

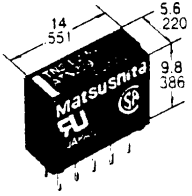
TN

910-387 → 46do.

NAIS

**ULTRA-SLIM
POLARIZED RELAY**

TN-RELAYS



UL File No.: E43149
CSA File No.: LR26550

- Ultra-slim size for minimal PC board mounting requirements.
- Small header area makes higher density packaging possible.
- High sensitivity: 140mW nominal operating power
- Surge voltage withstand: 1500V FCC Part 68
- Sealed construction allows automatic cleaning.
- Self-clinching terminal also available

SPECIFICATIONS

Contact		2 Form C	
Initial contact resistance, max. (By voltage drop 6V DC 1A)		60mΩ	
Contact material		Gold-clad silver	
Rating (resistive load)	Max. switching power	30W, 62.5VA	
	Max. switching voltage	110V DC, 125V AC	
	Max. switching current	1A	
	Min. switching capability	10μA, 10mV DC	
UL/CSA rating		1A 30V DC 0.5A 125V AC 0.3A 110V DC	
Expected life (min. operations)	Mechanical (at 180cpm)		10 ⁸
	Electrical (at 20cpm)	1A 30V DC resistive	2×10 ⁵
		0.5A 125V AC resistive	10 ⁵

Characteristics

Max. operating speed		20cpm
Operate time (at nominal voltage)		Approx. 2msec.
Release time (at nominal voltage)		Approx. 1msec.
Set time (latching) (at nominal voltage)		Approx. 2msec.
Reset time (latching) (at nominal voltage)		Approx. 2msec.
Initial breakdown voltage	Between open contacts	750Vrms for 1 min.
	Between contact sets	1,000Vrms for 1 min.
	Between contact and coil	1,000Vrms for 1 min.
FCC surge voltage between open contacts		1,500V
Initial insulation resistance		Min. 1,000MΩ (at 500V DC)
Temperature rise (at nominal voltage)		Max. 50 deg.
Ambient temperature		-40°C to +70°C -40°F to +158°F
Shock resistance	Functional	50G
	Destructive	100G
Vibration resistance	Functional	18G, 10 to 55Hz at double amplitude of 3mm
	Destructive	30G, 10 to 55Hz at double amplitude of 5mm
Unit weight		Approx. 1.5g .053oz.

ORDERING INFORMATION

Ex. TN 2 - L2 - H - 12V

Contact arrangement	Operating function	Terminal shape	Coil voltage (DC)
2: 2 Form C	Nil: Single side stable L: 1 coil latching L2: 2 coil latching	Nil: Standard PC board terminal H: Self-clinching terminal	3, 4.5, 5, 6, 9, 12, 24V

Note: AgPd stationary contact types available for high resistance against contact sticking.
When ordering, please add suffix "3" like TN2-12V-3.

TYPES AND COIL DATA (at 20°C 68°F)

Operating function	Part No.	Nominal voltage, V DC	Pick-up/set voltage, V DC (max.)	Drop-out/reset voltage, V DC (min.)	Nominal operating current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC
Single side stable	TN2-3V	3	2.25	0.3	46.7	64.3	140	4.5
	TN2-4.5V	4.5	3.38	0.45	31.1	145	140	6.7
	TN2-5V	5	3.75	0.5	28.1	178	140	7.5
	TN2-6V	6	4.5	0.6	23.3	257	140	9
	TN2-9V	9	6.75	0.9	15.5	579	140	13.5
	TN2-12V	12	9	1.2	11.7	1,028	140	18
	TN2-24V	24	18	2.4	8.3	2,880	200	36
1 coil latching	TN2-L-3V	3	2.25	2.25	33.3	90	100	4.5
	TN2-L-4.5V	4.5	3.38	3.38	22.2	203	100	6.7
	TN2-L-5V	5	3.75	3.75	20	250	100	7.5
	TN2-L-6V	6	4.5	4.5	16.7	360	100	9
	TN2-L-9V	9	6.75	6.75	11.1	810	100	13.5
	TN2-L-12V	12	9	9	8.3	1,440	100	18
	TN2-L-24V	24	18	18	6.3	3,840	150	36
2 coil latching	TN2-L2-3V	3	2.25	2.25	66.7	45	200	4.5
	TN2-L2-4.5V	4.5	3.38	3.38	44.4	101	200	6.7
	TN2-L2-5V	5	3.75	3.75	40	125	200	7.5
	TN2-L2-6V	6	4.5	4.5	33.3	180	200	9
	TN2-L2-9V	9	6.75	6.75	22.2	405	200	13.5
	TN2-L2-12V	12	9	9	16.7	720	200	18
	TN2-L2-24V	24	18	18	12.5	1,920	300	28.8

