

# DYMAX WIDECURE™

UV Light-Curing Conveyors – 18" and 25"



WIDECURE™ Conveyor (18" - PN39380, 25" - PN39381)

## Operation Manual

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Before shipping, your DYMAX WIDECURE™ UV Light-Curing Conveyor was thoroughly checked and tested for trouble-free performance.

The proper set up and operation of this conveyor system will maximize safety and user-friendly performance, providing optimum yield of your process.

Therefore, we encourage you to read, understand, and follow all safety and operating instructions and recommendations compiled in this and other related manuals prior to setting up and operating this new system or its individual components.

Questions related to the light-curing process should be directed to DYMAX Applications Engineering.

Questions related to conveyor performance, replacement parts, troubleshooting, or repair should be directed to Systematic Automation at (860) 677-6400, ext. 117.

## UNPACKING AND INSPECTION

Upon receipt of the unit, carefully remove the conveyor from the shipping crate and check for damage. DYMAX is not responsible for damage from shipping – all claims for shipping damage should be made with the carrier.

If you observe or experience any problem with your equipment, notify DYMAX Customer Service, your authorized distributor, or your DYMAX representative immediately.

**NOTE:** Report any equipment shortage to Systematic Automation – phone: (860) 677-6400, ext. 117.

Each system includes:

- 18" or 25" WIDECURE™ UV Light-Curing Conveyor
- Operation Manual

Before continuing with unpacking and installation, please read the following operation manual for safety recommendations and installation, operation, and troubleshooting instructions.



**Figure 1.** WIDECURE™ UV Light-Curing Conveyor

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## SAFETY



**CAUTION!** Always wear protective goggles or face shield when working near the front of the unit, which emits UV light! The rear of the unit also emits stray UV light.



**WARNING!** Always observe safety requirements!



**CAUTION!** This unit generates ozone during operation. Adequate ventilation should be provided or the unit should exhaust to outside.



**CAUTION!** Risk of electrical shock if controller cover is removed!



**CAUTION!** The sides of the unit are warm to the touch when unit is in operation!

To maximize safety, equipment should be set up properly with components correctly connected and operated in accordance with relevant instructions. This light-curing system was developed to maximize operator safety and minimize exposure to UV.

### SAFETY RECOMMENDATIONS:

- Use goggles or a face shield approved for complete UV protection to protect your eyes.
- Long-sleeved shirts or a lab coat are recommended to protect the arms and the use of UV-opaque gloves to protect the hands.

## DYMAX UV LIGHT-CURING SYSTEM SAFETY CONSIDERATIONS

DYMAX ultraviolet light-curing technology has been used successfully for over 30 years. The fast cure, one-component nature of our UV light-curing technology has made it the process of choice for many manufacturers requiring a cure on demand assembly process. There are four common questions/concerns related to UV light-curing systems: UV exposure, high-temperature surfaces, ozone, and bright, visible light.

### UV EXPOSURE

Standard DYMAX UV light-curing systems and bulbs have been designed to primarily emit UVA light (as shown in Chart 1). UVA light is generally considered the safest of the three UV ranges: UVA, UVB, and UVC. Although OSHA does not currently regulate ultraviolet light exposure in the workplace, the American Conference of Governmental Industrial Hygienists (ACGIH) does recommend Threshold Limit Values (TLV's) for ultraviolet light. The strictest interpretation of the TLV (over the UVA range) for workers' eyes and skin is 1 mW/cm<sup>2</sup> (intensity), continuous exposure. Unless workers are placing bare hands into the curing area, it is unusual to exceed these limits. To put 1 mW/cm<sup>2</sup> limit into perspective, cloudless summer days in Connecticut regularly exceed 3 mW/cm<sup>2</sup> of UVA light and also include the more dangerous UVB light (primarily responsible for sun tans, sun burns, and skin cancer) as well.

The human eye can not detect UV energy, only visible light. A radiometer should be used to measure stray UV energy to confirm the safety of a UV light-curing process. A workstation that exposes an operator to more than 1 mW/cm<sup>2</sup> of UVA energy continuously should be redesigned.

