

Installation, Operating and Maintenance Instructions for

Jola Floating Electrodes SCHE 2/Ex ...

- ⊕ I M2 Ex ia I or**
- ⊕ II 1 G Ex ia IIC T6 or**
- ⊕ II 1 G Ex ia IIB T6 or**
- ⊕ II 2 G Ex ia IIC T6 or**
- ⊕ II 1 GD Ex ia IIC T6 Ex iaD 20 T85°C or**
- ⊕ II 1 GD Ex ia IIB T6 Ex iaD 20 T85°C or**
- ⊕ II 2 GD Ex ia IIC T6 Ex iaD 21 T85°C**

and

**the System with
Jola Electrode Relay
NR 5/Ex ⊕ I (M1) / II (1) GD
[EEx ia] I / IIC, Version A**

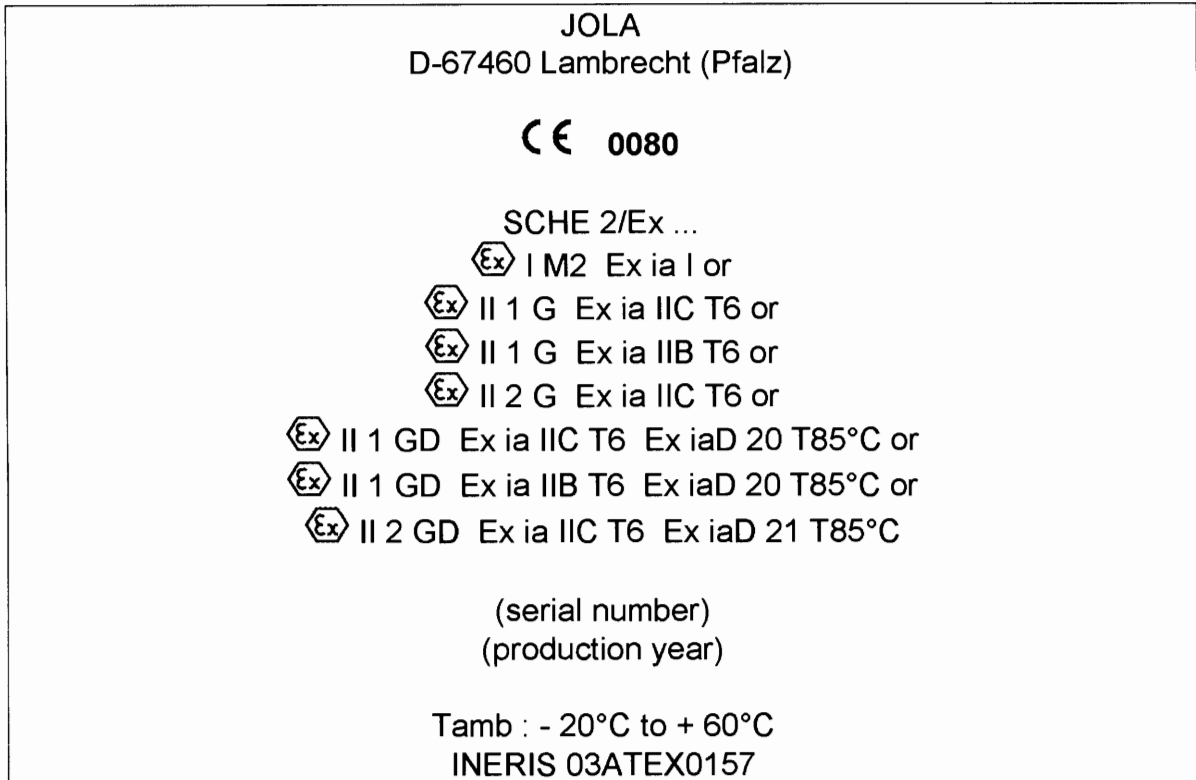
**These Installation, Operating and Maintenance
Instructions must always be handed over to the
fitter/operator/service personnel
of our products together with all other user
documentation and information!
They should be stored in a safe place together
with all other user documentation and
information so they can be consulted again
when necessary at any time!**

