DELCON

EX
- SERIES -

10 years warranty

Ex-relays

for hazardous locations

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Introduction

Delcon was founded in 1975 as a specialist manufacturer of solid state interface relays. Our relay design utilizes pulse transformer technology which gives unique advantages over traditional opto coupler based solid state relays and electro mechanical relays. This helps ensure a long lifetime and trouble free performance in harsh industrial applications where difficult loads, noise and interference can cause big problems.

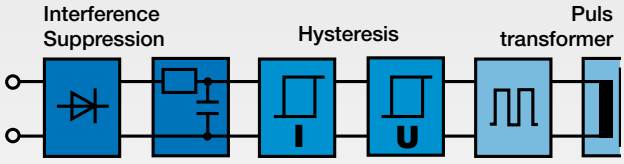
Delcon has distributors in more than 20 countries. The largest customer segments are the energy industry, cargo handling at ports, as well as the pulp and paper industry. Delcon's customers include a number of companies that are the market leaders in their own fields.

Explanations for EX-relay classifications are on page 7.

Problems with interference

- Power cables installed adjacent to signal cables, especially over long cable runs, create a capacitive effect that can cause opto coupler/electro mechanical relays to switch on or remain on after the control signal switches off
- Transients in the power supply causes damage to relay coils/ opto coupler relays
- Interference from frequency inverters can provide false on/off switching

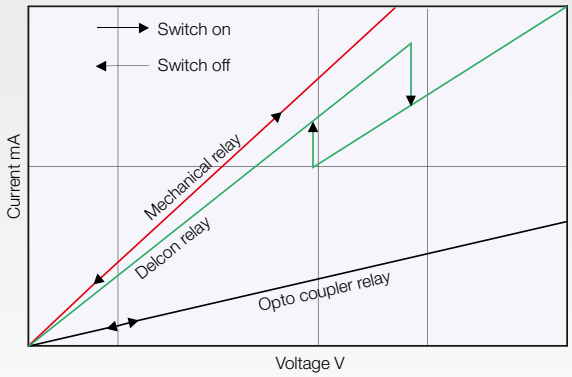
Solution
Delcon relays have built in capacitive suppression to allow safe, reliable operation even with very long cable runs. An RC circuit protects the relays from transients and high frequency interference.



Problems with signaling

- Electrical disturbances can cause the LED indicator of the opto coupler / electromechanical relays to glow when the relay is switched off and no input signal present. This makes it difficult to quickly diagnose faults and rectify problems

Solution
The Delcon LED is synchronized with the output so it is impossible for it to glow without being on. The relays have good hysteresis with clearly defined on / off points for reliable operation in high noise environments.



Interface Relays

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Problems with inductive loads

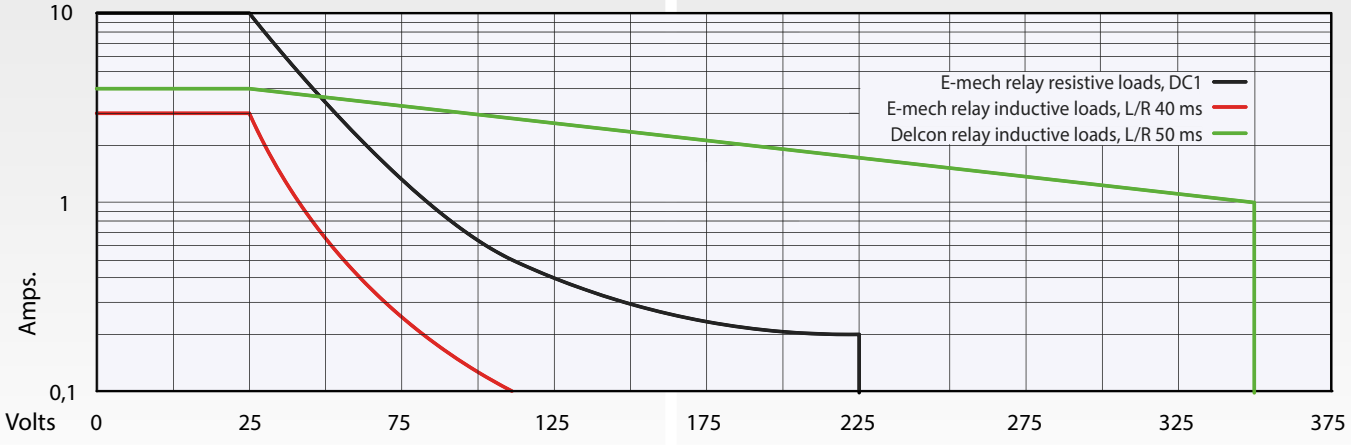
- Contactors and solenoid valves are commonly used throughout the industry, they are also problematic inductive loads for electromechanical relays to handle
- Contacts weld
- Short lifetime

Solution
Delcon AC output relays are rated at 3A and can switch inductive loads without any derating. Delcon DC output relays have no derating up to 24Vdc and thereafter still offer significantly less derating compared to electromechanical relays.

