ENERPAC
Hydraulic Technology Worldwide

Instruction Sheet

Accumulators
WA-502, WA-505, WA-5010, WA-5030

L1497 Rev. C 03/03

Repair Parts Sheets for this product are available from the Enerpac web site at www.enerpac.com, or from your nearest Authorized Enerpac Service Center or Enerpac Sales office.

1.0 IMPORTANT RECEIVING INSTRUCTIONS

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

SAFETY FIRST

2.0 SAFETY ISSUES

Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Enerpac cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Enerpac when in doubt as to the safety precautions and operations. If you have never been trained on high-pressure hydraulic safety, consult your distribution or service center for a free Enerpac Hydraulic safety course.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.

WARNING: Wear proper personal protective gear when operating hydraulic equipment.

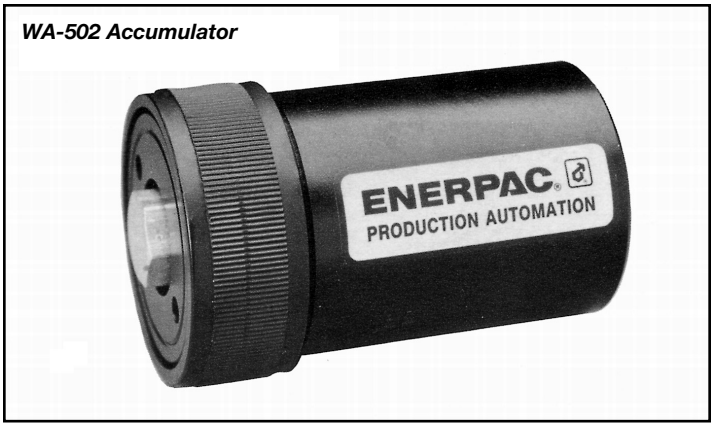
WARNING: Stay clear of loads supported by hydraulics. A cylinder, when used as a load lifting device, should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.

DANGER: To avoid personal injury keep hands and feet away from cylinder and workpiece during operation.

WARNING: Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury. The cylinders are designed for a max. pressure of 350 bar [5,000 psi]. Do not connect a jack or cylinder to a pump with a higher pressure rating.

Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.

WA-502 Accumulator



WARNING: The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.

CAUTION: Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.

Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.

IMPORTANT: Do not lift hydraulic equipment by the hoses or swivel couplers. Use the carrying handle or other means of safe transport.

CAUTION: Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65 °C [150 °F] or higher. Protect hoses and cylinders from weld spatter.

DANGER: Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

WARNING: Only use hydraulic cylinders in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically causing severe personal injury.

IMPORTANT: Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Authorized ENERPAC Service Center in your area. To protect your warranty, use only ENERPAC oil.

WARNING: Immediately replace worn or damaged parts by genuine ENERPAC parts. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.

CAUTION: To avoid internal seal damage, use only Enerpac hydraulic oil in the accumulator oil chamber. Seals are not designed for water or other liquids.

WARNING: Maximum charge of the accumulator is 5,000 psi. Do not overcharge the accumulator.

WARNING: Use only approved recharging equipment. Recharge using inert gas, such as nitrogen. Follow all charging instructions.

WARNING: Prior to performing maintenance on the accumulator or associated hydraulic lines, always discharge hydraulic lines, always discharge hydraulic oil and nitrogen gas.

3.0 DESCRIPTION

Accumulators consist of a steel outer casing with two internal chambers. An aluminum piston, using seal rings, separates each chamber and prevents the oil and nitrogen from mixing. The nitrogen chamber has a removable end cap and a filler valve. The hydraulic fluid chamber has a threaded steel end cap with a #8 SAE thread oil port. (See Cross Section in Figure 1).

The accumulator provides hydraulic oil under pressure to the system whenever system operating pressure decreases. The accumulator operates when hydraulic oil is pumped into one chamber forcing the piston to compress the nitrogen gas in the other chamber. When hydraulic pressure decreases, the nitrogen moves the piston, forcing hydraulic fluid into the system.

NOTE: Accumulator operating temperature range is -20˚ to +200°F at a maximum of 5,000 psi.

Accumulators can be used for:

- **Pressure Maintenance** – to compensate for leakage or load-holding without a pump.
- **Supplemental Pump Delivery** – to allow the pump to cycle on and off less frequently.
- **Shock Absorption** – to dampen system pulsations and "water hammer" effects.
- **Limited Power Source** – for emergency, remote, or temporary power.

Contact Enerpac for specific applications and recommendations.

4.0 INSTALLATION

4.1 Mounting

1. Mount accumulators between the system hydraulic pump and the working components (i.e. cylinders, clamps, etc.). Standard "U" bolts or AW-50 brackets can be used for mounting.

CAUTION: Use care when tightening the mounting brackets so that the outer shell of the accumulator is not damaged or distorted.

CAUTION: Mounting devices must not cover the entire shell, thereby restricting normal thermal expansion due to temperature variations.

