

Description

The electronic standard relay ESR10 Maxi is a solid state power relay combining two functions in a single unit.

- solid state relay function
- electronic overcurrent protection

The relay has been designed for 4-pole standard automotive relay sockets to ISO 7588. It is suitable for DC12V on-board electrical systems and is rated 50A. Up to now two separate components were connected to one functional unit in a load circuit to allow remote switching and protection of loads:

- an electro-mechanical relay or solid state relay which is powered via the control cable and then closes the circuit by means of the integral contact or power semi-conductor.
- an additional protective element (circuit breaker or fuse) providing line or equipment protection in the event of a failure.

By combining two functions in one component the ESR10 Maxi helps to minimise the number of plug-in connections in a circuit and thus reduces the risk of a failure. In addition the ESR10 Maxi is remotely resettable after overload tripping.

Applications

The ESR Maxi is suitable for all applications in DC 12 V on-board electrical systems where magnetic valves, motors or lamps have to be switched and protected:

- Road vehicles (work vehicles, emergency cars, buses, special vehicles, trucks, passenger cars, bikes)
- Construction vehicles and agricultural vehicles
- Rail vehicles

Of course the ESR10 Maxi is also suitable for the use in industrial applications (process control and production technology) as well as in the marine sector (work boats, sport-, motor- and sailing boats, yachts etc.)

Features and Benefits

- The exclusively solid-state based power electronics of the ESR10 Maxi offer wear-free switching function, unsusceptible to shock, vibration and dust.
- Compared to electro-mechanical relays, it requires only a fraction of the closed current and switching current. This is of the essence for battery-buffered load circuits which have to stay actuated even with the generator in the OFF condition and it helps to reduce the CO₂ emissions.
- In the event of a short circuit (ESR10-N) or of a short circuit plus overload (ESR10-P) the load circuit is disconnected.
- After trip on grounds of short circuit or overload and upon remedy of the failure, the ESR10 Maxi can easily be reset by simply switching it off and on, i.e. the ESR10-P works as a resettable fuse. There is no automatic re-start. Reset can alternatively be effected by resetting the supply voltage.
- For switching and monitoring loads of 50 A plus, it is possible to connect several devices in parallel. Equal distribution of current onto the individual units has to be ensured by a symmetrical design of the cables (length and cross section).



ESR10 Maxi

Technical data (T_{amb} = 25 °C, U_N)

Voltage supply LINE+

Voltage rating U _N	DC 12 V
Operating voltage U _B	9...16 V
Closed current I ₀ in OFF condition ¹⁾ :	typically 50 µA

Load circuit LOAD

Current rating I _N	50 A
Load output	Power MOSFET plus switching (HSS)
Load types	resistive, inductive and capacitive
Protective function	N short circuit proof, temperature shutdown P additional overload disconnection after t _{trip} at I ≥ I _{trip}
Voltage drop ¹⁾ U _{ON}	60 mV (at I _N)
Trip current ¹⁾²⁾ I _{trip}	1.3 x I _N
	-40 °C ... +85 °C 1.1...1.5 x I _N
Trip time ²⁾	t _{trip} 200 ms (at overload)
Max. overload	400 A (at L/R = 3 ms)
Free-wheeling diode for connected load	integral

Control input IN+

Control voltage IN+	0...5 V = OFF 8.5...16 V = ON
Control current IN+	1 mA at 12 V
Switching frequency at resistive or inductive load	max. 60 Hz
Rising edge of IN+	< 5 ms

Control input IN-

Control voltage IN-	relay is ON when IN connected to ground 0...5 V = ON, 8.5...16 V = OFF
Control current IN+	1.5 mA at 0 V
Switching frequency at resistive or inductive load	max. 60 Hz
Rising edge of IN-	< 5 ms

¹⁾ typical

²⁾ P-type only

Technical data (T_{amb} = 25 °C, U_N)

General Characteristics

Reverse polarity protection	
control circuit	yes
load circuit	no (due to integral free-wheeling diode)
Delay times	t _{ON} 0.5 ms, t _{OFF} 1.5 ms
Temperature range	-40 °C...85 °C
Temperature shutdown	power transistor > 150°C
Housing	
Degree of protection	IP54
Material	cover PA66-GF30 base plate PA6-GF30
Dimensions	ISO standard Maxi
plugged in	30 x 30 x 30 mm
including terminals	30 x 39 x 44.3 mm
Mass ¹⁾	55 g

