HIRDA-NK-A endoscopic pneumatic Super high temperature infrared thermal imaging temperature detection and analysis system

Technical Specification

catalogue

HIRDA-NK-A series of internal pneumatic cameras Ultra high temperature infrared thermal imaging temperature detection and analysis system Technical Specification

1. Product description

HIRDA-NK-A series of internal pneumatic hyper-temperature infrared thermal imaging temperature detection and analysis system is a special closed-circuit TV equipment specifically used in high-temperature environment. The system consists of infrared thermal imaging camera core, high-temperature resistant infrared thermal imaging lens, automatic retracting protection device, furnace wall mounting kit, air filtration system and field equipment box, algorithm server and intelligent temperature measurement software.

The high temperature resistant infrared thermal imaging lens is installed in the telescopic metal protective cover, and the high temperature resistant infrared thermal imaging lens is directly inserted into the kiln (below 2000℃) through the telescopic device, while the infrared thermal imaging core remains outside the kiln to realize continuous real-time monitoring of the operating state inside the kiln.

By compressing the cooling air or water to cool the shield, the infrared lens operates at a more suitable temperature; meanwhile, it blows on the lens to prevent dust from adhering to the lens protection window; the system is equipped with a high-temperature protection circuit, which will retract the lens if there is any abnormal circulation of cooling gas or water, preventing damage from the furnaces high temperature.

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. It is suitable for various positive pressure kilns under the condition that the camera probe is blowing compressed air normally.

2. System features

- It has the function of passive infrared temperature measurement all day long
- The self-developed temperature correction algorithm is adopted to realize accurate temperature measurement
- Supports onvif protocol and can access mainstream NVR;
- Not dependent on the system platform, you can directly log in the web page to access the image and configuration, and can directly output the alarm signal to PLC or alarm;
- The length can be customized and suitable for kilns of various wall thicknesses
- The spiral air curtain design prevents dust accumulation on the lens
- Overall stainless steel material, corrosion resistant and temperature resistant
- Direct view endoscope lens
- Automatic exit protection device, exit fault indicator
- Pneumatic transmission mechanism
- High temperature resistant optical pinhole lens with dustproof high temperature lens
- Over temperature, under voltage and power failure will automatically withdraw the furnace

3. application scenarios

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

4. System common engineering requirements

4.1 Power supply

The power supply of the on-site probe is 220VAC 50/60HZ, and the power is 50W/suites

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: 0.1-0.2m^3/Min

4.3, cooling water

Cooling water temperature: ≤35℃

Cooling water pressure: ≥ 0.4 Mpa

Cooling water flow: 30 l/min

5. the key technical indexes

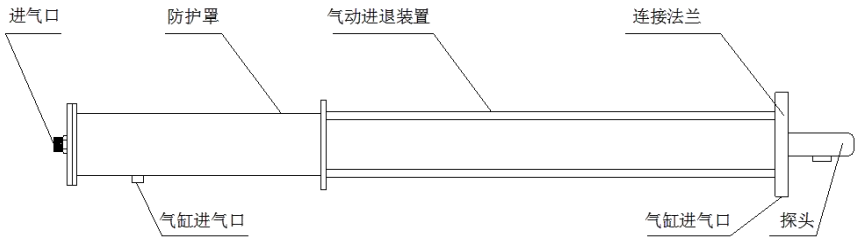
Use ambient temperature	Furnace temperature	≦ 2000℃
	navar	≦ 70℃
Automatic exit device	Automatic exit protection function	When power failure, gas stop, over temperature or under voltage, the probe can automatically withdraw from the furnace
	Exit the device travel	100-6 00mm, customizable according to the thickness of the furnace
	Manual insertion and exit function	have
control device	Integrated touch screen system	8 relays, 4 transistors
	Control of three places	It can realize the operation of three places: on-site control and mobile phone
Infrared thermal imaging	Type of detector	Non-cooled focal plane detector
	resolution ratio	384×288
	Lens focal length	3.3mm
	angle of field	98° × 76°
	Lens type	High temperature resistant pinhole lens
	Temperature measurement range	50℃~2000℃
	temperature measurement accuracy	±2℃ or 2%

	networking protocol	Support ONVIF/RTSP/FTP/PPPOE/DHCP/DDNS/NTP/UPnP/TCP
Visible light camera	resolution ratio	2 to 4 megapixels are optional
	focal distance	4.7~94mm 20 times
	dynamic range	120db
	ICR changing-over	support
	minimal illumination	Color 0.05lux@F1.6
	video compression	H.264/H.265
Vortex cold tube (optional)	When the inlet of compressed air is greater than 0.35MP, the temperature difference of compressed air outlet is 23 degrees	
Power supply requirements	service voltage	AC220V±10%
	Power supply frequency	50Hz
Installation distance	The maximum distance from the equipment to the field control box is 15 meters	

