

Applications of Thermal Cameras - Energy Conservation and Consumption Reduction in Petrochemical Enterprises

1 Application Background

On March 5, 2021, the Report on the Work of the Government 2021 of the State Council stated that the work related to peak carbon dioxide emissions and carbon neutrality should be done well, an action plan for carbon emissions to peak by 2030 should be formulated, and the industrial structure and energy structure should be optimized. In the Notice of the State Council on the Issuance of the Action Plan for Carbon Emissions to Peak by 2030 issued by the State Council on October 24, 2021, it is proposed to promote energy conservation and efficiency improvement for key energy consumption device in the action of energy conservation, carbon reduction, and efficiency improvement, and focus on motors, fans, pumps, compressors, transformers, heat exchangers, industrial boilers, etc. to comprehensively improve energy efficiency standards.

The thermal camera features fast temperature measurement, high sensitivity, wide measurement range, and visualization. It can be used to detect whether the transportation pipelines and boilers of petrochemical enterprises have such failures as blockage, thinning, corrosion, and leakage, and to test and assess the heat preservation effect of pipelines for appropriate improvement, thus becoming an effective means to save energy and reduce consumption in the petrochemical industry.

2 Unique Advantages of Thermal Cameras



Remote and non-contact measurement and no need to change the measurement target

Non-contact temperature measurement is achieved. The hottest spot on the screen or area is automatically captured to make problems directly visible and allow accurate problem locating. It helps ascertain the root causes of faults in a reliable and precise manner.



Alarm function and messages of abnormality alarms

It supports setting the alarm threshold. When the temperature reaches the set range, the alarm will be triggered, notifying the staff to take corresponding measures promptly.



Automatic temperature data collection and curve generation

It shows temperature data in real time and collects the target temperature data in conjunction with the client software. The generated temperature curve makes it convenient for operators to visually analyze the temperature change trend in the monitoring area.



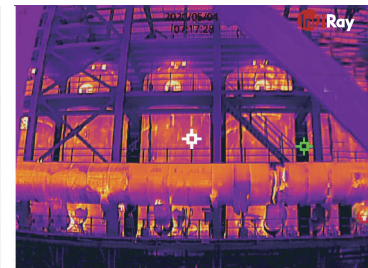
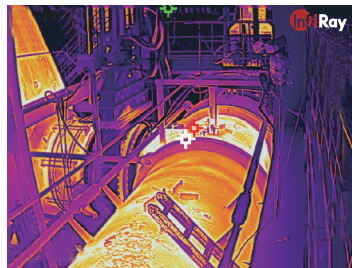
Secondary development support for customers' unique advantages

Provide the secondary development kit (SDK). Alarm messages can be pushed through the IO port, serial port, or other various methods to assist customers in the action linkage and development of automation devices.

3 Main Applications of Thermal Cameras in Energy Conservation and Consumption Reduction in Petrochemical Enterprises

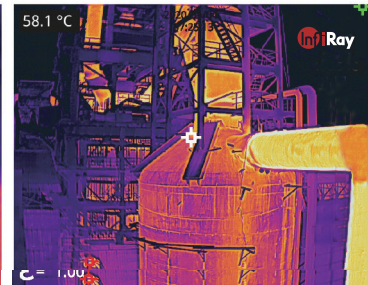
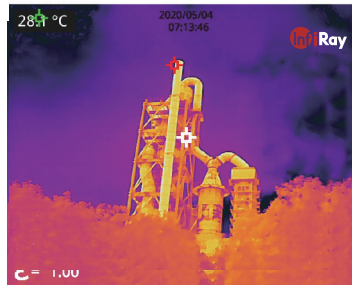
■ Detection of Pipeline Failures

Petrochemical enterprises usually use pipelines to transport steam, raw materials, products, etc. The external force or liquid erosion may thin the pipeline wall and damage the insulation, resulting in heat leakage and energy loss. The thermal camera can be used to detect the temperature of the pipeline surface to locate the fault area of the pipeline according to the temperature difference and notify the operators to repair the faulty and damaged pipeline in time, so as to improve the heat preservation effect, thus reducing the heat loss and achieving the purpose of energy conservation and emission reduction.