¹⁾ typical

Tests

Humid heat	combined test, 9 cycles with functional test test to DIN EN 60068-2-30
Temperature change	min. temperature -40 °C, max. temperature +90 °C 30 cycles, retention period 60 min., changing time 10 s test to DIN IEC 60068-2-14, Nb
Vibration (random)	test to ISO 16750-3 test 7 conducted acc. to DIN EN 60068-2-64 in operation with temperature change 6 g effective (10 Hz ... 2,000 Hz) Vibration was tested with standard sockets for PCB mounting. Behaviour at vibrations depends on design, quality and age (number of push-in cycles) of the socket particularly regarding duration of the vibration and the mounting position
Shock	test to DIN EN 60068-2-27 25 g / 11 ms, 10 shocks test to ISO 16750-3 500 m/s ² / 6 ms, 10 shocks
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	IP54 in accordance with DIN 40050
EMC requirements	
EMC directive	emitted interference EN 61000-6-3 noise immunity EN 61000-6-2
automotive directive	type approval to ECE regulation 10, revision 03

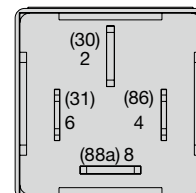
Approvals and characterisation

Authority	Approval mark	Regulation
KBA	E1	ECE R 10

Pin assignment

ESR10

LINE +	2	(30)	V _{system} (12 V _{DC})
IN	4	(86)	control input
GND	6	(31)	ground
LOAD	8	(88a)	load output

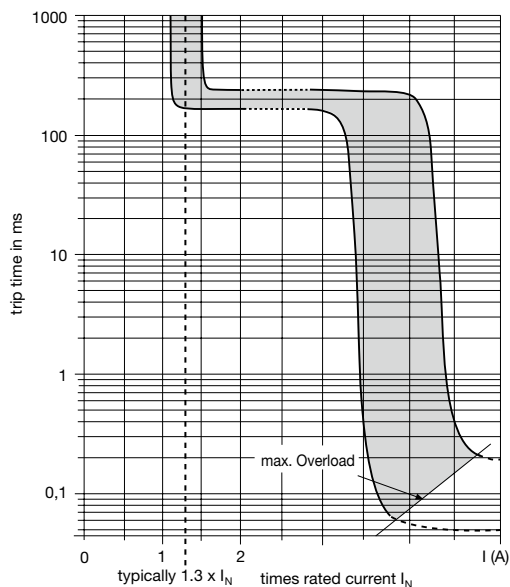


() [^] Automotive terminal description

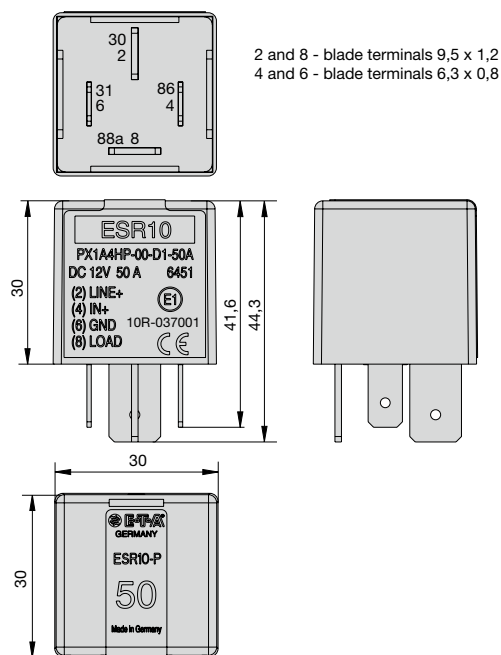
Order numbering code

Type No.	electronic standard relay
ESR10	
	Protective function
	N without trip curve (not protected)
	P with trip curve (protected)
	Type of enclosure
	X1 Maxi
	Terminal design
	A4 standard automotive, 4-pole (ISO)
	Load circuit and control circuit
	HN high-side-switch (HSS), negative (GND) control
	HP high-side-switch (HSS), positive control
	Sub type
	00
	Rated voltage
	D1 DC 12 V
	Current rating
	50 A
ESR10 - P X1 A4 HP - 00 - D1 - 50A	ordering example

Time/current characteristic ($T_{amb} = 25\text{ °C}$)

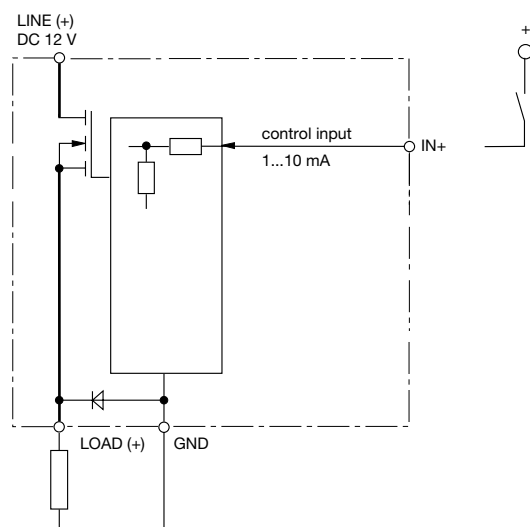


Dimensions



Schematic diagram

Option „HP“ (control input IN+)



Option „HN“ (control output IN-)

