

# Dold UG6980 Series Safety Relay With Selectable Function



Designed to protect people and machines in applications with various safety devices.

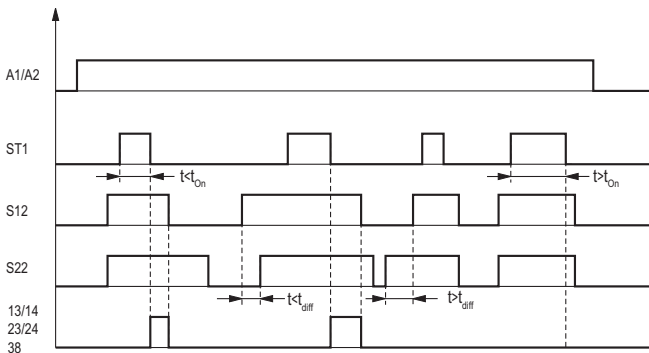
- Adjustable safety functions (power off before selecting the desired function):
  - E-Stop
  - Safety gate
  - Two-hand control
  - Safety mat / Safety edge
  - Exclusive XOR contacts
  - Light curtain

- According to:
  - Performance Level (PL) e and category 4 to EN ISO 13849-1: 2008
  - SIL Claimed Level (SIL CL) 3 to IEC/EN 62061
  - Safety Integrity Level (SIL) 3 to IEC/EN 61508 and IEC/EN 61511
  - Acc. to EN 50156-1 for furnaces
- Line fault detection on pushbutton:
- Manual restart or automatic restart
- With or without cross fault monitoring
- 2-channel
- Forcibly guided output contacts
- Output: 2 N.O. contacts per safety function
- One semiconductor output per safety function
- LED indicator for operation, safety function 1, 2 and failure
- Pluggable terminal blocks for easy exchange of devices
- Two PNP sensor inputs only

Safety Data – Values per EN ISO 13849-1	
Category	4
Performance level	PLe
MTTF <sub>d</sub>	>100 years
DC <sub>avg</sub>	99%
Safety Data – Values per IEC/EN 62061 /IEC/EN 61508	
SIL CL	3
SIL	3
HFT (Hardware Failure Tolerance)	1
DC <sub>avg</sub>	99%
SFF	99.7%
PFH <sub>D</sub>	1.88E-10 h <sup>-1</sup>

Safety Relays Selection Chart				
Part Number	Price	Marking Type	Voltage	Outputs
<b>UG6980-02PS-61-24</b>	\$176.00	Safety relay module	24VDC	2 N.O. positive guided safety contact(s), 1 N.O. monitoring contact(s)

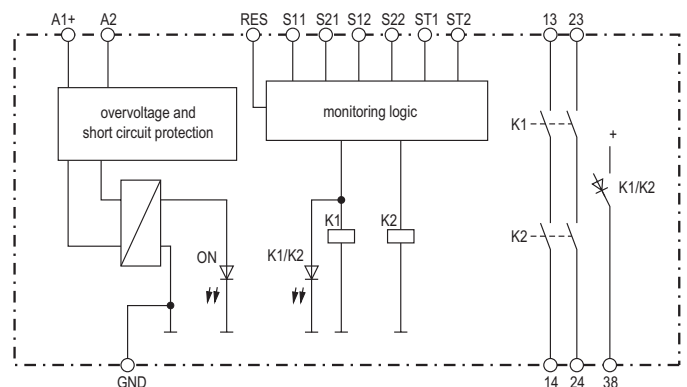
## Function Diagram



$t_{diff}$ : max. time delay for simultaneity demand dependent on selected safety function  
 E-Stop, safety gate, safety mat  $t_{diff}$ : max. 3s  
 Light curtains  $t_{diff}$ : max. 1s  
 Two-hand control  $t_{diff}$ : max. 0,5s  
 other times on request

$t_{on}$ : max. actuation time of start button  
 Standard  $t_{on}$ : max. 3s  
 other times on request

