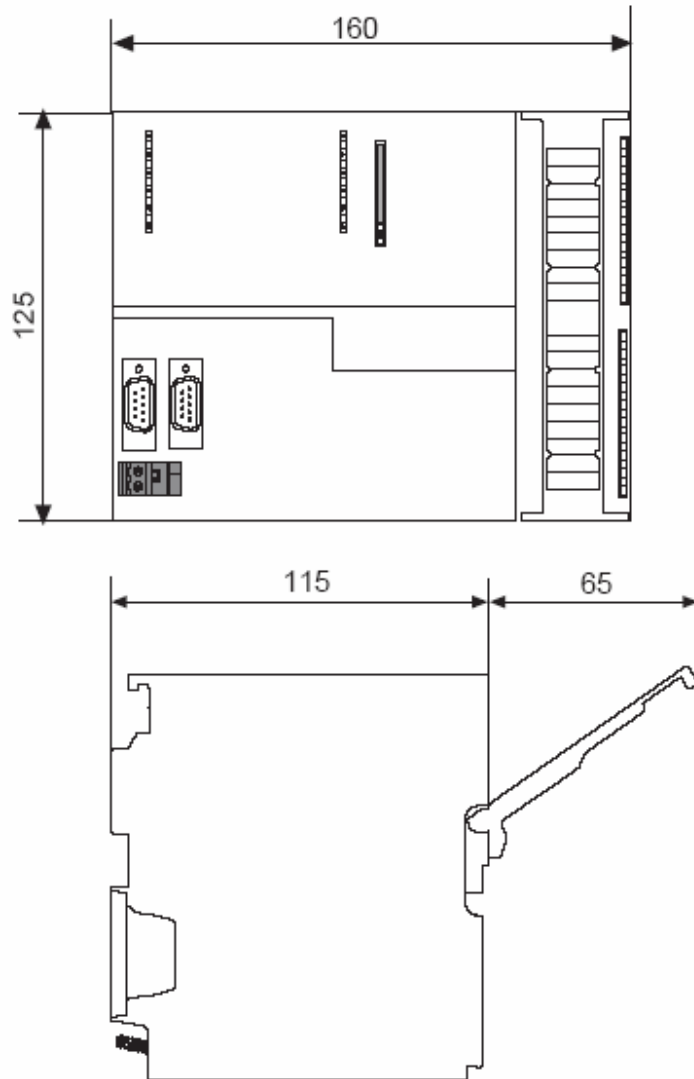
# 1. CPU 31xT-2 DP 技术工艺数据

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## 1.1 常规技术规格

### 1.1.1 CPU 31xT-2 DP 外形尺寸

CPU 31xT-2 DP



### 1.1.2 存储工艺程序MMC卡

Type	Order no.	Remark
MMC 4M	6ES7 953-8LM11-0AA0	-
MMC 8M	6ES7 953-8LP11-0AA0	当系统升级时，需要

### 1.1.3 CPU时钟特点，功能

Properties	CPU 31xT-2 DP
类型	硬件时钟
出厂设定	DT#1994-01-01-00:00:00
保持时钟的方式	内部电容
系统断电，时钟保持时期	通常6个星期（环境温度40 °C）
系统上电以后，时钟的反应	当系统上电以后，系统时钟将保持连续工作状态直至系统断电
系统时钟在系统断电以后的反应	在系统再次上电以后，系统时钟将会恢复系统断电时刻的 TOD(time of day)状态，继续工作

## 1.2 CPU 31xT-2 DP 工艺技术数据

CPU and product version		
Order no.	6ES7 315-6TG10-0AB0	6ES7 317-6TJ10-0AB0
• Hardware version	01	02
• Firmware version (CPU)	V 2.3	V 2.3
• Firmware version (integrated technology)	V 3.1	V 3.1.1
• Corresponding programming package	STEP 7 V 5.3 + SP 1 or higher, plus the optional software package <i>S7-Technology V2.0</i>	STEP 7 V 5.3 + SP 1 or higher and the optional software package <i>S7-Technology V2.0</i>
Technology objects		
Total	32 (axes, cam disks, cams, measuring sensors, external encoders)	64 (axes, cam disks, cams, measuring sensors, external encoders)
Axes	8 axes (virtual or real)	32 axes (virtual or real)
Cams	16 cams (8 cams can be output as "high-speed" cams to the integrated outputs of the Technology CPU. Another 8 cams can be implemented using distributed I/O, such as ET 200M or ET 200S. TM15 and TM17 High Feature support high-speed cams.)	32 cams (8 cams can be output as "high-speed" cams to the integrated outputs of the Technology CPU. Another 24 cams can be implemented using distributed I/O, such as ET 200M or ET 200S. TM15 and TM17 High Feature support high-speed cams.)
Cam disks	16 cam disks	32 cam disks
Measuring sensor	8 measuring sensors	16 measuring sensors
External encoder	8 external encoders	16 external encoders
Memory		
Work memory		
• Integrated	128 KB	512 KB

• Expandable	No	No
Size of retentive memory for retentive DBs	Max. 128 KB	Max. 256 KB
Load memory	Plug-in MMC (max. 8 MB)	Plug-in MMC (max. 8 MB)
Backup medium	Safe backup by means of MMC (maintenance-free)	Safe backup by means of MMC (maintenance-free)
Data consistency on the MMC (after the last programming operation)	At least 10 years	At least 10 years
<b>Technical data</b>		
<b>Processing times</b>		
Processing times for		
• Bit instructions	normally 0.1 $\mu$ s	normally 0.05 $\mu$ s
• Word instructions	normally 0.2 $\mu$ s	normally 0.2 $\mu$ s
• Fixed-point mathematics	normally 2.0 $\mu$ s	normally 0.2 $\mu$ s
• Floating-point mathematics	normally 3.0 $\mu$ s	normally 1.0 $\mu$ s
<b>Timers/counters and their retentive characteristics</b>		
S7 counters	256	512
• Retentivity	Configurable	Configurable
• Default	From C 0 to C 7	From C 0 to C 7
• Counting range	0 to 999	0 to 999
IEC Counters	Yes	Yes
• Type	SFB	SFB
• Number	Unlimited (limited only by the size of work memory)	Unlimited (limited only by the size of work memory)
S7 timers	256	512
• Retentivity	Configurable	Configurable
• Default	Non-retentive	Non-retentive
• Timer range	10 ms to 9990 s	10 ms to 9990 s
IEC Timers	Yes	Yes
• Type	SFB	SFB
• Number	Unlimited (limited only by the size of work memory)	Unlimited (limited only by the size of work memory)
<b>Data areas and their retentive characteristics</b>		
Flags	2048 bytes	4096 bytes
• Retentivity	Configurable	Configurable
• Retentivity is default setting	MB 0 to MB 15	MB 0 to MB 15

