HIRDA-PS
PS Converter infrared thermal imaging intelligent analysis system Technical Solution

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1 Overview

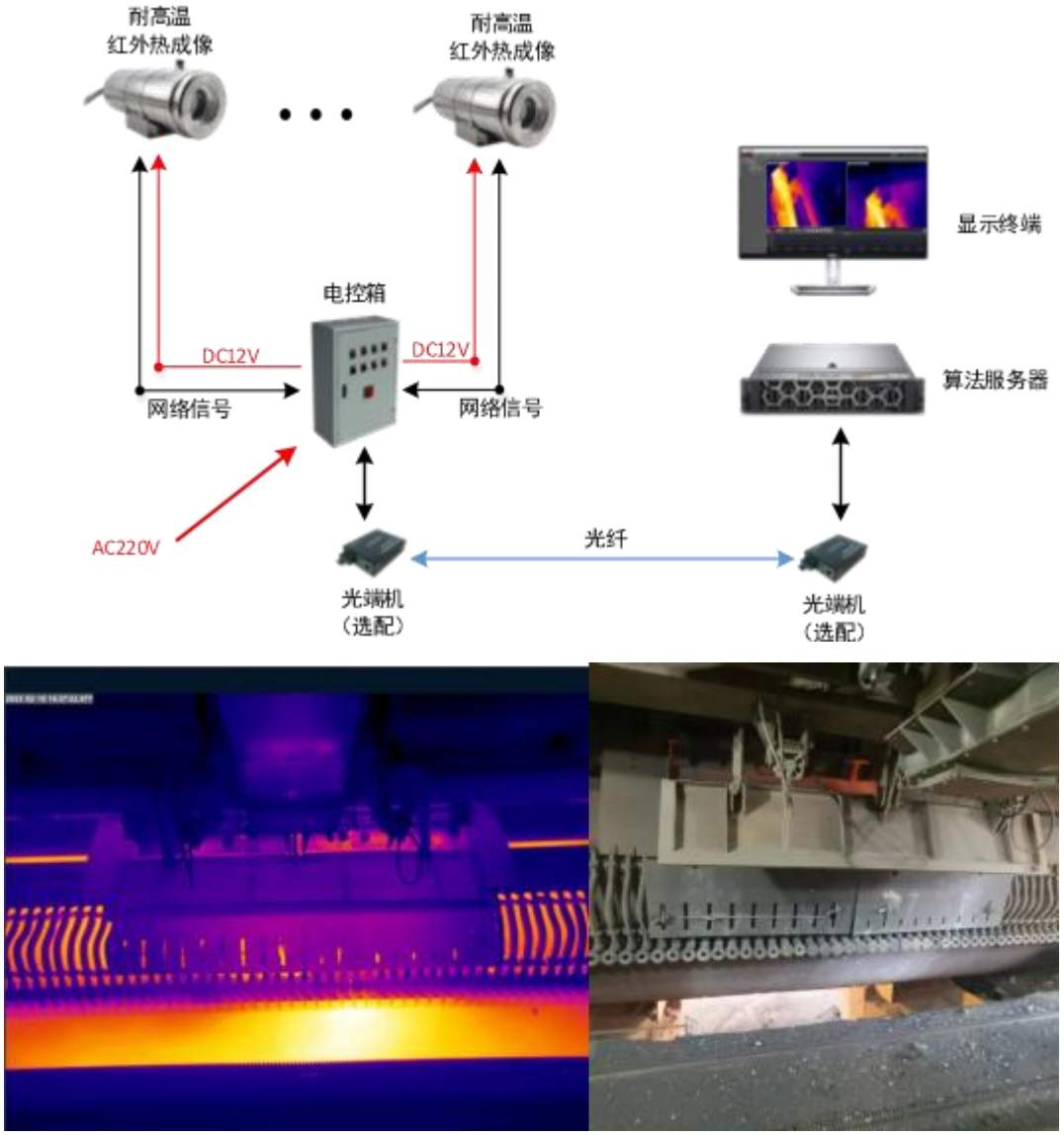
PS The converter is an important equipment for crude copper refining. Through the secondary oxidation reaction in the slag-making period and the copper-making period, the copper in the liquid matte is Fe and S Removed to form crude copper.

