Operating and Maintenance Handbook

LINEAR TRANSLATOR SHIFT (LTS)

REVISION	DATE	COMMENTS	INITIALS
1	June 1998	Original release	MJD
	Feb 2009		
2	Aug 2012	Improved gearing and mechanical support 2011	GC
		Removal of hand nut operation	
3	Aug 2015	Rebrand	

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WARRANTY

1. Subject to fair wear and tear and the due, observance of any installation user, storage, operating or maintenance instructions the Seller undertakes to replace or, at its option repair free of charge to the purchaser, any goods which the purchaser can establish are defective by reason of defective workmanship or materials which are returned to the Seller, carriage paid, within 12 months of the date of dispatch by the Seller. In the event, however, that the Seller supplies spare parts either direct, or that are fitted or installed or replaced by the Sellers' service center such spare parts will be subject to a warranty period of six months only.
2. The Purchaser cannot return any product for warranty repair without the prior approval of VACGEN and the issue of a Goods Return Number (GRN). This shall be obtained by contacting the service center at VACGEN. All returned products must be accompanied by a completed Declaration of Contamination form. Customers must, in the first instance, contact the local selling agent.
3. We reserve the right to decline to service equipment, we consider is in any way hazardous until a clearance or safety certificate, in a form satisfactory to VACGEN, has been completed and returned by the customer.

REPAIR

The following additional terms and conditions apply in the event that the customer elects to use the services of VACGEN workshop on a chargeable basis.

1. At its own cost the customer shall dispatch the equipment to the workshop, carriage paid, suitably packaged, protected and insured, bearing, a Goods Return Number (GRN)and a completed Declaration of Contamination certificate obtained from VACGEN in advance of shipment.
2. During the period that the equipment is on VACGEN premises, VACGEN will insure the equipment against all risks.
3. VACGEN will provide an acknowledgement of the receipt together with an estimate of the repair charges. Such estimates are carried out on a visual basis and are therefore intended as a guide only. Formal fixed price repair quotations are available and involve the disassembly of the equipment to determine the full extent of the work necessary to restore the equipment to an acceptable standard. In the event that the customer chooses not to proceed with the repair VACGEN will make a charge to cover this examination effort.

Note:
The above are extracts from VACGEN Conditions of sale. Complete copies can be obtained from: VACGEN, Maunsell Road, Castleham Industrial Estate St. Leonards on Sea, East Sussex, TN38 9NN, United Kingdom.

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1. INTRODUCTION

1.1 HEALTH AND SAFETY INFORMATION

This equipment is a component for use with vacuum systems. Whilst every effort has been made to eliminate hazards, its safe use is also dependent on the system to which it will be connected. The owner of the equipment must ensure that all users are aware of the Health and Safety information contained in this handbook. If the equipment is sold or passed to another owner, this handbook must he included with the equipment.
If in doubt contact VACGEN.

Warning: This equipment must be installed by qualified personnel.

Warning: It is the responsibility of the user to consider the safety requirements of hazardous materials used with this equipment and the consequence of any leakage, however caused. Consider possible reactions with materials of construction. Any equipment returned to VACGEN must have the correct Declaration of Contamination securely fastened to the outside of the packaging.

Warning: Harmful gases may be evolved if this equipment is heated to temperatures above the maximum specified bakeout temperature.

Warning: Lubricants used in this assembly may cause irritation to sensitive skin. Wear protective clothing.

Warning: Safe disposal of the equipment is the responsibility of the user.

Warning: Do not use this equipment with positive internal pressure above the specified maximum.

Warning: Equipment must be fully earthed to prevent dangerous electrostatic charge build-up.

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1.2 GENERAL

The Linear Translator Shift (LTS) is a stable, bellows sealed device that is designed for moving probes in and out of vacuum systems. It may be used in any orientation, although vertical mounting allows higher payload capacity (see section 2.1.3). The LTS is either manually driven, or motorized through a reduction worm gear, with the travelling flange motion provided by three equally spaced drive shafts and mating nuts, which are synchronously driven by a continuous stainless steel chain. Precision guide shafts provide additional alignment and support.

