

For maximum safety, the battery charger has a “Pending” status LED, which lights momentarily when the head is first placed on the charger. If a battery is very low, or is out of a specific temperature range, it cannot be safely charged. When this condition occurs the “Pending” indicator remains light. While “Pending,” the charger is actually charging the batteries at a very low rate. This brings the low battery into acceptable voltage range. Once the battery temperature and voltage are suitable for charging, the charger automatically begins trickle charging and the “Trickle” indicator light turns on.

To fast charge or discharge the battery the “Fast” button or “Discharge” button must be pressed. If the “Fast” button or “Discharge” button is pressed while the battery voltage is too low or temperature is not suitable for “Fast” or “Discharge” operation, the indicator light will flash on and off. This response acknowledges the request but indicates that the charger cannot follow the request at that time. Once voltage and temperature conditions are suitable, the requested “Fast” or “Discharge” operation will begin and the indicator light will change to a steady light.

Warning!

Note that if the battery is fully charged, a user is able to initiate fast charge by pressing the “Fast” button. After about 2 minutes, the charger will stop fast charge in this case. However, to avoid overcharging batteries, you should not press the “Fast” button with an already fully charged battery.

After the “Fast” charging cycle has completed the charger beeper will sound and automatically begin trickle charging. When this condition begins the “Trickle” indicator light turns on indicating that the battery is almost completely charged or is completely charged. For the laser head batteries, the two conditions occur within a few minutes of each other. Charge time from a fully discharged set of batteries to approximately a 90% voltage charge is 15 minutes.

After the “Discharge” cycle has completed the charger automatically begins fast charging and the “Fast” indicator light turns on. To avoid the battery memory concern, use the “Discharge” mode when you have more than 20 minutes to charge the sensor head batteries. The typical charge cycle is as follows:

Action	Time
Press DISCHARGE button	Start
DISCHARGE complete, FAST starts	7 minutes
FAST complete, TRICKLE starts – charging complete	22 minutes
NOTE: The heads can be left on TRICKLE indefinitely (until the next time they are needed).	

Note

After power has been applied to the charger and the sensor head have been placed in it, if none of the LED's for that sensor head are lit then the contact between the sensor head and charger may not be sufficient enough to charge the batteries. No LED's lit indicates a “no battery present” state. If this occurs, remove the sensor head from the charger and try reseating it back into the charger.

Note

After a charging cycle has begun, if that charging cycle is interrupted (e.g. disconnecting the power to the charger or removing the sensor head from the charger) the charging process described above begins again from the beginning. Therefore, if the charger cycle is interrupted while the “Fast” charge mode is in progress then the charger will then automatically begin trickle charging after “Pending.”

“Pending LED” will light momentarily and switch into FAST charge. Charge time for a fully discharged set of batteries is 15 minutes. The beeper will sound when both heads are fully charged and have switched to TRICKLE charge. To avoid the NiCad battery memory concern, use the DISCHARGE mode when you have more than 20 minutes to charge the sensor head batteries.

Charging the UltraSpec 8000 Analyzer with the Model 8211 Charger

Plug the charging cable (A821101) from the bottom end cap on the 8211 (earlier than Rev. 4) into the top of the analyzer. TRICKLE mode will start the charge cycle. To change to FAST mode, press the FAST button in the Analyzer section. The analyzer battery is not monitored but utilizes a timer to avoid overcharging. The 8211 will charge the analyzer in FAST mode for 15 hours or until the FAST button is pressed again (whichever comes first). If the 8211 charger is Rev. 4 or later, it cannot be used to charge an UltraSpec 8000 analyzer.

Charging the Model 8117 Analyzer with the Model 8211 Charger

Plug the charging cable (A821102) from the bottom end cap on the 8211 into the charger port on the top end cap of the 8117 analyzer. The battery pack will recharge in 14 to 16 hours. If the batteries are continually allowed to remain on charge for longer than 16 hours, battery degradation will occur. Overnight charging is allowable, however, charging over a weekend is not recommended.

Charging the Model 2120 Analyzer with the Model 8211 Charger

Plug the charging cable (A821102) from the bottom end cap on the 8211 into the charger port on the top end cap of the 2120 analyzer. The battery pack will recharge in two and one half hours. After the battery pack has been fully charged, the battery charger will automatically switch to a trickle charge.

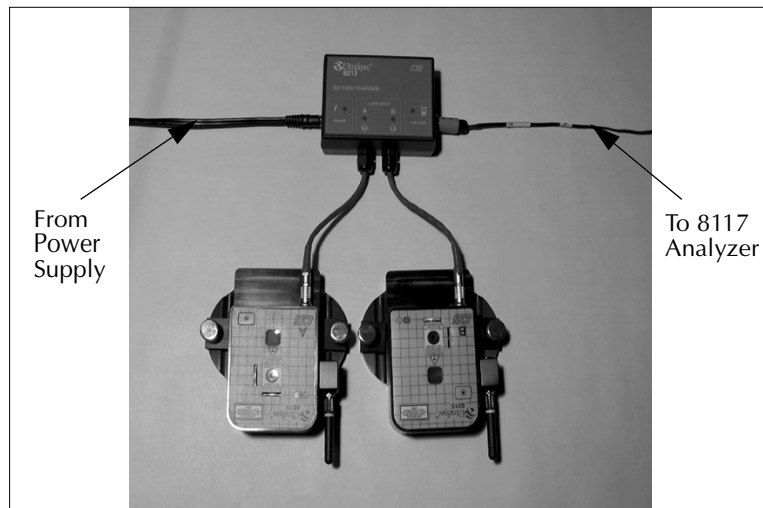
Model 8212 Trickle Charger

The Model 8212 battery charger is a trickle charger for the laser heads and the Model 8117 UltraSpec analyzer. It will charge the laser heads and analyzer in ten hours. This is intended to be an overnight charge. The laser heads should not be left on charge over 24 hours. Continual overcharging the batteries will result in a shortened life.