In these two processes of blowing, the reactions that occur are almost all exothermic reactions, which will release a lot of heat. Therefore, the temperature of the outer wall of the furnace body is sometimes too high, and the gas and copper matte liquid (as well as The white matte formed later erodes the refractory materials on the inner wall of the furnace, and some refractory materials are lost or missing. The temperature will be higher, sometimes reaching400 At the same time, during the blowing process, due to the characteristics of pyrometallurgy, During blowing, splashes will adhere to the water jacket and fall off the furnace after cooling. Eye of the storm, so the center of the eye is increased20mm Thick steel plate to protect the eye from large The newly added protection plate will affect the furnace temperature measurement, and the protection plate must be modified to measure the temperature. The corresponding furnace outer wall, in addition, the eye hose will also block the furnace wall, but the gap between the hoses can be Measure the outer wall temperature.

2 System Introduction

2.1 Product Description

HIRDA-PS typeThe PS converter infrared thermal imaging intelligent monitoring system is a system specially designed for high temperature metal smelting. The furnace temperature monitoring system consists of a high-temperature infrared thermal imaging thermometer, an electric control box, an algorithm server and a customer Centrally monitor and manage the equipment on the job site and transmit it through a digital transmission network Realize PS Collection, analysis, and location of high-temperature points of converter wall temperature.Automatic alarm and other functions.



picture 1 HIRDA - PSSystem block diagram and site diagram

2.2 System Features

- all-weather passive thermal imaging function;
- Use self-developed temperature measurement and correction algorithm to achieve accurate temperature measurement;
- Strong environmental adaptability, can be used in harsh environments such as high temperature and high dust;
- Full range temperature detection of furnace wall to fully display the temperature field distribution of furnace body;
- Automatic positioning and warning of high temperature areas in square decimeters;
- Establish a furnace wall surface temperature database;
- Build a corresponding model between refractory material thickness and furnace surface temperature;
- Open interface, providingSDK Development kit, available withDCS、 PLC Waiting for system connection.

2.3 System utility engineering requirements

2.3.1 power supply

Field probe power supply 220VAC 50/60 HZ Power 50W/ set;

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

3 Application Scenario

P-S converter, anode furnace, flash furnace and other high temperature metal material melting vessels

4 System composition

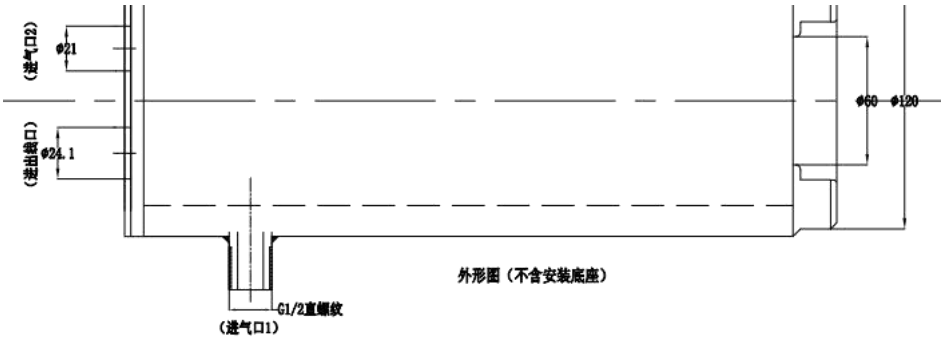
4.1 High temperature infrared thermal imaging thermom

Detector Type	Uncooled focal plane microbolometer
Image resolution	384×288 、 640×480
Lens selection	4 , 4.8 , 5.7 、 8mm
Wavelength range	8 ～ 14μm
Thermal sensitivity (NETD)	≤50 mk @30 ℃
Frame rate	25 Hz
focusing	Electric / Automatic
Temperature measurement accuracy	±2 ℃ or ±2%

Temperature measurement range	-20 ℃~ 550 ℃
Data Types	H264 、 H265 、 16 Bit Raw temperature data
Web Standards	Gigabit Ethernet / Adaptive 10M/ 100M/ 1000M
Protocol support	IPv4/ IPv6 , TCP , UDP , NTP , HTTP , RTSP , RTP , ICMP , WebSocket , ONVIF
Protection level	IP66
size	Φ 126 mm × 313 mm
Installation	Equipped with PTZ bracket
weight	≤ 8Kg
Operating temperature	-20 ～ 60 ℃
Storage temperature	-50 ℃~ 70 ℃
Temperature shock resistance	5 ℃ / min (-40 ℃ ~ 60 ℃)
Vibration resistance	4.3g , x , y , z Axis per axis 2 Hour
Shock resistance	Acceleration 30g , half sine wave, pulse width 6 ms , installation and use direction impact 3 Second-rate
humidity	≤ 95% (non-condensing)

