

Agilent Technologies

5DX Series 5000 Installation Guide

Manual Version A

Software Revision 8.0

April 2002

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N7200-90116



Emergency Shut Down Procedure

In the event of a disaster or system emergency, shut down the 5DX by pressing one of the Emergency Stop Buttons, as indicated in Figure T-1:

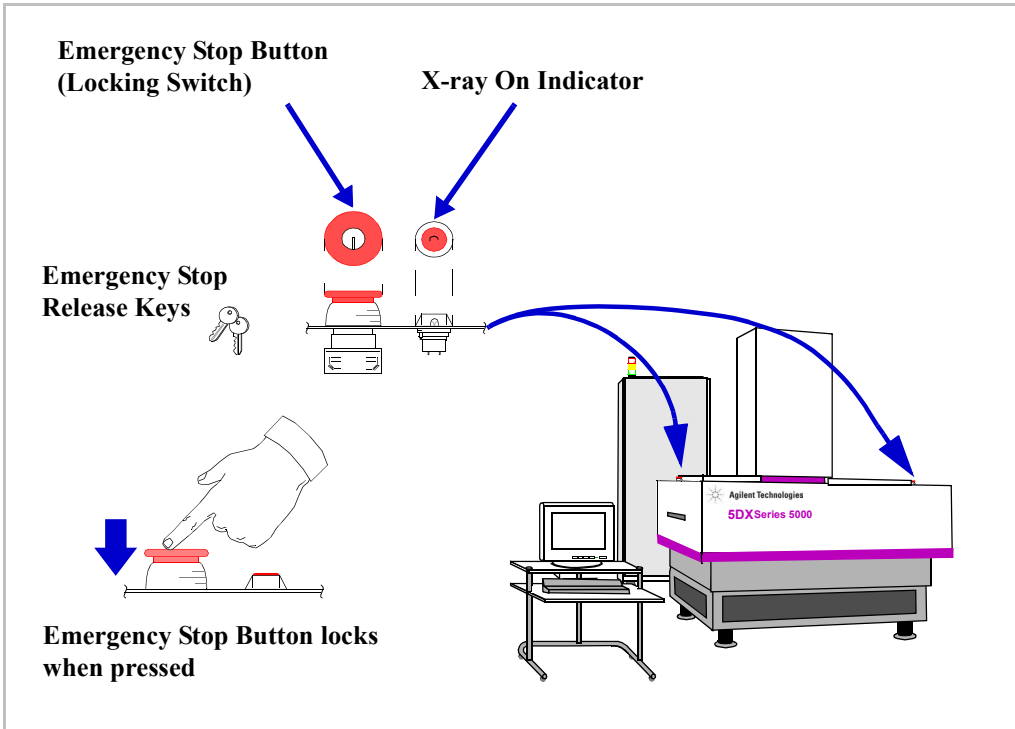


Figure T-1 Emergency Stop Button Locations

For additional information on safety and the 5DX system, see the **Safety Summary** (Chapter 2 of the User's Guide or Service Guide).

Notices

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Printed in USA

N7200-90116 Printed: April 2002

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This page lists this manual's printing history and the system's software revisions. If you receive manual updates or system software revisions, a new Printing History Page will accompany the updates and revisions. It is important that you insert the new Printing History Page in the manual and remove the old one.

Software Revision

8.0

Manual Revision

Rev A.1, April 2002

Safety Information

WARNING



This product produces X-rays. Do not attempt to open any part of the product. Exposure to X-rays can cause serious bodily injury. Refer all servicing to service-trained personnel.

WARNING

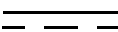


This product produces X-rays. Do not operate this product or turn on the X-rays source unless all shielding is in place. Operation without shielding in place can result in serious bodily injury.

ELECTRIC SYMBOLS



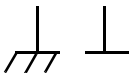
Alternating current (ac)



Direct Current (dc)



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment — protects against electrical shock in case of fault.



Frame or chassis ground terminal — typically connects to the equipment's metal frame.

SAFETY SYMBOLS



Calls attention to a procedure, practice, or condition that could result in bodily injury or death.



Calls attention to a procedure, practice, or condition that could cause damage to equipment or permanent loss of data.



Instruction symbol affixed to product. Indicates that the user must refer to the manual for specific WARNING or CAUTION information to avoid personal injury or damage to the product.



Indicates hazardous voltage.



Indicates Pinch Hazard.



Indicates this equipment produces laser radiation when energized.



Indicates this equipment produces X-rays when energized.

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Agilent Technologies, Inc. assumes no liability for the Customer's failure to comply with these requirements.

Ground the Equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.

For continued protection against fire, replace the line fuses(s) only with the fuse(s) of the same voltage and current rating and type. **DO NOT** use repaired fuses or short-circuited fuse holders.

Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, **DO NOT** perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or by any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Do not service or adjust alone: Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do not substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

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Agilent 5DX Installation

Overview

This document is intended to guide you through the Agilent 5DX installation process. All major steps have check boxes like this: on the left side of the page. Use these check boxes as you proceed with the installation to ensure all steps of the installation are complete.

NOTE



Installation is intended to be performed by qualified Agilent Customer Engineering personnel only.

Preparing for Agilent 5DX Installation

You may need to refer to the following documents.

- Unpacking Instructions (N7200-90075-C)
- Site Preparation Manual (N7200-90109)
- Agilent 5DX System Administration Manual (N7200-90124) (This document is also on-line.)
- 5DX Service Guide (on-line document)
- Agilent Electrostatic Discharge Control Specification (A-5951-1589-1)
- Agilent X-Ray Safety Test Procedure (5021-1979) and X-Ray Safety Test Report (N7200-90092)

The unpacking instructions (N7200-90075-C) will be located on the outside of the crate. The Site Preparation Manual has been sent to the customer before this installation began. The Service Guide and System Administration Manual are on-line when you get the system up and running. The ESD document is one of general corporate nature that you should already be familiar with, if you are not, please review it as soon as possible.

Time Required for Installation

It will generally take one or two days to install the Agilent 5DX System. If this is the first installation at the site, the three-day Basic Maintenance Training should also be provided for the customer's maintenance personnel and primary operators.

The time estimate is a general guideline. You may take more or less time to install the 5DX system depending on the customer's requirements, what components are to be installed, and how the 5DX system is handled throughout the delivery and installation process.

You will need a copy of the X-ray Safety Test Procedure (5021-1979) and the X-Ray Safety Test Report (N7200-90092) to complete the installation. You may need to acquire these before entering the customer site. These documents are available from your Agilent logon at: **http://mskc.usa.agilent.com**. Click on the **EPT/SPT** tab at the top of the page. Click on **LMC Quality X-ray documentation**. Both the procedure and report are available from this page.

What has to be done before installation begins?

All system components and software have been delivered and an acceptable site has been chosen for installation. All utilities (air, electric, etc.) are ready for the installation and are at the site of installation as specified in the Site Preparation Manual.

NOTE



An Agilent CE must be present to break the seal on the truck (domestic shipments) and for pallet unloading, system movement, uncrating and placement (whenever possible).

Table 1 Tools/Equipment Required

Description	Notes
Standard CE toolkit with 5DX tool set	Agilent PN E7200-67917
Torx Screwdrivers	10, 15, 20, 25 sizes
Medium size adjustable wrench	
Standard (SAE) socket set	
Multimeter	Continuity “beep” is useful
Level	25 cm (10 inch) minimum
Calipers	6”
Flashlight / Trouble light with stand	
Radiation meter(s)	Victoreen 440 RF/D Victoreen 290 GM, etc.

System Arrival, Inspection and Placement

An acceptable site must be prepared prior to the installation of the 5DX System. This includes having a level floor capable of supporting 3630 kg (>7600 pounds), clearances for all equipment, power and air utilities and acceptable climate control. Movement to the final location should be considered before transportation. Make sure there is a travel route with sufficient access clearances throughout the course of movement (this includes the turning radius for the 5DX and the forklift).



This photo shows the 5DX as it is waiting to be shipped from the manufacturing facility.

This is how it will look just prior to crating. For shipment, it will have a complete crate around it.

Figure 1 System Arrival

The main unit will be on a pallet 165 centimeters wide by 226 centimeters long (87 x 89 inches). This pallet requires a forklift with a rated lifting capacity of at least 4536 kilograms (10,000 pounds). The tines on the forklift must be at least 152 centimeters (60 inches) long, each tine must be no more than 17.5 centimeters (6.75 inches) wide. The main unit, crated and on its pallet, will be approximately 244 centimeters (96 inches) high. Consider this height, plus the lift height when moving the 5DX.

It may be desirable to remove the 5DX from its pallet in the receiving area and move it to the installation location from there.

Be careful of cables, hoses, etc.,
(see the note below about forklift
caution.)

Forklift tines should be no more
than 17.5 centimeters (6.75
inches) wide, set to 87.5 cm (34.5
inch) center-to-center distance apart
and be 152 cm (60 inches) long
(minimum)

(Rear of 5DX shown)

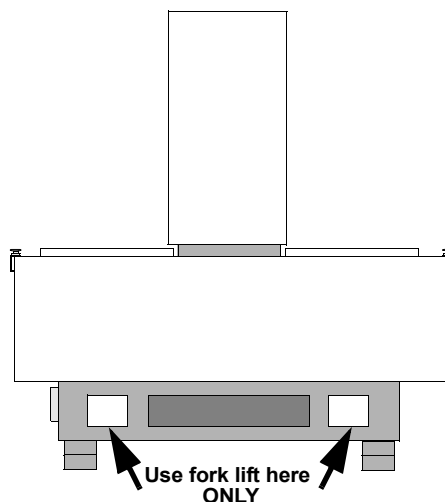


Figure 2 System Arrival

Caution



Lift the system where shown only. Do Not use a lift or jack on the rest of the frame or system damage could occur.

1. **Check for Gross Damage** — Look for and record any damage to packing materials, etc. Note any areas where the equipment has been exposed. Document any damage on the waybill. Note the two Tiltwatch Indicators and Drop Monitor. These indicators must not have been tripped during shipment or the system may be damaged. Advise the carrier and contact *Agilent 5DX Support Services* immediately. If significant damage exists, document the damage completely (take pictures if possible) prior to further unpacking or movement.

- 2. **Accessories** — If there is an accessories crate or pallet, it is advisable to move it to the installation area before opening. (If there is a wooden crate, open it by removing the bolts from the front of each (there are bolts on top as well as on both sides.)) Remove the boxes from the accessory crate or pallet.
- 3. **Electronics bay** — This will be located on the same pallet as the main unit. The unpacking instructions provide information on removal from the main 5DX pallet. The electronics bay is tethered to the main unit, leave this tether in place even after installation.

Caution



Do not rely on the tether to move the electronics bay along with the main unit. Someone must push or pull the electronics bay while the main unit is being transported.

- 4. **Verify Items Shipped** — *CE must be present for system and crate unloading, system movement, and system placement: (whenever possible)* Inspect all received containers and verify the correct number of items arrived with the shipment. *(See the packing list: If the packing list is missing, contact the customer facility receiving personnel.)*

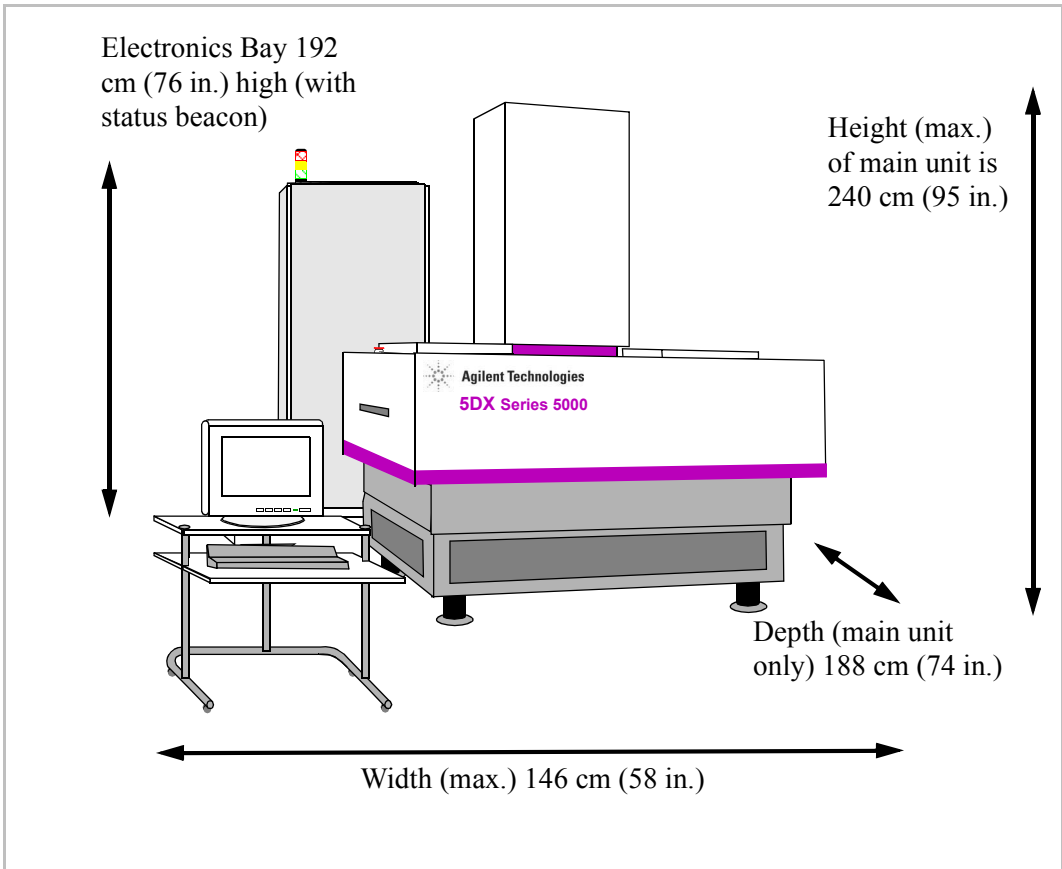


Figure 3 System Dimensions

NOTE



The main unit while on its pallet is 2.44 meters or 96 inches high. This height plus the required forklift lifting distance is needed for (clearance) movement while on the shipping pallet.

