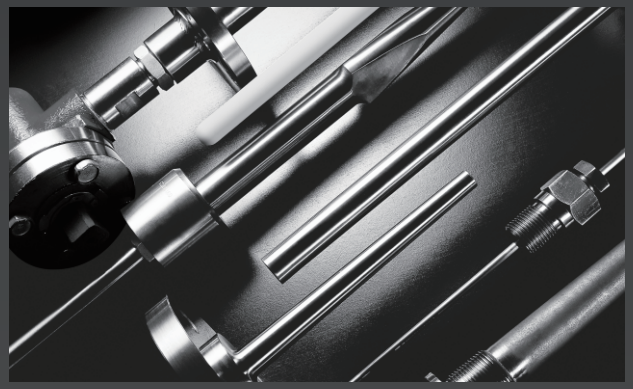

版本号 (Version)： 1.7

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ExSAF is committed to continuously optimize the product, so the technical data in the file will be changed accordingly.

本资料所介绍的信息是对可选用技术的一般性介绍，并非与所有具体情况完全吻合。
The information presented in this file is a general introduction to the optional technology, and it is not in full agreement with all the circumstances.

因此，客户要求的技术选项应在合同中予以确定。
Therefore, the customer requirements of the technical options should be determined in the contract.

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使用说明书
Technical Manual

W2052 系列温度变送器
W2052 SMART TEMPERATURE TRANSMITTER

质 量 方 针

通过我们对工作质量的持续改进来满足顾客的需求，并使顾客得到发展及成功。

中文

English

感谢您选择 W2052 系列温度变送器!

为确保人身和系统安全，并使产品达到最佳性能，在产品安装、使用和维修前，请完全阅读和理解本手册中的内容，特别是警告和注意的事项。

> **⚠ 警告**
> 重要安全信息，可能导致重大事故、严重财产损失和人身伤亡的危险，必须采取安全防范措施。

> **⚠ 注意**
> 与产品性能有关的重要信息和一般安全信息，如果不避免可能产生较轻的损害和财产损失。

> **☞ 提示**
> 表示关于产品操作和性能的一般信息，需要注意。

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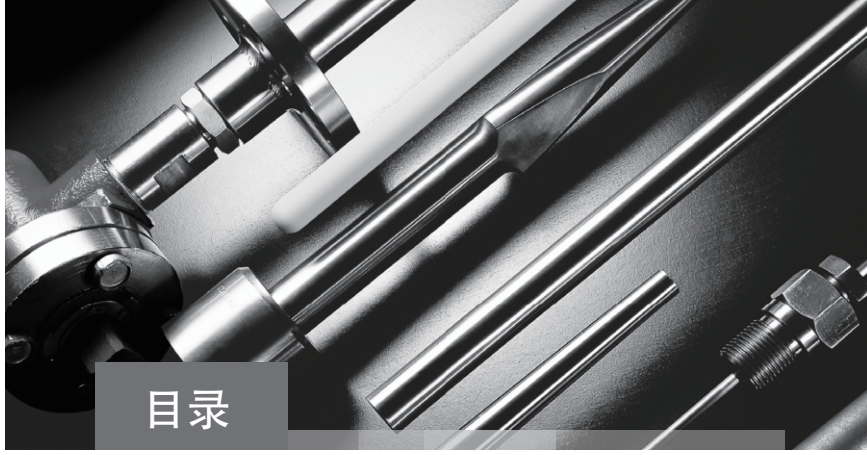


目录

1 . 概述

1.1 产品特点

- 一体化解决方案
- 支持 HART 通讯
- 传感器相关参数可编程
- 热电偶自动冷端补偿
- 实时监测传感器故障
- 电磁兼容性（ EMC ）电路设计
- 导轨安装模块和顶部安装模块

1.2 主要用途及适用范围

该系列的产品将温度信号转换为二线制4～20mA DC的电信号传输给显示仪、调节器、记录仪、DCS等，以实现对温度的精确测量和控制。一体化结构紧凑，方便安装、使用、维修。产品经过防爆安全认证，可用于防爆场所的温度测量系统，广泛应用于石油、化工、冶金、电站、轻工等行业。

1.3 型号组成及其代表意义

W2052系列产品可以是模块或是一体化温度变送器。变送器模块装配在隔爆壳体内与传感器构成一体化的温度变送器。产品的型号如下表。

产品类型	含义
W2052HP1K0 模块	热电偶 / 热电阻输入，隔离， 4~20mA 输出
W2052HP2K0 模块	热电偶 / 热电阻输入，隔离， 4~20mA 输出，支持 HART
W2052 模块 + 壳体 + 传感器	现场温度测量，提供所选模块的功能

1.4 使用环境条件

- 环境温度
  -40℃～+80℃
  爆炸环境：-30℃～+70℃
- 环境湿度
  5%-95%RH
- 机械振动
  10～500Hz, 峰值加速度19.6m/s2
- 其他限制条件
  防爆标志：Ex d IIC T6 Gb, Ex ib IIC T4 Gb
  当产品用于高温、高压、高流速、强腐蚀等场合时，请按照选型样本选择合适的保护管

1.5 工作条件

- 防护等级：IP67
- 供电电压：二线制供电，供电范围为11～35VDC

2. 安全使用注意事项

⚠ 警告

- 安装位置的极限温度不能超过产品的使用环境温度。
- 如果被测介质具有腐蚀性或高温特性，拆换维修时应谨慎操作，以免液体从过程接头处溅到其它部件或操作员身上。
- 所述仪表装配和操作只有在有资格认证人员确认电源连接正确后才能进行；正常操作或故障处理，确认无高电压进入仪表内后方可进行。
- 隔爆仪表设备只有在断电后方可打开。
- 用户在进行校准时，应采用高准确度的测量设备，如果不具备校准设备，不能进行校准，请送回制造厂家校准，否则可能影响仪表的测量精确度。
- 装配时变送器端盖必须按隔爆要求拧紧（不少于6扣）。
- 在易爆环境下，通讯装置连接前，应该确保回路中的仪表或设备按照本质安全或现场非燃环境接线规程操作。