**Jola Spezi schalter K. Mattil & Co. KG
Klostergartenstraße 11-20; D-67466 Lambrecht (Pfalz)
Phone +49 6325 188-01; Fax +49 6325-6396;
E-Mail: kontakt@jola-info.de; Website: www.jola-info.de**



1. Area of application

The combination of a conductive floating electrode SCHE 2/Ex ...



and one or two electrode relays NR 5/Ex, Version A is designed to transmit electrical switching signals coming from a **conductive floating electrode SCHE 2/Ex ... installed in a potentially explosive atmosphere**, to non-hazardous areas via one or two **electrode relays NR 5/Ex, Version A**.

The above mentioned electrodes are devices for use:

- ◆ **in underground areas in mines as well as in above-ground areas of mines which could be at risk due to firedamp and/or flammable dusts:**
SCHE 2/Ex ... -M Ex I M2;
- ◆ **in above-ground areas which could be at risk due to a potentially explosive atmosphere:**
SCHE 2/Ex ... -0G Ex II 1 G: in zone 0, 1 or 2;
SCHE 2/Ex ... -1G Ex II 2 G: in zone 1 or 2;
SCHE 2/Ex ... -0GD Ex II 1 GD: in zone 0, 20, 1, 21, 2 or 22;
SCHE 2/Ex ... -1GD Ex II 2 GD: in zone 1, 21, 2 or 22.

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Floating electrodes are designed **for use in pits, collection reservoirs, pump shafts, separating systems for liquids that are lighter than water ("light liquids") or similar areas.**

Please note that floating electrodes **can only be used for the detection of a layer of an electrically non-conductive "light liquid" that is not soluble in water on the surface of water or another electrically conductive liquid that has a higher specific gravity than the respective "light liquid" and that is sufficiently tranquil to allow phase formation (layer formation).**

The precondition for the proper functioning of the floating electrodes is the possibility of **clear separation between the heavier, electrically conductive liquid and the lighter, electrically non-conductive liquid to be detected** in the application locations such as pits, collection reservoirs, pump shafts, separating systems or similar locations.

In analogy with DIN 1999 (separators for "light liquids"), separation is proven in the case of "light liquids" that are not soluble in water and are insaponifiable, such as benzines, diesel and fuel oils, and other oils of mineral origin with specific gravities up to max. 0.95. The functionality of the floating electrodes is therefore assured **when used in self-contained monitoring areas without drainage (pits, collection reservoirs, pump shafts) and in separating systems in accordance with DIN 1999** for the specified media. Application tests have shown that an alarm is emitted when non-conductive liquids have formed in a layer of between approx. 3 mm and 10 mm on the conductive heavy liquid to be monitored (e.g. water).

Before using the floating electrodes **in any other area of application**, it must first be proven that the prevailing operating conditions (such as flow ratios, potential dwell time of the "light liquid" to be detected at the application location etc.) allow the phase formation with the corresponding minimum layer height of the non-conductive "light liquid" required for accurate functioning.

In case of doubt, you should consult a specialist from Jola or from a monitoring organisation (e.g. the TÜV in Germany) to ascertain the suitability of the installation environment for the use of the floating electrodes.

It is also important to note that, although the floating electrodes may in principle be used in the respective temperature ranges specified in the product brochure, **it is essential that both media are present in low-viscosity form to ensure proper functioning of the electrodes.** This means, for example, that proper functioning is only assured with water above temperatures of 0°C.

Proper functioning of the floating electrodes also **requires a minimum liquid level above the floor** (see the technical data of the respective floating electrodes). If this minimum liquid level is not present, the tips of the electrode rods are not in the liquid – in other words, they are not electrically bridged by the electrically conductive liquid. The result is normally undesired activation of the alarm via the connected electrode relay. The SCHE 2/Ex (Variant ILS) .. is the only type equipped with an alarm bridging contact for this eventuality.

