

# MD-SI-DP2 PROFIBUS Communication Extension Card User Guide



Industrial  
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Intelligent  
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Data code 19012191 A00

# Preface

## Introduction

This guide describes the specifications, dimensions, installation, wiring, communication protocols, and communication-related parameters of the MD-SI-DP2 extension card. This guide also illustrates how to configure the system for communication using the MD-SI-DP2 card.

## Note

- This user guide is applicable to the MD-SI-DP2 extension card with software of version 1.09 or later. The version is indicated by relevant parameter (for example, parameter U0-67 of the MD500 series AC drive) after the card is installed and powered on.
- This guide introduces the MD-SI-DP2 extension card based on its use with the MD500 series AC drives as an example. To use the MD-SI-DP2 card on other AC drives, consult the technical support center for applicability and related technical data.
- The MD-SI-DP2 card is compatible with the MD-SI-DP1 card and can be used in the same way as the MD-SI-DP1 card.

## Change History

Date	Version	Description
April 2023	A00	First release

## How to Obtain

This guide is not delivered with the product, but an electronic PDF version is available. To obtain it, visit

the official website of Inovance ([www.inovance.com](http://www.inovance.com)), search by keyword, and download the guide.

## Warranty Statements

For faults and damage that occur during normal use within the warranty period, Inovance provides free repair service. (For details about the warranty period, see the order list.) Out of the warranty period, Inovance will charge a fee for the repair service.

Even in the warranty period, Inovance will charge a fee for repair of the following damage.

- Damage caused by improper operation
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by use beyond the intended scope of application

- Damage caused by use under unintended working conditions
- Secondary damage caused by force majeure events (such as natural disasters, earthquakes, and lightning strokes)

The repair fee will be charged according to the standardized price list of Inovance if not otherwise agreed upon.

For details, see the Product Warranty Card.

# 1 Product Information

## 1.1 Introduction

The MD-SI-DP2 card (hereinafter referred to as "the DP card") is a PROFIBUS DP fieldbus adapter card compliant with international PROFIBUS fieldbus standards. The DP card can improve the communication efficiency of AC drives and implement networking between an AC drive as a slave and a fieldbus master. The DP card can implement PROFIBUS DP communication.

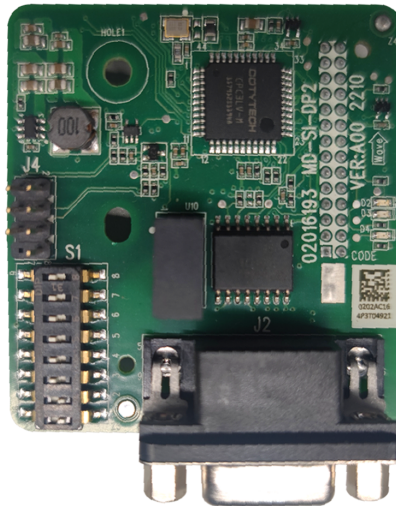


Figure 1-1 MD-SI-DP2 card appearance

The following table compares the MD-SI-DP2 card with the MD-SI-DP1 and MD38DP2 cards.

Card Type	MD-SI-DP2	MD-SI-DP1	MD38DP2
Diagnosis	Supported	Supported	Supported
DPV1	Supported	Supported	Supported
PPO4	Supported	Supported	Supported
PPO type setting	Set by Siemens software tool	Set by Siemens software tool	Set by Siemens software tool
PZD mapping address	Set by Siemens software tool	Set by Siemens software tool	Set by Siemens software tool
Device ID setting	1 to 125, set by DIP switch	1 to 125, set by DIP switch	1 to 125, set by DIP switch
Master disconnection	Card informs AC drive actively.	Card informs AC drive actively.	Card informs AC drive actively.

Card Type	MD-SI-DP2	MD-SI-DP1	MD38DP2
Communication rate between card and AC drive	Constant rate	Constant rate	Constant rate
Slave fault	Card informs master actively.	Card informs master actively.	Card informs master actively.
CAN communication	Not supported	Not supported	Supported

## 1.2 Applicable AC Drives

Extension Card Model	Applicable AC Drive
MD-SI-DP2	MD290
	MD480 (3.7 kW or above)
	MD480-PLUS
	MD500
	MD500-PLUS
	MD510
	MD520
	CS290
	CS710
	IS580
	ES680



This guide introduces the MD-SI-DP2 extension card based on its use with the MD500 series AC drives as an example. To use the MD-SI-DP2 card on other AC drives, consult the technical support center for applicability and related technical data.

## 1.3 Technical Specifications

Item	Technical Specifications
Conductor	1-pair (2x22 AWG) single-strand copper wire
Insulation sheath color	Green/Red

Item	Technical Specifications								
Shield	Aluminum-polyethylene tape and tinned copper wire braid								
Sheath material	PVC								
Operating temperature	-30°C to +70°C								
Appearance	Purple								
Baud rate and communication distance	Baud rate (kbps)	9.6	19.2	93.75	187.5	500	1500	3000	12000
	Transmission distance (m)	1200	1200	1200	1200	400	200	100	100

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### **Note**

The transmission distances in the preceding table are distances without using any repeater.

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## 1.4 Dimensions

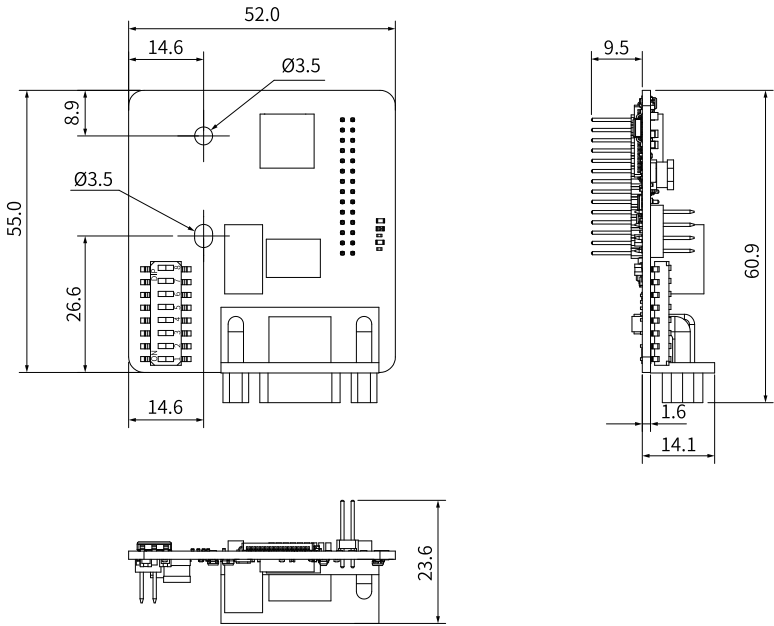


Figure 1-2 MD-SI-DP2 card dimensions (unit: mm)

## 1.5 Interfaces

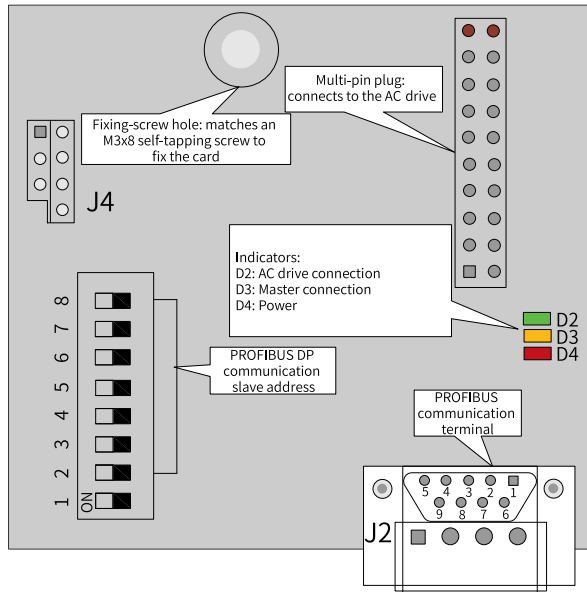
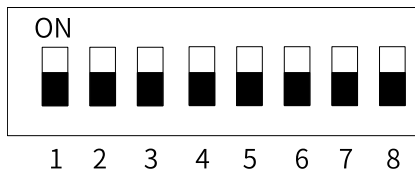


Figure 1-3 MD-SI-DP2 card interfaces

### DIP switch



Position	Function	Description										
1	Sets the PROFIBUS DP card type	OFF: MD-SI-DP2 (default) ON: Reserved										
2 to 8	Sets the slave address for PROFIBUS DP communication	The seven positions of the DIP switch together can set binary codes corresponding to device addresses of 1 to 125. Example: <table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>Addr.</th> <th>DIP Code (position 8 as the least significant bit)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>000 0001</td> </tr> <tr> <td>7</td> <td>000 0111</td> </tr> <tr> <td>20</td> <td>001 0100</td> </tr> <tr> <td>125</td> <td>111 1101</td> </tr> </tbody> </table>	Addr.	DIP Code (position 8 as the least significant bit)	1	000 0001	7	000 0111	20	001 0100	125	111 1101
Addr.	DIP Code (position 8 as the least significant bit)											
1	000 0001											
7	000 0111											
20	001 0100											
125	111 1101											



**Caution**

Changes to position 1 take effect only after the next power-on. Changes to the slave address positions take effect immediately after setting.

**Standard 9-pin PROFIBUS interface**

The DP card is provided with a standard DB9 socket to connect to the PROFIBUS master. The socket complies with the DB9 socket standards of Siemens in terms of pin signal definition and pin arrangement, as shown in the following figure.

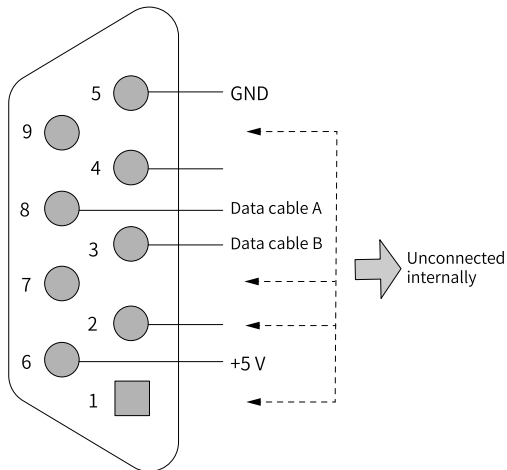


Figure 1-4 DB9 terminal pins

**Functions of control terminals**

Table 1-1 Functions of control terminals

Item	Terminal Symbol	Terminal Name	Function
PROFIBUS communication (J2)	1, 2, 7, and 9	NC	Unconnected internally
	3	Data cable B	Positive terminal of data cable
	5	GND	Ground terminal of isolated 5 V power supply
	6	+5 V	Isolated 5 V power supply
	8	Data cable A	Negative terminal of data cable
Program ming	J4	Programming	Interface for debugging in production environment. Users must not use it.

Item	Terminal Symbol	Terminal Name	Function
Indicator*	D4 (red)	Power indicator	<ul style="list-style-type: none"> <li>• Steady ON: The AC drive is energized.</li> <li>• OFF: The AC drive is not energized or the DP card is not installed properly.</li> </ul>
	D3 (yellow)	DP card and master communication indicator	<ul style="list-style-type: none"> <li>• Steady ON: Communication between the DP card and the PROFIBUS master is normal.</li> <li>• OFF: There is no communication between the DP card and the PROFIBUS master (check the connection of the PROFIBUS cable and the device ID setting).</li> <li>• Blinking: The master is not running or an error exists in communication between the DP card and the master.</li> </ul>
	D2 (green)	DP card and AC drive communication indicator	<ul style="list-style-type: none"> <li>• Steady ON: Communication between the DP card and the AC drive is normal.</li> <li>• OFF: Communication between the DP card and the AC drive failed (parameter F0-28 is not set to 1 or the AC drive does not support the MD-SI-DP2 card).</li> <li>• Blinking: Communication between the DP card and the AC drive is interfered with or the DP card address is not in the range of 1 to 125.</li> </ul>

## 2 Installation and Wiring

### 2.1 Installation

The DP card is designed to be embedded in the MD500 series AC drive. Before installation, cut off the power supply of the AC drive and wait for about 10 minutes until the charging indicator of the AC drive becomes off. Then, insert the DP card into the AC drive and fasten the screws to protect the signal socket between boards from being damaged by the pulling force of the external signal cable. See "[Figure 2-1](#)" on [page 10](#) for installation.