## Block Diagram



# Dold UG6980 Series Safety Relay With Selectable Function

Dold UG6980 Series Safety Relay with Selectable Function Specification Table	
<b>General Specifications</b>	
<b>Temperature</b>	Storage: -25°C to 85°C (-13°F to 185°F) Operating: -15°C to 55°C (5°F to 131°F)
<b>Altitude</b>	<2,000 meters
<b>Vibration Resistance</b>	Amplitude: 0.35mm, Frequency: 10 to 55 Hz (IEC/EN 60-068-2-6)
<b>Degree of Protection</b>	Per IEC/EN 60 529. Housing: IP40; Terminals IP20
<b>Housing</b>	UL 94V-0 Thermoplastic; DIN mount 35mm x 7.5 mm
<b>Weight</b>	210g (7.40 oz.)
<b>Terminal Designation per EN 50 005 Wire Connections</b>	1x4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled (isolated) or 2 x 1.5 mm <sup>2</sup> stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2.5 mm <sup>2</sup> solid DIN 46 228-1/-2/-3/-4
<b>Wire Fixing</b>	Terminal screws M3.5 box terminals with wire protection.
<b>Wire Connection</b>	60degC/75degC Copper conductors only; AWG20-12 Sol/Str Torque 0.5NM
<b>Input Specifications</b>	
<b>Nominal Voltage</b>	24VDC
<b>Voltage Range</b>	At 10% residual ripple: 0.8 to 1.1 U <sub>N</sub>
<b>Maximum Consumption</b>	DC approx. 1.9W
<b>Nominal Frequency</b>	Not applicable
<b>Minimum Off-time</b>	250ms
<b>Control Voltage on S11, S21, S31, S41 At UN</b>	20VDC pulsed, 10ms ON, 10ms OFF
<b>Control Current Over S12, S22, S32, S42</b>	Typ. 8mA at UN; Safety mats: Typ. 15mA at U <sub>N</sub>
<b>Min. Voltage on S12, S22, S32, S42 (relay activated)</b>	10VDC
<b>Short Circuit Protection</b>	Internal with PTC (Positive Temperature Coefficient resistor)
<b>Overvoltage Protection</b>	Internal VDR (Voltage Dependent Resistor)
<b>Output Specifications</b>	
<b>Electrical Contact Life</b>	AC 15 at 5A, 230VAC: > 2.2x10 <sup>5</sup> switching cycles
<b>Mechanical Life</b>	> 20x10 <sup>6</sup> switching cycles
<b>Contact Type</b>	2 positive guided N.O. safety contacts
<b>Operate Delay</b>	Manual start: 30ms; automatic start: 350ms
<b>Release Delay</b>	Disconnecting the supply: AC units: 150ms; DC units: 50ms Disconnecting S12, S22: AC units: 130ms. DC units: 50ms
<b>Nominal Output Voltage</b>	AC: 250V; DC: See continuous current limit curve in installation manual.
<b>Thermal Current (I<sub>th</sub>)</b>	Max. 8A. See quadratic total current limit curve in installation manual.
<b>Short Circuit Strength</b>	Max. fuse rating: 6A gL (IEC/EN 60 947-5-1); Line circuit breaker: B 6A
<b>Switching Capacity (IEC/EN 60 947-5-1)</b>	AC 15: N.O. contacts: 3A/230V; N.C. contacts: 2A/230V DC 13: N.O. contacts: 4A/DC24V. 0.5A/110V; N.C. contacts: 4A/24V; DC 13: N.O. contacts: 8A/24V >25x103. ON: 0.4 s, OFF: 9.6 s
<b>Switching Frequency</b>	Max. 1200 switching cycles/hr
<b>Agency Approvals and Standards</b>	CSA, cULus file E107778, CE, RoHS, TUV

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page at [www.automationdirect.com](http://www.automationdirect.com)

## Settings

### Setting

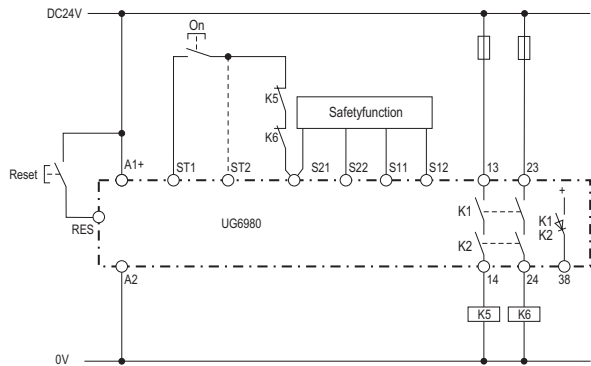
On the variant /0\_ \_ the safety function can be set via rotary switch.

