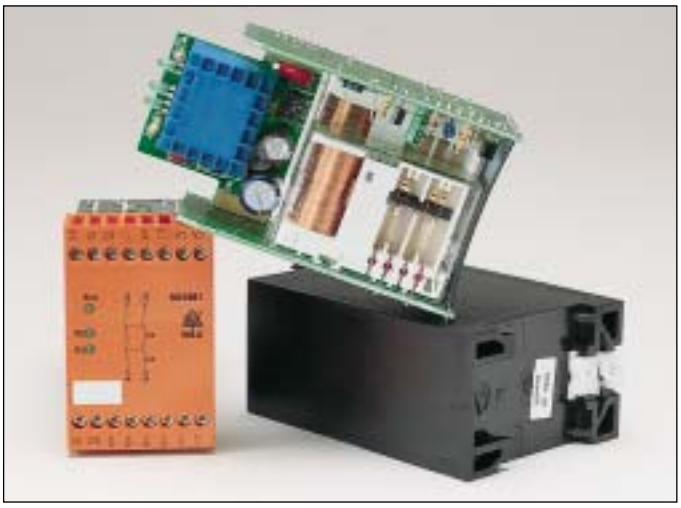
Contents

Applications

Safety relays with forced-guided contacts are the core components for safety devices and are indispensable when designing safety circuits. Safety devices are designed to protect man and machine as demanded in OSHA CFR 1910 Regulations “General Requirements for All Machinery”, and which is a mandatory requirement of the European Machinery Directive EMD 89/392 EEC.

DOLD safety relays are approved for use in safety applications to IEC 60204, EN 60204, DIN/VDE 0113, such as:



Typical Applications

- Emergency stop modules
- DIN Rail safety modules
- Safety door controls
- Two-hand operating devices
- Pressure mat controls
- Light barriers and curtains
- Speed controls
- Monitoring devices

Equipment controls systems for:

- Elevators and escalators
- Cranes
- Door and gate drive systems
- Printing and textile machinery
- Robots
- Stamping machines
- Medical equipment
- Cutting machines
- Rail transportation systems
- Signaling systems

WARNING

Improper use and installation of safety relays - modules into safety related circuitry without complying with the applicable regulations can cause serious injury to the operator.

Due to the wide range of potential users and customers’ interpretation of the standards covering the applications of the safety relays described in this brochure, it is impossible for DOLD personnel or sales agents to be familiar with all safety and health standards and requirements that may apply to any specific application.

It is the responsibility of the user to determine the suitability of a safety relay for the intended application and to determine that the safety relay chosen and its installation will comply with all applicable safety and health regulations and codes.

DOLD SAFETY MODULES

Safety Modules are a mandatory requirement of European Machinery Directive EMD 89/392 EEC. This requirement is for risk reduction purposes in order to protect personnel and machinery. Built for the International Market and Global Machine Design, all fail-to-safe modules are designed with Dual Logic Circuits, each of which provides a safety function carried out by safety relays with forced guided contacts.

USA CANADA GERMANY SWITZERLAND SWEDEN DENMARK

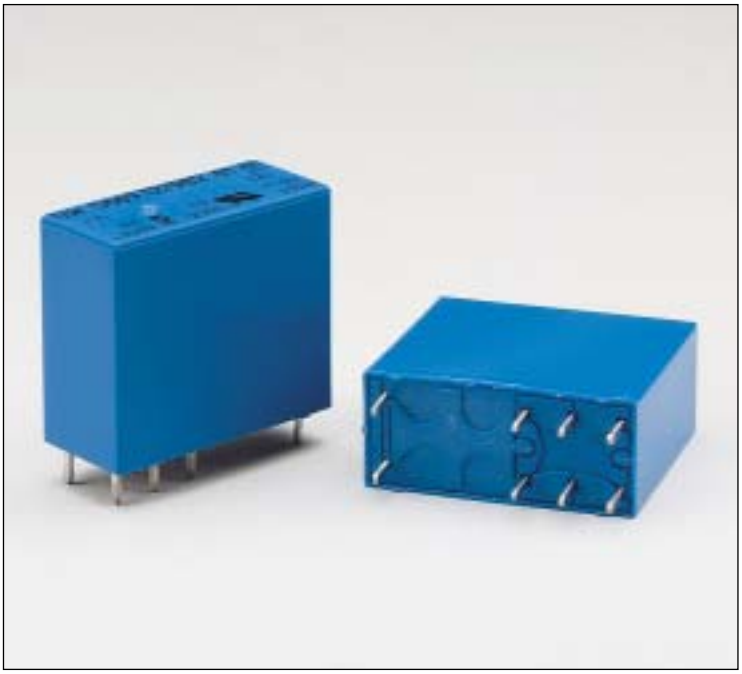
Safety Module Selector Guide

	Application	Features
BN 5983 	Emergency Stop Module Safety Gate Monitor	• Coil Voltage: 24, 48, 110, 127, 230, 240V AC, or 24V DC • Max. Switching Current: 10A • Max. Switching Voltage: 415V AC, 250V DC • Dimension: 100mm • 3 NO output contacts • LED indicator for channels 1 and 2 • Quick disconnect terminal strips • Front mounted fuse (optional)
BD 5987 	Emergency Stop Module Safety Gate Monitor	• Coil Voltage: 24, 48, 110, 127, 230, 240V AC, or 24V DC • Max. Switching Current: 10A • Max. Switching Voltage: 250V AC, 250V DC • Dimension: 45mm • 2 NO output contacts • LED indicator for channel 1, channel 2, and line voltage • Internal overvoltage protection with auto-reset • Line fault detection at ON pushbutton • Cross fault detection (optional)
BO 5988 	Emergency Stop Module Safety Gate Monitor	• Coil Voltage: DC 24V+ AC 48/110/230 or 240V, DC 24V • Max. Switching Current: 10A • Max. Switching Voltage: 250V AC, 250V DC • Dimension: 100mm • 6 NO output contacts • LED indicator for channel 1, channel 2 and line voltage • Internal overvoltage protection with auto-reset • Quick disconnect terminal strips • Line fault detection at ON pushbutton • Cross fault detection (optional) • Time delay optional
BD 5935 	Emergency Stop Module Safety Gate Monitor	• Coil Voltage: 24, 48, 110, 127, 230, 240V AC, or 24V DC • Max. Switching Current: 10A • Max. Switching Voltage: 250V AC, 250V DC • Dimension: 45mm • 3 NO output contacts • LED indicator for channel 1, channel 2 and line voltage • Internal overvoltage protection with auto-reset • Quick disconnect terminal strips • Line fault detection at ON pushbutton • Cross fault and auto-on selection switch located behind front panel
BD 5985N 	Safety Gate Monitor	• Coil Voltage: 24, 42, 110, 230, 240V AC, 24V DC • Max. Switching Current: 10A • Max. Switching Voltage: 250V AC, 250V DC • Dimension: 45mm • 2 NO output contacts • Internal overvoltage protection with auto-reset • Gate closing time 3 s
BD 5980N 	2-Hand Safety Module	• Coil Voltage: 24, 42, 110, 230, 240V AC, 24V DC, 24V DC+ AC • Max. Switching Current: 10A • Max. Switching Voltage: 250V AC, 250V DC • Dimension: 45mm • 2 NO output contacts • Internal overvoltage protection with auto-reset • Simultaneous input closing demand of 500 ms
BN 3081 	Extension Module	• Coil Voltage: 110, 230V AC, UC 24V • Max. Switching Current: 10A • Max. Switching Voltage: 415V AC, 250V DC • Dimension: 100mm • 7 NO output contacts • LED indicator for channels 1 and 2 • Quick disconnect terminal strips

Please call us for other DOLD products

Time Control Relays • Monitoring Relays • Interface Relays • Control Relays

Safety Relay
OA/OW 5669



Features

- 2 output contacts
- International approvals:
  TÜV, SA, CSA, UL, cUL, SUVA
- Quality control check for each safety relay
- Forced-guided contacts, all gold flash plated
- Contact Gap > 0.5 mm throughout life of relay
- Various contact materials,
  mixed contact material optional
- High coil voltage range
- High breakdown Voltage: contact/coil > 4 KV
- High Creeping Distance: contact/coil > 8 mm
- Protection Rating
  OA Version: IP 40
  OW Version: IP 67 washable
- Custom design available,
  -coil voltage -coil resistance,
  -contact pressure -operate/release time

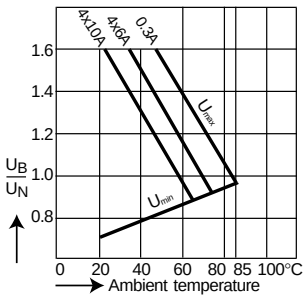
***** Special version available for
85°C ambient temperature

GERMANY SWEDEN USA/CANADA CANADA SWITZERLAND

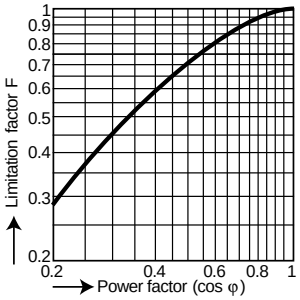
Technical Data

- **Nominal Coil Voltage** .....5, 6, 12, 20, 24, 48, 60, 110, DC
- **Coil Power Dissipation** .....0.7 W
- **Max. Switching Voltage** .....110V DC, 250V AC
- **Max. Switching Current**.....8 A (2 x 5A simultaneous)
- **Max. Switching Power — DC** .....200W (2 x 160W simultaneous)
- **Max. Switching Power — AC** .....2000VA (2 x1250VA simultaneous)
- **Contact Switching Rate** .....10 operations per second
- **Relay Operate Time** .....15 ms
- **Relay Release Time** .....12 ms
- **Operation Vibration** .....0.35 mm Ampl. max @ 10...55Hz, 5g max
- **Contact Arrangements**.....1NO/1NC, 2CO, 2NO, 2NC
- **Contact Material** .....AgNi10+0.2µmAu Standard AgCdO+0.2µmAu, AgNi10+5µmAu Optional
- **Mechanical Life** .....$50x10^6$ operation cycles
- **Electrical Life**.....AgCdO >$2x10^5$, AgNi10 >10^5 operation cycles @ 230V AC, 6A, cos φ=1
- **Ambient Temperature**.....-40...+60°C (85°C)*
- **Cover Material**.....Polyamide 6
- **Weight**.....15 g

Diagrams

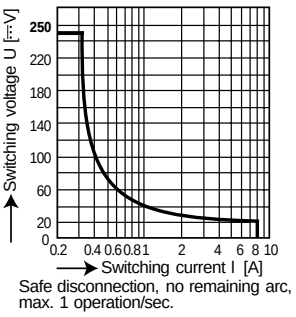


Relay operation voltage vs. ambient temperature



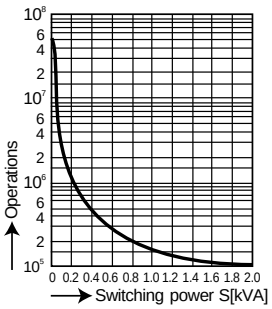
Operations =
Operations (ohmic) x limitation factor F

Limitation factor for inductive loads



Safe disconnection, no remaining arc,
max. 1 operation/sec.