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All the technical parameters of the conductive floating electrodes and/or the electrode relay are listed in this brochure and/or the accompanying product descriptions. These documents also contain the corresponding installation recommendations.

You must always observe and follow all the instructions relating to these parameters and installation recommendations. The units may not be used for applications outside the specified parameter range.

If the product descriptions are not supplied with the products or are lost, you must always request a copy of the descriptions prior to installation, connection or start-up and ensure that they are read and observed by the suitably qualified specialist personnel. Otherwise the conductive floating electrode and/or the electrode relay(s) may not be installed, connected and started up.

2. Preconditions for safe use

- ◆ Maximum parameters of the conductive floating electrodes SCHE 2/Ex ... fitted with a connecting cable

Electrode type	Type designation	Li	Ci
Floating electrode	SCHE 2/Ex ...	0 + 1 µH per metre connecting cable	0 + 200 pF per metre connecting cable
Floating electrode	SCHE 2/Ex (Variant 3 tiges) ...		
Floating electrode	SCHE 2/Ex (Variant ILS) ...		

- ◆ Special requirements/conditions for the safe use of the conductive floating electrodes SCHE 2/Ex ...

Power supply to the conductive floating electrode SCHE 2/Ex ... must be via a voltage source which is approved for use in potentially explosive atmospheres in explosion groups I, IIC, IIB or IIA with an output circuit which is approved as intrinsically safe.

The maximum output parameters of this voltage source must not exceed the following values:

$$U = 42 \text{ V}; I = 0.1 \text{ A}$$

- ◆ Maximum parameters of the electrode relay NR 5/Ex, Version A

Rated supply voltages (terminals J15, J16):

$$U = \text{DC } 24 \text{ V}; \text{AC } 24 \text{ V}, \text{AC } 230 \text{ V or AC } 240 \text{ V}$$

Maximum electrical parameters of the electrical circuit connected to terminals J9, J10 and J11:

U_{max.} = 250 V; I_{max.} = 4A, but max. P = 500 VA

or

U_{max.} = 250 V; I_{max.} = 4A, but max. P = 100 VA

(see name plate of the electrode relay NR 5/Ex, Version A)

Maximum electrical parameters at output terminals J1 and J7:

U_o = 11.5 V; I_o = 11.6 mA, but max. P_o = 64 mW

◆ **Special requirements/conditions for the safe use of the electrode relay NR 5/Ex, Version A**

The maximum parameters of the external circuits that may be connected to terminals J1 and J7 are as follows:

For explosion group IIC	For explosion group IIB	For explosion group IIA
Co(L=0) = 1.62 µF	Co(L=0) = 11.1 µF	Co(L=0) = 45 µF
Lo(C=0) = 172 mH	Lo(C=0) = 672 mH	Lo(C=0) = 972 mH
or	or	or
Lo/Ro = 156 µH/Ohm	Lo/Ro = 707 µH/Ohm	Lo/Ro = 1.05 mH/Ohm

3. Additional conditions for safe operation

Before using the conductive floating electrodes SCHE 2/Ex ..., you must ensure that the materials used in the respective floating electrode are sufficiently chemically and mechanically resistant to the liquids to be monitored and all other external influences.

In case of doubt, consult a suitably trained expert prior to use. Do not use the product before these questions have been fully clarified.

4. Installation, connection, start-up and maintenance, general regulations

Installation, connection, start-up and maintenance of the conductive floating electrode and the electrode relay(s) may only be performed by suitably qualified specialist personnel in line with all the information material and documentation supplied with the units and following all instructions contained therein.

The qualified specialist personnel must ensure that they are familiar with all valid standards, regulations, local requirements and specific conditions, in particular the standards, regulations, local requirements and specific conditions relating to explosion protection – and must proceed accordingly.

In potentially explosive atmospheres with gas hazards, the entire installation set-up of the the floating electrode SCHE 2/Ex ... and the electrode relay(s) NR 5/Ex, Version A must always comply with the standard EN 60 079-14 resp. the replacing standard.