To set up the Model 8212 charger, complete the following steps:

1. ... Plug the power cord into the power supply that came with the 8117 or 2120 analyzer.
2. ... Plug the power cord into an AC receptacle.
3. ... Plug the power supply into the Power connection on the 8212. Ensure the associated LED illuminates.
4. ... Plug the laser heads into the A and B pigtails from the 8212. Ensure the associated LEDs illuminate.
5. ... To charge the analyzer, plug the 821102 charge cable into the analyzer connector on the 8212. Ensure the associated LED on the 8212 illuminates.

See the photo below that illustrates the 8212 setup with a pair of laser heads and a Model 8117 UltraSpec analyzer.



Charging the Model 8215 Laser Heads with the Model 8212 Charger

Charging the Model 8117 and 2120 Analyzers with the Model 8212 Charger

After plugging the charging cable (A821102) into the 8212, plug the other end of the cable into the charger connection on the top end cap of the Model 8117 or the Model 2120 analyzer. Ensure the LED on the analyzer illuminates, if applicable. The Model 8117 battery pack will recharge in 14 to 16 hours. If the batteries are allowed to continually remain on charge for longer than 16 hours, battery degradation will occur. Overnight charging is allowable, however, charging over a weekend is not recommended. The Model 2120 battery pack will recharge in two hours then switch to a trickle charge that will not damage the battery.

Charging the Model 8000 Analyzer with the Model 8212 Charger

The Model 8212 trickle charger CAN NOT charge an UltraSpec 8000 analyzer. To charge the 8000 use either a Model 8211 (previously discussed in this section) or the Model 2115-C-120 wall charger. This includes the safety-rated UltraSpec 8000 analyzer.

Note

See “UltraSpec 8000 Analyzer Battery Recharge” on page 9-6 and “UltraSpec 8117 Analyzer Battery Recharge” on page 9-9 for information on optional methods of charging the UltraSpec analyzer.

Battery Usage - Laser Heads

A rechargeable battery pack is used to power each sensor head. A fully charged battery pack will give 3 to 4 hours of continuous service while transmitting data. Longer operation is possible since typical alignments do not require continuous communication with the analyzer. The battery is designed to have a long life and is not intended to be replaced by the user. Replacement should be performed only at CSI. CSI recommends that the batteries be replaced after 1,000 charges/discharges.

To conserve battery life, the 8215/8225 has a sleep mode and a shutdown mode. The sleep mode is activated after 5 minutes of no communication with the analyzer. In the sleep mode, the laser beam and RF communication are shutdown until communication is reestablished. All data in memory is saved. In the auto-shutdown mode, the sensor heads are completely shutdown. The POWER button will start the sensor heads again. All data in memory is lost, therefore another sweep should be taken.

The sleep and auto-shutdown modes can be disabled. When turning the sensor heads on, press and hold down the POWER buttons (the LEDs will turn on when the POWER buttons are first pressed). The LEDs will turn off when the sleep mode is disabled (approximately 3 seconds). When both LEDs light again, the shutdown mode will be disabled (approximately 5 seconds). Refer to “Laser Head Status Screen” on page 3-8 for more details.

Note

Please note that this disables the battery conservation (for the sensor heads) therefore, if the heads are left on, the batteries will run down.



Precautions

Please follow these precautions carefully. Any product damage due to these conditions may void the warranty.

- *Do not* change the battery pack with the battery charger connected as damage may occur to the analyzer.
- Use only CSI-supplied battery chargers that have been approved for use with UltraSpec analyzers and Model 8215/8225 laser heads. The use of any other charger will most likely damage the equipment.
- Do not use CSI battery chargers with anything other than what they are designed for! Do not use the 8211 or 8212 to charge anything else!
- Do not repeatedly overcharge the analyzer batteries. If the batteries are continually allowed to remain in the “Fast” charge cycle for periods longer than the recommended 14 to 16 hours, battery degradation will occur.
- Do not use any batteries other than those included and/or specified for UltraSpec analyzers and 8215/8225 laser heads.
- Do not connect a signal larger than ± 21 volts into the input of the analyzer.
- Do not connect any signal other than a TTL-level signal to the tachometer input. Other signals may damage the analyzer.
- Do not connect a printer directly to the RS232 port located on the top panel of the analyzer.
- Do not connect any adapters or accessories to the RS232 port located on the top panel of the analyzer while the analyzer is turned on.
- Do not start the machines being aligned with the laser alignment system equipment attached. Be sure to remove the laser system before starting the machinery.

Introduction to Laser Alignment Fixtures Setup

This section takes you through a step-by-step setup of the UltraSpec 8215/8225 Laser Alignment Fixtures. Before performing alignment, be sure all pre-alignment checks have been completed.

Caution!

Prior to mounting the laser alignment fixtures on machine shafts, all switches operating the machines should be “locked out.” Follow safety precautions for your facility. Normally, only personnel performing the alignment should be able to “unlock” any startup switch. After an alignment has been completed, the work area should be inspected to ensure that all equipment is clear of rotating shafts/couplings, prior to removal of the lockout protection.

Caution!

The 8215/8225 Laser Alignment Fixtures use a Class II (CDRH) laser or Class 2 (IEC) laser. This laser complies with 21 CFR 1040.10 and 1040.11 safety requirements with a power output < 1.0 mW (average) and a pulse repetition of 600 pulses/sec. The pulse duration is <110 microseconds. However, do not expose the human eye directly to the laser beam! Warnings are located on each sensor head.

