PO Box 309
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Autofocus **C**ontrol **M**odule

Capacitive Height Sensing System for Non-Contact Laser Cutting

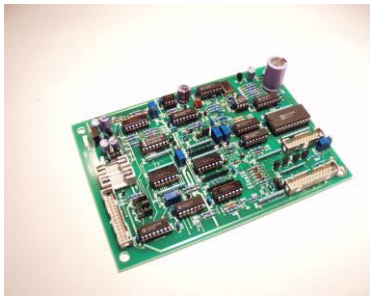
- **Non-Contact Focus Control**
- **Precise Z-Axis Control < .1 mm**
- **Stand Alone or OEM Configurations**
- **Programmable 1 Point Calibration**
- **Programmable Stand-Off Control**
- **Analog Driver Signal -10V to +10V**
- **Linear Distance Output 0 to +10V**

For optimal results, laser cutting systems require a consistent and constant stand-off distance between the cutting nozzle and work-piece. The American Laser Enterprises Autofocus Control Module (ACM) when used with an appropriate motor controlled Z-Axis maintains this stand-off at a fixed distance above the work-piece without contacting the material. This is accomplished by sensing the capacitance between the copper nozzle and work-piece. The position of the focal point is maintained by the mechanical relationship between the nozzle and focusing lens.

Capacitance is converted to an equivalent distance which is compared to the desired spacing. When there is a difference, the Z-Axis position is corrected to maintain the proper distance. Under static conditions the nozzle will be within .004 in. of the set point. Dynamic accuracy is determined by the Z-Axis servo motor response.

Equipment Description

The American Laser Enterprises capacitive height sensing system is available in several configurations. Listed below are a few examples:



ACM Circuit Board

User supplies enclosure, controls and required hardware.

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ACM Enclosure with Circuit Board
Indicators: Power, In Position, Hold, Tip Contact, Cable Fault

- Horizontal Configuration **Part No: 070160**
- Vertical Configuration **Part No: 070154**

ACM Circuit Board with Remote Location capabilities

* User specified location
* ALE can supply remote enclosure with controls and required hardware.

CNC Connection

Control is provided by the systems CNC controller, computer or other controlling device through a DB25 interface connector. The ACM requires +/- 15 VDC power. Digital level inputs and outputs are opto-isolated.

This includes the following signals:

Run/Hold
Calibrate In
In Position Out
Hold Out
Tip Contact

An analog voltage input selects the desired stand-off which can be provided either by the user's controller or the STANDOFF potentiometer (if present). A jumper on the ACM circuit board determines which is used. An analog position error signal output to the Z-Axis motor amplifier controls the position of the nozzle, correcting any deviation from the selected stand-off set point. In addition, an analog output allows metering of the stand-off if required or can be used directly to replace a unipolar tactile follower signal.

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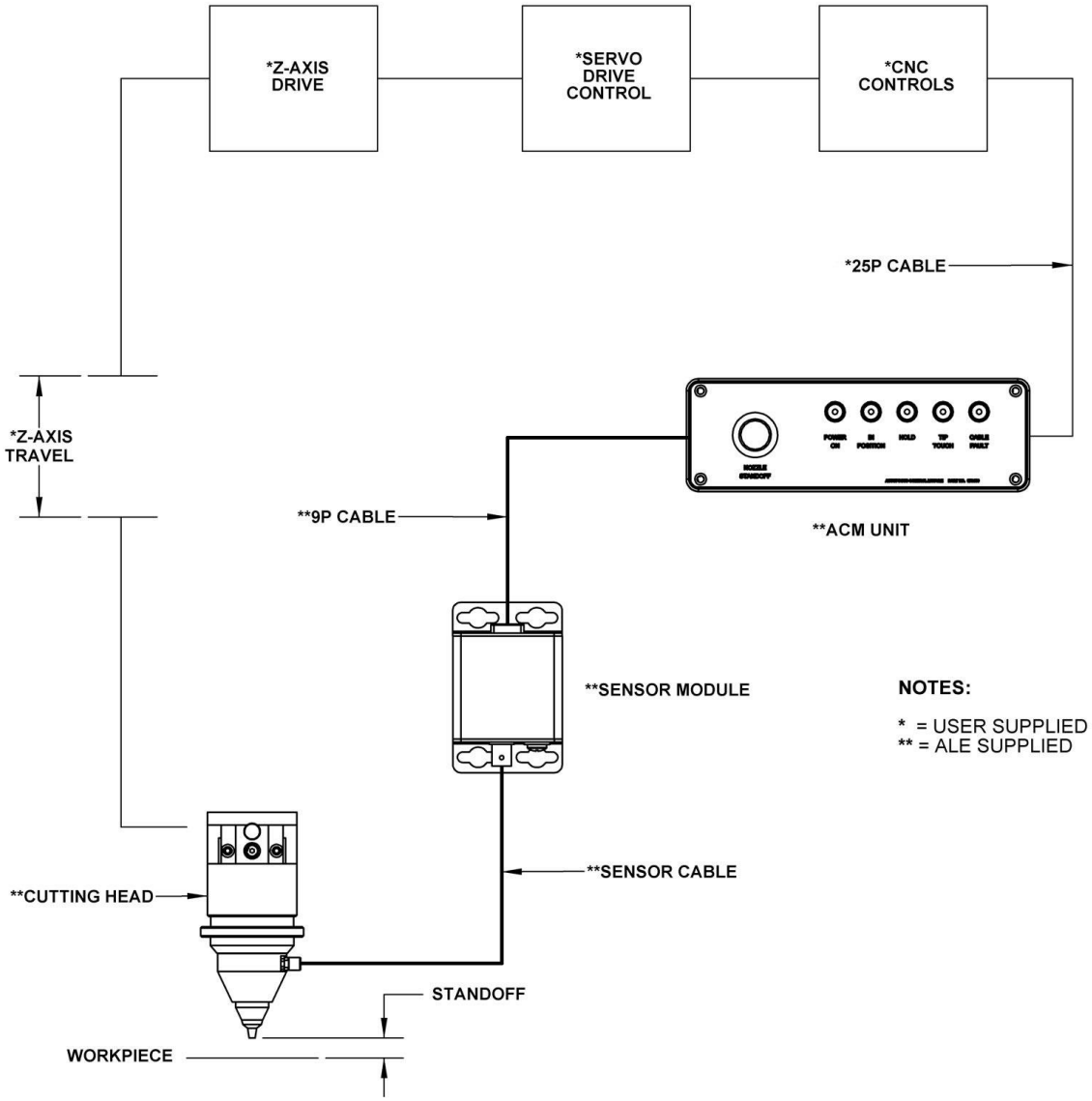
Closed Loop Stand-Off Control Diagram



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ACM Enclosure Dimensions