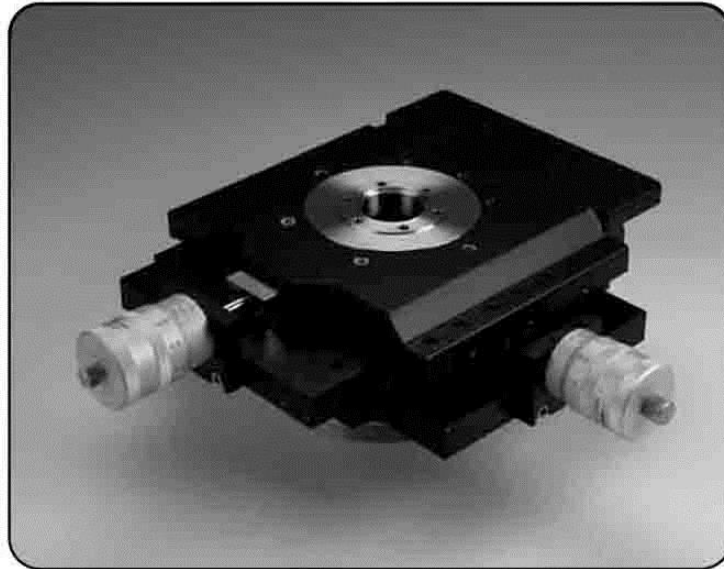


Operating and Maintenance Handbook

XY TABLES ZT105, ZT108, ZT208, ZT211



REVISION	DATE	COMMENTS	INITIALS
1	June 1997	Original release	MJD
2	Aug 2015	VACGEN rebrand	AJL

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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. Vacuum Generator 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.

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, it's safe use is also dependant 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 be 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.

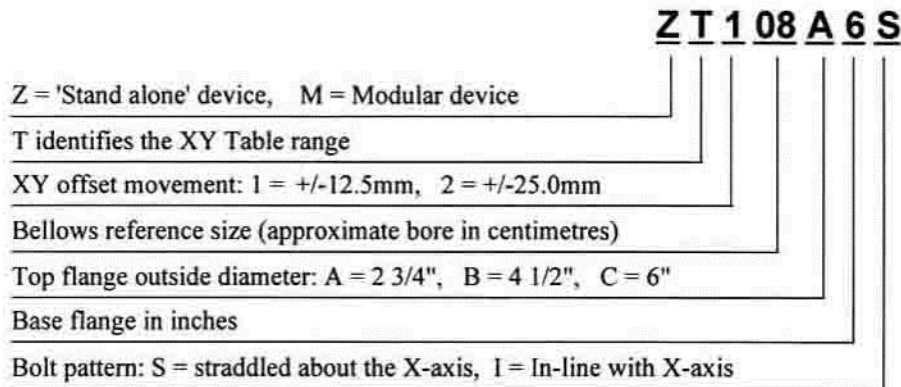
Warning: It is the responsibility of the user to fit emergency stops to automated equipment.

Warning: Keep clear of moving pans.

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

1.2 PRODUCT CODES

An eight code digit code uniquely describes each variant. For simplicity, the part codes are reduced in the text of this handbook to the basic table reference and bellows reference, i.e T105, T108, T208, T211. The full code is explained in the following example.



1.3 PRODUCT RANGE AND DIMENSIONS

For XY movement = $\pm 12.5\text{mm}$:						
Full Product Code	Top flange	Base flange	Base flange holes	Bellows bore	Probe diameter	Height A2
ZT105A2S	NW40CF	NW40CF (2.75")	Tapped M6	41	16	114
ZT105A6S		NW100CF (6")	$\text{\O}8.4$	44	19	114
ZT108A6S		NW100CF (6")	Tapped M8	85	40	135
ZT108B6S	NW63CF	NW100CF (6")	Tapped M8	85	58	135
ZT108B8S		NW150CF (8")	$\text{\O}8.4$	85	58	135
ZT108C6S	NW100CF	NW100CF (6")	Tapped M8	85	60	135
ZT108C8S		NW150CF (8")	$\text{\O}8.4$	85	60	135
For XY movement = $\pm 25.0\text{mm}$:						
ZT208A6S	NW40CF	NW100CF (6")	Tapped M8	85	35	167
ZT208B6S	NW63CF	NW100CF (6")	Tapped M8	85	35	167
ZT208B8S		NW150CF (8")	$\text{\O}8.4$	85	35	167
ZT211B6S		NW100CF (6")	Tapped M8	108	58	175
ZT211B8S		NW150CF (8")	$\text{\O}8.4$	108	58	175
ZT211C6S	NW100CF	NW100CF (6")	Tapped M8	108	58	175
ZT211C8S		NW150CF (8")	$\text{\O}8.4$	108	58	175

Table 1 - Range of XY Tables (Dimensions in mm unless otherwise stated)

