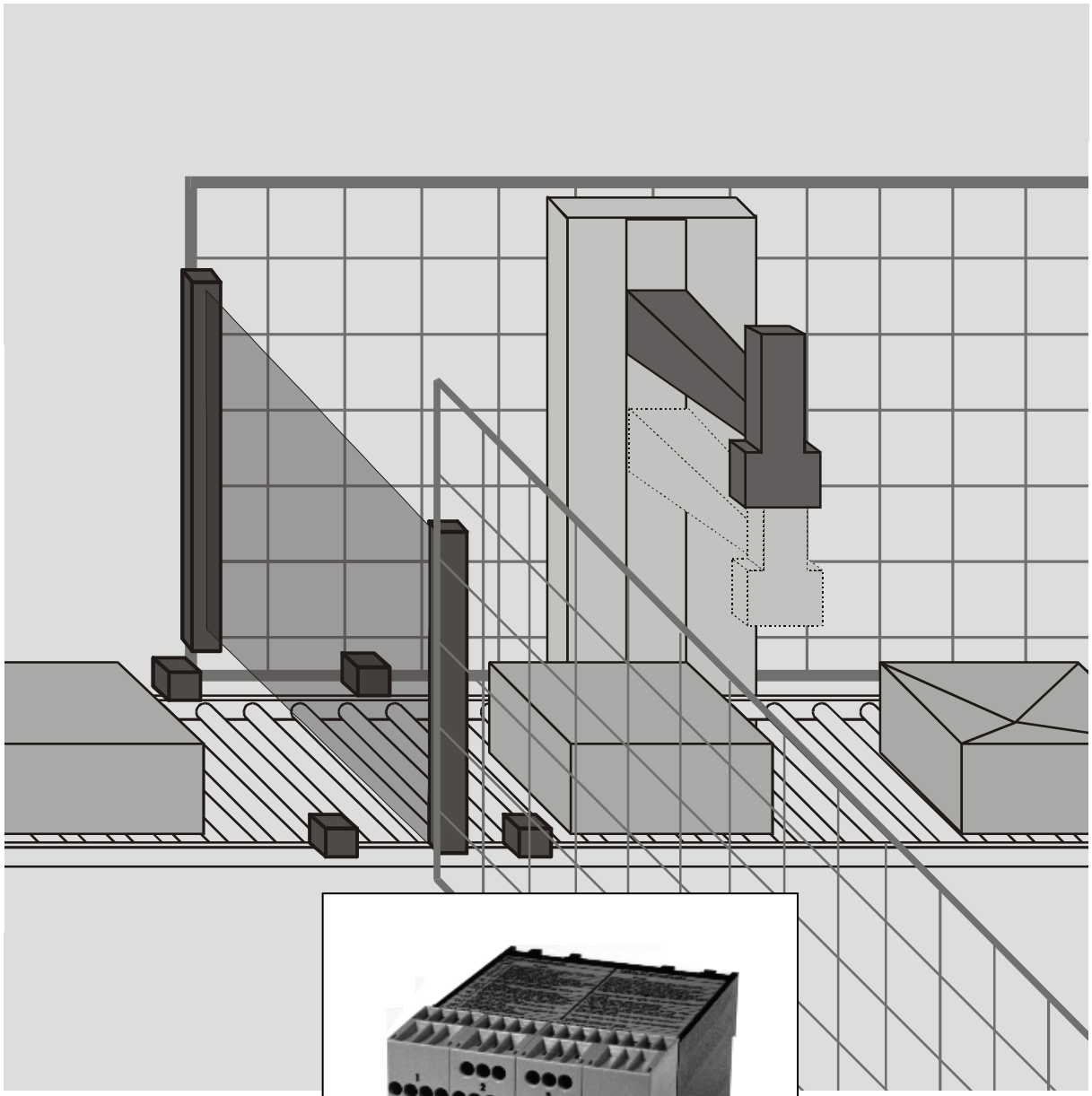
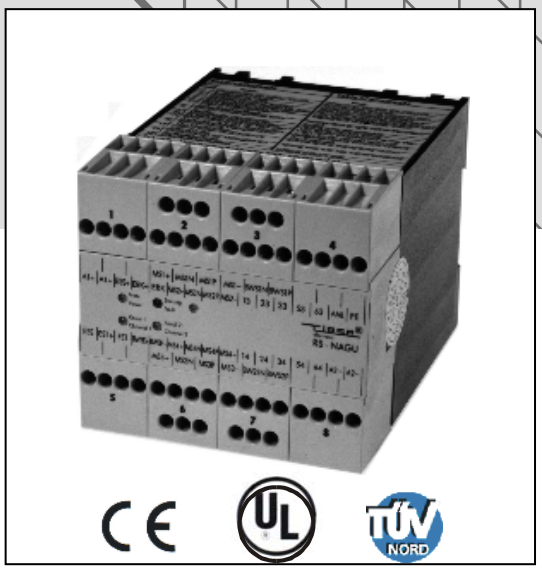
Original operating instructions for muting controller with relay outputs RS-NAGU.2f





riese electronic gmbh - Junghansstraße 16 - 72160 Horb a. N. - Germany
Tel. +49-(0)7451-55010 - Fax. +49-(0)7451-550170 - www.riese-electronic.de

Introduction

These operating instructions should familiarize you with the muting controller RS-NAGU.2f. The following pages contain information about:

- Structure and function
- Assembly
- Electrical installation
- Maintenance and repair
- Possible failures and actions to rectify failures

Target audience

These operating instructions are intended for the following persons:

- Skilled personnel who plan or develop safety equipment for machines and plants and are familiar with the safety instructions and safety regulations.
- Skilled personnel who build in safety equipment into machines and plants and activate them.

Explenatin of signs

The operating instruction contains several symbols which are used to high-light important information:

⚠ WARNING

This symbol show text passages which should absolutely payed attention too. Non-observance leads to serious injuries or damage to property.

This symbol show text passages which contain important information.

☞

This sign is placed for activities.

⇒

This sign shows a description how the condition has changed after an activity has been carried out.

This symbol marks the transmitter of a safety light barrier / -grid.

This symbol marks the receiver of a safety light barrier / -grid.

Explanation of terms

BWS = ESPE	Electro sensitive protective equipment include light barriers, light curtains and light grids
Muting	Temporary bypassing of a ESPE in order to transport material into or out of the danger area.
Restart inhibit	Prevention of automatic restart of the machine..

List of contents

Safety instructions

Intended use

The muting controller RS-NAGU.2f is used in conjunction with safety light barriers or safety light grids to safeguard danger areas and hazard points. The integrated muting function permits goods to be transported into or out of the danger area without impairment to the safety function of the equipment.

The RS-NAGU.2f may also be used as a controller for safety light barriers.

☞ **Please note the wiring instructions for this operating mode on page 13.**

⚠ WARNING

The safety of persons and equipment cannot be guaranteed if the muting controller is not used in accordance with its intended use.