Curing of UV light-curable chemistry can be a regulatory compliant, "worker-friendly" manufacturing process when the proper safety equipment and operator training is utilized. There are two ways to protect operators from UV exposure: shield the operator and/or shield the source.

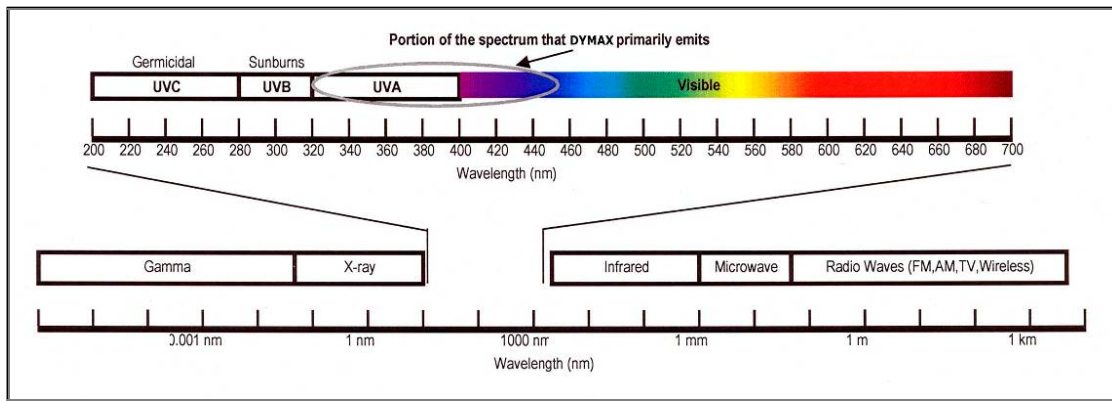


Chart 1. Light Spectrum

## SHIELD THE OPERATOR

- **UV-Blocking Eye Protection** – UV-blocking eye protection is recommended when operating UV light-curing systems. Both clear and tinted UV-blocking eye protection are available from DYMAX.
- **UV-Blocking Skin Protection** – Where the potential exists for UV exposure upon skin, opaque, UV light-blocking clothing, gloves, and full-face shields are recommended.

## SHIELD THE SOURCE OF UV

Any substrate that blocks UV light can be used as a shield to protect workers from stray UV light. The following materials can be used to create simple shielding structures or blind corners:

- **Sheet Metal** – Aluminum, steel, stainless steel, etc. Sheet metal should be coated black or black anodized to minimize reflection of UV and visible light toward operators.
- **Rigid Plastic Film** – Transparent, UV-blocking plastics (typically polycarbonate or acrylic) are commonly used to create shielding where transparency is also desired. These rigid plastic films are available either water-clear or tinted.
- **Flexible Film** – UV-blocking, flexible urethane films can be used to quickly create workstation shielding. This UV-blocking, flexible urethane film is available from DYMAX.

## HIGH-TEMPERATURE SURFACES

Surfaces exposed to high-intensity curing lights will rise in temperature. The intensity, distance, exposure time, cooling fans, and the type/color of the surface can all affect the actual surface temperature. In some cases, exposed surfaces can reach temperatures capable of producing a burn or causing damage to a substrate. In these cases, care must be taken to ensure either a more moderate surface temperature or appropriate protection/training for operators.

## OZONE

Standard DYMAX bulbs (UVA type) generate an insignificant amount of UVC and therefore essentially no ozone. Some UV light-curing systems, like those used to cure UV inks, emit primarily “shortwave” (UVB and UVC) energy. Upon exposure to UVC light (specifically <240 nm), oxygen molecules ( $O_2$ ) split into oxygen atoms (O) and recombine with  $O_2$  to create ozone  $O_3$ . The current, long-term ozone concentration limit recommended by ACGIH, NIOSH, and OSHA is 0.1 ppm ( $0.2\text{mg}/\text{m}^3$ ).

