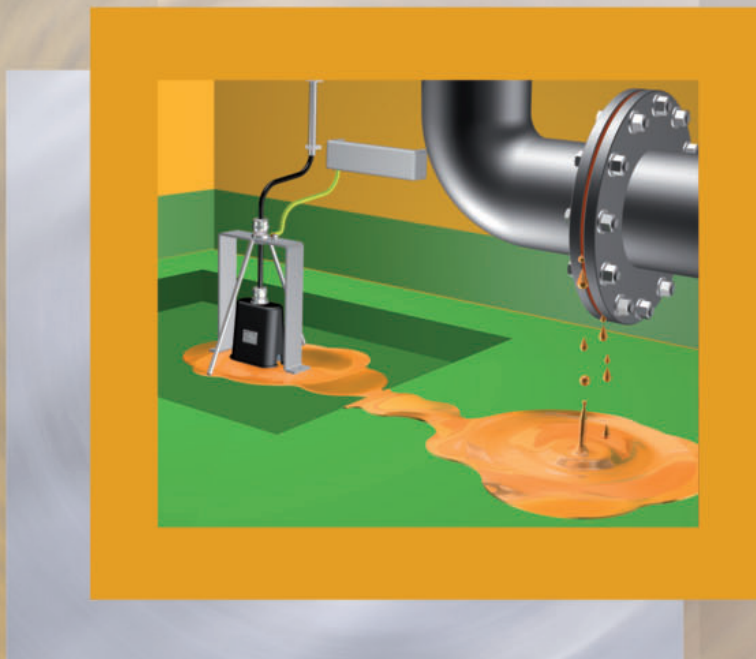




# Capacitive Ex leakage detectors of the Leckmaster range

with sensor and relay



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**Jola Spezialschalter GmbH & Co. KG  
sells only business-to-business (B2B).**








**The units described in this documentation  
may only be installed, connected,  
started up, serviced and replaced  
by suitably qualified personnel!**

**Subject to deviations from the diagrams  
and technical data.**

**The details in this brochure are product  
specification descriptions and  
do not constitute assured properties  
in the legal sense.**



# Capacitive Ex leakage detectors

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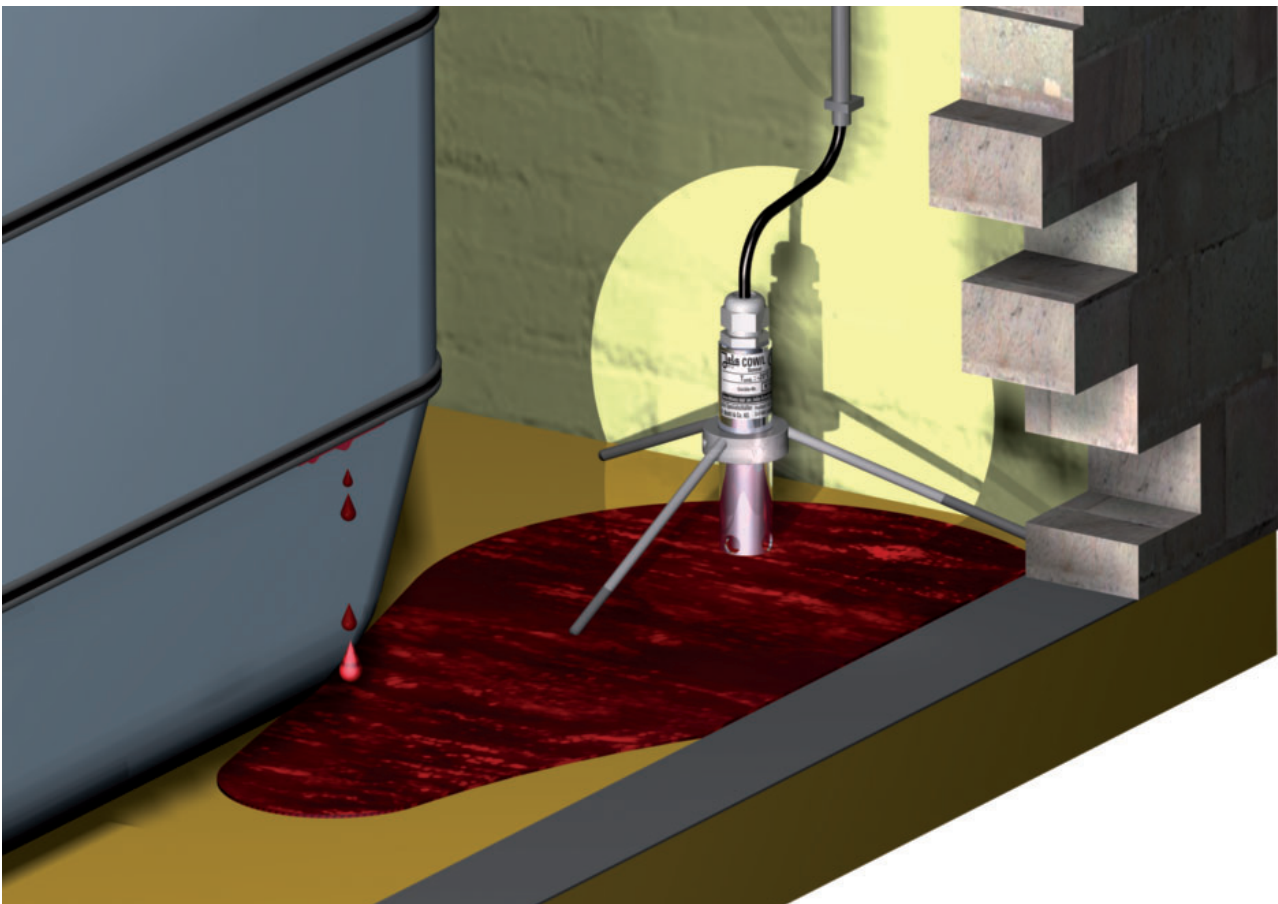
## The capacitive measuring principle

The capacitive measuring principle is mainly used for the detection of **electrically non-conductive (insulating) liquids**, but it can also be used to detect electrically conductive liquids.

Electrically non-conductive liquids are generally organic liquids like oils and solvents. An electrode assembly forms a measuring capacitor, and the dielectric is either air or liquid. The dielectric constant of air is 1. The dielectric constant of the liquid to be detected is higher. For our capacitive sensors, the dielectric constant has to be higher than 1.8.

The capacitive leakage detector recognises a change in the dielectric constant at the measuring capacitor and an alarm signal is emitted. The design of the measuring capacitor allows direct mounting on the floor and generally rules out the possibility of interference effects due to different subsurfaces.

### Application example: detection of a heating oil leakage











# Capacitive Ex leakage detectors of the Leckmaster range

with integrated cable break monitoring

for signalling the presence of electrically non-conductive and electrically conductive low-viscosity liquids on the floor of a normally dry tank room or in a normally dry collection tub


A capacitive **COW/Ex-1G**, **COW/Ex-0G**, **OWE/Ex-1G**, **OWE/Ex-0G** or **OWE 2/C/NL/Ex-1G** sensor installed in a potentially explosive atmosphere, transmits via an obligatory Ex connection box **OAK/LMT/2x1MΩ**  **II 2 G Ex ia IIC T6 Gb** also installed in a potentially explosive atmosphere, electrical signals to a capacitive Ex relay **Leckmaster 101/Ex**  **I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC**, which is placed outside potentially explosive atmospheres.

Each capacitive **COW/Ex-1G**, **COW/Ex-0G**, **OWE/Ex-1G**, **OWE/Ex-0G** or **OWE 2/C/NL/Ex-1G** sensor must be connected, via an obligatory Ex connection box **OAK/LMT/2x1MΩ**  **II 2 G Ex ia IIC T6 Gb**, to a separate capacitive Ex relay **Leckmaster 101/Ex**  **I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC**.

For more information relative to the use of a capacitive **COW/Ex-1G**, **COW/Ex-0G**, **OWE/Ex-1G**, **OWE/Ex-0G** or **OWE 2/C/NL/Ex-1G** sensor, an obligatory Ex connection box **OAK/LMT/2x1MΩ**  **II 2 G Ex ia IIC T6 Gb** and a capacitive Ex relay **Leckmaster 101/Ex**  **I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC**, please consult the Installation, Operating and Maintenance Instructions (**sent on request**).

The capacitive **COW/Ex-1G**, **COW/Ex-0G**, **OWE/Ex-1G**, **OWE/Ex-0G** and **OWE 2/C/NL/Ex-1G** sensors can be mounted either

- upright on the floor (using the stand offered by Jola as an option)  
or
- freely suspended by their cable above the floor.

