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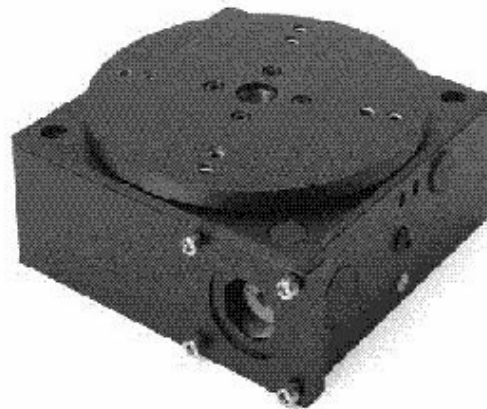
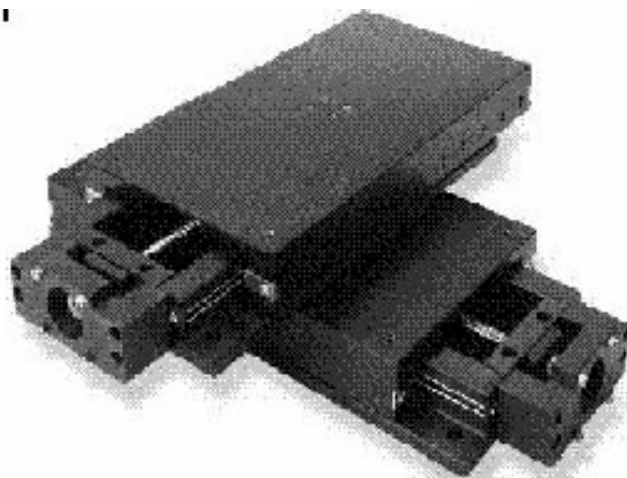
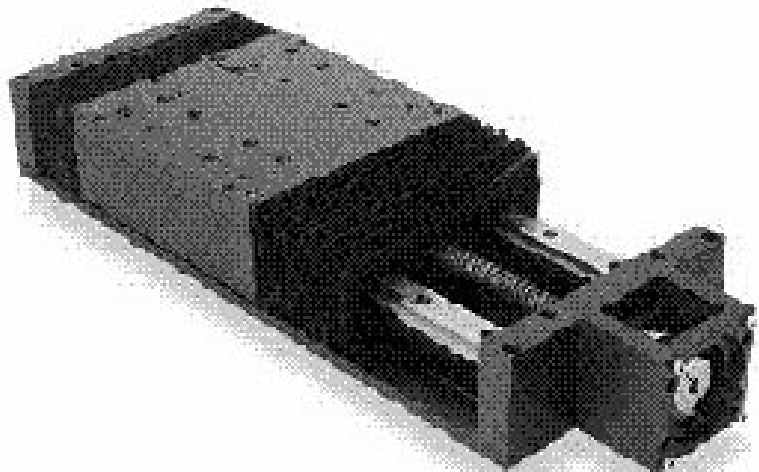
# Precision Positioning Tables Linear & Rotary

## Owner's Manual

Part # 6037-00 Revision 1.1 1/99

This manual covers the following  
IDC Products:

CP3B & CP3R Series  
CP8B & CP8R Series  
HM Series  
RB4, RB6, RB8 & LB8 Series  
PB4 Series  
CE6 & RC6 Series  
RG Series



**INDUSTRIAL  
DEVICES  
CORPORATION**





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## Positioning Table Dos and Don'ts

**Do fully support the positioning table body when lifting it.** *Page 3*

**Do make certain to remove shipping locks prior to table operation.** *Page 3*

**Do make sure that mounting surface is sufficiently flat.** *Page 4*

**Don't subject CP3, CP8, HM or RG tables to shock or impact loads.** *Page 6*

**Don't allow the carriage to collide with hard stops at end of travel.** *Page 7 and Pages 11-14*

**Do make certain that the installation area provides sufficient space for full carriage travel.** *Page 7*

**Don't drill holes into the carriage or base without consulting IDC.** *Page 6*

**Do protect the table against workplace contaminants and residues.** *Page 10*

**Do inspect the table mechanism regularly and clean and lubricate it as required.** *Page 8*

**Don't adjust carriage bearing preload screws.** *Page 6*

**Do use common sense by keeping fingers, hair, clothing, etc. away from any moving parts.** *Page 6*

**Do secure the carriage whenever transporting or shipping the table.** *Page 15*

**Don't disassemble XY configurations unless your system is equipped with precision alignment dowel pins (XYP assembly option).** *Page 6*



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# 1. Introduction

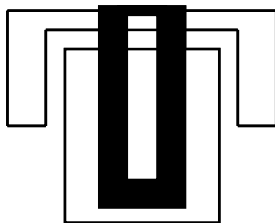
This manual provides technical information required for typical applications of IDC precision positioning tables driven with either stepping or servomotors. **Only personnel who have read this manual and thoroughly understand its contents should install and operate IDC positioning systems.**

# 2. Unpacking & Handling

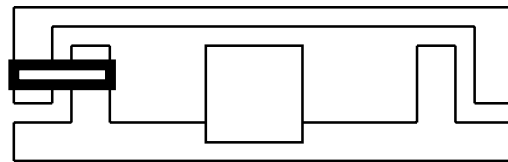
Remove the positioning system from the shipping container being careful to fully support the base structure during lifting operations. **Do not use the drive screw or motor - drive assembly as a lifting handle.** Gently lay the positioning system on a clean, sturdy and flat surface. Never allow the system to “drop” into place. If the system was shipped in a crate, retain it for future transportation of the system. Next, carefully separate the packing material from the positioning table. Examine the table for any evidence of damage. **Any shipping damages to either the positioning system or the container should be reported to IDC or to the distributor from which it was purchased.**

## Shipping Locks

Most IDC positioning tables and multi axis systems include shipping locks to restrict carriage movement during transit. The locks are unfinished, slotted aluminum or steel plates that fasten the carriage to the base with socket head cap screws. Special multi axis table configurations may employ supplemental restraining devices to immobilize the system. In either case the **restraining elements must be removed prior to table operation.** Locks on the CP8 and HM are located at the extreme ends of the units whereas locks on the other linear table models are located on the sides of the carriage. Shipping lock locations are shown in Figure 1. (*Note: CP3 and RG rotary tables are not equipped with shipping locks.*) With the positioning table resting on a completely flat surface (granite surface, plate or machined surface) unscrew the lock attachment screws and remove the locks. For the CP8, a bearing end tab (included with the table) must be attached where the lock was positioned. The carriage will now be free to move. Retain the locks and fasteners for future use in transporting the mechanism.



