

MANIPULATOR CRANE CLOSED CIRCUIT TV SYSTEM M.D.C.



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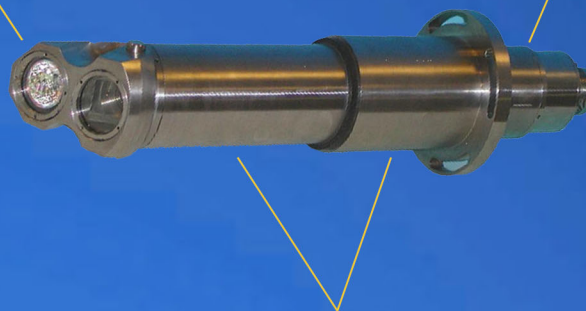
The manipulator crane closed circuit TV system is used to supervise the loading and unloading of fuel assemblies in the reactor building (on core, on permutation engines, and on transfer device).

The system consists of an underwater 'CF145BN' camera equipped with optical system and annular lighting, control rack and a video monitor.

The camera is designed to be used during a reactor shut down, so between an unloading and a loading. Between two reactor shut downs, the material is taken off the manipulator crane, and stocked in an appropriate room.

Lens with 30° sight and lighting

Connection unit



Camera housing and fixation flange

FUNCTION

The TV system allows the operator to ensure that following operations are carried out under optimum conditions:

- gripper tool insertion and withdrawal (in core, transfer or changing areas)
- raising and lowering of fuel (in core, transfer or changing areas)

The TV camera is used to verify that fuel assembly is correctly aligned and to monitor assembly movement.

A tabular structure secured to the manipulator crane mast supports the TV camera. This TV support mast ensures:

- effective viewing of the various handling operations
- underwater positioning and withdrawal of the TV camera under optimum conditions

The TV system allows to display, on the video monitor, and record on the video tape recorder, the X - Y values of the manipulator crane.

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DESCRIPTION

The manipulator crane closed circuit TV system is as follows:

- a camera with a optical system and an annular lighting for assembly loading and unloading observation. This camera is mounted on the TV pole.
- a composite cable between the camera and the cable drum. The remote control of the camera and the lighting is made trough this cable
- a cable drum, on the top of manipulator crane tower, giving the remote control from the control rack towards the camera by a rotary collector.
- a composite cable between the cable drum and the control rack.
- a control rack for remote control of the camera, its lighting and a position information incrustated in the picture on the monitor. This control rack is in the manipulator electric board.
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- a control board, which is on manipulator crane panel near the manipulator control. This control board gives the remote control rack for : ON/OFF system, focus camera, lighting variation and stand-by camera (to have only incrustation on picture)
- a monitor receiving the video signal directly from the control rack or trough a video recorder.
- a video recorder receiving the video signal from the control rack, for assembly movement recording.
- a microphone lined to the video redorder for comments during observation.

These last three elements are on support above the Manipulator Crane control board.

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MECHANICAL FEATURES

1- Camera

Sizes: Ø 132 mm - L : 532 mm
Weight: 8 kg
Matter: Stainless steel AISI 304L
Pressure: 2 bars
Tightness: Ethylene- propylène O-ring
Connector: Jupiter Serie M under water

2- Control rack

Sizes: 528,5 mm x 168,4 mm x 397 mm
(without connector)
Weight: 13,5 kg

3- Monitor

Sizes: 424 mm x 409 mm x 380 mm
(without connector)
Weight: 17,5 kg

4- Cable drum

Sizes: Ø 540 mm - L : 670 mm
Weight: 70 kg
Matter: Stainless steel AISI 304L

5- Control frame

Sizes: 100 mm x 60 mm x 41,5 mm
Weight: 1 kg
Matter: Stainless steel AISI 304L

6- Video recorder

Sizes: 420 mm x 100 mm x 340 mm
Weight: 5,8 kg

TECHNICAL FEATURES

1- Camera - Control rack

Standard: CCIR 625 lines, 25 frames / s
Video output: Synchro 0,3 Vpp on 75 Ω
Video 0,7 Vpp on 75 Ω
Resolution: 750 points on centre of the picture
Sensitivity: 2 lux on the target of the tube
Grey scale: 8 levels
Distortion: < 2 %
S/B ratio: > 42 dB level-headed
Lens
Sight angle: 30° vertical up
Focal length: 16 mm
Aperture : F: 2,8
Optical angle: horizontal 32° in water
vertical 25° in water
Lenses and prism: stabilized glass
Lighting power: 35 W
Lamp: halogen quartz
Temperature: 0° C to 80° C stocking
0° C to 50° C camera operating
0° C to 40° C control panel operating
Mains: 230 V + 6 % - 10 %
50 Hz ± 1 HZ
Resistance to radiation: 10⁶ rad/h dose flow
10⁸ rad accumulated dose
Immersion: 20 m demineralised water (pH 6 to 9)
with bore concentration as to 2 to 4 %

2- Monitor

Screen diagonal: 44 cm
Resolution: 850 TV lines on centre of the picture
Standard: CCIR 625 lines, 25 frames/s
Video input: 0,5 V to 2 V on 75 Ω
Mains: 230 V + 6 % - 10 %
50 Hz ± 1 HZ
Temperature: - 10° C to 40° C stocking
0° C to 35° C operating

Head Office

ZI Athélia II - 168 avenue du Serpolet - 13704 La Ciotat Cedex France - Phone : +33 (0)4.42.08.81.19 - Fax : +33 (0)4.42.71.58.44

Paris - Ile-de-France Branch Office

ZI Les Eglantiers - 16 rue des Cerisiers - CE1540 Lisses - 91015 Évry Cedex France - Phone: +33 (0)1.60.86.14.65 - Fax : +33 (0)1.60.86.98.73

E-mail : rovdeveloppement@wanadoo.fr

Web : www.rovdeveloppement.com