



INSTRUCTION MANUAL

AC-3/FD-1 ACTUATOR AND FARADAY CUP

Version 2

SERIAL # _____

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231 B Otto Street - Port Townsend, WA 98368 - (360)385-7707

Preface

Congratulations! You have purchased a precision vacuum positioning device from Thermionics. This unit is capable of many years of use with minimal care and maintenance. This manual is a tool to aid you in obtaining this service. We at Thermionics encourage your comments and suggestions on this manual.

Product Description

The AC-3/FD-1 Actuator and Faraday Cup is an electro- pneumatically actuated precision positioning device.

The probe carries a tantalum Faraday Cup capable of 400 watts of beam power. The construction is suitable for bakeout and operation in the UHV range. The cup acceptance diameter is 1" with proper secondary electron suppression capability. Beam current and bias BNC feedthroughs are mounted on the unit.

The actuator moves the cup 3 inches, moving the closest part of the cup 1.5" away from the beam centerline. The actuator probe can be finely adjusted +/- 0.25" in two axis perpendicular to the beam axis. The actuator re-positions the cup to better than 0.005". Positive indication of the probe position is provided with two micro-switch pairs. All actuator electrical connections are terminated in one connector, mating cable connector supplied.

Unpacking

Probe translators are shipped in custom foam-in-place packing. We have found this the only system to provide adequate protection for shipment. The foam is separated approximately halfway inside the crate with thin blue plastic. We recommend the packing be saved for possible future shipment or equipment storage.

Installation

*****WARNING*****

Shipping vibration can loosen screws. The user must check to verify the screw fasteners have not backed off on the unit during shipment. This is critical for safe operation.

*****THIS IS IMPORTANT *****

The AC-3/FD-1 Probe Translator with Faraday Cup is shipped ready for installation into a beamline. It can be mounted directly from the crate. As usual, care should be exercised to protect the knife seal surface. The standard unit mounts to a 6" OD flange. (other flanges are available). Proper tightening technique should be observed whenever tightening a metal sealed flange. We recommend a small quantity of high temperature anti-seize lubricant be used on all mounting bolts. This is especially important if the unit will be subject to bakeouts.

*****WARNING*****

Wiring

The Faraday Cup current connection is available through a BNC vacuum feedthrough marked SIG.

The bias supply should be connected to the BNC vacuum feedthrough marked B- for secondary electron suppression.

A single MS 10 pin connector (mating cable connector supplied) connects the power to the air solenoid valve and receives the switch closure information to indicate position. The wiring code is:

Pin	Color code	Use

A	Yellow	Insert switch outside NO
B	Green	Insert switch outside Common
C	Black	Retract switch outside common
D	Red	Retract switch outside NO
E	Yellow	Retract switch inside NO
F	Green	Retract switch inside common
G	Black	Insert switch inside common
H	Red	Insert switch inside NO
I	Black	+ 24 volts DC
J	White	24 volt return ground

Normally closed switch contacts are available at the switches.

Other solenoid voltages are available.

Operation

1. Install in beamline per standard good vacuum practice.
2. Connect to control system per wiring instructions.
3. Connect to 80 PSI max air pressure. A source of dry control air is required.
4. Via controller, command the actuator to insert into beamline.
5. Align per adjustments section.

This Faraday Cup is rated at 400 watts maximum power. The only cooling for the cup assembly is radiative. Ceramic insulation over bare wire must be used on the bias and signal leads if higher power levels are anticipated. (Teflon covered wire is supplied for most applications.) Forced air and/or water cooling must also be provided to the exterior of the beamline section housing the actuator/cup assembly for such use.

Adjustments

Your translator is correctly adjusted prior to shipment.

This section is included to aid the user in making changes in these settings if he so desires.

LINEAR BEARINGS:

The linear bearings are adjustable via eccentric shaft which carries the bearing wheel sets. This is adjusted by loosening the stud nut with one wrench while changing the stud orientation with a second wrench (13 mm, thin wrench). This adjustment is located inside the red housing. correct alignment is required for probe accuracy.

MICRO-SWITCH ACTUATORS:

The position micro-switches are actuated by independent adjustable studs. This adjustment is accessible through a small red door in the actuator housing.

CUP ALIGNMENT:

Cup alignment can be adjusted via three tall studs each with nut pairs. Care should be exercised not to exceed the range (+/- 0.25") of the X & Y adjustment. Mechanical damage may otherwise occur.

AIR CYLINDER ADJUSTMENT:

The air cylinder includes adjustable air dampers at each end of stroke. Adjustment is made via a small screw at each end of the cylinder. Correct adjustment will allow deceleration at the end of each actuation. Supply pressure may affect this correct adjustment.

Lubrication

All bearings and rails are lubricated with GHT-2 high temperature lubricant. The user may need to add more lubricant from time to time, depending on the frequency and temperature of bakeouts and operating environment.

*****WARNING*****

This lubricant has been tested to 230°C. We recommend limiting the temperature of the lubricant to 200°C or less.

Avoid inhalation of decomposition products formed above 300°C. This material may give off **toxic gases** at elevated temperatures.

*****WARNING*****

Bakeout Procedure

See safety warnings under "Lubrication".

DO NOT RUN UNCONTROLLED BAKEOUTS OR BAKEOUTS OVER 200°C.

CONVENTIONAL BAKEOUT:

The AC-3/FD-1 assembly can be baked with standard UHV bakeout procedures provided adequate insulation is utilized to limit the heat reaching the actuator box (RED) and adequate cooling is supplied to limit the temperature of this part of the unit. The tall studs aid in this procedure. Box temperatures should not exceed 80 degrees C. Under no condition should heater tapes be used directly on a welded bellows. An electrical short would not only create a safety hazard, but possibly destroy the vacuum integrity of the thin bellows wall.

***** WARNING *****

Any unit removed from a particle beamline should be checked for induced activation by appropriate personnel. We have taken precautions to limit the activation in the most common use, but this does not assure a safe situation after operation.

We at Thermionics have a large stake in your new equipment operating up to your expectations. If you experience difficulty with this unit, or any other aspect of your endeavor where our experience might be of value, we want to hear from you. We want to be part of your success.

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