Notes: 1. Please add "H" for self-clinching terminal types as TN2-L-H-12V.
2. Specified value of pick-up, drop-out, set and reset voltage is with the condition of square wave coil pulse.
3. Standard packing: Tube:50pcs Case:1,000pcs

NOTES

1. Coil operating power

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%. However, check it with the actual circuit since the characteristics may be slightly different.

2. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or mal-function.

3. External magnetic field

Since TF-relay is highly sensitive polarized relay, its characteristics will be affected by a strong external magnetic field. Avoid using relays under that condition.

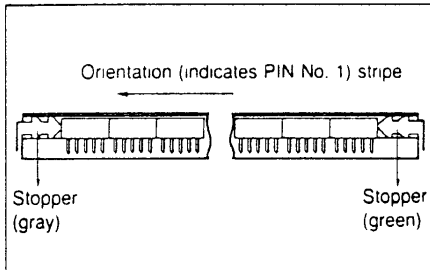
4. Cleaning

In automatic cleaning, cleaning with the boiling method is recommended. Avoid ultrasonic cleaning for relays. It is recommended that a fluorinated hydrocarbon or other alcoholic solvent be used.

Trichlene and chloroethene can be used for cleaning.

5. Packing direction

Relays are packed in a tube with the orientation stripe (PIN No. 1) toward the gray stopper.



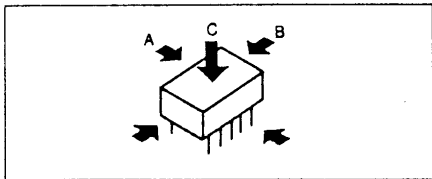
6. Automatic insertion

To maintain the internal function of the relay, the chucking pressure should not exceed the values below.

Chucking pressure in the direction A:
500 g or less*

Chucking pressure in the direction B:
1 kg or less

Mounting pressure in the direction C:
1 kg or less



*Avoid chucking the center of the relay

7. Soldering

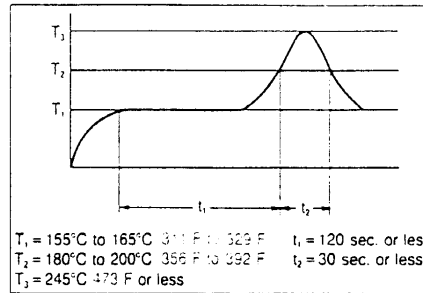
1) Preheat according to the following conditions.

Temperature	100°C 212 F or less
Time	Within 1 minute

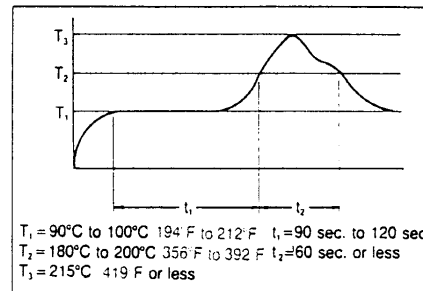
When soldering through hole terminals, soldering should be done at 250°C ±32 F with 5 sec.

2) When soldering surface-mount terminals, the following conditions are recommended.

(1) IR (Infrared reflow) soldering method



(2) Vapor phase soldering method



(3) Soldering iron method

Tip temperature: 280°C to 300°C
536°F to 572°F

Wattage: 30 to 60 W

Soldering time: within 5 sec.

(4) Other soldering methods

Check mounting conditions before using other soldering methods (hot-air, hot plate, pulse heater, etc.).

- The temperature profile indicates the temperature of the soldered terminal on the surface of the PC board. The ambient temperature may increase excessively. Check the temperature under mounting conditions.

- The conditions for the Infrared reflow soldering apply when preheating using the VPS method.

