HIRDA-KH Endoscope Pneumatic
Ultra-high temperature infrared thermal imaging temperature detection and analysis system
Technical Specifications

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HIRDA-KH Series Endoscopic Pneumatic Ultra-high temperature infrared thermal imaging temperature detection and analysis system Technical Specifications

1. Product Description

HIRDA-KH series endoscopic pneumatic ultra-high temperature infrared thermal imaging temperature detection and analysis system is a special closed-circuit television equipment specially used in high temperature environment. The system consists of infrared thermal imaging movement, high temperature resistant infrared thermal imaging lens, automatic retraction protection device, furnace wall installation kit, air filtration system and on-site equipment box, algorithm server and intelligent temperature measurement software.

The high-temperature resistant infrared thermal imaging lens is installed in a retractable metal protective cover, and the high-temperature resistant infrared thermal imaging lens is directly extended into the kiln furnace (below 1600℃) through the retractable device. The infrared thermal imaging movement stays outside the furnace to achieve continuous real-time monitoring of the operating status of the furnace.

The shield is cooled by compressed cooling air or cooling water, so that the infrared lens can work at a more suitable temperature. At the same time, the lens is purged to prevent dust in the furnace from adhering to the lens protection window. The system has a built-in high-temperature protection circuit. Once the cooling gas or cooling water circulation is abnormal, the lens will be retracted to prevent damage by the high temperature in the furnace.

It has the characteristics of high temperature resistance, corrosion resistance and maintenance-free. It can display various complex working conditions inside the kiln in real time. When the camera probe blows compressed air normally, it is suitable for various positive pressure kilns.

2. System Features

◆ Equipped with all-weather passive infrared temperature measurement function

◆ Adopt self-developed temperature measurement and correction algorithm to achieve accurate temperature measurement

◆ Supports onvif protocol and can be connected to mainstream NVR;

◆ Independent of the system platform, you can directly log in to the IP address to access images and configurations, and can directly output alarm signals to PLC or alarms;

◆ The telescopic length can be customized to suit kilns of various wall thicknesses

◆ Spiral air curtain design, no dust accumulation on the lens

◆ Overall stainless steel material, corrosion and temperature resistant

◆ Direct-view endoscope

◆ Automatic exit protection device, exit fault indication

◆ Pneumatic transmission mechanism

◆ High temperature resistant optical pinhole lens with dustproof and high temperature lens

◆ Automatically exit the furnace in case of over-temperature, under-voltage or power failure

3. Application Scenario

Cement plant kiln head, grate cooler blanking, steel plant heating furnace, annealing furnace, heat treatment furnace, garbage treatment plant incinerator and other industrial high temperature furnaces.

4. System Utility Engineering Requirements

4.1 Power Supply

On-site probe power supply 220VAC 50/60HZ Power 50W/set

Control room power supply: 220VAC 50/60HZ Power 100W

4.2 Compressed air

Compressed air temperature: ≤35℃

Compressed air pressure: ≥0.4 Mpa

Compressed air flow: 0.1-0.2m3/Min

4.3 Cooling water

Cooling water temperature: ≤35℃

Cooling water pressure: ≥0.4 Mpa

Cooling water flow: 30L /Min

5. Main technical indicators

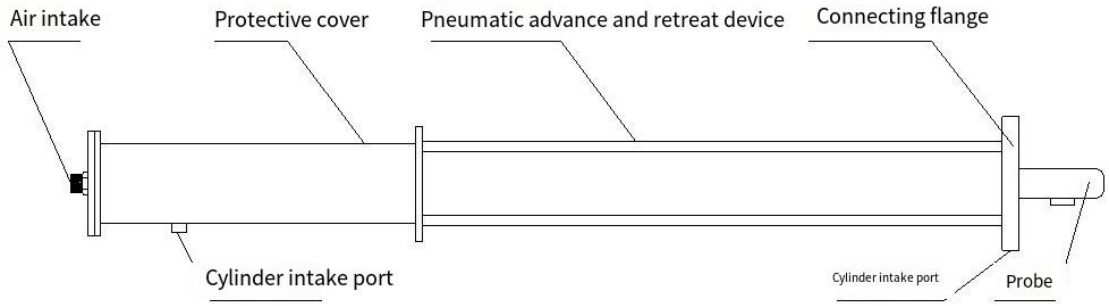
Operating ambient temperature	Furnace temperature	≦ 16 00 ℃
	Control System	≦ 70 ℃
Automatic exit device	Automatic exit protection function	The probe can automatically withdraw from the furnace in case of power failure, gas failure, over-temperature or under-voltage.
	Exit device trip	100-600mm , can be customized according to furnace thickness
	Manual in and out function	have
Controls	Integrated touch screen system	8 relays , 4 transistors
	Three-site control	It can realize the operation from three places: on-site central control and mobile phone
Infrared thermal imaging	Detector Type	Uncooled focal plane detector
	Resolution	384×288
	Lens focal length	3.3mm
	Field of view	98 ° × 76 °
	Lenses type	High temperature resistant pinhole lens
	Temperature measurement range	50℃ ~1600℃
	Temperature measurement accuracy	±2℃ or 2%
	Network Protocol	Support

