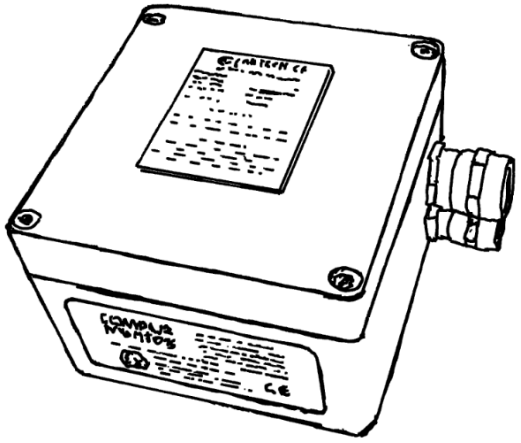
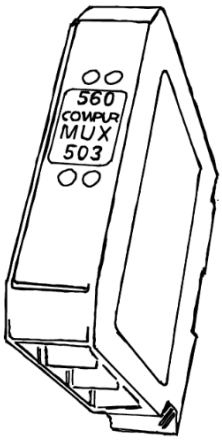
COMPUR Monitors

Manual

Statox MUX





MUX560 **MUX503**

Table of contents

1 Operating instructions

- Read these operating instructions carefully before commissioning and keep them in a safe place.
- The Statox MUX shall only be operated under the specified environmental conditions (see technical data).
- The Statox MUX shall only be installed, operated, repaired and maintained by trained and competent personnel. Only original Compur Monitors parts and accessories shall be used. The Statox MUX must not be connected to mains voltage! The supply voltage is nom. 24 VDC to 29 VDC!
- All connections must be supplied with a maximum of 30 VDC, otherwise the explosion protection is not given!
- The encapsulated Statox MUX 560 module must not be opened. It shall only be mounted in the corresponding Ex terminal box.
- The Statox MUX 503 **must not** be operated in potentially explosive atmospheres.

If the above points are not observed, the safety and explosion protection of the Statox MUX are no longer guaranteed. It then represents a danger to people and property.

Important information is shown as follows in these operating instructions:

DANGER

Indication of an imminently dangerous situation for people and property.

NOTE

Important information.

2 Product description

The Statox MUX is a modern extension unit for the Statox 560 head and is especially designed to simplify the previous ten-wire cabling. Instead of using the original ten wires between the measuring head and the evaluation unit, the Statox MUX enables the reduction to just two conductors. This development offers a more efficient installation without compromising the reliability and functionality of the warning system. Despite the reduction in the number of conductors, the system remains responsive and provides reliable monitoring of toxic gases. In addition, the Statox 560 measuring head can still be operated as a stand-alone device as well as a 4-20 mA transmitter in combination with the Statox 503 controller.
The Statox MUX consists of two assemblies,

- the Statox MUX 560, which is also the junction box for the Statox 560 with cable tail and can therefore be operated in hazardous areas just like the Statox 560 measuring head, and
- the Statox MUX 503, which is installed as a counterpart for the Statox MUX 560 outside the hazardous area in the vicinity of control systems or other signal processing systems.

3 Installation and connection of the Statox MUX

For mounting the Statox 560 measuring head, please refer to the “Statox 560” operating instructions. The installation of the Statox MUX 560 can also be taken from these operating instructions.
We recommend using closely shielded connection cables with a cable cross-section of ≥ 0.75 mm², e.g. type Ölflex 415 CP.

3.1 Maximum distance from the voltage source

The maximum possible length of the connecting cables depends on the cable cross-section used and the gas to be measured, as different amounts of energy are required to generate the test gas. The cable lengths specified below are based on an output voltage of 24 VDC from the voltage source and optimum contact resistances.

Table 1: Maximum connection lengths for different types of gas at 20°C.

Cable cross-section			Maximum distance from the voltage source [m]	
AWG-No.	**Cross-section / mm²**	**Diameter / mm**	**$COCl_2$**	**HCN, H_2S, Cl_2, CO**
24	0.2	0.511	96	314
20	0.5	0.812	242	793
19	0.65	0.912	306	1000
18	0.82	1.024	385	1261
16	1.3	1.29	613	2006
14	2	1.63	975	3190
12	3.3	2.1	1044	3418

If the above-mentioned lengths (maximum and minimum cross-sections) are not observed, fault-free operation cannot be guaranteed!

3.2 Installation of the Statox MUX 560

The Statox 560 is installed in combination with the Statox MUX 560 in the vicinity of a hazardous area. For detailed installation instructions of the measuring head, follow the instructions in the Statox 560 manual.

