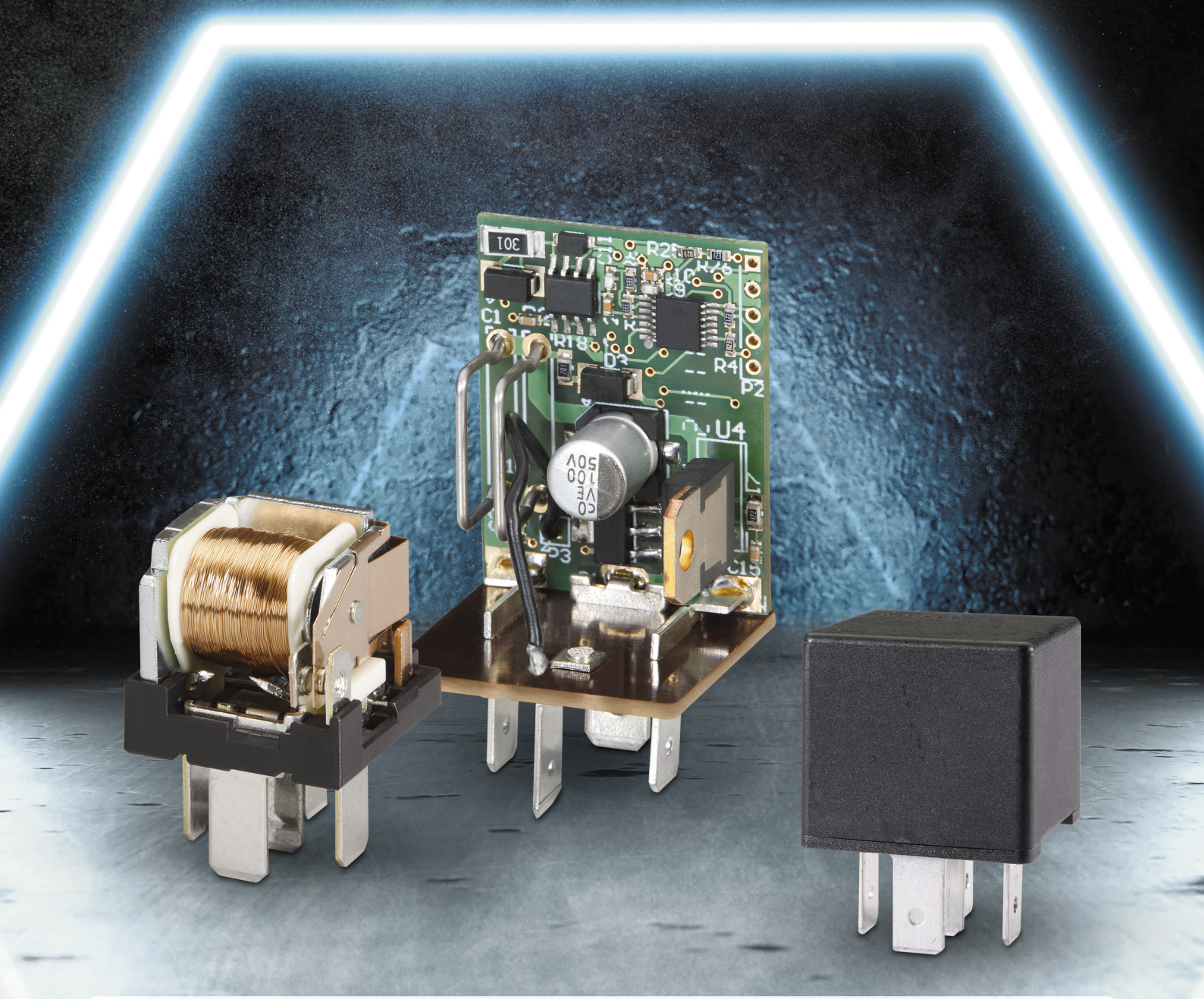
RELAYS AND RELAY DEVICES
PRODUCTS AND APPLICATIONS



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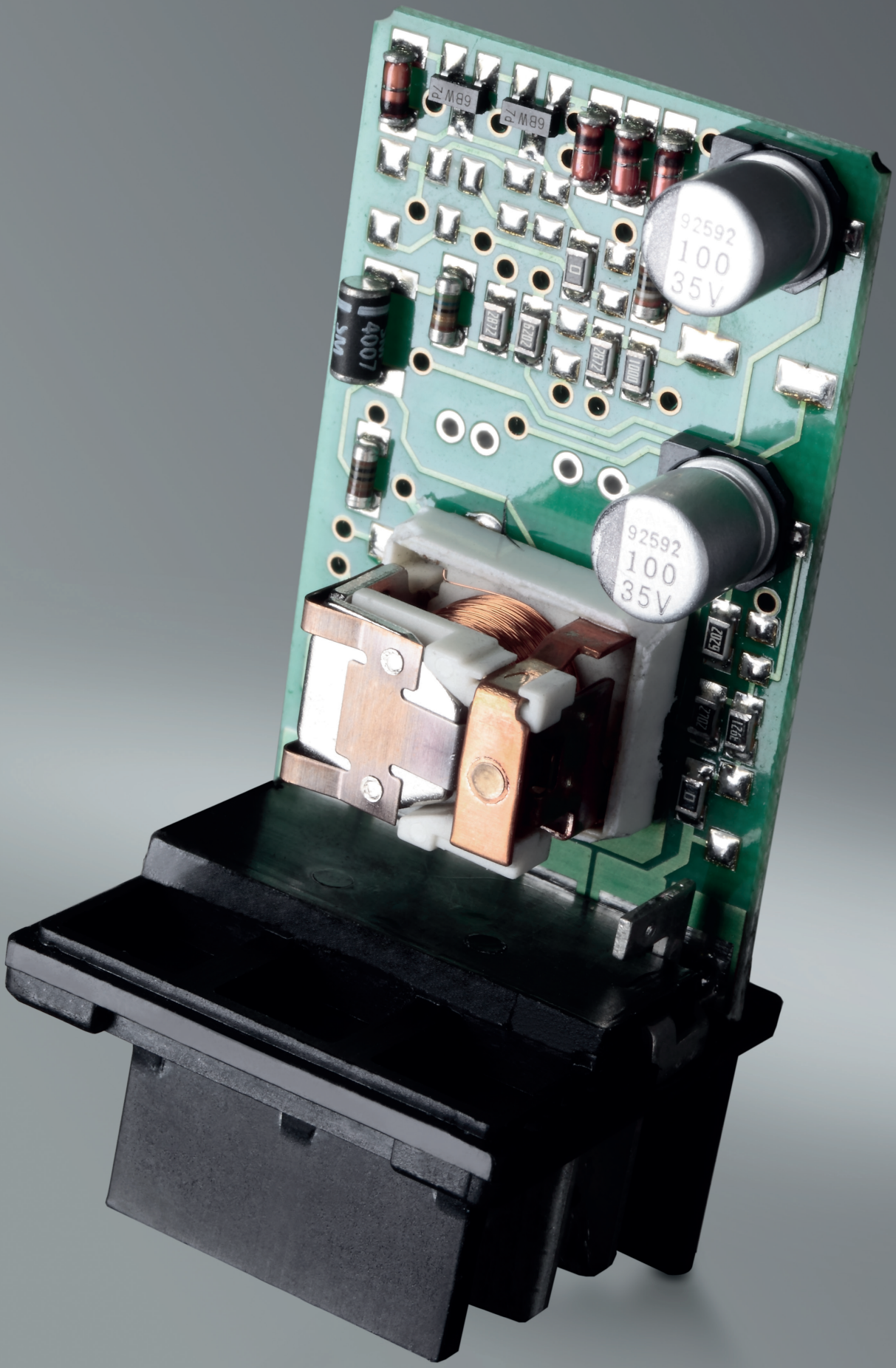
92592
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35V
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Relays have been used to remotely control circuits for over 180 years. The technology has proven its reliability millions of times and is today still the first choice for many applications, such as in automotive engineering.

From the telegraph to automotive engineering

- The relay owes its name to former times when mail was still carried by horse. An den so genannten Relaisstationen konnten die Postreiter ihre erschöpften Pferde gegen ausgeruhte tauschen. Today, we call an electromagnetic, remotely operated switch a relay.

- The American physician Joseph Henry invented the electric relay in 1835. The pioneer in communications engineering used it to send messages from his laboratory to his home. Relays were first used on a larger scale in 1837, as signal amplifiers for Samuel Morse's recording telegraphs. They would later make possible the widespread use of telephones and became a cornerstone of safety in railway engineering. In 1941, Konrad Zuse utilised 2,000 relays in his legendary Z3, the first digital computer. HELLA produced its first automotive relay in 1960.

- As electronics matured in the 20th century, the age of the relay was often seen as over; nevertheless, they retain a place in specific applications. The automotive industry, for example, needs relays, since relay functions cannot always be replaced by control units. Relays make galvanic isolation possible between input and output. Semi-conductors cannot manage this at the moment. The cost advantage relays have over electronic solutions is also unbeatable.

- Relays are used in automotive engineering to switch high currents. The engine control unit, for example, is switched by a relay. Because relays are robust and not particularly susceptible to failure, they can be installed near electric devices. They require only low control currents, making small line cross-sections sufficient. The switching and amplifier function of a relay could only be achieved with a lot more effort and a lot less reliability using more "modern" electronics. Another benefit of the relay is that it is quick and easy to replace. These positive characteristics are the reason why relays are still in use. Und sie sorgen auch in Zukunft dafür, dass Relais einen Stammplatz in vielen Kraftfahrzeugen haben werden.

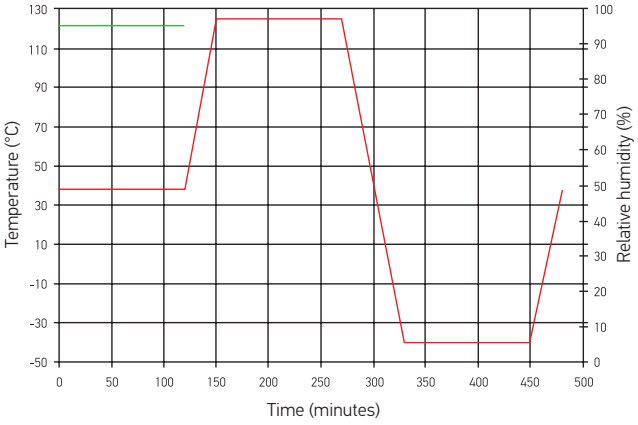
Quality relays from HELLA – versatile and reliable

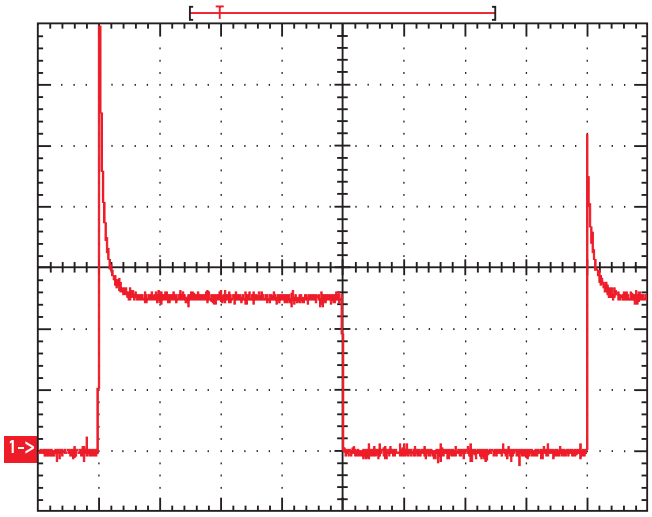
- **Manufacturing expertise:**
  HELLA produces more than 100 million units per year at its own facilities – thanks to optimised production at an attractive price and with one of the lowest failure rates in the entire industry.

- **Flexibility:**
  At HELLA, large volumes are produced fully automatically, smaller volumes semi-automatically. This allows a quick changeover in semi-automatic operation. HELLA is able to respond promptly to customer requirements and create new variants in addition to its existing product range at short notice.

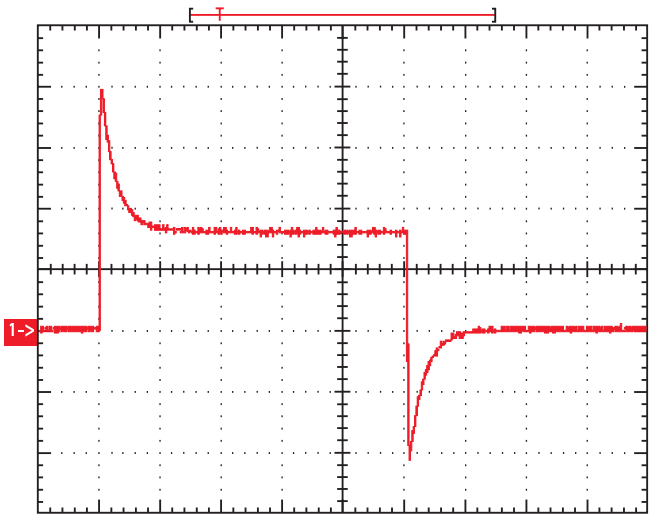
- **OEM customers:**
  HELLA develops and produces relays, for example for AGCO, Claas, Daimler, Ford, VW, GM, JCB, Opel, Nissan, John Deere, Chrysler, Jaguar/Land Rover, BMW, Audi, Volvo, Renault, PSA, BYD and FAW. Many of our customer relationships have existed for decades.

