X Series Cobot Profinet Device Interface Operation Manual

V2.0

Guangzhou Auctech Automation Technology Ltd

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Content

1.Profinet device interface configuration

1.1 Interface description

Refer to the XCORE Hardware Manual for hardware interface descriptions.

The Profinet data interaction period is 8ms.

1.2 Script functions

The robot provides corresponding script functions that can read or write the values of the data interface.

write_reg(number:num,number:type,val)

Function description:

This function modifies the value of the internal register.

Parameter description:

num: indicates the number of an internal register.

type: indicates that the register type 1 is a bool register, 2 is a word register, and 3 is a float register.

val: Specifies the val type based on the type type.

When type is 1, the val type is boolean,true is true, false is false, and num ranges from 1 to 64

When type is 2, the val type is number, the value ranges from 0 to 65535, and the value ranges from 1 to 32

When type is 3, the val type is number and num ranges from 1 to 32

The function does not change the internal register value when the argument is wrong.

Return value:

None

Example:

write_reg(5, 1,true)

read_reg (number:num,number:type,number:in_out)

Function description:

This function reads the value of the internal register.

Parameter description:

num: internal bool Register number.

type: indicates that the register type 1 is a bool register, 2 is a word register, and 3 is a float register.

When type is 1, num ranges from 1 to 64.

When type is 2, num ranges from 1 to 32.

When type is 3, num ranges from 1 to 32.

The function does not change the internal register value when the argument is wrong.

in_out: 0 indicates that the input register is read, 1 indicates that the output register is read.

Return value:

When type is 1, the return value type is boolean, where true indicates true and false indicates false.

When type is 2, the return value is of type number and ranges from 0 to 65535.

When type is 3, the return value type is number.

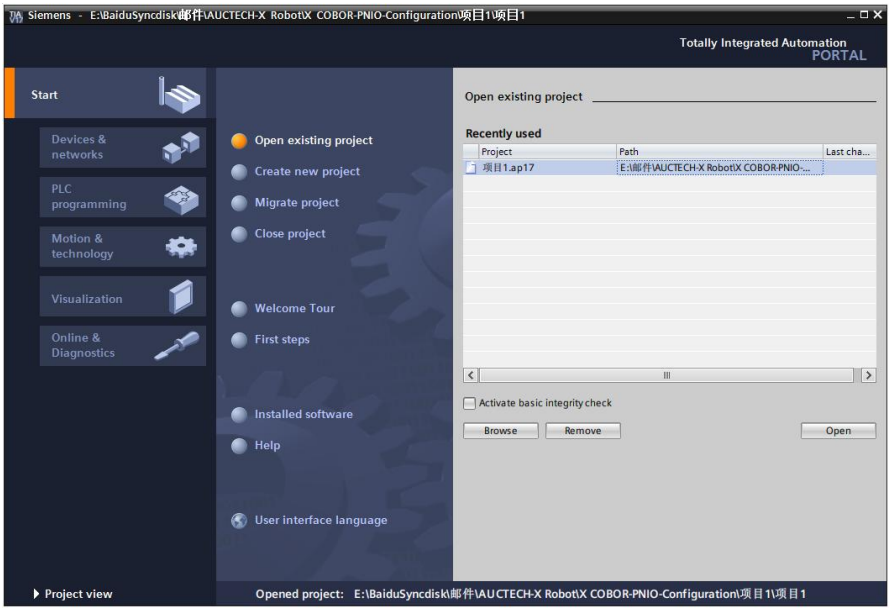
Example:

Ret = read_reg,1,1 (10)