Clock flags	8 (1 flag byte)	8 (1 flag byte)
Data blocks		
• Number	1023 (from DB 1 to DB 1023)	2047 (from DB 1 to DB 2047)
• Size	16 KB	64 KB
• Non-retain support (configurable retentivity)	Yes	Yes
Local data per priority class	Max. 1024 bytes	Max. 1024 bytes
<b>Technical data</b>		
<b>Blocks</b>		
Total	1024 (DBs, FCs, FBs) The maximum number of loadable blocks may be reduced by the size of the MMC you are using.	2048 (DBs, FCs, FBs) The maximum number of loadable blocks may be reduced by the size of the MMC you are using.
OBs	See the Instruction List	See the Instruction List
• Size	16 KB	64 KB
Nesting depth		
• per priority class	8	16
• additionally within an error OB	4	4
FBs	See the Instruction List	See the Instruction List
• Number	2048 (from FB 0 to FB 2047)	2048 (from FB 0 to FB 2047)
• Size	16 KB	64 KB
FCs	See the Instruction List	See the Instruction List
• Number	2048 (from FC 0 to FC 2047)	2048 (from FC 0 to FC 2047)
• Size	16 KB	64 KB
<b>Address areas (I/Os)</b>		
Total I/O address area	Max. 2048 bytes / 2048 bytes (can be freely addressed)	Max. 8192 bytes / 8192 bytes (can be freely addressed)
Of those are distributed I/O	Max. 2048 bytes	Max. 8192 bytes
I/O process image	128 byte / 128 bytes	256 byte / 256 bytes
Digital channels	16348/16348	65536/65536
Of those central	Max. 256	Max. 256
Analog channels	1024/1024	4096/4096
Of those central	64 / 64	64 / 64
<b>Address areas (I/O) of the integrated technology</b>		

Total I/O address area	Max. 1024 bytes / 1024 bytes (can be freely addressed)	Max. 1024 bytes / 1024 bytes (can be freely addressed)
I/O image DP(DRIVE)	64/64	64/64
<b>Configuration</b>		
Racks	1	1
Modules per rack	8	8
Number of DP masters		
• integrated	1	1
• by means of CP	2	2
Supported function modules and communication processors		
• FM	Max. 8	Max. 8
• CP (PtP)	Max. 8	Max. 8
• CP (LAN)	Max. 10	Max. 10
<b>Connection system</b>		
• Requisite front connector	1 x 40-pin	1 x 40-pin
<b>Technical data</b>		
<b>Time-of-day</b>		
Real-time clock	Yes (HW clock)	Yes (HW clock)
• Backup	Yes	Yes
• Backup period	Normally 6 weeks (at an ambient temperature of 40°C)	Normally 6 weeks (at an ambient temperature of 40°C)
• Accuracy	Deviation per day: < 10 s	Deviation per day: < 10 s
Operating hours counter	1	4
• Number	0	0 to 3
• Value range	2 <sup>31</sup> hours (when using SFC 101)	2 <sup>31</sup> hours (when using SFC 101)
• Resolution	1 hour	1 hour
• Retentive	Yes; has to be restarted at every system restart.	Yes; has to be restarted at every system restart.
Clock synchronization	Yes	Yes
• in the AS	Master / slave	Master / slave
• on MPI	Master / slave	Master / slave
<b>S7 message functions</b>		
Number of stations which can be logged on for message functions	16  (depends on the configured connections for PG / OP and S7 basic communication)	32  (depends on the configured connections for PG / OP and S7 basic communication)

Process diagnostic messages	Yes	Yes
• Simultaneously active interrupt S blocks	40	60
<b>Test and commissioning functions</b>		
Monitor/Modify Tags	Yes	Yes
• Tag	Inputs, outputs, flags, DBs, timers, counters	Inputs, outputs, flags, DBs, timers, counters
• Number of tags	30	30
Of those as monitor tag	Max. 30	Max. 30
Of those as modify tag	Max. 14	Max. 14
Forcing		
• Tag	Inputs / outputs	Inputs / outputs
• Number of tags	Max. 10	Max. 10
Monitor block	Yes	Yes
Single-step	Yes	Yes
Breakpoint	2	2
Diagnostic buffer	Yes	Yes
• Number of entries (not configurable)	Max. 100	Max. 100
<b>Technical data</b>		
<b>Communication functions</b>		
PG/OP communication	Yes	Yes
Global data communication	Yes	Yes
• Number of GD circuits	8	8
• Number of GD packets	Max. 8	Max. 8
Transmitters	Max. 8	Max. 8
Receivers	Max. 8	Max. 8
• Size of GD packets	Max. 22 bytes	Max. 22 bytes
Of those are consistent	22 bytes	22 bytes
S7 basic communication	Yes	Yes
• User data per job	Max. 76 bytes	Max. 76 bytes
Of those are consistent	76 bytes (with X_SEND or X_RCV) 76 bytes (with X_PUT or X_GET as server)	76 bytes (with X_SEND or X_RCV) 76 bytes (with X_PUT or X_GET as server)
S7 communication	Yes	Yes
• as server	Yes	Yes
• as client	Yes (by means of CP and loadable FBs)	Yes (by means of CP and loadable FBs)
• User data per job	Max. 180 bytes (with PUT/GET)	Max. 180 bytes (with PUT/GET)
Of those are consistent	64 bytes (as server)	160 bytes (as server)
S5-compatible communication	Yes (by means of CP and loadable FCs)	Yes (by means of CP and loadable FCs)



Number of connections	16	32
available for		
• PG communication		
Reserved (default)	1	1
Configurable	1 to 15	1 to 31
• OP communication		
Reserved (default)	1	1
Configurable	1 to 15	1 to 31
• S7 basic communication		
Reserved (default)	0	0
Configurable	0 to 12	0 to 30
Routing	Yes (max. 4)	Yes (max. 4)
<b>Interfaces</b>		
<b>1. Interface (X1)</b>		
Type of interface	Integrated RS485 interface	Integrated RS485 interface
Physics	RS485	RS485
Electrical isolation	Yes	Yes
Interface power supply (15 to 30 V DC)	Max. 200 mA	Max. 200 mA
<b>Technical data</b>		
<b>Functionality</b>		
• MPI	Yes	Yes
• PROFIBUS DP	Yes	Yes
• PROFIBUS DP(DRIVE)	No	No
• Point-to-point communication	No	No
<b>MPI</b>		
Services		
• PG/OP communication	Yes	Yes
• Routing	Yes	Yes
• Global data communication	Yes	Yes
• S7 basic communication	Yes	Yes
• S7 communication	Yes	Yes
as server	Yes	Yes
as client	Yes (by means of CP and loadable FBs)	Yes (by means of CP and loadable FBs)
• Transmission rates	Max. 12 Mbps	Max. 12 Mbps
<b>DP masters</b>		
Services		
• PG/OP communication	Yes	Yes
• Routing	Yes	Yes
• Global data communication	No	No