1951	First hot-wire flasher unit
1960	A-relay with metal housing Mechanical threshold voltage controller for windshield wipers
1965	E-relay: the first fully electronic flasher unit
1968	L-relay: the first modular system
1969	Wipe/wash interval control unit
1970	K-relay: current controlled relay for direction indicator lamps Bi-stable relay for switching between low and high beam
1972	Q-relay with plastic base plate, also available with built-in fuse
1973	V-relay: PCB relay for automatic placement
1976	S1-relay: replacement for Q-relay. Can be produced fully automatically, also available with built-in fuse
1978	H-relay: high-power relay for different motor loads
1982	Sounding relay for controlling direction indicator lamps
1989	Round connector relay: specially produced for Daimler AG, with plastic housing
1994	Micro relay: designed for fully automated production
1998	Mini solid state relay
2003	Bi-stable battery disconnect relay with flexible attachment system
2005	Micro relay: high-current and bi-stable version
2006	Intelligent flasher units for active LED flashers with current pulse evaluation in acc. with ISO 13207-1
2008	Flasher unit with microprocessor technology
2012	New and refined relay products with lower power consumption to help reduce CO_2 emissions
2013	CO_2 relay
2015	40 A micro relays
2018	High current Mini-SSR
2019	48 V battery disconnect relays





1) Load curve, 20 A resistive 10 A 500 ms



1) Load curve, 3 x high beam 10 A 500 ms

- **Design life tests:**
  The relays are switched on/off in cycles on fully automated test racks. Original loads or simulated resistive, inductive, capacitive or combined loads whose current characteristics are recorded as the original loads are connected. In addition, the relays can be subjected to different ambient temperature ranges or temperature profiles. The test is continuously documented.

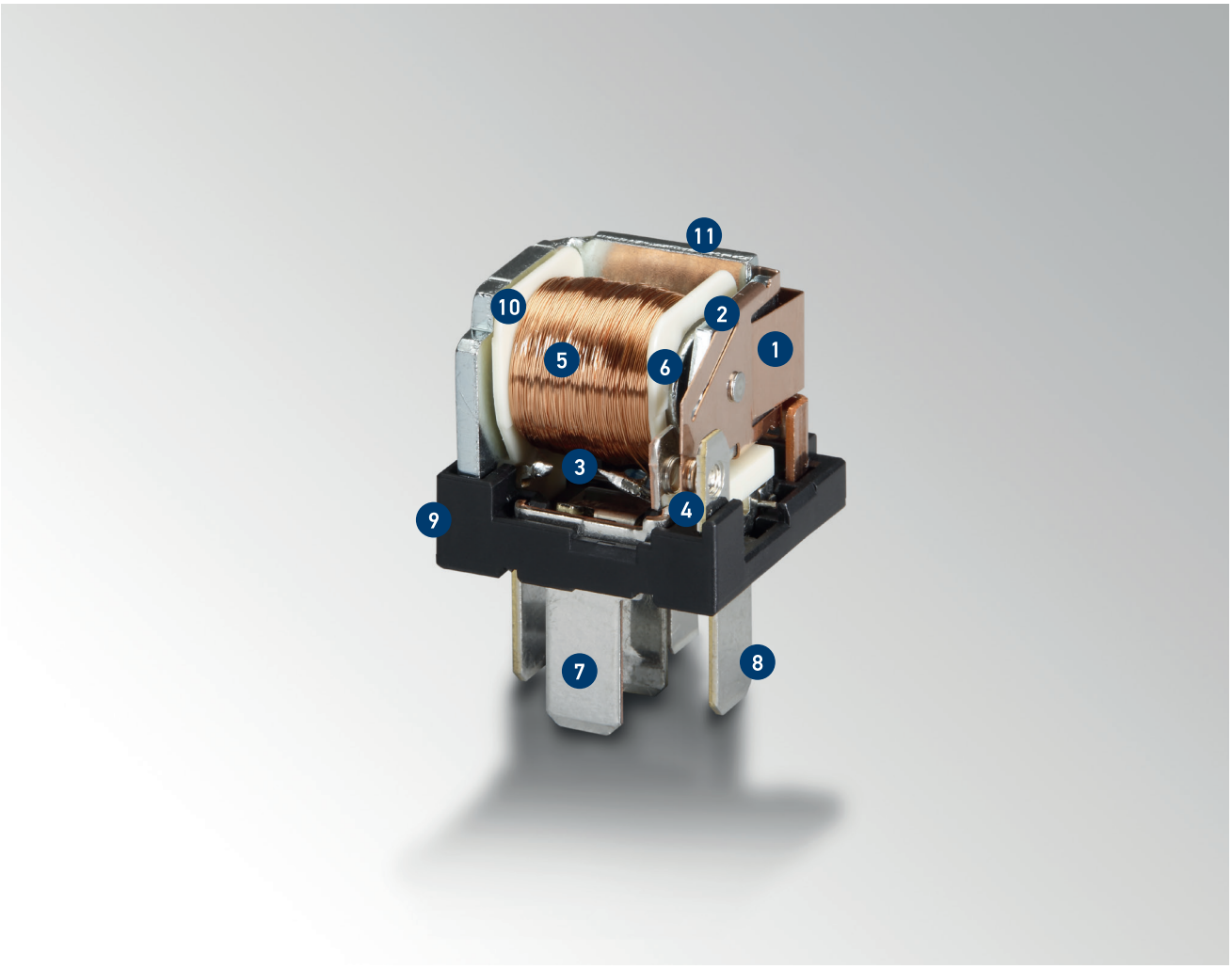
- **Electrical parameters:**
  Within the context of product release, starting voltage, dropout voltage, contact voltage drop, coil resistance and insulation resistance are tested, for example. Accompanying the manufacturing process, the electrical parameters are recorded at the end of the production process by end-of-line testers. These can be evaluated statistically. One important factor for guaranteeing the consistent high quality of the relays produced.

- **Environmental and mechanical tests:**
  Every relay has to pass tests such as the alternating temperature test, salt spray fog test, mechanical shock test or drop test and the vibration test within the context of the product release process. These tests are carried out using HELLA equipment.

- **Analytical tests:**
  Here, the materials used and the different connecting processes such as soldering and welding are tested.
  The tests are carried out randomly during incoming goods testing and following production.

- **Certificates:**
  HELLA has been certified in a range of relevant areas e.g. DIN EN ISO 9001:2008, ISO / TS 16949:2009, ISO 14001.
  HELLA relays also comply with the ROHS (2002/95/EC) and REACh standards.

Key components of an electromechanical relay



Key

1. Contact plates
2. Armature
3. Pins for coil wire
4. Switch contacts
5. Coil made of Cu wire
6. Iron core (in the coil)
7. Blade terminal (load) made of E-Cu (electrolytic copper) with tin-plated surface
8. Blade terminal (coil) made of CuZn (brass) with tin-plated surface
9. Base plate
10. Coil body
11. Yoke

Functional principle

Relays are basically electrically operated switches which use an electromagnet to move a switching mechanism by switching one or more contacts. They are used where one or more load circuits need to be switched on or off by means of a control signal. Characteristic of the electromechanical relay is the complete (galvanic) isolation between the control and controlled circuits.

Make relays

Make relays are used to close an electric circuit between a power source and one or more electrical loads, i.e. the loads are switched on. Relays are operated by means of switches, pulse generators or control devices. Typical vehicle applications are headlamps, auxiliary headlamps as well as fog lamps, horns, heaters, air conditioning systems and many other applications.

How make relays work

Fig.1) The control circuit (86/85) is inactive and the return spring keeps the armature open. The make contacts are open and the load circuit (30/87) is interrupted.

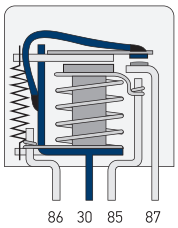


Fig. 1

Fig. 2) The control circuit (86 / 85) is active and the current flow in the magnetic coil (copper wire) induces a magnetic field, which pulls the armature down onto the magnetic core. The make contacts are closed and the load circuit (30/87) is therefore also closed.

Change-over relays

Change-over relays switch the load circuit over from one electrical load to another. These relays can be operated by a dashboard switch, for example. Change-over relays are used for switch applications with two stages/speeds such as heated rear windows or fan motors etc.

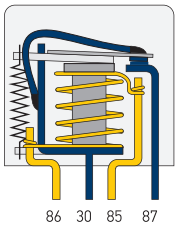


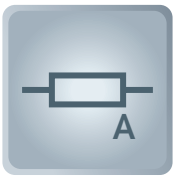
Fig. 2

How change-over relays work

A change-over relay operates on the same principle as a make relay. The only difference is that the armature is connected to a second (alternative) output (87a) when released. As soon as the control circuit is active, the armature is pulled in, opens the break contact (87a) and switches over to the make contact (87). A change-over relay can be used as either a make or a break relay. By design, the switching current of the make contact is always higher than that of the break contact.

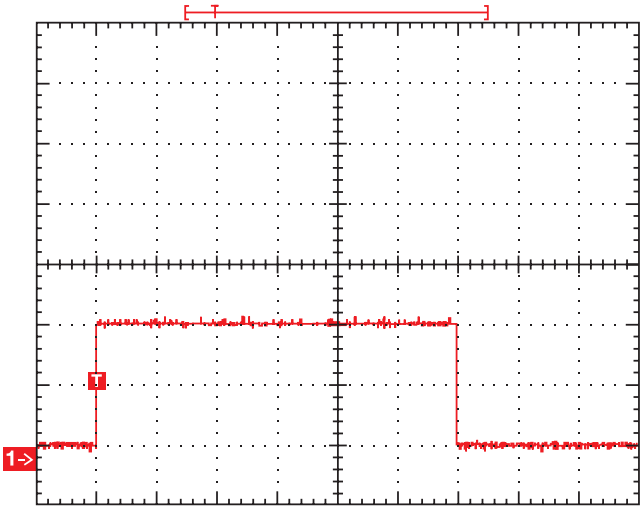
Rated voltage

- → 12 V: for passenger cars, agricultural and construction machinery etc.
- → 24 V: for commercial vehicles, buses, municipal vehicles etc.



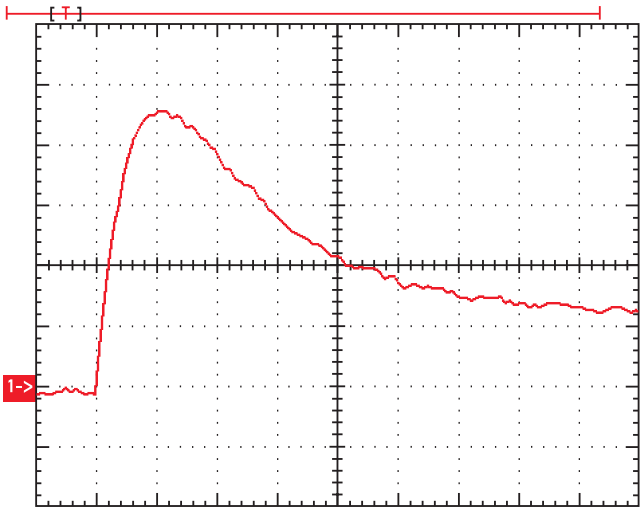
Rated load
(depending on load type)

→ **Resistive load:**
The current remains around the same from switch-on to switch-off (e.g. rear window heater).



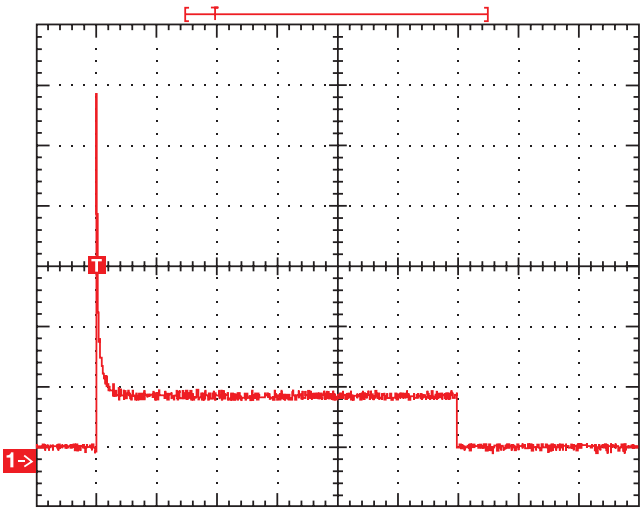
Example load curve, resistive load

→ **Inductive load:**
The inrush current increases to the rated current with a specific delay time due to the build-up of the inductor's magnetic field and then levels off (e.g. switching on a solenoid switch). During switch-off, a voltage of up to several thousand volts is (theoretically) induced, resulting in an electric arc between the relay contacts just opened.



Example load curve, inductive load

→ **Capacitive/bulb load:**
The inrush current of a capacitive load or a lamp can rise to ten times the rated current before leveling off to the rated current.



Example load curve, capacitive/bulb load

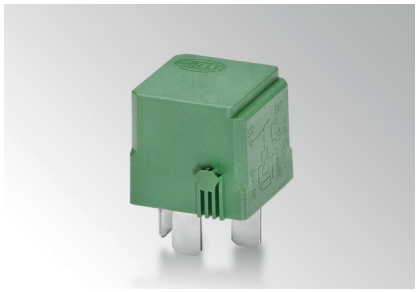
Coil circuit

In order to prevent voltage spikes caused by mutual inductance when switching off the coil current, our relays are in part equipped with resistors or diodes parallel to the coil.

Contacts and connector configurations

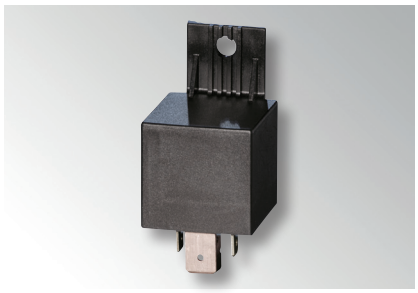
The connections of the relays are each labelled with numbers. The corresponding assignment is enclosed.

30	Load current +, terminal 15 (input)
85	Relay coil - (input)
86	Relay coil + (input)
87	Load current, make contact (output)
87a	Load current, break contact (output)



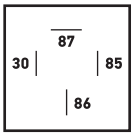
Mini relay
Mini relays according to ISO 7588-1, blade terminals according to ISO 8092-1.
Contact configurations: Normally open contact, changeover contact, max. 50 A rated switching current (normally open contact), rated voltage: 12 V, 24 V
Areas of application include: headlights, starters, fuel pumps, fan motors, horns and fanfares.

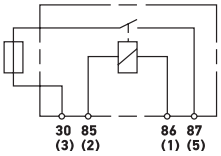
Micro relay
Micro relays according to ISO 7588-3 (1988), blade terminals according to ISO 8092-1.
Contact configurations: Normally open contact, changeover contact, max. 35 A rated switching current (normally open contact), rated voltage: 12 V, 24 V
Areas of application include: fuel pumps, air conditioning systems, windshield washer systems, wiper motors.