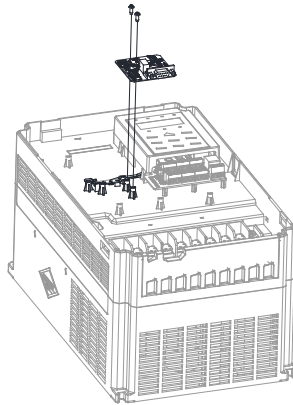


Figure 2-1 Installing the DP card



Do not remove or install the card with power ON.

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### 2.2 Wiring

#### 2.2.1 PROFIBUS Topology and Transmission Distance

The following figure shows the connection between the PROFIBUS DP cards and PROFIBUS master.

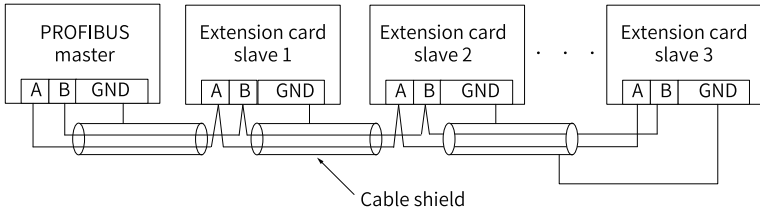
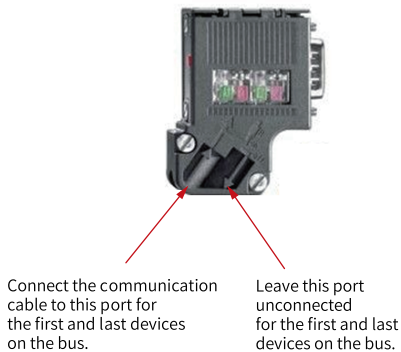


Figure 2-2 Connection between the PROFIBUS DP cards and PROFIBUS master

Connect termination resistors at both ends of the PROFIBUS bus by setting the DIP switches accordingly. If the termination resistors are connected correctly, the resistance between A1 and B1 should be about 110 Ω when power is off. For the first and last devices on the PROFIBUS bus, connect their communication cables to the ports marked with "IN" (namely, the ports corresponding to A1/B1) on the DP connectors. Otherwise, termination resistors cannot be connected to the bus. The absence of either required termination resistor will compromise the communication quality and stability.



The length of a communication cable between the DP card and the PROFIBUS master is limited by the baud rate of the master. Restrict the length of communication data cables in strict accordance with Siemens DB9 wiring standard. The following table lists limits of communication cable length based on baud rate.

Baud Rate (kbps)	Max Length of Cable Type A (m)	Max Length of Cable Type B (m)
9.6	1200	1200
19.2	1200	1200
187.5	600	600
500	200	200
1500	100	70

Baud Rate (kbps)	Max Length of Cable Type A (m)	Max Length of Cable Type B (m)
3000	100	Not supported
6000	100	
12000	100	

The following table lists the technical specifications of cables.

Cable Feature	Type A	Type B
Impedance	135 $\Omega$ to 165 $\Omega$ (f = 3 MHz to 20 MHz)	100 $\Omega$ to 130 $\Omega$ (f > 100 kHz)
Capacitance	< 30 pF/m	< 60 pF/m
Resistance	< 110 $\Omega$ /km	Not specified
Cross-sectional area of conductor	$\geq 0.34 \text{ mm}^2$	$\geq 0.22 \text{ mm}^2$

### 2.2.2 Wiring Considerations for EMC

- During on-site installation and commissioning, route communication cables and power cables in different cable ducts. Never bundle communication cables and power cables in routing. Failure to comply may result in communication interference.
- Connect the motor enclosure to the PE terminal of the AC drive and ensure that the ground cable of the motor enclosure is well grounded. Failure to comply will result in poor grounding performance.
- You can determine the status of the communication connection by checking the status indicators on the card. For details, see "[Functions of control terminals](#)" on [page 8](#).

## 3 Communication

### 3.1 Communication Protocol

#### Data transmission formats

The PROFIdrive protocol defines the Parameter Process Data Object (PPO) as the format for data transmission. PPO includes five types: PPO1, PPO2, PPO3, PPO4, and PPO5. The DP card supports all the five types of PPO.

The following table lists the functions supported by each type of PPO.

Data Type	Supported Functions
PPO1	<ul style="list-style-type: none"> <li>• Operation on a single function parameter</li> <li>• Setting of AC drive command and frequency</li> <li>• Reading of AC drive status and running frequency</li> </ul>
PPO2	<ul style="list-style-type: none"> <li>• Operation on a single function parameter</li> <li>• Setting of AC drive command and frequency</li> <li>• Reading of AC drive status and running frequency</li> <li>• Cyclic writing of 4 function parameters</li> <li>• Cyclic reading of 4 function parameters</li> </ul>
PPO3	<ul style="list-style-type: none"> <li>• Setting of AC drive command and frequency</li> <li>• Reading of AC drive status and running frequency</li> </ul>
PPO4	<ul style="list-style-type: none"> <li>• Setting of AC drive command and frequency</li> <li>• Reading of AC drive status and running frequency</li> <li>• Cyclic writing of 4 function parameters</li> <li>• Cyclic reading of 4 function parameters</li> </ul>
PPO5	<ul style="list-style-type: none"> <li>• Operation on a single function parameter</li> <li>• Setting of AC drive command and frequency</li> <li>• Reading of AC drive status and running frequency</li> <li>• Cyclic writing of 10 function parameters</li> <li>• Cyclic reading of 10 function parameters</li> </ul>

A PPO data block is subdivided into two areas: parameter value (PKW) and process data (PZD). The following figure shows the structure of each PPO type supported by the DP card.

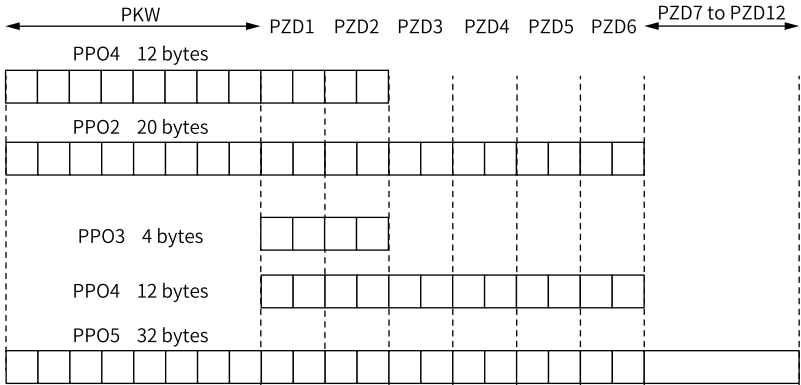


Figure 3-1 PPO data structures

**PKW area**

The PKW area enables the master to read or write a single AC drive parameter. The communication address of the AC drive parameter is directly specified in the communication data. The PKW area is used to:

- Read a function parameter of the AC drive
- Modify a function parameter of the AC drive

**Data format**

The PKW area consists of three parts: PKE, IND, and PWE. The PKE, IND, and PWE parts always contain two bytes, two bytes, and four bytes, respectively, as shown in the following table.

PKW Area in Master Request								
Operation Command	Address		Reserved				Write: parameter value Read: reserved	
PKE	PKE	IND	IND	PWE	PWE	PWE	PWE	
PKW Area in AC Drive Response								
Operation Command	Address		Reserved				Successful: parameter value Failed: error information	
PKE	PKE	IND	IND	PWE	PWE	PWE	PWE	

**Data description**

PKW Area in Master Request		PKW Area in AC Drive Response	
PKE	<ul style="list-style-type: none"> <li>High-order 4 bits: Command code0: No request1: Read2: Write(The preceding command code is in decimal format.)</li> <li>Low-order 4 bits: Reserved</li> <li>Low-order 8 bits: High-order bits of the parameter address</li> </ul>	PKE	<ul style="list-style-type: none"> <li>High-order 4 bits: Response code0: No request1: Operation correct7: Cannot execute</li> <li>Low-order 8 bits: High-order bits of the parameter address</li> </ul>
IND	High-order 8 bits: Low-order bits of the parameter address Low-order 8 bits: Reserved	IND	High-order 8 bits: Low-order bits of the parameter address Low-order 8 bits: Reserved
PWE	High-order 16 bits: Reserved Low-order 16 bits: Reserved (in the case of read request) or parameter value (in the case of write request)	PWE	<ul style="list-style-type: none"> <li>Request succeeded: Parameter value</li> <li>Request failed: Error code (consistent with standard Modbus)1: Invalid command2: Invalid address3: Invalid data4: Other error</li> </ul>

### Example

The following figure shows the PKW area in the request and response transmitted between the master and the AC drive when the master requests to read function parameter F0-08 of the AC drive.

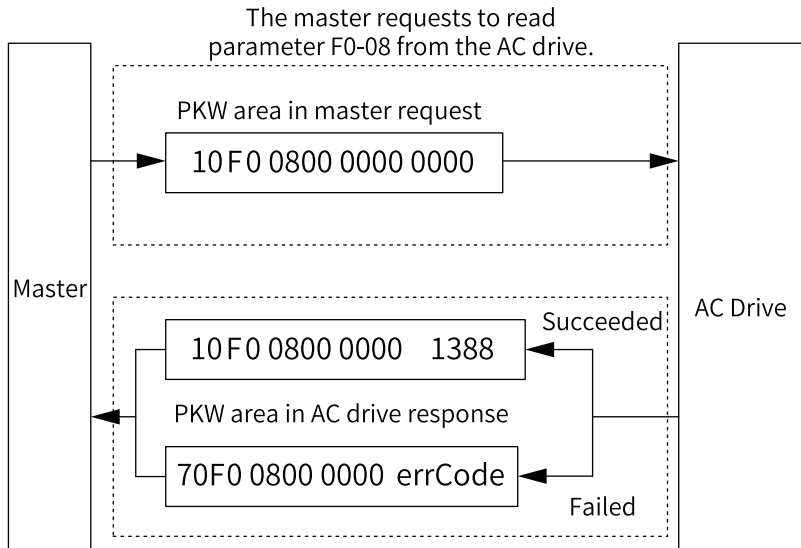


Figure 3-2 Example of PKW data transmitted when the master requests to read an AC drive parameter

The following figure shows the PKW area in the request and response transmitted between the master and the AC drive when the master requests to change function parameter F0-08 of the AC drive.

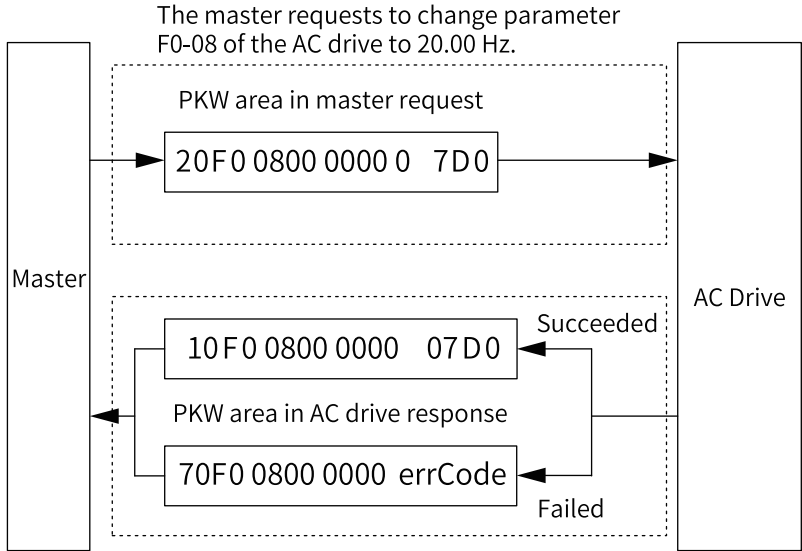


Figure 3-3 Example of PKW data transmitted when the master requests to write an AC drive parameter

PKW data exchange with the AC drive is performed cyclically. Continuous access to the EEPROM with the write command (PKE = 0x20xx) will significantly reduce the service life of the AC drive's main control chip. Therefore, to modify AC drive parameters, it is advisable to use the acyclic write command (see SFB53 described in ["3.3.5 Performing Aperiodic Read/Write Operations on the AC Drive Slave" on page 40](#)) or operate the RAM addresses in PKW. The following table lists the RAM addresses of the parameters.

Parameter Group	Address
F0 to FF	0x00 to 0x0F
A0 to AF	0x40 to 0x4F

For example, the RAM address of parameter F0-10 is 0x000A.

