AZEV140

40 AMP POWER RELAY WITH MONITORING

FEATURES

- Designed for IEC 61851 Mode 2 charging applications
- NO load contact plus NC signal contact for welding monitoring
- 40 Amp nominal, up to 50 Amp switching capability
- Electrical ratings according IEC 61851-1: CC2 / 50.000 cycles
- Withstands up to 1850 A short circuit current
- Wide load contact gap of ≥ 2.25 mm
- Dielectric strength 4 kV_{RMS}, surge withstand voltage 6 kV
- TÜV, UL / CUR and CQC approvals



CONTACTS

Arrangement	
load contact	SPST-NO (1 Form A)
signal contact	SPST-NC (1 Form B) coupled to NO load contact
Ratings (max.)	(resistive load)
load contact	
switched power	22000 VA
switched current	50 A
continuous current	50 A
switched voltage	440 VAC
contact load category	CC2
signal contact	
switched current	10 mA at 12 VDC
minimum load	10 mA, 5 VDC, 50mW (gold plated contact)
Approved ratings	(UL/CUR/TÜV/CQC)
load contact	40 A at 440 VAC, resistive, 85°C, 30k cycles
	32 A at 440 VAC, resistive, 85°C, 50k cycles
	50 A at 440 VAC, resistive, 85°C, 6k cycles
	20 A make, 50 A carry, 20 A break at 440 VAC, resistive, 85°C, 50k cycles
signal contact	10 mA at 12 VDC, 85°C, 50k cycles
Contact material	
load contact	$AgSnO_2$ (silver tin oxide)
signal contact	AgNi + Au (silver nickel, gold plated)
Contact gap	(clearance of open load contacts)
load contact	≥ 2.25 mm
Contact resistance	
load contact	
initial	≤ 50 mΩ (at 6VDC/1A)
typical	≤ 3 mΩ (at 40 A, contact factory for details)

COIL

Nominal coil voltages	5, 9, 12, 24, 48 (DC)
Dropout voltage	> 5% of nominal coil voltage
Holding voltage	> 35% of nominal coil voltage (at 23°C) 55 - 65% of nominal coil voltage (at 85°C)
Coil power	(at 23 °C)
nominal	2.1 W
holding power	260 mW
Temperature rise	70 K (126°F) at nominal coil voltage, 85°C
Insulation system	class F, max. temperature 155°C (311°F)

GENERAL DATA

Life Expectancy	(minimum operations)
mechanical	1×10^5
electrical	see UL/CUR/TÜV/CQC approved ratings
Timing	(at nominal coil voltage)
operate time	≤ 30 ms
release time	≤ 10 ms (without coil suppression)
Dielectric Strength	(at sea level for 1 min.)
open load contacts	2500 V_{RMS}
coil to load contacts	4000 V_{RMS}
open signal contacts	500 V_{RMS}
coil to signal contacts	500 V_{RMS}
signal to load contacts	4000 V_{RMS}
Surge voltage	
open load contacts	6 kV
coil to load contacts	6 kV
signal to load contacts	6 kV
Insulation Distances	(clearance / creepage)
open load contacts	≥ 2.25 mm / ≥ 4.2 mm
coil to load contacts	≥ 4.4 mm / ≥ 5.0 mm
coil to signal contacts	≥ 2.0 mm / ≥ 2.0 mm
signal to load contacts	≥ 4.0 mm / ≥ 4.7 mm
Insulation Resistance	1000 MΩ (min.) at 23°C, 500 VDC, 50% RH
Pulse current capability	≥ 1.50 kA , ≥ 6.0 kA^2s (based on requirements of IEC 62752) ≥ 1.85 kA , ≥ 4.5 kA^2s (based on requirements of IEC 62955)
Temperature Range	(at nominal coil voltage)
operating	-40°C (-40°F) to 85°C (185°F)
Vibration resistance	0.062" (1.5 mm) DA at 10–55 Hz
Enclosure	
protection category	RT II, flux proof
material	PBT. polyester
material group	IIIa
Flammability	UL94 V-0
Terminals	Tinned copper alloy, THT PCB mounting
Soldering	(referring IEC 61760-1 wave soldering)
preheating	120°C (248°F) / ≤ 120 s
soldering	260 ±5°C (500 ±9°F) / ≤ 10 s
Dimensions and Weight	35 mm x 16 mm x 28 mm, 35 grams
Compliance	UL 508, IEC 61810-1, GB/T 21711.1-2008 RoHS, REACH designed to meet requirements of IEC 62752
Agency Approvals	
UL / CUR	E365652
TÜV	B 088793 0016
CQC	CQC20002276475
Packing (pcs.)	50 per plastic tray 400 per carton box

AZEV140

COIL VOLTAGE SPECIFICATIONS

Voltage [VDC]				Resistance [Ω] ±10%	Current (ref.) [mA]	Power (ref.) [W]	
nominal	must operate	min. holding	max.		min. holding	nominal	min. holding
5	3.75	1.75	6.0	11.8	148	2.1	0.26
9	6.75	3.15	10.8	38.4	82		
12	9.0	4.2	14.4	68.5	62		
24	18.0	8.4	28.8	274.0	31		
48	36.0	16.8	57.6	1096.0	16		

Notes:
1. All values at 23°C, upright position, terminals downward.
2. Voltage max. is the voltage the coil can endure for a short period of time.
3. Values for coil current and coil power for reference only.
4. To avoid overheating at elevated ambient temperatures, we recommend to operate the coil at 55 - 65% of nominal coil voltage after applying the full nominal coil voltage for ≥200 ms.
5. Preferred coil voltages in bold face numbers.

