MICROCYBER

NCS-TT108 Temperature Transmitter User Manual

Content

Chapter 1 Overview

NCS-TT108 Smart Temperature Transmitter, using the fieldbus technology, is a new generation of smart fieldbus temperature transmitter and it is an indispensable field device for process control. NCS-TT108 transmitter integrates abundant function blocks and realizes not only general measurement function but also complicated control strategy.

NCS-TT108 Smart Temperature Transmitter supports eight-channel temperature sensor input. It applied to a variety of thermal resistance and thermocouple sensors and has wide range. Each channel support individually configure the sensor type and two-wire system and three-wire system connections of the thermal resistance. Eight channels are divided into four groups of temperature acquisition modules, with the security isolation between modules. Each temperature acquisition module has two temperature input channels.

NCS-TT108 Smart Temperature Transmitter adopts PVC fire-retardant plastic shell, which can be installed in the control room. When it is required to be installed outdoors, outdoor Aluminum box, with a water-proof body and die-cast aluminum materials, must be selected.

NCS-TT108 uses digital technology. It has simple interface between field and control room, which reduces the expense of installation, operation and maintenance.

NCS-TT108 supports FF and PA protocols. It can be widely used in the petroleum, chemicals, electricity, and metallurgical industries, etc.

Chapter 2 Installation
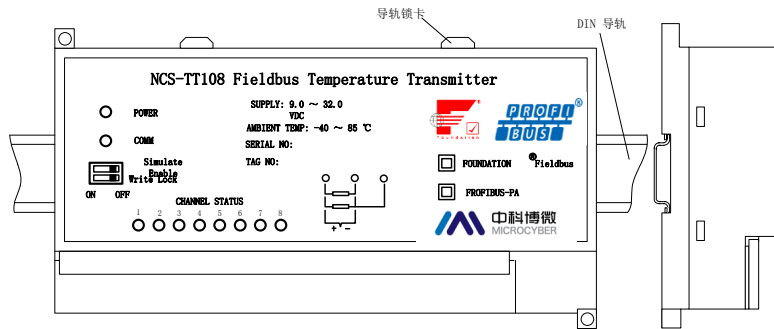
2.1 Mount of Transmitter
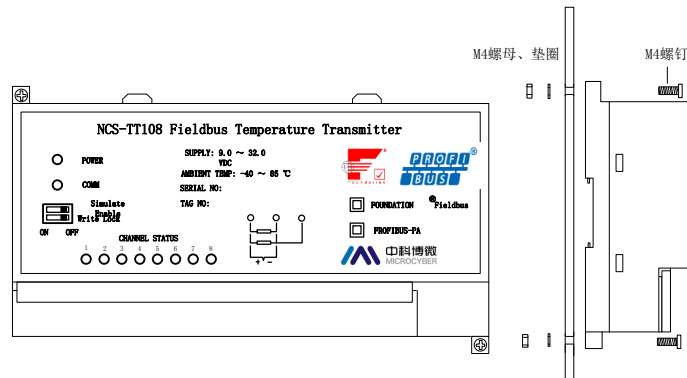

Figure 2.1 Mount of guide rail

Figure 2.2 Mount of screw

When the temperature transmitter needs mounting in outdoor, it must be mounted in outdoor box, whose case material is die-casting aluminum, and cable seal point is copper chroming.
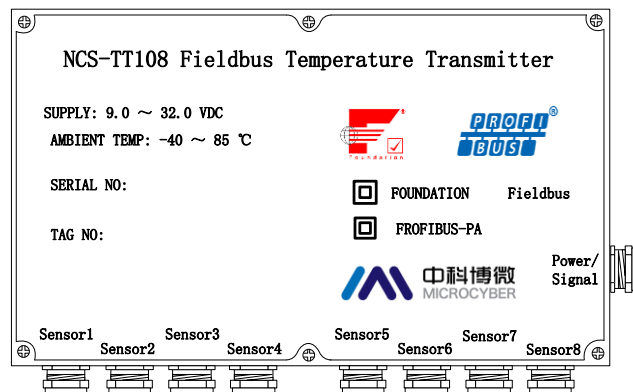
Figure 2.3 Outdoor case
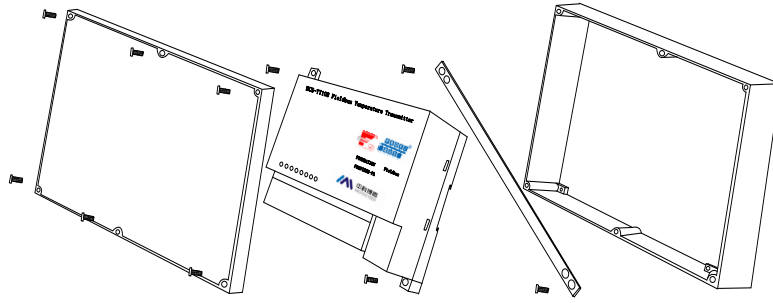
Figure 2.4 Mounted in outdoor box
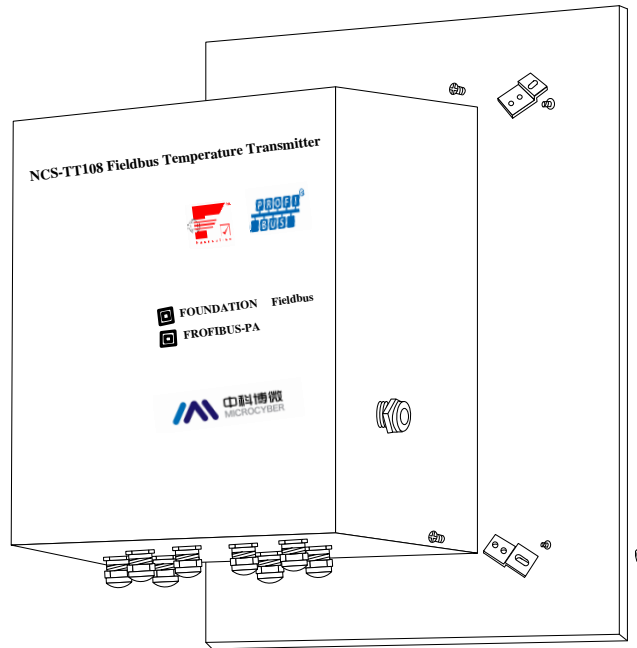
Figure 2.5 Outdoor case surface mounting

2.2 Connection

NCS-TT108 Temperature transmitter's power and bus signal share one couple cable, called bus cable. Customer is advised to use dedicated cable especially for fieldbus, recommended by IEC61158-2. The bus connection terminal of this temperature transmitter is positioned at the very right of connection terminals. From left to right, they are 'bus+', 'bus-'and 'earth', as showed in the following figure.

Of the left terminals of sensor's signal connection terminal strip, every three terminals in sequence form one channel's connection terminal, and will connect channel one to channel eight sensors, from left to right in sequence. The detailed connection mode is showed as following figure.
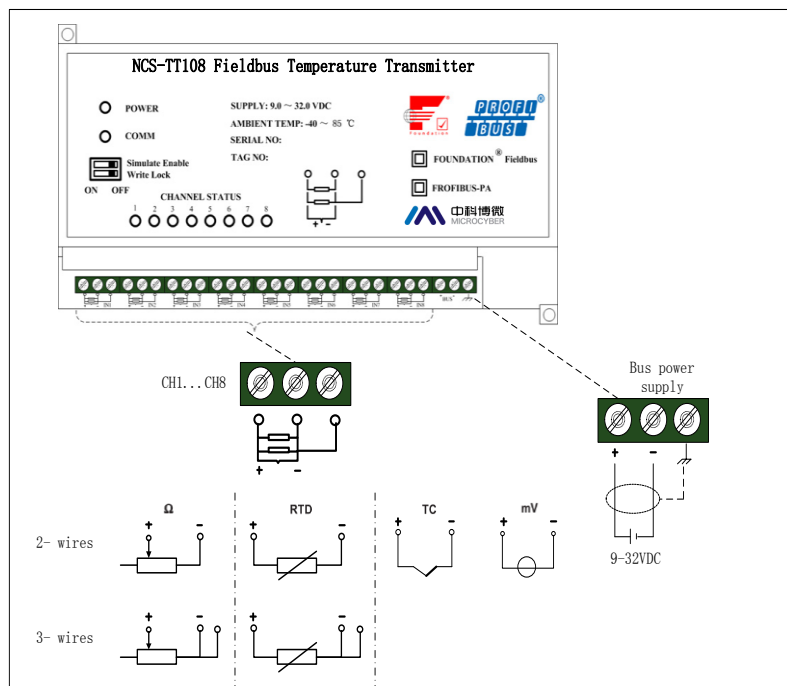
Figure2.6 Temperature transmitter connection