4.2 Overall structural dimensions

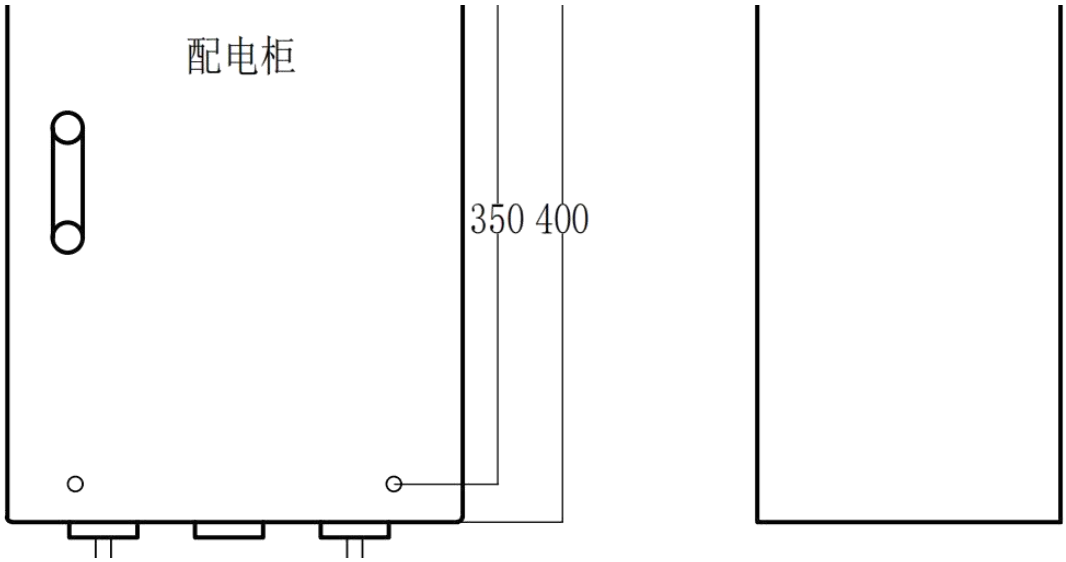
The overall structure dimensions are shown in the figure below.



4.3 On-site control box

The electric control cabinet contains an industrial Ethernet switch (photoelectric conversion) and a power adapter . Its main functions are Provide stable power supply, network switching (photoelectric conversion), and data conversion to the infrared thermal imager.

- Input interface: 100M/1000M Ethernet, RJ45interface
- Output interface: 1000M Optical port
- Transfer rate: Highest 1000M
- Standard: IEEE802.3, IEEE802.3u, IEEE802.3x
- Power supply: AC 220V±10% 50W
- Ambient temperature: -20℃~65℃
- Ambient humidity: ≤90%
- Dimensions: 400 (W)×300 (H)×200 (D) mm
- Dimensional drawings



4.4 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 the camera probe, The cables and compressed air connected to the camera probe use stainless steel hoses as the connecting media.

- Pass path: Φ 12,Φ 10,Φ 8,Φ 6
- catch Mouth: ZG1/2 ″
- Material: Heat-resistant stainless steel

4.5 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, the cables Choose high temperature resistant, fire resistant, and shielded composite cables.

The main technical parameters are as follows:

- Rated temperature: -65 ℃ ~ +250 ℃ (maximum ambient temperature: 250 ℃, Minimum use environment Temperature : -65 ℃)
- Rated voltage: 600V
- Implementation standard: GJB773A-2000
- Conductor: Stranded tinned copper wire
- Color: red, black DC12V 0.5m ^{2}; 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 No breakdown

4.6 Optical cables and interfaces (on demand)

The control signals and video signals transmitted over long distances are all transmitted using single-mode optical fiber. Optical fiber transmission has the characteristics of high signal quality and anti-interference. The signal transmission distance can reach 20km Above. In addition, system configuration SC Type Light Cable interface, convenient for optical cable connection. Technical parameters are as follows:

- Fiber type: Single mode
- Working wavelength: 1310nm and1550nm
- Attenuation characteristics: 1310nm The wavelength is0.36dB / km ; 1550nm The wavelength is0.21dB / km
- Bending loss: Φ 75 × 100 Loop, additional bending loss ≤ 0.5dB
- Fiber optic interface: single modeSC

