

WSF

Weld Seam Facing System

PUSHCORP, INC.

Dallas, Texas

June, 2009

! WARNING !

Requires 480 Volt, 3 Phase electrical power. DO NOT operate in rain, snow, or standing water.

! WARNING !

REMOVE ALL ELECTRICAL POWER and ACTUATE ALL E-STOPS before adjusting or servicing the Weld Shaver, Drive Carriage, or Control Console.

! WARNING !

SAFETY GLASSES ARE ALWAYS REQUIRED

Machine propelled metal chips or Insert breakage presents great potential for eye injury.

! WARNING !

ALL PERSONNEL MUST MAINTAIN A 10 ft. (3 m) SAFETY ENVELOPE AROUND THE DRIVE CARRAIGE WHILE IT IS IN OPERATION.

! WARNING !

Stud-weld feet **MUST** be used for Vertical, Horizontal, and Overhead track use.

! Attention !

Unless noted, All fasteners and fittings are METRIC.

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1.0 Limited Warranty

Duration:

One year from date of delivery to the original purchaser.

Who gives this warranty (warranter):

PushCorp, Inc.

Telephone: (972) 840-0208

Corporate Address:

P. O. Box 181915

Dallas, Texas 75218

Shipping Address:

3001 W Kingsley Rd

Garland, Texas 75041

Who receives this warranty (purchaser):

The original purchaser (other than for purposes of resale) of the *PushCorp, Inc.* product

What products are covered by this warranty:

Any *PushCorp, Inc.* industrial equipment or accessory supplied or manufactured by the Warranter.

What is covered under this warranty:

Defects in material and/or workmanship which occur within the duration of the warranty period.

What is NOT covered in this warranty:

- A. IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO ONE YEAR FROM THE DATE OF ORIGINAL PURCHASE. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.
- B. ANY INCIDENTAL, INDIRECT, OR CONSEQUENTIAL LOSS, DAMAGE or EXPENSE THAT MAY RESULT FROM ANY DEFECT, FAILURE, MALFUNCTION OF THE *PUSHCORP, INC.* PRODUCT. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you.
- C. Any failure that results from an accident, purchaser's abuse, neglect, unauthorized repair or failure to operate the products in accordance with the instructions provided in the owner's manual(s) supplied with the product.

Responsibilities of the Warranter under this warranty:

Repair or replace, at Warranter's option, products or components which have failed within the duration of the warranty period.

Responsibilities of the purchaser under this warranty:

- A. Deliver or ship the *PushCorp, Inc.* product or component to PushCorp, Inc. Service Center, Garland, TX. Freight and insurance costs, if any, must be borne by the purchaser.
- B. Use reasonable care in the operation and maintenance of the product as described in the owner's manual(s).

When warranter will perform repair or replacement under this warranty:

Repair or replacement will be scheduled and serviced according to the normal work flow at the service center, and depending on the availability of replacement parts. Purchasers requiring quicker repair may receive such with payment of a *PushCorp, Inc.* predetermined expediting fee.

This Limited Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

2.0 General Overview

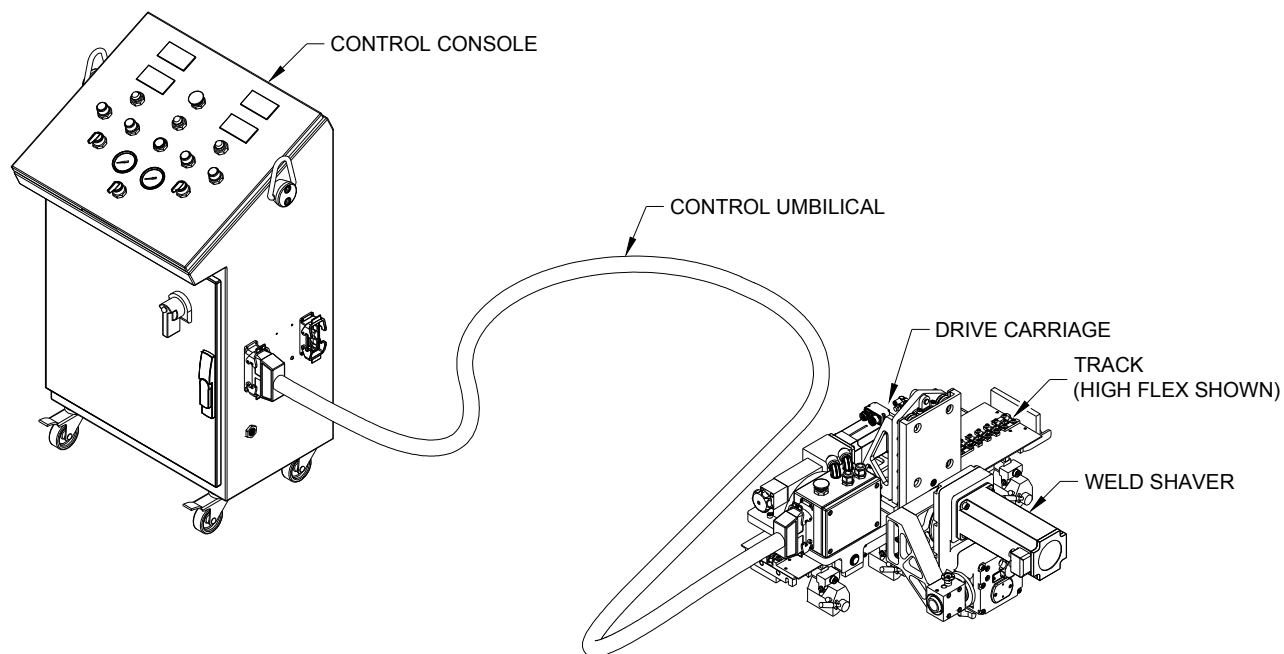


Figure 1: WSF System General Overview

The PushCorp WSF (Weld Seam Facing) System is an automated solution for the rapid removal of weld beads above a panel surface. The Weld Shaver is moved along a track by the Drive Carriage with the user managing everything remotely from the Control Console. The WSF System is comprised of five major components; the Track (either Flex or High-Flex), the Drive Carriage, the Weld Shaver, the Control Umbilical, and the Control Console.

The portable track is available in two configurations, a 35 in. (0.9m) High-Flex, and a 70 in. (1.8m) Flex. Both track configurations are held to the steel surface via eight (8) high strength magnets that generate over 200 lbs. (890 N) of holding force. These magnets must be supplemented with attachment feet that are secured to the panel via 1/2" weld studs during Horizontal, Vertical, or Overhead orientations, providing a "fail safe" connection. The High-Flex Track configuration must be utilized for any panel with a bend radius less than 10m (400 in.). The High-Flex Track has a minimum bend radius of 40 in. (1 m). The Flex Track may be used on any panel with a bend radius greater than 400 in. (10 m), allowing fewer track sections to be utilized.

The Drive Carriage travels along the track and moves the Weld Shaver over the weld by holding it against the surface. A Compliant Slide holds the Weld Shaver against the panel with pneumatic force, compensating for surface irregularities. The Compliant Slide also retracts the Weld Shaver for removal or installation. The Drive Carriage utilizes a servo motor coupled to a 60:1 reduction gearbox which rotates the drive sprocket. The servo motor has closed loop feedback to accurately maintain the desired Drive Carriage speed. This allows the operator to easily control and monitor feed rates. The Drive Carriage incorporates an Attachment Arm to support the Weld Shaver. This Attachment Arm can be rotated to facilitate Weld Shaver installation and removal. A Lateral Adjustment feature allows 2 in. (50 mm) fine positioning of the Weld Shaver over the weld seam after the track has been placed.

The Weld Shaver is installed on the Drive Carriage Attachment Arm. Utilizing a high torque servo motor coupled to a series of slotting cutters through a belt reduction, the Weld Shaver machines the weld seam off. The belt and pulley reduction allows a smaller/lighter servo motor to be used and isolates the servo motor from the shock loads of the weld shaving process. The 5 in. (125 mm) diameter slotting cutters utilize standard carbide inserts which have two cutting edges. The insert can be rotated after the first edge becomes dull. These inserts are easily removed and installed in preset holders using a Torx driver. The servo motor allows the cutting speed to be accurately set and the cutting effort monitored during the process. The Weld Shaver can be configured to cut weld seams up to 2.25 in. (57 mm) in width.

The Control Console allows the operator to completely manage the weld shaving process from a safe distance. The operator adjusts the Drive Carriage servo motor (Feed Rate) and the Weld Shaver servo motor (Cutting Speed) with rotary knobs. Speed and effort displays for each motor are also located on the console. The cutting force and retract is set from the Control Console, through the Orientation Selector. The Control Console is fitted with lifting eyes and locking casters for maneuvering the unit to and around the work area.

The Control Umbilical connects the Control Console and the Drive Carriage. All servo motor power and feedback cables, plus the pneumatic lines are protected inside. The outer tube is fire retardant and crush resistant. The Control Umbilical will only connect one way.