Signal cable and bus cable shall not share wiring tube or open wire trunking with other device and shall be far away from high-power device.
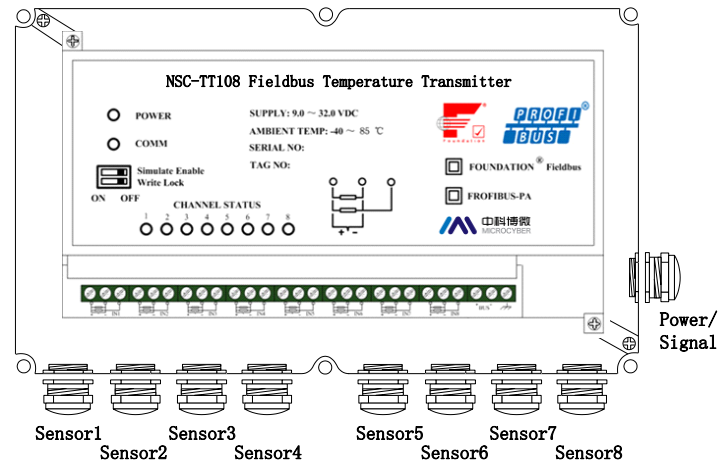
Figure2.7 Cable sealing connector

There are nine cable sealing connectors for outdoor box. The connector on side wall, labeled 'Power/Signal', should connect fieldbus cable, and cable connectors on inferior wall should connect every channel sensor to connect cable, from left to right they are channel one, channel two…channel eight in sequence.

Chapter 3 Working Principle and Structure

NCS-TT108 collects thermo resistance and thermocouple signal, which is converted into fieldbus signal after arithmetic and handling, and achieves temperature measurement functions.

NCS-TT108 mainly consists of two parts. The hardware structure is shown as Figure 3.1.

1. Communication board: It is the core component of smart temperature transmitter. It provides fieldbus communication, control, diagnosis and maintain.

2. Instrument board: It connects 8-channel temperature transmitter, converts the temperature sensor's signal to digital signal and finishes temperature arithmetic. It provides the signal to communication board via isolation communication interface, connects the bus and converts to communication board.
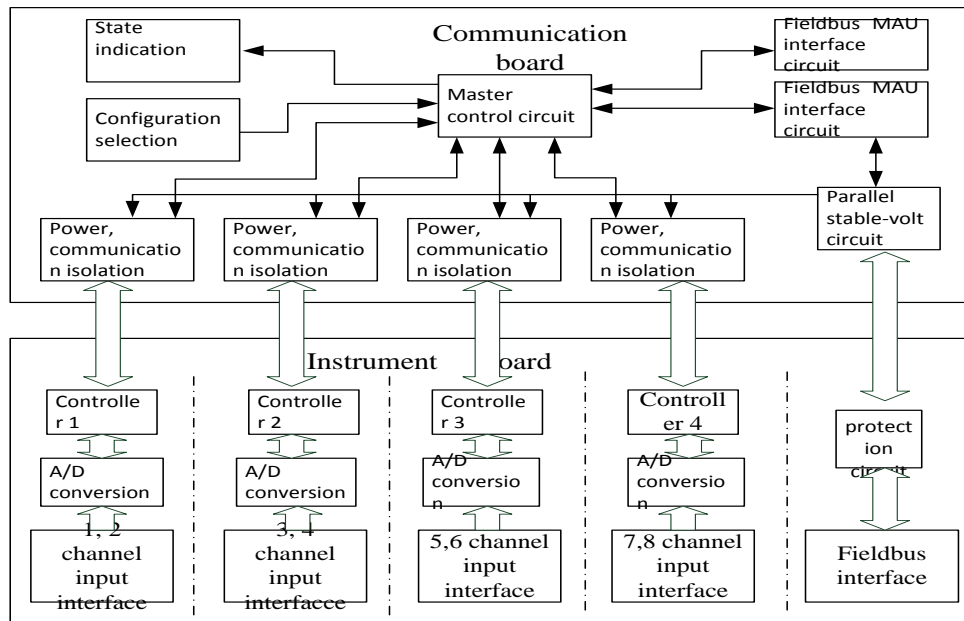
Figure 3.1 Hardware diagram of smart temperature transmitter

3.1 Principle Introduction

Instrument board interface is connected to field bus. Via pressing, over-current protection to communication board, which is in parallel with stable-volt circuit, to produce 3.3V direct current. Via four groups of isolation—DC/DC isolation module, it achieves stabilivolt again, and provides volt to four groups of temperature collecting module. Every group of temperature collecting module includes two-channel temperature converting unit. Each single channel alone can set sensor type and thermo resistance wiring; Via four magnetic isolation component, communication Board's master control circuit serial communicates with four groups of collecting module, and can set and

read temperature value respectively. Four groups of temperature collecting module are isolated respectively. Within collecting modules, two temperature input channels are not isolated.

Communication board indicates the working state of temperature transmitter via ten indicator lights. Two DIP switches set configuration. Master control circuit visits circuit via media, and communicates with field bus.

3.2 Dimensions

Dimensions are shown as the following:
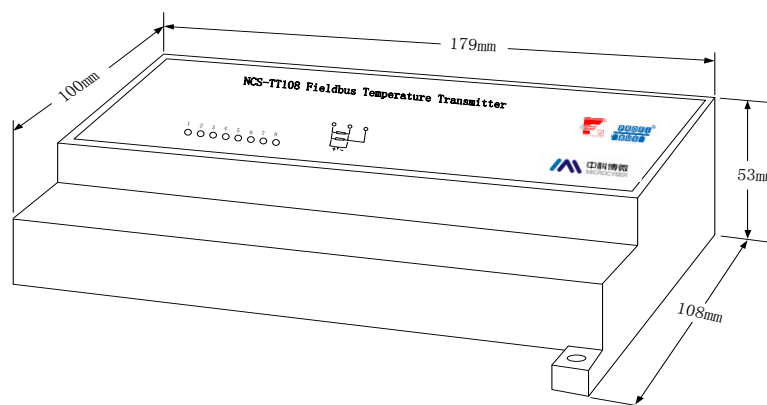
Figure 3.2 Dimensions

3.3 Structure
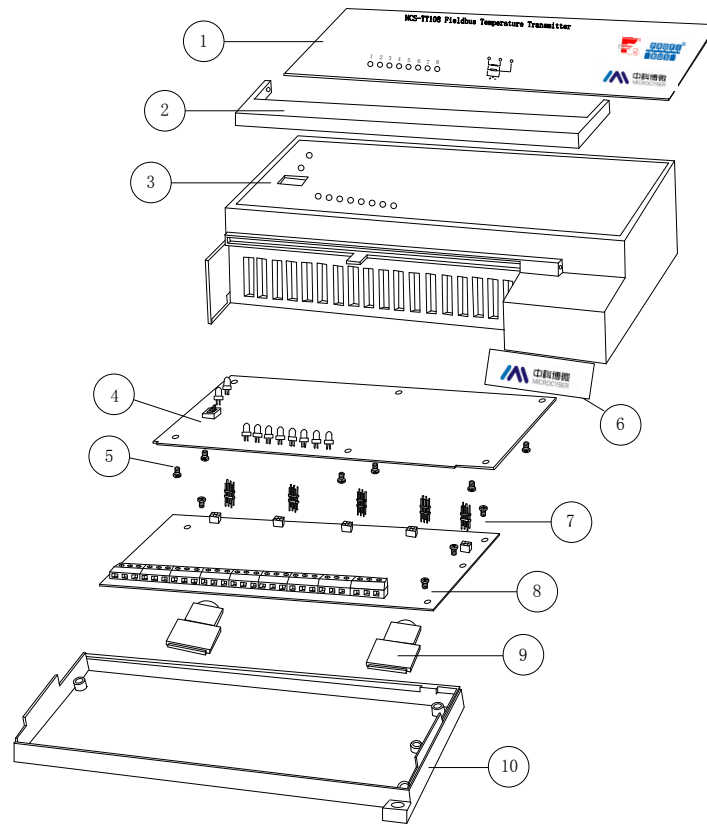
1	PVC film	2	Block board	3	Roof cover	4	Communication board
5	Tightening screw	6	PVC label	7	Pin	8	Instrument board
9	Rail guide lock	10	Bottom cover				

Figure 3.3 Transmitter structure

Chapter 4 NCS-TT108 FF Configuration

4.1 Topology Connection

NCS-TT108 Smart Temperature Transmitter supports many kinds of connection, as shown in Figure 4.1. In Figure 4.2, there's a transmitter bus connection, and the bus ends are connected with terminal matching resistance, which ensures the signal quality. The maximum length of bus is 1900m and it can be prolonged to 10km with repeaters.