Maximum switching power curve



Mechanical life

Safety Relay 5669 Data

Relay Data			Ordering Information			
Rated Voltage	*Voltage Range*	*Coil Resistance*	*1 NO/1 NC Type*	*2 CO Type*	*2 NO Type*	*2 NC Type*
5V	4.0 - 8.0V	36 Ω	56.O□69.0511□	56.O□69.0500□	56.O□69.0520□	56.O□69.0502□
6V	4.8 - 9.6V	50 Ω	56.O□69.0611□	56.O□69.0600□	56.O□69.0620□	56.O□69.0602□
12V	9.6 - 19.2V	210 Ω	56.O□69.1211□	56.O□69.1200□	56.O□69.1220□	56.O□69.1202□
20V	16.0 - 32.0V	580 Ω	56.O□69.2011□	56.O□69.2000□	56.O□69.2020□	56.O□69.2002□
24V	19.2 - 38.4V	820 Ω	56.O□69.2411□	56.O□69.2400□	56.O□69.2420□	56.O□69.2402□
48V	38.4 - 76.8V	3200 Ω	56.O□69.4811□	56.O□69.4800□	56.O□69.4820□	56.O□69.4802□
60V	48.0 - 96.0V	5200 Ω	56.O□69.6011□	56.O□69.6000□	56.O□69.6020□	56.O□69.6002□
110V	88.0 - 176.0V	20000 Ω	56.O□69.1111□	56.O□69.1100□	56.O□69.1120□	56.O□69.1102□

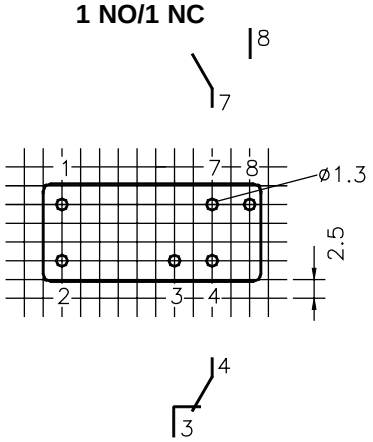
Protection Class, Example:
- A IP 40, Flow Solder Proof
- W IP 67, Washable

Contact Material, Example:
- C AgCdO+.2µmAu
- N AgNi10+.2µmAu
- S AgNi10+5µmAu

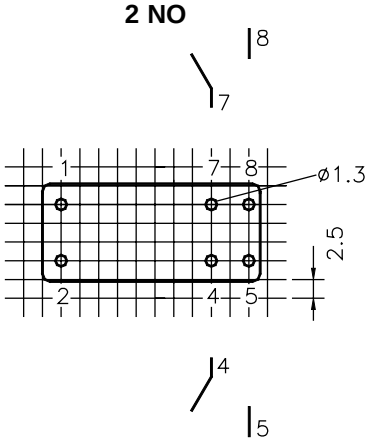
Footprints

(Note: Shown at their actual size.)

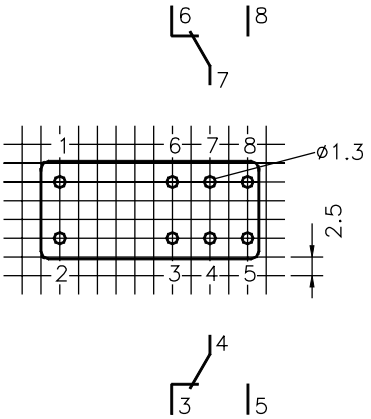
1 NO/1 NC



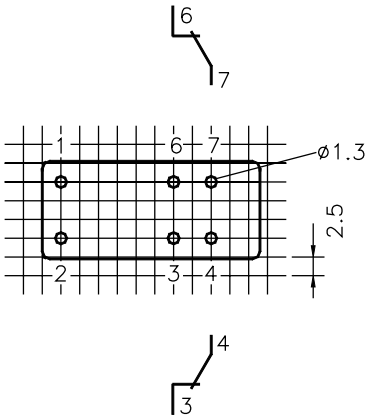
2 NO



2 CO

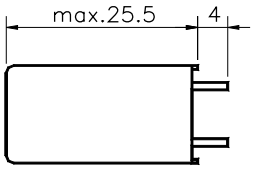


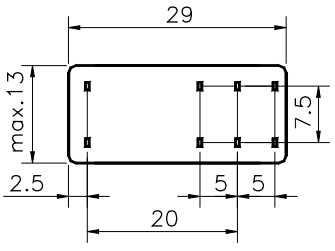
2 NC



Dimensions

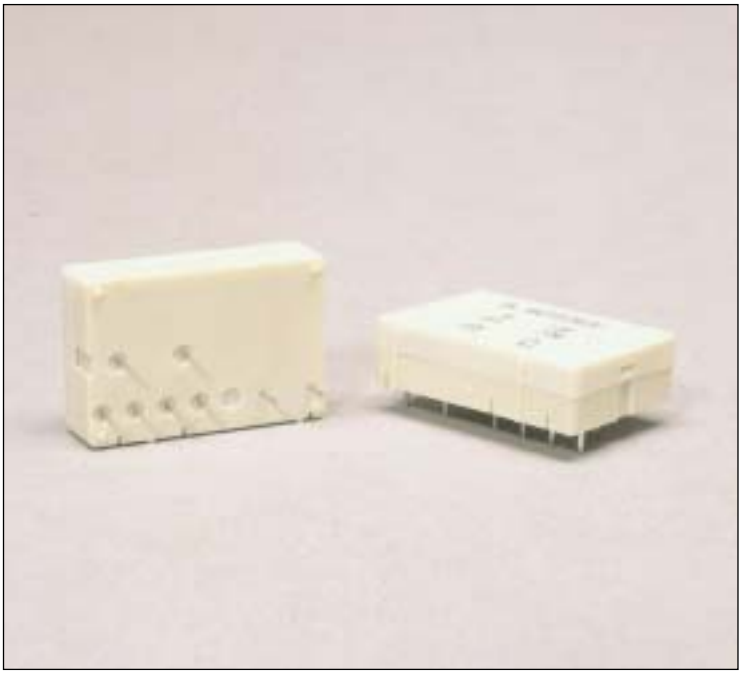
(Note: Shown at their actual size.)





Note: All dimensions are shown in millimeters.
To convert to inches, divide by 25.4.

Safety Relay
OA 5667, OA5667S



Features

- 2 output contacts
- International approvals: TÜV, UL, cUL
- Quality control check for each safety relay
- Forced-guided contacts, all gold flash plated
- Contact Gap > 0.5 mm throughout life of relay
- Various contact materials,
  mixed contact material optional
- High coil voltage range
- High breakdown Voltage:
  contact/coil ≥ 4 KV
  contact/contact ≥ 2.5 KV
  contact/contact ≥ 4 KV; S-Type
- High Creeping Distance:
  contact/coil > 8 mm
  contact/contact > 5.5 mm; S-Type
- Custom design available,
  -coil voltage -coil resistance,
  -contact pressure -operate/release time

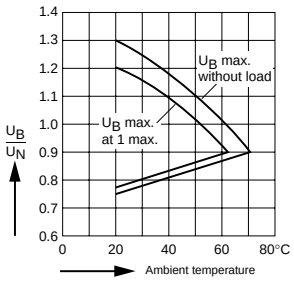
GERMANY

C US
USA/CANADA

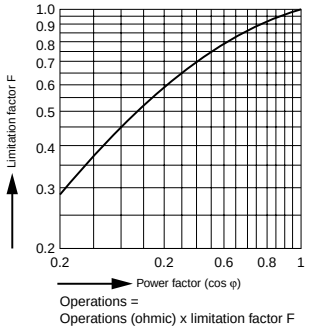
Technical Data

- **Nominal Coil Voltage** .....5, 6, 12, 20, 24, 48, 60, 110 DC
- **Coil Power Dissipation** .....0.75 W
- **Max. Switching Voltage** .....250V DC, 400V AC
- **Max. Switching Current** .....6A (2 x 6A simultaneous)
- **Max. Switching Power — DC** .....200W (2 x 160W simultaneous)
- **Max. Switching Power — AC** .....1500VA (2 x1500VA simultaneous)
- **Contact Switching Rate** .....10 operations per second
- **Relay Operate Time** .....10 ms
- **Relay Release Time** .....6 ms
- **Operation Vibration** .....0.35 mm Ampl. max @ 10...100Hz, 4g max
- **Contact Arrangements** .....1 NO/1 NC, 2CO
- **Contact Material** .....AgNi10+0.2µmAu Standard .....AgCdO+0.2µmAu, AgNi10+5µmAu Optional
- **Mechanical Life** .....$\geq 10^7$ operation cycles
- **Electrical Life** .....AgCdO >$2x10^5$, AgNi10 >10^5 .....operation cycles @ 250V AC, 6A, cos φ=1
- **Ambient Temperature** .....-25...+70°C
- **Protection Rating** IP40
- **Cover Material** .....Thermoplast
- **Weight** .....16 g

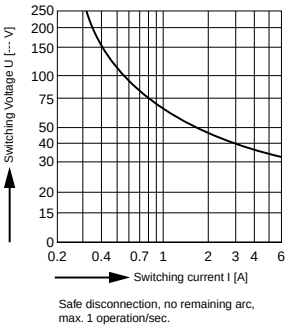
Diagrams



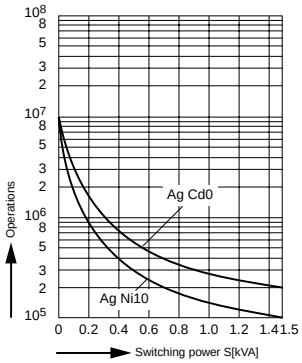
Relay operation voltage vs. ambient temperature