6. system composition

6.1 High temperature resistant probe

The high temperature resistant probe adopts an integrated design, with the protection function of high temperature, high pressure, corrosion and power failure, gas interruption, etc. The integrated probe integrates high temperature infrared lens, infrared thermal imaging and pneumatic advance and retreat device.



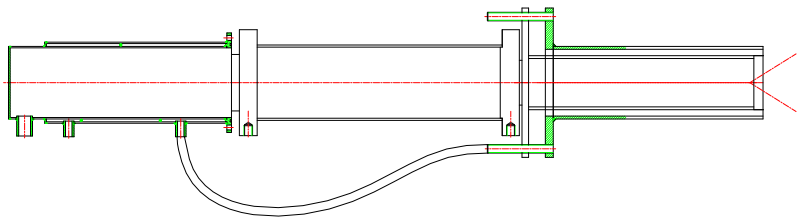
6.2 High temperature infrared lens

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

- Focal length: 3.3mm, 6mm and other focal length options;
- Pupil diameter: Φ2mm;
- High temperature resistance: <2000℃;
- Low temperature resistance: -40℃;
- Cooling medium: compressed air (oil-free and water-free);
- Air inlet: Φ12, ZG1/2〃;
- Intake pressure: 0.1~0.4MPa;
- Cylinder inlet: Φ12, ZG1/4〃;
- Cylinder intake pressure: 0.1~0.4MPa;
- Environmental humidity: 10~90%, no dew;

6.3 Pneumatic advance and retreat device

The high-temperature resistant probe is integrated inside the pneumatic transmission device, utilizing the reciprocating motion of the cylinder piston to achieve the forward and backward movement of the camera probe. The front sides of the pneumatic device are equipped with advance and retreat indicators, used to signal the "forward" and "backward" positions of the camera probe. The internal components of the cylinder are made of high-temperature resistant and wear-resistant materials, making it suitable for operation in high-temperature, corrosive, and dusty environments.



The main technical parameters are as follows:

- Cylinder diameter: Φ100mm
- Work schedule: can be customized according to the thickness of the furnace wall
- Environmental temperature: -40℃~250℃
- Air inlet: Φ12, ZG1/4"

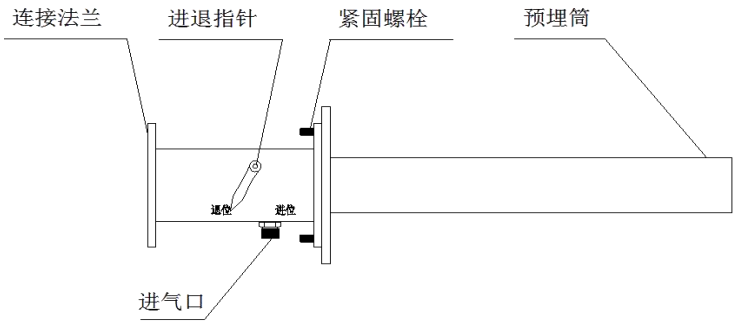
- Cylinder intake pressure 0.1~0.4MPa

6.4, embedded parts

During equipment installation, the embedded parts are pre-installed in the monitoring holes, and there is a dedicated flange to connect with the camera probe. The embedded parts are made of high-temperature resistant stainless steel and come with a specialized installation shield to enclose the perimeter of the monitoring hole and connect to the main body of the embedded part. On both sides of the embedded part, there are camera probe advance and retreat indicators. At the rear end of the embedded part, an automatic door is installed. When the camera probe advances, the automatic door is opened by the front end of the probe; when the camera probe retracts, the automatic door closes automatically, protecting the camera probe from damage caused by the lack of protective compressed air after it exits the monitoring position due to high-temperature dust inside the kiln.

