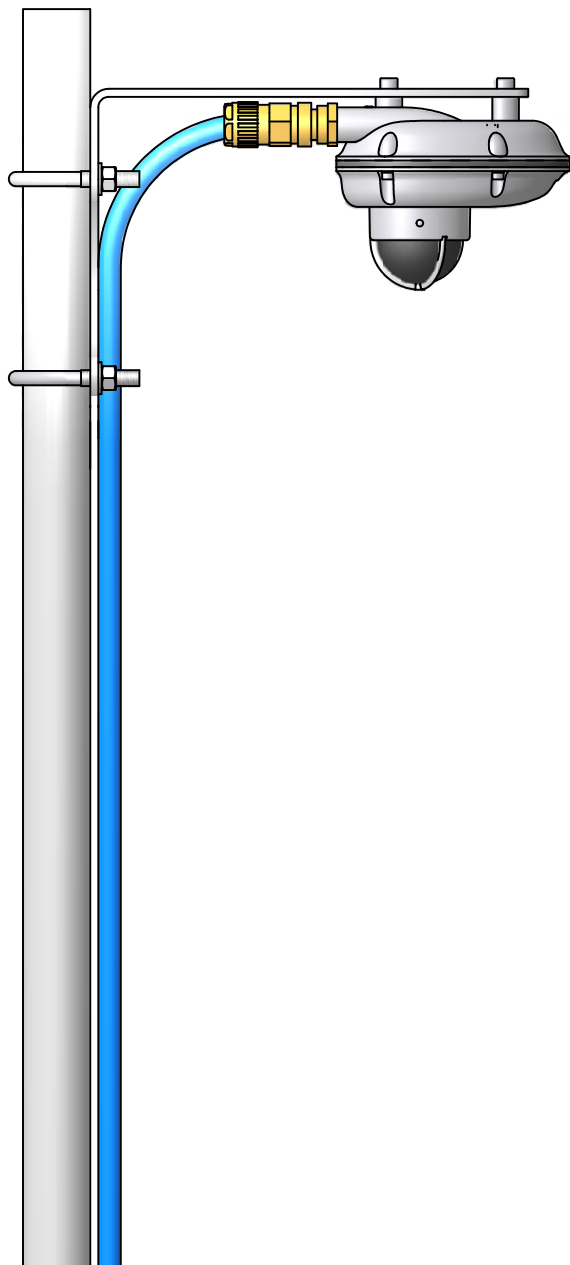


User guide for  
**Gassonic Surveyor**  
Ultrasonic gas leak detector

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## 1.0 The Gassonic Surveyor



The Gassonic Surveyor is an ultrasonic gas leak detector. It is designed to detect pressurized gas leaks by sensing the ultrasound generated by escaping pressurized gas.

The detector is designed for use in harsh environments and extreme weather conditions, making it ideal for detecting leaks in complex pipeline systems both onshore and offshore.

### 1.1 Application

The Gassonic Surveyor is ideal for:

- High pressure gas facilities (methane, hydrogen etc.)
- Petrochemical processing plants
- Gas pipeline compressor stations
- Gas storage facilities

### 1.2 Working principle

When gas is leaking from a pressurized system, it emits a characteristic “hissing” sound. A part of this sound is high frequency ultrasound, which can not be heard by humans.

As the detector senses ultrasonic noise, the Gassonic Surveyor does not have to be in contact with the leaking gas itself. It will detect the gas leak instantly even if the gas is carried away by wind or diluted in the air. The Gassonic Surveyor can be used in configurations with other detection methods.

### 1.3 Main features

Detection radius	5 to 20 meters, depending on ultrasonic background noise level.
Microphone characteristic	Omni-directional.
Outputs	Analogue 4-20 mA interface and Alarm relay or Error relay. (NAMUR and dry contact).
Visual output	Red and green LED
Housing	Acid-proof stainless steel (316L), Intrinsically Safe.

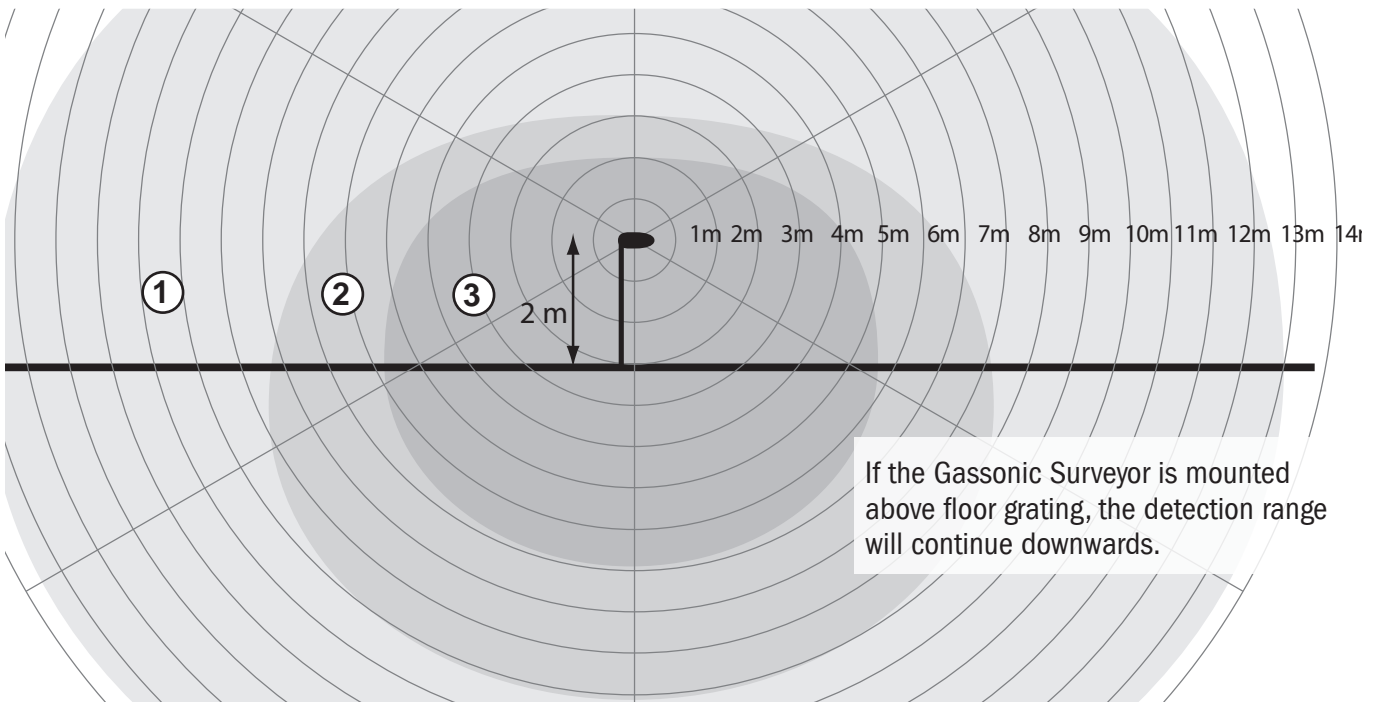
## 2.0 Background noise mapping

The Gassonic Surveyor filters out frequencies below 25 kHz. However, a few sources other than leaking gas may produce ultrasonic noise above 25 kHz, which could trigger the detector. To avoid these sources from influencing the gas leak detector, it is recommended to perform a background noise mapping survey of the plant using the

Gassonic 1700 Ultrasonic Mapping Meter. The mapping survey makes it easy to adjust the trigger level and the delay time of each detector so that it is unaffected by background noise in the area covered. Gassonic can be contacted for further details.

### 2.1 Noise levels

It is helpful to know the actual noise level before installation, as this has influence on the Gassonic Surveyor's detection range. Most environments can be divided in three overall noise levels. ▼



**① Very low-noise areas**

In "very low-noise areas", where background noise is below 58dB, the trigger level must be set to at least 64 dB. This corresponds to a detection radius of 13-20 m.

**Typical areas:**

- Onshore wellhead areas in calm environment
- Salt dome gas storage facilities in calm environment

**② Low-noise areas**

In "low-noise areas", where background noise is below than 68dB, the trigger level must be set at min. 74 dB. This corresponds to a detection radius of 9-12 m.

