



Elektronika

Moduł 3

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v2024/1



Moduł 3

- Karty charakterystyki
- Przykładowe czujniki

Czytanie kart charakterystyki

LED: 334-15/T1C1-4WYA

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Continuous Forward Current	I _F	30	mA
Peak Forward Current(Duty /10 @ 1KHZ)	I _{FP}	100	mA
Reverse Voltage	V _R	5	V
Operating Temperature	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
Soldering Temperature (T=5 sec)	T _{sol}	260 ± 5	°C
Power Dissipation	P _d	100	mW
Zener Reverse Current	I _z	100	mA
Electrostatic Discharge	ESD	4K	V

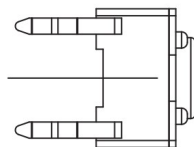
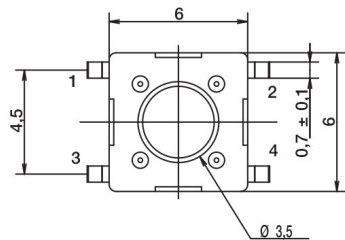
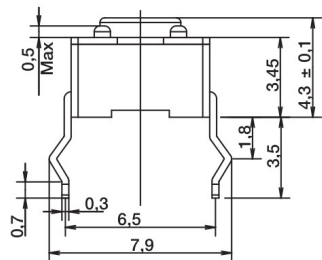
Electro-Optical Characteristics (Ta=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Forward Voltage	V _F	I _F =20mA	3.0	----	3.6	V
Zener Reverse Voltage	V _z	I _z =5mA	5.2	----	----	V
Reverse Current	I _R	V _R =5V	----	----	50	uA
Luminous Intensity	I _v	I _F =20mA	14250	----	28500	mcd
Viewing Angle	2 θ 1/2	I _F =20mA	----	15	----	deg
Chromaticity Coordinates	x	I _F =20mA	----	0.30	----	
	y		----	0.29	----	

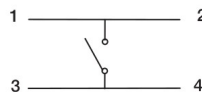
Czytanie kart charakterystyki

Przycisk: PTS645-S

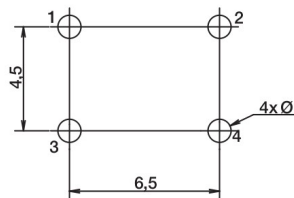
S STRAIGHT



SCHEMATIC



PCB LAYOUT



Tactile Switches

Specification

FUNCTION: Momentary action
CONTACT ARRANGEMENT: SPST, N.O.
TERMINALS: PC pins

Mechanical

ACTUATION FORCE: 130 grams, 160 grams, 200 grams, 260 grams
LIFE EXPECTANCY: 100,000 operations.

Electrical

CONTACT RATING: 50 mA @ 12 V DC.
DIELECTRIC STRENGTH: 250 V AC min.
CONTACT RESISTANCE: 100 mΩ max. initial.
INSULATION RESISTANCE: $10^{11} \Omega$ min.

Environmental

OPERATING TEMPERATURE: -20°C to 60°C

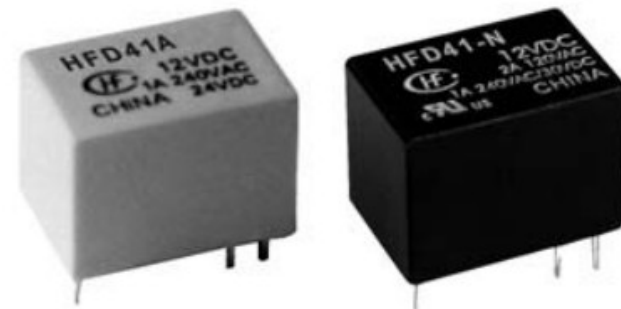
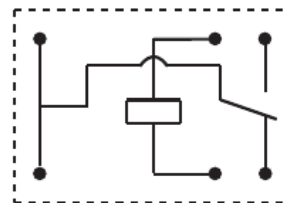
Czytanie kart charakterystyki



Absolute Maximum Ratings $T_a=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{CBO}	Collector-Base Voltage : BC546	80	V
	: BC547/550	50	V
	: BC548/549	30	V
V_{CEO}	Collector-Emitter Voltage : BC546	65	V
	: BC547/550	45	V
	: BC548/549	30	V
V_{EBO}	Emitter-Base Voltage : BC546/547	6	V
	: BC548/549/550	5	V
I_{C}	Collector Current (DC)	100	mA
P_{C}	Collector Power Dissipation	500	mW
T_{J}	Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature	-65 ~ 150	$^{\circ}\text{C}$