Figure 4.1 FF network topology

Figure 4.2 FF bus connection

4.2 Function Block

NCS-TT108 Smart Temperature Transmitter realizes FF standard blocks, shown as below. Please refer to related FF Protocol documents for detailed info about function block setting.

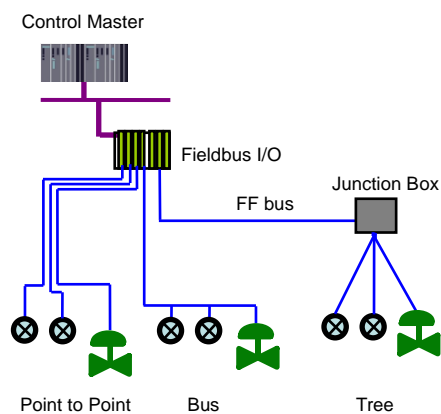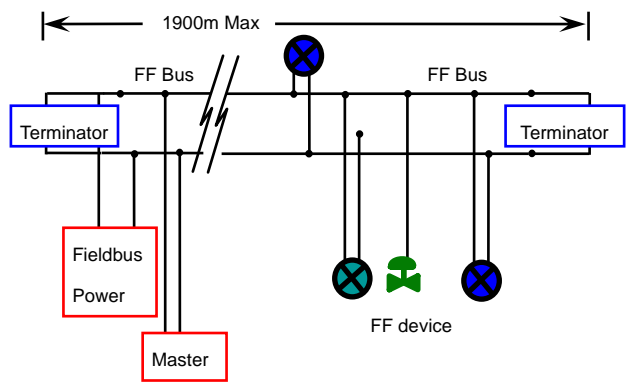| Function Block	Description
Resource	Resource block is used to describe device characters in the field, such as device name, manufacture, serial number. There is no input or output parameter in resource block. Generally there is only one resource block for each device.
Sensor Transducer	Temperature sensor transducer block reads physical channel data of temperature sensor, and has data processing based on sensor type. It's used for AI or MAI function block.
Differential Transducer	By parameter setting, differential transducer block may realize difference calculation of any two physical channels.
AI	Analog input function block is used to achieve transducer block input data and transfer it to other function blocks, and has the function of range conversion, square root, cut mantissa, etc.
MAI	Multi-channel analog input function block is used to achieve input data of several transducer blocks, and may transfer it to other function blocks.
ISEL	Input selection function block selects input based on options, such as options of max., min., or medium value, etc., to calculate output.

4.3 Transducer Block Configuration

Smart temperature transmitter supports FF Configuration Software, NCS4000 Configuration Software from Microcyber, NI-FBUS Configurator from NI, Delta V from Rosemount, etc. Now take NI-FBUS Configurator as an example to introduce the configuration method of smart temperature transmitter.

- Configuration Environment

(1) PC, Windows 2000 or Windows XP;

(2) NI-FBUS interface card, H1 bus power, H1 terminator;

(3) NI-FBUS Configurator.

- Sensor Type Configuration

Sensor type of corresponding physical channel can be set by modifying each sensor transducer block SENSOR_TYPE parameter, such as PT100, CU50, etc.
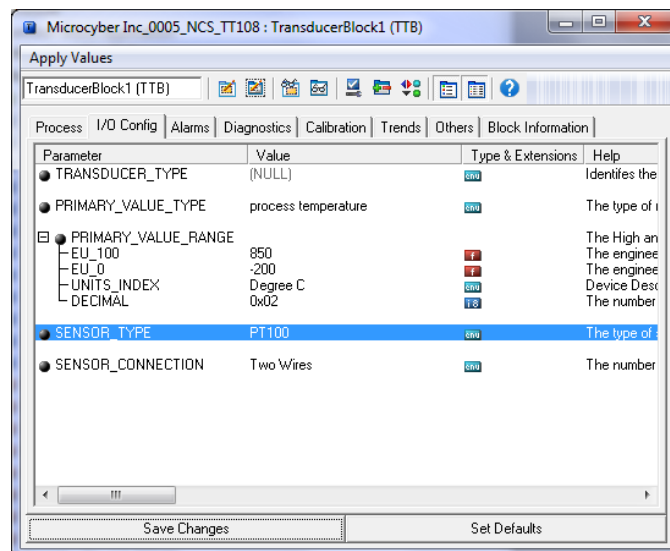
Figure 4.3 Sensor type configuration

- 2-wire Zero Point Calibration Configuration

For 2-wire measurement, 2-wire zero point calibration can be realized by modifying sensor transducer block's TWO_WIRES_COMPENSATION parameter. Firstly, give zero point value to channel to make a short circuit. Then set the TWO_WIRES_COMPENSATION parameter as "Start" to write in. If it is successful, read the parameter. If the parameter value is "Finished", it means that 2-wire zero point calibration is successful.

● Enable Cold End Compensation

If the sensor is thermocouple, transducer block BODY_TEMP parameters show cold end temperature value. The sensor firstly enables cold end compensation by default. The user also may set cold end compensation via parameter BODY_TEMP_COMPENSATION. When it is set as "Enable", it enables cold end compensation. At this time, PRIMARY_VALUE value is the temperature value after cold end compensation. When it is set as "Disable", the cold end compensation is forbidden. At this time, PRIMARY_VALUE value is the temperature value without cold end compensation.

● 2-point Linearization Calibration

Smart temperature transmitter has strict calibration in factory. Generally, it is not necessary for user to calibrate. The user can use CAL_POINT_HI, CAL_POINT_LO and CAL_UNIT to realize 2-point linearization calibration. The operation steps shown as following:

(1) Make sure and set SESOR_TYPE, and set CAL_UNIT according to sensor type. Now it supports Celsius, Ohms and MV.

(2) Set transducer block MODE parameter as "OOS", and then set the SENSOR_CAL_METHOD as "User Trim Standard Calibration".

(3) Give standard data to channel to calibrate via standard source, when the input is stable, write calibration data to CAL_POINT_HI or

CAL_POINT_LO according to upper limit calibration or lower limit calibration. It is successful if there is no write error.

Notes: The calibration will be failed if there is a great deviation between write-in calibration data and practical input channel data.

● Differential Transducer Block Configuration

Smart temperature transmitter has 4 differential transducer blocks, by which, realize difference calculation between any two physical channel data. Select sensor transducer block via parameter INPUT_A and INPUT_B. Configure difference calculation type via parameter DIFFRENTIAL_TYPE. If DIFFRENTIAL_TYPE ="Not Used", difference calculation isn't done by the differential transducer block. If DIFFRENTIAL_TYPE ="Input A - Input B", output of the difference transfer block is INPUT_A - INPUT_B. If DIFFRENTIAL_TYPE ="Absolute", output of the difference transfer block is absolute value of difference between INPUT_A and INPUT_B. What calls for attention is that the two sensor transducer blocks to do difference calculations must use the same unit; otherwise, output of differential transducer block will display "Bad Configuration Error".
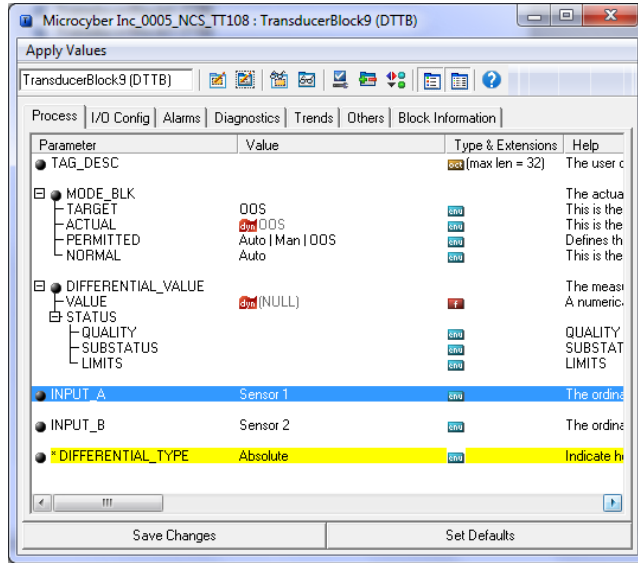
4.4 Parameter List of Temperature Sensor Transducer Block

