

MR compatible camera “CS”

User manual



This manual describes the essential parts of the MR compatible camera with vario lens and illustrates its operation.

1. Intended use

The MR compatible camera “CS” is designed to view and record video images of subjects in an MR scanner from a distance. It can also be used for the monitoring of objects and instruments. The camera can be used in a distance of about 1 m from the scanner entrance (depending on the scanner's type and field strength). The correct orientation of the cables, the correct installation of the filter box, and the correct grounding should be checked before the application. Respective descriptions can be found in this user manual.

The camera is not equipped with an automatic alert in case of an interruption of the video stream. That is why it is not intended to identify critical states or situations.

2. System components

- Camera
- Filter box (with optical isolation of video signal)
- Camera connection cable (length: 8 m)
- Vario lens
- Power supply (length: 1.8 m)
- BNC cable (length: 2 m)
- BNC/Cinch adapter
- Earth ground cable for provisional installation

Note: The vario lens enables the independent adjustment of the focal length and the focusing. It has no auto-focus. Whenever the focal length is changed in order to select an optimal magnification a readjustment of the focus is required.

3. Video camera and vario lens

Figure 1 shows the camera housing and the connected vario lens.

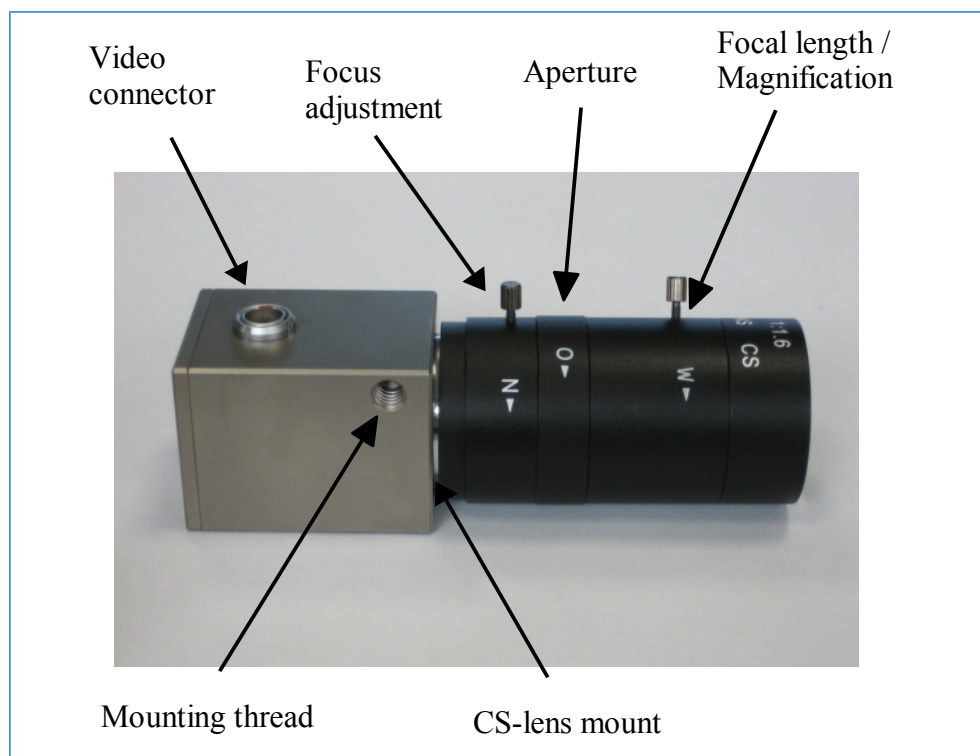


Figure 1:
Video camera and
vario lens

The lens is connected to the standard **CS-lens mount** in the housing. It has three operating controls:

- The **focal length** defines the magnification of the recorded images. It can be adjusted by rotating the foremost ring (see figure 1).

- The **aperture** controls the depth of sharpness. If the aperture is changed the camera electronics automatically readjusts the amplification. Closing the aperture increases the depth of sharpness and in that way the image quality.
- The **focus adjustment** ring serves for the manual refocusing.

The position of the focal length and focus adjustment rings can be fixed with two screws.

4. Connection of camera to filter box

The camera is connected to the filter box via the camera connection cable, which includes power and signal lines as well as shielding.

The filter box prevents the transmission of disturbing signals into the MR cabinet. It avoids interferences in the video signals and the MRI imaging.

The filter box includes a low pass filter that suppresses frequencies higher than 1 MHz with over 100 dB. This filter prevents damage and interferences caused by the high frequency signals of the MR scanner. Additionally an optical isolation is included in the filter box.