Possible functions:

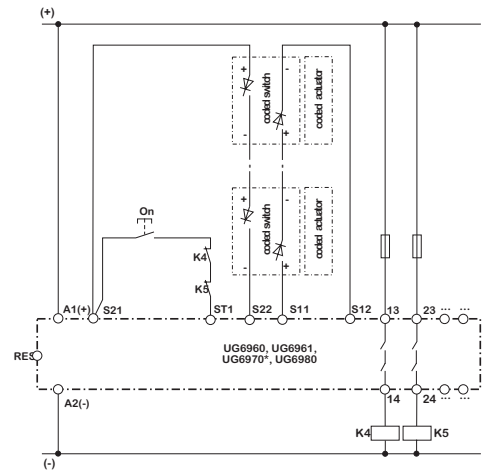
Fct.	Safety function	
1	E-Stop	cross fault detection
2	Safety gate	
3	Two-hand control	
4	Safety mat / Safety edge	
5	Exclusive or contacts	
6	E-Stop	without cross fault detection
7	Safety gate	
8	Light curtain	

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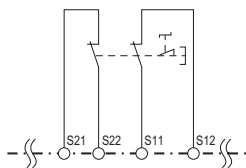
## Applications



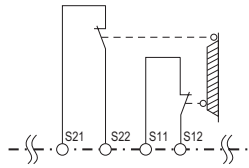
Safety function: see below, Manual-Start (for automatic start make a bridge to ST2 instead of ON button).



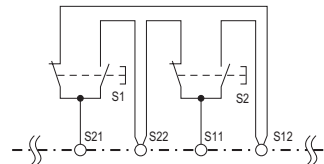
\*UG6970: The safety function 2 is connected as well as safety function 1, but S11≠ S31, S12 = S32, S21 = S41, S22 = S42 and ST1 = ST2



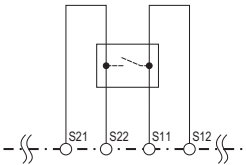
Fct.: E-stop (1), with cross fault detection SIL 3, PL e, Cat. 4



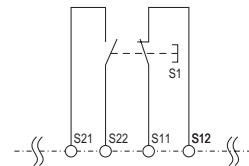
Fct.: Safety gate (2), with cross fault detection SIL 3, PL e, Cat. 4



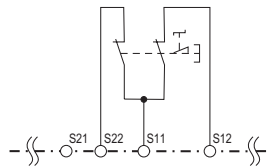
Fct.: Two-hand control (3), with cross fault detection SIL 3, PL e, Cat. 4 Type III C to EN 574



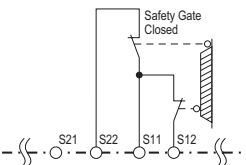
Fct.: Safety mat / Safety edge (4), with cross fault detection SIL 3, PL e, Cat. 4



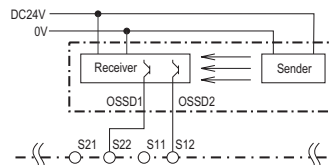
Fct.: Exclusive XOR contacts (5), with cross fault detection SIL 3, PL e, Cat. 4



Fct.: E-Stop (6), without cross fault detection SIL 3, PL e, Cat. 4 <sup>1)</sup>



Fct.: Safety gate (7), without cross fault detection SIL 3, PL e, Cat. 4 <sup>1)</sup>



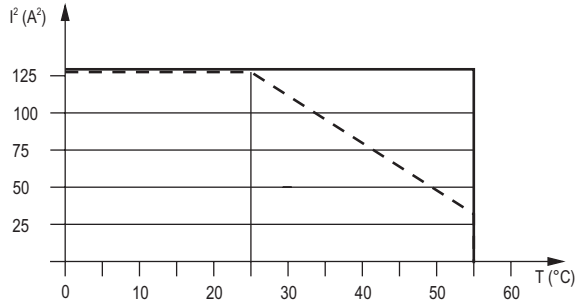
Fct.: Light curtain (8), without cross fault detection SIL 3, PL e, Cat. 4 <sup>2)</sup>

<sup>1)</sup> To achieve the stated safety classification the wiring has to be done with crossfault monitoring.

