



INSTRUCTION MANUAL

FBT 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

The FBT series of translators are based on the FB 100 series manipulator Z drive. These units offer unparalleled mechanical support for customer payloads. They are available with bellows ID's from 2" through 4" standard, with larger ID's available. Standard flange size is 6" OD, with tapped or clearance holes as required. Other flange diameters available. Options include three lead screw version for extra heavy payloads and 10" OD base flange for horizontal mounting. The Z drive is acme with a precision 4:1 gearbox. The stage position is indicated to 0.001" divisions.

The FBT Series instruments have an 80# equipment payload for vertical operation (NOT inverted). Three lead screw units have a 200# rating. For applications which need different payloads and/or other operational orientations, please consult the factory. See "installation " section below for complete payload considerations.

This unit is covered under our 1-YEAR GUARANTEE.

MODEL DESIGNATION:

- Basic unit (includes 2" travel)
- Model # FBT-a-z where a = bellows Id, z = stroke

OPTIONS:

- Three lead screw option
- Horizontal mounting pkg.
- Motor drives available

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

Unpacking

FBT Translators are shipped with 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 plastic. The bellows assembly is shipped in place protected by a 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.

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 especially important for the four or six large socket head cap screws attaching the base flange to the anodized aluminum frame and the four attaching the traveling flange to the traveling stage.

Their proper installation is critical for safe operation.

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

The standard FBT 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 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*****

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.

PAYLOAD CONSIDERATIONS

The FBT Series instruments have an 80# equipment payload for standard vertical (NOT inverted) operation. This rating is increased to 200# for the three-lead screw version. This payload is based upon the total equipment 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 6") and within 8" of the flange face.

Special models are available for special mounting and payload requirements. If your unit is such a special one, verify the unit you have is correct for the application. If not, consult the factory if your application requires:

- Payload greater than above ratings
- Center of gravity beyond above limits
- Mounting orientation other than standard vertical (angled, horizontal, inverted, etc.)

FBT translators are capable of horizontal operation only when ordered in that manner from the factory. The Horizontal mounting package includes (depending on the particular model) oversized guide rods, large limit stop, large diameter mounting flange (e.g., 10" OD), counterbalance springs, support stands/framework. Many standard models can be retrofitted, if required. The factory should be consulted on such operational changes in the field.

Adjustments

Your FBT 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:

All the linear bearings are adjustable on the FBT translators. A limited amount of preload is allowed by the bearing manufacturer, but care should be used to minimize the preload to what is necessary for the application. Excessive preload will cause rough operation and shorten the useful life of the components. The linear bearings are properly adjusted before the manipulator leaves the factory. To make this adjustment in the field requires feeling the load on each bearing under motion independently. This usually requires disassembly of the stages and removal of the drive system involved.

TRAVEL LIMIT STOP COLLARS:

Some models come equipped with stop screws attached to the Z Back or 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, replace them accurately upon re-assembly. Overextension 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.

There are approximately 5 tenths play (0.0005" effective Z travel) or less in the worm-to-worm wheel engagement. This is normal.

Anti-backlash Z drive (optional) incorporates two lead nuts with independent locks. The lower nut should be permanently locked into place. The upper nut should be rotated until all axial play is removed and locked via set screw. Perimeter holes are drilled in the upper nut assemblies to aid in this procedure.

Lubrication

All exterior bearings, micrometers, 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 on the frequency and temperature of bakeouts and operating environment.

*** WARNING ***

Additional lubricant must be added to the lead screw 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 relubricate 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:

We recommend limiting the temperature of the device (and the lubricant) to a maximum bakeout temperature of 200 C. Bakeouts of long duration (12 hours or more) should be limited to lower temperatures. We recommend 180 C maximum for long bakeouts.

Our bakeout temperatures are conservative. We find they lead to long service life and high reliability. Tear-down and re-lubrication is held to a minimum. Operation outside these parameters cannot be guaranteed.

SUMMARY:

The FBT 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 prior to bakeout.

Motorized Operation

Your translator can be motorized. Retrofit kits are available for field installation. Please consult the factory for further information.

All motors and limit switches/ position indicators must be removed prior to 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.

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

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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