### PZD area

The PZD area enables the master to modify or read AC drive data in real time and exchange data with the AC drive cyclically. The communication address of relevant data is directly configured by the AC drive. The PZD area is used to:

- Set the AC drive control command or frequency reference in real time

- Read the AC drive status or running frequency in real time
- Exchange function parameters and monitoring parameters between the AC drive and the PROFIBUS master in real time

The PZD area is used for cyclic data exchange between the master and the AC drive, as described in the following table.

PZD Area in Master Request		
AC Drive Command	AC Drive Frequency Reference	AC Drive Parameters Modified in Real Time
PZD1	PZD2	PZD3 to PZD12
PZD Area in AC Drive Response		
AC Drive Command	AC Drive Running Frequency	AC Drive Parameters Read in Real Time
PZD1	PZD2	PZD3 to PZD12

### Request from the master

PZD Area in Master Request		
PZD1	AC drive command word (valid when the command source is set to communication)	
	0: No command 01: Forward run 02: Reverse run 03: Forward jog	04: Reverse jog 05: Coast to stop 06: Decelerate to stop 07: Fault reset
PZD2	<ul style="list-style-type: none"> <li>• Specifies the AC drive frequency reference (valid when the frequency reference source is set to communication; the value unit is determined by the AC drive and Hz is used as an example here).</li> <li>• The frequency reference range is 0 to F0-10.</li> <li>• When F0-22 is set to 1, the frequency range is 0.0 Hz to 3200.0 Hz.</li> <li>• When F0-22 is set to 2, the frequency range is 0.00 Hz to 320.00 Hz.</li> <li>• When the specified frequency reference exceeds F0-10, the AC drive does not respond to the frequency reference.</li> </ul>	
PZD3 to PZD12	<ul style="list-style-type: none"> <li>• Specifies parameter values (group F and group A) to be modified in real time. The modification is not written to EEPROM.</li> <li>• FE-02 to FE-11 correspond to PZD3 to PZD12. For the configuration, see PZD data configuration.</li> <li>• After communication between the PLC and the AC drive is established, FE-02 to FE-11 show the parameter values written in PZD3 to PZD12. Manual setting of the parameters in group FE on the AC drive does not take effect.</li> </ul>	

### Response from the AC drive

PZD Area in AC Drive Response	
PZD1	<p>Indicates the AC drive status by bits as follows:</p> <ul style="list-style-type: none"> <li>• Bit 0: 0: Stopped; 1: Running</li> <li>• Bit 1: 0: Forward running; 1: Reverse running</li> <li>• Bit 2: 0: No fault; 1: Fault</li> <li>• Bit 3: 0: Frequency reference not reached; 1: Frequency reference reached</li> </ul>
PZD2	<p>Indicates the AC drive running frequency: The AC drive running frequency is indicated by 16-bit signed data.</p> <ul style="list-style-type: none"> <li>• When F0-22 is set to 1, -32000 to +32000 correspond to the actual running frequency of -3200.0 Hz to +3200.0 Hz.</li> <li>• When F0-22 is set to 2, -32000 to +32000 correspond to the actual running frequency of -320.00 Hz to +320.00 Hz.</li> </ul>
PZD3 to PZD12	<p>Indicates function parameter values (group F and group A) and monitoring parameter values (group U) read in real time.</p> <ul style="list-style-type: none"> <li>• FE-22 to FE-31 correspond to PZD3 to PZD12. For the configuration, see PZD data configuration.</li> <li>• After communication between the PLC and the AC drive is established, FE-02 to FE-11 show the parameter values written in PZD3 to PZD12. Manual setting of the parameters in group FE on the AC drive does not take effect.</li> </ul>

## 3.2 Communication Parameters

### AC drive communication card setting

To select PROFIBUS DP as the serial port communication protocol of the AC drive, set parameter F0-28 to 1. See the following table.

Para.	Name	Value Range	Setpoint	Description
F0-28	Serial communication protocol	0: Modbus protocol 1: Communication card network bridge protocol	1	Selects the special communication card network bridge as the serial communication protocol

## Communication control parameters

Para.	Name	Value Range	Hexadecimal Address	Decimal Address
U3-16	Frequency reference	–Maximum frequency to +Maximum frequency Unit: 0.01 Hz	H7310	29456
U3-17	Control command	0001: Forward run 0002: Reverse run 0003: Forward jog 0004: Reverse jog 0005: Coast to stop 0006: Decelerate to stop 0007: Fault reset	H7311	29457
U3-18	DO control	Bit 0: DO1 control Bit 1: DO2 control Bit 2: RELAY1 output control Bit 3: RELAY2 output control Bit 4: FMR output control Bit 5: VDO1 Bit 6: VDO2 Bit 7: VDO3 Bit 8: VDO4 Bit 9: VDO5	H7312	29458
U3-19	AO1 control	0 to 7FFF indicate 0% to 100%.	H7313	29459
U3-20	AO2 control	0 to 7FFF indicate 0% to 100%.	H7314	29460
U3-21	FMP control	0 to 7FFF indicate 0% to 100%.	H7315	29461
U3-23	Speed control	Signed data, 1 RPM	H7317	29463

When the DP card is used, the written PZD1 and PZD2 are mapped to parameters U3-17 and U3-16, respectively, by default. If the command or frequency reference cannot be written to the AC drive but PZD3 to PZD12 can be written while parameter F0-02 is set to 2 and parameter F0-03 is set to 9, check whether parameters FE-00 and FE-01 are consistent with parameters U3-17 and U3-16, respectively. If not, manually correct the values of parameters FE-00 and FE-01.

## Communication monitoring parameters

Para.	Name	Unit	Hexadecimal Address	Decimal Address
U0-00	Running frequency (Hz)	0.01 Hz	H7000	28672
U0-01	Frequency reference (Hz)	0.01 Hz	H7001	28673
U0-02	Bus voltage (V)	0.1 V	H7002	28674

Para.	Name	Unit	Hexadecimal Address	Decimal Address
U0-03	Output voltage (V)	1 V	H7003	28675
U0-04	Output current (A)	0.01 A	H7004	28676
U0-05	Output power (kW)	0.1 kW	H7005	28677
U0-06	Output torque (%)	0.1%	H7006	28678
U0-07	DI state	1	H7007	28679
U0-08	DO state	1	H7008	28680
U0-09	AI1 voltage (V)	0.01 V	H7009	28681
U0-10	AI2 voltage (V)	0.01 V	H700A	28682
U0-11	AI3 voltage (V)	0.01 V	H700B	28683
U0-12	Count value	1	H700C	28684
U0-13	Length value	1	H700D	28685
U0-14	Load speed display	1	H700E	28686
U0-15	PID reference	1	H700F	28687
U0-16	PID feedback	1	H7010	28688
U0-17	PLC stage	1	H7011	28689
U0-18	Pulse input reference (kHz)	0.01 kHz	H7012	28690
U0-19	Feedback speed (Hz)	0.01 Hz	H7013	28691
U0-20	Remaining running time (min)	0.1 min	H7014	28692
U0-21	AI1 voltage before correction (V)	0.001 V	H7015	28693
U0-22	AI2 voltage before correction (V)	0.001 V	H7016	28694
U0-23	AI3 voltage before correction (V)	0.001 V	H7017	28695
U0-24	Linear speed (m/min)	1 m/min	H7018	28696
U0-25	Current power-on time (min)	1 min	H7019	28697
U0-26	Current running time (min)	0.1 min	H701A	28698
U0-27	Pulse input reference (Hz)	1 Hz	H701B	28699
U0-28	Communication reference (%)	0.01%	H701C	28700
U0-29	Encoder feedback speed (Hz)	0.01 Hz	H701D	28701
U0-30	Main frequency X display (Hz)	0.01 Hz	H701E	28702

Para.	Name	Unit	Hexadecimal Address	Decimal Address
U0-31	Auxiliary frequency Y display (Hz)	0.01 Hz	H701F	28703
U0-32	Any memory address	1	H7020	28704
U0-33	Synchronous motor rotor position	0.1°	H7021	28705
U0-34	Motor temperature	1°C	H7022	28706
U0-35	Target torque (%)	0.1%	H7023	28707
U0-36	Resolver position	1	H7024	28708
U0-37	Power factor angle (°)	0.1°	H7025	28709
U0-38	ABZ position	1	H7026	28710
U0-39	Target voltage in V/f separation (V)	1 V	H7027	28711
U0-40	Output voltage in V/f separation (V)	1 V	H7028	28712
U0-41	DI state display	1	H7029	28713
U0-42	DO state display	1	H702A	28714
U0-43	DI state display 1	1	H702B	28715
U0-44	DI state display 2	1	H702C	28716
U0-45	Fault information	1	H702D	28717
U0-58	Z signal counter	1	H703A	28730
U0-59	Frequency reference (%)	0.01%	H703B	28731
U0-60	Running frequency (%)	0.01%	H703C	28732
U0-61	AC drive state	1	H703D	28733
U0-62	Current fault code	1	H703E	28734
U0-63	Data sent by master in point-to-point communication (%)	0.01%	H703F	28735
U0-64	Data sent by slave in point-to-point communication (%)	0.01%	H7040	28736
U0-65	Torque upper limit	0.1%	H7041	28737
U0-66	Extension card model	100: CANopen 200: PROFIBUS DP 300: CANlink	H7042	28738
U0-67	Extension card version	1	H7043	28739
U0-68	AC drive state	1	H7044	28740
U0-69	Running frequency (Hz)	0.01 Hz	H7045	28741
U0-70	Motor speed (RPM)	1 RPM	H7046	28742
U0-71	Output current (A)	0.1 A	H7047	28743

When the DP card is used, the read PZD1 and PZD2 are mapped to parameters U0-68 and U0-69, respectively, by default. If the state or running frequency cannot be read but PZD3 to PZD12 can be read, check whether parameters FE-20 and FE-21 are consistent with parameters U0-68 and U0-69, respectively. If not, manually correct the values of parameters FE-20 and FE-21.



If the AC drive is updated from an earlier version that supports MD38DP1 to a later version that supports MD38DP2, the preceding operations must be performed or the AC drive must be reset after the update is complete.

---

### 3.3 Communication Configuration Instance

#### 3.3.1 General Description

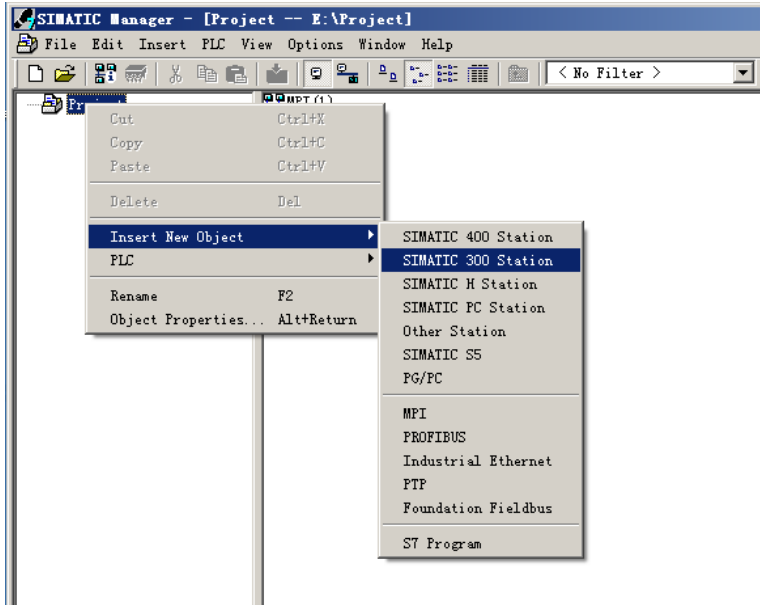
The MD-SI-DP2 extension card uses the same GSD file as the MD38DP2 card in the same way as the MD38DP2 card. Therefore, the following description borrows the communication interface screenshots of the MD38DP2 card and mentions "MD38DP2" for illustrative purposes only. For details, see the communication examples in this section.