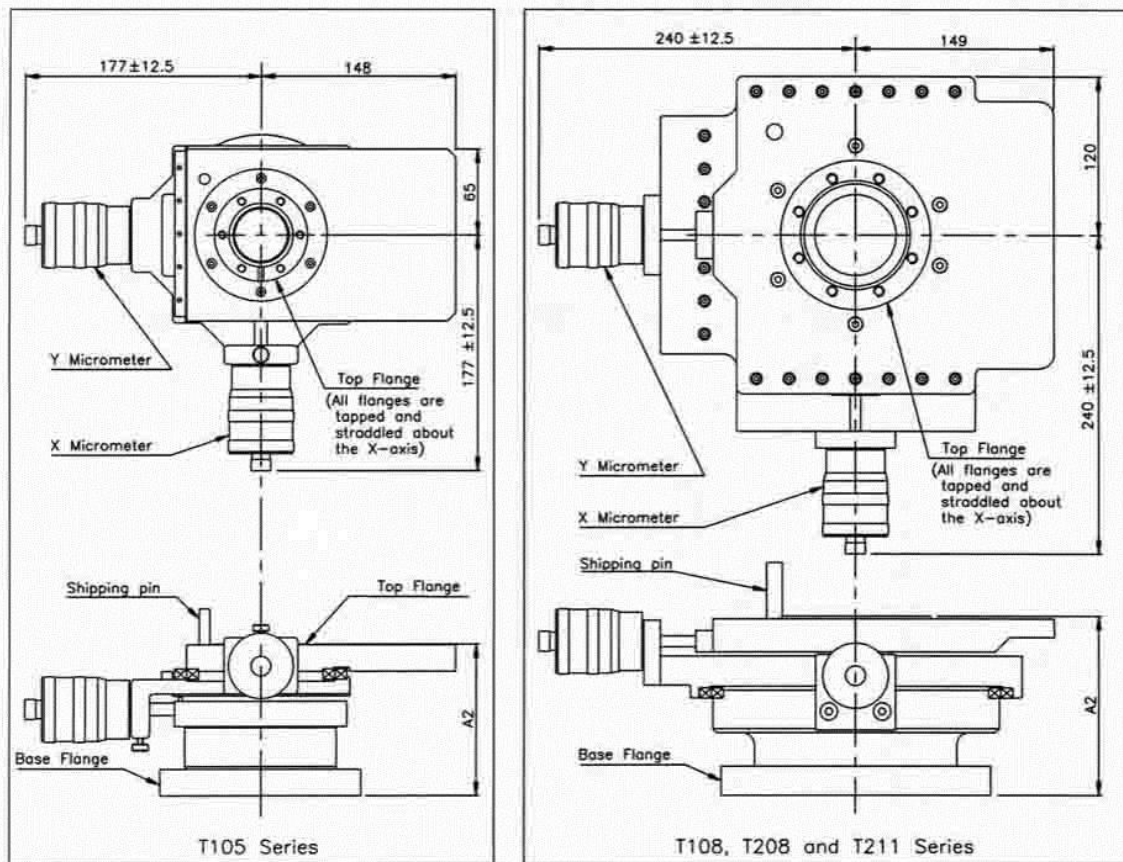


Figure 1 - Basic dimensions (mm)

1.4 SPECIFICATIONS

Movement limits: The XY movement, or offset from the central position, is limited by the vectorial sum of the X and Y motions, i.e. $\sqrt{X^2 + Y^2}$. If the probe diameter is greater than the limit given in table 1, then the travel must be restricted. The available movement with a bellows bore, B, and probe diameter, P is given as: $\pm XY = 0.5(B-P)$. For example, a ZT105A2S fitted with a probe of diameter 20mm will have a maximum vectorial movement of +10.5mm. Exceeding these limits can permanently damage the unit.

Table 2: Examples of Vectorial limits (in millimetres)

For $\pm 12.5\text{mm}$,	Xmax =	12.5	10	8.8	5	3
	Ymax =	0	7.5	8.8	11.4	12.1
For $\pm 25\text{mm}$,	Xmax =	25	20	17.6	12	3
	Ymax =	0	15	17.6	21.9	24.8

Pressure range: UHV to atmospheric pressure.

Bake out temperature: 230°C maximum.

Working temperature: 55°C maximum.

Environment: This equipment is intended for use in clean, dry environments. For use in alternative conditions, please contact Vacuum

Generators Technical Sales.

Motors.. All XY tables can be fitted with stepper motors. These are normally supplied with flying leads and microswitch limit stops as standard.

Table 3 - Accuracy

Basic code	Manual		Motorised*		
	Resolution	Repeatability	Resolution	Repeatability	Typical max. speed
T105	5 microns	5 microns	2.5 microns	5 microns	2.5mm/s
T108	5 microns	5 microns	0.5 microns	1 microns	4mm/s
T208	5 microns	5 microns	0.5 microns	1 microns	4mm/s
T211	5 microns	5 microns	0.5 microns	1 microns	4mm/s

* Motor specifications apply to Vacuum Generators motor controllers only.

Orientation: Any.

Table 4: Payload limits

Basic code	Max. vertical loading [†]	Max. horizontal loading [‡]
T105	82kg	17kg
T108	130kg	25kg
T208	130kg	25kg
T211	72kg	25kg

[†] The maximum vertical load is in addition to vacuum loading and must act on the center of the top flange. For loads that are offset from the center this must be reduced. For example an offset of 60mm will reduce the load to approx 50% of the maximum.

[‡] If more than 5 kg is applied to horizontally mounted units, the correct gravity compensation must be fitted. Additional limits on load position apply. See section 2 for installation and limitations.

1.5 MATERIALS OF CONSTRUCTION

All units are manufactured mainly from stainless steel or aluminum alloy. Stainless steel is used for parts that form the vacuum envelope. The guidance bearings use cross roller guide rails made from bearing steel and lubricated with high temperature 'Carbaflo' grease or fluid. The micrometers are conditioned for bakeout to 230°C. Motors contain non-bakeable plastic and must be removed for bakeout. Screw threads are treated with ZTL thread lubricant.

