

AZEV180G

80 AMP / 120 AMP POWER RELAY WITH MONITORING

FEATURES

- Designed for SAE J1772 AC Level 2 charging applications
- 80 Amp / 277VAC switching capability, 120 Amp continuous current
- SPST-NO load contact plus NC mirror contact acc. IEC 60947-4-1 for welding monitoring
- Withstands inrush currents according ISO 17409 cl. 8.2.2
- Meets IEC 60664-1 requirements for 1000 V rated insulation voltage
- Wide load contact gap of ≥ 3.6 mm and wide clearance/creepage distances
- High dielectric strength of 5 kV_{RMS}
- 10 kV surge withstand voltage



CONTACTS

Arrangement load contact monitor contact (optional)	SPST-NO (1 Form A) SPST-NC (1 Form B) coupled to NO load contact
Ratings (max.) load contacts switched power switched current continuous current switched voltage contact load category monitor contact switched current recommended min. load	(resistive load) 22160 VA 80 A 120 A 277 VAC / 1000 VDC CC2 10 mA at 12 VDC 10 mA, 5 VDC, 50 mW (gold plated contact)
Approved ratings load contact AgNi contacts AgSnO ₂ contacts monitor contact	(UL/CUR) 80 A at 277 VAC, resistive, 95°C, 6k cycles 30 A make, 80 A carry, 30 A break at 277 VAC, 95°C, resistive, 40k cycles 10 A at 30 VDC, resistive, 60°C, 30k cycles 80 A at 277 VAC, resistive, 85°C, 10k cycles 500 mA at 12 VDC, resistive 105°C, 50k cycles
Contact material load contact monitor contact	AgNi (silver nickel) AgSnO ₂ (silver tin oxide) AgNi+Au (silver nickel, gold plated)
Contact gap load contact monitor contact	(clearance of open load contacts) ≥ 3.6 mm ≥ 0.7 mm (≥ 0.5 mm if NO load contact is welded)
Contact resistance load contacts monitor contact	(initial) ≤ 100 m Ω (at 6V/1 A, voltage drop method) < 1 m Ω (typ. at 70 A) ≤ 100 m Ω

COIL

Nominal coil voltages	6, 9, 12, 24 (DC)
Dropout voltage	$\geq 5\%$ of nominal coil voltage
Holding voltage (at 23°C)	$\geq 40\%$ of nominal coil voltage
Coil power (at 23°C) standard coil sensitive coil	nominal / holding 3.0 W / 0.51 W 1.9 W / 0.31 W
Temperature rise	70 K at 70% of nom. coil voltage, 85°C
Insulation system	class F, max. temperature 155°C

GENERAL DATA

Life Expectancy mechanical electrical	(minimum operations) 3×10^5 see approved ratings section
Timing operate time release time	(at nominal coil voltage) ≤ 40 ms ≤ 10 ms (without coil suppression)
Dielectric Strength coil to load contact open load contact load to monitor contact open monitor contact coil to monitor contact	(at sea level for 1 min.) 5000 V _{RMS} 2500 V _{RMS} 5000 V _{RMS} 1000 V _{RMS} 1000 V _{RMS}
Surge Voltage coil to load contact load to monitor contact open load contact	(1.2/50 μ s pulses) 10 kV 10 kV 8 kV
Insulation Distances coil to load contact load to monitor contact coil to monitor contact open load contact	(clearance / creepage) ≥ 11.2 mm / ≥ 12.5 mm ≥ 11.2 mm / ≥ 12.5 mm ≥ 1.5 mm / ≥ 4.0 mm ≥ 3.6 mm / ≥ 12.5 mm
Insulation Type coil/monitor to contact open load contact	(referring IEC 60664-1) 1000V / PD 2 / OVC II / reinforced / 4500 m 1000V / PD 2 / OVC II / basic / 4500 m * * tested with 8kV impulse voltage test
Insulation Resistance	≥ 1000 M Ω (at 23°C, 500 VDC, 50% RH)
Temperature Range operating non-operating	-40°C to 105°C (at 70% of nom. coil voltage) -40°C to 105°C
Vibration Resistance	2.0 mm DA at 10–55 Hz
Shock	10 g
Enclosure material protection category material group flammability	PBT RT II, flux proof case: IIIa / base: I UL94 V-0
Terminals	Tinned copper alloy, THT PCB mounting
Soldering preheating soldering	(referring IEC 61760-1 wave soldering) 120°C (248°F) / ≤ 120 s 260 $\pm 5^\circ$ C (500 $\pm 9^\circ$ F) / $\leq 2 \times 5$ s
Dimensions and Weight	41 mm x 36 mm x 43 mm, 95 grams
Compliance	UL 508, IEC 61810-1, GB/T 21711.1 RoHS, REACH
Agency Approvals UL/CUR	E43203
Packing (pcs.)	10 per plastic tube 90 per carton box