For your safety

Observe the following points without fail:

⚠ WARNING

- **The device may only be build in and operated by specialized staff, who are familiar with this instruction and the current regulations for safety at work and accident prevention. Working on electrical equipment is only allowed for specialized staff.**
- **Any repairs have to be done by the manufacturer or a person which is authorized by the manufacturer. It is prohibited to open the device or implement unauthorized changes, otherwise any warranty expires.**
- **Pay attention to valid regulations, particularly in reference to preventative measures and the installation of muting sensors, the muting lamp and the BWS.**
- **The danger area must be observable by the assembling area of the start button.**
- **It must be impossible to start the equipment from the danger area.**
- **Avoid mechanical vibration and impacts during transport and operation. Impacts greater than 0.7 Nm or vibrations with a frequency > 33 Hz or an amplitude > 0.35 mm can lead to damage of the equipment.**

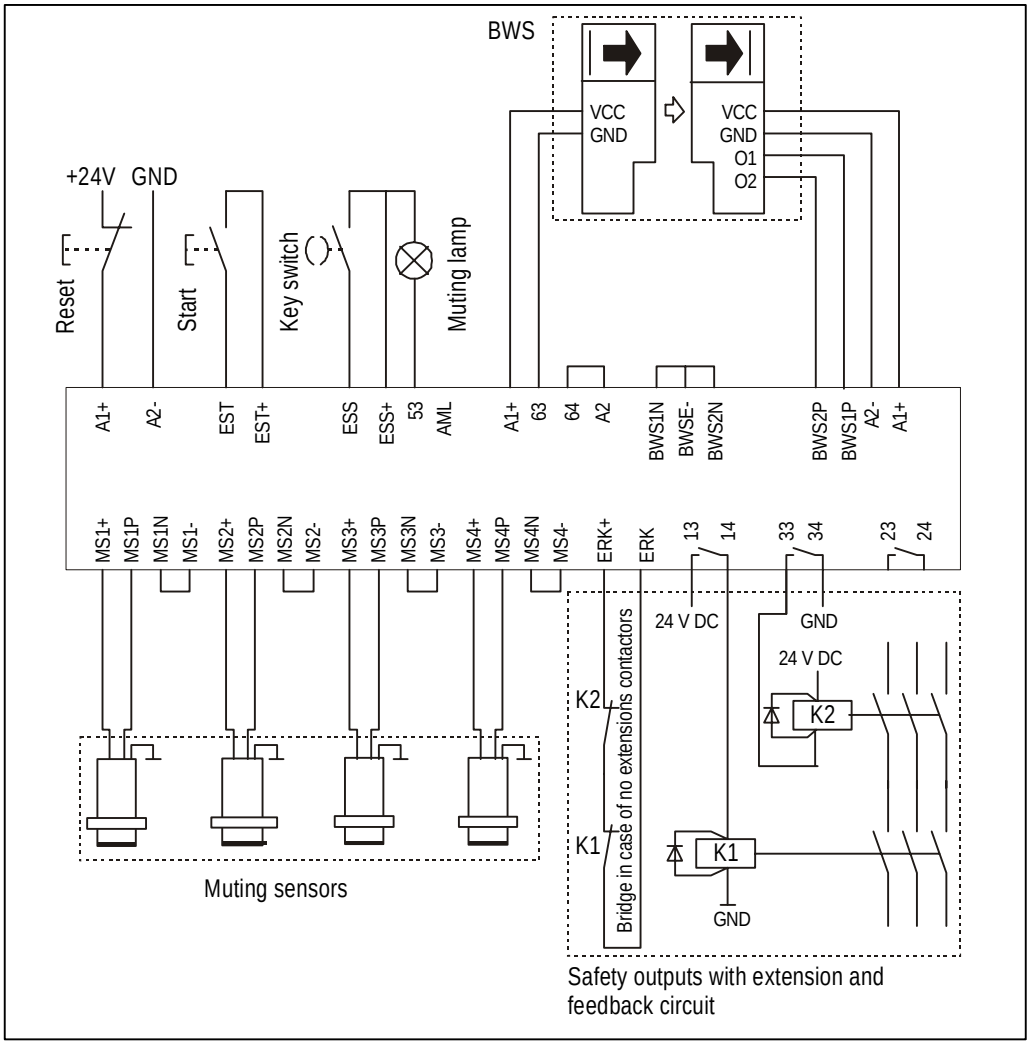
Application and function

Introduction

The muting controller RS-NAGU.2f is used in conjunction with safety light barriers or safety light grids to safeguard danger areas and danger points up to category 4 to EN 13849-1. The integrated muting function to EN 61496 permits goods to be transported into or out of the danger area without impairment to the safety function.

The device is suitable and tested for connection to safety light barriers and light grids from a wide range of different manufacturers. A current list of tested light grids / light barriers and the relevant wiring instructions are provided in the "Applications" brochure. Should you not find the safety light barrier or safety light grid you wish to use in this list, please contact us by telephone.

The diagram below provides an initial impression of connection possibilities. In the section "Installation and commissioning", step-by-step instructions are provided on electrical connection of the muting controller.



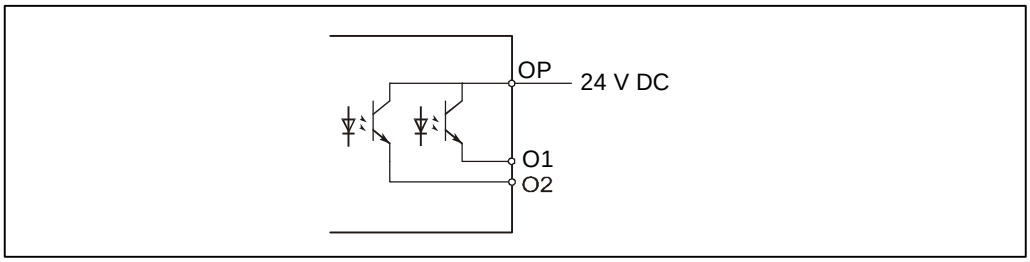
Device types

Type	Description	Order number
RS-NAGU.2f	Device with fixed terminal strips	AR.9667.9020

Outputs

The muting controller has the following outputs:

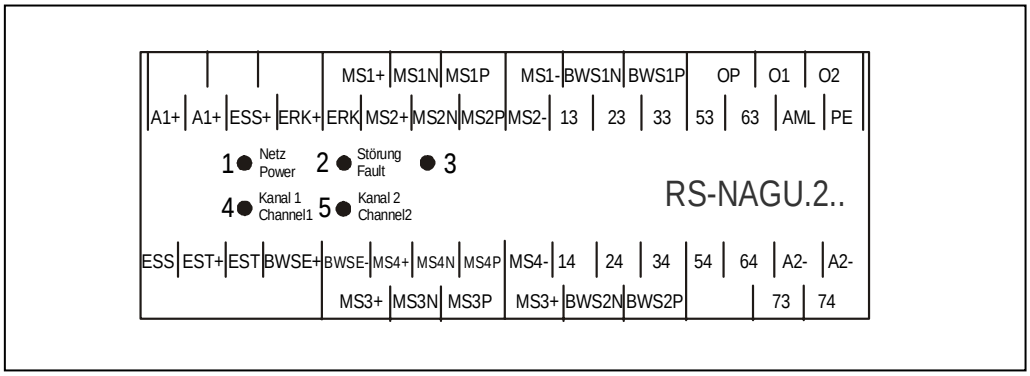
- Three safety relay outputs (13-14, 23-24, 33-34) as n.o. contacts.
- One signal output (73-74) as a n.o. contact. The signal output connects as long as the muting is active.
- Two optocoupler outputs (OP-O1, OP-O2)



Optocoupler output O1 switches to 24V when the safety outputs are active. Optocoupler output O2 switches to 24V when the connected safety light barrier is not delivering a signal. This can be the case when the device is switched off or in the muting mode, provided there are moving objects located in the area of the safety light barrier.