In potentially explosive atmospheres with dust hazards, the entire installation set-up of the the floating electrode SCHE 2/Ex ... and the electrode relay(s) NR 5/Ex, Version A must always comply with the standard EN 61 241-14 resp. the replacing standard.

You must always read – and adhere to the instructions outlined in - the yellow DIN A 5 leaflet "User information/Instructions for use with mounting, operating and maintenance instructions for the product...". If the leaflet is not supplied with the product or is lost, you must always request a replacement leaflet from Jola.

5. Installation of the floating electrodes SCHE 2/Ex ...

The floating electrodes SCHE 2/Ex ... must be installed **by qualified specialist personnel.**

The floating electrode is placed on the surface of the liquid to be monitored in such a way that the electrode rod tips point downwards and the cable points upwards.

You must ensure that other objects/devices already installed at the installation location do not impair the proper functioning of the floating electrode.

The **cable of the floating electrode** must be sufficiently long and flexible to ensure that the floating electrode can follow the expected upward and downward movement of the liquid.

We recommend that a **float** be attached to the connecting cable of the floating electrode to ensure the signalling accuracy of the floating electrode **when used in deep shafts with high liquid movement** requiring a long floating electrode connecting cable that needs to follow the movement of the liquid. When the liquid level is high, this float bears the weight of the connecting cable and prevents the floating electrode from tilting or falling over due to a one-sided load.

This float must be supplied by Jola. It is equipped with a potential equalisation line. **This potential equalisation line must be connected to the floating element of the floating electrode at the appropriate point.**

If several floats are used, they must all be integrated in the potential equalisation system. They must be connected with each other via the potential equalisation line, with only the last float being connected to the floating element of the floating electrode.

We recommend the use of a **mounting frame with two guide ropes or two guide rods** to prevent uncontrolled movement of the floating electrode on the liquid surface and to ensure that the proper functioning of the floating electrode is not impaired. A suitable mounting frame can also be ordered from Jola. **This mounting frame must also be integrated in the potential equalisation system at the appropriate point.**



6. Adjustment of the floating electrode

The floating electrode SCHE 2/Ex ... normally floats on an electrically conductive liquid – on water, for example. The height of the rod electrode integrated in the floating electrode is set to ensure that the two electrode rod tips (model SCHE 2/Ex (Variant 3 tiges) ...), the electrode rod tip of the upper electrode rod and the electrode rod of the earth electrode E0) are permanently under water if the surface of the water is tranquil. Depending on the degree of movement of the surface of the liquid, the position of the rod electrode must be set lower to a greater or lesser degree.

The position of the rod electrode is adjusted by loosening the fastening screw(s) and pushing the rod electrode shaft up or down in the corresponding guide.

When adjusting the rod electrode, its position should be optimised in such a way that the two electrode rod tips (model SCHE 2/Ex (Variant 3 tiges) ...: the electrode rod tip of the top electrode rod) is permanently but only just under water – so that if an electrically non-conductive liquid (e.g. fuel oil) forms on top of the electrically conductive liquid (e.g. water), a thin layer of the electrically non-conductive liquid suffices to lift the electrode rod tips out of the electrically conductive water phase up into the electrically non-conductive fuel oil phase, thereby interrupting the control current from the electrode relay at the rod electrode and activating the alarm.

7. Installation of the electrode relay NR 5/Ex, Version A

The electrode relay NR 5/Ex, Version A must be installed **by qualified specialist personnel**.

See the Installation, Operating and Maintenance Instructions for the Jola electrode relay NR 5/Ex.

8. Connection in the form of an intrinsically safe system

The attached connection diagrams show how to connect a conductive floating electrode SCHE 2/Ex ... to one or two electrode relays NR 5/Ex, Version A to create an intrinsically safe system.

List of circuit diagrams:

NR 5/Ex, Version A, **without** potential equalisation terminal:
51P-5256b dated August 02, 2005 and
51P-5259b dated August 02, 2005.

