

Temperature measurement
scheme of grain vertical silo and
steel plate warehouse

square
table
detailed
separate

Langfang Zhaosui Temperature
Measurement Cable Co., LTD

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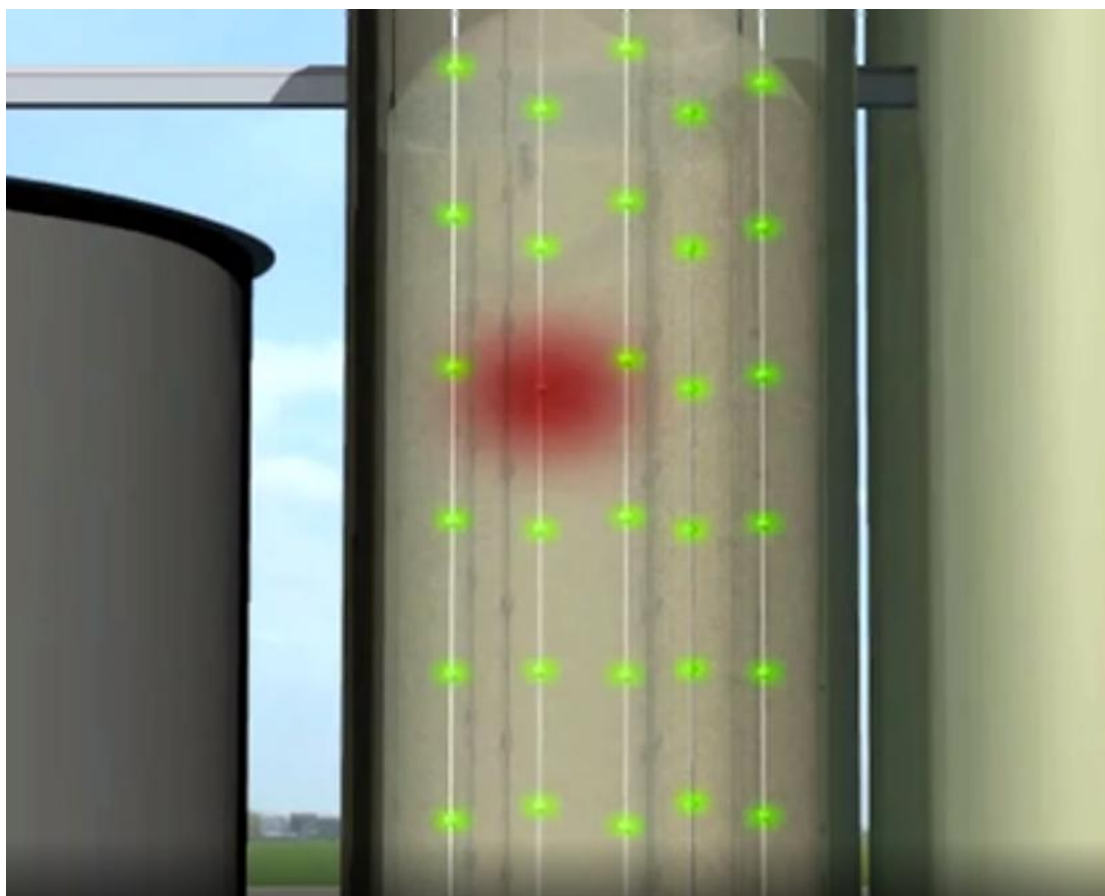
一、 System Overview and Design Significance

This scheme is designed to monitor the temperature inside the silo. N temperature measuring cables are hung in the silo. The temperature measuring cable has N built-in temperature measuring points, and each temperature measuring cable is connected to the temperature measuring collector on the top of the silo.

The temperature collector converts the signal of the temperature sensor to wireless, or the wired (485) signal is sent to the wireless signal receiving end next to the temperature measuring computer, and finally realizes the effect of computer monitoring the temperature inside the silo.

There are two main causes of crop damage: mildew and pests. Both cases are accompanied by an increase in grain temperatures in the anomalous regions.

This system can effectively reduce the loss of grain caused by "mildew" "insect pest" and other reasons by monitoring the temperature inside the silo and dealing with the high temperature area in time.



