



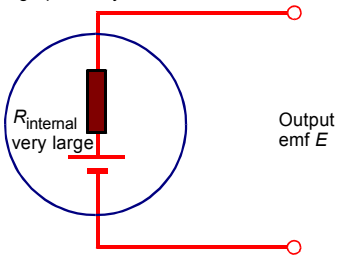
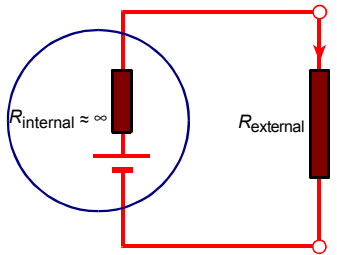


2 - Sensing - Amplifiers	
<ul style="list-style-type: none"> A measurement (or operational) amplifier is an electronic amplifier which has an output voltage that changes smoothly with a changing input voltage. The voltage to be measured is applied to the input and measured at the output. Physical properties such as temperature and pressure may be measured, monitored and recorded by using a transducer connected to a measurement amplifier. 	<p>Keywords Amplifier Voltage Sensitivity</p> <p style="text-align: right;">2.13</p>

2 - Sensing - Properties of sensors	
<ul style="list-style-type: none"> The resolution of an instrument is the smallest change of the input that can be detected at the output. The sensitivity of a measuring instrument is the change of its output divided by the change in input. A linear device gives a change of output in proportion to the change of input. Non-linear measuring devices do not have a linear scale. For example, a rubber band. Non-linear devices can be used in conjunction with look-up tables to obtain values. 	<p>Keywords Resolution Sensitivity Sensor Linear Non-linear Look-up table</p> <p style="text-align: right;">2.15</p>

2 - Sensing - Response time	
<ul style="list-style-type: none"> Response time is the time taken by a system to change after a signal initiates the change. In an electronic measuring instrument, the response time is the time taken by the instrument to give a reading after being supplied with a change in input. If the response time is too long, the instrument would not measure changing inputs reliably. If the response time is too short, the instrument might respond to unwanted changes in input. 	<p>Keywords Signal Response time Sensor</p> <p style="text-align: right;">2.14</p>

2 - Sensing - Emf	
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Open circuit</p> <p>Source: Extremely high resistance e.g. quartz crystal</p>  <p>R_{internal} very large</p> <p>Output emf E</p> </div> <div style="text-align: center;"> <p>Circuit with load R_{external}</p>  <p>$R_{\text{internal}} \approx \infty$</p> <p>$R_{\text{external}}$</p> <p>$I \approx 0$</p> <p>output $V = I R_{\text{external}} \approx 0$</p> <p>Almost no current flows, potential difference V across R_{external} is nearly zero</p> </div> </div>	
2.16	