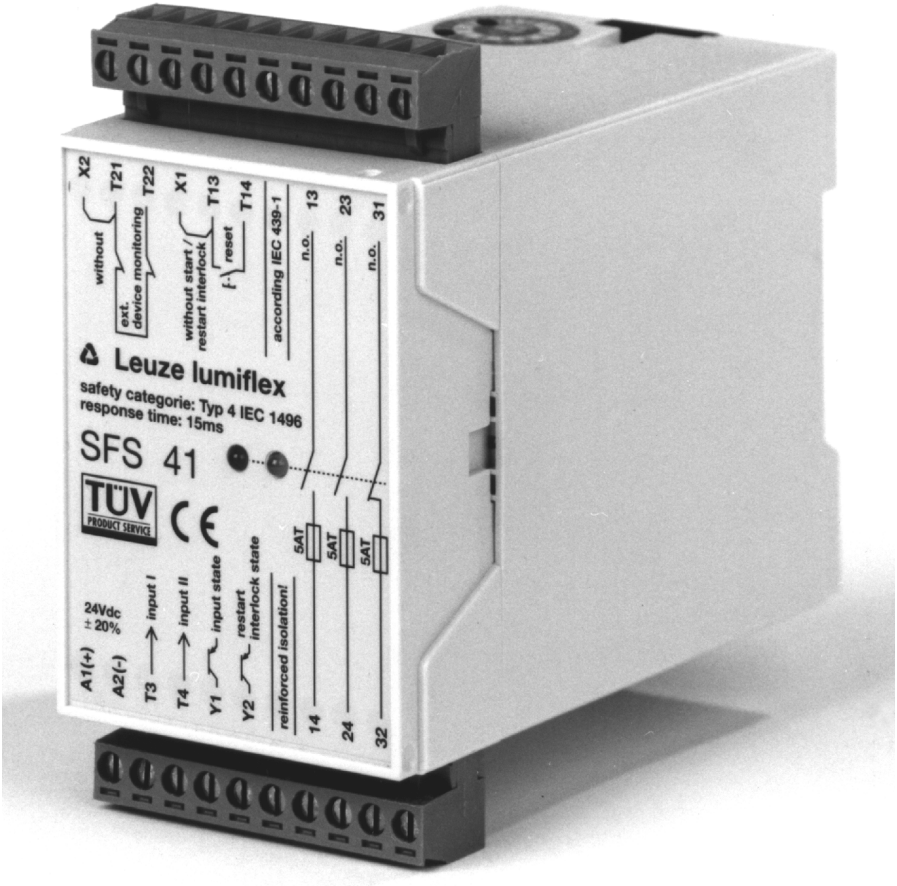
SFS 41

Sicherheitsfolgeschaltung
Anschluß- und Betriebsanleitung

Safety sequential circuit
Connection and Operating Instructions



Notes on using these connection and operating instructions

This manual contains information regarding the proper and effective use of the SFS 41. It is included with the delivery of every SFS 41.

Safety precautions and warnings are designated by the symbol  .

Leuze lumiflex GmbH + Co. KG is not liable for damage resulting from improper use of its equipment. Familiarity with these instructions constitutes part of the knowledge required for proper use.

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1 System Overview and Possibilities for Use

1.1 General

The SFS 41 Safety Sequential Circuit serves as a connection between active optoelectronic protective devices (AOPD) and the machine controller. The module can perform such simple control functions as “restart interlock” and “input control” optionally, and serves at the same time to convert electronic sensor outputs into potential-free relay outputs. Furthermore, the SFS 41 also has signal outputs to display the sensor state and the interlock state of the restart interlock. The SFS 41 complies with Safety Category 4 in accordance with IEC 61496-1 and EN 61496-1. The 24 V DC circuits are insulated from the AC circuits by reinforced insulation according to IEC 439-1 up to a testing voltage of 4 KV. The acknowledge switch for unlocking the restart interlock is dynamically monitored.

1.2 Approvals

EC Type Testing (Europe)
TÜV Product Service GmbH
Ridlerstraße 31
80339 München

North America
Application for UL and C(UL)
approval submitted

2 Safety Instructions

2.1 General Dangers In the Case of Non-Observance of the Safety Instructions

Leuze lumiflex products are developed and manufactured with careful application of recognised rules of engineering and technology. The protective function of the devices can nevertheless be restricted if the devices are not used properly or in accordance with their intended use. In this case, danger can result for the life and limbs of the persons operating the machine.

2.2 Conditions of Installation and Proper Use

The applicable regulations for the safety of mechanical equipment apply to the installation and use of the SFS 41. The responsible local authorities (for example, Workman’s Compensation Board, OSHA, ANSI) are available to answer technical safety questions. In general, the following conditions for installation and use are to be complied with:

- Cutoff function must be guaranteed even when a relay of SFS 41 is defect. The guarantee cutoff function at least two relays outputs must be integrated into the cutoff path of machine control (see figure 2).