中文

3. 结构特征与工作原理

3.1 总体结构及工作原理

W2052系列一体化温度变送器由温度变送器模块、壳体组件、传感器、可选附件等组成。

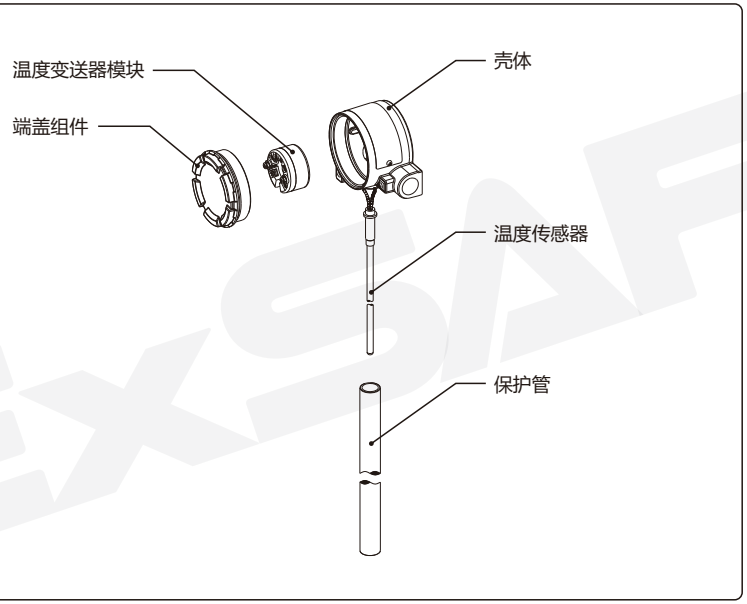
温度传感器是热电偶或热电阻。它把被测点的温度转换为毫伏信号或欧姆信号。为适应恶劣的现场环境，温度传感器具备耐高温、耐高压、耐腐蚀、耐磨或阻漏等特性。

温度变送器把温度传感器输出的信号经过处理，输出标准为4～20mA电流信号，支持HART。

壳体是隔爆结构，适应广泛的工业应用条件。

3.2 主要部件结构

结构图如下所示：



☞ 提示

由于温度变送器模块、温度传感器与保护管有多种形式，此图示可能与您定制产品不同。

⚠ 警告

在电气接口外接电缆引入装置时，做好密封处理以防止水渗入，否则影响测量精度。

4. 技术特性

- 热电阻：Pt100
  接线形式：二、三或四线制
- 热电偶：K、N、E、J、T、S、R、B型 (IEC584) 。接线形式：二线制
- 输出：4~20mA、4~20mA+HART
- 阻尼时间：0~30秒可调
- 超量程下限：3.8mA
- 超量程上限： 20.5mA
- 故障告警电流： 3.75mA
- 数字测量误差

输入		测量范围℃	最小可测量温度℃	测量误差℃
热电阻	Pt100	-200～+850℃	10	0.1
热电偶	K	-200～+1370℃	50	1
	N	-200～+1300℃	50	1
	E	-200～+1000℃	50	1
	J	-210～+1200℃	50	1
	T	-200～+400℃	40	1
	R	-50～+1760℃	100	2
	S	-50～+1760℃	100	2
	B	0～+1820℃	100	2

