When do I need to use TuffGrip™ double-acting over other Work Supports?
You will want to use TuffGrip™ Work Supports whenever your application requires positive retraction of the work support plunger such as in automatic/unattended applications. The support plunger is retracted when hydraulic pressure reduction pulls back the shuttle cylinder. You will not be relying on a mechanical spring to return the plunger to its initial starting position.

Consider TuffGrip™ Work Supports whenever your application requires extremely tight tolerances. When pressurized, the TuffGrip™ Work Support sets the industry standard for minimizing elastic deformation and maximizing uniformity in clamping surface stability.

You will want to use TuffGrip™ Work Supports in applications where the single acting fluid advanced work support might kick your part out of position when unclamp occurs. The hydraulic pressure on the sleeve gripping the plunger is maintained until the double-acting positioning piston retracts. An internal check valve opens to release the pressure on the sleeve. The plunger is released only after it has been pulled back from the workpiece. This “shuttle” action prevents “workpiece ejection” that might be experienced with single acting fluid advanced Work Supports.

I understand that this work support has two (2) strokes, a shuttle stroke and a work support stroke. Do these strokes add one upon the other resulting in a total stroke of 0.875 inches?
No, the support plunger stroke is contained within the piston shuttle stroke. Because the work support plunger is spring advanced, it is extended while the sleeve is unlocked. The shuttle strokes forward causing the extended plunger to contact the part and compress the spring. Finally, the internal sleeve locks the plunger in place.

Does the shuttle extend and stroke the full 0.50 inches every time?
Yes, the advance shuttle will travel a full stroke every time. However, it stops on an internal component allowing the inside sequencing to lock the work support plunger.

Where do I position my part so it is in the work support plunger “working zone”?
Position the part in the middle of the plunger stroke. The catalog chart lists a dimension that represents the fully extended length. For best performance, position your part at the fully extended shuttle stroke minus half of the plunger stroke.

I thought it was wrong to clamp over a column of fluid! How can I clamp over a work support that is inside a cylinder supported by hydraulic fluid?
While it is not the best option to clamp over a column of fluid, neither is it always wrong. Certain considerations must be addressed and adhered to when this is done. In this application, the work support is supported by the advance cylinder which is held firmly against a shoulder inside the body. This positioning is maintained by a 3:1 ratio of seating force verses the support force of the work support plunger. This advance/support ratio has shown to be the most stable combination and has the least elastic deformation compared to other units on the market.

2750 lb TOP FLANGE DOUBLE ACTING WORK SUPPORT CYCLE

WORK PIECE

SHUTTLE ADVANCES PLUNGER
PLUNGER CONTACTS PART
TUFF™GRIP LOCKS
SHUTTLE RETURNS WITH PLUNGER LOCKED
SHUTTLE RELEASES PLUNGER
NEVER EJECTING A PART!
TuffGrip™ Work Support Features

- All TuffGrip™ styles are available in 2,750 lbs and 5,500 lbs capacities at 5,000 psi.
- Exclusive Vektek design eliminates part ejection of any workpiece and the need for ancillary part retention devices.
- Innovative design features a spring advanced work support within a double-acting shuttle cylinder.
- A wiper at the shuttle and at the plunger keep chips out and your work support running smoothly.
- TuffGrip™ sleeve design is 2.5 times thicker than other work support models on the market. This sleeve efficiently closes and uniformly grips the plunger making it superior in precision applications.
- BHC™ (Black Hard Coat) body, hardened chrome shuttle piston and stainless steel plunger promote long life in harsh machining environments. The Position Sensing option is an aluminum housing that is Black Anodized for corrosion resistance.

Double Acting Work Support Operation

**Advance:** Hydraulic pressure extends the shuttle cylinder to the full stroke position, moving the work support plunger to the part. The spring advanced plunger will contact the part during the shuttle extension applying only spring force. Internal sequencing occurs after the shuttle is fully extended allowing hydraulic pressure to lock the plunger inside the sleeve.