**They must be used in normally dry surroundings, e.g. in normally dry collection rooms or collection tubs.** The obligatory Ex connection box **OAK/LMT/2x1MΩ**  **II 2 G Ex ia IIC T6 Gb** has a protection class of IP65 and is designed for surface mounting.

The capacitive Ex relay

**Leckmaster 101/Ex**  **I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC** is designed for U-bar mounting or surface mounting (in a switch cabinet or in a protective housing) **outside potentially explosive atmospheres**. The various operating statuses are shown by coloured LEDs.

## Areas of application:

All organic and inorganic liquids with a specific dielectric constant of 1.8.

Prerequisite is that these liquids, dependent on the ambient temperature, are present in fluid form, and that the sensors to be used will be sufficiently wetted. Response height is approx. 12 mm.



# Capacitive Ex sensors and obligatory Ex connection box



**COW/Ex-1G** II 2 G  
Ex ia IIC T5 Gb



**COW/Ex-0G** II 1 G  
Ex ia IIC T5 Ga



**COW/Ex-1G** II 2 G Ex ia IIC T5 Gb  
with mounting stand



# Capacitive Ex sensors and obligatory Ex connection box



**OWE/Ex-1G** **Ex ia IIC T5 Gb**



**OWE/Ex-0G** **Ex ia IIC T5 Ga**



**OWE 2/C/NL/Ex-1G** **Ex ia IIB T4 Gb**



**OWE/Ex-1G** **Ex ia IIC T5 Gb**  
with mounting stand



**Obligatory Ex connection box**  
**OAK/LMT/2x1MΩ**  
 **Ex ia IIC T6 Gb**



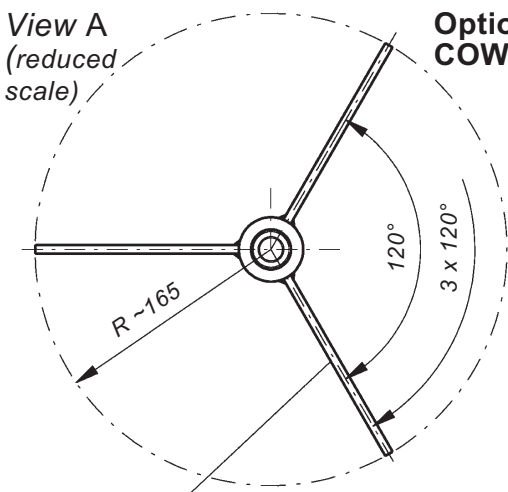
# Capacitive Ex sensors

## COW/Ex-1G $\text{Ex}$ II 2 G Ex ia IIC T5 Gb

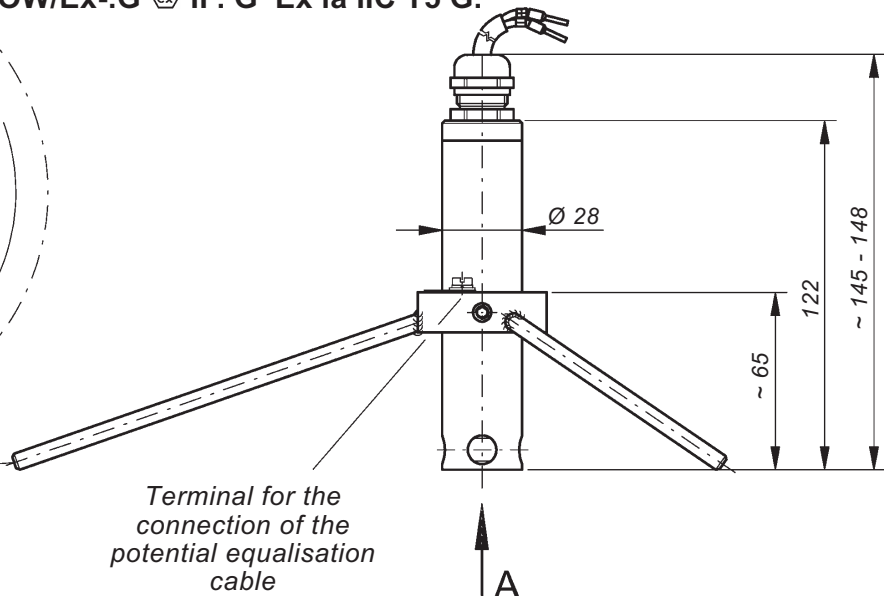
## and

## COW/Ex-0G $\text{Ex}$ II 1 G Ex ia IIC T5 Ga

Technical data	COW/Ex-1G $\text{Ex}$ II 2 G Ex ia IIC T5 Gb	COW/Ex-0G $\text{Ex}$ II 1 G Ex ia IIC T5 Ga
Application	for use in intrinsically safe circuits in potentially explosive atmospheres zone 1 or 2   zone 0, 1 or 2 EC type examination certificate INERIS 03ATEX0160	
Housing Connecting cable	stainless steel 316 Ti and PTFE PVC cable, 2X0.75 mm <sup>2</sup> , length 5 m, longer cable on request, PTFE cable on request	antistatic PURLF cable (with external conductive PUR sheath), 2X0.75 mm <sup>2</sup> , length 5 m, longer cable up to max. 20 m on request
Functional principle Self-capacitance Self-inductance	capacitive sensor with stainless steel cylindrical capacitor C <sub>i</sub> = 220 nF + 200 pF per metre of connecting cable L <sub>i</sub> = 1.1 mH + 1 μH per metre of connecting cable	
Protection class of the electronics sealed in the housing Response height from bottom edge of housing	IP65 ≥ 12 mm (depending on the dielectric constant of the liquid)	
Temperature range Max. length of connecting cable between sensor and relay	- 20°C to + 60°C approx. 1,000 m, see Installation, Operating and Maintenance Instructions (sent on request)	
CEM	for interference emission in accordance with the appliance- specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies	



Optional: mounting stand made of stainless steel 316 Ti for COW/Ex-.G  $\text{Ex}$  II . G Ex ia IIC T5 G.