- 5. **Move 5DX To Install Site** — To remove the 5DX from its pallet, remove the four (15/16”) nuts from the 5DX in the bottom four corners of the main frame. When you are ready, (using acceptable lifting equipment) raise the 5DX from its pallet and move to the install area. You will need assistance to move the tethered electronics bay along with the main unit.

Caution



Be very careful while moving the forklift in place to remove the 5DX from its pallet. You will likely have to do this at the rear of the unit and there are wires, air lines and the interlock controller that can all be damaged by careless forklift use.

- 6. **Staging** — Organize all materials in the installation area. Prior to beginning installation, find the box with the foot pads and spacers (part number E7200-80024).
- 7. **Clear Packaging** — Remove all remaining items from the 5DX pallet. Remove the remaining packing materials, straps, padding etc. from the 5DX. Tape is applied to the edges of the tower door to prevent damage during shipping. Be sure to remove this tape to ensure a good door seal.
- 8. **Inspect the 5DX** — Inspect the 5DX and accessories for damage. Inspect system exterior for abrasions or dents. Record any damage on the waybill. Advise the carrier and contact *Agilent 5DX Support Services* immediately.

WARNING



While lowering the 5DX on the threaded foot pads and spacers, make sure the forklift operator is aware you will be under the raised system.

- 9. **System Placement** — When the system has been delivered to the install area, move it to the desired placement location. Position the system according to the customer’s requirements then install the foot

pads with spacers for the estimated height requirement (see Table 3 on page 10). It is recommended that the pads and spacers be put on while the system is elevated by the fork lift. The system can be lowered on to the pads and spacers, however this is extremely difficult to execute.

Table 2 Spacer Size Reference

Spacer	In Centimeters	In Inches	Quantity
Spacer A (E7200-24715)	1.60 cm	0.630 in.	4
Spacer B (E7200-24717)	3.175 cm	1.25 in.	8
Spacer C (E7200-24716)	7.62 cm	3.0 in.	4

ADVICE



If the height of the system does not matter, it may be best to install all the spacers so none become lost.

- 10. Check System Height and Position** — If the 5DX is installed on a production line, adjust the system location such that the fixed rail aligns with the production line conveyors. Markings will be on each outer barrier frame to show where the stage position for loading and unloading will be (see Figure 4). Use these markings to align height and position of the 5DX with the customers line.
- 11. Verify that the system is level** — Adjust pads as required. This is done by turning the top of the threaded shaft (see Figure 5). Use a level inside the system on the granite base in various locations rather than on the top of the system. Check x and y orientation in all 4 corners.

ADVICE



If the 5DX system is to be integrated into a production line, you may wish to level and adjust height at the same time. Align the 5DX with the production line using the lines marked on the outer barrier frame.

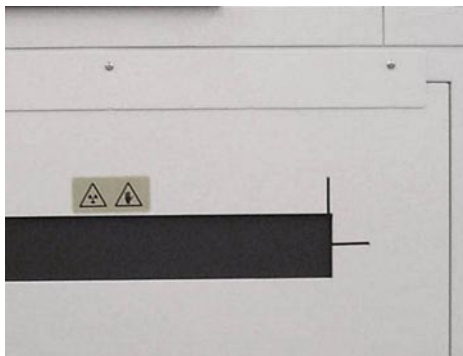
Table 3 Height Configuration Chart

Spacer Combinations	Minimum Height in centimeters (inches)	Maximum Height in centimeters (inches)
A	81.0 (31.9)	82.9 (32.6)
B	82.5 (32.5)	84.4 (33.2)
A B	84.1 (33.1)	86.0 (33.9)
B B	85.7 (33.7)	87.6 (34.5)
C	87.0 (34.2)	88.9 (35.0)
A B B	87.3 (34.4)	89.2 (35.1)
A C	88.6 (34.9)	90.5 (35.6)
B C	90.1 (35.5)	92.0 (36.2)
A B C	91.7 (36.1)	93.6 (36.9)
B B C	93.3 (36.7)	95.2 (37.5)
A B B C	94.9 (37.4)	96.8 (38.1)

ADVICE



Use the spacer combination closest to the minimum for better system stability. For example if you need a height of 87 centimeters, two B spacers would work but use one C instead; this way the threaded shaft is closer to its bottom point. Using no spacers is not an option due to cable and camera requirements.



Use these alignment marks on the 5DX to align the system with the customer's line.

(left side shown)

Figure 4 Stage Rail Alignment Markings

Check the height of both stage rail belts. (If the system has a middle rail, you can use only the outer rails for height adjustment.)

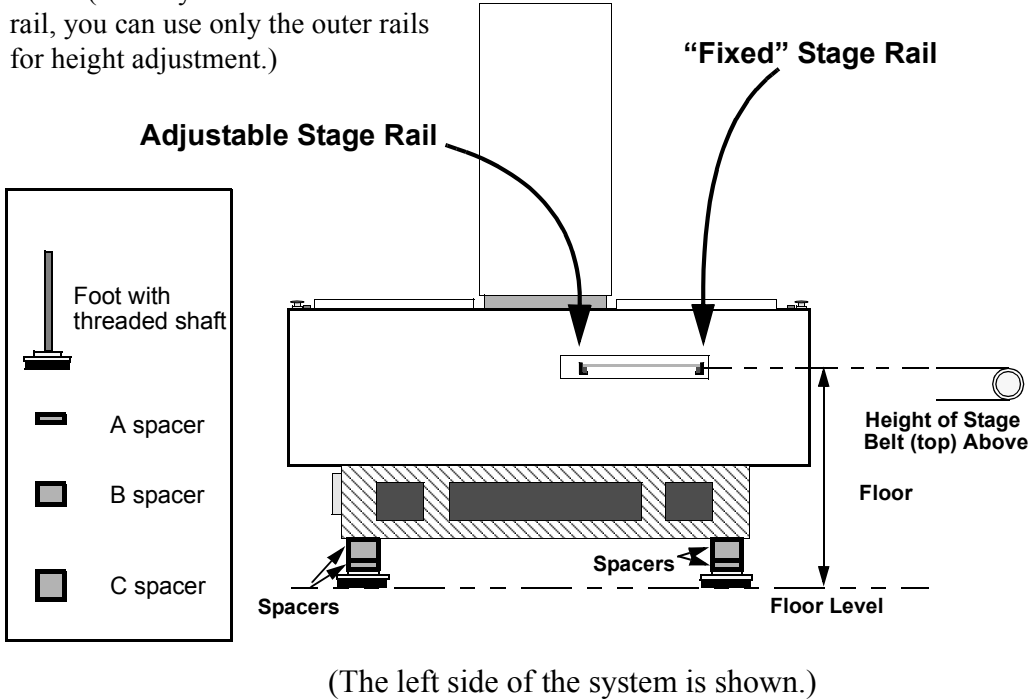


Figure 5 **Height Setup**

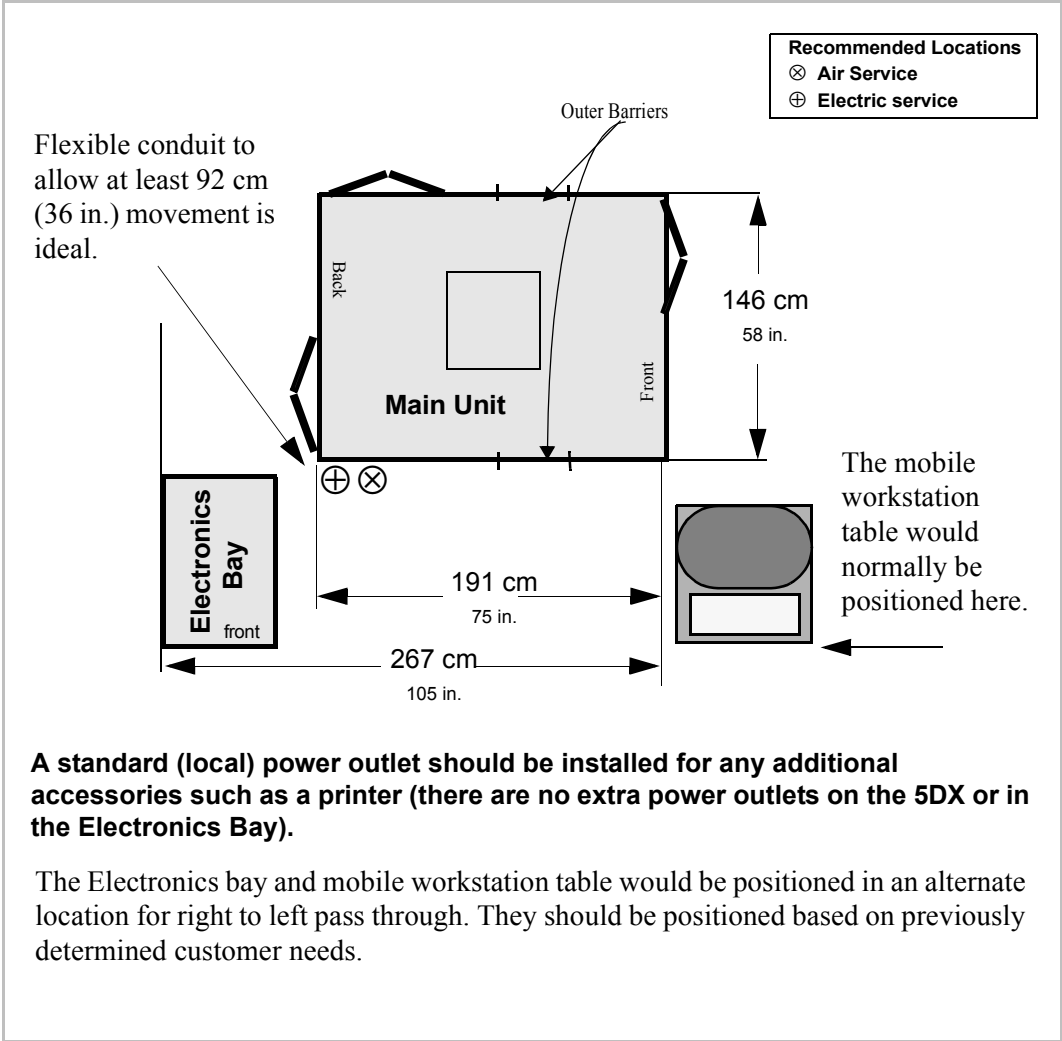


Figure 6 Typical Installation (overhead view)

System Hardware Installation and Setup

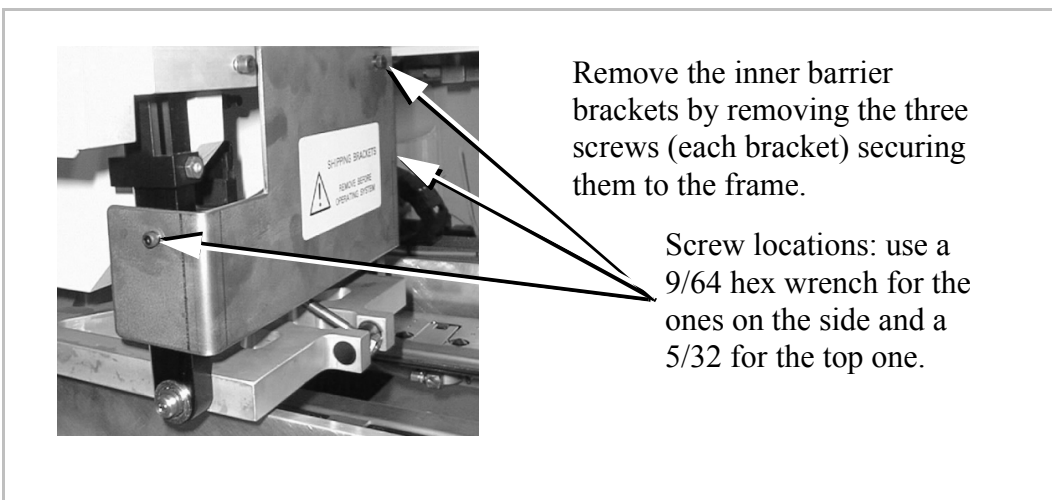
Site preparation and movement to the final location should be complete at this point. Verify correct placement of the main unit, and subsystems (such as the Electronics Bay, user interface and monitor) with your customer (see Figure 6). Begin assembly of the 5DX system using the following procedure:

- 1. **Stage Release** — There are several tie wraps securing the stage, movement motors and assemblies inside the main cabinet. Remove these to allow both X and Y movement.
- 2. **Check Lead Panels** — There are eight lead panels around the outer edge of the granite. Check to make sure none have come loose during shipment.
- 3. **Inner Barrier Release** — There are brackets mounted to both sides of the inner barrier. Each is held in place by three screws (see Figure 7). Open the top sliding access panel on each side and remove these to allow barrier movement. These parts may be discarded or recycled after they are removed.