3.3 Connection of the Statox MUX 560

Mount the Statox 560 at the desired location and insert the cable tail on the Ex m approved Statox MUX 560 through the approved cable gland. For operation in hazardous areas, this must comply with the relevant conditions.

The operating voltage of the Statox 560 is nom. 24 VDC to 29 VDC. Higher voltages and short circuits can destroy the measuring head.

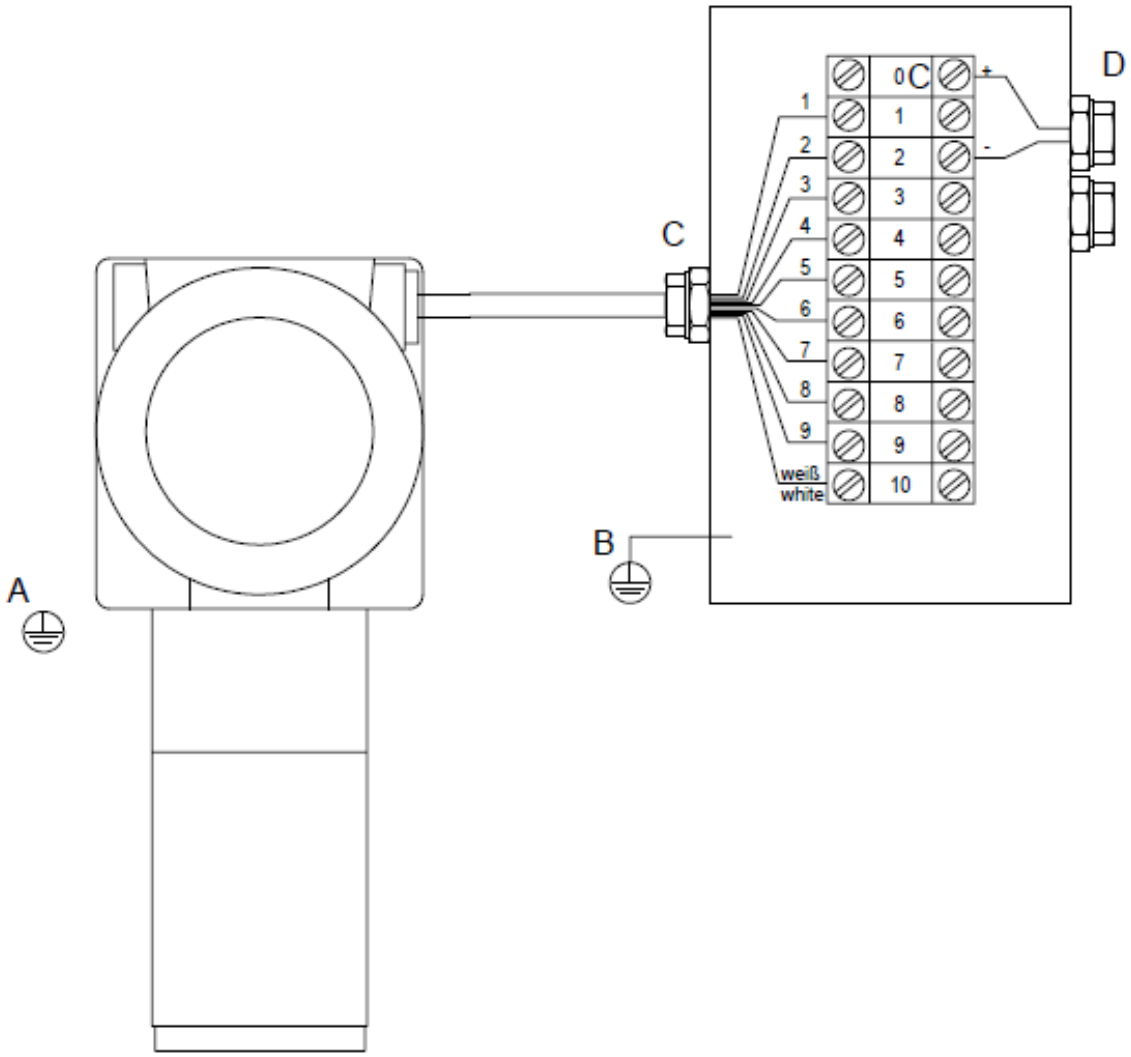


Figure 1: Connection diagram Statox 560 to the Statox MUX 560.

The following points must be observed:

A. Connect the earthing point on the housing of the Statox 560 to the building earth. The cable used should have a cross-section of ≥ 6 mm². Check that the Statox 560 is correctly grounded using a suitable measuring device.