High-power relay
Mini relay version with enlarged dimensions, flat connector according to ISO 8092-1.
Contact configuration: Normally open contact, changeover contact, max. 60 A rated switching current, rated voltage: 12 V, 24 V
Areas of application include: battery disconnect relays, starter motors, glow plugs, ignitions, windshield heating.

Solid state relay
Mini semiconductor relays according to ISO 7588-1, blade terminals according to ISO 8092-1.
Contact configuration: Normally open contact, max. 22 A rated switching current (normally open contact), rated voltage: 12 V
Areas of application include: vacuum pumps for brake booster support, daytime running lights.

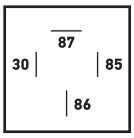


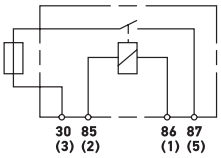


Rated switching current*	Number of switching operations
max. 15 A	min. 100,000

Coil resistance: 85 ohm, bracket: yes

Description	VPE**	Part number
12 V, 4-pole, with fuse link 15 A	1	**4RA 003 530-001**
12 V, 4-pole, with fuse link 15 A	112	**4RA 003 530-007**

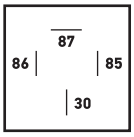


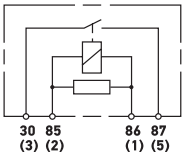


Rated switching current*	Number of switching operations
max. 25 A	min. 100,000

Coil resistance: 85 ohm, bracket: yes

Description	VPE**	Part number
12 V, 4-pole, with fuse link 25 A	112	**4RA 003 530-041**
12 V, 4-pole, with fuse link 25 A	1	**4RA 003 530-042**

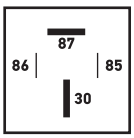


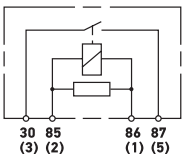


Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: Yes

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 007 791-021**



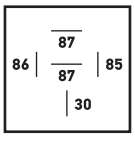


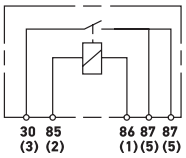
Rated switching current*	Number of switching operations
min. 44 A, max. 50 A	min. 75,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: Yes

Description	VPE**	Part number
12 V, 4-pin, with 9.5 mm load contacts	1	**4RA 007 793-041**
12 V, 4-pin, with 9.5 mm load contacts	175	**4RA 007 793-047**

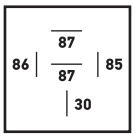
* At 80°C ambient temperature

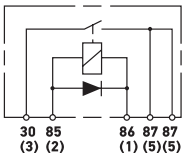




Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000
Coil resistance: 85 ohm, bracket: yes	

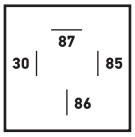
Description	VPE**	Part number
12 V, 5-pole, with dual-output	1	**4RA 933 791-061**
12 V, 5-pole, with dual-output	40	**4RA 933 791-067**

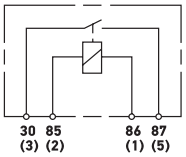




Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000
Coil resistance: 85 ohm, bracket: yes	

Description	VPE**	Part number
12 V, 5-pole, with dual output and parallel diode	1	**4RA 933 791-091**

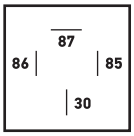


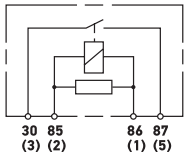


Rated switching current*	Number of switching operations
min. 15 A, max. 30 A	min. 100,000
Coil resistance: 90 ohm, Bracket: Yes	

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 965 400-001**

* At 80 °C ambient temperature / ** Packaging unit

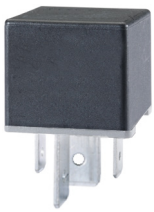


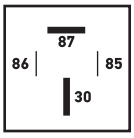


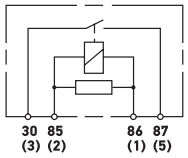
Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 007 791-011**
12 V, 4-pole	200	**4RA 007 791-017**



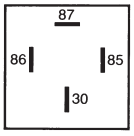


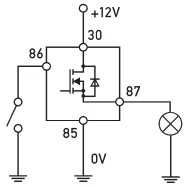


Rated switching current*	Number of switching operations
min. 44 A, max. 50 A	min. 75,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 4-pin, with 9.5 mm load contacts	1	**4RA 007 793-031**
12 V, 4-pin, with 9.5 mm load contacts	175	**4RA 007 793-037**

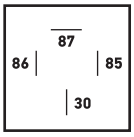


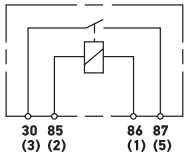


Rated switching current*	Number of switching operations
max. 22 A	min. 900,000

Protection class: IP 67, bracket no

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 931 774-031**

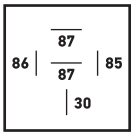


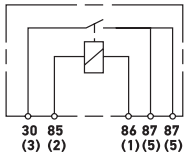


Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000

Coil resistance: 85 ohm, bracket: no

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 933 332-101**
12 V, 4-pole	40	**4RA 933 332-107**

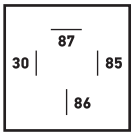


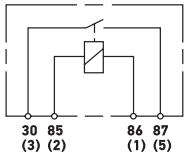


Rated switching current*	Number of switching operations
min. 30 A, max. 40 A	min. 100,000

Coil resistance: 85 ohm, bracket: no

Description	VPE**	Part number
12 V, 5-pole, with dual-output	1	**4RA 933 332-151**
12 V, 5-pole, with dual-output	100	**4RA 933 332-157**



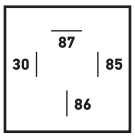


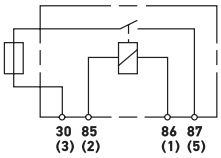
Rated switching current*	Number of switching operations
min. 16 A, max. 30 A	min. 100,000

Coil resistance: 90 ohm, Bracket: No

Description	VPE**	Part number
12 V, 4-pole	100	**4RA 965 400-017**

* At 80 °C ambient temperature / ** Packaging unit

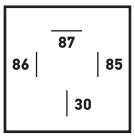


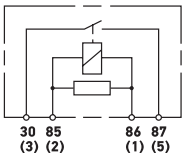


Rated switching current*	Number of switching operations
max. 15 A	min. 100,000

Coil resistance: 315 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole, with fuse link 15 A	1	**4RA 003 530-051**

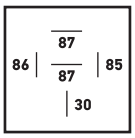


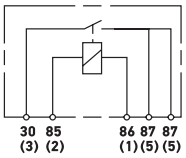


Rated switching current*	Number of switching operations
min. 16 A, max. 20 A	min. 100,000

Coil resistance: 305 ohm, Parallel resistance: 1,200 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 007 957-011**
24 V, 4-pole	200	**4RA 007 957-017**

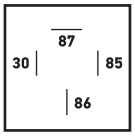


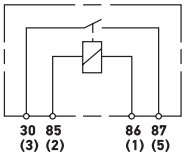


Rated switching current*	Number of switching operations
min. 16 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole, with dual-output	1	**4RA 933 791-071**



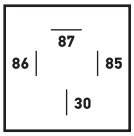


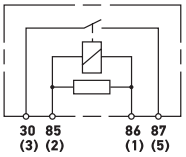
Rated switching current*	Number of switching operations
min. 16 A, max. 30 A	min. 100,000

Coil resistance: 360 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 965 400-031**

* At 80 °C ambient temperature / ** Packaging unit

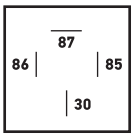


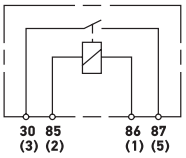


Rated switching current*	Number of switching operations
min. 16 A, max. 20 A	min. 100,000

Coil resistance: 305 ohm, Parallel resistance: 1,200 ohm, Bracket: No

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 007 957-001**
24 V, 4-pole	200	**4RA 007 957-007**

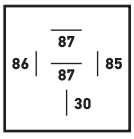


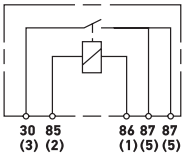


Rated switching current*	Number of switching operations
min. 16 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: No

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 933 332-111**
24 V, 4-pole	40	**4RA 933 332-117**



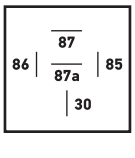


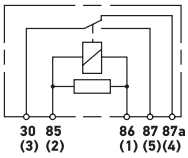
Rated switching current*	Number of switching operations
min. 16 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole	1	**4RA 933 791-081**

* At 80 °C ambient temperature / ** Packaging unit

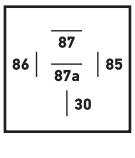


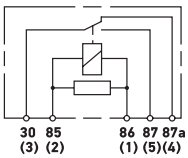


Rated switching current*	Number of switching operations
min. 5 A, max. 30 A	min. 100,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: Yes

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 007 794-031**
12 V, 5-pole	200	**4RD 007 794-037**

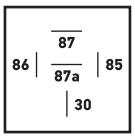


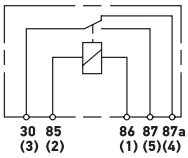


Rated switching current*	Number of switching operations
min. 5 A, max. 40 A	min. 100,000

Coil resistance: 85 ohm, Parallel resistance: 680 ohm, Bracket: Yes

Description	VPE**	Part number
12 V, 5-pole	200	**4RD 007 794-067**

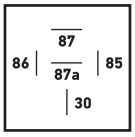


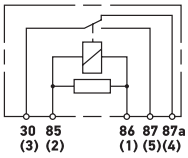


Rated switching current*	Number of switching operations
min. 5 A, max. 40 A	min. 100,000

Coil resistance: 85 ohm, bracket: yes

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 933 332-011**
12 V, 5-pole	100	**4RD 933 332-017**



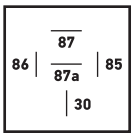


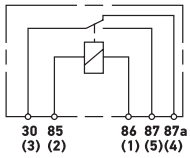
Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000

Coil resistance: 85 ohm, Parallel resistance: 680 ohm, Bracket: Yes

Description	VPE**	Part number
12 V, 5-pin, dust and water protected, IP 6K7 / IP 6K9K***	1	**4RD 933 332-031**
12 V, 5-pin, dust and water protected, IP 6K7 / IP 6K9K***	160	**4RD 933 332-037**

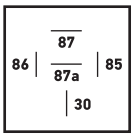
* At 80 °C ambient temperature / **packaging unit / *** In combination with mating connector 8JD 745 801-001/-011

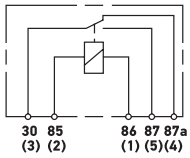




Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000
Coil resistance: 85 ohm, bracket: yes	

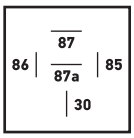
Description	VPE**	Part number
12 V, 5-pole	1	**4RD 933 332-041**
12 V, 5-pole	40	**4RD 933 332-047**

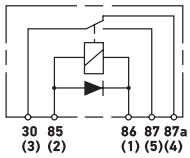




Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000
Coil resistance: 85 ohm, bracket: yes	

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 933 332-237**

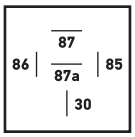


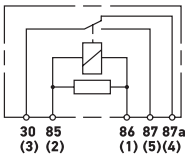


Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000
Coil resistance: 85 ohm, bracket: yes	

Description	VPE**	Part number
12 V, 5-pin, with parallel diode	40	**4RD 933 332-277**

* At 80 °C ambient temperature / ** Packaging unit

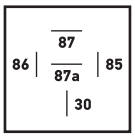


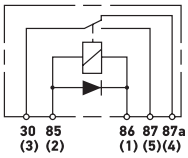


Rated switching current*	Number of switching operations
min. 5 A, max. 30 A	min. 100,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 007 794-021**
12 V, 5-pole	200	**4RD 007 794-027**
12 V, 5-pole	200	**4RD 007 794-077**

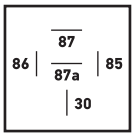


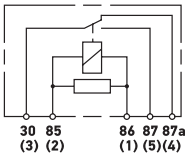


Rated switching current*	Number of switching operations
min. 5 A, max. 30 A	min. 100,000

Coil resistance: 100 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pin, with parallel diode	1	**4RD 007 794-041**
12 V, 5-pin, with parallel diode	200	**4RD 007 794-047**

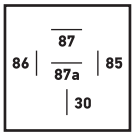


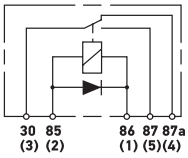


Rated switching current*	Number of switching operations
min. 15 A, max. 30 A	min. 100,000

Coil resistance: 90 ohm, Parallel resistance: 470 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pole	360	**4RD 931 680-017**



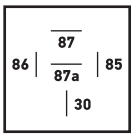


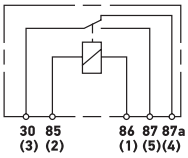
Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000

Coil resistance: 85 ohm, bracket: no

Description	VPE**	Part number
12 V, 5-pin, with parallel diode	1	**4RD 933 332-021**
12 V, 5-pin, with parallel diode	40	**4RD 933 332-027**

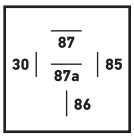
* At 80 °C ambient temperature / ** Packaging unit

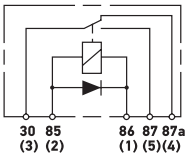




Rated switching current*	Number of switching operations
min. 6 A, max. 30 A	min. 60,000
Coil resistance: 85 ohm, bracket: no	

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 933 332-051**
12 V, 5-pole	40	**4RD 933 332-057**

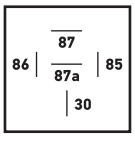


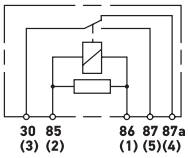


Rated switching current*	Number of switching operations
min. 8 A, max. 33 A	min. 100,000
Coil resistance: 95 ohm, Parallel resistance: 680 ohm, Bracket: No	