Czytanie kart charakterystyk



Przełącznik: HFD41

CONTACT DATA

Concat arrangement	1C
Contact resistance	100mΩ max. (at 1A 6VDC)
Contact material	AgNi, AgCdO
Contact rating (Res. load)	1A 120VAC, 1A 240VAC / 30VDC 3A 120VAC 2A 120VAC, 5A 120VAC
Max. switching voltage	240VAC / 30VDC
Max. switching current	5A
Max. switching power	600VA / 30W
Mechanical endurance	1 x 10 ⁷ OPS
Electrical endurance	9.9 x 10 ⁴ OPS (1A 120VAC, 1A 30VDC, Resistive load, Room temp., 1s on 9s off)

COIL DATA

at 23°C

Nominal Voltage VDC	Pick-up Voltage VDC max.	Drop-out Voltage VDC min.	Max. Voltage VDC	Coil Resistance x (1±10%) Ω		
				H	N	B
3	2.3	0.3	3.9	45	25	20
5	3.8	0.5	6.5	120	70	56
6	4.5	0.6	7.8	180	100	80
9	6.8	0.9	11.7	400	220	180
12	9.0	1.2	15.6	700	400	320
24	18.0	2.4	31.2	2800	1600	1280

Czujniki

Parametryczne

- rezystancyjne,
- indukcyjne,
- pojemnościowe.

Generacyjne

- dynamiczne,
- termoelektryczne
- piezoelektryczne,
- elektrochemiczne,
- fotoelektryczne.



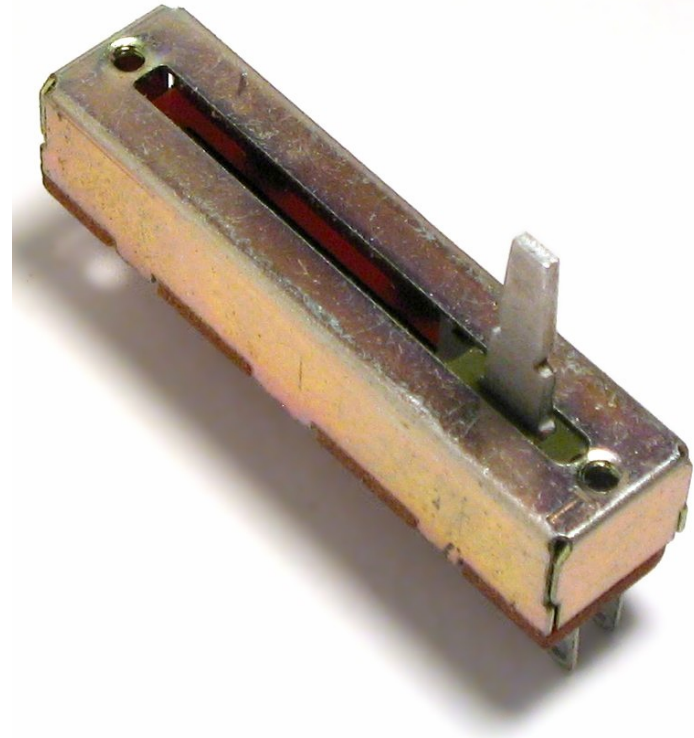
Źródła:

<https://sklepautomatyka.com.pl/produkt/czujnik-indukcyjny-ims18-08bpsnc0s-sick/>

