AZSR170

70 AMP POWER RELAY WITH OPTIONAL MONITORING

FEATURES

- Up to 70 Amp / 600 VAC switching capability
- Optional NC mirror contact acc. EN 60947-4-1 for welding monitoring
- Wide load contact gap of ≥ 3.0 mm and optionally ≥ 3.42 mm
- High dielectric strength of 5 kV_{RMS}
- 10 kV surge withstand voltage
- Compact size with less than 670 mm² (1.04 sq.in) of board space required
- TÜV, UL / CUR and CQC approvals

CONTACTS

Arrangement	
load contact	SPST-NO (1 Form A)
monitor contact (optional)	SPST-NC (1 Form B) coupled to NO load contact
Ratings (max.)	(resistive load)
load contacts	
switched power	42000 VA
switched current	70 A
continuous current	70 A
switched voltage	600 VAC
contact load category	CC2
monitor contact	
switched current	500 mA at 12 VDC
recommended min. load	10 mA, 5 VDC, 50 mW (gold plated contact)
Approved ratings	**TUV, UL/CUR, CQC**
load contact	20 A make, 70 A carry, 20 A break at 600 VAC, resistive, 85°C, 50k cycles * [2]
	20 A make, 70 A carry, 20 A break at 400 VAC, resistive, 85°C, 50k cycles [1][2][3]
	20 A make, 55 A carry, 20 A break at 277 VAC, resistive, 105°C, 50k cycles [1][2][3]
	50 A at 277 VAC, resistive, 85°C, 6k cycles [1][2][3]
	70 A at 400 VAC, resistive, 85°C, 1k cycles [1][2][3]
	70 A at 600 VAC, resistive, 85°C, 500 cycles * [2]
monitor contact	500 mA at 12 VDC, 105°C, 50k cycles
	Note: Approvals with * are at TÜV and CQC only.
Contact material	
load contact	AgNi (silver nickel) [1]
	$AgSnO_2$ (silver tin oxide) [2]
	$AgSnO_2$+Ag (silver tin oxide, silver plated) [3]
monitor contact	AgNi+Au (silver nickel, gold plated)
Contact gap	(clearance of open load contacts)
standard version	≥ 3.0 mm
option (200) version	≥ 3.42 mm
Initial contact resistance	
load contacts	≤ 10 mΩ (at 6V/20 A, voltage drop method)
	< 1 mΩ (typ. at 70 A)
monitor contact	≤ 100 mΩ(at 6V, 100mA, voltage drop method)

COIL

Nominal coil voltages	6, 9, 12, 24, 48 (DC)
Dropout voltage	≥ 5% of nominal coil voltage
Holding voltage	≥ 45% of nominal coil voltage (at 23°C)
Coil power	(at 23°C)
nominal	2.5 W
holding power	0.4 W
Temperature rise	70 K at nom. coil voltage, 85°C
Insulation system	class F, max. temperature 155°C

GENERAL DATA

Life Expectancy	(minimum operations)
mechanical	1A: 3 x 10^5 ； 1A1B: 1x 10^5
electrical	see approved ratings
Timing	(at nominal coil voltage)
operate time	≤ 20 ms
release time	≤ 10 ms (without coil suppression)
Dielectric Strength	(at sea level for 1 min.)
coil to load contact	5000 V_{RMS}
open load contact	2500 V_{RMS}
load to monitor contact	5000 V_{RMS}
open monitor contact	1000 V_{RMS}
coil to monitor contact	1000 V_{RMS}
Surge Voltage	(1.2/50 µs pulses)
coil to load contact	10 kV
open load contact	6 kV
load to monitor contact	10 kV
Insulation Distances	(clearance / creepage)
coil to load contact	≥ 8.0 mm / ≥ 8.0 mm
load to monitor contacts	≥ 6.9 mm / ≥ 7.3 mm
coil to monitor contact	≥ 1.3 mm / ≥ 1.4 mm
open load contact	
standard version	≥ 3.0 mm / ≥ 5.0 mm
option (200) version	≥ 3.42 mm / ≥ 5.0 mm
Insulation Type	(coil to load contacts)
rated voltage ≤ 300 VAC	Reinforced insulation, OVC III, PD2
rated voltage > 300 VAC	Basic insulation, OVC III, PD2
Insulation Resistance	≥ 1000 MΩ (at 23°C, 500 VDC, 50% RH)
Temperature Range	(at nominal coil voltage)
operating	-40°C to 85°C (for load current ≤ 70 A)
	-40°C to 105°C (for load current ≤ 55 A)
Vibration Resistance	1.5 mm (0.062") DA at 10–55 Hz
Shock	10 g
Enclosure	
material	PBT
protection category	RT II, flux proof
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) / ≤ 2 x 5 s
Dimensions and Weight	33.1 mm x 20.1 mm x 32.5 mm, 40 grams
Compliance	UL 508, IEC 61810-1, GB/T 21711.1
	RoHS, REACH
Agency Approvals	
TÜV	R 50618310
UL/CUR	E365652
CQC	CQC 24002421520
Packing (pcs.)	40 per plastic tray
	400 per carton box