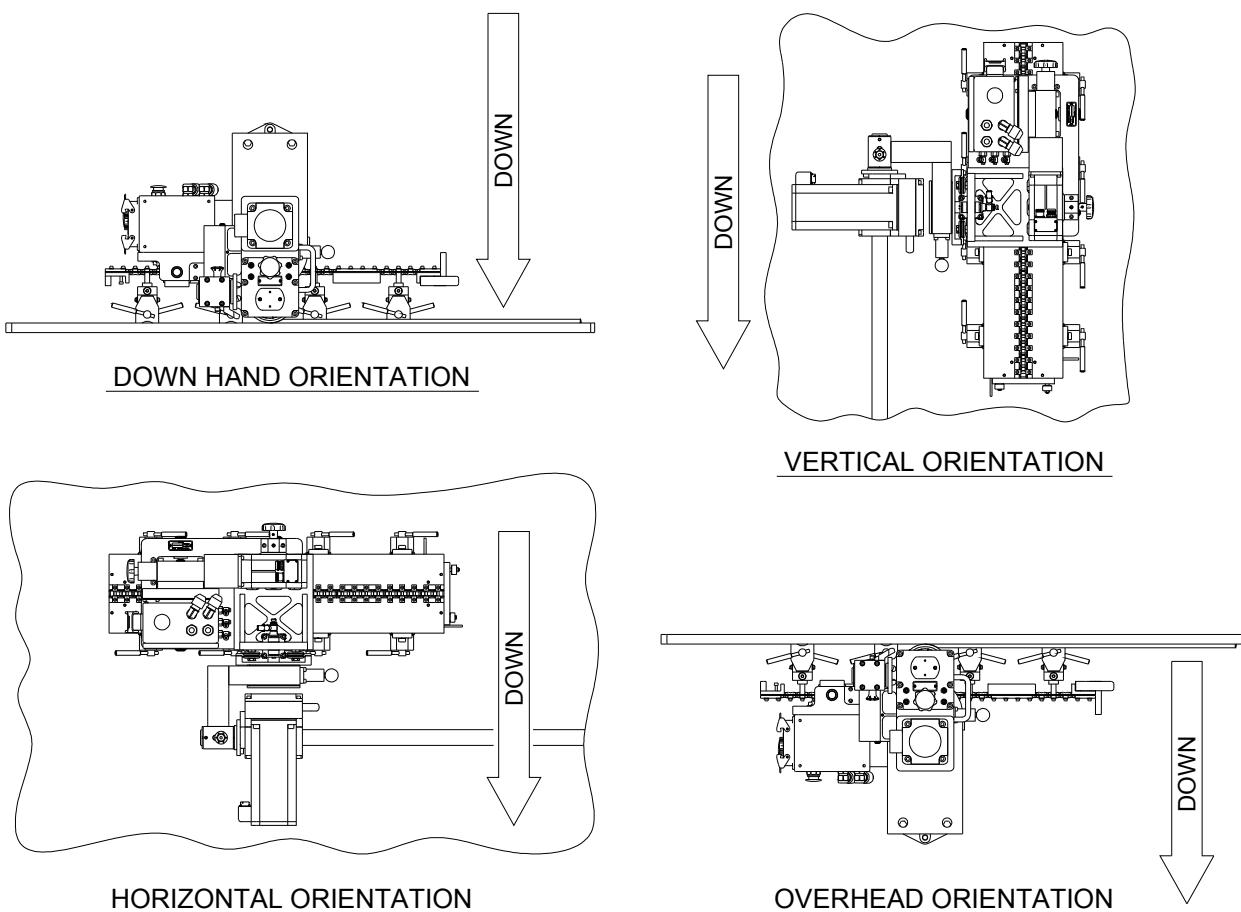


Figure 2: Track Orientations

3.0 WSF System Installation

3.1 Track Installation

1. The operator chooses the appropriate track type, High-Flex or Flex based on the surface contour along the weld seam. The track selection may be dictated by a work order listing the minimum radius of contour for the weld seam. The short High-Flex Track has a minimum bend radius of 40 in. (1 m). The longer Flex Track has a minimum bend radius of 400 in. (10 m).
2. The operator observes the panel orientation (see Figure 2) and determines on which side of the weld to place the track. The track should always be placed so that the weld shaving chips are projected in a direction shown in Figure 3. Never allow the chips to fall across the track or back onto the Weld Shaver. Always place the track such that the Drive Carriage travels from the Slotted End to the Cam End of the track. In the Down Hand orientation the track may be positioned to either side of the weld seam. In the Horizontal orientation the track is always positioned above the weld so that the weld shaving chips fall away from the track. In the Vertical orientation the track must be positioned to the right of the weld because the weld removal process direction is always down. This insures that the weld shaving chips fall away from the Drive Carriage. In the Overhead orientation the Track can be positioned on either side of the weld seam.

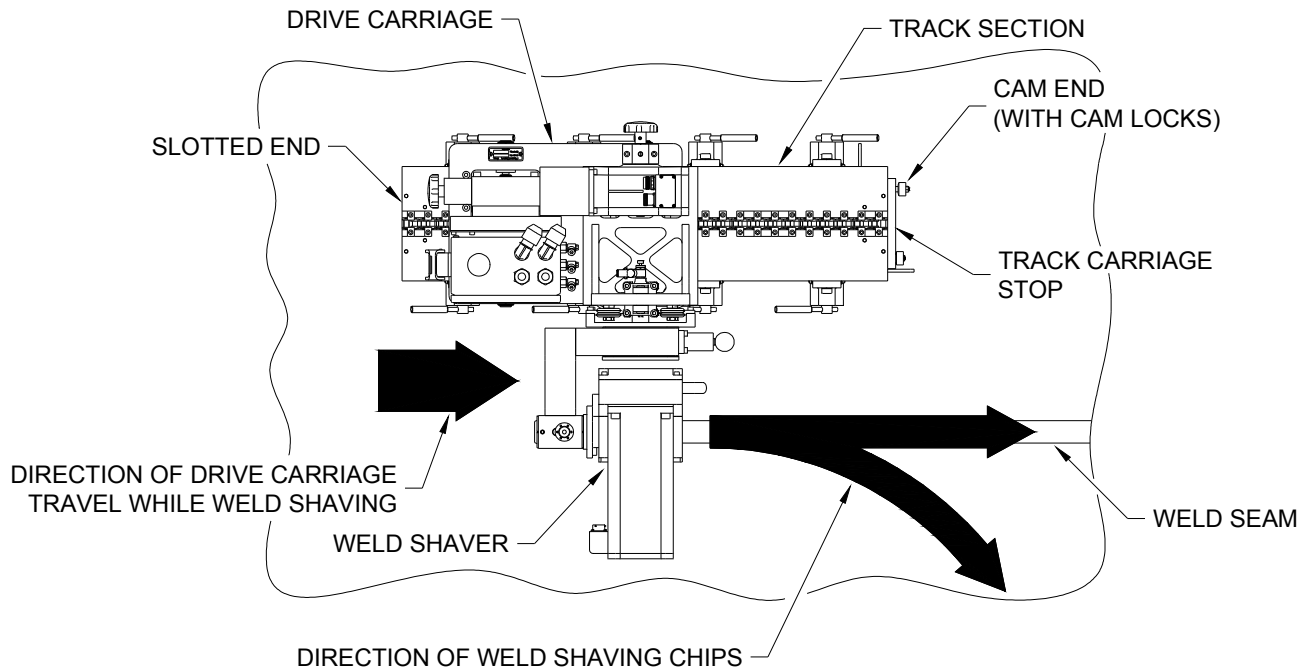


Figure 3: Track Positioning

3. The operator places the track section into position as shown in Figure 4. The Lateral Adjustment allows the operator to place the track within the dimensions shown, however the track must be parallel to the weld seam. In other words the distance from the face of any Track Magnet to the centerline of the weld seam must be the same.

The Lateral Adjustment is provided to ease track installation by providing a wider tolerance for track placement. The Lateral Adjustment is NOT to be adjusted during weld facing operations.

4. The operator activates each of the Track Magnets by rotating the Magnet Handle until it locks, thereby magnetically securing the track section to the panel. Each Track Magnet must be inspected to ensure they are seated against the panel, and that the Handle Lock is secure. See Figure 4.

WARNING: The magnet force of 200 lbs (890 N) is reduced for plate thicknesses less than 1/2 in. (13 mm). For 3/8 in (10 mm) thick plate the magnet force is reduced to 140 lbs. (623 N). For 1/4 in. (7 mm) thick plate the magnet force is reduced to 80 lbs. (356 N).

5. Once the first section of the track is securely attached to the panel. The operator attaches the next track section by first placing the Slotted End over the Cam Rods of the Cam End. Then engaging the alignment pins and rotating the Cam Locks to pull the track sections together tightly.
6. The operator activates each of the Track Magnets on the new Track section, checks for proper seating, and ensures all Handle Locks are engaged.
7. The operator should attach safety strapping, as required, to each track section for all orientations except Down Hand.
8. The operator repeats Steps 1. through 7. for the length of the weld seam to be faced.

9. A flat Starting Pad must be prepared for the Weld Shaver before the facing process can begin. The operator must manually remove the weld bead approximately flush with the panel surface to provide a flat 7 in. (180mm) long Starting Pad. The location of the Starting Pad with respect to the Slotted End is shown in Figure 4.

WARNING: A flat Starting Pad or flat un-welded section must be provided for the Weld Shaver cutters. Insert damage will occur if the Weld Shaver is plunged into an unprepared weld seam.

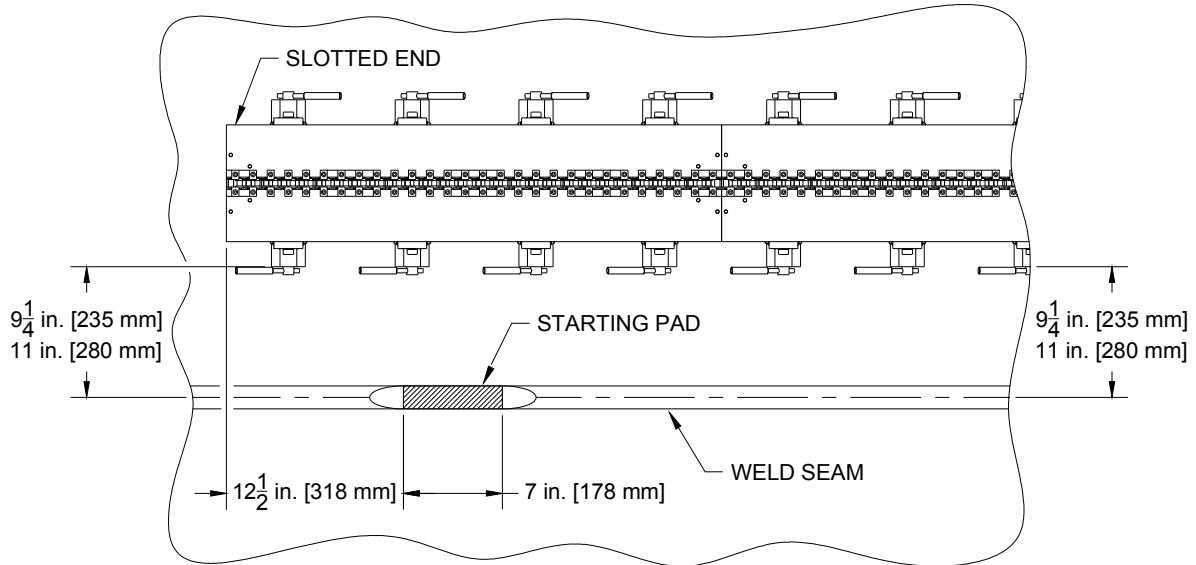


Figure 4: Starting Pad Location

10. The operator must install the Track Carriage Stop on the end of the last section of Track, and toggle the Cam Locks to secure it in place. The Track Carriage Stop is shown in Figure 3.

3.2 Drive Carriage Installation

1. With the track fully assembled, two operators lift the Drive Carriage (approx. 100 pounds, 45 kg) into position, sliding the Front Guide Wheels onto the open Slotted End, see Figure 5. The Track Guides located on both sides under the Drive Carriage align the Rear Guide Wheels to the track.
2. Once the Drive Sprocket contacts the Drive Chain, the operator must manually rotate the removable Drive Carriage Motor Knob to continue mounting the Drive Carriage. The Drive Carriage should be manually driven onto the track until the rear of the Drive Carriage is even with the Slotted End. The Drive Sprocket will hold the Drive Carriage stationary until the Control Umbilical is connected and the Drive Carriage is commanded to move.
3. Now the operator is ready to connect the Control Umbilical to the Control Umbilical Connector. This provides all the electrical power and pneumatics to operate the unit. The cable is keyed so that each end can only be connected in one way.
4. The operator positions the Orientation Selector switch, on the Control Console, to the RETRACT position.

5. The operator should verify that the Attachment Arm is in the orientation shown in Figure 5 by pulling the Swivel Lock and rotating the Attachment Arm. This is the Storage position.

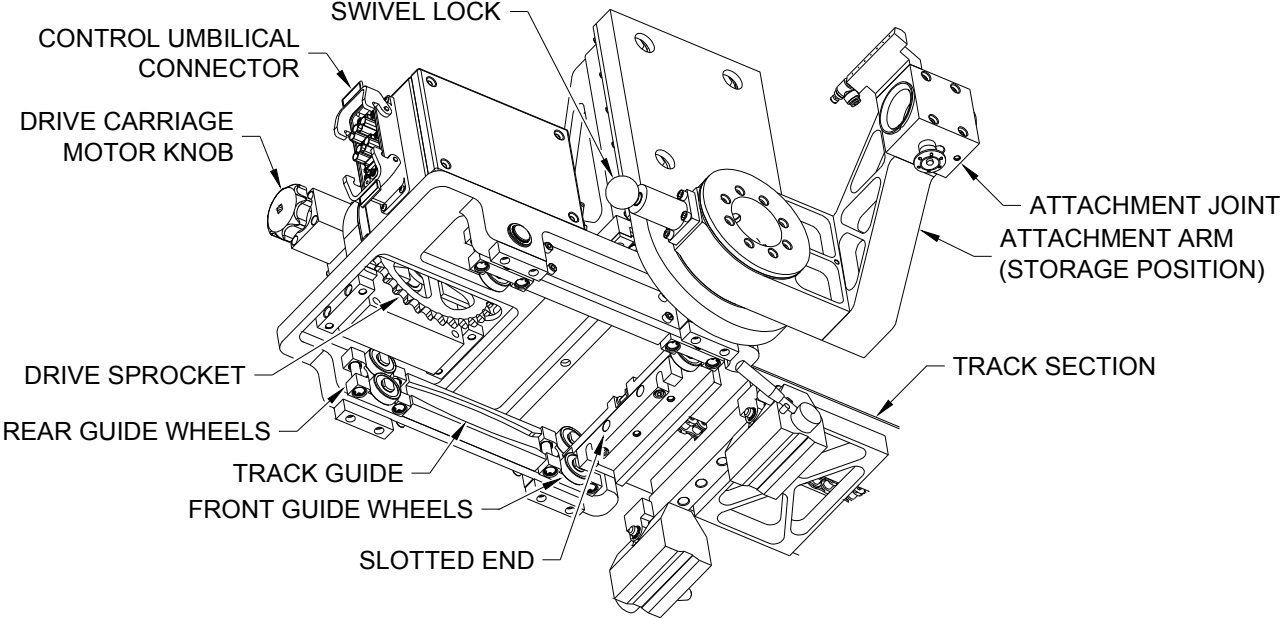


Figure 5: Drive Carriage installation

3.3 Control Console Installation

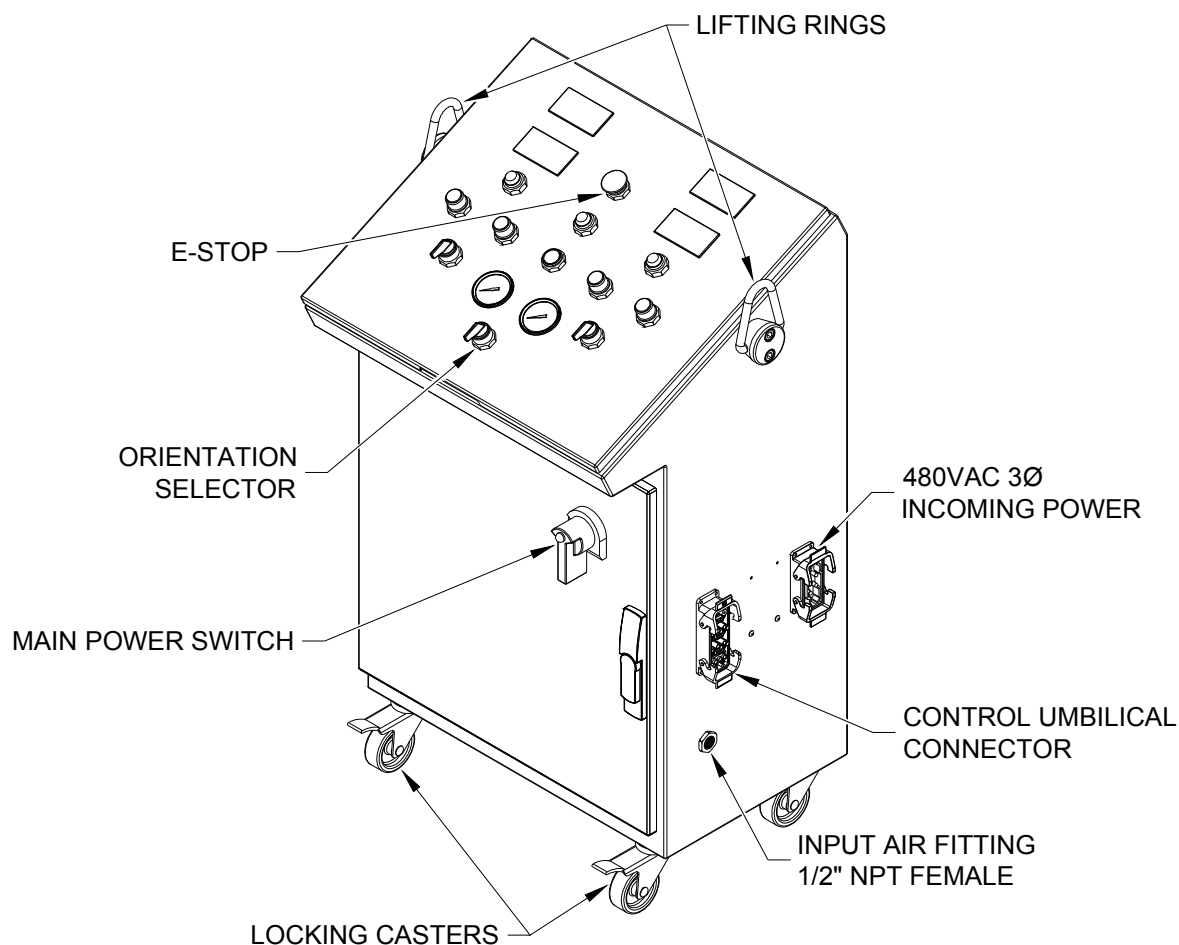


Figure 6: Control Console Installation

1. The operator positions the Control Console outside a 10 ft. (3 m) safety envelope around the Drive Carriage, and out of the path of any weld shaving chips.
2. The operator ensures that the Main Power Switch located on the front of the Control Console is turned off, the E-Stop is actuated, and that the Orientation Selector is turned to the RETRACT position.
3. The operator connects the Control Umbilical. The cable is keyed so that each end can only be connected in one way.
4. Connect the power cable to the Incoming Power connector. The Control Console requires 480VAC 3Ø, 30 amp electrical power.
5. Connect a ½ in. (12 mm) or larger air line to the Input Air Fitting. The Control Console requires 80 psi (5.5 Bar) clean, dry, non-lubricated air.
6. Turn the Main Power Switch to the ON position. This should cause the Compliant Slide to raise to the fully retracted position.

3.4 Weld Shaver Installation

1. The operator must determine which Weld Shaver will be required based on the width of the weld to be faced. The Weld Shaver can be configured to provide three widths of cut (0.75 in. [20 mm], 1.5 in. [39 mm], or 2.25 in. [59 mm]). The width of the Weld Shaver must exceed the width of the weld.
2. The operator should inspect the Weld Shaver cutter inserts, before installation on the Drive Carriage, by manually rotating the Weld Shaver cutter. For more information see Section 5.1 for the procedure to replace the cutter inserts.
3. Then rotate the Attachment Arm to the position shown in Figure 7 by pulling the Swivel Lock and rotating the Attachment Arm 90° clockwise. This is the Installation position.
4. The operator removes the Attachment Pin from the Attachment Joint.
5. The operator lifts the Weld Shaver (approx. 65 lbs., 30 kg) into position manually via the Weld Shaver Handle to insert the Weld Shaver Attachment Shaft into the Attachment Joint. See Figure 7.

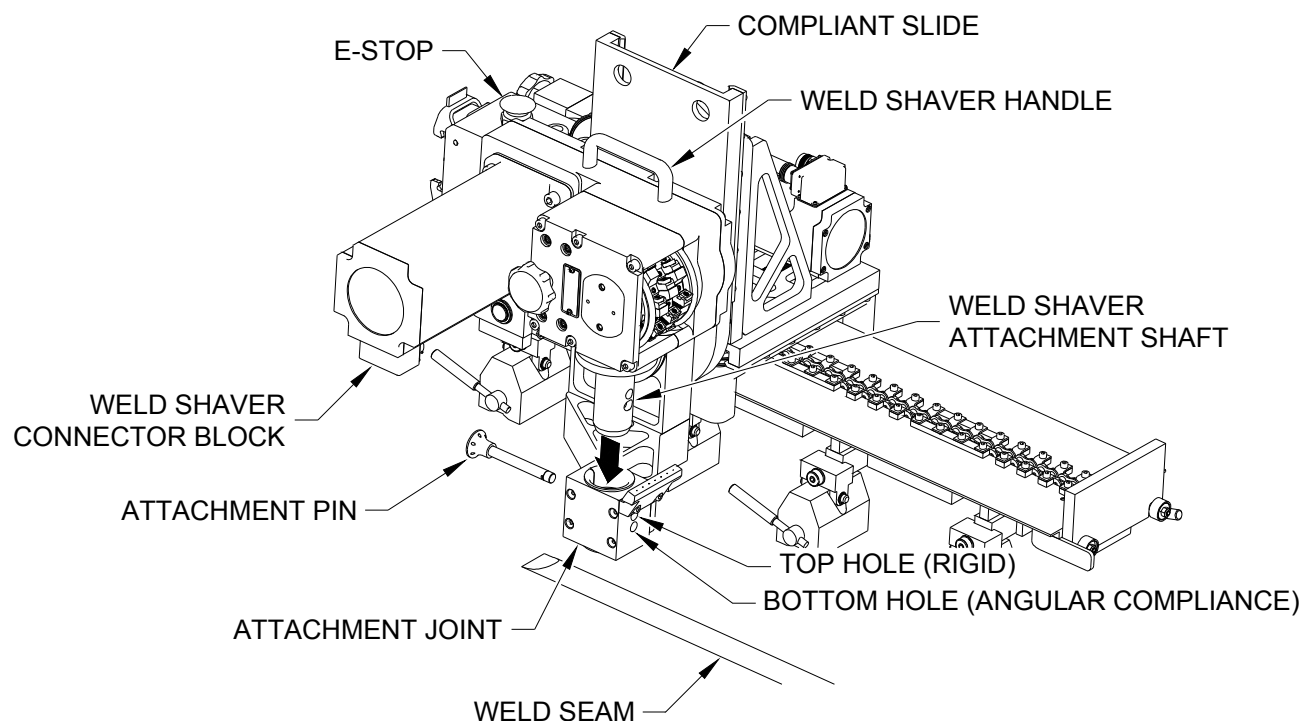


Figure 7: Weld Shaver Installation

6. The operator inserts the Attachment Pin into one of two holes in the Attachment Joint. With the pin in the top hole, the Weld Shaver is held rigid, while the bottom hole allows for +/- 3° of angular compliance.

WARNING: Failure to replace the Attachment Pin will allow the Weld Shaver to separate from the Drive Carriage causing serious damage to equipment and/or injury to personnel.

7. Ensure that the E-Stop on the Drive Carriage is actuated.

- The operator then connects the two Weld Shaver cables coming from the Drive Carriage Control Box to the Weld Shaver Connector Block. These cables are not interchangeable, and can not be connected to the wrong connector.

The WSF System is now installed.

4.0 Initial Setup

This section covers the steps required to set up the WSF.

4.1 Weld Shaving Depth

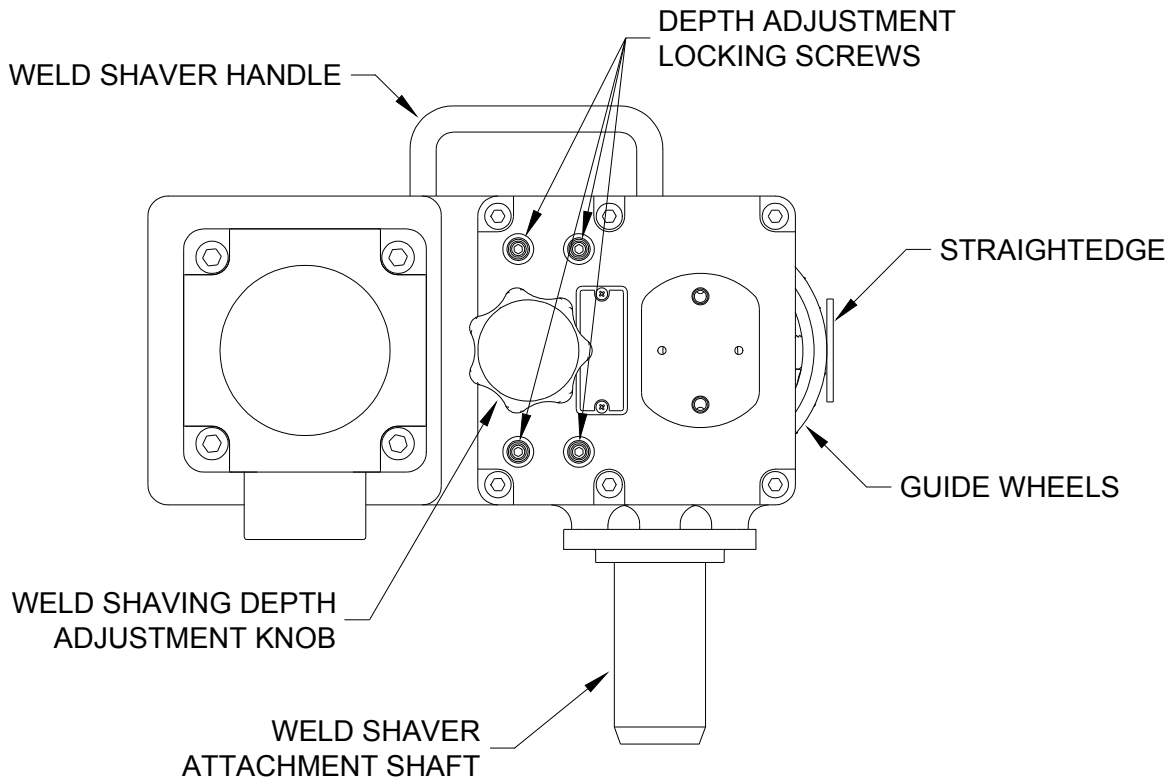


Figure 8: Weld Shaver depth adjustment

The weld facing depth can be set from 0 in. (flush with the panel) to +0.1 in. (2.5 mm) above the surface. The following steps describe how to set the desired weld facing depth.

- This procedure is best performed before the Weld Shaver has been installed on the Attachment Arm. However, if necessary it can be done while the Weld Shaver is installed. **WARNING: If the Weld Shaver is installed, ensure the Attachment Arm is in the Installation position, and the Weld Shaver cables are disconnected from the Weld Shaver Connector Block.**
- Loosen the four (4) Depth Adjustment Locking Screws (a 4 mm METRIC hex key is required) sufficiently to allow the Weld Shaver Depth Adjustment Knob to turn freely.
- Position a straightedge across the Guide Wheels, as shown in Figure 8.
- Rotate the Weld Shaver Depth Adjustment Knob until the desired weld shaving depth is reached. The gap between the straightedge and the cutter inserts will be

the height of weld left above the panel after the process. Gages may be used to set the clearance between the straightedge and the cutter inserts.

5. Tighten and torque the four (4) Depth Adjustment Locking Screws to 120 lb.-in. (13.5 Nm).

NOTE: The following adjustments in Sections 4.2, 4.3 and 4.4 require power and air to be supplied to the Control Console. Extreme caution must be observed while making these adjustments as the Control Console, and Drive Carriage will be under power.

4.2 Chip Blower air flow

A Chip Blower Manifold uses jets of compressed air to keep the area in front of the Weld Shaver free of weld shaving chips. Weld shaving chips under the Guide Wheels will cause an uneven faced profile on the finished weld seam and must not be allowed. The amount of air flow is controllable via the Chip Blower Flow Adjustment Screw (shown in Figure 9). To adjust the amount of air flow, follow the steps below.

1. The Weld Shaver must not be installed on the Drive Carriage to set the air flow.
2. Ensure that the Orientation Selector is turned to the RETRACT position and the E-Stops are actuated.
3. With all personnel clear of the Drive Carriage, connect electrical power and air supply before turning the Main Power Switch to the ON position. De-activate the E-Stops on the Control Console and Drive Carriage. This should cause the Compliant Slide to RETRACT position.
4. The Attachment Arm must be in the Storage position, as shown in Figure 5.
5. Ensure personnel are clear of the Drive Carriage. Rotate the Orientation Selector to DOWN HAND, HORZ/VERT or OVERHEAD. This will activate the Chip Blower Manifold and extend the Compliant Slide. No part of the Attachment Arm will come into contact with the panel to be faced.
6. The air flow may now be adjusted by rotating the Chip Blower Flow Adjustment Screw (See Figure 9). The screw incorporates a knurled locknut which is hand tightened, loosen this first. Rotating the screw clockwise decreases the airflow, while rotating it counter-clockwise will increase the air flow. Once the desired air flow is achieved tighten the knurled locknut.
7. Turn the Orientation Selector to the RETRACT position.
8. Actuate the E-Stops, and turn the Main Power Switch OFF.
9. Disconnect the electrical power and air supply.

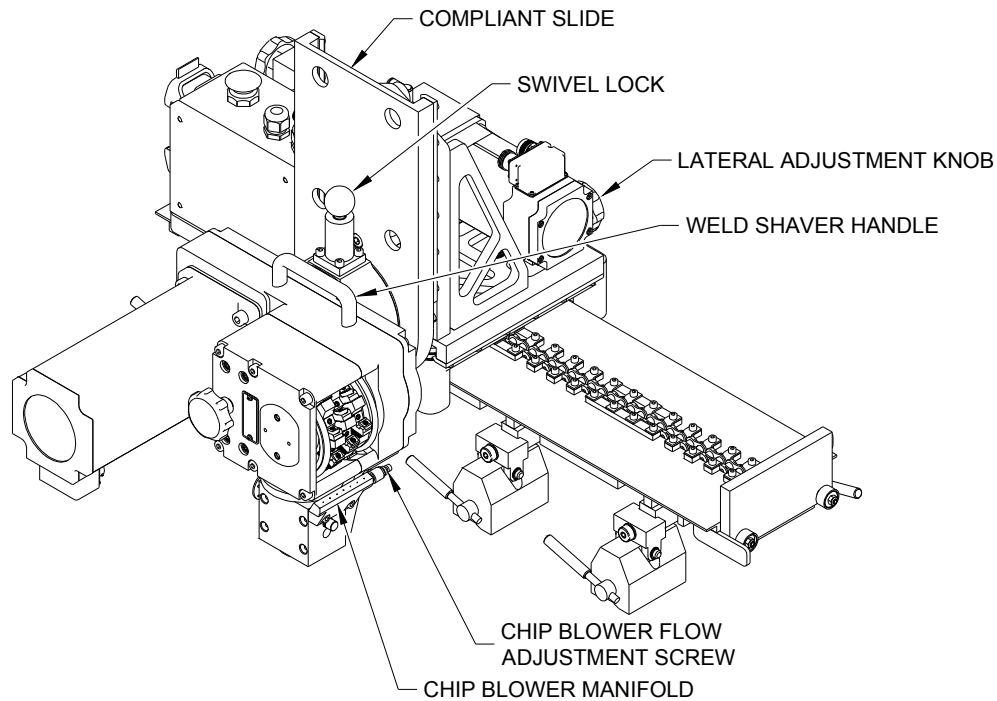


Figure 9: Chip Blower Flow Adjustment and Weld Shaver Lateral Adjustment

4.3 Adjusting Weld Shaver Lateral Position

The Drive Carriage has provision for adjusting the lateral position of the Weld Shaver relative to the weld seam. The lateral axis located on the Drive Carriage has 2 in. (50 mm) of total adjustment. The Weld Shaver should be centered over the weld seam as follows.

1. With the electrical power and air supply disabled, disconnect the weld shaver cables from the weld shaver. This is done to ensure that the Weld Shaver is not inadvertently enabled.

WARNING: NEVER disconnect the Weld Shaver cables while the Weld Shaver is enabled.

2. Ensure that the Orientation Selector is turned to the RETRACT position.
3. With all personnel clear of the Drive Carriage, turn on the electrical power and air. Then turn the Main Power Switch to the ON position. De-activate the E-Stops on the Control Console and Drive Carriage. This should cause the Compliant Slide to raise to the RETRACT position.
4. The Weld Shaver must be in the Installation position, as shown in Figure 9. Use the Attachment Pin as a guide for the center of the Weld Shaver cutters.
5. Depending on where the Attachment Pin is, rotate the Lateral Adjustment Knob clockwise or counter-clockwise to position the Attachment Pin directly over the center of the weld seam. Rotating the Lateral Adjustment Knob clockwise will move the Weld Shaver closer to the track. Rotating the Lateral Adjustment Knob counter-clockwise will move the Weld Shaver away from the track. The weld seam must be centered between the Guide Wheels.
6. Actuate both E-Stops, and turn the Main Power Switch to the OFF position. Disable the electrical power and air supply to the Control Console.

7. Re-attach the Weld Shaver power and feedback cables.

4.4 Setting the Applied Guide Wheel Force

The amount of force the Compliant Slide applies to the Weld Shaver Guide Wheels is set at the factory. These settings should not need adjustment. However, should the factory settings not prove adequate (i.e., Guide Wheels losing contact with the panel, or excessive deflection), the applied force may be adjusted. To do so requires the operator to access the inside of the Control Console while electrical power and air supply are present, so extreme caution must be exercised by qualified personnel.

1. The applied force can only be adjusted with the Control Umbilical and the Weld Shaver removed from the Drive Carriage.
2. Ensure that the Orientation Selector is turned to the RETRACT position and both E-Stops are actuated.
3. With all personnel clear of the Drive Carriage, connect the electrical power and air. Then turn the Main Power Switch to the ON position. De-activate the E-Stops on the Control Console and Drive Carriage. This should cause the Compliant Slide to raise to the RETRACT position.
4. The Attachment Arm must be in the Storage position as shown in Figure 5.
5. Turn the Main Power Switch Off, and open the Control Console door by rotating the Door Latch.
6. Using an adjustable wrench, turn the Main Power Shaft clockwise 90°. The Control Console is now ON. This should cause the Compliant Slide to raise to the RETRACT position.

DANGER: EXTREME care should be exercised while working inside the Control Console. 480VAC 3Ø electrical power is present.

7. Locate the Pneumatic Manifold as shown in Figure 10. Red lights should be illuminated on Valves #3 and #4 (RETRACT position). (See Figure 10)
8. Turn the Orientation Selector to the DOWN HAND position (Factory setting is 25 psi [172 kPa]). Red lights should be illuminated on Valves #1 and #4. This will cause the Compliant Slide to fully extend.
9. Set the applied force by loosening the Regulator Locknut on Valve #1, and turning the Valve #1 Regulator Screw. Turning the screw clockwise will raise the applied pressure, which in turn raises the applied force. Turning the screw counter-clockwise reduces the applied pressure, which in turn decreases the applied force.
10. Monitor the Applied Pressure with the gage located on top of the Control Console. The applied force is approximately 3 times the applied pressure, for U.S. units (3 lb/psi [2 N/kPa]).
11. When the desired applied force is reached torque the Regulator Locknut on Valve #1 to 90 lb.-in. (10 Nm).
12. Turn the Orientation Selector to the VERT/HORZ position, and repeat steps 10-11 for Valve #2. Red lights should be illuminated on Valves #2 and #4. (Factory setting is 50 psi [345 kPa])

13. Turn the Orientation Selector to the OVERHEAD position, and repeat steps 10-11 for Valve #3. Red lights should be illuminated on Valves #3 and #4. (Factory setting is 75 psi [517 kPa])
14. Turn the Orientation Selector back to RETRACT.
15. Rotate the Main Power Shaft counter-clockwise 90° to disable power. This must be done or the door will not close properly.
16. Shut the Control Console door and rotate the Door Latch to the closed position.
17. Disable the incoming electrical power and air supply.

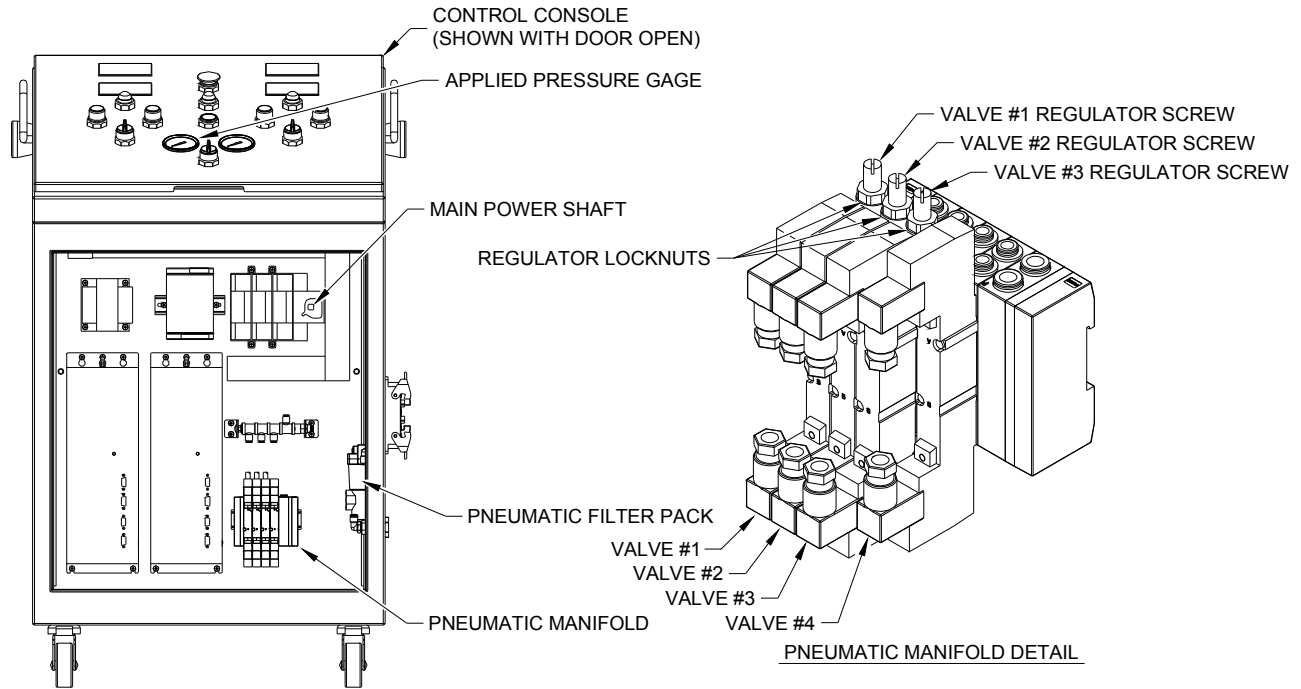


Figure 10: Setting Applied Force

The WSF System is now set up to begin weld facing operations.

5.0 Operation

Following Installation and/or Initial Setup the WSF system is ready to begin weld facing operations. The following are the steps required to shave a weld seam.

1. The operator must ensure that all of the following are completed:
 - A. All Magnet Handles are in the ON position and Handle Locks are engaged.
 - B. All track Cam Locks are engaged.
 - C. Adequate safety strapping is in place and/or stud-weld feet are installed. **Stud-weld feet are required for Vertical, Horizontal and Overhead orientations.**
 - D. The Control Umbilical is connected to both the Drive Carriage and Control Console and connector locks are engaged.
 - E. The Control Console is positioned more than 10 ft. (3 m) away from the Drive Carriage.
 - F. The Weld Shaver cutting depth is set correctly and the locking screws are torqued to specification.
 - G. All of the Cutter Inserts have been inspected and are torqued to specification.
 - H. The Weld Shaver cables are connected.
 - I. The Orientation Selector is set to RETRACT.
 - J. The Starting Pad profile is correct.
 - K. The Track Carriage Stop is in place on the last piece of track.
 - L. All E-Stops are actuated.
2. With all personnel outside a 10 ft. (3 m) safety envelope around the Drive Carriage, turn on the electrical power and air supply. Then rotate the Main Power Switch to the ON position. De-activate the E-Stop on the Drive Carriage first, then deactivate the E-Stop on the Control Console. This should cause the Compliant Slide to raise to the RETRACT position.
3. Move the Attachment Arm to the position shown in Figure 2 by pulling the Swivel Lock and rotating the Attachment Arm. This is the actual Weld Shaving position. Ensure that this positions the Weld Shaver cutters directly over the Starting Pad shown in Figure 4.

WARNING: Failure to position the Weld Shaver cutters directly over the Starting Pad, while in the Weld Shaving position, will result in cutter insert damage. DO NOT rotate the Orientation Selector from RETRACT without the Weld Shaver correctly positioned over the Starting Pad.

4. From the Control Console ensure all personnel are outside the 10 ft. (3 m) safety envelope around the Drive Carriage. Use the Orientation Selector to enable the current orientation, See Figure 2. This will cause the Compliant Slide to move the Weld Shaver Guide Wheels into contact with the Starting Pad.
5. Ensure the CARRIAGE SPEED knob is turned to STOP, and the CUTTER SPEED knob is turned to 0 as shown in Figure 11.
6. Depress the FAULT RESET button.

7. The operator depresses the CUTTER ENABLE button and sets the cutter speed to approximately 250 x10 SFPM (Surface Feet Per Minute) by turning the CUTTER SPEED knob clockwise and observing the CUTTER SPEED display.
8. Depress the CARRIAGE ENABLE button and rotate the CARRIAGE SPEED knob clockwise (forward) to move the Drive Carriage slowly toward the weld seam.
9. As the Weld Shaver cutters engage the weld seam, the operator adjusts the carriage speed via the CARRIAGE SPEED knob. The carriage speed should be adjusted to maintain a maximum cutter effort of no more than 60% as indicated on the CUTTER EFFORT display. **Too slow of a Drive Carriage speed will reduce cutter insert life.** In the case of operating the weld shaver with a 2.25 inch wide slotting cutter, the operator may choose to reduce the depth of cut and take two passes over the weld seam. Depending on the weld width, the initial seam height can be used as another means of not exceeding the maximum cutter effort.

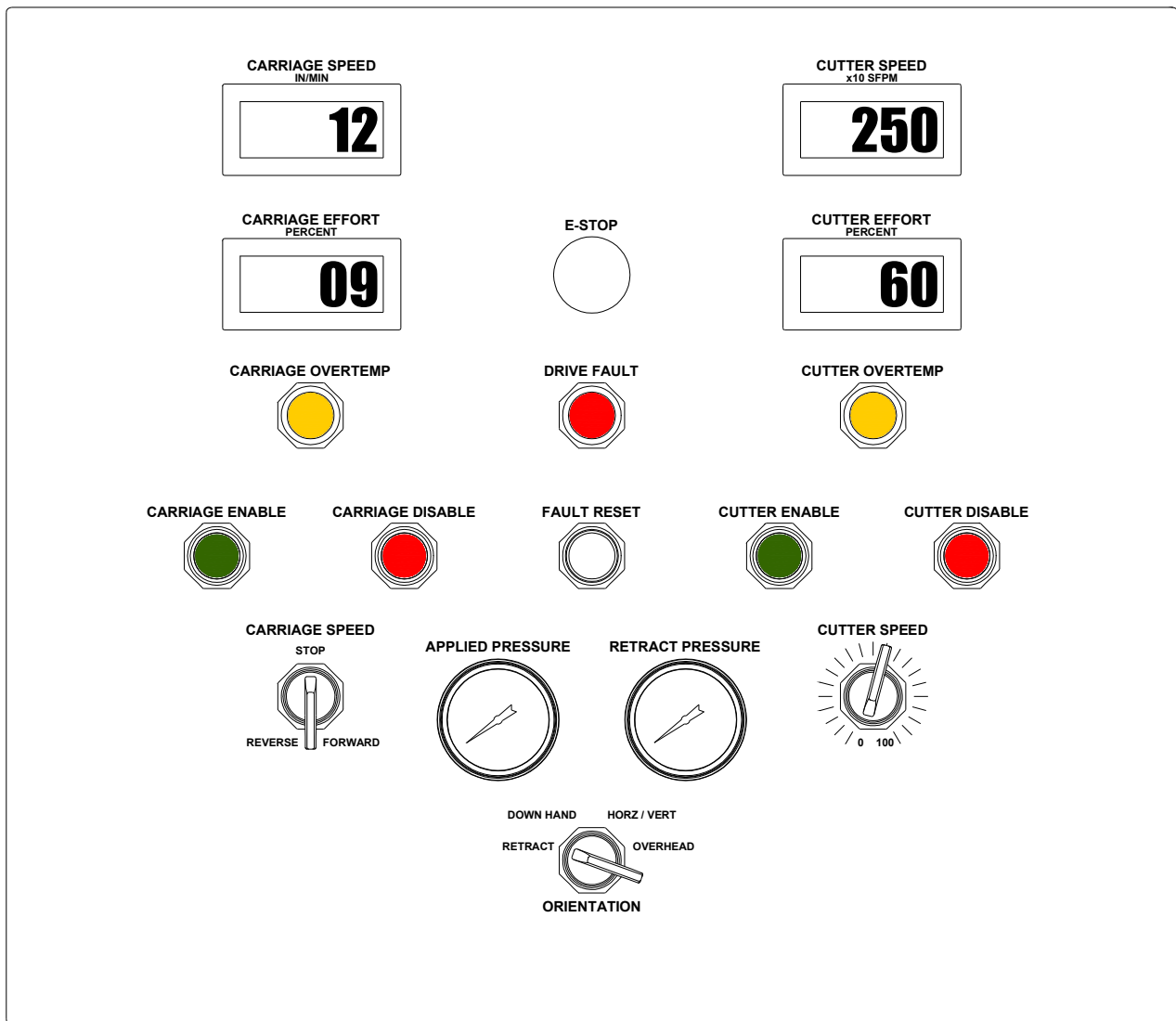


Figure 11: Control Console Interface

10. The operator must carefully monitor the progress of the facing operation and actuate the E-stop button to immediately halt operation if any unusual, dangerous or potentially damaging conditions are observed.
11. When the desired stopping point is reached, the operator reverses the Drive Carriage by rotating the CARRIAGE SPEED knob counter-clockwise past the STOP position. Once the cutter has fully disengaged the weld seam, the operator depresses the CARRIAGE DISABLE and CUTTER DISABLE.

WARNING: It is important that the cutter not be in contact with the weld seam when the cutter is disabled or else the cutter inserts may be damaged.

12. The Weld Shaver must then be raised away from the panel by moving the Orientation Selector to the RETRACT position.
13. If the Drive Carriage is not at the end of the track (near the Track Carriage Stop), the operator may depress the CARRIAGE ENABLE, and move the Drive Carriage near the end of the track. **Note: The operator must leave enough room between the front of the Drive Carriage and the end of the track to actuate the Cam Locks to remove the Track Carriage Stop.**

Under no circumstances should the Drive Carriage be driven off the track with the Weld Shaver still installed.

14. The operator then actuates the both E-Stops.
15. Disconnect the Weld Shaver cables to prevent it from being unintentionally enabled.
16. The operator then rotates the Attachment Arm to the Installation position shown in Figure 7.
17. The Weld Shaver may now be removed from the Drive Carriage. Removal is the reverse of steps 1 through 8 described in Section 3.4 Weld Shaver Installation.
18. The Attachment Arm is then rotated to the Storage position shown in Figure 5.
19. The operator then turns the Main Power Switch off, and disables the incoming electrical power and air supply.
20. The operator now disconnects the Control Umbilical from both the Control Console and Drive Carriage and rolls it up for proper storage.
21. The operator then removes the Track Carriage Stop from the last piece of track and returns the Cam Locks to the locked position.
22. The Drive Carriage may then be manually driven off the end of the track by turning the Drive Carriage Motor Knob. Two people are required to remove the Drive Carriage as it comes off the end of the track.
23. The track is then disassembled by reversing steps 1 through 7 as described in Section 3.1 Track Installation.

6.0 Maintenance

6.1 Cutter Insert Replacement

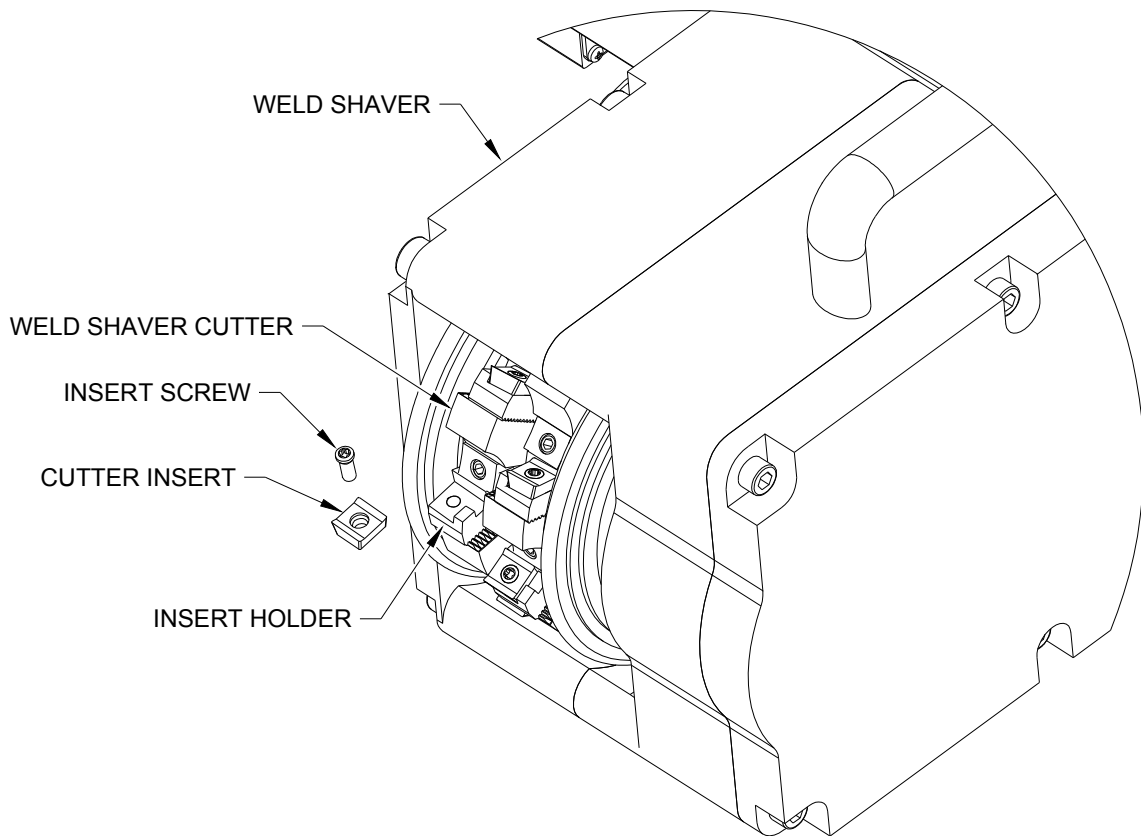


Figure 12: Cutter Insert Replacement

The Weld Shaver utilizes standard cutter inserts. The cutter inserts are PushCorp part number PAR03298 (Sandvik part no. N331.1A-1150 08M-PM4240). These may be purchased from PushCorp, or directly from Sandvik. The Weld Shaver cutter inserts are easily replaced if dulled or damaged using the following procedure.

CAUTION: Any maintenance to the Weld Shaver must be performed with the Weld Shaver cables disconnected and the Weld Shaver un-installed from the Drive Carriage. This ensures no power is supplied to the unit.

1. Using a 15 IP Torx Plus driver loosen and remove the insert screw.
2. If the second cutting edge of the cutter insert has not been utilized the cutter insert may be rotated 180° and the insert screw replaced and torqued to 27 lb-in (3 Nm).
3. If both cutting edges have been used or damaged then the cutter insert must be replaced with a new one. Place the new cutter insert in the insert holder as shown in Figure 12.
4. Replace the insert screw and torque to 27 lb-in (3 Nm).
5. Should the insert screw become lost or damaged the PushCorp part number is PAR03550 (Sandvik part no. 5513 020-29).

6.2 Weld Shaver Drive Belt Replacement

The Drive Belt used in the Weld Shaver transfers power from the servo motor to the Weld Shaver cutters. The Drive Belt has been sized to handle the largest possible peak servo motor torque, so that fatigue will most likely be the cause of any belt failure. It is not unusual for a belt of this type to perform for thousands of hours, however actual life is highly dependent on the application.

One of the benefits of synchronous belt drives is lower belt pre-tensioning in comparison to other belt drives. However, proper installation tension is still important in achieving the best possible performance. In general terms, belt tensioning is needed for proper belt/pulley meshing to prevent belt ratcheting under peak loading.

CAUTION: Any maintenance to the Weld Shaver must be performed with the Weld Shaver cables disconnected and the Weld Shaver un-installed from the Drive Carriage. This ensures no power is supplied to the unit.