NR 5/Ex, Version A, **with** potential equalisation terminal:
51P-4849c dated August 02, 2005 and
51P-4848c dated August 02, 2005.



Always observe the following when connecting the unit:

◆ **Potential equalisation**

To avoid the danger coming from the static electricity, potential equalisation is necessary with the floating electrode SCHE 2/Ex

The green-yellow potential equalisation line of the cable of the floating electrode, the potential equalisation terminal of the optional mounting frame, the potential equalisation line of the optional float and the potential equalisation terminal of the electrode relay NR 5/Ex, Version A (only of the version for P = max. 500 VA which is equipped with a potential equalisation terminal) must be connected to the potential equalisation system.

Connection to the potential equalisation system is essential for safe operation and must never be neglected.

In potentially explosive atmospheres with gas hazards, the entire installation set-up must always comply with the standard EN 60 079-14 resp. the replacing standard.

In potentially explosive atmospheres with dust hazards, the entire installation set-up must always comply with the standard EN 61 241-14 resp. the replacing standard.

◆ **Maximum cable length between floating electrode and electrode relay NR 5/Ex, Version A**

Electrode type	Connec- tion to "x" elec- trode relay(s) NR 5/Ex, Version A	Maximum length of cable between floating electrode and electrode relay(s) NR 5/Ex, Version A with a cable where $C \leq 200 \text{ pF/m}$ and $L \leq 1 \mu\text{H/m}$	Maximum length of cable between floating electrode and electrode relay(s) NR 5/Ex, Version A with a cable where $C \leq 100 \text{ pF/m}$ and $L \leq 1 \mu\text{H/m}$
SCHE 2/Ex...	1	1000 m	1000 m
SCHE 2/Ex (Variant ILS)...	1	1000 m	1000 m
SCHE 2/Ex (Variant 3 tiges)...	2	350 m	700 m

◆ **Connecting cables**

Use connecting cables with several conductors to connect the conductive floating electrode SCHE 2/Ex ... to one or two electrode relays NR 5 /Ex, Version A or to an optional terminal box – and to connect the optional terminal

box to another optional terminal box or to the/both electrode relay(s) NR 5/Ex, Version A.

The connecting cable must possess a dielectric strength of at least AC 500 V test voltage.

Each conductor must have a cross section greater than or equal to 0.017 mm².

The cable between the floating electrode and the terminal box nearest to the floating electrode may not be longer than 100 m.

◆ **Terminal box(es) (optional extra)**

The protection class of each terminal box must be at least IP 20.
The terminal box(es) must be **approved** for use in potentially explosive atmospheres.

If the **terminal box is made of metal**, the **dielectric strength** between the intrinsically safe circuit and the metal body of the terminal box must be **greater than or equal to AC 500 V**.

◆ **Connection terminals**

Manufacturer: Weidmüller or other manufacturer.

Type: AKZ4 - PA blue or other connection terminal with equivalent technical data.

◆ **Dielectric strength between the intrinsically safe circuit and an adjacent non-intrinsically safe circuit**

The **dielectric strength** between the intrinsically safe circuit and an adjacent non-intrinsically safe circuit **must be greater than or equal to AC 1500 V**.


9. Start-up

Prior to start-up, you must re-check the mounting position, the mechanical fastening and the electrical connection of the units.

In particular, you must check once again that the conductive floating electrode is also connected to the corresponding, admissible intrinsically safe circuit(s).

In addition, you must also check and verify that there is no possibility whatsoever of hazardous conditions occurring due to non-adherence to any of the relevant instructions, standards or official regulations.

Only then may the unit in question be started up electrically.
You must then perform the first maintenance routine.



10. Response in the event of an alarm

After every alarm, the floating electrode in question, the connecting cable and the operating area must be cleaned thoroughly.

If the floating electrode or its cable show signs of mechanical or chemical aggression, the floating electrode must be replaced.

11. Maintenance

The floating electrodes and the electrode relays must be serviced at regular intervals by **qualified specialist personnel**. The intervals depend on the risk of soiling to the respective floating electrode and its environment.