Display

Five LED's are used to indicate status.



1	Power ON
2	Fault
3	Restart inhibit on, waiting for start
4	Operation – Channel 1 activated
5	Operation – Channel 2 activated
4+5 flashing	Error code

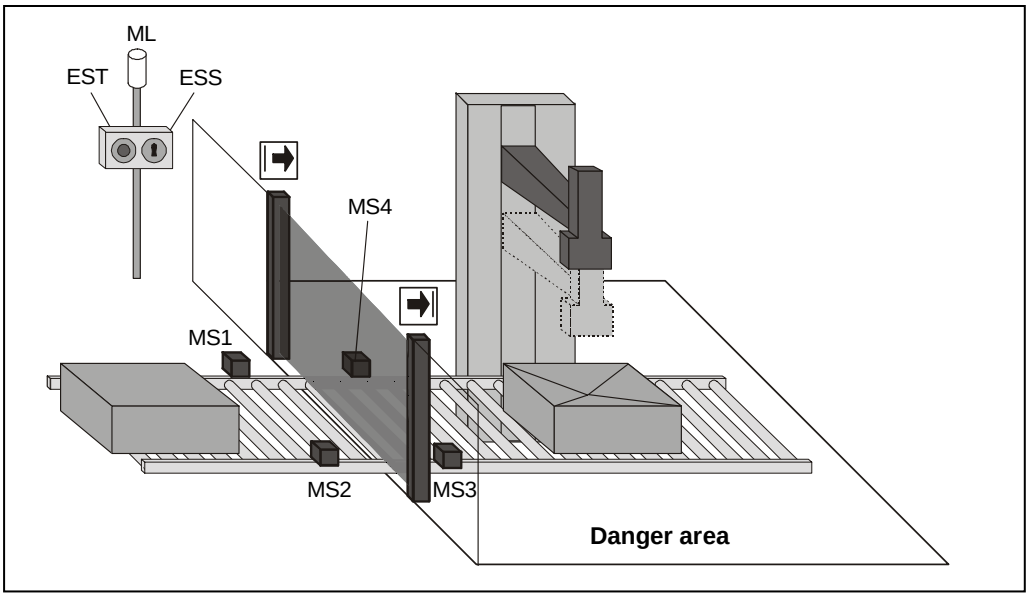
Function

After applying the supply voltage, the device performs a self test. LED's 1,3,4 and 5 light up and the device can be activated by pressing the start button.

If the self-test has not been successfully executed, there is a fault or a connection error. For details, see the section "Troubleshooting" on page 15.

If it is not possible to start the device by pressing the start button, at least one of the muting sensors is blocked or incorrectly connected. In the case of blocked muting sensors, see the section "Muting components and function".

Muting components and function



MS1, MS2, MS3, MS4	Muting sensors	ML	Muting lamp
EST	Start button	ESS	Key-operated switch

Muting

Muting is a temporary, automatic and reliable way of bypassing a presence-sensing safeguarding device (ESPE), in order to transport material into or out of a danger area. For this purpose, two or four muting sensors (MS 1-4) are installed at the entrance/exit of the danger area in such a way that only the material activates the sensors. The muting controller then initiates the muting cycle for the period during which the material is being transported through the protected field. It is not possible for a person to activate the muting sensors in the same way. A person approaching the danger area will trigger a shut-down of the hazardous movement.

Muting lamp

During material transport through the protected field, the muting controller switches the muting lamp (ML) on. The muting controller monitors the filament of the muting lamp even when the muting function has not yet been initiated. If the filament is defective, or if no lamp is connected, the muting controller indicates a failure and the safety outputs are switched off.

In accordance with EN 61496-1, the following conditions must be adhered to by the muting lamp. The luminous surface must be at least 1cm² and have a brightness of at least 200cd/m².

Key-operated switch

On start-up of the ESPE using the start key (EST), the muting controller checks whether all the muting sensors are inactive. If this is not the case, for example after a fault in which the material is already located in the area monitored by the muting sensors, the output signals of the muting controller are not switched, in other words the plant comes to a standstill. Using the key-operated switch, the muting cycle can be started and the material can continue to be transported. The muting cycle remains active as long as the key-operated switch is actuated, but for a maximum of ten minutes.

If all muting sensors are subsequently free, the enable circuits and the muting lamp switch off.

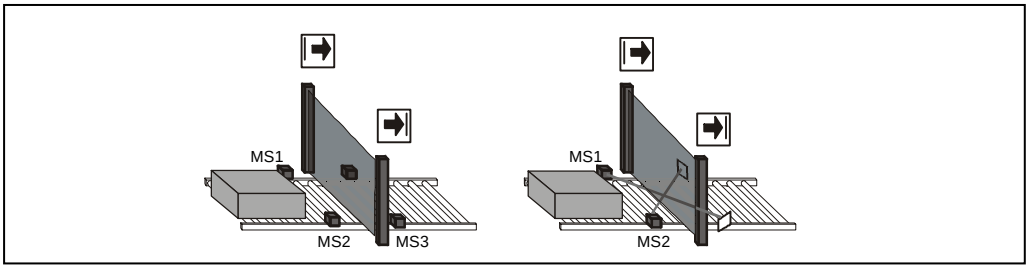
☞ Release the key-operated switch and press the start key.

If the key-operated switch is released prematurely, the enable circuits switch off and the muting lamp remains alight.

☞ Press the key-operated switch again.