Water vapor or dust can interfere with a target “seeing” its laser. The air between the sensor heads should be visually clear. Take care to ensure that the air between the sensor heads is not being heated from steam leaks, uninsulated piping, etc. Heated air rising within the span between the sensor heads can refract the laser beams and cause errors in the alignment readings.

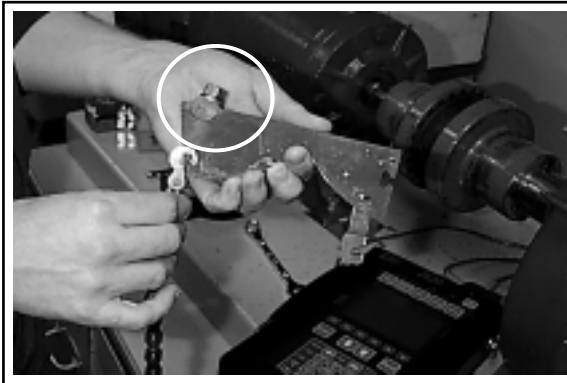
Operate the laser fixtures at ambient temperatures. If the fixtures have been stored at a different temperature than the ambient temperature, allow the laser fixtures to reach ambient temperature. Ensure that any heat source that may be present is not creating a large temperature difference between the laser fixtures and the ambient temperature. Sunlight itself will not cause a laser reading problem.

Attaching the Fixtures

This section shows how to attach and secure the mounting base, chains, align the two mounting bases by leveling, install the sensor heads, turn on the sensor heads, and center the lasers on their targets.

Attaching Chain to the Mounting Base

Select the chain tightener of choice. The left photograph shows a standard hex nut which should be tightened with a 9/16 inch wrench. The right photograph shows a knurled nut which can be tightened by hand. The hex nut mechanism provides a more stable, versatile mounting while the knurled nut is more convenient. Use each nut as shown.



Standard Nut



Knurled Nut

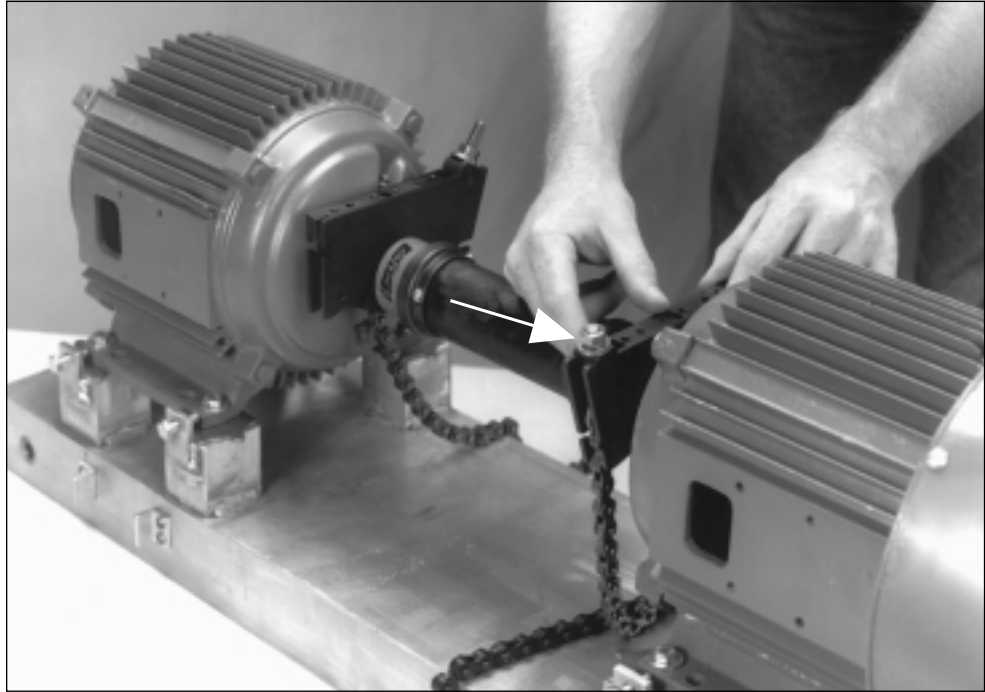
These photographs show how the chain assembly should be slipped into the mounting base. Hold the chain out away from the base and slip the cylinder into its cradle. To ensure maximum tightening range, each nut should be flush with the end of the tightening bolt.

Attaching Chain to the Chain Pickup



This photograph shows how the chain attaches and actually clamps the shaft. After slipping a chain link into the chain pickup, tighten the bolt at the end of the chain.

Allowing Maximum Tightening Range



To allow for maximum tightening range, ensure that the chain nut is flush with the end of the chain bolt (as shown by arrow). Notice that the chain bolts are on opposite sides. As shown in later sections, each mounting base can be installed on either end and the chain bolts placed on either side of the shaft.