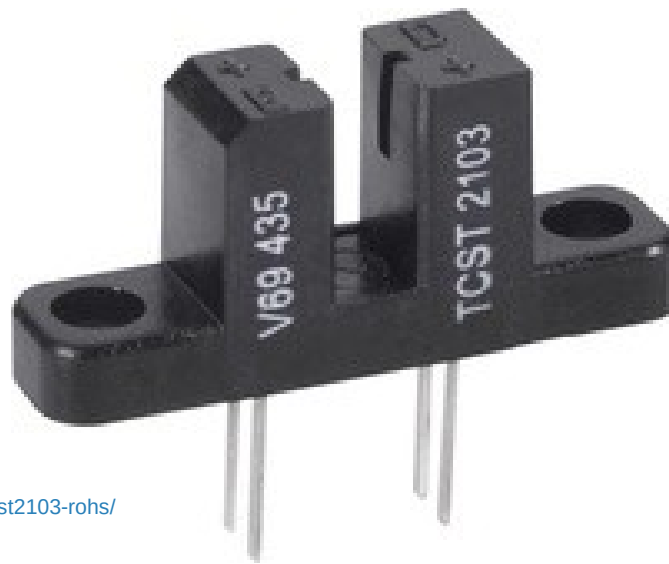
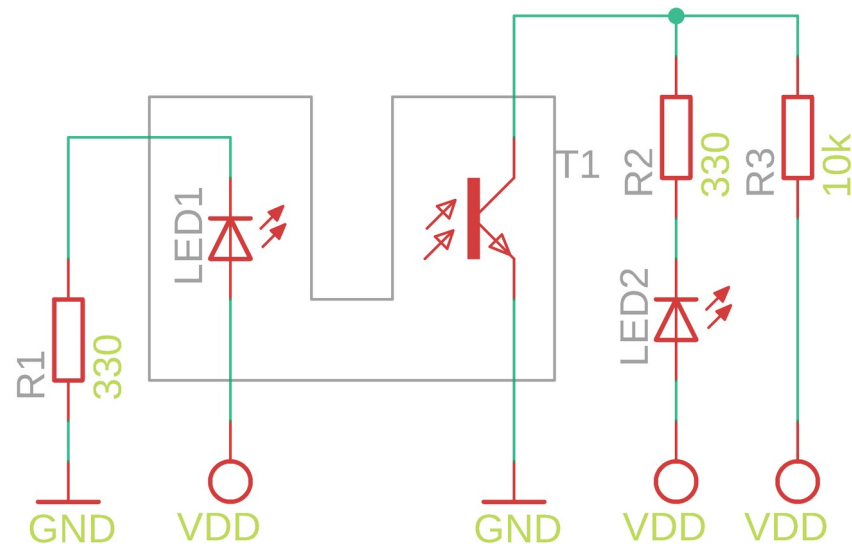
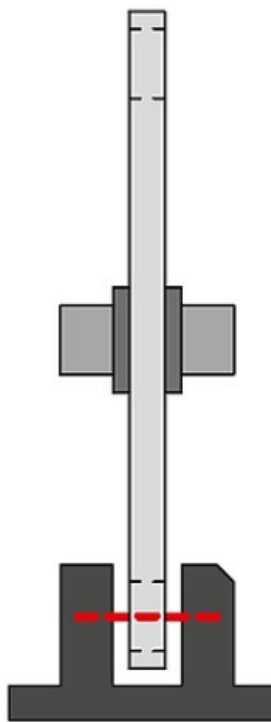
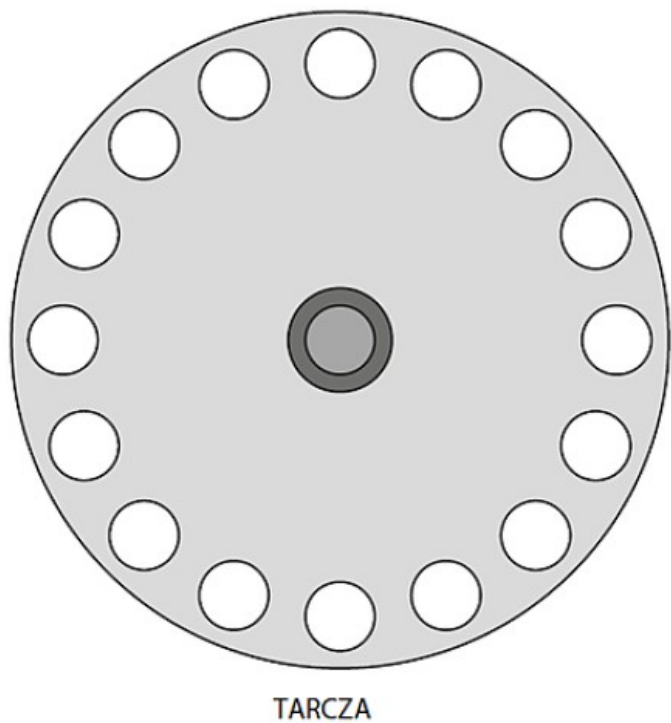
<http://www.hvac4u.pl/81,ls-cap-czujnik-poziomu-cieczy-pojemnoscowy.html>

<http://seneca.energoelektronika.pl/produkt/urzadzenia-pomiarowe-i-sterujace/czujniki-temperatury/czujniki-temperatury-czujniki-temperatury/sonda-temperatury-czujnik-temperatury-pt100/>