Stand (optional)  
with these or any  
other dimensions

Terminal for the  
connection of the  
potential equalisation  
cable





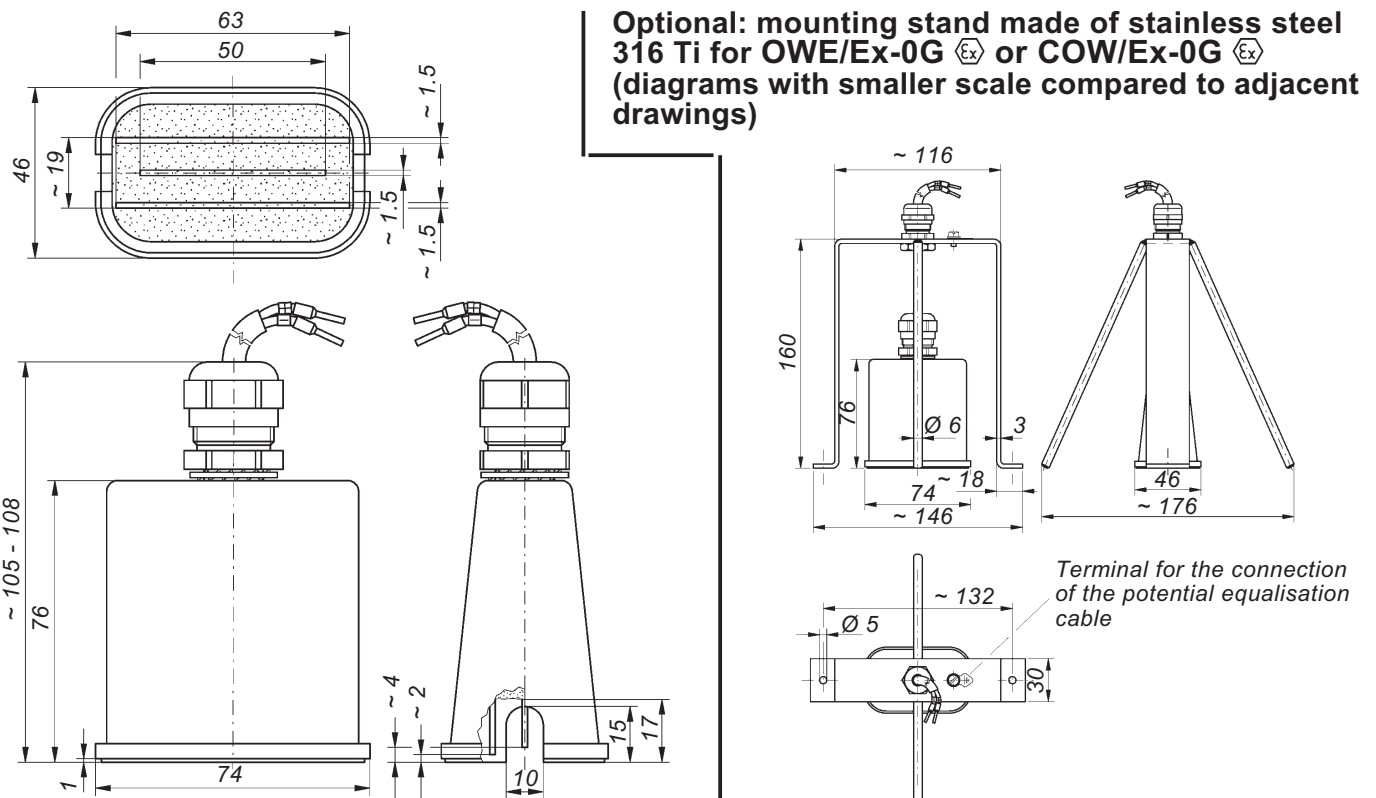
# Capacitive Ex sensors

## OWE/Ex-1G $\text{Ex}$ II 2 G Ex ia IIC T5 Gb

## and

## OWE/Ex-0G $\text{Ex}$ II 1 G Ex ia IIC T5 Ga

Technical data	OWE/Ex-1G $\text{Ex}$ II 2 G Ex ia IIC T5 Gb	OWE/Ex-0G $\text{Ex}$ II 1 G Ex ia IIC T5 Ga
Application	for use in intrinsically safe circuits in potentially explosive atmospheres zone 1 or 2   zone 0, 1 or 2 EC type examination certificate INERIS 03ATEX0160	
Housing Connecting cable	antistatic (conductive) PP and cast resin PVC cable, 2X0.75 mm <sup>2</sup> , length 5 m, longer cable on request, PTFE cable on request	antistatic PURLF cable (with external conductive PUR sheath), 2X0.75 mm <sup>2</sup> , length 5 m, longer cable up to max. 20 m on request
Functional principle	capacitive sensor with gold-plated capacitor plates on epoxy resin backing material	
Self-capacitance	Ci = 220 nF + 200 pF per metre of connecting cable	
Self-inductance	Li = 1.1 mH + 1 $\mu$ H per metre of connecting cable	
Protection class of the electronics sealed in the housing	IP65	
Response height from bottom edge of housing	$\geq 12$ mm (depending on the dielectric constant of the liquid)	
Temperature range	- 20°C to + 60°C	
Max. length of connecting cable between sensor and relay	approx. 1,000 m, see Installation, Operating and Maintenance Instructions (sent on request)	
CEM	see page 31-8-7	

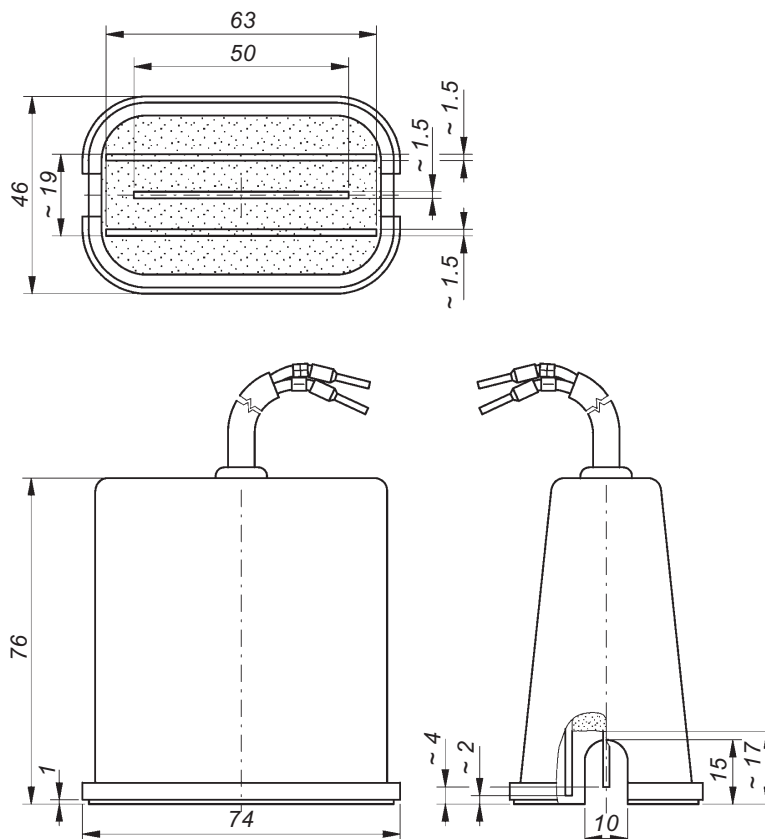




# Capacitive Ex sensor OWE 2/C/NL/Ex-1G

⊕ II 2 G Ex ia IIB T4 Gb

Technical data	OWE 2/C/NL/Ex-1G ⊕ II 2 G Ex ia IIB T4 Gb
Application	for use in intrinsically safe circuits in potentially explosive atmospheres zone 1 or 2 EC type examination certificate INERIS 03ATEX0160
Housing Connecting cable	PP and cast resin PVC cable, 2X0.75 mm <sup>2</sup> , length 5 m, longer cable on request, PTFE cable on request
Functional principle	capacitive sensor with gold-plated capacitor plates on epoxy resin backing material
Self-capacitance Self-inductance	Ci = 80 nF + 200 pF per meter of connecting cable Li = 0 + 1 μH per meter of connecting cable
Protection class of the electronics sealed in the housing	IP65
Response height from bottom edge of housing	≥ 12 mm (depending on the dielectric constant of the liquid)
Temperature range	- 20°C to + 60°C
Max. length of connecting cable between sensor and relay	approx. 1,000 m, see Installation, Operating and Maintenance Instructions (sent on request)
CEM	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies
Mounting accessories (option)	mounting stand made of stainless steel 316 Ti (see page 31-8-8)





# OAK/LMT/2x1MΩ

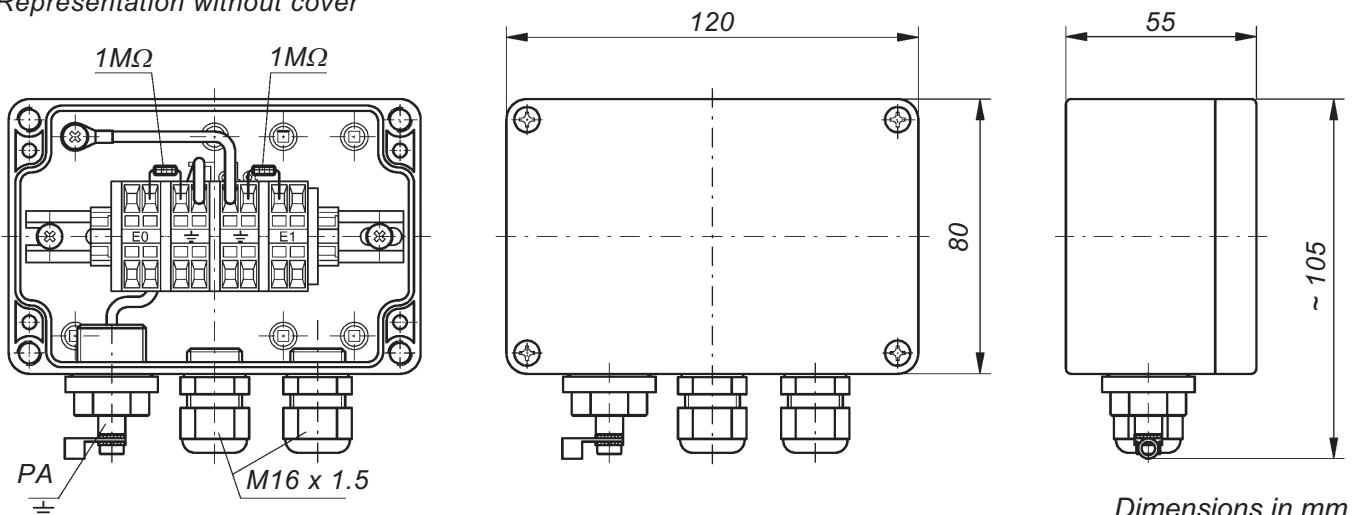
## II 2 G Ex ia IIC T6 Gb

### obligatory Ex connection box



Technical data	OAK/LMT/2x1MΩ II 2 G Ex ia IIC T6 Gb
Application	<ul style="list-style-type: none"> <li>• for integration of a capacitive Ex sensor in the potential equalisation system of the installation</li> <li>• for the connection of the intrinsically safe control circuit of the capacitive Ex relay to the capacitive Ex sensor</li> <li>• for installation in potentially explosive atmospheres in zone 1 or 2</li> </ul> EC type examination certificate INERIS 03ATEX0160
Material	antistatic (conductive) PP
Dimensions	120 x 80 x 55 mm
Cable entries	2 cable entries made of PA
Terminals	4 terminals for cable with a cross-section > 0.196 mm <sup>2</sup> and < 2.5 mm <sup>2</sup> and with a minimum diameter of 0.5 mm in case of multi-core conductors
Connection to the potential equalisation system	to outer potential equalisation terminal
Protection class	IP65
Mounting	via 4 boreholes Ø 4 mm
Mounting orientation	any
Temperature range	- 20°C to + 60°C

Representation without cover



Dimensions in mm



## Leckmaster 101/Ex

⊕ I (M1) / II (1) GD [Ex ia Ma] I /  
[Ex ia Ga] IIC / [Ex ia Da] IIIC  
capacitive Ex relay

- with cable break monitoring feature and switchable self-hold
- for connection of 1 capacitive Ex sensor
- with 1 potential-free changeover contact at the output

Capacitive Ex relay for U-bar mounting or surface mounting, with connection terminals on top and with 3 built-in LEDs for signalling the operating statuses.

