DEK-FL/GL/800 Explosion-proof Endoscopic High-temperature Industrial CCTV System

System proposal | Source edition as supplied

Changzhou Derke Electromechanical Equipment Co., Ltd.

English translation of DEK-FLGL800.pdf. Source ratings, historical standards and source conflicts are retained. This translation does not update the product specification or issue a new certificate.

Source notes

This is a translation of the supplied system proposal, not a newly issued safety certificate. The source mixes analog-video and network-camera specifications and uses USP for the backup supply. Confirm the ordered system configuration and backup-retraction design with DEK.

1. Technical description

The source describes monitoring in Zone 1 and Zone 2 explosive atmospheres, gas groups IIA/IIB/IIC and temperature classes T1-T6, and cites GB3836.1-2010 and GB3836.2-2010. The high-temperature camera is described as IP68 and Exd IIC T6. The lens enters the furnace so operators can continuously observe flames, burner nozzles and furnace objects from the control room. It helps identify poor oil atomization, oil leakage, weak flame, excessive flame length caused by poor air distribution, flame impingement on tubes, and tube deformation, sintering or rupture. The PLC-controlled system automatically retracts on loss of air or excessive temperature. Intended uses include petrochemical heating and hydrogenation furnaces, power-plant combustion furnaces, waste incinerators, steelworks furnaces and oil-, coal- or gas-fired furnaces.

2.1 Main performance

The source lists explosion marking Exd IIC T6 Gb / Ex tD A21 IP68 T80°C and IP68 ingress protection. Stroke: 200-1000 mm. Axial scanning speed: 10°/s. Color-CCD horizontal resolution is printed as 1920 x 1080. Deflection angles: 0°, 45°, 60°. Diagonal field of view: 85°. Video output: 1 Vp-p, negative synchronization, 75 ohms. Signal-to-noise ratio: at least 42 dB. Brightness discrimination: >=8 levels. Power consumption: 100 W.

2.2 Camera parameters

Model DS-2CD5026EFWD; 2 MP starlight 1/1.8-inch CMOS ultra-wide-dynamic ICR day/night box network camera. Sensor: 1/1.8-inch Progressive Scan CMOS. Minimum illumination: color 0.001 lux and B/W 0.0001 lux, AGC ON, RJ45 output. Shutter: 1/3 to 1/100,000 s. Lens mount C/CS; DC auto iris; ICR infrared-cut filter. WDR 120 dB; 3D digital noise reduction; selectable-area backlight compensation; triple stream. Compression H.265/H.264/MJPEG. 50 Hz: 25 fps at 1920 x 1080, 1280 x 960, 1280 x 720 (the source line is unclosed). S/N 50 dB. Manual focus; automatic iris. -30°C to +60°C, humidity below 95%, non-condensing. PAL; metal housing.

2.3 Pinhole lens

Focal length 3.5 mm; relative aperture 1:3.5; iris control F3.5-F360. Field of view: diagonal 85°, horizontal 72.5°, vertical 57.6°. Deflection 60° or 45°. CS mount. Overall size: diameter 25 x 1080 mm.

2.4 Automatic retraction

The probe must retract automatically if any of the following occurs: internal probe-housing temperature exceeds the setting (>=55°C); compressed-air pressure drops below the specified value (<=0.3 MPa); or power fails. The source says a USP power supply is required for power-loss protection; this appears to refer to a UPS, but the source designation is retained for manufacturer confirmation.

2.5 Manual control

During normal operation, press insertion button S101 or retraction button S102 to move the probe in or out. The red button on the solenoid valve can also actuate insertion/retraction when compressed air is available or the reservoir retains air.

2.6 Remote control

An operator controller in the central control room can command insertion/retraction, left/right image rotation and lens-iris opening.

2.7 Overall dimensions

Automatic retraction assembly: 1320 x 265 x 420 mm (L x W x H). Control system: 400 x 500 x 1200 mm (L x W x H).

2.8 Operating conditions

Compressed-air inlet: G1 inch; pressure 0.3-0.4 MPa; flow 0.2-0.3 cubic meters/min; inlet temperature <=35°C. Ambient: retraction assembly -5°C to +90°C, excluding the probe housing; control system -5°C to +70°C. Furnace temperature below 2000°C. Refer to the source site-installation figure.

3. Operating principle

The system comprises a pneumatic automatic retraction mechanism, explosion-proof color HD camera, sapphire high-temperature pinhole lens, explosion-proof control system, lens cooling, color monitor and central control. Compressed air or nitrogen continuously purges the lens outer protective sleeve, exits through the front into the furnace, removes heat and prevents coal ash/dust fouling the aperture. Axial probe-housing rotation allows 360° furnace scanning and real-time observation of flames and tubes.

