camSAT

CAM-9

Wireless system for simultaneous transmission of video, audio and control for PTZ cameras

	IP65	SMA ANTENNA CONNECTOR		9 V DC ÷ 14 V DC	-20°C ÷ +55°C	RoHS	CE
VIDEO:	5,8 GHz	25 mW	FM	PAL NTSC	BNC VIDEO	UTP VIDEO	8 CHANNELS
DATA:	869 MHz	300 mW	GFSK	RS-485	10 CHANNELS		

Operating manual
Warranty Terms

DECLARATION OF CONFORMITY

I, the undersigned, representing the following company:

CAMSAT Przemysław Gralak
ul. Ogrodowa 2a 86-050 Solec Kujawski

hereby declare, with full responsibility, that the following device: **CAM-9** is approved for operation within the EU and conforms to the fundamental requirements and other relevant provisions of Directive 1999/5/WE:

Video

Fundamental requirements: - Article of Directive 1999/5/WE	Applied standards	Assessment
Electromagnetic Compatibility – Art.3.1b	ETSI EN 301 489-1 V1.6.1 ETSI EN 301 489-3 V1.4.1	Conformity
Effective use of the frequency resources – Art.3.2	ETSI EN 300 440-1 V1.4.1 ETSI EN 300 440-2 V1.2.1	Conformity

Frequency range of the transmitter and receiver: **5725 MHz – 5875 MHz**
Radiation power of the transmitter: **≤25,0 mW (14 dBm)**

Dane

Wymagania zasadnicze: - artykuł dyrektywy 1999/5/WE	Zastosowane normy	Ocena
Electromagnetic Compatibility – Art.3.1b	EN 301 489-1/-3	Conformity
Effective use of the frequency resources – Art.3.2	EN 300 220-1/-2	Conformity
Safety requirements - art. 3.1a	EN 60950-1+A11+A1+A12 EN 62311	Conformity

Frequency range of the transmitter and receiver: **869,40 MHz – 869,65 MHz**
Transmitter power (measured): **169,8 mW (22,3 dBm)**

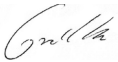
Notified body participating in the conformity assessment:

EMCCert dr Rasek GmbH
Stoernhofer Berg 15
91364 Unterleinleiter,
Germany
Notified body number: 0678

Responsible person:
Przemysław Gralak

Position:
właściciel

Signature:



Solec Kujawski 01.07.2014

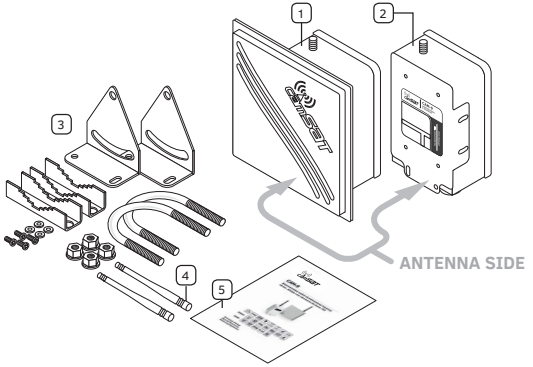
Table of contents

Product features

The CAM-9 kit is an integrated transmission system comprised of a module for video transmission and data transmission to and from industrial cameras in a single compact case.

Kit contents

The kit includes:

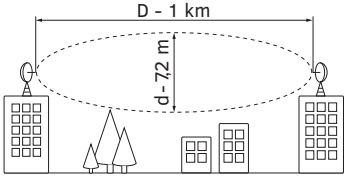


1. Video/audio transmitter (Tx) with an IP65 antenna x 1 pcs.
2. Video/audio receiver (Rx) with an IP65 antenna x 1 pcs.
3. 35-50mm pole mount x 2pcs.
4. 869 MHz antenna x 2 pcs.
5. Operating manual, warranty terms

Recommendations

1. Larger systems consisting of a few kits should be started up and set up one after another, i.e. the power supply should be connected to the next kit only after the previous kit has been set up precisely.
2. It is recommended to install CAM-9 receivers at least 7 m away from digital receivers (CDS-5021, CDS-5IP and other).
3. It is not permitted to power devices without antenna cables screwed into the SMA connectors.