Limitation factor for inductive loads



Maximum switching power curve



Mechanical life

Safety Relay 5667/5667S Data

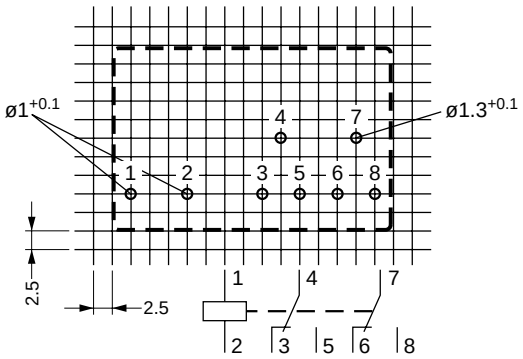
Relay Data			Ordering Information			
Rated Voltage	*Voltage Range*	*Coil Resistance*	*1 NO/1 NC Type*	*2 CO Type*	*1 NO/1 NC **S**-Type*	*2 CO **S**-Type*
5V	3.75- 6.5V	33 Ω	56.OA67.0511☐	56.OA67.0500☐	56.OA67S.0511☐	56.OA67S.0500☐
6V	4.5 - 7.8V	48 Ω	56.OA67.0611☐	56.OA67.0600☐	56.OA67S.0611☐	56.OA67S.0600☐
12V	9.0 - 15.6V	183 Ω	56.OA67.1211☐	56.OA67.1200☐	56.OA67S.1211☐	56.OA67S.1200☐
20V	15.0- 26.0V	530 Ω	56.OA67.2011☐	56.OA67.2000☐	56.OA67S.2011☐	56.OA67S.2000☐
24V	18.0 - 31.2V	750 Ω	56.OA67.2411☐	56.OA67.2400☐	56.OA67S.2411☐	56.OA67S.2400☐
48V	36.0 - 62.4V	3200 Ω	56.OA67.4811☐	56.OA67.4800☐	56.OA67S.4811☐	56.OA67S.4800☐
60V	45.0 - 78.0V	4700 Ω	56.OA67.6011☐	56.OA67.6000☐	56.OA67S.6011☐	56.OA67S.6000☐
110V	82.5 - 143.5V	15300 Ω	56.OA67.1111☐	56.OA67.1100☐	56.OA67S.1111☐	56.OA67S.1100☐

Contact Material, Example: C AgCdO+.2µmAu
N AgNi10+.2µmAu
S AgNi10+5µmAu

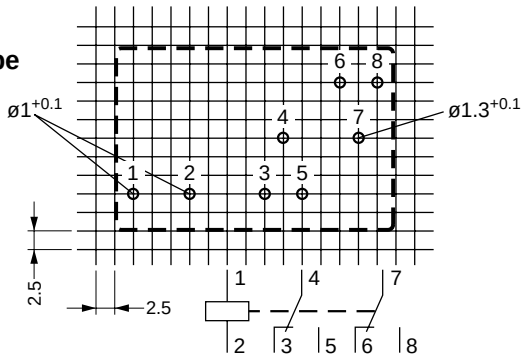
Footprints

(Note: Shown at their actual size.)

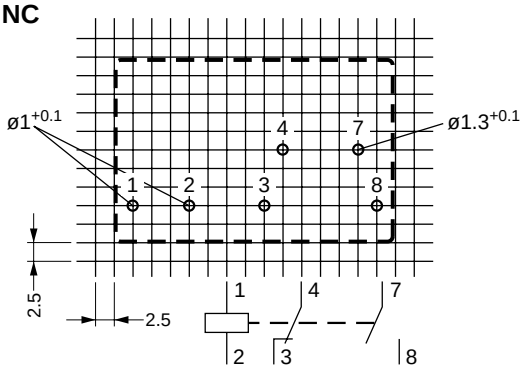
2 CO



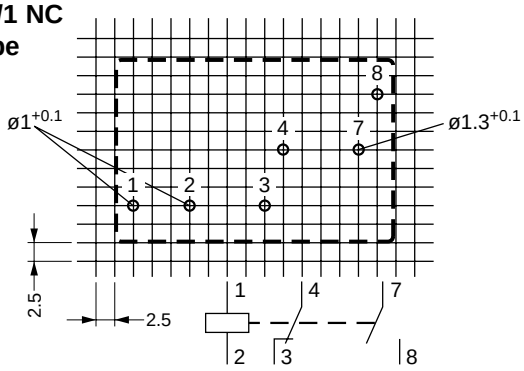
2 CO S-Type



1 NO/1 NC



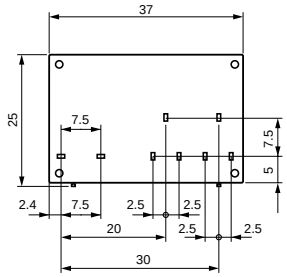
1 NO/1 NC S-Type



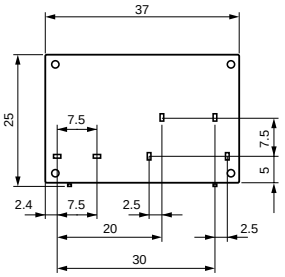
Dimensions

Note: All dimensions are shown in millimeters.
To convert to inches, divide by 25.4.

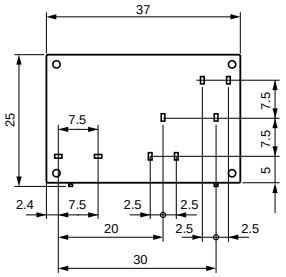
2 CO



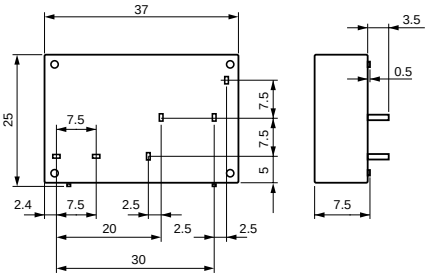
1 NO/1 NC



2 CO, S-Type



1 NO/1 NC, S-Type



Safety Relay
OA 5611

Features

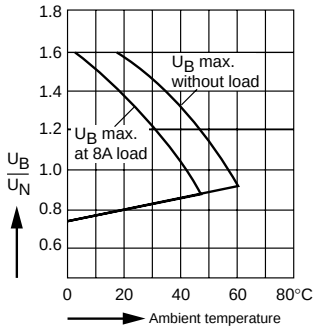
- 4 output contacts
- International approvals: TÜV, UL, cUL, CSA
- Quality control check for each safety relay
- Forced-guided contacts, all gold flash plated
- Contact Gap > 0.5 mm throughout life of relay
- Various contact materials, mixed contact material optional
- High coil voltage range
- High switching voltage
- High breakdown voltage: contact/coil > 4 KV
- High creeping distance: contact/coil > 8 mm
- Crown contacts
- Solid connection between coil and contact housing
- Compact size
- Custom design available,
  -coil voltage -IP67 washable
  -contact pressure -coil resistance
  -operate/release time
  -low power dissipation models
  -Manual test relay (slide activated)

GERMANY USA/CANADA CANADA

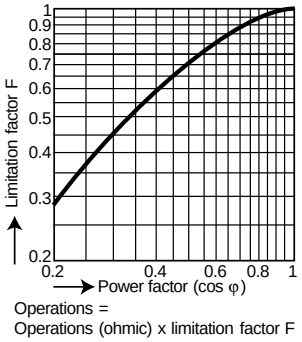
Technical Data

- **Nominal Coil Voltage** .....6, 12, 24, 48, 60, 110, DC
- **Coil Power Dissipation** .....0.6 W
- **Max. Switching Voltage** .....250V DC, 400 V AC
- **Max. Switching Current** .....8 A
- **Max. Switching Power — DC**.....200W
- **Max. Switching Power — AC**.....2000VA
- **Contact Switching Rate** .....10 operations per second
- **Relay Operate Time** .....20 ms
- **Relay Release Time** .....6 ms
- **Operation Vibration** .....0.35 mm Ampl. max
  .....@ 10...200Hz, 3g max
- **Protection Rating** .....IP 40
- **Contact Arrangements** 2NO/2NC, 3NO/1NC
- **Contact Material**.....
  ....AgNi10+0.2µmAu, AgCdO+0.2µmAu, AgNi10+5µmAu
- **Mechanical Life** .....$50x10^6$ operation cycles
- **Electrical Life**.....AgCdO $>3x10^5$, AgNi10 $>2x10^5$
  .....operation cycles @ 230V AC, 5A, cos φ=1
  AgCdO $>1.5x10^5$, AgNi10 $>10^5$
  .....operation cycles @ 230V AC, 8A, cos φ=1
- **Ambient Temperature**.....-25...+85°C
- **Cover Material**.....Thermoplast
- **Weight**.....35 g

Diagrams

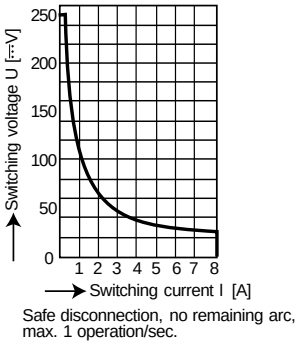


Relay operation voltage vs. ambient temperature



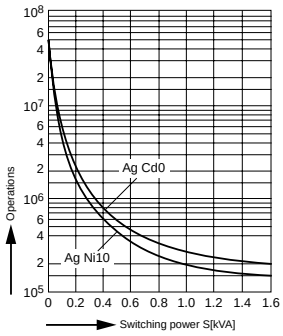
Operations =
Operations (ohmic) x limitation factor F

Limitation factor for inductive loads



Safe disconnection, no remaining arc, max. 1 operation/sec.