二、 Composition of equipment

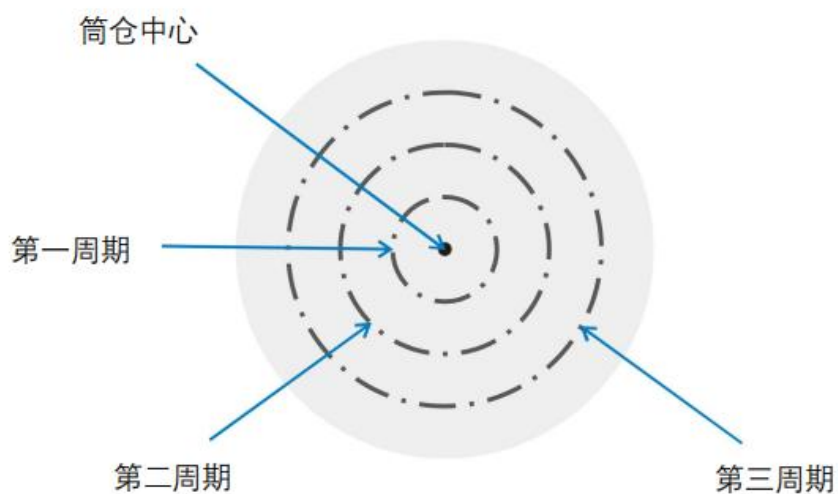
Name of equipment and materials	Model / specification	remarks	unit	dosage
Temperature measurement host	ZS-DLL	Valid wireless transmission distance: 7,000 m	Set	One factory / station

Temperature measuring machine	ZS-RTU	The dual 485 output can communicate with the computer and the local display screen simultaneously to collect up to 400 temperature measurement points	set	One silo group / unit or less than 300 temperature measuring point / unit
Temperature measurement cable	ZS-7	7 tons of tensile, waterproof core, Replaceable inner core	root	According to the actual situation
Barn rain hood		After the temperature measuring cable is opened, the opening hole can be sealed and plugged to facilitate the replacement of the inner core. Note: If internal cable is not required	individual	Single temperature measurement cable / individual
connecting lead		Conire connecting temperature measuring cable to temperature extension	rice	According to the actual site distance layout
The 220V power supply conductor		Connect the temperature extension to the 220V power supply	rice	According to the actual site distance layout
Temperature measurement software		It has cycle monitoring, three-dimensional view, print data, history query, temperature alarm, graph and other functions. It can support mobile app and remote computer	Set	One factory / set

		terminal, supporting up to 200 subsidiaries that can be added by total / branch architecture.		
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Design Standard for Root Number of Silo Temperature Measurement Cable (International General Standard)

Note: The number of temperature measuring cables can be specified by oneself.