• S7 basic communication	No	No
• S7 communication	No	No
• Constant bus cycle time	Yes	Yes
• SYNC/FREEZE	Yes	Yes
• DPV1	Yes	Yes
Transmission speed	Up to 12 Mbps	Up to 12 Mbps
Number of DP slaves	124	124
Address range per DP slave	Max. 244 bytes	Max. 244 bytes
<b>DP slave</b>		
Services		
• Routing	Yes	Yes
• Global data communication	No	No
• S7 basic communication	No	No
• S7 communication	No	No
• Direct data exchange	Yes	Yes
• Transmission rates	Up to 12 Mbps	Up to 12 Mbps
• Automatic baud rate detection	No	No
• Transfer memory	244 bytes I / 244 bytes Q	244 bytes I / 244 bytes Q
• Address areas	Max. 32, each with max. 32 bytes	Max. 32, each with max. 32 bytes
• DPV1	No	No
<b>Technical data</b>		
<b>2. Interface (X3)</b>		
Type of interface	Integrated RS485 interface	Integrated RS485 interface
Physics	RS485	RS485
Electrical isolation	Yes	Yes
Type of interface	Integrated RS485 interface	Integrated RS485 interface
Interface power supply (15 to 30 V DC)	Max. 200 mA	Max. 200 mA
<b>Functionality</b>		
MPI	No	No
PROFIBUS DP	No	No
PROFIBUS DP(DRIVE)	Yes	Yes
Point-to-point communication	No	No
<b>DP(DRIVE) master</b>		
Services		
• PG/OP communication	No	No
• Routing	No	No
• Global data communication	No	No
• S7 basic communication	No	No
• S7 communication	No	No

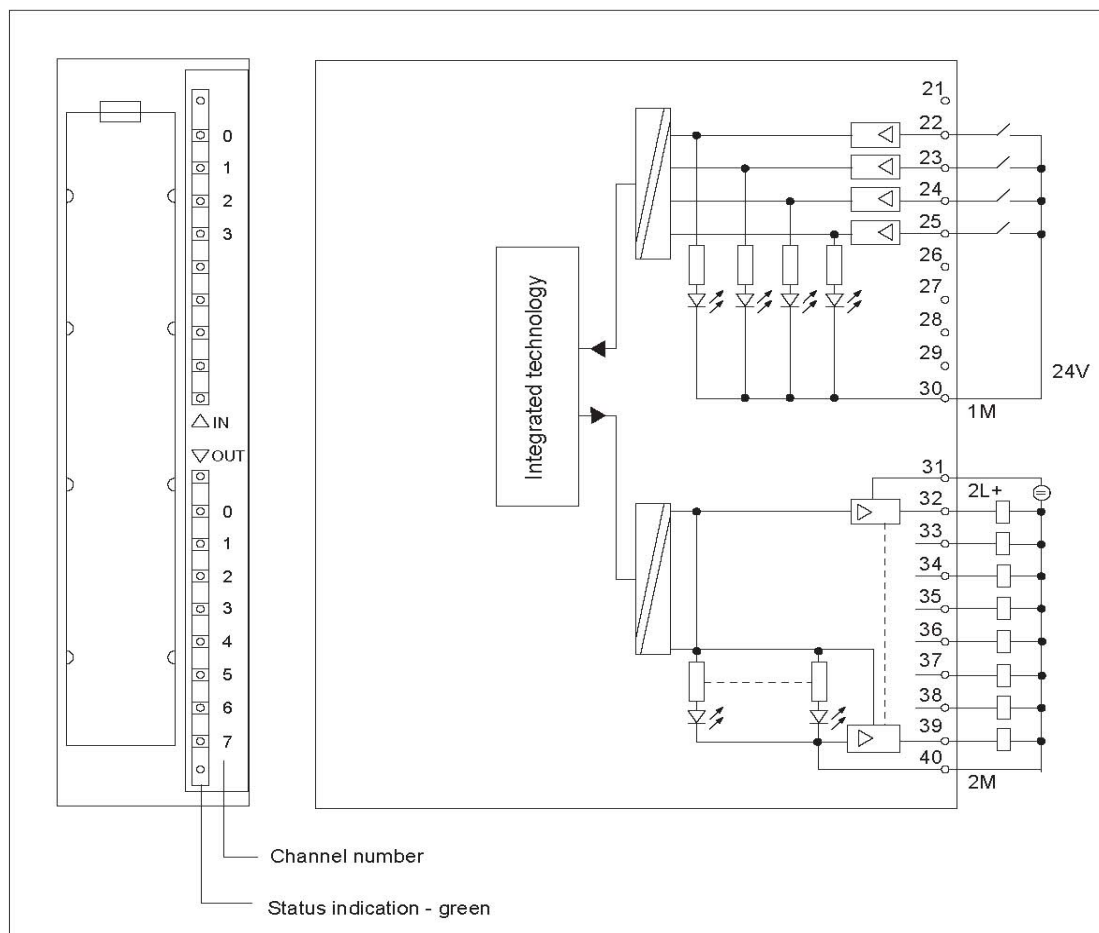
• Constant bus cycle time	Yes	Yes
• SYNC/FREEZE	No	No
• DPV1	No	No
Transmission speed	Up to 12 Mbps	Up to 12 Mbps
Number of DP slaves	32	32
Address range per station	Max. 244 bytes	Max. 244 bytes
<b>DP slave</b>	<b>No</b>	<b>No</b>
<b>Programming</b>		
Programming language	LAD/FBD/STL	LAD/FBD/STL
Instructions database	See the Instruction List	See the Instruction List
Nesting levels	8	8
System functions (SFCs)	See the Instruction List	See the Instruction List
System function blocks (SFBs)	See the Instruction List	See the Instruction List
User program security	Yes	Yes
<b>Dimensions</b>		
Mounting dimensions W × H × D (mm)	160 × 125 × 130	160 × 125 × 130
Weight	750 g	750 g
<b>Technical data</b>		
<b>Voltages, currents</b>		
Power supply (rated value)	24 V DC	24 V DC
• Permissible range	20.4 V to 28.8 V	20.4 V to 28.8 V
Current consumption (no-load)	normally 200 mA	normally 200 mA
Inrush current	normally 2.5A	normally 2.5A
I <sup>t</sup>	1 A <sup>2</sup> s	1 A <sup>2</sup> s
External fusing of supply lines (recommendation)	min. 2 A	min. 2 A
Power losses	normally 6 W	normally 6 W

## 1.3 集成运动控制功能的 I/O

### 1.3.1 配置集成运动控制功能的 I/O

#### 介绍

CPU 31xT-2 DP 集成了4个数字量输入点、8个数字量输出点。用户可以使用这些集成的I/O点处理运动控制工艺，例如，通过接近开关(BERO)寻找设备的原点，或者利用数字量输出点作为快速凸轮开关的输出信号。



### 1.3.2 集成数字量输入点的技术工艺数据

介绍:

集成数字量输入点，被设计为处理运动控制功能，例如，通过接近开关(BERO)寻找设备的原点。当然，也可以利用STEP 7中的功能块 FB "MC\_ReadPeriphery"，得到输入点的状态，应用于普通的PLC逻辑控制应用程序中。

Technical data of the integrated technology inputs <b>Technical data</b>	
<b>Module-specific data</b>	<b>Digital inputs</b>
Number of inputs	4
• of those available for technological functions	4
Cable length	
• unshielded	600 m
• shielded	1000 m
<b>Voltage, currents, potentials</b>	