## BRIGHT, VISIBLE LIGHT

The bright, visible light emitted by some UV light-curing systems can be objectionable to some workers and can cause eyestrain. Tinted eye protection and/or opaque/tinted shielding can be utilized to address this concern.

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## SUMMARY

UV light sources can be more “worker friendly” than many commonly accepted industrial processes provided the potential concerns are addressed. Contact your DYMAX representative for information regarding the proper use of DYMAX UV light-curing systems.

## GENERAL DESCRIPTION

DYMAX WIDECURE™ conveyors are designed to provide reliable and consistent processing of UV light-curable adhesives, coatings, inks, gaskets, masks, and more. DYMAX 18" and 25" WIDECURE™ UV Conveyors offer fast, consistent UV light-curing of large parts. The 18" Conveyor has a belt width of 26" and an active curing width of 18". The 25" Conveyor has a 33" wide belt and an active curing width of 25".

Standard features include a direct drive Motor, an integrated Cooling System, and an UV-resistant Belt. The self-contained Cooling System and complete UV-Light Shielding allow it to be placed virtually anywhere space permits.

The Conveyor Belt speed may be set from 1 fpm to 50 fpm (feet per minute). Higher Belt speeds are available on special order. An integral vacuum hold down ventilation system keeps parts securely to the conveyor's Belt. The internal Lamp may be adjusted from 5" above the Belt to 24" above the Belt. This allows curing of a wide variety of larger parts.

The conveyor may be outfitted with either a Long-Wave Bulb (for most DYMAX materials) or a Short-Wave Bulb (for inks).

The Ventilation System has an External Exhaust Duct that can be attached to standard exhaust ducting. External exhaust installation is recommended because the unit produces a small amount of ozone that might be a problem when exhausted to a confined or poorly ventilated space. A UV Blower is provided to remove heat and ozone produced by the UV Bulb. Ducting for the UV Blower exhaust is provided to the top of the curing system. You should provide additional ducting to vent the exhaust outside of your building. You may need to add an additional blower to your system depending upon the length and configuration of your exhaust ducting.

After the UV Power Supply is shut off there is a delay of about 20 seconds before the UV Blower shuts off. Do not shut off the main machine power before the Blower shuts off.

The UV Power Supply will not turn on if the conveyor Belt is not running. This is to protect the Belt from overheating. Turn on the main power for the machine and then turn on the conveyor Belt using the AC Tech Drive. After that you can turn on the UV Power Supply.

The conveyor system includes a variable-speed AC Tech Drive, AC Motor, and Gearbox. Different Gearboxes are available to meet your particular Conveyor speed and load requirements. The digital readout for the AC Tech Drive indicates the conveyor speed in feet per minute. Pressing the up arrow will increase the Belt speed and pressing the down arrow will decrease it.

The conveyor includes adjustable height legs. Adjust the height of your conveyor by loosening the locking nuts and turning the threaded rods. Retighten the locking nuts.