- 温度影响：<0.01%·极限量程/℃
- 长期漂移：<0.04%·极限量程
- 启动时间：变送器通电后20s内（阻尼时间设置为0s）达到技术规格范围内性能

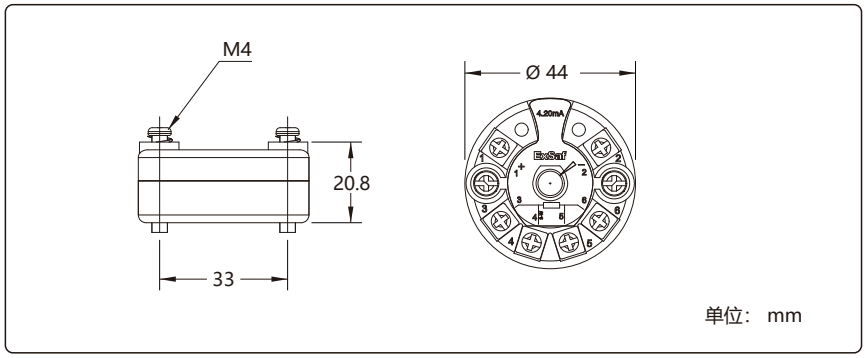
中文

5. 尺寸、重量

5.1 传感器尺寸：根据客户定选型不同而变化。

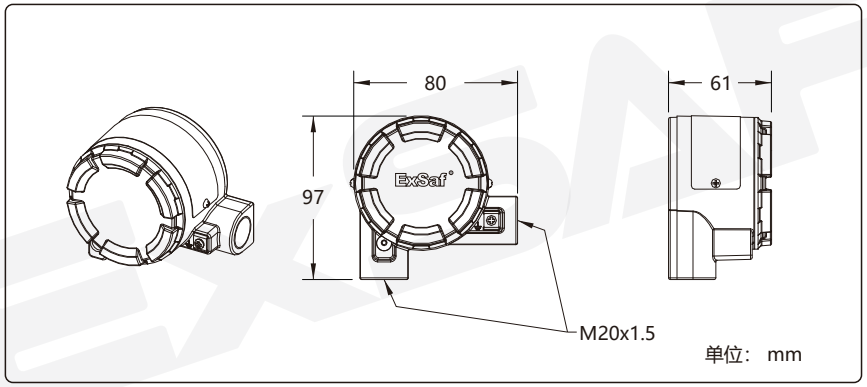
5.2 模块尺寸

模块尺寸如下图所示：



5.3 壳体尺寸

壳体尺寸如下图所示：



5.4 重量

- 模块50g
- 壳体0.5kg

6. 安装、调整

6.1 安装步骤、方法及注意事项

6.1.1 一体化温度变送器安装

6.1.1.1 安装步骤

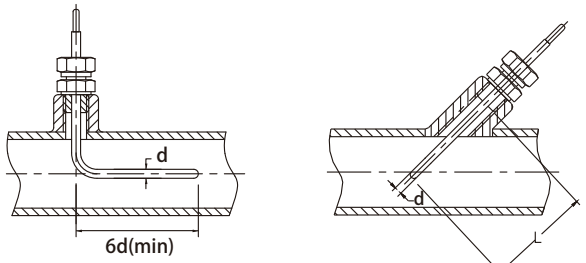
- 在非爆炸环境的室内通电，进行组态参数设置。产品出厂前已按照用户的使用要求进行了组态，如果使用要求没有变化，那么这个步骤可省略。
- 将一体化温度变送器现场安装后，进行传感器安装处的泄漏检查。
- 打开端子盖。
- 接线配管与引入装置相连接，现场引线接入接线盒，并拧紧电缆密封装置。
- 清除腔体内杂物，拧紧端子盖。