**Typical areas:**

- Areas with no machinery
- Areas with low frequency machine made noise

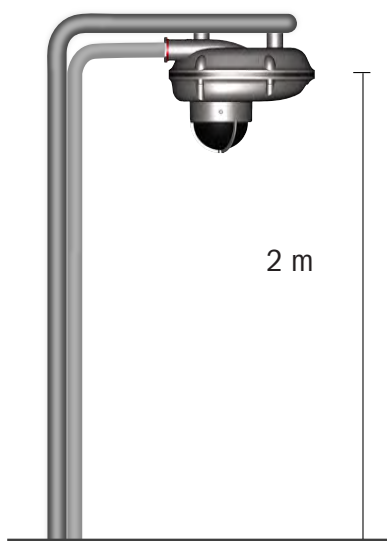
**③ High-noise areas**

In "high-noise areas", where background noise is below 78dB, the trigger level must be set at min. 84 dB. This corresponds to a detection radius of 5-8 m.

**Typical areas:**

- Turbo compressor areas
- Complete open offshore weather deck
- Next to very noisy machinery

## 3.0 Mounting



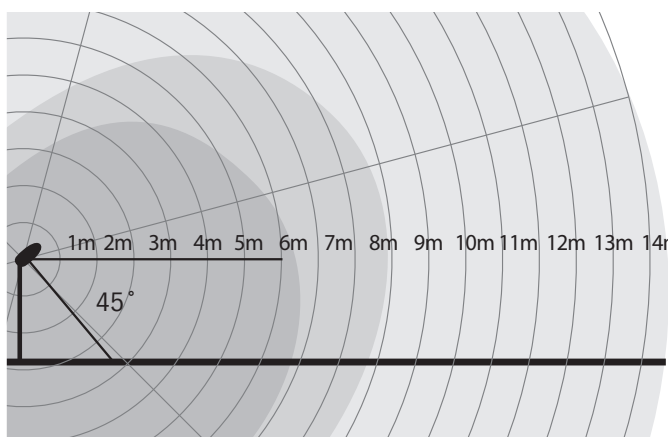
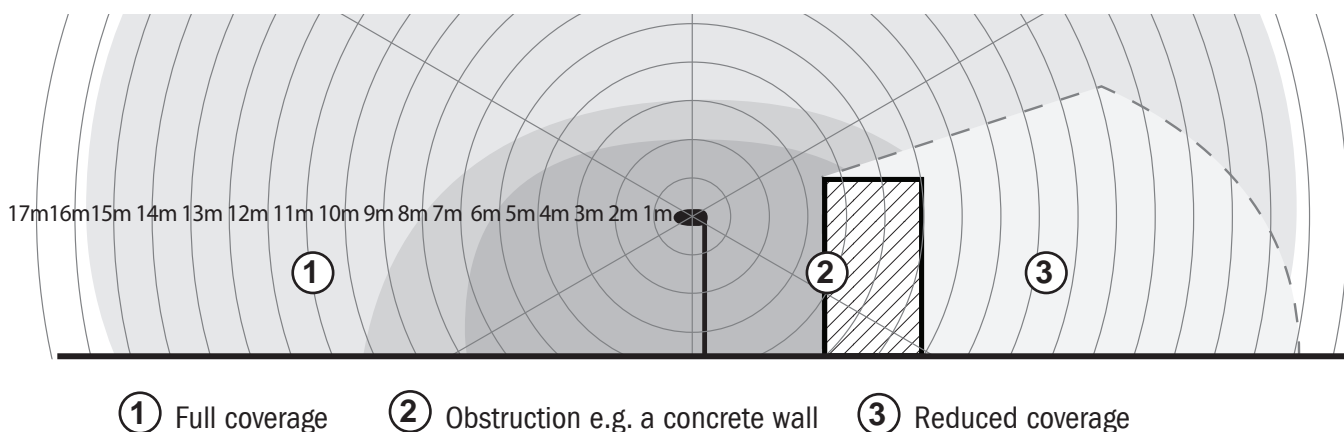
To ensure optimal performance from the Gassonic Surveyor, correct mounting is essential.

◀ For optimal detection coverage the Gassonic Surveyor should be mounted in a height of 1 to 2 meters above potential leak spots, and if possible in a position which makes it accessible for maintenance purposes. In special cases, like installation over compressors, the height can be increased.

It can be mounted on a pole or a wall using optional mounting bracket UA1352 for standard horizontal mounting. It can be mounted on a ceiling, on structural beams or similar non-vibrating structures.

As it primarily detects in a downward direction it must be mounted with the microphone compartment facing down. This will also avoid dirt from collecting in the wind

Mount the detector so it is clear of solid physical structures like walls and heavy machinery, as these will subdue any ultrasonic noise, leading to reduced detection coverage. Normal piping will not affect the coverage. ▼



◀ If necessary, the Gassonic Surveyor can be mounted with an inclination not exceeding  $45^\circ$ . If mounted next to a wall, the inclination will give better coverage. Optional mounting bracket UA1353 for mounting in a  $45^\circ$  angle can be used.

## 4.0 Mechanical construction

The Gassonic Surveyor is an intrinsically safe (Ex-i) ultrasonic gas leak detector. The cables are connected through M20 x 1.5 cable entries in the top part using glands according to Ingress Protection class IP66. The inner cores of the cable penetrating the detector should be 200 mm long. This will ensure no tension on the wires and the connectors when the unit is opened. The two mounting bolts are on the top part of the detector.



This means that the cables will enter on the fixed part of the detector. The bottom part is attached to the top part by means of four allen screws with water sealing washers. Unscrewing these screws will expose the connectors. The screws will be retained to the bottom part and will not drop out. The bottom part of the detector is supported by the Load-strap, which is connected to the top part.

Figure 1 (indsæt tegning til at illustrere.....)

1. Top (the fixed part of the detector)
2. Sealing flange
3. M5 earth connection inside the top part
4. M5 earth connection outside the top part
5. Inner top part (Ex-i)
6. M20 x 1.5 cable entries
7. Load strap and earth wire between top and bottom parts
8. Plate protecting the electronics and permanently attached to the bottom part
9. Ex-i connector
10. Four allen screws and sealing washers (must be tightened with 6Nm)
11. Rubber sealing
12. M5 allen screw
13. M5 sealing washer

The Gassonic Surveyor is mounted from the top with two 8 mm stainless steel bolts. Maximum thread depth is 15 mm. To open the unit, loosen the four screws. The screws are secured, and will not drop out. When closing the unit use a torque of 5Nm on the 4 screws.

The lower part of the unit is supported by a solid cable strap on which it can hang while connecting the cables.

When connecting the cables and moving the jumpers, the power of the unit must be switched off.

See wiring diagram on page 18.

Figure 2 (indsæt tegning til at illustrere.....)

- Windscreen
- Microphone
- User LED
- Communication LED

## 4.1 Mechanical operation and safety

When closing the top chamber ensure that the Load-strap and wires are not caught between the bottom part and the top part of the detector. Check the status of the rubber sealing and the flange. Send the unit to Gassonic for repair if the flange and/or the rubber sealing is damaged. Check the sealing washers and replace them if they are damaged. The four allen screws with sealing washers must be tightened to 6 Nm using a torque-wrench.

### WARNING:

The inner three screws should not be unscrewed and the bottom part should not be opened.

The warranty will be void if the bottom part is opened.

### 4.3. Mechanical Installation

Two M8 stainless steel bolts (not supplied), 88mm apart, attached to the top of the detector are used to fix the Gassonic Surveyor in its operating position. These bolts may penetrate the detector top by a maximum of 14 mm. The detector can be mounted using a Gassonic mounting bracket. The bracket is an optional accessory and is supplied with two M8 mounting U-bolts which can fit around a pole with a maximum dimension of 63 mm.