3.1 Imaging

The color HD camera and sapphire high-temperature pinhole lens are fitted inside the probe housing. With the probe inside the furnace, the camera captures the furnace image through the lens, forms a television signal and routes it through the control system to the color monitor.

3.2 Pneumatic circuit

Clean, dry compressed air from the compressor station is split at a G1-to-G1/2 tee. One branch forms an air curtain at the furnace door to prevent flame discharge and reduce radiant heat. The other passes through the filter box to the control system and fine filtration to cool the camera and pinhole lens.

3.3 Control system and power

If internal temperature reaches >=55°C, air pressure drops to <=0.3 MPa, or power fails with the specified backup supply fitted, the Siemens S7-200 PLC issues a retract signal. The pneumatic cylinder withdraws the probe outside the furnace. The source states 24 VAC / 220 VAC supply. An explosion-proof solenoid valve controls cylinder insertion/retraction, and the supply also powers the color camera.

4. Applications

Computer analysis of full-furnace flame images extracts characteristic flame parameters and combines them with operating-process parameters for diagnosis of combustion conditions. This can guide operation, improve stability and efficiency, optimize combustion and prevent coking associated with flame-center deviation. With variable coal types, digital-image and combustion-trend monitoring helps identify critical flames and prevent flameout or furnace pressure events. When flame characteristics cross preset thresholds, a combustion-instability alarm can be generated for operator action. Images from minutes before and after an event can be compressed and stored for replay and analysis. Networking to DCS/MIS enables use with trip sequence records and accident recall. The source describes later integration into protection systems after reliable long-term alarm operation.

4. System topology and display figures

The topology uses an industrial-standard service-oriented network platform integrating video monitoring, image analysis, display and management. A layered client/server architecture reduces construction complexity, supports flexible distributed deployment, and provides unified internal/external interfaces for expansion and management. Source illustrations show topology, client display, application cases and video-wall display. Detailed operating principles are to be read with the drawings.

Source company details

Changzhou Derke Electromechanical Equipment Co., Ltd. Historical source address: No. 6 Qingjiang Road, Xinbei District, Changzhou. Source telephone: +86 519 88059555 / 88059628. Source website: www.dek.net.cn.

Reference illustrations

Original dimension drawings and interface screenshots are retained for reference. Original-language labels may remain inside these images; the English operating text and legends explain them. Dimensions are copied from the supplied source, not redrawn or recalculated.

Figure 1. Source page 3, illustration 1.



Figure 2. Source page 7, illustration 1.



Figure 3. Source page 10, illustration 1.