Caution



The screws also have washers. Be careful not to drop the bracket screws or washers inside the 5DX.



Remove the inner barrier brackets by removing the three screws (each bracket) securing them to the frame.

Screw locations: use a 9/64 hex wrench for the ones on the side and a 5/32 for the top one.

Figure 7 Inner Barrier Bracket

- 4. Check X-ray Tower** — Open the tower door with the T-handle that shipped with the system. Check the SF⁶ pressure. It must be above 40psi, and should be 55-65psi. Verify all cords are firmly seated in their connections. Two bolts in the tower door are designed to prevent damage during shipment and to reduce vibration during high speed stage movement.
- 5. Electronics Bay Setup** — Open the rear door of the bay and locate the bay door keys. Unlock the front door for accessibility. Remove the light stack and install on top of the bay with the screws provided. (This will require removal of the top of the electronics bay. You may want to remove the doors at this time as well to facilitate access.)

Attention



Assemblies within the electronics bay are susceptible to electrostatic discharge. Be sure to properly ground yourself before handling any assemblies.

- 6. Electronics Bay Subassemblies & PCBs** — Inspect the condition of electronics subassemblies. Inspect the individual subassemblies and pc boards; look for those which may have unseated during shipping. Particular attention should be paid to the motion driver assemblies.

- 7. Mobile Workstation Cabling** — Route the monitor, keyboard and operator console cabling toward the mobile workstation table location.

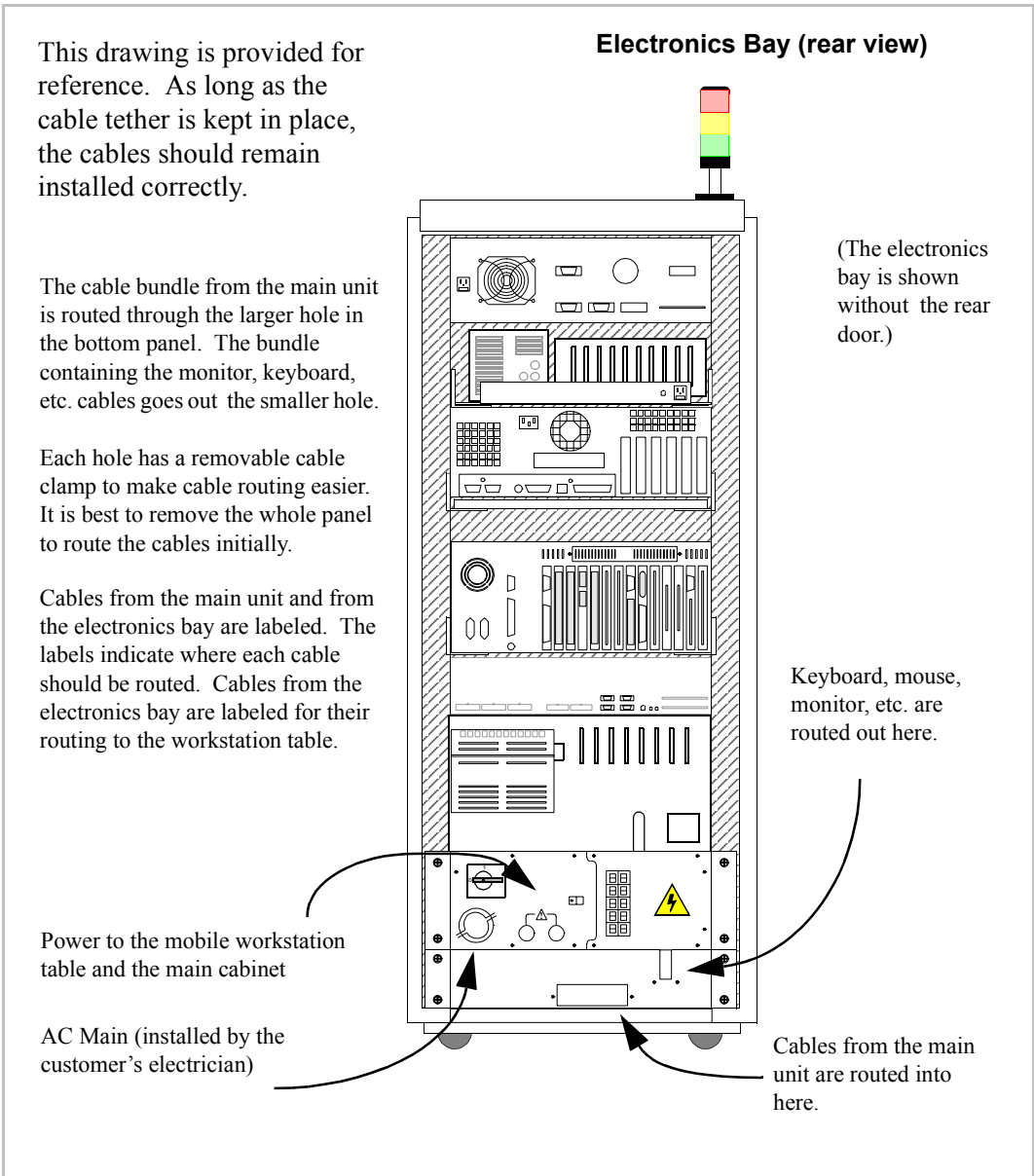


Figure 8 Cable Harness Routing

- 8. **Mobile Workstation Table Assembly** — Unpack and assemble the mobile workstation “Computer Table” according to the manufacturer’s instructions included with the unit. Set the height of the keyboard table and monitor shelf according to customer needs.
- 9. **Operator Interface Assemblies** — Unpack the monitor, keyboard, and mouse and put them on the workstation table. Connect all cables as shown by the labels.
- 10. **Operator Control Panel** — Install the Operator Control Panel on the workstation table using two screws (0624-0853) and mounting to the parallel monitor supports. Connect the cable (E7200-61469) to the port on the side of the control panel.
- 11. **Accessory Power** — The power outlet box needs to be assembled with the mobile workstation cart.
 - a. Install the power outlet box (E4000-61623) on the rear of the bracket (E7200-01220) that will mount to the mobile workstation table using two screws (0515-0433).
 - b. Mark the input voltage at 200-208 or 220-240 AC, whichever is appropriate, with a permanent marker.

	200-208 V
	220-240 V
 - c. Install the bracket to the rear vertical support of the mobile workstation table using two screws (0624-0394).
 - d. Route the cables from the power outlet box for a neat appearance. Use cable ties (provided) to secure to the mobile workstation table.
- 12. **Laser Printer (Optional)** — If a laser printer came with the system, install the printer in a location convenient to the proper power source. United States and Canada customers will receive printers requiring 108 - 110 Volts. Plug these printers in to a wall 110 outlet (as referred

to in the Site Preparation Guide) that is provided by local facilities.

Caution

Do not plug a printer that requires 108-110 volts in to the workstation power supply on the 5DX. This power supply is 200-208 or 220-240 volts. Damage will occur to the printer.

Customers outside the United States and Canada receive printers requiring 220-240 Volts. These printers can be plugged in to the power supply mounted on the workstation cart or to any wall outlet providing the correct 220-240 volts.

- 13. Compressed Air and Filter Canister Assembly** — Install the air filter canister by inserting and turning counter-clockwise. Connect the facility air input line. (see Figure 9)

NOTE

The air filter and connection are located on the lower rear of the main cabinet. Verify the input air supplied is at least 5.6 Kg/cm² (80 psi or 550 kpa), and adjust if required. The air supply should also be free of contaminants such as debris, oil or water

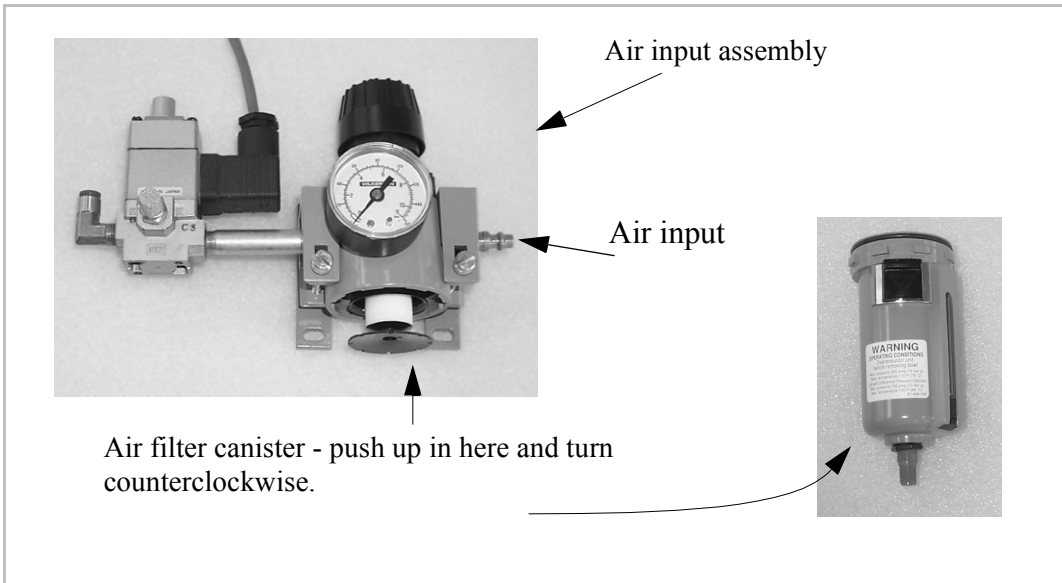


Figure 9 Air Input and Filter Canister

- 14. Main Cabinet Inspection** — Inspect the inside of the Main Cabinet to:
 - verify that there are no loose items
 - remove excess grease from the X and Y axes lead screws with a clean cloth
 - verify all stage securing ties are removed
- 15. Air Filter Installation** — Install the air filter on top of the x-ray tower. It fits into a beveled area on top of the tower.
- 16. Connect Camera Cabling**
 - a. Connect the camera and camera power supply and install the power cord to the camera power supply.
 - b. Connect the frame grabber cables (**SMD CAMERA, N7200-61734**) to the **DATA1** and **DATA2** connection on the camera, according to

the labels. Be very careful to when making this connection since the pins are very small and fragile. **Use great care to orient the sockets correctly! Incorrect connection CAN BE forced. Connector damage will result.** If the sockets are incorrectly oriented, there will be no image in the image window. If Data1 and Data2 are switched, the picture on the image window will be upside down.

- c. Connect the **SERIAL** (telephone style) connection on the camera.
- d. Connect the shutter cable (**CAMERA SHUTTER, E7200-61463**) to the **SYNC** connector on the camera (the sync connector is the one closest to the LEDs).

17. AC Main Hookup — Work with the customer electrician to provide main power installation to local code. For general service feed location, see Figure 8 on page 17 and Figure 10 on page 22. Normal requirements are:

- Between 195 and 240 volts, three phase (3 Φ) 5 \emptyset or 6 \emptyset Hz. (See appendix C for overall requirements)
- Where allowed, the recommended attachment is via flexible conduit, allowing a range of motion for the electronics bay of a minimum of 1 meter (a bit over 3 feet) to allow for serviceability. For optimum flexibility, extend this to 2 meters. Cables must be the stranded type (not solid). **Follow local code if it supersedes these instructions.**
- A breaker panel near the 5DX installation area can be used to allow complete power down in case of an emergency. The E1135C PDU (Power Distribution Unit) has a rotating, lockable switch for this as well.

NOTE

5DX systems are pre-wired with a cord and plug. The local electrician will only need to install a suitable outlet where the plug can be inserted. Follow local code regulations.

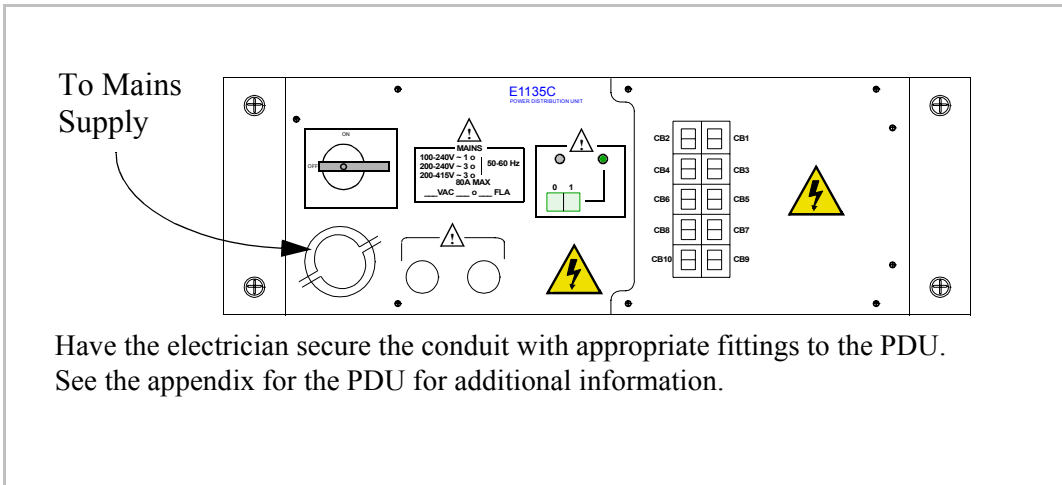


Figure 10 Power Distribution Unit

18. **Connect Power from PDU** —Connect the power cords to the PDU as described by the information in Figure 11 below.

