thermionics laboratory, inc.

INSTRUCTION MANUAL

ZC SERIES PRECISION TRANSLATORS

Version 2

SERIAL # _____

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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

ZC SERIES Precision Linear Translators

The ZC SERIES Translators offer a more compact version of Thermionics' more traditional Linear Translator product line. They are available in several flange and bellows options.

	ZC-B275C-T275C-X-X	ZC-B450C-T450T-X--X
Traveling Flange	2.75" Tapped	4.50" Tapped
Base Flange	2.75" Clearance	4.50" Clearance
Bellows ID	X=1.53"; 1.88"	X=1.88"; 2.5"
Payload	Up to 25 Lbs.	Up to 25 Lbs.

C = Clearance T= Tapped

Z motion is provided by an Acme Drive Gearbox calibrated in 0.001" increments with 0.050" travel per turn standard and has a position lock for the drive. A coarse side scale is provided. Traveling flanges are supplied tapped standard and Base flanges are clearance. Other flange and drive configurations are available. These assemblies are available with or without axis tube probe/ bearing assembly.

Basic unit (includes 2" travel)
addl. inches available in 2" increments

Model # Z-BxxxC-TyyyT-a-z
where: a = bellows Id
z = stroke
B = Base flange
x = base flange size
C = Clearance
T = Traveling flange or Tapped
y = traveling flange size

Available up to 48" travel standard, in 2-inch increments.

The ZC SERIES instruments have a 25 Lb. equipment payload for vertical operation. For applications which need different payloads and/or other operational orientations, please consult the factory. See "installation " section below for complete payload considerations.

A full complement of options is available. Many are suitable for field retrofit. This allows the unit to be modified to suit changing requirements as the role for the translator changes through its life. These options include tilt and an extended support shaft. Motor drive is available, both DC stepping and AC synchronous.

Unpacking

ZC SERIES Translators are typically shipped with custom foam-in-place packing, bubble wrap, or dense foam. We have found this to provide adequate protection for shipment. The foam-in-place is separated approximately halfway inside the crate with thin plastic. The bellows assembly is shipped in place protected by a plastic wrap and cardboard or thick paper wrap about the bellows. This wrap should be left in place until the manipulator is fully mounted. We strongly recommend the packing crate with packing be saved for possible future shipment or equipment storage.

WARNING

It is necessary, especially on long stroke translators, to have an axis rod or tube down the axis of the Z travel. This will keep the bellows from "springing" out when the pressure is returned to atmosphere (usually when the unit is near its most compressed mode). This function is usually satisfied by a "theta" rotation shaft or support tube. Damage to the equipment can occur if this precaution is not observed.

Installation

WARNING

Shipping vibration can loosen screws. The user must check to verify the screw fasteners have not backed off on the unit.

***THIS IS IMPORTANT ***

The standard ZC SERIES Translator can be installed directly from the crate. As usual, care should be exercised to protect the knife seal edge. The standard unit mounts to a 2.75" o4 4.50" OD flange. 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.

PAYLOAD CONSIDERATIONS

The ZC SERIES instruments have a 25 Lb. equipment payload for vertical operation. This payload is based upon the total load on the traveling flange with the base flange securely attached to the customers chamber, providing a strong and stable mounting. The payload center of gravity must be within the diameter of the traveling flange OD (Normally 2.75") and within 8" of the flange face.

Please consult the factory if your application requires:

- Payload greater than 25 Lb.

- Center of gravity beyond above limits
- Mounting orientation other than standard vertical

Adjustments

Your ZC SERIES 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 BUSHINGS:
The linear bushings are not adjustable on the ZC SERIES translators.

TRAVEL LIMIT STOP COLLARS:
Some models may come equipped with stop collars clamped to the guide rods or the Z axis lead screw. These stops limit travel to the specifications of the device, such that the bellows is not extended beyond its operating parameters. If a need arises to move these stops, measure their locations prior to their removal, and replace them accurately upon re-assembly. Over extension of the bellows will cause premature failure of the bellows and/or mechanical damage to the manipulator or other equipment.