Problems with high dc voltage

- Reduced switching capacity
- Electromechanical relays are significantly derated at higher DC voltages
- Usually require special version electromechanical relays that are physically bigger and take up more space

Solution
Delcon DC output relay types CHA & CHA4 can switch up to 300Vdc with no derating compared to electromechanical relay and in a smaller package. Example EXO 24CHA4 switching 40ms inductive load at 3A / 110Vdc will give service life of 15 years or more.



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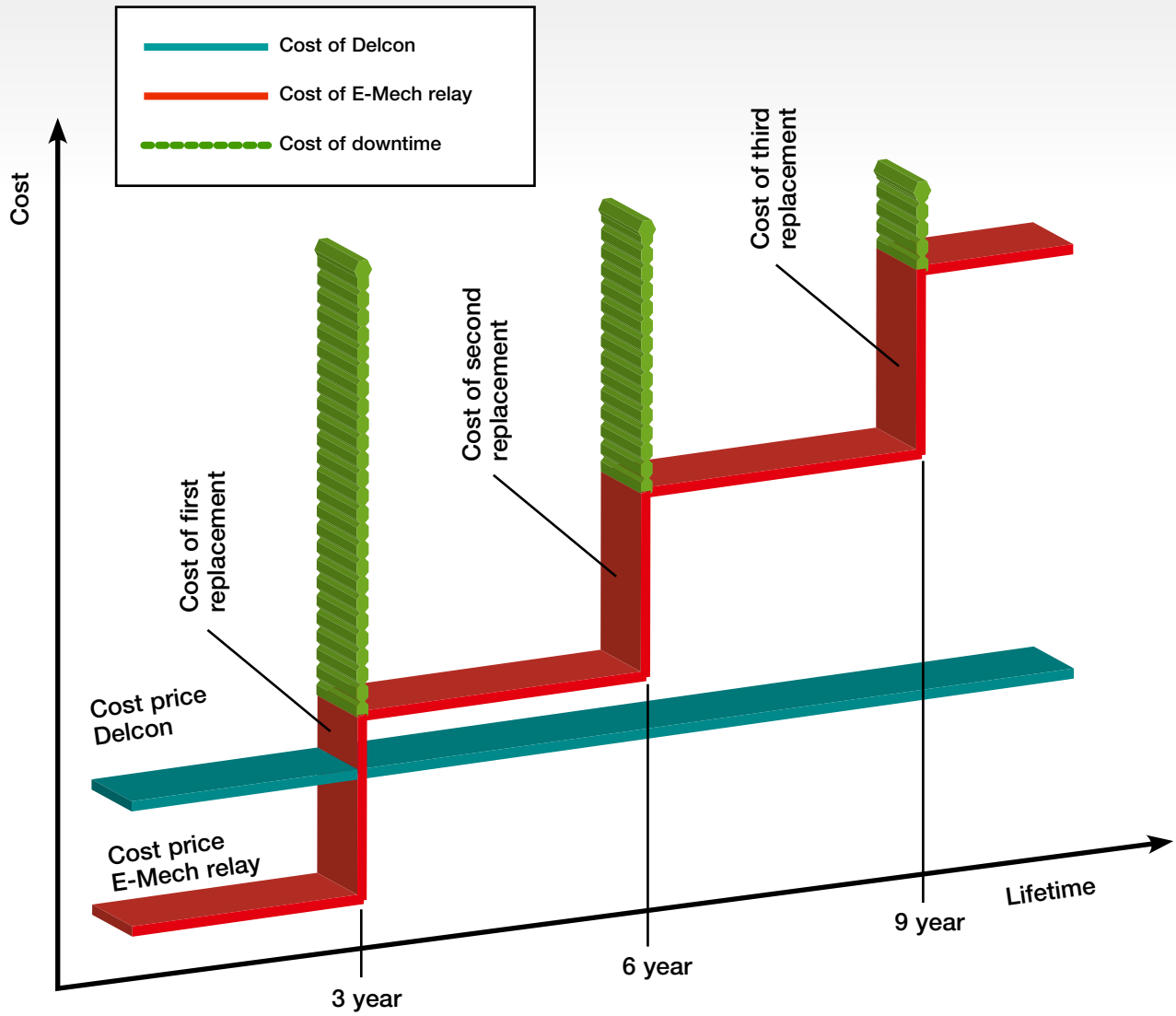
Changing relays is a costly business