In order to ensure a stable radio range, the antennas have to see each other optically. One hundred percent optical visibility should be provided in the first Fresnel zone.



At the frequency of 5.8 GHz and the distance of 1 km, free space with the diameter of at least 7.2 m should be provided for the radio beam.

A few ready-made calculations for CAM-9 are presented below

Distance [km]	0.4	0.8	1	1.2	1.6	2	2.5	3
Diameter [m]	4.5	6.4	7.2	7.9	9.1	10.2	11.4	12.5

Larger directional antennas can be plugged into the connectors (Rx) in order to extend the ranges.

Technical data

	DANE	AUDIO-WIDEO
Frequency	869 MHz	5.8 GHz
Number of operating channels	10	8/16*
Radio link modulation	GFSK	FM
EIRP radiated power	300 mW	25 mW
Receiver sensitivity	–118 dBm@1200 bps / –114 dBm@9600 bps	≤ –85 dBm
Antenna connectors	SMA-RP F 50 Ω	SMA-RP F 50 Ω
Antenna characteristics	omnidirectional 360°H/15°V	Tx: directional – 30°H/30°V Rx: directional – 20°H/20°V
Antenna gain	2.15 dBi	Tx: 5 dBi; Rx: 19 dBi
Device range	3 km (with the option to extend the range to 5 km)	
Video interface	BNC 1Vp-p (75 Ω) + screw terminal for UTP (100 Ω)	
Video format	PAL/NTSC	
Audio interface	Screw terminal, stereo audio in/out 2Vp-p (2 kΩ)	
Audio frequency response	50–15000 Hz	
Data interface	RS-485 (A+, B–)	
Supported protocols	Alec, Aritech, Baxal, Bosch Biphase (with additional converter), COP-1, COP-2, D-Max, Dynacolor, Ganz, Kalatel, LG, Longcomity, Molynx, Multix, Panasonic, Pelco D, Pelco P, Samsung, Santachi, Sensormatic, Ultrak, VCL, Vicon and many other	
Data format	8n1, 8o1, 8e1	
Data transmission rate	1200, 2400, 4800, 9600, 19200 [bps]	
Power supply voltage	9–14 V**	
Maximum power consumption	310 mA**	
Case protection class	IP65 (external application)	
Operating temperature	from –20°C to +55°C	
Warranty	2 years	
Certificates	CE	
Device external dimensions	Tx: 152 × 103 × 60 [mm]; Rx: 164 × 164 × 80 [mm]	

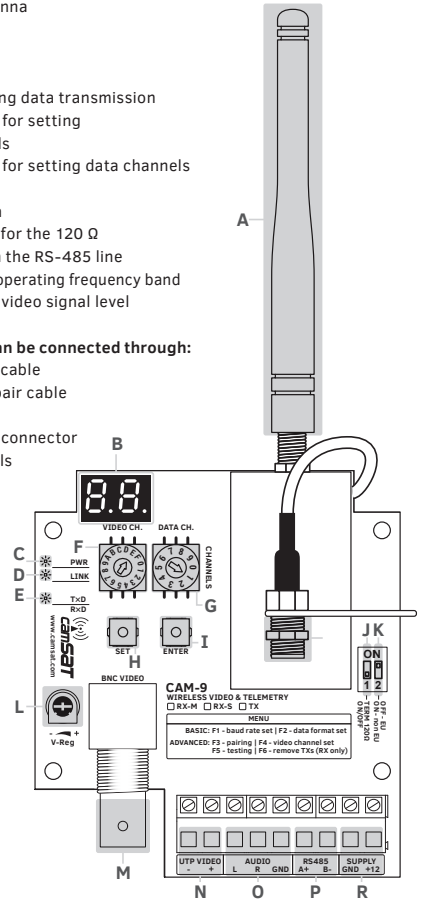
**The number of usable channels depends on the regulations in the specific country. The use of 8 channels is permitted in the European Union countries, while in many countries outside of the Union 16 channels can be used.*