HM Table - End View, One Side



CP8B & CP8R Tables - End View



RB6, RB8, LB8, RC6, CE6, RB4 & PB4 Tables - Side View

**Figure 1**  
**Shipping Lock Locations**



### 3. Identifying Your Table

IDC positioning tables are described by a modular part number that identifies the basic model as well as the component options supplied with the system. Linear positioning tables are described in the following example:

**Sample Part # RB6-24-5P-BE4-X23X-LX3-EM1-CV0**

**RB6 24 5P BE4 X23X LX3 EM1 CV0**

**Model - RB6**  
**Travel ----- 24"**  
**Drive screw ----- 5P**  
**Coupling ----- BE4**  
**Motor Mount ----- X23X**  
**Limit & Home Switches ----- LX3**  
**Linear Encoder ----- EM1**  
**Covers ----- CV0**

Rotary positioning tables are described in the same way as shown in the following example:

**Sample Part # RGP-10-90-SE4-X23X-H1**

**RGP 10 90 SE4 X23X H1**

**Model – RGP (RG = rotary positioning table – P = precision class)**  
**Diameter ----- 10**  
**Worm Gear Ratio ----- 90**  
**Coupling ----- SE4**  
**Motor Mount ----- X23X**  
**Home Switch ----- H1**

Please refer to the *IDC Linear & Rotary Position Systems & Controls Catalog* for available options. Further detailed descriptions of positioning table components and options are also included in the Appendix of this manual. **Any difference or discrepancy between the product delivered and the product that was ordered should be reported immediately to IDC or to your distributor.**

Multi axis assemblies can be achieved with a standard assembly (XY) or with a dowel pin assembly (XYP). Only the dowel pin assembly (XYP) can be disassembled and reassembled to the original, precise orthogonality. The RC6 tables can also be assembled carriage to carriage (XYC).

### 4. Mounting Considerations

The base mounting pads of all IDC positioning tables are precision-machined surfaces that have been calibrated on a grade AA granite surface plate. To operate within the design specifications, IDC positioning tables must be mounted on a precision surface that fully supports the base of the table. The surface should be flat to within 0.0002" per 12" for all positioning tables except for the RG rotary tables and CE6 linear table, which require at least 0.001" per 12". The surface to which the positioner mounts may be shimmed or scraped to meet the required flatness.



For long travel positioning tables, the need for large surface co-planarity may be reduced by the use of mounting pads or feet on the mounting surface. For the HM open frame positioning tables it is critical that all surfaces of the base must be fully supported for proper operation.

Attachment of the positioning table to the mounting surface requires a minimum of four (4) screws at symmetric locations in the base of the table. The mounting base screw torque is specified at 50 in-lbs. Attachment of the payload to the positioning table carriage requires a fastening torque of 140 in-lbs. for ¼-20 screws and 65 in-lbs for 10-32 screws. Holes in the carriage top for load attachment are normally equipped with steel thread inserts. Inserts reduce the possibility of stripping out threads when attaching the payload to the aluminum carriage. **Please contact IDC concerning non-uniform, dynamic, cantilevered or points loads or multi axis operations.**

## Motor Compatibility

IDC positioning tables include a motor mounting block to accept the particular motor that was selected for your application. IDC positioning tables are supplied with a motor block for true NEMA motors. The following table gives the standard motor mounts for IDC tables:

Table	Motor Block Type	Motor Code
CP3	True NEMA 17	X17n
CP3, CP8, HM & PB4	True NEMA 23	X23n
RB4, RB6, CE6, RC6 & RG	True NEMA 23	X23n
HM, RB6, LB8, RB8, CE6 & RC6	True NEMA 34	X34n
LB8 & RB8	True NEMA 42	X42n

n = C                      Motor supplied by Customer or Distributor and mounted by IDC  
n = X                      Motor supplied and mounted by Distributor or Customer

A positioning table may be purchased with a standard IDC motor mounted to the table. In this case, the IDC motor code appears in the motor mount field of the part number. Non-NEMA motor mounts and Non-NEMA motors can also be used with IDC's tables. An IDC Applications Engineer must approve all non-NEMA and non-IDC motors. A special motor suffix is added to the positioning table part number as shown in the example below:

<i>Example:</i>	<b>RB8-24-20MG-BM14S-X-LI2-EM1-CV1-ELE30C</b>
<b>X</b>	Motor code for a non-IDC motor
<b>ELE30n</b>	Specific motor ordering code <u>assigned by IDC</u>
n = C	Motor supplied by Customer or Distributor & mounted by IDC
n = P	Motor supplied and mounted by IDC
n = X	Motor supplied and mounted by Distributor or Customer
<b>BM14m</b>	Bellows Coupling (metric – 14mm diameter)
m = S	Special Coupling Designation (non-standard coupling)

A system configured by your distributor or integrator may incorporate a gearhead or other motor blocks and couplings. Please contact an IDC Applications Engineer or your distributor for answers to motor mounting questions.



## Motor Attachment

A flexible shaft coupling is required to connect the drive motor shaft to the table's drive screw. Most IDC positioning tables are ordered with a coupling. Motor attachment proceeds as follows: First, remove the coupling from the drive screw shaft by loosening the coupling set screw or cap screw. It may be necessary to rotate the coupling to allow access to the screw via the port in the end block. To access the coupling for the Model HM positioning table, first remove the cover of the drive screw housing.

Several screws in the top secure the cover and side of the drive screw housing that is located on the extreme outboard edge of the table. **With the motor power OFF**, attach the coupling to the motor shaft and remove the four (4) motor attachment screws from the motor mounting block. Position the motor on the block such that the power cables will not interfere with free movement of the carriage, then insert and tighten the four (4) attachment screws. Re-attach the coupling to the table drive screw. User supplied motors should be checked for shaft interference. **Direct contact between the ends of the drive and motor shafts is not acceptable.** For tables purchased with motors attached, simply verify that the coupling is properly secured to both shafts.

## 5. General Precautions

IDC precision positioning tables incorporate low friction ball bearing or cross roller bearing ways, which can translate sizable loads with minimum path deviation throughout their travel range. The bearing ways of Models CP3, CP8, HM, RB4, PB4 and CE6 consist of finely ground steel cylindrical rods or flats that can be damaged by sharp impact loading at the contact points. RB6, RC6, RB8 and LB8 positioning tables incorporate recirculating bearings. Although recirculating bearings are more robust, they should still be handled with care. Positioning table operations should adhere to the following guidelines:

***Never subject the cross roller or linear ball & rod bearing positioning tables to repetitive impact forces such as riveting, hammering operations, etc., which can damage bearing surfaces.***

***Do not drill holes into the positioning table carriage or base. Metal chips may contaminate the drive screw and bearings, and holes and fasteners may interfere with the table mechanisms. Please contact IDC if such modifications are desired.***

***Never adjust bearing preload screws that are found along the sides of the CP3, PB4, CP8 and HM positioning tables. Bearing preload is set at the factory to achieve specified straight-line accuracy within acceptable friction limits. Unauthorized adjustment will void the IDC product warranty.***

***Do not immerse the positioning table in liquids or store or operate it in condensing atmospheres. Liquids or condensate may dissolve lubricants or cause corrosion of the components.***

***Do not disassemble multi axis configurations unless your system was purchased with the dowel pin assembly option (XYP). The user cannot restore unpinned configurations to precise orthogonality.***

***Observe common sense rules of machinery operation. Keep fingers, hair, clothing, etc. away from any moving parts.***





## 6. Travel & Space Requirements

The carriage of IDC positioning tables equipped with non-recirculating bearings travels symmetrically about the position where the carriage is centered. These models (CP3, CP8 and HM) require a space allowance for the cantilevered carriage when it travels away from center. **Prior to operating any positioning table, check to be certain that your installation allows sufficient space for unobstructed travel.**

**Over travel excursions, resulting in carriage collisions with the hard stops, are potentially damaging to the positioning table and must be avoided. Damage incurred as a result of over travel is not covered by IDC's Product Warranty.** Limit switches are recommended for all IDC tables. The locations of any limit switches (both internal and external) that are installed at the IDC factory are not adjustable. *Limit switches alone do not guarantee over-travel protection since load, speed and the resulting momentum of the user's move profile will affect necessary stopping distance. Brakes or over travel allowances sufficient to stop the carriage prior to hard stop contact are the responsibility of the user.*

## 7. Operations

### Thermal Considerations

The standard operating temperature range of IDC positioning tables is 32-104 F (0-40 C) unless the system has been specially modified. The highest levels of performance will be achieved when the ambient temperature is maintained in the range of 68-72 F (20-23 C).