The unit is designed for switch cabinet mounting or installation in a suitable protective housing outside potentially explosive atmospheres and may therefore only be mounted / installed in these locations. It is suitable for use in clean environments only.

The capacitive Ex relay **Leckmaster 101/Ex**

⊕ I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC is designed to transmit control commands from an intrinsically safe control current circuit to a non-intrinsically safe active current circuit. **It must be installed outside potentially explosive areas in compliance with the relevant standards and regulations.**

An Ex approved capacitive sensor, such as our capacitive COW/Ex-1G, COW/Ex-0G, OWE/Ex-1G, OWE/Ex-0G or OWE 2/C/NL/Ex-1G sensor, may be used, via an obligatory Ex connection box OAK/LMT/2x1MΩ ⊕ II 2 G Ex ia IIC T6 Gb, in the intrinsically safe control current circuit.

The different application possibilities and the special conditions for safe use are described in the corresponding Installation, Operating and Maintenance Instructions (sent on request).

### Self-hold:



- If the switch for self-hold is switched on, an alarm is stored. The relay continues to signal the alarm even if the cause of the alarm (e.g. the presence of water or a cable break) is no longer present – in other words, if the sensor is dry again or if the line has contact. The alarm is acknowledged by switching off the switch for self-hold.
- If the switch for self-hold is not switched on, the alarm is not maintained when the cause of the alarm has been remedied but is terminated.



### Connection diagrams

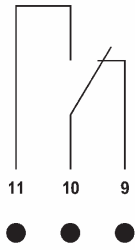
COW/Ex-.G or OWE/Ex-.G or OWE 2/C/NL/Ex-1G capacitive Ex sensors to a Leckmaster 101/Ex ⊕ I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC capacitive Ex relay:

see pages 31-8-14 to 31-8-22 and Installation, Operating and Maintenance Instructions (sent on request).

Technical data	Leckmaster 101/Ex  I (M1) / II (1) GD [Ex ia Ma] I / [Ex ia Ga] IIC / [Ex ia Da] IIIC
Alternative supply voltages (terminals 15 and 16)	AC 230 V (supplied if no other supply voltage is specified in the order) or AC 240 V or AC 115 V or AC 110 V or AC 24 V
Power consumption	approx. 3 VA
Control circuit (terminals 6 and 8)	2 terminals (under safety extra low voltage SELV), acting on 1 output relay with switchable self-hold
Sensor connection (in line with EN 50 227):	
No-load voltage	DC 8.4 V (under safety extra low voltage SELV)
Short-circuit current	< 10 mA
Response hysteresis	1.5 mA  1.8 mA
Cable break monitoring	I < 0.15 mA
Controlled circuit (terminals 9, 10, 11)	1 single-pole potential-free changeover contact based on the quiescent current principle
Switching status indicators	3 LEDs (see page 31-8-13)
Switching voltage	max. AC 250 V
Switching current	max. AC 4 A
Switching capacity	max. 100 VA
Housing	insulating material, 75 x 55 x 110 mm
Connection	terminals on top of housing
Protection class	IP20
Mounting	clip attachment for U-bar to DIN 46 277 and DIN EN 50 022 or fastening via 2 boreholes
Mounting orientation	any
Temperature range	– 20°C to + 60°C
Max. length of connecting cable between Ex relay and Ex sensor	see Installation, Operating and Maintenance Instructions (sent on request)
EC type examination certificate	INERIS 03ATEX0159
CEM	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies

## Position of the output contact in the Leckmaster 101/Ex relay

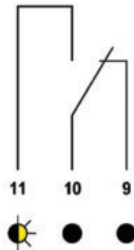
Leckmaster 101/Ex  
without voltage



**LEDs dark:**  
Ex relay  
without voltage,

output relay  
not energized

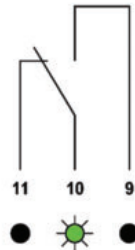
Cable break



**yellow LED flashes:**  
Ex relay  
with voltage,  
cable break in sensor  
or its connecting  
cable,

output relay  
not energized

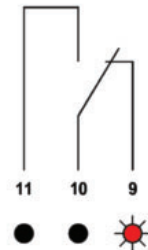
OK status



**green LED lights:**  
Ex relay  
with voltage,  
sensor not energized,

output relay  
energized

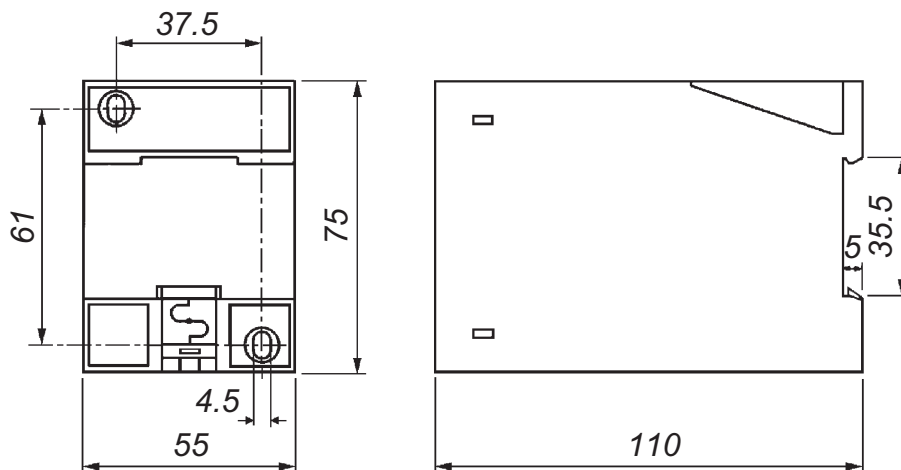
Leakage



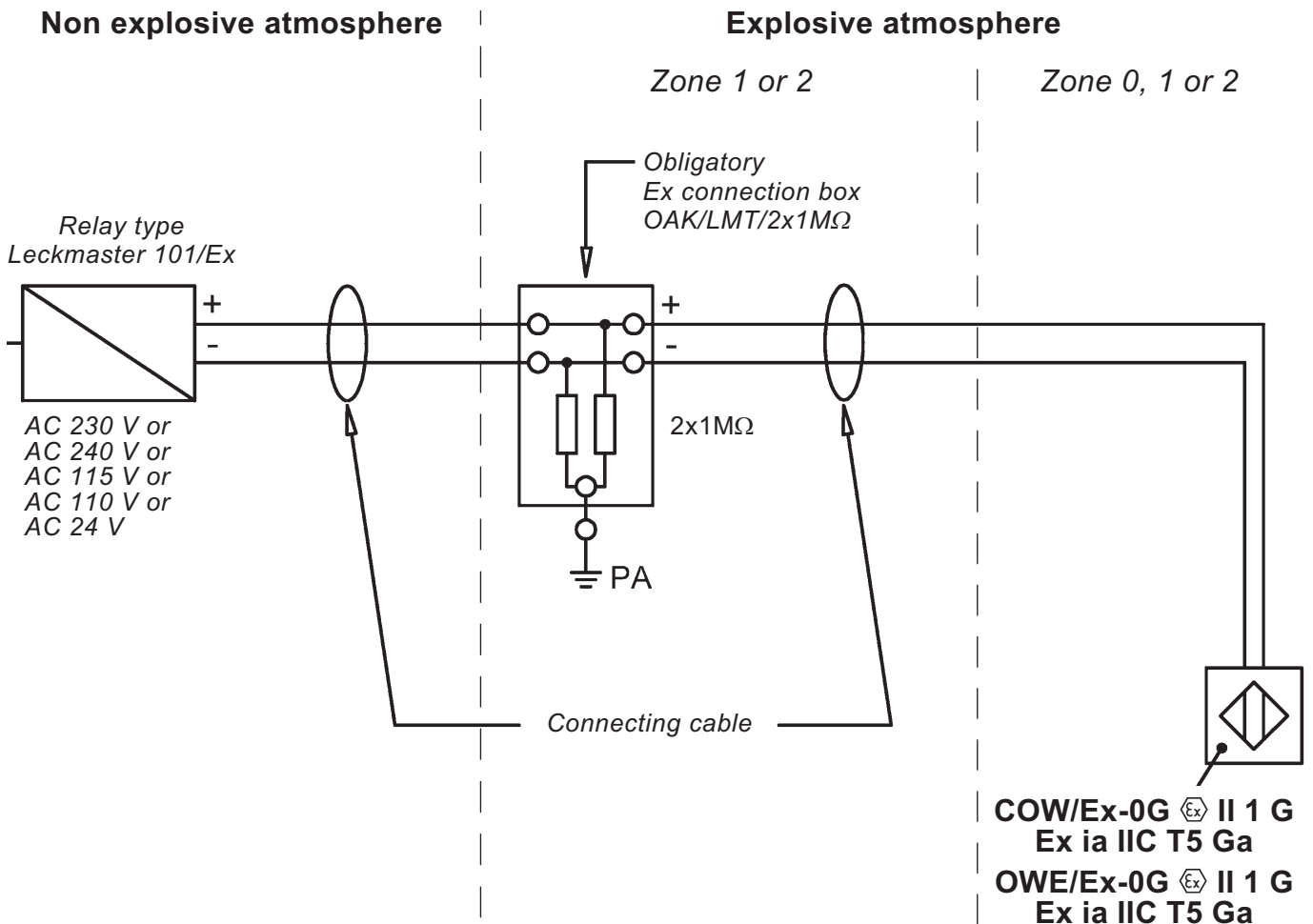
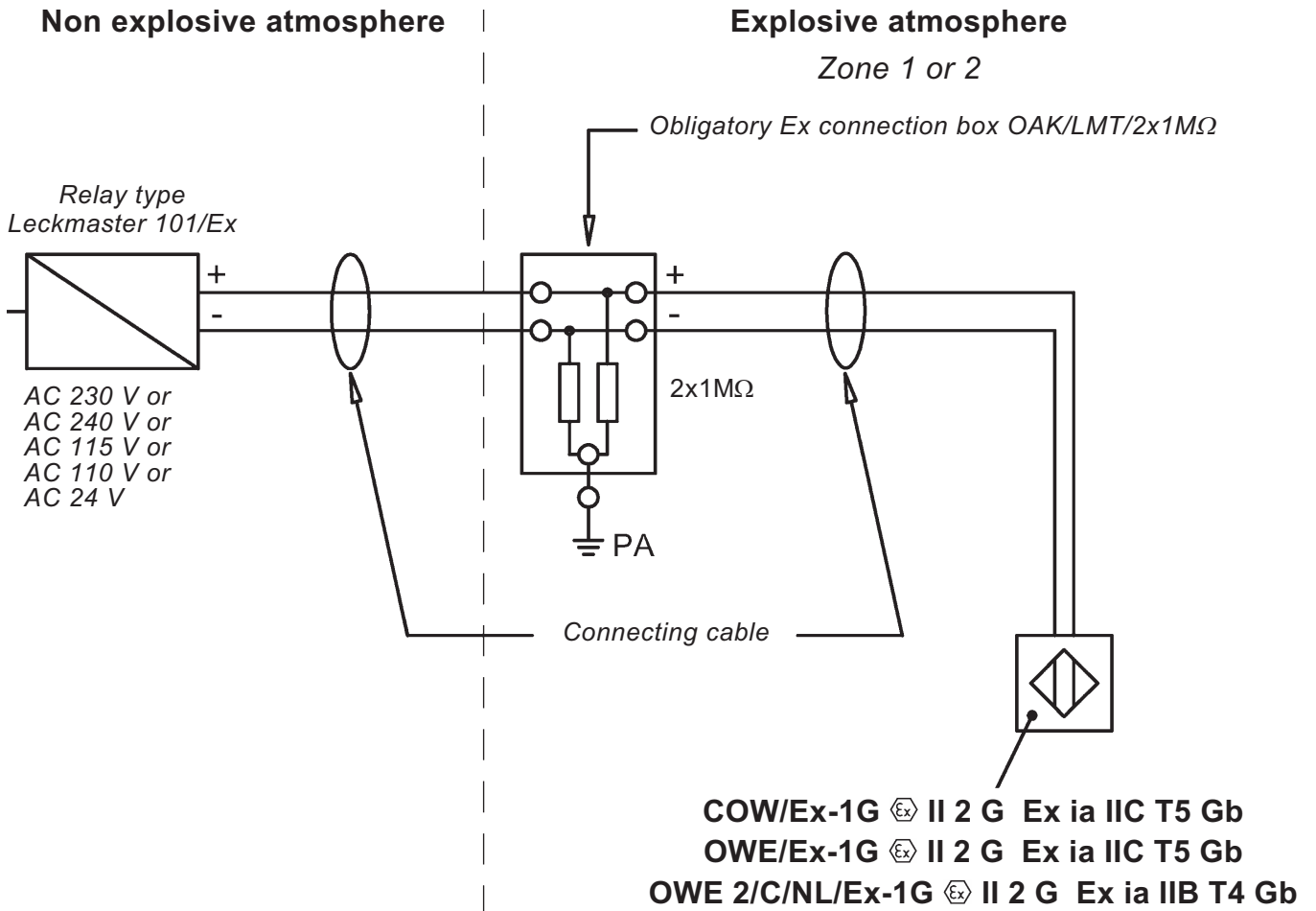
**red LED lights:**  
Ex relay  
with voltage,  
sensor energized,