The main technical parameters are as follows:

- Installation diameter: Φ108 (standard)
- Burial depth: determined by the thickness of the furnace wall
- Environmental temperature: <2000℃
- Cooling medium: compressed air
- Air inlet: Φ12, ZG1/2″
- Intake pressure: 0.05~0.6MPa



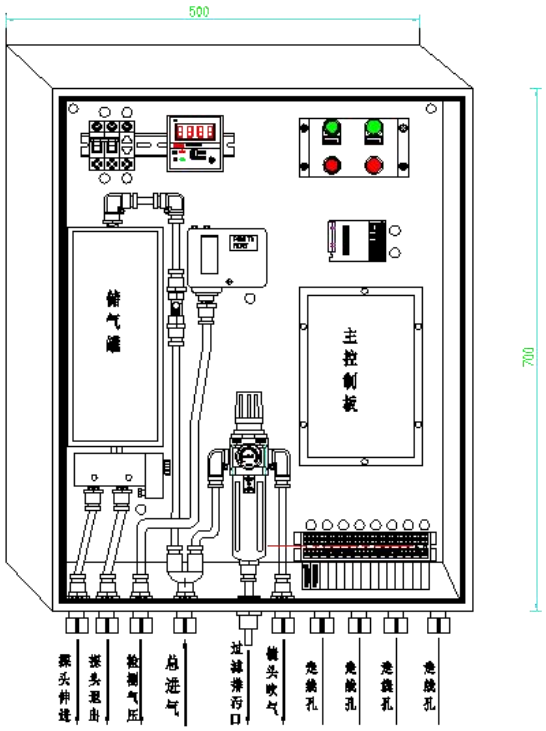
6.5, control cabinet

The control cabinet provides the working power supply to the camera probe and automatically controls the advance and retreat of the probe. It receives the coding

instructions from the transport 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 quantity
- Power output: 12VDC/1.5A
- Video input: IP network
- Video output: network, fiber optic SC interface
- Temperature control: 0-60 degrees
- Gas supply index: 0.4MPa~1MPa, temperature less than 40℃, flow rate greater than 3m3/h
- Exhaust gas indicators:
- Working gas of cylinder: 0.1 MPa~0.2 MPa, solenoid valve, two paths
- Cold air: 0.1 MPa~0.3MPa, flow rate>2m3/h
- Blow sweep air: 0.1 MPa~0.3 MPa, with built-in air filtration treatment, flow rate> 0.2 m3/h
- Protection class: IP65
- Shape size: 700 (width) x 500 (height) x 200 (depth)
- Installation hole size: 640 (width) x 400 (height) x Φ10



6.6 Stainless steel hose

Stainless steel hose has the characteristics of high temperature resistance, high pressure resistance and corrosion resistance. In order to facilitate the movement of camera probe, the cable connected to the camera probe and compressed air are connected with stainless steel hose as the connecting medium.

- Through diameter: Φ12, Φ10, Φ8, Φ6
- Interface: ZG1/2″
- Material: heat resistant stainless steel

6.7 High temperature resistant cable

Due to the high ambient temperature at the work site, in order to ensure the stability and reliability of communication and video transmission, the cable is selected as a comprehensive cable with high temperature resistance, fire resistance and shielding net.

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: multi-strand tinned copper wire
- Color: Red, black DC12V 0.5m^2; Orange white, orange, green white, green, blue white, blue, gray white, gray net line.
- Ultimate body: polytetrafluoroethylene (PTFE)
- Performance: corrosion resistant, strong acid resistant, strong alkali resistant, oxidation resistant; high voltage resistant, non-flammable, non-aging
- Test voltage: 7000V without breakdown

6.8 Optical cable and interface (as required)

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

- Fiber type: Single mode
- Working wavelengths: 13l0nm and 1550nm
- Attenuation characteristics: 0.36dB/km at 13l0nm wavelength; 0.21dB/km at 1550nm wavelength
- Bending loss: Φ75×100 turns, bending additional loss ≤ 0.5dB
- Fiber optic interface: single mode SC

7. operational software

The client software interface of the system is shown in the following figure.