Maximum switching power curve



Mechanical life

Safety Relay 5611 Data

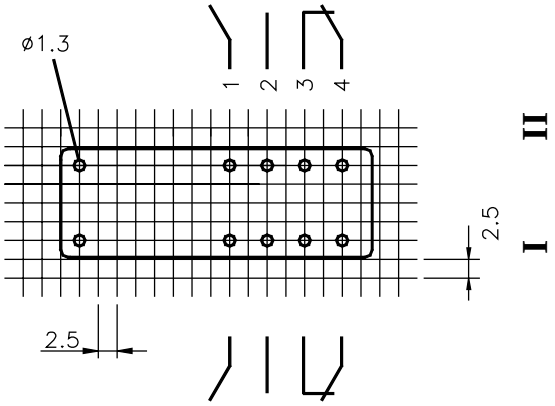
Relay Data			Ordering Information	
Rated Voltage	*Voltage Range*	*Coil Resistance*	*2 NO/2 NC Type*	*3 NO/1 NC Type*
6V	4.2 - 8.4V	56 Ω	56.OA11.0622☐	56.OA11.0631☐
12V	8.4 - 16.8V	240 Ω	56.OA11.1222☐	56.OA11.1231☐
24V	16.8 - 33.6V	960 Ω	56.OA11.2422☐	56.OA11.2431☐
48V	33.6 - 67.2V	3840 Ω	56.OA11.4822☐	56.OA11.4831☐
60V	42.0 - 84.0V	6000 Ω	56.OA11.6022☐	56.OA11.6031☐
110V	77.0 - 154.0V	20150 Ω	56.OA11.1122☐	56.OA11.1131☐

Contact Material, Example:
☐C AgCdO+.2µmAu
☐N AgNi10+.2µmAu
☐S AgNi10+5µmAu

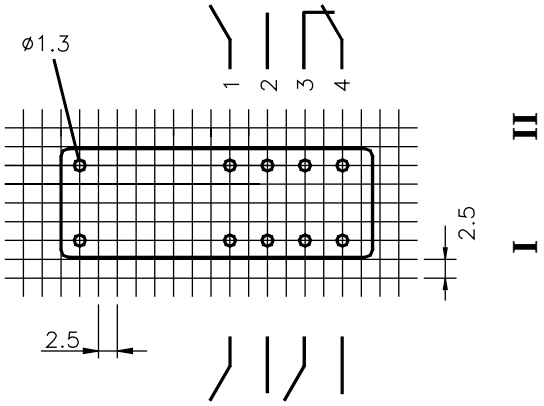
Footprints

(Note: Shown at their actual size.)

2 NO/2 NC

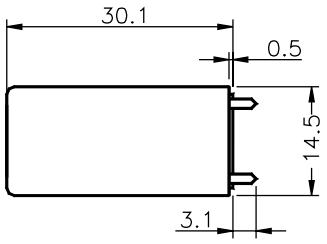


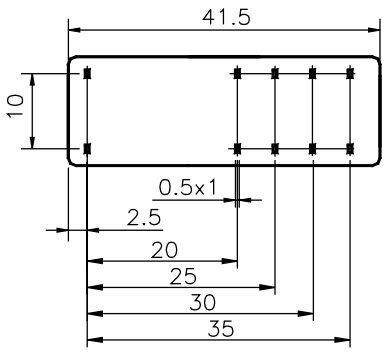
3 NO/1 NC



Dimensions

(Note: Shown at their actual size.)





Note: All dimensions are shown in millimeters.
To convert to inches, divide by 25.4.

Safety Relay
OA 5612

Features

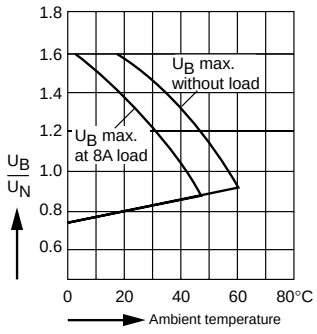
- 6 output contacts
- International approvals: TÜV, UL, cUL, CSA
- Quality control check for each safety relay
- Forced-guided contacts, all gold flash plated
- Contact Gap > 0.5 mm throughout life of relay
- Various contact materials, mixed contact material optional
- High coil voltage range
- Very high switching voltage
- High breakdown voltage: contact/coil > 4 KV
- High creeping distance: contact/coil > 8 mm
- Crown contacts
- Solid connection between coil and contact housing
- Compact size
- Custom design available,
  -coil voltage
  -contact pressure
  -operate/release time
  -low power dissipation models
  -IP67 washable
  -coil resistance

GERMANY USA/CANADA CANADA

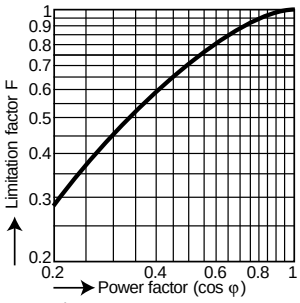
Technical Data

- **Nominal Coil Voltage** .....6, 12, 24, 48, 60, 110, DC
- **Coil Power Dissipation** .....0.8 - 1.0 W
- **Max. Switching Voltage** .....250V DC, 400V AC
- **Max. Switching Current** .....8 A
- **Max. Switching Power—DC** 200W
- **Max. Switching Power—AC** 2000VA
- **Contact Switching Rate** .....10 operations per second
- **Relay Operate Time** .....20 ms
- **Relay Release Time** .....6 ms
- **Operation Vibration** .....0.35 mm Ampl. max @ 10...200Hz, 3g max
- **Protection Rating** .....IP 40
- **Contact Arrangements** 2NO/4NC, 3NO/3NC, 4NO/2NC
- **Contact Material** ....AgNi10+0.2µmAu, AgCdO+0.2µmAu, AgNi10+5µmAu
- **Mechanical Life** .....$50x10^6$ operation cycles
- **Electrical Life** .....AgCdO >$3x10^5$, AgNi10 >$2x10^5$ .....operation cycles @ 230V AC, 5A, cos φ=1 .....AgCdO >$1.5x10^5$, AgNi10 >10^5 .....operation cycles @ 230V AC, 8A, cos φ=1
- **Ambient Temperature** .....-25...+85°C
- **Cover Material** .....Thermoplast
- **Weight** .....38 g

Diagrams

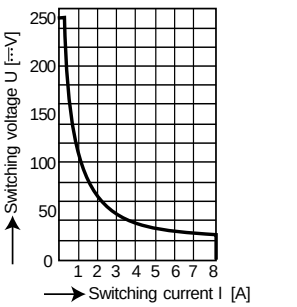


Relay operation voltage vs. ambient temperature



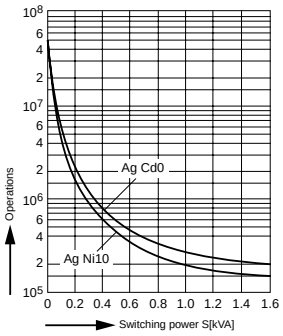
Operations =
Operations (ohmic) x limitation factor F

Limitation factor for inductive loads



Safe disconnection, no remaining arc,
max. 1 operation/sec.

Maximum switching power curve



Mechanical life

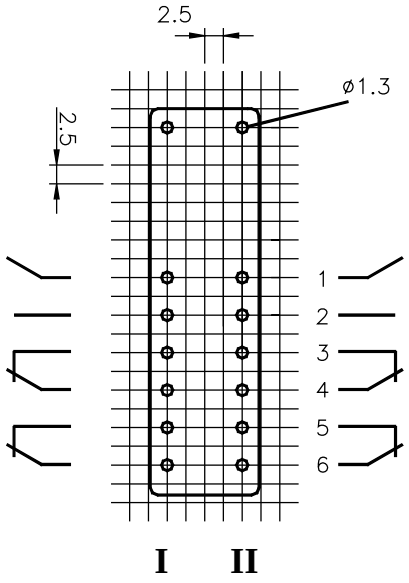
Safety Relay 5612 Data

Relay Data			Ordering Information			
Rated Voltage	*Voltage Range*	*Coil Resistance*	*2 NO/4 NC Type*	*Coil Resistance*	*3 NO/3 NC Type*	*4 NO/2 NC Type*
6V	4.2 - 8.4V	36 Ω	56.OA12.0624☐	45 Ω	56.OA12.0633☐	56.OA12.0642☐
12V	8.4 - 16.8V	145 Ω	56.OA12.1224☐	180 Ω	56.OA12.1233☐	56.OA12.1242☐
24V	16.8 - 33.6V	600 Ω	56.OA12.2424☐	720 Ω	56.OA12.2433☐	56.OA12.2442☐
48V	33.6 - 67.2V	2300 Ω	56.OA12.4824☐	2880 Ω	56.OA12.4833☐	56.OA12.4842☐
60V	42.0 - 84.0V	3600 Ω	56.OA12.6024☐	4500 Ω	56.OA12.6033☐	56.OA12.6042☐
110V	77.0 - 154.0V	12100 Ω	56.OA12.1124☐	15125 Ω	56.OA12.1133☐	56.OA12.1142☐

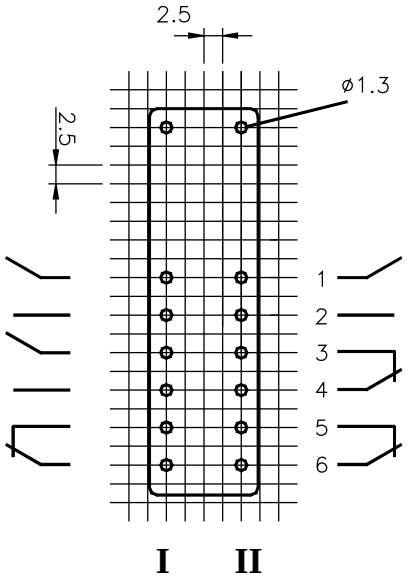
Contact Material, Example: ☐C AgCdO+.2µmAu
☐N AgNi10+.2µmAu
☐S AgNi10+5µmAu

Footprints (Note: Shown at their actual size.)

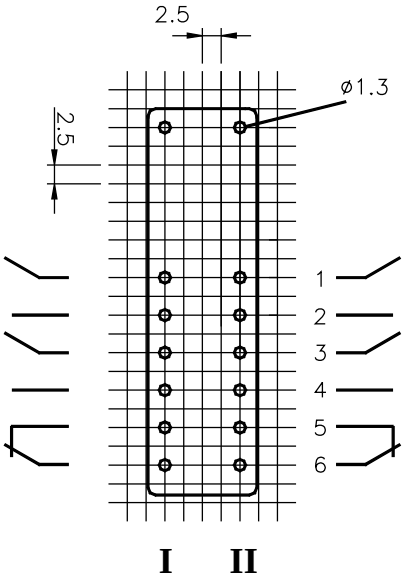
2 NO/4 NC



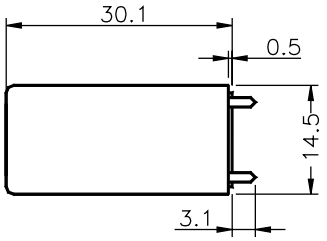
3 NO/3 NC

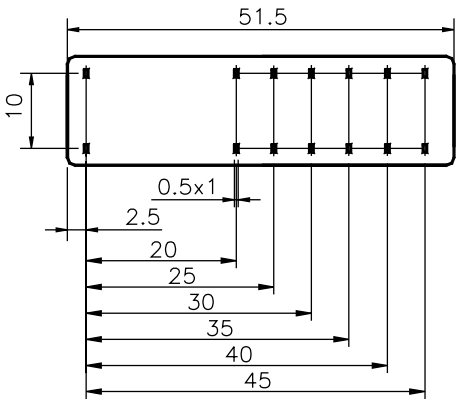


4 NO/2 NC



Dimensions (Note: Shown at their actual size.)