Kąt obrotu/przesunięcie



Czujnik szczelinowy

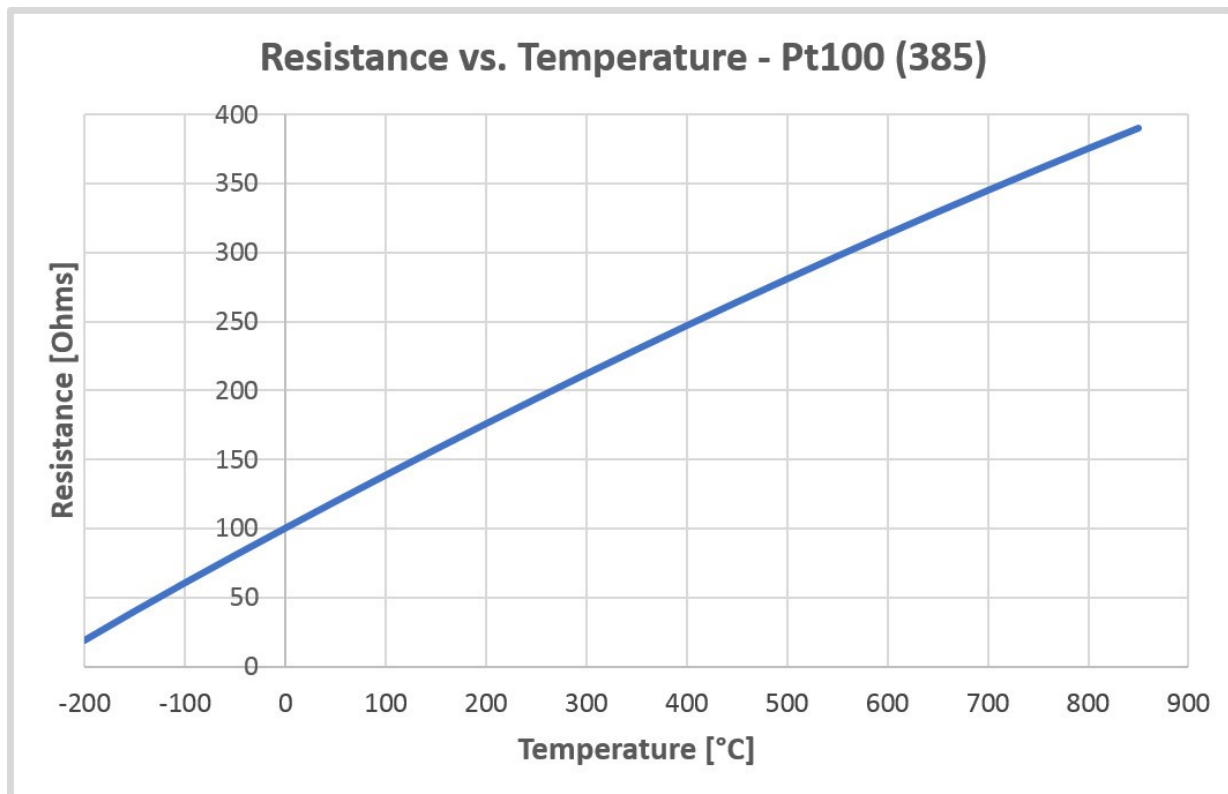


Termometr rezystancyjny PT100

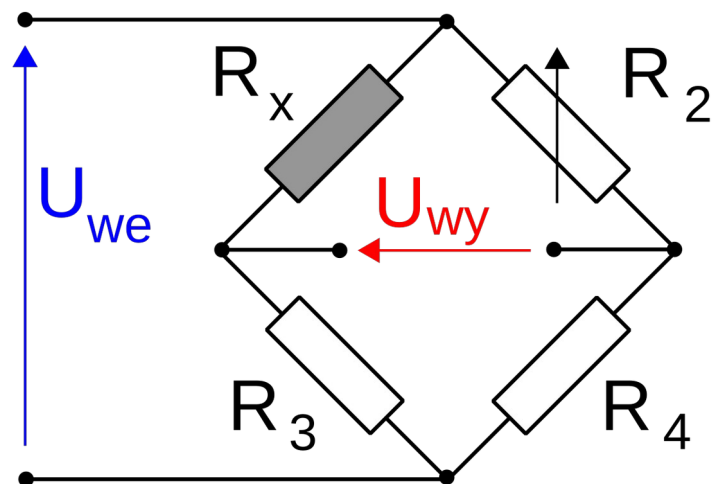


TR1

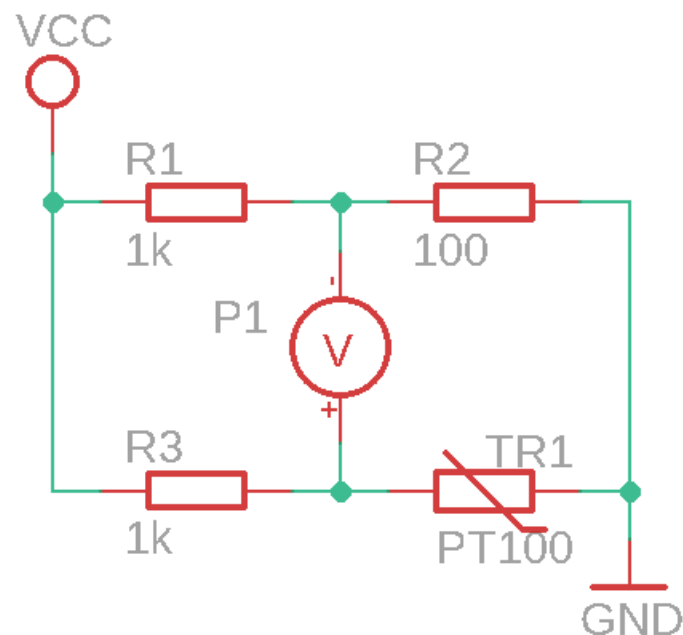
PT100



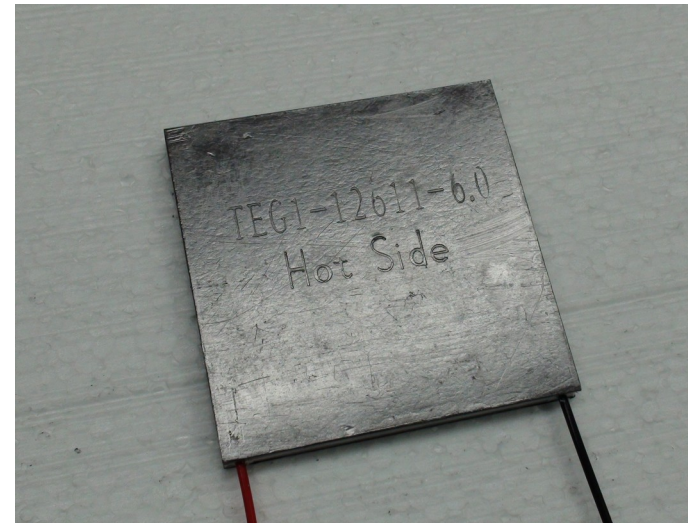
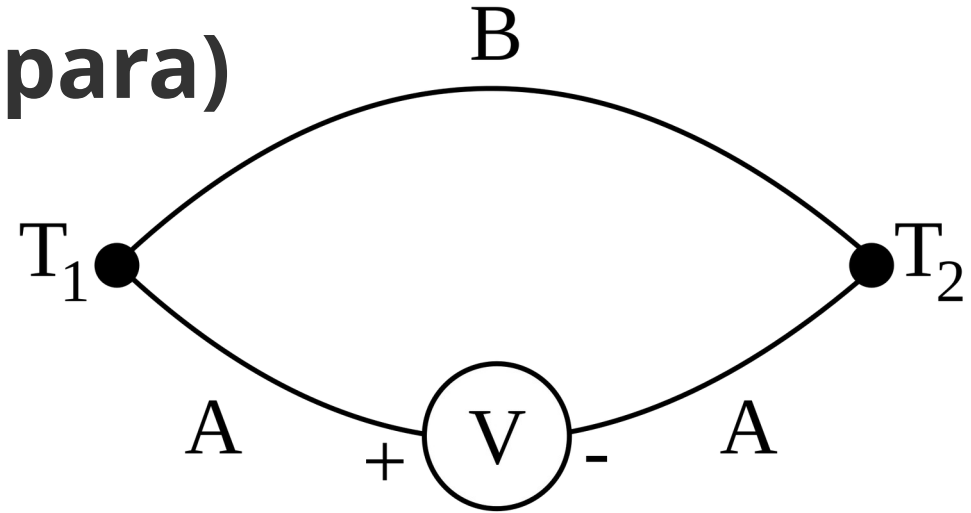
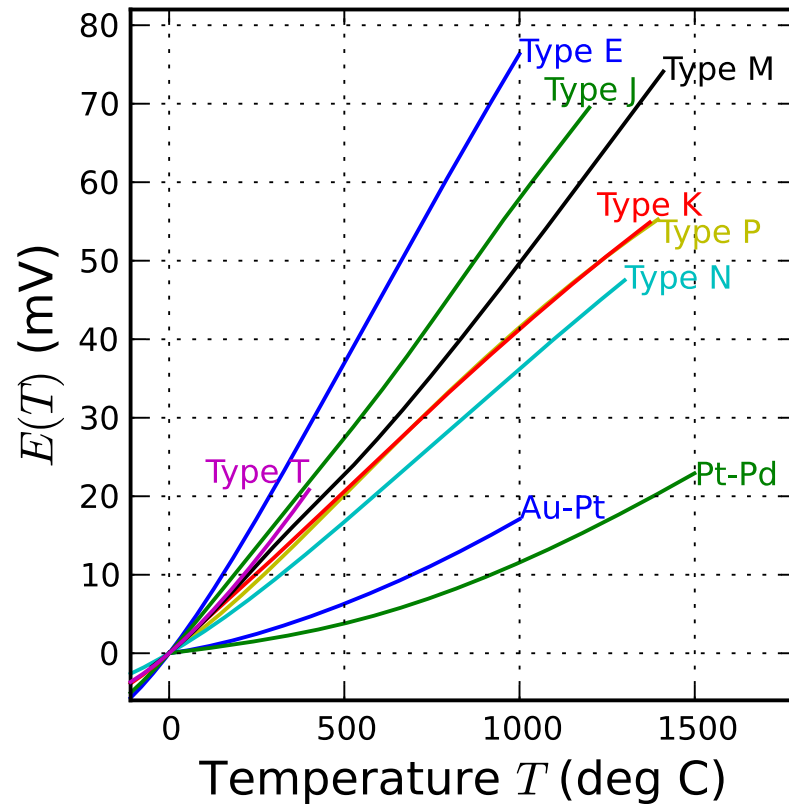
Mostek Wheatstone'a



$$U_{wy} = \left(\frac{R_x}{R_3 + R_x} - \frac{R_2}{R_4 + R_2} \right) U_{we}$$



Termoelement (termopara)