- Cross-connections between the sensor outputs are not detected by the SFS 41 and must be prevented through suitable line routing. (Applies only if SFS41 is not used in connection with COMPACT, since COMPACT for its part already exposes cross-circuits.)
- The “input state” and “restart interlock state” signal outputs are not suitable for the switching of safety-related signals.
- The electrical connection is to be performed by knowledgeable technical personnel.
- The acknowledge switch „reset“ for unlocking the restart interlock must be positioned in such a way that the entire danger area can be seen from the place where the acknowledge switch is mounted. You must not be able to reach the button from the danger area.

3 Structure and Function

3.1 System Overview

SFS 41 features positively driven relays and dynamic, self-monitoring circuitry. Sensor signals on the inputs “input I” and “input II” are checked for equality and displayed via the signal output “input state”. Depending on which function has been selected, SFS 41 outputs either switch automatically to ON (“without start/restart interlock) or stay on OFF until the acknowledging button ”reset“ has been pressed and released again. Two closing contacts and one opening contact serve as output contacts. The status of the output contacts is shown via two LEDs and the signal output “restart interlock state”.

3.2 Relay monitoring

The function „relay monitoring“ monitors the downstream contactors or relays for SFS 41 (see figure 2). Each time before the output relays of SFS 41 are switched on, it checks whether the downstream circuit elements are released. If this is not the case, the relay outputs of SFS 41 remain in off-condition.

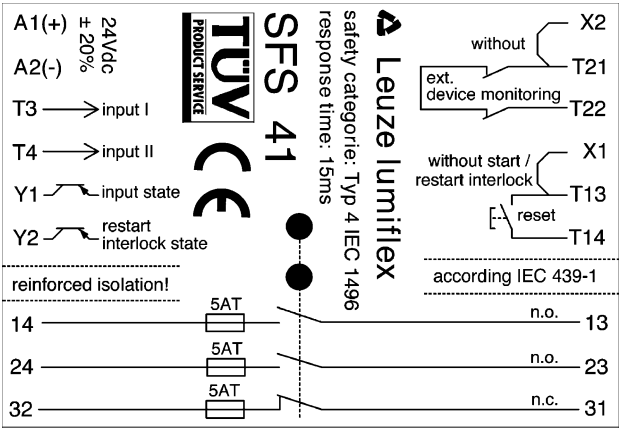


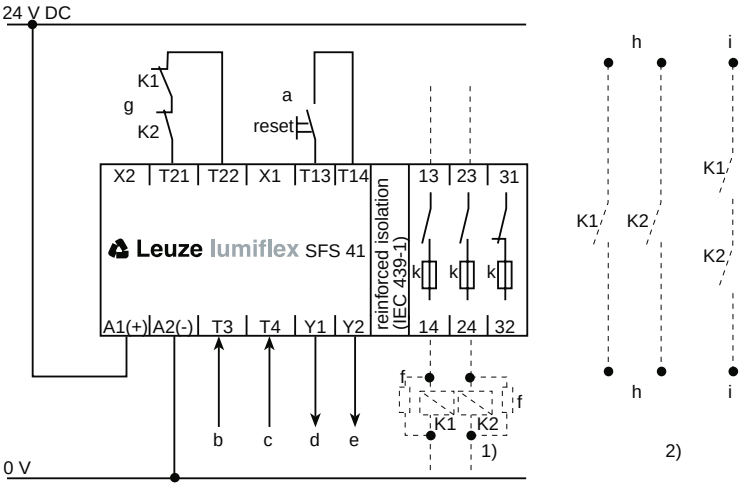
Fig. 1 SFS 41 film label

4 Electrical Installation

4.1 Installation Regulations

The General Safety Instructions in Chapter 2 are to be observed. The electrical installation is to be performed by properly trained technical personnel.

The plug-in terminal strips permit a connection cross-section of up to 2.5 mm∑. The distribution voltage supply line (A1) has to be protected by a fuse 0,5 AT. If the "start/ restart interlock" or "input state" functions are not required, the T13-X1 or T21-X2 wire bridges are to be inserted.



a = Command device for releasing the restart interlock
b = AOPD output 1 (pnp or normal open contact)
c = AOPD output 2 (pnp or normal open contact)
d = Signal output sensor status (= 24 V, if T3 and T4 = 24 V)
e = Signal output restart interlock state (= 24 V, if restart interlock is locked)
f = Suitable spark quenching element necessary
g = Feedback loop for relay monitoring
h = Switching off paths with two channel control
i = Switching off path with one-channel control
j = Fuse 5 Amp (medium responsive)
k = Fuse internal, 5 AT
l = Fuse external, 0,5 AT
1) = If SFS 41 and K1, K2 are in separate housings a suitable line installation is necessary to avoid cross circuits.
2) = If no external switching elements are used, contacts 13 - 14 and 23 - 24 must be used instead of K1 and K2.