Index	Parameter Name	Parameter Description
1	ST_REV	Static Version
2	TAG_DESC	Tag No.
3	STRATEGY	Strategy
4	ALERT_KEY	Alert ID number
5	MODE_BLK	Mode
6	BLOCK_ERR	Error
7	UPDATA_EVT	Update affair of static data
8	BLOCK_ALM	Function block alarm
9	TRANSDUCER_TYPE	Transducer block type
10	XD_ERROR	Transducer block error description
11	PRIMARY_VALUE_TYPE	Primary value types are "Process Temperature" and "Non Process Temperature"
12	PRIMARY_VALUE	Primary value is channel measurement data, which is transferred to function block AI and MAI via CHANNEL of function block.
13	PRIMARY_VALUE_RANGE	Range and unit of primary value. The unit shall be the same with XD_SCALE of function block AI. Otherwise, function block AI will display "Configuration Error".
14	SENSOR_TYPE	Sensor types are "0-500 Ohms", "0-4000 Ohms", "CU50", "CU100", "PT100", "PT1000", "-/+100mV", "T/C Type B", "T/C Type E", "T/C Type J", "T/C Type K", "T/C Type N", "T/C Type R", "T/C Type S" and "T/C Type T".
	SENSOR_RANGE	Sensor range, there will be different ranges based different sensor types.
15	SENSOR_SN	Sensor Serial No.

16	SENSOR_VERSION	Version number of sensor measurement board
17	SENSOR_CONNECTION	Sensor wire system, supports two-wire system and three-wire system.
18	CAL_POINT_HI	Summit calibration value. Its unit is assigned by CAL_UNIT.
19	CAL_POINT_LO	Lowest point calibration value. Its unit is assigned by CAL_UNIT.
20	CAL_MIN_SPAN	Min span permitted by calibration. The min span guarantees smooth calibration progress, and make the distance between the highest and lowest points of the calibration not too close. Its unit is assigned by CAL_UNIT.
21	CAL_UNIT	Calibration unit, now only supports Celsius, Ohms and MV.
22	SENSOR_CAL_METHOD	Calibration method may select "Factory Trim Standard Calibration" and "User Trim Standard Calibration".
23	SENSOR_CAL_LOC	Calibration location record.
24	SENSOR_CAL_DATE	Calibration data record.
25	SENSOR_CAL_WHO	Calibration personnel record.
26	BODY_TEMP	Instrument temperature. It is cold end temperature.
27	BODY_TEMP_UNIT	Unit of BODY_TEMP
28	BODY_TEMP _COMPENSATION	Enable cold end temperature compensation.
29	TWO_WIRES _COMPENSATION_CMD	2-wire system calibration command
30	SENSOR_STATUS	Sensor status includes "Enabled", "Disabled", "Open circuit", "Cfg Error" and "Comm Error".
31	SENSOR_AD_DATA	Sensor data of AD gather
32	BODY_AD_DATA	Instrument temperature data of AD gather

4.5 Parameter List of Differential Transducer Block

Index	Parameter Name	Parameter Description
1	ST_REV	Static version
2	TAG_DESC	Tag No.
3	STRATEGY	Strategy
4	ALERT_KEY	Alert ID number
5	MODE_BLK	Mode
6	BLOCK_ERR	Error
7	UPDATA_EVT	Update affair of static data
8	BLOCK_ALM	Function block alarm
9	TRANSDUCER_TYPE	Transducer block type
10	XD_ERROR	Transducer block error description
11	DIFFERENTIAL_VALUE	Differential value, is difference data after calculation.
12	DIFFERENTIAL_VALUE	Differential value range, calculate based on selected sensor channel range.

	_RANGE	
13	INPUT_A	The first sensor to select difference calculation, from"Sensor 1" to "Sensor 8".
14	INPUT_B	The second sensor to select difference calculation, from"Sensor 1" to "Sensor 8".
15	DIFFERENTIAL_TYPE	Difference calculation type, 0:"Not Used", 1:"Input A - Input B", 2:"Absolute".

4.6 Configuration Setting and Indicating

NCS-TT108 Smart Temperature Transmitter has two DIP switches, as shown in Figure 4.4:

Simulate Enable: Set "ON" to realize simulate function.

Write Lock: Set "ON", any write-in operation to temperature transmitter will be refused. This is to prevent that instrument's data is changed at random.
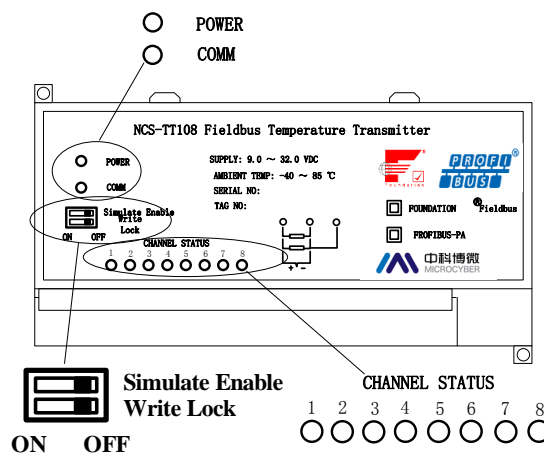

Figure 4.4 DIP switch of NCS-TT108 Smart Temperature Transmitter

NCS-TT108 smart temperature transmitter has ten indicating lights, to show bus power status, communication status and the working status of eight temperature input channels, as shown in the upper figure.

Input Channel Status Indicating:

CHANNEL STATUS
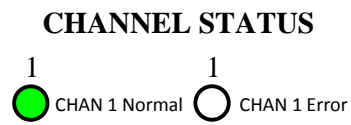
1   1

🟢 CHAN 1 Normal   ⭕ CHAN 1 Error

Figure 4.5 Status Instruction of Channel 1

0.5s is communication error;

1s is configuration error;

No.1 indicating light shows the status of the first temperature transfer channel, and so on; Indicating methods of the eight channels are the same.

Indicating of Power and Communication:

🟢   **POWER**   Bus power is normal.
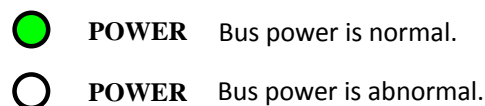
⭕   **POWER**   Bus power is abnormal.

Figure 4.6 Indicating of Power Status

"COMM" indicating light shows bus communication status. The indicating light flashes, when communication data package is sent and received in the connected field bus. The indicating light status is stationary, when the connected field bus is silent.

Chapter 5 NCS-TT108 PA Configuration

5.1 Topology Connection

NCS-TT108 PA Smart Temperature Transmitter supports many kinds of connection, as shown in Figure 5.1. In Figure 5.2, there's a transmitter bus connection, and the bus ends are connected with terminal matching resistance, which ensures the signal quality. The maximum length of bus is 1900m and it can be prolonged to 10km with repeaters.
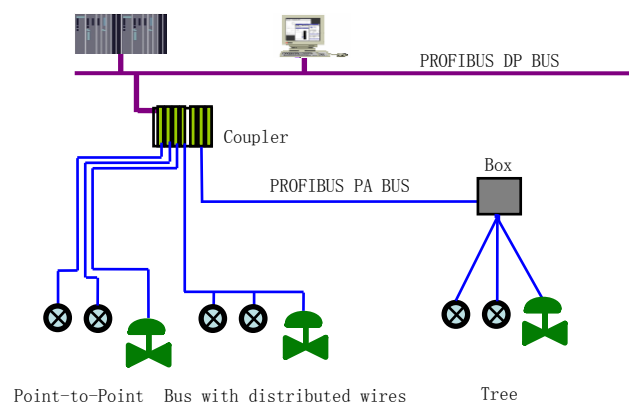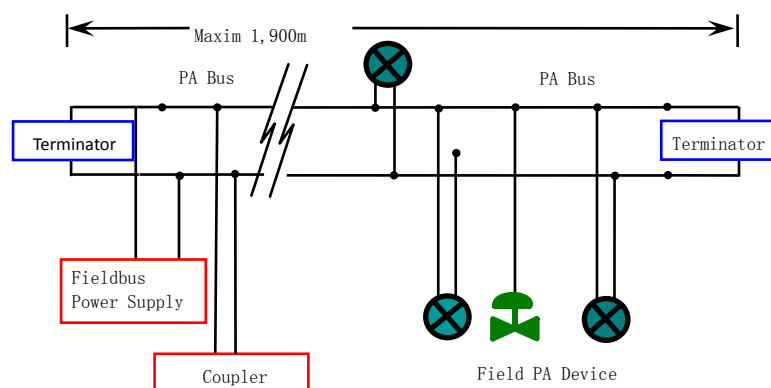

Figure 5.1 Profibus PA Network Topology

Figure 5.2 Profibus PA Bus Connection

5.2 Function Block

PA smart transmitter carries out the PA standard function blocks, shown as the table below. Please refer to related PA protocol document for detailed info about configutaion methods of function blocks.