IDC positioning tables are constructed of either 6061 aluminum alloy or aluminum tool and jig plate. The thermal expansion characteristics of the aluminum structure and differential thermal effects between the structure, bearings, drive train, etc. result in accuracy changes in the range of 7 PPM per degree F (12 PPM per degree C).

In high speed, high acceleration or high duty cycle applications, the frictional heating of the drive train may exceed the ambient temperature by as much as 50 F (28 C). Accuracy requirements for such move profiles may require a linear encoder to compensate for the thermal expansion of the drive train.

### Rated Speed

The maximum speed of screw driven positioning tables is limited by the *critical speed* (also known as the natural resonant speed) of the drive screw. This speed is a function of table travel and screw diameter. Operation at or above the rated speed limit can cause the drive screw to whip, resulting in poor performance and noisy operation. **The Appendix gives the necessary equations for calculating maximum angular speed of the drive screws for IDC linear positioning tables.** The critical speed of the worm shaft and acceptable life of the ring gear determine the maximum speed of rotary positioning tables. The maximum rated motor input shaft speed for the RG rotary tables is 1800 RPM. The worm gear ratio determines the maximum output speed. **The maximum input torque for the RG table is 75 oz-in.**

### Loading

IDC positioning tables are rated for *normal loads* - load vector directed down onto the surface of the carriage, for *axial loads* - load vector directed in the direction of travel, and for *moment loads* - torsional loads caused by loads with an offset center of gravity. The moment loading limits are based on the maximum moment in pitch, roll or yaw including any dynamic components that are move profile dependent.



An IDC linear positioning table loaded within limits given in the Appendix will meet catalog rated specifications for the corresponding life rating. RG rotary tables are rated to provide 1 million reversing cycles at specification.

## Life Calculations

The IDC positioning table load ratings correspond to the maximum allowable loads where full catalog specification can be achieved. The *dynamic load* rating is based on B10 bearing life of the positioning table bearings - the travel life, under a specified load, for which 90% of the contact elements will maintain geometric integrity free of surface wear or fretting.

The Appendix lists the dynamic capacity for each positioning table. This provides the basis for positioning table bearing life computations when subjected to a given load. The formulas for estimating the travel life of an IDC positioning table are:

$$\text{Ball Bearing Systems:} \quad \mathbf{Li} = [\text{SDC} / \mathbf{Lo}]^3 \mathbf{10}^6$$

$$\text{Cross Roller Bearing Systems:} \quad \mathbf{Li} = [\text{SDC} / \mathbf{Lo}]^{10/3} \mathbf{10}^6$$

$\text{SDC} = \text{Dynamic Capacity} / fs$   
where  $fs$  is

- |   |                               |
|---|-------------------------------|
| 1 | for smooth, shock free motion |
| 2 | for gradually varying loads   |
| 4 | for shock and vibrations      |

$\mathbf{Lo}$  is the applied load in lbs.

$\mathbf{Li}$  is the life in inches

## Duty Cycle

Duty Cycle is the percentage of Move Time divided by Total Cycle Time for a 10-minute interval representing the worst case of the motion sequence. Frictional heating of the positioning table components (primarily the drive screw assembly) limits the duty cycle to less than 100% for some models. In general, ballscrew driven recirculating bearing positioning tables are rated for a 100% duty cycle. Lead screw driven and non-recirculating bearing positioning tables are rated for a 60% duty cycle. Exceeding the recommended duty cycle will accelerate wear and may damage the positioning table components. Consult *IDC's Linear and Rotary Positioning Systems & Controls Catalog* for individual model number ratings.

## 8. Maintenance

Maintenance intervals and requirements are highly dependent upon several factors including move profile, duty cycle, environment and contaminants. To establish a base line for periodic maintenance, the positioning table mechanical components should be inspected at least every week for the first month of normal operations to assess the lubrication status, contaminant build up, etc. Contaminants should be removed from bearing surfaces and screw shafts by wipe down with a clean, dry cloth. Cleaning solvents to aid in grease removal should be limited to alcohol. *Acetone or similar organic solvents will attack plastic materials and must not be used.*



## Access for Lubrication

It is necessary to remove the optional bellows or plate style protective covers to lubricate the bearings and drive components. Bellows covers (optional on RB4, PB4, RB6, LB8 and RB8) can be removed by either loosening the button head screws or by separating the Velcro strips that fasten the bellows to the end plates and carriage.

Plate type covers (optional on RC6 & CE6) are removed by loosening the four (4) screws at the corners of the top and side plates.

## Drive Screws

The positioning table drive screw (lead screw or ball screw type) must be kept clean and correctly lubricated for long life and proper function. Certain lead screws may be permanently lubricated. Please refer to the Appendix for further details. All special precision leadscrews should be cleaned and adjusted by IDC only.

Contamination from work place dirt and debris must be avoided. The screws should be periodically cleaned and re-lubricated. Positioning tables with ball screws should never be run dry. The screw shaft support bearings are permanently lubricated and require no service in normal operation. The approved drive screw lubricants are listed in the Appendix. Please also see the appendix for material safety data sheets. Note that old lubricants should be completely removed before new lubricants are applied. Care should be taken to:

***(1) Never mix oils and greases when lubricating the table mechanisms.***

***(2) Never mix synthetic and petroleum based greases when lubricating the positioning table.***

Material Safety Data Sheets for IDC factory supplied lubricants are contained in the Appendix of this manual.

## Carriage Support Bearings – Non-recirculating

Non-recirculating ball bearings in the CP3, CP8 and HM models do not require lubrication under normal conditions. The point contact design is inherently self-cleaning and the rod ways are corrosion resistant 440C stainless steel. For smooth performance, cross roller types (CP3R, CP8R and PB4) should be lightly oiled with STAZON or other light instrument oil. The lubricant should be applied so that it works its way into the retainer assembly. Lubricant should be applied every 1-2 million inches of travel. As previously stated, shock or impact loads on the non recirculating bearing ways should be avoided due to the potential damage at the rod contact points.

## Carriage Support Bearings - Recirculating

Lubrication of recirculating ball bearings is recommended at intervals of 1-2 million inches of travel. For the ball bushing elements in the CE6 model, STAZON or other light machine oil (SAE 10) is recommended for application directly to the ½" dia. shafts.