8. Others

1) If in error the relay has been dropped, the appearance and characteristics should be checked before use without fail.

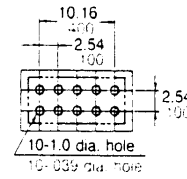
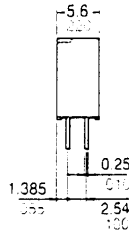
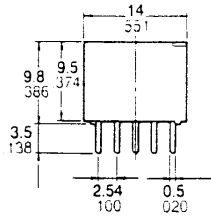
2) Latching relays are shipped from the factory in the reset state. A shock to the relay during shipping or installation may cause it to change to the set state. Therefore, it is recommended the relay be used in a circuit which initializes the relay to the required state (set or reset) whenever the power is turned on.

DIMENSIONS

2C

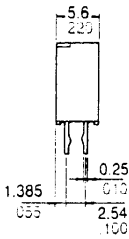
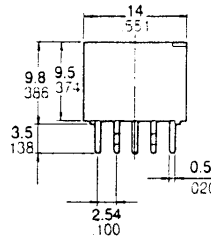
Standard PC board terminal

PC board pattern (Copper-side view)



Tolerance: $\pm 0.1 \pm 0.04$

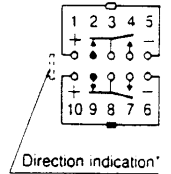
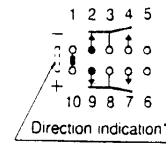
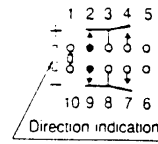
Self-clinching terminal



General tolerance: $\pm 0.3 \pm 0.12$

Schematic (Bottom view)

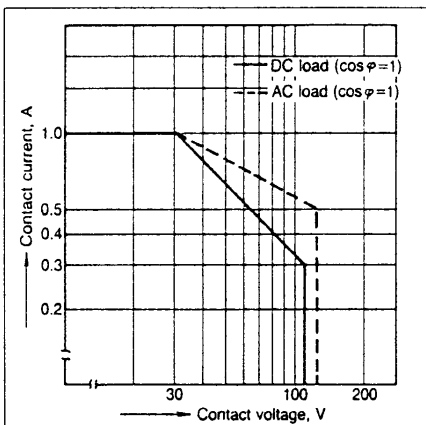
- Single side stable (Deenergized condition)
- 1-coil latching (Reset condition)
- 2-coil latching (Reset condition)



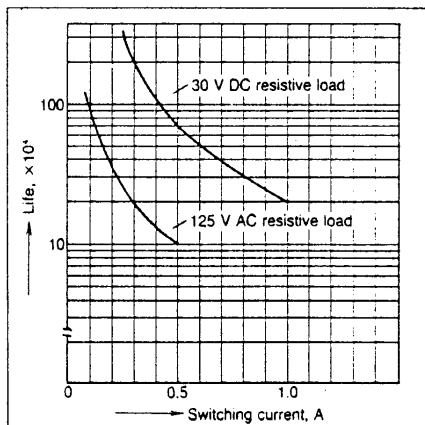
*Orientation stripe located on top of relay

DATA

1. Maximum switching power

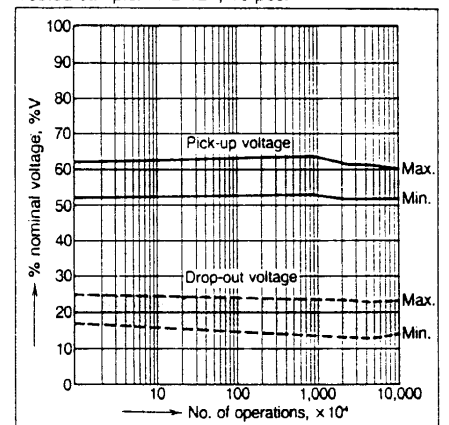


2. Life curve



3. Mechanical life

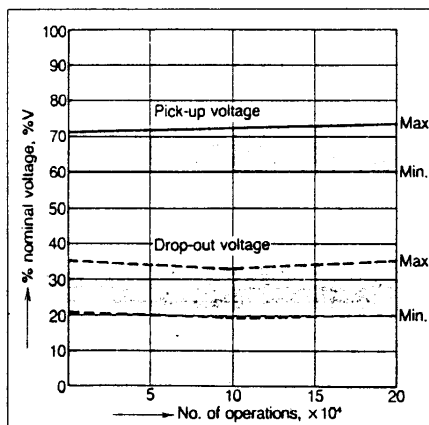
Tested sample: TN2-12V, 10 pcs.