Function Block	Description
Physical Block	Physical block describes device hardware information, recognizing and diagnosing information, including device number, software version, hardware version and installation dates, etc.
Transducer Block	Transducer block separates function blocks from the instrument input and output characteristic, it mainly carries out the function such as calibration and linearization for input and output data, and then provides the processed data to AI through the inner channel.
Analog Input Block	AI block gets simulation processing value from the inner channel, and then processes the value, providing proper measurement value to master station via bus communication.

5.3 Function Configuration

PA smart transmitter parameter configuration keeps to Profibus PA Specification Version 3.02. It can carry out read and write function for transmitter function block parameters with Simatic PDM, also is able to configure transmitter with Siemens Step7.

● **Configuration Environment:**

1) PC, Windows 2000 or Windows XP;

2)Siemens Step7 configuration software, PDM device management

software;

3) DP/PA coupler or linker;

4) I master station: e.g. PLC; II master station: e.g. CP5611 board;

5) PA terminator matcher;

6) Standard temperature source.

● **Temperature transducer block parameter configuration:**

Transducer block separates function block from sensors, actuators and other I/O devices. It depends on the device supplier to access and control I/O devices. Transducer block is able to get input data and set output data by accessing I/O devices. Generally, transducer block has the function of linearization, specialization, temperature compensation and data's control and exchange, etc. Transducer block structure is shown as Figure 5.3.
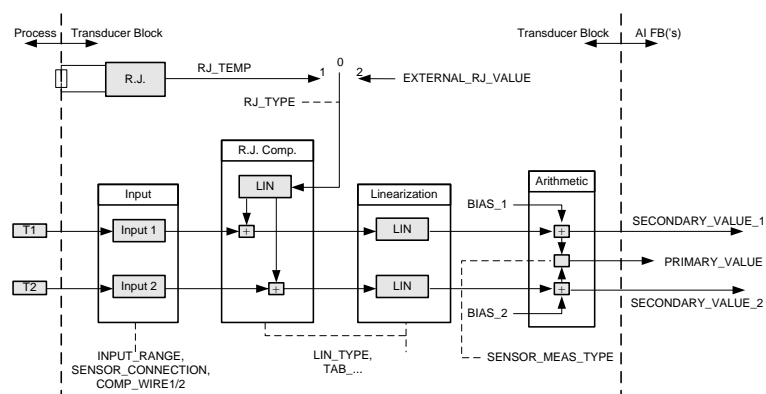

Figure 5.3 Transducer Block Structure

● **Parameters of transducer block are as follows:**

Parameter	Function Description
INPUT_FAULT_GEN	Input fault: includes the failure diagnosed objects of all values. 0: Device normal Bit 0: Rj Failure Bit 1: Hardware failure Bit 2-4: Reservation Bit 5: Manufacture designation Bit 6: Communication failure Bit 7: Manufacture designation
INPUT_FAULT_1	Input fault: the failure diagnosed objects related to SV_1 0: Input normal Bit 0: Reservation Bit 1: Higher than the upper range Bit 2: Break Bit 3-5: Reservation Bit 6: Communication failure
INPUT_FAULT_2	Input fault: the failure diagnosed objects related to SV_2 Please refer to INPUT_FAULT_1 for the bit description.
BIAS_1	Deviation value for processing parameters of Channel 1 Units are set by PRIMARY_VALUE_UNIT.
BIAS_2	Deviation value for processing parameters of Channel 2 States are set by PRIMARY_VALUE_UNIT.
INPUT_RANGE	0: mV Range 1 => mV 100 128: Ω Range 1 => Ohm 500 129: Ω Range 2 => Ohm 4000
LIN_TYPE	Linearization type
SENSOR_MEAS_TYPE	Sensor mathematics function type, coding as follows: 0: PV = SV_1 1: PV = SV_2 128: PV = SV_1 - SV_2 D-value 129: PV = SV_2 - SV_1 D-value 192: PV = ½ * (SV_1 + SV_2) Average Value 194-219: Reservation 220-239: Manufacture designation

PRIMARY_VALUE	Transmitter measurement value and status Units are set by PRIMARY_VALUE_UNIT.
PRIMARY_VALUE_UNIT	Engineering unit code of transmitter measurement value
UPPER_SENSOR_LIMIT	Sensor physical upper limit
LOWER_SENSOR_LIMIT	Sensor physical lower limit
SECONDARY_VALUE_1 (SV_1)	From Channel 1 and the processed value and status calibrated by BIAS_1. Units are set by PRIMARY_VALUE_UNIT.
SECONDARY_VALUE_2 (SV_2)	From Channel 2 and the processed value and status calibrated by BIAS_2. Units are set by PRIMARY_VALUE_UNIT.
MAX_SENSOR_VALUE_1	SV_1 Maxim. State Definition according to SECONDARY_VALUE_1.
MIN_SENSOR_VALUE_1	SV_1 Minim. State Definition according to SECONDARY_VALUE_1.
MAX_SENSOR_VALUE_2	SV_2 Maxim. State Definition according to SECONDARY_VALUE_2.
MIN_SENSOR_VALUE_2	SV_2 Minim. State Definition according to SECONDARY_VALUE_2.

● **Thermocouple additional parameters as follows:**

Parameter	Function Description
EXTERNAL_RJ_VALUE	Fixed value from outer reference point. Unit is set by PRIMARY_VALUE_UNIT. If the unit is not for temperature, it should be set as ℃.
RJ_TEMP	Temperature at reference point. Unit is set by PRIMARY_VALUE_UNIT. If the unit is not for temperature, it should be set as ℃.
RJ_TYPE	Setting reference point type, coding as follows: 0: No reference, no compensation. 1: Inner, temperature at reference point self-tested by the device. Choose 1 when in default.

- **Thermo resistance additional parameters as follows:**

Parameter	Function Description
COMP_WIRE1	Linearization compensation for thermo resistance 1 selecting 2-wire or 3-wire. Unit is fixed as Ω.
COMP_WIRE2	Linearization compensation for thermo resistance 2 selecting 2-wire or 3-wire. Unit is fixed as Ω.
SENSOR_CONNECTION	It can be used to connect sensor with 2-wire or 3-wire. 0: 2-wire. 1: 3-wire.

- **Parameters defined by manufacture:**

Parameters	Function Description
SENSOR_VALUE_1	Original data value for sensor 1.
SENSOR_VALUE_2	Original data value for sensor 2.
CAL_POINT_HI	Calibration value at the highest point The unit is set by CAL_UNIT.
CAL_POINT_LO	Calibration value at the lowest point The unit is set by CAL_UNIT.
CAL_MIN_SPAN	Allowable minimum step length during the calibration ensures the calibration smoothly, and the distance between highest point and lowest point is not too close. The unit is set by CAL_UNIT.
CAL_UNIT	Calibration units (℃, Ω, mV)
CAL_CHANNEL	Select calibration channel: 0: CHANNEL1; 1: CHANNEL2.
TWO_WIRES_COMPENSATION	2-wire zero point compensation

- **PROFIBUS periodic data communication configuration**

PROFIBUS DP periodic data communication is to exchange input output

data, between 1st Class master station and slave station, in the polling way. The communication method is non-connected. In every cycling period, 1st Class master station sends data exchange request, the slave station answers it passively. The periodic data communication is mainly applied in configuration between slave station and PLC master station. With it, master station PLC receives slave station input data or output the data to slave station.