Positioning a Mounting Base

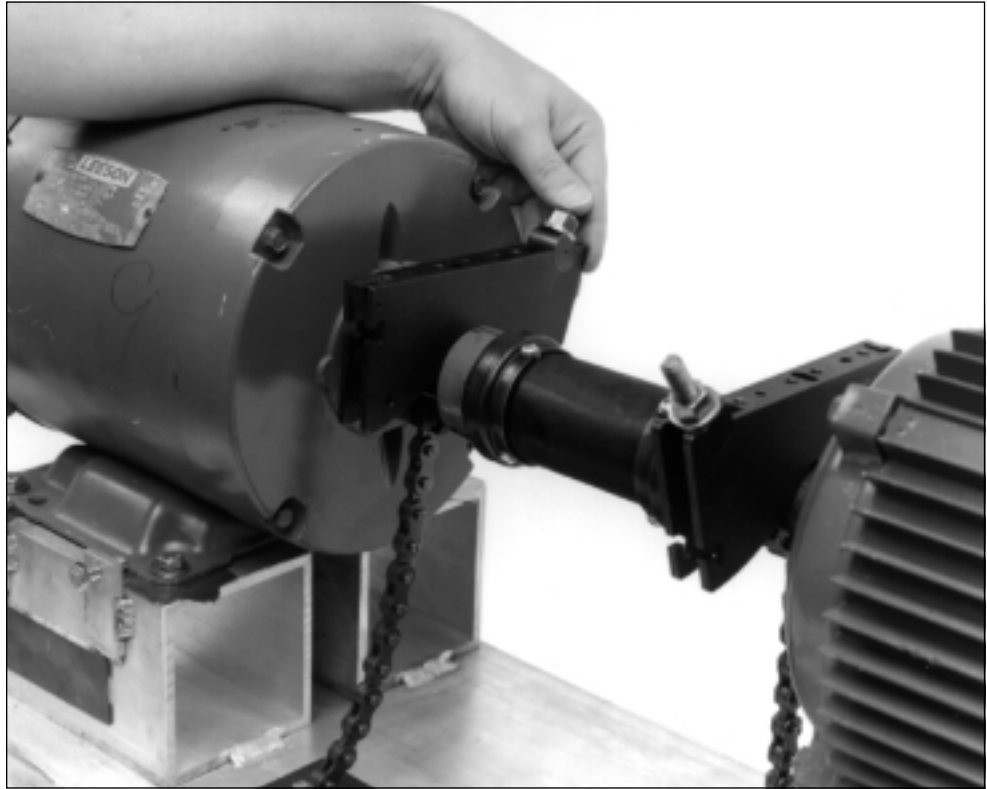


Tighten one of the mounting bases and rotate it (along with the shaft) until it is somewhat level at the top of the rotation. *To tighten the mounting base, use a 9/16 inch wrench or your hand, depending on which chain tightener is being used.*

Caution!

Do not overtighten the chain – the maximum tightening torque is 10 ft.-lbs.

Positioning the Other Mounting Base



With the previous mounting base still in its level position, if necessary, loosen and rotate the other mounting base until it is somewhat level with it. Tighten this base and recheck the other base to ensure that both bases are now level with each other.

Although this part of the procedure is not absolutely critical, placing the mounting bases relatively level with each other allows the laser beam adjustment to be more or less centered. This ensures that the laser beams can line up with their targets easily.

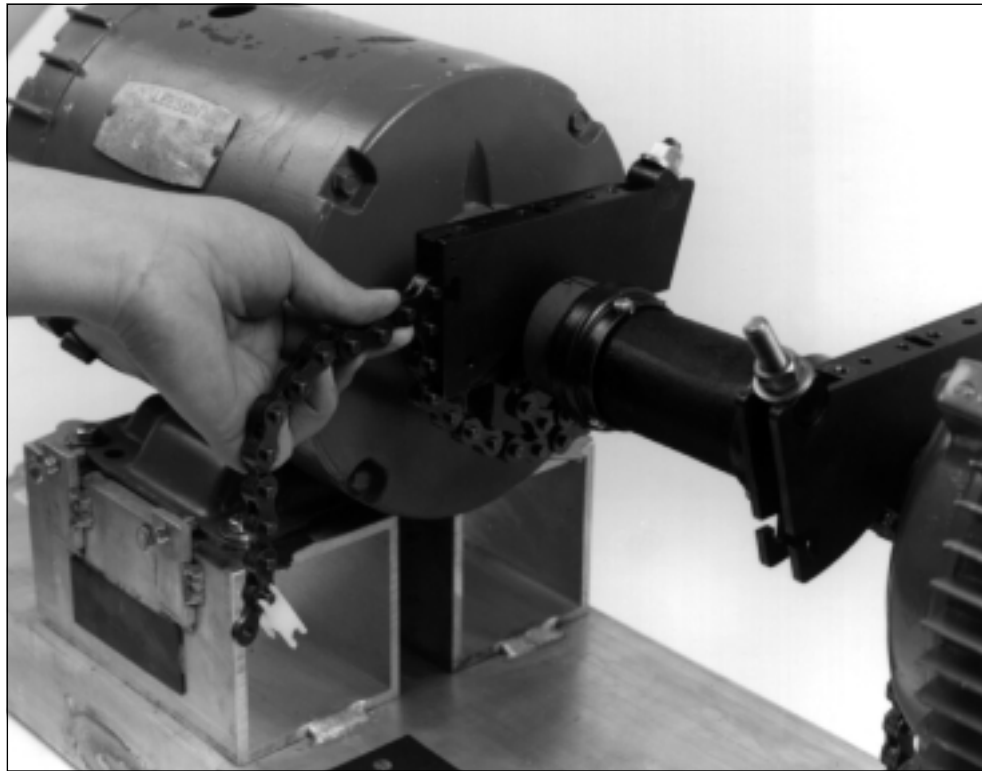
Also, there may be times when the top position is not accessible. The objective of this step is to mount the sensor heads in the same rotational position. This provides the maximum sensor range during data acquisition.