**Retract:** The sleeve maintains its locked condition while hydraulic pressure retracts the shuttle. On reaching the full retracted position, the sleeve unclamps and the plunger returns to its spring advance state at least 0.125 inches below the part (may be separated from the part by as much as 0.50 inches).
Double Acting Top Flange

Double Acting Work Support

- TuffGrip™ Top Flange models are available in 2,750 lbs or 5,500 lbs capacities at 5,000 psi.
- Innovative design features a spring advanced work support within a double acting shuttle cylinder.
- TuffGrip™ sleeve design is 2.5 times thicker than other work support models on the market.
- Efficiently closes and uniformly grips making this design superior in precision applications.
- Exclusive Vektek design eliminates part ejection and the need for any ancillary workholding devices.
- Top flange body style allows for hydraulic connection through face sealed O-Rings or through SAE ports.

Dimensions

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Support Capacity (lbs)</th>
<th>Contact Force (lbs)</th>
<th>Work Support Stroke (in)</th>
<th>Shuttle Stroke (in)</th>
<th>Body Dia.</th>
<th>Piston Area (sq. in.)</th>
<th>Oil Capacity (cu. in.)</th>
<th>Maximum Oil Flow Rate (cu. in. /min)</th>
<th>Port X for Optional In-Port Valves**</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-0208-00</td>
<td>2750</td>
<td>3.5-7.0</td>
<td>0.38</td>
<td>0.50</td>
<td>2.12</td>
<td>1.62</td>
<td>0.81</td>
<td>0.26</td>
<td>70 SAE 4 X .58</td>
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<tr>
<td>10-0212-00</td>
<td>5500</td>
<td>4.4-8.1</td>
<td>0.38</td>
<td>0.50</td>
<td>2.99</td>
<td>3.55</td>
<td>0.79</td>
<td>1.78</td>
<td>150 SAE 4 X .58</td>
</tr>
</tbody>
</table>

* Support capacities are listed at 5,000 psi maximum operating pressure. Support capacities for other pressures must be determined by consulting the capacity graph at the start of Section B.
** In-Port valves require the use of manifold mount ports.

Note: If you would like to produce your own springs for these Work Supports see dimensions drawing on Page B-6.
TuffGrip™ Work Supports

Double Acting Top Flange

For proper sealing, mating surface must be flat within 0.003 in with a maximum 63 µin. Ra surface finish.

Custom Contact Bolt

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Capacity</th>
<th>O-Ring Part No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Support, D/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-0208-00</td>
<td>2750</td>
<td>39-0000-72</td>
<td>0.625</td>
<td>0.312</td>
<td>0.460</td>
<td>0.080</td>
<td>9/16-18 UNF-2A</td>
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<tr>
<td>10-0208-01</td>
<td>2750</td>
<td>39-0050-66 (016)</td>
<td>0.875</td>
<td>0.500</td>
<td>0.650</td>
<td>0.080</td>
<td>3/4-16 UNF-2A</td>
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<tr>
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<td>5500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-0212-01</td>
<td>5500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cylinders, actuated hydraulically both directions.

Manifold Port/Bolt Mounting Dimensions

<table>
<thead>
<tr>
<th>Model No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-0208-00</td>
<td>2.130</td>
<td>0.938</td>
<td>10-32 UNF</td>
<td>1.360</td>
<td>0.500</td>
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<td>10-0212-00</td>
<td>3.005</td>
<td>1.281</td>
<td>1/4-28 UNF</td>
<td>1.750</td>
<td>0.750</td>
</tr>
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</table>

R S T V W X Y Z AA AB AC AD AE

<table>
<thead>
<tr>
<th>R</th>
<th>0.22</th>
<th>0.63</th>
<th>1.88</th>
<th>0.19</th>
<th>0.63</th>
<th>9/16-18 X 0.31</th>
<th>0.69</th>
<th>0.56</th>
<th>0.51</th>
<th>SAE 4</th>
<th>SAE 4</th>
<th>1.36</th>
<th>0.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>0.28</td>
<td>0.70</td>
<td>N/A</td>
<td>0.25</td>
<td>1.00</td>
<td>3/4-16 X 0.50</td>
<td>1.13</td>
<td>0.56</td>
<td>0.63</td>
<td>SAE 4</td>
<td>SAE 4</td>
<td>1.75</td>
<td>0.75</td>
</tr>
</tbody>
</table>
Device Operation

The Return Position Sensor unit requires continuous and regulated air pressure. In the retracted position, air pressure will build in the system to the regulated set pressure. An air logic switch detects the "retracted" pressure condition and signals the controller that Work Supports have retracted. When the work support extends, the internal check opens and vents air from the device. The system air pressure falls to the "extended" preset pressure and an air logic switch resets. When the support retracts, the internal check closes and air pressure again builds to the regulated value. The air pressure switch detects "retracted" pressure and again signals the controller that the device is in the retracted position.