output relay  
not energized

## Dimensions Leckmaster 101/Ex



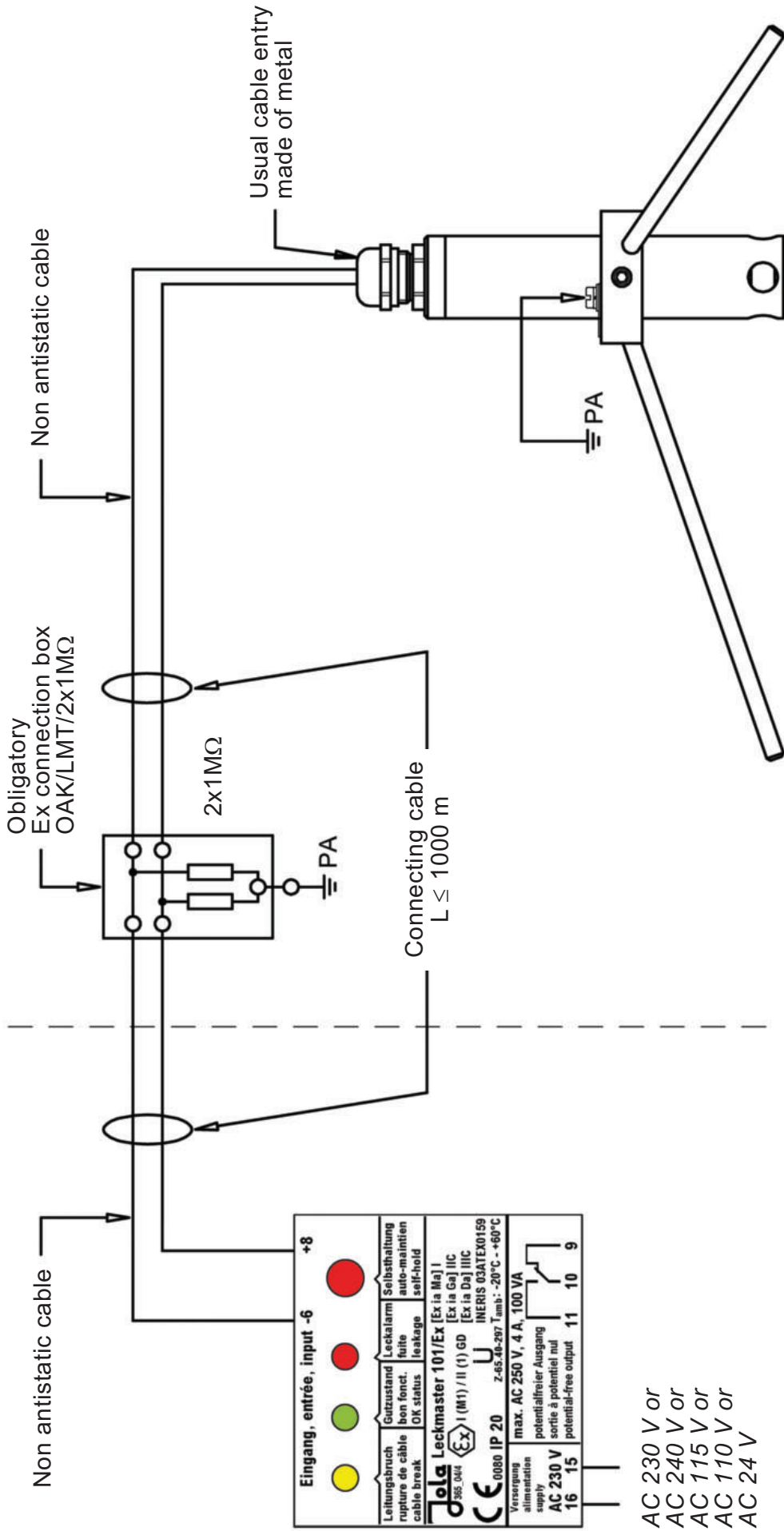
## Connection diagrams



Non explosive atmosphere

Explosive atmosphere

Zone 1 or 2



COW/Ex-1G Ex ia IIC T5 Gb

Eingang, entrée, input -6		+8	
Leitungsbruch rupture de câble cable break	Gutzustand bon fonct. OK status	Leckalarm fuite leakage	Selbsthaltung auto-maintien self-hold
<b>Jola Leckmaster 101/Ex</b> [Ex ia Ma] I 0080 IP 20 z.65.40-297 T <sub>amb</sub> : -20°C - +60°C max. AC 250 V, 4 A, 100 VA potentialfreier Ausgang sortie à potentiel nul potential-free output			
AC 230 V 16 15	AC 230 V 16 15		AC 230 V 11 10 9

- AC 230 V or
- AC 240 V or
- AC 115 V or
- AC 110 V or
- AC 24 V



Non explosive atmosphere

Explosive atmosphere

Zone 0, 1 or 2

Zone 1 or 2

Antistatic cable (with external conductive sheath)

EMC cable entry made of metal

Non antistatic cable

Obligatory Ex connection box OAK/LMT/2x1MΩ

2x1MΩ

Connecting cable L ≤ 1000 m

PA

Eingang, entrée, input	+8	
Leitungsbruch rupture de câble cable break	Gutzustand bon fonct. OK status	Leckalarm fuite leakage
	Selbsthaltung auto-maintien self-hold	
<b>Jola</b> <small>085_004</small> <b>Leckmaster 101/Ex</b> [Ex ia Ma] I I (M1) / II (1) GD [Ex ia Ga] IIC [Ex ia Da] IIIC INERIS 03ATEX0159 Z-85-48-287 T <sub>amb</sub> : -20°C - +60°C CE 0080 IP 20		
Versorgung alimentation supply	max. AC 250 V, 4 A, 100 VA	
AC 230 V	potentialfreier Ausgang sortie à potentiel nul	
16 - 15	potential-free output	11 10 9

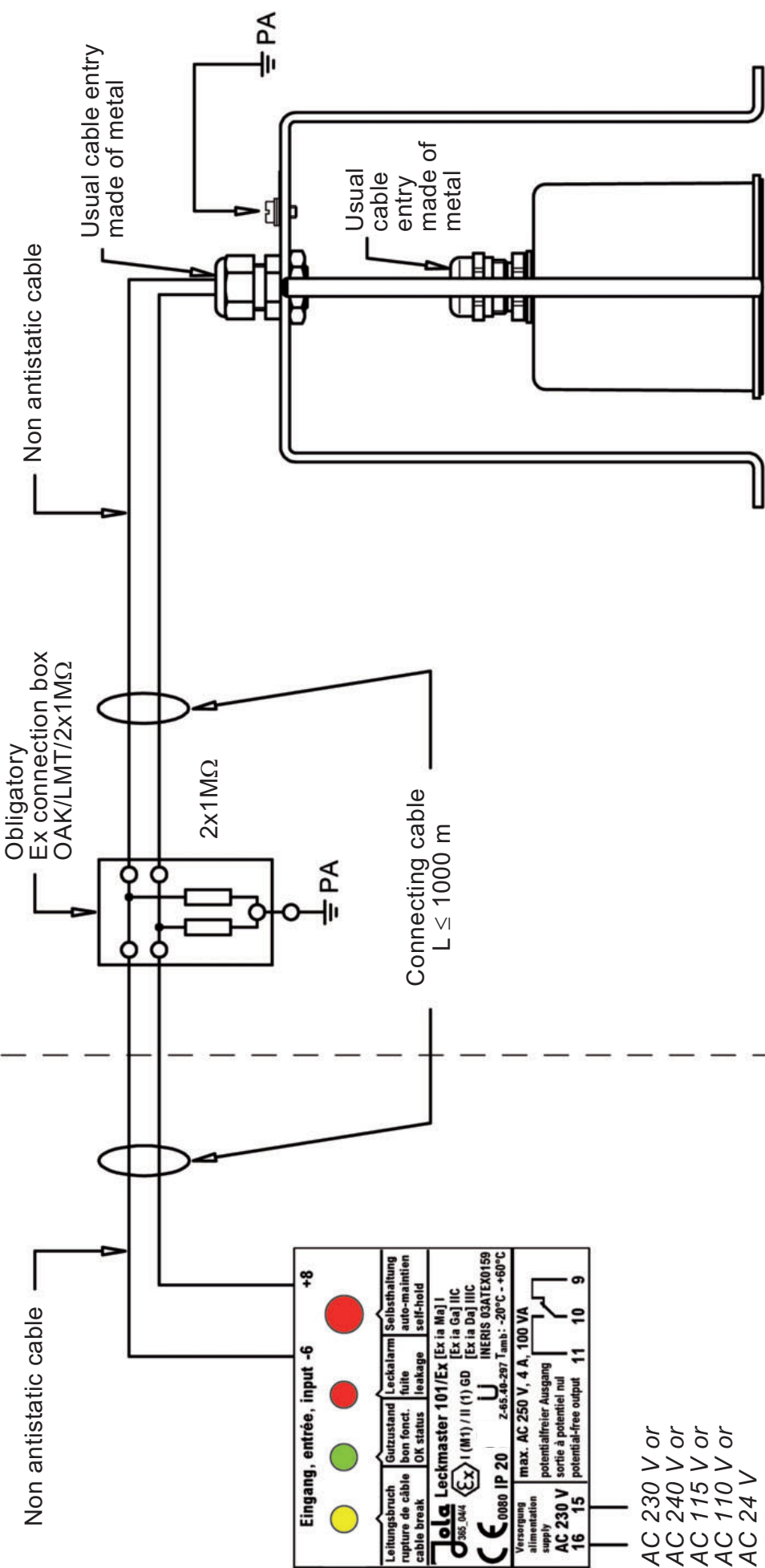
- AC 230 V or
- AC 240 V or
- AC 115 V or
- AC 110 V or
- AC 24 V