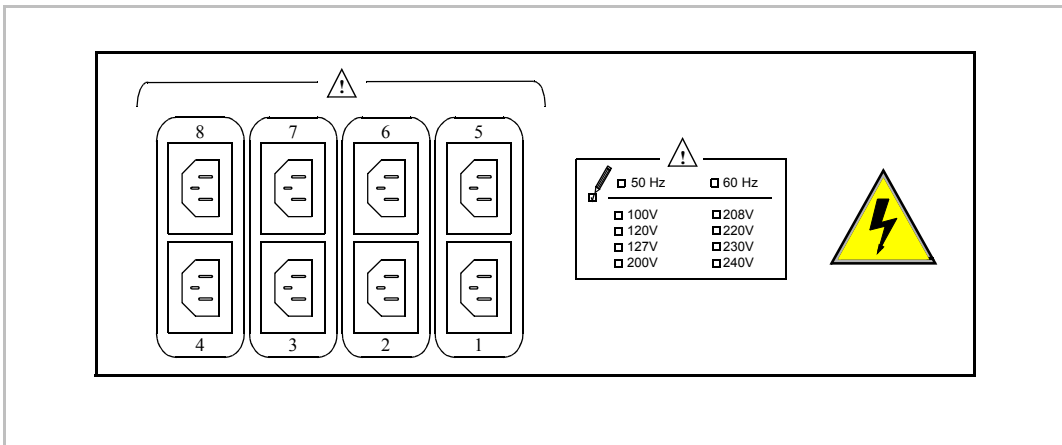


Figure 11 PDU Rear Panel

The auxiliary outlets are numbered. The following components plug into the respective auxiliary outlets as follows:

- Outlet 1 — Rear Laser Displacement Sensor
- Outlet 2 — Front Laser Displacement Sensor
- Outlet 3 —
- Outlet 4 —
- Outlet 5 — X Servo Module
- Outlet 6 — R Servo Module
- Outlet 7 — Y1 Servo Module
- Outlet 8 — Y2 Servo Module

System Performance Verification Procedure

The following procedures should be closely followed to verify proper system performance. These steps will verify that all levels are correct before full power is applied to all assemblies.

- 1. **AC Voltage Check** — After the site power (main) is connected to the PDU, unplug all subassembly AC power cords.
 - a. Make sure all connectors are properly seated prior to turning on the power, especially the connectors that attach to the back of the PDU. System damage may occur if all connectors are not properly seated.
 - b. Turn the power **ON** using the **switch on the rear of the PDU**.

WARNING



Voltage and current sufficient to cause severe shock or other bodily damage are present in this assembly.

- c. Check the bay AC voltage using line voltage safety precautions:
- d. The PDU output voltage should be between *195 volts*, and *240 volts AC*. If it is not:
 - Turn off mains power from the system at the facility circuit breaker.
 - Check the wiring into the PDU. Have the customer electrician verify all wiring. Repeat this process until the range above is reached.
- e. If the output voltage is in the range, turn power off at the main circuit breaker on the rear of the PDU.
- f. Reconnect all subsystem power cords.
- g. Verify the expansion chassis (PCI expansion box, below the CPU) power switch is **OFF**.

- h. Check that the other components in the electronics bay are in the **ON** state, so they will power up when the PDU is switched on.
- i. Turn on PDU breaker, but not the switch.

2. **CPU Power Up** — The switch should be off on the expansion chassis.

NOTE

The power for the main CPU (Kayak computer) is controlled by the power switch on the expansion chassis.

- a. Switch the expansion chassis **ON**.
- b. Power **ON** the computer monitor. Allow CPU to boot up and note any warnings or errors. Errors indicate a system (hardware/software) failure and require troubleshooting and repair before proceeding. For troubleshooting, refer to the Service Guide (N7200-90041).
- c. Switch the PDU **ON** (if it is not already).

3. **Vacion™ Power Supply Voltage Check** — Use a voltmeter and measure the Vacion Power Supply at test point J04000 on the power supply. It is located under the main unit in the rear (see Figure 12). Measure this at the BNC connector on the power supply. The reading may be as high as 3 volts d.c. but after warm-up (~1/2 hour) it should read in the 20 - 50 millivolt range and be continuing to drop slowly.

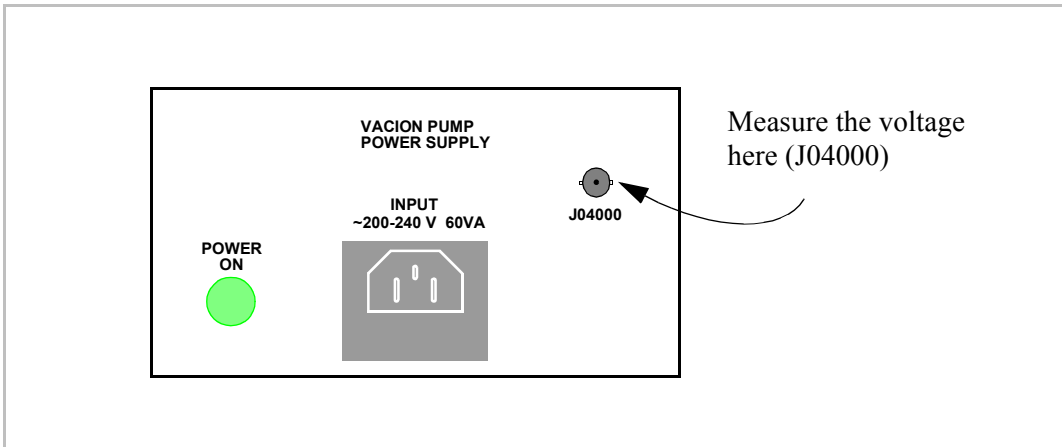


Figure 12 Vacion Power Supply

4. **Check Interlocks** — Enable the X-ray key and press the **ON** switch. Tap each of the 6 side doors, 2 topside access panels, tower door and interlock points with your hand. Watch to see if the red interlock LED on the control panel goes off. If it does, adjustment of interlock switches may be required. (Refer to the Service Manual, Safety Interlock Subsystem section for more information.).

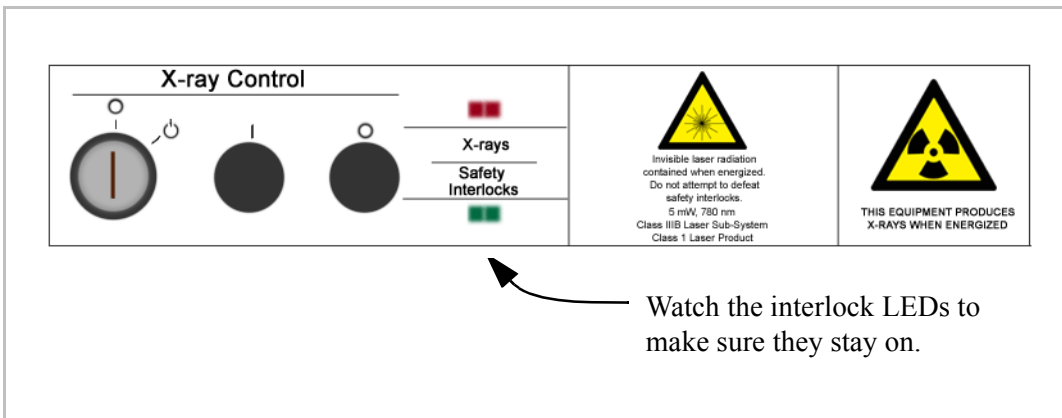


Figure 13 Operator Control Panel

System Start-up

1. **Log on to the Computer** - Press **Ctrl Alt Del** and the login screen will appear. It already has “Administrator” as the user name. Type in the password and press **Enter**. You will see a dialog box appear like that below; press a key to continue.

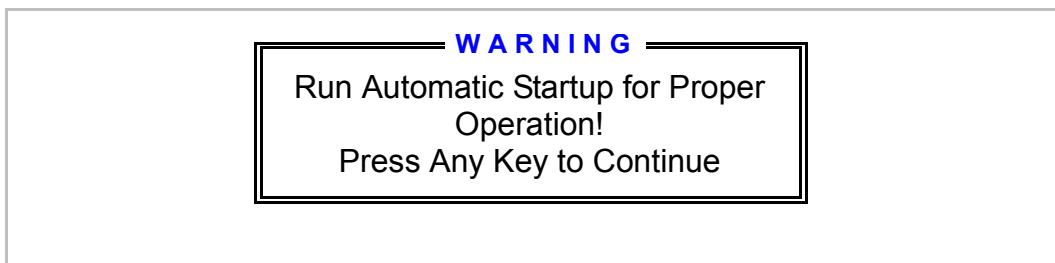


Figure 14 Start-up Warning Dialog Box

2. **Configure the network** - Immediately after logging on the first time, the network must be configured. Have your local systems administrator or IT specialist perform the required network protocol settings as described in the Site Prep Guide (N7200-90049).
3. **5DX Logon** - A box with **Enter your name** comes up. Type **S** and press **Enter**.
4. **Start-up** - In the system configuration window, use the arrow and enter key (or select the letter shown in yellow) to select: **System Access > Startup > Automatic Startup**.

NOTE



If you go too far into a menu, use the **Esc** key to back out one level from the current menu item.

- 5. The system will begin the start-up procedure (see Figure 15).



Figure 15 **Start-up message**

- 6. **Start-up** - There will be several messages about the system starting up and initializing subsystems. During this, the system should home the stage and start the rotary scintillator.

7. **X-ray Start-up** - The system should now bring up a start-up screen similar to Figure 16. Press **Esc** to exit X-ray Startup, since you don't want to bring up X-rays yet. Panel Handling should be verified before X-rays are turned on.

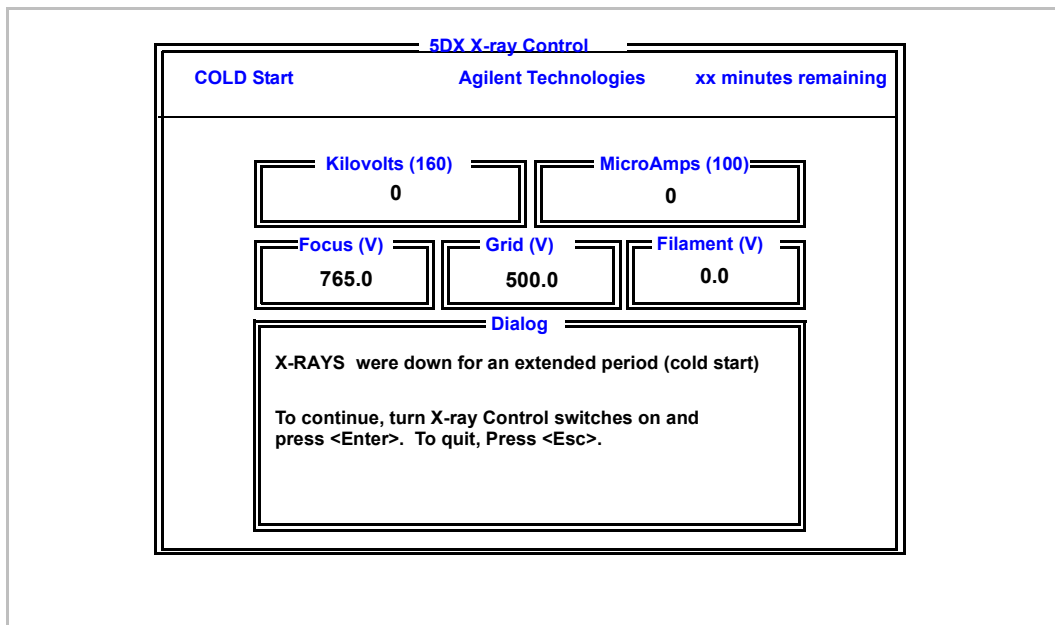


Figure 16 X-ray Start-up Screen

NOTE



Other error or warning messages could occur during this process. In general, press **Esc** to clear these. If error dialog boxes appear with a choice, use one of the choices. For example: “Failed to establish X-ray power on, do you wish to retry start-up (Y/N)”. Press **N** to disable the retry.

Panel Handling Subsystem Verification

NOTE



All main cabinet access panels must be closed and the green and red interlock LEDs lighted on the operator control console.

NOTE



When installing a Pay Per Use system, remember to use Agilent CE test credits during all panel handling verification, so as not to use customer credits during this setup phase.

1. **Verify Correct Load/Unload Configuration** — Standard systems are Left-to-Right. However, if the customer requires a Right-to-Left configuration, a procedure must be followed to change the configuration to Right-to-Left. This procedure is available in the online documentation 5DX Service Guide. If it is required, do this before you continue further. If not, proceed with the next step now.



2. **Stage Alignment Verification** — Check loading and unloading.

- a. Select **Utilities > Load Panel Program** from the menu. From the pick list, choose **5DX_512**. (The older panel uses **4picalibxxx/sub** where xxx = the last three digits of the serial number of the machine).
- b. From the **Utilities Menu**, select **Panel Handling** and choose **Automatic**. Load and unload the calibration board several times, homing the rails after each load and unload iteration.

NOTE



On passback models, errors may occur. If so, perform **Reset Panel Handling** to clear them.

- Verify that the load and unload cycle is consistent, and the external barriers (doors) operate smoothly both in the open and the closed directions.

- Verify that the stage rails align to the production line rails for the load and unload transitions (if this is an in-line installation). Refer to the online Service Guide for troubleshooting.

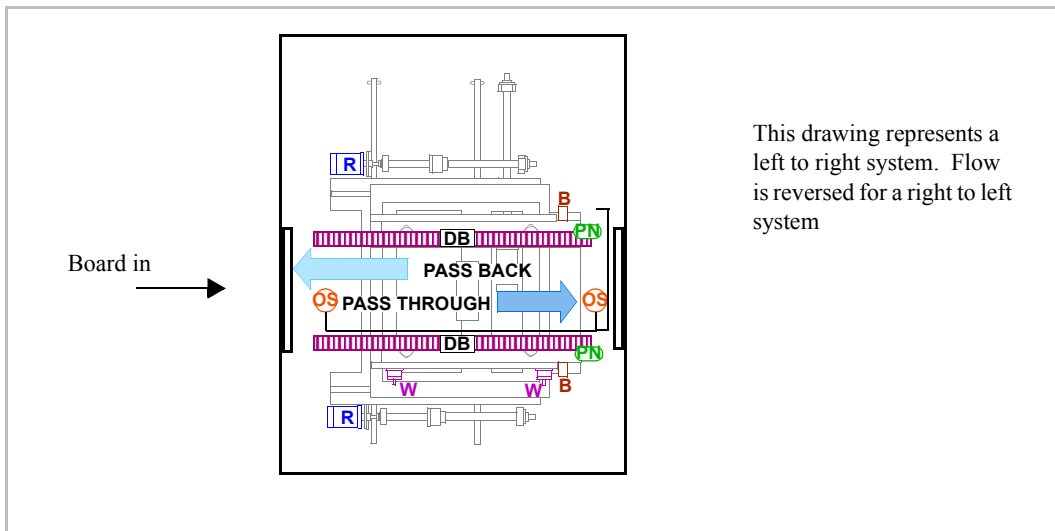


Figure 17 Main Stage (top down view)

3. **Verify Panel Handling System Operation** — Verify operation and width adjust: Only perform this step and the next step (**Step 4.-Stage Rail Adjustment**) if you have problems loading a panel. Otherwise, proceed to **Step 5.- XYZ Axis Checks**
 - a. Select **Utilities > Panel Handling > Home Rails**.
 - b. Select **Utilities > Panel Handling > Manual Panel Load**.

- c. At the prompt, enter **11450** (see note below) and press **Enter**. This number is the width of the confirmation panel in mils (1 mil equals 0.001 inches).

NOTE



It is recommended you use the value for the newer Confirmation and Adjustment board (E7200-90039) for installation. This board uses the 11450 value. If there is not a newer board available, the older panel (E7200-60027) (Four Pi 403570-101) will need to be used. If that is the case, use a value of 11950 here and all other instances where this guide mentions the 11450 value.

4. **Stage Rail Adjustment** — After the board has loaded, unload it using **Panel Handling > Unload Panel**. (Press **Esc** to abort the load process if you need to.) If the confirmation and adjustment board does not load or unload properly, adjustment will be required. You should perform the steps below anyway.
 - a. Open the two sliding access panels on top of the main unit. Use calipers (or equivalent) to measure the distance between the fixed rail and the adjustable rail for the main stage. The distance should be **11.480 (±0.005)** inches (11.980 for the older panel). Measure the width at both ends of the rails to verify that they are parallel.
 - b. If this distance is incorrect then select **Quit from 5DX** under the **System Access** menu.
 - At the **DOS** prompt type **ca** and press **Enter** to go to the **Calib** directory.
 - Type **vs machine.cfg** and edit the appropriate home width that requires correction. (This should be the line with “@Mach_MainHomeWidth”)
 - After editing, press **ALT W** to *save* the changes then press **ALT X** to *exit* the file.

- Type **ma** to return to the master directory.
 - Type **loadinit** and press **Enter**.
 - Type **auto** and press **Enter** to return to *User Interface*.
 - Close all access panels.
- c. From the **Utilities** menu select **Panel Handling > Home Rails**.
- d. Select **Manual Panel Load**. At the prompt enter **11450** again (11950 for the older panel). Repeat the measurement procedure again until the measurements all meet the **11.480 (±0.005)** (11.980 for the older panel) specification.
5. **XYZ Axis Checks** — Verify the stage operation as follows:
- a. Load the confirmation and adjustment board.
 - b. From the **Utilities Menu**, select **Service > XYZ Stage > Z Stage Test**. The prompts will step you through the setup test parameters. The results should be contained in four graphs. There should be no more than 5 mil. difference (Z coordinates only) between the four. (Passing means a sigma of equal to or less than **(±0.5)**.) (If there is a second laser, repeat the test for it.)
 - c. Unload the confirmation board.
6. **Bring up X-ray High Voltage** — This step ramps the high voltage up slowly without drive current (no X-ray generation at this time).

WARNING

The 5DX produces X-rays. Do not operate the 5DX unless all shielding is in place. Exposure to X-rays can result in serious bodily injury.

- a. Use a voltmeter to recheck the Vacion Power Supply at test point J04000. (Figure 12 on page 26) The reading should now be less than 20 mv. If it is not, or has risen since your last reading, there is a

problem--do not bring up X-Rays. Refer to the online Service Guide (N7200-90041) for troubleshooting.

Caution



If the reading is not less than 20mv, allow more time for the Vacion power supply to operate. Recheck this again before proceeding.

- b. Select **System Access** then **Quit from 5DX**.
- c. From the DOS prompt, type **ca** and press **Enter**.
- d. Type **vs xray.cfg** and edit the line **Cold Start Rampup** to have a value of **60** instead of **15**.

Caution



Failure to do this step could result in permanent damage to the X-ray tube. The X-ray tube has components that need to warm up before generating X-rays. The system has been unpowered for an extended period of time so the X-ray tube requires a 60 minute start up.

- e. After editing the **xray.cfg** file, use **Alt W** to save the file and **Alt X** to exit the editor.
- f. From the Operator Control Panel (Figure 13 on page 26) turn the X-Ray Enable Key to **Enable**, then push the X-Ray **On** Button.
- g. From the DOS prompt, type **ma** and press **Enter** to enter the master directory. Then type **xrayon -zero** and press **Enter**. A warning will be displayed. Press **Esc** to continue. The time remaining should indicate 60 minutes in the status display.
- h. After 60 minutes ramp time, the high voltage should show about 160 kv in the status display and remain stable. If it does not, there is a problem and you should contact Agilent 5DX Hardware Support.

- i. From the DOS prompt, type **ca** and press **Enter**.
 - j. Type **vs xray.cfg** and edit the line labeled **Cold Start Rampup** so it has a value of **15** (this is the original value).
 - k. As before, use **Alt W** to save and **Alt X** to exit.
 - l. Type **ma** and press **Enter** to return to the master directory.
7. **5DX Main Cabinet Radiation Integrity Check** — To verify the 5DX Cabinet Integrity and containment of X-Ray emissions, perform the following:
 - Complete a formal on-site radiation survey. Use two documents: Document Number 5021-1979 is the procedure to follow, “X-ray Safety Test Procedure,” and Document Number E7200-90084 (Series I and II), or N7200-90092 (Series 2L,3 and 5000) is the report form “X-Ray Safety Test Report.” (The latest versions can be obtained from the MSKC web site: <http://mskc.usa.agilent.com/>)
8. **Laminography Imaging Validation** — To verify that laminographic imaging is functioning, perform the following steps:
 - a. From the *User Interface* menu, go to the *Utilities* menu and select **Load Panel Program**. Select **5DX_512** from the pick list.
 - b. Select **400 FOV**.
 - c. From the *Utilities* menu, select **Panel Handling** then choose **Automatic**. When prompted, load the confirmation and adjustment board.
 - d. From the **System Access Menu**, select **Quit from 5DX**. At the DOS prompt type **gotocal -dots** and press **Enter**.
 - e. Type **loadsync -f400 -b1** and press **Enter**.
 - f. Type **sync -e** and press **Enter**.

- g. Select the camera icon on the graphic display window. Switch the display to Live Laminography.
- h. Verify that the **5 dot** calibration pattern is visible on the graphic display window. (Some adjustment of the focus (Z axis) may be required.)
- i. From the DOS prompt type **auto** and press **Enter**.



9. **Self Test Validation** — To verify that Self Test is functioning properly, perform the following steps:
- a. From the **System Access** menu select **System Startup**.
 - b. Select **Automatic Startup** to bring the 5DX to a ready state.
 - c. Select **Utilities > Service Menu > Adjust > Self-test > Self Test Setup**
 - d. Go to **Utilities > Service Menu > Adjust > Self-test**. From the menu, select **Run**.
 - e. For information on running self tests, see the System Administration Guide (on line with the system manuals).
 - f. Verify that all tests pass. If tests do not pass, refer to the Service Guide (N7200-90041) or try self test setup and run self test again.

NOTE



It may be difficult for Self-Test to pass until Confirm and Adjust has been run.



10. **System Operation Functional Checks** — To verify that the overall system is functioning properly, perform the following steps:
- a. From the **Utilities** menu, select **Load Panel Program** then choose **5DX_512**. Select a 400 FOV.

- b. Load the confirmation and adjustment board, if not still in from previous step.
- c. From the **Utilities** menu, select **Align Board**. When prompted, choose **Manual** and **Use Previous Alignment for all views**
- d. A Caution Box will appear:
Board will need to be exposed to continuous X-rays. Do you want to turn on Live X-rays (Y/N)
Press **Y**.
- e. Follow the steps on the screen: verify that the alignment points are in range. Perform adjustment if necessary, including the Z-axis for focus. Be aware that large corrections in any of the axes indicate a possible change in an axes' zero reference, or change in rail location.

NOTE

If the alignment is not where expected, it may mean that an alignment or reference in the axes assemblies has changed. If alignment is significantly moved (such as out of the view), verify the confirmation & adjustment panel is loaded correctly. Home the axes and recheck. Next, try a customer board and verify that the alignment is off by the same amount. If the alignment is significantly out of range, it may require a verification of the axes assemblies' alignment. Refer to the System Administration Manual.

- f. Select **Automatic**. Verify that the images are clear and focused.
- g. From the **Utilities** menu, select **Surface Map**. Select **Automatic**.
- h. From the top level **User Interface** menu, select **Test**. Select **Panel**. Provide data entries as requested (for most items, simply pressing **Enter** will be appropriate).
- i. Review the measurement information and verify there were no failures.

- 11. **Hardware Reliability Functional Checks** — To verify that system hardware is functioning properly, perform the following steps:
 - a. From the *User Interface* menu, select **System Access** menu, select **Quit from 5DX**.
 - b. From the DOS prompt type **auto -demo** and press **Enter**.

NOTE



This command will initiate and repeat the automatic inspection mode for the confirmation and adjustment board.

- c. Select **Test**. Select **Panel** and press **Enter**. Follow the menu steps through to the start of inspection mode.
 - d. When the first test run is completed, the process should continue to repeat without operator interaction. Allow the demo inspection mode to run for a minimum of two hours. If convenient at the time, let the tests run overnight.
 - e. Press **Esc** to stop the inspection when done.
 - f. When the demo period is complete, from the **System Access** menu, select **Quit from 5DX**.
 - g. Enter *User Interface* from the DOS prompt by typing **auto** and pressing **Enter**.
- 12. **Final Adjustments** — Perform the final adjustments by selecting **Confirm and Adjust > Adjust > All**. All of the adjustments will run in proper order. Remain at the controller, some intervention or input may be required during adjustment cycle. Run self-test setup. When completed, run the self-test. Select **Adjust > Self-test > Run**.
- 13. **File Backup and Restore** — Run the backup utility.
 - a. Select **Adjust** from the Confirm and Adjust menu and press **Enter**.

- b. Select **Backup/Restore** from the Adjust menu and press **Enter**.
 - c. Select **Backup Adjustments** and press **Enter**.
14. **Verify a Customer Board** — Request a test panel/board from the customer.

If the customer already has 5DX systems in place, check a typical application to be used on this machine. If this is the first 5DX on site, verify that the customer's board will load and unload.

15. **Back up the Hard Drive** — Follow the procedure as described in detail in Chapter 3 of the System Administration Guide.
16. **System Cleanup** — Replace all electronic bay access panels and doors. Clean the system exterior removing any dirt, hand prints, etc.
17. **Set the Clock** — Set the system clock to the customer's time zone.
18. **Turn the Audible Alarm ON** — If the customer wants to have the audible alarm sound when the light tower indicates RED, you must perform the following procedure.
- a. Using the Windows Explorer, go to the **Calib** directory for the current software release installed on the system.
 - b. In the **Calib** directory, locate the **cxobj.cfg** file.
 - c. In the **cxobj.cfg file**, perform a search to locate the server section named **INDICTRS**.
 - d. Under the **INDICTRS** section, edit the line "bBuzzerIndicatorInstalled=TRUE" to turn the buzzer ON or to "=FALSE" to turn the buzzer OFF. **NOTE: the line may be commented out by a ; symbol. To make the line effective, you will delete the ; symbol from the front of the line.**

- e. Save the file and exit from Windows Explorer.
- f. You will need to reset the 5DX to allow the changes to be recognized. Before you continue, verify that there is no panel inside the 5DX.
- g. Select **User Interface > System Access > Shutdown > Long Term Shutdown**.
- h. Wait for the system to completely shut down. Select **Quit from 5DX**.
- i. At the Dos prompt, type EXIT.
- j. Click on the “5DX Reset” icon on the desktop.
- k. After the reset completes, click on the “Start 5DX Interface” icon on the desktop.
- l. When the interface prompts, log on.
- m. Select **Sytem Access > Startup > Automatic Startup** to restart the 5DX. Wait for all of the startup sequence to complete.
- n. In the **User Interface**, select **Confirm & Adjust > Panel Handling > Hardware Control** to open the Hardware Control window.
- o. Click on the **Lights/Lasers** tab in the Hardware Control window.
- p. Click the buzzer **ON** button to turn it on and to verify that the audible alarm will sound.