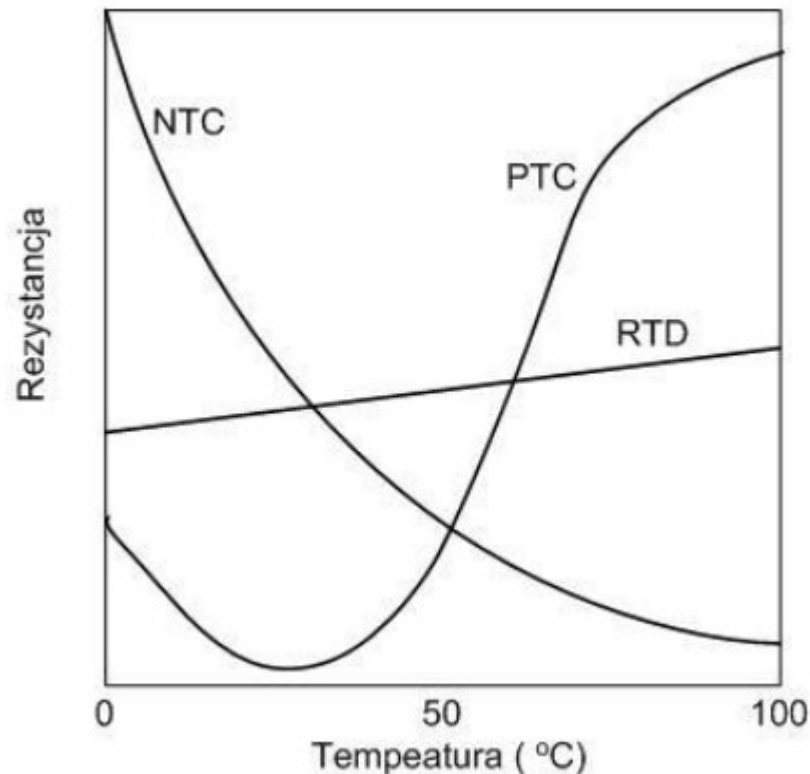
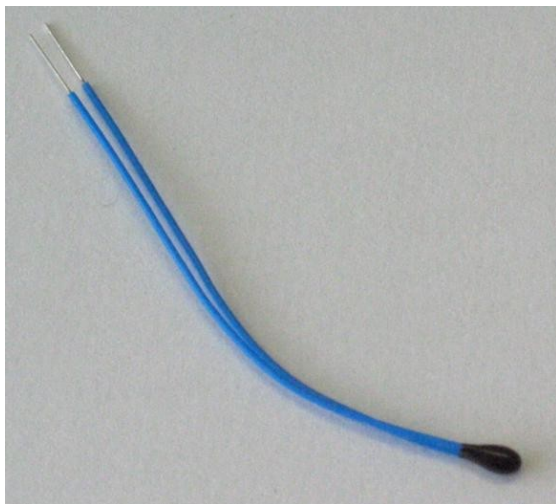
Termistory (termometry półprzewodnikowe)

NTC – negative temp. coefficient

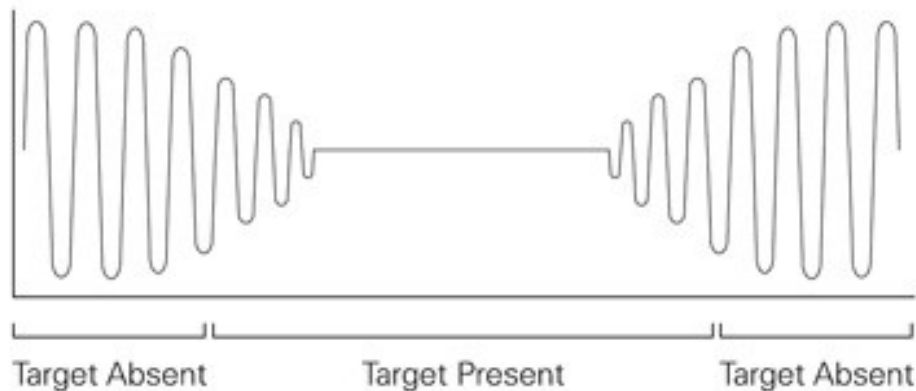
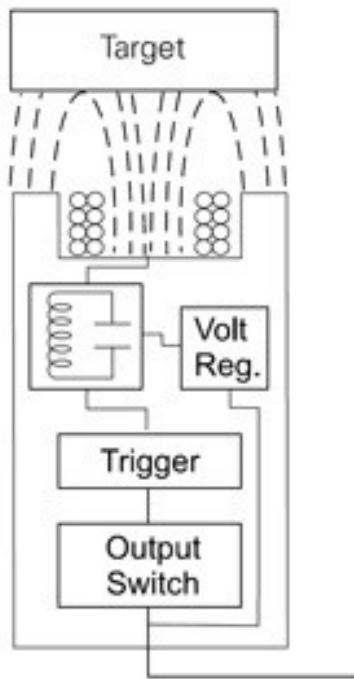
$$R_T = A \exp [\beta / T]$$

A – wsp. Rozmiaru próbki

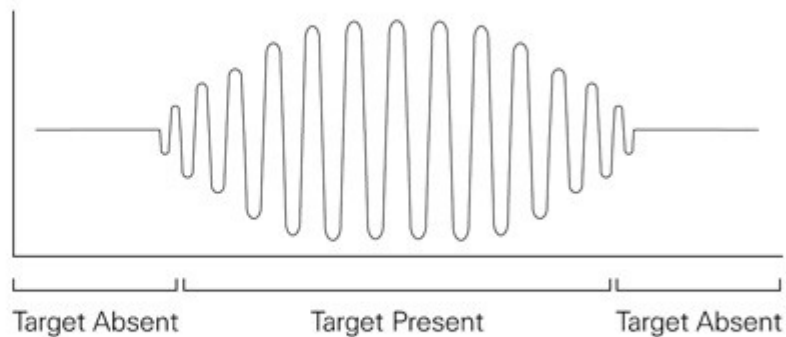
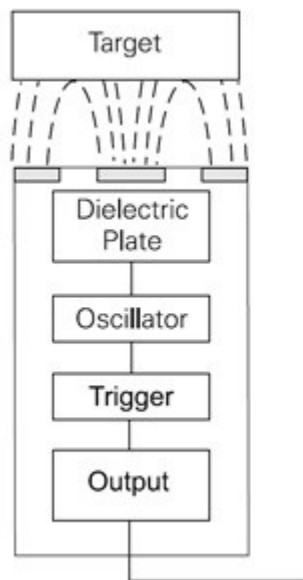
β – stała materiałowa