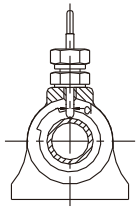
6.1.1.2 安装方法

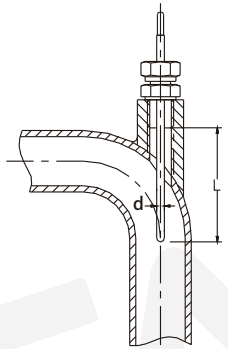
工程安装方法按所选过程连接方式决定。共有2类：螺纹连接、法兰连接。

- 铠装式热电偶（阻）安装固定方式如下图：

中文



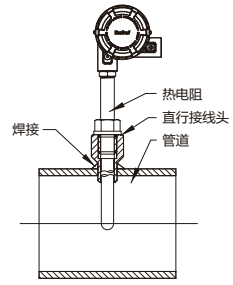




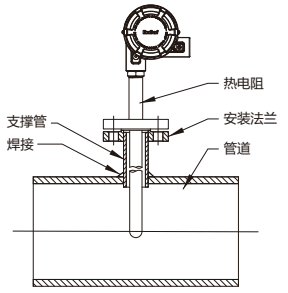
提示

通常铠装热电阻的直径为d，应将其置入管道的中心位置，置入深度L，且L≥10d。

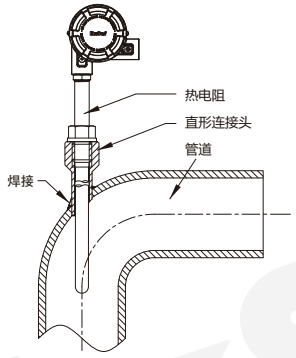
- 装配式热电偶（阻）安装固定方式如下图：



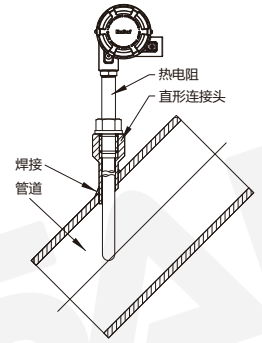
垂直管道安装形式



法兰安装形式



弯曲管道安装形式

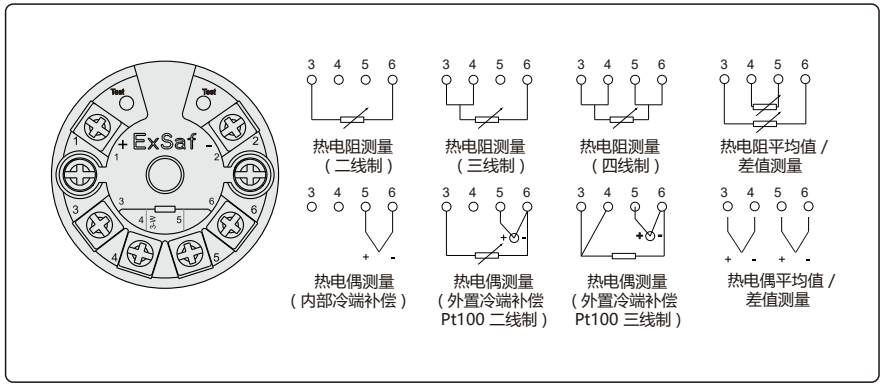


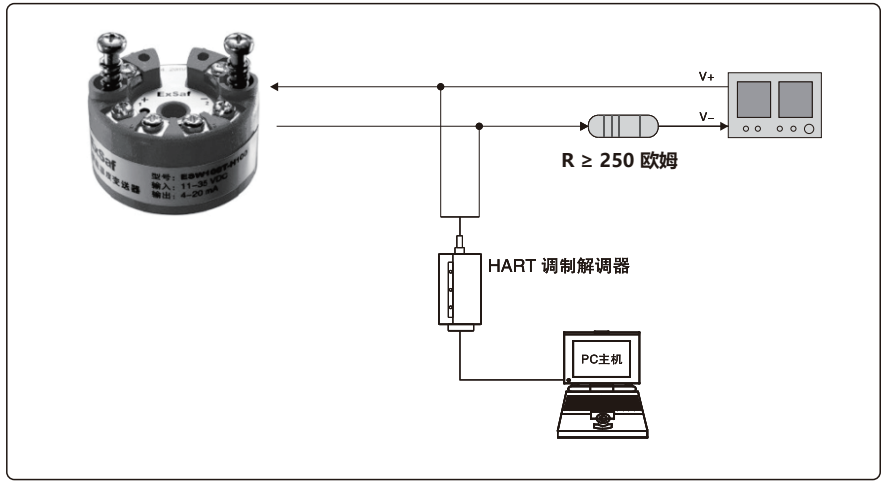
倾斜管道安装形式

6.1.2 接线

标注有"+"、"-"，表示分别连接供电电源的正、负极。

- 顶部安装的温度变送器模块接线如下图。





6.2 调试程序、方法

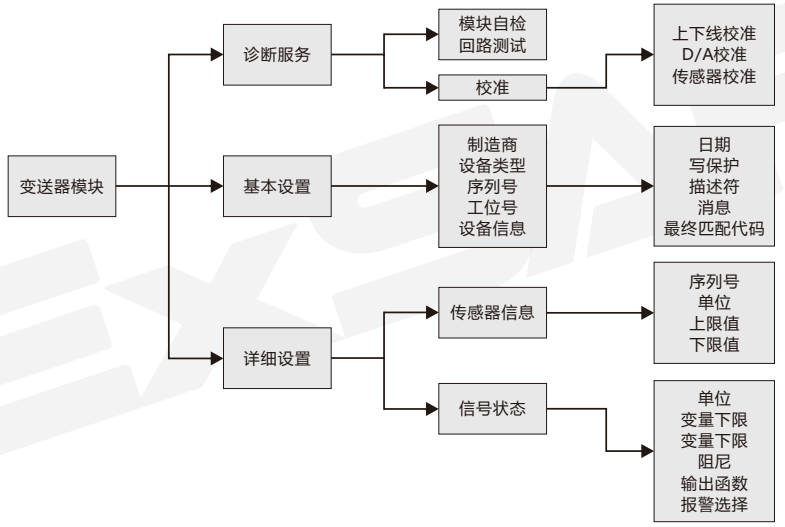
- 调试设备和连线

W2052系列的不带HART的温度变送器，需要使用Exsaf专用的调制解调器和PC机软件进行调校。

带HART功能的W2052系列的温度变送器，可使用ESH475现场通讯器或者HART调试解调器和相应的PC软件。

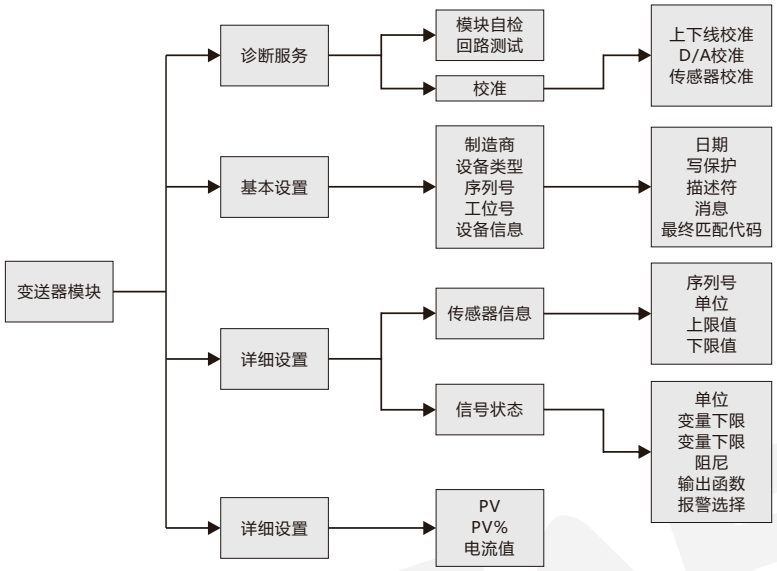
连接示意图如下所示：

- W2052系列的不带HART的温度变送器校准树形如下图：



中文

- 带HART功能的W4052系列和W2052系列的温度变送器校准树形图如下图所示：



6.3 安装、调试后的验收试验项目和判断依据

上电前检查和上电后验证的验收项目和判断依据如下表：

序号	验收项目	判断依据
1	螺纹、法兰连接是否可靠	螺纹连接到位
2	传感器现场安装密封性检查	用水试压，压力 >1.5 倍介质压力
3	上电前检查接线是否正确、紧固	以说明书所描述的接线方式为依据
4	检查 4 ~ 20mA 是否正常	根据被测温度和设定温
5	带显示模块，检查是否处于正常监控状态	根据输出电流值计算，确认显示值在正常范围
6	检查 4 ~ 20mA 是否正常	读取、设置、读取，比较 2 次读取值应一致

7. 故障分析与排除

7.1 常见故障

变送器出现下表中的故障，按照表中的排除方法仍无法解决时，请联系我公司。

序号	现象	故障	排除方法
1	测量值偏大	传感器引线松动	紧固传感器引线
2	测量值偏小	电源地线不绝缘	排查电源地线不绝缘情况
3	电流输出为告警电流	工程量或电流超量程或温度变送器告警（传感器断、短，或者变送器模块的RAM,ROM, EEPROM, 等故障）	●检查传感器是否短、断路； ●变送器所处环境温 ●重新上电； ●更换变送器模块

提示

变送器是精密仪表，维修前请仔细阅读说明书。

7.2 故障检修时拆卸步骤和装配步骤

7.2.1 拆卸步骤

- 切断变送器的电源。
- 对带保护管的温度变送器，直接将变送器从设备管道上取下。对没有保护管的温度变送器，必须对被测介质清空或泄压后，再进行拆卸。
- 松开端子盖的防转卡扣，拧下变送器壳体的端子盖，从 "+" "-"端子处分别拆下电源线。

7.2.2 装配步骤

- 打开端子盖，按照6.1.2接线方式检查内部接线是否正确和可靠。
- 根据传感器安装固定方式紧固在测量位置上。
- 电源线通过电气引入装置接入壳体，与”+“、”-”接线端子连接。
- 清除腔体内接线时的杂物，拧紧端子盖。

English

Quality Policy

We continually improve our work and quality to satisfy customer requirement and enable customer grow up and success.

English

Thanks for your selection of W2052 series smart temperature transmitter!