#### 3.3.2 在STEP7 V5\_en.4中用S7-300主站配置从站

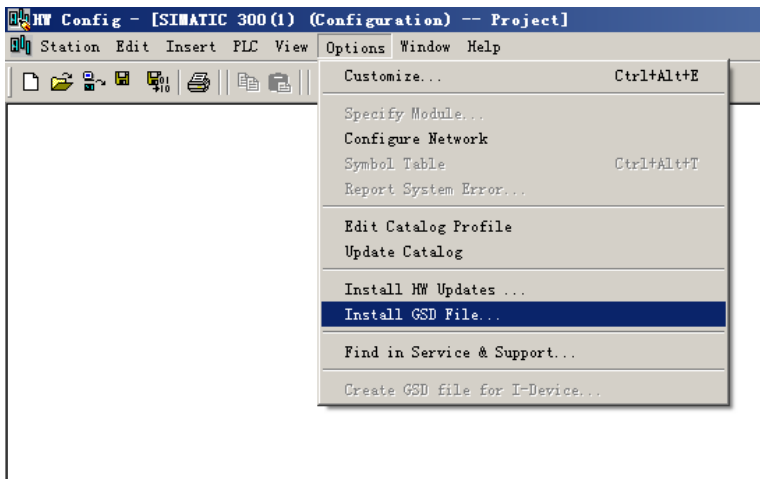
Before using the PROFIBUS master, you need to configure the General Station Description (GSD) file of the slave to add the slave device to the system of the master. If the GSD file is already configured, skip step 2. You can obtain the GSD file from Inovance or its agent.

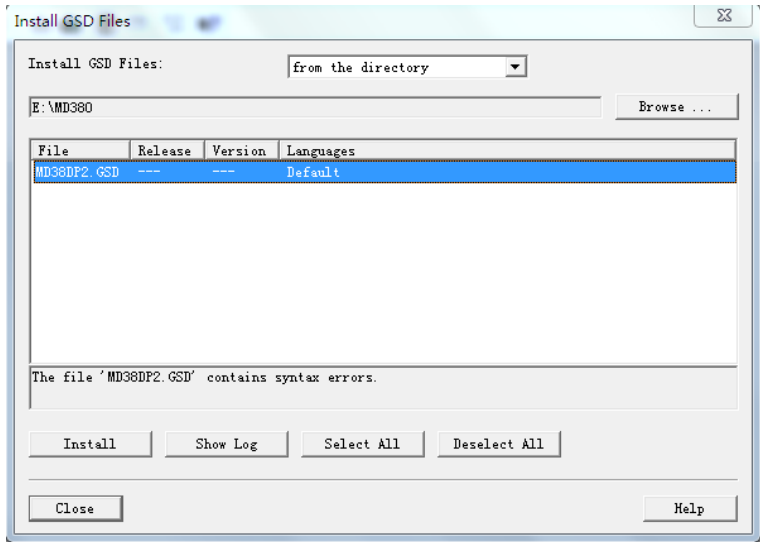
The configuration procedure is as follows:

1. Install the GSDML file. (Skip this step if the GSDML file has been installed.) Choose "Options" > "Manage GSD".

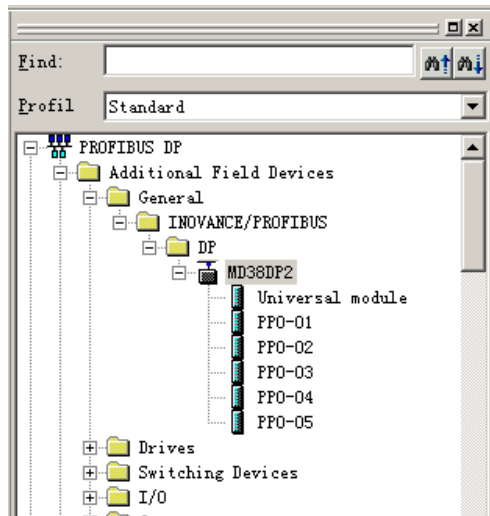


2. Double-click the hardware icon to access the "HW Config" interface. Choose "Options" > "Install GSD file" to add the MD38DP2.GSD file (English path required), as shown in the following figure.





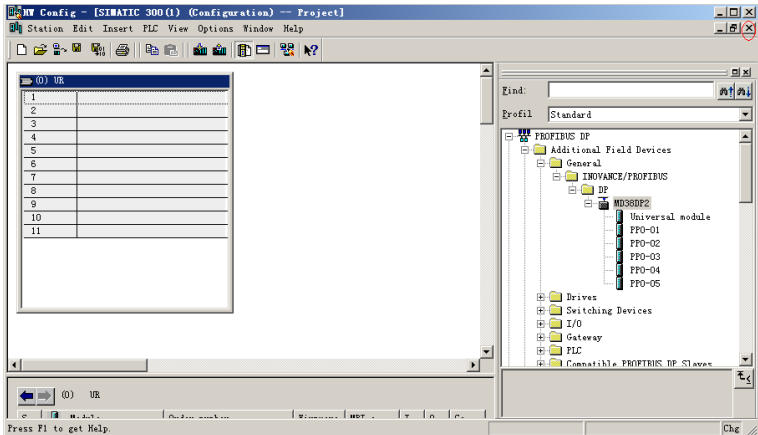
Click "Install". After the installation is completed, the PROFIBUS DP module named MD38DP2 is listed, as shown in the following figure.



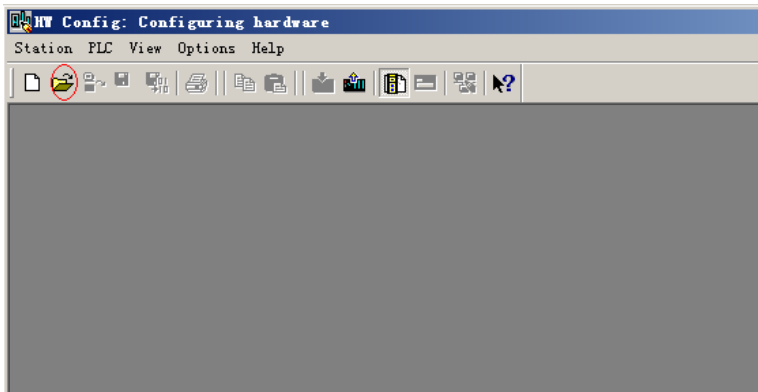


## Caution

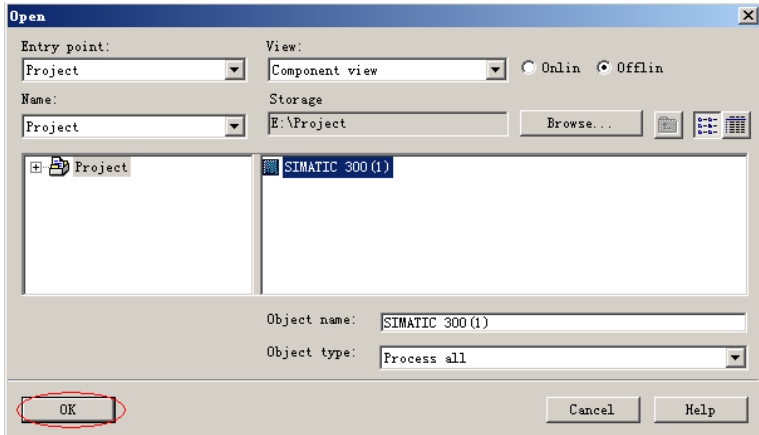
If any master or slave already exists on the "HW Config" interface, close the current interface by clicking the Close button (marked with a red circle as shown in the following figure) before importing the GSD file.



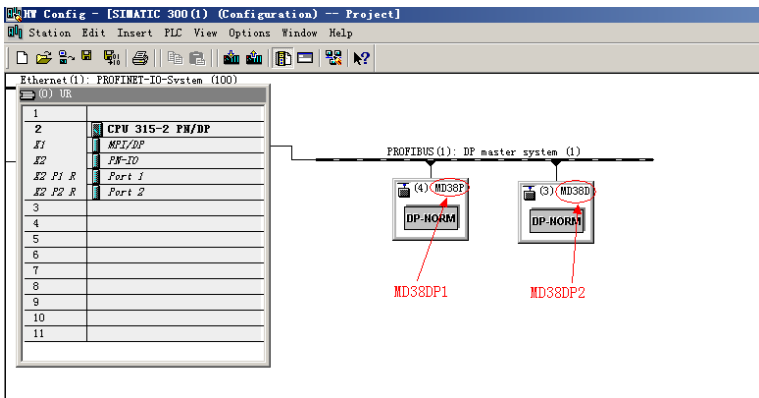
In this case, you can save the existing project. If a warning indicating that system data cannot be created is displayed, click "OK". After closing the interface of the existing configuration project, you can install the GSD file by following the preceding steps. After the installation is completed, click the Open button, as shown in the following figure.



You can also select the previously existing configuration project and click "OK" to open it.

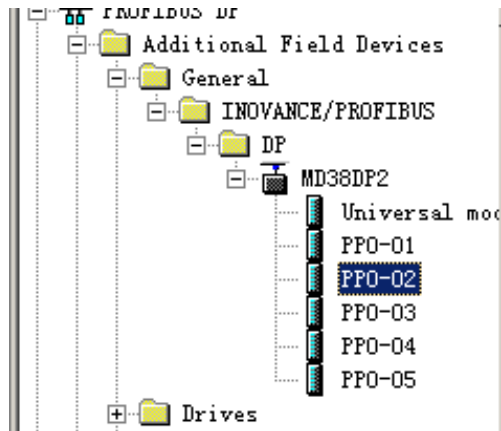


3. Configure the actual hardware system, as shown in the following figure.



The preceding figure shows MD38DP1 as station 4 for illustrative purposes only. For details about card usage, see the *MD380 Series PROFIBUS Interface Card User Guide*. MD38DP1 cards and MD-SI-DP2 cards can be configured together on the same network.

4. Configure data properties of the slave.



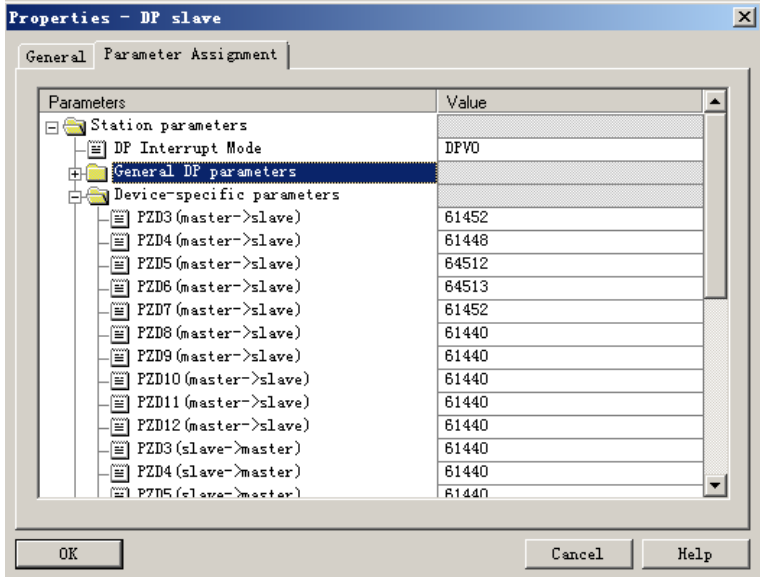
After the PPO type is added, the address assigned by the PLC to the slave is displayed, as shown in the following figure. Slot 1 marked with a red circle in the following figure indicates the PKW address (8 bytes). Slot 2 indicates the PZD address (12 bytes).

If the selected PPO type does not have a PKW area, the I address and Q address of slot 1 are blank.

S...	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	44X	PPO-02	284...291	284...291	
2	6AF	--> PPO-02	292...303	292...303	

##### 5. Configure PZD.

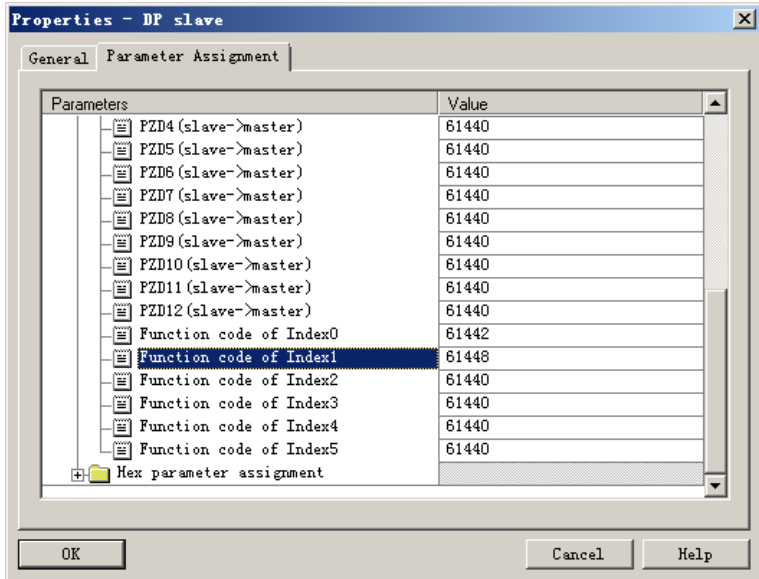
PZD1 and PZD2 configurations are preset and cannot be modified by users. PZD3 to PZD12 are intended for cyclic data exchange. They can be set by users in hardware configuration. On the HW Config interface, double-click the MD38DP icon and then click "Device-specific parameters" to configure parameter addresses as needed.