- 19. Check your work** — Verify that all steps are complete and all boxes (like the one on the left) are checked off.

- 20. Complete Install Documentation** — Complete all other hardware related install documentation and provide copies to the customer.

NOTE

It is likely the customer will need additional documentation - be sure the customer is aware that local radiation requirements must be met. This varies between states, provinces, regions and countries.

- 21. Complete X-ray Survey Documentation** — Make a copy of the X-ray survey document and test results and provide a copy to the customer.
- 22. Mail All Original Documentation** — Mail original X-ray Safety Test Report (E7200-90084 or N7200-90092) and signed Hardware Acceptance (5021-1982) to:

**SPT HW Support Manager
Agilent Technologies, Inc.
815 14th Street S.W. MS BU221
Loveland, CO 80537-6390
USA**

Notes:

Appendix A SMEMA

Introduction

The communication interface between adjacent machines is provided by way of a Surface Mount Equipment Manufacturers Association (SMEMA) compliant protocol. The purpose of multi-machine in-line interfacing is to allow the Agilent 5DX to integrate directly into your printed circuit assembly manufacturing process.

There are two SMEMA connectors on each side of a 5DX system. This allows the system to be configured to load panels from the left or the right or for altering the system to a dual-lane panel flow. Standard, single-lane 5DX systems will only use the front connector on both sides of the system. Systems with the middle rail installed (dual-lane) will use the both connectors on both sides. The front connectors will refer to the front lane status and the rear connectors will refer to the rear lane status.

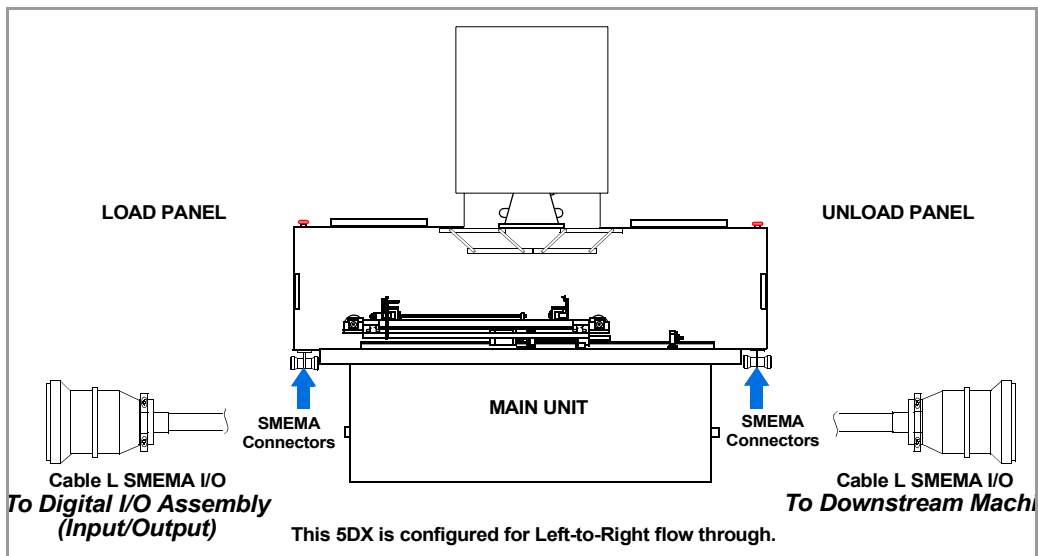


Figure A-1 Location of SMEMA connectors (NOTE: Single lane installations only use the “Front” connector.)

SMEMA Signals

Table A-1 identifies the SMEMA electrical interface signals that are used by the 5DX. Figure A-2 graphically represents these signals in a process flow diagram.

Table A-1 SMEMA electrical interface signals

SMEMA Signal Name	Digital I/O Assembly Description	Function
Send Request Input (SRI)	SMEMA SRI - Panel In Available	The upstream equipment forces this signal low when it is ready to send a panel to the 5DX.
Transfer Request Output (TRO)	SMEMA TRO - 5DX Not Busy	The 5DX forces this signal low when it is ready to accept the panel from the upstream equipment.
Send Request Output (SRO)	SMEMA SRO - Panel Out Available	The 5DX forces this signal low when it is ready to send a panel to the downstream equipment.
Transfer Request Input (TRI)	SMEMA TRI - Output Not Busy	The downstream equipment forces this signal low when it is ready to accept the panel from the 5DX.
Good Panel Output (GPO)	SMEMA GPO - Panel Passed	The 5DX uses this signal to indicate that the panel being sent has been tested and is good.
Untested Panel Output (UPO)	SMEMA UPO - Untested Panel Output	The 5DX uses this signal to indicate that the panel being sent has not been tested.
Good Panel Output (GPO)	Rear SMEMA GPO	The 5DX with the middle rail installed uses this signal to indicate that the panel being sent in the rear lane has been tested and is good.

Table A-1 SMEMA electrical interface signals

SMEMA Signal Name	Digital I/O Assembly Description	Function
Untested Panel Output (UPO)	Rear SMEMA UPO	The 5DX with the middle rail installed uses this signal to indicate that the panel being sent in the rear lane has not been tested.
Transfer Request Input (TRI)	Rear SMEMA TRI	The 5DX with the middle rail installed forces this signal low when it is ready to send a panel to the downstream equipment for the rear lane.

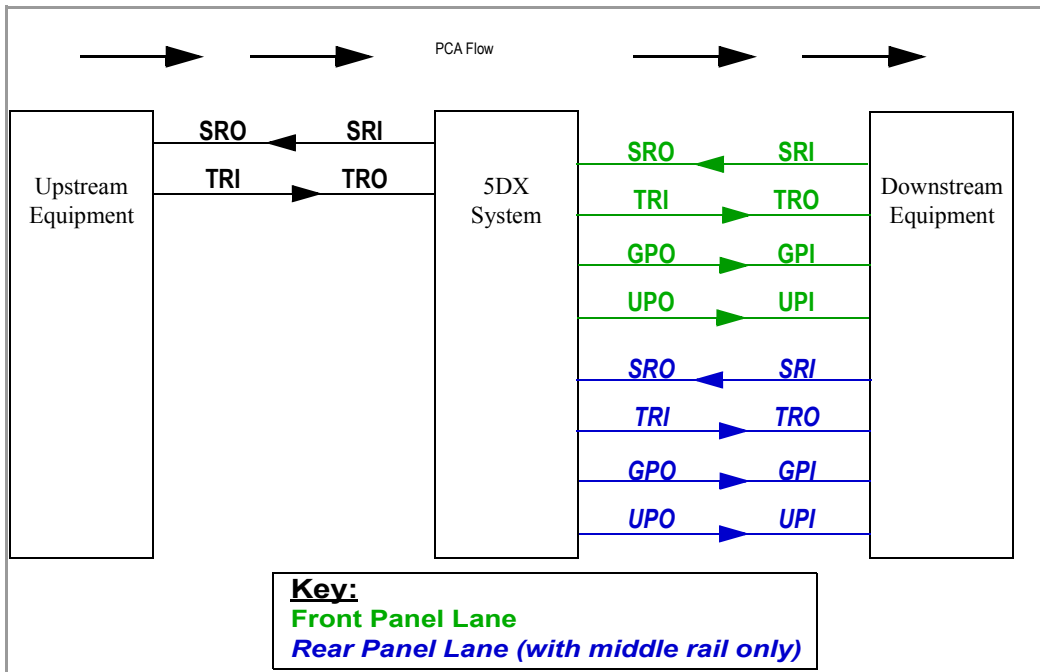


Figure A-2 SMEMA signals used by the 5DX

NOTE

See Table A-1 on page A-44 for an explanation of the SMEMA electrical interface signals that are referenced in Figure A-2.

Figure A-3 shows the electrical interface schematic for the 5DX, using only the front connectors. The rear connections are a duplicate of the front connections.

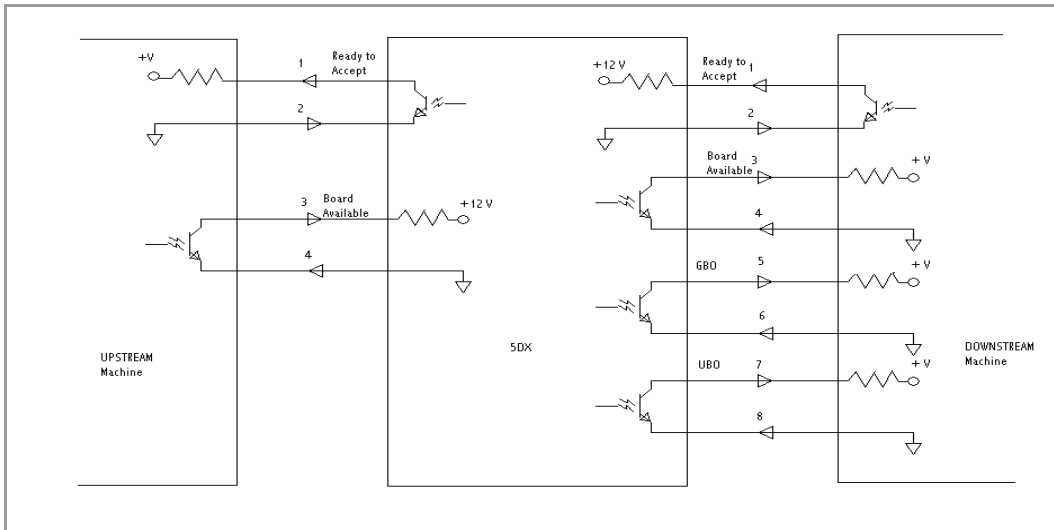


Figure A-3 SMEMA Electrical interface schematic(for front connectors only)

SMEMA Connectors

Figure A-4 shows a connector with all pin numbers labeled, and Table A-2 shows the pin number and signal description for the 5DX SMEMA connectors.

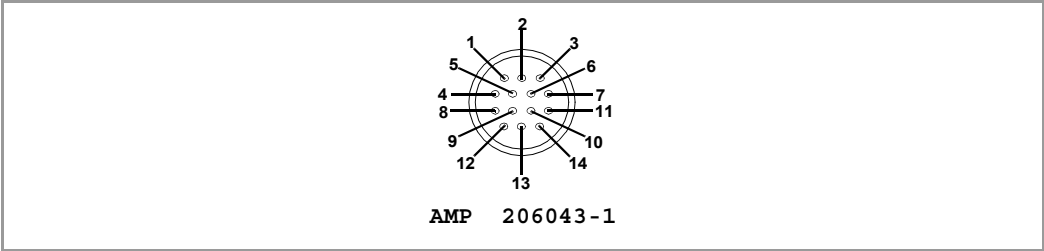


Figure A-4 A typical SMEMA connector with pins numbered

Table A-2 SMEMA connector information

Connector	Pin#	Signal Description
Upstream SMEMA	1	Ready to Accept - 5DX is ready to receive a panel.
	2	Floating signal return for (1)
	3	Panel Available - Upstream equipment is ready to send a panel.
	4	Electrical ground
	5-13	N/A
	14	Grounded shield
Downstream SMEMA	1	Ready to Accept - Downstream equipment is ready to received panel.
	2	Electrical ground
	3	Panel Available - 5DX is ready to send a panel.
	4	Floating signal return for (3)
	5	GPO - Good panel out. PCA has been tested and considered good with no defects.
	6	Floating signal return for (5)
	7	UPO - Untested panel out. PCA being transferred was not tested.
	8	Floating signal return for (7)
	9-13	N/A
	14	Grounded shield

Appendix B Wiring Configuration

Wiring Configuration

This appendix contains the wiring configuration information for the Agilent 5DX System.

There are two possible wiring configurations for the 5DX: a three phase wye or delta and a three phase wye with neutral. The drawings in this appendix show how the Power Distribution Unit (PDU) is wired for those configurations. It also lists the options associated with each configuration and lists those options to be used in international locations.

The 220 volt outlet strip wire egress is through the holes on the front of the Power Distribution Unit. The 220 volt outlet strip for the mobile workstation table uses the wire egress hole on the left as indicated in Figure B-1. The Vacion Pump power supply and auxiliary power strip use the wire egress hole on the right.