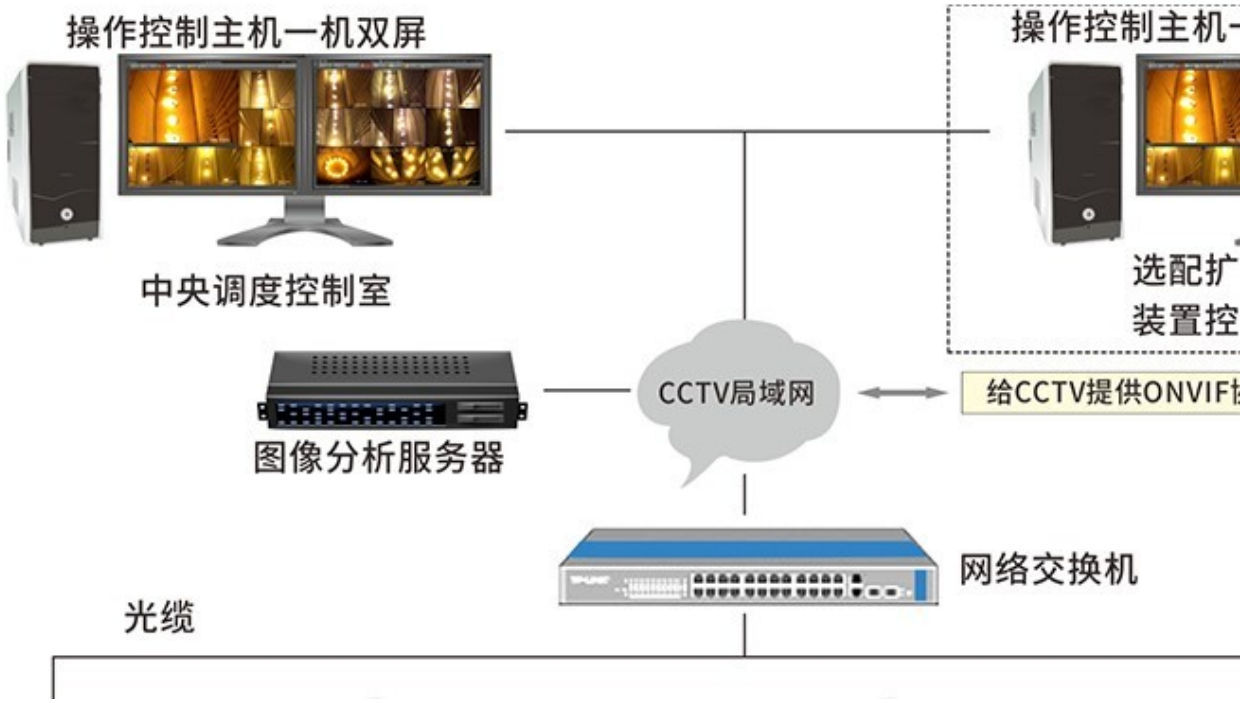


Figure 4. Source page 10, illustration 2.



Figure 5. Source page 11, illustration 1.



Figure 6. Source page 11, illustration 2.



Figure 7. Source page 11, illustration 3.

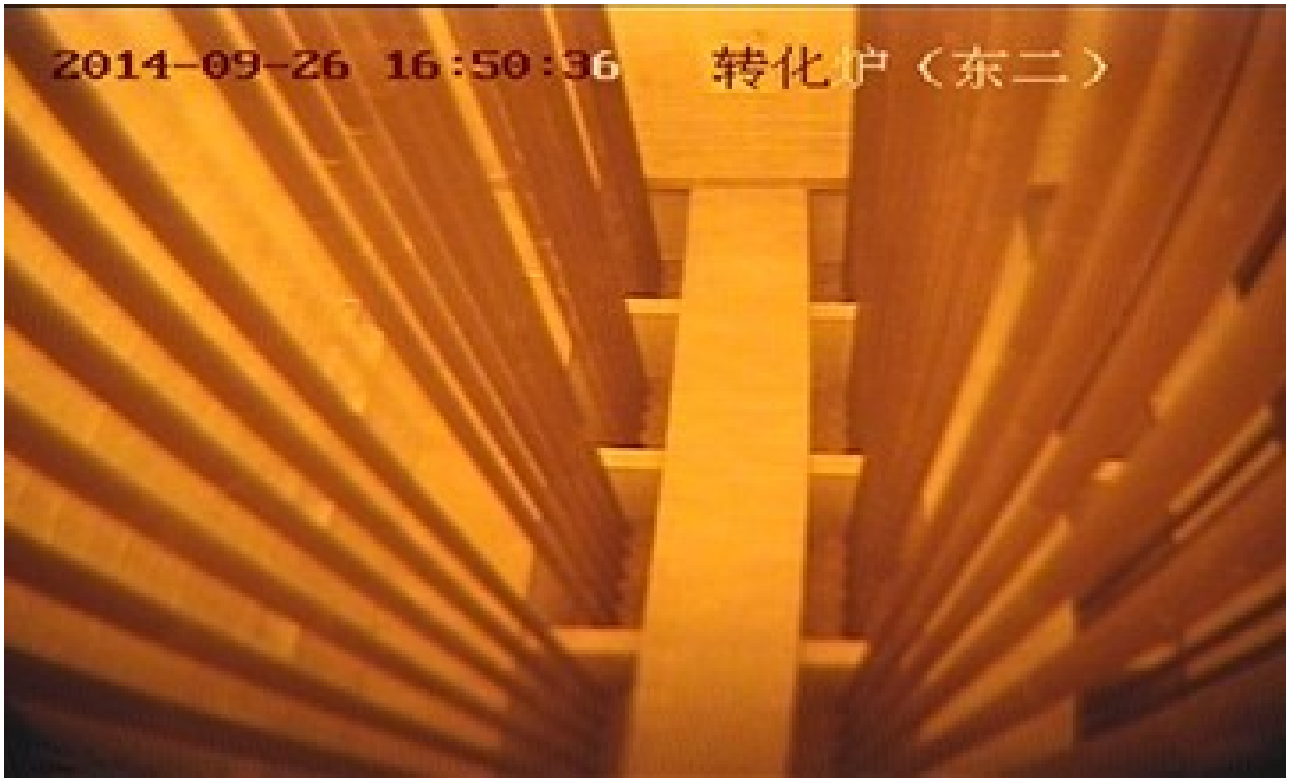


Figure 8. Source page 11, illustration 4.