<sup>2)</sup> To achieve the stated safety classification light curtains with selftest (type 4) according to IEC/EN 61496-1 have to be used.

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## Characteristic Curves



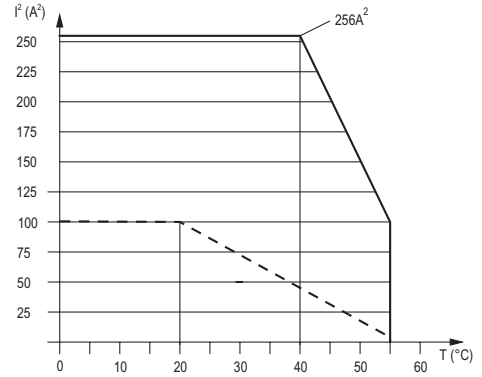
— device free-standing  
max. current at 55°C over  
2 contact path =  $8A \triangleq 2 \times 8^2 A^2 = 128A^2$

- - - device mounted without distance heated by  
devices with same load,  
max. current at 55°C over  
2 contact path =  $4A \triangleq 2 \times 4^2 A^2 = 32A^2$

$$\sum I^2 = I_1^2 + I_2^2$$

$I_1, I_2$  - current in contact paths

UG 6980.02  
Quadratic total current limit curve



— device free-standing  
max. current at 55°C over  
4 contact path =  $5A \triangleq 4 \times 5^2 A^2 = 100A^2$

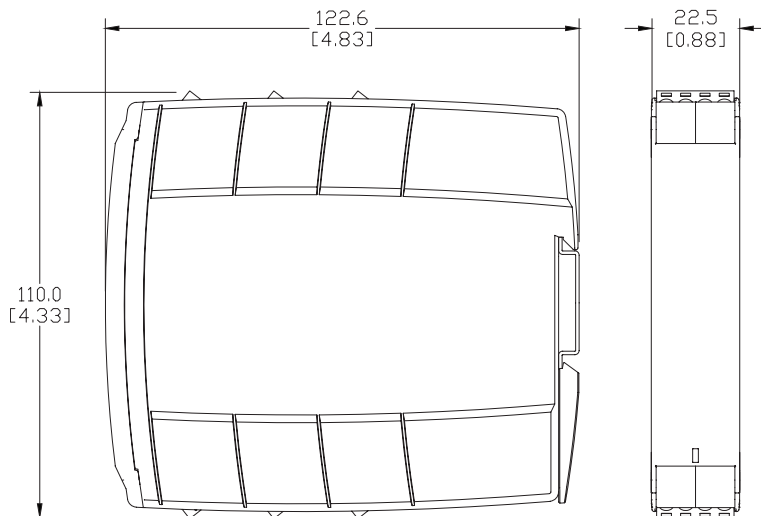
- - - device mounted without distance heated by  
devices with same load,  
max. current at 55°C over  
4 contact path =  $1A \triangleq 4 \times 1^2 A^2 = 4A^2$

$$\sum I^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2$$

$I_1, I_2, I_3, I_4$  - current in contact paths

Quadratic total current limit curve output contacts

## Dimensions mm(in)



## Connection Terminals

Terminal designation	Signal designation
A1 +	DC 24 V
A2	0 V
13, 14, 23, 24, 43, 44, 53, 54	Forcibly guided NO contacts for release circuit
38	Semiconductor monitoring output
GND	Reference potential for Semiconductor monitoring output
S11, S21	control output
S12, S22, ST1, ST2, RES	control input

See our website: [www.AutomationDirect.com](http://www.AutomationDirect.com) for complete Engineering Drawings.

# Safety Products



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