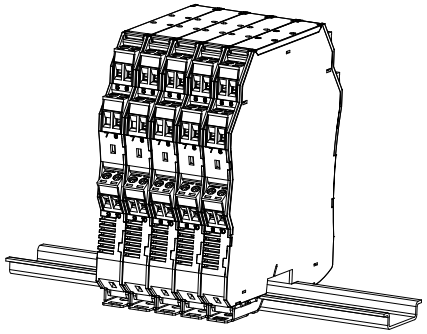
User Manual

Isolated safety barrier at detection side

PHD-11TZ/TT-*1



● Overview

The temperature signal input isolation safety barrier can convert the two-wire or three-wire thermal RTD signal or thermocouple TC signal in the dangerous area into a 4-20A current signal and output it to the safe area. This safety barrier has a cold junction compensation function and can be configured intelligently. The actual range of the thermal resistor and thermocouple can be set through computer software. It has the function of disconnection alarm and out-of-range alarm.

This product needs to be powered independently, and the power supply, input and output terminals are isolated.

"*" indicates the input type of thermal resistance and thermocouple, and the specific model is represented by a code (see "Input Signal Type and Range Table" for details).

● Usage environment

1. There should be no electromagnetic induction effects such as strong vibration, impact, large current and sparks in the surrounding environment. The air should not contain media that corrode chromium, nickel, and silver plating, and should not contain flammable or explosive substances.
2. Relative humidity: 10%～95%RH without condensation
3. Working temperature: -20℃～+60℃,
   storage temperature: -40℃～+80℃
4. Altitude: ≤3500m

● Main technical parameters

Number of channels：1 input and 1 output

Power supply：

Power supply voltage: 20～35VDC, power consumption ≤40mA
(24VDC power supply, 20mA output)

Power protection: power reverse protection

Input in hazardous area:

Input signals: RTD, TC signal(Please refer to "Input Signal Type and Range Table)

Input disconnection: The default is "low temprature alarm", which can be modified to "high temperature alarm" through the configuration software

Signal range: Measurement range corresponding to the input signal

Measurement range: The user makes the configuration when ordering. Specify it in the tail number or please make a note

Thermocouple cold compensation: ±1℃ (compensation range -20℃~+60℃)

Thermal resistor excitation current: 250μA

Safety side output:

Output signal: 4~20mA

Load capacity: 0~500Ω (can be customized)
Optional voltage output type, load resistance R_L≥330kΩ

LED indicator light: green —— power indicator Wiring diagram
The low-range alarm L1 light is on; the high-range alarm L2 light is on.

Output accuracy: see "Input signal type and range table" for details

Response time: 300ms to reach 90% of final value

Temperature drift: 0.005% F.S/℃

Insulation strength: intrinsically safe end and non-intrinsically safe end (≥3000V AC/min)
Between power supply and non-intrinsically safe terminals (≥1500V AC/min)

Insulation resistance: ≥100MΩ (between input/output/power supply)

Electromagnetic compatibility: Comply with IEC 61326-1 (GB/T 18268), IEC 61326-3-1

Average no fault time: 100000h

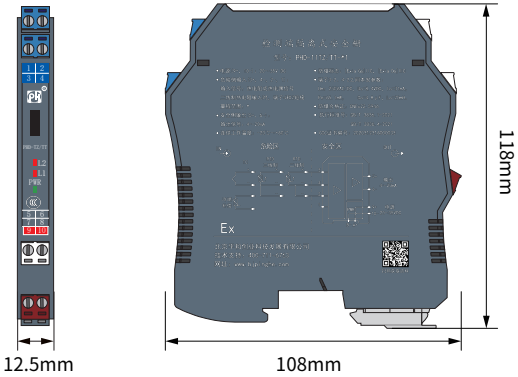
Applicable field equipment: two-wire and three-wire thermal resistors, thermocouple sensors

Wire requirements: Hard wire (flexible wire) cross section: 0.2~2.5mm²
Wire diameter range: 26~14AWG; stripping length: 8mm