### SPARE PARTS AND ACCESSORIES

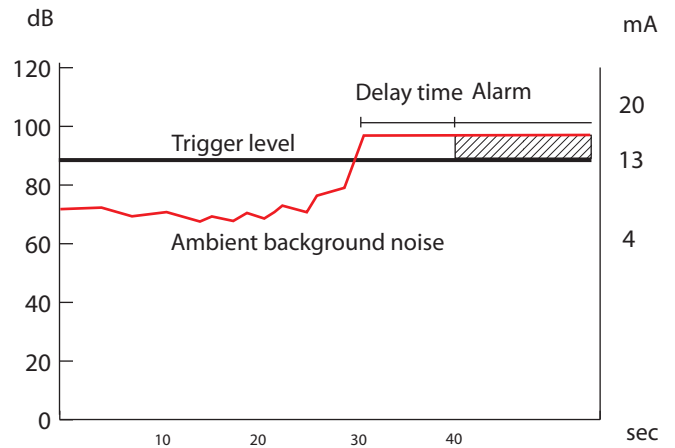
Description	Gassonic Part Number
Allen screw (M5)	YQ9854
Sealing washer (M5)	Y00877
Microphone	MM4190
Magnet stick	UC5352
Mounting bracket (standard)	UA1352A
Mounting bracket (45° angle)	UA1353
Torque wrench	EZ1000
Windscreen	DS0592

## 5.0 Alarm delay and trigger level

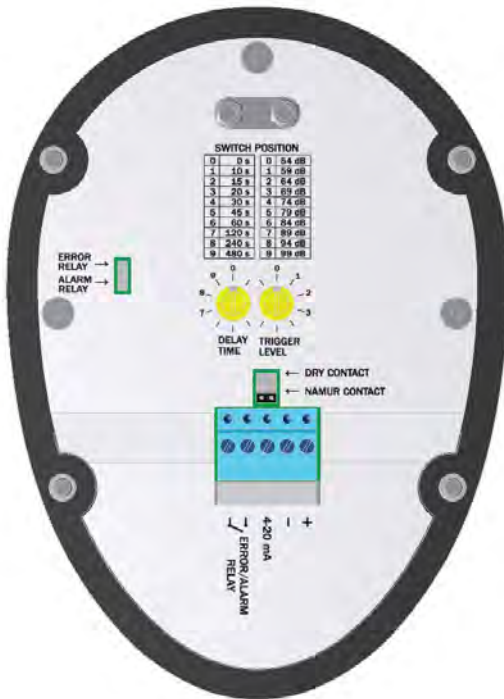
An alarm delay time prevents false alarms when the Gassonic Surveyor detects spikes of high level ultrasonic noise. After the delay time has run out an alarm will be triggered, but only if the noise level is still above the trigger level.

It is imperative to incorporate an alarm delay time of at least 10 seconds. This can be set locally in the unit if using the relay or in the Fire & Gas system if using the 4-20mA output.

The trigger level is set at least 6 dB higher than the ambient ultrasonic background noise.



▲ In this example the trigger level is set to 84 dB (corresponding to 13 mA) and the alarm delay time to 10 sec.



### 5.1 Output methods

The Gassonic Surveyor has two output methods:

- Standard 4 - 20 mA output. When using this output method a trigger level and delay time should be set in the Fire & Gas system.
- Alarm relay or Error relay. The unit has one relay output. This can be configured to be either an Alarm or Error relay. When using the Alarm relay, the trigger level and delay time should be set internally.

The relay (Alarm or Error) output is also changeable from contact to NAMUR Dry contact. You must decide which output is the most suited for your application. Factory default settings are: Alarm relay and Dry contact.

### 5.2 Using the 4 - 20 mA output

When using the 4-20 mA output, the trigger level and the delay time are set in the Fire & Gas system. The 4-20 mA output is a straight output. This means that if the noise level increases the output current increases as well. The trigger level must be set at least 6 dB higher than the ambient ultrasonic background noise level.

dB	mA
44	4,00
54	6,67
59	8,00
64	9,33
69	10,67
74	12,00
79	13,33
84	14,67
89	16,00
94	17,33
99	18,67
104	20,00

◀ Noise levels (trigger levels) and the relating output values. You can calculate other values using this formula:  
 $mA = (((dB - 44) / 60) * 16) + 4$   
 or  
 $dB = (((mA - 4) * 60) / 16) + 44$



### 5.3 Alarm relay

When using the Alarm relay output, the trigger level must be set **internally**, together with a delay time. The rotary switches are marked with numbers from 0 to 9 representing a specific value (see table). The Alarm relay is NC as default factory setting.

It is good practice always to set the internal trigger level at the same level, as that on the external system when using the 4 -20 mA output. Doing so will ease the test procedure and the maintenance of the system.

#### Trigger level switch



Position	Trigger level, dB
0	54
1	59
2	64
3	69
4	74
5	79
6	84
7	89
8	94
9	99

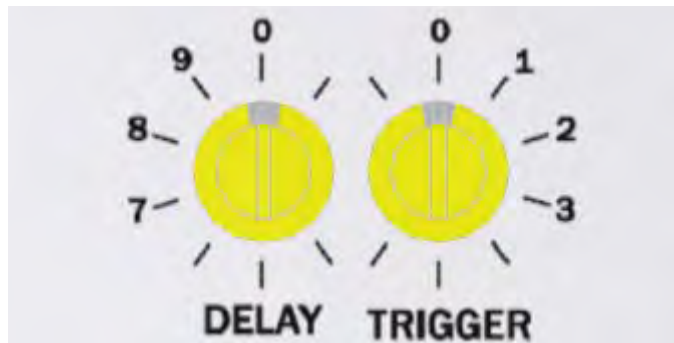
◀ The trigger level switch position and the corresponding ultrasonic noise level values.

#### Alarm delay switch



Position	Delay time, seconds
0	0
1	10
2	15
3	20
4	30
5	45
6	60
7	120 (2 minutes)
8	240 (4 minutes)
9	480 (8 minutes)

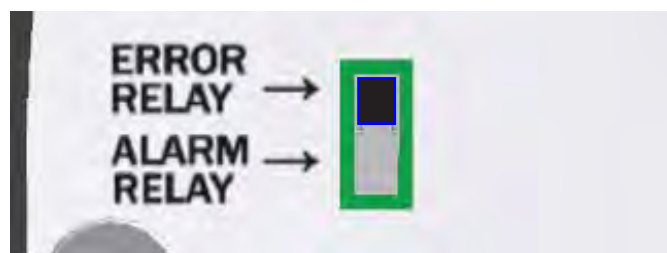
◀ The alarm delay switch position and the corresponding delay times. The delay must be at least 10 seconds.



▲ Rotary switches for setting trigger level and delay time.

### 5.4 Error relay

In Error relay mode the Gassonic Surveyor will indicate low supply voltage. Externally it will indicate acoustic test failure. The Error relay is always NC.



▲ The figure shows the jumper in the lower position (factory default setting) to provide Alarm relay functionality. To choose Error relay function instead of Alarm relay function, you must move the relay jumper to the upper position.

### 5.5 NAMUR or dry contact



▲ The figure shows the two jumpers in the upper position (factory default settings) to provide Dry contact functionality to either the Alarm or Error relay. To switch the relay mode from NAMUR to dry contact move the two jumpers as shown.

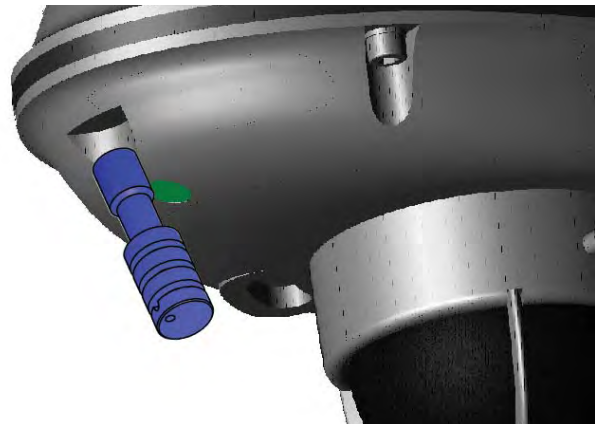
## 6.0 Test and calibration

The Gassonic Surveyor is tested and calibrated as part of the manufacturing process. However, prior to use, it is good practice to calibrate and test the unit. You will need the Gassonic 1701 test and calibration tool to do this.