Compared to the total system cost, a relay is a relatively inexpensive component. However, a relay that fails in a system runs the risk of becoming the most expensive component. Choosing a relay with a shorter life span than the entire system will probably result in costly unwanted system downtime!
The life span of an industrial system is typically considered to be 15 years.
If your application has any of the following requirements then select Delcon relays for a hassle free and safe operation that spans the entire system life.

- Frequent switching - relays operate at least once per minute
- Inductive loads – fitting clamp diodes can help but increases switch off time
- Inductive loads combined with high switching frequency
- High dc voltages



Choosing Delcon relays for your system will improve your long term profitability. The cost of system downtime differs depending on the type of industry but is usually very expensive. If we consider only the cost of trouble shooting and replacing a faulty relay for the first time then the initial cost of choosing Delcon is already exceeded.

Delcon is the default choice in many Scandinavian paper mills which is a well known, tough industrial environment. These customers choose Delcon for reliable, safe operation and long term cost savings through minimal maintenance and avoiding costly downtime.

Interface Relays

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Quick guide

EXI-relays for mA size loads: AC-control, DC-load	**CH** • Long signal cables (> 100 m) • Parallel signal & load cables • Radio frequency noise • Transient noise	**CHP** • 2 wire sensor version for leakage current immunity up to 3.5mA
EXI-relays for mA size loads: DC-control, DC-load	**CH** • Parallel signal & load cables • Radio frequency noise • Transient noise	**CHF** • High switching frequency
EXO-relays for A size loads: DC-control, AC-load	**TR** • high switching frequency • resistive loads • inductive loads	
EXO-relays for A size loads: DC-control, DC-load	**CH** • high switching frequency • resistive loads	**CHA & CHA4** • inductive loads • high DC-loads
EXO-relays for A size loads: AC-control, AC-load	**IHA** • all AC- and DC-loads • high switching • 0,5 ms off-delay	
Accessories		Mounting bases for EXI-relays: • MIS 1GNEX (screw connectors) • MIS 1CCNEX (spring connectors) • MIS 1TNEX (screw connectors with test contacts) Mounting bases for EXO-relays: • MOS 1GNEX (screw connectors) • MOS 1CCNEX (spring connectors) • MOS 1TNEX (screw connectors with test contacts)

For more information please call or visit our website www.delcon.fi

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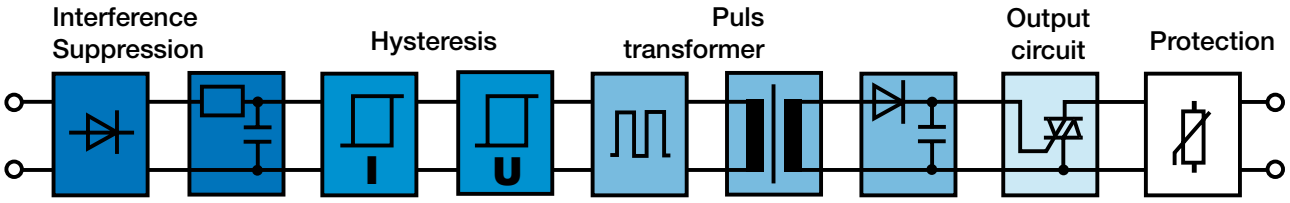
Delcon's unique interface relays

Field of application

Delcon's interface relays are designed to withstand tough industrial environments. Reliable activation and drop out, very high interference immunity, 4 kV isolation and high load currents provide a maintenance-free process with low service costs and reliable operation. Lifetime is estimated at up to 20 years, depending on the type.

Interference protection

Delcon's interface relays have interference protection in several layers that effectively prevent false signals from affecting the relays. Only actual control signals pass through the filter.



Capacitive Suppression

When power cables with AC voltage are installed alongside a signal cable, a capacitance occurs between the cables. This capacitance creates an undesired current in the signal cable that can affect optocouplers/mechanical relays so that they are activated or do not disconnect when the control signal ceases. Delcon's relays have integrated protection that prevents capacitive cross-talk from incorrectly activating relays. Installation of power cables beside unshielded signal cables for long distances (>1.5 km) is therefore feasible.