Models RB6, RC6, RB8 and LB8 are supported by recirculating square rail bearings that require lubrication with lithium based grease #2 at intervals of 1-2 million inches travel for optimum performance. The bearing blocks on these rails are equipped with standard grease fittings (GN3 on the RB6 & RC6 - GN6 on the RB8 & LB8).

Similar lubrication intervals should be followed for the RB4, which incorporates recirculating ball elements on rod type surfaces.



## RG Rotary Table - Bearings & Drive

RG rotary tables are equipped with a check-ball type grease fitting that services both the worm gear and the carriage support bearing. Simply pumping a 2-5 cc of RHEOLUBE (or lithium soap based grease #1) into the fitting will adequately lubricate the mechanism. Avoid excessive lubrication (both frequency and amount).

Without removing the top and internal cover for visual inspection, the only indications for adding grease are rough running and increased input torque.

For complete service the unit should be disassembled, cleaned and re-greased by IDC only.

## Warm Up Cycles

For positioning tables or complete systems that will be inactive for long periods of time, a short warm up cycle prior to operation is recommended for all immobile axes to minimize break away torque.

# 9. Environments

## Contamination

Uncovered, non-recirculating bearing positioning tables (CP3, CP8 and HM) should only be used for applications with clean environments. If these positioning tables will be used in unclean conditions, it is recommended that the user install protective shields or covers. It is also important to adhere to a regular program of periodic cleaning and maintenance (*please see this manual's section on Maintenance*).

RC6 and CE6 recirculating bearing positioning tables may be fitted with aluminum plate type covers, which protect the positioning table mechanisms against damage from large objects (dropped fasteners, tools, etc.).

Bellows covers may be fitted to the RB4, PB4, RB6, RB8 and LB8 positioning tables to provide a significant degree of protection against airborne particulates and liquid mists. The bellow covers are coated with neoprene to enhance moisture resistance. The carriage support bearings on the RB6, RC6, RB8 and LB8 are equipped with rubber wipers to further protect them against contaminants.

## Clean Rooms

For clean room environments, IDC positioning tables can be modified to minimize their potential for particulate generation. Here are some general guidelines for clean room applications:

- Use only stepper or brushless servomotors.***
- Remove seals, bellows and wipers from bearings, ballscrews, etc.***
- Replace black oxide and oil coated hardware with stainless steel.***
- Replace standard lubricants with special clean room rated lubricants.***
- (Sources for specialty lubricants are listed in the Appendix).***



In general, experience has shown that these simple modifications will provide conformance with Class 100 clean room standards. Compliance with more demanding standards requires significant modifications, including surface finish, vacuum evacuation ports, etc. Please contact IDC to review your application.

## Vacuum

IDC positioning tables are designed to be operated at atmospheric pressures of 760 to 250 torr. This corresponds to an elevation range of sea level to 10,000 feet.

Standard IDC positioning tables will function at ambient pressures as low as 0.001 torr. However, outgassing from the positioning table may contaminate the vacuum environment. To minimize outgassing at pressures of  $10^{-4}$ - $10^{-6}$  torr, the following modifications are required:

***Remove paint from all surfaces.***

***Degrease all surfaces, components, hardware, etc.***

***Ventilate all blind holes and employ ventilated fasteners to avoid trapping volatiles.***

***For environments below  $10^{-6}$  torr, the aluminum structure is preferably left unfinished or nickel-plated.***

***Replace PVC insulated cables and wires with Teflon or Kapton insulated wiring.***

***Lubricate the bearings and drive train with vacuum compatible oils and greases.***

***(Sources for specialty lubricants are listed in the Appendix).***

***Note: High temperature bake out to remove lower volatility outgas components should not be attempted with any positioning table that incorporates IDC limit switches or linear encoders due to the limited temperature range of electronic components. In addition, the various support bearings have thermal limitations based on their retainers, wipers, housings, etc.***

# 10. Components and Accessories

## Motor Couplings

IDC positioning tables are normally supplied with flexible shaft couplings as indicated in the modular part number. ***Improperly selected couplings with poor torsional stiffness can cause wind up errors, unwanted resonance problems and long settling times.*** The Appendix gives the available coupling options and replacement part numbers that are available for IDC's positioning tables.

## Limit & Home Switches

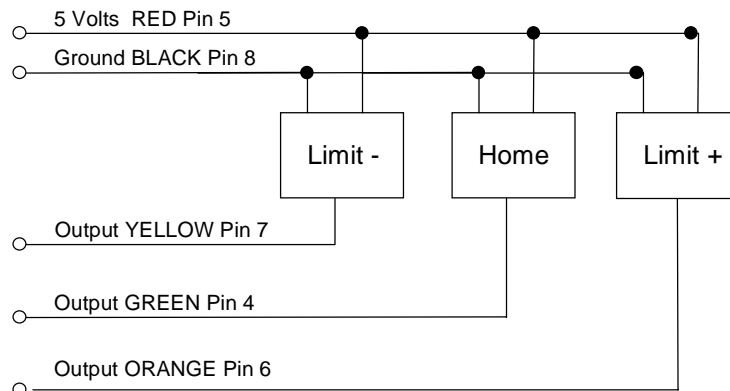
Limit switches define the end of travel and protect the table against over travel. Unless otherwise noted, the limit and home switches for the CP3, CP8 and HM positioning tables are Hall effect limit switches that are enclosed and externally mounted to the side of the positioning table.



These switches are the normally closed, current sinking, NPN type limit switches. A vane passes over the sensor element to activate the switch. The limit switches are wired to interrupt power to the motor upon activation. The output voltage switches from HIGH to LOW when the vane activates the switch. The switches are conventionally located slightly inboard from the hard stops to allow for safe deceleration of the carriage when the switch is triggered. The home switch, when installed, provides a reference location for programming positioning table movement. Home switches are normally located approximately 1" in from the retracted carriage end of travel. **The locations of all IDC installed limit and home switches are fixed and should not be adjusted. Please contact IDC if limit switch location changes are desired.** Limit switches are designated in the modular IDC positioning table part number as follows:

- L X 2
- Switch Option ----- |**  
**L = Hall Effect Switch**  
**O = Optical Switch (optional)**
- Location ----- |**  
**X = External - Hall Effect or Optical Switches**  
**I = Internal - Hall Effect Switches Only**
- Switch Locations ----- |**  
**0 = No Switches**  
**1 = 1 Limit Switch (typical for rotary positioning tables)**  
**2 = 2 End of Travel Limit Switches**  
**3 = 2 End of Travel Limits Switches and 1 Home Switch**

Wiring diagrams applicable to all IDC limit switches are shown in Figure 2. The two-position limit switch option has 2 end of travel limit switches. The three-position limit switch option has 2 end of travel limit switches and 1 home switch. The limit switch option for the RG rotary positioning table incorporates a single limit switch that is used as a home switch. For cables without flying leads, Pins 1 and 2 are not used. Pin 3 is the shield.