## SPECIFICATIONS

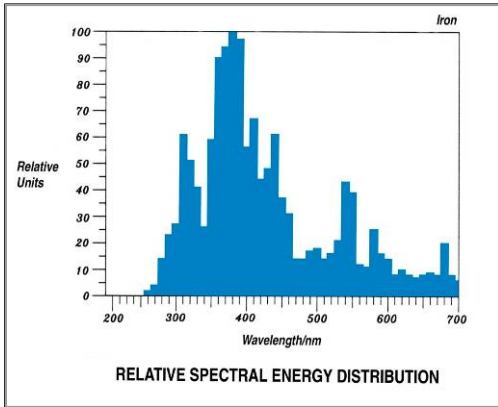
SPECIFICATIONS	DESCRIPTION	18" CONVEYOR	25" CONVEYOR
	<b>DYMAX Part Number</b>	<b>39380</b>	<b>39381</b>
<b>UV-CURING INFORMATION</b>	<b>Bulb Curing Width</b>	18" [45.7 cm]	25" [63.5 cm]
	<b>Peak Intensity</b>	900 mW/cm <sup>2</sup> nominal <sup>1</sup>	
	<b>Energy @ 5 fpm</b>	4.0 J/cm <sup>2</sup> nominal <sup>1</sup>	
	<b>Bulb Degradation</b>	<20% degradation over 750 hours typical	
	<b>UV Lamp Type</b>	400 W/in metal halide Bulb (standard <sup>2</sup> )	
	<b>Reflector Type</b>	Focused	
<b>BELT INFORMATION</b>	<b>Belt Width</b>	25-7/8" [65.7 cm]	32-7/8" [83.5 cm]
	<b>Belt Working Height</b>	Adjustable from 35" to 41" [88.9 cm to 104.1 cm] above	
	<b>Belt Material</b>	Teflon coated fiberglass	
	<b>Belt Speed</b>	Adjustable 1-50 fpm	
	<b>Speed Control</b>	Digital readout; 0.1 fpm increments; 2% accuracy	
	<b>Maximum Belt Load</b>	30 lbs [13.6 kg]	
<b>DIMENSIONS</b>	<b>Overall Dimensions (L x W x H)</b>	126" x 38" x 71" [320 cm x 96.5 cm x 180.3 cm]	126" x 45" x 71" [320 cm x 114.3 cm x 180.3 cm]
	<b>In-Feed Length</b>	36" [91.4 cm]	
	<b>Shroud Length</b>	60" [152.4 cm]	
	<b>Out-Feed Length</b>	36" [91.4 cm]	
	<b>Clearance and Lamp Height</b>	Adjustable from 5" to 24" [12.7 cm to 61.0 cm]	
<b>ELECTRICAL INFORMATION</b>	<b>UV Lamp Electrical Requirements</b>	220 VAC <sup>3</sup> , 60 Hz, 50 Amps	220 VAC <sup>3</sup> , 60 Hz, 80 Amps
		Single phase plus ground	
	<b>Conveyor Electrical Requirements</b>	110 VAC, 60 Hz, 15 Amps	
<b>AIR FLOW INFORMATION</b>	<b>Cooling Air Flow</b>	600 CFM	900 CFM
	<b>Blower Duct Dimensions</b>	8" [20.3 cm] square	
	<b>Replacement Bulbs</b>	<b>39376</b> – 18" Metal Halide (standard) <b>39613</b> – 18" Mercury <b>39373</b> – 25" Metal Halide (standard) <b>39614</b> – 25" Mercury	
	<b>Shipping Weight</b>	~650 pounds	
	<b>Lead Time</b>	3-7 weeks, depending upon inventory	

<sup>1</sup> Measured with an EIT Power Puck (320-395 nm) radiometer at a lamp height of 5"

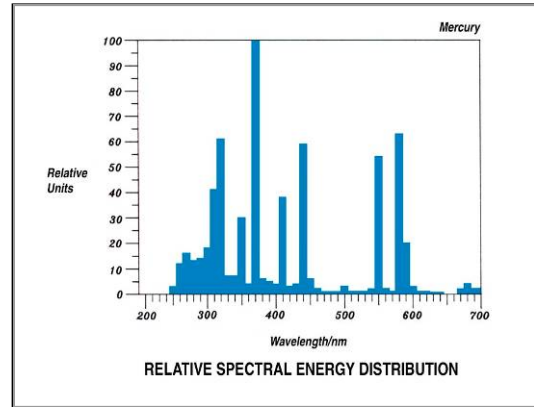
<sup>2</sup> Can also be outfitted with mercury bulbs (aka shortwave, UVB, UVC, "H" type) for UV inks and cationics

<sup>3</sup> Other UV lamp voltages are available upon request (208V, 420V, 460V)

WIDECURE™ conveyors can be outfitted with either a Long Wave (metal halide, UVA/Visible) Bulb or a Short Wave (mercury, UVB/UVC) Bulb. The Long Wave Bulbs are recommended for most DYMAX UV light-curable materials while the Short Wave Bulbs are generally recommended for UV inks. The following charts show the spectral distribution of each type of Bulb. Unless otherwise specified, DYMAX WIDECURE Conveyors are outfitted with Long Wave (metal halide) Bulbs.