Fig. 2 FS 41 connecting plan with restart interlock and external device monitoring

5 Technical Data and Dimensional Drawings

Classification	Type 4 according to prEN 61496-1 and IEC 61496-1
Supply voltage	24 V DC +/- 20 % External supply unit with safe disconnection from the mains
Power input	250 mA max (status outputs included)
Response time	15 ms
Restart time	50 ms
Enclosure rating	IP 20, installation in the control cabinet with protective system IP54 necessary
Operating modes	Via wire bridges can be selected: with/without restart interlock with/without relay monitoring
Voltage / current	250 V / 4 A
Electrical durability	at 250 V / 4 A $\cos\varphi = 1 > 3 \times 10^5$ at 250 V / 4 A $\cos\varphi = 0.5 > 2 \times 10^5$
Relative humidity of air	... 93%
Ambient temperature	0 ... +55 ˚C
Storage temperature	-25 ... +75 ˚C
Inputs	Two channel sensor signal (fail-safe pnp or potential free normal open contacts) button “reset” to release restart interlock feedback loop for relay monitoring
Insulation	Reinforced insulation according to ICE 439-1
Safety outputs	Positive guided relay contacts 4A AC, DC, 2 normal open contacts, 1 normal closed contact (fused with 5 Amp, medium responsive) Always use at least two contacts for error protection
Fuse	5 AT
Status outputs	2 pnp-outputs 24 V DC, 50 mA – status of sensor – status of restart interlock
Connection technology	Plug-in screw terminal strips ur to 2.5 mm^2
Display elements	2 LED red, green for relay status
Protection class	II
Measurements	Width 55 mm, height 75 mm, depth 105 mm

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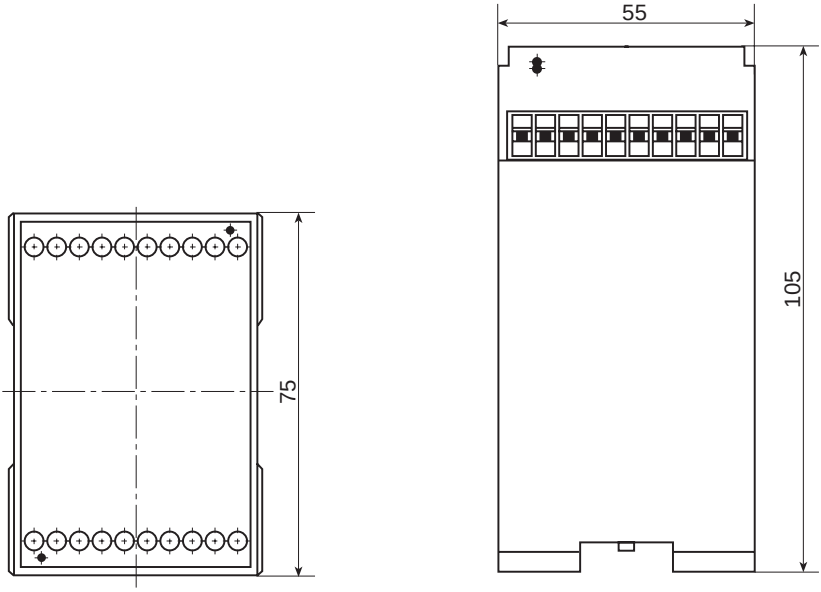

Fig. 3 Dimensional Drawing SFS 41

6 Order Details

SFS 41, Order No. 560011

7 Declaration of Conformity

Leuze lumiflex

EC Declaration of Conformity

according to EC Machine Directive 98/37/EEC, Annex II C

We herewith declare,	Leuze lumiflex GmbH + Co. KG Liebigstr. 4 82256 Fürstenfeldbruck

that the following described safety component in our delivered version complies with the appropriate basic safety and health requirements of the EC Machinery Directive 89/392/EEC based on its design and type, as brought into circulation by us. In case of alteration of the safety component, not agreed upon by us, this declaration will lose its validity.

Description of the Safety Component:	safety sequential circuit
Safety Component Type:	**SFS 41**
Serial Number:	see type plate
Classification:	AOPD type 4 (IEC 61496-1)
Safety Function:	safety sequential circuit according to classification type 4 (IEC 61496-1)
Examination Basis:	EC Machinery Directive 98/37/EEC EC Directive of Electromagnetic Compability 89/336/EEC EC Low Voltage Directive 73/23/EEC IEC 61496-1 / 08.97 DIN EN 60204-1 / 06.93 (as far as applicable) prEN 50178 / 11.94 EN 55022 / 05.95
Notified Body according to annex VII	TÜV Product Service GmbH Ridlerstraße 31 80339 München
Responsible for:	EC type-examination Certificate no. **M 6 98 01 22795 008**
Technical Report:	LM 51818

Fürstenfeldbruck, 15. März 2002

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Michael Heyne
Vorsitzender des Verwaltungsrats: Meinert Hahnemann