We are already using TuffGrip™ double acting Work Supports; why would we need to use the Return Position Sensor?

Extended Work Supports could cause a crash. Use the Return Position Sensor in any automated system where work support retraction is critical before the unload/load cycle begins. Monitor the position of Work Supports and confirm all is clear before unloading/loading the part.

Does the Return Position Sensor also tell me that the work support is extended and locked?

No, the Return Position Sensor only communicates that the Work Supports have retracted. Even though the pressure drops when the supports extend, it does not indicate that all the Work Supports have extended or are locked.

Can I add a Return Position Sensor to my existing double-acting work support?

No, adding the Return Position Sensor requires a specific body, a longer plunger and different contact spring. Adding the Return Position Sensor also increases the work support length from the mounting flange to the contact bolt. Please contact your Vektek Customer Support Specialist for more information.

How many Work Supports with Return Position Sensors can I put on one pneumatic circuit?

The maximum number of Return Position Sensors in one circuit is a function of the circuit design and pressure drop over the length of the circuit path. Vektek has tested ten devices plumbed in parallel with excellent results.

What if I want to run a different pneumatic pressure switch than what Vektek engineers recommend?

Any programmable pneumatic switch that interfaces with the machine tool logic can monitor air pressure in the Return Position Sensor circuit. Also see Air Sensing Control Kit 50-8240-00.

Is it okay to route my air through a rotary union?

Yes, size the rotary union so that there is a separate path for the air circuit.

Do I need a pneumatic pressure switch for each work support on my fixture?

No, connect all the Work Supports (that are on the same hydraulic circuit) with an air circuit feeding the Return Position Sensor to one pneumatic pressure switch.
**Recommended Pneumatic Circuit Design**

- Use Vektek Air Sensing Control Kit (Model # 50-8240-00).
- Parallel circuit design with minimum of 0.125” inside diameter feed line size.
- Circuit design should be simple and free from flow restrictions that can cause excessive pressure drop.
- The maximum number of Return Position Sensors in one circuit is a function of the circuit design and pressure drop over the length of the circuit path. Vektek has tested 10 devices plumbed in parallel with excellent results.

**Recommended System Setup:**

- Set air pressure regulator to 12 psi when all Work Supports in the system are in the retracted position.
- Adjust and set air flow control so that air pressure falls to 3 psi when the work support at the furthest point of the pneumatic circuit is in the extended position and all other supports in the circuit are retracted.
- Set the air pressure sensor “Retract” switch point to 10 psi.
- Set the air pressure sensor “Extend” reset switch point to 5 psi.

**Custom Contact Spring**

<table>
<thead>
<tr>
<th>Work Support Series</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>OD</th>
<th>Wire Ø</th>
<th>Free Length</th>
<th>Rate (lbs/in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-0208-00</td>
<td>1.13</td>
<td>0.51</td>
<td>0.46</td>
<td>0.38</td>
<td>0.48</td>
<td>0.045</td>
<td>1.50</td>
<td>9.4</td>
</tr>
<tr>
<td>10-0208-01</td>
<td>1.69</td>
<td>0.51</td>
<td>0.46</td>
<td>0.38</td>
<td>0.48</td>
<td>0.051</td>
<td>2.25</td>
<td>9.3</td>
</tr>
<tr>
<td>10-0212-00</td>
<td>1.13</td>
<td>0.68</td>
<td>0.62</td>
<td>0.47</td>
<td>0.59</td>
<td>0.055</td>
<td>1.56</td>
<td>10.0</td>
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<td>10-0212-01</td>
<td>1.78</td>
<td>0.68</td>
<td>0.62</td>
<td>0.47</td>
<td>0.60</td>
<td>0.059</td>
<td>2.5</td>
<td>9.6</td>
</tr>
</tbody>
</table>