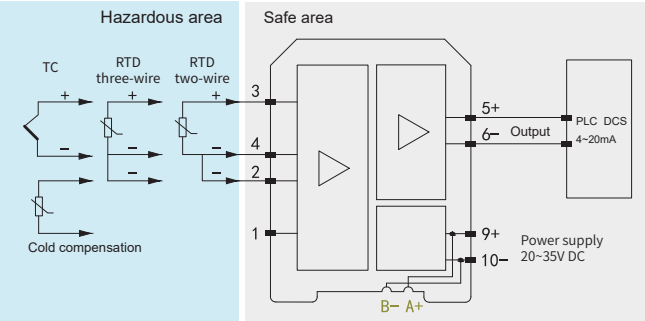
Input signal type and range table

	Code	Model	Measurement range	Minimum range	Conversion accuracy
RTD	1	G53	-50~150℃	20℃	0.2℃/0.1%
	2	Cu50	-50~150℃	20℃	0.2℃/0.1%
	4	Pt100	-200~850℃	20℃	0.2℃/0.1%
	6	Pt1000	-200~850℃	20℃	0.2℃/0.1%
	7	Ni1000	-60~250℃	20℃	0.2℃/0.1%
TC	1	K	-200~1370℃	50℃	0.5℃/0.1%
	2	S	-50~1760℃	500℃	1.5℃/0.1%
	3	E	-140~1000℃	50℃	0.5℃/0.1%
	4	J	-160~1200℃	50℃	0.5℃/0.1%
	5	B	250~1800℃	500℃	1.5℃/0.1%
	6	T	-200~400℃	50℃	0.5℃/0.1%
	7	R	-50~1760℃	500℃	1.5℃/0.1%
	8	N	-200~1300℃	50℃	0.5℃/0.1%

● Dimensions



● Wiring diagram



Note: 1. Power bus power supply is an optional function.
Users need to specify the power supply method when ordering.
2. When using a three-wire thermal resistor input,
try to ensure that the three wires are of equal length.
3. When using a two-wire thermal resistor input,
the safety barrier terminals 4 and 2 must be short-circuited.

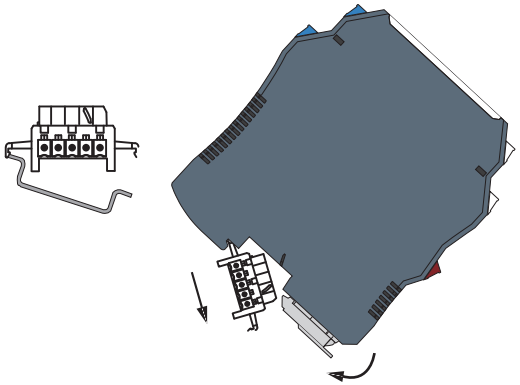
● Terminal definition

Terminal	Terminal function definition			
9(A)	Power supply+			20~35V DC
10(B)	Power supply-			
	RTD 2 wire	RTD 3 wire	TC	
1			Cold compensation	RTD/TC signal
2	with 4 short connected	Input-		
3	Input+	Input+	Input+	
4	Input-	Input-	Input-	
5	Output+			4~20mA
6	Output-			

Installation

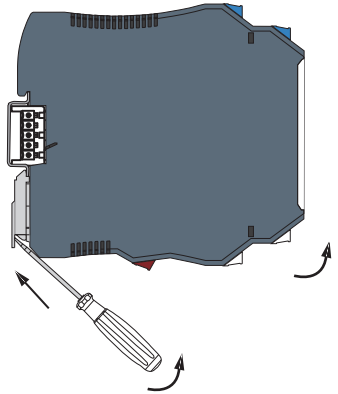
The isolation safety barrier should be installed in a safe place, and the installation, use and maintenance of the product should also comply with GB3836.13-2013 "Explosive Environment Part 13: Repair, Overhaul, Restoration and Modification of Equipment", GB/T3836.15 -2017 "Explosive Environment Part 15: Design, Selection and Installation of Electrical Devices", GB/T3836.18-2017 "Explosive Environment Part 18: Intrinsically Safe Electrical Systems" and GB50257-2014 "Electrical Device Installation Engineering Explosion and "Code for Construction and Acceptance of Electrical Installations in Fire Hazardous Environments".
The isolated safety barrier adopts DIN35mm rail installation method. The installation steps are as follows:

1. Clamp the upper end of the instrument on the rail;
2. Push the lower end of the instrument into the rail



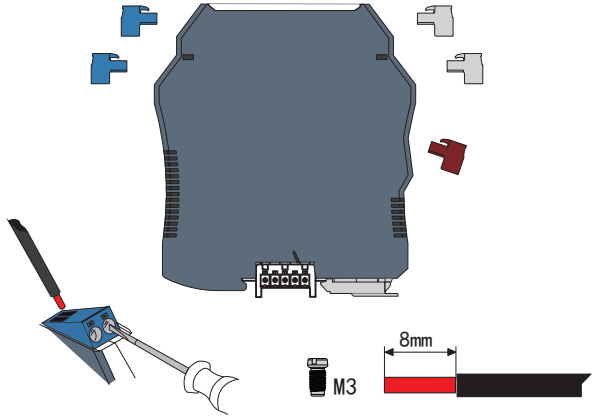
Disassembly

1. Use a screwdriver (blade width ⩽ 6 mm) to insert the metal lock at the lower end of the meter;
2. Push the screwdriver upward and pry the metal lock downward;
3. Pull the instrument up and out of the rail.



