

# How to Select an Industrial Motion Controller

Congratulations! You have found the world's finest industrial motion control devices. Why? Because CTI Electronics Corporation completely designs and manufactures all of the critical sensors, components, circuitry, and firmware necessary to ensure our customers guaranteed **long term availability**. CTI's industrial motion control devices have survived 25 years of service; this high **durability** of success is due to the uses of thick layers of hard gold, stainless steel shafts, molded delrin knobs, and shielding to minimize effects of high EMI and RFI signals. The **reliability** is unquestionable; 7x24x365 performance in the most critical of environments (Aviation, Marine, Military, Medical) require that these industrial motion control devices be designed to an aerospace grade quality. That's why we say, "When Reliability is Critical" you need to talk with us. CTI's offers Commercial Off-The-Shelf (COTS) industrial motion controllers as well as customized (Build to Print) manufacturing. Advanced rapid prototyping and optimization to your demanding requirements is available.

An Industrial Motion Controller is an interface to a machine, either a computer or typically a PLC (Programmable Logic Controller) which controls some apparatus via servo motor, actuator, stepper motor, or hydraulics, allowing the operator to position the apparatus. Joysticks are typical industrial motion control interfaces. Which is the most appropriate motion control device? It is CTI's goal to navigate you through the selection process in determining the best human machine interface device for your application. The selection of the most appropriate device requires a fundamental understanding of the application, e.g. the type and number of functions to be performed. As well as, the Installation Details, Environmental Conditions, Operation, Usage, and Signaling Interface requirements. Other factors like budget & time constraints, time-to-market issues, also affect the proper choice of an industrial motion controller.

**Allow CTI to determine the proper industrial motion control device solution by providing the specific requirements of your application, be as detailed as possible.**

**Installation (Stage of Manufacture):** OEM Panel Mount Plug-n-Play Other:  
 OEM – Exposed electronics parts which require mounting into an enclosure/panel.  
 Panel Mount – Exposed electronics with a metal plate requires mounting into an enclosure/panel.  
 Plug-n-Play – Enclosed electronics that can be a handheld or desktop version.

**Describe any extraordinary Installation/Removal Requirements:**  
 Ex. 1) The motion controller will be permanently mounted into an operations command console. Ex. 2) The motion controller needs to be easily plugged/unplugged into/from a panel that constantly requires cleaning with harsh chemicals and water.

## Understanding NEMA and IP Ratings

**Environmental Condition** Indoor Outdoor Both Other:

**Operating Temperature Range:** (-40°C to 0°C) (0°C to +40°C) (+40°C to +80°C) Other:

**Will the Industrial Motion Controller be subjected to Hazardous Substances:** Yes No Not Sure  
 (check all that apply)

Liquids: Water Oil Grease Bio-Hazard Chemical Others:  
 Solids: Dirt Dust Food Bio-Hazard Chemical Others:  
 High Emission Signals: EMI RFI Specifics:

**Will the Industrial Pointing Device be subjected to Vibration/Movement:** Yes No Not Sure  
 Mobile applications subject motion control devices to high vibrations such as airplanes, helicopters, marine vessels, trucks, etc.

**Operation:**  
 Describe how and where the Industrial Motion Controller will be used:

Ex. 1) The six degrees of freedom (6DOF) motion controller will be used at a surgical station in a hospital.  
 Ex. 2) The multi axis motion control device will be used for control of unmanned aerial vehicles onboard a mobile vehicle.  
 Ex. 3) The stepper motor control or servo motor control device will control machinery inside of our manufacturing plants.

Will the Operator of the Motion Control Device be using gloves? Yes No  
 Heavy/Thick Flexible/Thin Other

**Usage:**  
 Describe the tasks an Operator will perform while using the Industrial Motion Control Device:

Ex. 1) The operator will walk over to a monitor then quickly use the camera motion control device to control the camera system pan/tilt/zoom/iris functions.  
 Ex. 2) The operator will be sitting at a desk to move the cursor up/down and across the display into fields of a spreadsheet type of application.

How many hours of an eight hour day will the Pointing Device be used?

**Select the Hardware Interface:** Computer Embedded Processor PLC Other  
 If a computer, select the Operating System: Windows Solaris Unix Linux Real-Time Other

**Select the Communication Signaling Interface:**  
 Select a **Digital Output** or **Analog Input / Output**  
 USB +12V / +3V to +9V  
 Serial RS232 +5V / 1.25V to 3.75V  
 Serial RS422 ±5V / ±5V  
 Serial RS485 ±12V / ±10V  
 Quadrature +5V / 0.5V to 4.5V  
 +5V / 0V to 5V  
 ±10V / ±10V  
 Other Other  
 Please explain digital interface: Please explain Input and Output Voltages:

The selection of the knob is determined by the physical and functionality requirements of the application and the usage by the operator. It can be somewhat subjective at times.

**Specify the desired number of Axes of movement:** Single Axis Dual Axes Three Axes Six Axes Other

**Select Joystick release movement:** Spring Return to Center Friction Held

**Select the type and number of NEMA 4 (IP66) switchpads:** None 1 Button 3 Button 6 Button Other

Ex. 1) A usb motion control device for a flight control system could require 8 axes of control (degrees of freedom) and 30 button functions. The 18 buttons could comprise of three 6 button switchpads.

**Specify an Operating Temperature Range:** Standard: 0°C to +80°C Optional: -40°C to +80°C

**Does your application require Conformal Coating on PCB?** Yes No  
 Conformal Coating on the PCB protects electrical components from moisture and prolongs life. Conformal Coating is used when the environment may contain moisture caused by either condensation from high humidity or rapid changes in temperature.

**Does your application require a Deadband?** Yes No  
 Typically most Analog applications will require the use of a Deadband, whereas digital applications require a joystick without a Deadband. When a joystick has a Deadband of 2 degrees about center the output voltage will remain constant with a slight movement off center. When a joystick is without a Deadband, the output voltage will change with the slightest movement off center.

**Does your application require an Optical Neutral "Safety" Switch?** Yes No  
 CTI's patented Optical Neutral Switch is a safety feature for your application. It uses an optical indicator, totally redundant from the Vref analog output, which indicates that the joystick is either on or off center. Note: Can only be used with +5V model.  
 Ex 1: Analog +5V Input, 0V output off center Ex 2: Analog +5V Input, 0 Logic Level on center, 1 Logic Level off center

**Specify Spring Type:** Standard Spring Maximum Compression Spring  
 A Maximum Compression Spring is used when the operator is wearing heavy gloves or when the application requires a greater stiffness in the movement of the joystick.

**Specify Mounting Thread Type:** 4-40 Threads 3mm Threads

**Describe any other requirements of the Industrial Motion Control Device:**

### Contact Information:

First: Last:  
 Company:  
 Address 1:  
 Address 2:  
 City: State/Province: Country: ZIP:  
 Phone: Fax: E-mail: