Actuation time:

Time between switching on the power until the contacts are closed with certainty. This includes the chatter time.

Armature return force:

Force with which the contacts are pulled apart when opening measured at the center of the contact surface.

Contact force:

Force with which the closed contacts are pressed against another measured at the center of the contact surface.

Contact gap:

Air space between open contacts.

Continuous current:

Current load through the relay which can flow continuously without damaging the relay.

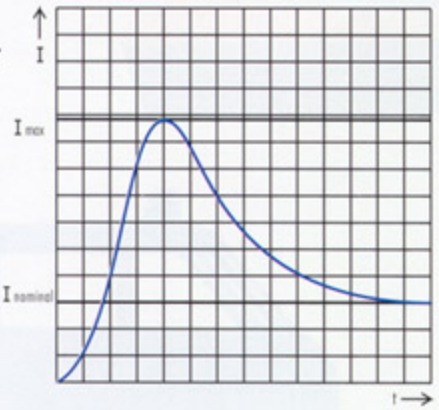
Erosion margin:

Or excess travel is the distance the armature moves after closing the contacts before making contact with the solenoid core measured at the contacts.

Inductive load (motor):

The switch-on current increases rapidly up to a multiple of the rated current and then flattens out to the rated current (e.g. when fan motor starts running). When switched off a voltage of up to several thousand volts can be induced leading to an arc between the relay contacts as they begin to open.

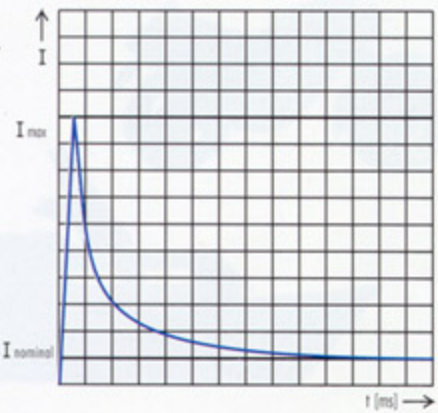
Switch-on characteristics:



Lamp load:

The switch-on current can be up to 10 times the rated current when the lamps are cold (e.g. headlamps, glow plugs).

Switch-on characteristics:



Mechanical service life:

Service life of relay without electrical load on contacts, the coil is actuated with 10 rectangular pulses per second for testing.

Operating voltage:

Voltage range in which the relay operates reliably at the specified temperature.

Permissible ambient temperature:

Temperature range in which the relay fulfills the specified data and operates continuously without damage.

Protective system IP 5K4K:

Hella relays are protected against unintentional contact, are splash-proof and fulfill the requirements for protective system IP 5K4K to DIN 40 050 when installed upright with the flat plugs pointing down.

Pull-in voltage:

Voltage on the coil at which the relay moves from the non-actuated position to the operating position (operating contacts closed – armature pulls in).

Rated voltage:

Voltage of vehicle electrical system, 12V or 24V .

Release time:

Time between switching off the coil current until the contacts open with certainty. This includes the chatter time.

Release voltage:

Voltage on the coil at which the relay returns from the operating position to the non-actuated position (armature is released). See pull-in voltage.

Resistive load:

The current is approximately the same from the time it is switched on until it is switched off (e.g. rear window defroster or mirror defroster).

Storage temperature:

Temperature range in which the relay can be stored without damage.

Switch-on current (inrush):

Load current flowing through the relay contacts immediately after closing.

Test temperature:

Temperature at which the service life and environmental tests are performed.

Test voltage:

Voltage at which the service life and environmental tests are performed.

Voltage drop:

Voltage loss in relay with load current applied and contacts closed measured at a load current of 10A between flat plugs of load circuit.

Winding/contact test voltage:

Voltage maintained between excitation and load circuit and between open flat plugs in load circuit up to electrical separation.

SOME FACTS WORTH KNOWING ABOUT RELAYS - FOR YOUR REFERENCE:

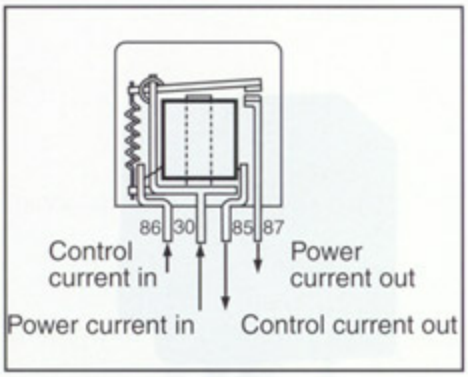
What is a relay?

Briefly: a remote-control switch in which an electro-magnetically produced force operates the contacts through which the main power current flows.

Why use a relay?

Leads are resistances. Resistances cause voltage drop, which means that consumer performance is reduced.