COW/Ex-0G Ex II 1 G Ex ia IIC T5 Ga

Non explosive atmosphere

Explosive atmosphere

Zone 1 or 2



Non antistatic cable

Obligatory Ex connection box OAK/LMT/2x1MΩ

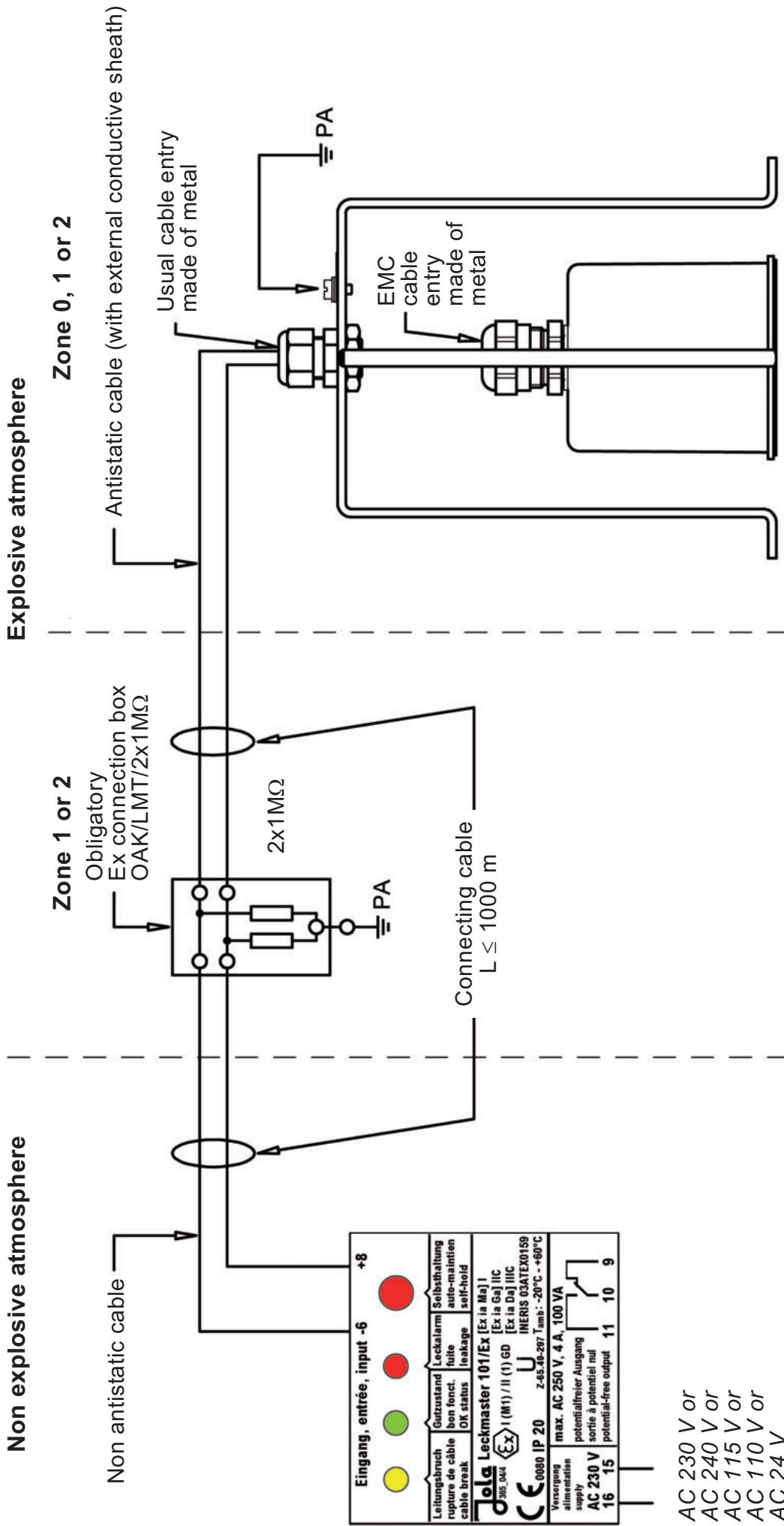
Non antistatic cable

Usual cable entry made of metal

Eingang, entrée, input		+8	
Leitungsbruch / rupture de câble / cable break		Gutzustand / bon fonct. / OK status	Leckalarm / fuite / leakage
Leitungsbruch / rupture de câble / cable break		Gutzustand / bon fonct. / OK status	Selbsthaltung / auto-maintien / self-hold
<b>Jola</b> Leckmaster 101/Ex I (M1) / II (1) GD [Ex ia Ga] IIC [Ex ia Da] IIC <small>385 2044</small>			
<b>0080 IP 20</b> Z-65-40-297 T amb.: -20°C - +60°C			
Versorgung / alimentation / supply		max. AC 250 V, 4 A, 100 VA	
AC 230 V		potentialfreier Ausgang / sortie à potentiel nul	
16	15	11	10 9

- AC 230 V or
- AC 240 V or
- AC 115 V or
- AC 110 V or
- AC 24 V

OWE/Ex-1G II 2 G Ex ia IIC T5 Gb



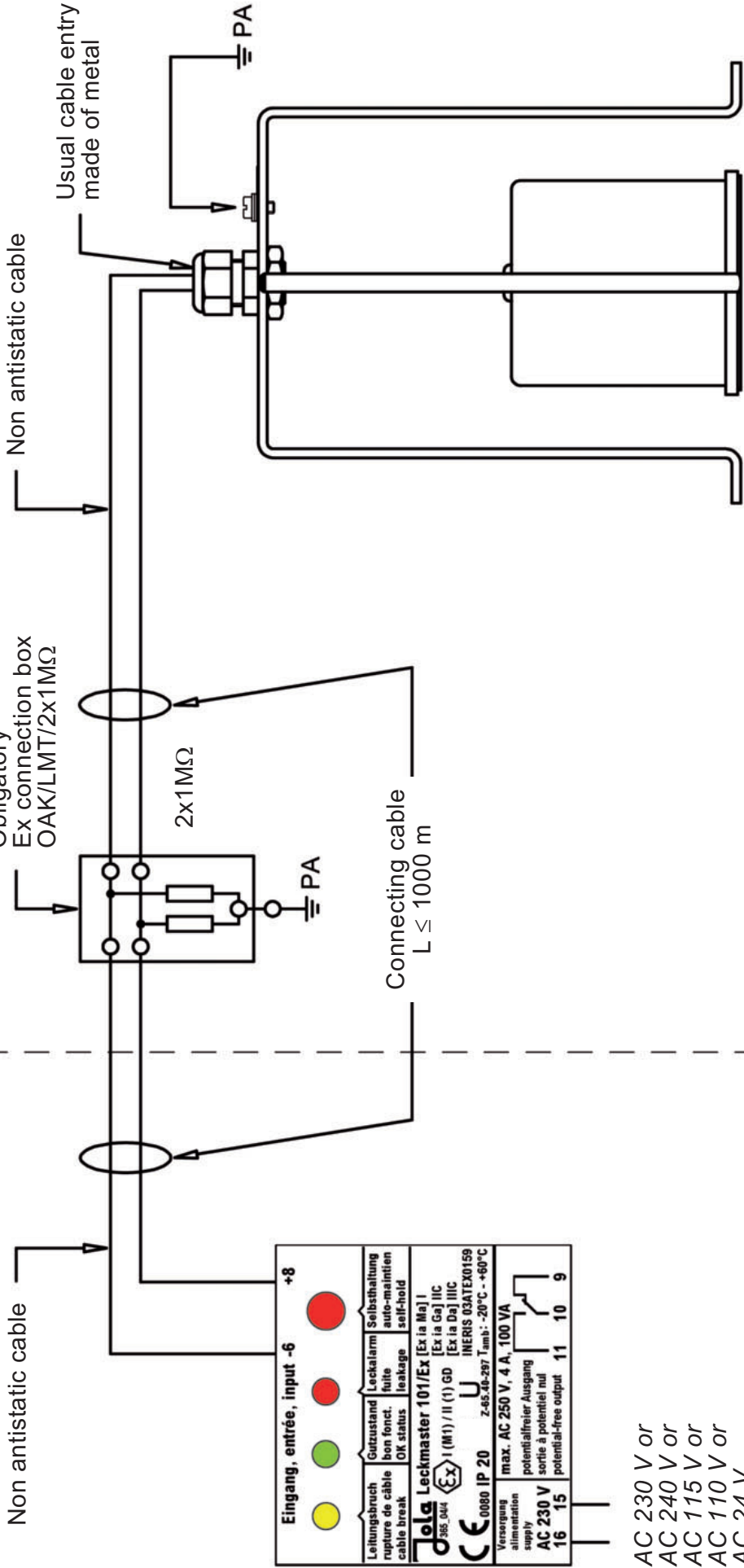
- AC 230 V or
- AC 240 V or
- AC 115 V or
- AC 110 V or
- AC 24 V