Rated load voltage L+	24 V DC
• Polarity reversal protection	No
Number of simultaneously controllable inputs	
• horizontal assembly	
up to 40 °C	4
up to 60 °C	4
• vertical assembly	
up to 40 °C	4
Electrical isolation	
• between channels and backplane bus	Yes
Permissible potential difference	
• between different circuits	75 V DC / 60 V AC
Insulation test voltage	500 V DC
Current consumption	
• from load voltage L+ (no-load)	0 mA
<b>Status, interrupts, diagnostics</b>	
Status display	1 green LED per channel
Interrupts	No
Diagnostic functions	No
<b>Technical data</b>	
<b>Encoder selection data</b>	
Input voltage	
• Rated value	24 V DC
• logical "1" signal	15 V to 30 V
• logical "0" signal	-3 V to 5 V
Input current	
• with logical "1" signal	normally 7 mA
Input delay	
• "0" to "1" transition	normally 10 µs
• "1" to "0" transition	normally 10 µs
Input characteristic	to IEC 1131, Type 1
Connection of 2-wire BEROs	No

### 1.3.3 集成数字量输出点的技术工艺数据

介绍:

集成数字量输入点，被设计为处理运动控制功能，例如，利用数字量输出点作为快速凸轮开关的输出信号。当然，也可以利用STEP 7中的功能块 FB "MC\_WritePeriphery"，

得到输出点的状态，应用于普通的PLC逻辑控制应用程序中。

Technical data of the integrated technology outputs <b>Technical data</b>	
<b>Module-specific data</b>	<b>Digital outputs</b>
Number of outputs	8
Cable length	
• unshielded	Max. 600 m
• shielded	Max. 1,000 m
<b>Voltage, currents, potentials</b>	
Rated load voltage L+	24 V DC
• Polarity reversal protection	No
Accumulated current of outputs (per group)	
• horizontal assembly	
up to 40 °C	max. 4.0 A
up to 60 °C	max. 3.0 A
• vertical assembly	
up to 40 °C	max. 3.0 A
<b>Technical data</b>	
<b>Electrical isolation</b>	
• between channels and backplane bus	Yes
Permissible potential difference	
• between different circuits	75 V DC / 60 V AC
Insulation test voltage	500 V DC
Current consumption	
• from load voltage L+ (no-load)	Max. 100 mA
<b>Status, interrupts, diagnostics</b>	
Status display	1 green LED per channel
Interrupts	No
Diagnostic functions	No
<b>Data for the selection of an actuator for standard DO</b>	
Output voltage	
• with logical "0" signal	Max. 3 V
• with logical "1" signal	min. (2 L+) - 2.5 V
Output current	
• with logical "1" signal	
Rated value	0.5 A
Permissible range	5 mA to 0.6 A
• with logical "0" signal (quiescent current)	Max. 0.3 mA
Load impedance range	48 Ω to 4 kΩ

Lamp load	Max. 5 W
Parallel wiring of 2 outputs	
• for redundant load control	Not possible
• for performance increase	Not possible
Control of a digital input	Not possible
Signal frequency	
• with resistive load	Max. 100 Hz
• with inductive load to IEC 947-5, DC13	Max. 0.2 Hz
• with lamp load	Max. 100 Hz
Inductive shutdown voltage limited internally to	normally (2 L+) - 48 V
Short-circuit protection of the output	Yes, electronic
• Response threshold	normally 1 A
High-speed cams	
• Switching accuracy	+/- 70 $\mu$ s

## 2. CPU 31xT-2 DP 订货信息

# 2

### 2.1 CPU 31xT-2 DP 硬件和编辑软件

SIMATIC Technology CPU / software 订货号信息:

Function	Product	Order number
SIMATIC Technology CPU	CPU 315T-2DP	6ES7315-6TG10-0AB0
SIMATIC Technology CPU	CPU 317T-2DP	6ES7317-6TJ10-0AB0
Micro Memory Card	MMC 4 MB (or more)	6ES7953-8LM11-0AA0
需要的前连接器	1 x 40-pin	6ES7 392-1AM00-0AA0 或者 6ES7 392-1BM01-0AA0
Optional "S7-Technology" software package	SIMATIC S7 Technology V3.0	6ES7864-1CC30-0YX0
STEP 7	STEP 7 V5.3 + SP3	6ES7810-4CC07-0Yxx

另外，除了可以使用软件选件包“S7-Technology”提供的“表格”、“多项式”的方式编辑凸轮盘，用户还可以选择如下软件提供的“图形化凸轮编辑器”进行编辑凸轮盘：

Function	Product	Order number
SCOUT CamTool	SCOUT CamTool V2.1	6AU1810-0FA21-0XA0



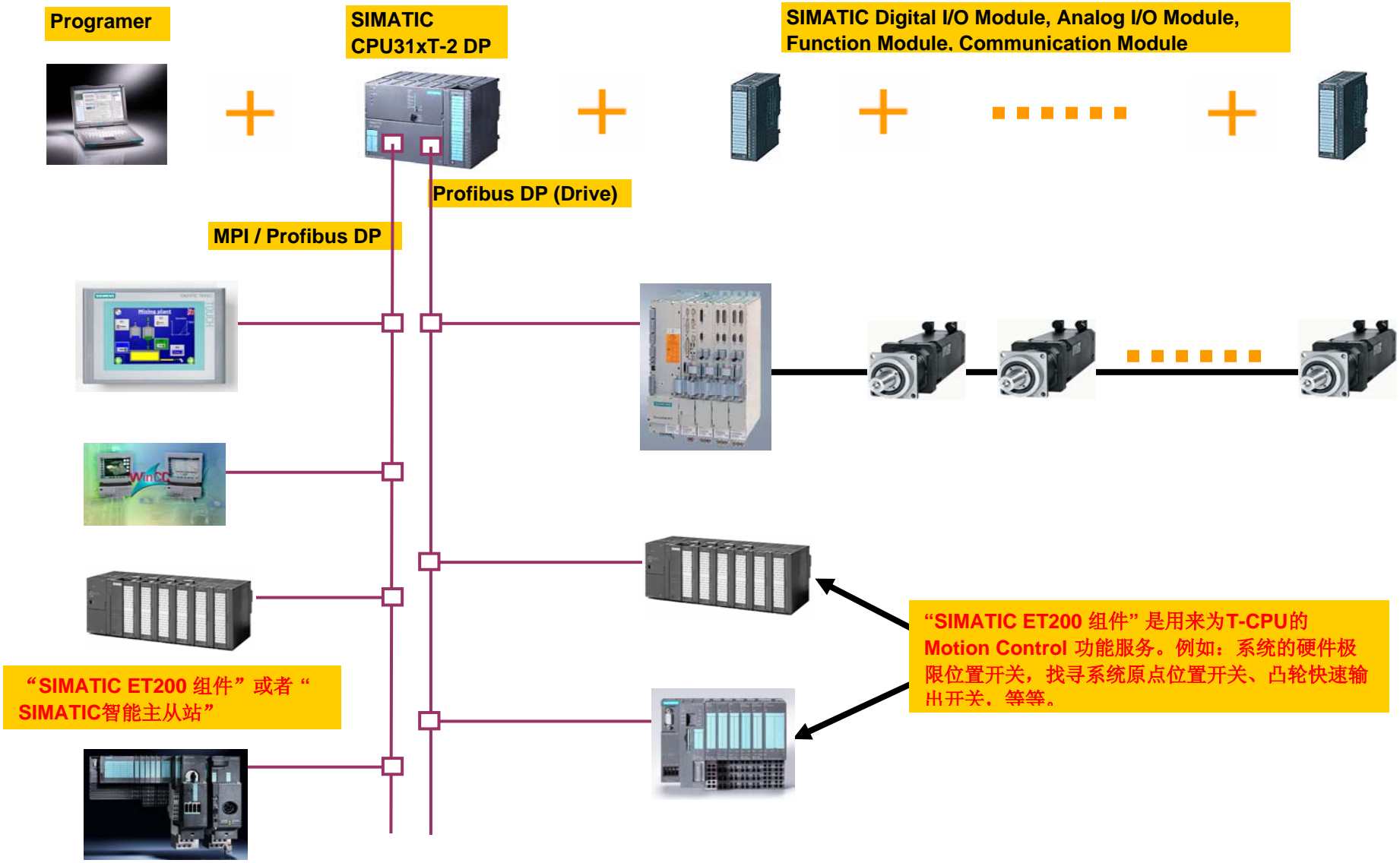
## 2.2 在PROFIBUS DP (Driver) 可以选择的组件订货号信息