ORDERING DATA

AZEV140-1AE□□□-□□D□□□

Options
nil: standard version
(xxx): special version

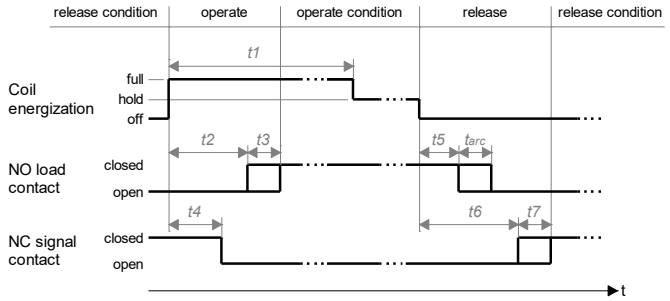
Nominal coil voltage
see coil voltage specifications table

Signal contact
nil: without signal contact
1BG: equipped with 1 Form B signal contact

Example ordering data

AZEV140-1AE-24D	Without signal contact, 24VDC coil
AZEV140-1AE1BG-12D	With 1 From B signal contact, 12VDC coil

TIMING DIAGRAM

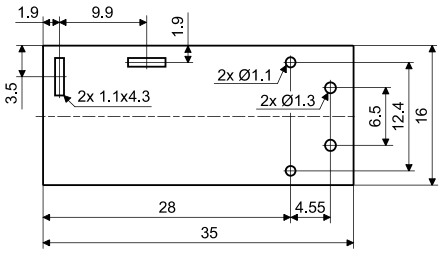


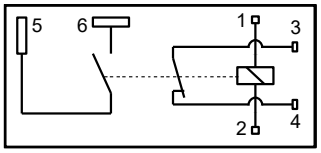
Item	Description	Notes	Timing [ms]		
			min.	typ.	max.
t1	Full energization time	recommended value	200	-	-
t2	NO operate time	at nominal coil voltage (at 23°C) [1]	-	< 10	30
		at nominal coil voltage (at hot coil) [2]	-	< 20	65
t3	NO bounce time	at nominal coil voltage	-	< 2	-
t4	NC operate time	at nominal coil voltage (at 23°C) [1]	-	< 7	20
		at nominal coil voltage (at hot coil) [2]		< 12	40
t5	NO release time	without coil suppression	-	< 2	10
		with suppression: U_{BR}/U_{nom} = 2 [3]	-	< 3	-
t6	NC release time	with suppression: U_{BR}/U_{nom} = 2 [3]	-	< 4	10
t7	NC bounce time		-	< 8	-
t_{arc}	arcing duration	if released under load, dependent on actual load condition			

Notes: 1) Cold coil at ambient temperature of 23°C
2) Hot coil with relay operated at max. temperature.
3) 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.

PC BOARD LAYOUT / WIRING DIAGRAMS

Layout and footprint recommendation. Dimensions in mm. Viewed towards terminals.
Note: Pins 3 and 4 are omitted in versions without 1 Form B signal contact.

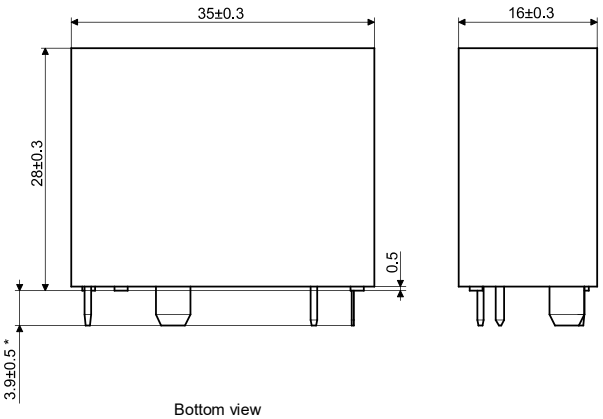




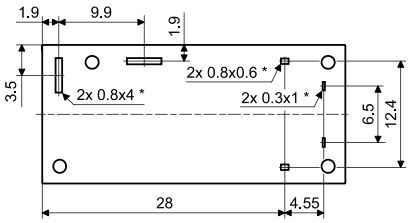
1	Coil end - winding outer layer
2	Coil start - winding center layer
3, 4	NC signal contact
5	NO load contact - movable
6	NO load contact - stationary

MECHANICAL DATA

Dimensions in mm. Tolerance ±0.1mm if not stated otherwise.
Notes: * Pin dimensions for reference only and given without tin coating.



Bottom view



CAD data in attachment of the datasheet.

IEC 62752 / IEC 62955 Short Circuit Withstand

Compliance with IEC 62752, IEC 62955 or similar standards for short circuit withstand is a function of both relay design and PCB layout. ZETTLER's relay design and applications engineering teams have developed an application note that contains important design suggestions to optimize the performance of the relay with respect to its short circuit current withstand capability.

In addition, as the overall performance depends on multiple factors such as part arrangement and trace routing, compliance cannot be generically guaranteed by ZETTLER. We strongly encourage customers to conduct their own short circuit tests in accordance with IEC 62752, IEC 62955 or similar standards in the context of their individual application design.

Application note in attachment of the datasheet.

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 (RTII) 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 form 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 signal contact to ensure a reliable and stable electrical connection.
22. As with any contact mechanism, the relay's NC signal contact bounces when switching. For evaluation of its signal, suitable debouncing measures must be taken to get a reliable signal.

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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