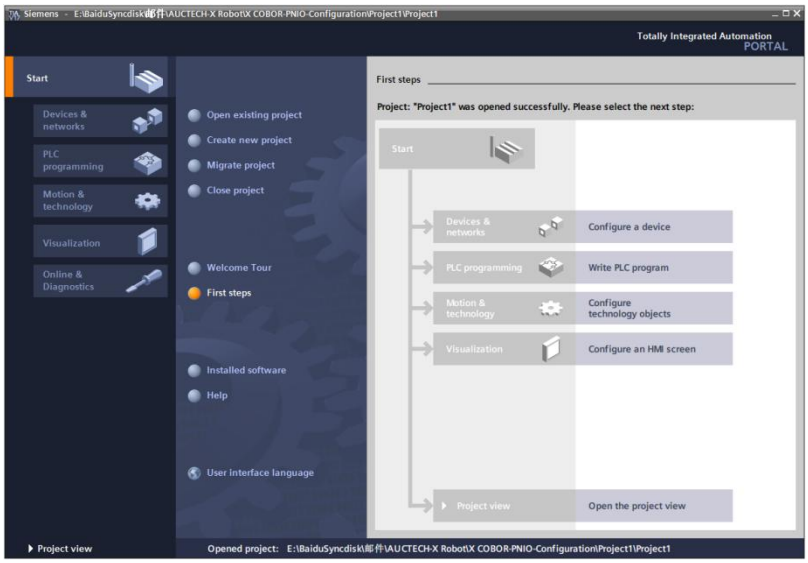
1.3 Configuration flow

The following takes Siemens PLC as an example and uses TIA 14 software to briefly describe the configuration process of Profinet interface:

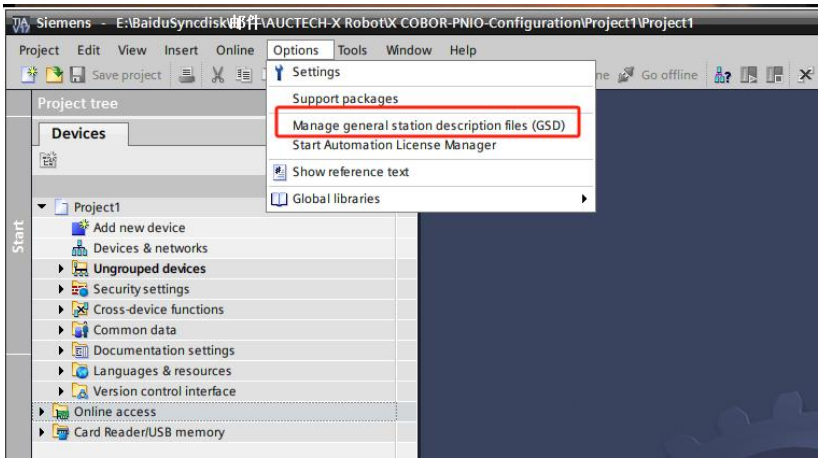
If you want to create a new project, click Create New Project. If you want to open an existing project, click Open Existing Project:



Click Open Project View:



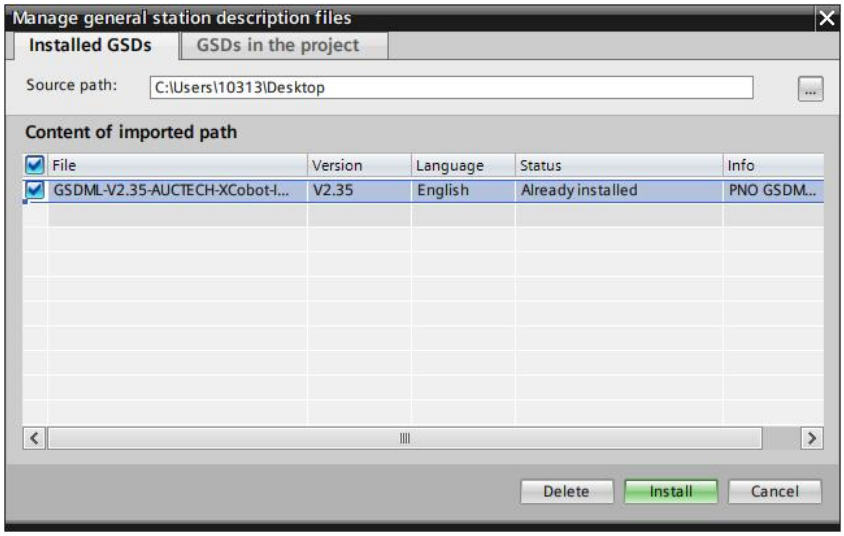
Click “Install Device Description File (GSD)” in menu bar “Options” :