Attaching Excess Chain

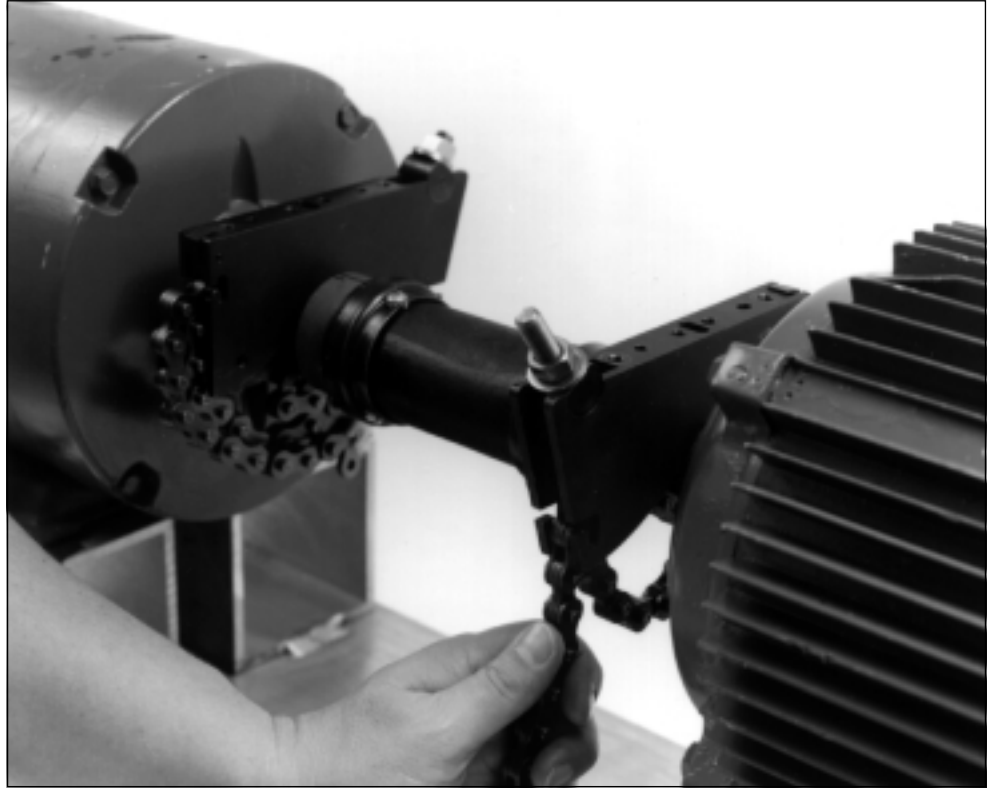
One of the problems with using chains as a mounting bracket is that the excess chain flops and can cause errors. UltraSpec laser alignment fixtures provide solutions for this problem.

Two slots are provided (one on either side) to take up the slack. As shown in the following photographs, you can use either or both of the slots as needed. The order of use is not important. In fact, the L-slot cannot be used when mounting to shafts (or couplings) greater than 3 inches (76 mm) in diameter. When fastening the chain into the T-shaped slot, the rubber block will hold the chain in place.

The photograph below illustrates using the T-shaped slot; use of the L-shaped slot is shown on the next page.



Using the T-shaped Slot

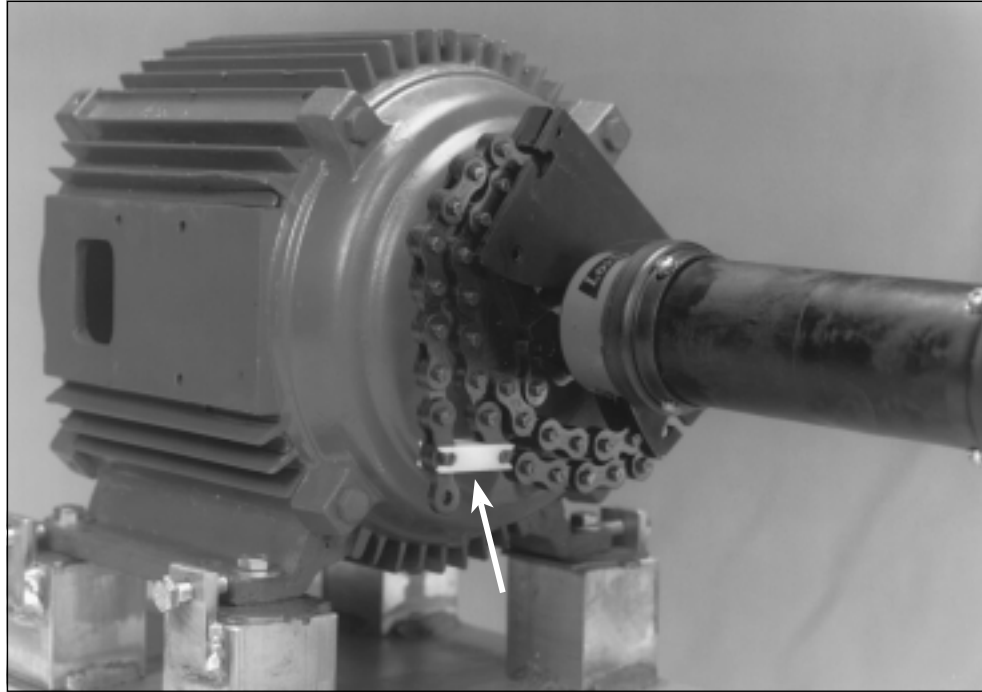


Using the L-shaped Slot

Caution!

Do not attach excess chain prior to tightening the mounting base chain bolts. Doing so may cause damage to the L and T-shaped slots.