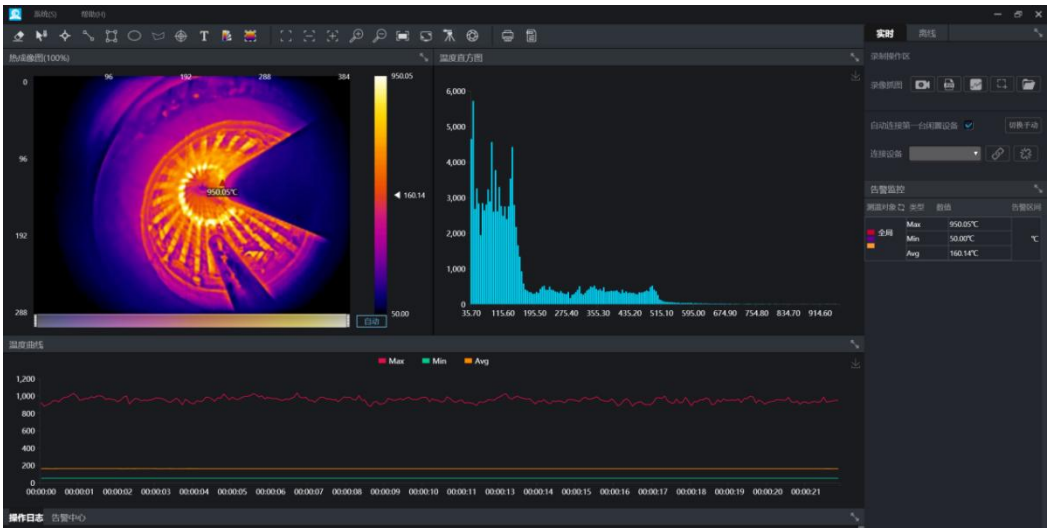


Figure 2 System software interface

The basic functions of the software are as follows:

1. Real-time video display: real-time display of full radiation heat map and high-definition visible light video, view the temperature of any position in the infrared heat map, record, take photos and analyze abnormal conditions.

2. Temperature tracking: automatically analyze the temperature rise trend of the entire picture or specific area of the infrared thermal map to detect potential areas in advance.

3. Data capture: It can collect thermal imaging image data at regular intervals for later analysis.

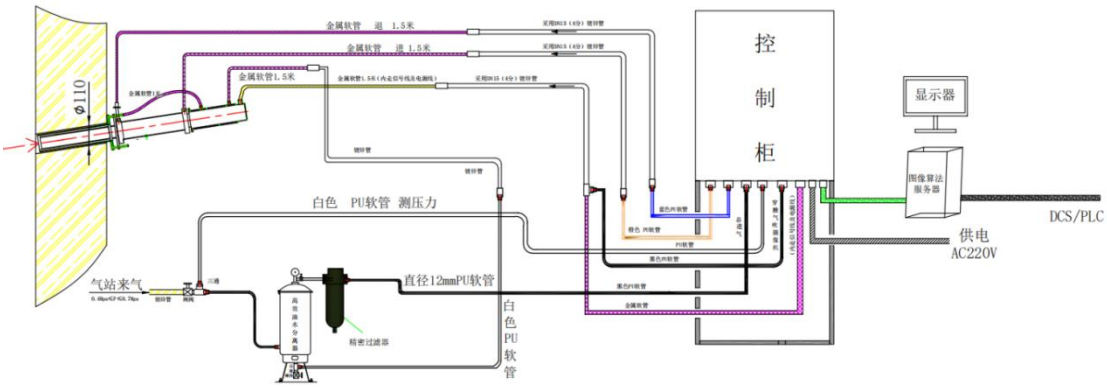
4. High temperature trigger shooting and alarm: When the temperature is abnormal, the background can find it in time and trigger alarm. The software background will take infrared pictures and visible light pictures during the incident process.

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

6. Custom alarm threshold and level: The system can define multiple different alarm threshold and level, to assist the staff to evaluate the emergency degree and development trend of hidden dangers.

8. System wiring diagram

耐高温内窥式红外热成像温度检测与分析系统连接示意图



9. Configuration list

order number	name	model	unit	quantity	remarks
1	Infrared thermal imaging camera core	NX26Exx	short for Taizhou		Resolution: 384 x 288 Focal length: 3.3mm Temperature measurement range: 50~2000℃
2	High temperature resistant probe	HIRDA-HTP	individual		
3	Pneumatic advance and retreat device	HIRDA-CY	individual		
4	built-in fitting	HIRDA-EMB	individual		
5	control cabinet	SEB752	individual		
6	Image algorithm server	IDS	cover		Hardware and software, display
7	air compressor	YBM-15A	short for		apolegamy

			Taizhou		
8	Cold dryer	S-100AFB	short for Taizhou		apolegamy
9	High temperature metal hose	Φ12mm	cover		
10	High temperature hose	Φ12mm	cover		
11	Supporting cable	/	cover		
12	Install accessories	HIRDA-FJ	cover		