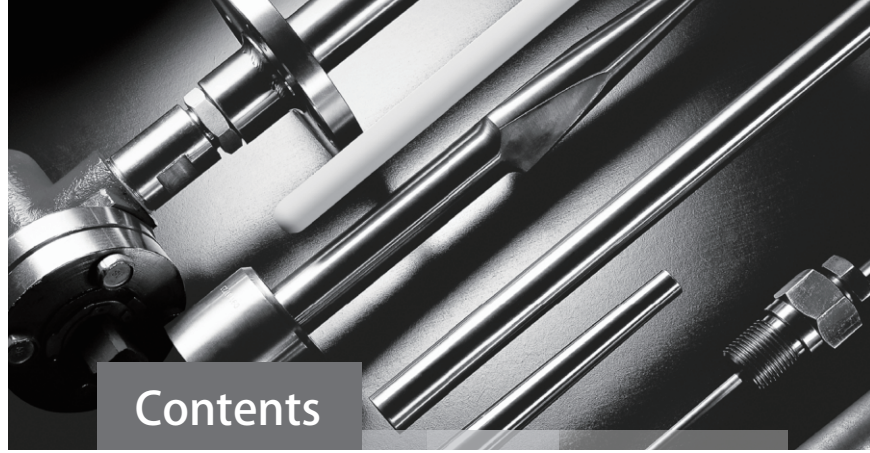
Ensure that this Technical Manual is read and understood BEFORE installing/operating/ maintaining the equipment. Pay particular attention to Warnings and Cautions.

> **⚠ Warning**
> For important information that may result in major accident, severe injury or death to personnel, product or property, take safety and preventive measures.

> **⚠ Caution**
> For major information and general safety information related to product performance, if unavoidable, this could result in minor injury to personnel, or product or property damage.

> **☞ Note**
> For general information related to product operation and performance, note.

Shenzhen ExSaf Electronics Co., Ltd. greatly appreciates being informed of any errors or omissions that may be found in the contents of any of our documents.



Contents

English

1 . Introduction

1.1 Features

- Integrated solution
- Support HART
- Certain parameters of sensor programmable
- Thermocouple automatic cold-junction compensation
- Real time monitor sensor faults
- EMC circuit design
- Lead rail installation mould and head installation mould

1.2 Application and scope

This series products transfer temperature signal into 2-wire 4~20mA DC electric signal or digital signal and introduce it to display screen, regulator, recorder, DCS, etc., to realize the specific measuring and controlling of temperature. The compact integrated structure is convenient for installation, application and maintenance. The products passed explosion-proof certification and are suitable for the temperature measurement of explosion-proof environment, which is widely used in petrol, chemical industry, metallurgy, power plant, light industry.

1.3 Models and meaning

W2052 series products can be mould or an integrated temperature transmitter. Transmitter mould is installed inside of explosion-proof enclosure and is integrated to be a temperature transmitter with sensor. The models is as follows.

Products type	Function
W2052HP1K0 mould	Thermocouple / thermal resistance input, isolation, 4~20mA output
W2052HP2K0 mould	Thermocouple / thermal resistance input, isolation, 4~20mA output, support HART
W2052 mould+enclosure +sensor	Site temperature measurement, provide selected mould function

1.4 Application Environment

- Environment temperature
  -40℃~+80℃
  Explosive: -30℃~+70℃
- Environment humidity
  5%-95%RH
- Mechanical vibration
  10~500Hz, peak acceleration 19.6m/s2
- Other restriction condition
  Explosion-proof mark: Ex d ⅡC T6 Gb , Ex ib IIC T4 Gb
  When products are applied in high temperature, high pressure, high flow rate, strong corrosion environment, Please select suitable protective tube according to type selection guides.

1.5 Work Condition

- IP grade: IP67
  Power voltage: 2-wire power supply, range of 11~35VDC

2. Safty

⚠ Warning

- Temperature limit can not excess the application temperature.
- If detected medium is corrosive or high temperature, when dismantling, pay attention not to make medium splashing on other components or personnel.
- The installation and operation can only be practiced after qualified personnel assuring the correctness of wiring; normal operation or fault disposal can only be completed after confirming no high voltage going into device.
- Flameproof device or equipment can only be dismantled after switch off.
- High accuracy measuring equipment shall be adopted in debugging, if no such equipment, return the product into manufacturer for debugging, otherwise which will affect the measuring accuracy of product.
- Terminal cover of transmitter shall be screwed tight (at least 6 wires engaged)
- Under explosive environment, before communication device connected, the device or equipment in loop shall be confirmed to be operated according to intrinsic safety requirements and have passed.

English

3. Structure and Working Principle

3.1 Structure and working principle

W2052 series integrated temperature transmitter is composed with transmitter mould, enclosure component, sensor, display component.

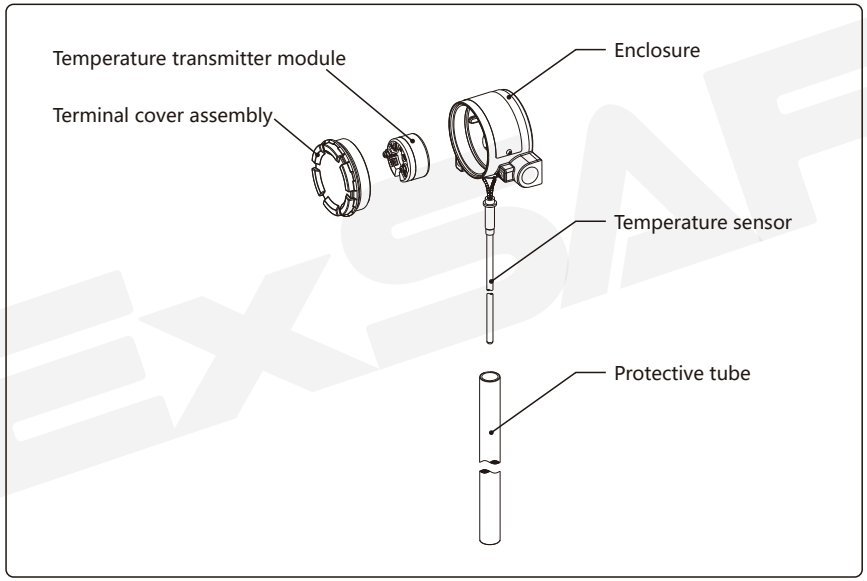
Temperature sensor is thermocouple or thermal resistance. It transfers the detected temperature into millivolt signal or ohm signal. To adapt to bad environment, temperature sensor is provided with features of heat-resistant, high pressure-resistant, corrosion resistant, wear resistant features.

