

L2216 Rev. O 05/97

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IMPORTANT RECEIVING INSTRUCTIONS

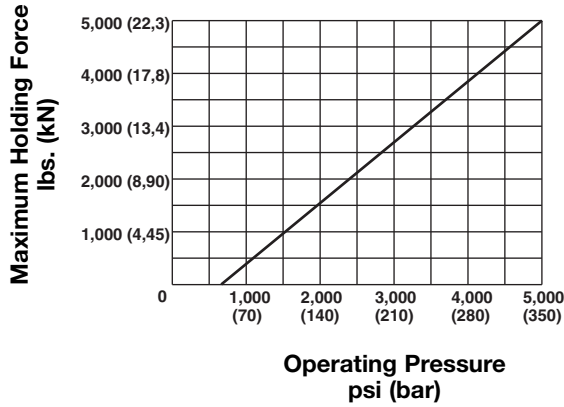
Visually inspect all components for shipping damage. If any shipping damage is found, notify carrier at once. Shipping damage is NOT covered by warranty. The carrier is responsible for all repair or replacement costs resulting from damage in shipment.

SPECIFICATIONS

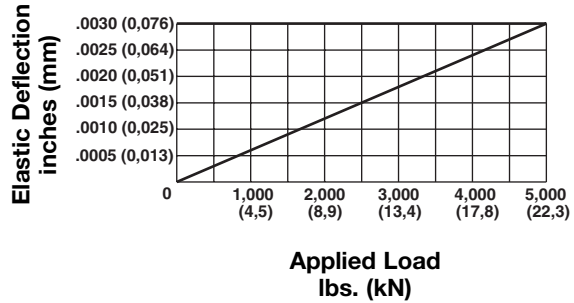
MODEL NUMBER	Capacity @ Max. psi/bar lbs. (kN)	Support Plunger Stroke inches (mm)	Retracted Height inches (cm)	Support Plunger Spring Force lbs. (kN)		Oil Capacity inches ³ (cm ³)
				Plunger Extended	Plunger Retracted	
WFL 221	5,000	0.41	3.61	1.0 - 3.25	16.0 - 23.0	.19
WFL 222	(22,3)	(10,4)	(91,7)	(4,4 - 14,0)	(71,0 - 102,0)	(3,1)
WFL 331	7,400	.53	3.87	2.0 - 6.0	16.0 - 19.0	.24
WFL 332	(32,9)	(13,5)	(98,3)	(9,0 - 26,0)	(71,0 - 84,0)	(4,0)
WFL 441	10,000	.65	4.42	1.5 - 5.0	16.0 - 28.0	.30
WFL 442	(44,5)	(16,5)	(112,3)	(6,7 - 22,0)	(71,0 - 124,0)	(4,9)
WSL 221	5,000	0.41	3.61	1.0 - 3.25	16.0 - 23.0	.01
WSL 222	(22,3)	(10,4)	(91,7)	(4,4 - 14,0)	(71,0 - 102,0)	(0,2)
WSL 331	7,400	.53	3.87	2.0 - 6.0	16.0 - 19.0	.01
WSL 332	(32,9)	(13,5)	(98,3)	(9,0 - 26,0)	(71,0 - 84,0)	(0,2)
WSL 441	10,000	65	4.42	1.5 - 5.0	16.0 - 28.0	.01
WSL 442	(44,5)	(16,5)	(112,3)	(6,7 - 22,0)	(71,0 - 124,0)	(0,2)

SPECIFICATIONS TABLE

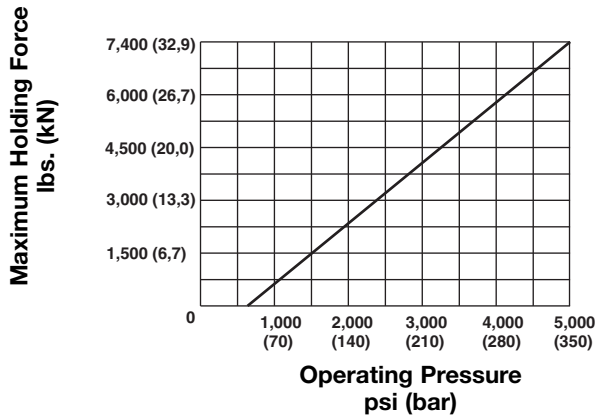
**Maximum Holding Force
vs.
Hydraulic Operating Pressure
WFL / WSL 221, 222**