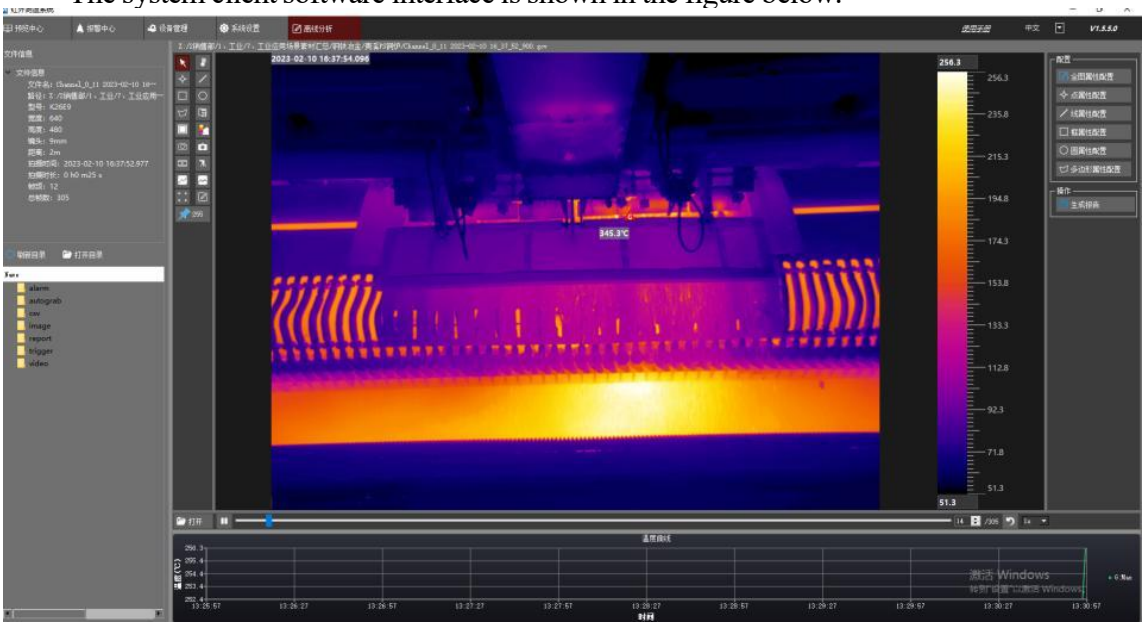
4.7 Multi-function server

- Intel® Core™ i7-11700 processor (Quad Core, 8MB, 3.60GHz)
- Memory 16 GB 1600MHz DDR3 Non-ECC

- Hard disk 256G Solid state + 1TB 3.5inch SATA (7,200 Rpm) harddisk
- Monitor 23.8inch
- Windows 10 Professional, 64bit operating system

5 System Software

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



picture 2 System software interface

The basic functions of the software are as follows:

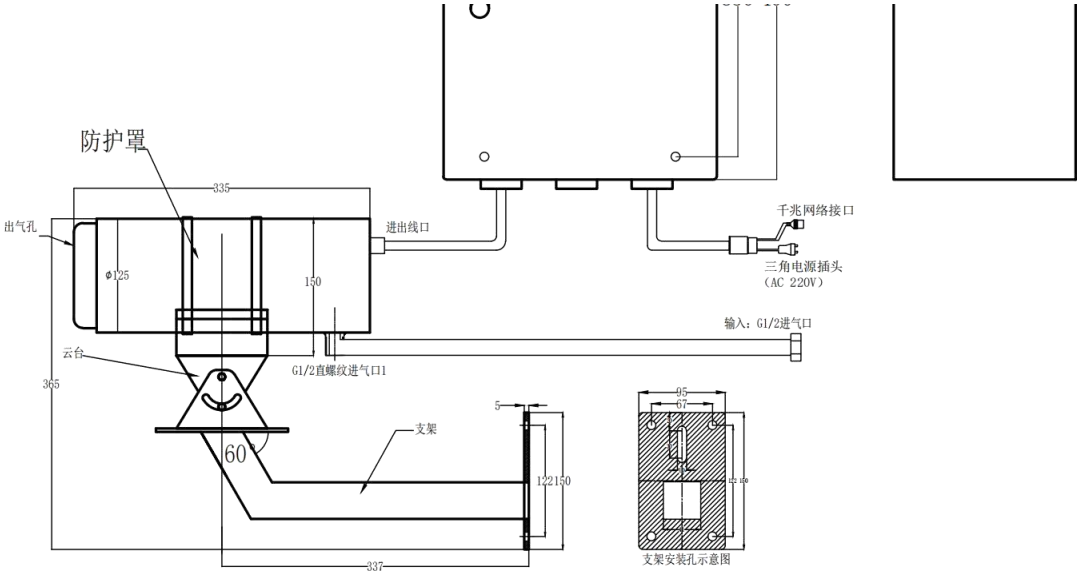
- Real -time video display: Real-time display of full radiation thermal images and high-definition visible light videos, and infrared thermal images The temperature at any location in the environment can be recorded, photographed, and analyzed for abnormal conditions.
- Temperature tracking: Automatically analyze the temperature rise trend of the entire infrared thermal image or a specific area, and Discover potential risk areas.
- Data capture: Thermal imaging image data can be collected regularly for later analysis.
- High temperature trigger shooting and alarm: When the temperature is abnormal, the background can detect it in time and trigger the alarm. The background of the software will take infrared and visible light pictures of the incident.
- Fault self-diagnosis: When a terminal device fails, the system automatically alarms.
- Customized alarm thresholds and levels: The system can define multiple different alarm thresholds and levels to assist workers The staff will assess the urgency and development trend of the hidden dangers.