4. Electrical life

Tested sample: TN2-12V, 10 pcs.

Condition: 1 A 30 V DC resistive load, 20 cpm

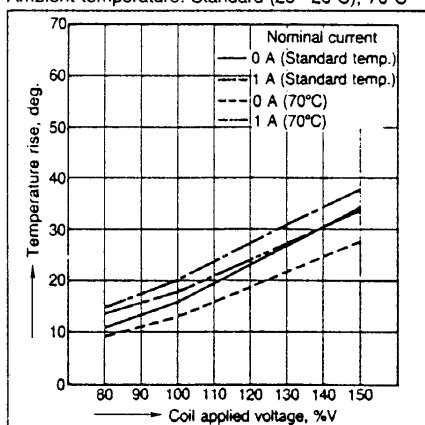


5. Coil temperature rise

Sample: TN2-12V

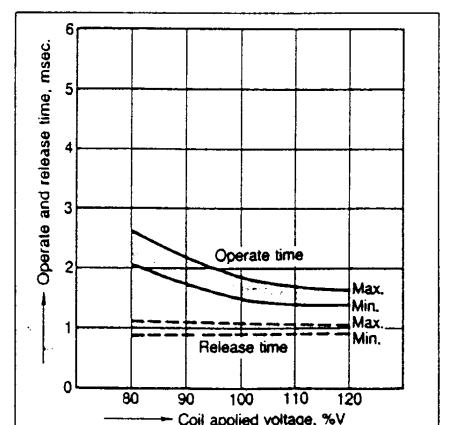
Point measured: Inside the coil

Ambient temperature: Standard (25°-26°C), 70°C



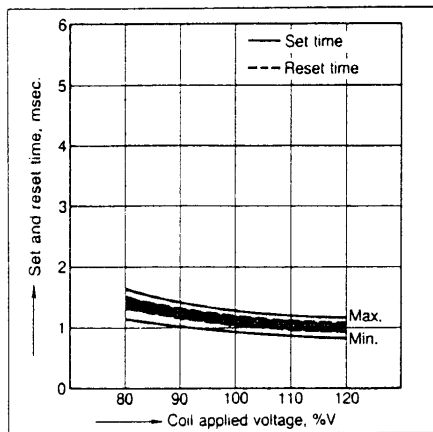
6. Operate and release time

Sample: TN2-12V, 5 pcs.



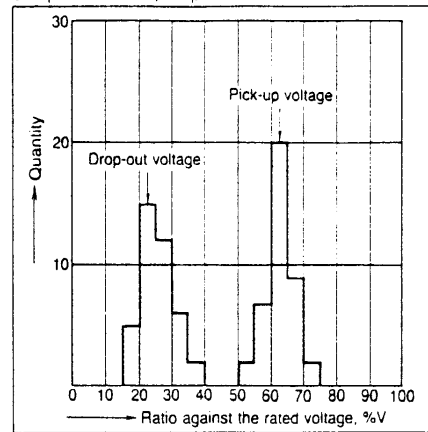
7. Set and reset time

Sample: TN2-L2-12V, 5 pcs.



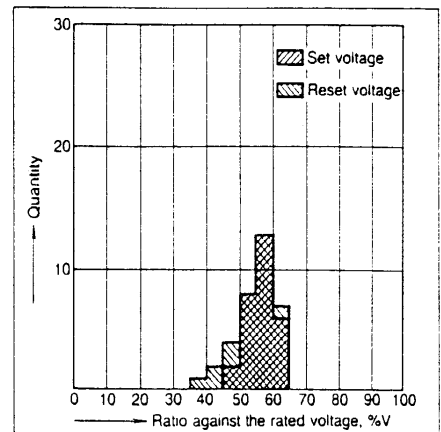
8. Distribution of pick-up and drop-out voltages

Sample: TN2-12V, 40 pcs.



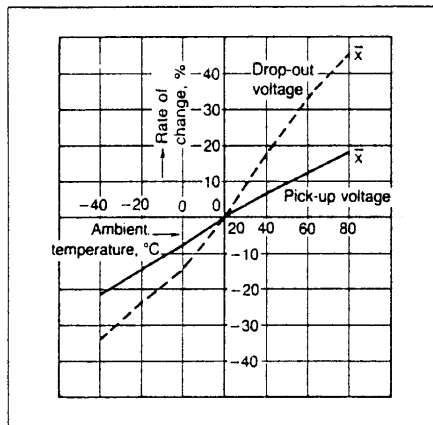
9. Distribution of set and reset voltage

Sample: TN2-L2-12V, 32 pcs.



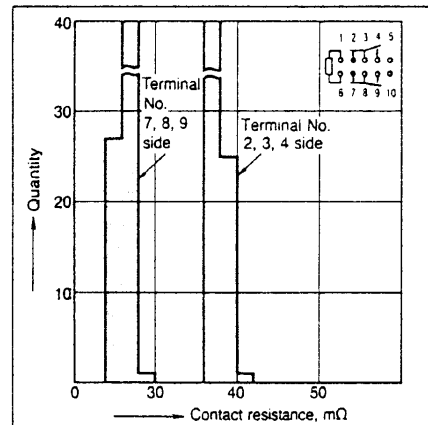
10. Ambient temperature characteristics

Sample: TN2-12V, 5 pcs.



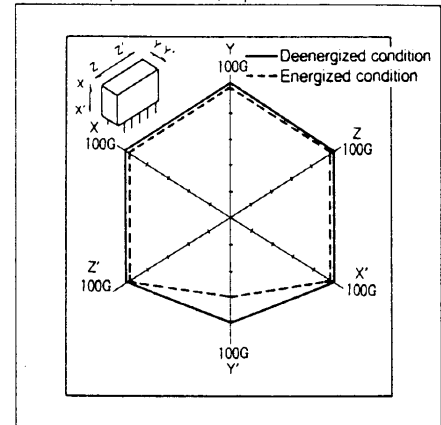
11. Distribution of contact resistance

Sample: TN2-12V, 38 pcs.



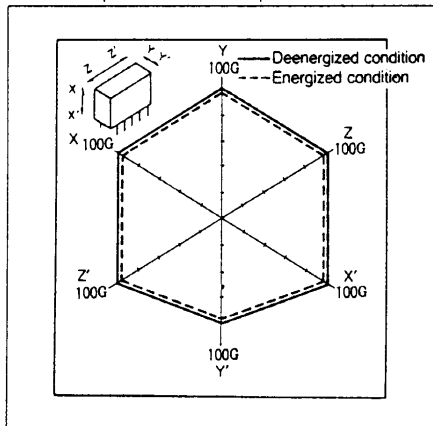
12-(1). Malfunctional shock (single side stable)

Tested sample: TN2-12V, 6 pcs.

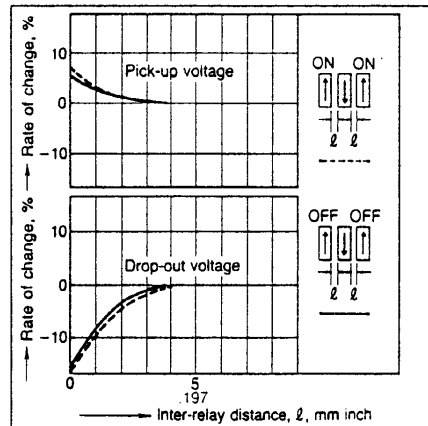


12-(2). Malfunctional shock (latching)

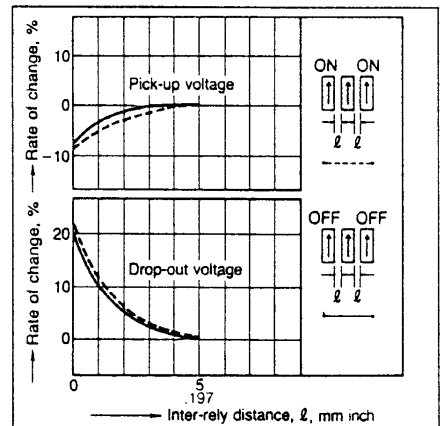
Tested sample: TN2-L2-12V 6 pcs.