Figure 2: Filter box (front side)

5. Filter box installation

For a permanent installation, the filter box should be screwed onto the panel board by means of the feed through **camera connector** (see figure 2). Figure 3 illustrates the recommended configuration:

- A 12 mm through hole in the panel board is required.
- The **camera connector** is guided through this hole.
- The camera connector provides the ground connection to the shielding of the MR cabinet.

For temporary use, the camera cable can be brought into the MR cabinet by other means, e.g. through a service entry hole (“waveguide”). In this case, an additional grounding cable should be used to connect the camera connector to the shield panel grounding. The camera connector must completely protrude into the MR cabinet and the video cable must not jut out.

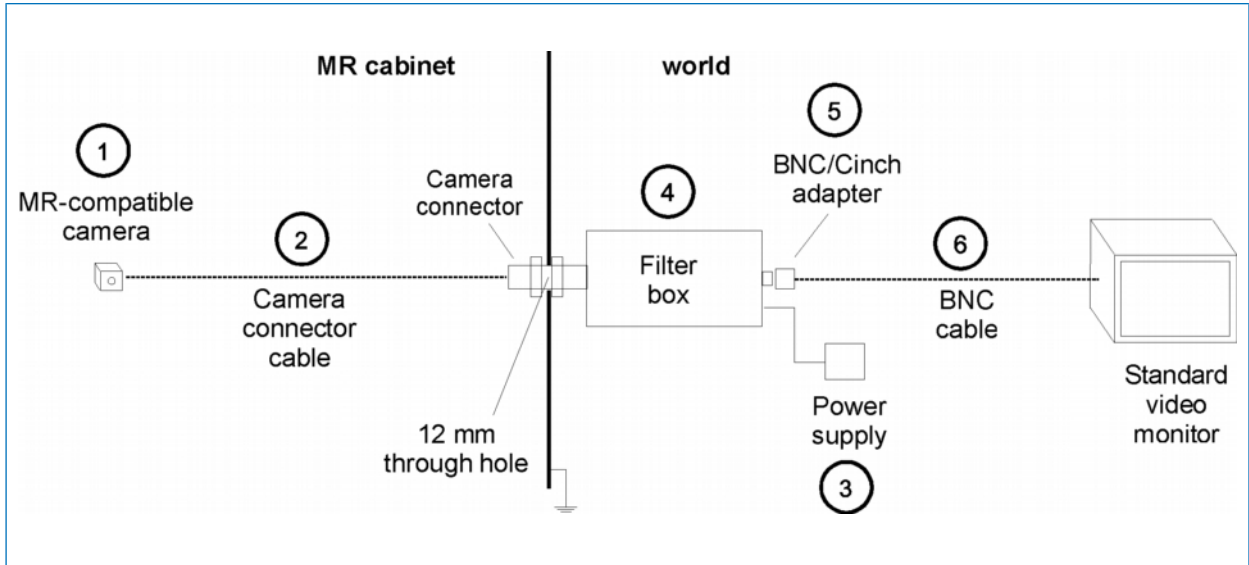


Figure 3: Device and cable configuration

6. Connection of power supply

The power for the camera is transmitted via the camera connector cable. Therefore, the power supply is connected to the filter box (see figure 4). The required power values are 200 mA, 6-12 V.

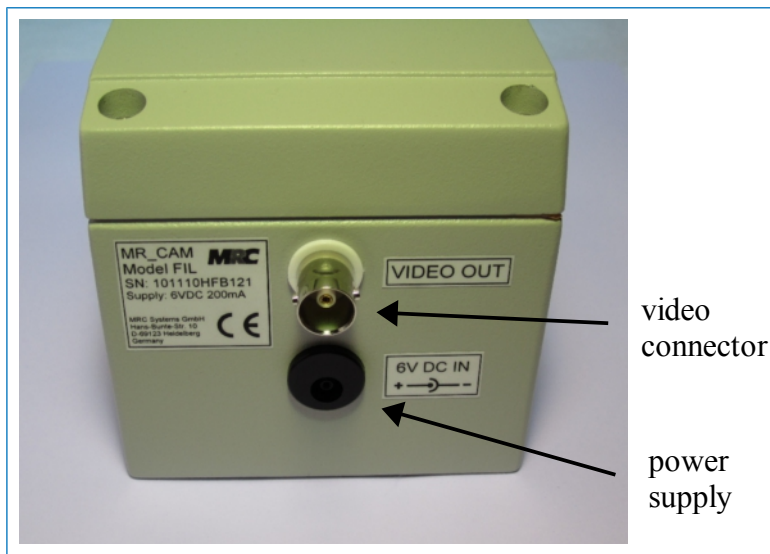


Figure 4: Filter box (rear side)

7. Connection to TV set / VCR / frame grabber

A BNC/Cinch adapter and a standard BNC cable are used to transfer the video output signal to a TV set, VCR, frame grabber, or video card. The BNC/Cinch cable is plugged to the video connector at the filter box (see figure 4).