B. Connect the earthing point on the Statox MUX 560 to the reference grounding of the building. The cable used should have a cross-section of ≥ 4 mm². Check the correct earthing of the terminal housing with a suitable measuring device.

C. The connection cable of the Statox 560 must be fed into the Statox MUX 560 via an EMC cable gland. To do this, remove the protective tube from the cable shield. Note: the cable shield of the cable tail is not connected to the measuring head!

D. Connect the cables to the terminal block in the Statox MUX 560 according to their numbers, the white cable is connected to terminal 10. Connect all 10 cables, even if you do not want to use them all!

E. The number of outgoing cable glands depends on your application. To avoid earth loops, the shield of the supply cable may only be connected on one side.

- Do not attempt to unscrew the cable from the Statox 560 as this will damage the device!
- Do not leave any loose cables in the terminal box, as these can cause malfunctions!
- A missing earth connection will impair the function of the Statox 560!

Table 2: Cable assignment of the Statox 560 with cable tail.

Line	Designation	Explanation
1	+24 VDC	+ 24 V power supply (16-30 VDC)
2	0 VDC	Power supply ground
3	I_OUT+	0-22 mA current output
4	I_OUT-	current output ground
5	Remote selftest	Remote triggering of the self-test
6	GND_R	Common ground for all digital outputs
7	Maintenance Request	Digital output maintenance requirement (open drain)
8	System Failure	Digital output system error (open drain)
9	A2	Digital output alarm 2 (open drain)
withe	A1	Digital output alarm 1 (open drain)

3.4 Installation of the Statox MUX 503

The Statox MUX 503 is prepared for top-hat rail mounting. It can be installed in any position.

3.5 Connection between the Statox MUX 560 and the Statox MUX 503

A two-wire connection is established between the Statox MUX 560 and the Statox MUX 503 using a shielded cable (see chapter 3 Installation and connection of the Statox MUX). The maximum cable lengths

depend on the cross-section of the cable (see chapter 3.1 Maximum distance to the voltage source). The electrical connection must be made with the correct polarity as follows:

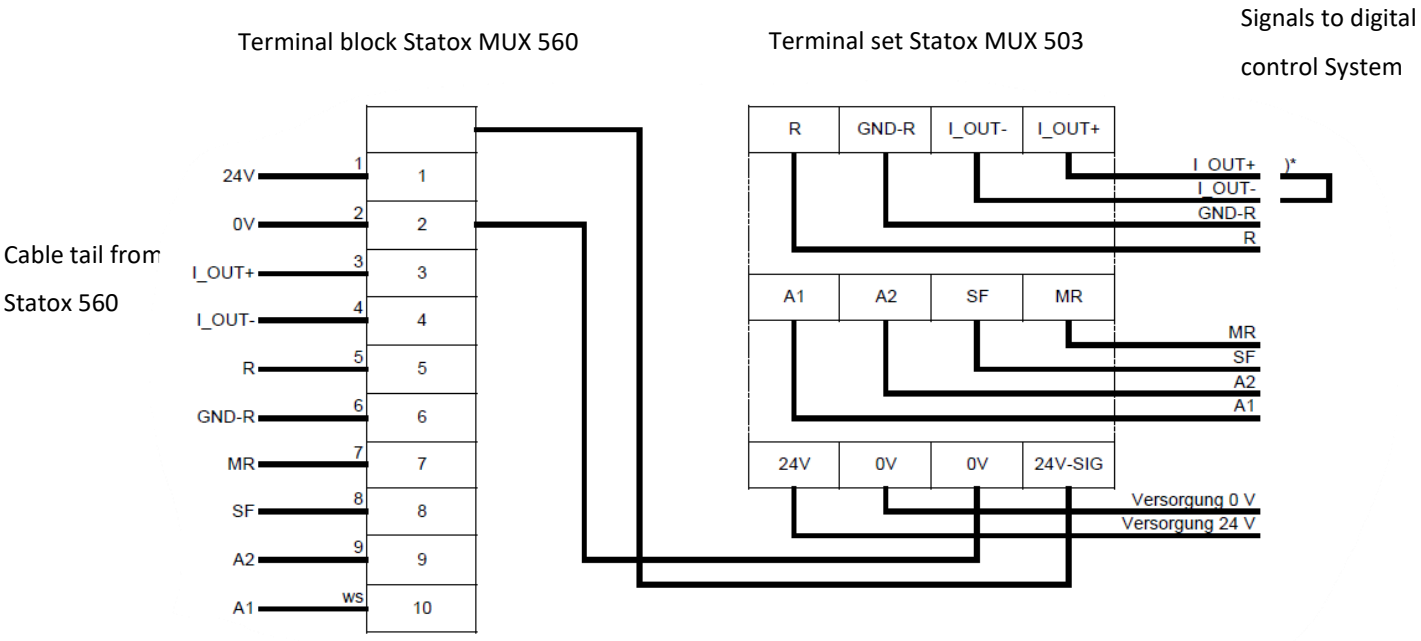


Figure 2: Connection diagram Statox MUX.