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AZEV180G

COIL VOLTAGE SPECIFICATIONS

Voltage [VDC]				Resistance [Ω] ±10%	Power (ref.) [W]	
nominal	must operate	min. holding	max.		nominal	min. holding
Standard coil						
6	4.5	2.4	6.6	12	3.0	0.51
9	6.75	3.6	9.9	27		
12	9.0	4.8	13.2	48		
24	18.0	9.6	26.4	192		
Sensitive coil						
6	4.5	2.4	6.6	19	1.9	0.31
9	6.75	3.6	9.9	43		
12	9.0	4.8	13.2	76		
24	18.0	9.6	26.4	303		

Notes:

- All values at 23°C, upright position, terminals downward.
- Voltage max. is the voltage the coil can endure for a short period of time.
- To avoid overheating at elevated ambient temperatures, we recommend to operate the coil at 60 - 70% of nominal coil voltage after applying the full nominal coil voltage for ≥200 ms.

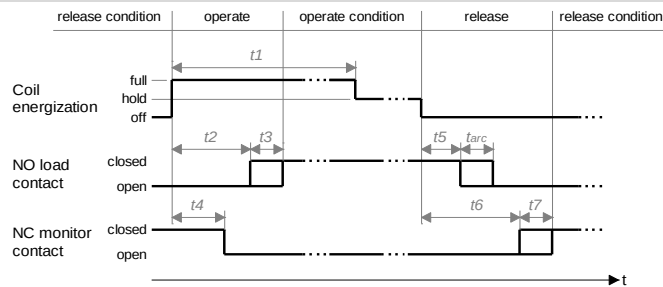
ORDERING DATA

AZEV180G-1A	☐	☐	☐	☐	D	☐	☐	☐	☐
									Options
									nil: standard version
									Coil version
									nil: Standard coil 3 W nom. power
									S: Sensitive coil 1.9 W nom. power
									Nominal coil voltage
									see coil voltage specifications table
									Monitor contact
									nil: without monitor contact
									1BG: equipped with 1 Form B monitor contact
									Contact material
									nil: AgNi (silver nickel)
									E: AgSnO ₂ (silver tin oxide)

Example ordering data

AZEV180G-1AE-12D	AgSnO ₂ contacts, without monitor contact, 12 VDC / 3 W standard coil
AZEV180G-1A1BG-24DS	AgNi contacts, equipped with monitor contact, 24 VDC / 1.9 W sensitive coil

TIMING DIAGRAM



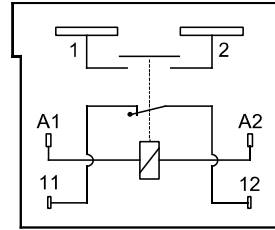
Item	Description	Notes	Timing [ms]		
			min.	typ.	max.
t1	Full energization time	recommended value	200	-	-
t2	NO operate time	at nominal coil voltage (at 23°C) ¹⁾	-	< 20	40
		at nominal coil voltage (at hot coil) ²⁾	-	< 50	110
t3	NO bounce time	at nominal coil voltage	-	< 2	-
t4	NC operate time	at nominal coil voltage (at 23°C) ¹⁾	-	< 19	40
		at nominal coil voltage (at hot coil) ²⁾	-	< 48	110
t5	NO release time	without coil suppression	-	< 2	10
		with suppression: $U_{BR}/U_{nom} = 2$ ³⁾	-	< 4	-
t6	NC release time	with suppression: $U_{BR}/U_{nom} = 2$ ³⁾	-	< 5	10
t7	NC bounce time		-	< 10	-
tarc	arcing duration	if released under load, dependent on actual load condition			

