ISO 9001:2015

CVG-SAB-ECM-NO
Raspberry Pi based HD IP Camera for Explosive Atmospheres

1258

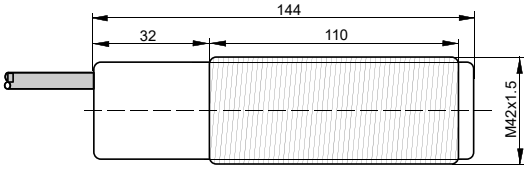
- Video streaming up to either 1920x1080 pixels or 90 FPS
- Based on RTSP
- Configuration and control via Modbus TCP
- Automatic or manual shutter, ISO and white balance
- IEEE 802.3af-2003 compliant Power over Ethernet (PoE)

Technical Data	CVG-SAB-ECM-NO
Gas Ex protection designation	II 2G Ex db IIC T4 Gb
Dust Ex protection designation	II 2D Ex tb IIIC T135°C Db
For use in Ex Zones	1, 2, 21 and 22
Interface	10/100Mbps Ethernet (please connect to a 100Mbps or 1Gbps network for full performance)
Pollution degree	According to IEC 60664-1:2007 : 4
Optical filter	No filter
Camera focus	600mm, fix
Field of view (FOV)	64° horizontally and 48° vertically (29mm full frame equivalent)
Image sensor	Sony IMX 219, 1/4", 8MP
Focal ratio (F-Stop)	f/2.0
Color depth	24 bit (True Color)
Power supply type	IEEE 802.3af-2003 compliant Power over Ethernet (PoE)
Maximum power dissipation	3.4W, class 1
Bootup time	$t_b \approx 90s$
Configuration and control interface	via Modbus TCP at port 502, big endianness for word and byte order, recommended timeout: 10s
IPv4 configuration	Automatic IPv4 address retrieval via DHCP and one static address, default is 192.168.200.200 with subnet mask 255.255.255.0
IPv6 configuration	Automatic IPv6 address retrieval via DHCPv6, using SLAAC as fallback
Housing	M42, material: stainless steel 1.4404
Video stream codec	H.264 encdoded with 0.5 to 20 Mbit/s
Enclosure rating	IP67
Optical window	Multiple layers of Corning Gorilla Glas 3
Video stream transfer	Real Time Streaming Protocol (RTSP), accessible at port 554 with url "/live" with up to three clients, e.g. rtsp://192.168.200.200:554/live
Weight	650g without cable
Delay of video feed	< 200 ms
Embedded computer	Raspberry Pi with Debian (Buster)
Ambient working temperature range, T_{amb}	0°C up to +50°C
Storage temperature range	–20°C up to +75°C
Relative humidity	15% to 90%
Connection cable	Length: 5m, Cat.5e industrial Ethernet cable type LEONI MegaLine D1-20 S/U superflex 4P 11Y, drag chain suitable (≈5 million bending cycles with bending radius R_{min} ≥ 20mm), chemical resistant

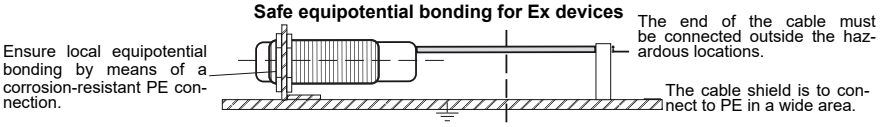
Wiring and Dimensions

1) yellow:	RX+/DC+	(PoE mode A)	5) grey:	DC+	(PoE mode B)
2) green:	RX-/DC+	(PoE mode A)	6) red:	TX-/DC-	(PoE mode A)
3) black:	TX+/DC-	(PoE mode A)	7) blue:	DC-	(PoE mode B)
4) orange:	DC+	(PoE mode B)	8) brown:	DC-	(PoE mode B)

Connect shield to ⏚ protection earth (over RJ45 plug)
Wiring according to ANSI/TIA/EIA 568-A and IEEE 802.3af-2003



Safe equipotential bonding for Ex devices



EX related markings

CE 1258	Manufacturer with Address
Typ: CVG-SAB-ECM-NO	Electrical data according table
Gas: II 2G Ex db IIC T4 Gb	Dust: II 2D Ex tb IIIC T135°C Db
ATEX:	BVS 10 ATEX E130 X
IECEx:	IECEx BVS 14.0108X
Tamb:	0°C up to +50°C
Manufacturing date:	Number 5 to 8 of the Serial Number (Year / CW)

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CVG-SAB-ECM-NO_e1/2022–11–03/MP

Operating Manual / EU-declaration of conformity

Product description
The CVG-SAB-ECM-NO camera system is intended for surveillance and inspection within potentially explosive atmospheres. It must be installed and operated in accordance to this operating manual.

General installation prescriptions
The equipment must not be used as personal protective equipment (PPE). The mounting, wiring, application and maintenance must be realized in accordance with the relevant rules and prescriptions. It is necessary to take into consideration the relevant international and national regulations.

Ex installation prescriptions
It is necessary to take into consideration the valid international and national rules and regulations (IEC 60079-14). The maximum ratings must not be exceeded. The electrical connections must be done according to the wiring diagram. The local equipotential bonding must be connected corrosion resistant and permanentely. The protective earth (PE) is solidly connected with the housing.
The cable shield must be solidly connected to protection earth. The cable have to be installed and protected against damages. The cable with termination fittings, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings. To connect cables inside hazardous locations only use certificated Ex housings. All cable terminals must be connected outside hazardous locations.
Other then original manufacturer, additional optical lenses are not allowed in hazardous locations.
The product CVG-SAB-ECM-NO may only be installed and operated within Ex zones 1, 2, 21 and 22.