Muting sensors

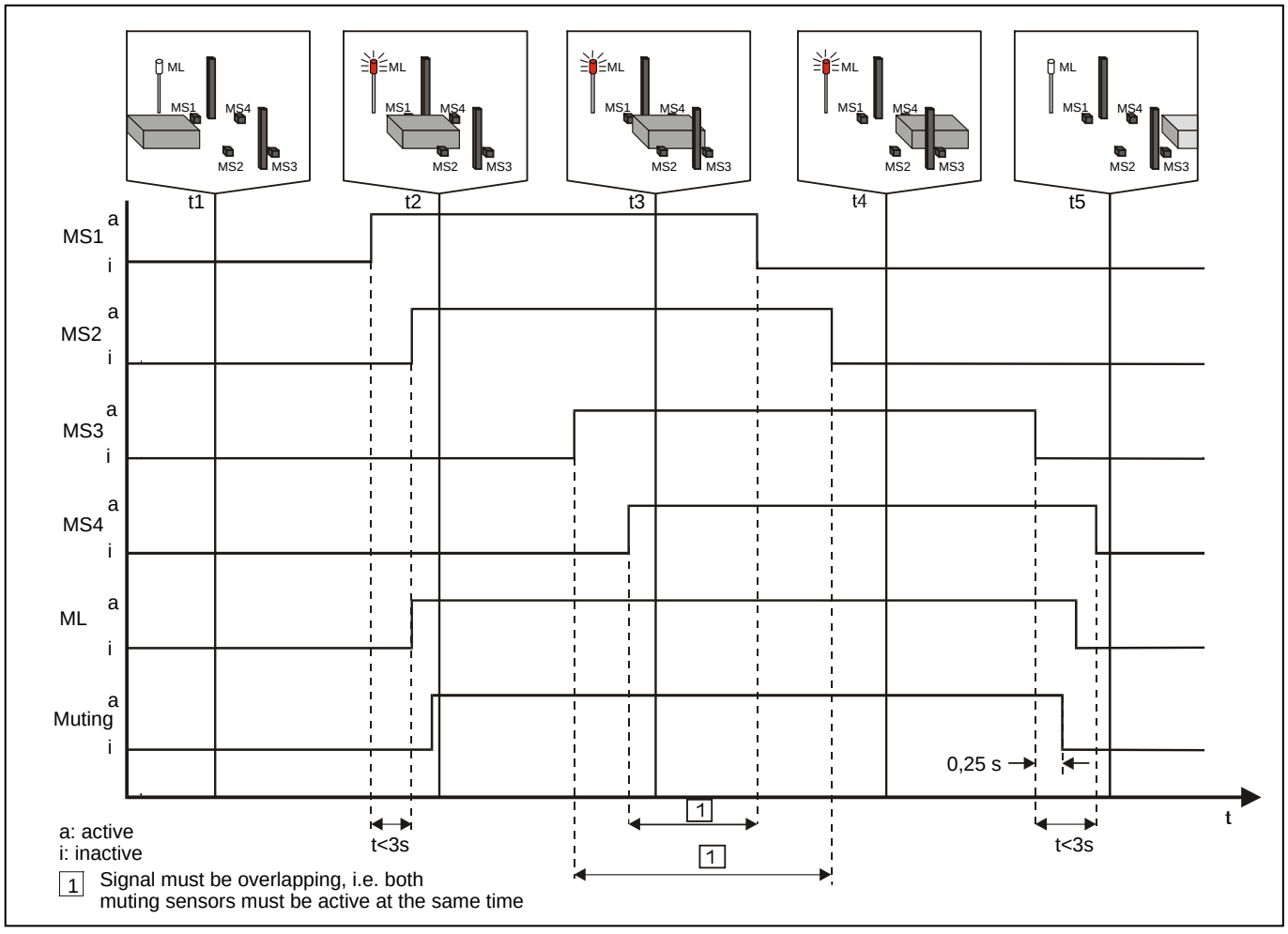
Mechanical, inductive, capacitive and opto-electronic sensors are suitable as muting sensors, whereby both sensors with solid-state outputs and also with relay outputs can be used. If retroreflective light barriers are used as muting sensors, they are arranged across corners. The cross-over point of the light beams must be located behind the safety light barriers in the danger area.



1. **The muting sensors must have a rated voltage of 24 V DC at the output.**
2. **Only light barriers with a dark switching output can be connected to the muting controller as muting sensors.**

Sequence of a muting cycle

If the muting sensors MS1 and MS2 are activated within a 3-second period, the muting cycle is initiated. The muting lamp is switched on and interruption of the safety light barrier does not cause the device to switch off. If three of the four muting sensors are inactive, the muting cycle is terminated after a delay period of 0.25 seconds.

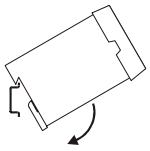


⚠ WARNING

Dust and moisture can lead to malfunctions. Install the device in a dust and damp-proof housing, for example in a switch cabinet or a IP54 housing.

Mechanical installation

☞ Mount the muting controller on a universal mounting rail.



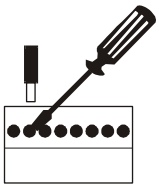
⚠ WARNING

Short circuits, broken cables, power failure or voltage fluctuations in the network can impair and/or cancel the safety function and result in serious accidents.

Pay attention to the following points:

- **The safety solid-state output lines and the lines of the two muting sensor groups must be lay in separate non-metallic-sheathed cables.**
- **When using two light barriers as muting sensors, the voltage supply for the transmitters must be lay separately and wired separately to the terminals.**
- **No circuits may be used which generate a muting signal in case of a cable breakage or power failure.**
- **The power supply to the device and all connections must be reliably isolated from the light / threephase mains, either by using an isolating transformer in accordance with IEC 60742 or an equivalent disconnecting device.**

Electrical connection

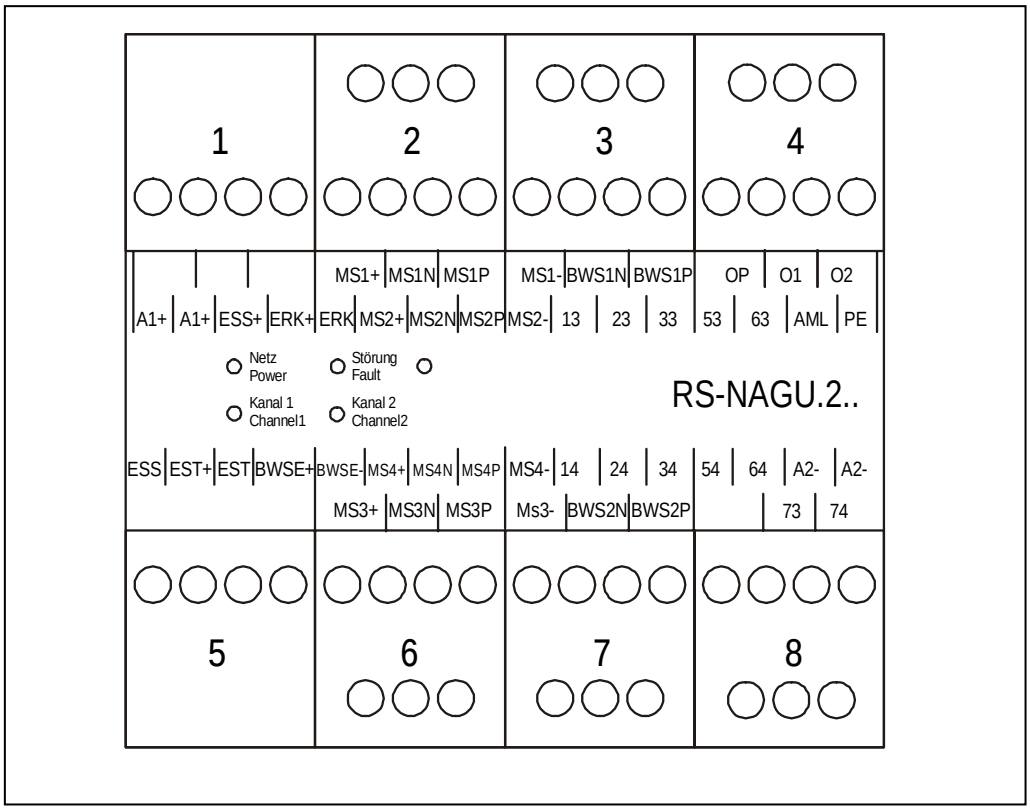


Wiring of the muting controller is subdivided into two areas:

1. General wiring
2. Specific wiring according to the ESPE (BWS) type used

All steps for general wiring are described in the following. A precise description of the specific wiring is provided in the separate brochure "Applications".