Temperature transmitter process the signal output by temperature sensor, and output 4~20mA current signal and digital signal.

Enclosure is explosion-proof structure to adapt the wide industrial application condition.

3.2 Main components

Structural diagram is as follows:



Note

For the diversification of temperature transmitter module, temperature sensor and protective tube, the graph is possible different from customized product.

Warning

Electrical interface is introduced with cable entry device is introduced into electrical interface, do well in seal processing to avoid water penetration, otherwise which will affect measuring currency.

4. Technical Features

- Thermal resistance: Pt50, Pt100, Pt500, Pt1000, Ni50, Ni00 (IEC60751).
- Wiring style: 2, 3, or 4-wire.
- Thermocouple: K,N,E,J.T,S,R,B (IEC584).Wiring style: 2-wire.
- Output: 4~20mA, 4-20mA+HART
- Damp time: 0~30 seconds adjustable
- Exceeding lower limit: 3.8mA
  Exceeding upper limit:20.5mA
- Fault alarm current: 3.75mA
- Digital measurement error

Input		Measure scope ℃	Mini span	Measure error ℃
Thermal resistance	Pt50	-200 ~ +850 ℃	10	0.15
	Pt100	-200 ~ +850 ℃	10	0.1
	Pt500	-200 ~ +850 ℃	10	0.15
	Pt1000	-200 ~ +850 ℃	10	0.15
	Ni50	-60 ~ +250 ℃	10	0.15
	Ni100	-60 ~ +250 ℃	10	0.1
Thermocouple	K	-200 ~ +1370 ℃	50	1
	N	-200 ~ +1300 ℃	50	1
	E	-200 ~ +1000 ℃	50	1
	J	-210 ~ +1200 ℃	50	1
	T	-200 ~ +400 ℃	40	1
	R	-50 ~ +1760 ℃	100	2
	S	-50 ~ +1760 ℃	100	2
	B	0 ~ +1820 ℃	100	2

- Temperature affect:＜0.01% limit span /℃
- Long term drift: ＜0.04% limit span
- Initiate time: transmitter realizes the features of technical specification after power on within 20s (damp time is set to be 0s)

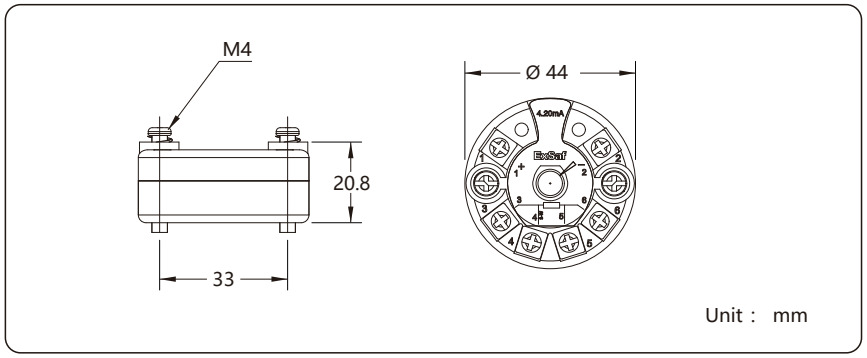
English

5. Dimension and Weight

5.1 Sensor dimension

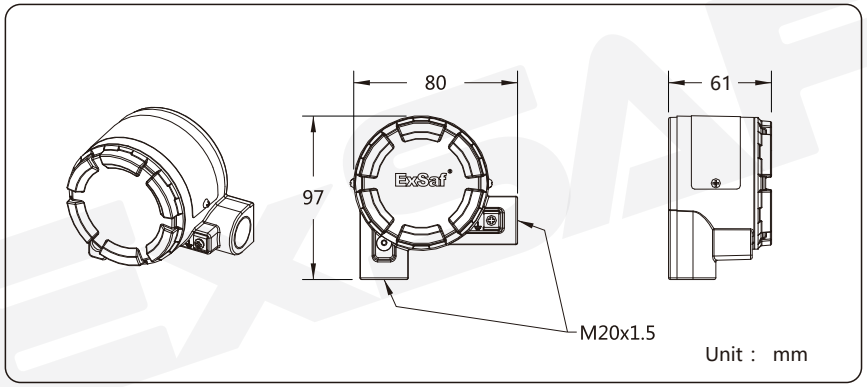
5.2 Mould dimension

Mould dimension is as follows:



5.3 Enclosure dimension

Enclosure dimension is as follows:



5.4 Weight

- Mould : 50g
- Enclosure : 1kg

6. Installation

6.1 Installation procedure, method and caution

6.1.1 Installation of integrated temperature transmitter

6.1.1.1 Installation procedures

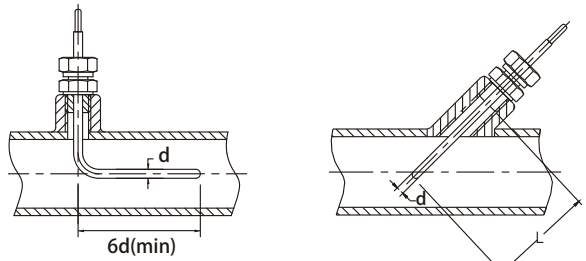
- Under non-explosive environment, it is electrified indoor to set configuration parameter. Before delivery from factory, the product has been configured based on the requirements of customer. If the requirement is unchanged, the procedure can be omitted.
- After the transmitter is installed at-site, make leak inspection on the sensor.
- Open terminal cover.
- Connect wiring piping with entrance device, introduce on-site lead into injunction box and screw tight cable sealing device.
- Remove sundries in cavity and screw tight the terminal cover.