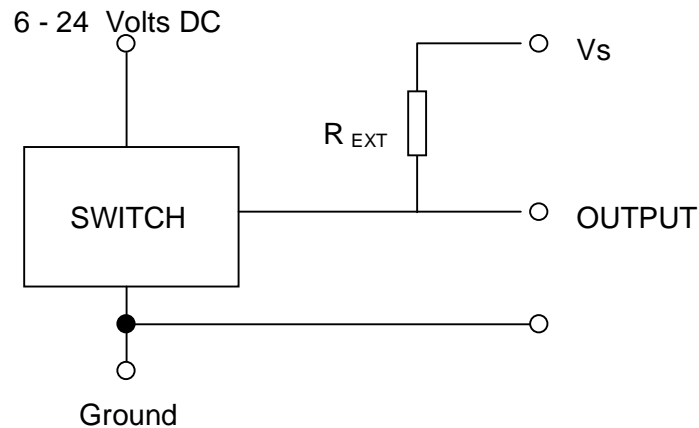
**Figure 2**  
**General Limit Switch Wiring**



### External Hall Effect Limit and Home Switches

<b>Limit Switch Part #</b>	<b>1164 – 00</b>	<b>(switch element only)</b>
<b>Manufacturing Part #</b>	<b>Honeywell</b>	<b>4AV16F</b>
<b>Supply Voltage</b>	<b>4.5 – 26.5 VDC</b>	
<b>Output Voltage</b>	<b>4.5 – 26.5 VDC</b>	
<b>Supply Current</b>	<b>5 - 18.5 mA each</b>	
<b>Output Current (sinking)</b>	<b>20 mA</b>	

The standard external limits are supplied with 4.5-26.5 Volt sensors (1164 - 00 type). Circuits to interface limit switches with 12 Volt and 5 Volt logic are shown in Figure 3. The external resistor values shown are the minimum required resistances. The positional repeatability for all standard Hall effect sensors (internal and external) is  $\pm 0.001$  inches. **Part numbers for complete limit switch assemblies are provided in the Appendix.** A 10' cable that terminates in flying leads is supplied with all limit switch assemblies (internal and external).



For 12 Volt Circuit :  $V_s = 12$  Volt;  $R_{EXT} = 680$  Ohm  
For 5 Volt Circuit :  $V_s = 5$  Volt;  $R_{EXT} = 270$  Ohm

**Figure 3.**  
**Limit Switch Interface Circuits**

The optional optical limit and home switches are also current sinking, normally closed, NPN type limit switches (IDC part number 7086-50 (switch only) - manufactured by Honeywell (HOA1884-012)). The wiring requirements closely resemble Figure 3, except that the optical switch supply requirements are 5 Volt DC and 20 mA. The output current is 1.8 mA (minimum) when a 5 Volt potential exists between the output and common. The saturation voltage of the output transistor is less than or equal to 0.4 Volts at a current of 230 micro Amp. The minimum required resistance to interface with TTL circuitry is 100k Ohm (R external). The positions of the optical switches are not adjustable. The standard 10' cable also terminates in flying leads.

The RG series rotary positioning tables can be equipped with a single switch that defines a reference position for programming. This single switch has the same attributes and electrical characteristics as the externally mounted, Hall effect limit switches described earlier.



Limit & home switches for all recirculating bearing linear positioning tables (models RB4, RB6, RC6, RB8, LB8 and CE6) are non-adjustable, internally mounted, Hall effect limit switches with a connector mounted on the table base end plate.

**Internal Hall Effect Limit and Home Switches**

<b>Limit Switch Part #</b>	<b>7955 – 00</b>	<b>(switch element only)</b>
<b>Supply Voltage</b>	<b>5 - 24 VDC</b>	
<b>Output Voltage</b>	<b>5 - 24 VDC</b>	
<b>Supply Current</b>	<b>13 mA each</b>	
<b>Output Current (sinking)</b>	<b>50 mA</b>	
<b>Cable with CPC connector</b>	<b>6818 - 00</b>	
<b>Cable with D connector</b>	<b>7919 - 51</b>	
<b>(option for RC6 and CE6 only)</b>		

As previously noted, limit switches alone do not guarantee over travel protection because the load, the speed and the resulting momentum of the move profile will affect the required stopping distance. Brakes or over travel allowances (sufficient to stop the carriage before a collision with the physical hard stops) are the responsibility of the user.

**Linear Encoder**

The linear encoder option addresses applications that require a higher degree of accuracy by providing direct measurement of carriage position rather than using the drive screw as the master-measuring element to infer linear position. Linear encoders are especially effective at compensating for backlash (lost motion) and hysteresis. The linear encoder option, available with a standard metric pitch grating or, by special request, an imperial grating, is designated in the modular IDC positioning table part number as shown below.

**- E M 1**

**Encoder Type ----- |**

**0 = No Encoder**

**M = Metric Encoder**

**E = Imperial (inch) Encoder (special request)**

**Encoder Resolution ----- |**

**0 = No Encoder**

**1 = 1 micron (metric) or 0.0001” (imperial)**

**2 = 2 micron (metric) or 0.00005” (imperial)**

The linear encoder contains a precision etched glass scale packaged within a protective aluminum housing with a photo electric read head. The scale is protected against contamination by rubber lip seals that cover the length of the housing. Specifications for linear encoders supplied with IDC linear positioning tables are given below:





## Linear Encoder Specifications

<b>Scale Accuracy</b>	<b><math>\pm 5</math> microns per meter</b>
<b>Max output frequency</b>	<b>100 kHz</b>
<b>Max acceleration</b>	<b>45 m per sec <sup>2</sup></b>
<b>Operating temp.</b>	<b>32 - 122 F (0 - 50 C)</b>
<b>Sealing</b>	<b>IP 53 (DIN 40050)</b>
<b>Power Supply</b>	<b>+ 5 VDC <math>\pm</math> 5% (150 mA max.)</b>
<b>Outputs</b>	<b>TTL square waves - quadrature with Z reference channel</b>

Conventionally, the encoder is fixed to the base of the linear positioning table on a precisely machined surface with the read head attached to the carriage. The user should make provision for the encoder cable when mounting or installing the positioning table. Due to the internal space limitations of the positioning table, linear encoders are externally mounted on all IDC positioning tables. All encoders used on IDC tables provide differential square wave output signals (RS422) for compatibility with a wide variety of motion controllers. Each encoder is supplied with a 3 meter (~ 10 foot) cable that terminates in a 12 pin DIN connector. The mating connector is also supplied (part number 5767-50). For use in cable carriers, high flex cable may be specified. A complete wiring diagram is shown in the Appendix. Linear encoders are not user serviceable. Please contact IDC for assistance with linear encoder issues. Improperly shielded or grounded encoders can cause serious controller errors.