2. INSTALLATION

2.1 UNPACKING INSTRUCTIONS

- a. Remove the unit from the packaging and retain the packaging if possible.
- b. Check for signs of damage and report problems to the carrier AND to VACGEN within three days of receipt.
- c. Experience has shown that some loosening of screws is possible during transit. Tighten any loose fixing screws. Note that some micrometer barrels are intentionally loose and that motors are shipped separately.

2.2 GENERAL

- a. Bolt the XY Table to the system flange using the correct size bolts and gaskets as indicated below. For tapped flanges use a thread lubricant, such as VACGEN ZTL on the bolt threads. Use washers under bolt heads or nuts.

Table 5 - XY Table flange details

Flange Size:	NW40CF (2.75" OD)	NW63CF (4.5" OD)	NW100CF (6" OD)	NW150CF (8" OD)
Gasket size (VG ref.):	ZCU38	ZCU64	ZCU100	ZCU150
Tapped holes:	M6	M8	M8	M8
Clearance holes (mm):	O6.8	O8.4	O8.4	O.84

- b. The top mounting plate has a number of holes that can be used to help mount equipment to the top unit. Refer to Table 4 for maximum payload limits.
- c. Install equipment to the top flange, using the same guidelines as the base flange.
- d. Fit and adjust the micrometers or motors as described in the sections below.

2.3 MICROMETER INSTALLATION

Caution: Do not operate the stage unless the shipping pin is removed.

Caution: Note the vectorial limits of travel as given in the 'Product Range' section of the introduction. Exceeding these limits can permanently damage the bellows. There are NO stops fitted to restrict vectorial movement.

Some micrometers may be supplied with the barrels intentionally loose in the housing. With the shipping pin in position, adjust the micrometers to read the central position of the stage. The graduated thimble can be rotated to 'zero' the scale. Tighten the clamp and remove the shipping pin for use.

2.4 MOTORS

2.4.1 Motor installation (T105 tables) (Refer to fig.2)

Warning: It is the responsibility of the user to fit emergency stops to automated equipment. (Note: VACGEN stepper motor controllers have a facility for adding emergency stops.)

- Motor wiring details are given in Appendix A.
- Rotate each motor so that the single screw on the shaft coupling is in line with the access hole in the motor housing.
- The flat on the lead screw that protrudes from the stage will also need to be aligned with the single screw on the motor shaft coupling. Rotate the lead screw to achieve this condition.
- The motor housing must fully enter the bore so that the shoulder makes contact. If it is prevented from entering to this depth, the lead screw should be screwed in, one full revolution at a time, until this can be achieved. If the lead screw is tightened too far, the coupling may not have enough length of engagement.
- Once the motor housing and shaft coupling are in correct alignment, both axially and radially, tighten the motor housing retaining screw and then tighten the coupling screw against the flat of the lead screw.
- Mark the motors to identify the correct location for future use.

Caution: Do not operate the stage unless the shipping pin is removed.

Caution: Note the vectorial limits given in the 'Specifications' section of the introduction. Exceeding these limits can permanently damage the device. There are NO stops fitted to restrict vectorial movement

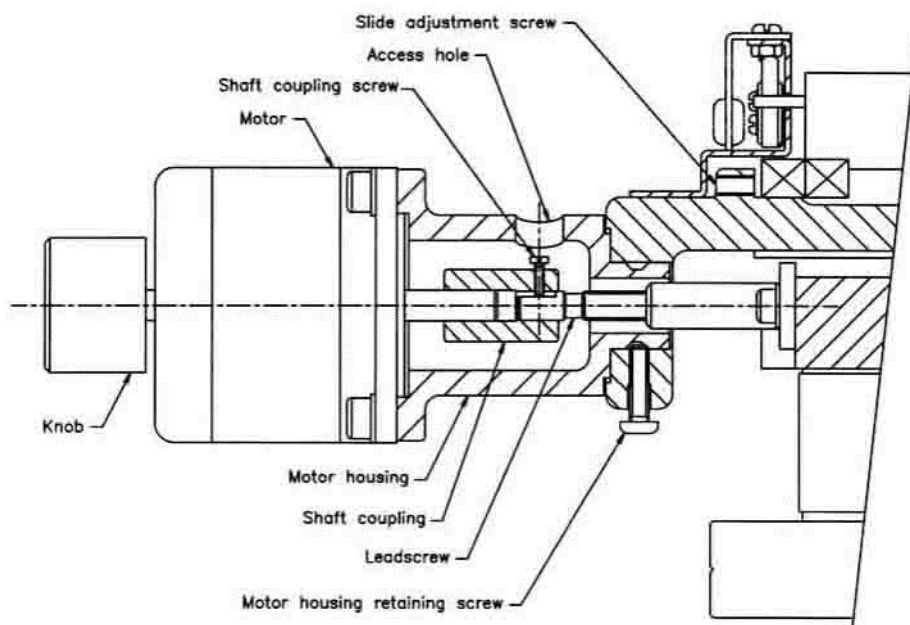


Figure 2 - Motor on T105 Table

2.4.2 Motor installation (T108, T208 and T211 tables) (Refer to fig.3)

Warning: It is the responsibility of the user to fit emergency stops to automated equipment. (Note: VACGEN stepper motor controllers have a facility for adding emergency stops.)

- Motor wiring details are given in Appendix A.
- Bolt the stainless steel block and lead screw assembly to the slide.
- Screw the anti-backlash assembly onto the lead screw.
- Carefully fit the main mounting block over this assembly. Secure the anti-backlash assembly by tightening the single lead screw, located under the plate, against the central spacer. It may be necessary to unscrew the anti-backlash assembly to achieve this.
- Rotate the anti-backlash assembly so that the mounting block is within 1 mm of the side of the XY Table. (Tip: The pulley can be turned around and used as a convenient handwheel.)
- Remove the shipping pin and loosen the stainless steel block holding the lead screw.
- Bolt the mounting block to the side of the Table using 3 x M6 bolts.