AZSR170

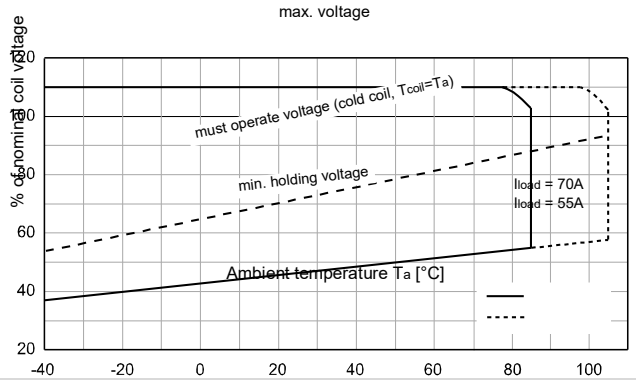
COIL VOLTAGE SPECIFICATIONS

Voltage [VDC]					Resistance [Ω] ±10%	Power (ref.) [W]	
nominal	must operate contact gap 3.0 mm	must operate contact gap 3.42 mm	min. holding	max.		nominal	min. holding
6	4.2	4.8	2.4	6.6	14.4	2.5	0.4
9	6.3	7.2	3.6	9.9	32.4		
12	8.4	9.6	4.8	13.2	57.6		
24	16.8	19.2	9.6	26.4	230.4		
48	33.6	38.4	19.2	52.8	921.6		

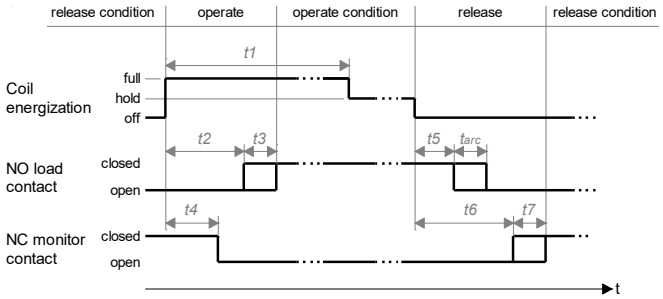
Notes:
1. All values at 23°C, upright position, terminals downward.
2. Voltage max. is the voltage the coil can endure for a short period of time.
3. To avoid overheating at elevated ambient temperatures, we recommend to operate the coil at 55 - 65% of nominal coil voltage after applying the full nominal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

COIL OPERATIVE RANGE

Note: Diagram shown for standard 3.0 mm contact gap version. For versions with 3.42 mm contact gap (option 200) the *must operate voltage* is approx. 14% higher.



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]	-	< 15	20
		at nominal coil voltage (at hot coil) [2]	-	< 42	55
t3	NO bounce time	at nominal coil voltage	-	< 3	-
t4	NC operate time	at nominal coil voltage (at 23°C) [1]	-	< 14	20
		at nominal coil voltage (at hot coil) [2]		< 40	55
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		-	< 4	-
t_{arc}	arcing duration	if released under load, dependent on actual load condition			

ORDERING DATA

AZSR170-1A□□□-□□D□□□

Options
nil: standard version
(200): 3.42 mm contact gap version

Nominal coil voltage
see coil voltage specifications table

Monitor contact
nil: without monitor contact
1BG: equipped with 1 Form B monitor contact

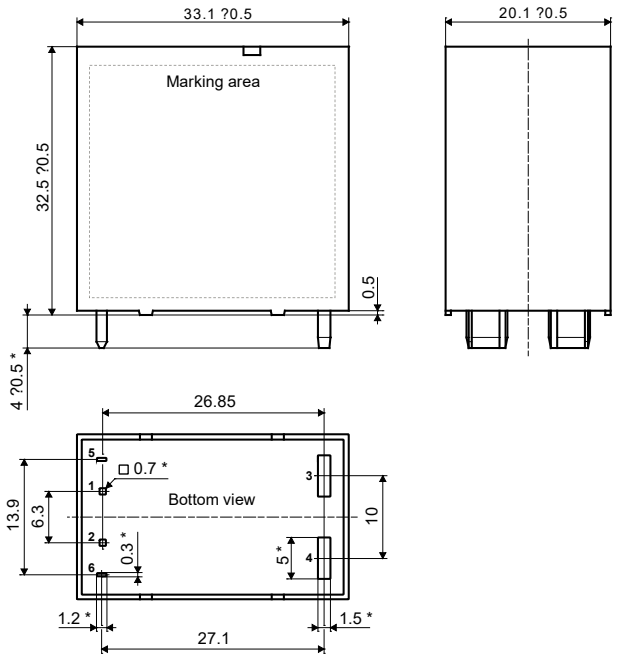
Contact material
nil: AgNi (silver nickel)
E: $AgSnO_2$ (silver tin oxide)
EP: $AgSnO_2$+Ag (silver tin oxide, silver plated)

Example ordering data

AZSR170-1A-12D	AgNi contact material, 12VDC nominal coil voltage
AZSR170-1AE1BG-24D	$AgSnO_2$ contact material, with 1 Form B monitor contact, 24VDC nominal coil voltage.