如果筒仓直径大于8米，我们建议客户遵循我们的传感器编号和传感器安装位置指南，以保证系统能够完全监测筒仓内物料的温度变化。

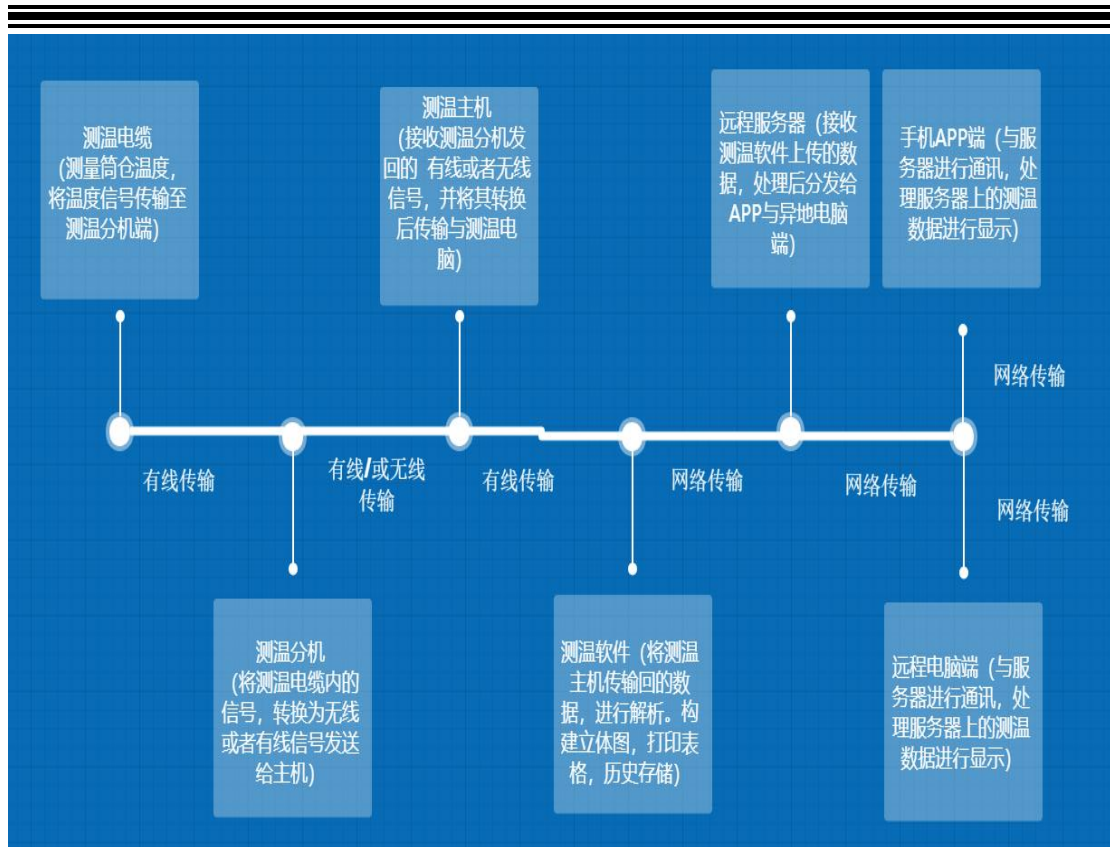
筒仓直径	无害环境	筒仓中心	第一周期			第二周期			第三周期		
			半径(m)	数量	区间角	半径(m)	数量	区间角度角	半径	数量	区间角
4	1	1									
6	1	1									
8	3	0	2.3	3	120						
10	3	0	2.5	3	120						
12	4	1	3.3	3	120						
14	6	1	4.7	5	72						
16	7	1	5.6	6	60						
18	8	1	6	7	51						
20	11	0	2.5	3	120	7.5	8	45			
22	12	0	2.8	3	120	8.2	9	40			
24	13	0	3	3	120	9	10	36			
26	17	1	5.3	6	60	10.6	10	36			
28	19	1	6.6	6	60	10.6	12	30			
30	22	0	2.6	3	120	7.5	7	51	12.8	12	30
36	29	0	2.5	3	120	8.5	10	36	14.5	16	22.5
40	34	1	5.6	5	72	11.3	10	36	17	18	20