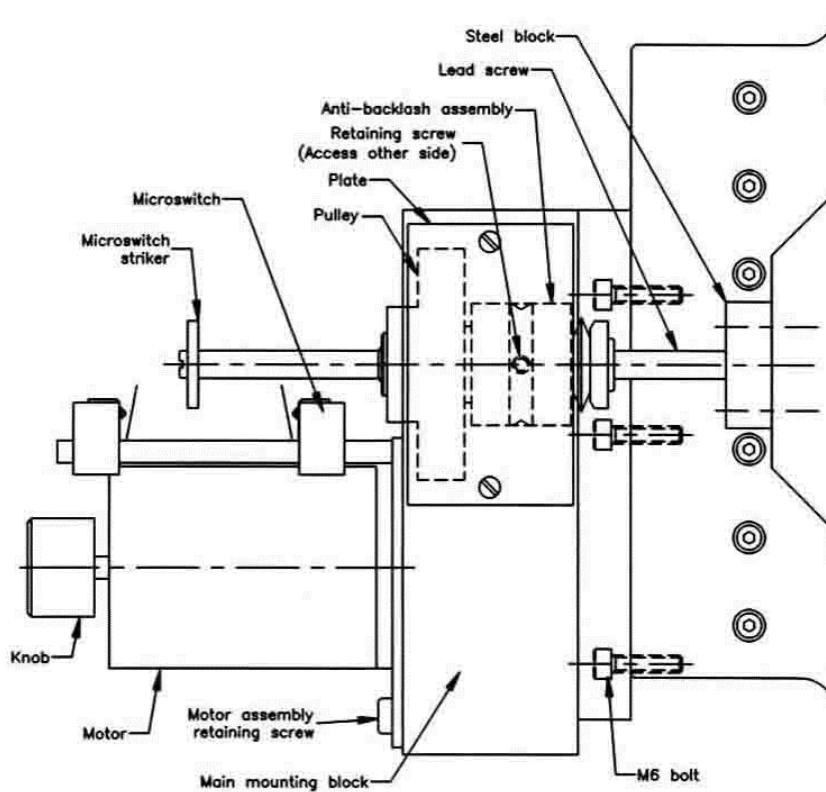


Figure 3 - Motor on the T108, T208 and T211 tables

- h. Tighten the lead screw mounting block and cheek that the anti-backlash assembly can rotate freely. If the rotation is stiff, some angular misalignment between the main mounting block and the side of the table may be visible when the M6 bolts are just loosened. If this is the case, thin shims can be fitted between to correct this.
- i. Fit the pulley.
- j. Ensure that both plates are secured to the sides of the mounting block.
- k. Position the drive belt and use the three pan head screws to fit the motor assembly. Before tightening the screws, slide the assembly away from the lead screw to remove slack from the drive belt. Note: the belt need not be under tension.
 - 1. Rotate the motor manually until the shipping pin can be repositioned. This indicates the central position of the stage.
- m. Mark the motors to identify the correct location for future use.

Caution. Do not operate the stage unless the shipping pin is removed

Caution: Note the vectorial limits given in the 'Specifications' section of the introduction. Exceeding these limits can permanently damage the device. There are NO stops fitted to restrict vectorial movement

2.4.3 Setting the microswitches

(All motorised XY Tables)

- a. Remove the shipping pin.
- b. Switch off any power to the motors. Use the manual knob to move either motor from the central position to either limit of travel.
- c. Loosen the limit protection microswitch and adjust its position until the switch can be heard to operate (click) at the limit position. Repeat for the other limit of travel.
- d. Return the first motor to the central position before attempting to set the second pair of microswitches.

Caution: Do not use microswitches as position indicators or datum markers.

Caution: Microswitches do not protect against vectorial limits unless they are set to the 45° vector, i.e. $X=Y=8.8\text{mm}$ for $\pm 12.5\text{mm}$ stages, or $X=Y=17.6\text{mm}$ for ± 25.0 stages. For applications without the support tube, the top flange must be held solidly in place by tightening the M4 set screw (1).

2.5 HORIZONTAL MOUNTING

All XY tables in this range can be mounted horizontally. If the payload exceeds 5 kg, the vertical micrometer or motor will become more difficult to operate and life expectancy will suffer. Gravity (or horizontal) compensation springs are available to relieve the loading. Compensation springs can be supplied with different numbers of spring leaves to support a range of loads, as shown in Table 6. The orientation of the table is as shown in figure 4 below.

Note that the chamber flange must still support the full weight of the XY Table plus the payload.

Basic code of XY table	Basic code of spring compensator	Load options (kg)	Number of springs	Max. centre of gravity offset* (mm)
T105	ZT05HC	7	2	215
		12	6	125
		17	8	85
T108, T208 & T211	ZT08HC	7	2	285
		12	3	165
		16	4	125
		21	5	95
		25	6	80

Table 6 - Horizontal compensation information

* To prevent damage to the slide bearings, the centre of gravity offset must not exceed the limit. Special compensators are possible for such arrangements, such as the ZHSA compensator. Please contact VACGEN Technical Support.