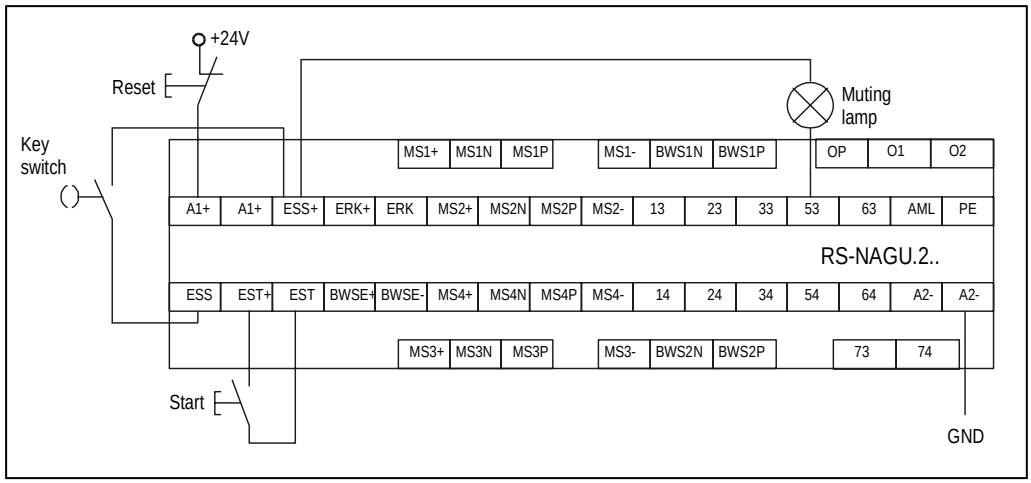
Terminals



Pins	Meaning
A1+ , A2-	Connection of supply voltage
EST+, EST	Start button
ESS+, ESS	Key-operated switch
ESS+, 53	Muting lamp
AML, 53	Bridge when NAGU is used as a controller for safety light barriers
ERK+, ERK	Feedback circuit
MSx+	Positive voltage for muting sensor x
MSx-	Negative voltage for muting sensor x
MSxP	Input of muting sensor x -PNP
MSxN	Input of muting sensor x -NPN
BWSE+	Positive voltage for BWS signals
BWSE-	Negative voltage for BWS signals
BWSxP	Input of BWS channel x - PNP
BWSxN	Input of BWS channel x - NPN
13-14, 23-24, 33-34	Relay safety outputs
63-64	Relay output for activating the BWS
54	Negative internal supply voltage (internally connected to EST-, ESS-, ERK-, BWSE-, MSx-)
73-74	Signal output connects as long as muting is active
OP, O1, O2	Optocoupler outputs

Wiring

- **Supply voltage**
- **Key-operated switch**
- **Muting lamp**
- **Start button**



☞ Connect the key-operated switch to terminals ESS+ and ESS.

☞ Connect the muting lamp to terminals ESS+ and 53.

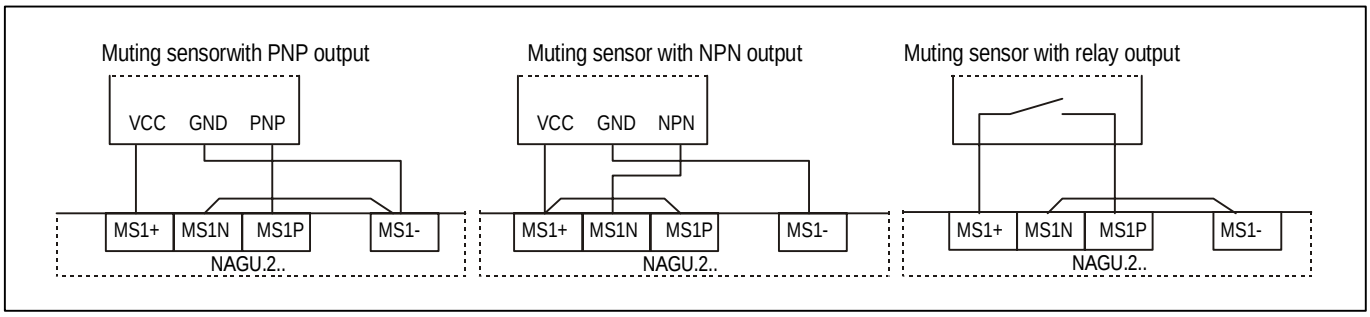
☞ Connect the start button to terminals EST+ and EST.

☞ **Only connect the operating voltage to terminals A1+ and A2- when the remaining wiring has been completely connected.**

Wiring muting sensors

Muting sensors are wired depending on the operating mode, type and number of sensors. Either 2 or 4 muting sensors must be connected to the muting controller. When using two muting sensors, these must be connected to terminals MS1... and MS2... .

☞ Connect the muting sensors in accordance with the instructions below.



MSxP and MSxN must always be connected from the connected muting sensor inputs. If the muting sensor only makes one signal available, the remaining unassigned terminal at the RS-NAGU... must be connected as follows.

☞ Insert a bridge between MSx- and MSxN, when MsxN is unassigned at the RS-NAGU...

☞ Insert a bridge between MSx+ and MSxP, when MsxP is unassigned at the RS-NAGU...

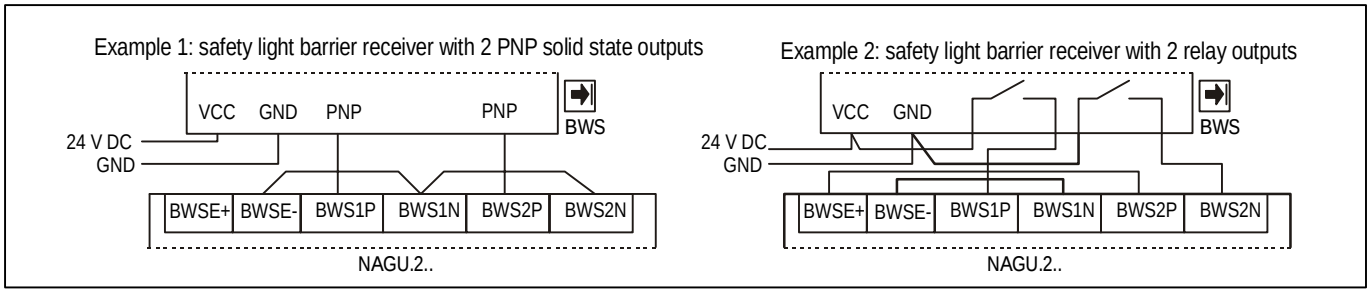
1. **If 4 muting sensors are connected, sensors with the same polarity must be used at the terminals MS1.. and MS4.. / at MS2.. and MS3.. .**
2. **The terminals for MS1../MS4.. and MS2../MS3.. must be laid in separate conted cables.**

Wiring BWS

The precise wiring of the ESPE (BWS) depends on the type and manufacturer. In general, however, the following wiring rules apply:

1. Connect the outputs at the ESPE (BWS)

☞ Connect the outputs of the BWS receiver directly to the inputs of the muting controller (BWS1P, BWS1N, BWS2P, BWS2N) .