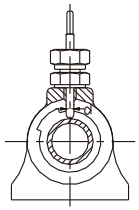
6.1.1.2 Installation method

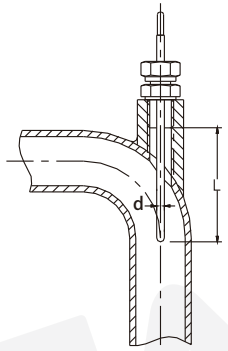
Engineering installation style is up to the selected procedure linkage. 2 ways: thread, flange.

- Installation style of sheathed thermocouple is as follows:

English



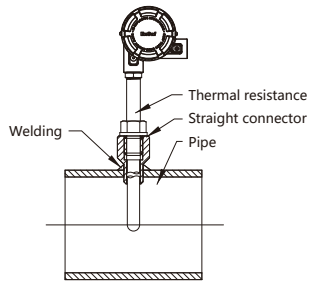




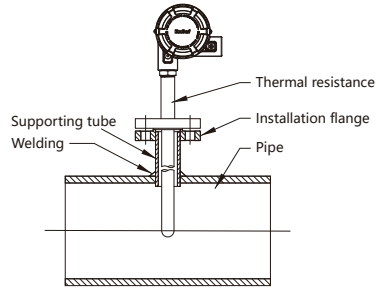
Note

The diameter of sheathed thermocouple is generally d, which shall be put into the middle position of tube, the input depth is L, besides L≥10d.

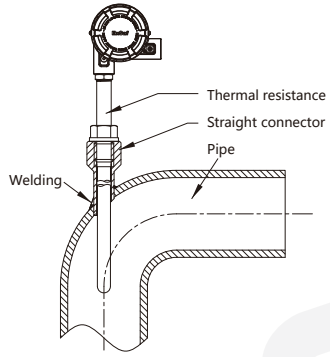
- Installation fixing methods of assembly thermocouple is as follows:



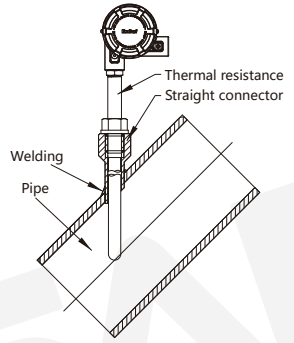
Straight pipe installation style



Flange installation style



Bending pipe installation style



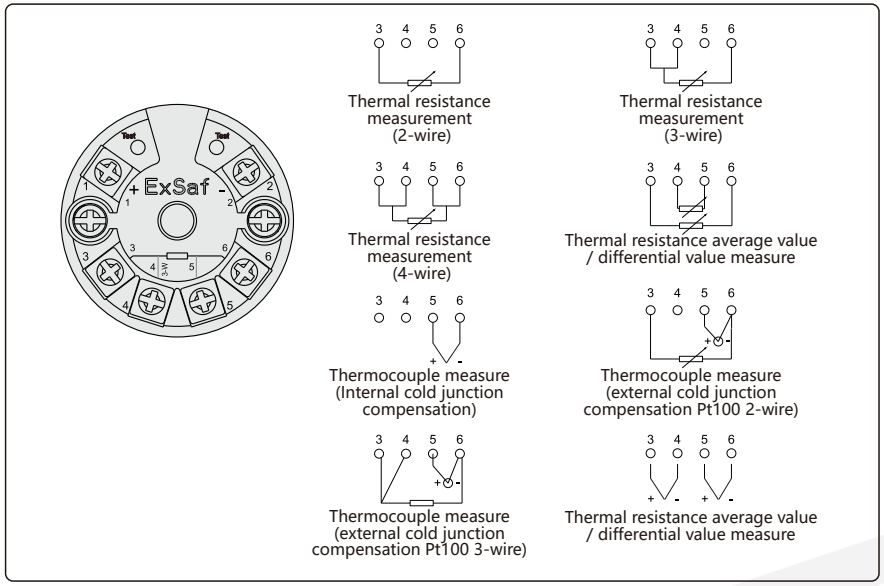
Declining pipe installation style

6.1.2 Wiring

"+", "-"represents the positive pole and negative pole of power supply separately.

- Top-mounted temperature transmitter module wiring is as follows.