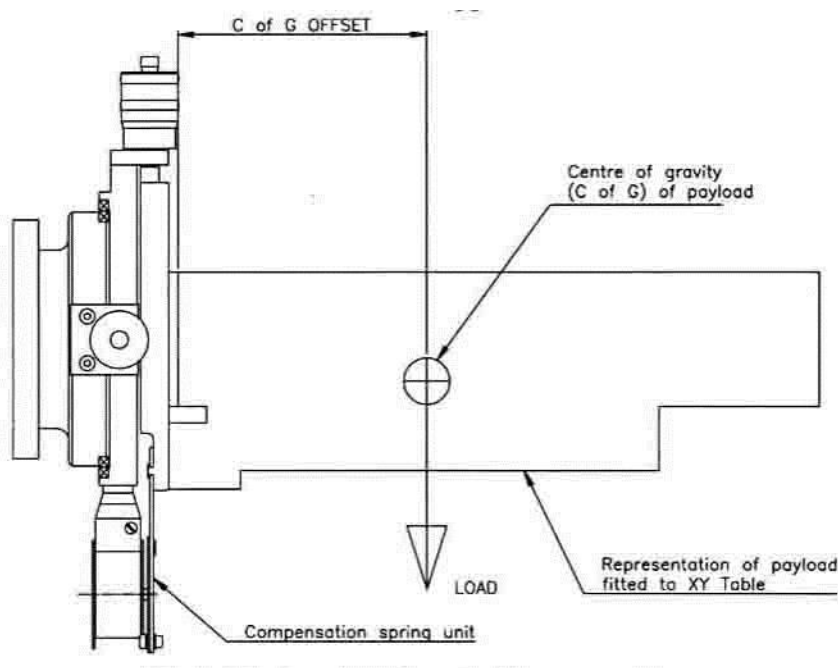


Figure 4 - Horizontal Gravity Compensation

3. OPERATION

3.1 NORMAL USE

3.1.1 Important information

Warning: Keep clear of moving parts.

Caution: Note the vectorial limits given in the 'Specifications' section of the introduction. Exceeding these limits can permanently damage the device. There are NO stops fitted to restrict vectorial movement

Caution: Where the motor is fitted, the motor connector must not be disconnected unless the power to the drive has first been switched off. Allow a few seconds for the circuits to discharge.

Caution. Do not operate the stage unless the shipping pin is removed

Caution: The XY Tables are precision mechanisms. Care should be taken to avoid undue strain for example clashes with fixed objects, exceeding the vectorial limit, overloading the top flange, or leaning on the equipment.

3.1.2 Operation

- The unit must be correctly installed, and the information above followed carefully.
- Manual operation is straightforward and needs no special consideration.
- Operation with the stepper motor is dependent on the motor controller used, and the user should refer to the controller instructions.
- If any movement becomes tight or if backlash (play) becomes visible, the unit will require maintenance. Refer to section 4.
- Periodic routine maintenance is required. See section 4.1.

3.2 BAKEOUT

3.2.1 Manual XY Tables

Centralise the X and Y axes and follow the bakeout guidelines listed below. It is not necessary to remove the micrometers.

3.2.2 Motorised T105 Tables

- a. Centralise the X and Y axes and fit the shipping pin.
- b. For each motor, loosen the single shaft coupling screw visible through the motor housing.
- c. Loosen the screw which retains the motor housing and remove the unit.
- d. Remove the microswitches and all cabling from the bakeout zone.
- e. Follow the bakeout guidelines listed below.

3.2.3 Motorised TIOS, T208 and T211 tables

- a. Centralise the X and Y axes.
- b. For each motor, remove the three screws securing the motor mounting plate.
- c. Remove the motor, microswitches, drive belt and all cabling from the bakeout zone.
- d. Follow the bakeout guidelines below.

3.2.4 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.
- * Centralise the XY table and remove all non-bakeable equipment from the bakeout zone.

4. MAINTENANCE

4.1 ROUTINE MAINTENANCE

4.1.1 Inspection schedule

The following inspections and procedures should be performed after 150 to 200 hours of accumulated bakeout.

4.1.2 Gravity compensation springs

(Horizontally mounted units only):

Warning: The spring compensators are pre loaded and have sharp edges. Do not attempt to dismantle.

- a. Visually inspect the springs to check that no spring leaves have broken. Any broken springs must be replaced as soon as possible. Contact VACGEN Service Department for information.
- b. Check that the springs correctly support the payload by manually operating the vertical (Y) micrometer (or motor). It will be possible to find a position where the resistance to raising the stage is the same as the resistance to lowering it. This is the neutral position.
- c. Check that the neutral position is within 5mm of the central position. If the neutral position is beyond this limit, the compensator is not balanced, and action is required to correct it. Contact VACGEN Service Department for information.

4.1.3 Micrometer or motor stiffness

- a. Compare the action of the X and Y drives by hand operation at the neutral position (see above to establish the neutral position). Both movements should feel smooth and have the same degree of stiffness. If a movement is believed to be stiffer than normal, proceed as follows:
- b. Loosen (but do not remove) the screw(s) that secure the micrometer or motor housing to the XY table. Repeat the check for stiffness.
- c. If the drive is now significantly smoother or less stiff than previously, the slides may have loosened or the drive may be misaligned with the XY table.
- d. Check for loosened slides as indicated in section 4.1.5
- e. Check for misalignment on T108, T208 or T211 units by observing the gap between the micrometer (or motor) and the housing when the bolts are just loosened. An uneven gap indicates misalignment. This can be rectified by fitting thin sheet or foil between the housings at the correct position to eliminate misalignment.
- f. If the drive remains stiff, this may be due to incorrect lubrication, wear of the drive, or damage.