三、system composition

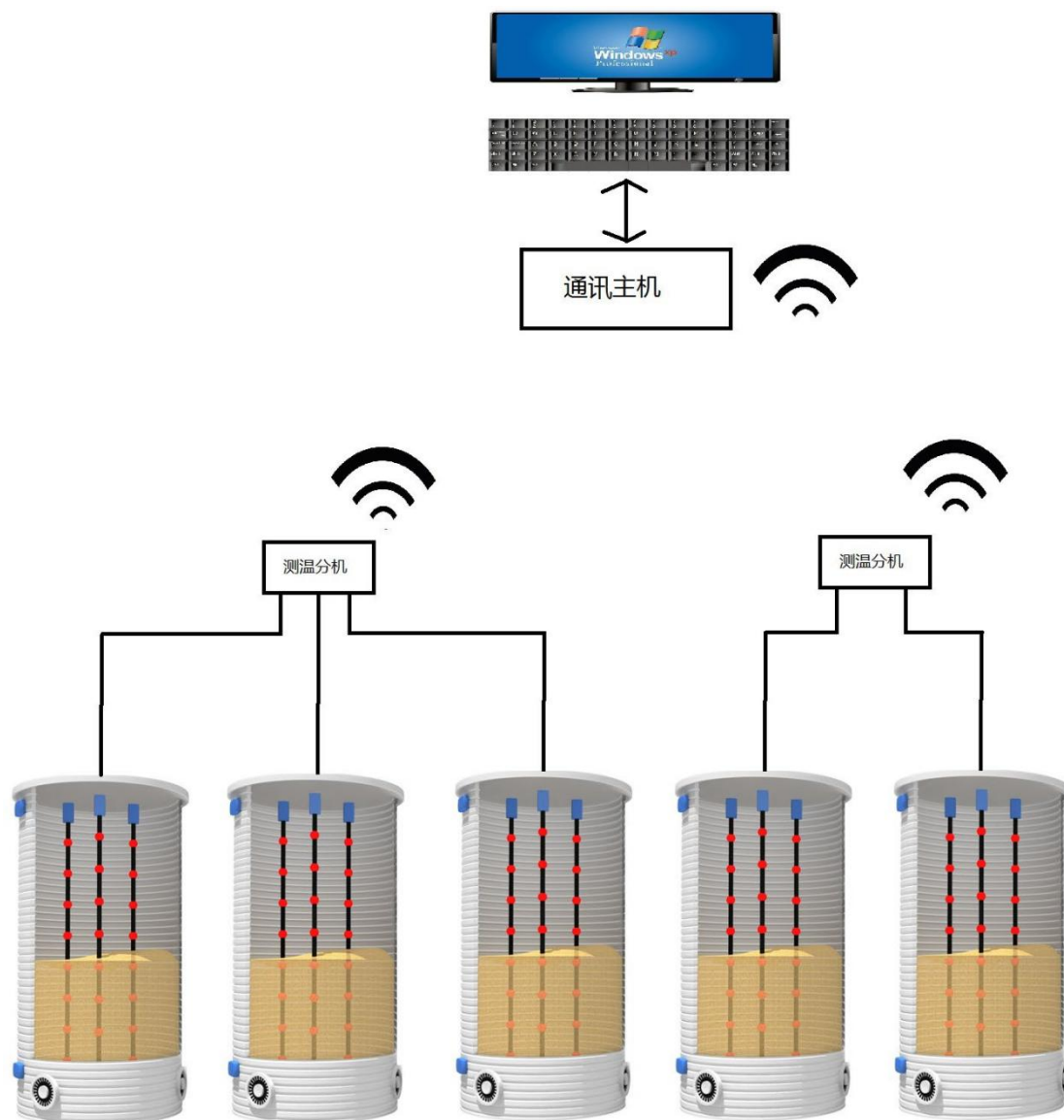
The system composition is basically divided into:

[Langfang Zhaosui Temperature Measurement Cable Co., LTD. 0316-5830830 Sunhuiluo Industrial Zone, Dacheng County, Hebei Province www.zscewen.cn](http://www.zscewen.cn)

1. Temperature measuring cable (measure the silo temperature and transmit the temperature signal to the temperature extension terminal)
2. Temperature measuring extension (convert signal in temperature measuring cable into wireless or wired signal to host)
3. Temperature measuring host (after receiving the wired or wireless signals sent back from the temperature measuring extension unit, and transferring them to the temperature measuring computer)
4. Temperature measuring software (the data transmitted back by the temperature measuring host for analysis.)
5. Remote server (receiving data uploaded by temperature measuring software, processed and distributed to APP and remote computer)
6. Mobile phone APP terminal (communicate with the server, process the temperature measurement data on the server for display)
7. Remote computer side (communicate with server and display temperature measurement data on server)



System architecture diagram (stand-alone version of wireless transmission):



四、 Parameters of the main equipment:

1. Basic parameters of ZS-7 temperature measuring cable:

1. External sheath material: non-recycled high molecular weight polyethylene, mixed with independently developed modified additives. High temperature resistance, wear resistance, high hardness, high smoothness.

2. Resistance parameters: $\geq 7T$ or $\geq 12T$ (custom version)

3. Waterproof and anti-fumigation: it can sink into a water tank less than 100 meters and into a well. Effectively prevent water entry and damage to the cable.