## 11. Transporting the Table

When moving, transporting or shipping IDC positioning tables, the shipping locks and restraining materials included in the original packaging should be re-installed to immobilize the carriage. ***Failure to properly immobilize the carriage may result in damages to the positioning table that are not covered under warranty.***

For recirculating bearing positioning tables (models RB4, RB6, RC6, RB8, LB8, CE6), as well as the PB4 non-recirculating bearing positioning table, simply re-install the shipping locks at the appropriate locations to secure the carriage to the base. The CP3 and RG positioning tables are not equipped with shipping locks. For CP8 and HM positioning tables, the following procedures should be followed:

### ***Non-recirculating Bearing Positioning Tables -- CP8 and HM.***

*Loosely attach the lock plate to the carriage at the end of the table. Manually rotate the drive screw by hand until the ends of the carriage and base are aligned.*

*Loosely attach the lock plate to the base, and then tighten the screw holding the lock plate to the carriage.*

*Carefully secure the lock plate to the lower axis while manually adjusting the lead screw to eliminate any axial force in the drive train.*

*When finished there should be approximately 5 degrees of free rotation in the drive train. If rotation is not possible, loosen the screw holding the lock to the table base and repeat the previous step.*



## 12. Product Service

### Technical Support

Industrial Devices Corporation provides product technical support through its network of factory trained and authorized distributors. IDC is also available through factory based Applications Engineering and Customer Service departments. Routine technical information is available through IDC's web site at [www.idcmotion.com](http://www.idcmotion.com). If application issues arise or product failures occur, please contact your local IDC distributor. IDC can also be contacted directly at (800) 747-0064. For customers outside of North America, please contact IDC by phone at (707) 789-1000 or by fax at (707) 789-0175.

### Product Returns

All IDC service for precision positioning systems is performed at our factory located in northern California (north of San Francisco, California). Before shipping any positioning system to IDC for evaluation or repair (under warranty or for paid service), it is first necessary to obtain a return authorization number. A Return Material Authorization (RMA) number can be obtained from IDC's Application Engineering or Customer Service Departments. Please contact your local distributor or IDC at (800) 747-0064 by phone or (707) 789-0175 by fax to make the necessary arrangements. When requesting an RMA number, it is necessary to provide the following:

- Original IDC order number
- Distributor identity and order number
- Product serial number
- Contact information
- Detailed description of the problem

Pack the product securely, preferably in the original shipping carton. The IDC positioning system must be wrapped or bagged to separate it from cushioning packing materials. Foam in place urethane or other high density, cushioning foam blocks are recommended. Styrofoam packing chips should be avoided if possible. Failure to protect the mechanism from packing chips and dust and to securely package the positioning system may result in damages that will not be covered under IDC's warranty terms. **The RMA number should be printed prominently on the packing carton exterior and referenced on all shipping documents. Ship the positioning system prepaid to:**

**Industrial Devices Corporation  
3925 Cypress Drive  
Petaluma, CA 94954**

**Attn: RMA # \_\_\_\_\_**

There is a minimum charge of US \$175.00 for inspection and repair of a returned positioning table. This charge applies to all paid (non-warranty) repairs and to tables within their warranty period if no problem is found with the positioning system.



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While IDC makes every effort to address both warranty and non-warranty repairs as rapidly as possible, turn around time will depend upon the availability of resources (both internal and external). Delivery will be quoted by phone or fax after an evaluation by IDC technicians.

## Warranty Terms

Unless otherwise specified, IDC warrants its precision positioning systems to be free from defects in materials and workmanship when handled and operated in accordance with the terms stated in this manual. IDC will repair or replace, at no charge, positioning systems that are defective in materials or workmanship, provided that such defects are declared in writing within 12 months after the original shipment date. **IDC's obligation under this warranty is limited to the repair or replacement of the apparatus at IDC's factory. The decision to replace or repair a table is reserved to IDC.** Repairs or replacements made under warranty terms will be shipped prepaid to the user.

## Feedback

Thank you for selecting IDC as your supplier for positioning systems. In an effort to continuously improve our products and services, we would like to invite you to express your opinions about entire experience with IDC. Please feel free to call, fax or email us. If you choose to write us, please use the address above and direct your comments to the Precision Positioning Systems Product Manager.



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# Appendix

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<u>Maximum Speed for IDC Positioning Table</u>	<u>19</u>
<u>Standard Limit Switch Part Numbers</u>	<u>19</u>
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## Maximum Screw Speed for IDC Linear Positioning Tables

### Critical Speed Calculations for all Drive Screws (Lead Screws and Ball Screws)

$$\text{Critical Speed (rpm)} = 2,000,000 / (\text{table travel in inches})^2$$

$$\text{Critical Speed (rpm)} = 750,000 / (\text{table travel in inches})^2 \text{ (Models CP3 \& CP8 only)}$$

### Additional Speed Consideration

**Leadscrews**                    *(Models 5A, 10A, 40A, 50A and Obsolete Model 4MA)*

Actual leadscrew shaft speed less than or equal to 2800 rpm (60% duty cycle).

**Rolled Ball Screws**        *(Model 5P and Obsolete Models 5B, 2B, 1B 5DB, 2DB and 1DB)*

Actual rolled ball screw shaft speed less than or equal to 2900 rpm (100% duty cycle).

**Ground Ball Screws**      *(Models 5G, 10MG and 20MG)*

Actual ground ball screw shaft speed less than or equal to 4000 rpm (100% duty cycle).

## Standard External Limit Switch Part Numbers *(Complete Switch Assembly)*

Table	Travel	LX2 Assembly	LX3 Assembly	
CP3	1	6899-51	5057-51	
CP3	2	6899-52	5057-52	
CP3	3	6899-53	5057-53	
CP3	4	6899-54	5057-54	
CP3	5	6899-55	5057-55	
CP3	6	6899-56	5057-56	
CP8	5	2356-00	2358-00	
CP8	7	2351-03	2355-03	
CP8	9	2351-04	2355-04	
CP8	12	2348-02	2350-02	
HM	6	2338-01	3459-50	
HM	8	6448-02	2340-01	
HM	12	2338-02	2340-02	
HM	18	2338-03	2340-03	
HM	24	2338-04	2340-04	
PB4	2	2058-00	2132-00	includes 6818-00 connector
PB4	4	6577-50	2011-00	includes 6818-00 connector



## Drive Screw Lubricants

<b>Screw Designation</b>	<b>Description</b>	<b>Lubricant</b>
5A 10A 40A 50A 4MA (obsolete)	ACME Lead Screw with Plastic Nut	Lubriplate DS-E5
2B (obsolete) 5B (obsolete) 1B (obsolete)	Rolled Thread Ball Screw – Single Nut	NYLOGEL 701
5BD (obsolete) 2BD (obsolete) 1BD (obsolete)	Rolled Thread Ball Screw – Double Nut	NYLOGEL 701
5P	Precision Rolled Thread Ball Screw	NYLOGEL 701
5G 10MG 20MG	Precision Ground Thread Ball Screw	NYLOGEL 701
RG Rotary	Worm Gear and Bearing	RHEOLUBE 362

## Carriage Support Bearing Lubricants

<b>Bearing Type</b>	<b>IDC Precision Table Model</b>	<b>Lubricant</b>
Ball Type	CP3B, CP8B and HM	None Required
Cross Roller	CP3R, CP8R and PB4	STAZON Oil
Ball Bushing	CE6	STAZON Oil
Ball Groove Rail	RB4, RB6, RC6, LB8 and RB8	NYLOGEL 701



## Acceptable Substitute Lubricants

STAZON (IDC #1897-00)	Nye Synthetic Oil 180P Turbine oil #1 or #3 Light machine oil
NYLOGEL 701	ALVANIA #2 BEACON #2 MOBILUX #2 #2 Lithium Soap Grease
RHEOLUBE 362	#1 Lithium Soap Grease

All standard IDC lubricants can be obtained from Nye Lubricants in New Bedford, MA (508) 996-6721, except Lubriplate DS-E5. Lubriplate DS-E5 can be obtained from Fiske Brothers Refining in Toledo, OH (419) 691-2491.