The video signal can be directly viewed with a TV or recorded with a VCR. To view and store the images with a PC, the BNC/Cinch cable must be connected to a frame grabber or video card within the PC. Any software for analog video viewing should be appropriate to process the signals.

8. Mounting options

There are different mounting options for the camera. The standard configuration makes use of the wall-mount included in delivery (see figure 5).



Figure 5: Camera mounted with wall-mount

An alternative setup is to mount the camera on a tripod using the **mounting thread** in the camera housing (see figure 6).

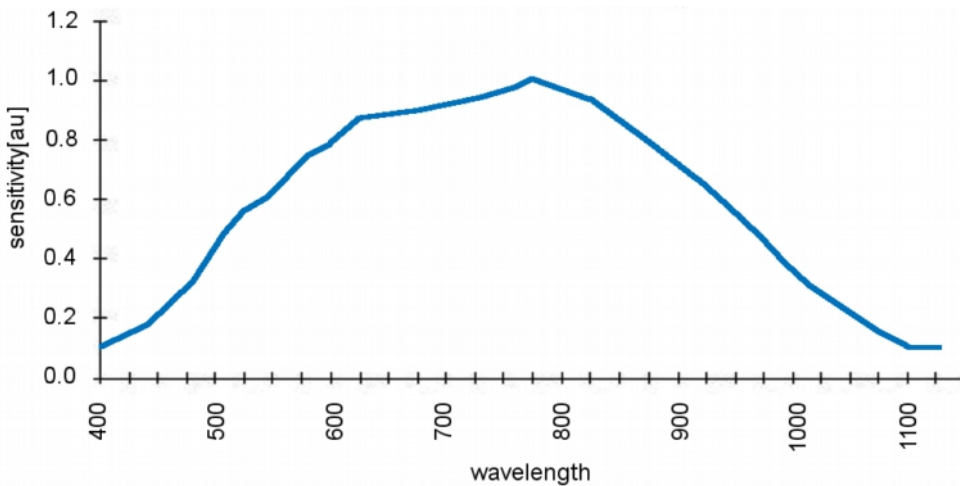


Figure 6: Camera mounted on a tripod

9. Technical Data

Sensor Type: B/W or color CMOS Sensor 1/3 inch
 Output: EIA(NTSC) video signal with 60 Hz half frame rate
 or CCIR(PAL) video signal with 50 Hz half frame rate
 Sensitivity: 0.2 Lux for f#1.2 (B/W)

Spectral sensitivity (B/W camera)



Housing dimensions

Dimensions: 36 mm x 36 mm x 125 mm (incl. standard lens)
 Connector for lens: CS-Mount 1 inch, 32 threads/inch(UN-2A)
 Mounting thread: 1/4 inch
 Weight: 325 g

Lenses to choose from (lenses with other focal lengths on request)

Type 1: Telephoto (standard)

Type: vario lens with manual iris and focus
 Mount: C (with adapter)
 Focal length: 6-52mm
 Aperture range: 1.8-closed

Type 2: Wide angle (optional)

Type: vario lens with manual iris and focus
 Mount: CS
 Focal length: 2.8-12mm
 Aperture range: 1.4-closed

Electronics

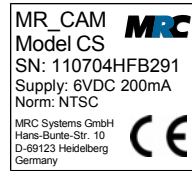
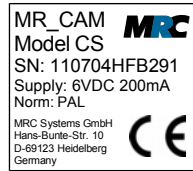
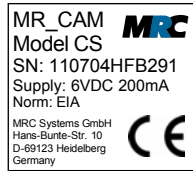
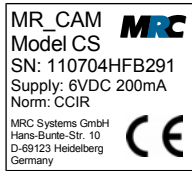
Power supply: 200 mA, 6-12 V DC
 Output impedance: 75 Ω
 Type: Friwo FW7555M/06, 6 V (medical power supply)

Filter box

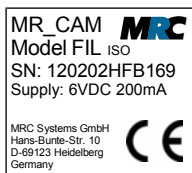
Dimensions: 80 mm x 120 mm x 80 mm
 Weight: approx. 700 g

10. Labelling

A label on the camera housing includes the information about the embedded video sensor (black&white: CCIR[50Hz], EIA[60Hz], color: PAL[50Hz], NTSC[60Hz]). The following copies are enlarged:



In addition, there is a label on the filter box:



11. Contact

MRC Systems GmbH
Hans-Bunte-Strasse 10
D-69123 Heidelberg
Germany
phone: +49-6221-13803-00
fax: +49-6221-13803-01
mail: info@mrc-systems.de