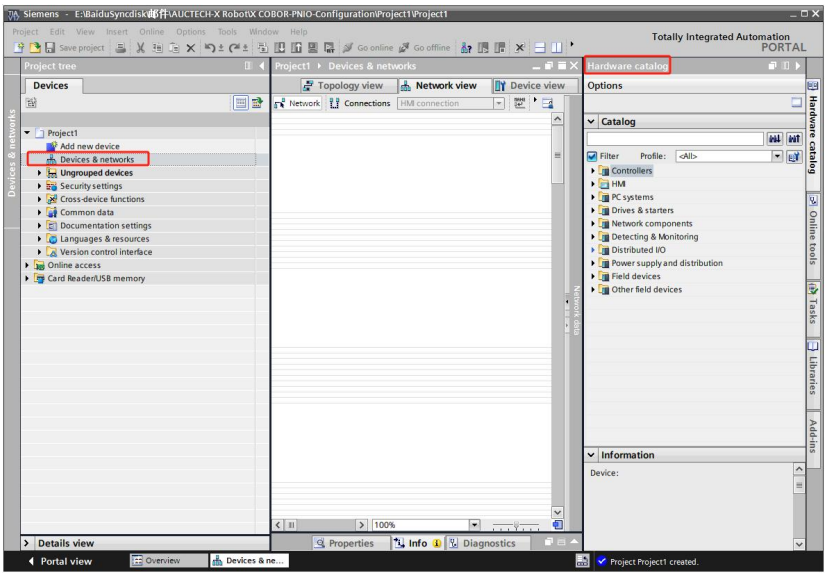
Select the path to the GSD file by clicking button 1 in the order of the following figure.

Select the two checkboxes to import GSDML-V2.35-AUCTECH XCobot-

IODevice-20200615.xml file, and finally click “Install” at 3.



Double-click “Devices and Networks” and select “Hardware Catalog” in the leftmost column:

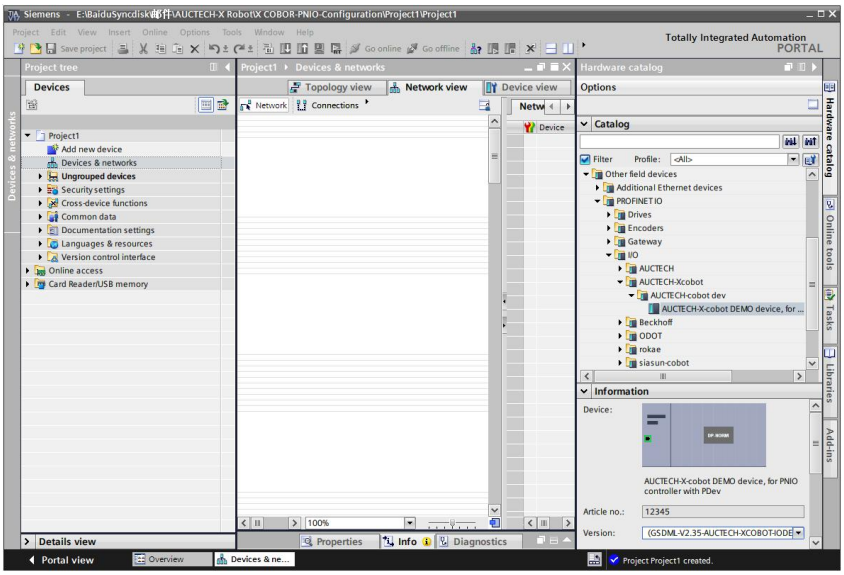


Double-click Other Field Devices ->PROFINET

IO->I/O->AUCTECH-Xcobot dev

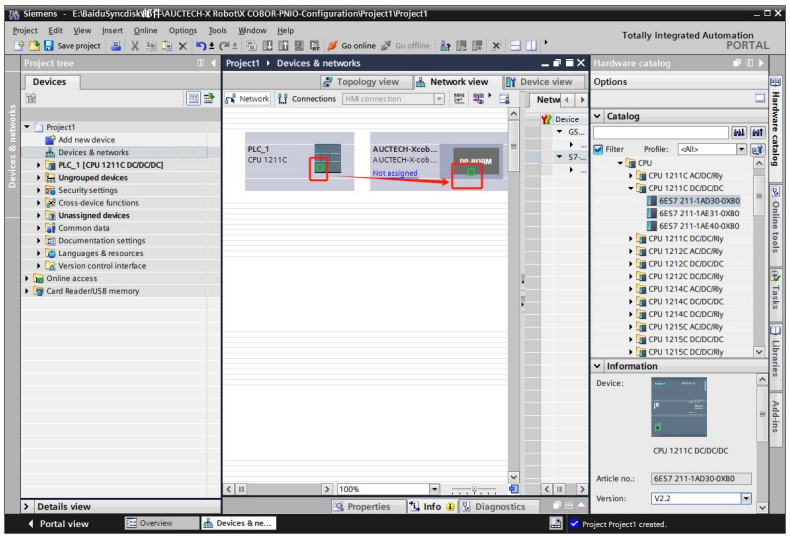
“AUCTECH-Xcobot dev”, note that the version is just loaded

GSDML V2.35 – AUCTECH XCobot - IODevice - 20230615. The XML



As a Profinet Device, the configuration also requires the controller, which is shown in the figure above

Add the CPU1211C DC/DC/DC as the controller in the same way. Left-click center The green box of one device does not loosen and then drag to the green box of another device to realize the device connection



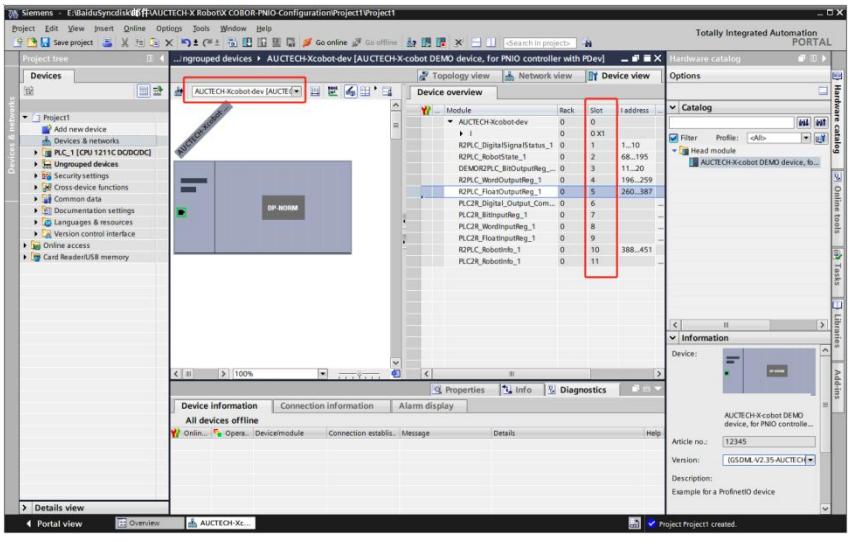
Select a device and choose Properties >PROFINET Interface > Ethernet Address

Select Set IP address in the project, enter IP address and subnet mask, and add A device is configured in the same way.

On the AUCTECH-Xcobot dev device, choose Properties >PROFINET Interface > Advanced Options > Real-time Settings >IO Cycle and select Manual Settings. The refresh time is 8ms

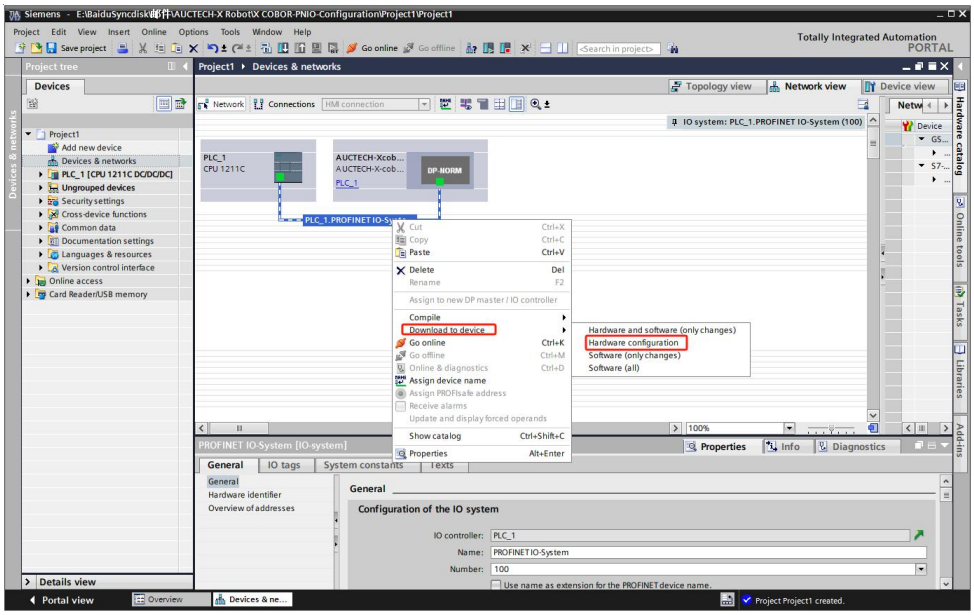
Click Device View.

