Considerations for Choosing a Controller

Use the worksheet on the following pages as a checklist of the things to consider when determining programmable controller requirements. It lists the most important areas to consider when choosing a system, and provides space for recording determinations of your system needs.

Consideration	Information to Record		Why this is important
1. Proposed System	____ New system	_____ Existing system	Determine whether your system is new or existing: Will your system be installed from scratch or are there existing products already installed? The rest of your system will need to be compatible with new components. ***Why this is important:*** Certain controller products may not be compatible with others. Making sure your existing products are compatible with any new products you are researching will save you time and money. Check appropriate entry.
2. Environmental Issues	____ Codes/environmental issues to consider	____ No codes or environmental issues to consider	Consider any environmental issues that will affect your application (temperature, dust, vibration, codes specific to your facility, etc.). ***Why this is important:*** Certain environments may affect the operation of a controller. For example, typical controllers have an operating temperature of 0-55 degrees Celsius (32-130 degrees F). If your application will include any extreme environmental conditions, or you have specific codes at your facility that must be met, you will need to either research products that meet those specifications or design the installation to meet requirements. Check appropriate entry.
3. Discrete Devices	_____ Total inputs: _____ AC _____ DC	_____ Total outputs: _____ AC _____ DC	Determine how many discrete devices your system will have. Which types (AC, DC, etc.) are needed? ***Why this is important:*** The number and type of devices your system will include is directly linked to the amount of I/O that will be necessary for your system. You will need to choose a controller that supports your I/O count requirements and has modules that support your signal types.Enter quantities and type based on corresponding field devices.
4. Analog Devices	_____ Total inputs: ____ Voltage ____ Current ____ Thermo ____ RTD	_____ Total outputs: ____ Voltage ____ Current	Determine how many analog devices your system will have. Which types (voltage, current, temperature, etc.) are needed? ***Why this is important:*** The number and type of devices your system will include is directly linked to the amount of I/O that will be necessary for your system. You will need to choose a controller that supports your I/O count requirements and has modules that support your signal types. Enter quantities and type based on corresponding field devices.
5. Specialty Modules or Features (application-specific)	_____ High speed counter _____ Positioning _____ Servo/stepper _____ BASIC programming _____ Real-time clock _____ Others (list)		Determine whether your system will require any specialty features: Will your application require high-speed counting or positioning? What about a real-time clock or other specialty feature? ***Why this is important:*** Specialty functions are not necessarily available in a controller CPU or in standard I/O modules. Understanding the special functions your system may perform will help you determine whether or not you will need to purchase additional specialty modules. Check all features required.

Table continued on the following page

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6. CPU Required	**Hardware requirements:** _____ K program memory required (estimated) _____ K data memory required (estimated) _____ Fast scan time required? _____ Battery backup required? **Software/special function requirements:** ____ PID ____ Floating Point Math Others (see Programming section below)	Determine the type of CPU you will need: How much memory will your system require? How many devices will your system have (determines data memory)? How large is your program, and what types of instructions will your program include (determines program memory)? How fast a scan time do you need? ***Why this is important:*** Data memory refers to the amount of memory needed for dynamic data manipulation and storage in the system. For example, counter and timer instructions typically use data memory to store setpoints, current values, and other internal flags. If the application requires historical data retention, such as measured device values over a long period of time, the size of the data tables required may determine the CPU model you choose. Program memory is the amount of memory needed to store the sequence of program instructions that have been selected to perform the application. Each type of instruction requires a specific amount of program memory, typically defined in a programming manual. Applications that are basically sequential in nature can rely on the I/O device rule of thumb to estimate program memory (five words of memory for each I/O device); complex applications will be more difficult to judge. If scan time is important in your application, consider the CPU processor speed as well as instruction execution speed. Some CPUs are faster at boolean logic but slower with data handling instructions. If special functions such as PID are required, the CPU you select may make those functions easier to perform. For program memory required, follow this rule of thumb: 5 words of program memory for each discrete device and 25 words for each analog device. Check or calculate all requirements that apply.
7. I/O Locations	_____ Local . . . only _____ Remote Locations Specific remote I/O protocol required? Which one? _____	Determine where your I/O will be located: Will your system require only local I/O, or both local and remote I/O locations? ***Why this is important:*** If subsystems will be needed at long distances from the CPU, you will need a controller that supports remote I/O. You will also have to determine if the remote distances and speeds supported will be adequate for your application. Serial and Ethernet-based I/O hardware are two typical choices available for most systems. This I/O may also be referred to as distributed I/O, and may require a particular protocol, such as Modbus. Enter number of physical locations needed, and if/what specific protocol may be required.
8. Commuications	_____ Ethernet _____ PLC to PLC _____ Modbus RTU _____ ASCII (interface to serial devices) _____ Other	Determine your communication requirements: Will your system be communicating to other networks, systems or field devices? ***Why this is important:*** Communication ports (other than the programming port) are not always included with a controller. Knowing your system communication requirements will help you choose a CPU that supports your communication requirements, or additional communication modules if necessary. Check any/all communications functions required.
9. Programming	____ Floating point math ____ Drum sequencer _____ PID loops _____ number of loops needed _____ Subroutines _____ Direct interrupts _____ Others (list)	Determine your programming requirements: Does your application require only traditional programming instructions, or are special instructions necessary? ***Why this is important:*** Certain controllers may not support every type of instruction. You will need to choose a model that supports all instructions that you may need for a specific application. For example, built-in PID functions are much easier to use than writing your own code to perform closed-loop process control. Typical instructions such as timers, counters, etc. are available in most controllers; note any other special instructions required here. Check any/all programming functions required.