Z DRIVE:
The two main bearings in the gearbox assembly are preloaded at assembly via the main drive gear, shims, and held via roll pin. The worm wheel is locked into place by the main set screw in tangent with the acme drive screw, which creates a 'sandwich' with a thrust bearing/radial bearing set. The worm drive gear set is adjusted by positioning of the upper gearbox housing before locking down the two 5/16-18 SHCS mounting bolts. A slight force toward engagement is usually best to minimize gear binding while minimizing backlash. If smooth Z drive cranking is not obtained under load, this placement should be repeated.
This alignment is set at the factory and should not be disturbed unless necessary.

BELLOWS ASSEMBLY REMOVAL:
The bellows assembly is removable in the ZC Series Translators via simple bolt and clamp removal. With all peripheral components removed and a bellows protector wrap in position around the bellows, the base bolts and or clamps can be removed, and the assembly can be lifted from the translator.

Lubrication

All exterior bearings, gears, gearboxes, and lead screws are lubricated with Thermionics GHT-2 high temperature lubricant. The user may need to add more lubricant from time to time, depending mostly on use, but also on the frequency and temperature of bakeouts and operating environment. We suggest a visual inspection of the lead screw and its lubrication on a periodic basis.

*** WARNING ***

Additional lubricant must be added to the lead screw and Z bushings as the use and environment requires. The standard lifting mechanism is a bronze acme thread on a burnished steel acme lead screw. This is a sliding contact, requiring lubrication. Equipment overloading, heavy use, high temperature bakeouts, environmental conditions, etc. can and will remove the lubricant from this interface. THIS WILL CAUSE PREMATURE WEAR. If this is continued to an extreme, the nut will fail and allow the stage to suddenly drop. THIS SITUATION IS DANGEROUS TO EQUIPMENT AND PERSONNEL AND MUST BE AVOIDED. Inspect this mechanism and re-lubricate as needed. The mechanism should have 0.002" to 0.006" vertical (axial) backlash maximum. If more is detected, consult the factory for suitable repair.

*** 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.

Bakeout Procedure:

CONVENTIONAL BAKEOUT:
SUMMARY: The ZC SERIES translator can be baked with standard UHV bakeout procedures.

See safety warnings under "Lubrication".

DO NOT RUN UNCONTROLLED BAKEOUTS OR BAKEOUTS OVER 200°C

All motors and limit switches/ position indicators must be removed during bakeout.

For motorized models, see under "Motorized operation" for removal instructions for bakeout. All motors and limit switches/ position indicators must be removed during bakeout.

The Z drive gearbox should be locked in place during bakeout. (locks are not provided on motor driven models).

We do not recommend stage temperatures exceed 180°C continuously and 200°C intermittently. The design of the translator allows room around the bellows for thermal insulation, making possible greater bellows temperatures while not exceeding our recommendations. Under no condition should heater tape be used directly on welded bellows. An electrical short would not only create a safety hazard, but possibly destroy the vacuum integrity of the thin bellows wall.

Motorized Operation

All axes of your manipulator can be motorized. When purchased without a controller the wiring comes un-terminated. It is the customer's responsibility to be sure the wiring is properly strain-relieved mechanically. Retrofit kits are available for field installation. Please consult the factory for further information.

All motors and limit switches/ position indicators must be removed during bakeout.

REMOVAL AND ADJUSTMENT PROCEDURES

Z DRIVE:
The Z drive motor is removed by first releasing the clamp screw on the drive shaft. This screw is accessed through a hole in the aluminum spacer between the motor mounting flange and the gearbox. Once this coupling is released, the four socket head screws holding the motor can be removed and then the motor.

LIMIT SWITCHES:
The limit switches are mounted in removable assemblies. Simply remove the two associated mounting screws and remove the plate (typically the Z scale).

POSITION INDICATORS:
Position indicators may be removed with limit switch mounting plates or individually as required. Care should be used upon re-assembly to dress the wires so as not to interfere with stage motion.

WIRING COLOR CODE…Limit switches and Position indicators
Switches:

Common	Yellow
Normally closed	Green
Normally open	Red

LED Position Indicators: CLI870W

Pin #	
1	Red
2	Yellow
3	Green
4	Black

ZERO POSITION CONNECTORS

SIGNAL	SENSOR WIRE COLOR
Detector Ground	Green
Detector Output	Blue
Detector Vcc	White
Anode (3.3 V)	Red
Ground	Black

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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