**Figure 2.** Spectral Distribution with a Metal Halide Iron-Doped Mercury Bulb (standard bulb).



**Figure 3.** Spectral Distribution with a Mercury Bulb (optional bulb).

## INSTALLATION AND INTERCONNECTION

Your WIDECURE UV light-curing conveyor system requires minimal assembly once removed from the packing skid or crate.

1. Install the four threaded Legs into the Conveyor Feet. Adjust the threaded Legs as required to level the unit and to set the conveyor Belt working height.
2. Provide two sources of AC power to the conveyor (See Table 2 for requirements).

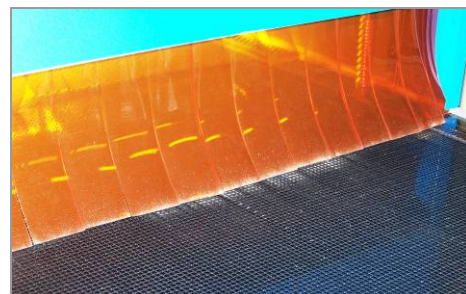
**NOTE:** On the higher voltage models, the power sources must be hard-wired into the back of the conveyor by a qualified electrician. The 115V model has a standard North American wall plug.

3. Wire the Power Supply by removing the conveyor's back panel and inserting the wires thru the hole on the left side of the Power Supply. Attach the wires to the Terminal Block (Figure 4).
4. Verify that the UV Shielding is installed on the outlet side of the conveyor. The UV Shielding is designed to minimize UV exposure to the operator.

Table 2. Power Requirements	
Required AC Power	Conveyor – 115 Volts
	UV Power Supply – 220 Volts (208, 240, or 460 VAC are available on special request)
Power Supply	18" Conveyor – 50 AMP
	25" Conveyor – 80 AMP



**Figure 4.** Power Supply Wiring



**Figure 5.** UV Shielding

- Adjust the UV Irradiator height above the Belt. The Irradiator is mounted on a Hand Crank System that allows the height of the curing Lamp from the conveyor Belt to be adjusted. Turn the Crank Handle located at the top of the curing system to move the Irradiator up or down as needed.

**NOTICE:** The UV light should be turned off before you look into the Curing Chamber to make an adjustment on the Irradiator height or for any other purpose.

- A Scale located above the Conveyor indicates the distance from the bottom of the Lamp Housing to the conveyor Belt.

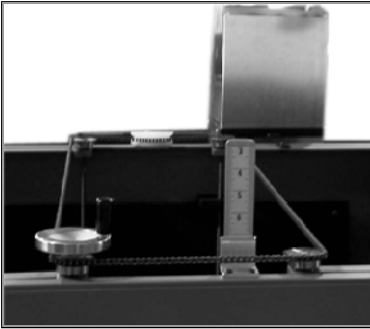


Figure 6. Hand Crank System

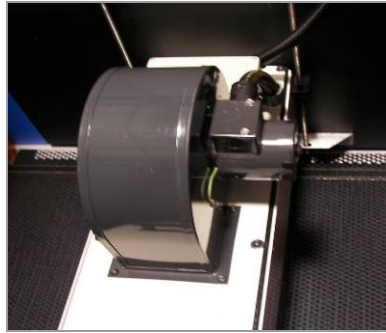


Figure 7. Irradiator

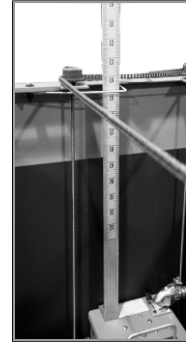


Figure 8. Scale

- The Curing Chamber is surrounded by an enclosure but is open on top. There are panels that are screwed onto the Chamber Housing at the entry and at the exit. These panels may be removed to allow for taller products to pass thru the Curing Chamber. Remove only enough panels to allow your package to enter the Curing Chamber.
- There are two layers of Light-Blocking Curtains (Figure 10) after the entrance to the Curing Chamber and before the exit of the Curing Chamber. The Light-Blocking Curtains are hung in slots on the top of the Curing Chamber and can be moved within the slots if needed.