Note: All dimensions are shown in millimeters.
To convert to inches, divide by 25.4.

Safety Relay
OA 5603

GERMANY USA/CANADA CANADA

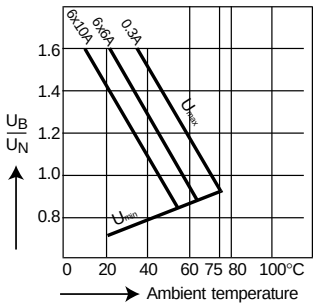
Features

- 8 output contacts
- International approvals: TÜV, UL, cUL, CSA
- Quality control check for each safety relay
- Forced-guided contacts, all gold flash plated
- Contact gap > 0.5 mm throughout life of relay
- Various contact materials, mixed contact material optional
- High coil voltage range
- Very high and low switching current
- High switching voltage
- High breakdown voltage: contact/coil > 4 KV
- High creeping distance: contact/coil > 8 mm
- Crown contacts
- Solid connection between coil and contact housing
- Custom design available,
  -coil voltage -coil resistance,
  -contact pressure -operate/release time

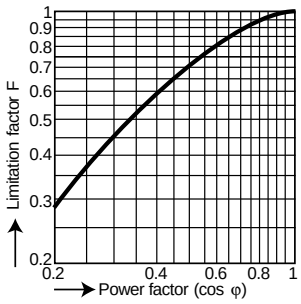
Technical Data

- **Nominal Coil Voltage** 6, 12, 24, 48, 60, 110, DC
- **Coil Power Dissipation** .....1.25 - 1.65 W
- **Max. Switching Voltage** .....250V DC, 400V AC
- **Max. Switching Current** .....10 A
- **Max. Switching Power—DC** 240W
- **Max. Switching Power—AC** 2500VA
- **Contact Switching Rate** .....10 operations per second
- **Relay Operate Time** .....27 ms
- **Relay Release Time** .....5 ms
- **Operation Vibration** .....0.35 mm Ampl. max .....@ 10...55Hz
- **Protection Rating** .....IP 40
- **Contact Arrangements** ....2NO/6NC, 3NO/5NC, 4NO/4NC, 5NO/3NC, ...6NO/2NC, 7NO/1NC
- **Contact Material** ....AgCdO+0.2µmAu , AgNi10+0.2µmAu , AgNi10+5µmAu
- **Mechanical Life** .....$30x10^6$ Operation cycles
- **Electrical Life** .....AgCdO >$7x10^5$, AgNi10 >$5x10^5$ .....operation cycles @ 230V AC, 5A, cos φ=1 .....AgCdO >$3x10^5$, AgNi10 >$2x10^5$ .....operation cycles @ 230V AC, 10A, cos φ=1
- **Ambient Temperature** .....-25...+75°C
- **Cover Material** .....Thermoplast
- **Weight** .....95 g

Diagrams

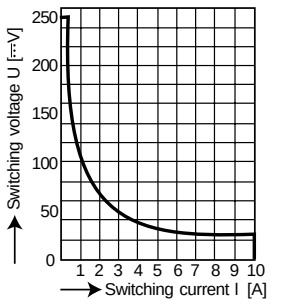


Relay operation voltage vs. ambient temperature



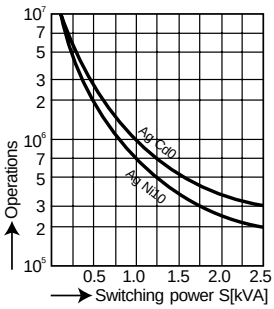
Operations =
Operations (ohmic) x limitation factor F

Limitation factor for inductive loads



Safe disconnection, no remaining arc, max. 1 operation/sec.

Maximum switching power curve



Mechanical life

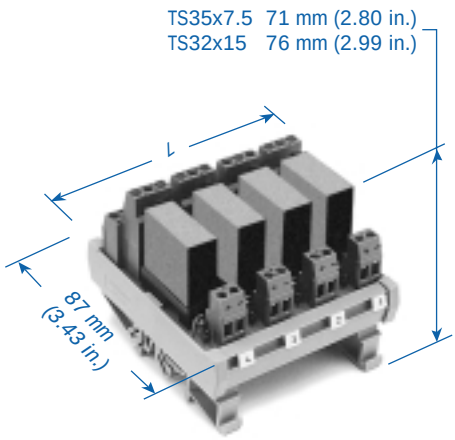
SAFETY RELAY MODULES
8 Amp Contacts,
35 or 32mm DIN Rail

Altech Safety Relay Modules utilize Relays with Force-Guided-Contacts that meet or exceed international standards, TÜV, SA, SUVA, and UL. They are designed to protect man and machine as specified in OSHA FR1910 Regulations, a mandatory requirement of the European Machinery Directive EMD 89.392 EEC. The Safety Relays are used in Safety Devices such as Emergency Stop Modules, Safety Gate Monitors, 2-Hand Safety Modules, etc.

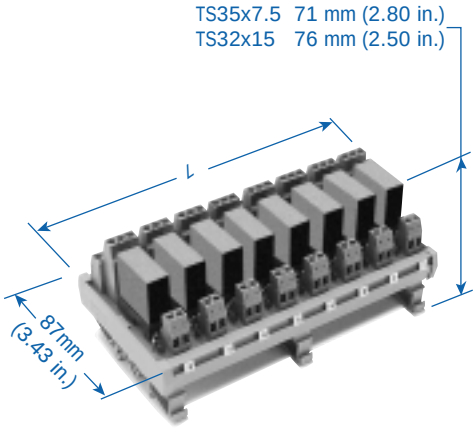
This series of Safety Relay Modules are Double Pole, Double Throw configurations, and are available as 1, 2, 4, 8 and 16 isolated channels and 8 and 16 bussed channels with 12 or 24 VDC coils. Isolated channels allow control of each relay by a different logic system, if necessary. There are two inputs for each relay coil per channel. Bussed channels allow high density packaging with a common input for all relays.Safety Relay Modules may be ordered with three different types of relay contact material, depending on the actual load current.

- Screw-Cage Clamp Connection
- LED Coil Voltage Indicator
- Reverse DC Polarity LED Protection
- Surge Suppression With DC Coils
- Industry Standard Relays
- DIN Rail Mount, Panel Mount Available

Isolated Channel
Double Pole Double Throw



Bussed Channel
Double Pole Double Throw

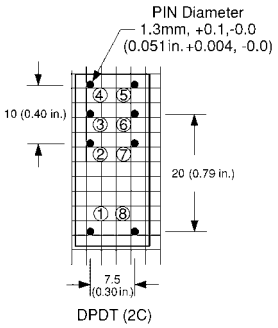


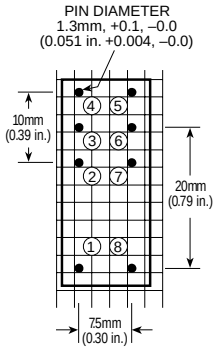
		Contact Material: AgCdO+0.2µmAu **Contact Ratings:** 8A(2x5A) 110DC, 250VAC	**Contact Material:** AgNi10+0.2µmAu **Contact Ratings:** 8A(2x5A) 110DC, 250VAC	**Contact Material:** AgNi10+5µmAu **Contact Ratings:** 8A(2x5A) 110DC, 250VAC
Isolated Channels (No Bus)	**Length (L) mm (in.)**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**
1 Channel, Coil Voltage	21 (0.83)			
12V		**8949.2C**	**8949.2N**	**8949.2S**
24V		**8951.2C**	**8951.2N**	**8951.2S**
2 Channel, Coil Voltage	40 (1.57)			
12V		**8949.3C**	**8949.3N**	**8949.3S**
24V		**8951.3C**	**8951.3N**	**8951.3S**
4 Channel, Coil Voltage	79 (3.11)			
12V		**8955.2C**	**8955.2N**	**8955.2S**
24V		**8956.2C**	**8956.2N**	**8956.2S**
8 Channel, Coil Voltage	157 (6.18)			
12V		**8955.3C**	**8955.3N**	**8955.3S**
24V		**8956.3C**	**8956.3N**	**8956.3S**
16 Channel, Coil Voltage	311 (12.24)			
12V		**8963.2C**	**8963.2N**	**8963.2S**
24V		**8972.2C**	**8972.2N**	**8972.2S**
Bussed Channels	**Length (L) mm (in.)**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**
8 Channel, Bussed DC+	125 (4.92)			
12V		**8923.2C**	**8923.2N**	**8923.2S**
24V		**8924.2C**	**8924.2N**	**8924.2S**
8 Channel, Bussed DC-	125 (4.92)			
12V		**8923.3C**	**8923.3N**	**8923.3S**
24V		**8924.4C**	**8924.4N**	**8924.4S**
16 Channel, Bussed DC+	248 (9.76)			
12V		**8926.2C**	**8926.2N**	**8926.2S**
24V		**8926.3C**	**8926.3N**	**8926.3S**
16 Channel, Bussed DC-	248 (9.76)			
12V		**8927.2C**	**8927.2N**	**8927.2S**
24V		**8927.3C**	**8927.3N**	**8927.3S**

Isolated Channel, DPDT

Bussed Channel, DPDT

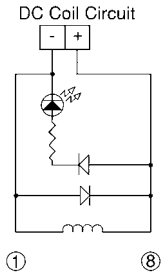
Relay Pinout

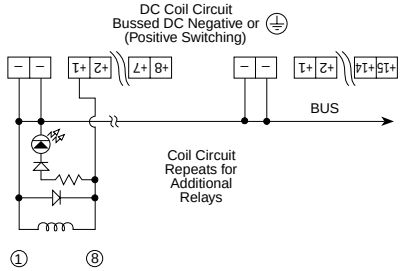


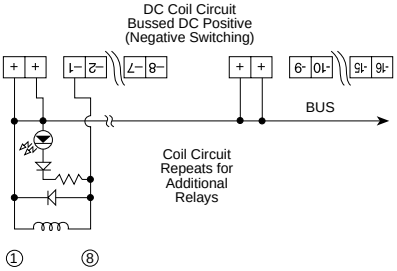


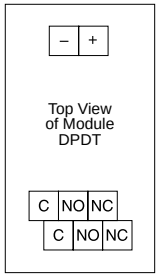
Bottom View, Relay Pinouts, Grid 2.54mm (0.1in.)

