

<b>Functional Requirements for an Instrument</b>	
<b>Block Diagram</b>	<p>Block diagram and description of Software and Hardware to meet the General or Detailed Requirements.</p> <ol style="list-style-type: none"> <li>1. A hardware block diagram showing the interfaces (or ports).</li> <li>2. A software flowchart and/or state diagram showing the program flow.</li> <li>3. A timing diagram of the overall operation of the unit.</li> </ol>
<b>Define the interfaces</b>	<p>For each interface:            What type of data are exchanged?</p> <p><b>Inputs</b>            Number of bits for ADC.            Updated every T seconds.</p> <p><b>Outputs</b>            Format to display and update rate.</p> <p><b>Communication</b>            Format, Baud rate, etc.</p> <p><b>User inputs and responses:</b>            What can the user choose?            What will the user see or hear?</p>
<b>Storage</b>	<p>Are data temporary or to be saved in case of power failure?</p> <p>Define the data to be stored from the inputs:            Format and size            Number of values            Time stamp?            (Similarly for the output data.)</p> <p>Estimate storage requirement and draw preliminary memory map.</p>
<b>Timing</b>	<p>Define overall timing for the unit - the main timing cycle.</p> <p>For each interface:            Data rates between modules.</p> <p><b>Input:</b>            How often is ADC read?            How often is User input device scanned?</p> <p><b>Output:</b>            (Similarly for each output device)</p>

	Timing between modules - are some modules critical as to timing?
Conversions and Processing	<b>Input:</b> Conversion from counts to engineering units. Error checking. Exactly what processing or analysis of data is required? Define output conversion - to ASCII, etc?  Define output formats for alarms or errors.
Other functional specification.	Are there constraints that will determine the enclosure, power dissipation, type of display, etc.

NOTE: The emphasis in the Functional Requirements is on the operation of the product and the modules (not necessarily the components) defined by trade-offs between hardware and software. For example, to meet the performance requirements, is hardware needed or will software modules or routines be sufficient?

It is critical to define the INTERFACES between modules and those with the outside world, timing constraints, and more details about the input and output signals. An estimate of the storage requirements and the program size are important.

From this document, a competent designer should be able to select particular components, enclosures, etc. to prototype the product.