6 Configuration List

Serial number	name	model	unit	quantity	Remark
1	High temperature infrared thermal Like a thermometer	PFC 320- NS 46 Exx	tower		Resolution: focal length: Temperature measurement range:
2	Electric control cabinet	SEB 432	indivual		
3	Image algorithm server	IDS	set		Including hardware and software Parts, Display
4	Air Compressor	YBM -15A	tower		Optional
5	Cold dryer	S-100 AFB	tower		Optional

6	High temperature metal hose	φ 12mm	set		
7	Supporting cables	/	set		
8	Mounting accessories	HIRDA-FJ	set		With mounting bracket, Adjust the PTZ
9	4-20 mA Conversion Module	HIRDA-DA	indivual		Optional

7 On-site installation diagram



8 Division of labor between the two parties

Supplier:

1) Provide HIRDA-PS type PS Manufacturing, transportation and guidance of converter infrared thermal imaging intelligent monitoring system Installation and commissioning services ensure the normal operation of the system, ensure the integrity of the system, and meet the requirements of on-site use.

2) Responsible Choice HIRDA-PS type PS Installation location of converter infrared thermal imaging intelligent monitoring system equipment, Provide equipment installation location diagram before construction.

3) Responsible for the purchaser's personnelHIRDA-PS typePS The training on commissioning, use, maintenance and overhaul of the converter infrared thermal imaging intelligent monitoring system enables the purchaser's personnel to master the operating skills independently.

4) Provide relevant technical information such as product certificates, inspection reports, operating and maintenance instructions , etc.

Buyer:

1) ProvideHIRDA-PS typePS Installation and commissioning of converter infrared thermal imaging intelligent monitoring system equipment

Relevant on-site information and design drawings.

2) UndertakeHIRDA-PS typePS Cooling air (cooling) required for converter infrared thermal imaging intelligent monitoring system equipment Cooling water), piping, wiring and fiber optic melting of optical fibers and cables.

3) Ensure that the site meets the installation conditions required by the supplier, and notify the supplier's technical staff in advance to participate in the guidance Installation and debugging.

4) The purchaser shall assist in providing working conditions for the supplier's on -site service personnel.

9 Acceptance Criteria

1) Able toHIRDA-PS typePS The infrared thermal imaging intelligent monitoring system software interface of the converter displays the infrared thermal image of the ladle and3D model shows that the equipment maintains good Work results;

2) It can display the ladle number and usage status of the currently monitored ladle and check the historical maintenance data;

3) Display the abnormal temperature area on the ladle surface and prompt an alarm;

4) The supplier shall provide professional training to the personnel designated by the purchaser.

10 After-sales commitment

1) HIRDA-PS type PS The warranty period of the converter infrared thermal imaging intelligent monitoring system is from the date of acceptance. 12 Months or after the equipment arrives 18 Months (for purchased products and servers, including internal hardware warranty period from the time the equipment arrives) Daily calculation 12 months).

2) If the thermal imager is damaged due to improper use, the buyer shall order spare parts in time and the supplier shall provide maintenance services. Service.

3) HIRDA-PS type PS The converter infrared thermal imaging intelligent monitoring system software is used for a long time and is provided free of charge Software upgrade service. When receiving a call from the buyer, the supplier is responsible for guiding the buyer to handle the fault; if the buyer is unable to solve the problem, The supplier promises to 48 The company will rush to the scene to handle the problem within hours. The company's service phone number is: 400-080-4288 .