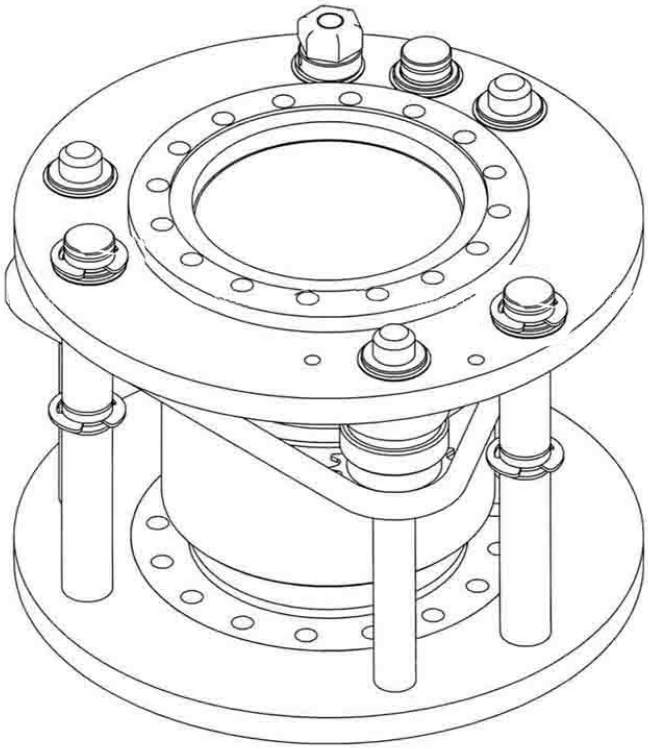

Figure 1- Linear Translator Shift (LTS)

1.3 PRODUCT RANGE AND DIMENSIONS

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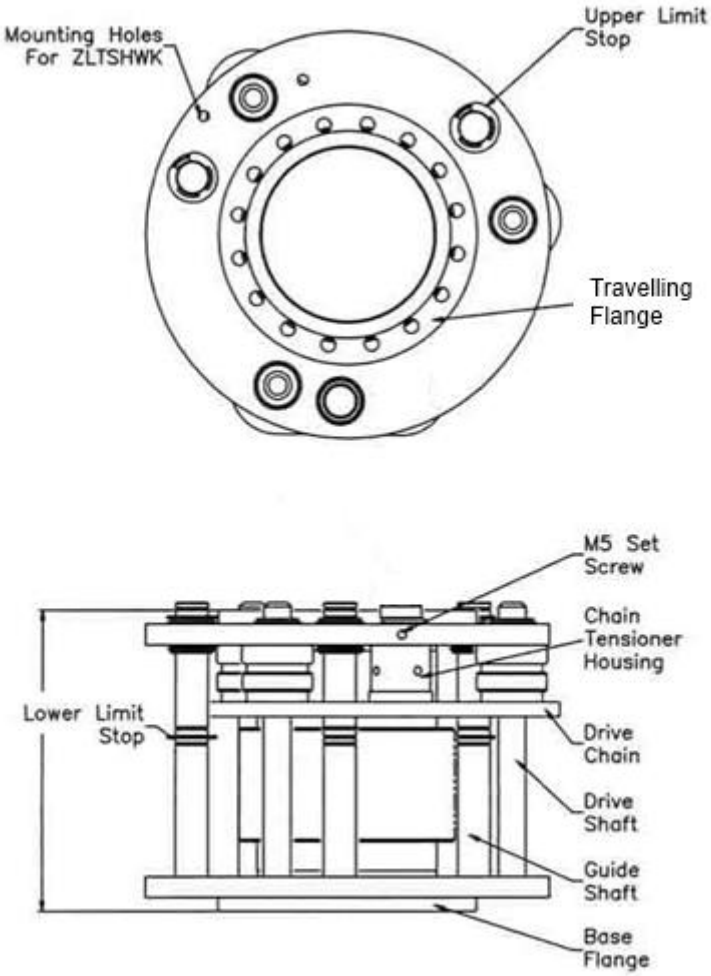

Figure 2 - LTS Features

Model	Travel	L Extended	L Compressed	Clear Bore	Base & Travelling Flanges
LTS0405	50	175	125	68	NW63CF
LTS0410	100	240	140	68	NW63CF
LTS0605	50	175	125	101	NW100CF
LTS0610	100	240	140	101	NW100CF
LTS0615	150	305	155	101	NW100CF
LTS0620	200	365	165	101	NW100CF
LTS0625	250	430	180	101	NW100CF
LTS0805	50	175	125	152	NW150CF
LTS0810	100	240	140	152	NW150CF
LTS0815	150	305	155	152	NW150CF
LTS0820	200	365	165	152	NW150CF
LTS0825	25	430	180	152	NW150CF

1.4 SPECIFICATIONS

Bake out:
230°C (446°F) without dismantling.