Description	VPE**	Part number
12 V, 5-pin, with parallel diode	40	**4RD 965 400-027**

* At 80 °C ambient temperature / ** Packaging unit

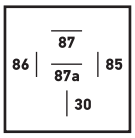


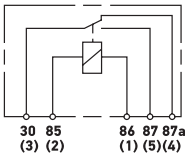


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 305 ohm, Parallel resistance: 1,200 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 007 903-011**
24 V, 5-pole	240	**4RD 007 903-017**

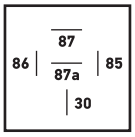


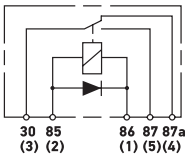


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 933 332-061**
24 V, 5-pole	40	**4RD 933 332-067**

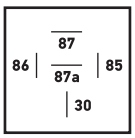


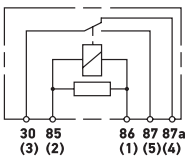


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole, with parallel diode	1	**4RD 933 332-081**
24 V, 5-pole, with parallel diode	40	**4RD 933 332-087**



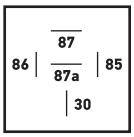


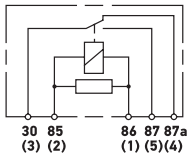
Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Parallel resistance: 1,200 ohm, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 933 332-201**

* At 80 °C ambient temperature / ** Packaging unit

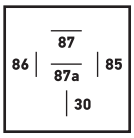


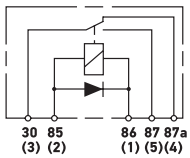


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 305 ohm, Parallel resistance: 1,200 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 007 903-001**
24 V, 5-pole	200	**4RD 007 903-007**

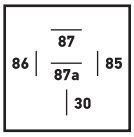


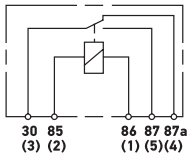


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 305 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole, with parallel diode	1	**4RD 007 903-021**
24 V, 5-pole, with parallel diode	200	**4RD 007 903-027**

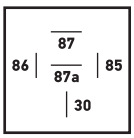


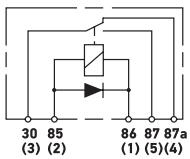


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 933 332-071**
24 V, 5-pole	40	**4RD 933 332-077**

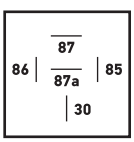


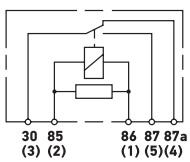


Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

Coil resistance: 350 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole, with parallel diode	1	**4RD 933 332-091**
24 V, 5-pole, with parallel diode	40	**4RD 933 332-097**





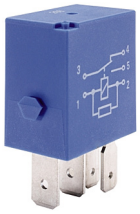
Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 100,000

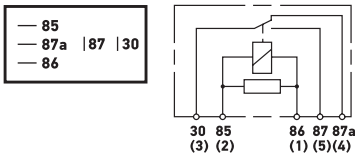
Coil resistance: 350 ohm, Parallel resistance: 1,200 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 933 332-261**

* At 80 °C ambient temperature / ** Packaging unit

12 V

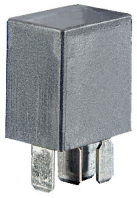


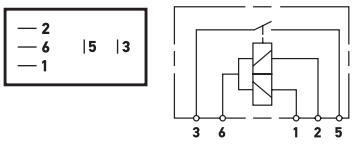


Rated switching current*	Number of switching operations
min. 10 A, max. 35 A	min. 100,000

Coil resistance: 140 ohm, Parallel resistance: 1,000 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pole, with locating lugs	450	**4RD 933 319-007**

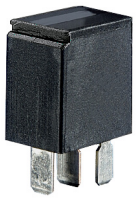


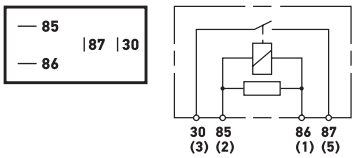


Rated switching current*	Number of switching operations
max. 20 A	min. 100,000

Coil resistance: 2 x 75 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pole, Bi-stable	1	**4RC 933 364-027**

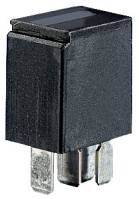


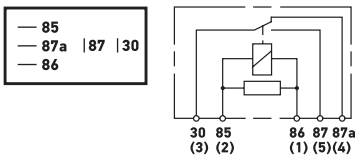


Rated switching current*	Number of switching operations
max. 20 A	min. 150,000

Coil resistance: 103.5 to 126.5 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 933 766-111**
12 V, 4-pole	50	**4RA 933 766-117**



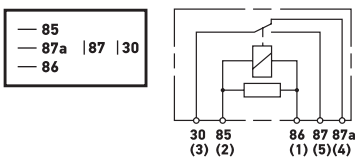


Rated switching current*	Number of switching operations
min. 10 A, max. 20 A	min. 100,000

Coil resistance: 103.5 to 126.5 ohm, Parallel resistance: 680 ohm, Bracket: No

Description	VPE**	Part number
12 V, 5-pole	1	**4RD 965 453-041**
12 V, 5-pole	350	**4RD 965 453-047**

24 V



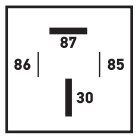
Rated switching current*	Number of switching operations
min. 5 A, max. 20 A	min. 50,000

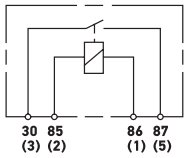
Coil resistance: 360 ohm, Parallel resistance: 384 ohm, Bracket: No

Description	VPE**	Part number
24 V, 5-pole	1	**4RD 933 319-011**
24 V, 5-pole	50	**4RD 933 319-017**

* At 80 °C ambient temperature / ** Packaging unit

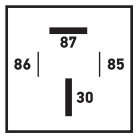
12 V

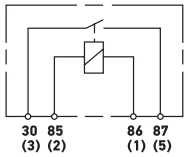




Rated switching current*	Number of switching operations
min. 25 A, max. 60 A	min. 50,000
Coil resistance: 85 ohm, bracket: yes	

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 003 437-081**
12 V, 4-pole	120	**4RA 003 437-087**

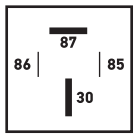


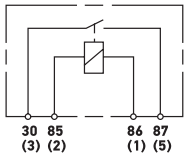


Rated switching current*	Number of switching operations
min. 25 A, max. 60 A	min. 50,000
Coil resistance: 85 ohm, bracket: no	

Description	VPE**	Part number
12 V, 4-pole	1	**4RA 003 437-111**

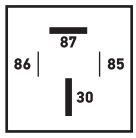
24 V

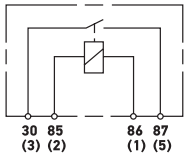




Rated switching current*	Number of switching operations
min. 25 A, max. 60 A	min. 50,000
Coil resistance: 310 ohm, Bracket: Yes	

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 003 437-091**
24 V, 4-pole	120	**4RA 003 437-097**





Rated switching current*	Number of switching operations
min. 25 A, max. 60 A	min. 50,000
Coil resistance: 310 ohm, Bracket: No	

Description	VPE**	Part number
24 V, 4-pole	1	**4RA 003 437-121**
24 V, 4-pole	180	**4RA 003 437-127**

* At 80 °C ambient temperature / ** Packaging unit

	Mini relay 12 V 4RA 007 791-... 4RD 007 794-...	 4R* 933 332-... 4RA 933 791-... 4R* 965 400-... 4RA 003 530-...	Mini relay 24 V 4RA 007 957-... 4RD 007 903-... 4RA 003 530-...	 4R* 933 332-... 4RA 933 791-... 4RA 965 400-...	Power mini relay 12 V 4RA 007 793-...
General specifications					
Test voltage	13.5 V	13.5 V	27 V	27 V	13.5 V
Test temperature	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C
Permissible ambient temperature	-40 °C ... +125 °C	-40 °C ... +85 °C	-40 °C ... +125 °C	-40 °C ... +85 °C	-40 °C ... +125 °C
Storage temperature	-40 °C ... +130 °C	-40 °C ... +125 °C	-40 °C ... +130 °C	-40 °C ... +125 °C	-40 °C ... +130 °C
Flat connector (in accordance with ISO 8092)					
30	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	9.5 x 1.2 mm
85	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm
86	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm
87	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	9.5 x 1.2 mm
87a	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	–
Coil specifications					
Rated voltage	12 V	12 V	24 V	24 V	12 V
Operating voltage range at permissible ambient temperature	8 V ... 16 V	8 V ... 16 V	16 V ... 30 V	16 V ... 30 V	8 V ... 16 V
Pick-up voltage at test temperature	< 8 V	< 8 V	< 17 V	< 15.6 V	< 8 V
Drop-out voltage at test temperature	< 1 V	< 1 V	> 3.5 V	> 3.5 V	> 1.3 V
Coil resistance at test temperature without parallel component	85 / 100 Ohm ± 10 %	85/90 Ohm ± 10 %	305 / 315 Ohm ± 10 %	350 / 360 Ohm ± 10 %	100 Ohm ± 10 %
Response time	< 10 ms	< 10 ms	< 10 ms	< 10 ms	< 10 ms
Drop-out time	< 10 ms	< 10 ms	< 10 ms	< 10 ms	< 10 ms
Insulation resistance Coil circuit/load circuit	> 100 MOhm	> 100 MOhm	> 100 MOhm	> 100 MOhm	> 100 MOhm
Breakdown strength Coil circuit/load circuit	> 1,000 VDC	> 1,000 VDC	> 1,000 VDC	> 1,000 VDC	> 1,000 VDC
Contact details					
Contact voltage drop-out at test voltage ...					
... normally open contact in new state	< 10 mV/A	< 10 mV/A	< 10 mV/A	< 10 mV/A	< 5 mV/A
... break contact in new state	< 10 mV/A	< 15 mV/A	< 10 mV/A	< 15 mV/A	–
... normally open contact after life endurance test	< 10 mV/A	< 15 mV/A	< 10 mV/A	< 15 mV/A	< 10 mV/A
... break contact after life endurance test	< 10 mV/A	< 20 mV/A	< 15 mV/A	< 20 mV/A	–
Residual current	1 A / 6 V	1 A / 6 V	1 A / 6 V	1 A / 6 V	1 A / 6 V
Mechanical lifetime (number of switching operations)	10^7	10^7	10^7	10^7	10^7

High performance relay		Micro relay			Solid state relay
12 V	**24 V**	**12 V**		**24 V**	**12 V**
4RA 003 437-...	4RA 003 437-...	4RD 933 319-... 4RA 933 766-... 4RD 965 453-...	4RC 933 364-...	4RD 933 319-...	4RA 931 774-...
13.5 V	27 V	13.5 V	13.5 V	27 V	13.5 V
+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C	+23 °C ± 5 °C
-40 °C ... +85 °C	-40 °C ... +85 °C	-40 °C ... +125 °C	-40 °C ... +105 °C	-40 °C ... +125 °C	-40 °C ... +125 °C
-40 °C ... +125 °C	-40 °C ... +125 °C	-40 °C ... +130 °C	-40 °C ... +125 °C	-40 °C ... +85 °C	-40 °C ... +150 °C
9.5 x 1.2 mm	9.5 x 1.2 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm
6.3 x 0.8 mm	6.3 x 0.8 mm	4.8 x 0.8 mm	4.8 x 0.8 mm	4.8 x 0.8 mm	6.3 x 0.8 mm
6.3 x 0.8 mm	6.3 x 0.8 mm	4.8 x 0.8 mm	4.8 x 0.8 mm	4.8 x 0.8 mm	6.3 x 0.8 mm
9.5 x 1.2 mm	9.5 x 1.2 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm	6.3 x 0.8 mm
–	–	4.8 x 0.8 mm	4.8 x 0.8 mm	4.8 x 0.8 mm	–
12 V	24 V	12 V	12 V	24 V	12 V
8 V ... 16 V	16 V ... 30 V	8 V ... 16 V	8 V ... 16 V	16 V ... 30 V	7 V ... 18 V
< 7.5 V	< 17 V	< 8 V	< 6 V	< 14.4 V	< 8 V
< 1 V	> 5 V	< 1 V	–	< 2.4 V	< 12.5 V
85 Ohm ± 10 %	310 Ohm ± 10 %	115 / 140 Ohm ± 10 %	2 x 75 Ohm ± 10 %	360 Ohm ± 10 %	–
< 10 ms	< 10 ms	< 10 ms	< 5 ms	< 10 ms	< 400 µs
< 10 ms	< 10 ms	< 10 ms	< 5 ms	< 10 ms	< 115 µs
> 100 MOhm	> 100 MOhm	> 20 MOhm	> 100 MOhm	> 100 MOhm	–
> 1.000 VDC	> 1.000 VDC	> 500 VDC / VAC	> 800 VDC	> 500 VAC	–
< 3 mV/A	< 3 mV/A	< 10 mV/A	< 5 mV/A	< 10 mV/A	–
–	–	< 10 mV/A	–	< 10 mV/A	–
< 10 mV/A	< 10 mV/A	< 25 mV/A	< 10 mV/A	< 25 mV/A	–
–	–	< 25 mV/A	–	< 25 mV/A	–
1 A / 6 V	1 A / 6 V	1 A / 6 V	1 A / 6 V	1 A / 6 V	–
10^7	10^7	10^7	10^7	10^7	–

Vibration test

DIN EN 600 68-2-6; test: Fc (sinusoidal);
20 – 200 Hz, 5 g, 6 h per axis

Damp/heat test, constant

DIN EN 600 68-2-78, test: Cab;
Upper temperature: +55°C, 93% rel. hum., 56 d

Shock test

DIN EN 600 68-2-27; test: Ea (semi-sinusoidal);
max. 50 g, 11 ms, 1,000 shocks per direction