If the current output is not connected, it has to be short circuited with a bridge (**Figure 2**).

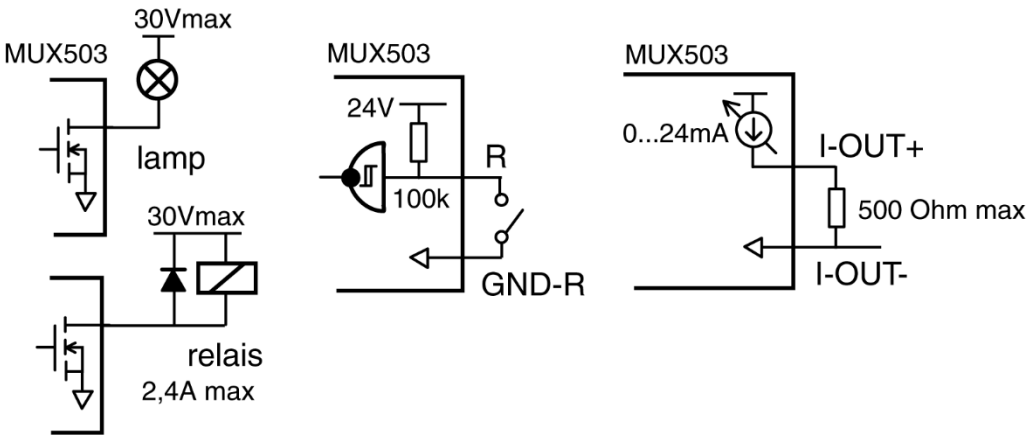


Figure 3: Connection characteristics for the Statox MUX 503. left: Outputs A1, A2, SF and MR, center: Connection of the reset function, Right: Current loop with 500 Ohm load.

4 Product features

4.1 LED´s

Both modules carry out cyclical self-tests. The result is displayed on the MUX 503 by LEDs for both devices. Illuminated green LED´s indicate normal function, while illuminated red LED´s signal a fault. The display is useful for troubleshooting.

5 Maintenance and cleaning

5.1 Routine measures

- Carry out regular visual checks for damage to the housing and connection cable.
- Only clean the Statox MUX 560 with a damp cloth. Do not use any harsh cleaning agents, solvents or steam jets.

6 Accessoires and spare parts

Designation	Item number
Statox MUX 560	562306
Statox MUX 560 sea water resistant	562303
Statox MUX 503	562301

7 Functional safety

This chapter is intended to provide the user with the information required for planning a safety instrumented system (SIS) with safety integrity level 2. The intended use of the Statox 560 and the Statox MUX is the responsibility of the operator.

7.1 Safety functions

Safety fuctions 1 (SF1)

The Statox 560 with gas sensor detects toxic gas and provides the concentration at the analog 0 - 22 mA current output. The two switching outputs maintenance requirement (MR) and system fault (SF) are also used for maintenance requirement and system fault messages. The following applies to the current output values:

- 0 mA signalizes system error
- 2 mA signal service operation
- 4 mA corresponds to 0% of the measuring range
- 20 mA corresponds to 100% of the measuring range
- 22 mA signalize overrange

Safety functions 2 (SF2)

The Statox 560 with gas sensor detects toxic gas and signals when the set alarm thresholds are exceeded via the two switching outputs A1 and A2. The two switching outputs maintenance requirement (MR) and system fault (SF) are used to report maintenance requirements and system faults.

The Statox MUX transmits the signals to the safety function of the Statox 560 and fulfills the requirements for functional safety up to SIL 2.
In accordance with DIN EN 61508:2010, the multiplexer is classified as a complex type B system that is operated in low demand mode.

Table 3: Characteristic values for Statox MUX in accordance with SIL 2.

	λ_s [FIT]	λ_{du} [FIT]	λ_{dd} [FIT]	SFF [%]
Statox MUX 560	253.15	33.31	120.63	91.8
Statox MUX 503	381.05	61.71	220.13	90.7

The SFF values comply with the >90% required for SIL2 and are calculated as follows:

$$PFD_{avg} = 0.5 * T * \lambda_{du} \text{ with T = years}$$

Table 4: Table 4: PFDavg: Average Probability of Dangerous Failure on Demand.