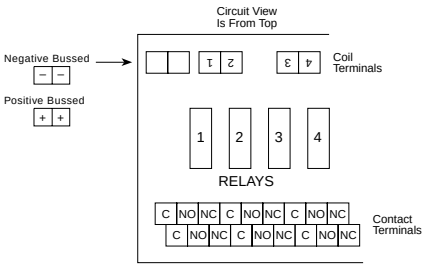
Coil Circuits





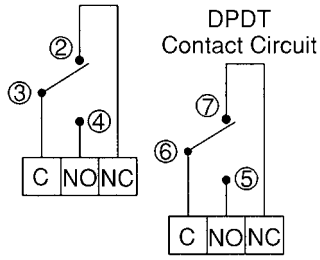


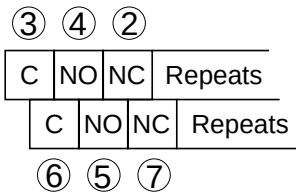




Contact Circuits

For Both Isolated and Bussed Channels





Relay Specifications

-Normal Coil Voltage:	12,24 VDC
-Coil Power Dissipation:	0.7W
-Max. Switching Voltage:	110VDC, 250VAC
-Max. Switching Current:	8A(2x5A simultaneous)
-Max. Switching Power	
DC	200W (2x160W simultaneous)
AC	2000VA (2x1250VA simultaneous)
-Contact Switching Rate:	10 operations/ sec.
-Relay Operate Time	15 ms
-Relay Release Time	12 ms
-Contact Arrangements	DPDT, 2 FORM C
-Contact Material:	
Standard	AgNi10+0.2µmAu
Optional	AgCdO+0.2µmAu
	AgNi10+5µmAu
-Mechanical Life:	$50x10^6$ operation cycles
-Ambient Temperature:	-40°+ 60°C
-Cover Material:	Polyamide 6
-Weight:	15g

Coil Specifications

Rated Voltage	Voltage Range	Coil Resistance
12VDC	9.6V-19.2V	210Ω ± 15%
24VDC	19.2V-38.4V	820Ω ± 15%

SAFETY RELAY MODULES
4 Pole Relays, 8 or 10 Amps

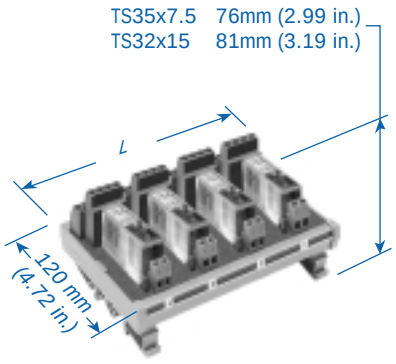
Altech Safety Relay Modules utilize Relays with Force-Guided-Contacts that meet or exceed international standards, TÜV, SA, SUVA, and UL. They are designed to protect man and machine as specified in OSHA CFR1910 Regulations, which is a mandatory requirement of the European Machinery Directive EMD 89.392 EEC.

Altech Safety Relays are electro-mechanical relays that are mechanically linked together, causing all contacts to move together when the coil is energized. Force-Guided-contacts are also known as positive-guided-contacts, captive contacts or locked contacts. In addition, our Safety Relays have Crown Contacts which provide two locations per contacts to improve switching conditions. The Safety Relays are used in Safety Devices such as Emergency Stop Modules, Safety Gate Monitors, 2-Hand Safety Modules, Safety Light Curtains, etc.

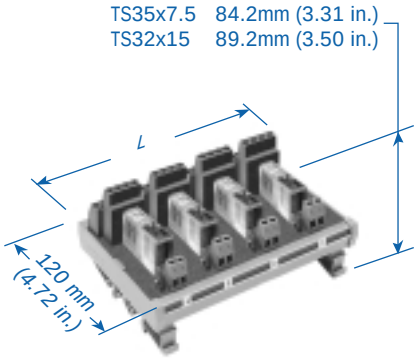
This series of Safety Relay Modules consist of 4 pole relays with two choices of configurations (2NO/2NC or 3NO/1NC), with 8 or 10 Amp contacts, and are available as 1,2, and 4 isolated channels with 12, or 24 VDC coils. Isolated channels allows control of each relay by a different logic system, if necessary. There are two inputs for each relay coil per channel. Safety Relay Modules may be ordered with three different types of relay contact material, depending on the actual load current. The part numbers shown in this data sheet are for our standard contact material, which is AgCd0 + 0.2µmAu.

- Screw-Cage clamp Connections
- LED Coil Voltage Indicator
- Reverse DC Polarity LED Protection
- Surge Suppression With DC Coil
- Din Rail Mount, Panel Mount Available

4 Pole, 8 Amp



4 Pole, 10 A



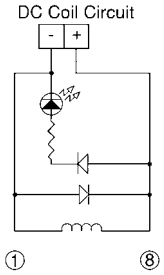
		Contact Material*: AgCd0 + 0.2µmAu **Contact Ratings:** 8A(2x5A) 250VDC,400VAC		**Contact Material*:** AgCd0 + 0.2µmAu **Contact Ratings:** 10A(2x5A) 250VDC, 400VAC	
		Contacts: 2N.0 + 2N.C	3N.0 + 1N.C	2N.0 + 2N.C	3N.0 +1N.C
Ordering Information	**Length (L) mm (in.)**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**
1 Channel, Coil Voltage	40.10 (1.58)				
12V		**156.0A11.1222C**	**156.0A11.1231C**	**156.0A01.1222C**	**156.0A01.1231C**
24V		**156.0A11.2422C**	**156.0A11.2431C**	**156.0A01.2422C**	**156.0A01.2431C**
2 Channel, Coil Voltage	78.20 (3.08)				
12V		**256.0A11.1222C**	**256.0A11.1231C**	**256.0A01.1222C**	**256.0A01.1231C**
24V		**256.0A11.2422C**	**256.0A11.2431C**	**256.0A01.2422C**	**256.0A01.2431C**
4 Channel, Coil Voltage	154.40 (6.08)				
12V		**456.0A11.1222C**	**456.0A11.1231C**	**456.0A01.1222C**	**456.0A01.1231C**
24V		**456.0A11.2422C**	**456.0A11.2431C**	**456.0A01.2422C**	**456.0A01.2431C**

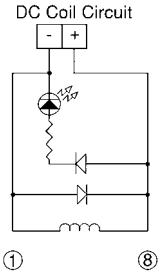
* Note: Additional relay contact materials are available upon request. Please contact Altech for additional information.

4 Pole, 8 Amps

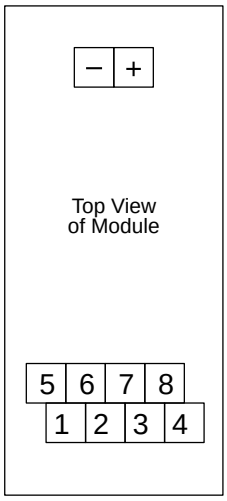
4 Pole, 10 Amps

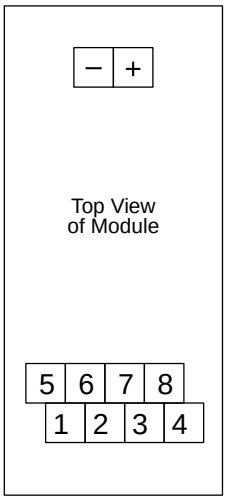
DC Coil Circuits





Contact Circuits





Relay Configurations

2 N.O + 2 N.C
NO Pin (1,2), (5,6)
NC Pin (3,4), (7,8)

3 N.O + 1 N.C
NO Pin (1,2), (5,6), (7,8)
NC Pin (3,4)

Relay Configurations

2 N.O + 2 N.C
NO Pin (3,4), (7,8)
NC Pin (1,2), (5,6)

3 N.O + 1 N.C
NO Pin (3,4), (5,6), (7,8)
NC Pin (1,2)

Relay Specifications - 8 Amps

-Normal Coil Voltage:	12,24 VDC
-Coil Power Dissipation:	0.6W
-Max. Switching Voltage:	250VDC, 400VAC
-Max. Switching Current:	8A
-Max. Switching Power	
DC	200W
AC	2000VA
-Contact Switching Rate:	10 operations/ sec.
-Relay Operate Time	20 ms
-Relay Release Time	6 ms
-Contact Arrangements	2NO/2NC, 3NO/1NC
-Contact Material:	
Standard	AgCdO+0.2µmAu
Optional	AgNi10+0.2µmAu
	AgNi10+5µmAu
-Mechanical Life:	$50x10^6$ operation cycles
-Ambient Temperature:	-25°+ 85°C
-Cover Material:	Thermoplast
-Weight:	35g

Coil Specifications

Rated Voltage	Voltage Range	Coil Resistance
12VDC	8.4V-16.8V	240Ω ± 15%
24VDC	16.8V-33.6V	960Ω ± 15%

Relay Specifications - 10 Amps

-Normal Coil Voltage:	12,24 VDC
-Coil Power Dissipation:	0.75W
-Max. Switching Voltage:	250VDC, 400VAC
-Max. Switching Current:	10A
-Max. Switching Power	
DC	240W
AC	2500VA
-Contact Switching Rate:	10 operations/ sec.
-Relay Operate Time	27 ms
-Relay Release Time	5 ms
-Contact Arrangements	2NO/2NC, 3NO/1NC
-Contact Material:	
Standard	AgCdO+0.2µmAu
Optional	AgNi10+0.2µmAu
	AgNi10+5µmAu
-Mechanical Life:	$30x10^6$ operation cycles
-Ambient Temperature:	-25°+ 80°C
-Cover Material:	Thermoplast
-Weight:	75g

Coil Specifications

Rated Voltage	Voltage Range	Coil Resistance
12VDC	8.4V-19.2V	192Ω ± 15%
24VDC	16.8V-38.4V	770Ω ± 15%

SAFETY RELAY MODULES
6 Pole Relays, 8 or 10 Amps

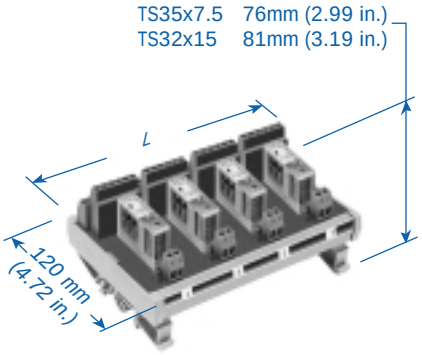
Altech Safety Relay Modules utilize Relays with Force-Guided-Contacts that meet or exceed international standards, TÜV, SA, SUVA, and UL. They are designed to protect man and machine as specified in OSHA CFR1910 Regulations, which is a mandatory requirement of the European Machinery Directive EMD 89.392 EEC.