English



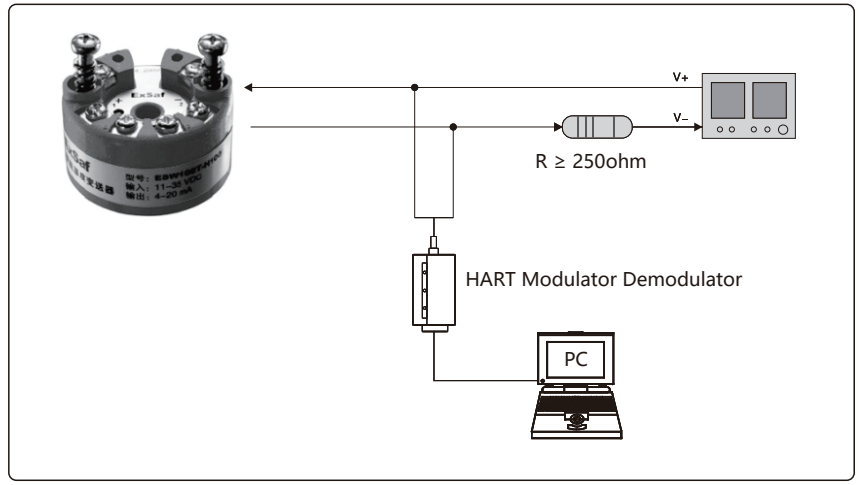
6.2 Debugging procedure, method

- Connection of debugging device

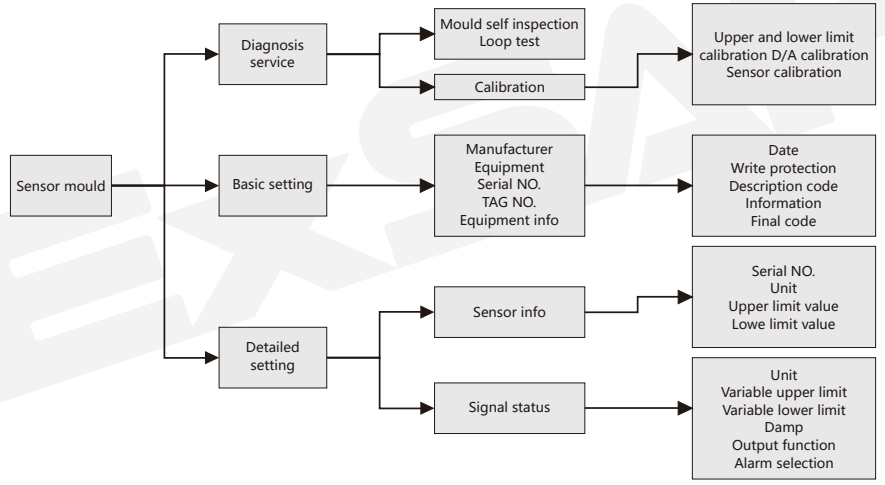
  W2052 series, without HART temperature transmitter, requires ExSaf special modulator and PC software to debug.

  W2052 series temperature transmitter with HART can use ESH475 site communicator or HART modulator and responsible PC software.

  Connecting graph is as follows:

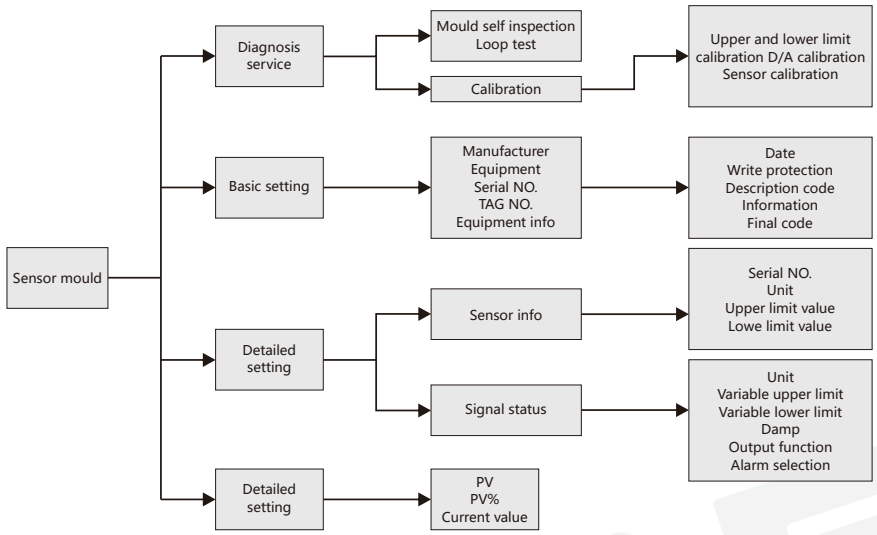


- W2052 temperature transmitter tree diagram is as follows:



English

- Tree diagram of W2052 and W2052 series temperature transmitter with HART:



6.3 Installation, acceptance item after debugging and judgment basis

Judge basis for acceptance project after switch on and judgment basis of inspection before switch on is as follows:

No.	Acceptance item	Judgment basis
1	Thread and flange connection is reliable or not	Thread is connected fully.
2	Sealing inspection before sensor on-site installation	Use water to test pressure, pressure is more than 1.5 times of medium pressure
3	Check and confirm wiring is right and fixed before power-on	Take description in manual is as basis
4	Inspect 4~20A is normal or not	According to the detected temperature and set temperature scope, Accumulate current is within the normal scope
5	With display module, check it to be under normal monitoring state	Estimate current to be within normal scope according to measured temp. And set temp. scope
6	Communication is normal or not	Read, set, read and compare 2 times value to be same

7. Troubleshooting

7.1 Common faults

When transmitter appears the following faults, contact ExSaf when fault cannot be resolved by using the ways listed in the table.

No.	Phenomena	Fault	Disposing method
1	Measure value is large	Sensor leading line is loose	Fix and stabilize sensor leading line
2	Measure value is small	Power earth line is not isolative	Check the insulation condition
3	Current output is alarm current	Engineering quantity, current overrange or temperature transmitter Alarm (sensor is open or short circuit, RAM, ROM, EEPROM of sensor appear faults	• Check the open or short circuit of sensor; • The environment temperature of transmitter is over limit; • Power-on again; • Replace transmitter mould

Note

Transmitter is precision instrument, read carefully manual before maintenance.

7.2 Dismantling and assembling procedur

7.2.1 Dismantling procedure

- Switch-off power supply of transmitter.
- For temperature transmitter with protective tube, directly remove transmitter from equipment pipe. For temperature transmitter without protective tube, dismantle it after the detected medium is cleared or decompression.
- Loosen the buckle of terminal cover, screw off the terminal cover form transmitter enclosure, and dismantle power line from "+", "-" point.

7.2.2 Installation procedure

- Screw off terminal cover; check the internal wiring is right and reliable according to 6.1.2 wiring style.
- Fix sensor on the measuring position according to sensor installation style.
- Introduce power line into enclosure through electrical entrance device, connect wiring terminal marked with "+", "- ".
- Clear the sundries in cavity, screw tight terminal cover.

English