Using the Chain Clip



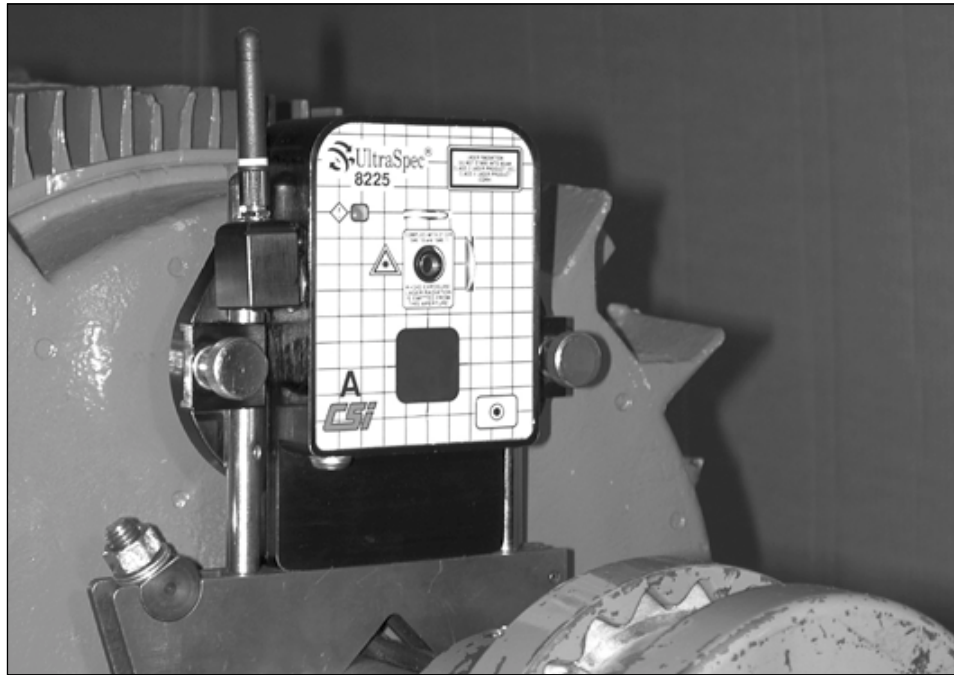
You will almost always have a little extra chain left over. In that case, use the chain clip to attach it to the previous chain loop. CSI recommends that you use this clip to help prevent the chain from sliding out of the L-slot as the shafts are rotated.

Installing a Post



Screw a post into each of the outer holes in the mounting base. Tighten each post with the supplied tightener (Phillips screwdriver) or with a 1/8 inch Allen wrench (not supplied with kit).

Mounting a Sensor Head

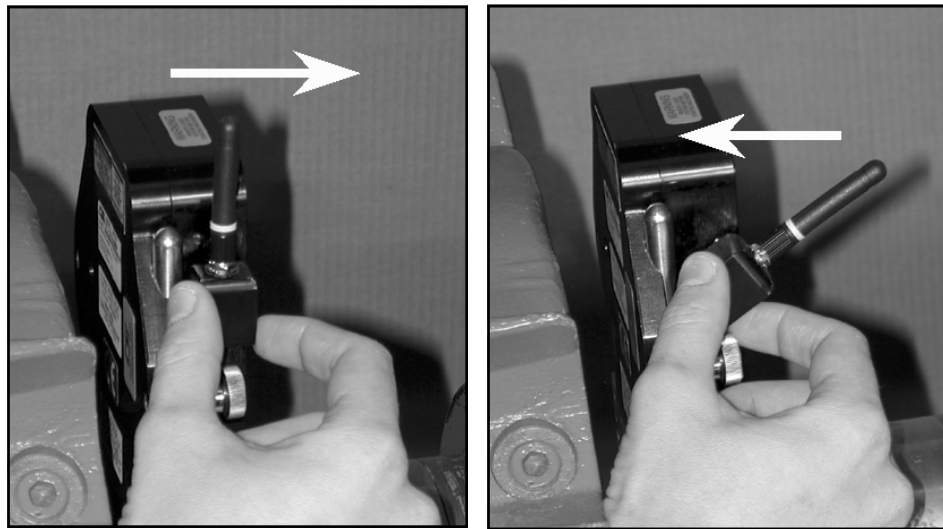


Note

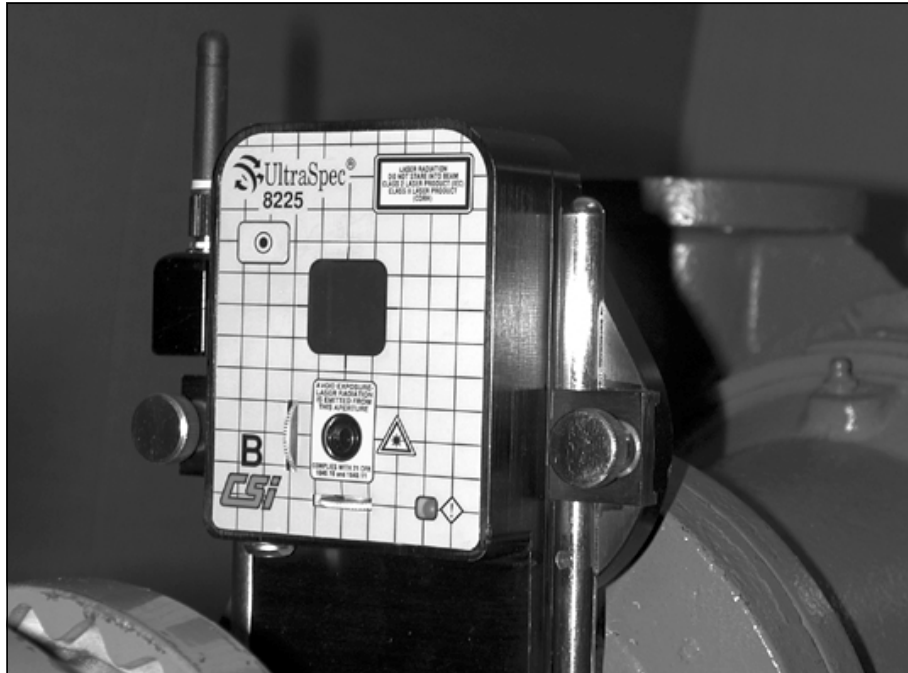
Head A and B are identified with letters on the front panel.