PZDx (master->slave) indicates the address used for the master to write data to the slave, whereas PZDx (slave->master) indicates the address used for the master to read data from the slave. PZD3 to PZD12 are displayed in decimal and can be modified. For example, to set PZD3 (master->slave) to F0-12, enter 61452.

By default, all the PZD fields of MD380 are set to F0-00 (61440 in decimal). For unused PZD fields, modification is not required and default values can be retained. Every slave must be configured with its own PZD mapping. (If multiple slaves use the same mapping, you can set them with the clipboard function. Specifically, select a configured slave, press Ctrl+C, select the PROFIBUS DP bus in the configuration, press Ctrl+V, and modify the device ID).

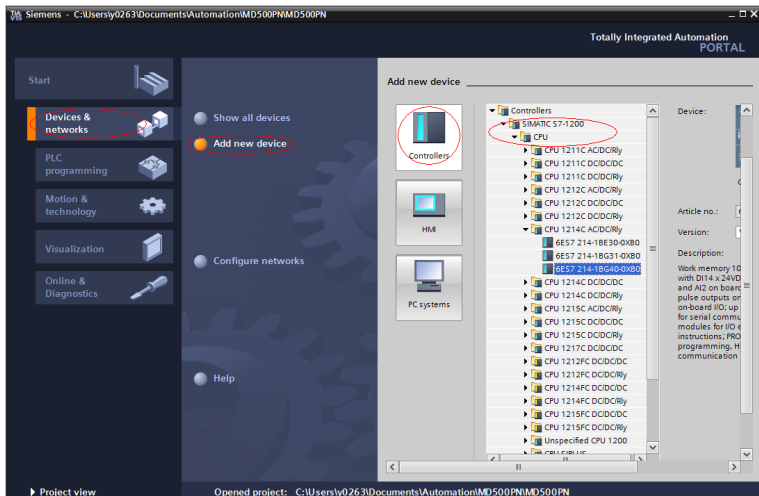
To enable the acyclic parameter read and write function of DPV1, set relevant parameters in user-definable indexes at the end of the device-specific parameter list. MD380 provides six user-definable indexes numbered from 0 to 5, as shown in the following figure. For example, you can set index 0 to F0-02 and index 1 to F0-08.



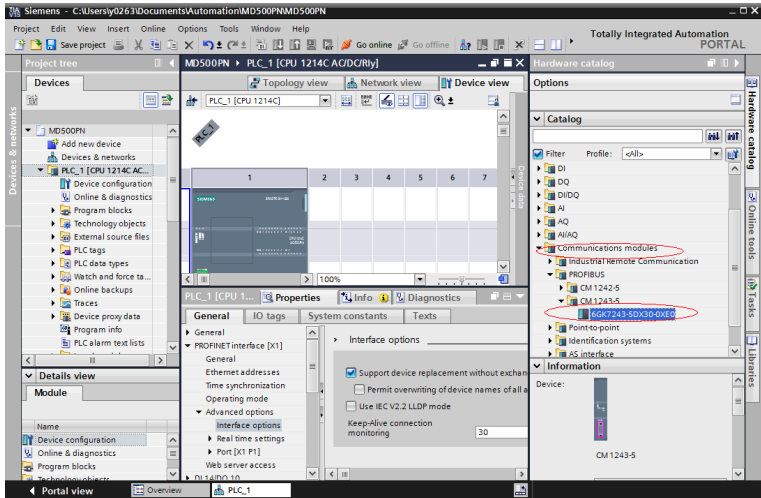
After the preceding steps, the PROFIBUS slave is configured. Now, you can compile programs on the S7-300 master to control the AC drive.

### 3.3.3 Configuring a Slave on the S7-1200 Master in TIA Portal V13

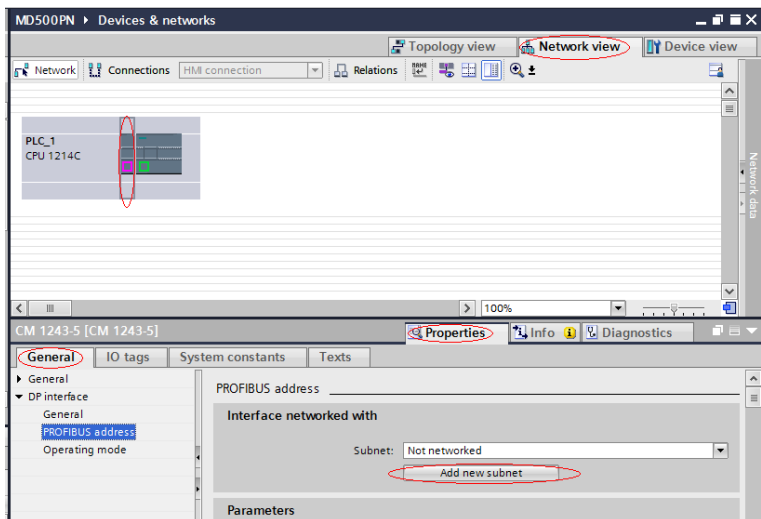
1. Open TIA Portal V13, create a project, and add an S7-1200 master based on the actual situations.



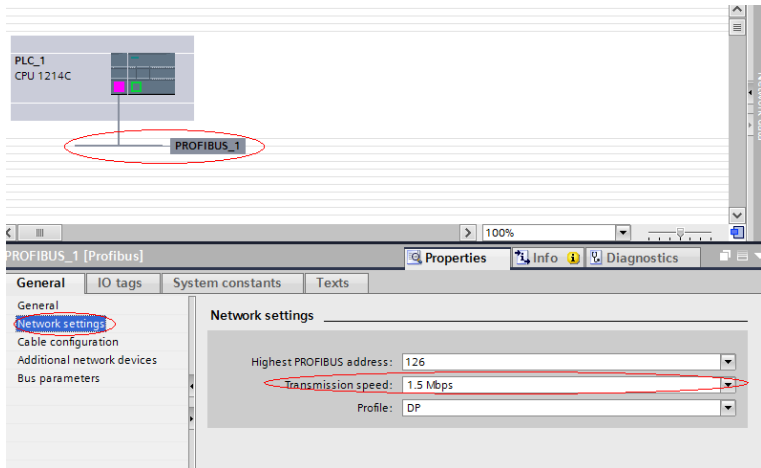
The S7-1200 CPU does not have a PROFIBUS interface, so you need to add a PROFIBUS communication module first. In this example, a CM1243-5 master module is added.



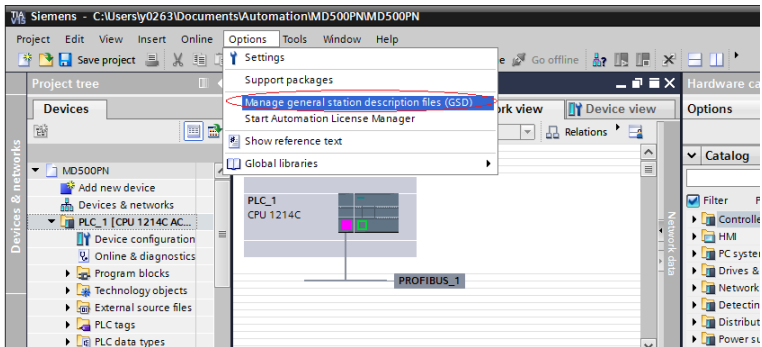
After adding the PROFIBUS master module, click the "Network view" tab. Select the communication module. Choose "Properties" > "General" > "New subnet" to create a PROFIBUS network. You can also modify the master ID on this page.

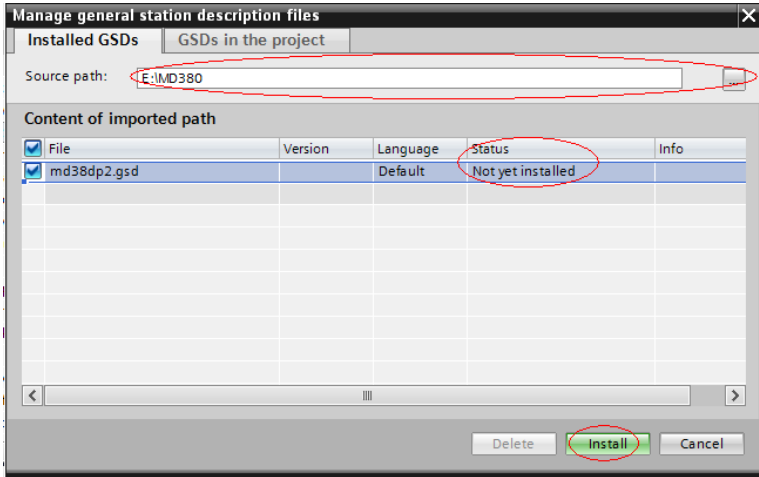


To modify the PROFIBUS baud rate, select the network in the view, and choose "Properties" > "General" > "Network settings". Click the transmission rate drop-down list to select a baud rate.

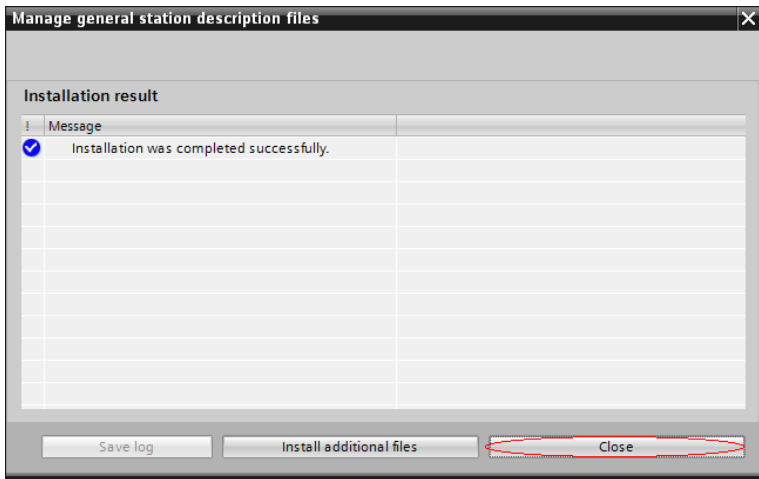


2. Install the GSD file. Skip this step if the GSD file is already installed.  
If the GSD file is not installed yet, "Not installed" is displayed in the "Status" column. Select the GSD file and click "Install". (Note that an error will occur if the installation path contains Chinese characters.)

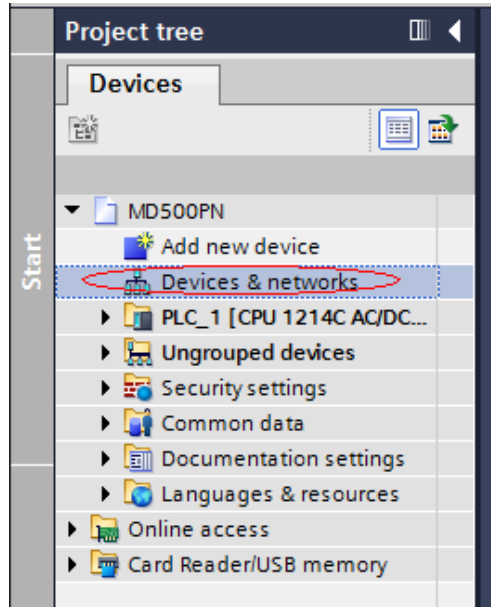




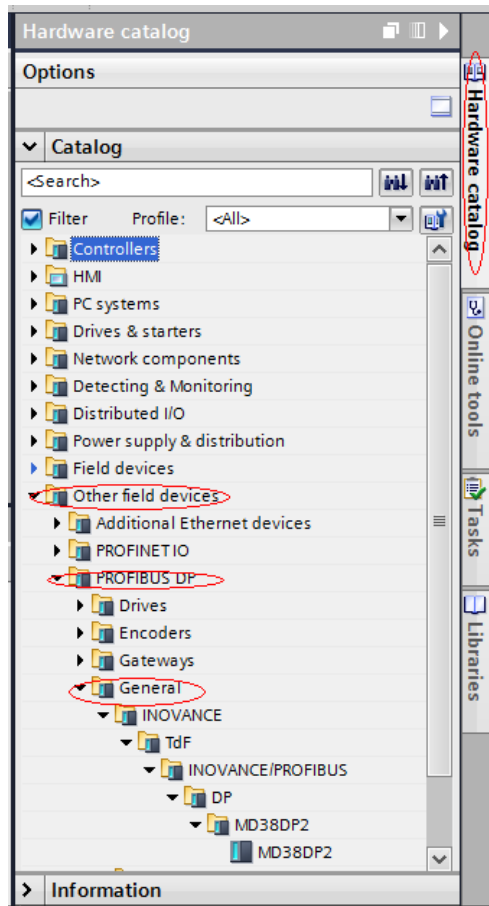
When the following interface is displayed, the installation is completed. Click "Close".