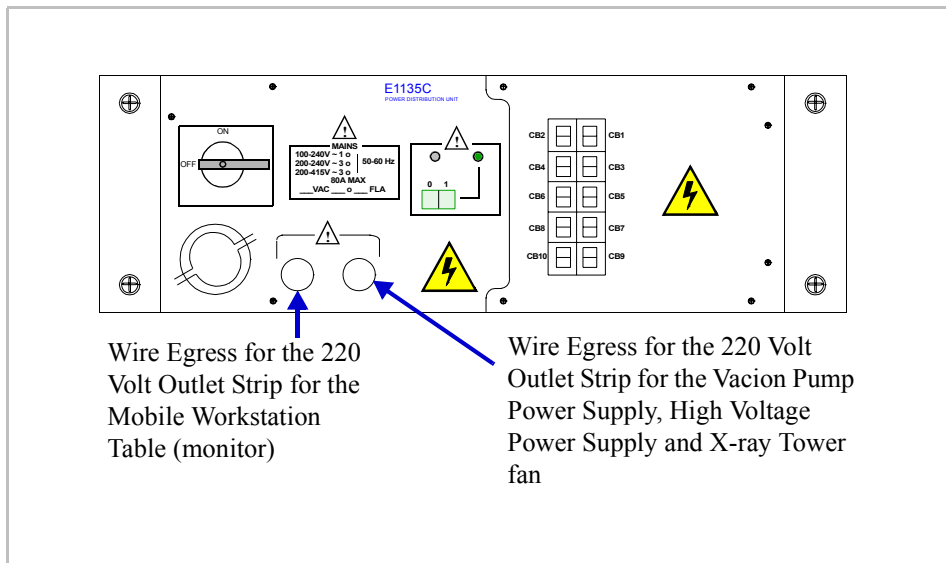


Figure B-1 PDU Wire Egress

Table B-1 Agilent 5DX Power Source and Loading Configuration Options

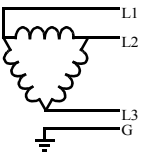
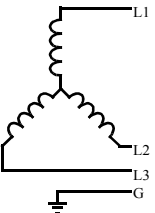
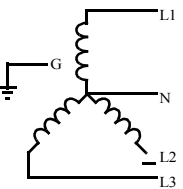
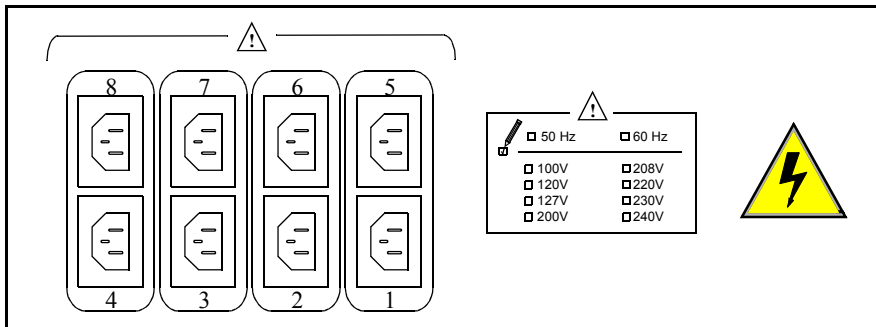
Power Source and Loading	Input Configuration, Input Wiring, and Terminal Block Wiring	Description	VAC
3-Phase Delta Load: L1-L2 L1-L3 L2-L3 (17 A)	 <p>Input and Terminal Block Wiring-Figure B-4</p>	200 - 240V Three Phase	200V
			220V
			230V
			240V
3-Phase Wye Load: L1-L2 L1-L3 L2-L3 (17 A)	 <p>Input and Terminal Block Wiring-Figure B-4</p>	208 - 220V Three Phase Wye	120/208V
			127/220V
3-Phase Wye with Neutral Load: L1-N L2-N L3-N (10 A)	 <p>Input and Terminal Block Wiring-Figure B-6</p>	380- 415V Three Phase Wye w/Neutral	220/380V
			230/400V
			240/415V

Figure B-2 PDU Outlets



- Outlet 1 — Laser Displacement Unit 2
- Outlet 2 — Laser Displacement Unit 1
- Outlet 3 —
- Outlet 4 —
- Outlet 5 — X Motor Servo Module
- Outlet 6 — R Motor Servo Module
- Outlet 7 — Y1 Motor Servo Module
- Outlet 8 — Y2 Motor Servo Module

NOTE



5DX systems have been pre-wired with a cord and plug. The local electrician will need to install a suitable outlet where the plug can be inserted.

NOTE



Wire the PDU only as shown in the following drawings. Terminals numbered the same are the same electrically but for proper load balancing and current distribution, follow the wiring diagrams.