4.1.4 Lubrication

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

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.

- a. Micrometers: Move one micrometer at a time to the limit position so that the spindle is retracted. Unscrew and remove the small knurled knob that retains the micrometer thimble. Pull the thimble away. Apply Carbaflo grease to the lead screw. Replace the thimble and knob.

b. T105 motors: Centralise the X and Y movements and fit the shipping pin. Remove the motor as stated in the bakeout instructions. Carefully note the axial and angular position of the shaft protruding from the XY table. Unscrew this and lubricate the lead screw with Carbaflo grease.

Replace the lead screw and return it to the original position.

c. T105, T208 and T211 motors: Drive the motor to either limit of travel, periodically stopping to lubricate the lead screw as it becomes visible on either side of the anti-backlash assembly.

Warning: Keep clear of moving parts.

d. Slides: Use a small quantity of Carbaflo fluid to lubricate the slide. Apply using a dropper or by dipping a thin shaft into the container and allowing it to drip onto the exposed slide. Note that it is not possible to lubricate the full length of the slide, but by cycling the movement a few times, the lubricant will be adequately dispersed.

4.1.5 Adjustment of the XY slides

a. Check the slide for play when the unit is not under vacuum. Loosen (but do not remove) the screws that hold the micrometers or motors to the XY table.

b. Hold one corner of the top plate, beside the end of the slide bearing, and try to pull it away from the chamber.

Warning: It is important to apply an opposing force to the chamber to prevent any risk of it moving or being strained. If any movement can be detected, it will be desirable to adjust the slides to remove play.

c. To remove play, the XY tables are fitted with three adjustment screws in a row on one side of each pair of slides. These adjustment screws are located on the micrometer (motor) brackets of the smaller T105 table. On the larger T108, T208 and T211 tables, the X slide adjustment screws are located below the Y axis micrometer (or motor). The Y adjustment screws are on the side of the top plate, on the same side as the shipping pin.

d. Before adjusting these three screws, it is first necessary to loosen the screws which retain the bearing closest to the adjustment screws.

e. Check that the roller cage between the slides is centrally positioned along the length of the slide.

f. Do not over tighten the adjusting screws. They should be just finger tight. Then tighten the bearing screws.

4.2 CORRECTIVE MAINTENANCE

4.2.1 Bellows and flange assembly

All units have a welded assembly that includes both the flanges and the bellows. The unit must be taken off the system before this assembly can be removed.

a. T105 stages:

Remove the top (NW40CF) (2.75") flange by removing the six screws around its periphery. This holds a retaining wire ring which can be withdrawn to release the flange. If the base flange is also an NW40CF, the method of removal is identical.

For NW100CF (6") base flanges, the stage will need to be partially dismantled.

- Loosen the three slide adjustment set screws for the X axis (refer to section 4.1.5)
- Remove the screws which secure the bearing that is in contact with the adjustment screws. The table can then be separated at the X slide.
- Unscrew the ten large cap head screws now exposed to allow the bellows unit to be removed.

- When refitting the slides, ensure that the rollers between the bearing slides are central. Adjust the slides as outlined in section 4.1.5

b. T108, T208, T211 stages:

Remove the top flange by removing the screws around its periphery. Remove the twelve screws that retain the spinning to the lower slide housing. The assembly can then be removed.

4.2.2 Removal of micrometers

± 12.5mm micrometers: Fit the shipping pin. Remove the two screws which secure the spindle coupling to the slide. Loosen the screw that retains the micrometer barrel and pull the micrometer away carefully.

± 25.0mm micrometers: Fit the shipping pin. Loosen the screw that retains the micrometer barrel. Carefully remove the two screws that retain the small steel block to the slide. Important: This block should not be allowed to separate from the spindle until the unit is out of the table as the split retainer may become dislodged. Note also the spring washers fitted over the screws and positioned between the steel block and slide.

4.2.3 Removal of motors

Refer to section 2.4 (Installing the motors) for guidance. Removal is a reversal of the installation.

5. SPARES AND ACCESSORIES

5.1 GENERAL

Gaskets: The large selection of gasket types shown below is normally available from stock for standard CF flange sizes. Please contact VACGEN for more information.

- * Super quality copper (CU series)
- * 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
Lubrication kit: ZLUBEK

5.2 T105 TABLES

X axis motor: MT05X
Y axis motor: MT05Y
Horizontal compensation: ZT05HC
Shipping Pin: XPIN001

5.3 T108, T208, T211 TABLES

X axis motor:	MT08X
Y axis motor:	MT08Y
Horizontal compensation:	ZT08HC
Shipping pin:	XPIN002

Most component parts including bellows assemblies can be supplied as spares. Please contact VACGEN with your model type and serial number, stating requirements clearly.

APPENDIX A. STEPPER MOTOR CONNECTIONS

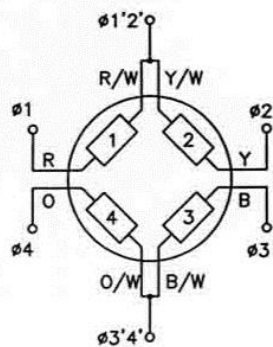
A1. OVERVIEW

Motors and encoders used in VACGEN equipment achieve their intended performance with VACGEN controllers (SDU, SMC or SMC-E) and no responsibility can be accepted should performance be inadequate when other controllers are used.

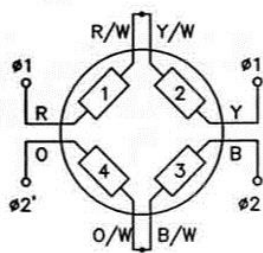
For attachment to VACGEN controllers, the motors (and encoders if applicable) can be supplied wired with suitable connectors. Otherwise, motors are supplied without connectors to allow connection to alternative drive and controller systems.