Place a sensor head on the two posts. It does not matter which side of the coupling Head A or Head B is mounted on – the heads will be configured in the analyzer. Adjust to desired position and tighten each post clamp finger tight. The vertical posts allow up to 1.5 inches (38 mm) of vertical adjustment. If more vertical adjustment is needed, use the vertical extension blocks. See “Introduction to Special Applications” on page 4-46 through “Adding a 2-inch Block” on page 4-48 for additional information.

Depending on the clearance around which the laser head will be rotated, the position of the RF antenna may have to be adjusted. When the antenna is in its most upright position it extends up above the top of the laser head. Holding the antenna housing (not the antenna itself), rotate or twist the antenna down (or up depending on its starting position) to its desired position. The antenna's rotational arc is 30 degrees. When the antenna is in its most downward position it does not extend up above the top of the laser head.



Mounting the Other Sensor Head



Install the opposite sensor head in the same manner (Head A or Head B, depending on which sensor head was mounted on the other side).

Connecting the 8000RF Interface



Attaching 8000RF to RS232 25-pin Serial Port



Install the 8000RF Interface onto the RS232 serial port of the UltraSpec analyzer by completing the following steps:

1. ... Ensure that the UltraSpec analyzer is turned off.
2. ... Connect the 8000RF Interface to the RS232 25-pin connector to the UltraSpec analyzer.
3. ... Turn the UltraSpec analyzer on.

Note

The RF antenna on the 8000RF Interface does not rotate or twist. Therefore, trying to rotate or twist the antenna will only result in damaging the 8000RF Interface.

Starting the UltraSpec Analyzer



Turn on the UltraSpec analyzer by pressing the ON/OFF button located at the top right of the Front Panel. This automatically takes you to the program's main menu. From the main menu, press the Options key. Select (4) Alignment Setup and press Enter.

From the Alignment Setup menu, configure the alignment parameters. (Refer to "Alignment Setup" on page 3-6 for details.) The default settings are:

Method – Auto Sweep

ACQ Mode – Standard

Tolerance – Angle/Offset

Thermal Growth – No

Foot Pre-Check – Soft Foot

Quick Spec – No

When finished, press Enter to accept any changes made. Finally, press the Reset/Main key to return to the program's Main menu.

Communication Between the Fixtures and Analyzer

The UltraSpec analyzer conducts communication with the fixtures via a short-range, low-power radio frequency (RF) carrier or by cable.

Communication – With RF, communication occurs in much the same manner as with other short-range wireless systems (e.g., cordless phones) – a direct line of sight communication is not required.

A typical operating range of up to 50 feet can be achieved using RF communication, but this range is greatly influenced by building construction materials and contents, other radio systems operating in the vicinity at or near the same operating frequency, and noise generated by nearby equipment. It is not unusual to achieve four times the typical operating range in electrically quiet environment or to achieve less than the typical operating range in an electrically noisy environment.

Note

The RF operating frequency is 916.5 MHz.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution!

Changes or modifications not expressly approved by CSI could void the user's authority to operate the equipment.

There may be times when an RF communication between each sensor head and the UltraSpec analyzer is not convenient. Moving or keeping the analyzer closer to the laser heads can minimize this inconvenience.

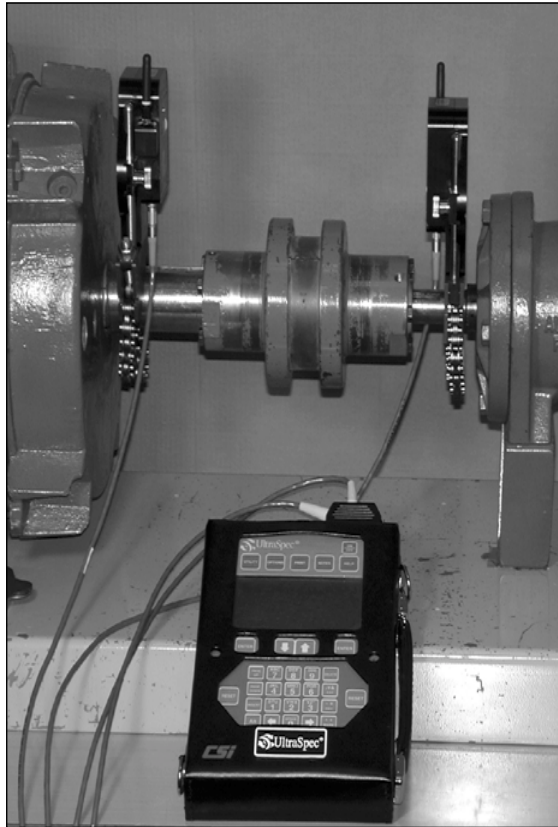
The sensor heads have memory for saving alignment readings. If communication with the UltraSpec analyzer is broken during rotation (while using the Auto Sweep mode), these readings are stored in memory until they can be transmitted. When the sensor head is turned off, the memory data is erased.

If the UltraSpec analyzer is out of range of one or both sensor heads or if some sort of RF interference is occurring, it will repeatedly attempt to communicate with the sensor heads. A message will be displayed on the analyzer until the communication link is established.

When communication using RF becomes difficult, CSI recommends that you use the Direct Connect link as described in the following section.