Wiring

1. The instrument wiring adopts detachable terminal blocks for easy use. The intrinsically safe end (blue terminal) leads to the hazardous side The signal terminals, the non-intrinsically safe terminals (white and red terminals) are the signal terminals leading to the safe side;
2. The wiring on the intrinsically safe side should use intrinsically safe wires marked with blue, and the insulation strength of the wires should be greater than 500V;
3. The wiring conductors of the intrinsically safe end and the non-intrinsically safe end of the isolated safety barrier should be laid separately in the bus trough and used separately with protective sleeve;
4. The conductors use multi-bundle or single-strand cables with a cross-sectional area of0.2mm^2~2.5mm^2;
5. The stripping length of the wire is about 8mm, and it is locked by M3 screws. Tightening torque: 0.6Nm;
6. The terminals are removable.



Maintainance

1. Before the isolated safety barrier is powered on and in calibration, the model and explosion-proof level of the isolated safety barrier must be checked again. Whether it is consistent with the design and use environment, you must recheck the wiring of the safe side and the dangerous side and their power supply. and whether the polarity of the signal is correct;
2. It is strictly forbidden to use a megger to test the insulation between the isolated safety barrier terminals. When you want to check the insulation of system lines, you should first disconnect all isolation safety barrier wiring, otherwise it will cause the internal fast fuse to blow;
3. Products have undergone strict inspection and quality control before leaving the factory. If you find that they are not working properly, please contact the nearest your agent or contact the technical support hotline directly;
4. Within one year from the date of shipment of the product, any product quality problems that arise during normal use will be handled free of charge by Pinghe.

Intrinsically safe explosion-proof circuit system

The isolated safety barrier is connected to the on-site intrinsically safe instruments to form an intrinsically safe explosion-proof loop (intrinsically safe loop) system,before they are in use must confirm:

1. The explosion-proof level of on-site intrinsically safe instruments must comply with the use environment, and instruments should be certified explosion-proof by authorized agencies of the state with explosion-proof certificates.
2. The respective certification parameters between the isolated safety barrier and the on-site intrinsically safe instruments are clear and comply with GB/T3836.15-2017 Section 12.2.5 and other requirements.
3. If any of the parameters are unclear, and it need form the intrinsically safe loop system, it must be certified by a nationally authorized explosion-proof product certification body.

Precautions for using isolation safety barrier

Please pay attention to the following requirements when using the maximum external capacitance (Co) and inductance (Lo) values:

1. For circuits that only contain distributed inductance and capacitance, such as distributed capacitance and inductance of cables, the maximum allowable external capacitance and inductance values are the allowable values of Co and Lo in the certification parameters.
2. For circuits combined with cables, when the intrinsically safe circuit contains an inductor that is less than 1% of the allowable value in the certification parameters or a capacitor that is less than 1% of the allowable value in the certification parameters, the maximum allowable external capacitance and inductance values are certified allowed parameters valuesof Co and Lo in certification.
3. For the inductor and capacitor combination circuit, when the inductor and capacitor are both greater than 1% of the allowable values of Co and Lo in the certification parameters (excluding cables), the maximum allowable external capacitance and inductance values are 50% of the allowable valuesof Co and Lo in the certification parameters.
4. Products that have passed the explosion-proof inspection must not replace components or change the structure at will to avoid affecting the explosion-proof performance.

北京平和
Bei Jing Ping He

Office address: 6th Floor, Building 13, Greenland Sailing International, No. 5 Tianhua Street, Daxing District, Beijing
Production base: Building 7, Beijing-Tianjin-Hebei Zhongnan High-Tech Pinghe Intelligent Industrial Park
Telephone: 010-61252352/61259872/61252312
Technical Support: 400-711-6763
URL: www.bjpinghe.com
E-mail: linsen@bjpinghe.com

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