4. Use environment: recommended in -50°C -120°C , temperature environment. Can be used for coal warehouses, corn warehouses below 60 meters, wheat warehouses and other grain warehouses. It can be used in less than 30 meters deep water, less than 100 meters deep storage tanks, groundwater Wells.

5. Temperature measurement range: -55°C -128°C

6. Temperature measurement accuracy: $\leq 0.5^{\circ}\text{C}$

7. Cable core: integral silicone is filled and sealed. Effectively prevent water entry, prevent condensation. The inner core can be drawn out.

8. Temperature measuring chip: 18b20

9. Communication mode: 1-wire

10. Line core color: black is GND (ground line), and other colors are signal line.

11. Operating voltage: 0-5.5V



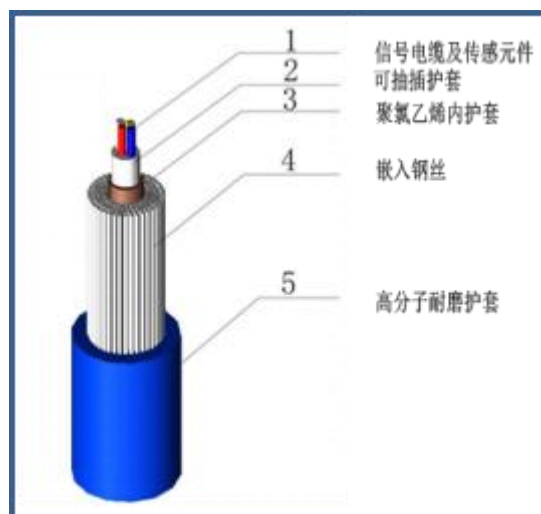
2. Structural characteristics of ZS-7 temperature measuring cable:

1. Product tensile: composed of 30 high carbon steel wire outer sheath. And through the special treatment, so that each steel wire force is uniform. Different from the straight-pull steel wire of the ordinary all-inclusive temperature measurement cable, the single or more root of the force is too large, resulting in local fracture.

2. Product waterproof treatment: the product adopts the temperature measurement inner core + inner core tube + tensile steel wire + outer sheath composition. The inner core is treated with integral perfusion and waterproof silica gel. Can effectively prevent the internal core condensation, water seepage, internal corrosion. The technology has been used in hot springs, water storage tanks, tidal power generation, oil tanks, and freezing shafts.

3. Advantages of the product inner core: the whole inner core can be pulled out, convenient to replace, the whole inner core is completely waterproof, and the inner core material is resistant to 125°C high temperature. The product inner core can be replaced with other types of temperature measurement cables.

3. Outer sheath material: the outer sheath material of ordinary temperature measurement cable on the market is generally PVC or high pressure polyethylene. Very low wear resistance. ZS-7 heavy-duty replaceable core temperature measurement cable, skin using non-renewable high molecular weight polyethylene, mixed with self-developed modified additives. It is protected by high strength and high wear resistance of polymer material. Can be excellent applied in the wear index of high coal bin, grain bin. High temperature resistance is superior than ordinary temperature measurement cable.



3. Basic parameters of the temperature measuring collector.

product model	ZS-RTU-400	Product manufacturer	Langfang Zhaosui Temperature Measurement Cable Co., LTD Dacheng County Sun Hui Luo teng more temperature measurement cable factory Dacheng County Pihong Network Technology Co., LTD (Joint R & D)
Voltage input	9-24v (1A)	Communication parameters	9600bps, 8 data bits, 1 stop bits, no effect test
Temperature measurement resolution	0.1℃	Support chip	DS18B20/CT1820/QT18B20/GX18B20
joggle	1 Road power input 2 Road temperature measurement input 2-Road 485 output	protocol	MODBUS — RTU protocol (Customizable MODBUS-TCP)
Capability	Single-channel 200 temperature measurement point Single channel 800m (Note: points and distance need to be reduced in strong)	Number of temperature measuring channels	2 channels

	interference environment)		
Temperature measurement and sampling polling time	4s	working temperature	-40°C-80°C
Case material	Crushed aluminum alloy (anti-interference)	Shell size	128*127

五、 Introduction of the temperature measuring software