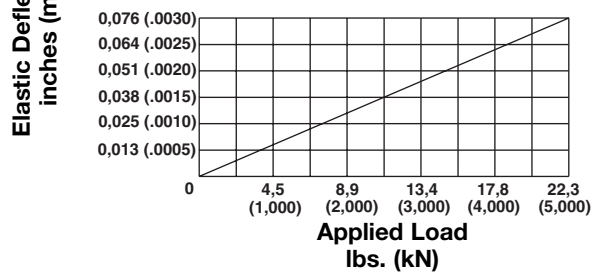
**Support Plunger Deflection
vs.
Applied Load
at 5000 psi (350 bar)
Operating Pressure
WFL / WSL 221, 222**



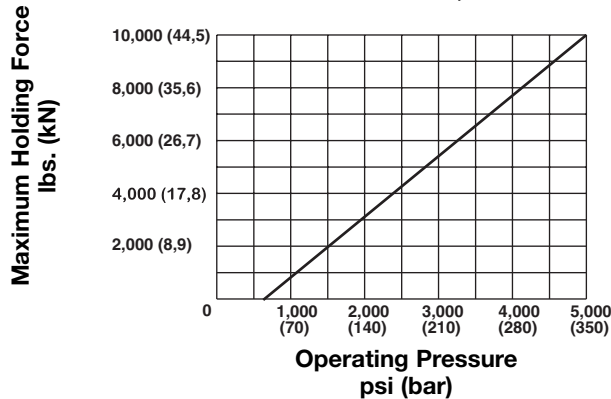
**Maximum Holding Force
vs.
Hydraulic Operating Pressure
WFL / WSL 331,332**



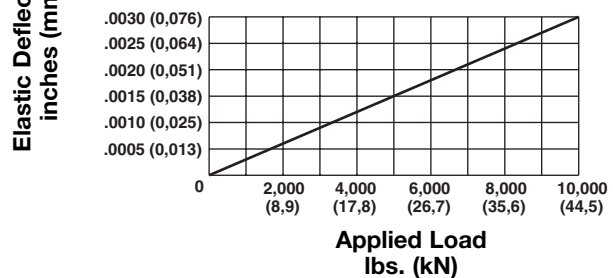
**Support Plunger Deflection
vs.
Applied Load
at 5000 psi (350 bar)
Operating Pressure
WFL / WSL 331, 332**



**Maximum Holding Force
vs.
Hydraulic Operating Pressure
WFL / WSL 441, 442**



**Support Plunger Deflection
vs.
Applied Load
at 5000 psi (350 bar)
Operating Pressure
WFL / WSL 441, 442**



SAFETY INFORMATION

To avoid personal injury during system operation, read and follow all CAUTIONS, WARNINGS, and INSTRUCTIONS included with or attached to each product. ENERPAC CANNOT BE RESPONSIBLE FOR DAMAGE RESULTING FROM UNSAFE USE OF PRODUCT, LACK OF MAINTENANCE, OR INCORRECT PRODUCT OR SYSTEM APPLICATION. Contact Enerpac when in doubt about applications and safety precautions.



WARNING

The system operating pressure must not exceed the maximum pressure rating of the lowest rated component in the system. Always check product limitations regarding pressure ranges, load capacities, and set-up requirements. Personal injury and/or equipment damage can occur if system operating pressure exceeds the maximum pressure rating of system components.



WARNING

Always wear proper personal protective gear when operating hydraulic equipment (i.e. safety glasses, gloves, etc.).



WARNING

Make sure that all system components are protected from external sources of damage, such as excessive heat, flame, moving machine parts, sharp edges, and corrosive chemicals.



WARNING

Do not exceed the specified maximum load on the support plunger.

INSTALLATION

Hydraulic Connections

1. Locate the work supports at the lowest point of the fixture's hydraulic system to aid in bleeding. Work supports must be purged of air by cycling several times and allowing air in the system to vent at the highest point in the system.
2. Install the work supports by either threading into the fixture, using the accessory jam nuts, or bolting the flange onto the fixture. Mount the work support so that the plunger is at the approximate middle of its stroke when contacting the workpiece in the fixture.
3. Hydraulic connections can be made at the side port or at the manifold port. If making hydraulic connections at the manifold port, the port screw plug and copper gasket must first be removed from the hydraulic manifold port (item D). Lightly lubricate the provided O-ring (item C) and install it in the counterbore around the port prior to mounting and bolting down the work support (see figure 3). Be sure that the O-ring does not get pinched or damaged during this mounting as leakage could result. To ensure that the manifold mounting does not leak, provide a fixture mounting surface with a flatness within .003 inch (0,08 mm) and a surface roughness average (R_a) not to exceed 32 μin . (0,8 μm).