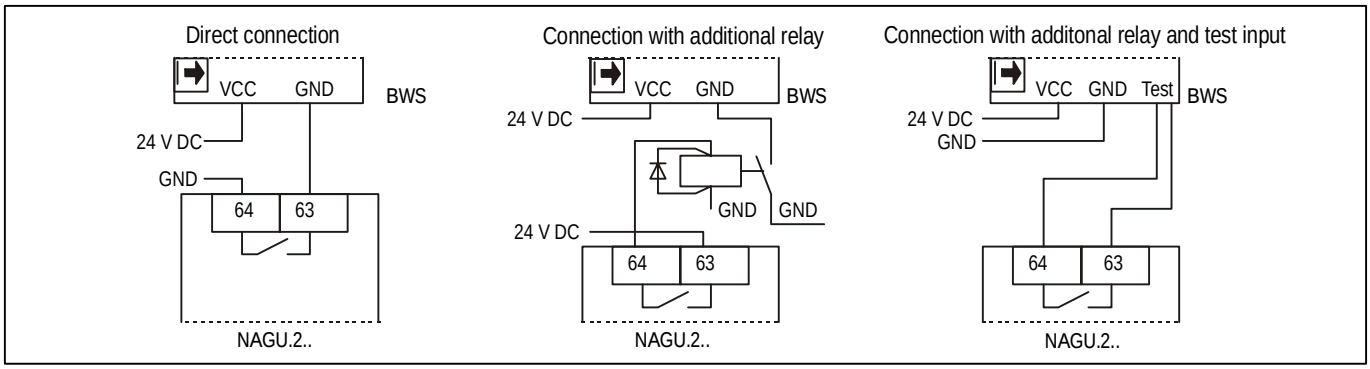


In the case of safety light barriers / light grids with solid-state outputs, the light switching outputs must be used.

2. Connect the operating voltage

☞ Connect the ESPE (BWS) receiver directly to the external power supply.

☞ Connect the ESPE (BWS) transmitter to the muting controller in accordance with the instructions below. The BWS is activated via terminal 63 and 64.



Direct power supply to the transmitter is only admissible if:

- The current consumption is smaller than 2 A and
- The peak current is smaller than 5 A and
- The supply voltage does not fall below 21.6V at this moment in time.

If these values are exceeded, a supplementary relay (e.g. type RS-IR2 from riese electronic) must be interconnected.

⚠ WARNING

The use of external relays without spark suppressors can result in damage to the muting controller. For this reason, always connect external relays with a spark quenching diodes, e.g. type 1N4007.

Wiring safety outputs

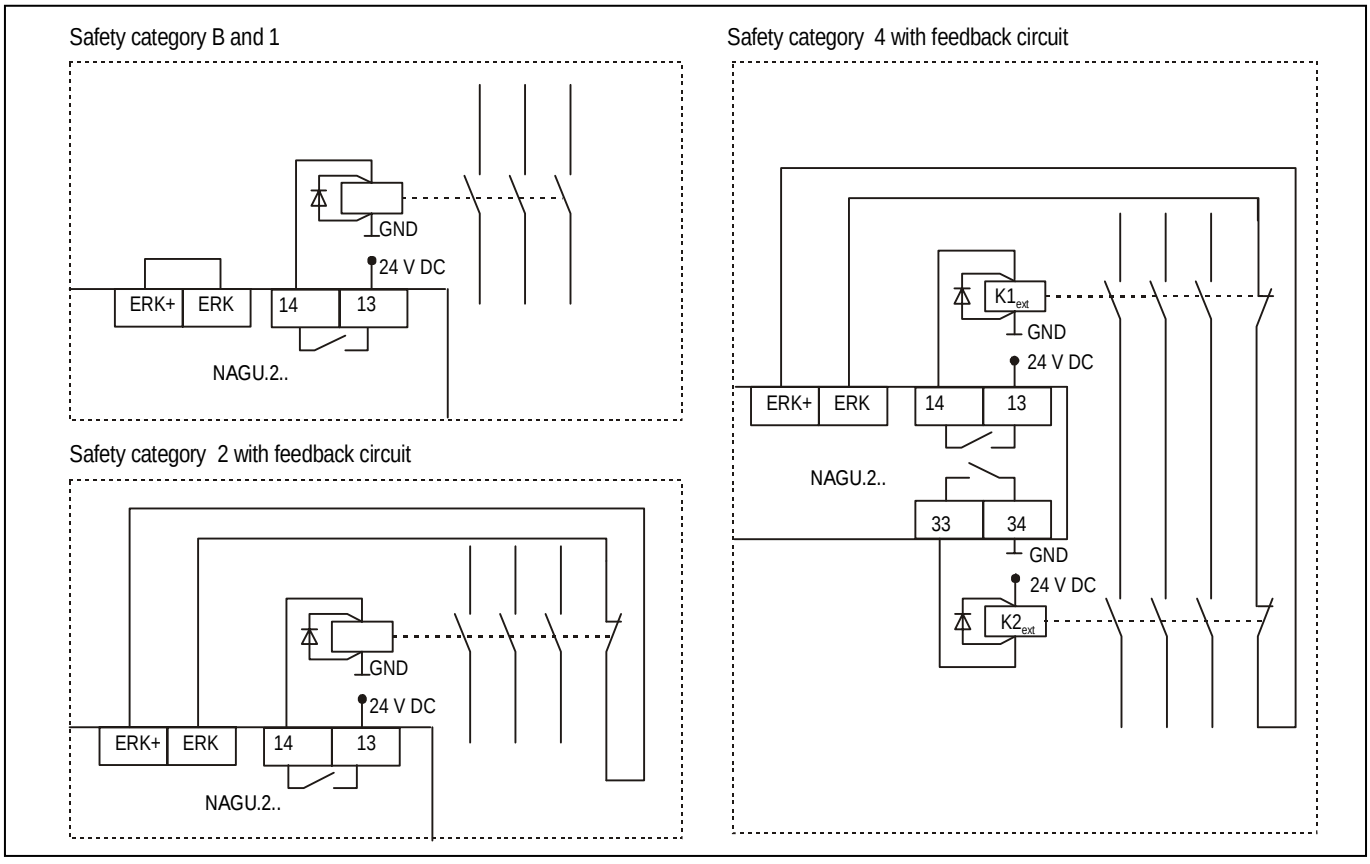
The safety outputs must be electrically integrated in accordance with the category as specified by EN 13849-1 and DIN EN 60204-1.

The terminals 13-14, 23-24 and 33-34 are safety relay outputs. If the muting controller has started and the light beam of the BWS is unobstructed, the outputs will also be connected. In the deactivated status, the outputs are open.

Expansion modules RS-NAGX5 are provided in order to expand the safety outputs. For wiring details, see page 13.

To expand the safety outputs, relay with positive guided contacts are also admissible.

Depending on the category, the following wiring arrangements must be executed.