Select the “AUCTECH-Xcobot dev” device, double-click on different variable types of “Module” in different numbered slots to add modules:



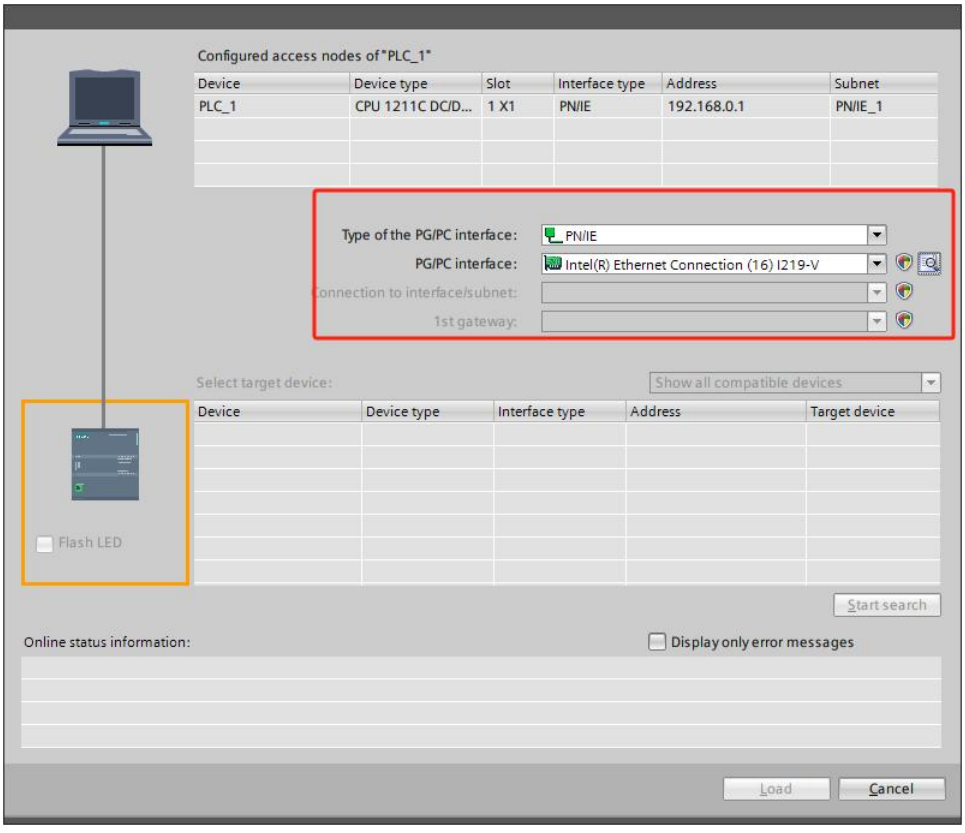
The data type of each slot is shown in the following figure. For details, see below:

After adding, right-click controller, which is CPU1211C, and select “Download to Hardware Configuration for Device