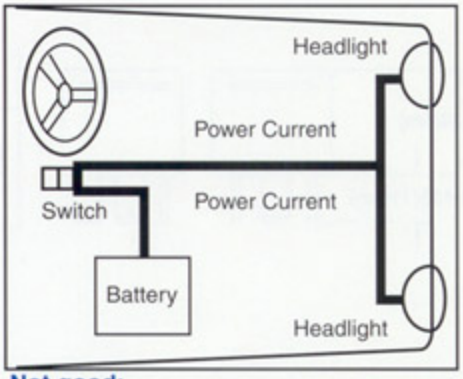
One of the basic rules of electricity states that the electrical resistance of a lead depends on its length and cross-sectional area. The longer and thinner it is, the greater the resistance will be. Higher resistance means less voltage at the far end of the lead, i.e. where the power user is. If the power user is a bulb, a little less voltage will mean a lot less light, as illustrated in the table below:



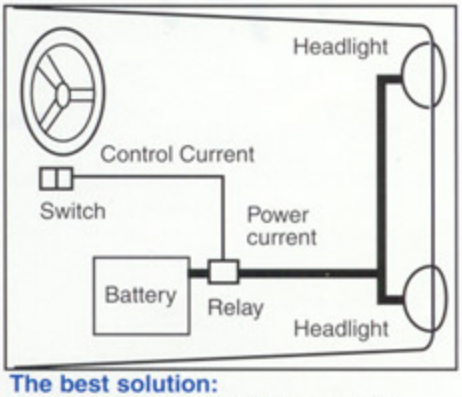
Operating voltage*		Luminous intensity
100%	=	100%
95%	=	83%
90%	=	67%
85%	=	53%

* 100% = 6.75 volts
or 100% = 13.5 volts
or 100% = 27 volts

Important:
The importance of optimum operating current and the negative effect voltage drop can have, e.g. on the luminous intensity of a bulb, can be seen from the table above.



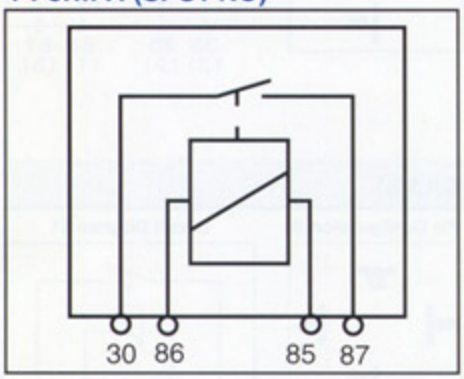
Not good:
Power current must travel from battery to headlamps - via the dashboard switch using large gauge cable.
Result: voltage drop causing reduction in headlamp performance.
Possible overloading of switch.



The best solution:
The power current is routed over the shortest distance between battery and headlamp via the relay. A control current lead of only 0.75 sq. mm (current consumption for this lead less than 150 mA!) is required between dashboard switch and relay.
Result: practically the whole power current reaches the consumer.

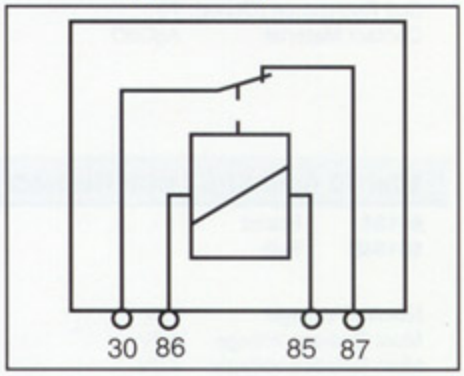
What sorts of relays are there?

1. The normally-open relay: 1 Form A (SPST-NO)



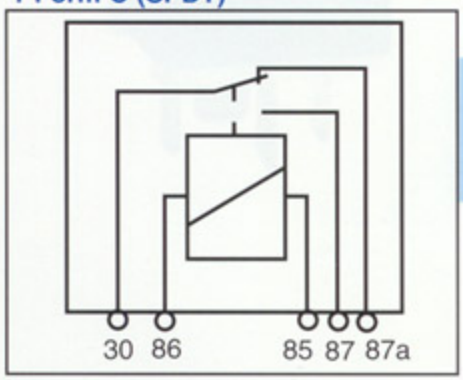
A normally-open relay closes an electrical circuit when current is passed through its coil. Normally-open relays are required for all types of vehicle lighting, horns, fanfares, heating circuits, fan motors and air-conditioning equipment.

2. The normally-closed relay: 1 Form B (SPST-NC)



A normally-closed relay opens an electrical circuit, i.e. it interrupts the flow of current. This type of relay is used, for example, to automatically disconnect headlights and radio when the engine is being started since for these few seconds the starter motor needs all the "power" it can get from the battery.

3. The change-over relay: 1 Form C (SPDT)



A change-over relay switches current from one user to another. Change-over relays are used for switching from the horn to the fanfare, from forward to backward movement of the sliding roof, from opening to closing electrically operated windows and for two-stage users such as fans and some rear window heating systems.

Eliminating voltage spikes: Relays with resistor and diode. Voltage spikes from 300V to 500V can occur momentarily when a relay is switched off. Sensitive electronic equipment can be damaged or malfunctions can occur if these spikes reach the vehicle electrical network without suppression. A relay with a resistor reduces these voltage spikes to less than 100V.
A relay with a diode eliminates them completely. The correct polarity of the connections is marked on the diode protected relay.