WARNING

The fixture manifold must be capable of withstanding hydraulic pressure of 5000 psi (350 bar).

4. The hydraulic power pump should not exceed 5000 psi (350 bar) maximum. Power pumps must be large enough to provide a usable oil supply for the work supports, hoses, clamps, and all items in the system. Refer to specifications table for maximum applied loads vs. operating pressure.

Venting

1. If the breather fitting (item A) is subject to a coolant flood condition, the breather fitting should be removed. Use tubing and a threaded connector to vent to a clean, remote area of the fixture (see figure 2).
2. Venting can also be achieved using the optional manifold breather port (see figure 3).
 - 2a. Remove the screw plug and copper gasket from the manifold breather port (item B).
 - 2b. Lightly lubricate the provided O-Ring (item C) and install it in the counterbore around the manifold breather port.

- 2c. Remove the breather fitting (item A) from the side breather port and plug the port using a 1/8 NPT pipe plug.
- 2d. The breather fitting can be reused at a non-flooded area of the fixture.

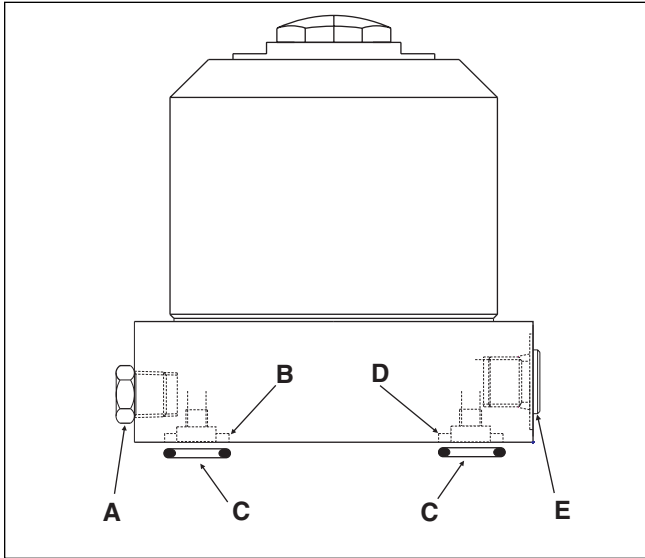


Figure 1 - Work Support

A	Breather Fitting
B	Manifold Breather Port
C	O-Ring
D	Manifold Hydraulic Port
E	Hydraulic Port
F	Tubing
G	Fitting
H	Plug

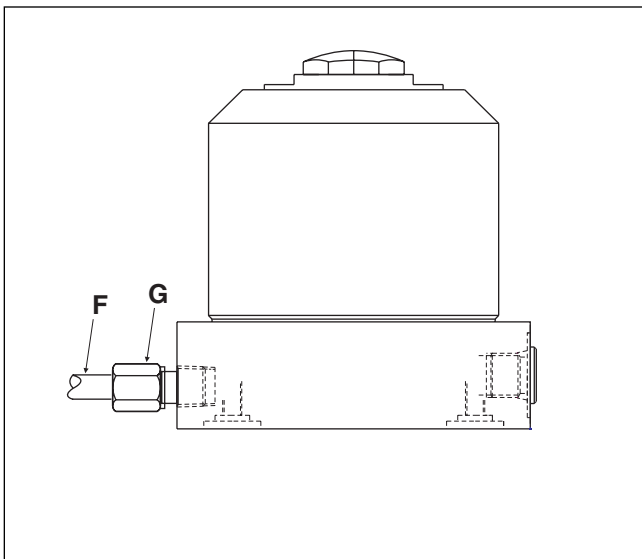


Figure 2 - Venting through side port (using additional tubing and fitting)