Temperature cycle test

DIN EN ISO 600 68-2-14, test; Nb;
- 40°C / + 85°C (5°C per minute), 10 cycles

Corrosion test

DIN EN 600 68-2-42; test: Kc;
10 ± 2 cm^3/m^3 SO_2, + 25 °C, 75 % rF, 10 d

Condensation-water test

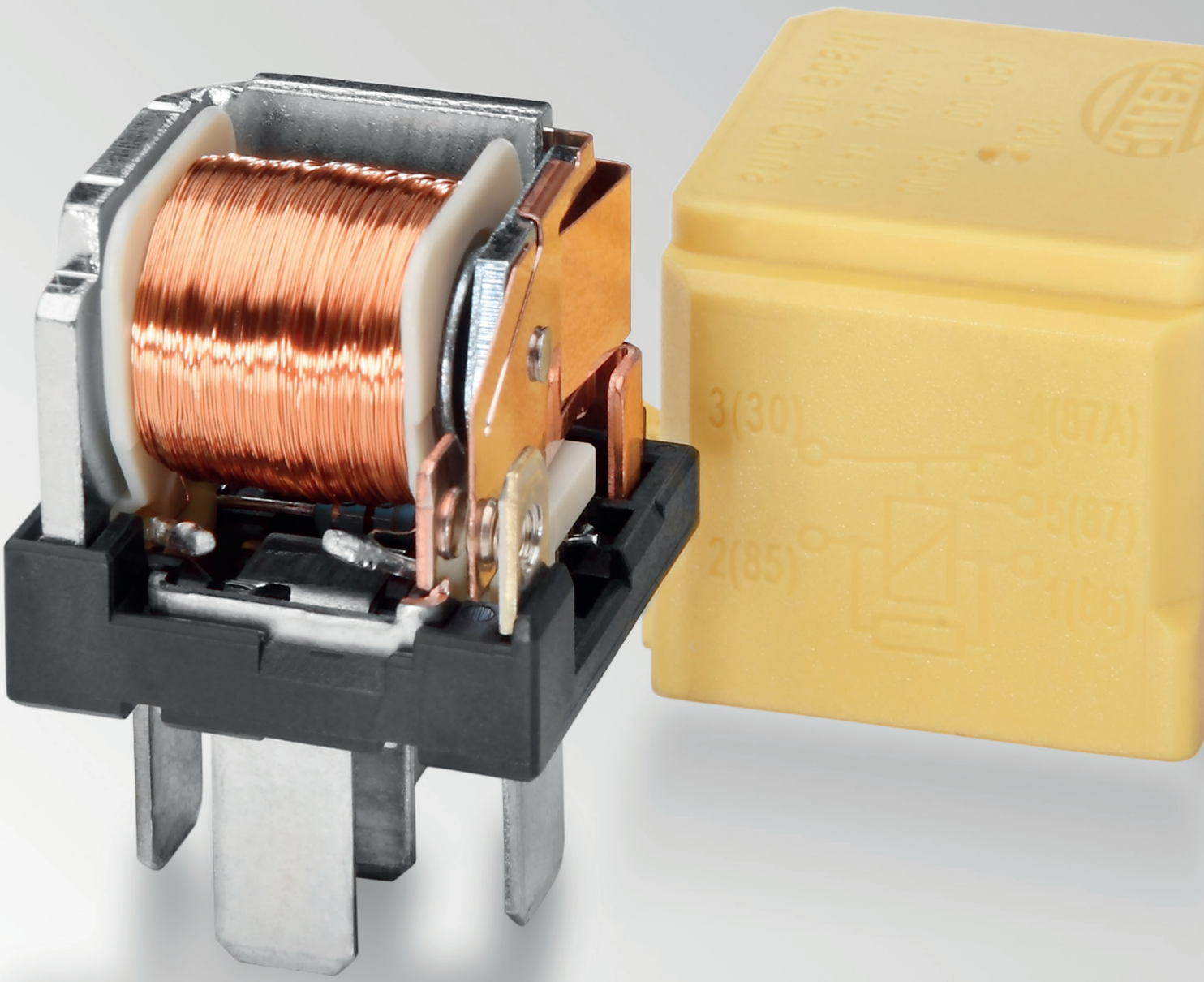
DIN EN ISO 6988;
+ 40°C, 0.2 dm^3 SO_2, 6 cycles (24 h cycle),
Storage: 8 h per cycle

Damp/heat test, cyclic

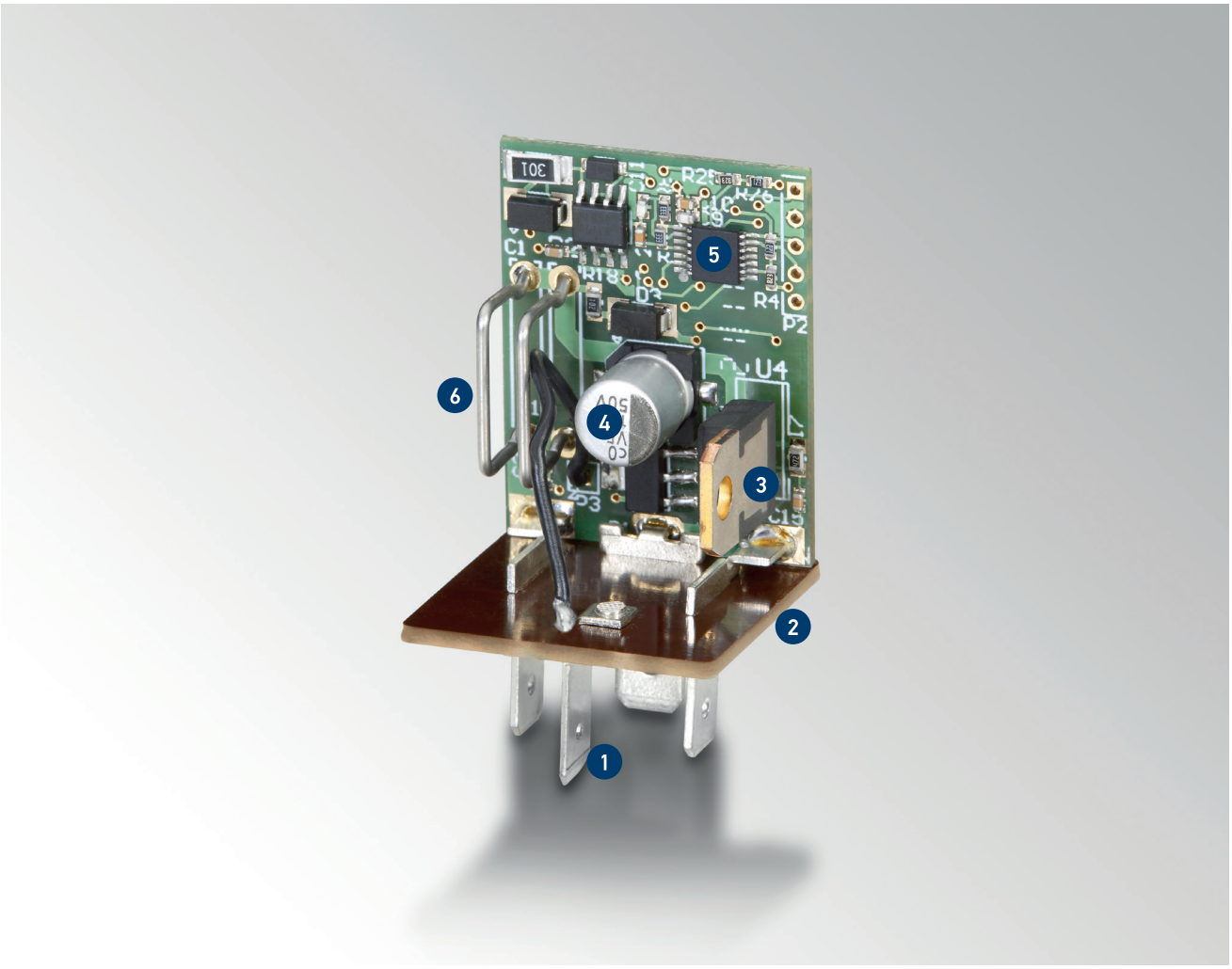
DIN EN 600 68-2-30, test: Db, variant 1;
Upper temperature: +55°C, min. 90% rel. hum., 6 cycles

Protection class

IP54 according to ISO 20653


3(30)
4(87A)
5(87)
2(85)
1(86)

Key components of a flasher unit



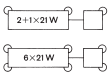
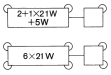
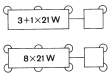
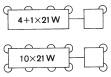
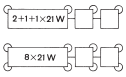
Key

1. Blade terminal made of E-Cu with tin-plated surface
2. Base plate
3. Power transistor
4. Capacitor
5. IC module
6. Measuring resistor for flasher current

Functional principle

→ Each flasher unit is an astable multivibrator in the circuitry sense. Its role is to operate blinker lights at the statutory frequency of 1.5 +/- 0.5 Hz or 90 +/- 30 rpm. This value applies to both directional and hazard warning lights.

→ Each flasher unit is assigned a separate output load or a permissible number of flashing indicator lights. This specific load case variant may not be exceeded or undercut, as otherwise the failure control will fail to work correctly. Some typical load cases which are supported are shown below:

Scenario	Direction indicators	Hazard warning lights	Pictogram
Towcar only	2 x 21 W	4 x 21 W	
	2 x 21 W + 0 ... 5 W	4 x 21 W + 2 x 5 W	
Towcar + 1 trailer	2 + 1 x 21 W	6 x 21 W	
	2 + 1 x 21 W + 0 ... 5 W	6 x 21 W + 2 x 5 W	
	3 + 1 x 21 W	8 x 21 W	
	3 + 1 x 27 W (32 CP) + 3 W (SAE)	8 x 27 W (32 CP) + 2 x 3 W (SAE)	–
	4 + 1 x 21 W	10 x 21 W	
Towcar + 2 trailers	2 + 1 + 1 x 21 W	8 x 21 W	

In addition to the load cases above, there are other use cases which do not feature failure control. These variants can be found in the table overview from page 44 on.

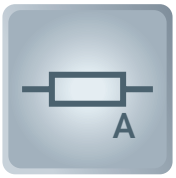
→ The failure of an indicator light must be clearly displayed to the driver. The law permits failure control by doubling the flashing frequency (E-control) or the indicator control lamp remaining off (P-control). The failure control applies to motor vehicles and all trailers.

→ For flashing circuits, it is common for different electric and control circuits to be split:
We distinguish between:
- Single-circuit flasher units
- Dual-circuit flasher units
- Pulse generators

→ In addition to the above HELLA also offers pulse generators for flashing circuits. In principle, these are flasher units without failure control. In contrast to the above-mentioned types, pulse generators can already be operated with small loads (e.g. 10 W).

Rated voltage

- → 6 V: for motorbikes etc.
- → 12 V: for passenger cars, agricultural and construction machinery etc.
- → 24 V: for commercial vehicles, buses, municipal vehicles etc.



Rated load, rated switching current
(depending on load case)

- → The number of connected flashing indicator lamps must not exceed the use cases/rated loads indicated for the respective flasher units
- → Special-purpose variants available for LED lights

Contacts and connector configurations

Single-circuit flasher unit

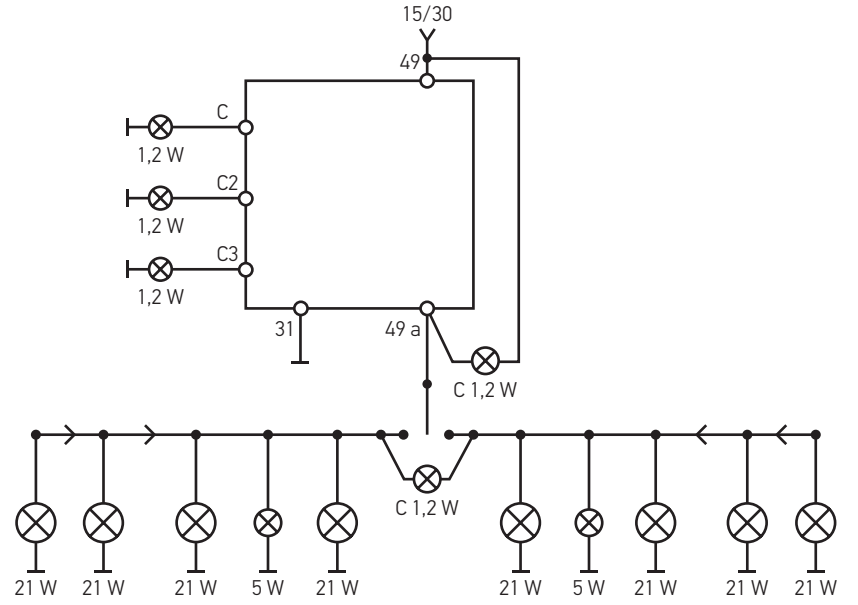
C	Towcar failure control lamp
C2	1st trailer failure control lamp
C3	2nd trailer failure control lamp
31	Ground
49	Input
49a	Output

Dual-circuit flasher unit

L	Indicator, left (input)
R	Indicator, right (input)
LL	Towcar indicator, left
RL	Towcar indicator, right
C	Towcar failure control lamp
C2	1st trailer failure control lamp
31	Ground
49	Input
49a	Output
54L	Trailer indicator, left
54R	Trailer indicator, right

The single-circuit test circuit

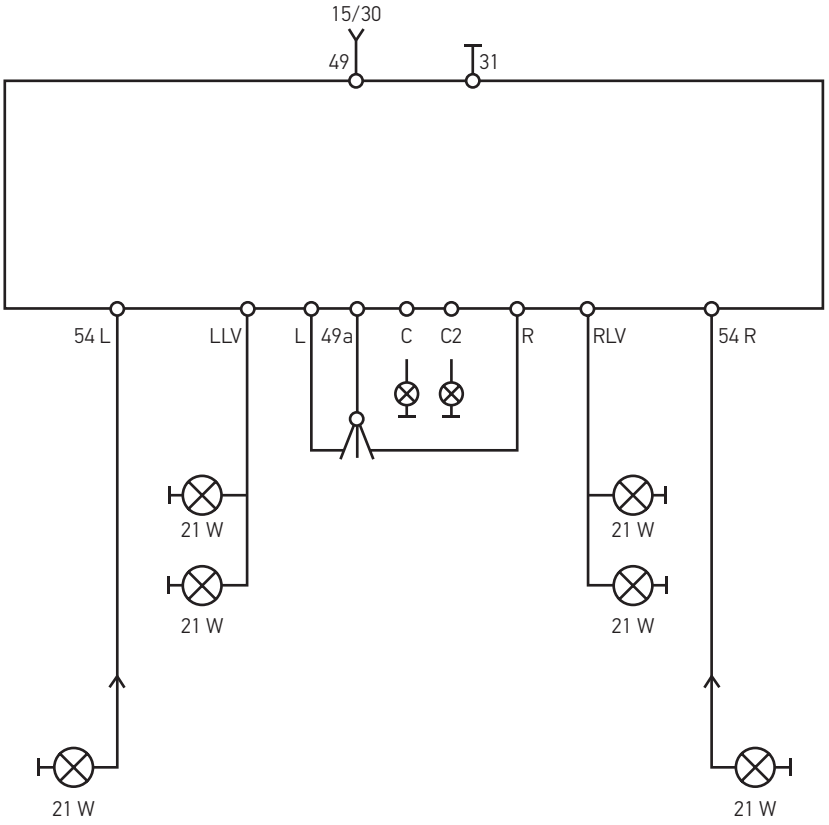
Single-circuit units are used in load cases (per 21 W bulb) 2x, 4x, 5x, 2+1, 3+1, 2+1+1 for passenger cars, light commercial vehicles and tow vehicles. It is not possible to distinguish between the failure of a lamp on the towcar or on the trailer, as there is only one measuring resistor for the load current.