During installation of the GSD file, the PORTAL automatically closes the configuration interface. After the installation is completed, double-click "Devices & networks" in the "Start" pane on the left to open the previous configuration interface.

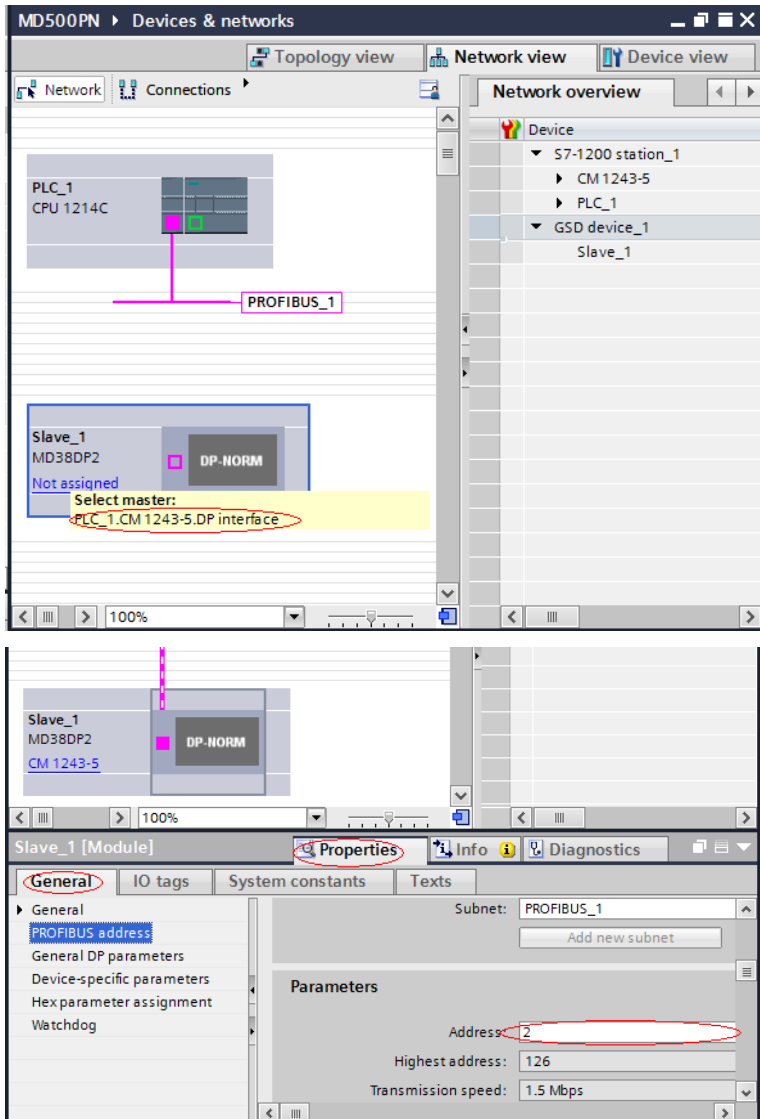


Similar to STEP 7, choose "Hardware catalog" > "Other field devices" > "PROFIBUS DP" > "General", and you will find MD38DP2 in the list. When using TIA portal V13, fully expand the sub-directories as shown in the following figure.

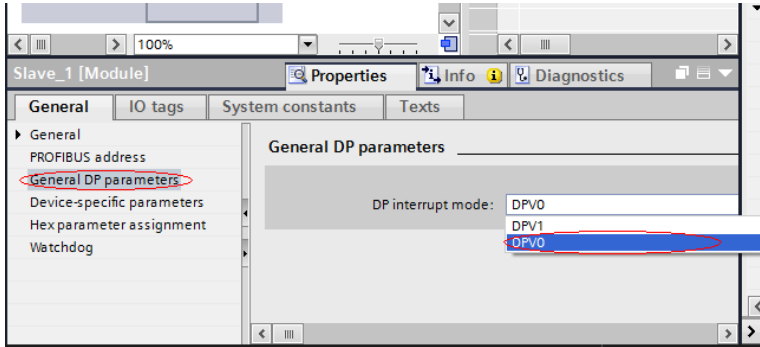


3. Start the configuration.

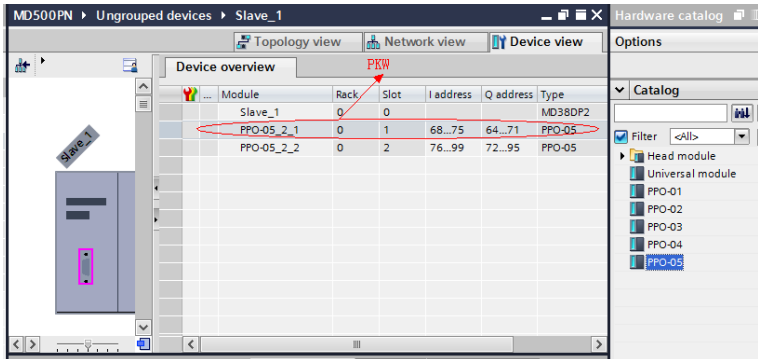
On the "Hardware catalog" tab page, double-click "MD38DP2" or drag it to "Network view" under "Devices & networks". Click "Not assigned" below the slave name to select the corresponding PROFIBUS network. Select the slave, choose "Properties" > "General", and set the slave ID. Note that the setting must be consistent with that set by the DIP switch on the MD38DP2 extension card.



Click "General DP parameters" and set "DP interrupt mode" to "DPV0" by using the drop-down list, as shown in the following figure.

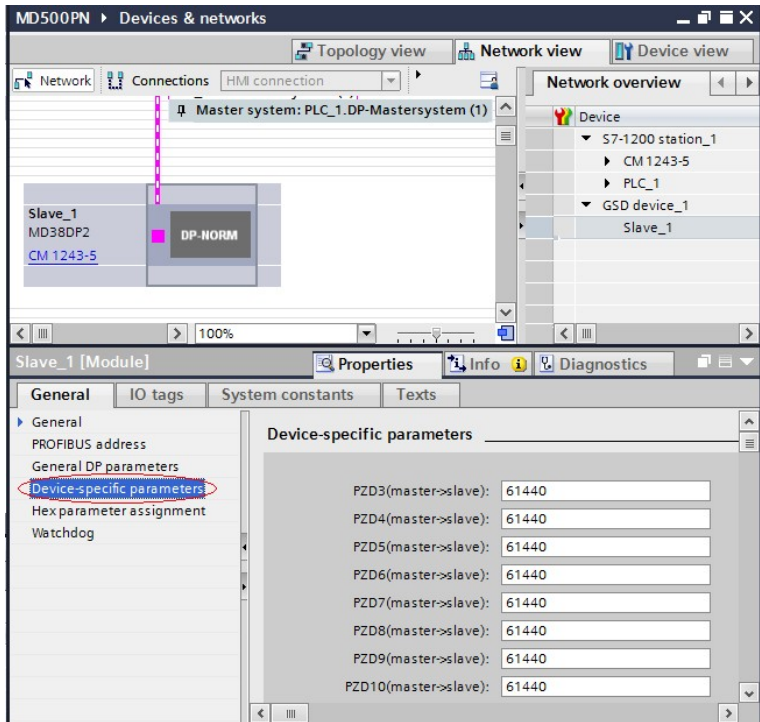


Click the "Device view" tab. Select a suitable PPO type under "Hardware catalog". Check the addresses assigned for each segment, as shown in the following figure. The row marked with a red circle in the following figure indicates the PKW address. If the selected PPO type has no PKW, the address column is blank.



4. Set PZD mapping.

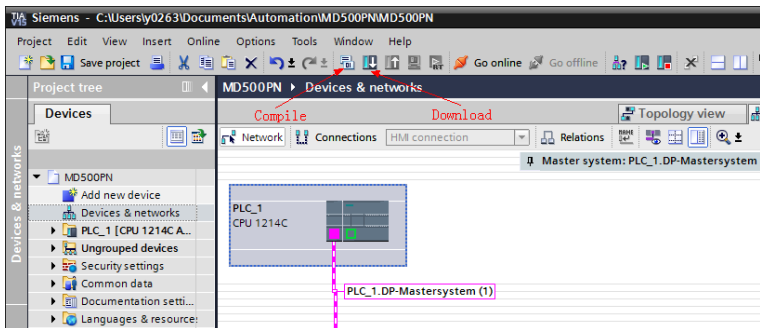
Click the "Network view" tab. Click "Device-specific parameters" to set the mapping for PZD3 to PZD12. The PZD mapping relationships for the PLC to read and write to the slave must be set independently. For details, see ["3.3.2 在STEP7 V5\\_en.4中用S7-300主站配置从站" on page 22.](#)



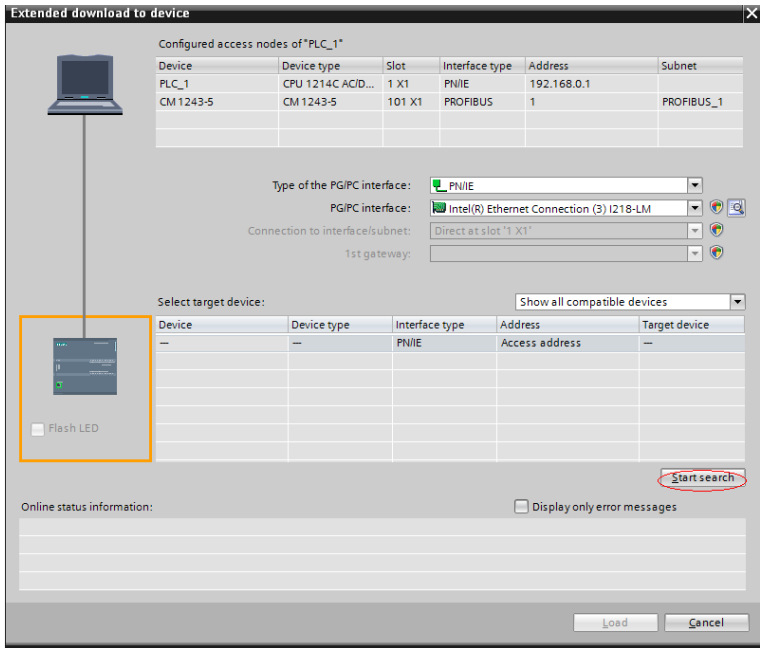
##### 5. Compile and download the configuration.

If the settings of multiple slaves are the same, select a configured slave, press Ctrl +C and then Ctrl+V (or right-click the configured slave and choose "Copy" and then "Paste") to connect other slaves to the network, and then modify their device IDs.

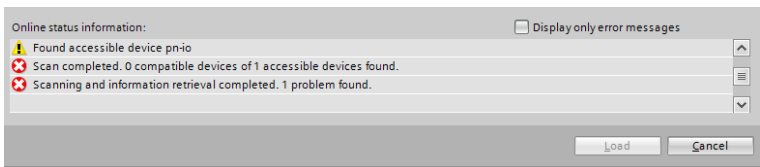
After every required slave is configured, save the configuration and click the Compile button. After the compiling is completed successfully, click the Download button.



On the displayed page, set the interface for the PC to communicate with the PLC. In this example, a local network port is selected. Then, click "Start search" to search for the PLC.



If no accessible device is found, the connection between the PC and PLC is faulty. Eliminate the fault first. (This problem also occurs if the PC downloaded configurations through Ethernet in STEP 7 before. In this case, restart the PC or change the PG/PC interface to a non-Ethernet interface in STEP 7.)



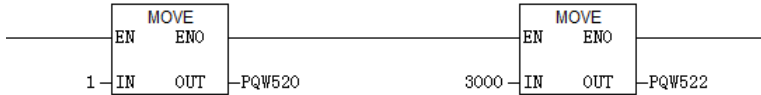
If the connection is normal, the "Load" button is available. You can click "Load" to download the configuration to the PLC as instructed.