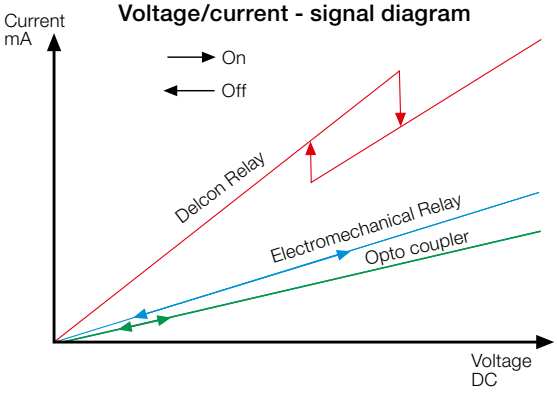
Transient & High Frequency Suppression

The relays have integrated protection against transients and EMI that can occur on the primary side.

Switching Points & Hysteresis

The relays have defined activation and drop-out points. Activation occurs at 2/3 of the nominal voltage and drop out occurs at 1/2 of the nominal voltage. Current hysteresis entails that the relay's impedance is changed at the activation point; less current is required to hold the relay in the activated position. The two functions above ensure a hysteresis between the activation and drop-out point. Activation and drop out are always reliably conducted, even in environments with high interference.

The diagram shows the change-over levels/hysteresis for Delcon's interface relays compared with mechanical relays and optocouplers.



Pulse transformer

Delcon uses a pulse transformer for transmission of the signal from the primary to secondary side, resulting in high energy transfer. This permits the use of heavy duty output components of high quality.
In comparison with an optocoupler, which utilises the load side for supply to the internal electronics, the pulse transformer and Delcon's circuit solution offer many benefits:

- Creep distance of 8 mm
- 4 kV isolation
- Very low leakage current
- No demand for min. load
- High immunity to load transients
- High load currents
- High dV/dt values

Solid State Switch & Protection Components

AC output

TRIAC output semi-conductor. Thanks to the pulse transformer's strong signal transmission, TRIACs can be used that are less sensitive to rapid load voltage (dV/dt) rise/fall times. Sensitive TRIACs can be activated by rapid voltage changes. This problem is eliminated with Delcon's interface relays. The SLO24TR standard relay has very low leakage current (0.05 mA) and has varistor protection against load transients. Other AC relays have varistors and RC protection on the secondary side. No minimum load is required and all modules have a wide voltage range. The relays can handle resistive and inductive loads without load currents needing to be reduced.

DC output

Power MOSFET output semi-conductor. Available for load currents up to 10A in the same compact casing. Transient protection is provided by a zener diode or varistor, which entails that there is no leakage current. Low reduction of load current for inductive loads compared with mechanical relays.

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Quick guide

HazLoc:

- Class I, Division 2, Groups A, B, C, D
- Class I, Zone 2, IIC
- T4 (Ta ≤ 70 °C)

Where...

Class I = Gases and Vapors

Division 2 = Not normally present in an explosive concentration (but may accidentally exist)

Groups = A: Acetylene
B: Hydrogen, etc.
C: Ether, etc.
D: Hydrocarbons, fuels, solvents, etc.

Zone 2 = Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mists is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

T4 (Ta ≤ 70 °C) = Maximum surface temperature

ATEX: II 3 G Ex nA IIC Gc

Where...

II = Device group II; There are 2 groups of devices. Devices of Group I, Category M are for use in underground mines and their above ground equipment, which are at risk from firedamp and/ or inflammable dusts. All other areas at risk of explosion are combined in Device Group II.

3G = Category 3; equipment ensuring a normal level of protection. Explosive atmospheres are unlikely to occur.

Ex = explosion protection identifier.

nA = Protection principle non sparking device.

IIC = Explosion group; IIC can be used for all explosion groups (IIA, IIB and IIC).

Gc = Protection level; Assured level of protection against becoming an ignition source in normal operation.

IECEx: Ex nA IIC Gc

Where...

Ex = explosion protection identifier.

nA = Protection principle non sparking device.

IIC = Explosion group; IIC can be used for all explosion groups.