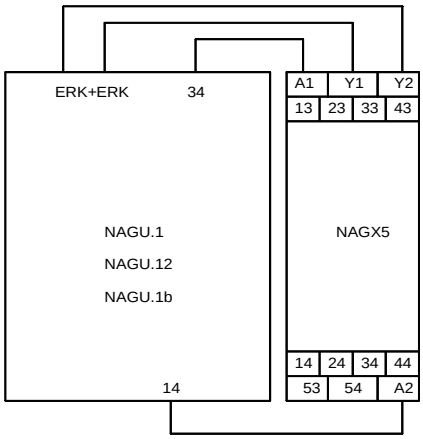
⚠ WARNING

The use of external relays without a recovery diodes can result in damage to the muting controller. For this reason, always connect external relays with a recovery diode, e.g. type 1N4007.

Wiring feedback circuit

Using the feedback circuit, it is possible to monitor the statuses of these modules via the n.c. contact of an external contactor or of the expansion module, for example, the RS-NAGX5 from riese electronic.

☞ Connect the expansion module in accordance with the following circuit diagram.

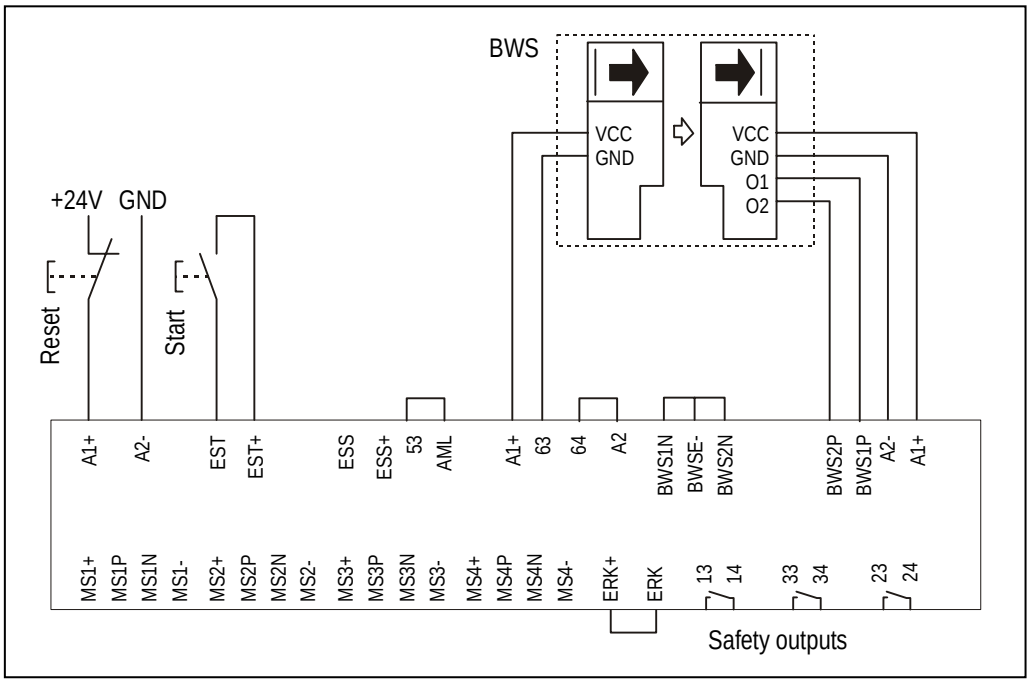


Usage as a controller for safety light barriers

Function

The muting controller NAGU.2f can also be used as a controller for safety light barriers. In this case, the inputs for the muting sensors remain unconnected. The key-operated switch and muting lamp are not connected. A bridge must be inserted between the terminals 53 and AML. After the start, the outputs 13-14, 23-24 and 33-34 are connected. Other functions of the device are not affected.

Circuit diagram

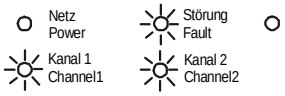


Maintenance and repair

The muting controller works maintenance free.

In the device RS-NAGU.2f, the terminal blocks are not detachable.

Troubleshooting



The muting controller is equipped with comprehensive troubleshooting functions. If an error is discovered, one or both LED's of channel 1 and channel 2 begin to flash. Thereby it's possible that under certain circumstances both LED's indicate different errors. The error code can be read off by the flashing LED's.

Example:

The channel 1 LED flashes 9 times (code 9) channel 2 LED flashes once (code 1)

⇒ channel 1 LED indicates the error "Muting lamp interrupted" and

⇒ channel 2 LED indicates the error "Inequality of the two channels".

At the same time, the fault LED lights.

Tip: If both LED's are alight, the flashing code can be more easily read by covering over the other LED.

On the next page, you will find a breakdown of all flashing codes with the relevant explanations, their possible causes and actions which can be initiated to remove the failure.

1. **In case of an error, also check the supply voltage. At terminals A1+ and A2- 24 V DC must be available also after connecting all consumers to this supply voltage.**
2. **When switching devices or light barriers, the voltage must not drop below 21.6 V DC.**

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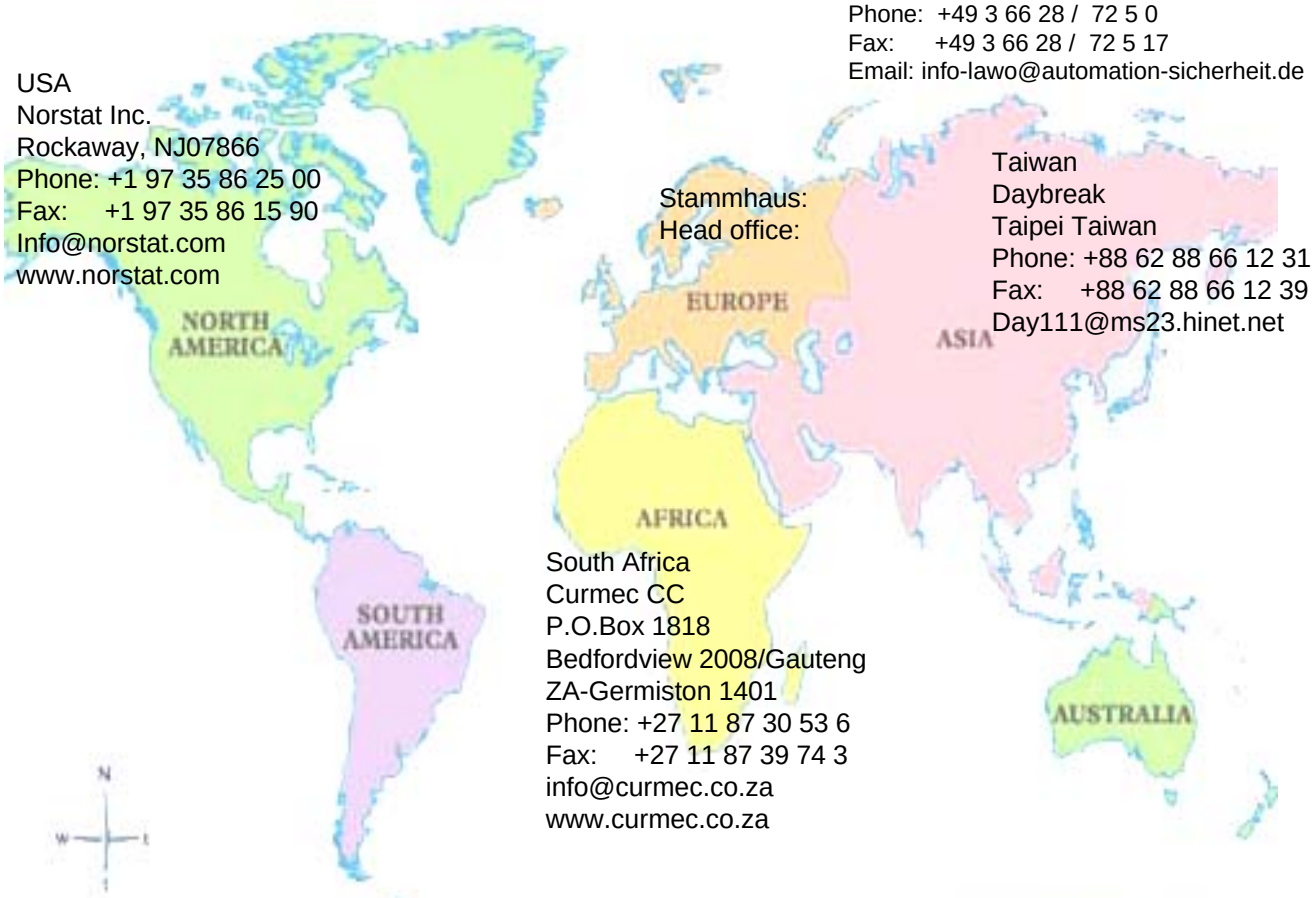
Deutschland
Stammhaus: / Head office
Junghansstr. 16
D-72160 Horb am Neckar
Phone: +49 74 51 / 55 01 0
Fax: +49 74 51 / 55 01 70
info@riese-electronic.de
www.automation-safety.de
www.automation-safety.com