***We recommend using high quality power supplies (high-efficiency transformer-based or impulse ones, with low current rippling), with current efficiency of at least 400 mA*

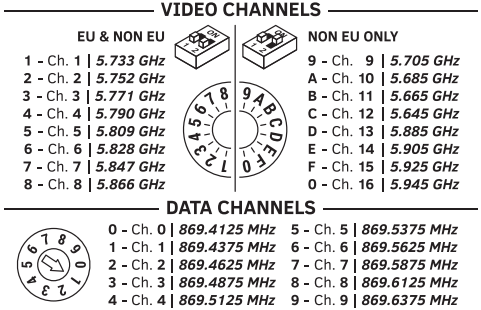
[A] - 869 MHz antenna
[B] - LED display
[C] - POWER diode
[D] - LINK diode
[E] - diode signalling data transmission
[F] - rotary switch for setting video channels
[G] - rotary switch for setting data channels
[H] - SET button
[I] - ENTER button
[J] - on/off switch for the 120 Ω terminator on the RS-485 line
[K] - changing the operating frequency band
[L] - adjusting the video signal level

The video signal can be connected through:
[M] - video coaxial cable
[N] - UTP twisted pair cable

[O] - audio signals connector
[P] - RS-485 signals connector
[R] - +12 V DC power supply



Switch settings



Installation

1. Fasten the transmitter and receiver to a stable pole with the mounts.
2. Screw the 869 MHz **[A]** antennas into SMA antenna connectors at the top of the case.
3. Connect the video cables with the coaxial cable **[M]**, or the UTP twisted pair cable **[N]**.
4. Connect the audio cables **[O]** (right channel, left channel, signal ground).
5. Connect the RS-485 cables **[P]** (A+, B-).
6. Connect the 9-14V DC power supply **[R].**

Basic settings

Operating the dip-switch

SWITCH 1 **[J]** – enables / disables the 120 Ω resistor (terminator) in parallel with the RS-485 interface terminals. This resistor should always be added at the end of every RS-485 line to avoid interference. In order to enable the resistor (RS-485 line terminator), it should be set to the ON position; in order to disable it, it should be set to the OFF position.

SWITCH 2 **[K]** – changes the frequency band for video signal transmission. The device can operate in two frequency ranges: 5.733 – 5.866 GHz (8 operating channels – ISM band, permitted within the European Union) and 5.705 – 5.945 GHz **(16 operating channels – can be used only in selected countries outside of the European Union).**
In order to change the frequency band for video transmission, use switch no. 2: OFF position – 8 operating channels, ON position – 16 operating channels **(permitted only in selected countries outside of the EU).**

Video transmission settings

Setting the video transmission operating channel

1. In order to set the video transmission operating channel, turn the rotary switch, labelled "VIDEO CH." **[F]**, to the desired position.
2. The display will show the number of the currently selected channel.
3. After selecting the proper channel, the display will start blinking, indicating that the settings are being saved to the device memory. Then, the display will turn off by itself.

Data transmission settings

Setting the data transmission operating channel

1. In order to set the data transmission operating channel, turn the rotary switch, labelled "DATA CH." **[G]**, to the desired position.
2. The display will show the number of the currently selected channel.
3. After selecting the proper channel, the display will start blinking, indicating that the settings are being saved to the device memory. Then, the display will turn off by itself.

Method for setting the transmission rate and data format

1. In order to get to the settings, enter the device menu by holding the ENTER button **[I]** for three seconds (until **F. 1** appears on the display).
2. You can switch between the menu options (**F. 1, F.2, F.3**) by pressing the ENTER button **[I]** shortly.
3. To enter a specific submenu, press the SET button **[H]**.
4. To exit a menu (return to the main menu), hold the ENTER button **[I]** again for 3 seconds (until the display turns off).