Load case variant	Control types:		
	Towcar	1st trailer	2nd trailer
2 (4) x 21 W + 5 W 12 V	E, P	–	–
2 + 1 (6) x 21 W + 5 W 12 / 24 V	E, P	P	–
3 + 1 (8) x 21 W 12 / 24 V	P	P	–
2 + 1 + 1 (8) x 21 W 12 V	P	P	P

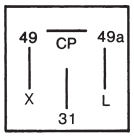
The dual-circuit test circuit

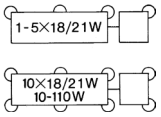
Dual-circuit units (separate test circuits for trailer and towcar) are typical in large commercial vehicles and help to minimise power losses caused by long cables and numerous connectors.



Load case variant	Control types:	
	Towcar	1st trailer
2 + 1 (6) x 21 W 12 / 24 V	E, P	P
3 + 1 (8) x 21 W 12 / 24 V	E, P	P

6 V



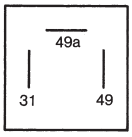


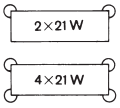
Flashing frequency*	Bright-light time*
90 ± 15 per minute	46.5 ± 8.5 %

Voltage range: 5 to 7.5 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE**	Part number
6 V, 4-pole, universal, pulse generator, without failure control	1	**4AZ 003 787-051*** **

12 V

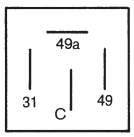


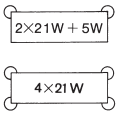


Flashing frequency*	Bright-light time*
90 ± 15 per minute	50 ± 8 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE**	Part number
12 V, 10 – 140 W, 3-pole, universal, pulse generator, without failure control	1	**4AZ 001 879-041****

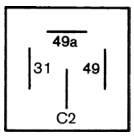


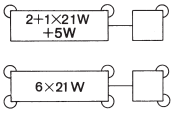


Flashing frequency*	Bright-light time*
80 ± 15 per minute	50 ± 10 %

Voltage range: 11 to 15 V, Temperature range: -20 to +60°C, Bracket: Yes

Description	VPE**	Part number
12 V, 4-pole	1	**4DB 001 887-041**

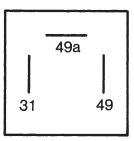


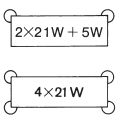


Flashing frequency*	Bright-light time*
87.5 ± 12.5 per minute	50 ± 3 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE**	Part number
12 V, 4-pole, 31 + C2 on top of housing	1	**4DM 003 360-021**
12 V, 4-pole, 31 + C2 on top of housing	200	**4DM 003 360-027**



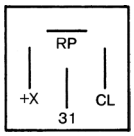


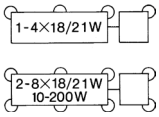
Flashing frequency*	Bright-light time*
90 ± 30 per minute	50 ± 5 %

Voltage range: 10 to 15 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
12 V, 3-pole	1	**4DB 003 750-721**

* At room temperature and test voltage / ** Packaging unit / *** not permitted according to StVZO

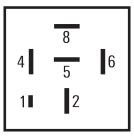


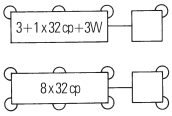


Flashing frequency*	Bright-light time*
90 ± 20 per minute	50 ± 10 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE**	Part number
12 V, 4-pole, Universal, pulse generator, without failure control	1	**4AZ 003 787-081****

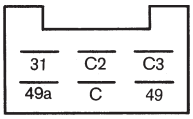


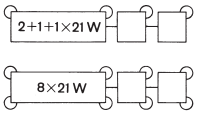


Flashing frequency*	Bright-light time*
97 ± 10 per minute	50 ± 5 %

Voltage range: 10 to 15 V, Temperature range: -30 to +70°C, Bracket: Yes

Description	VPE**	Part number
12 V, 6-pole, universal, pulse generator, without failure control	100	**4AZ 006 252-027****

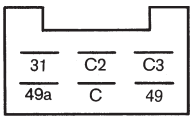


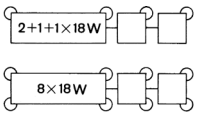


Flashing frequency*	Bright-light time*
90 ± 15 per minute	50 ± 5 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE**	Part number
12 V, 6-pole	99	**4DN 008 768-117**

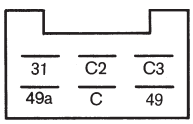


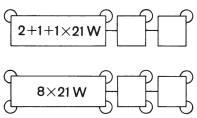


Flashing frequency*	Bright-light time*
90 ± 15 per minute	50 ± 5 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes, bracket set, three different brackets

Description	VPE**	Part number
12 V, 6-pole	1	**4DN 008 768-151**
12 V, 6-pole	1	**4DN 008 768-191**
12 V, 6-pole	99	**4DN 008 768-197**





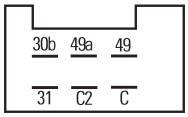
Flashing frequency*	Bright-light time*
90 ± 30 per minute	52.5 ± 22.5 %

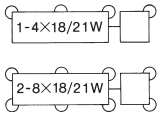
Voltage range: 10.8 to15 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
12 V, 6-pole	250	**4DN 996 173-017**

* At room temperature and test voltage / ** Packaging unit

12 / 24 V



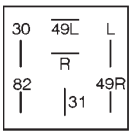


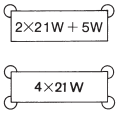
Flashing frequency*	Bright-light time*
90 ± 15 per minute	37.5 ± 5.5 %

Voltage range: 10 to 32 V, Temperature range: -20 to +70°C, Bracket: Yes

Description	VPE**	Part number
12 / 24 V, 6-pole	1	**4DZ 004 019-021**

12 V

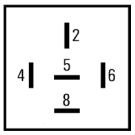


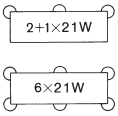


Flashing frequency*	Bright-light time*
87.5 ± 17.5 per minute	52.5 ± 7.5 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: no

Description	VPE**	Part number
12 V, 7-pole	1	**4DB 006 716-041**

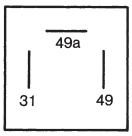


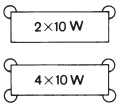


Flashing frequency*	Bright-light time*
–	3 times / switch

Voltage range: 9 to 15 V, temperature range: -40 to +70 °C, bracket: no

Description	VPE**	Part number
12 V, 5-pole	1	**4LZ 003 750-401**



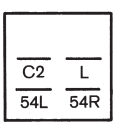


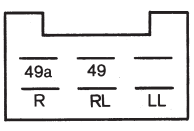
Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

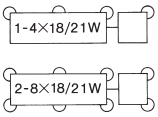
Voltage range: 10 to 15 V, Temperature range: -40 to +85°C, Bracket: No

Description	VPE**	Part number
12 V, 3-pole, for motorbikes	250	**4DB 003 750-707**

24 V





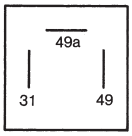


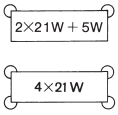
Flashing frequency*	Bright-light time*
90 ± 30 per minute	50 ± 20 %

Voltage range: 22 to 30 V, Temperature range: -30 to +70°C, Bracket: Yes

Description	VPE**	Part number
24 V, 11-pole	1	**4DZ 002 834-162**

* At room temperature and test voltage / **Packaging unit

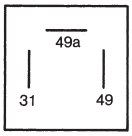


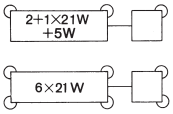


Flashing frequency*	Bright-light time*
90 ± 30 per minute	50 ± 5 %

Voltage range: 10 to 15 V, Temperature range: -40 to +85°C, Bracket: No

Description	VPE**	Part number
12 V, 3-pole	1	**4DB 003 750-711**
12 V, 3-pole	150	**4DB 003 750-717**

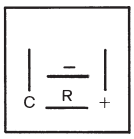


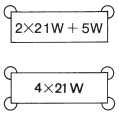


Flashing frequency*	Bright-light time*
87 ± 18 per minute	50 ± 3 %

Voltage range: 10 to 15 V, Temperature range: -30 to +60°C, Bracket: No

Description	VPE**	Part number
12 V, 5-pole, 31 + C2 on top of housing	1	**4DM 005 698-021**

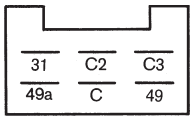


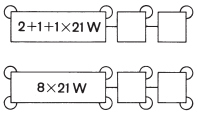


Flashing frequency*	Bright-light time*
87.5 ± 12.5 per minute	50 ± 3 %

Voltage range: 10 to 15 V, Temperature range: -40 to +70°C, Bracket: No

Description	VPE**	Part number
12 V, 4-pole	1	**4DB 007 218-001**

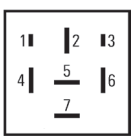


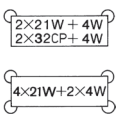


Flashing frequency*	Bright-light time*
90 ± 15 per minute	50 ± 5 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: no

Description	VPE**	Part number
12 V, 6-pole	1	**4DN 008 768-101**



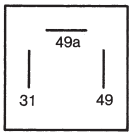


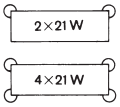
Flashing frequency*	Bright-light time*
100 ± 6 per minute	50 ± 5 %

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: no

Description	VPE**	Part number
12 V, 7-pole	256	**4DB 933 825-007**

* At room temperature and test voltage / ** Packaging unit

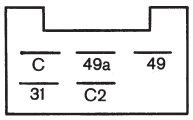


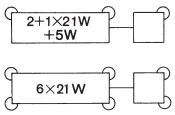


Flashing frequency*	Bright-light time*
90 ± 15 per minute	50 ± 8 %

Voltage range: 18 to 32 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 3-pole, universal, pulse generator, without failure control	1	**4AZ 001 879-051*** **

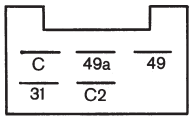


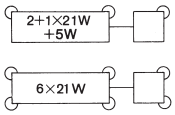


Flashing frequency*	Bright-light time*
87.5 ± 12.5 per minute	48 ± 8 %

Voltage range: 21 to 31 V, Temperature range: -25 to +55°C, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole	1	**4DM 003 474-001**
24 V, 5-pole	90	**4DM 003 474-007**

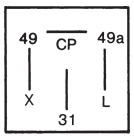


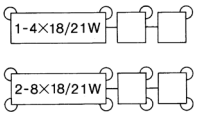


Flashing frequency*	Bright-light time*
87.5 ± 12.5 per minute	48 ± 8 %

Voltage range: 21 to 31 V, Temperature range: -25 to +55°C, Bracket: Yes

Description	VPE**	Part number
24 V, 5-pole	126	**4DM 003 474-017**

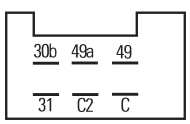


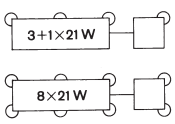


Flashing frequency*	Bright-light time*
90 ± 15 per minute	46.5 ± 8.5 %

Voltage range: 20 to 32 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole, universal, pulse generator, without failure control	1	**4AZ 003 787-071****



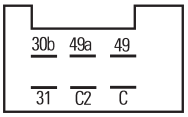


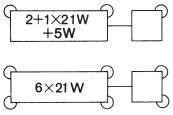
Flashing frequency*	Bright-light time*
90 ± 15 per minute	53.5 ± 8.5 %

Voltage range: 21.6 to 30 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 6-pole	1	**4DW 003 944-071**

* At room temperature and test voltage / ** Packaging unit / *** not permitted according to StVZO

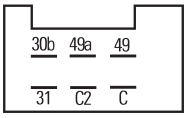


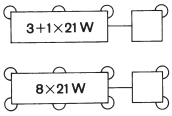


Flashing frequency*	Bright-light time*
90 ± 15 per minute	48.5 ± 8.5 %

Voltage range: 21.6 to 30 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 6-pole	1	**4DM 003 944-091**

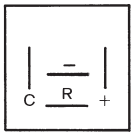


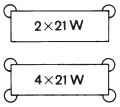


Flashing frequency*	Bright-light time*
90 ± 20 per minute	53.5 ± 8.5 %

Voltage range: 21.6 to 30 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 6-pole	1	**4DW 003 944-105**

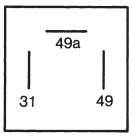


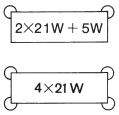


Flashing frequency*	Bright-light time*
85 ± 15 per minute	50 ± 5 %

Voltage range: 20 to 30 V, Temperature range: -20 to +60°C, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole	1	**4DB 009 123-041**