MECHANICAL DATA

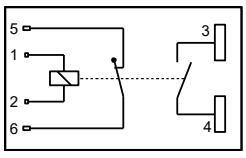
Dimensions in mm. Tolerance ±0.3mm if not stated otherwise .
Notes: * Pin dimensions for reference only and given without tin coating.
Pins 5 and 6 are omitted in versions without 1 Form B monitor contact.



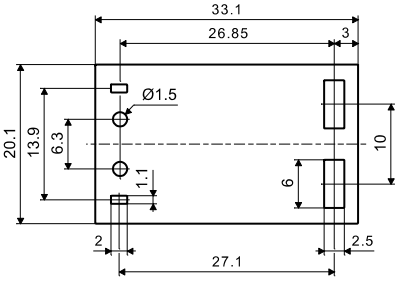
CAD data in attachment of this datasheet.

PCB FOOTPRINT / WIRING DIAGRAM

Layout and footprint recommendation. Dimensions in mm. Viewed towards terminals.
Note: Pins 5 and 6 are omitted in versions without 1 Form B monitor contact.



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



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. Protect relays from atmospheres containing corrosive gases, liquids, or solids such as water vapor, H2S, SO2, NO2, Cl, P, dust, and other harmful substances and elements. Corrosion of internal structures and contacts leads to malfunction and shortens the component's service life.
7. Prevent non-sealed relays and relays with opened vent hole 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. With sealed versions of this relay type, the vent hole must be cut open after washing or conformal coating to achieve the specified performance and service life. Care must be taken to ensure no particles get into the relay as a result of the cutting process.
12. Avoid high frequency or ultrasonic vibrations on the relays as these can cause contact welding and misalignment or destruction of internal structures.
13. 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

14. The relay may pull in and operate with less than the specified *must operate* voltage value.
15. 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.
16. At elevated ambient temperatures, after applying the rated nominal coil voltage for ≥ 200 milliseconds, the coil energization must be reduced to a holding level in order to reduce thermal stress and prevent the coil from overheating.
17. 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.
18. For short-circuit performance according IEC62955, IEC61008-1 or IEC62752, coil suppression circuits with a breakdown voltage of ≥ 2 times the nominal coil voltage must be used. Using rectifier diodes or similar in parallel to the coil is not appropriate.
19. 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 the IEC62955, IEC61008-1 or IEC 62752 required short-circuit performance, when de-energizing the coil, the recirculation diode must be eliminated from the circuit to get a fast decay of coil current and a short release time. As PWM frequency we recommend ≥ 15 kHz in order to avoid audible noise from magnetostriction. To reduce EMI effects, we recommend to apply the PWM to the coil's inner layer terminal and have the outer layer terminal connected to ground or the supply rail.
20. 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.
21. 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.
22. 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.
23. For load current greater than 50 Amps, the load contact sets must be connected in parallel to share the load current. See section *Wiring Diagram* for details.
24. A minimum load of 10 mA / 5 V / 50 mW is recommended for the gold plated monitor contact to ensure a reliable and stable electrical connection.
25. 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.

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.

ZETTLER GROUP

Building on a foundation of more than a century of expertise in German precision engineering, ZETTLER Group is a world-class enterprise, engaged in the design, manufacturing, sales and distribution of electronic components. Our industry leadership is based on a unique combination of engineering competence and global scale.

For more information on other ZETTLER Group companies, please visit zettler-group.com. For support on this product or other ZETTLER relays, please visit one of the group sites below.

SITES FOR ZETTLER RELAYS

NORTH AMERICA

American Zettler, Inc.
www.azettler.com
sales@azettler.com

EUROPE

Zettler Electronics, GmbH
www.zettlerelectronics.com
office@zettlerelectronics.com

Zettler Electronics, Poland
www.zettlerelectronics.pl
office@zettlerelectronics.pl

CHINA

Zettler Group, China
www.zettlercn.com
relay@zettlercn.com

ASIA PACIFIC

Zettler Electronics (HK) Ltd.
www.zettlerhk.com
sales@zettlerhk.com