		ONVIF/RTSP/FTP/PPPOE/DHCP/DDNS/NTP/UPnP/TCP
Visible light camera	Resolution	2~4 million pixels optional
	focal length	4.7~94mm 20 times
	Dynamic Range	120db
	ICR Switching	support
	Minimum illumination	Color 0.05lux@F1.6
	Video Compression	H.264/H.265
Vortex cooling tube (optional)	When the compressed air inlet is ≧0.35MP, the compressed air outlet temperature difference is 23 degrees	
Power supply requirements	Supply voltage	AC220V±10%
	Power supply frequency	50Hz
Installation distance	The maximum distance between the equipment and the on-site control box is 15 meters	

6. System composition

6.1 High temperature resistant probe

The high temperature resistant probe adopts an integrated design and has protection functions against high temperature, high pressure, corrosion, power failure, gas failure, etc. The integrated probe integrates a high temperature infrared lens, infrared thermal imaging and a pneumatic advance and retreat device.



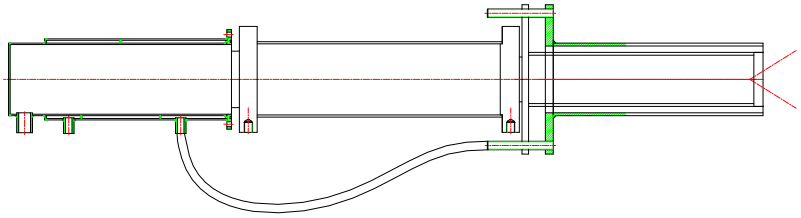
6.2 High temperature resistant infrared lens

The high temperature resistant infrared lens shell is made of stainless steel, the front end imaging adopts the micro-hole imaging principle, the peephole diameter is 2mm, and the flange connection port is reserved for infrared thermal imaging connection. The technical parameters are as follows:

- Focal length: 3.3mm, 6mm and other focal lengths are available;
- Peephole diameter: Φ2mm;
- High temperature resistance: <2000℃;
- Low temperature resistance: -40℃;
- Cooling medium: compressed air (oil-free and water-free);
- Air inlet: Φ12, ZG1/2″;
- Inlet pressure: 0.1～0.4MPa;
- Cylinder air inlet: Φ12, ZG1/4″;
- Cylinder intake pressure: 0.1～0.4MPa;
- Ambient humidity: 10~90%, no condensation;

6.3 Pneumatic advance and retreat device

The high temperature resistant probe is integrated inside the pneumatic transmission device, and the reciprocating motion of the cylinder piston is used to realize the forward and backward movement of the camera probe. The front sides of the pneumatic device are equipped with forward and backward indicators to indicate the "advance" and "retraction" of the camera probe. The internal components of the cylinder are made of high temperature resistant and wear-resistant materials, suitable for operation in high temperature, corrosive and high dust environments.