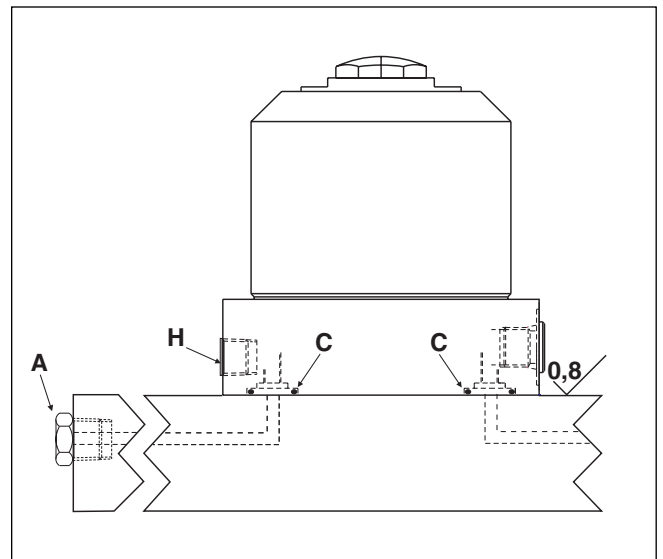


Figure 3 - Venting through manifold port / Hydraulic manifold mounting

MODIFICATIONS

“Air Purge” Work Supports

If the wiper area of the work support is exposed to coolant flooding or fine machining debris, the work support should be modified to become an “air purge” work support. An “air purge” work support allows air to blow through the wiper and prevents coolant and debris from entering the work support.

1. Connect an air supply line (item F) to the side breather port (see figure 4) or through manifold breather port (see figure 5). If connecting to the side breather port, the breather fitting must first be removed. If connecting to the manifold breather port, remove the screw plug and copper gasket from the port, lightly lubricate the provided O-Ring, and install the O-Ring in the counterbore around the port.
2. NOTE: The air purge only requires between 5-15 psi (0,3-1,0 bar) air pressure.

“Air Spring” Work Supports

An “air spring” work support uses air, instead of a spring, to maintain the support plunger in an extended position. An “air-spring” work support will not retract the plunger. (Note: Only spring advanced work supports can be modified to become “air spring” work supports.) An “air spring” work support can offer greater control over the force of the plunger against the workpiece. An air spring work support can also provide more force against the plunger than conventional spring advanced models.

1. Remove the contact bolt, adjustment screws and spring from within the work support plunger.
2. After removing the spring, replace the nylon adjustment screw to seal the threads. Also replace the contact bolt.
3. Connect an air supply line (item F) to the side breather port (see figure 4) or through the manifold breather port (see figure 5). If connecting to the side breather port, the breather fitting must first be removed. If connecting to the manifold breather port, remove the screw plug and copper gasket from the port, lightly lubricate the provided O-Ring, and install the O-Ring in the counterbore around the port.
4. Add a two-position manual air valve or a solenoid operated air valve to the air supply line.