### 3.3.4 Performing Periodic Read/Write Operations on the AC Drive Slave

In this example, the PLC is S7 315-2PN/DP, and the following figure shows the address assignment.

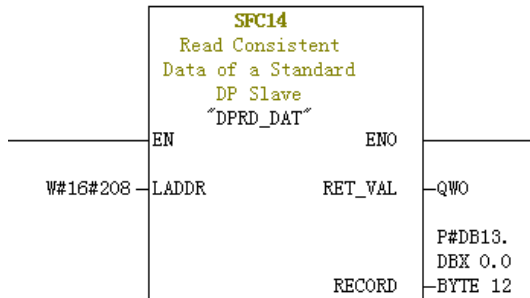
S...	DP ID	Order Number / Designation	I Add...	Q Address	Comment
1	4AX	FP0-02	512...519	512...519	
2	6AX	--> FP0-02	520...531	520...531	

1. Directly use the MOVE command to enable the AC drive to run in forward direction at the target frequency of 30 Hz (F0-02 = 2, F0-03 = 9), as shown in the following figure.

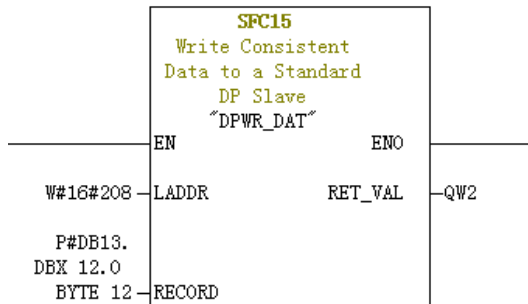


Other data is written in a similar way. The read data can also be transmitted from the PIW register to the common Q, I, L, M, or D register using the MOVE command for parsing.

2. Use SFC14 and SFC15.



- **LADDR:** Starting address configured in the I block of the module, which must be in hexadecimal format.
- **RET\_VAL:** Return value. If an error occurs during function activation, the return value contains an error code. If no error occurs, 0 is returned.
- **RECORD:** Target area of the read user data. Its length must be consistent with the length of the module configuration selected in STEP 7. Only the byte data type is allowed.

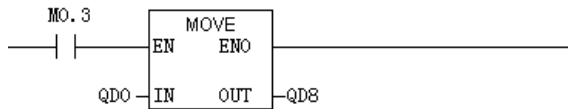
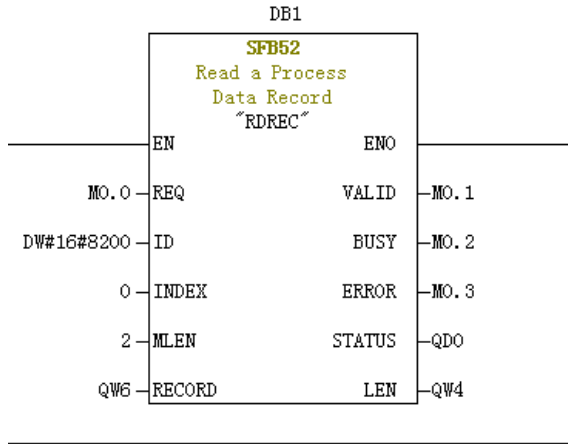


- **LADDR:** Starting address configured in the Q block of the module, which must be in hexadecimal format.
- **RET\_VAL:** Return value. If an error occurs during function activation, the return value contains an error code. If no error occurs, 0 is returned.
- **RECORD:** Source area of the user data to be written. Its length must be consistent with the length of the module configuration selected in STEP 7. Only the byte data type is allowed.

For both SFC14 and SFC15, the addresses must be in hexadecimal format converted from the I and Q starting addresses (in this example, the address is 520, which is H208 in hexadecimal format). The length of **RECORD** must be consistent with the BYTE length of the PPO type PZD (in this example, PPO2 is used, which includes six PZDs, that is, a total of 12 bytes).

### 3.3.5 Performing Aperiodic Read/Write Operations on the AC Drive Slave

To perform aperiodic read and write operations on the AC drive PROFIBUS DP slave, Siemens's system function modules SFB52 (for reading) and SFB53 (for writing) are required. Create an organization block in the program, and add relevant function blocks and programs in the organization block.



After M0.0 is set, the function block reads F0-02 (Index 0 has been set to F0-02 before) of the AC drive No. 3 and saves it in QW6. The fields are defined as follows:

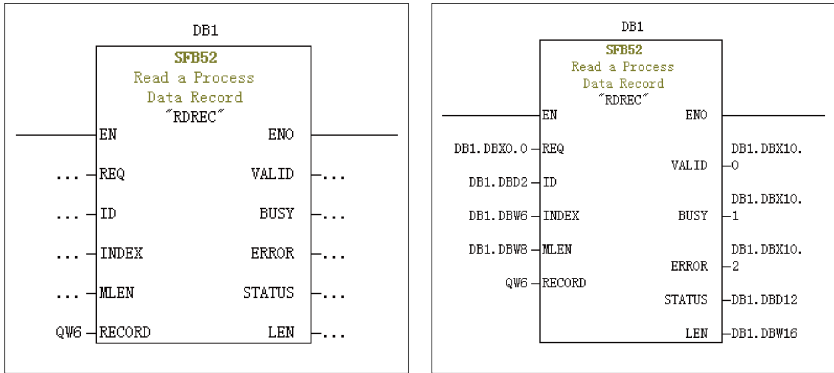
- **REQ:** Command enable. When this field is set to 1, the function block is enabled.
- **ID:** Logic address. To specify this field, convert any Q address of the corresponding AC drive slave to a hexadecimal value, and set bit 15 of the value to 1. For example, for Q512, the hexadecimal value is H200. After bit 15 is set to 1, H8200 is obtained.

S...	DP ID	...	Order Number / Designation	I Add...	Q Address	Comment
1	4AX		PPO-02	512...519	512...519	
2	6AF		--> PPO-02	520...531	520...531	

- **INDEX:** Index number, ranging from 0 to 5. This field can be customized to an index mapping address of a slave as required.
- **MLEN:** Maximum length of the data to be obtained. For MD38DP2, this field must be set to 2.
- **RECORD:** Target area of the obtained data record. This field is used to store read data when the read operation is performed and sent data when the write operation is performed.

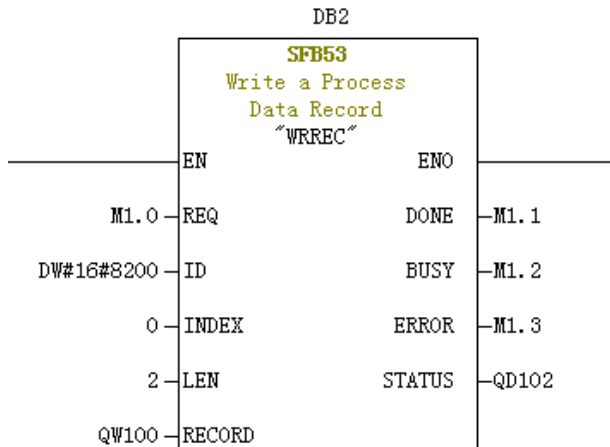
- **VALID:** New data record received and valid.
- **BUSY:** When the value is **ON**, the operation is not completed.
- **ERROR:** Error flag. When the value is **ON**, an error occurs.
- **STATUS:** Block status or error information.
- **LEN:** Length of the obtained data record.

During invocation, you can customize parameters or use some or all default parameters, as shown in the following figure.



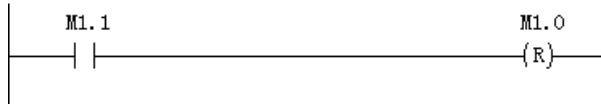
In the preceding figure, default parameters are used on the left. In this case, parameters are set according to the information shown on the right. You can set customized or default parameters for corresponding blocks as required.

Aperiodic write operations are performed in a similar way as aperiodic read operations. The **RECORD** field stores data to be written, as shown in the following figure.



Note that before running an organization block, you need to download data blocks (above the function block, DB1 and DB2 in this example) to the PLC. Otherwise, an error indicating that the DB blocks are not loaded will be reported.

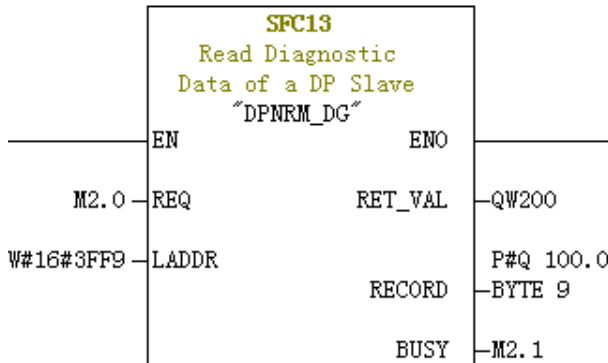
SFB53 is used to perform operations on the EEPROM. Therefore, the program is required to invoke relevant operations when required and disable relevant operations in time. As shown in the following figure, after the write operation is complete (M1.1 is set to 1), the program is invoked to reset M1.0.



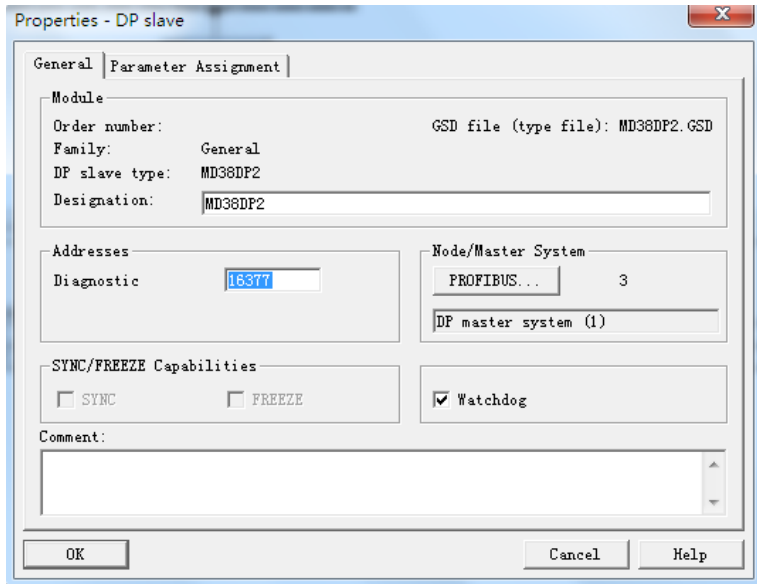
When SFB52 and SFB53 are executed, relevant blocks need to be invoked for multiple times. Therefore, do not invoke them when single execution is required.

### 3.3.6 Diagnosis

You can use SFC13 in the program to obtain specific diagnosis information of each slave, as shown in the following figure.



- **REQ:** Command enable. When this field is set to **ON**, diagnosis information reading is initiated.
- **LADDR:** Configured diagnosis address of the PROFIBUS DP slave. The following figure shows the actual value. For SFC13, the address must be specified in hexadecimal.



- **RET\_VAL:** Error code (negative) when an invocation error occurs or actual length of transmitted data (positive) when no error occurs.
- **RECORD:** Target area of the read diagnosis data. The value must be 9 bytes. Otherwise, an error is reported during invocation. The 9 bytes are defined as follows:
  - Bytes 0–2: Station status
  - Byte 3: Master number
  - Byte 4: Supplier ID (high-order byte)
  - Byte 5: Supplier ID (low-order byte)
  - Byte 6: Dedicated device diagnosis length (fixed to 3)
  - Byte 7: Dedicated device diagnosis (high-order byte)
  - Byte 8: Dedicated device diagnosis (low-order byte)
- **BUSY:** When this field is **1**, reading is not complete. Device-specific diagnosis provides relevant AC drive fault information, which is consistent with the value of U0-62. When the communication between the MD-SI-DP1 expansion card and AC drive is interrupted, 0x34 is returned.

## 4 Troubleshooting of Communication Faults

The following table describes the faults that may occur during the use of the DP card with the AC drive.