Product	Order number
<b>SIMODRIVE</b>	
SIMODRIVE 611 universal	6SN1118-XNH00-0AAx
SIMODRIVE 611 universal HR	6SN1114-0NBOX-0AAx
Optional module Motion Control with PROFIBUS DP (for SIMODRIVE 611U)	6SN1114-0NB01-0AA1
SIMODRIVE POSMO CA	6SN2703-3AAx
SIMODRIVE POSMO CD	6SN2703-2AAx
SIMODRIVE POSMO SI	6SN24x
SIMODRIVE sensor single-turn / synchro-flange	6FX2001-5FP12
SIMODRIVE sensor, single-turn / clamping flange	6FX2001-5QP12
SIMODRIVE sensor multi-turn / synchro-flange	6FX2001-5FP24
SIMODRIVE sensor multi-turn / clamping flange	6FX2001-5QP24
<b>MICROMASTER 4</b>	
COMBIMASTER 411	6SE6401-0PB00-0AA0
MICROMASTER 420	6SE6400-1PB00-0AA0
MICROMASTER 430	6SE6400-1PB00-0AA0
MICROMASTER 440	6SE6400-1PB00-0AA0
<b>MASTERDRIVES with communication module CBP2</b>	
Motion Control	6SE7090-0XX84-0FF5
Motion Control Plus	6SE7090-0XX84-0FF5
Vector Control CUVC	6SE7090-0XX84-0FF5
Vector Control Plus	6SE7090-0XX84-0FF5
Note the order number suffix "Gxx" for communication module CBP2 when placing your order.	
<b>SINAMICS</b>	
SINAMICS S120 (firmware up to V2.3x)	6SL3040-0MA00-0AAx
Terminal Module TM15 *	6SL3055-0AA00-3FA0
Terminal Module TM17 High Feature *	6SL3055-0AA00-3HA0
<b>Interface Module</b>	
ADI 4 Module	6FC5211-0BA01-0AA2
IM 174 Module	6ES7174-0AA00-0AA0
Connection between IM 174 and SIMODRIVE 611-A ±10 V	6FX2002-3AD01-xxxx (Last 4 number based on actual cable Length)
Connection between IM 174 and four stepper drives	6FX2002-3AE00- xxxx (Last 4 number based on actual cable Length)

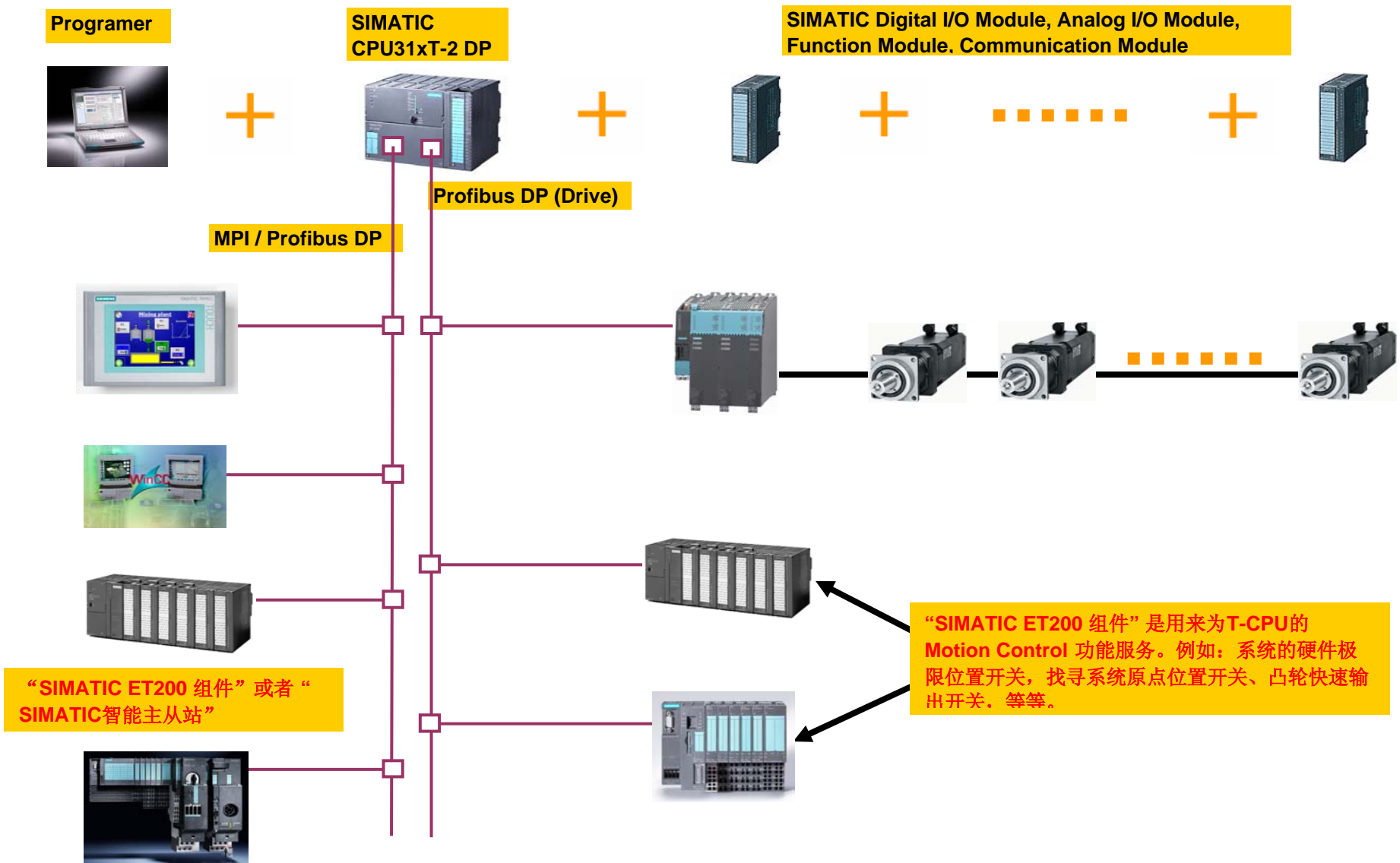
Connection between Incremental position encoder with RS422 and IM 174 (EXE with linear scale)	6FX8002-2CD01- xxxx (Last 4 number based on actual cable Length)
Connection between ROD 320 encoder with 1FT5 motor and IM 174	6FX8002-2CE02- xxxx (Last 4 number based on actual cable Length)
Connection between absolute encoder (SSI) and IM 174	6FX8002-2CC11- xxxx (Last 4 number based on actual cable Length)
Connection between SIMODRIVE 611-A controller plug-in 1FK6 motors with resolver encoder and IM 174	6FX8002-2CJ00- xxxx (Last 4 number based on actual cable Length)
<b>SIMATIC ET 200M **</b>	
IM 153-2 High Feature	6ES7153-2BA00-0XB0
SM 331 AI8x14Bit	6ES7331-7HF00-0AB0
SM 331 AI8x14Bit	6ES7331-7HF01-0AB0
SM 332 AO4x16Bit	6ES7332-7ND01-0AB0
SM 332 AO4x16Bit	6ES7332-7ND02-0AB0
SM 321 DI16xDC24V	6ES7321-1BH10-0AA0
SM 321 DI16xDC24V, Alarm	6ES7321-7BH01-0AB0
SM 322 DO16xDC24V/0,5A	6ES7322-1BH10-0AA0
<b>SIMATIC ET 200S **</b>	
IM 151-1 High Feature	6ES7151-1BA00-0AB0
2AI I 2WIRE HS	6ES7134-4GB51-0AB0
2AI I 4WIRE HS	6ES7134-4GB61-0AB0
2AI U HS	6ES7134-4FB51-0AB0
2AO I HF	6ES7135-4MB01-0AB0
2AO U HF	6ES7135-4LB01-0AB0
2DI DC24V HF	6ES7131-4BB00-0AB0
4DI UC24..48V	6ES7131-4CD00-0AB0
4DI DC24 HF	6ES7131-4BD00-0AB0
2DO DC24V/0,5A HF	6ES7132-4BB00-0AB0
2DO DC24V/2A HF	6ES7132-4BB30-0AB0
4DO DC24V/0,5A ST	6ES7132-4BD00-0AA0