3-Phase Wye or Delta

OPTIONS:
3PD 3PY

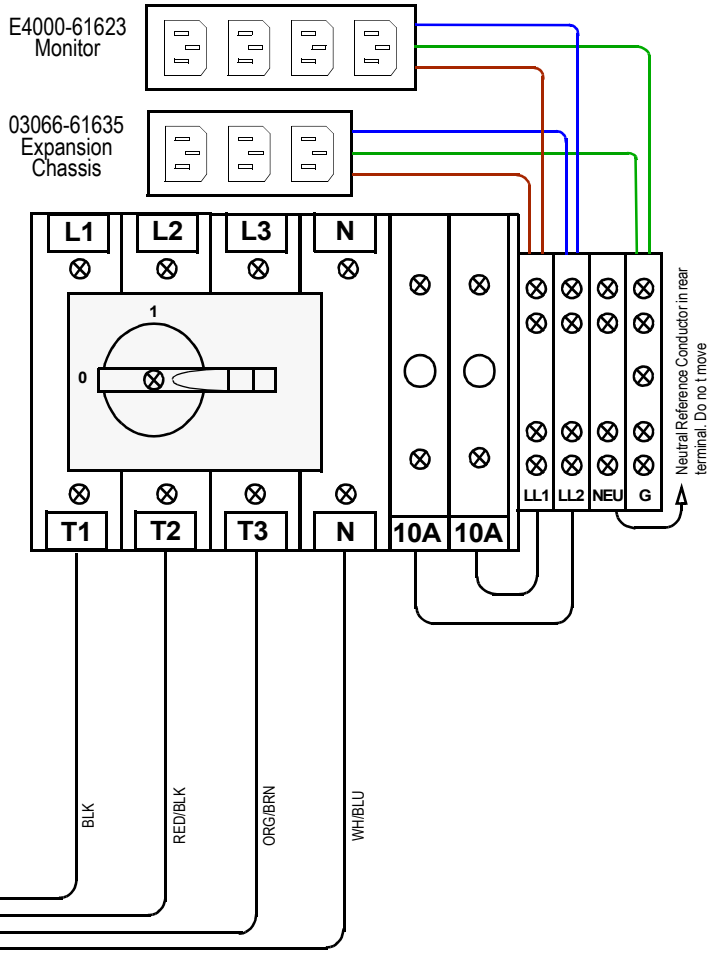


Figure B-3 Input Wiring — 3-Phase Wye or Delta

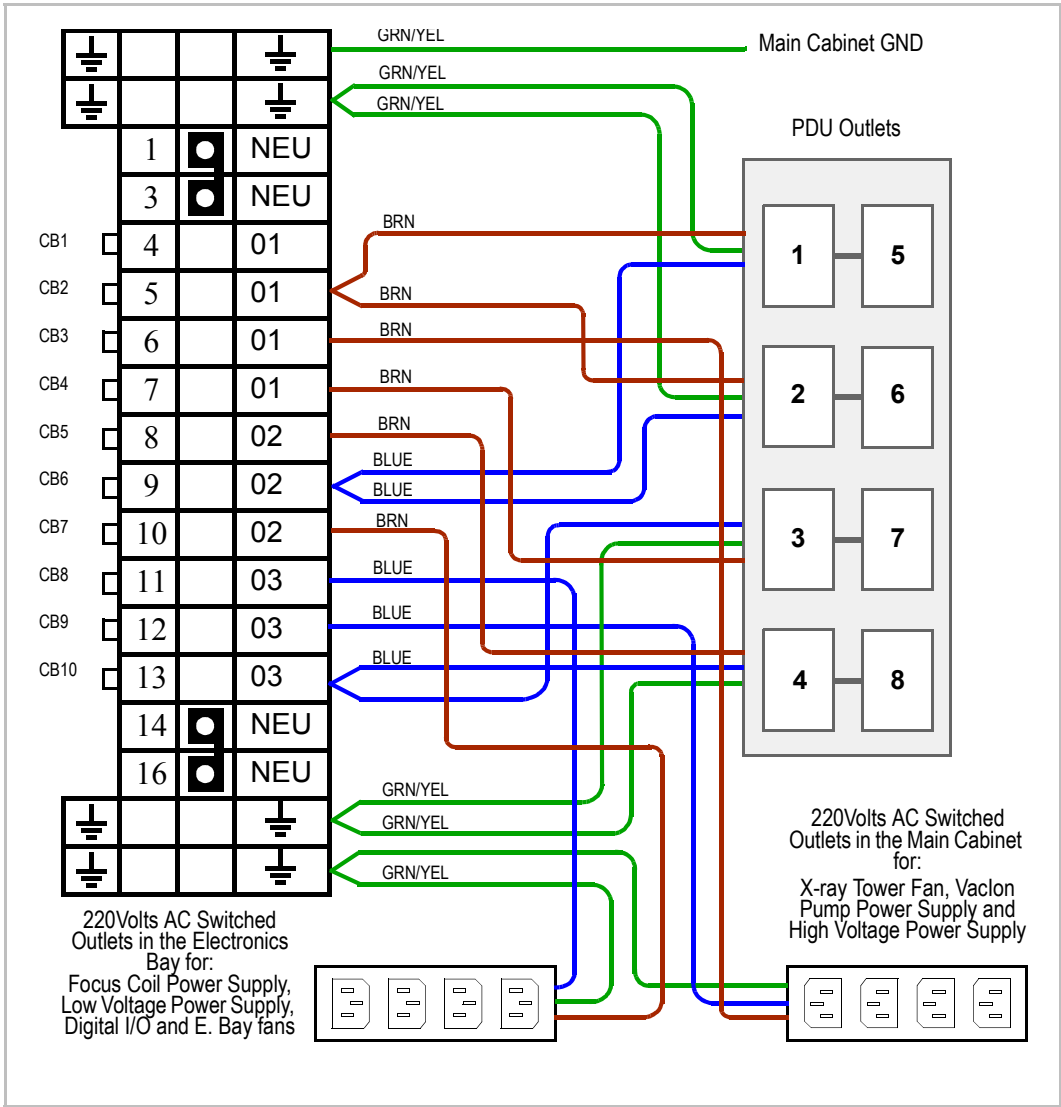


Figure B-4 Terminal Block Wiring — 3-Phase Wye or Delta

3-Phase Wye with Neutral

OPTIONS:
3PN

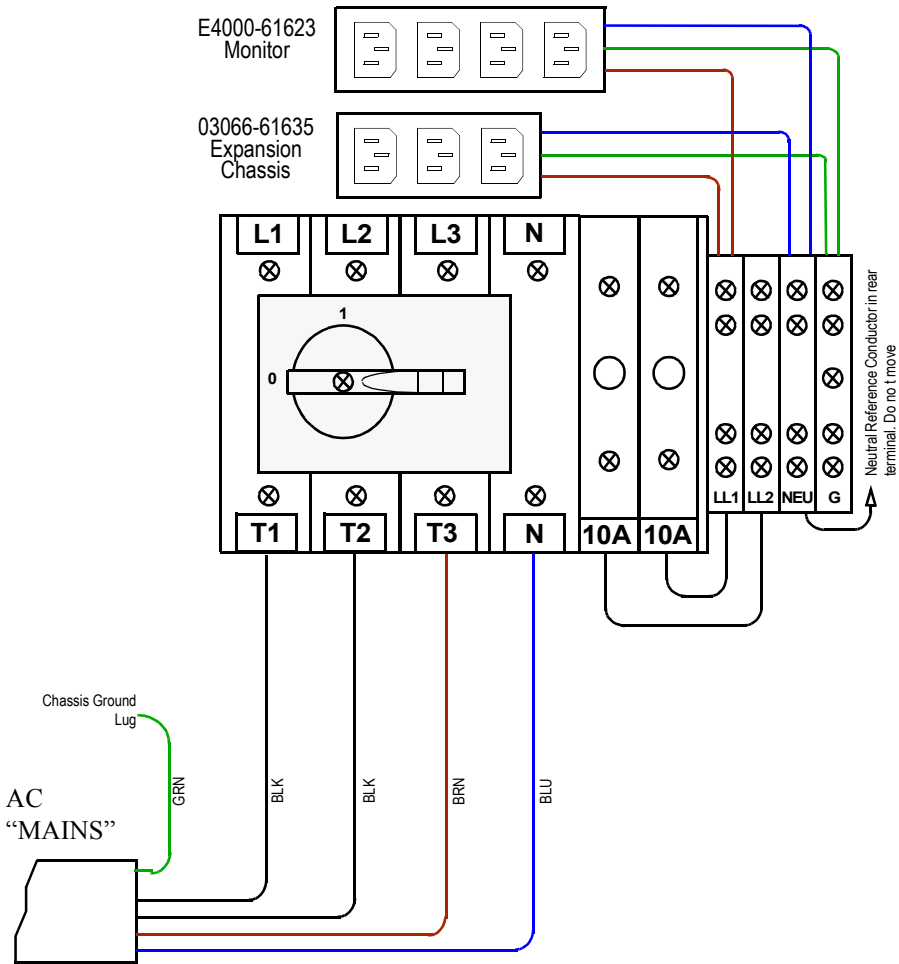


Figure B-5 Input Wiring — 3-Phase Wye with Neutral

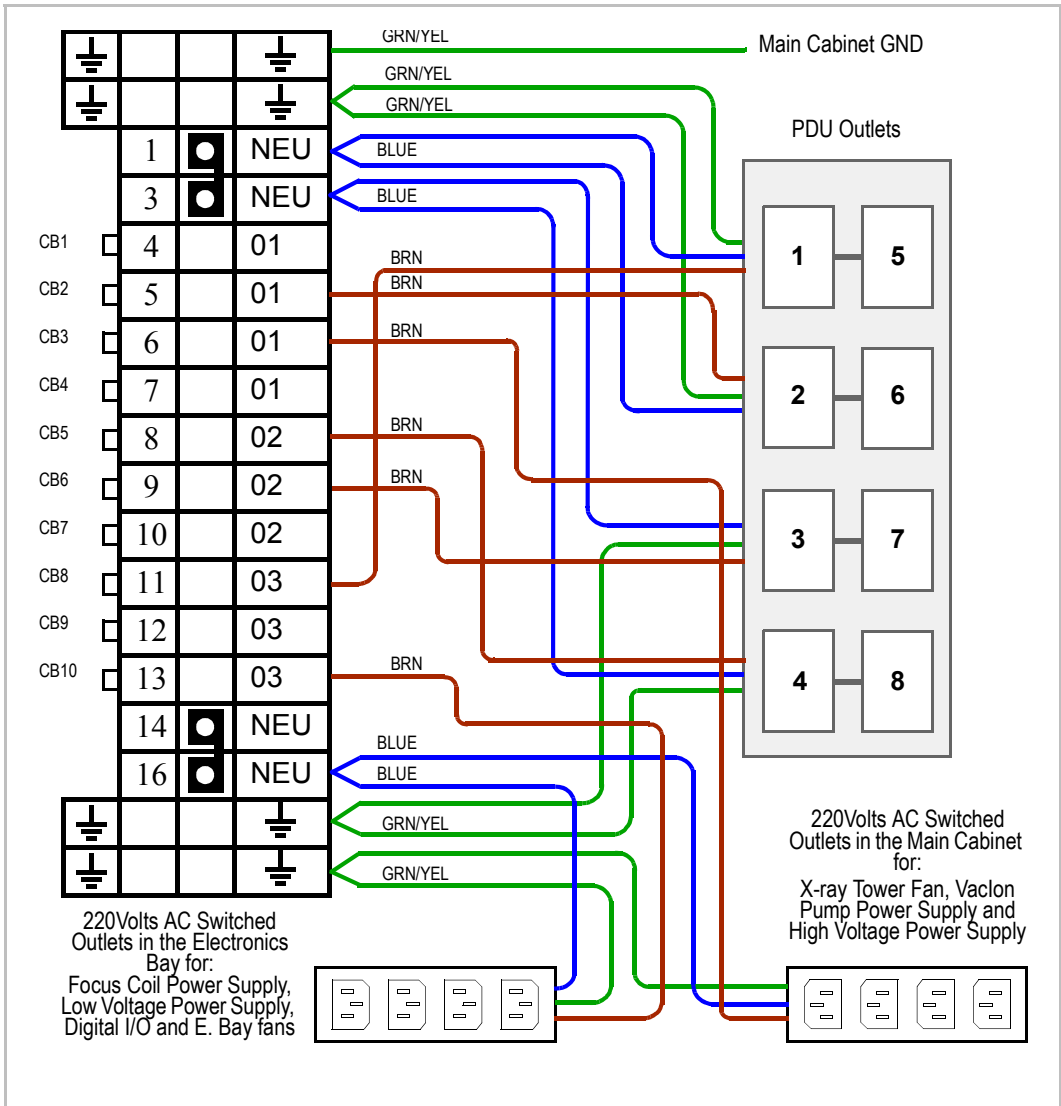


Figure B-6 Terminal Block Wiring — 3-Phase Wye with Neutral

The following table shows the Agilent Country Code and associated power options for most countries of the world. All configurations are three phase.

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Afghanistan	531	3PN	220/380	50	5
Albania	481	3PN	220/380	50	5
Algeria	721	3PY	127/220	50	4
Algeria	721	3PN	220/380	50	5
Angola	762	3PN	220/380	50	5
Argentina	357	3PN	220/380	50	5
Australia	602	3PN	240/415	50	5
Austria	433	3PN	220/380	50	5
Bahamas	236	3PD	240	60	4
Bahamas	236	3PY	120/208	60	4
Bahrain	525	3PN	230/400	50	5
Bahrain	525	3PD	240	50	5
Bangladesh	538	3PD	220	50	4
Barbados	272	3PY	200	50	4
Barbados	272	3PD	230	50	4
Belarus	017	3PN	220/380	50	5
Belgium	423	3PN	230/400	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Belize	208	3PD	230	60	4
Benin	761	3PN	220/380	50	5
Bermuda (Dependent Territory of the UK)	232	3PD	240	60	4
Bermuda (Dependent Territory of the UK)	232	3PY	120/208	60	4
Bolivia	335	3PD	230	50	5
Bolivia	335	3PN	230/400	50	5
Botswana	793	3PN	230/400	50	5
Brazil	351	3PD	230	60	4
Brazil	351	3PY	127/220	60	4
Brazil	351	3PN	220/380	60	5
Brunei	561	3PN	240/415	50	5
Bulgaria	487	3PN	220/380	50	5
Burkina Faso	760	3PN	220/380	50	5
Burma (Myanmar)	546	3PN	230/400	50	5
Burundi	767	3PN	220/380	50	5
Cambodia	555	3PY	120/208	50	4
Cambodia	555	3PN	230/400	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Cameroon	742	3PY	127/220	60	4
Cameroon	742	3PN	230/400	50	5
Canada	122	3PD	240	60	4
Cape Verde		3PN	220/380	50	5
Cayman Islands (Dependent Territory of the UK)	244	3PD	240	60	4
Central African Republic	754	3PN	220/380	50	5
Chad	756	3PN	220/380	50	5
Chile	337	3PN	220/380	50	5
China, People's Republic of	570	3PN	220/380	50	5
Colombia	301	3PY	120/208	60	4
Colombia	301	3PD	220	60	4
Congo, Democratic Republic of the (Zaire)	766	3PN	220/380	50	5
Congo	763	3PN	220/380	50	5
Costa Rica	223	3PD	240	60	4
Cyprus	491	3PN	240/415	50	5
Czech Republic	435	3PN	220/380	50	5
Denmark	409	3PN	220/380	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Djibouti	777	3PN	220/380	50	5
Dominican Republic	247	3PD	220	60	4
Ecuador	331	3PD	240	60	4
Ecuador	331	3PY	127/220	60	4
Egypt	729	3PN	220/380	50	5
El Salvador	211	3PD	230	60	4
Fiji	055	3PN	240/415	50	5
Finland	405	3PN	230/400	50	5
France	427	3PD	220	50	4
France	427	3PY	127/220	50	4
France	427	3PN	220/380	50	5
Gabon	755	3PN	220/380	50	5
The Gambia	750	3PN	220/380	50	5
Germany	428	3PN	230/400	50	5
Ghana	749	3PN	230/400	50	5
Gibraltar	472	3PN	240/415	50	5
Greece	484	3PN	220/380	50	5
Greenland	101	3PN	220/380	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Grenada	063	3PN	230/400	50	5
Guatemala	205	3PD	240	60	4
Guinea	746	3PN	220/380	50	5
Guinea-Bissau	764	3PN	220/380	50	5
Guyana	312	3PD	220	50	4
Haiti	245	3PD	220	60	4
Honduras	215	3PD	220	60	4
Hong Kong	582	3PN	220/380	50	5
Hungary	437	3PN	220/380	50	5
Iceland	400	3PN	220/380	50	5
India	533	3PN	230/400	50	5
Indonesia	560	3PN	220/380	50	5
Indonesia	560	3PY	127/220	50	4
Ireland	419	3PN	220/380	50	5
Israel	508	3PN	230/400	50	5
Italy	475	3PN	220/380	50	5
Italy	475	3PY	127/220	50	4
Ivory Coast (Cote d'Ivoire)	748	3PN	220/380	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Jamaica	241	3PD	220	50	4
Japan	588	3PD	200	50 or 60	4
Jordan	511	3PN	220/380	50	5
Kazakhstan	021	3PN	220/380	50	5
Kenya	779	3PN	240/415	50	5
Korea, Republic of (South Korea)	580	3PD	220	60	4
Korea, Republic of (South Korea)	580	3PN	220/380	60	5
Kuwait	513	3PN	240/415	50	5
Laos	553	3PN	220/380	50	5
Lebanon	504	3PN	220/380	50	5
Lesotho	799	3PN	220/380	50	5
Liberia	765	3PY	120/208	60	4
Liberia	765	3PD	240	60	4
Luxembourg	045	3PN	230/400	50	5
Macedonia	029	3PN	220/380	50	5
Malawi	797	3PN	230/400	50	5
Malaysia	557	3PN	240/415	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Mali	745	3PN	220/380	50	5
Malta and Gozo	473	3PN	240/415	50	5
Mauritania	741	3PN	220/380	50	5
Mauritius	785	3PN	230/400	50	5
Mexico	201	3PY	127/220	60	4
Monaco	015	3PY	127/220	50	4
Monaco	015	3PN	220/380	50	5
Morocco	714	3PY	127/220	50	4
Morocco	714	3PN	220/380	50	5
Mozambique	787	3PN	220/380	50	5
Myanmar (Burma)	546	3PN	230/400	50	5
Namibia	792	3PN	230/400	50	5
Nepal	536	3PN	220/380	50	5
Netherlands	421	3PN	220/380	50	5
Netherlands Antilles	277	3PN	220/380	50	5
Netherlands Antilles	277	3PY	127/220	50	5
Netherlands Antilles	277	3PD	220	50	5
New Zealand	614	3PN	230/400	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Nicaragua	219	3PD	240	60	4
Niger	751	3PN	220/380	50	5
Nigeria	753	3PN	230/400	50	5
Norway	403	3PN	220/380	50	5
Norway	403	3PD	230	50	5
Oman	523	3PN	240/415	50	5
Pakistan	535	3PN	230/400	50	5
Palau	683	3PD	240	60	4
Panama	225	3PD	230	60	4
Paraguay	353	3PN	220/380	50	5
Peru	333	3PD	220	60	4
Peru	333	3PN	220/380	60	5
Philippines	565	3PD	230	60	4
Philippines	565	3PY	127/220	60	4
Poland	455	3PN	220/380	50	5
Portugal	471	3PN	220/380	50	5
Puerto Rico	903	3PY	120/208	60	4
Puerto Rico	903	3PD	240	60	4

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Qatar	518	3PN	240/415	50	5
Romania	485	3PN	220/380	50	5
Russia	462	3PN	220/380	50	5
Rwanda	769	3PN	220/380	50	5
Saudi Arabia	517	3PY	127/220	60	4
Senegal	744	3PY	127/220	50	4
Serbia and Montenegro	479	3PN	220/380	50	5
Seychelles	780	3PN	240/415	50	5
Sierra Leone	747	3PN	230/400	50	5
Singapore	559	3PN	230/400	50	5
Slovakia (Slovak Republic)	030	3PN	220/380	50	5
Somalia	770	3PN	220/380	50	5
Somalia	770	3PD	230	50	5
South Africa	791	3PN	230/400	50	5
Spain	470	3PY	127/220	50	4
Spain	470	3PN	220/380	50	5
Sri Lanka	542	3PN	230/400	50	5
Sudan	732	3PN	240/415	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Suriname	315	3PY	127/220	60	4
Swaziland	795	3PN	230/400	50	5
Sweden	401	3PN	230/400	50	5
Switzerland	441	3PN	220/380	50	5
Syria	502	3PN	220/380	50	5
Tahiti, Society and Marquesas Islands	641	3PY	127/220	60	4
Taiwan	583	3PD	220	60	4
Tajikistan	023	3PN	220/380	50	5
Tanzania	783	3PN	230/400	50	5
Thailand	549	3PN	220/380	50	5
Togo	752	3PY	127/220	50	4
Togo	752	3PN	220/380	50	5
Trinidad and Tobago	274	3PD	230	60	4
Trinidad and Tobago	274	3PN	230/400	60	5
Tunisia	723	3PY	127/220	50	4
Tunisia	723	3PN	220/380	50	5
Turkey	489	3PN	220/380	50	5
Turkmenistan	024	3PN	220/380	50	5

Table B-2 5DX Country Specific Electrical Information

Country	Agilent Country Code	Agilent Power Option	Nominal Voltage	Nominal Freq.	Number of Wires*
Uganda	778	3PN	240/415	50	5
Ukraine	018	3PN	220/380	50	5
United Arab Emirates	520	3PN	230/400	50	5
United Kingdom - England Scotland Wales N. Ireland	412	3PN	230/415	50	5
United States	000	3PD	240	60	4
United States	000	3PY	120/208	60	4
Uruguay	355	3PN	220/380	50	5
Uzbekistan	025	3PN	220/380	50	5
Venezuela	307	3PD	240	60	4
Vietnam	552	3PY	127/220	50	4
Vietnam	552	3PN	220/380	50	5
Western Samoa	615	3PN	230/400	50	5
Yemen	521	3PN	230/400	50	5
Zambia	794	3PN	220/380	50	5
Zimbabwe	796	3PN	220/380	50	5

* Number of Conductors includes Safety Grounding Conductor

All Configurations are 3 phase