	PFD_{avg}
Statox MUX 560	1.46*10^-4
Statox MUX 503	2.7*10^-4

This means that the values for PFD_{avg} are significantly lower than the values required for SIL2 of 10^-3 … 10^-2.

8 Repair and replacement parts

Repairs to the hardware or the Ex e housing must not be carried out by the user.

Only original spare parts are to be used.

9 General technical data

9.1 Statox MUX 560

Product name:	Statox MUX 560
Item number:	562306, 562303 (sea water resistant)
Type:	5381
Ambient temperature:	-30...+60 °C
Storage temperature:	-30...+60 °C
Humidity range:	0...99 % RH (non-condensing)
Pressure range:	700...1300 hPa
Explosion protection:	Ex mb IIC T3 Gb
Application range:	II 2 G
Protection class:	IP66
Operating voltage:	nom. 24 VDC to 29 VDC
Analog input:	0 ... 22 mA, load 220 Ohm against GND
Digital output:	24 Vmax, 2.5 Amax
Digital inputs:	Pull up 4.7 kΩ against 24 V
EMC:	according to DIN EN 50270
Functional safety:	SIL2 according to DIN EN 61508
Weight:	1300 g
Dimensions:	120 x 120 x 85 mm

9.2 Statox MUX 503

Product name:	Statox MUX 503
Item name:	562301
Type:	5382
Ambient temperature:	-10...+60 °C
Storage temperature:	-30...+60 °C
Humidity range	0...99 % RH (non-condensing)
Pressure range:	900...1100 hPa
Protection class:	IP20
Operating voltage:	16 ... 30 VDC
Current consumption:	300 mA; 800 mA pulsed short-term
Analog input:	0...22 mA, load <= 500 Ohm
Digital output:	30 Vmax, 2,5 Amax
Digital inputs:	internal 100 k Ohm pullup
Connections:	screw terminals for up to 2,5 mm² cross-section
EMC:	according to DIN EN 50270
Functional safety:	SIL2 according to DIN EN 61508
Mounting:	auf 35 mm DIN rail
Weight:	130 g
Dimensions:	23 x 103 x 115 mm

10 Declaration of conformity

EU-KONFORMITÄTSERKLÄRUNG
EU-DECLARATION OF CONFORMITY
UE-DÉCLARATION DE CONFORMITÉ

Compur Monitors GmbH & Co. KG
Weißenseestraße 101
D 81539 München

erklärt in alleiniger Verantwortung, dass das Produkt
hereby declares in sole responsibility, that the product
déclare comme seul responsable, que le produit

Statox MUX 560
Statox MUX 560
Statox MUX 560

den folgenden EU-Richtlinien und den entsprechenden harmonisierten Normen entspricht.
complies with the following EU directives and the corresponding harmonized standards.
correspond aux directives européennes suivantes et à leurs normes harmonisées.

Richtlinie/Directive 2014/30/EU
EN IEC 61000-6-4 2019
EN 50270:2015 (Typ 2 / type 2)

Richtlinie/Directive 2014/34/EU
EN IEC 60079-0:2018
EN IEC 60079-7:2024+A1:2018
EN 60079-18:2015+A1:2017

TÜV-A 24 ATEX 0104
Notified body: 0408
TÜV Austria Deutschland,
Kurze Straße 40, D-70794 Filderstadt

Richtlinie/Directive 2012/19/EU

Richtlinie/Directive 2011/65/EU

München, 17.12.2024
Munich, 2024-12-17

Dr. Josef v. Stackelberg, Geschäftsführung

COMPUR Monitors GmbH & Co. KG
Postfach 900147
D-81539 München
DIN EN ISO 9001:2015 zertifiziert

Tel. Nr. ++ 49 89 62038250
Internet: http://www.compur.de
E-Mail: compur@compur.de

Geschäftsführer:
Dr. Josef v. Stackelberg

This information is provided to the best of our knowledge, but only as non-binding information, also with regard to any third-party property rights.

The above technical data and application notes do not exempt the user from a thorough examination of our products and application suggestions with regard to their suitability for the intended processes and purposes.

The application of the products is beyond our control and is therefore the sole responsibility of the customer. The products are sold in accordance with the General Terms and Conditions of Sale and Delivery of Compur Monitors GmbH & Co. KG, Munich.

Compur Monitors GmbH & Co. KG
Weißenseestraße 101
D-81539 München
Tel. 0049 (0) 89 62038 268
Fax 0049 (0) 89 62038 184
Internet: www.compur.com
E-Mail: compur@compur.de

U 5381 000 998 07 02 562986