Setting the transmission rate

In order to set the transmission rate, select the **F. 1**,
option from the menu. The display will show the currently set transmission rate in the following format: **1.2** - 1200 bps; **2.4** - 2400 bps; **4.8** - 4800 bps; **9.6** - 9600 bps; **19.**- 19 200 bps

Select the proper option with a short press of the ENTER button **[I]**. To confirm the selection, hold the SET button **[H]** for 3 seconds; the display will start blinking, indicating that the settings are being saved to the device memory. Then, the device will return to the main MENU.

Setting the data format

In order to set the data format, select the **F.2** option from the menu. The display will show the currently set data format:
8n - 8n1; **8o** - 8o1; **8E** - 8e1

Select the proper option with a short press of the ENTER button **[I]**. To confirm the selection, hold the SET button **[H]** for 3 seconds; the display will start blinking, indicating that the settings are being saved to the device memory. Then, the device will return to the main MENU.

Advanced settings

In order to use the advanced options, devices operating at the same building should be paired together. All the CAM-9 Tx transmitters should be assigned to the CAM-9 M Rx receiver memory.

Procedure for assigning transmitters to the receiver memory

1. Select the **F.3** option from the main menu in the receiver. Menu options are selected by pressing the SET button **[H]** shortly.
2. The display in the receiver will show the number of transmitters currently entered into memory. This value will blink, indicating that the assigning procedure is active.
3. Select the **F.3** option from the main menu in the transmitter. The value on the display will start blinking. After a moment, the blue LINK diode **[D]**, will light up, indicating that the pairing procedure was completed successfully. The identification number, received by each transmitter in the network, will appear on the display. **It should be noted down, in order to identify that transmitter later.** After a few seconds, the device will return to the main menu.
4. The procedure from section 3 should be repeated for each CAM-9 Tx transmitter.
5. In order to end the assigning procedure, turn off the **F.3** function in the receiver by holding the ENTER button **[I]**. The device will return to the main menu. The LINK diode **[D]** on the receiver will remain lit.

A properly conducted assigning procedure enables the following:
- setting the video transmission operating channels remotely (from the CAM-9 M Rx receiver level),
- testing links – both from the transmitter and receiver levels,
- setting the data transmission parameters (data rate, data format) remotely.

WARNING: When transmitters are assigned to a specific receiver and have their identification numbers (the LINK diode is lit), the function of setting the data transmission parameters (rate and format) and setting the video transmission operating channel is locked in them. All these functions are configured remotely, from the CAM-9 M Rx receiver level.

Setting the video operating channel remotely

In order to set the video transmission operating channel (for a specific transmitter) remotely from the CAM-9 M Rx receiver level, do the following:

1. Select the **F.4** option from the main menu.
2. Select the identification number of the transmitter whose video transmission operating channel you intend to change with the ENTER button **[I]** and then confirm the selection by holding the SET button **[H]**.
3. The receiver will communicate with the transmitter and the video transmission operating channel currently set in the transmitter will appear on the display.
4. Select the desired operating channel with the ENTER button **[I]** and then confirm it with the SET button **[H]**.
5. If the selected operating channel appears on the display **[B]** blinking, then it has been configured properly. If the **Err**, symbol appears instead, it indicates a transmission error (repeat steps from 1 to 4)
6. The device will return to the main menu.

Setting the data transmission parameters remotely

In order to set the data transmission parameters (data rate and format) remotely from the CAM-9 M Rx receiver level, follow the instructions in the **[Method for setting the transmission rate and data format]** section at page 10. When the radio link parameters are being set, the receiver, if its memory contains transmitters assigned to it, automatically communicates with the transmitters and the entire network is configured according to the CAM-9 M/S Rx receiver parameters.

