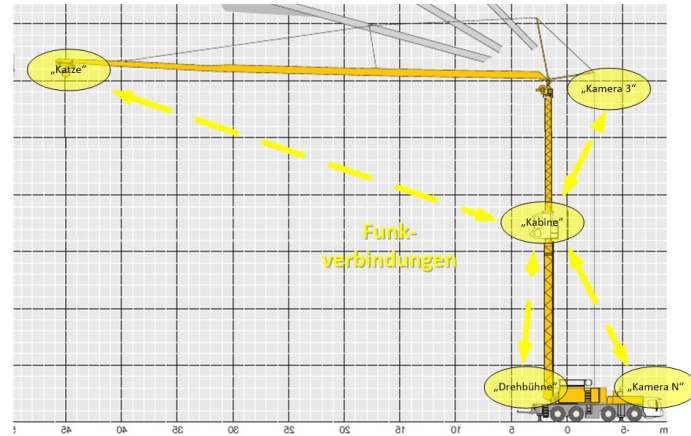




## MRX.KranFunk (MRX.CraneRadio)

Video and data transmission system with mesh nodes

- x High speed video transmission and processing
- x High data rate (up to 300 Mbit/s)
- x Range approx. 200m
- x Encrypted/meshed radio based on IEEE 802.11s (AZG.mesh)
- x Hybrid system: support for analogue and digital cameras
- x Easy expandability with additional cameras
- x Digital monitor interface
- x Support for touch monitor



The MRX.CraneRadio system transmits analogue and digital camera images from different positions on cranes to a touch monitor in the crane operator's cabin. Data is transmitted via a robust, encrypted and meshed radio network.

The central node can work with several parallel transducer units to build a point-to-multipoint architecture. The hybrid system allows to support different camera types on one crane.

The touch monitor allows the user to interact with the system (zoom, image change, etc.).

### Introduction

MRX.CraneRadio is a radio-based transmission system for all types of construction machinery. Originally designed to transmit video streams from analogue or digital cameras into the crane operator's cab, it is suitable for the bidirectional transmission of many different data signals.

The system is based on AZG.mesh technology, which enables a very robust and encrypted network. AZG.mesh allows several nodes to be connected in a network to enable different use cases. AZG.mesh allows data to be transmitted via several stations, resulting in redundancies and overcoming possible radio shadows.

The powerful nodes allow video data to be transmitted with very low latency, ensuring an up-to-date video image in the operator's cab at all times.

The encryption of MRX.CraneRadio ensures that the systems on different cranes working on the

same construction site can neither interfere nor influence each other. A falsely transmitted camera image to the wrong driver's cab is thus ruled out.

The radio transmission uses modern digital technology according to IEEE 802.11s with 2x2 MIMO antenna technology. This enables a long range with a large transmission bandwidth at the same time.

## X Features

### Overview

- Wireless Mesh System + Video Processing
- Fully encrypted wireless meshed network
- Different components for different applications

### Mesh Radio

- 2x2 MIMO
- 2.4GHz:
  - ↳ BW: 20/40MHz
  - ↳ Std: 2.412 ~ 2.472GHz
  - ↳ max. 20dBm
- Data rate: up to 300 Mbit/s
- Modulation techniques
  - ↳ OFDM: BPSK, QPSK, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM

### Mesh Features

- IEEE 802.11s
- Fully encrypted (AES 256)
  - ↳ SAE key exchange
  - ↳ AES-SIV (RFC5297)
- HWMP routing
  - ↳ Selfforming & selfhealing
- Up to 32 nodes per mesh system

### Video Features

- supported digital video formats
  - ↳ H.264, H.265, ....
- HW-decoding for very low latency (GPU)
  - ↳ Latency: ~250ms (over all)
- Displaying system information on the monitor
  - ↳ Zoom, radio quality, temp., battery status, etc.

### System interfaces

- PAL-Video
- Ethernet: 10/100/1000BaseT

- HDMI (Video)
- USB (Touch monitor, mouse, etc.)
- Zoom pedal (Zoom-In, Zoom-Out)

### Security

- Encryption of the entire radio transmission
- Secure login to the system

### System management

- Interactive menu on the touch monitor
- Web-GUI
- SNMPv2c, SNMPv3

### Power

- Power supply:
  - ↳ DC: 12-24V

### Certifications

- CE, eMark regulations
- RoHS