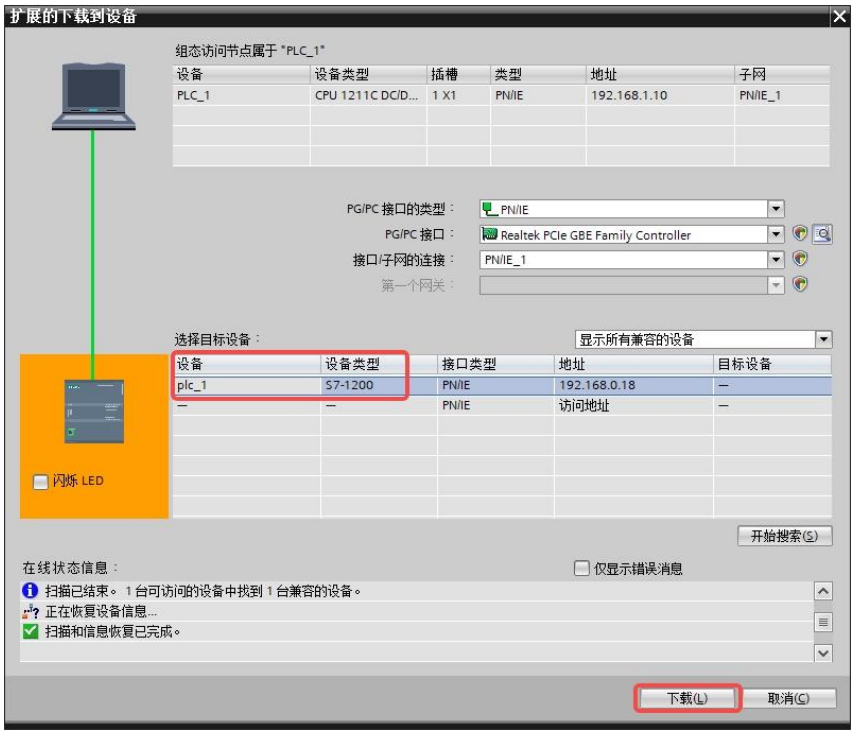


Select PG/PC Interface Type, PG/PC Interface, and Interface/Subnet Connection

Then click “Start Search” (Note: The configuration computer running TIA needs to be connected with controller devices can be connected, for example, in the same network segment.)



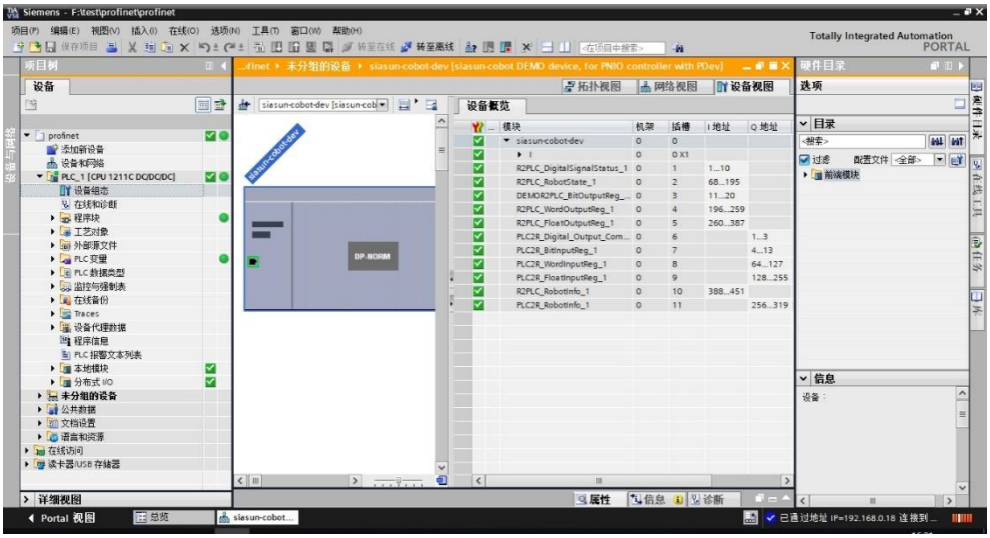
Select the controller device found (CPU 1121C in this case) and click Download:



Everything is fine, click “Download” and wait for the download to complete:

Click Finish and wait for startup:

Click Go Online. If there are no errors in the Diagnosis TAB, communication is normal.



Communication under normal conditions, all modules are “white checkmark on green background”

2. Slot data structure

Note: The data of each slot, the data of WORD and FLOAT type, has been converted to bytes. That is, it is converted to the low and high bytes and the high and low bytes.