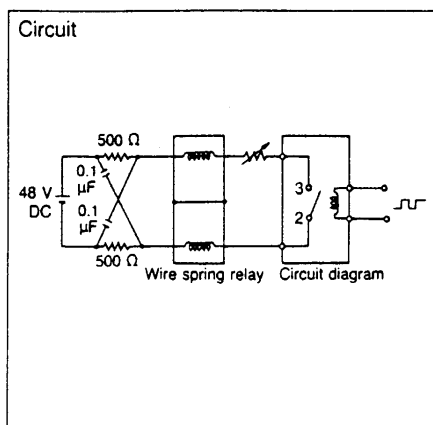
13-(1). Influence of adjacent mounting



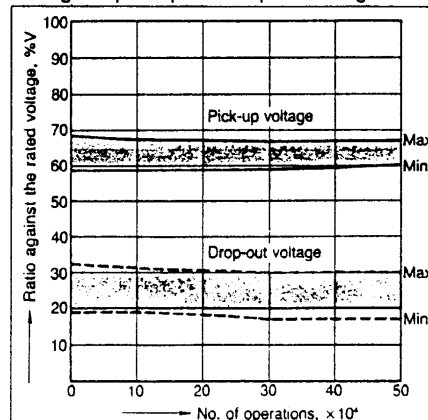
13-(2). Influence of adjacent mounting



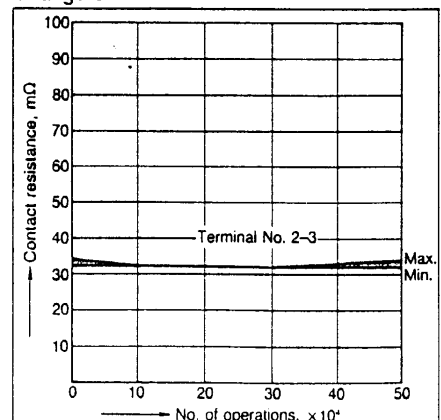
14. Pulse dialing test (35 mA 48 V DC wire spring relay load)



Change of pick-up and drop-out voltage



Change of contact resistance



NOTES

1. Coil operating power

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%. However, check it with the actual circuit since the characteristics may be slightly different.

2. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

3. External magnetic field

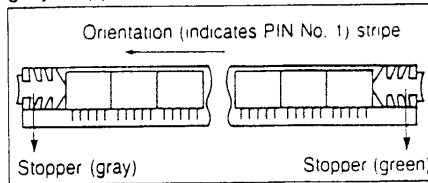
Since TN-relay is highly sensitive polarized relay, its characteristics will be affected by a strong external magnetic field. Avoid using relays under that condition.

4. Cleaning

In automatic cleaning, cleaning with the boiling method is recommended. Avoid ultrasonic cleaning for relays. It is recommended that a fluorinated hydrocarbon or other alcoholic solvents be used. Trichlene and chloroethene can be used for cleaning.

5. Packing direction

Relays are packed in a tube with the orientation stripe (PIN No. 1) toward the gray stopper.



6. Automatic insertion

To maintain the internal function of the relay, the chucking pressure should not exceed the values below.

Chuckling pressure in the direction A:

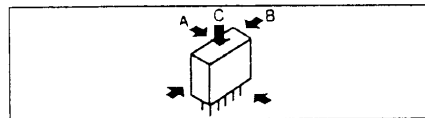
1 kg or less*

Chuckling pressure in the direction B:

1 kg or less

Mounting pressure in the direction C:

500 g or less



*Avoid chucking the center of the relay

7. Soldering

Preheat according to the following conditions.

Temperature	100°C (212 F) or less
Time	Within 1 minute

Soldering should be done at 250°C (482 F) within 5 sec.

8. Others

- 1) If in error the relay has been dropped, the appearance and characteristics should be checked before use without fail.
- 2) Latching relays are shipped from the factory in the reset state. A shock to the relay during shipping or installation may cause it to change to the set state. Therefore, it is recommended the relay be used in a circuit which initializes the relay to the required state (set or reset) whenever the power is turned on.