Modbus TCP
Modbus TCP communication is organized in four types of registers:
1. Register type: Coils (writable)

Address	Type	Function (default state underlined)
00001	Bit	Write 1 to apply configuration
00002	Bit	DHCP Enable (0:disabled/1:enabled)
00003	Bit	Horizontal flip of image 0:off/1:on
00004	Bit	Vertical flip of image 0:off/1:on
00005	Bit	Reserved
00006	Bit	Write 1 to save configuration permanently
00007	Bit	Reserved

Since certain configuration parameters are dependent on each other, any changes will only be applied after 1 has been written to the apply configuration field.
By default, any applied configuration changes are **only stored until a power cycle occurs**. In order to save the configuration permanently; changes must be applied first, followed a second command that writes 1 to the save configuration field. We recommend not saving the configuration if it's feasible to apply them temporary after a power cycle.
The DHCP-Client is enabled by default. The static IPv4 configuration is ignored as long as a valid DHCP-Server is available on the network. If the DHCP-Client is disabled or no compatible DHCP-Server can be found, the static IPv4 configuration will be applied.
2. Register type: Discrete inputs (read only)

Address	Type	Function (default state underlined)
10001	Bit	Reserved

The discrete registers are not used in this application.
3. Register type: Input Registers (read only)

Address	Type	Function
30001	int32	Reserved

The input registers are not used in this application.
4. Register type: Hold registers (writable)

Address	Type	Function
40001	int32	Video resolution mode (see table for possible values)
40003	int32	White balance mode (see table for possible values)
40005	float32	Reserved
40007	float32	Reserved
40009	float32	Reserved
40011	float32	Reserved
40013	int32	Reserved
40015	int32	Shutter speed (0:auto, 1µs to 100'000µs, depending on frames per second)
40017	int32	ISO mode (0:auto, ISO 100 to ISO 800)
40019	int32	Saturation (0 to 100, 0:neutral)
40021	int32	Contrast (0 to 100, 0:neutral)
40023	int32	Brightness (0 to 100, 50:neutral)
40025	int32	Sharpness (0:neutral to 100:enhanced)
40027	int32	Frames per second (15Hz to 30Hz or 90 if resolution is 640x480)
40029	int32	Bitrate (200'000 to 20'000'000bps)
40031	uint32	Static IPv4 device address (192.168.200.200)
40033	uint32	Static IPv4 subnetmask (255.255.255.0)
40035	uint32	Static IPv4 gateway address (192.168.200.1)

The video resolution can be selected by writing the corresponding value from the table below into the video resolution field.

Mode	Resolution
0	640x480
1	1280x720
2	1640x1232
3	1920x1080 (cropped field of view: 37° by 21°)

The ISO mode field supports 0 for automatic gain or one of the following values: 100, 200, 400, 800.
The following white balance modes are available:

Mode	Description
1	Automatic white balance
2	Sunlight, about 5200K
3	Cloudy, about 6000K
4	Shade, about 8000K
5	Tungsten bulp, about 2800K
6	Fluorescent lamp, about 4200K

General safety
The sensor must not be used for Accident-Prevention! In worst case the output can change to any state! When installing and operating the product, it is necessary to take into consideration all relevant international and other national regulations, especially those regarding explosion protection.

Maintenance
No special maintenance is required.
The equipment must only be repaired or serviced by the manufacturer.

General notes and disposal
We reserve the right to modify our products. Our products are designed in such a way, that it has the least possible adverse effect on the environment. It neither emits or contains any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

EU-Declaration of Conformity
The product meets the requirements of the following standards and directives:
EN/IEC 60079-0:2018, EN 60079-1:2014, EN 60079-28:2015, EN 60079-31:2014, EN 60529:2014, EN 61000-6-2:2005, EN 61000-6-3:2007 + A1:2011, ATEX directive 2014/34/EU, Machine directive 2006/42/EC, EMC directive 2014/30/EU, RoHS directive 2011/65/EU
ATEX/IECEx-Designation:
Gas: II 2G Ex db IIC T4 Gb
Dust: II 2D Ex tb IIIC T135°C Db
ATEX EU-type examination certificate No.: BVS 10 ATEX E130 X
IECEx CoC No.: IECEx BVS 14.0108X
Ex CB IECEx: DEKRA Testing and Certification GmbH, Carl-Beyling-Haus, Dinendahlstrasse 9, D-44809 Bochum, Ident number: 0158.
ATEX certification of quality management system, type production of Ex devices, in accordance to the directive 2014/34/EU:
Certification No.: SEV 21 ATEX 4580, QAR No.: CH/SEV/QAR21.0009/00, CB: Eurofins Electric & Electronic Product Testing AG, Luppmenstrasse 3, CH-8320 Fehraltorf CE 1258 Ident. Number: 1258
Pablo Ledergerber, Matrix Elektronik AG, is authorized to generation of documentation.
The conformity of the devices with all used standards and directives and the EC-type examination certificate and the observation of the Quality Management System ISO 9001:2015, declares:

Ehrendingen, 3.11.2022

Pablo Ledergerber, Matrix Elektronik AG