## Recommended Specialty Lubricants Sources

Manufacturer	Product	Application
E.I. Du Pont (800) 424-7502 <a href="http://www.lubricants.dupont.com">www.lubricants.dupont.com</a>	Krytox	Vacuum Clean Room
Kluber Lubrication (603) 434-7704 <a href="http://www.kluber.com">www.kluber.com</a>	Barreirta Asonic	Vacuum Clean room
Castrol	Braycote	Vacuum



## Linear Positioning Table Load Ratings

Model	Travel	Normal	Axial	Moment	Dynamic <sup>1</sup>
CP3 B	1"-2"	20 lb	10 lb	----	50 lb
CP3 B	3"-5"	30 lb	10 lb	----	70 lb
CP3 R	1"-2"	40 lb	15 lb	----	70 lb
CP3 R	3"-5"	50 lb	15 lb	----	100 lb
CP8 B	5"-7"	100 lb	50 lb	----	400 lb
CP8 B	9"-12"	150 lb	50 lb	----	600 lb
CP8 R	5"-7"	150 lb	100 lb	----	600 lb
CP8 R	9"-12"	200 lb	100 lb	----	700 lb
HM	6"	100 lb	----	----	500 lb
HM	8"-12"	150 lb	----	----	600 lb
HM	18"-24"	200 lb	----	----	800 lb
RB4	2"-8"	25 lb	20 lb	15 ft lbs	300 lb
PB4	2"-4"	40 lb	20 lb	20 ft lbs	320 lb
RB6	6"-48"	200 lb	100 lb	60 ft lbs	800 lb
LB8	8"-60"	600 lb	200 lb	120 ft lbs	3800 lb
RB8	6"-60"	1000 lb	200 lb	240 ft lbs	7600 lb
CE6	6"-48"	100 lb	50 lb	20 ft lbs	125 lb
RC6	6"-48"	200 lb	100 lb	60 ft lbs	800 lb

1. For Load / Life Computations Only - See Page 7

## Rotary Positioning Table Load Ratings

Model	Dia.	Normal	Radial	Moment <sup>2</sup>	Output Torque <sup>3</sup>
RG	6"-8"	100 lb	30 lb	60 in lbs	65 in lbs
RG	10"-12"	200 lb	90 lb	180 in lbs	65 in lbs

2. CG of load on axis of rotation

3. For move profile computation

The maximum input for an RG Rotary table is 75 oz-in.





## Couplings for IDC Positioning Tables

Table	Coupling	Diameter	IDC Number
CP3	AE4 Aluminum Beam (obsolete)	0.25 inch	1918-06
CP3	SE4 Stainless Steel Beam	0.25 inch	1918-19
CP3	OE4 Oldham	0.25 inch	2121-00
CP3	BE4 Stainless Steel Bellows	0.25 inch	9869-50
CP3	AE5 Aluminum Beam (obsolete)	0.3125 inch	1918-24
CP3	SE5 Stainless Steel Beam	0.3125 inch	1918-25
CP3	AM5 Aluminum Beam (obsolete)	5 mm	1918-26
CP3	SM5 Stainless Steel Beam	5 mm	1918-27
CP3	OM5 Oldham	5 mm	6873-50
CP8	AE4 Aluminum Beam (obsolete)	0.25 inch	8032-00
CP8	SE4 Stainless Steel Beam	0.25 inch	1918-09
CP8	OE4 Oldham	0.25 inch	4501-52
CP8	BE4 Stainless Steel Bellows	0.25 inch	9722-50
CP8	AE5 Aluminum Beam (obsolete)	0.3125 inch	1918-28
CP8	SE5 Stainless Steel Beam	0.3125 inch	1918-29
CP8	OE5 Oldham	0.3125 inch	2105-00
CP8	BE5 Stainless Steel Bellows	0.3125 inch	2092-00
HM	AE4 Aluminum Beam (obsolete)	0.25 inch	8032-00
HM	SE4 Stainless Steel Beam	0.25 inch	1918-09
HM	OE4 Oldham	0.25 inch	4501-52
HM	BE4 Stainless Steel Bellows	0.25 inch	9722-50
HM	AE5 Aluminum Beam (obsolete)	0.3125 inch	1918-28
HM	SE5 Stainless Steel Beam	0.3125 inch	1918-29
HM	OE5 Oldham	0.3125 inch	2105-00
HM	BE5 Stainless Steel Bellows	0.3125 inch	2092-00
HM	AE6 Aluminum Beam (obsolete)	0.375 inch	1918-02
HM	SE6 Stainless Steel Beam	0.375 inch	1918-22
HM	OE6 Oldham	0.375 inch	3790-52
HM	BE6 Stainless Steel Bellows	0.375 inch	2032-00