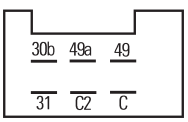


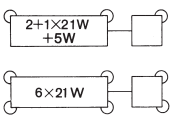


Flashing frequency*	Bright-light time*
87.5 ± 12.5 per minute	50 ± 3 %

Voltage range: 20 to 30 V, Temperature range: -40 to +85°C, Bracket: No

Description	VPE**	Part number
24 V, 3-pole	1	**4DB 003 675-011**



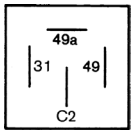


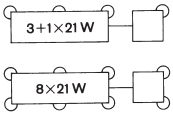
Flashing frequency*	Bright-light time*
90 ± 15 per minute	48.5 ± 8.5 %

Voltage range: 21.6 to 30 V, temperature range: -40 to +85 °C, bracket: no

Description	VPE**	Part number
24 V, 6-pole	1	**4DM 003 944-081**

* At room temperature and test voltage / ** Packaging unit

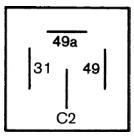


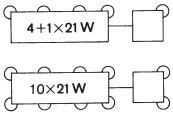


Flashing frequency*	Bright-light time*
95 ± 20 per minute	50 ± 10 %

Voltage range: 20 to 30 V, Temperature range: -30 to +70°C, Bracket: No

Description	VPE**	Part number
24 V, 4-pole, silent	1	**4DW 004 513-021**

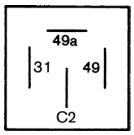


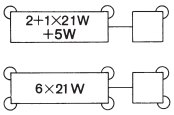


Flashing frequency*	Bright-light time*
95 ± 20 per minute	50 ± 10 %

Voltage range: 20 to 30 V, Temperature range: -30 to +70°C, Bracket: No

Description	VPE**	Part number
24 V, 4-pole, silent	1	**4DW 004 513-031**

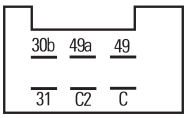


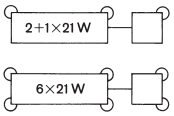


Flashing frequency*	Bright-light time*
90 ± 15 per minute	48.5 ± 8.5 %

Voltage range: 20 to 30 V, Temperature range: -40 to +85°C, Bracket: No

Description	VPE**	Part number
24 V, 4-pole	1	**4DM 004 639-061**
24 V, 4-pole	180	**4DM 004 639-067**

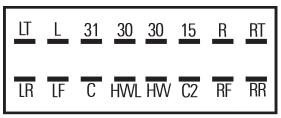


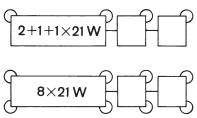


Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

Voltage range: 21 to 28 V, Temperature range: -40 to +85°C, Bracket: No

Description	VPE**	Part number
24 V, 6-pole	162	**4DM 006 475-087**





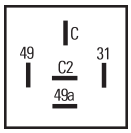
Flashing frequency*	Bright-light time*
90 ± 25 per minute	52 ± 8 %

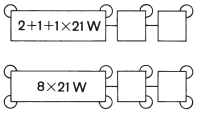
Voltage range: 22 to 30 V, Temperature range: -30 to +70°C, Bracket: No

Description	VPE**	Part number
24 V, 16-pole	1	**4DN 007 431-201**

* At room temperature and test voltage / ** Packaging unit

12 V

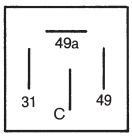


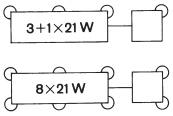


Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

Voltage range: 10 to 15 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
12 V, 5-pole	1	**4DN 009 492-101**



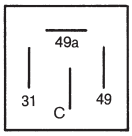


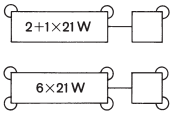
Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

Voltage range: 10 to 15 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
12 V, 4-pole	1	**4DW 009 492-111**

24 V

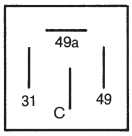


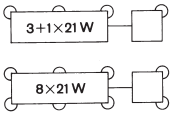


Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

Voltage range: 18 to 32 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole	1	**4DM 009 492-001**



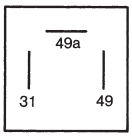


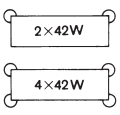
Flashing frequency*	Bright-light time*
90 ± 30 per minute	57.5 ± 17.5 %

Voltage range: 18 to 32 V, Temperature range: -40 to +85°C, Bracket: Yes

Description	VPE**	Part number
24 V, 4-pole	1	**4DW 009 492-011**

9 – 33 V





Flashing frequency*	Bright-light time*
60 – 120 per minute	50 ± 10 %

Voltage range: 9 to 33 V, temperature range: -40 to +85 °C, bracket: no

Description	VPE**	Part number
9 – 33 V, 3-pole	1	**4JZ 177 846-001**
9 – 33 V, 3-pole	24	**4JZ 177 846-007**

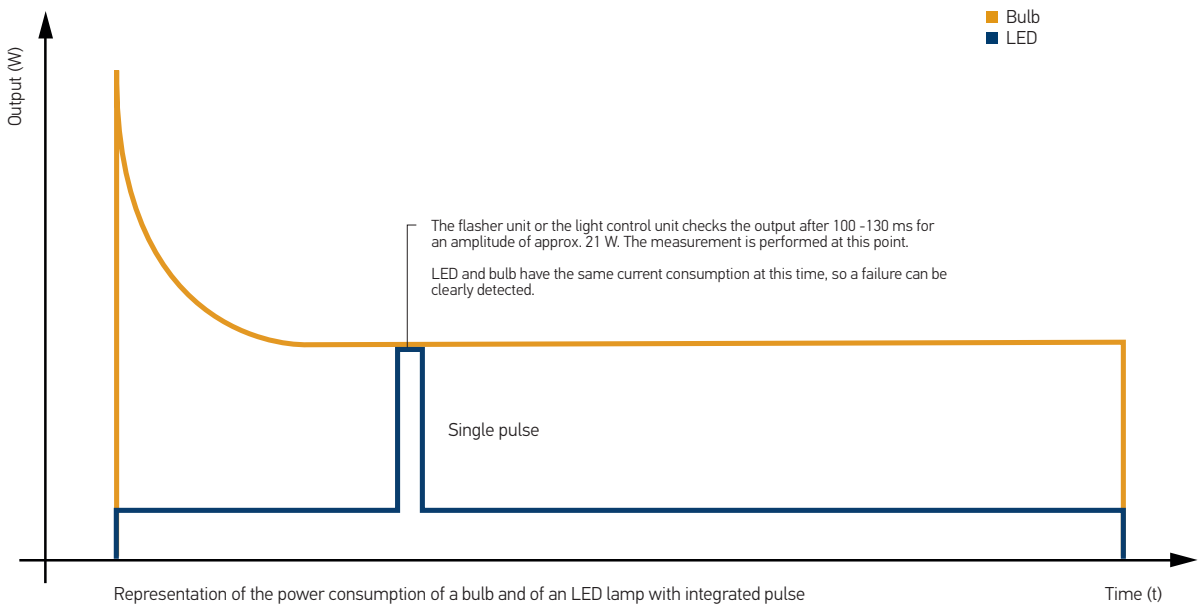
* At room temperature and test voltage / ** Packaging unit

LED lighting: Failure control and electrical connection

In the ECE R48 area of application, it is necessary by law to ensure failure control of LED lamps/LED headlamps in the vehicle's electrical system using suitable measures. The driver must be made aware of the failure visually or acoustically in the vehicle.

HELLA recommends, as the best solution, detecting the electrical pulse directly in the car manufacturer's vehicle electrical system. It is merely necessary to integrate the check according to ISO 13207-1. This means that you no longer have to rely on interim solutions and use direction indicator control units.

Functional diagram



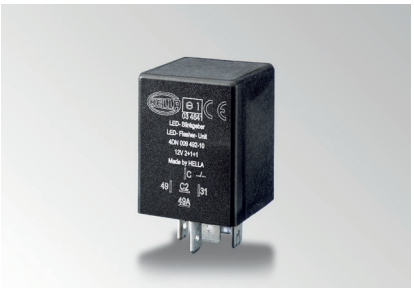
Representation of the power consumption of a bulb and of an LED lamp with integrated pulse

All HELLA LED direction indicators with integrated electronics for failure control run checks on themselves and generate a single pulse. This pulse is evaluated by the electronic ballasts. The ballasts simulate a 21 W bulb. This makes operation with conventional flasher units possible.

In the event of a defect in the lamp, which can occur even if a single LED fails, the above-mentioned impulse is not generated. The ballasts switch off the bulb simulation and the flasher unit reports the defect to the driver. By measuring the lamp current during the time window of 10 ms, it is possible to directly compare the HELLA LED lamp and a bulb version.

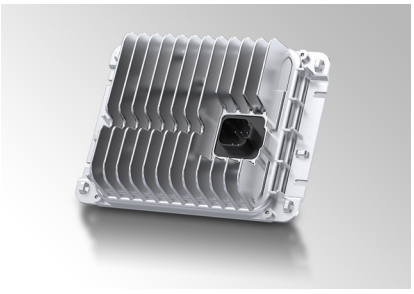
If the vehicle manufacturer does not provide direction indicator failure control via the vehicle electrical system, HELLA offers the following solutions:

HELLA provides electronic ballasts that make it possible to display the direction indicator failure for various vehicle assemblies and modifications. This is necessary if the vehicle manufacturer does not guarantee direction indicator failure control via the vehicle's electrical system:



ISO 13207-compliant LED lamps and LED flasher units
LED flasher unit: towing vehicle

Simulation devices for cold check in switched-off state
Simulation device for cold check



LED lamp control units for function monitoring
LED lamp control unit

ISO 13207-1 SOLUTION

RETROFITTING/ EQUIPING THE VEHICLE

Start

Is a direction indicator relay installed in the vehicle?

Yes

No

Switch on vehicle ignition and remove the bulb of a direction indicator lamp without pressing the direction indicator switch.

A flasher unit failure is shown.

Yes

No

Press the direction indicator switch

A flasher unit failure is shown.

Yes

No

Vehicle not ECE-compliant

RETROFITTING/EQUIPPING TRAILERS

Solution 1:
Light control unit with integrated check of the failure pulse in accordance with ISO 13207-1

Vehicle manufacturers' light control units are able to check the failure pulse in a standardised and unified manner in accordance with ISO 13207-1.

Therefore interim solutions 1 - 3 will not be necessary since communication takes place directly with the direction indicator lamps. HELLA recommends this solution.

(Since trailers do not currently have their own vehicle electrical system, this solution must be integrated in the towing vehicle.)

Solution 2:
LED flasher unit

	12 V	12 V	24 V
Operating voltage	10 – 15 V	10.5 – 16 V	32 V
Operating temperature	-40 to +85°C	-40 to +85°C	-40 to +85 °C
Protection class	IP 53 (contacts underneath)	IP 53 (contacts underneath)	IP 53 (contacts underneath)
LED flasher unit	**3+1**	**–**	**3+1**
3 direction indicators on the vehicle / towing vehicle 1 direction indicator lamp on an optional trailer	**4DW 009 492-111**	**–**	**4DW 009 492-011**
LED flasher unit	**2+1+1**	**2+1**	
2 direction indicator lamps on the vehicle/towing vehicle 1 direction indicator on optional trailers	**4DN 009 492-101** 1 direction indicator on a max. of 2 optional trailers	**4DM 009 492-001**	

Solution 1:
By means of monitoring in compliance with ISO 13207-1 in the vehicle manufacturer's vehicle electrical system.

Light control unit already integrated in the vehicle by the manufacturer.

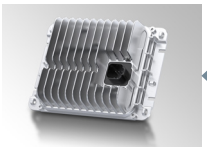
Solution 2:
Replacement of the existing flasher unit by an LED flasher unit from HELLA with ISO pulse.

One flasher unit is required per vehicle. Any possible combination of bulbs and HELLA LED direction indicators is permitted: from a full package with bulbs through mixed versions right up to a full package with LED lights. Bulbs or HELLA LED direction indicator lamps are also permitted on trailers.

Solution 3:
Using simulation device for cold check.

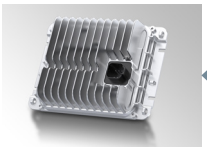
One simulation device is required per LED lamp.

Solution 4:
Using LED lamp control unit from HELLA with ISO pulse.



Two LED direction indicators per vehicle can be monitored with one simulation device (only one simulation device can be used per vehicle).

Solution 4:
Using LED lamp control unit from HELLA with ISO pulse.



Failure control

2BA 013 334-021

2BA 011 172-031

2SD 013 155-001

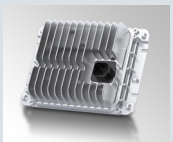
2VP 340 960-011

2VD 012 381-...

2SD 013 342-121

Solution 3:
Simulation device for cold check

	12 V	24 V
Operating voltage	10 – 15 V	18 – 32 V
Rated current	1.5 A	1.5 A
Operating temperature	-40 to +85°C	-40 to +85 °C
Protection class	IP 54 (contacts underneath)	IP 54 (contacts underneath)
Simulation device		
for cold check	**5DS 009 602-011**	**5DS 009 602-001**



Solution 4:
LED lamp control unit
Universal trailer solution, truck-independent, hazard warning signal mode must be taken into consideration separately

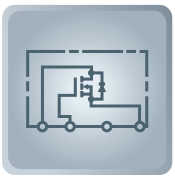
	Basic / Premium
Operating temperature	-40 to +50°C
Protection class	IP 6K9K
Basic control unit	
12 V	**5DS 227 488-001***
24 V	**5DS 227 488-101***
Premium control unit	
12 V (1 stop light channel)	**5DS 227 489-001***
12 V (2 stop light channel)	**5DS 227 489-011***
24 V (1 stop light channel)	**5DS 227 489-101***

* The LED control unit does not generate a load supplement in the event of a hazard warning light flashing. This must also be taken into account.

Key components of a wash/wipe interval control unit

Key

1. Blade terminal made of E-Cu with tin-plated surface
2. Base plate
3. Capacitor
4. PCB relay
5. SMD components (resistors, diodes etc.)