Figure 9. Conveyor Curing Chamber Entrance

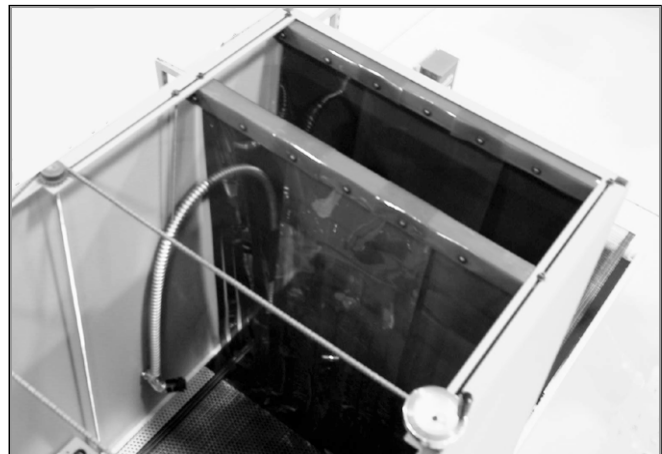


Figure 10. Light-Blocking Curtains in Curing Chamber (Top View)

## SYSTEM OPERATION

1. Turn on the main power to the conveyor (Figure 11).
2. Press "START" on the Conveyor Speed Controller (Figure 12). Set the Belt speed by pressing and holding the up arrow or down arrow. Belt speed can be adjusted from 1 to 50 fpm.
3. Turn Power Supply's main power on. This is done by turning the red knob on the Power Supply Front Panel (Figure 13) to the "ON" position.



Figure 11. Main Power Controls



Figure 12. Conveyor Speed Controller



Figure 13. Power Supply Front Panel.

4. Select "RUN UV" on the Touch Screen Interface (Figure 14).
  5. Turn on the control power to the UV by pushing the green "ON" Button located on the Power Supply Front Panel (Figure 13).
  6. Select "LAMP ON 400W" on the Touch Screen Interface to start the UV Lamp (Figure 15). "LAMP WARMING" will appear at the bottom of the Touch Screen. Once the UV Lamp is ready, "LAMP ON 400W" will be displayed.
- NOTE:** The UV Lamp must always be started at 400 W. After the UV Lamp has warmed up, a lower power may be selected if desired.
7. Adjust the height of the UV Lamp as desired by turning the UV Irradiator's Hand Crank (Figure 16). The height of the UV Lamp above the Belt is shown by a Scale mounted on the top of the conveyor so that adjustments may be performed without the operator looking into the Curing Chamber.

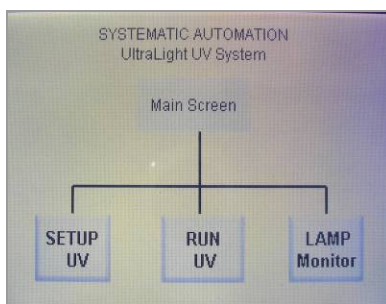


Figure 14. Select "RUN UV" on the Touch Screen Interface.

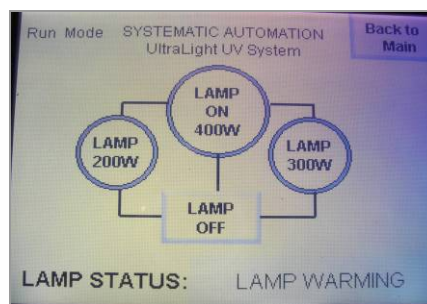


Figure 15. Select "LAMP ON 400W" on the Touch Screen Interface.