All motor variants are 4 phase, 8-lead hybrid stepper motors that can be wired up in most normal configurations as shown below. Some motor kits may include microswitches.

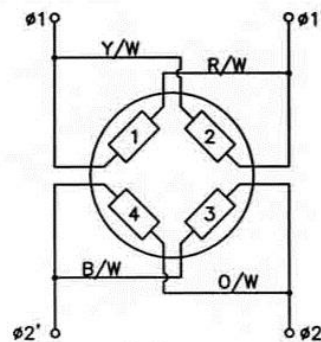
For motors fitted with incremental encoders, the VACGEN SMC-E range of controllers is required to provide passive feedback. If the motor has no encoder fitted, the controller cannot be used in the "Loop Active" mode. Note that encoders cannot be retrofitted to motors.



UNI-POLAR:
Use only where low torque at low speed is sufficient.



BI-POLAR IN SERIES
Provides high torque at low speed.



BI-POLAR IN PARALLEL
Provides moderate torque at low and high speeds.

Key to Colour Coding:

Wire colours as

follows.

R - Red, W - White, Y - Yellow, B - Black, O - Orange, G - Green

Alternative motors may be used, with alternative colours. Refer to the following sections.

A2. MOTOR SPECIFICATION

Motor Type	Step angle	Step angle tolerance	Rotor inertia	Resistance per phase	Current per phase	Inductance per phase
23HS-108E	1.8 ⁽¹⁾	5%	0.12 kg cm ²	0.33	3.9A ⁽²⁾	0.38mH
23HS-309E	1.8 ⁽¹⁾	5%	0.23 kg cm ²	0.40	4.7A ⁽²⁾	0.84mH
23HS-409E	1.8 ⁽¹⁾	5%	0.33 kg cm ²	0.48	4.6A ⁽²⁾	1.00mH
34HS-109E	1.8 ⁽¹⁾	5%	0.67 kg.cm ²	0.45	4.7A ⁽²⁾	1.30mH
34HS-209E	1.8 ⁽¹⁾	5%	11.30 kg cm ²	0.55	4.6A ⁽²⁾	2.50mH

Notes:

(1) Step angle quoted for full step drive. VACGEN controllers use half step drives with step angle being 0.9°.

(2) Limit the maximum current to the following values, determined by the drive used.

(Note that running at maximum current can cause motor to run hot and can give rise to resonance.)

- * Maximum current/phase for unipolar drive = rated current.
- * Maximum current/phase for bi-polar in series = 0.70 x rated current.
- * Maximum current/phase for bi-polar in parallel = 1.4 x rated current.

A3. COLOUR CODING OF MOTOR WIRES

Key to Colour Coding:

R - Red, W - White, Y - Yellow, B - Black, O - Orange, G - Green

Alternative motors may be used. Wire colours as follows.

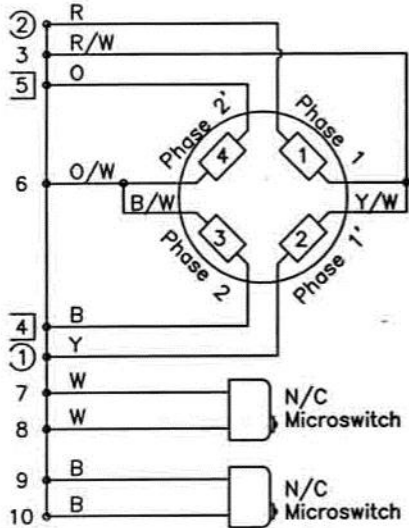
	As Drawn	Alternative 1	Alternative 2
Phase 1	R	R	R
	R/W	B	Purple
Phase 1'	Y	R/W	Y
	Y/W	W	Blue
Phase 2	B	G/W	Pink
	B/W	B/W	Grey
Phase 2'	O	G	B
	O/W	O	W

A4. MOTOR WIRING DIAGRAMS

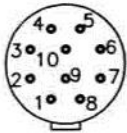
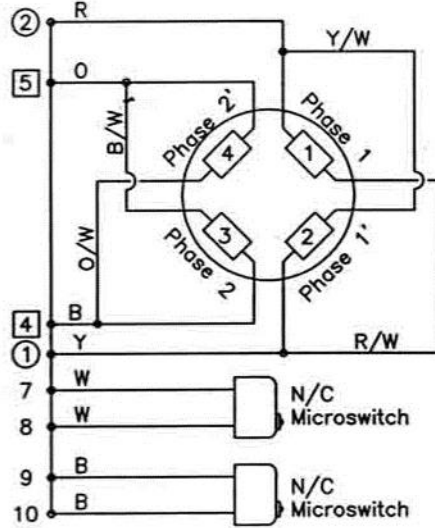
Caution: When wiring motors, care must be taken to make all connections secure. Failure to do so may result in disconnection during use and this can permanently damage the motor drive. For the same reason, never disconnect a motor from its drive unless the power has first been switched off.

Refer to previous section for colour coding of wires.

Series Motor Wiring



Parallel Motor Wiring



These diagrams show connections for compatibility with Vacuum Generators motor controllers.

Socket used is ref. XSOC24 (Series and parallel connection).

Series connection is preferred for high torque at low speed. Parallel connection is used for higher speed applications.