Drive:
Manual hand wheel / gear reduction kit ZLTSHWK (One revolution gives 0.4mm travel).

Travel Limits:
Travel stops at maximum and minimum limits of motion.

Materials of Construction:
Steel, stainless steel, aluminium bronze and phosphor bronze. All materials in the vacuum envelope are stainless steel.

1.4.1 Accuracy

	Manual		Motorised*	
Motion	**Resolution**	**Repeatability**	**Resolution**	**Repeatability**
Z (Handwheel)	10 microns	20 microns	10 microns	10 microns

* Motor specifications apply to VACGEN motor controllers only.
Using stepping motor ½ steps, approximately 1 micron resolution / repeatability can be expected initially (this may degrade over time due to wear).

2. INSTALLATION

2.1 UNPACKING INSTRUCTIONS

Warning: This device is heavy; take care when lifting the translator from its packaging. Carefully inspect the translator for visual signs of damage. The packaging is designed to withstand shook and vibration but some of the fixings may have become loose, more especially with air freight shipment, all parts should be secure and there should be no 'play' in the movement.

Any damage in transit should be reported to the carrier and VACGEN at Hastings or your local agent, within three days.

2.1.1 General

Consideration must be given to the loading imposed to the vacuum vessel and any other devices by the translator, especially if mounting horizontally (see section 2.1.2).

Before mounting equipment to the traveling flange, lower the traveling flange so it is as close as possible to the base flange. Care should be taken to avoid large torsional loading imposed by tightening bolts: the bolt tightening operation should then be carried out whilst applying an equal and opposite torque to the tightening torque.

2.1.2 Orientation

The LTS may be mounted either horizontally or vertically. When mounted horizontally, the LTS is self supporting over the full extended length, but there is a limit on the load that can be carried on the traveling flange (see

section 2.1.3). In general, all loads carried on the traveling flange when the LTS is other than vertical, should be separately and individually supported. If in doubt, consult VACGEN.

2.1.3 Load Carrying Capacity

Vertical Load
The payload, W, represents the maximum weight that can be mounted to the LTS in the vertical mounting orientation and it is dependent on the offset, V, from the main axis of the translator. Where shock loads or vibrations are present in the system, the load must be reduced from the maximum stated value.

W can be determined from the following formula.
W = A/B+V where A and B are constants for each LTS model (see table)

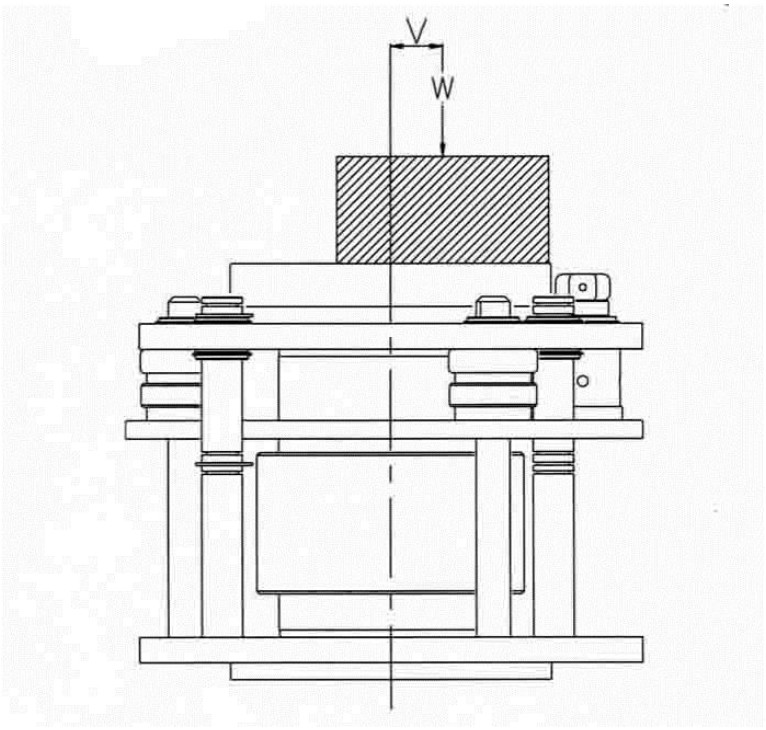

Figure3 - Offset vertical load moments

Note that all units are in newtons (N) and millimeters (mm)

			Example 1		Example 2		Example 3	
Model	**A**	**B**	**V(mm)**	**W(N)**	**V(mm)**	**W(N)**	**V(mm)**	**W(N)**
LTS04	79235	40	0	1990	25	1220	50	880
LTS06	75111	49	0	1550	25	1020	50	760
LTS08	18417	62	0	300	25	212	50	164

Conversion factors: 1kg = 2.22lb = 9.8N

Horizontal mounting

The amount of weight, W, that can be supported is dependent on the distance of the center of mass of the load from the base flange, H. Horizontal loads should always be supported independently to improve rigidity.