2. The accumulator may be mounted in any position, provided that the oil line and the charging valve are accessible.
3. Install a shut-off valve in the oil line between the accumulator and the system components to close the oil line from the accumulator, preventing uncontrolled fluid flow.

4.2 Hydraulic Connections

WARNING: Do not make or break hydraulic connections when the system is pressurized. Hydraulic oil at 5,000 psi may cause personal injury and/or equipment damage.

The following general guidelines will be helpful in determining if you have properly connected your hydraulic circuit:

- Be sure all hoses and fittings are connected to the proper inlet and outlet ports of the pump and cylinders.
- Be sure all hydraulic connections, hoses, fittings, and couplers are of the proper pressure rating and are fully tightened.
- **Do not** overtighten connections. Connections need only be snug and leak free.
- Seal all NPTF connections with a high-grade pipe thread sealer. If using Teflon tape, use 1-1/2 wraps of tape, leaving the first complete thread free of tape to ensure that pieces do not break off and enter the system, causing damage.

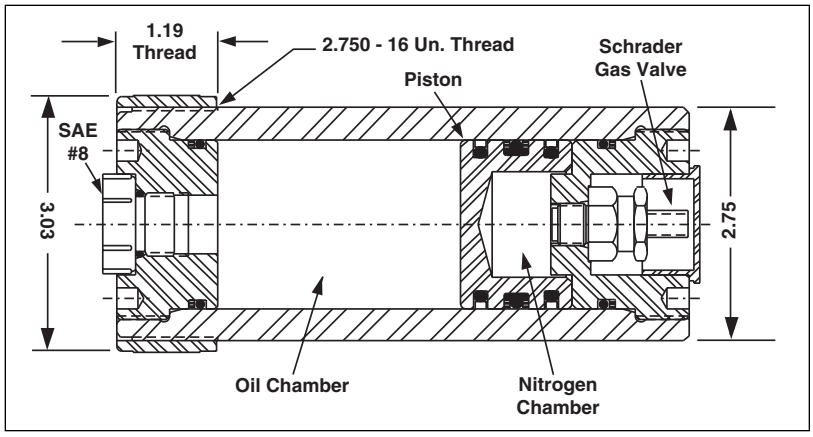


Figure 1

Specifications: This instruction sheet covers four models of Enerpac Accumulators. The following table shows their model numbers, length, and capacity.

Model No.	Length	Nitrogen Capacity	Hydraulic Fluid Capacity
WA-502	4.69 in. (11.91 cm)	2.5 in^3 (40.98 cm^3)	2.5 in^3 (40.98 cm^3)
WA-505	5.50 in. (13.97 cm)	5 in^3 (81.95 cm^3)	5 in^3 (81.95 cm^3)
WA-5010	7.13 in. (18.11 cm)	10 in^3 (163.90 cm^3)	10 in^3 (163.90 cm^3)
WA-5030	13.50 in. (34.29 cm)	30 in^3 (491.70 cm^3)	30 in^3 (491.70 cm^3)

Precharge Chart

Model Number	Hydraulic Pressure psi (bar)	Pre-charge Pressure psi (bar)	Usable Oil Capacity in^3 (cm^3)
WA-502	0 - 1,000 (0 - 69)	500 (34)	1.50 at 1,000 psi (25 at 69 bar)
	1,000 - 3,000 (69 - 207)	1,000 (69)	2.00 at 3,000 psi (33 at 207 bar)
	3,000 - 5,000 (207 - 344)	1,000 (69)	2.50 at 5,000 psi (41 at 344 bar)
WA-505	0 - 1,000 (0 - 69)	500 (34)	2.00 at 1,000 psi (33 at 69 bar)
	1,000 - 3,000 (69 - 207)	1,000 (69)	3.50 at 3,000 psi (57 at 207 bar)
	3,000 - 5,000 (207 - 344)	1,200 (83)	4.00 at 5,000 psi (66 at 344 bar)
WA-5010	0 - 1,000 (0 - 69)	500 (34)	5.50 at 1,000 psi (90 at 69 bar)
	1,000 - 3,000 (69 - 207)	1,000 (69)	6.50 at 3,000 psi (107 at 207 bar)
	3,000 - 5,000 (207 - 344)	1,200 (83)	7.50 at 5,000 psi (123 at 344 bar)
WA-5030	0 - 1,000 (0 - 69)	500 (34)	13.50 at 1,000 psi (221 at 69 bar)
	1,000 - 3,000 (69 - 207)	1,000 (69)	18.00 at 3,000 psi (295 at 207 bar)
	3,000 - 5,000 (207 - 344)	1,200 (83)	18.50 at 5,000 (303 at 344 bar)

4.3 Pre-charging

Pre-charge is the initial gas pressure that is contained by the accumulator prior to system activation. Typically, pre-charge varies from 30 - 80% of system pressure, depending upon the type of application.

Accumulators are shipped uncharged. When the unit is installed and the hydraulic line is connected, charge the accumulator with nitrogen gas to the required pre-charge pressure. The maximum precharge pressure is 3,000 psi. See the Precharge Chart.

4.4 Charging Accumulators

Initial charging and recharging can be accomplished with or without the accumulator installed in the system. When charging an accumulator installed in a system, all hoses and fittings should be inspected to ensure that no leaks exist.

WARNING: When charging an accumulator not installed in a system, the hydraulic port should have fittings and plugs removed, and should be directed away from people and equipment, as any residual fluids may be expelled from the accumulator at a high rate of speed.

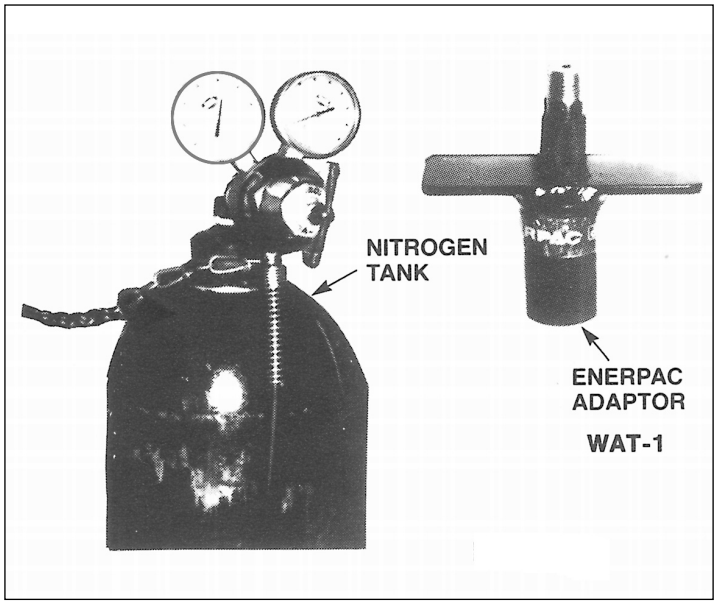


Figure 2

Equipment Required

1. Nitrogen tank with gauges and hoses.
2. Enerpac adaptor WAT-1. See Figure 2.

Conditions Required

1. Hydraulic pump turned "OFF".
2. Shut-off valve between the accumulator and the hydraulic system must be open and free to tank.

WARNING: Nitrogen gas is recommended for charging accumulators. Never use oxygen or any flammable gas. Never exceed maximum charging pressure of 3,000 psi.

Charging Procedure

1. Install the charging adaptor (WAT-1) by removing the protective cap on the accumulator gas fill valve. Slide the hex of the WAT- 1 onto the valve while threading the adaptor stem onto the gas fill port hand tight. (See Figure 3).

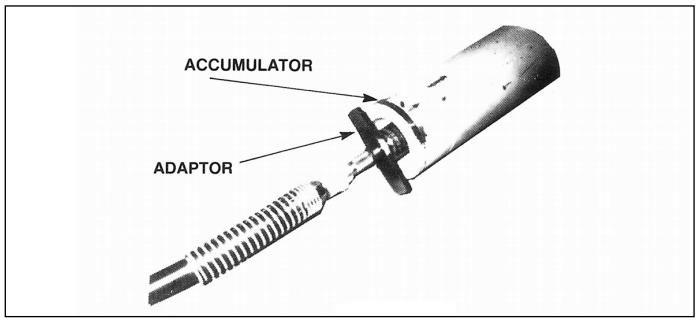


Figure 3

2. Attach the adaptor stem to the charging regulator on the nitrogen tank. The stem has 1/8 NPTF threads. The regulator must be fully relieved of pressure prior to attaching the adaptor stem.
3. Slowly open the accumulator gas fill valve by turning the WAT-1 adaptor counter-clockwise.

   NOTE: Bleed down of pressure may occur.
4. While slowly opening the nitrogen tank regulator, charge the accumulator to the desired pressure, not to exceed the maximum of 3,000 psi. Close the accumulator valve by turning the WAT-1 clockwise firmly while it is under pressure.

5. Relieve all pressure to the accumulator using the regulator valve. Remove the WAT-1 adaptor, using caution to avoid opening the gas fill valve on the accumulator. Replace the fill valve protective cap.
6. After removal of the charging tool, the gas fill valve can be tightened to 80 - 100 in-lbs (9.04 - 11.30 Nm). Make certain that the torque wrench socket is engaged on the upper hex of the gas fill valve.
7. Check system performance.

5.0 MAINTENANCE AND TROUBLESHOOTING

Normal maintenance consists of replacing the seals using Kit No. WA-500K1. Servicing will be required if deterioration of performance is observed.

Verify that the system is leak free, and that load-holding valves, if used, are functioning properly. If any of the following conditions exist, contact your local Authorized Enerpac Service Center:

1. Frequent recharging of the accumulator is required.
2. Oil is found in the nitrogen chamber.
3. Oil becomes frothy at the hydraulic port of the accumulator.

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