Start any test and calibration procedure by clipping the Gassonic 1701 onto the Gassonic Surveyor sensor head. Lock the tool on the mounting bayonet by rotating it clockwise. ►



To activate the calibration mode of the Gassonic Surveyor place the magnet stick in the notch as illustrated. ►











## 7.0 Gain test procedure

Action	Button	Display	Button
1 Switch on the Gassonic 1701. The version number will display briefly. You must now select the detector type.		Select type	
2 Select "Gassonic Surveyor" by pressing the Enter button.		Gassonic Surveyor	
3 Use default filter 25 kHz by pressing the Enter button.		Filter 25 kHz	
4 Select test with the Down button.		Select test	
5 Select gain test by pressing the Enter button.		Test gain	
6 Activate the test by pressing the Enter button.		Activate "TEST"	
7 When the test is finished, the Gassonic 1701 beeps twice, and shows a message, corresponding to the Gassonic Surveyor's internal settings. In this example the trigger level is 79 dB and the rotary switch is in position 5. If the test is more than $\pm 3$ dB out of tolerance, perform calibration.		Meas: 79 Pos: 5	
If the test was faulty the Gassonic 1701 beeps tree times and a No response message displays on the screen. Press Enter to try again, or check the "Trouble shooting"-chapter		No response	

## 8.0 Delay test procedure

After a successful gain test, you must move on to the delay test. Please note that this test will trigger an alarm regardless of output mode (Alarm relay or 4-20 mA). If you use the 4-20 mA output you should be in contact with the staff in the fire and gas control room to measure the delay time and to avoid causing a false alarm.










When the control room observes an alarm, press "ENTER" or "TEST" to stop the test. The time read-out on the display corresponds to the alarm delay setting of the system. The user interface LED will turn red when the test starts and then flash when the internal delay time has exceeded.

Action	Button	Display	Button
1 Switch on the 1701. The version number will display briefly. You must now select the sensor type.		Select type	
2 Select "Gassonic Surveyor" by pressing the Enter button.		Gassonic Surveyor	
3 Use default filter 25 kHz by pressing the Enter button.		Filter 25 kHz	
4 Select test with the Down button.		Select test	
5 Select the delay test by pressing the Enter button.		Test delay	
6 To test the internal delay, you must keep an eye on the unit LED as it changes from constant red to flashing red. To test the external alarm delay time you must be in contact with staff in the control room.		Activate "TEST"	
7 Press Enter when the LED flashes red. The delay shows on the screen. If you use the analog 4-20 mA output, press Enter when the control room observes an alarm.		Delay on: 0:10	

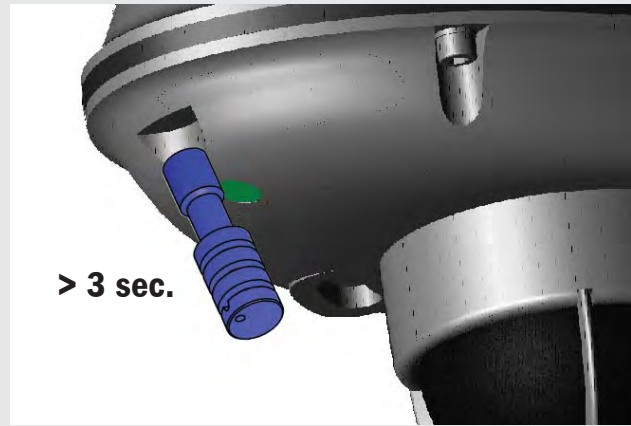
## 9.0 Calibration procedure

A calibration can be performed at any time. Along with the Gassonic 1701, you will need the magnet-stick to

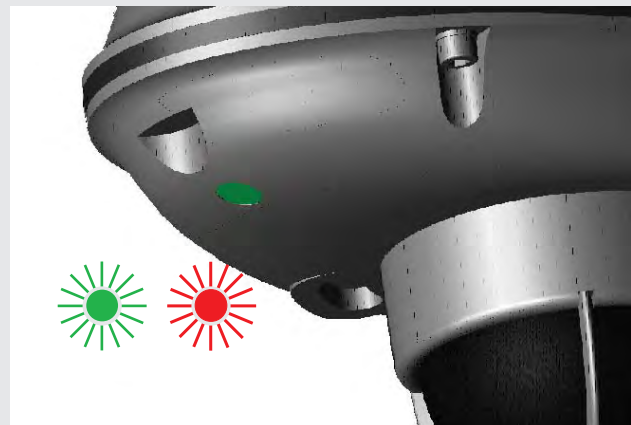
set the Gassonic Surveyor in calibration mode.

Action	Button	Display	Button
<p>1 Switch on the Gassonic 1701 tool. The version number will display briefly. You must now select the sensor type.</p>		Select type	
<p>2 Select "Gassonic Surveyor" by pressing the Enter button.</p>		Gassonic Surveyor	
<p>3 Use default filter 25 kHz by pressing the Enter button.</p>		Filter 25 kHz	
<p>4 Select test with the Down button.</p>		Select test	
<p>5 Select the Gassonic Surveyor calibration by pressing the Enter button.</p>		Surveyor Calibr.	

- 7 Activate the test and calibration mode on the Gassonic Surveyor with the enclosed magnet-stick. Place the magnet-stick in the magnet stick notch next to the interface LED and hold it for more than 3 seconds.



- 8 The interface LED will flash green and red to indicate that the unit is now in test mode. The test mode will time out after 60 sec of inactivity and return to normal mode. You may also return the Gassonic Surveyor to normal service by placing the magnet stick in the magnet stick notch once.



- 9 Activate the calibration by pressing Enter on the 1701-tool.



Activate  
Calibr.



- 10 The calibration is carried out automatically, and will stop when finished. The Gassonic Surveyor LED turns green.



Calibr.  
complete








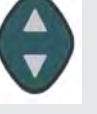

If the test was faulty the red LED flashes and a message turns up on the screen. Check the chapter "Trouble shooting" and try calibrating again.

No response

## 10.0 Step test

The step test can be carried out to validate the 4-20 mA output to the control room. The test makes it possible to step through different sound pressure levels.

Note that this test might trigger an alarm if the sound level exceeds the trigger level.

Action	Button	Display	Button
1 Switch on the 1701 tool. The version number will display briefly. You must now select the sensor type.		Select type	
2 Select "Gassonic Surveyor" by pressing the Enter button.		Gassonic Surveyor	
3 Use default filter 25 kHz by pressing the Enter button.		Filter 25 kHz	
4 Select test with the Down button.		Select test	
5 Select the step test.		Step test	
6 Push UP-button to increase the test sound level from 44 to 101 dB.		049 dB	
7 Push DOWN-button to decrease the test sound level.		045 dB	
8 When all levels are tested, push ENTER to stop the step test.		Step test	

## 11.0 Gassonic Surveyor LED interface

The Gassonic Surveyor has two interface LEDs, that will flash red or green, depending on the state of the unit. The LED on the front of the unit indicates the Gassonic Surveyor's actual mode, and the LED next to the sensor

head communicates with the test- and calibration tool. During service operations the communication LED is not visible.

Normal operation		
	Front LED	Communication LED
Normal Operation	Green	Off
Voltage Error	Off	On
Internal Trigger level reached	Red	On
Service operation		
Calibration Mode	Flash Red and Green	
Calibration Test fault	Flash Red	
Internal Delay time testing	Red	
Internal Delay time elapsed	Flash Red	

## 12.0 Trouble shooting

If the calibration or gain test was faulty the Gassonic 1701 beeps tree times and a No response message displays on the screen.

- Check if there is dirt on the optical window between the 1701 and the Gassonic Surveyor.
- Check if there is dirt on the windscreen or on the microphone.
- Replace microphone if nessesary.