The main technical parameters are as follows:

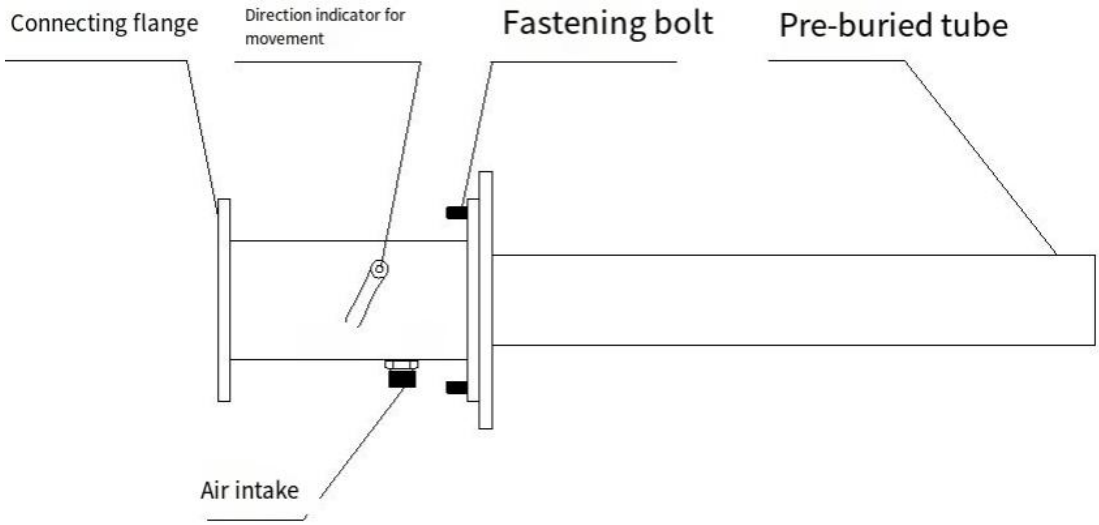
- Cylinder diameter: Φ100mm
- Working stroke: can be customized according to the thickness of the furnace wall
- Ambient temperature: -40℃～250℃
- Air inlet: Φ12, ZG1/4″
- Cylinder intake pressure 0.1～0.4MPa

6.4 Embedded parts

When installing the equipment, the embedded parts are pre-installed in the monitoring hole and connected to the camera probe with a special flange. The embedded parts are made of high-temperature resistant stainless steel and equipped with a special installation guard plate to close the surroundings of the monitoring hole and connect the embedded parts. The camera probe advance and retreat indicator pointers are installed on both sides of the embedded parts, and an automatic door is installed at the rear end of the embedded parts. When the camera probe is pushed forward, the automatic door is pushed open by the front end of the probe. When the camera probe is withdrawn, the automatic door automatically closes to protect the camera probe from being damaged by high-temperature dust inside the kiln after it withdraws from the monitoring position due to the lack of protective compressed air.

The main technical parameters are as follows:

- Installation diameter: Φ108 (standard)
- Buried depth: Determined by the thickness of the furnace wall
- Ambient temperature: <2000 ℃
- Cooling medium: Compressed air
- Air inlet: Φ12, ZG1/2″
- Inlet pressure: 0.05～0.6MPa

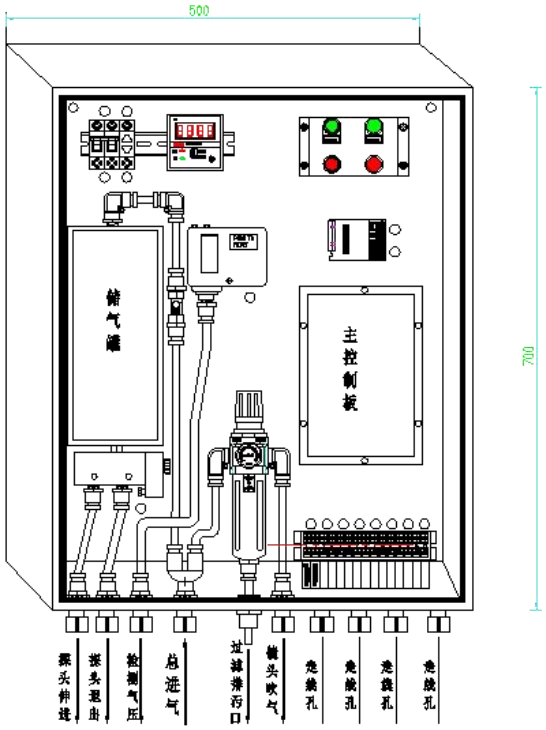


6.5 Control Cabinet

The control cabinet provides working power to the camera probe and automatically controls the advance and retreat of the probe. It receives the coded instructions from the operation process and drives the various control functions of the camera probe after conversion. The control cabinet can control the camera probe by connecting to the operation controller.