### **3. CPU 31xT-2 DP 典型硬件配置形式**

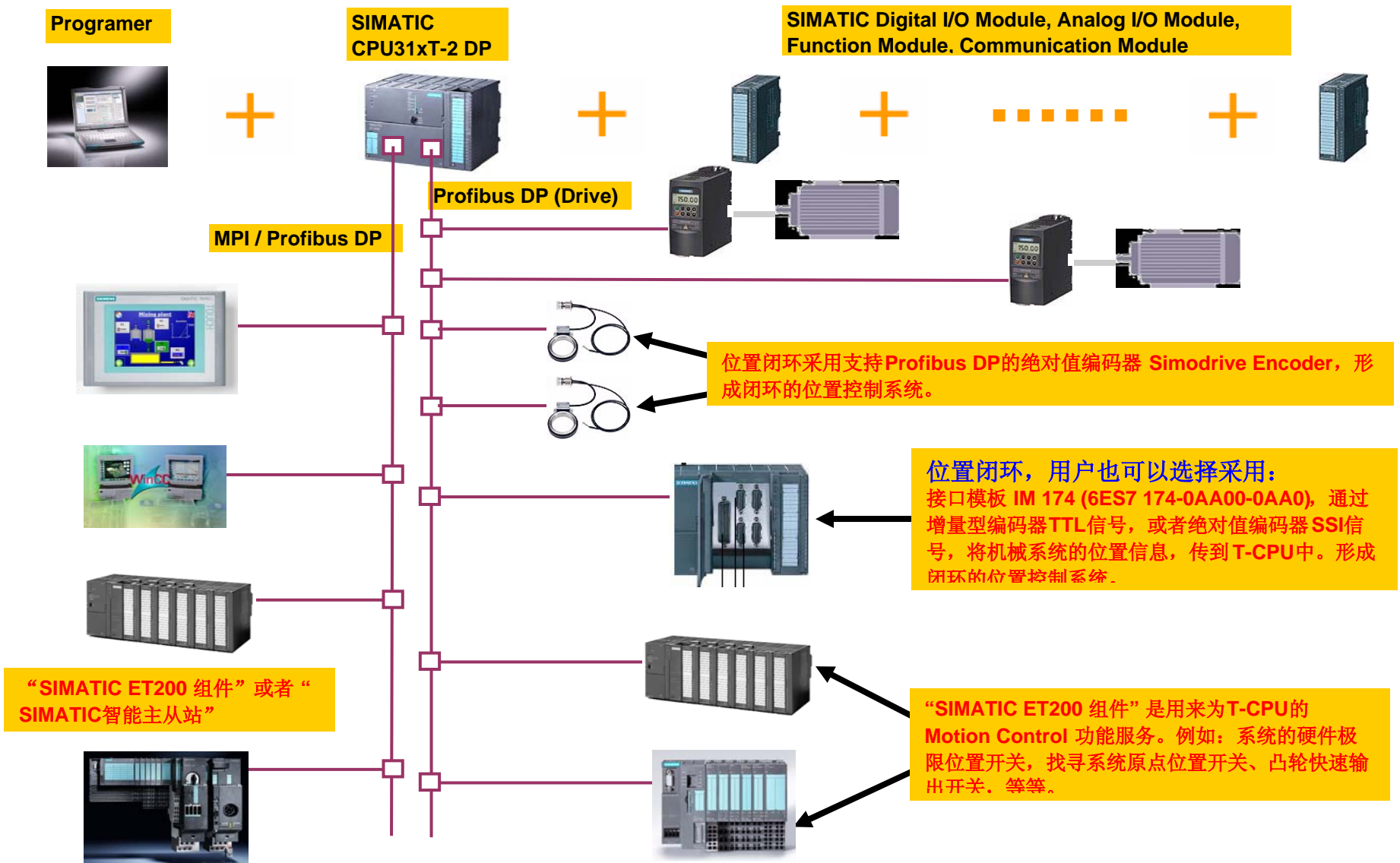
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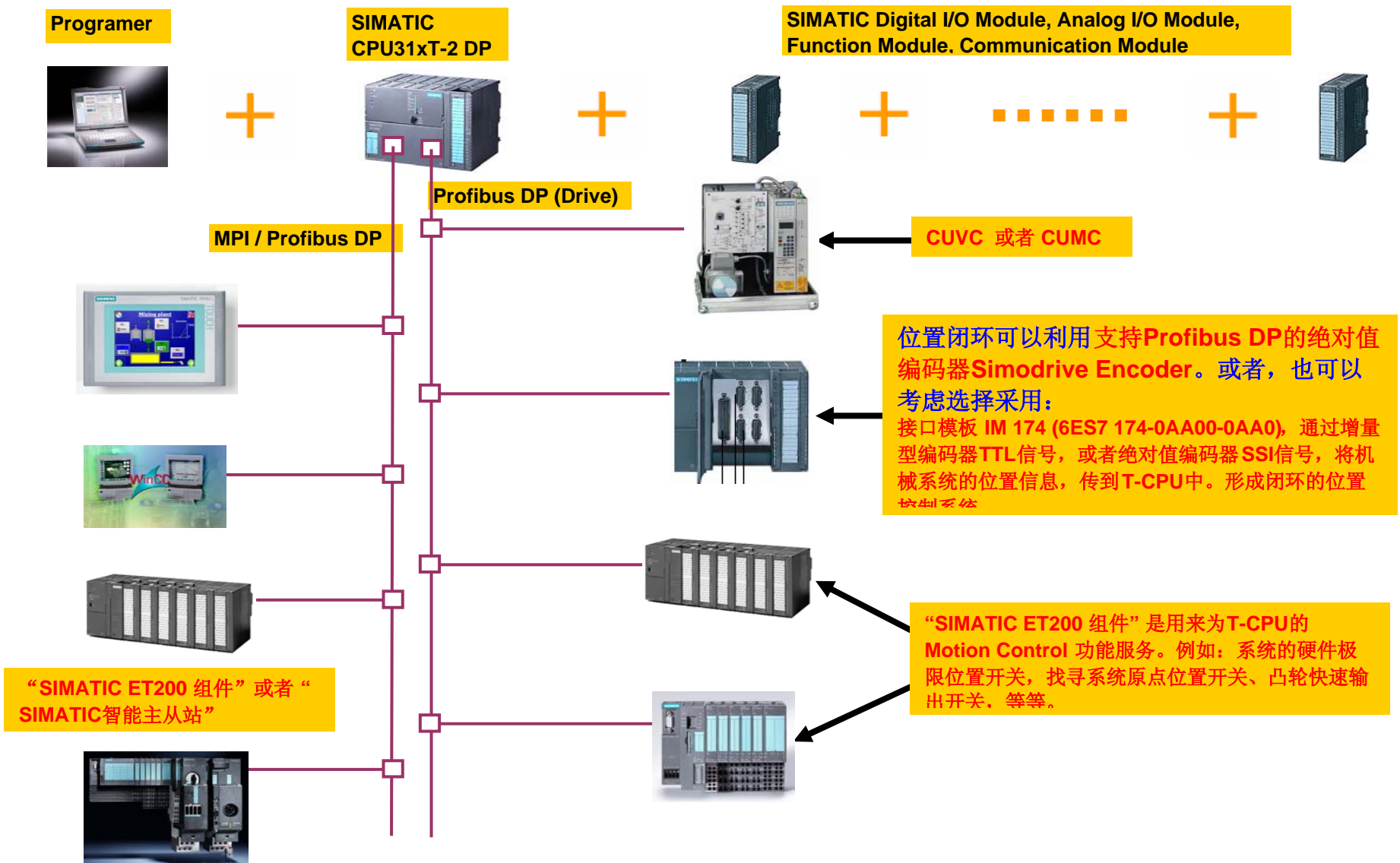
Connect with SIMODRIVE - 611U



