

News Release

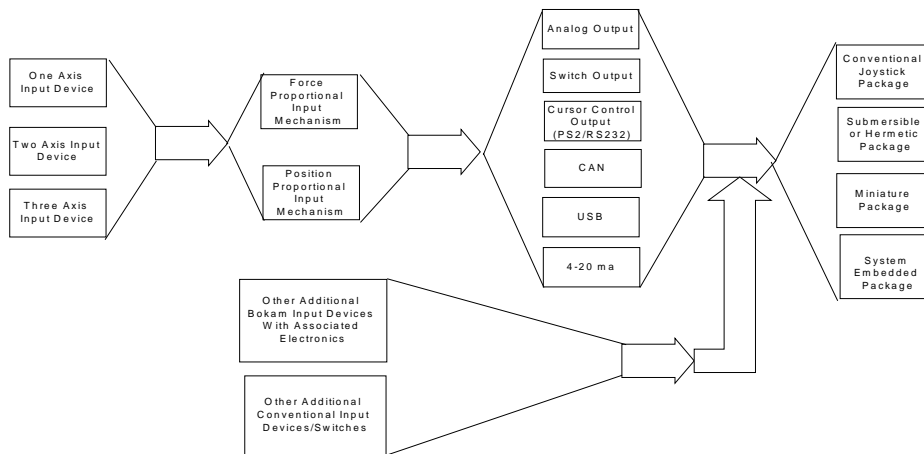
BOKAM ANNOUNCES THE FIRST FORCE AND POSITION PROPORTIONAL JOYSTICK FOR THE MINING AND UNDERWATER APPLICATIONS,

Santa Ana, CA, BOKAM ENGINEERING INC., a leader in new sensor development introduces the latest addition to its solid steel multi-axis motion control product line - the worlds first fully submersible position proportional joystick. Developed specifically for the Mining and Underwater Industries this device combines the reliability and accuracy of Bokam's Force Proportional product lines with a newly developed input mechanisms that allows the input lever to move without adding moving parts to the sensing mechanism itself. With both the interface between grip mounted input features and the main joysticks and the joystick electrical output achieved via embedded fully submersible connectors the entire assembly becomes fully water tight, hermetically sealed and explosion proof. The complete input device can be subjected to any environmental conditions and was based on customer requirements for inserting remote pointing devices and instrumentation into applications where the environment had prevented the use of conventional joysticks, controllers, and switches. This joystick combines the Bokam's award winning technology of the Aurora and DX-400 series of products (see list of awards for details) with new materials and material application advances developed at Bokam within the past two years. The solid steel welded construction of the body and sensing element along with embedded underwater and mine safety rated internal connectors make the device not only impervious to environments and salt water submersion but also allow it to survive and thrive in the abusive, highly demanding and unpredictable mining environments. The all weld construction of the device along with its molded in connector make the electronics compartment of the joystick completely hermetically sealed. The submersible connectors developed by Underwater Systems Inc also allow additional switch and secondary function switches to be mounted in the grip without degradation in its submergibility or mine safety.

PRODUCT PHOTOS IN ANY FORMAT ARE AVAILABLE UPON REQUEST.

THE MODULAR DESIGN

The product line is designed so that it is modular and adaptable to a variety of applications and functions. The Joystick product line comes in a variety of outputs ranging from Analog to USB to CAN. Additional secondary features can be added to the submersible grip assembly with its variations or outputs.



SENSOR CONSTRUCTION AND TECHNOLOGY:

In this sensor design we start with a robust solid steel base, machined to fit the customer's applications and interface requirements, and create an elaborate network of conductive strain sensitive elements on a sealed steel surface. This method assures that the only part of the sensor that comes in contact with the environment is the machined stainless surface. The strain sensitive materials located on the back of the sensor are capable of measuring even microscopic strain in the sensor base and resolve the applied force into three distinct outputs proportional to the X, Y, and Z component of the force vector. Due to the elastic nature of the steel surface and due to the absence of a bond or glue line between the strain sensitive materials and the stainless surface, the output of these sensors is significantly higher than that of their ceramic or even discrete strain gage on metal counterparts. The sensor consists of a monolithic non magnetic steel element with machined mounting ring, sensing membrane and perpendicular post for translation of input force into membrane strain. The strain sensitive artwork/circuitry located on the sensing membrane consists of a bridge circuit that changes resistance and output due to the elongation of the membrane surface. The sensing element is welded into an interface housing made of the same non-magnetic steel and containing the o-ring and the tapped interface. That signal

from the sensor is proportional and linear to the applied force. In motion control applications, this device allows the user to position and control the rate of the intended object's motion by simply applying a force with his/her finger or palm on the top of the post. In switching application the device is used to change an electronic state or issue a binary output. In a cursor control application the device is used to control the position of a cursor on a computer screen. The variety of the applications are governed by the selection of the signal conditioning electronics that are application or usage specific and can be mounted behind the device.