

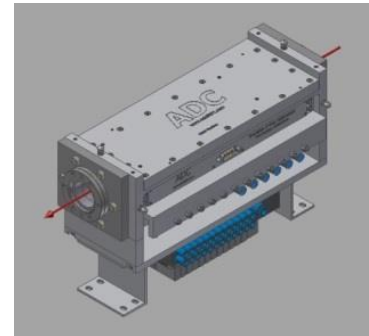
Controller for the Precision Attenuator for Hard X-Rays (ABS-CR-01)

EPICS compatible



ABS-300 CONTROLLER:

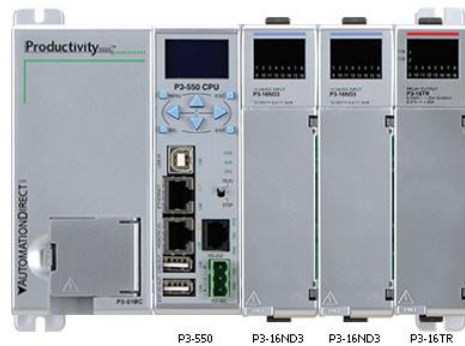
The ABS-300 precision attenuator is controlled using a Productivity 3000 Programmable Automation Controller (Fig.5), but could be operated with other controllers. The Productivity 3000 acts as a slave to the PC and use the MODBUS protocol to interface over the Ethernet port. The Productivity 3000 is a modular system. This particular application uses two relay inputs and one relay output. Each relay module has a total of sixteen terminals. The computer will act as the master and will run a program developed in LabView. The Productivity 3000 has an address definition loaded however the definitions can be customized if needed.



The ABS-300 precision attenuator is of the filter bank rather than wheel type. It is an economical and robust absorber system which can be used in a wide energy range, depending on the choice of filters. The provided filters may easily be swapped for filters of other thicknesses and metals as needed by the researcher. It is high-vacuum capable to $1e-7$ bar. The filters are moved by means of pneumatic actuators which are located on the outside and are coupled magnetically to the filters inside the vacuum. This means that no vacuum feed-through has been used for this design and that the absorber moves promptly and quickly.

In the presented setup 12 different filters (made from ultrapure aluminum, titanium and copper) can be moved into the beam and small reed-sensors detect success of the

movement. The communication with external control systems is in the presented setup done by a stand-alone Productivity 3000 controller (see below). However, any external 24V-toggle signal can be used to drive the single pneumatic actuators, and the reed-sensors are simple switches which can be read by TTL- logics.



Productivity 3000 PLC inside brains of the ABS-CR-01.

1. LabView GUI code containing:
 - a. The ability to toggle any of the 12 filters, i.e. 12 switches on the screen
 - b. The ability to select which Absorber Configuration 1 or 2, or be able to enter your own Absorber Configuration.
 - c. The Absorber Configuration will tell you what the filter theoretical thickness is. I.e. add each filter that is in the stack for a final thickness.
 - d. Ability to monitor by green LED on the GUI the 24 read switches.
 - e. LabView will communicate with the Beckhoff controller using the Modbus communication scheme.
2. Hardware:
 - a. Control box have 24 LEDs mounted on the front panel for easy viewing of the read switches. These are hard wired not software controlled.



ABS-300 SOFTWARE

The ABS-CR-01 Controller will come with control software on a CD. This should automatically install on the user's PC. The ABS-300 software is a simple but effective way to move the filters in and out of the beam. Below is a summary layout.