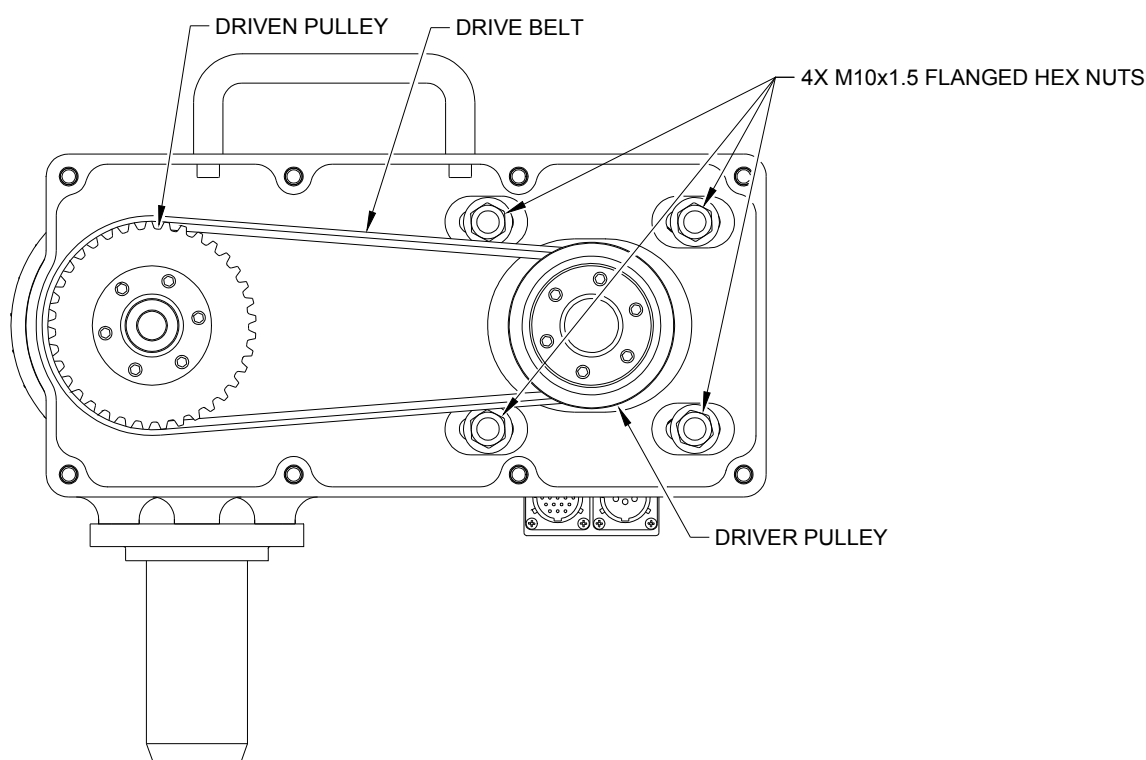


Figure 13. Replacing the Drive Belt

1. Remove the eight (8) M6x1 Socket Head Cap Screws securing the Belt Cover to provide access to the Drive Belt.
2. Loosen the (4) four M10x1.5 Flanged Hex Nuts, shown in Figure 13, approximately $\frac{1}{2}$ turn. This will allow the servo motor to move, but constrain the driver pulley to remain essentially parallel to the driven pulley during tensioning.
3. Move the servo motor (driver pulley) in the slots toward the driven pulley. This is the shortest distance between the two pulleys.
4. Slide the Drive Belt off the driven pulley (no flanges) until it is clear, and slip the Drive Belt off of the driver pulley.

5. To install the new Drive Belt (PushCorp part no. PAR03318, Gates part no. 8MGT-640-21), first place it over the driver pulley and then slide it over the driven pulley. It is absolutely critical that the belt teeth are correctly meshed with the teeth on both of the pulleys.
6. Proceed to Section 6.3 to set the proper Drive Belt tension.

6.3 Weld Shaver Drive Belt Tensioning

Applying the proper Drive Belt tension is a very important factor in the life of the Drive Belt and the Servo Motor. Too little tension will allow the Drive Belt to jump teeth on the pulleys. Too much tension will cause premature failure of the Servo Motor bearings. The Weld Shaver requires tension in each belt segment of 100 lbs. (445 N) for a new belt, and 80 lbs. (356 N) for a used belt, which results in a separation force of 200 lbs. (890 N) and 160 lbs. (712 N), respectively, between the driver and driven pulleys.

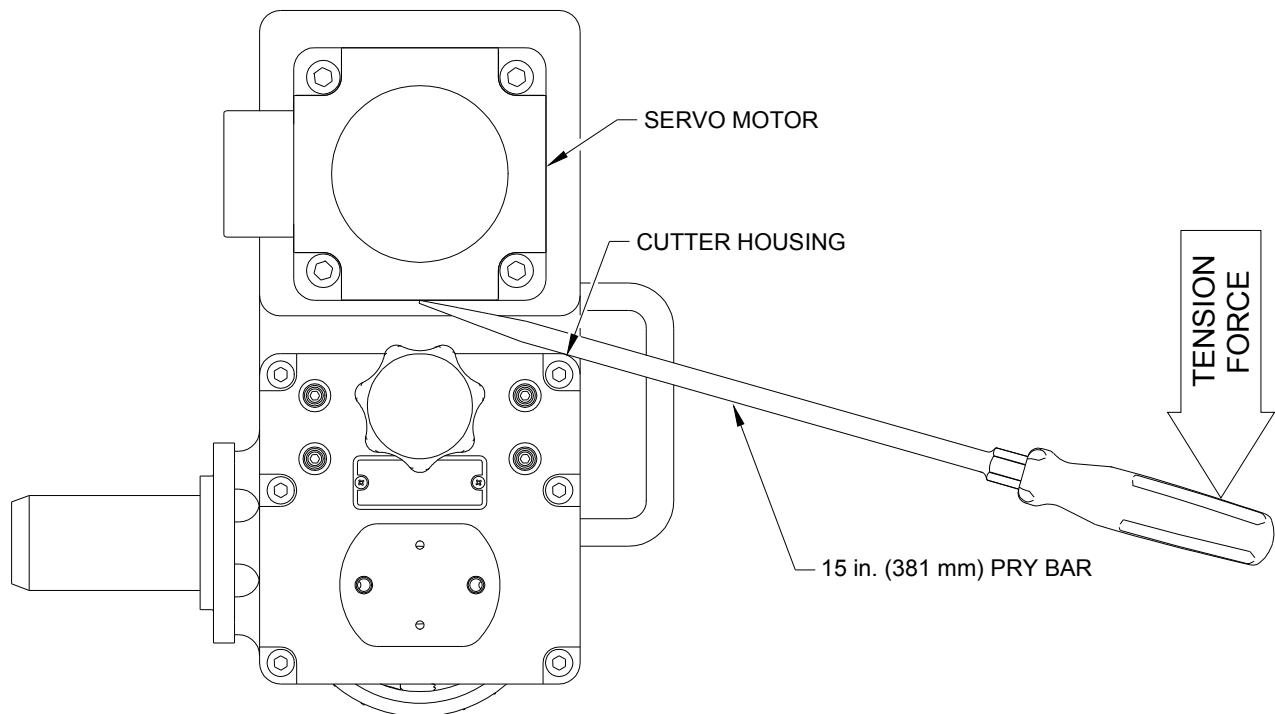


Figure 14. Tensioning the Drive Belt

The main problem with tensioning the Drive Belt is accurately applying the required separation force with tools readily available on the factory floor. Placing a 15 in (381 mm) pry bar on top of the corner of the Cutter Housing and underneath the mid-point of the Servo Motor flange, as shown in Figure 14, allows the Drive Belt to be easily tensioned. This lever/fulcrum creates a force multiplier of four times.

With the Weld Shaver in the position shown in Figure 14, the proper Tension Force with a 15 in (381 mm) pry bar will be 50 lbs. (222 N) for a new belt, and 40 lbs. (178 N) for a used belt. Once the proper Tension Force has been applied, tighten the (4) four M10x1.5 Flanged Hex Nuts to 32 lb-ft (43 Nm). Replace the Belt Cover and re-install the eight (8) M6x1 Socket Head Cap Screws. Tighten the M6x1 Socket Head Cap Screws to the torque specified in Section 7.0.

CAUTION: Never operate the Weld Shaver without the Belt Cover properly installed.

6.4 Pneumatic Filter Pack Service

The Control Console is equipped with a supplementary Pneumatic Filter Pack to condition the incoming air supply. This Pneumatic Filter Pack is provided to supplement the plant air filtration system. The Control Console requires 80 psi (5.5 Bar) minimum clean, dry, non-lubricated air. The Pneumatic Filter Pack is located inside the Control Console shown in Figure 10. **Any service of the Pneumatic Filter Pack must be done with the incoming electrical power and air supply disconnected from the Control Console.** The Control Umbilical should also be disconnected. The Pneumatic Filter Pack consists of an SMC mist separator (AMG150-01B-R) and air filter (AF20-01-C). The sight glass of the mist separator should be periodically checked. If liquid is seen in the sight glass, the liquid is drained by opening the fitting on the bottom of the unit. The filter element (PushCorp part no. PAR03567, SMC part no. AF20P-060S) located in the SMC air filter should be changed every two (2) years or as needed.

7.0 Technical Specifications

Component Weight:

High Flex Track: 70 lbs. (32 kg)

Flex Track: 75lbs. (34 kg)

Drive Carriage: 100 lbs. (45 kg)

Weld Shaver:

.75 in. [20 mm] Width: 62 lbs. (28 kg)

1.5 in. [39 mm] Width: 65 lbs. (30 kg)

2.25 in. [59 mm] Width: 68 lbs. (31 kg)

Control Umbilical: 35 lbs. (16 kg)

Control Console: 160 lbs. (73 kg)

Air Requirement: 80 psi (552 kPa) minimum, clean, dry, non-lubricated.

Electrical Requirement: 480 VAC, 3Ø, 30 Amp

Replacement Parts Numbers:

Cutter Insert: PushCorp PAR03298 (Sandvik N331.1A-1150 08M-PM4240)

Insert Screw: PushCorp PAR03550 (Sandvik 5513 020-29)

Drive Belt: PushCorp PAR03318 (Gates 8MGT-640-21)

Air Filter: PushCorp PAR03567 (SMC AF20P-060S)

Specifications subject to change without notice.

Fastener Tightening Torque Specs					
Fastener Size	Torque			Minimum Depth	
	in.-lbs.	ft.-lbs.	N·m	in.	mm
M4 x .7	40	4.2	4.5	0.17	4.3
M5 x .8	75	7.1	8.5	0.21	5.3
M6 x 1	120	10.0	13.6	0.25	6.3
M8 x 1.25	240	20.0	27.2	0.33	8.4
M10 x 1.5	432	36.0	48.8	0.41	10.5