The unit must, however, be serviced directly after start-up.

To rule out any risks, however, the floating electrode and electrode relay must be sight-checked and function-tested by qualified specialist personnel at least once a year.

Where risks cannot be ruled out, you should adhere to an inspection frequency suited to the application in question and laid down in consultation with the relevant supervisory authorities.

If the floating electrode and electrode relay(s) are installed as safety elements within a system, they must always be inspected and checked at intervals to be agreed with the local supervisory authorities.

Prior to all maintenance work, the qualified specialist personnel must inform themselves of all valid standards, regulations, local guidelines and special conditions, in particular standards, regulations, local guidelines and special conditions concerning explosion protection and proceed accordingly.

Maintenance work should include the following:

- ◆ Cleaning of the electrode and the surrounding area.
- ◆ Sight check of the electrode to ensure clean, flawless condition.
- ◆ Function check of the electrode as follows:

All types with the exception of type SCHE 2/Ex (Variant ILS)..:

Lift the floating electrode by the electrode body or, if present, by the special handle-shaped holder, **but not by its cable!** Then lift the electrode rod tips of the rod electrode mounted on the floating electrode out of the water phase. An alarm must then be emitted.

Type SCHE 2/Ex (Variant ILS)..:

Lift the floating electrode by the electrode body or, if present, by the special handle-shaped holder, **but not by its cable!** Then lift the electrode rod tips of the rod electrode mounted on the floating electrode out of the water phase without activating the alarm bridging contact via the activation arm (the activation arm must be freely suspended!). An alarm must then be emitted.



Installation, Operating and Maintenance Instructions for Jola Floating Electrodes 11/11
SCHE 2/Ex ... and the system with Jola Electrode Relay NR 5/Ex, Version A 18.01.08

Then test the alarm bridging contact by lifting and lowering the activation arm. During the test, the electrode rod tips may not be electrically bridged by the water.

No alarm should be given when the activation arm is raised.

An alarm must be emitted when the activation arm is lowered.

- ◆ Testing the cable break monitoring feature:
Ensure that the electrode rod tips of the rod electrode are bridged by the water. Then disconnect an electrode cable (two cables with model SCHE 2/Ex (Variant 3 tiges)..:) in the junction box nearest the floating electrode – or, where the electrode cable is not routed through a junction box, on the respective electrode relay. Proper functioning of the cable break monitoring feature is signalled by the fact that the assigned electrode relay reverts to alarm status. The switching status caused by the cable break corresponds to the status causing an alarm due to an electrically non-conductive liquid.