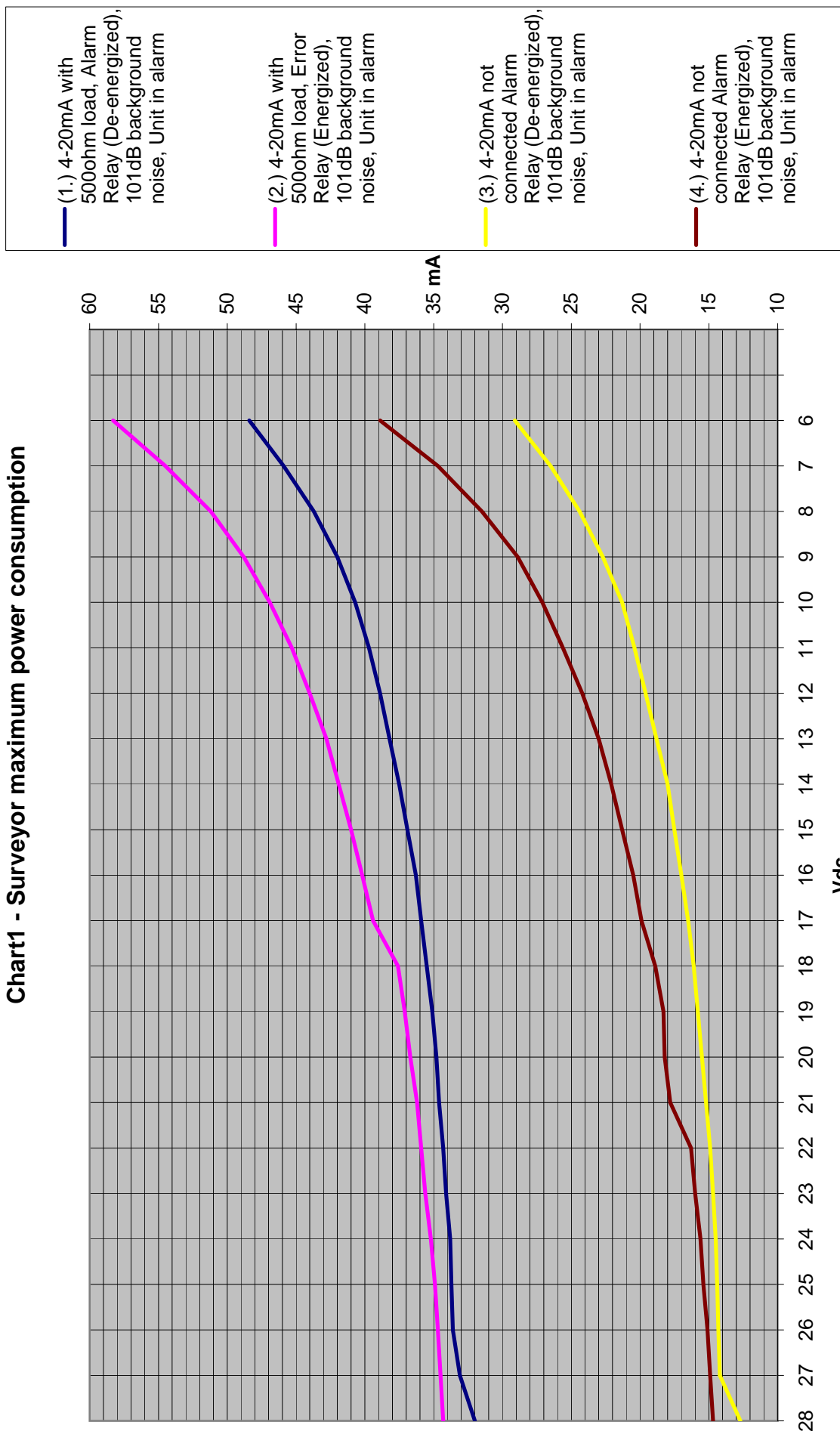
## 13.0 Power consumption

The unit can operate with a supply voltage of 9 to 28 Vcd. Power consumption below are calculated with a 33% safety factor, and with the minimum voltage of 9 Vcd.

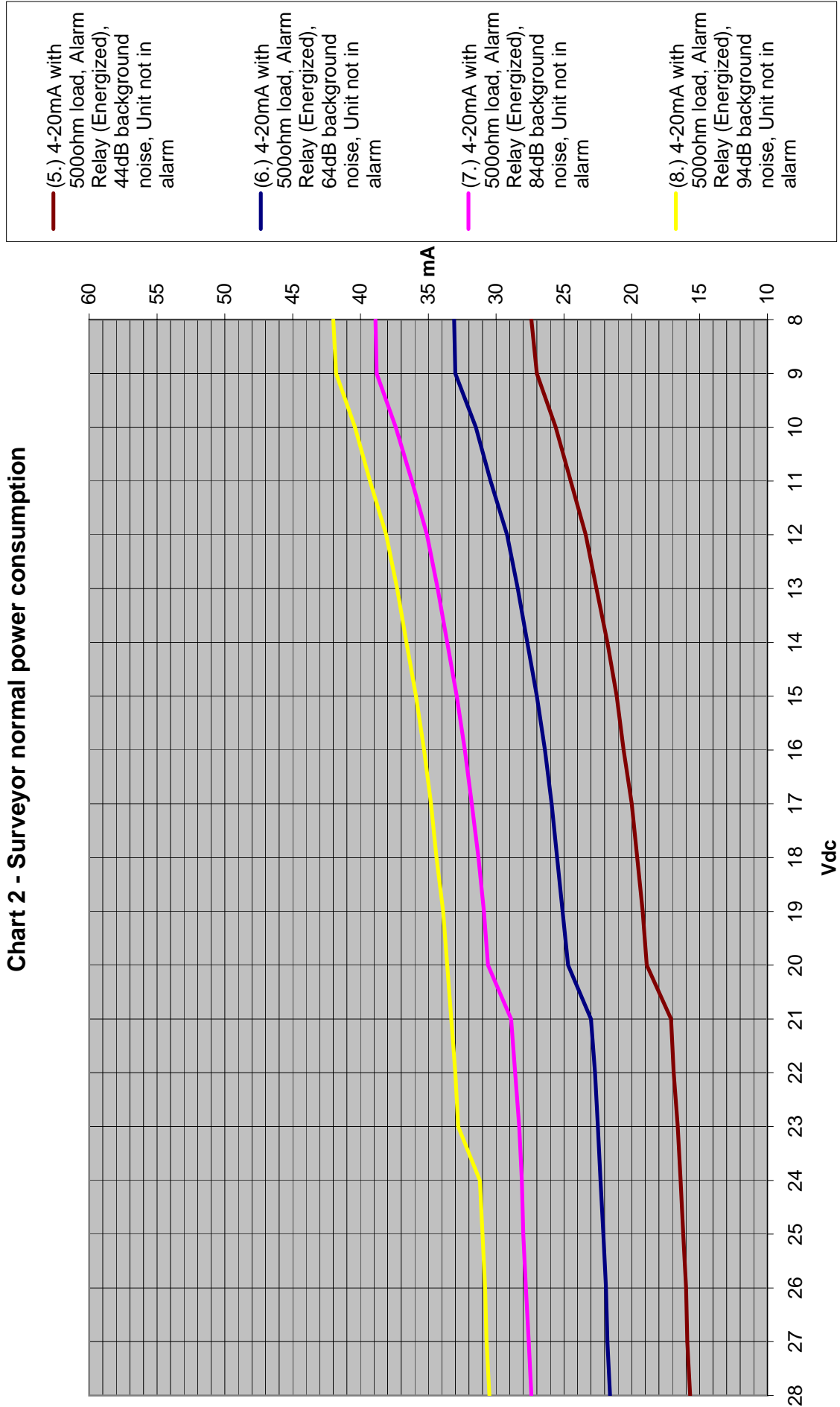
When using the 4-20 mA and the relay in Error mode	$I_{min} = 600 \text{ mW}$
When using the 4-20 mA and the relay in Alarm mode	$I_{min} = 500 \text{ mW}$
When using only relay output in Alarm mode	$I_{min} = 350 \text{ mW}$