Notes:

- Cold coil at ambient temperature of 23°C
- Hot coil with relay operated at max. temperature.
- Coil suppression breakdown voltage U_{BR} twice the nominal coil voltage U_{nom} .
E.g. 24V transient voltage suppressor diode in parallel to 12V coil.

WIRING DIAGRAMS

Viewed towards terminals.

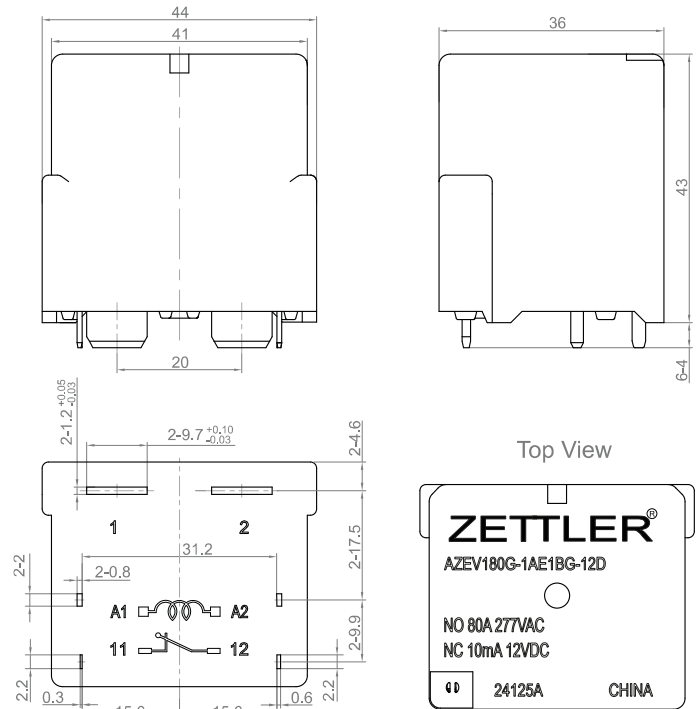


A1	Coil end - winding outer layer
A2	Coil start - winding center layer
1, 2	NO load contact
11, 12	NC monitor contact

MECHANICAL DATA

Dimensions in mm. Tolerance ±0.5mm if not stated otherwise.

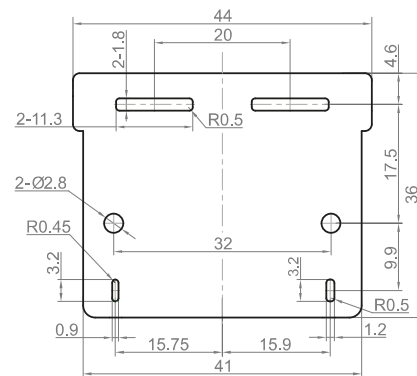
Note: Dimensions for pins A1, A2, 11 and 12 for reference only and given without tin coating.



CAD data in attachment of the datasheet.

PCB FOOTPRINT

Layout and footprint recommendation. Dimensions in mm. Viewed towards terminals.



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page 2 of 4

2026-09-29

NOTES

General

1. All values in this datasheet are at reference temperature of 23°C (73°F) unless stated otherwise.
2. Evaluate the component's performance and operating conditions under the worst-case conditions of the actual application.
3. The datasheet and the component's specifications are subject to change without notice.