W can be determined from the following formula.
W = A/B+V where A and B are constants for each LTS model (see table)

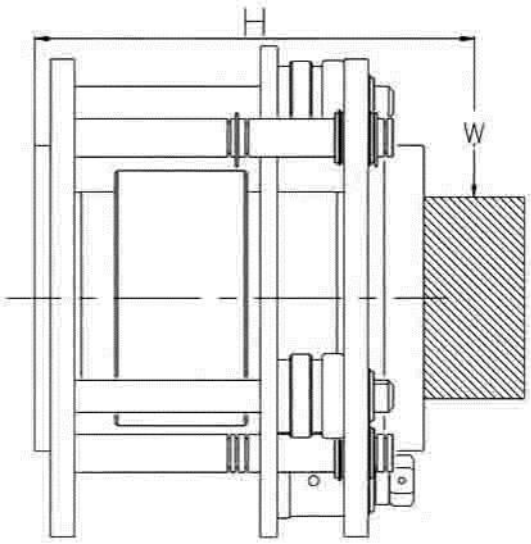

Figure 4 - Horizontal load moments

Note that all units are in newtons (N) and millimeters (mm)

		Example 1		Example 2		Example 3	
Model	**H x W max**	**H(mm)**	**W(N)**	**H(mm)**	**W(N)**	**H(mm)**	**W(N)**
LTS04	25000Nmm	240	104	340	74	440	57
LTS06	38000Nmm	430	87	530	71	630	60
LTS08	50000Nmm	430	116	530	94	630	79

Conversion factors: 1kg = 2.22lb = 9.8N

3. OPERATION

3.1 NORMAL USE

Manually the LTS is extended or retracted by means of a worm drive reduction unit operated via handwheel (part code ZLTSHWK assembly available separately). One full turn of the worm drive hand wheel gives 0.4mm of linear travel. This may be attached to the LTS unit using two M6 cap head screws as shown in figure 5.

Alternatively the LTS can be extended or retracted by means of a stepper motorized worm drive reduction unit (part code ZWBMOTZ assembly available separately).

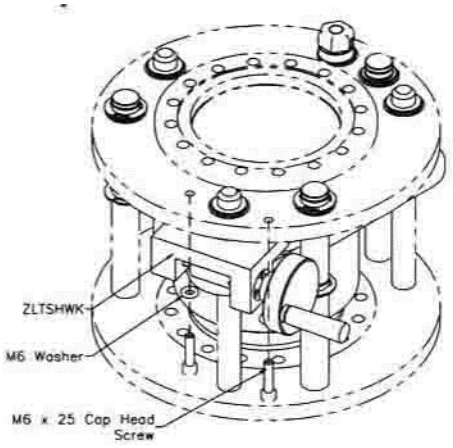

Figure 5 - Attaching ZLTSHWK to the LTS

3.1.1 Important information
Warning: Keep clear of moving parts

The unit must be correctly installed, and the information above followed carefully.
Periodic routine maintenance is required. See section 4.1

3.2 Bakeout
The LTS is bakeable to 230^{o}C (446^{o}F) without dismantling with or without the hand wheel kit attached. Bakeout limitations of instrumentation used on the LTS should be observed.

After baking it is advisable to operate the manipulator over the full range of travel. Adjust and lubricate if necessary (see section 4.1).

3.2.1 Bakeout guidelines
Warning: Harmful gases may be evolved if this product is heated above the Maximum specified bakeout temperature.

* Heater tape should be avoided as this can cause local hot spots.
* All temperature sensors must be suspended above the unit and within the bakeout zone and must not touch any part of the equipment as this will give a false result that will cause overheating.

4. MAINTENANCE

4.1 ROUTINE MAINTENANCE

It will be necessary to lubricate all shafts and other mating parts periodically. The frequency will depend on usage and will be increased if the device is baked often. It is essential to re-lubricate when the motion appears to require more effort to operate than previously experienced. Lubrication details are given in section 4.1.1.

4.1.1 Lubrication

Warning: Lubricants used in this product may cause irritation to sensitive skin. Wear protective clothing. Wash with warm soapy water.