<b>Table</b>	<b>Coupling</b>	<b>Diameter</b>	<b>IDC Number</b>
<b>RB4 &amp; PB4</b>	<b>AE4 Aluminum Beam (obsolete)</b>	<b>0.25 inch</b>	<b>8032-00</b>
<b>RB4 &amp; PB4</b>	<b>SE4 Stainless Steel Beam</b>	<b>0.25 inch</b>	<b>1918-09</b>
<b>RB4 &amp; PB4</b>	<b>OE4 Oldham</b>	<b>0.25 inch</b>	<b>4501-52</b>
<b>RB4 &amp; PB4</b>	<b>BE4 Stainless Steel Bellows</b>	<b>0.25 inch</b>	<b>9722-50</b>
<b>RB4 &amp; PB4</b>	<b>AE5 Aluminum Beam (obsolete)</b>	<b>0.3125 inch</b>	<b>1918-28</b>
<b>RB4 &amp; PB4</b>	<b>SE5 Stainless Steel Beam</b>	<b>0.3125 inch</b>	<b>1918-29</b>
<b>RB4 &amp; PB4</b>	<b>OE5 Oldham</b>	<b>0.3125 inch</b>	<b>2105-00</b>
<b>RB4 &amp; PB4</b>	<b>BE5 Stainless Steel Bellows</b>	<b>0.3125 inch</b>	<b>2092-00</b>
<b>RB6, RC6 &amp; CE6</b>	<b>AE4 Aluminum Beam (obsolete)</b>	<b>0.25 inch</b>	<b>8032-00</b>
<b>RB6, RC6 &amp; CE6</b>	<b>SE4 Stainless Steel Beam</b>	<b>0.25 inch</b>	<b>1918-09</b>
<b>RB6, RC6 &amp; CE6</b>	<b>OE4 Oldham</b>	<b>0.25 inch</b>	<b>4501-52</b>
<b>RB6, RC6 &amp; CE6</b>	<b>BE4 Stainless Steel Bellows</b>	<b>0.25 inch</b>	<b>9722-50</b>
<b>RB6, RC6 &amp; CE6</b>	<b>AE5 Aluminum Beam (obsolete)</b>	<b>0.3125 inch</b>	<b>1918-28</b>
<b>RB6, RC6 &amp; CE6</b>	<b>SE5 Stainless Steel Beam</b>	<b>0.3125 inch</b>	<b>1918-29</b>
<b>RB6, RC6 &amp; CE6</b>	<b>OE5 Oldham</b>	<b>0.3125 inch</b>	<b>2105-00</b>
<b>RB6, RC6 &amp; CE6</b>	<b>BE5 Stainless Steel Bellows</b>	<b>0.3125 inch</b>	<b>2092-00</b>
<b>RB6, RC6 &amp; CE6</b>	<b>AE6 Aluminum Beam (obsolete)</b>	<b>0.375 inch</b>	<b>1918-02</b>
<b>RB6, RC6 &amp; CE6</b>	<b>SE6 Stainless Steel Beam</b>	<b>0.375 inch</b>	<b>1918-22</b>
<b>RB6, RC6 &amp; CE6</b>	<b>OE6 Oldham</b>	<b>0.375 inch</b>	<b>3790-52</b>
<b>RB6, RC6 &amp; CE6</b>	<b>BE6 Stainless Steel Bellows</b>	<b>0.375 inch</b>	<b>2032-00</b>
<b>LB8 &amp; RB8</b>	<b>AE6 Aluminum Beam (obsolete)</b>	<b>0.375 inch</b>	<b>1918-21</b>
<b>LB8 &amp; RB8</b>	<b>SE6 Stainless Steel Beam</b>	<b>0.375 inch</b>	<b>1918-23</b>
<b>LB8 &amp; RB8</b>	<b>OE6 Oldham</b>	<b>0.375 inch</b>	<b>2119-00</b>
<b>LB8 &amp; RB8</b>	<b>BE6 Stainless Steel Bellows</b>	<b>0.375 inch</b>	<b>2109-00</b>
<b>LB8 &amp; RB8</b>	<b>AE8 Aluminum Beam (obsolete)</b>	<b>0.5 inch</b>	<b>1918-32</b>
<b>LB8 &amp; RB8</b>	<b>SE8 Stainless Steel Beam</b>	<b>0.5 inch</b>	<b>1918-33</b>
<b>LB8 &amp; RB8</b>	<b>OE8 Oldham</b>	<b>0.5 inch</b>	<b>2120-00</b>
<b>LB8 &amp; RB8</b>	<b>BE8 Stainless Steel Bellows</b>	<b>0.5 inch</b>	<b>6787-50</b>
<b>LB8 &amp; RB8</b>	<b>AE10 Aluminum Beam (obsolete)</b>	<b>0.625 inch</b>	<b>1918-34</b>
<b>LB8 &amp; RB8</b>	<b>SE10 Stainless Steel Beam</b>	<b>0.625 inch</b>	<b>1918-35</b>
<b>LB8 &amp; RB8</b>	<b>OE10 Oldham</b>	<b>0.625 inch</b>	<b>4546-50</b>
<b>LB8 &amp; RB8</b>	<b>BE10 Stainless Steel Bellows</b>	<b>0.625 inch</b>	<b>2112-00</b>



<b>Table</b>	<b>Coupling</b>	<b>Diameter</b>	<b>IDC Number</b>
<b>RG</b>	<b>AE4 Aluminum Beam (obsolete)</b>	<b>0.25 inch</b>	<b>1918-06</b>
<b>RG</b>	<b>SE4 Stainless Steel Beam</b>	<b>0.25 inch</b>	<b>1918-19</b>
<b>RG</b>	<b>OE4 Oldham</b>	<b>0.25 inch</b>	<b>2121-00</b>
<b>RG</b>	<b>BE4 Stainless Steel Bellows</b>	<b>0.25 inch</b>	<b>9869-50</b>
<b>RG</b>	<b>AE5 Aluminum Beam (obsolete)</b>	<b>0.3125 inch</b>	<b>1918-24</b>
<b>RG</b>	<b>SE5 Stainless Steel Beam</b>	<b>0.3125 inch</b>	<b>1918-25</b>
<b>RG</b>	<b>BE5 Stainless Steel Bellows</b>	<b>0.3125 inch</b>	<b>2107-00</b>

### **Positioning Table Linear Encoder Wiring** **12 Pin Din Connector**

<b>Pin</b>	<b>Signal</b>	<b>Standard Cable</b>	<b>High Flex Cable</b>
<b>A</b>	<b>Shield</b>	<b>Bare</b>	<b>Bare</b>
<b>B</b>	<b>0 Volt</b>	<b>White</b>	<b>Brown</b>
<b>C</b>	<b>A+</b>	<b>Green</b>	<b>Green</b>
<b>D</b>	<b>A-</b>	<b>Yellow</b>	<b>Yellow</b>
<b>E</b>	<b>B+</b>	<b>Pink</b>	<b>Orange</b>
<b>G</b>	<b>Ref+</b>	<b>Brown</b>	<b>Violet</b>
<b>H</b>	<b>Ref-</b>	<b>Gray</b>	<b>Blue</b>
<b>K</b>	<b>5 Volt+</b>	<b>Black</b>	<b>Black</b>
<b>L</b>	<b>B-</b>	<b>Red</b>	<b>Red</b>

**A mating connector (5767-50) is shipped with each encoder.**





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# Positioning Table Dos and Don'ts

**Do fully support the positioning table body when lifting it.** *Page 3*

**Do make certain to remove shipping locks prior to table operation.** *Page 3*

**Do make sure that mounting surface is sufficiently flat.** *Page 4*

**Don't subject CP3, CP8, HM or RG tables to shock or impact loads.** *Page 5*

**Don't allow the carriage to collide with hard stops at end of travel.** *Page 6 and Pages 10-13*

**Do make certain that the installation area provides sufficient space for full carriage travel.** *Page 6*

**Don't drill holes into the carriage or base without consulting IDC.** *Page 5*

**Do protect the table against workplace contaminants and residues.** *Page 9*

**Do inspect the table mechanism regularly and clean and lubricate it as required.** *Page 7*

**Don't adjust carriage bearing preload screws.** *Page 5*

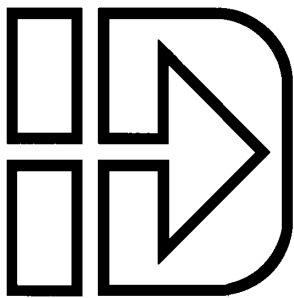
**Do use common sense by keeping fingers, hair, clothing, etc. away from any moving parts.** *Page 6*

**Do secure the carriage whenever transporting or shipping the table.** *Page 14*

**Don't disassemble XY configurations unless your system is equipped with precision alignment dowel pins (XYP assembly option).** *Page 6*

**IMPORTANT NOTICE:**

**Any adjustment, disassembly or shipment of any IDC Positioning System not in compliance with the specifications in this Manual will void the warranty.**



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Precision Positioning Tables - Linear & Rotary Manual

Part # 6037-00

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