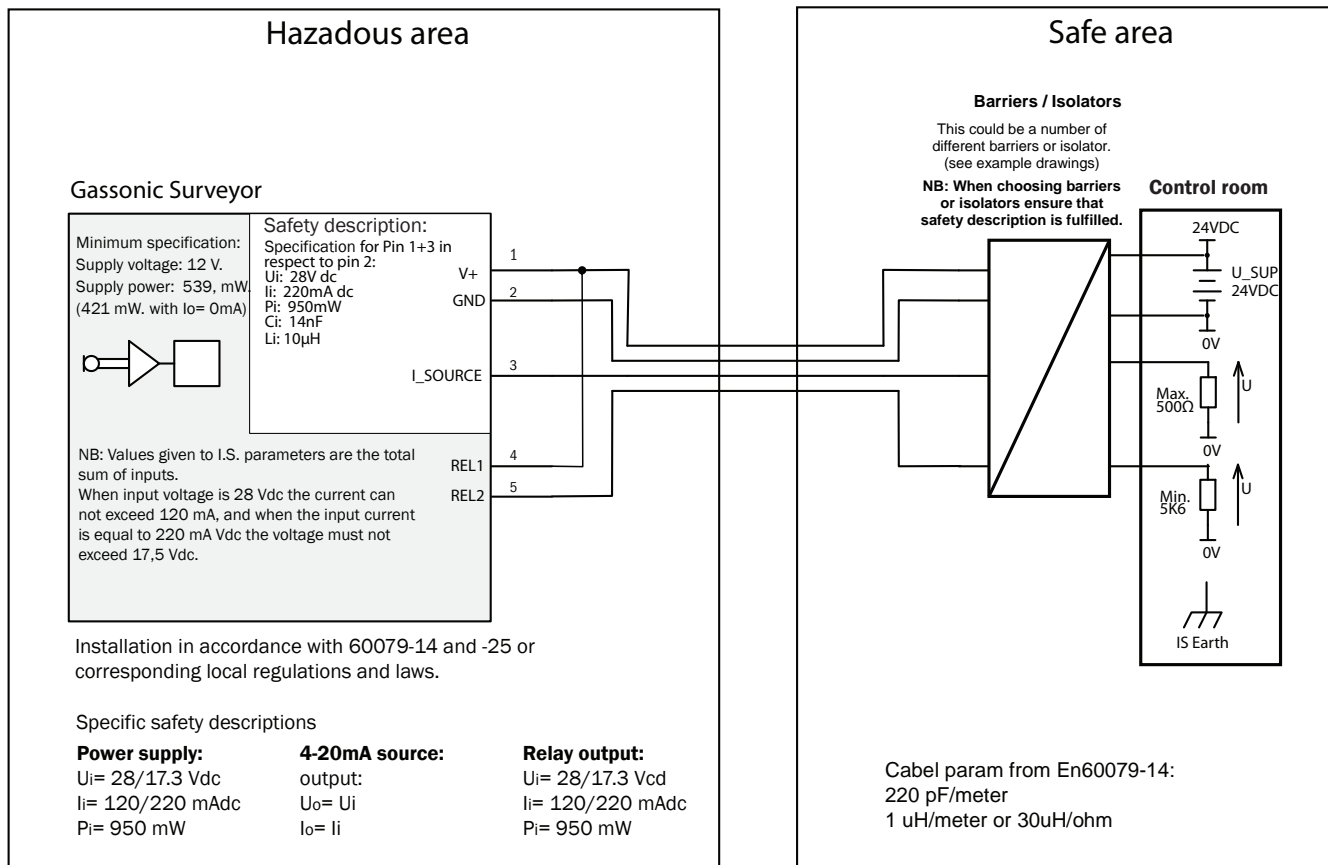
**Chart1 - Surveyor maximum power consumption**



**Chart 2 - Surveyor normal power consumption**

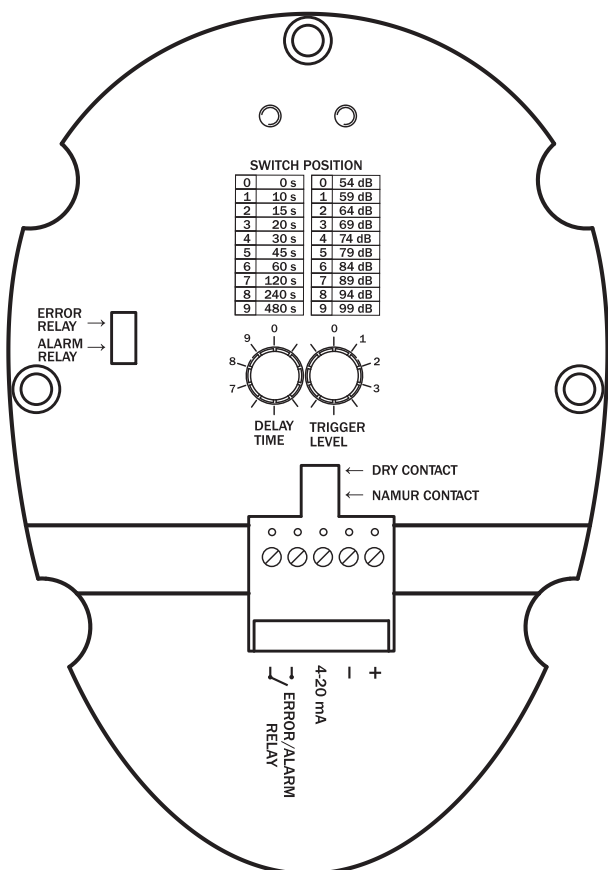


# 14.0 Wiring



▲ Generic wiring diagram for Gassonic Surveyor. Connection data and example wiring diagrams of MTL and Peppel & Fuchs barriers/isolators can be found in the Appendix.

Any barriers/isolators can be used as long as their output safety description does not exceed that of the Gassonic Surveyor. This product is designed to be installed according to IEC Standard EN 60079-14.

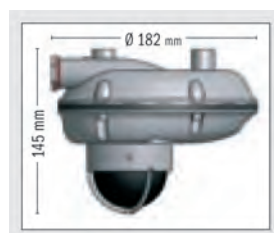


◀ Wire connectors on the unit are individually marked for correct wiring and reference.