Functional principle

The wash/wipe interval control unit essentially comprises a pulse generator with a fixed or variable pulse/pause ratio. Every pulse with which the wipe/wash motor is controlled via a relay causes a one-off back-and-forth movement of the windshield wipers. Depending on the design, the length of the wipe pause is 4 s to X s.

The WWI control unit comprises the following:

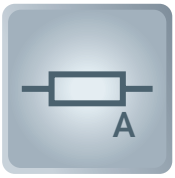
→ PCB with electronic components, blade terminals and a PCB relay
→ Synthetic material housing, sometimes with holder

Similarly to flasher units, the timer is designed as an astable multivibrator in the wipe/wash interval control unit. A failure control stage as required by the flasher system is not needed for the WWI control unit.

HELLA also offers headlamp cleaning equipment that sprays cleaning fluid onto the headlamp glazing at a high pressure. Depending on the variant, the length of the spray varies between 0.4 s and 0.8 s.

Rated voltage

→ 12 V: for passenger cars, agricultural and construction machinery etc.
→ 24 V: for commercial vehicles, buses, municipal vehicles etc.



Rated load, rated switching current

→ 3.5 A to 10 A, depending on vehicle type

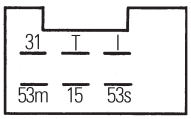
Contacts and connector configurations

Wash/wipe interval control units

I	Intermittent wiping (input)
S, 53 M	Wiper motor field winding (output)
T, 86	Wash button (input)
15	Battery +, switched (input)
31	Ground
31b, 53S	Wiper motor cam switch/ park position/limit switch (input)

Headlight cleaning system control unit

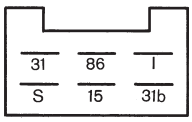
P	Water pump (output)
S	Actuating switch (input)
30	Load current +, terminal 15 (input)
31	Ground
56	Light (input)



Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 10 A

Voltage range: 9 to 16 V, temperature range: -30 to +70 °C,
bracket: yes

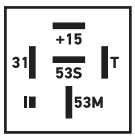
Description	VPE**	Part number
12 V, 6-pole	1	**5WG 002 450-111**



Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 3.5 A

Voltage range: 10.6 to 15 V, Temperature range: -25 to +70°C,
Bracket: Yes

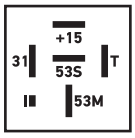
Description	VPE**	Part number
12 V, 6-pole	1	**5WG 002 450-311**
12 V, 6-pole	100	**5WG 002 450-317**



Function times	Load current
5.3 s release delay* 0.5 s turn-on delay*** 1.3 - 22.5 s pause time***	max. 12 A

Voltage range: 9 to 15 V, temperature range: -40 to +70 °C,
bracket: no

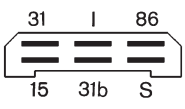
Description	VPE**	Part number
12 V, 6-pole	1	**5WG 002 450-321**



Function times	Load current
6 ± 1 s release delay* 1 s turn-on delay*** 15 s pause time***	max. 5 A

Voltage range: 10 to 16 V, Temperature range: -30 to +80°C, Bracket: No

Description	VPE**	Part number
12 V, 6-pole	1	**5WG 003 620-091**
12 V, 6-pole	100	**5WG 003 620-097**

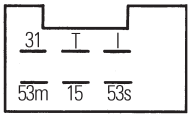


Function times	Load current
3.9 ± 1 s release delay* 0.8 to 0.4 s turn-on delay*** 6.5 ± 1.5 s pause time***	max. 20 A

Voltage range: 10 to 15 V, Temperature range: -20 to +60°C, Bracket: No

Description	VPE**	Part number
12 V, 6-pole	1	**5WG 996 165-001**

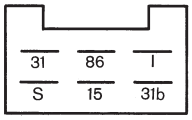
* Wipe/wash mode / ** Packaging unit / *** Interval mode



Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 10 A

Voltage range: 21 to 30 V, Temperature range: -30 to +70°C, Bracket: Yes

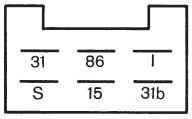
Description	VPE**	Part number
24 V, 6-pole	1	**5WG 002 450-121**



Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 3.5 A

Voltage range: 21.2 to 30 V, Temperature range: -40 to +85°C,
Bracket: Yes

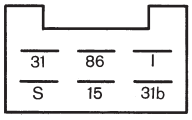
Description	VPE**	Part number
24 V, 6-pole	50	**5WG 002 450-287**



Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 3.5 A

Voltage range: 21.2 to 30 V, Temperature range: -40 to +85°C,
Bracket: Yes

Description	VPE**	Part number
24 V, 6-pole	1	**5WG 002 450-291**
24 V, 6-pole	100	**5WG 002 450-297**



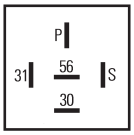
Function times	Load current
4 ± 1 s release delay* 1 s turn-on delay*** 5 ± 1 s pause time***	max. 3.5 A

Voltage range: 21.2 to 30 V, Temperature range: -40 to +85°C,
Bracket: No

Description	VPE**	Part number
24 V, 6-pole	1	**5WG 002 450-301**
24 V, 6-pole	140	**5DW 002 450-307**

* Wipe/wash mode / ** Packaging unit / *** Interval mode

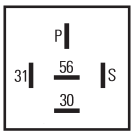
12 V



Duty time Output
0.8 ± 0.04 s
Voltage range: 9 to 15 V, Temperature range: -40 to +90°C

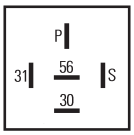
Description	VPE*	Part number
12 V, 5-pole	1	**5WD 005 674-131**

24 V



Duty time Output
0.43± 0.02 s
Voltage range: 18 to 30 V, Temperature range: -40 to +90°C

Description	VPE*	Part number
24 V, 5-pole	1	**5WD 003 547-071**

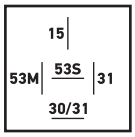


Duty time Output
0.8 ± 0.04 s
Voltage range: 18 to 30 V, Temperature range: -40 to +90°C

Description	VPE*	Part number
24 V, 5-pole	1	**5WD 005 674-141**
24 V, 5-pole	12	**5WD 005 674-147**

* Packaging unit

12 V

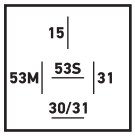


Function times	Load current
Clearing time control 1: t_i = 0.8 ± 0.4 s Clearing time control 2: t_p is variable (max. 20 ± 8 s)	max. 15 A

Voltage range: 9 to 16 V, temperature range: -40 to +85 °C, bracket: yes

Description	VPE*	Part number
12 V, 5-pole	1	**5WA 001 871-061**

24 V



Function times	Load current
Clearing time control 1: t_i = 0.8 ± 0.4 s Clearing time control 2: t_p is variable (max. 20 ± 8 s)	max. 15 A

Voltage range: 18 to 30 V, Temperature range: -40 to +85°C, Bracket: Yes

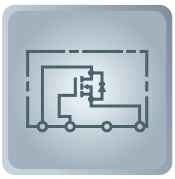
Description	VPE*	Part number
24 V, 5-pole	1	**5WA 001 871-071**

* Packaging unit

Key components of a time relay

Key

1. Blade terminal made of E-Cu with tin-plated surface
2. Base plate
3. Potentiometer (for fine adjustment of delay time)
4. DIP switch (for setting the time base)
5. PCB relay



Functional principle

A time relay is a combination of an electromechanical output relay and a control circuit.

The time relay is available in two variants:

- → **Pick-up delay:** the control circuit is activated by applying a voltage to the device input. Depending on the set time, the relay is then switched on with a delay. After deactivating the input, the relay voltage drops immediately.
- → **Drop-off delay:** the relay is switched on immediately by applying a voltage to the input of the monovibrator. After deactivating the input, the relay voltage drops after a predetermined time.

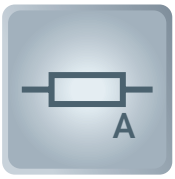
HELLA also supplies time relays with neither pick-up nor drop-off delay. In this case, the output is activated or switched on for a specific period of time.

The delay or turn-on time can be adjusted with a DIP switch and fine-tuned with a potentiometer.

If a more powerful relay is used, higher current strengths or different load types – e.g. inductive, capacitive / lamps – can be easily activated.

Rated voltage

- → 12 V: for passenger cars, agricultural and construction machinery etc.
- → 24 V: for commercial vehicles, buses, municipal vehicles, etc.



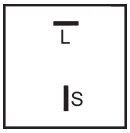
Rated load, rated switching current

- → Up to 20 A, make contact
- → Up to 10 A, break contact

Contacts and connector configurations

The connections of the relays are each labelled with numbers. The corresponding assignment is enclosed.

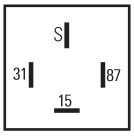
HL	Handbrake control (input)
HK	Handbrake contact (input)
L, 87	Load current, make contact (output)
N	Emergency-off switch (input)
S, 15	Actuating switch (input)
SK	Grounding contact (input)
30	Load current +, terminal 15 (input)
31	Ground
87a	Load current, break contact (output)



Duty time Output	Load current
2± 0.7 s	max. 0.31 A

Voltage range: 10 to 15 V, Temperature range: -10 to +60°C, Bracket: No

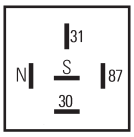
Description	VPE*	Part number
12 V, 2-pole, with turn-off delay	250	**5HE 003 724-027**



Duty time Output	Load current
25 ± 5 s	max. 10 A

Voltage range: 10 to 15 V, Temperature range: -20 to +85°C, Bracket: No

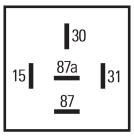
Description	VPE*	Part number
12 V, 4-pole	1	**5HE 004 911-037**



Duty time Output	Load current
5± 1.5 s	max. 10 A

Voltage range: 9 to 16 V, Temperature range: -40 to +85°C, Bracket: No

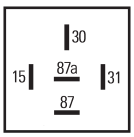
Description	VPE*	Part number
12 V, 5-pole	100	**5HE 006 207-027**



Duty time Output	Load current
0 to 900 ± 90 s	min. 10 A, max. 20 A

Voltage range: 9 to 16 V, Temperature range: -25 to +80°C, Bracket: Yes

Description	VPE*	Part number
12 V, 5-pole, with turn-off delay	1	**5HE 996 152-131**

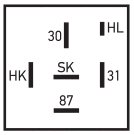


Duty time Output	Load current
0 to 900 ± 90 s	min. 10 A, max. 20 A

Voltage range: 9 to 16 V, Temperature range: -25 to +80°C, Bracket: Yes

Description	VPE*	Part number
12 V, 5-pole, with turn-on delay	1	**5HE 996 152-151**

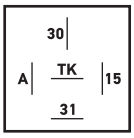
* Packaging unit



Duty time Output	Load current
1.5± 0.5 s	max. 3 A

Voltage range: 18 to 32 V, Temperature range: -40 to +85°C, Bracket: No

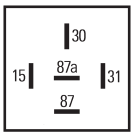
Description	VPE*	Part number
24 V, 6-pole, with turn-on delay	1	**5HE 004 236-017**



Duty time Output	Load current
10± 2.5 s	max. 7.5 A

Voltage range: 20 to 32 V, Temperature range: -20 to +70°C, Bracket: No

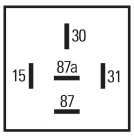
Description	VPE*	Part number
24 V, 5-pole	180	**5HE 005 922-017**



Duty time Output	Load current
0 to 900 ± 90 s	min. 10 A, max. 20 A

Voltage range: 18 to 32 V, Temperature range: -25 to +80°C, Bracket: Yes

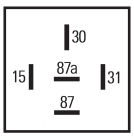
Description	VPE*	Part number
24 V, 5-pole, with turn-off delay	1	**5HE 996 152-141**



Duty time Output	Load current
0 to 900 ± 90 s	min. 10 A, max. 20 A

Voltage range: 18 to 32 V, Temperature range: -25 to +80°C, Bracket: Yes

Description	VPE*	Part number
24 V, 5-pole, with turn-on delay	1	**5HE 996 152-161**



Duty time Output	Load current
5± 0.5 s	min. 10 A, max. 20 A

Voltage range: 18 to 32 V, Temperature range: -25 to +80°C, Bracket: Yes

Description	VPE*	Part number
24 V, 5-pole, with turn-off delay	200	**5HE 996 152-177**

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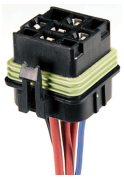
Product photo	Product designation	Available accessories	**Part number** VPE*
	Female connector housing, 5-pole	Blade terminal sleeves: 8KW 744 819-003, 8KW 701 235-..., 8KW 744 820-003	**8JA 715 606-001** 10 pieces
	Female connector housing, 5-pole	Blade terminal sleeve: 8KW 719 874-007	**8JA 717 291-007** 100 pieces
	Female connector housing, 5-pin, mountable side by side	Blade terminal sleeves: 8KW 744 819-003, 8KW 701 235-..., 8KW 744 820-003, 8KW 733 815-003	**8JD 733 767-107** 5 pieces
	Female connector housing, 5-pole	Pin contacts already equipped	**8JD 733 962-001** 5 pieces
	Female connector housing, 5-pole	With pre-fitted cable assembly	**8JD 745 801-001** 1 pieces
	Female connector housing, 5-pole	Blade terminal sleeves: 8KW 863 904-003, 8KW 863 904-013	**8JD 745 801-011** 1 pieces

* Packaging unit

Product photo	Product designation	Available accessories	**Part number** VPE*
	Female connector housing, 5-pole	Flat receptacles are already assembled, therefore no accessories are required.	**8JD 733 963-001** 5 pieces
	Cable sachet housing, 9-pin, mountable side by side	Blade terminal sleeves: 8KW 744 819-003, 8KW 701 235-..., 8KW 744 820-003	**8JA 003 526-107** 5 pieces **8JA 003 526-108** 50 pieces
	Cable sachet housing, 9-pin, mountable side by side	Blade terminal sleeves: 8KW 744 819-003, 8KW 701 235-..., 8KW 744 820-003, 8KW 744 822-003	**8JA 183 161-107** 5 pieces

* Packaging unit

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