Direct Connect

Direct Connect is designed for those conditions where it is difficult to communicate between the analyzer and the sensor heads using RF. Conditions such as building construction materials and contents, other radio systems operation in the vicinity at or near the same operation frequency, and noise generated by nearby equipment may make RF communication unsatisfactory.



To use Direct Connect, complete these steps:

1. ... Make sure the UltraSpec analyzer is turned off.
2. ... Attach the 25-pin connector of the direct connect cable to the RS232 port on top of the analyzer.
3. ... Connect the Lemo connectors to the mating straight Lemo connector on the extension cables.

Note

When connecting the Lemo connector to its mating connector, line up the red dots located on each connector with each other before completing the connections.**

4. ... Connect the Lemo connector on the opposite end of the extension cable to the Lemo port under the nose of each 8215/8225.

Note

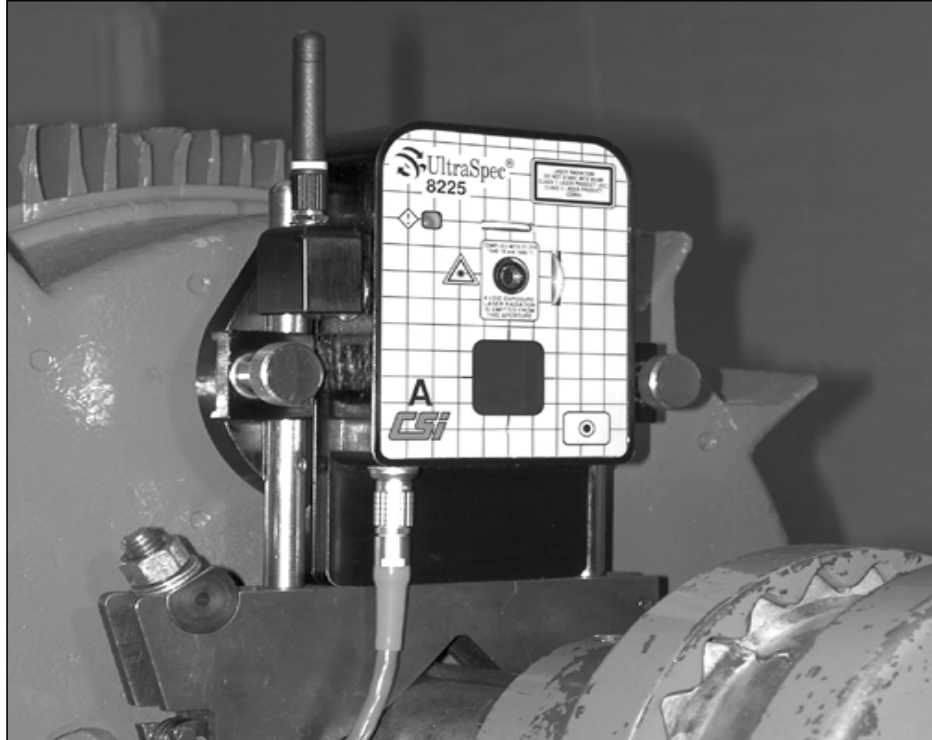
When connecting the Lemo connector to its mating connector, line up the red dots located on each connector with each other before completing the connections.**

Caution!

***To complete connection, push connector together. DO NOT TWIST.*

5. ... Turn the UltraSpec analyzer on.

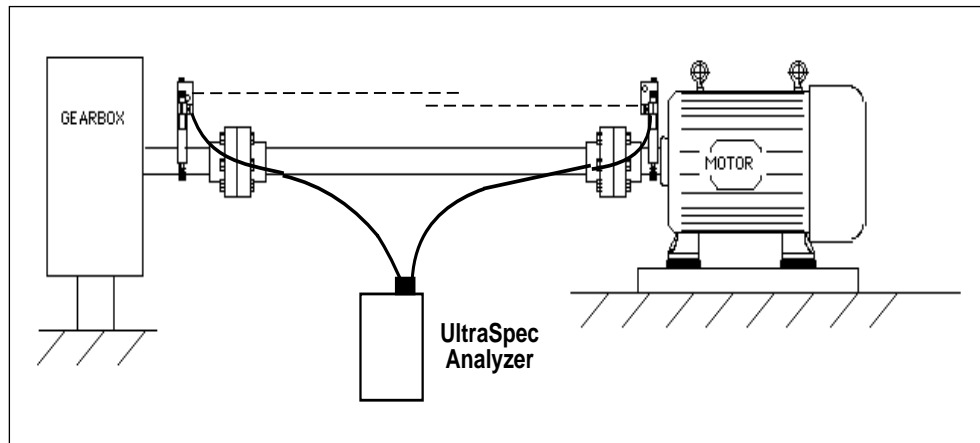
From this point on, Direct Connect is very easy to use. The analyzer determines that it is connected and disables the RF communication. Cables can be unplugged and reconnected at any time (and at any connection). You do not have to remember which cable is plugged to which head. Even if you switch the orientation of the cables (when reconnecting), the analyzer can adjust to the change and will still work correctly.



Caution!

When using any cable connector inside the sensor head connector, DO NOT turn or twist the connector. This will shear the cable pins off (inside the connector) totally disabling the sensor head and cable. Pull the cable connector completely out of the sensor head connector before turning the cable.

The extension cables are 10 feet (3 m) long. With the connection pigtail, the total length is 12 feet (3.6 m). When standing between the sensor heads, a 20 feet (6 m) span can be aligned. Extension cables are available for longer spans or, if you cannot stand directly in the middle.



Note

With the 8215, a maximum distance of 30 feet between the laser heads can be achieved. With the 8225, a maximum distance of 100 feet between laser heads can be achieved.