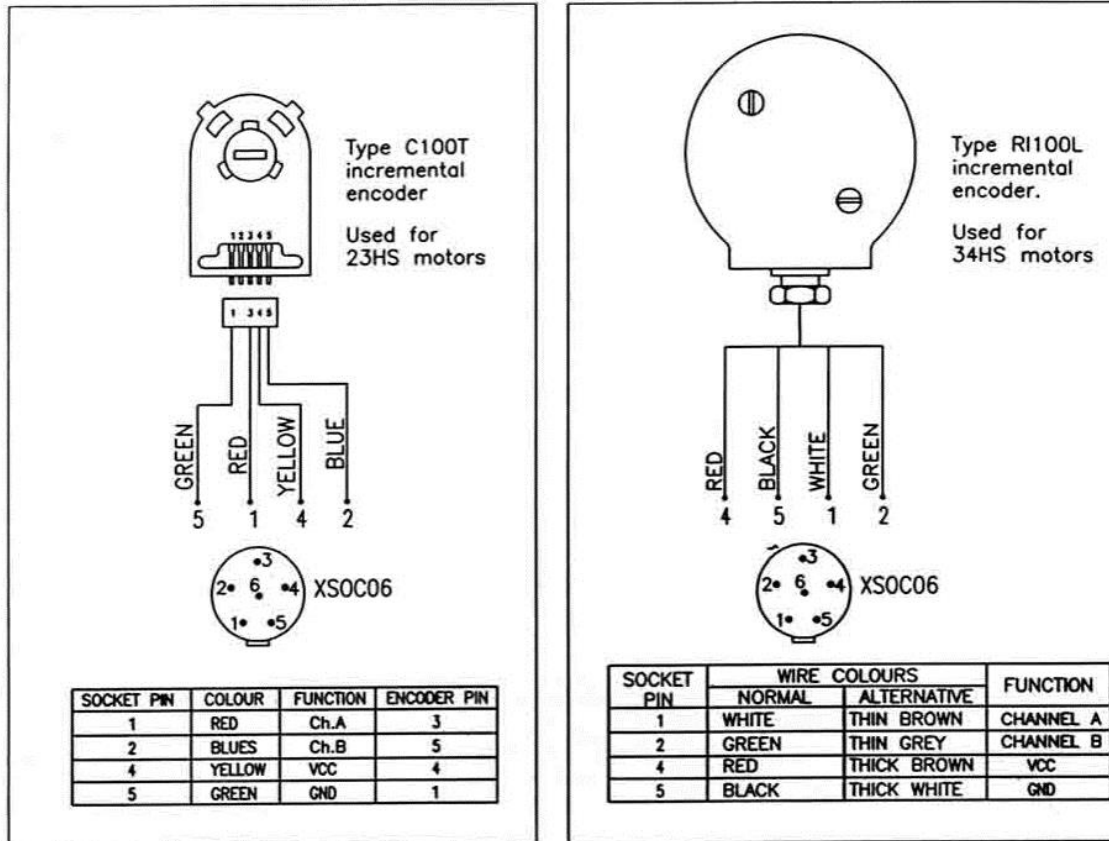
Where microswitches are not used, links must be made between pins 7 and 8, and between pins 9 and 10.

If the rotation direction is opposite to that required, reverse the connections on pins 1 and 2.

Twist together phase pairs to reduce electro-magnetic emission, i.e.: ① and ②, and ④ and ⑤.

Wiring diagrams for motors suitable for VACGEN Controllers

A5. ENCODER WIRING DIAGRAMS



Wiring diagrams for incremental motor encoders.

A6. MOTOR SPARES

Order Code	Description
ZSMPC3LH	Cable: Motor to SMC, SME-E or SDU controller.
DB08073	Cable: Encoder to SMC-E controller.
XSOC24	Connector socket. Fitted to motor lad or connection to VACGEN controllers.
XPLU11	Connector plug. Fitted to controllers for connection to XSOC24 motor socket.

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E.C. Declaration of Incorporation
ref Dol-147 (VGF 4.06d Iss2)

We hereby declare that the following product range: **XY TABLES**

Part Codes:

T108, T105, T208, T211, both Z and M groups and derivatives having combinations of Conflat flanges top and bottom.

are, suitable for incorporation or assembly into a vacuum system or other machinery. These products may only be put into service if it has been verified that the system or machinery into which it is incorporated conforms to the provisions of the appropriate EU directives and with the limitations of the equipment specifications.

Applicable regulations:

89/392/EEC Version.93/68/EEC

Appropriate harmonised or national standards.

EN292-1

EN292-2

Service and Repair Form

Declaration of Contamination of Equipment and Components	
<p>Servicing 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.</p>	
1 Description of Equipment and Components	
Equipment Type.....	Model Number.....
Serial Number.....	Your Reference Number.....
2	Reasons
return	for
.....	
.....	
.....	
.....	
3 Condition of Equipment	
YES () NO () Toxic?	YES () NO () Corrosive?
YES () NO () Explosive?	YES () NO () Biological Hazard?
YES () NO () Radioactive?	YES () NO () Other Harmful Substances?
<p>Equipment and Components that have been contaminated, WILL NOT be accepted without written evidence of decontamination.</p>	
5 Contamination Materials	
<p>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</p>	
.....	
.....	
.....	
<u>6 Legally Binding Declaration</u>	
<p>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</p>	
Organisation.....	Name.....
Country.....	Job Title.....
Post/ZIP code.....	Telephone.....
	Email.....
Signature.....	Date.....
<p>Return goods to: Address at top Phone: (0) 1424 851291 Fax (0) 1424 851489 (Form VGF33)</p>	