Storage, handling, and environmental guidelines

4. Relays are electromechanical components that are sensitive to shock. The relay's adjustment can be affected if the relay is subjected to excessive shock or excessive pressure is applied to the relay case. Relays which have been dropped must no longer be used.
5. Substances containing silicone or phosphorus must be avoided in the vicinity to the relay. Outgassing from these substances can penetrate the relay and adhere on the contacts. Deposits of these substances may act as insulators and adversely affect the contact resistance. Silicone can be found e.g. in gaskets, lubricants or filling materials, phosphorus can be found e.g. as a flame retardant in plastics.
6. Prevent relays from atmospheres containing corrosive gases. Corrosion of internal structures and contacts leads to malfunction and shortens the component's service life.
7. Prevent non-sealed relays from atmospheres subject to dust. Dust particles may enter the case and get stuck between the contacts, causing the contact circuits to fail.
8. Do not use these relays in environments with explosive or flammable gases. Electrical arcing at the contacts could ignite these gases and cause fire.
9. For automated dual wave soldering process we recommend preheating with 120°C (248°F) for max. 120 seconds and a soldering temperature of 260 ±5°C (500 ±9°F) for max. 10 seconds soldering time (max. 5 seconds per wave). For manual soldering we recommend 350°C (662°F) max. temperature for max. 5 seconds. During the soldering process, no force may be exerted on the relay terminals.
10. Non-sealed relays must not be washed, immersion cleaned or conformal coated as substances may enter the case and cause corrosion or seizure of mechanical parts.
11. Avoid high frequency or ultrasonic vibrations on the relays as these can cause contact welding and misalignment or destruction of internal structures.
12. During operation, storage and transport, ambient temperature should be within the specified operating temperature range. Humidity should be in the range of 5% to 85% RH. Icing and condensation must be avoided. Relays stored for an extended period of time may show initially increased contact resistance values due to chemical effects such as oxidation.

Design guidelines

13. The relay may pull in and operate with less than the specified *must operate* voltage value.
14. The coil's *must operate* and *min. holding* voltages, the coil's *ohmic resistance* and the relay's *operate time* depend on the temperature of the coil. The specified values are given for a coil temperature of 23°C and increase by approx. 0.39% per Kelvin of temperature rise. This circumstance must be considered, especially during operation with high load currents and elevated ambient temperature.
15. At elevated ambient temperatures, after applying the rated nominal coil voltage for ≥ 200 milliseconds, the coil energization must be reduced to a suitable holding level in order to reduce thermal stress and to prevent the coil from overheating.
16. Coil suppression circuits such as diodes, etc. in parallel to the coil will lengthen the release time. We recommend using suppression circuits with a breakdown voltage of approx. 2 times the nominal coil voltage in order to achieve a quick release time.
17. When using PWM coil control, use a fast-switching recirculation diode in parallel with the coil to keep the coil current during pulse pauses. To achieve a quick release time when de-energizing the coil, the recirculation diode must be eliminated from the circuit to get a fast decay of coil current. As PWM frequency we recommend ≥ 15 kHz in order to avoid audible noise from magnetostriction. To reduce negative EMI effects, we recommend to apply the PWM to the coil's inner/center layer terminal and have the outer layer terminal connected to ground or the supply rail.
18. Contact resistance is a function of load current, dwell time and wear level of the contacts. Immediately after closing the contacts, or if tested with low current only, the contact resistance will show a relatively high value. A low level steady state contact resistance is reached at higher current after a certain time in thermal equilibrium.
19. The relay dissipates heat from power losses through its load terminals. Provide sufficient cross section and area of the PCB traces so that they can act as heat spreader.
20. For PCBs with multiple relays, do not place the components directly next to each other. We suggest providing a mounting distance of minimum 10 mm to allow for better cooling.
21. A minimum load of 10 mA / 5 V / 50 mW is recommended for the gold plated NC monitor contact to ensure a reliable and stable electrical connection.
22. As with any contact mechanism, the relay's NC monitor contact bounces when switching. For evaluation of its signal, suitable debouncing measures must be taken to get a reliable signal.

AZEV180G

DISCLAIMER

This product specification is to be used in conjunction with the application notes which can be downloaded from the regional ZETTLER relay websites. The specification provides an overview of the most significant part features. Any individual applications and operating conditions are not taken into consideration. It is recommended to test the product under application conditions. Responsibility for the application remains with the customer. Proper operation and service life cannot be guaranteed if the part is operated outside the specified limits.

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