OWE/Ex-0G Ex II 1 G Ex ia IIC T5 Ga

Non explosive atmosphere

Explosive atmosphere

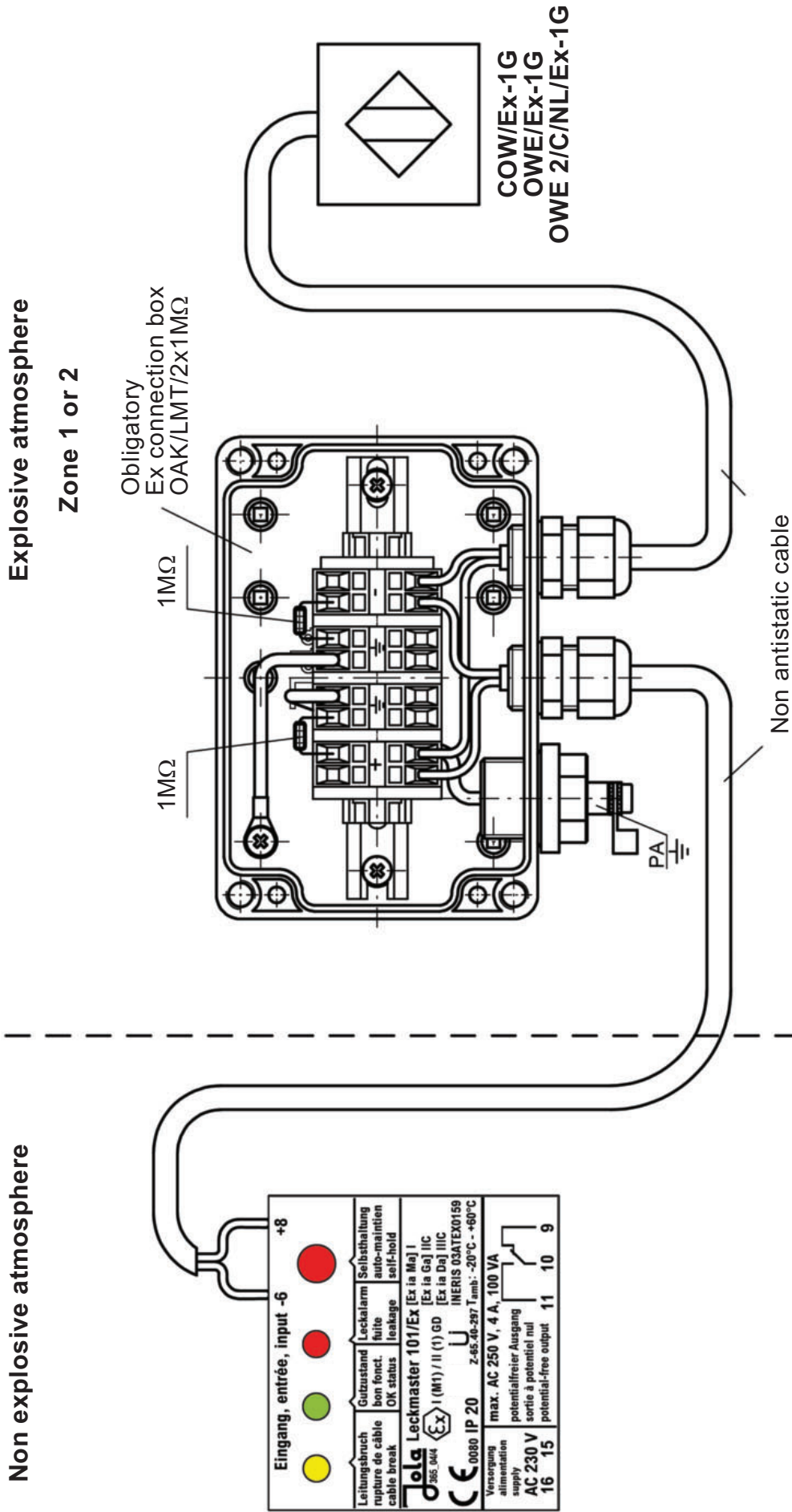
Zone 1 or 2



- AC 230 V or
- AC 240 V or
- AC 115 V or
- AC 110 V or
- AC 24 V

OWE 2/C/NL/Ex-1G II 2 G Ex ia IIB T4 Gb





Non explosive atmosphere

Explosive atmosphere  
Zone 1 or 2

Obligatory  
Ex connection box  
OAK/LMT/2x1MΩ

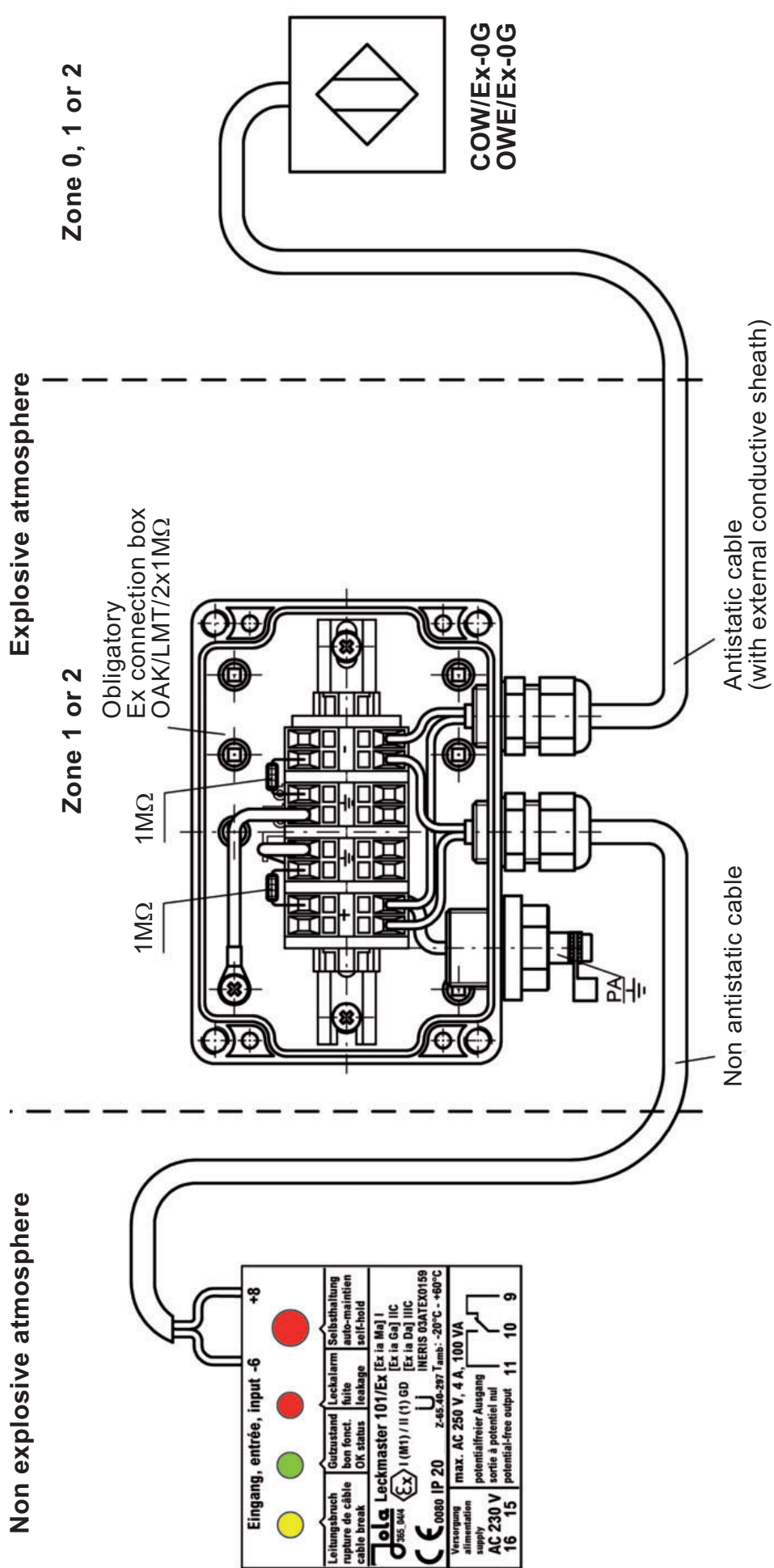
1MΩ

1MΩ

Non antistatic cable

COW/Ex-1G  
OWE/Ex-1G  
OWE 2/C/NL/Ex-1G

Eingang, entrée, input -6		+8	
Leitungsbruch rupture de câble cable break	Gutzustand bon fonct. OK status	Leckalarm fuite leakage	Selbsthaltung auto-maintien self-hold
<b>Jola</b> Leckmaster 101/Ex [Ex ia Ma] I <small>965 944</small> I (M1) / II (1) GD [Ex ia Ga] IIC <small>INENIS 03ATEX0159</small>			
<b>CE</b> 0080 IP 20 Z-65.46-297 T <sub>amb.</sub> : -20°C - +60°C			
Versorgung alimentation supply	max. AC 250 V, 4 A, 100 VA		
AC 230 V	potentialfreier Ausgang sortie à potentiel nul		
16 15	potential-free output 11 10 9		



Eingang, entrée, input -6		+8	
Leitungsbruch rupture de câble cable break	Gutzustand bon fonct. OK status	Leckalarm fuite leakage	Selbsthaltung auto-maintien self-hold
<b>Jola</b> Leckmaster 101/EX [Ex ia Ma] I <small>395_044</small> I (M1) / II (1) GD [Ex ia Da] IIC <small>INERIS 03ATEX0159</small>			
<b>CE</b> 0080 IP 20 z-65-60-297 T <sub>amb.</sub> : -20°C - +60°C			
Versorgung alimentation	max. AC 250 V, 4 A, 100 VA		
AC 230 V	potentialfreier Ausgang sortie à potentiel nul		
16 15	potential-free output 11 10 9		