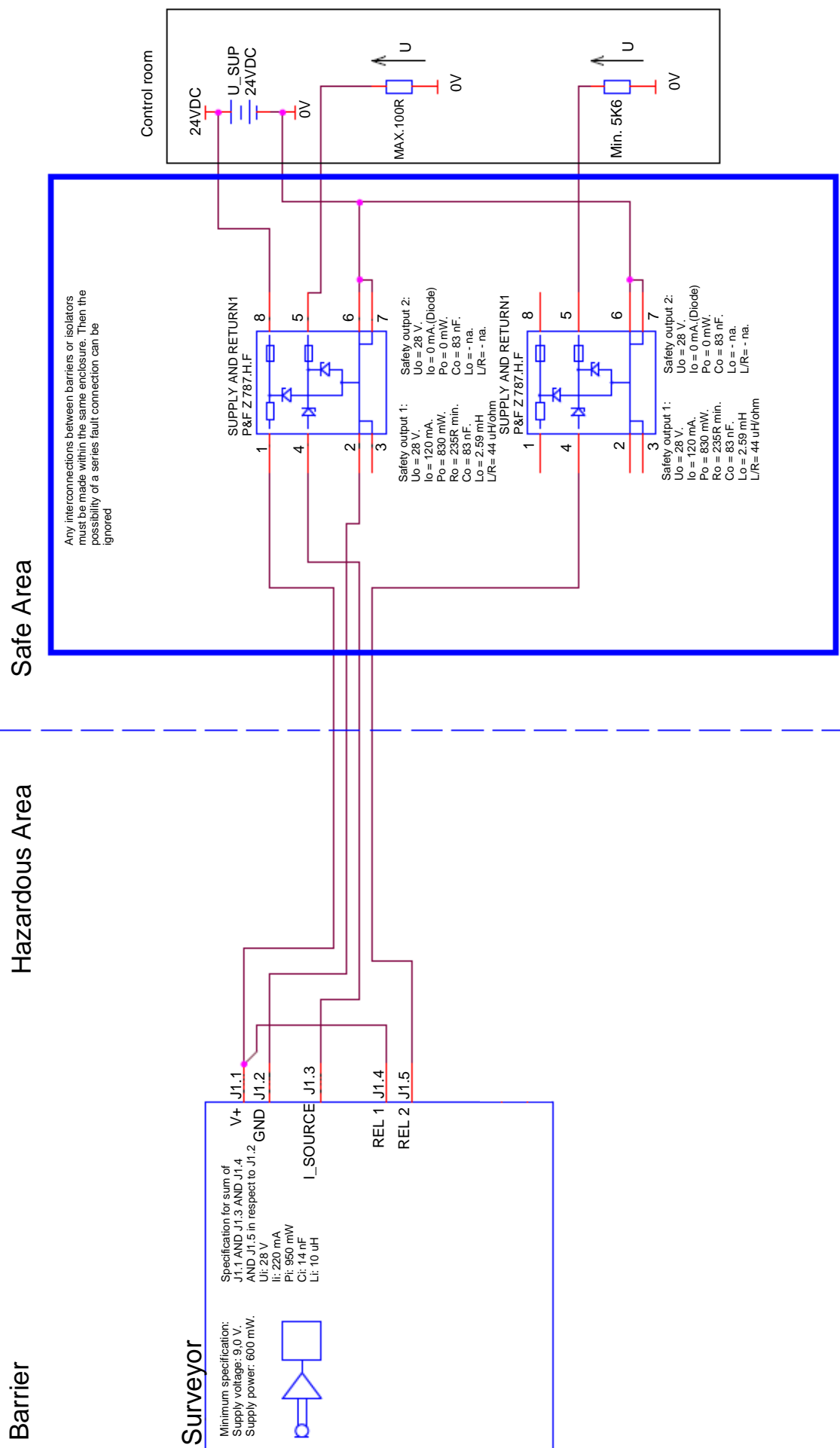
## 15.0 Technical data

<b>General description</b>	
Detector type	Ultrasonic Gas Leak Detector for fixed installations
Sensor technology	SS Microphone technology
Detector frequency range	25 kHz - 70 kHz
Dynamic range	44 dB - 104 dB SPL
Response time	Instant
Detection coverage (leak rate 0.1 kg/s)	5 - 20 meter radius
<b>Power requirements (minimum)</b>	
When using 4-20mA and Relay output	
Input Voltage	9 Vdc
Input Current	57 mA
Input Power	600 mW
<b>When using relay output only</b>	
Input Voltage	9 Vdc
Input Current	39 mA
Input Power	350 mW
<b>Safety description</b>	
<b>Power supply</b>	
U <sub>i</sub>	28 Vdc
I <sub>i</sub>	220 mA
P <sub>i</sub>	950 mW
C <sub>i</sub>	14 nF
L <sub>i</sub>	10 µH

<b>Output methods</b>	
Analogue interface	
0 mA	Low supply voltage/No power
3 mA	Unit locally inhibit
4 - 20 mA	44 dB - 104 dB SPL
<b>Relay (option 1 or 2 operator selectable)</b>	
Option 1	Alarm relay (switch on preset trigger level)
Option 2	Error relay
<b>NAMUR/dry contact (operator selectable)</b>	
NAMUR output	
Normal	1.28kΩ ±1%
Alarm	10kΩ ±1%
<b>Environmental data</b>	
Operating temperature	- 40 °C to + 75 °C
Humidity	0 to 100 % relative humidity
Ingress Protection	IP66
Atmospheric conditions	Normal air pressure and oxygen content
<b>Construction</b>	
Housing	Stainless steel AISI 316L
Weight: 2.24 kg	
<b>Vibration sensitivity</b>	
0.13 m/s <sup>2</sup> perpendicular to the membrane will trigger the unit in the most sensitive range (44dB SPL)	
<b>Dimensions</b>	
Ø 180 x 141 mm (7.09 x 5.55 in)	
Two gland/conduit entries: M20 x 1.5	
<b>RF emission and immunity</b>	
Tested according to:	
General electrical safety	EN61010-1
RF emission	EN61000-6-4
RF immunity	EN61000-6-2
<b>Certifications</b>	
ATEX: II 2G EEx ia IIC T4	
IECEX: EEx ia IIC T4	