Altech Safety Relays are electro-mechanical relays that are mechanically linked together, causing all contacts to move together when the coil is energized. Force-Guided-contacts are also known as positive-guided-contacts, captive contacts or locked contacts. In addition, our Safety Relays have Crown Contacts which provides two locations per contacts to improve switching conditions. The Safety Relays are used in Safety Devices such as Emergency Stop Modules, Safety Gate Monitors, 2-Hand Safety Modules, Safety Light Curtains, etc.

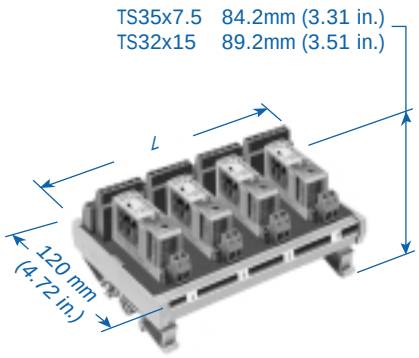
This series of Safety Relay Modules consist of 6 pole relays with three configuration choices (2NO+4NC, 3NO+3NC, 4NO+2NC), 8 or 10 Amp contacts and either 1, 2 and 4 isolated channels with 12 or 24 VDC coils. Isolated channels allow control of each relay by a different logic system, if necessary. There are two inputs for each relay coil channel. Modules can ordered with three contact materials, dependent upon the actual current load. The standard contact material is AgCd0+0.2µmAu.

- Screw-Cage clamp Connections
- LED Coil Voltage Indicator
- Reverse DC Polarity LED Protection
- Surge Suppression With DC Coil
- Din Rail Mount, Panel Mount Available

6 Pole, 8 Amps



6 Pole, 10 Amps



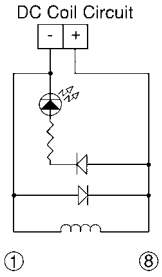
		Contact Material*: AgCdO+0.2µmAu **Contact Ratings:** 8A(2x5A) 250VDC,400VAC			**Contact Material*:** AgCdO+0.2µmAu **Contact Ratings:** 10A(2x5A) 250VDC,400VAC		
		Contacts: 2N.0 + 4N.C	3N.0 + 3N.C	4N.0 + 2N.C	2N.0 + 4N.C	3N.0 + 3N.C	4N.0 + 2N.C
Ordering Information	**Length (L) mm (in.)**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**	**Type / Cat. No.**
1 Channel, Coil Voltage	46.45 (1.83)						
12V		**156.0A12.1224C**	**156.0A12.1233C**	**156.0A12.1242C**	**156.0A02.1224C**	**156.0A02.1233C**	**156.0A02.1242C**
24V		**156.0A12.2424C**	**156.0A12.2433C**	**156.0A12.2442C**	**156.0A12.2424C**	**156.0A02.2433C**	**156.0A02.2442C**
2 Channel, Coil Voltage	90.90 (3.58)						
12V		**256.0A12.1224C**	**256.0A12.1233C**	**256.0A12.1242C**	**256.0A02.1224C**	**256.0A02.1233C**	**256.0A02.1242C**
24V		**256.0A12.2424C**	**256.0A12.2433C**	**256.0A12.2442C**	**256.0A12.2424C**	**256.0A02.2433C**	**256.0A02.2442C**
4 Channel, Coil Voltage	179.80 (7.08)						
12V		**456.0A12.1224C**	**456.0A12.1233C**	**456.0A12.1242C**	**456.0A02.1224C**	**456.0A02.1233C**	**456.0A02.1242C**
24V		**456.0A12.2424C**	**456.0A12.2433C**	**456.0A12.2442C**	**456.0A12.2424C**	**456.0A02.2433C**	**456.0A02.2442C**

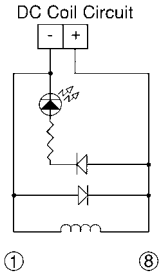
* Note: Additional relay contact materials are available upon request. Please contact Altech for additional information.

6 Pole, 8 Amps

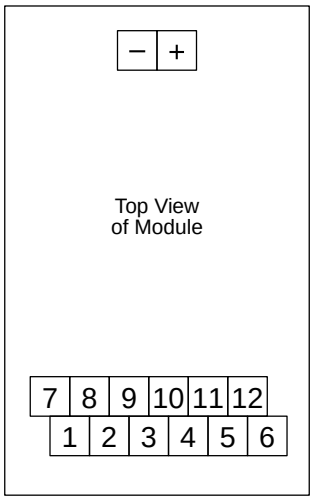
6 Pole, 10 Amps

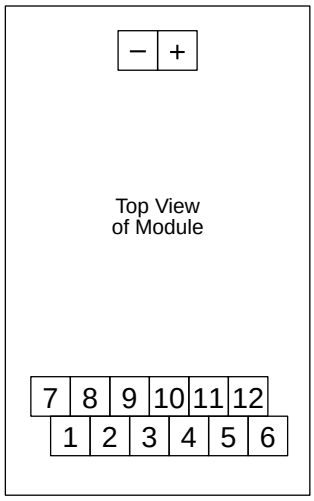
DC Coil Circuits





Contact Circuits





Relay Configurations

2N.0 + 4N.C
NO Pin (1,2), (7,8)
NC Pin (3,4), (5,6), (9,10), (11,12)

3N.0 + 3N.C
NO Pin (1,2), (7,8), (9,10)
NC Pin (3,4), (5,6), (11,12)

4N.0 + 2N.C
NO Pin (1,2), (3,4), (7,8), (9,10)
NC Pin (5,6), (11,12)

Relay Configurations

2N.0 + 4N.C
NO Pin (5,6), (11,12)
NC Pin (1,2), (3,4), (7,8), (9,10)

3N.0 + 3N.C
NO Pin (3,4), (5,6), (11,12)
NC Pin (1,2), (7,8), (9,10)

4N.0 + 2N.C
NO Pin (3,4), (5,6), (9,10), (11,12)
NC Pin (1,2), (7,8)

Relay Specifications - 8 Amps

-Normal Coil Voltage:	12,24 VDC
-Coil Power Dissipation:	0.8-1.0 W
-Max. Switching Voltage:	250VDC, 400VAC
-Max. Switching Current:	8A
-Max. Switching Power	
DC	200W (2x160W simultaneous)
AC	2000VA (2x1250VA simultaneous)
-Contact Switching Rate:	10 operations/ sec.
-Relay Operate Time	20 ms
-Relay Release Time	6 ms
-Contact Arrangements	2NO/4NC, 3NO/3NC, 4NO/2NC
-Contact Material:	
Standard	AgCdO+0.2µmAu
Optional	AgNi10+.0.2µmAu
	AgNi10+5µmAu
-Mechanical Life:	$50x10^6$ operation cycles
-Ambient Temperature:	-25° + 85°C
-Cover Material:	Thermoplast
-Weight:	38g

Coil Specifications

Rated Voltage	Voltage Range	Coil Resistance
12VDC	8.4V-16.8V	145Ω ± 15%
24VDC	16.8V-33.6V	600Ω ± 15%

Relay Specifications - 10 Amps

-Normal Coil Voltage:	12,24 VDC
-Coil Power Dissipation:	1.0 W
-Max. Switching Voltage:	250VDC, 400VAC
-Max. Switching Current:	10A
-Max. Switching Power	
DC	240W
AC	2500VA
-Contact Switching Rate:	10 operations/ sec.
-Relay Operate Time	27 ms
-Relay Release Time	5 ms
-Contact Arrangements	2NO/4NC, 3NO/3NC, 4NO/2NC
-Contact Material:	
Standard	AgCdO+0.2µmAu
Optional	AgNi10+0.2µmAu
	AgNi10+5µmAu
-Mechanical Life:	$30x10^6$ operation cycles
-Ambient Temperature:	-25°+ 80°C
-Cover Material:	Thermoplast
-Weight:	85g

Coil Specifications

Rated Voltage	Voltage Range	Coil Resistance
12VDC	8.4V-19.2V	140Ω ± 15%
24VDC	16.8V-38.4V	570Ω ± 15%

Relay Terminology

Ambient Temperature: The temperature of the surrounding medium that comes in contact with the device/ equipment.

Breakdown Voltage: The minimum root-mean-square (rms) value of a sinusoidal voltage that results in sparkover.

Coil, relay: One or more windings on a common form.

Coil Power Dissipation: The amount of electric power consumed by a winding. For the most practical purpose, this equals the I^2R loss.

Coil Resistance: The total terminal-to-terminal resistance of a coil at a specified temperature.

Contact Gap: The final length of the isolating distance between mating contacts when the contacts are open.

Contact Arrangement: The combination of contact forms that make up the entire relay switching structure.

Contact Housing: The part that provides means for mounting fixed contacts on a supporting structure.

Contact Material: Substance or combination of substances used as constituents in the manufacture of the contacts.

AgCdO + 0.2µmAu: Silver-Cadmium Oxide with a 0.2µm layer of gold. Medium to high current applications for resistive, capacitive and particular inductive loads, 100mA-10A.

AgNi10+ 0.2µmAu: Silver-Nickel 10 with a 0.2µm layer of gold. Medium to high current applications, 15mA-10A.

AgNi10+ 5µmAu: Silver-Nickel 10 with a 5µm layer of gold. Low current applications only, where switching of very low current is crucial; 1mA-300mA, 100mV-60V.

Contact Pressure: Force exerted by one contact against the mating contact of a relay.

Contact Switching Rate: The velocity at which contact switching occurs, e.g., 10 switching operations per second.

Corrosion: The deterioration of a substance, usually a metal, because of a reaction with its environment.

Cover Material: Substance or combination of substances used as constituents in the manufacture of a protective covering used to enclose equipment.

Creeping Distance: The shortest distance between two conducting parts measured along the surface or joints of the insulating material between them.