PA smart transmitter periodic data communication configuration is similar to PROFIBUS DP slave station, only a coupler or a linker between PA BUS and DP BUS is needed to add between PA bus and DP bus.

There are 8 AI function blocks in NCS-TT108P, and they are at 8 slots. The cyclic data of NCS-TT108P is from AI function block output parameter, and there are 5 bytes, including 4 bytes of temperature value floating data and 1 byte of status data. Take the first AI function block as an example, for cyclic data, the transmitter supports 2 kinds of TAG, they are short TAG 0x94 and long TAG 0x42, 0x84, 0x08 and 0x05. The user may use Siemens Step 7 to configure Profibus PA cyclic data communication status.

The performances of remaining 7 AI function blocks are totally as the same as the first one.

Following is an example for configuration with Siemens Step 7:

Turn on SIMATIC Manager, select PLC master station and create a new
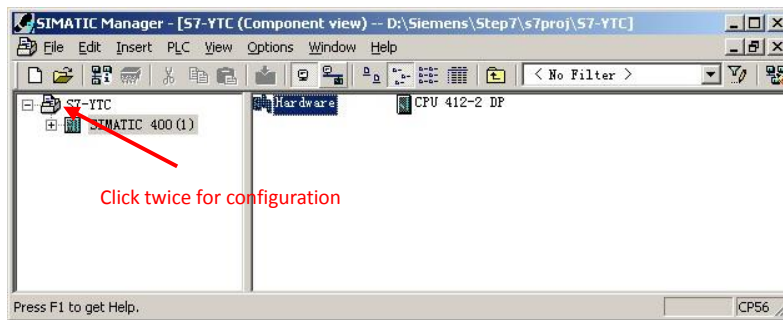
project, shown as Figure 5.4.

Figure 5.4 Select PLC Master Station and Create a New Project

Click Hardware twice to turn on HW Config Software Hardware Configuration. Select Install GSD to install PA transmitter GSD document in Option list, shown as Figure 5.5.
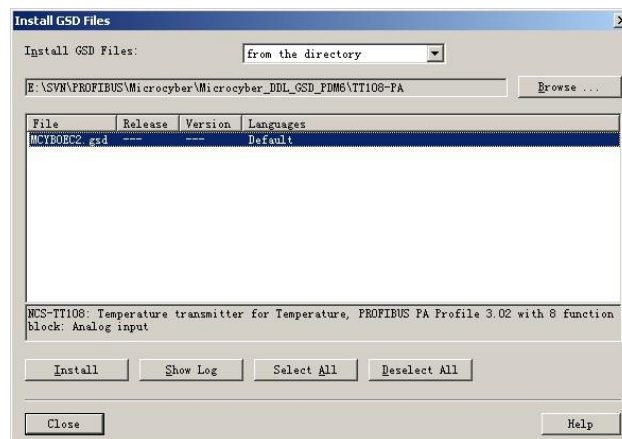

Figure 5.5 Install GSD

After GSD Document is installed successfully, the installed PA device will be listed in the PROFIBUS-PA index on the right of HW Config Software. Click it and drag it to the PROFIBUS DP bus, shown as Figure 5.6.
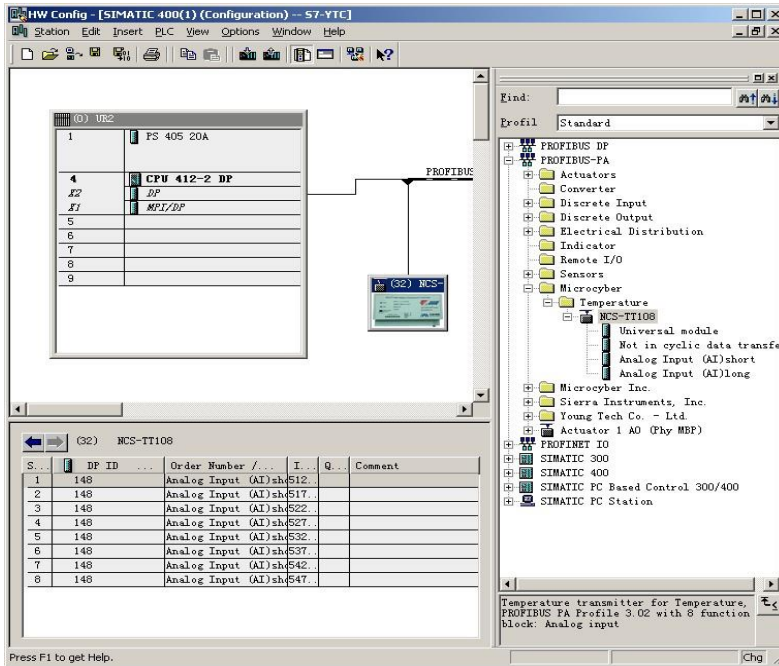
Figure 5.6 Drag the Device to the PROFIBUS DP Bus

Download the configuration information to PLC master station in the PLC list. Then the periodic data communication configuration between PA instrument and master station is finished, shown as Figure 5.7.
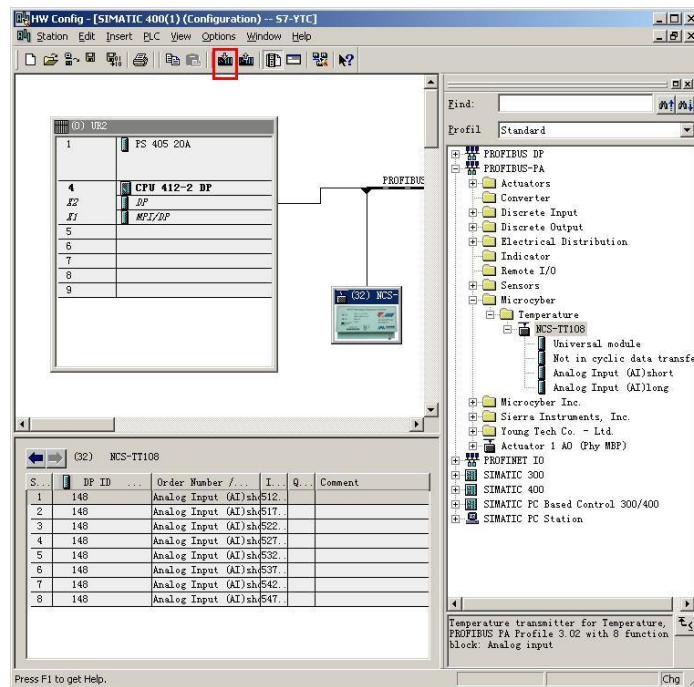

Figure 5.7 Download the Configuration Infomation to PLC

- **Extended Diagnosis Information**

Extended diagnosis data is in 2 bytes, Figure 5.8 is the screenshot for STEP 7 diagnosis information. The dialogue box indicates the diagnosis information content, and the last 2 bytes include extended diagnosis data.
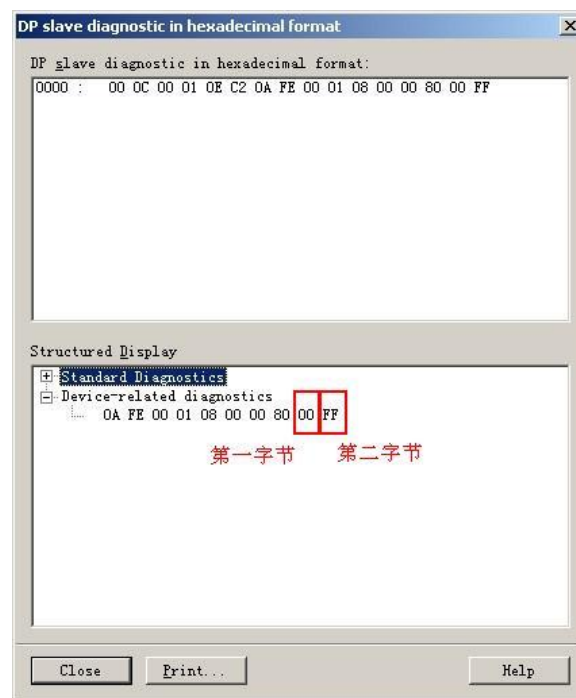

Figure 5.8 Extended Diagnosis Data

The first byte:

The byte represents the communication error channel between communication board and instrument board, shown as the HEX in Figure 5.8. The highest bit represents Channel 1, and the lowest bit represents Channel 8, and remaining channels represent in the same way.