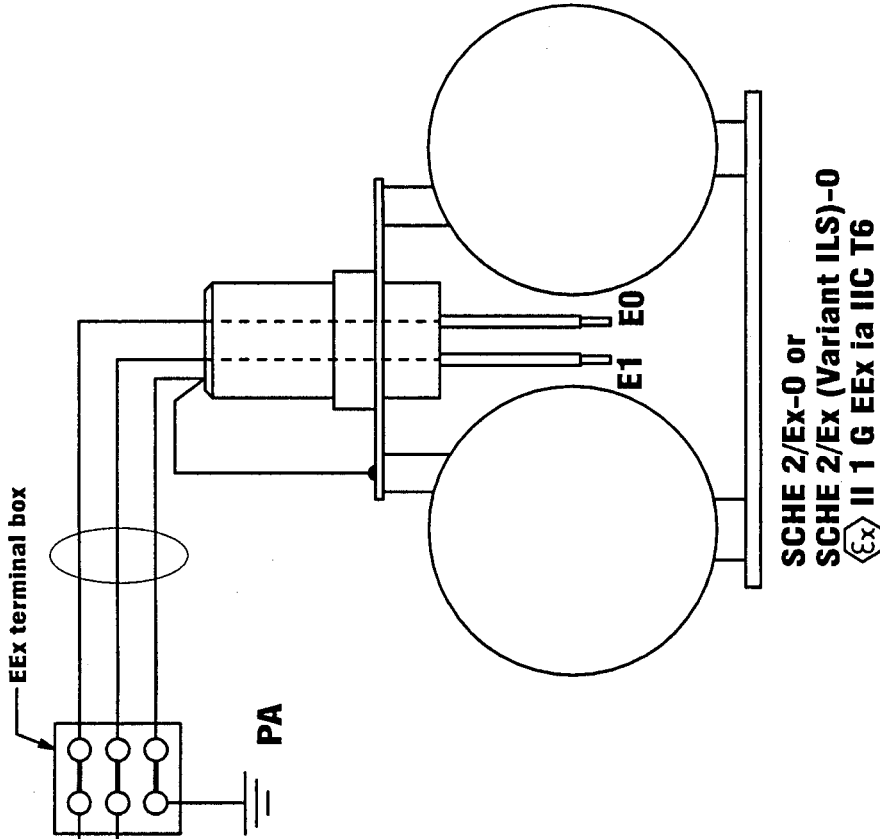
12. Repair

All alterations and repairs to the floating electrode SCHE 2/Ex ... and/or the electrode relay(s) NR 5/Ex, Version A must be performed in the manufacturer's facility. Under no circumstances may other individuals or companies perform unauthorised alterations or repairs.



Non-potentially explosive atmosphere

Potentially explosive atmosphere



1 Masse earth
E0

Aus 6 Ein
arrêt E2 E1 marche
off on

Jola NR 5/Ex
500 VA Version A

Elektodenrelais
Relais à électrodes
Electrode relay

CE 0080

max. AC 250 V, 4 A, 100 VA
potentialfreier Ausgang
sortie à potentiel nul
potential-free output

11 10 9

11 10 9

[Ex] I (M) / II (1) GD
[EEEx ia] I / IIC IP 20
INERIS 03ATEX0151
Tamb. : -20°C. +60°C

**Output contact shown in
no-current condition of the NR 5/EX**

Core colours of connecting cable:

- Electrode rod E0 = brown
- Electrode rod E1 = black
- Potential equalisation cable (PA) = green-yellow

**SCHE 2/Ex-0 or
SCHE 2/Ex (Variant ILS)-0
II 1 G EEx ia IIC T6**

Aus der Zulassungszeichnung resultierende verwandte Zeichnung:

Dessin apparenté:
Aucune modification permise sans l'accord de M. Volker Mattil

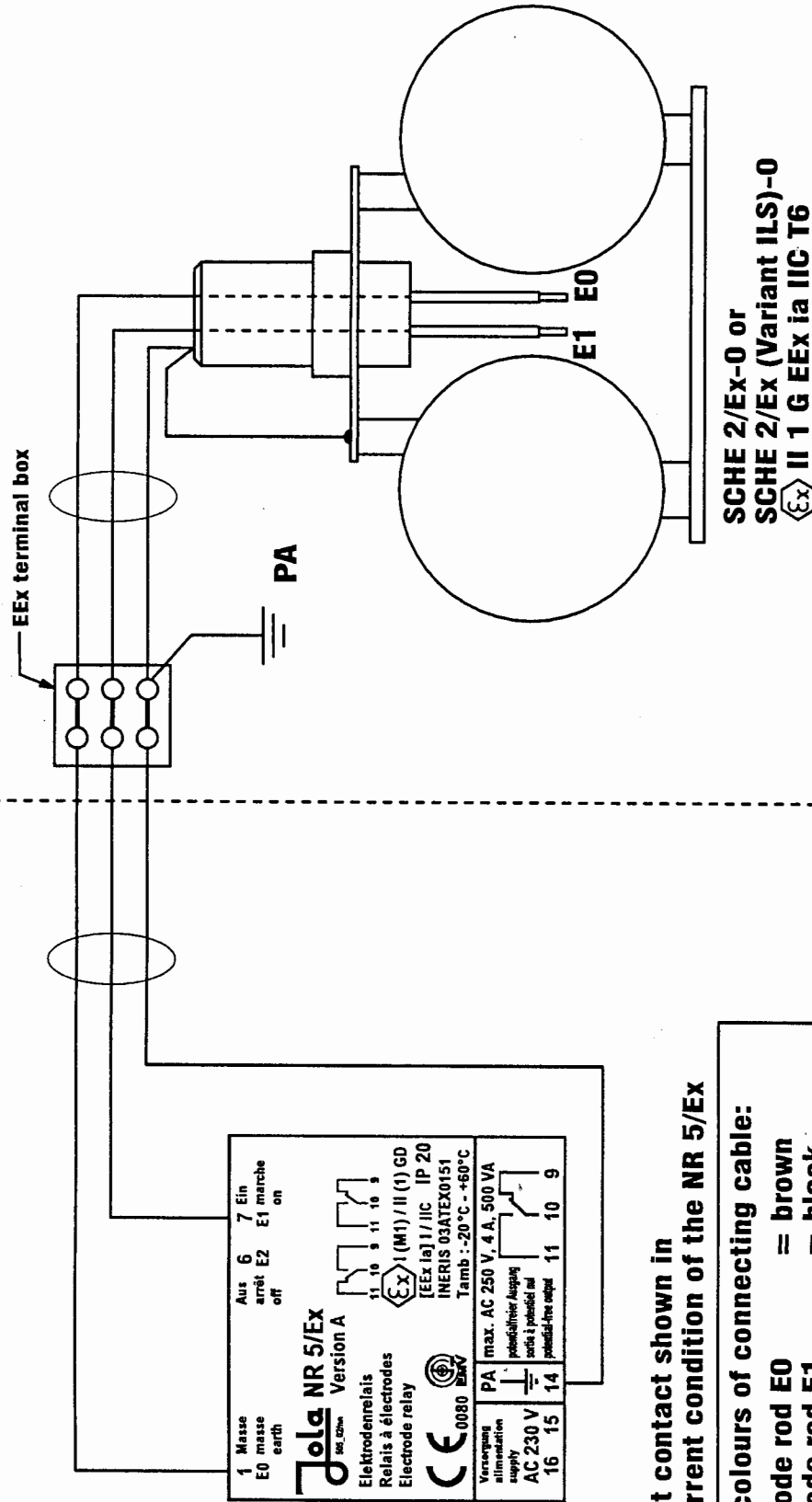
Keine Modifizierung zugelassen ohne Zustimmung von Herrn Volker Mattil

Standardisieren	01.08.05	Eisner	Blatt
Bezeichnung NR 5 Ex	05.07.05	Scherer	
Zeichnung	Datum	Name	Zehng. Nr.:
	02.06.05	Scherer	51P-5256 b
	02.08.05	<i>[Signature]</i>	von Seiten
			Erz. durch:

**Circuit diagram NR 5/Ex, Version A, without PA
+ SCHE 2/Ex complete with 2 rods**

Non-potentially explosive atmosphere

Potentially explosive atmosphere



Output contact shown in no-current condition of the NR 5/Ex

Core colours of connecting cable:
 Electrode rod E0 = brown
 Electrode rod E1 = black
 Potential equalisation cable (PA) = green-yellow

SCHE 2/Ex-0 or SCHE 2/Ex (Variant ILS)-0
Ex II 1 G EEx ia IIC T6

Aus der Zulassungszeichnung resultierende verwandte Zeichnung:
Dessin apparenté:
 Aucune modification permise sans l'accord de M. Volker Mattil

Keine Modifizierung zugelassen ohne Zustimmung von Herrn Volker Mattil

c	Standardisieren	01.08.05	Fluck	Zchng. Nr.: 51P-4849 c	Jola	Blatt
	Revisions Nr. 5 Ex	04.07.05	Schnee			
b	Überprüfung u. Test	02.04.04	Kissel	Ers. durch:	von Seiten	Ers. durch:
a	Herstellung	02.08.05	<i>[Signature]</i>			

Circuit diagram NR 5/Ex, Version A, with PA + SCHE 2/Ex complete with 2 rods