■ Assessment of Boiler Heat Loss

A boiler is a kind of energy conversion device, which uses the heat energy or other energy released by fuel combustion to heat the working medium to meet the requirements of certain parameters. The thermal camera can be used to assess the heat loss of boilers, with the main assessments on the heat loss of incomplete combustion of gas and solid fuel, heat loss while dissipation, heat loss due to smoke exhaust, etc. The benefits from the assessment mainly include improving the boiler combustion energy-saving technology to make the combustion more adequate and strengthening the heat preservation energy-saving technology to reduce heat loss caused by dissipation and smoke exhaust.



IRay Technology Co.,Ltd.

Tel: 400-998-3088

Fax: 0535-3410604

Website: www.infiray.com

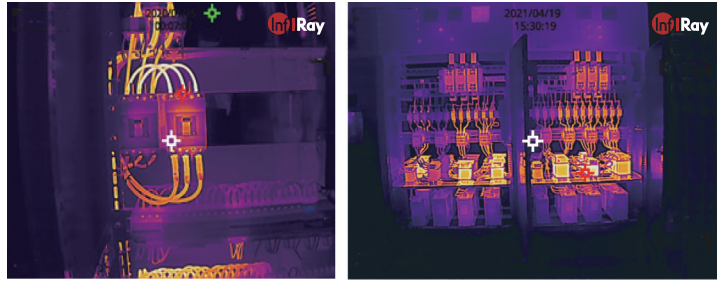
Add: 11th Guiyang Street, YEDA, Yantai 264006

E-mail: sales@iraytek.com

Infiray, Sense Difference

Monitoring of Power Supply Efficiency

The power supply system is essential for petrochemical industry operation, therefore, the stability of the power supply system is the prerequisite for efficient production in the petrochemical industry. The thermal camera can be used to monitor the operation status of the electrical devices of the power supply system in real time to timely discover and accurately locate the fault, quickly report the alarm information, and remind the operation and maintenance personnel to deal with it in a timely manner, so as to effectively avoid the electrical and fire hazards caused by thermal faults of the electrical devices and reduce the maintenance workload, thereby achieving the purpose of energy conservation and consumption reduction.




4 Recommended Models

Infiray

SFB4 Explosion-Proof Dual-Spectrum Bullet IP Camera


- Double explosion-proof certification, with explosion-proof mark: Ex d IIC T6 Gb/Ex tD A21 IP68 T80°C
- Adopt the latest generation of 12μm infrared thermal imaging detector, integrated with leading infrared image algorithms for farther and clearer imaging
- Satisfy the all-weather and 24-hour security monitoring requirements with its visible light and thermal imaging dual-spectrum imaging
- Support intelligent behavior analysis algorithms such as dual-spectrum tripwire intrusion and regional intrusion
- Support professional tools of analysis on measured temperature and intelligent fire point detection algorithms
- 304/316L stainless steel body of IP68 ingress protection rating
- Support standard ONVIF and GB28181 interface protocol, and provide SDKs and supporting VMS software



Infiray

SPT Series Explosion-Proof Dual-Spectrum PTZ IP Camera


- Adopt the latest generation of 12μm infrared thermal imaging detector, integrated with leading infrared image algorithms for farther and clearer imaging
- Satisfy the all-weather and 24-hour security monitoring requirements with its visible light and thermal imaging dual-spectrum imaging
- Support intelligent behavior analysis such as dual-spectrum tripwire intrusion and regional intrusion
- Support professional tools of analysis on measured temperature and intelligent fire point detection algorithms
- Explosion-proof certification of the highest level, with explosion-proof mark: Ex d IIC T6 Gb/Ex tD A21 IP68 T80°C
- 316 stainless steel body of IP68 ingress protection rating
- Provide supporting NVR and VMS software and SDKs for secondary development, and support standard ONVIF and GB28181 interface protocol and others