For example, if the communication error is from Channel 3 and 4, and the remaining channel are in normal, the byte's error for BIN is 00110000, HEX is 30. If the communication error is from Channel 5 and 6, as well as

7 and 8, and the remaining channels are in normal, the byte's error for BIN is 00001111, HEX is 0F.

The alarm burst caused by extended diagnosis, it is only means the error from configured channel. The un-configured channels won't burst slave station alarm. If the channel error causing master station to alarm is relieved, the master station shall be back to normal automatically.

The second byte:

The byte represents the open channel for sensor measurement circuit, shown as the HEX in Figure 5.8. The highest bit represents Channel 1, and the lowest bit represents Channel 8, and remaining channels represent in the same way.

For example, if the sensor open error is from Channel 1, the byte's error for BIN is 10000000, HEX is 80. If the sensor open error is from Channel 2 and 3, the byte's error for BIN is 01100000, HEX is 60.

● **PROFIBUS non-periodic data communication configuration**

PROFIBUS DP non-periodic data communication is the data communication between 2nd Class master station and slave station, facing connection. The data communication is non-periodic, without affecting data communication. The non-periodic data is mainly PA function block parameters, together with recognizing and diagnosing information for the device. The non-periodic data communication is mainly applied in management, recognizing, diagnosing, testing,

maintaining for PA device.

Siemens device management software SIMATIC PDM can be used to carry out the non-periodic data configuration for PA instrument.

There is an example given below to show non-periodic data configuration for PA instrument.

Open the LifeList software attached by SIMATIC PDM, select Start to scan DP bus in Scan list, shown as Figure 5.9.
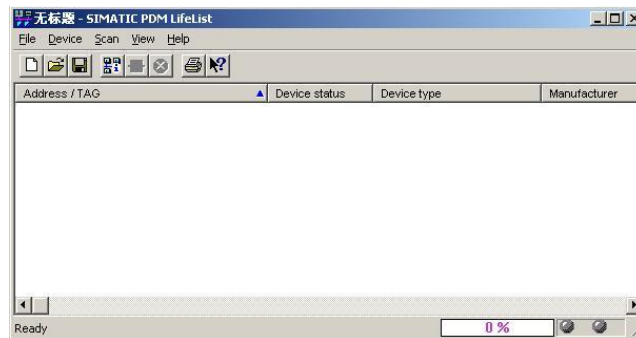

Figure 5.9 Start LifeList

After scanning the bus, slave station device in DP bus will be listed, meanwhile the device manufacture ID number and some diagnosis information are displayed, shown as Figure 5.10.
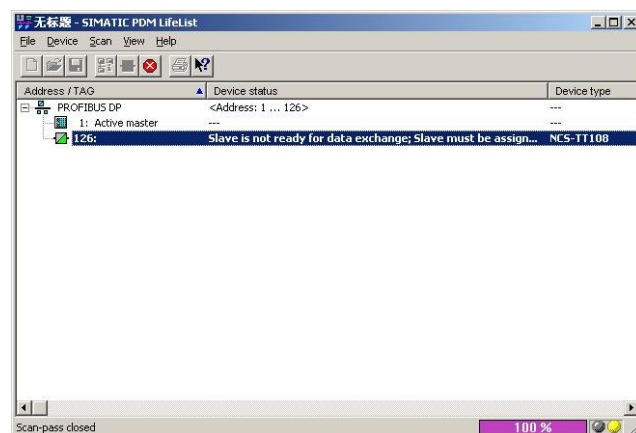

Figure 5.10 Scan DP Bus and List PA Device

Click PA device twice to start SIMATIC PDM software. You may read, write

and diagnose parameter for PA device. Select the Device catalog... when

you are asked to select the PA instrument type, lead the GSD document.

Microcyber Inc\NCS-TT108 can be selected for the NCS-TT108 series of

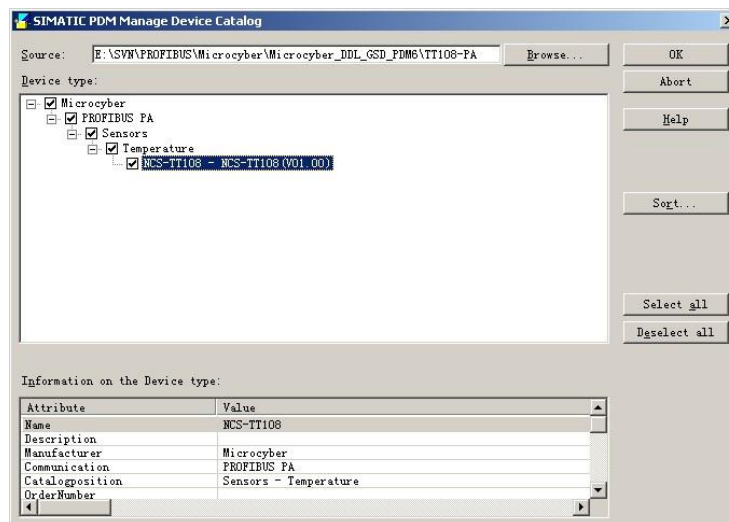PA transmitters, shown as Figure 5.11.

Figure 5.11 Select Device Type

After selecting the device type, click OK, thus non-periodic data

communication is configuration successfully. You can carry out the

parameter read and write via the function of upload and download

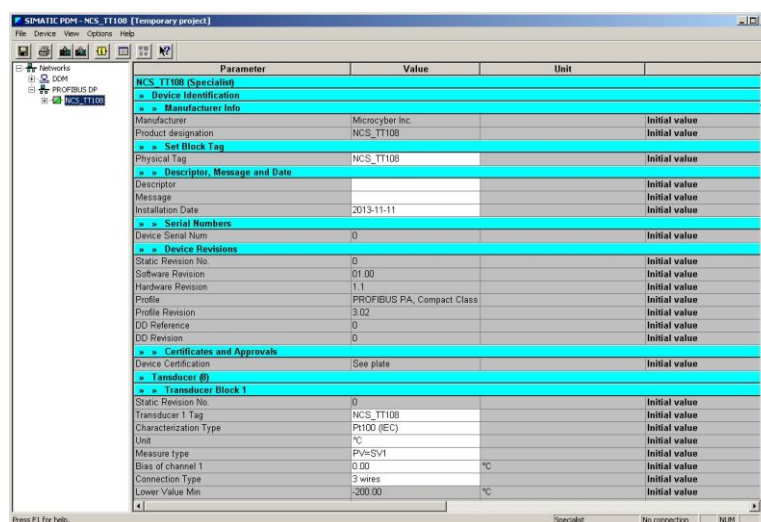function of PDM Software, shown as Figure 5.12.

Figure 5.12 Device Management with PDM software

- **Online, offline configuration function**

PA smart transmitter realizes PA standard function blocks, online and offline configuration functions realize function block parameters configuration separately. With PDM software, after configuration, choose Device -> Online Configuration or Device -> Offline Configuration, to do write operation for the function parameter.

- **Sensor type configuration**

Sensor Type can be set by modifying Characterization Type and Input Range and Mode Parameters of transducer block. E.g. PT100, CU50, etc. When Characterization Type Parameter is Linear, Input Range and Mode parameters are effective.

- **2-wire zero point calibration configuration**

For 2-wire measurement, you may use TWO_WIRES_COMPENSION parameter to calibrate. First, set zero value for channel, which will cut the channel off. Next, turn on PDM software, after the configuration, choose Device -> Offline Configuration -> Transducer Block 1. In Advanced Settings, there is 2-wire calibration function. After pressing write button, when Finished is displayed, it means 2-wire zero point calibration is successful.

- **Enable cold-end temperature compensation**

When thermocouple is used as sensor, Reference Junction Temperature parameter of transducer block is cold-end temperature value. Primary Value is measurement value related to cold-end temperature value.

If 0℃ is to display in primary value output, it can be realized by setting Reference Junction parameter. If 1℃ is to display in primary value output, it can be realized by measurement temperature as well as cold-end temperature as Primary Value output. The cold-end temperature compensation is enabled in default.