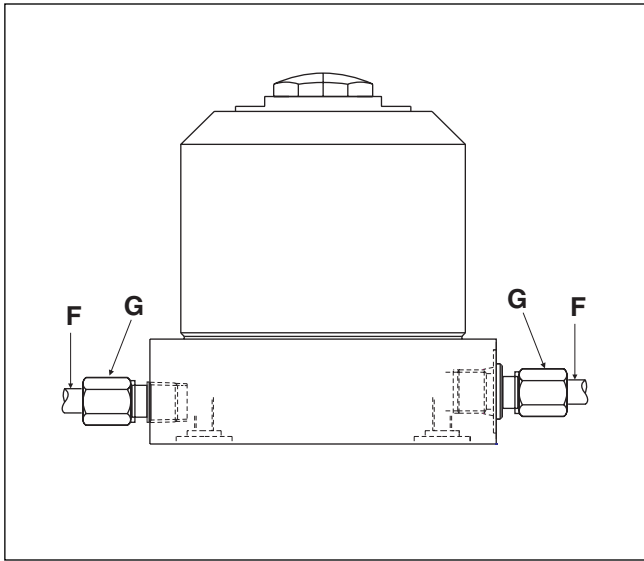


Figure 4 - "Air Purge" / "Air Spring" work support using side breather port

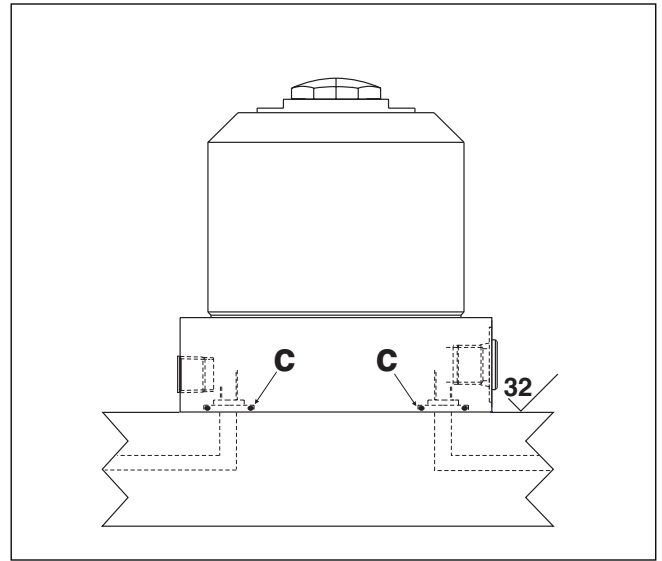


Figure 4 - "Air Purge" / "Air Spring" work support using manifold breather port

5. Use an air regulator (Enerpac RFL 102) to control air pressure. Excessive air pressure may actually lift a work piece off of its rest surface. The correct amount of air pressure will vary depending on the size and weight of the workpiece and the work support.

OPERATION

Spring Advanced Work Supports

1. Adjust the contact force between the work support plunger and the workpiece.
 - 1a. Remove the plastic adjustment screw from within the top of the plunger.
 - 1b. Turn the second adjustment screw clockwise to increase the contact force. Turn the second adjustment screw counter clockwise to decrease the contact force. Note: If the adjustment screw is backed out too far, the plunger stroke will be reduced. Refer to specifications table for the minimum and maximum contact force for each work support model.
 - 1c. Replace the first adjustment screw. Make sure the first adjustment screw is positioned snug against the second screw.

2. Place the workpiece into the fixture and above the work supports. The plunger should be at the approximate middle of its stroke when contacting the workpiece. If the weight of the workpiece does not push the plunger down to the proper height, repeat step 1 and adjust the contact force appropriately.
3. Activate hydraulic pressure to lock the work support plunger into position. The position of the plunger will be maintained until hydraulic pressure is released.
4. Clamp the workpiece into position to facilitate machining operations.
5. When machining is complete, release hydraulic pressure from clamping cylinders first, then release hydraulic pressure from work supports.
6. Remove the workpiece from the fixture.

Fluid Advanced Work Supports

1. When no hydraulic pressure is applied, the plunger will be in the retract position. Place the workpiece into the fixture and above the work supports. The plunger should be at the approximate middle of its stroke when contacting the workpiece.
2. Activate hydraulic pressure to advance the work support plunger into position. When hydraulic pressure is applied, a piston pushes against an internal spring that advances the plunger to the workpiece. As hydraulic pressure increases, the compression sleeve grips and locks the plunger at the point of contact. The position of the plunger will be maintained until hydraulic pressure is released.
3. Clamp the workpiece into position to facilitate machining operations.
4. When machining is complete, release hydraulic pressure from clamping cylinders first, then release hydraulic pressure from work supports.
5. Remove the workpiece from the fixture.

“Air Spring” Work Supports

1. Set the air regulator to the correct air pressure. The correct pressure will vary depending on the size of the work support and the weight of the workpiece.
2. When no air pressure is applied, the plunger will be in the retract position. Place the workpiece into the fixture and above the work supports.
3. Shift the handle of the air valve to activate air pressure and advance the work support plunger into position. The plunger should be at the approximate middle of its stroke when contacting the workpiece. If the weight of the workpiece does not push the plunger down to the correct position, repeat step 1 and adjust the air pressure appropriately.

4. Activate hydraulic pressure to lock the work support plunger into position. The position of the plunger will be maintained until hydraulic pressure is released.
5. Clamp the workpiece into position to facilitate machining operations.
6. When machining is complete, release hydraulic pressure from clamping cylinders first, then release hydraulic pressure from work supports.
7. Remove workpiece from the fixture.

MAINTENANCE AND SERVICE

Maintenance is required only when wear and/or leakage is noticed. Occasionally, inspect all components to detect any problems requiring service and maintenance. Enerpac offers repair kits for equipment maintenance. Repair parts sheets are also available. Contact your Enerpac representative.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
Plunger will not advance when system pressure is activated.	Determine if hydraulic system is exceeding maximum flow rate (see specifications table). Check for broken take up spring. Check plunger and sleeve for damage.
The workpiece is experiencing excessive deflection.	Hydraulic pressure may be below minimum amount to hold plunger. Cutting forces may be exceeding the capacity of the work support.
Plunger will not retract. Plunger will not release to extended height.	Hydraulic pressure has not been released from the system. Excessive back pressure from small diameter tubing or tight bends. Check plunger and sleeve for damage or for debris accumulation. Check for broken return spring.
Work support leaks oil.	Check seals for wear or damage. Connection to work supports may be leaking.