Note that Carbaflo grease discolours with time, particularly where regular bakeouts are applied to the equipment. This is normal and does not affect the behavior of the lubricant.

Warning: Keep clear of moving parts.

ITEM	LUBRICANT	COMMENTS
Drive & Guide Shafts	Carboflo Grease	Liberally cover the screw and rod surfaces and drive the full travel.
Chain	Carbaflo D fluid	Apply sparingly
Drive Shaft Nut Bearings, Tensioner and Wormdrive Bearings	Carbaflo D fluid	Lubricate sparingly when necessary only
Hand Wheel Worm Gears	Carboflo Grease	Lubricate frequently. Apply sparingly over all surfaces
Remove excess.		

4.2 CORRECTIVE MAINTENANCE

The drive chain may need occasional adjustment and should be checked after bakeout. The chain should be relatively tight and have a free movement of no greater than 5 mm when measured at the centre of the greatest span. To adjust the chain it is necessary to insert a suitable 5 mm drill shank or rod into one of the holes in the chain tensioner housing. The M5 set screws in the side of the moving flange can now be released and the tensioner housing can be slightly rotated to tension the chain. The set screw is now tightened to lock the tensioner (see figure 2).
Further adjustment should not be necessary other than a periodic check that none of the screw fixings have slackened off, due perhaps to prolonged baking or use. All screws should be secure - neither too slack nor excessively tight.
A factory servicing scheme exists for all translators. The translator should be returned (with details of hazardous materials, if used) to VACGEN factory with a covering order. The servicing scheme includes the following-

* Complete strip down
* Cleaning
* Relubrication
* Reassembly

When shipping the unit use the original packing and pack with care to avoid expensive transit damage.

5. SPARES AND ACCESSORIES

5.1 GENERAL

Hand Wheel Kit: ZLTSHWK is a worm drive reduction unit available to provide a more accurate drive.

Gaskets: The large selection of gasket types shown below is available for standard CF flange sizes.
* Super quality copper (CU series)

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* Commercial user copper (CUC series)
* Blank copper gaskets (CUB series)
* Annealed high quality copper (CUA series)
* Silver plated copper (CUSP series)
* Viton (VIT series)
* Aluminium (AL series)

Nut, Bolt and Washer sets: Metric sets are available for most flange combinations. Please contact VACGEN for more information.

Tool kit: ZTOOLK for general use. Includes a wide range of spanners and ball-ended hexagon keys, circlip pliers, small screwdriver and nylon gloves.

Lubrication kit: ZLUBEK for general use. Includes high temperature grease and. lubricant, non-ozone depleting solvent, thread lubricant and nylon gloves.
For other parts, please contact VACGEN with your model type and serial number, stating requirements clearly.

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Service and Repair Form

Declaration of Contamination of Equipment and Components

Serving and repairs will only be carried out if the conditions for Servicing and Repair are complied with in full, according to the VACGEN Ltd. Conditions of Sale. A summary of these requirements are included on the inside front cover of the Operating Instructions. The manufacturer will refuse to accept any equipment without a signed declaration attached to the OUTSIDE of the packaging. This declaration can only be completed and signed by authorized and qualified staff.

1 Description of Equipment and Components

Equipment Type……Model Number……
Serial Number…… Your Reference Number……

2 Reasons for return……
……
……
……
……
……
……
……

3 Condition of Equipment

YES ( ) NO ( ) Toxic?
YES ( ) NO ( ) Explosive?
YES ( ) NO ( ) Radioactive?
YES ( ) NO ( ) Corrosive?
YES ( ) NO ( ) Biological Hazard?
YES ( ) NO ( ) Other Harmful Substances?

Equipment and Components that have been contaminated, WILL NOT be accepted without written evidence of decontamination.

5 Contamination Materials

List all the substances, gases and by-products that may have come in contact with the equipment, giving trade name, manufacture, chemicals names or symbols.
Please note that any of these listed, must be completely removed, so it is safe to handle and weld, without giving off health threatening gases. Please enter details below and/or attach data sheets
……
……
……

6 Legally Binding Declaration

I hereby declare that the information supplied on this form is complete and accurate.
There by stating that the goods offer no risk to health or safety
Organisation…… Name……
Country…… Job Title……
Post/ZIP code…… Telephone……
Email……
Signature…… Date……

Return goods to: Address at top
Phone: (0) 1424 851291 Fax (0) 1424 851489 (Form VGF33)