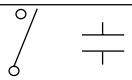
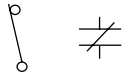
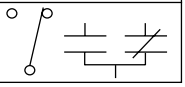
Safety Relay Selection Material Table

Material	Characteristics	Applications	Range
AgCdO + 0.2µmAu	very low welding tendency highest burn-up resistivity very good arc suppression	special for switching inductive loads	100mA - 10A
AgNi10 + 0.2µmAu	low welding tendency high burn-up resistivity good arc suppression	circuits with medium to high loads, DC current circuits	15mA - 10A
AgNi10 + 5µmAu	higher welding tendency low burn-up resistivity low contact resistance	where very low to medium switching current and voltage is mandatory	1mA - 300mA

Crown Contacts: Improved contact form to enforce high contact stress on at least two spots on the contact to penetrate any built-up contamination; to maintain low contact resistance throughout the life of a relay; and to increase the value of switchable output voltage. Supports low current to high power applications.

Custom Design: Special design to meet customer requirements regarding coil voltage, coil resistance, contact pressure, and relay operate/release time. Possible alteration of max. 3 specifications from the original standard value while the remaining 1 is retained at its original value.

Graphic Symbols

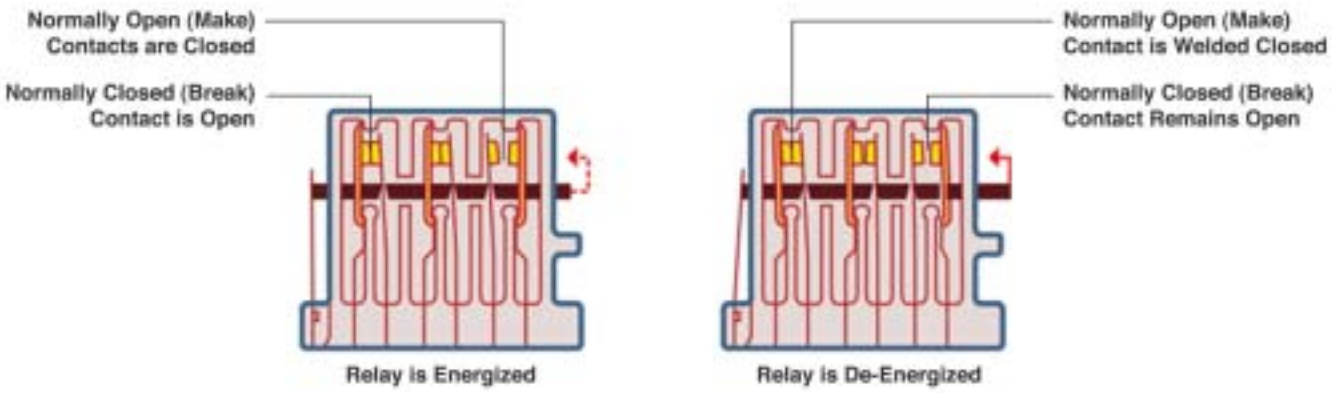
Contact Name	Short Form	DIN / IEC Symbol	UL / CSA Symbol
Normally Open	NO, Form A		
Normally Closed	NC, Form B		
Changeover	CO, Form C, SPDT		

Forced-Guided Contacts: Electro-mechanical relay contacts that are mechanically linked together, so that when the relay coil is energized or de-energized, all of the linked contacts move together. If one set of contacts in the relay becomes immobilized, no other contact of the same relay will be able to move. An open-contact gap > 0.5 mm (0.02 in.) is maintained during life of the relay, even with malfunction, and at 1.6 x Nominal Voltage. Forced-Guided contacts are also known as captive contacts, positive-guided contacts, or locked contacts. They are used in Safety Relays.

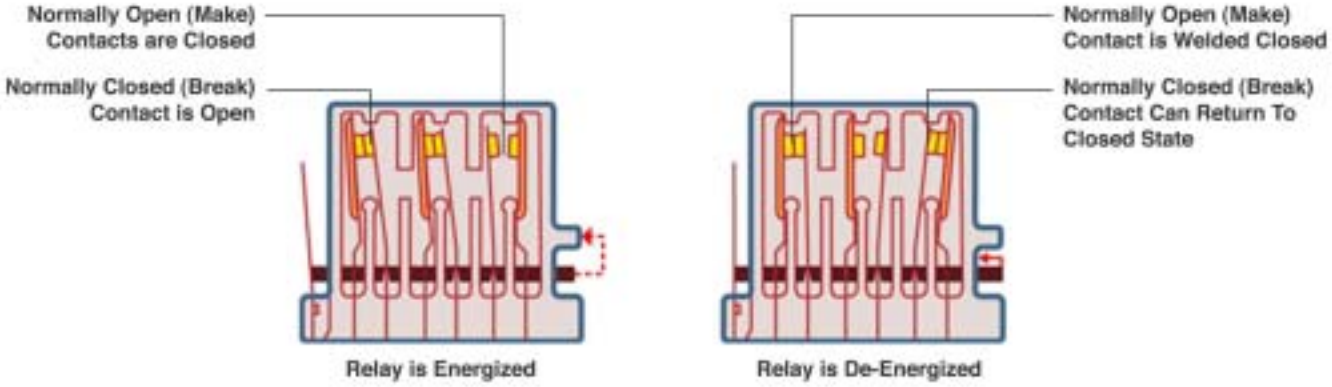
Relay Terminology

Forced-Guided versus Standard Relay Contacts

Forced-Guided Relay Contacts



Standard Relay Contacts



Relay Terminology

Flash-Plated: Thin gold coating of the relay contacts to prevent corrosion during shelf-life (long-time storage).

Mechanical Life: Number of expected operation cycles of the relay contacts.

Mixed Contact Material: Pertaining to a safety relay on which each single contact can be made of different material, e.g., 6 pole safety relay: 4 n/o contacts made of AgCdO + 0.2µmAu and 2 n/c contacts made of AgNi 10 + 5µmAu.

Normally Closed Contact (NC): A relay contact pair that is closed when the coil is not energized.

Normally Open Contact (NO): A relay contact pair that is open when the coil is not energized.

Nominal Coil Voltage: The voltage by which the coil is designated and to which certain operating characteristics of the relay are related.

Operating Voltage: The voltage by which the relay performs to the desired function.

Pin Diagram: A diagram of the points at which a connection is made between the relay and the circuit board.

Protection Rating: Classification system for the sealing effectiveness of electrical equipment to protect against foreign bodies. In a two digit code, the first digit indicates the protection against solid objects, while the second indicates protection from moisture.

International Protection (IP, according to IEC 529): Protection against a process whereby unwanted material enter the relay to occupy space that would otherwise remain free of such material.

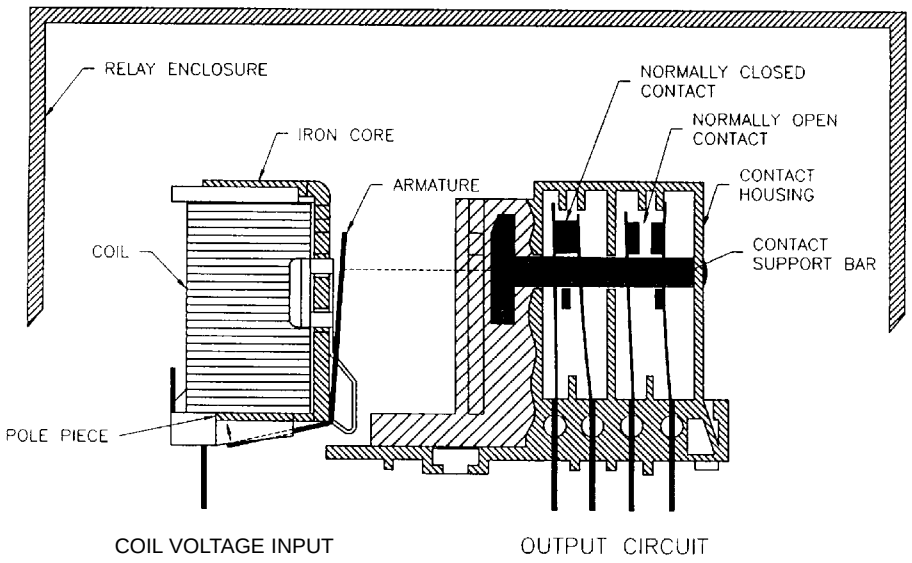
IP 40, First digit 4: Protection from entry by solid objects with a diameter greater than 1.0 mm.
Second digit 0: no special protection against moisture

IP 67, First digit 6: Dust-tight.
Second digit 7: Protection against immersion.

Relay Operate Time: The time interval from coil energization to the functioning time of the last contact to function.

Relay Release Time: The time interval from coil de-energization to the functioning time of the last contact to function.

Safety Relay: An electro-mechanical relay with forced-guided contacts used in Safety Devices such as Emergency Stop Modules, Safety Gate Monitors, 2-Hand Safety Modules, Safety Light Curtains, etc.



Switching Current: The value of the root-mean-square (rms) symmetrical current expressed in amperes, which the relay output contact interrupts at the rated maximum voltage and rated frequency.

Switching Power: The value of the product of switching voltage x switching current, which the relay output interrupts under certain test conditions.

Switching Voltage: The value of the voltage expressed in volt, which the relay output contact interrupts at the rated maximum current and rated frequency.

Voltage Range: The region between the lower and upper limits in regards of the Nominal Coil Voltage.

Washable: A sealed construction allows automatic washing and cleaning of the PC board.

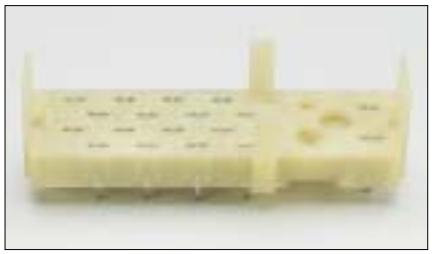
Accessories

Socket for OA/OW 5669*

Socket for OA 5601*

Socket for OA 5602*

Extraction Tool**



Socket for OA 5603*

Socket for OA 5611/12*

**Note: Extraction tool for de-mounting the relay from the socket is only available for OA5601/02/03.

Ordering Information

Relay Style	*Matching Socket Type*	*Extraction-Tool Type*	*Hold Down Clip Type*
OA/OW 5669	56.5669.00	n.a.	56.5669.99
OA 5667	n.a.	n.a.	n.a.
OA 5601	56.5601.01	56.5601.10	n.a.
OA 5602	56.5602.02	56.5602.20	n.a.
OA 5603	56.5603.03	56.5603.30	n.a.
OA 5611	56.5611.11	n.a.	n.a.
OA 5612	56.5612.12	n.a.	n.a

*Current data sheets of sockets are available on request.