The main technical parameters are as follows:

- Power supply: 220VAC/50Hz
- Power consumption: 50W
- Control input: RS485
- Control output: switch
- Power output: 12VDC/1.5A
- Video input: IP network
- Video output: Network, optical fiber SC interface
- Temperature control: 0-60 degrees
- Gas supply index: 0.4MPa～1MPa, temperature ≤40℃, flow rate ≥3m3/h
- Gas outlet index:
- Cylinder working gas: 0.1 MPa~0.2 MPa, solenoid valve, two-way
- Cooling air: 0.1 MPa～0.3MPa, flow rate ≥2m3/h
- Purge gas: 0.1 MPa～0.3 MPa, with self-contained air filtration, flow rate ≥0.2 m3/h
- Protection level: IP65
- Dimensions: 700 (width) × 500 (height) × 200 (depth)
- Installation hole size: 640 (width) × 400 (height) × Φ10



6.6 Stainless steel hose

Stainless steel hoses are resistant to high temperature, high pressure and corrosion. In order to facilitate the movement of the camera probe, the cables and compressed air connected to the camera probe use stainless steel hoses as the connecting medium.

- Diameter: Φ12, Φ10, Φ8, Φ6
- Interface: ZG1/2″
- Material: Heat-resistant stainless steel

6.7 High temperature resistant cables

As the ambient temperature at the work site is generally high, in order to ensure stable and reliable communication and video transmission, cables are selected that are high temperature resistant, fire resistant, and have shielded mesh.

The main technical parameters are as follows:

- Rated temperature: -65 ℃ ～ +250 ℃ (maximum ambient temperature: 250℃, minimum ambient temperature: -65℃)
- Rated voltage: 600V
- Implementation standard: GJB773A-2000
- Conductor: Stranded tinned copper wire
- Color: red, black DC12V 0.5m2 ; orange and white, orange, green and white, green, blue and white, blue, gray and white, gray network cable.
- Insulator: Polytetrafluoroethylene (PTFE)
- Performance: corrosion resistance, strong acid resistance, strong alkali resistance, oxidation resistance; high voltage resistance, non-flammable, non-aging
- Test voltage: 7000V without breakdown

6.8 Optical cables and interfaces (on demand)

The control signals and video signals for long-distance transmission are all transmitted using single-mode optical fiber. Optical fiber transmission has the characteristics of high signal quality and anti-interference, and the signal transmission distance can reach more than 20km. In addition, the system is equipped with SC type optical cable interface to facilitate optical cable connection. The technical parameters are as follows:

- Fiber type: Single mode
- Working wavelength: 1310nm and 1550nm
- Attenuation characteristics: 1310nm wavelength is 0.36dB/km; 1550nm wavelength is 0.21dB/km
- Bending loss: Φ75×100 turns, additional bending loss ≤0.5dB
- Fiber interface: single mode SC

7. System Software

The system client software interface is shown in the figure below.