Slot1_R2PLC_DigitalSignalStatus (10 byte): robot digital signal status data direction: Robot – PLC

	bit0	bit1	bit2	bit3	bit4	bit5	bit6	bit7
BYTE1	general_digital_input[0..7]							
BYTE2	general_digital_input[8..15]							
BYTE3	tool_digitial_input[0..7]							
BYTE4	general_digital_output[0..7]							
BYTE5	general_digital_output[8..15]							
BYTE6	tool_digital_output[0..7]							
BYTE7	fun_digital_input[0..7]							
BYTE8	fun_digital_output[0..7]							
BYTE9	safety_state_input							
BYTE10	safety_state_output							

See the XCORE Hardware Manual for terminal definitions

general_digital_input: general DI status of the control cabinet.

tool_digital_input: DI state of the end of a robotic arm

general_digital_output: general DO status of the control cabinet

tool_digital_output: DO status of the end of the manipulator

fun_digital_input: function DI status of the control cabinet

fun_digital_output: indicates the DO status of the control cabinet function

Security controller status safety_state Structure description

	safety_state_1	safety_state_2
bit0	ystem_emergency_stop	config_safety_output0
bit1	external_emergeny_stop	config_safety_output1
bit2	protective_stop_input	reserved
bit3	operation_mode_input	reserved
bit4	3_position_enable_input	reserved
bit5	config_safety_input0	reserved
bit6	config_safety_input1	reserved
bit7	reserved	reserved

config_safety_input: security input set by the interface

config_safety_output: security output set by the interface

Slot2_R2PLC_RobotState(29 float): robot status information output data direction: robot – PLC

Float1..7	joint_pos（rad）
Float8..13	tcp_pose(tcp relative to the base coordinate system)
Float14..19	tcp_force
Float20..25	tcp_offset
Float26..29	tcp_load (Center of mass,mass)

Slot3_R2PLC_BitOutputReg (10 byte): bit output register, output the current bit register status information of the robot data direction: robot – PLC

	bit0	bit1	bit2	bit3	bit4	bit5	bit6	bit7
BYTE1	fun_registers_output[1..8]							
BYTE2	fun_registers_output[9..16]							
BYTE3	bool_registers_output[1..8]							
BYTE4	bool_registers_output[9..16]							
BYTE5	bool_registers_output[17..24]							
BYTE6	bool_registers_output[25..32]							
BYTE7	bool_registers_output[33..40]							
BYTE8	bool_registers_output[41..48]							
BYTE9	bool_registers_output[49..56]							
BYTE10	bool_registers_output[57..64]							

Slot4_R2PLC_WordOutputReg (64 byte): Word output register data direction: robot – PLC

Word1..32	word_output_register [1..32]

Slot5_R2PLC_FloatOutputReg (32 float): floating point output register Data direction: robot – PLC

Float1..32	float_output_register [1..32]

Slot6_PLC2R_Digital_Output_Command (3 byte): Robot related control command Input data direction: PLC – robot

	bit0	bit1	bit2	bit3	bit4	bit5	bit6	bit7
BYTE1	general_digital_ouput[1..8]							
BYTE2	general_digital_ouput[9..16]							
BYTE3	tool_digital_output[1..8]							

Slot7_PLC2R_BitInputReg(10 byte): Universal bit input register data direction: PLC – robot

	bit0	bit1	bit2	bit3	bit4	bit5	bit6	bit7
BYTE1	general_digital_ouput[1..8]							
BYTE2	general_digital_ouput[9..16]							
BYTE3	tool_digital_output[1..8]							

Slot8_PLC2R_WordInputReg (64 byte): Word input register data direction: PLC – robot

Word1..32	word_input_register[1..32]

Slot9_PLC2R_FloatInputReg(32 float): Universal floating point input register data direction: PLC – robot

Float1..32	float_input_register[1..32]

Slot10_R2PLC_RobotInfo(16 float): Robot speed and other information data direction: robot – PLC

Float1	Read global speed pertage
Float2	Read Jog speed percentage
Float3	Read the terminal closing speed
Float4	Read emulation/real machine mode
Float5	Read error ID (system last error ID)
Float6..16	reserve

Slot11_PLC2R_RobotInfo(16 float): Robot speed and other information data direction: PLC – robot

Float1	Set the global speed percentage
Float2..16	reserve

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