Gc = Protection level; Assured level of protection against becoming an ignition source in normal operation

Interface Relays

EXI-relays for mA size loads: DC-control, DC-load

Relay type	Application	Control voltage	Load voltage	Max. current
EXI 12CH	Limit switches	12 VDC	0...28 VDC	50 mA
EXI 24CH	Limit switches	24 VDC	0...28 VDC	50 mA
EXI 24CHF	Fast connection	24 VDC	0...28 VDC	50 mA
EXI 24CHL	Increased input current	24 VDC	0...28 VDC	50 mA
EXI 48CH	Limit switches	48 VDC	0...28 VDC	50 mA
EXI 125CH	Limit switches	120 VDC	0...28 VDC	50 mA
EXI 250CH	Limit switches	250 VDC	0...28 VDC	50 mA

EXI-relays for mA size loads: AC-control, DC-load

Relay type	Application	Control voltage	Load voltage	Max. current
EXI 25CH	Limit switches	24 VAC	0...28 VDC	50 mA
EXI 49CH	Limit switches	48 VAC	0...28 VDC	50 mA
EXI 120CH	Limit switches	120 VAC	0...28 VDC	50 mA
EXI 120CHI	Normally closed operation	120 VAC	0...28 VDC	100 mA
EXI 120CHP	2-wire proximity switches	120 VAC	0...28 VDC	50 mA
EXI 230CH	Limit switches	230 VAC	0...28 VDC	50 mA
EXI 230CHI	Normally closed operation	230 VAC	0...28 VDC	100 mA
EXI 230CHP	2-wire proximity switches	230 VAC	0...28 VDC	50 mA
EXI 230CHR	Output current limited	230 VAC	0...28 VDC	50 mA

EXO-relays for A size loads: DC-control, DC-load

Relay type	Application	Control voltage	Load voltage	Max. current
EXO 5CH	Resistive loads	5 VDC	0...60 VDC	3 A
EXO 5CHA	Inductive loads	5 VDC	0...250 VDC	1,8 A
EXO 5CHX	Resistive loads	5 VDC	0...28 VDC	10 A*
EXO 5CHXSN	Resistive loads	5 VDC	0...28 VDC	10 A
EXO 12CH	Resistive loads	12 VDC	0...60 VDC	3 A
EXO 12CHA	Inductive loads	12 VDC	0...250 VDC	1,8 A
EXO 12CHX	Resistive loads	12 VDC	0...28 VDC	10 A*
EXO 12CHXSN	Resistive loads, DIN-rail	12 VDC	0...28 VDC	10 A
EXO 24CH	Resistive loads	24 VDC	0...60 VDC	3 A
EXO 24CHA	Inductive loads	24 VDC	0...250 VDC	1,8 A
EXO 24CHA4	Inductive loads	24 VDC	0...250 VDC	4 A
EXO 24CHX	Resistive loads	24 VDC	0...28 VDC	10 A*
EXO 24CHXSN	Resistive loads, DIN-rail	24 VDC	0...28 VDC	10 A
EXO 48CHA	Inductive loads	48 VDC	0...250 VDC	1,8 A
EXO 48CHA4	Inductive loads	48 VDC	0...250 VDC	4 A
EXO 48CHX	Resistive loads	48 VDC	0...28 VDC	10 A*
EXO 48CHXSN	Resistive loads, DIN-rail	48 VDC	0...28 VDC	10 A
EXO 120CHA	Inductive loads	120 VDC	0...250 VDC	1,8 A
EXO 120CHA4	Inductive loads	120 VDC	0...250 VDC	4 A
EXO 220CHA	Inductive loads	220 VDC	0...250 VDC	1,8 A
EXO 220CHA4	Inductive loads	220 VDC	0...250 VDC	4 A

* 6,3 A when used with a mounting base

EXO-relays for A size loads: DC-control, AC-load

Relay type	Application	Control voltage	Load voltage	Max. current
EXO 5IHA	Fast switch-off	5 VDC	0...240 VAC/250 VDC	1,2 A
EXO 5TH	AC loads	5 VDC	0...240 VAC	3 A
EXO 12TH	AC loads	12 VDC	0...240 VAC	3 A
EXO 24IHA	Fast switch-off	24 VDC	0...240 VAC/250 VDC	1,2 A
EXO 24TH	Wider operation temperature range	24 VDC	0...240 VAC	3 A
EXO 24TR	AC loads	24 VDC	0...240 VAC	3 A

EXO-relays for A size loads: AC-control, AC-load

Relay type	Application	Control voltage	Load voltage	Max. current
EXO P120TH	AC loads	120 VAC	0...240 VAC	3 A
EXO P230TH	AC loads	230 VAC	0...240 VAC	1,5 A

Mounting bases for EXI-relays:

- MIS 1GNEX (screw connectors)
- MIS 1CCNEX (spring connectors)
- MIS 1TNEX (screw connectors with test contacts)

Mounting bases for EXO-relays:

- MOS 1GNEX (screw connectors)
- MOS 1CCNEX (spring connectors)
- MOS 1TNEX (screw connectors with test contacts)

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