Fault	Measure
<p>After the AC drive is powered on, only the power indicator (D4) is on. This means that communication between the DP card and the AC drive is not established.</p>	<ul style="list-style-type: none"> <li>• Check that F0-28 is set to 1.</li> <li>• Check the AC drive type. This user guide covers MD380 and MD500 only. To use the DP card with other AC drives, contact the technical support center to obtain the applicable user guide.</li> <li>• Check whether the software of the AC drive supports the DP card.</li> </ul>
<p>After the AC drive is powered on, the power indicator (D4) is on and the AC drive communication indicator (D2) blinks.</p>	<p>Set the device ID correctly (within the range of 1 to 125). Note that position 8 of the DIP switch is the least significant bit of the address.</p>

Fault		Measure
The connection fails after the configuration is downloaded.	After the configuration is downloaded, indicators D2 and D4 on the DP card are steady on while the yellow indicator D3 is off.	<ul style="list-style-type: none"> <li>• Check that the cable is properly connected.</li> <li>• Check the DIP switches on the DP connectors. The DIP switches on the DP connectors of the first and last AC drives on the network must be set to ON, whereas the DIP switches on other DP connectors must be set to OFF.</li> <li>• If the AC drive is the last device on the network, check that the communication cable is connected to the IN port of its DP connector. (If the communication cable is connected to the OUT port, the OUT terminal is not connected to the network even when the DIP switch of the DP connector is set to ON.)</li> <li>• Check that the device ID setting on the DP card is consistent with the configuration. Position 8 of the DIP switch is the least significant bit of the address.</li> <li>• Check that the GSD file used in the configuration is correct.</li> </ul>
	After the configuration is downloaded, indicators D2 and D4 on the DP card are steady on while the yellow indicator D3 blinks slowly at about 1 Hz to 2 Hz.	<ul style="list-style-type: none"> <li>• Check that the GSD file used is correct.</li> <li>• Check that the PZD mapping is set correctly. Device-specific parameters in STEP 7 and PORTAL must be set in decimal format. Therefore, you need to convert the parameter numbers to decimal values when setting device-specific parameters. For example, FC-11 is expressed as 64523 in decimal (and 0xFC0B in hexadecimal). If you set a parameter number that is not supported by the AC drive, the connection fails. Also note that PZD mapping does not support Modbus addresses, such as H2000 and H8000.</li> </ul>
	After the configuration is downloaded, the yellow indicator D3 on the DP card blinks quickly.	The PLC is not running. Check the PLC status and locate the fault cause (possibly because the OB block does not exist).

Fault		Measure
After the connection is established, all the indicators on the PLC are green, but data cannot be written into or read from the AC drive.	No data can be written/read.	Check whether the operated address is correct. No matter whether the PPO type used contains the PKW area, the address for the read or write operation is located in the second row (namely, the last row). For example, if the I address and Q address in the last row of the station are both 520 to 531 (note that the I and Q addresses may start from different numbers), the PZD1 written into the AC drive is stored in QW520, PZD2 is stored in QW522, and so on. (If the PLC is an S7-300 or S7-400 master, PQW is required.) If SFC15 is used, check whether RET_VAL of the SFC15 block is 0. If not, an invocation error exists. Eliminate the error first and invoke the block again. For details, see <a href="#">"3.3.4 Performing Periodic Read/Write Operations on the AC Drive Slave" on page 38.</a>
After the connection is established, all the indicators on the PLC are green, but data cannot be written into or read from the AC drive.	PZD3 or subsequent data can be written, but PZD1 or PZD2 cannot be written/read.	Check that F0-02 is set to 2 and F0-03 is set to 9. Check whether the command value (not the bit value) is in the range of 1 to 7 and the frequency reference value is in the range of -F0-10 to +F0-10. If not, the write operation fails. Check whether FE-00 is consistent with U3-17 and FE-01 is consistent with U3-16. If not, manually correct the parameter values or restore to factory settings.
	PZD1 and PZD2 can be written/read, while PZD3 or subsequent data cannot be written/read.	Check whether the PPO type supports the relevant PZD fields. Check whether device-specific parameters are set correctly.
	-	Check the logic relations. Check whether one PZD field is assigned with values by multiple devices in a certain logic relation (check whether the value given by the PLC is correct under the logic relation in the monitoring table of the PLC).
After communication is established, the AC drive reports ERR16, which cannot be cleared. However, the indicators on the DP card and the BF indicator on the PLC are normal.		In the PLC program, check whether the value converted from the high-order 8 bits of PZD1 (QW data) written to the AC drive is 0. If not, change it to 0. Note that the PZD1 command in this user guide refers to a value instead of the bits. <b>Note:</b> This solution applies to MD380 and MD500 only. For other AC drives, consult the technical support center.

Fault	Measure
After communication is established, the communication is normal when the AC drive is not running. However, when one or more AC drives are running, the AC drive is disconnected randomly.	<ul style="list-style-type: none"> <li>• Disconnect the power supply and measure the resistance between A1 and B1 of the PROFIBUS DP slave connector at the farthest end with a multimeter. The resistance must be <math>100 \pm 20 \Omega</math>.</li> <li>• Check that the shield layers of cables are connected together and the shield layers are in good contact with the sheet metal in the PROFIBUS DP connector. The shield layers are not required to connect to other GND terminals.</li> </ul>
After the connection is established, the AC drive reports a fault. After the PLC configuration is changed and downloaded again or after the AC drive alone is powered on again, the faulty slave still cannot connect to the network.	The DP card only supports the interruption mode DPV0. If the interruption mode is set to DPV1, when a slave is faulty, the PLC master may disable the DP connection channel of the slave or disable all the PLC communication (which usually occurs on an S7-1200 master). When such a problem occurs, go to the page of general DP parameters and change the PROFIBUS DP interruption mode of the slave to DPV0 (the mode is DPV0 by default in STEP 7 and DPV1 by default in PORTAL). Then, compile and download the configuration, and power on the PLC again.

### Indicator status and troubleshooting

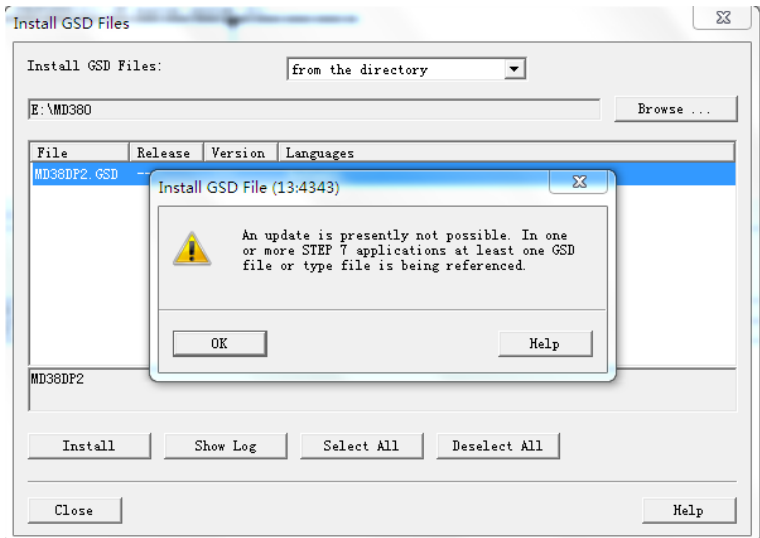
Indicator*	Status	Fault	Measure
Red (D4)	OFF	The DP card is not powered on.	Check that the DP card is securely connected to the AC drive.
Green (D2)	OFF	The connection between the DP card and the AC drive fails.	Check that F0-28 is set to 1 and the DP card is securely connected to the AC drive.
Green (D2)	Blinking at 1 Hz	The connection between the DP card and the AC drive is not successful.	Check that the PROFIBUS DP device ID is within the range of 1 to 125.
Yellow (D3)	Blinking at 1 Hz	A configuration error occurs.	Check that the GSD file is correct.
Yellow (D3)	Blinking at 2 Hz	A parameter error occurs.	Go to the page of device-specific parameters to check that all the parameter addresses are supported by the AC drive.
Yellow (D3)	Blinking at 5 Hz	The master is not running.	Check the master status.
Yellow (D3)	OFF	The connection between the DP card and the PROFIBUS master fails.	Check that the slave address is correct and the PROFIBUS cable is connected properly.

## Note

On some models, the indicators may have colors different from those described in this guide. In any case, the indicators are D2, D3, and D4 from top to bottom. See .

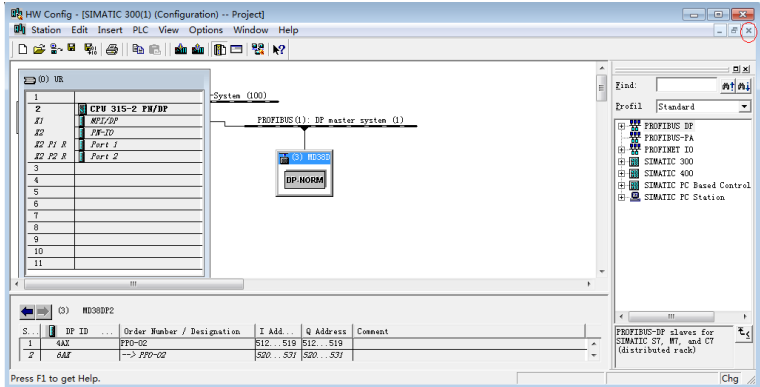
### Troubleshooting for GSD installation failure

- Problem 1: The GSD file cannot be installed or updated when STEP 7 is used, as shown in the following figure.

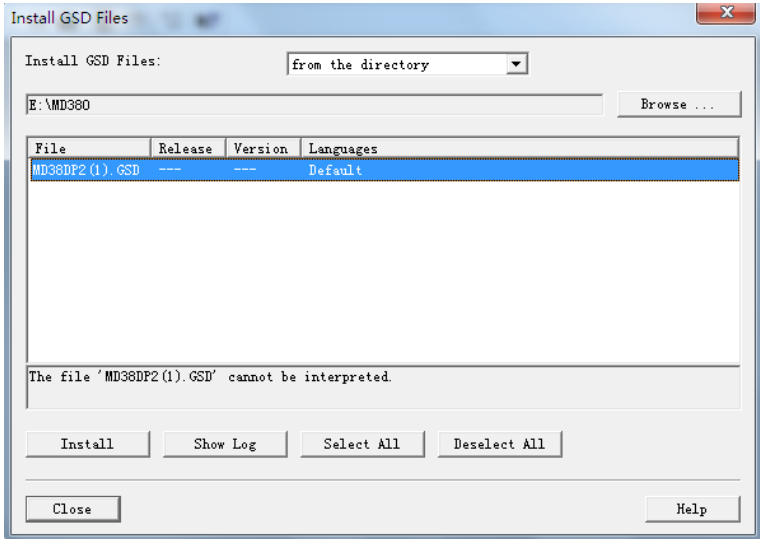


Possible cause: The current hardware configuration interface is opened and the GSD file is being used by other components.

Solution: Close the current configuration interface by clicking the Close button (marked with a red circle in the following figure). Then, install or update the GSD file and open the configuration interface again.



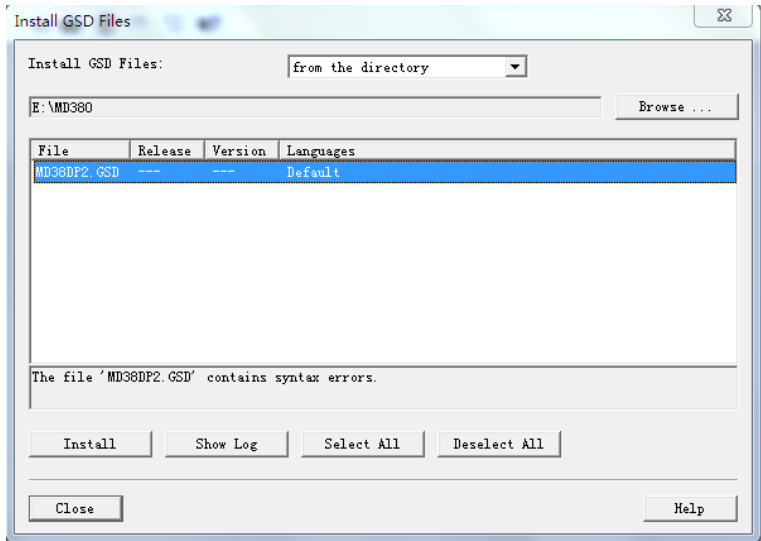
- Problem 2: The file cannot be interpreted.



Possible cause: During the GSD file transmission, the file name is changed manually or by the transmission tool. In this case, the file name fails to meet the PROFIBUS requirements.

Solution: Change the GSD file name to MD38DP2.GSD.

- Problem 3: The file contains syntax errors.



Possible cause: The GSD file is modified.

Solution: Use a correct GSD file.

- Other cases

Some versions of STEP 7 and PORTAL do not support a path that contains Chinese for installing the GSD file. In this case, store the GSD file in a path that does not contain Chinese characters.



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