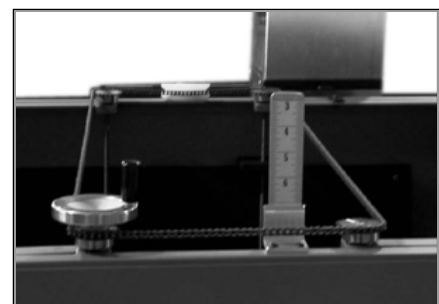


Figure 16. UV Lamp's Hand Crank & Scale

8. After the Power Supply is shut off there is a delay before the UV Blower shuts off. Do not shut off the power to the main machine before the UV Blower shuts off.

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## MAINTENANCE

The conveyor should require little maintenance. It is important that the Belt be operated under proper tension and alignment. If it is loose the Belt can slip resulting in Belt and Roller wear and improper conveyor speed. If the alignment is incorrect, the Belt can track to one side inducing wear to the side of the Belt and the Rubber Roller Guides. The conveyor should be inspected daily to assure that the Belt and Rollers rotate in phase with one another and that the Belt remains relatively centered between the two Rubber Roller Guides.

If the Belt requires an adjustment, loosen the Jam Nut and Set Screw and turn the Adjustment Screw clockwise to increase Belt tension. Make this adjustment equally on both sides of the conveyor to ensure proper Belt tracking. Retighten the Jam Nuts and locking Set Screws. Do not over-tension the Belt. Over tensioning can cause tearing of the Belt seam and damage to other components.

If you remove the high-voltage Irradiator Cable from the Irradiator, use care when replacing it. If the Connector is not properly seated and tightened, the Irradiator Cable can be ruined by arcing across the Connector.

### BELT TRACKING ADJUSTMENT

All DYMAX WIDECURE™ conveyors are adjusted at the factory to provide proper tracking of the Belt. Should further adjustments become necessary, this is done via two Adjustment Screws located at the input end of the conveyor. To adjust tracking, simply tighten the side to which the Belt is tracking.

**CAUTION:** Do not over tighten the Belt. This will lead to accelerated degradation of the Belt.

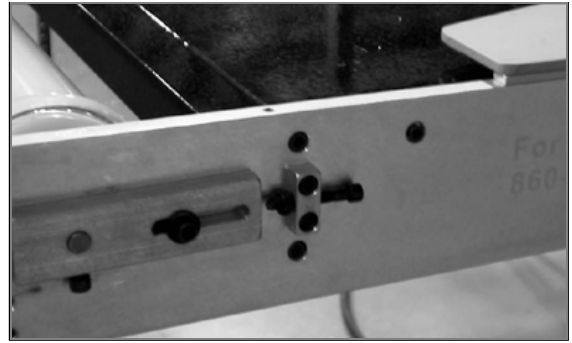


Figure 17. Adjustment Screws for Belt Tension and Alignment

## TROUBLESHOOTING

**WARNING:** Only qualified maintenance personnel should attempt the following procedures:

Problem	Possible Cause	Testing	Corrective Action
<b>Conveyor Not Operating</b>	Main Line Circuit Breaker tripped.	Toggle Power Switch off, then on.	Find cause of tripped breaker.
	Improperly fastened Connections.	Check all connections.	Properly fasten connections.
	Fuses for Motor Controller blown.	Remove Fuses from Fuse Holders (located in the left side of control box of unit) and check with an Ohmmeter.	Replace Fuses if defective.
	Belt is hung up.	Inspect the Belt for any signs of a mechanical bind.	Resolve bind and continue operation.
	Tension too low on Belt (Power Switch lights and Motor turns but Belt does not move).	Verify the operation of the Drive Shaft and Drive Rollers.	Use the tracking adjustment screws to increase the tension on the Belt. Both knobs need to be turned the same amount to maintain alignment.
<b>Belt Tracks to One Side</b>	Belt Adjustment Screws are out of position.	Visually inspect the Belt. The Belt will track to one side.	Tighten the Belt Adjustment Screw (the one located on the side to which the Belt is tracking towards) until Belt tracks straight. Only minor adjustments should be made at one time.