Serviceadresse für ganz Europa /
servic adress for europe
Niederlassung Ost Langenwolschendorf /
Langenwolschendorf branch
Dr.-Riese-Str. 1
D-07937 Langenwolschendorf
Phone: +49 3 66 28 / 72 5 0
Fax: +49 3 66 28 / 72 5 17
Email: info-lawo@automation-sicherheit.de

USA
Norstat Inc.
Rockaway, NJ07866
Phone: +1 97 35 86 25 00
Fax: +1 97 35 86 15 90
Info@norstat.com
www.norstat.com



Stammhaus:
Head office:

Taiwan
Daybreak
Taipei Taiwan
Phone: +88 62 88 66 12 31
Fax: +88 62 88 66 12 39
Day111@ms23.hinet.net

South Africa
Curmec CC
P.O.Box 1818
Bedfordview 2008/Gauteng
ZA-Germiston 1401
Phone: +27 11 87 30 53 6
Fax: +27 11 87 39 74 3
info@curmec.co.za
www.curmec.co.za

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Please ask for our additional information on:

- •Zeitrelais / time-delay relays
- •Messrelais / measuring relays
- •Sicherheitsrelais / safety relays
- •Kundenspezifische Entwicklung und Fertigung elektronischer Baugruppen/ custom-made designs and the fabrication of electronic subassemblies
- •Leitfaden für eine partnerschaftliche Elektronikfertigung / (only in German)

riese automation & safety

EG-Konformitätserklärung

EC Declaration of Conformity

RS-NAGU.1, RS-NAGU.12 und RS-NAGU.2f

Der Hersteller
The manufacturer

riese electronic gmbh,
Junghansstraße 16
D-72160 Horb am Neckar
Tel.: +49 (0) 74 51/5501-0

erklärt hiermit, dass folgendes Produkt
hereby declares that the following product

Produktbezeichnung *product name*	Sicherheitsschaltgeräte für berührungslos wirkende Schutzeinrichtungen, Mutingschaltgeräte *Safety controller for safety light curtains and light barriers, muting controller*
Typenbezeichnung *type designation*	RS-NAGU.1, RS-NAGU.12 und RS-NAGU.2f

allen einschlägigen Bestimmungen der Richtlinie **Maschinen (2006/42/EG)** entspricht.
Die unvollständige Maschine entspricht zusätzlich den Bestimmungen der Richtlinien **Elektrische Betriebsmittel (2006/95/EG)** und **Elektromagnetische Verträglichkeit (2004/108/EG).**
Die Schutzziele der Niederspannungsrichtlinie wurden gemäß Anhang I, Nr. 1.5.1 der Richtlinie **Maschinen (2006/42/EG)** eingehalten.
*is conform to all relevant regulations of the directive **Machinery (2006/42/EC).***
*The partly completed machinery conforms additionally the directives **Low Voltage Directive (2006/95/EC)** and **Electromagnetic Compatibility (2004/108/EC).***
*The protection goals of the low voltage directive were maintained according to Appendix I, No. 1.5.1 of the directive **Machinery (2006/42/EC).***

Folgende harmonisierte Normen und Richtlinien wurden angewandt:
The following harmonised standards were applied:

EN ISO 13849-1:2008	Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen Teil 1: Allgemeine Gestaltungsgrundsätze	*Safety of machinery - Safety-related* *parts of control systems -* *General principles for design*
EN 60204-1:2006	Sicherheit von Maschinen- Elektrische Ausrüstung von Maschinen Teil 1: Allgemeine Anforderungen	*Safety of machinery -* *Electrical equipment of machines -* *General requirements*
Richtlinie 2006/42/EG *Directive 2006/42/EC*	Maschinen	*Machinery*
Richtlinie 2006/95/EG *Directive 2006/95/EC*	Elektrische Betriebsmittel	*Low Voltage Directive*

Die Maschine wurde von folgenden Prüfinstituten validiert:
The partly completed machine was validated by the following testing institutes:

TÜV NORD / Hannover
Am TÜV 1
30519 Hannover
Prüfbericht
certificate:
44 205 09 376463-009

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine in die die unvollständige Maschine eingebaut wird, den Bestimmungen der Richtlinie **Maschinen (2006/42/EG)** entspricht.
*The partly completed machine must not be put into operation until the final machinery into which it is to be assembled has been declared in conformity with the regulation of the directive **Machinery (2006/42/EC),** where appropriate.*

Die relevanten technischen Unterlagen wurden gemäß Anhang VII Teil B erstellt. Sie werden einzelstaatlichen Stellen auf begründetes Verlangen elektronisch oder postalisch übermittelt.
In response to a reasoned request by national authorities, relevant information on the partly completed machinery will be sent electronically or postal.

Dokumentationsbevollmächtigter ist:
Person that is authorized to compile the relevant technical documentation is:

Dipl. Ing. (TH) Helmut Geselle,
Tel.: +49 (0) 74 51/5501-0
Junghansstraße 16
D-72160 Horb am Neckar

Horb am Neckar,
9.5.11
Datum / *date*:

O. Riese
Unterschrift / *signature* - Oliver Riese, Geschäftsführer riese electronic gmbh / *managing director*