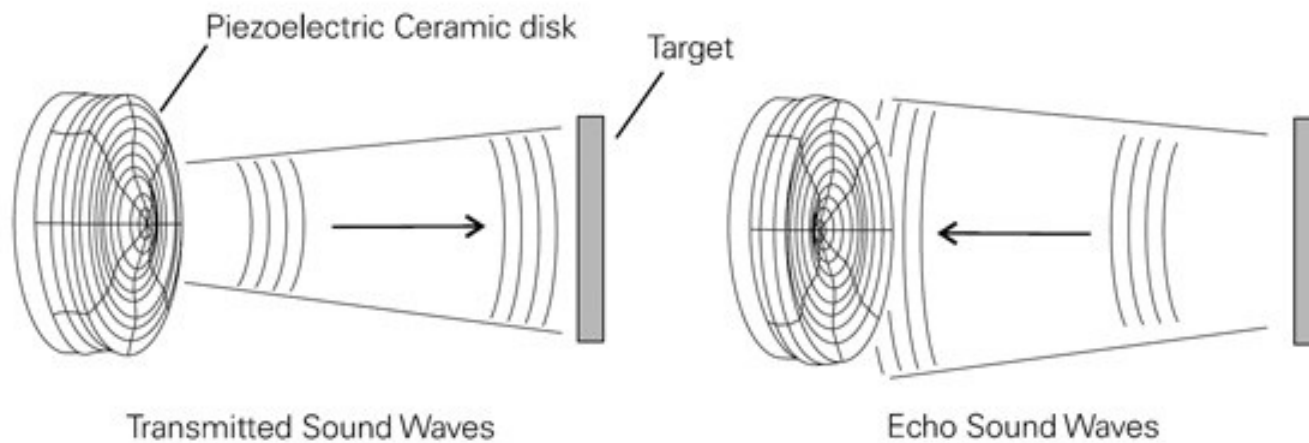
Czujnik indukcyjny



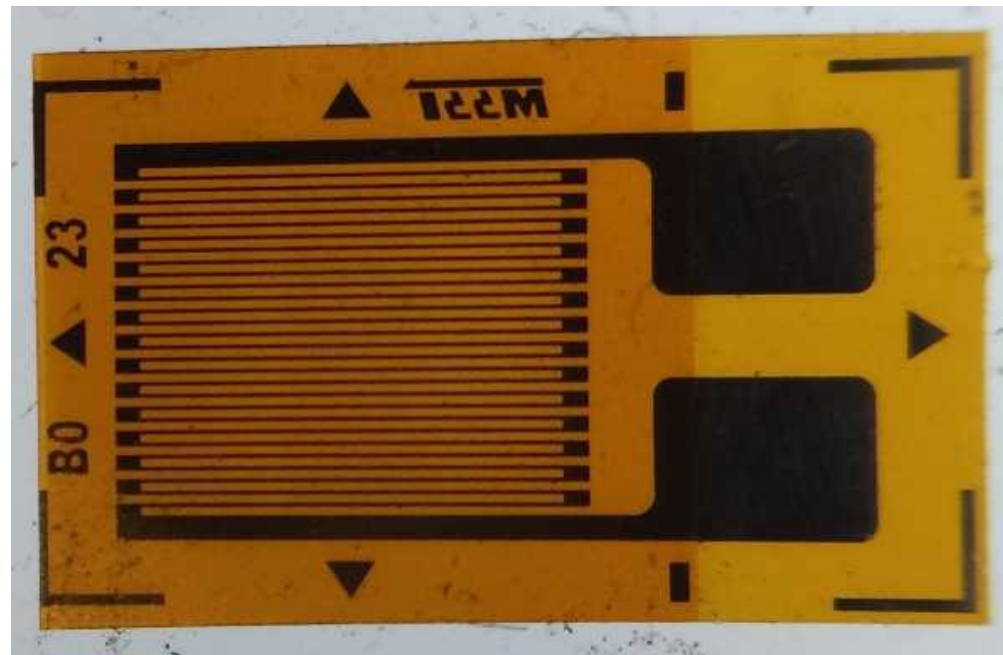
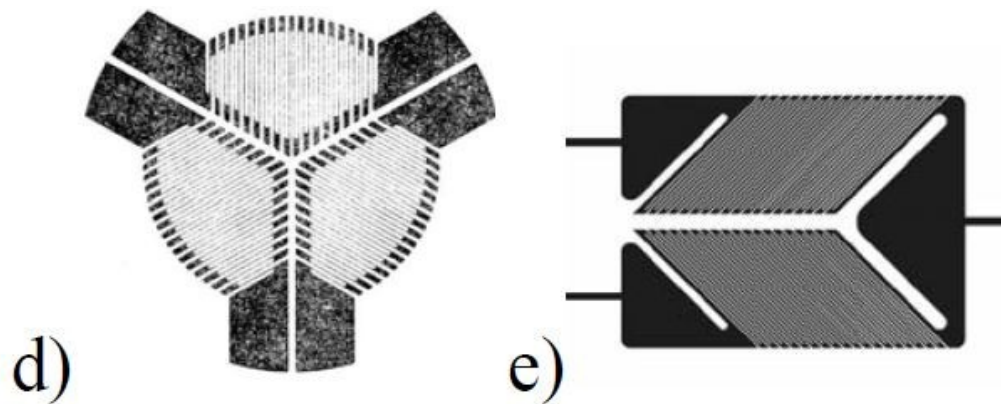
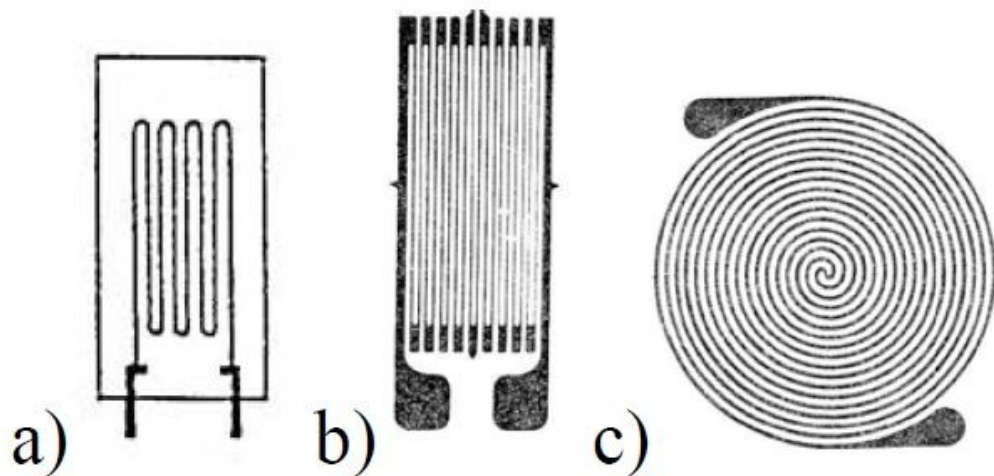
Czujnik pojemnościowy



Czujnik ultradźwiękowy



Tensometry oporowe



$$\sigma = \frac{lG}{S} \left[\frac{\text{siemens}}{\text{metr}} \right]$$

σ - Przewodnictwo właściwe materiału
 G – przewodnictwo elektryczne
 S – pole przekroju poprzecznego elementu
 l – długość bloku

Czujniki piezoelektryczne