## SPARE/REPLACEMENT PARTS

Part #	Part Description
40671	Conveyor Belt Guide
39376	18" Metal Halide Bulb (standard)
39613	18" Mercury Bulb
40672	Reflector for 18" Conveyor
39661	Conveyor Belt for 18" Conveyor
39373	25" Metal Halide Bulb (standard)
39614	25" Mercury Bulb
40673	Reflector for 25" Conveyor
39663	Conveyor Belt for 25" Conveyor

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## DEFINITION OF TERMS

**Bulb** - Light source generating ultraviolet, visible, and infrared radiant energy from burning matter stimulated by electrical power conditioned by a proper power supply which is an integral part of a Lamp. A light source is usually placed into a reflector (of various geometry) to increase light source efficiency by collecting and directing radiant energy of selected spectra (for a given curing process).

**Intensity** - a measure of light energy over the unit of surface area (usually surface at the specified working distance from the bottom of a Reflector Housing) in  $W/cm^2$  or  $mW/cm^2$ . This measure may also be referred to as "irradiance".

**Brightness**, also known as **Luminance** - description of energy in the visible region of the spectrum (approximately from 400 to 700 nm) and recorded in photometric units. "**Intensity**" (see below) of visible light energy is called Illuminance.

**Ultraviolet (UV)** - The invisible region of the spectrum just beyond the violet end of the visible region. Wavelength ranges in general from 1.0 to 400 nm. DYMAX bulbs do not radiate energy in deep ultraviolet; there are very minute amounts below 220 nm and practically nothing can be sensed below 200 nm. This is due to the use of ozone-blocking quartz bulb envelope (See Ozone).

1. **Ultraviolet A (UV-A)** - UV of long wavelength from approximately 400 to 320 nm of the spectral band . This is the predominant energy produced by DYMAX flood lamps.
2. **Ultraviolet B (UV-B)** - UV of medium wavelength from approximately 320 to 280nm - DYMAX flood lamps produce some amount of their energy within this bandwidth.
3. **Ultraviolet C (UV-C)** - UV of short wavelength below 280 nm.
4. **Visible** – Energy that can be seen by the human eye (400-700 nm).

**Dose** - Irradiance integrated over time, or Irradiance ( $W/cm^2$ ) x Time (s) = Dose ( $Joules/cm^2$ ). Note: Watt is the power that gives rise to the production of energy at the rate of 1-joule (J) per second (s).

**Ozone** - Oxidizing agent ( $O_3$ ) produced by the action of ultraviolet radiant energy (below 250 nm) or electrical corona discharge of oxygen on air.

**OSHA 1910.145:** "Regulation of Accident prevention Signs and Tags" defines the following headers as:

**WARNING** – Used when there is a hazardous situation that has some probability of severe injury.

**CAUTION** – Used to indicate a hazardous situation that may result in minor or moderate injury.

**NOTICE** – Used to convey a message related directly or indirectly to the safety of personnel, or protection of property.

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## WARRANTY

### CAUTION!

DYMAX CORPORATION RESERVES THE RIGHT TO INVALIDATE ANY WARRANTIES, EXPRESSED OR IMPLIED, DUE TO ANY REPAIRS PERFORMED OR ATTEMPTED ON DYMAX EQUIPMENT WITHOUT WRITTEN AUTHORIZATION FROM DYMAX. THOSE CORRECTIVE ACTIONS LISTED BELOW ARE LIMITED TO THIS AUTHORIZATION.

DYMAX offers a one-year warranty against defects in material and workmanship on all system components (excluding bulbs) with proof of purchase date. Unauthorized repair, modification, or improper use of equipment may void warranty. The use of aftermarket replacement parts not supplied or approved by DYMAX Corporation, will void any effective warranties and may result in damage to the equipment.

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## NOTES

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MAN018 02/10/2011

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