- **2-point linearity calibration**

Strict calibration must be done to temperature transmitter in the factory, so it is not necessary for users to calibrate again. The parameters such as Lower Calibration Point, Upper Calibration Point and Calibration Unit areused to carry out 2-point linearity calibration.

- **Operation Steps:**

1) Turn on PDF software, after configuration; choose Device -> Calibration -> Lower/Upper, get page of temperature calibration.

2) Make sure of sensor type, set Characterization Type and Input Range and Mode, and set Calibration Unit according to sensor type. It supports the parameters ℃, Ω, and mV. Write the parameter after the setting.

3) Give standard data to channel to calibrate. When the input is stable, write calibration data to Upper Calibration Point or Lower Calibration Point according to the operation one is upper calibration or lower calibration. If there is no write error, the calibration is successful.

4) **Notes: There should not be a great deviation between written calibration data and practical input channel data, otherwise the calibration will be in failure.**

Notes: When you are using Device -> Master Reset, it may course the instrument CPU reset as well as communication broken, which is normal. Please connect again.

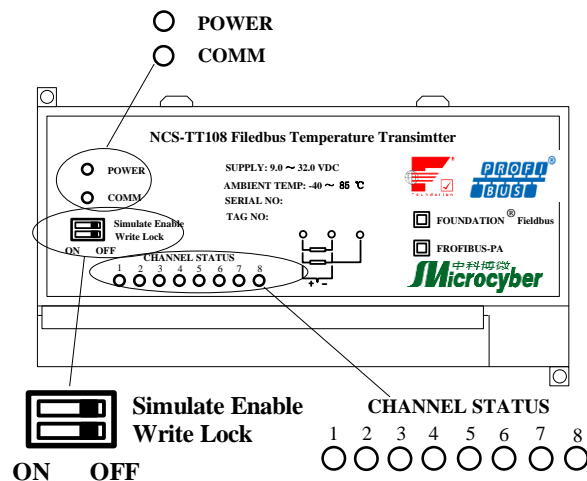## 5.4 Configuration Setting and Indicating

Figure 5.13 DIP switch of NCS-TT108 Smart Temperature Transmitter

NCS-TT108 Smart Temperature Transmitter has 2 DIP switches, as shown in Figure 5.13:

Simulate Enable: Set "ON" to realize simulate function.

Write Protection: Set "ON", any write-in operation to temperature transmitter will be refused. This is to prevent that instrument's data is changed at random.

For NCS-TT108P, Simulate Enable cannot be used, the user shall set in PDM software when need to set Simulate Enable.

● **Indicating lights**

NCS-TT108 smart temperature transmitter has ten indicating lights, to show bus power status, communication status and the working status of eight temperature input channels, as shown in the Figure 5.14.

Input Channel Status Indicating:

CHANNEL STATUS

Figure 5.14 Indicating of Channel 1
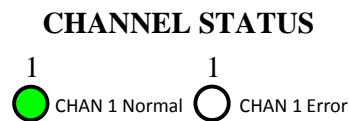
Indicating lights indicates present temperature conversion channel status, the indicating way are the same for 8 channels.

  a) 0.5s means there is a communication error for the channel;

  b) 1s means the sensor measurement circuit open for the channel;

  c) "The light on" means "Normal";

  d) If there is communication error, there is no measurement circuit open error indicates;

e) No matter the error channel is configured, the indicating light shall indicate related error;

f) Only the configured channel errors, it shall send alarm to master station.

Indicating of Power and Communication:

POWER   Bus power is normal.

POWER   Bus power is abnormal.

Figure 4.6 Indicating of Power Status

"COMM" indicating light shows bus communication status. The indicating light flashes, when communication data package is sent and received in the connected field bus. The indicating light status is stationary, when the connected field bus is silent.

Chapter 6 Maintenance

Phenomenon	Solution
No Communication	**Temperature Transmitter Connection** Check the bus cable connection Check bus power polarity Check bus cable shield, whether it is single point earthing or not.
	Bus Power Bus power should in the range 9~32V for the temperature module, and bus noise and ripple should fulfill: (1)peak-to-peak value noise 16mV, 7~39kHz; (2)peak-to-peak value noise 2V, 47~63HZ, non-intrinsically safety (3)peak-to-peak value noise 0.2V, 47~63HZ, intrinsically safety (4)peak-to-peak value noise 1.6V, 3.9M~125Mz.
	Network Connection Check network topology structure Check terminal matcher and wiring Check the length of main trunk and branch
	Address Conflict When coming to market, the temperature module has a random address, avoiding address conflict. But on a network segment it still possibly appears address conflicts. When conflict occurs, sometimes conflicting device will be temporary address online, you should just reset the device address. Sometimes device will not be temporary address online, you should cut off the electricity of conflicting device, and then power them one by one, modify the address of new powered device as non-conflicting.
	Temperature Module Failure Replace the temperature module with others for testing.
Reading Error	**Temperature Module Connection Failure** Check sensor short circuit, open circuit, and earthing. Check sensor
	Noise Disturb Adjust damping Check the house earthing Check the terminal Check the cable is away from the strong electromagnetic interference

	Software Configuration
	Check sensor type configuration
	Check function block parameter configuration
	Temperature Module Failure
	Replace the temperature module with others for testing

Chapter 7 Technical Specifications

7.1 Basic Parameters

Input Signal	Resistance: PT100, CU50, CU100, 0~500Ω, 0~4000Ω Thermocouple: B, E, J, N, K, R, S, T Voltage signal: -100mV～100mV
Channel	8-channel
RTD Wiring	2-wire, 3-wire,
Bus Power	9~32 VDC Current consumption (static): ≤20mA
Bus Signal	Communication ratio 31.25Kbit/s, current mode
Isolation	Between input channel and bus: 500Vrms (707 VDC) Between temperature converter module: 500Vrms (707 VDC) The two temperature input channels in the module are not isolated.
Working Temperature	-40℃~85℃
Humidity Range	0%~100%RH
Start Time	≤5s
Refresh Time	0.2s
Protection	IP20; Outside box IP67
Vibration	Arbitrary axial 0~200Hz, error is±0.05%/g of largest range
EMC	Bus terminal: GB/T 18268-2000 Table A1 Sensor terminal: GB/T 18268-2000 Table 1

7.2 RTD Technical Parameter

● RTD Accuracy Parameter at Normal Temperature (25℃)

Signal Type	Suggested Range (℃)	Accuracy
Resistance Signal	0~500Ω,0~4000Ω	±0.05%
PT100	-200 ~ 850℃	±0.2℃
PT1000	-200 ~ 850℃	±0.1℃
CU50	-50 ~ 150℃	±0.3℃
CU100	-50~ 150℃	±0.2℃

● RTD Other Parameter

Wiring	2, 3
Data Refresh Ratio	≥ 1Hz/each channel
Common Mode Rejection	≥80Db (50Hz)
Series Mode Rejection	≥60dB(50Hz)
Temperature Drift	50ppm

7.3 Thermocouple Parameter

● Thermocouple Accuracy Parameter at Normal Temperature (25℃)

Signal Type	Suggested Range (℃)	Accuracy
mV	-100 mV ~100mV	0.05%
B	500℃~1810℃	±1.0℃
E	-200℃~1000℃	±0.4℃
J	-190℃~1300℃	±0.4℃
K	-200℃~1372℃	±0.4℃
N	-190℃~1300℃	±0.8℃
R	0℃~1768℃	±1.0℃
S	0℃~1768℃	±1.0℃
T	-200℃~400℃	±0.4℃

● Thermocouple Other Parameter

Compensation Accuracy	< ±1℃
Data Refresh Ratio	≥ 1Hz
Sensor Type	B,E,J,N,K,R,S,T -100mV~100mV Voltage
Common Mode Rejection	≥60Db (50Hz)
Series Mode Rejection	≥60dB(50Hz)
Temperature Drift	50ppm

7.4 Physical Parameter

Material	Flame retardant plastic;Die-casting aluminum (outside box)
Protection	IP20; Outside box IP67
Weight	0.42kg 1.98kg (With outside box)

7.5 Model Reference

NCS-TT108 F - W
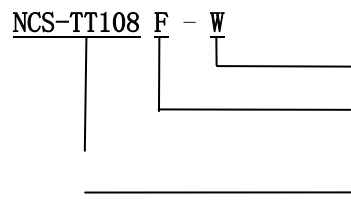
Selective Outside Box
F: FF-H1 Protocol
P: Profibus PA
Product Model