Infiray

Portable Uncooled Gas Leakage Thermal Camera

- Range of application: methane and other organic gases
- Thermal imaging resolution: 640×512
- Focal length: 9.1mm, manual focus
- Temperature measurement: point/line/area measurement, and high/low temperature alarm
- LCD: 3.5-inch touch LCD, with a resolution of 640×480
- Visible light camera: 5-megapixel CMOS, auto focus
- Laser pointer: class 2, 1mW/635nm red
- Annotation function: voice annotation via microphone
- Operating time: about 3h

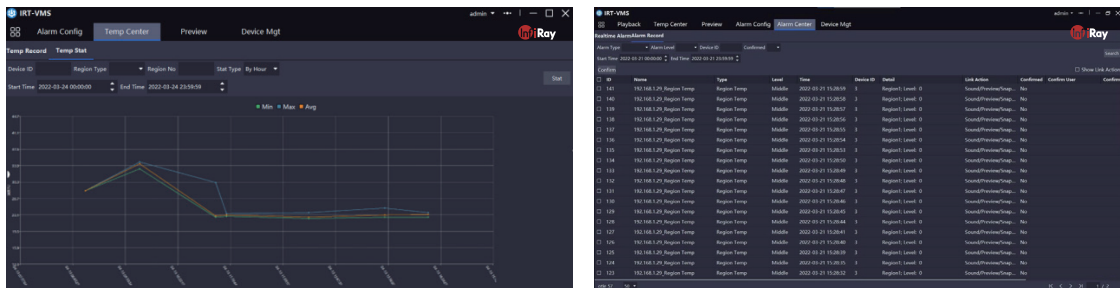


AT20 Online Dual-Spectrum Thermal Camera

- Resolution: 256×192
- Lens: 3.2mm, with a FOV of 56°×42°
- Detector: uncooled VOX infrared detector
- Pixel pitch: 12μm
- Measurement range: -20°C~150°C (high gain); 0°C~550°C (low gain)
- Measurement accuracy: ±2°C or ±2% of reading (The greater shall prevail)
- Support line/area analysis tools
- Support manual temperature range selection
- Support multiple interface protocols including ONVIF, GB28181, Modbus TCP, and MQTT

5 Software Solution

- It is recommended to use with IRay's professional temperature measurement and monitoring software
- It supports networking of multiple devices to be connected to the software platform and enables preview of up to 64 real-time pictures for responsible staff to check the monitoring pictures of the multiple devices deployed
 - Palette selection and configuration of measurement tools are supported, which can be flexibly and easily applied to provide a simple way for temperature data collection at the backend
 - Automatically generate temperature data curves and temperature reports for effective analysis of the monitored objects' temperature change in the area
 - In case of temperature abnormality, the alarm can be triggered in time. The audible and visual alarm module sends an alarm, and the software background will take pictures of the incident in the process
 - Linkage with the firefighting module can automatically trigger the control of the firefighting system, automatically deal with the hidden disasters to prevent the occurrence of deflagration accidents



6 How to Take an Infrared Thermal Image of Premium Quality?

- Please refer to the following suggestions for using a thermal camera to take an infrared thermal image of premium quality:
- Equip an explosion-proof enclosure to adapt to the harsh environment and ensure reliable operation
 - Select thermal cameras with high thermal sensitivity for scenarios with a small regional temperature difference
 - Select products or levels of proper measurement ranges for different scenes and temperatures
 - Pay attention to whether there are other heat sources around during shooting, especially for pipelines with bright surfaces, because their shells are more likely to reflect the surrounding heat sources and cause interference to the detection. Therefore, please change the shooting angle if there are heat sources around
 - Use automatic measurement first, and then enable the temperature width stretch function. Manually set the temperature width to the minimum and include the previously measured temperature range to enrich the image details