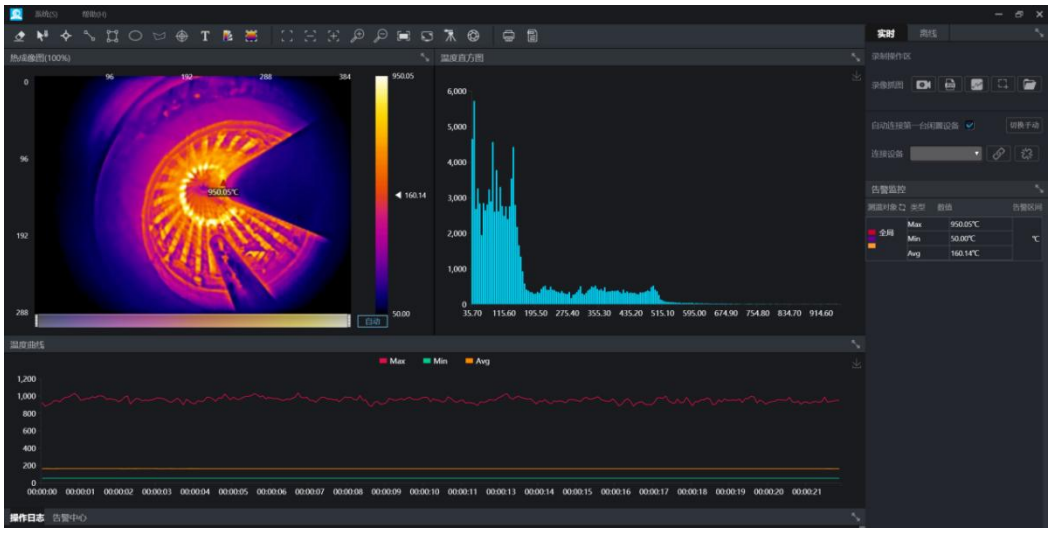


Figure 2 System software interface

The basic functions of the software are as follows:

1. Real-time video display: Real-time display of full radiation thermal images and high-definition visible light videos . You can view the temperature at any location in the infrared thermal image and record, take photos and analyze abnormal situations.

2. Temperature tracking: Automatically analyze the temperature rise trend of the entire infrared thermal image or a specific area to detect potential danger areas early.

3. Data capture: Thermal imaging image data can be collected regularly for later analysis.

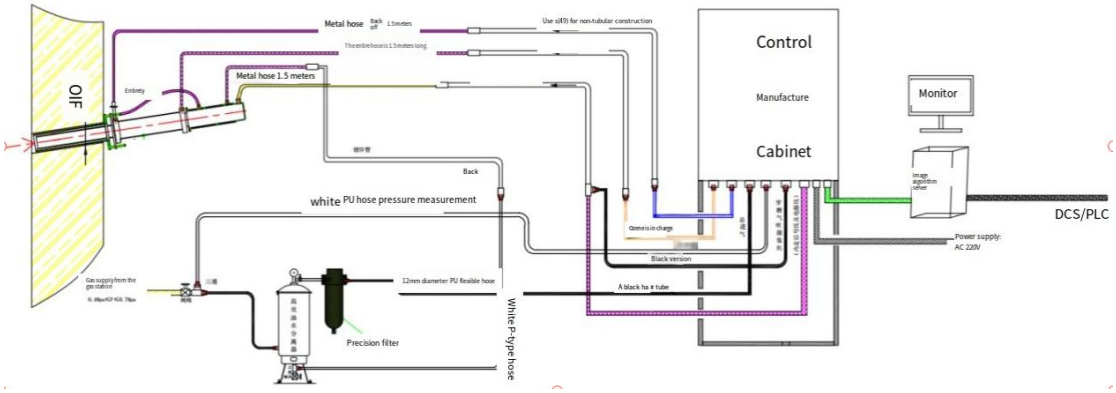
4. High temperature triggers shooting and alarm: When abnormal temperature occurs, the background can detect it in time and trigger the alarm . The software background will take infrared and visible light pictures of the incident .

5. Fault self-diagnosis: When a terminal device fails, the system automatically alarms .

6. Customized alarm thresholds and levels: The system can define multiple different alarm thresholds and levels to assist staff in assessing the urgency and development trend of hidden dangers.

8. System wiring diagram

Connection diagram of the high-temperature-resistant endoscopic infrared thermal imaging temperature detection and analysis system



9. Configuration List

Serial number	name	model	unit	quantity	Remark
1	Infrared thermal imaging movement	NX26Exx	tower		Resolution: 384×288 Focal length: 3.3mm Temperature range: 50~1600℃
2	High temperature resistant probe	HIRDA-HTP	indivual		
3	Pneumatic advance and retreat device	HIRDA-CY	indivual		
4	Embedded parts	HIRDA-EMB	indivual		
5	Control cabinet	SEB752	indivual		
6	Image algorithm server	IDS	set		Including hardware and software, display
7	Air Compressor	YBM-15A	tower		Optional
8	Cold dryer	S-100AFB	tower		Optional
9	High temperature	Φ12mm	set		

	metal hose				
10	High temperature hose	Φ12mm	set		
11	Supporting cables	/	set		
12	Mounting accessories	HIRDA-FJ	set		