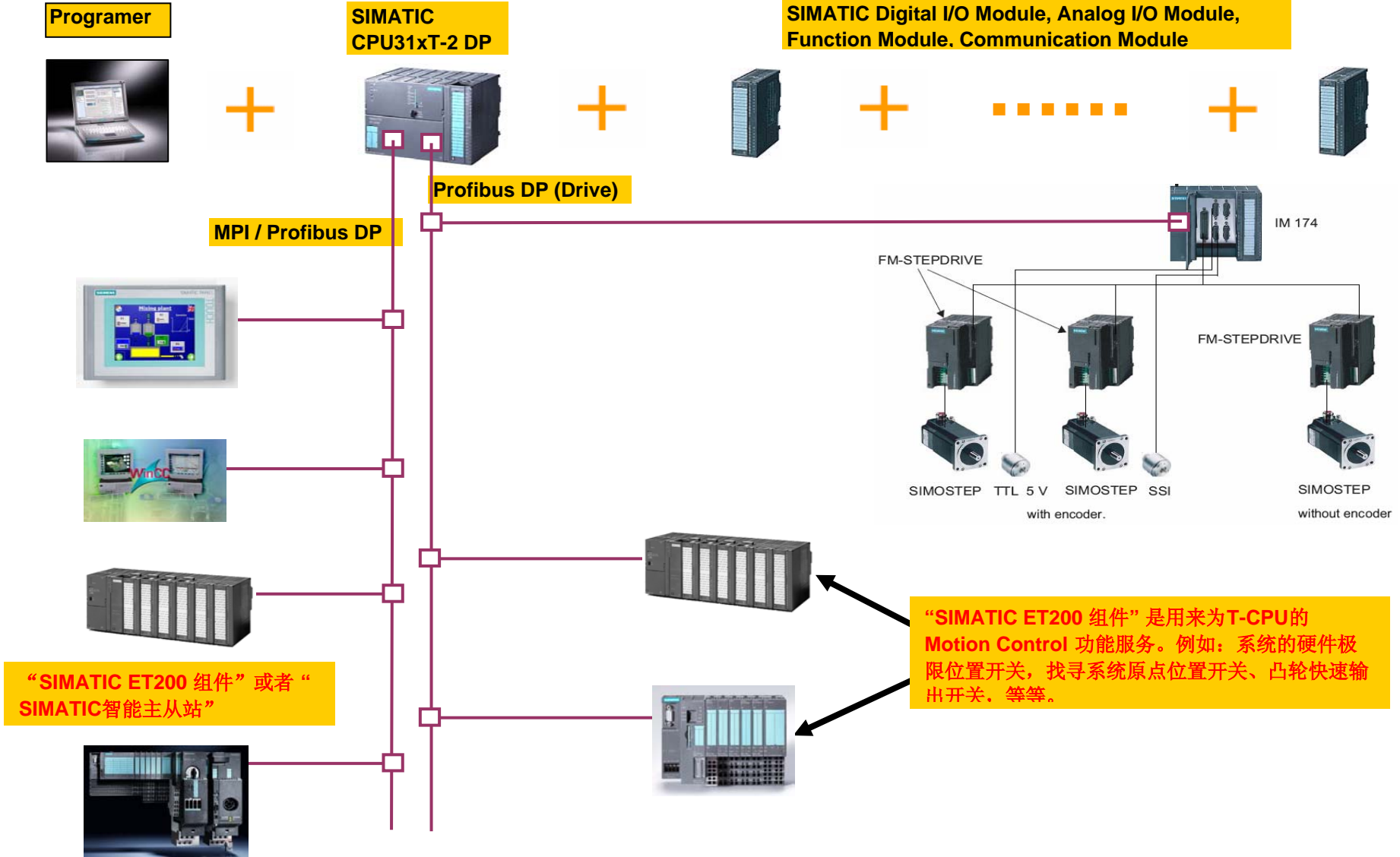
Connect with SINAMICS S120



Connect with SD

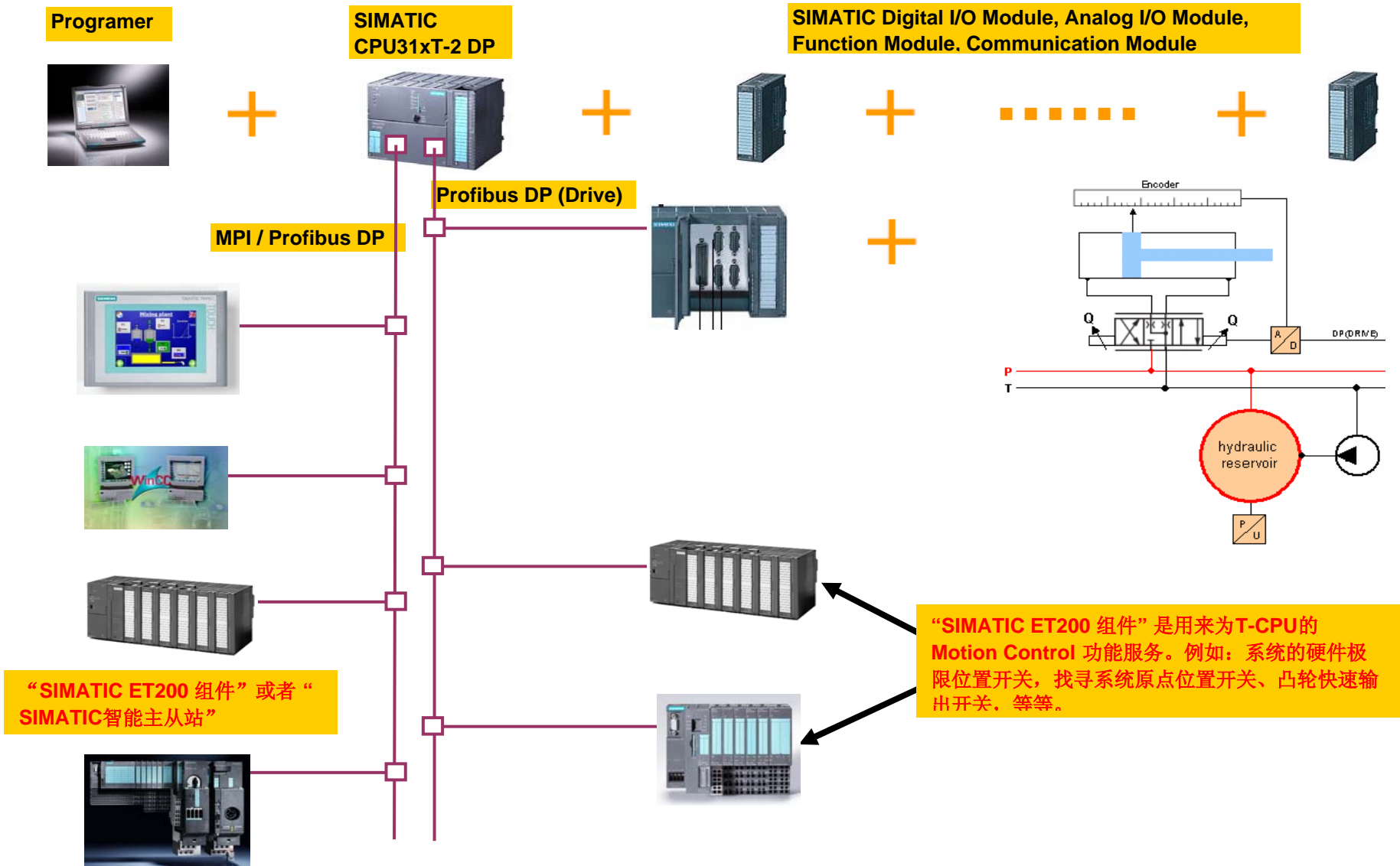


Connect with CUMC or CUVC