**NOTE:** Vektek recommends only 17-7 stainless steel springs. Too light of a custom spring force may not actuate the plunger, especially if a custom contact bolt is used. Too heavy of a custom spring may cause damage to the device’s internal components. Vektek cannot guarantee that custom springs will provide proper plunger actuation.
Position Sensing Top Flange

Return Position Sensing for D/A Top Flange Work Support

- Exclusive Vektek design eliminates part ejection and the need for any ancillary workholding devices.
- TuffGrip™ Return Position Sensors use air to communicate that the work support has retracted and is ready to load/unload.
- TuffGrip™ Return Position Sensors monitor work supports to prevent crashes in automated systems.
- Dual wipers and Pressure Relief Vent keep chips and debris out.
- Fails-safe design requires air pressure to build before sensing the retracted position.
- Top Flange body style allows for hydraulic connection through face sealed O-Rings or through SAE ports.
- Black anodized aluminum sensor housing for superior corrosion resistance.
- Air connection through face sealed O-Rings of top flange body or externally plumbed through NPT ports on housing.
- Optional In-Port Flow Control is a meter-in device with reverse free flow check valve.
- Optional In-Port Sequence valve is a sequencing device with reverse free flow check valve.

<table>
<thead>
<tr>
<th>Model No.**</th>
<th>Support Capacity (lbs)*</th>
<th>Contact Force (lbs)</th>
<th>Work Support Stroke (in.)</th>
<th>Shuttle Stroke (in.)</th>
<th>Body Dia.</th>
<th>Piston Area (sq. in.)</th>
<th>Oil Capacity (cu. in.)</th>
<th>Max Oil Flow Rate (cu. in./min.)</th>
<th>Port X Depth for Optional In-Port Valves***</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-0208-01</td>
<td>2750</td>
<td>5.2-8.6</td>
<td>0.38</td>
<td>0.50</td>
<td>2.12</td>
<td>1.62</td>
<td>0.52</td>
<td>0.81</td>
<td>0.26</td>
</tr>
<tr>
<td>10-0212-01</td>
<td>5500</td>
<td>6.9-10.5</td>
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<td>0.50</td>
<td>2.99</td>
<td>3.55</td>
<td>0.79</td>
<td>1.78</td>
<td>0.4</td>
</tr>
</tbody>
</table>

* Support capacities are listed at 5,000 psi maximum operating pressure. Support capacities for other pressures must be determined by consulting the capacity graph at the start of Section B.
** Use Return Position Sensor to monitor retracted position only and not plunger advance or plunger lock.
*** In-Port valves requires the use of manifold mount ports.

Dimensions

<table>
<thead>
<tr>
<th>Model No.***</th>
<th>A</th>
<th>B*</th>
<th>C**</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-0208-01</td>
<td>3.19</td>
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<td>0.50</td>
<td>2.32</td>
<td>1.72</td>
<td>1.91</td>
<td>2.12</td>
<td>1.25</td>
<td>0.75</td>
<td>2.90</td>
<td>1.13</td>
<td>2.25</td>
<td>1.13</td>
<td>0.94</td>
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<tr>
<td>10-0212-01</td>
<td>3.41</td>
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<td>2.69</td>
<td>1.72</td>
<td>1.91</td>
<td>2.99</td>
<td>2.00</td>
<td>1.25</td>
<td>3.69</td>
<td>1.56</td>
<td>3.13</td>
<td>1.56</td>
<td>1.28</td>
<td>3.12</td>
</tr>
</tbody>
</table>

* Plunger Stroke “B” is the available work zone of the plunger. The workpiece must be positioned inside this window to prevent part ejection.
** Shuttle Stroke “C” is the stroke the shuttle travels to position the work support plunger relative to the workpiece.
*** The shuttle moves the full range of this stroke every cycle.
**** The difference between “C” and “B” (C-B) equals the minimum distance the plunger is below the workpiece in the retracted position.

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For proper sealing, mating surface must be flat within 0.003 in with a maximum 63 µ in Rₐ surface finish.

Note: If you would like to produce your own springs for these Work Supports see dimensions drawing on Page B-6