Advanced settings

Testing the data link

In order to test the correctness of data transmission between the CAM-9 M Rx receiver and the CAM-9 transmitters, select the **F.5** option from the main menu. The procedure will commence automatically. Testing can be conducted both from the receiver and transmitters levels.
When the testing is completed, the result will appear on the display. The display method depends on whether the testing was conducted from the transmitter or receiver level.

Testing from the CAM-9 Tx transmitter level

- If, after testing is completed, the display alternates between **OH** (OK) and the transmitter's ID number, it indicates a correct transmission.
- If **Err**, appears on the display, it indicates a transmission error (check the connections and test again).

Testing from the CAM-9 M Rx receiver level

- If, after testing is completed, the display alternates between **OH** (OK) and the number of transmitters entered into memory, it indicates a correct transmission.
- If the display alternates between **Err** and a number, it indicates a transmission error between the receiver and the transmitter with this ID number.

Removing a transmitter from the CAM-9 Rx receiver memory

- If there is a need to turn one of the transmitters off permanently (removal, damage), it should be deleted from the CAM-9 M Rx receiver memory. In order to do this, select the **F.6** option from the main menu in the receiver.
- Next, select the ID number of the transmitter to be deleted with the ENTER button **[I]** and confirm the selection by holding the SET button **[H]**. The transmitter will be deleted from the device memory and will no longer be visible during testing, setting parameters, etc.

Restoring the device to default settings

- In order to reset the transmitter or receiver to the default settings, disconnect the device's power supply, press the ENTER button and connect the power supply again.
- The display will count from 5 to 1, the ENTER button should be held during that entire time. The device will reset itself to the default settings.

General warranty terms

Camsat grants a 24 month warranty for the Cam-9 transmission kit

1. If the device is not be operating properly, make sure, before returning the device for servicing, that everything was done according to the operating manual.
2. If the faulty device is returned or send in for repairs, a thorough written description of the signs of the device's faulty operation, including the operating environment and the manner in which they appear, should be enclosed.
3. The prerequisite for exercising the warranty rights is enclosing the proof of purchase, including the purchase date and description of damage, with the faulty device.
4. Warranty repairs cover only faults occurring due to reasons inherent to the sold device.
5. Warranty repairs will be carried out in the shortest possible amount of time not exceeding 14 days, counting from the moment of accepting the device for servicing. If parts need to be imported, the repair deadline may be extended. After the repairs have been carried out, the warranty period will be extended by the repair time.
6. The warrantor is not responsible for the loss of the device configuration settings resulting from device repair or malfunction.
7. The warrantor may refuse to carry out warranty repairs or terminate the warranty if it is determined that the seals placed on devices or components comprising it are damaged.
8. All repair services resulting from the warranty are carried out at the Camsat service exclusively.

The warranty does not cover

- Mechanical damage of devices and failures occurring due to fortuitous events, such as: fire, power grid overvoltage, electrical discharges, power supply, effects of chemical substances.
- Damage occurring due to: improper handling of the device, using the device against its intended use or the operating manual, customer's negligence, improper use (temperature, humidity, flooding, dust, sanding up, improper power supply voltage).
- Claims on account of the technical parameters, if they are consistent with those indicated by the manufacturer.
- Marks created during usage, such as scratches, soiling and localised wear are not covered by warranty.

In cases not regulated by the terms of this warranty sheet, the appropriate provisions of the Civil Code are applicable

Device disposal

The mark presented to the left informs that this electrical or electronic device, after its use has ended, cannot be thrown together with household refuse. The device should be delivered to a specialised collection point. Detailed information about the closest collection point is available from local authorities.

The proper disposal of this device allows for preserving precious resources and avoiding the negative impact on health and environment, which may be endangered if the waste is handled improperly. Improper waste disposal is subject to penalties provided for in the appropriate regulations.

Manufacturer:
CAMSAT Gralak Przemysław
Ul. Ogrodowa 2a
86-050 Solec Kujawski



Product offer and information: www.camsat.com
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