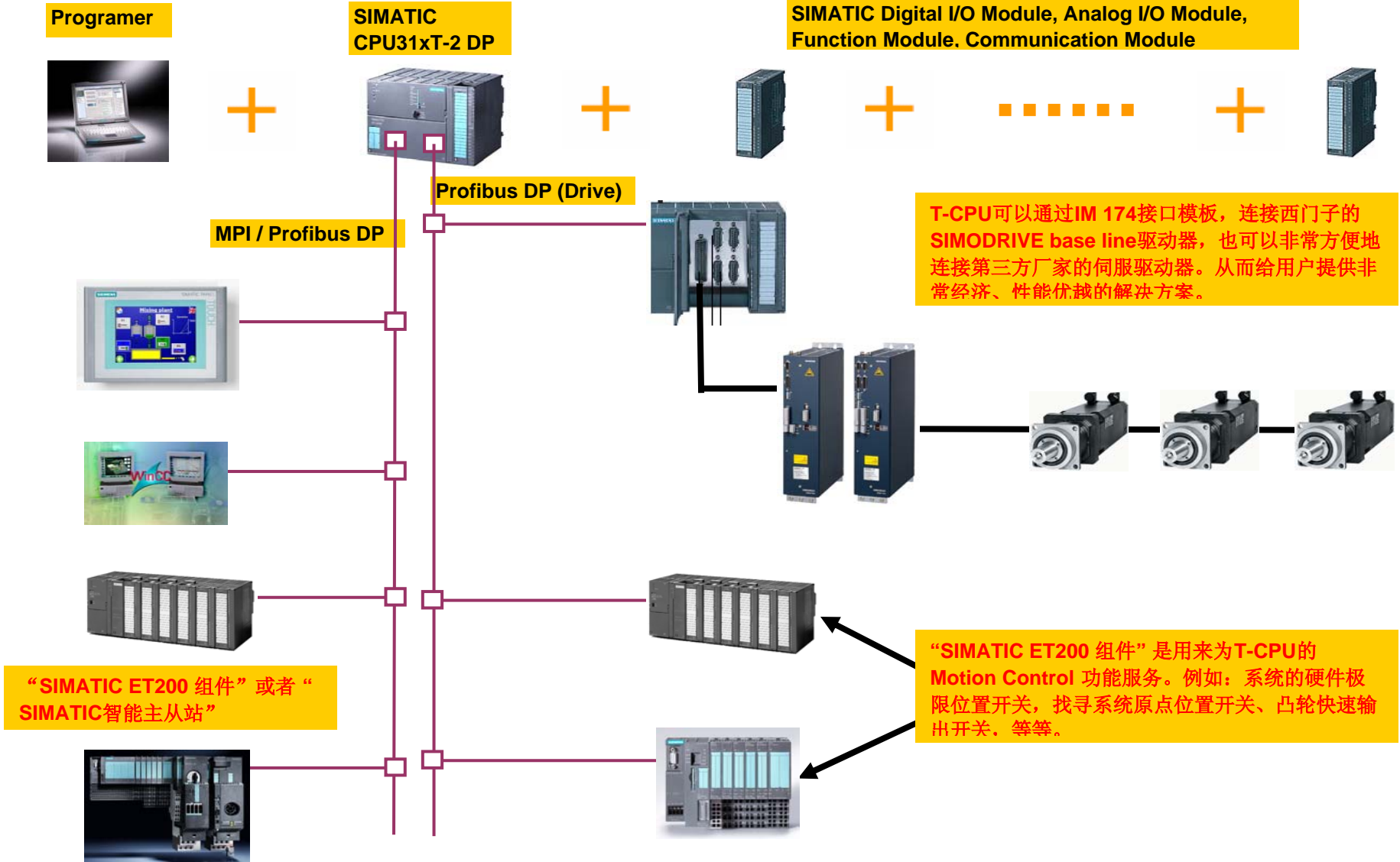


Connect with Stepping Motor





Connect with Hydraulic Axis



Connect with Third party drive