Assignment two

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For the sensors in the table please answer he following questions

1-Type of the output signal Analogue or digital

2- Type of the signal voltage, current, position etc.

3-How it works for example gives output voltage proportional to speed

4-State if the sensor is active or passive and why

Name of Sensor	Analogue/Digital	Output Signal	Passive/Active	How its woks
1-Thermocouple	**Analogue**	**Voltage**	**Passive (sensors, they don't require an external power source to operate**).	**Work based on the Seebeck effect that generates a voltage in response to temperature differences between its two junctions.**
2-Potentiometer	**Analogue**	**Voltage or Resistance change**	**Passive (depending on whether they are used to sense a position)** **Active (actively provide a feedback signal to a control system)** **and don't require an external power source**	**Positioning of a slider varies the resistance in a potentiometer.**
3-Encoder	**Digital**	**Digital Pulses**	**Active (They may require an external power source for their operation, especially in the case of optical encoders with light sources).**	**They are commonly used for measuring position or speed, and it converts angular motion or position of a shaft into an analog or digital code to identify position or motion.**
4-Tachogenerator	**Analogue**	**Voltage**	**Passive (They don't require an external power source for their basic function of generating a voltage signal in response to shaft rotation).**	**It generates a voltage proportional to the speed of rotation.**

5-Pressure sensor	**Pressure sensors can have both analog and digital output.**	**Voltage or Current.**	**Active (Some pressure sensors require an external power source for signal conditioning and amplification). Passive (Others, like simple resistive or capacitive pressure sensors, may be considered passive as they directly respond to the applied pressure without needing an external power source.)**	**It produces a voltage or current output proportional to the applied pressure, and the working principle depends on the type of pressure sensor. Common types include piezoelectric, capacitive, resistive, and optical pressure sensors.**
6-Proximity sensor	**Digital**	**Digital signals (binary output signal)**	**Active (Many proximity sensors they require an external power source to generate the sensing field or signal). Passive (Some photoelectric sensors, for example, can be considered passive as they rely on external light sources, and their basic detection function does not require additional power).**	**it detects infrared radiation and produces a signal based on the intensity or presence of infrared light and the working principle of proximity sensors depends on the type. Common types include inductive, capacitive, ultrasonic, infrared, and photoelectric sensors.**
7-Infra red	**Analog (IR sensors provide a continuous range of output values) Digital (IR sensors provide discrete output states (e.g., on/off)).**	**Analog IR sensors may output a voltage signal. Digital IR sensors typically provide a binary output signal.**	**Active: IR sensors that emit their own infrared radiation (e.g., infrared LEDs) and measure the reflection or absorption are considered active. Passive: IR sensors that detect existing infrared radiation without emitting their own (e.g., thermopile sensors) are considered passive.**	**IR sensors work by detecting infrared radiation emitted or reflected by objects. Different types of IR sensors include: Thermopile Sensors, Infrared Photodiodes or Phototransistors, and Infrared Reflective Sensors.**