# 16.0 Appendix

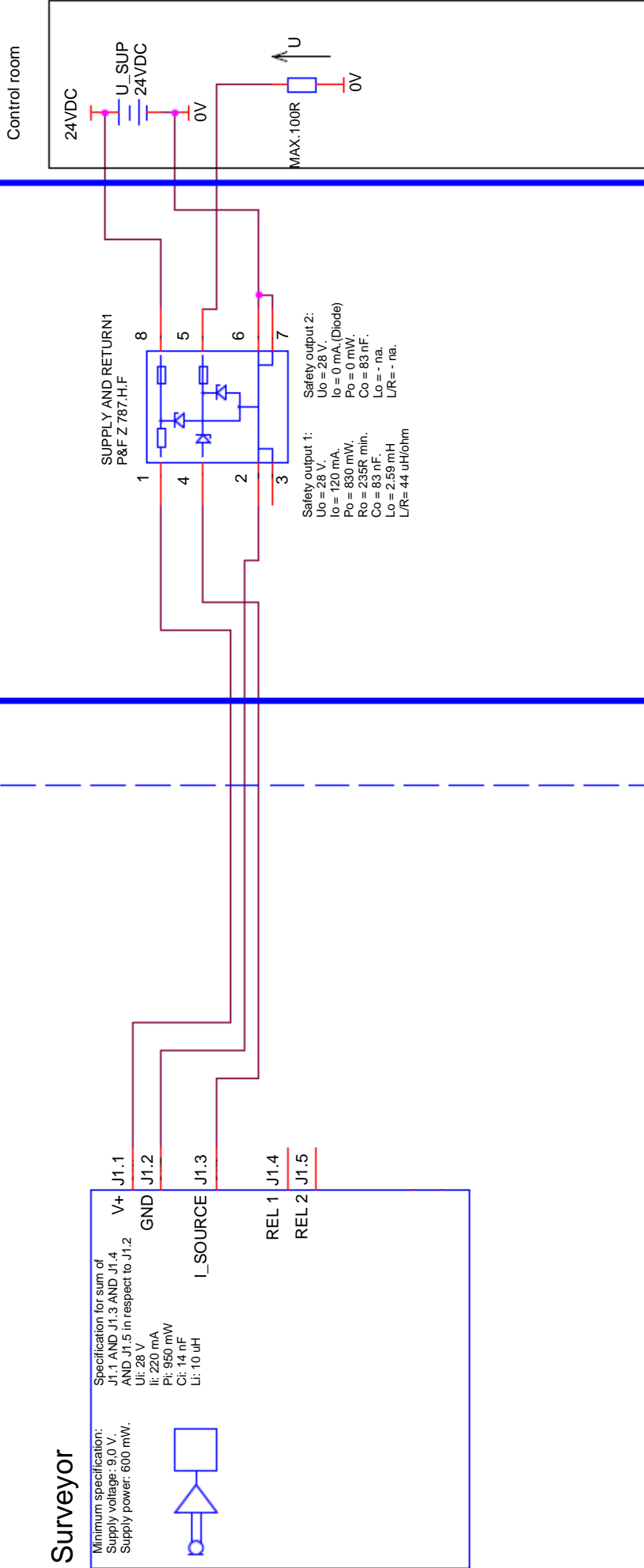


Cabel param from En60079-14:  
220 pF/meter  
1 uH/meter or 30uH/ohm

Barrier

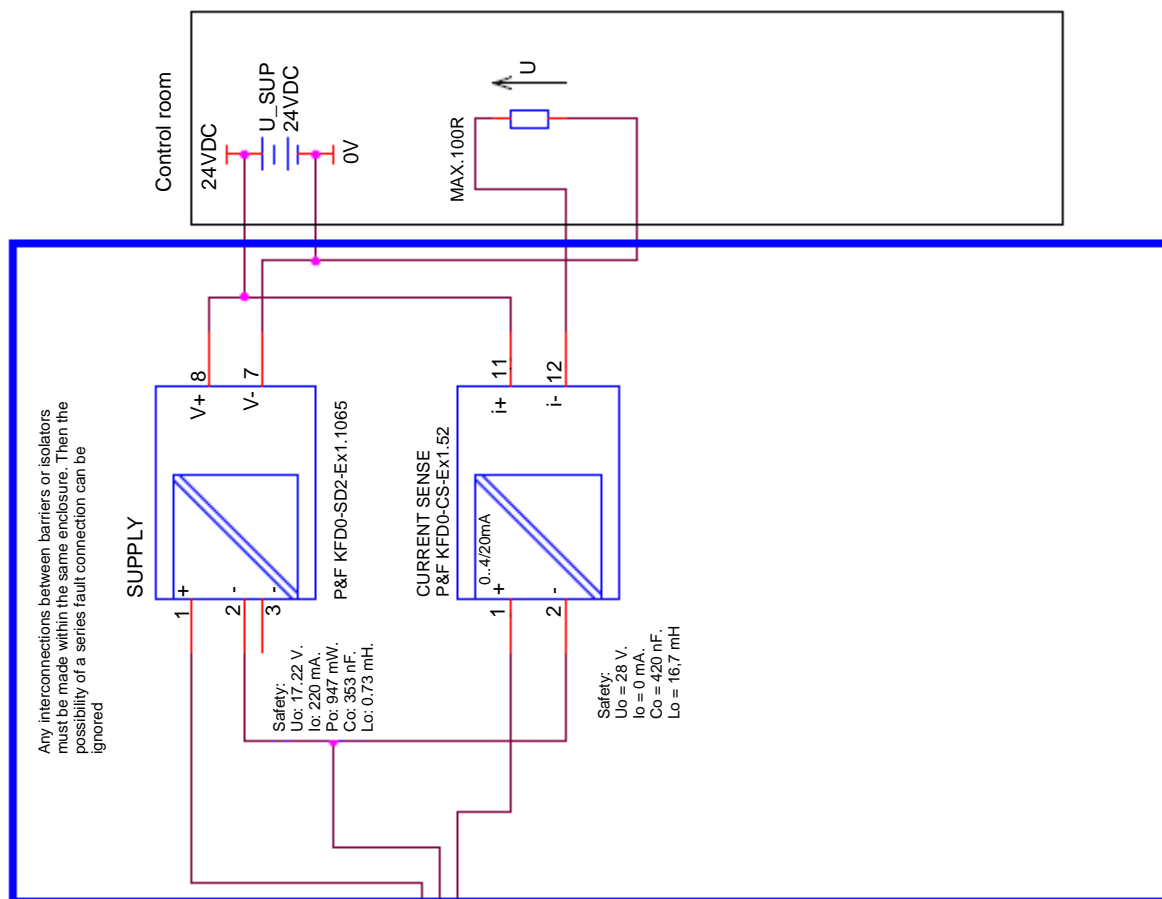
Hazardous Area

Safe Area



Cabel param from En60079-14:  
 220 pF/meter  
 1 uH/meter or 30uH/ohm

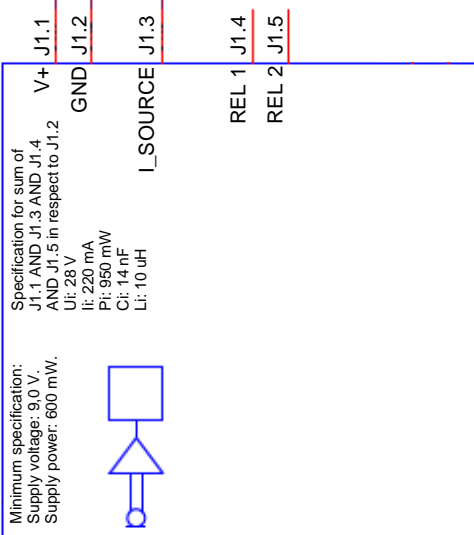
### Safe Area



### Hazardous Area

### Isolator

### Surveyor



Cabel param from En60079-14:  
220 pF/meter  
1 uH/meter or 30uH/ohm

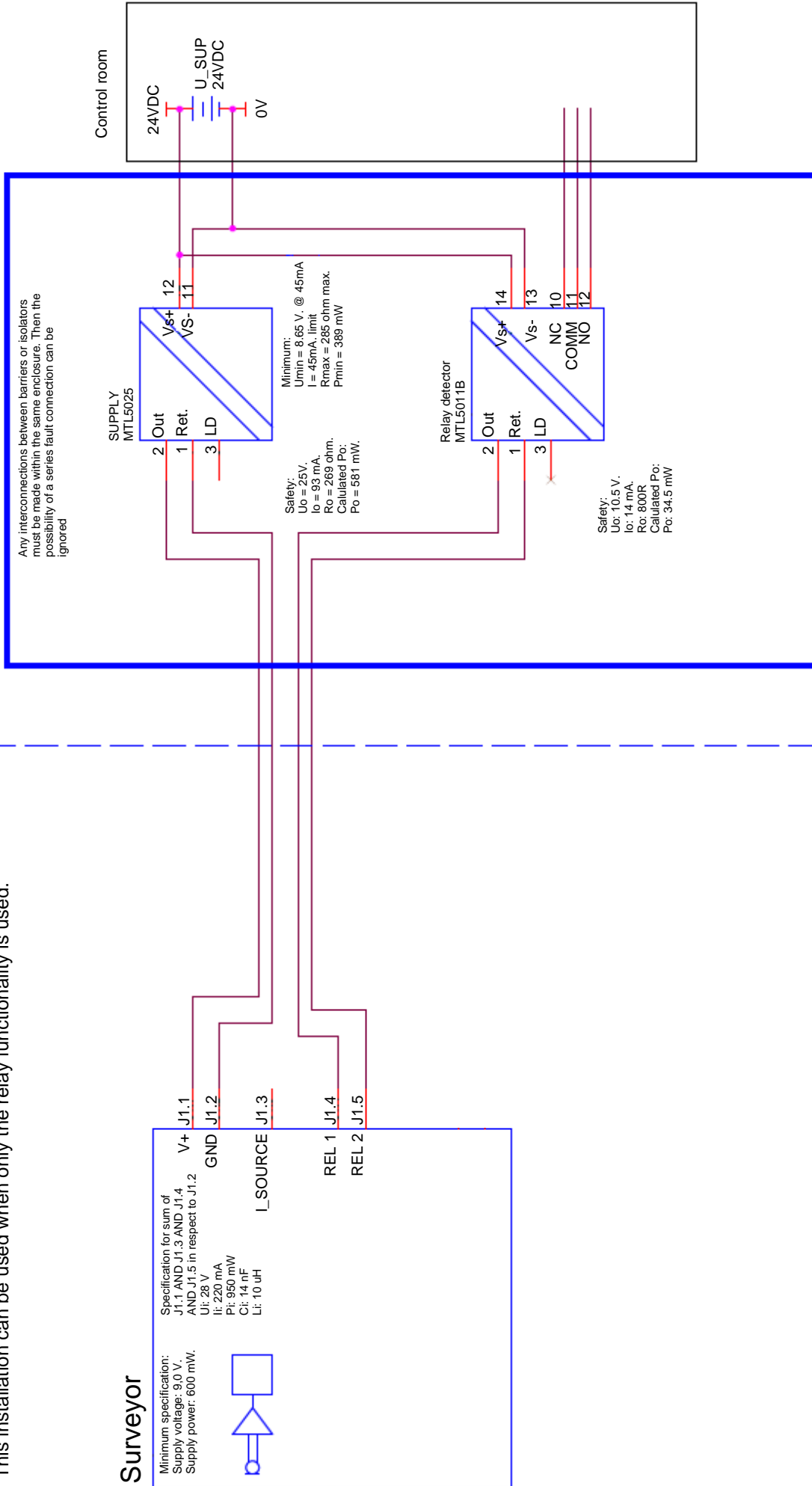
### Isolator

Description of use:

This installation can be used when only the relay functionality is used.

### Hazardous Area

### Safe Area



Cabel param from En60079-14:  
220 pF/meter  
1 uH/meter or 30uH/ohm