ENERPAC
Hydraulic Technology Worldwide

Instruction Sheet

MRS-1, 2, AND 5
MRS-1001, 2001, 3001, AND 5001
SPRING LOADED CLAMPING CYLINDERS

EIS 57.110-1 Rev. A 04/99

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.

WARNING: USE ONLY RIGID PIECES TO HOLD LOADS. Carefully select steel or wood blocks that are capable of supporting the load. Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.

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 700 bar. Do not connect a jack or cylinder to a pump with a higher pressure rating.

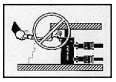
Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.

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.

WARNING: BE SURE SETUP IS STABLE BEFORE LIFTING LOAD.

Cylinders should be placed on a flat surface that can support the load. Where applicable, use a cylinder base for added stability. Do not weld or otherwise modify the cylinder to attach a base or other support.

Avoid situations where loads are not directly centered on the cylinder plunger. Off-center loads produce considerable strain on cylinders and plungers. In addition, the load may slip or fall, causing potentially dangerous results.

Distribute the load evenly across the entire saddle surface. Always use a saddle to protect the plunger.

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.

3.0 DESCRIPTION

Spring loaded clamping cylinders use high force internal springs to clamp and hydraulic pressure to release clamping. Each clamping cylinder has an oil port for hydraulic input. The maximum operating pressure of all MRS-cylinder types is 350 bar. (See Table A.)

The plunger has internal threads for attaching clamp arms or suitable clamping devices. The cylinder body is threaded for installing and adjusting in mounting flanges or fixtures. (See Figure 1.)

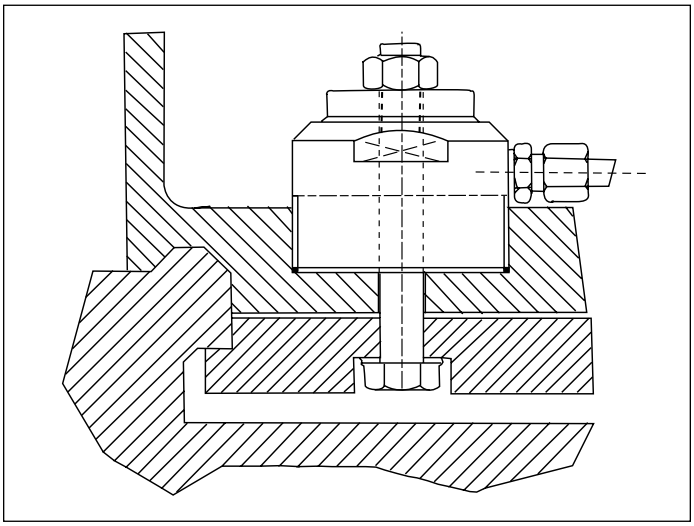


Figure 1, Example of Installation

4.0 APPLICATION

These cylinders are designed for prolonged clamping applications in moveable machine parts, tools, fixtures, pallets and workpieces. To ensure maximum lifetime, it is advisable to use these cylinders only within their effective working area. (See Figures 2 and 3.)

The clamping action is instantaneous with the release of hydraulic pressure. Due to the unique design, these cylinders provide uninterrupted mechanical clamping force.

5.0 INSTALLATION

Install the cylinders as close to the work piece as possible to provide maximum clamping force and minimum stroke which prolong the lifetime of the cylinder. Use mounting flanges or suitable fixtures to provide a stable, secure mounting. Cylinder hydraulic ports can be use to connect hydraulic hose or pipe. Always use high pressure tubes and fittings in all applications. Use hydraulic gauges in each hydraulic system to indicate safe operating pressures and loads.

CAUTION: To avoid cylinder damage, do not subject the plunger to severe side loading.

6.0 OPERATION

Available mechanical clamping forces varies from a maximum level at fully retracted to minimum at fully extended. (See Figures 2 and 3.)

IMPORTANT: The effective clamping force is influenced by the tolerances on the work piece to be clamped.

All spring loaded clamping cylinders are reverse single-acting cylinders using the spring to apply working forces and hydraulic pressure to release them. Due to the design, these cylinders provide uninterrupted mechanical clamping force.

7.0 SERVICE AND MAINTENANCE

Maintenance is required when wear and/or leakage is noticed. Occasionally inspect components to detect any problem requiring service and maintenance. ENERPAC offers ready-to-use spare parts kits for repairs and/or replacements. Repair parts sheets are available. Contact your ENERPAC representative.

8.0 TROUBLESHOOTING GUIDE

Problem	Probable Cause
Cylinder will not advance	1. Spring broke. Replace spring(s). 2. Plunger binding. Check cylinder internal parts. 3. No oil or too low oil level in pump. Refill reservoir. 4. Pump release valve open. Close pump's valve.
Cylinder leaks oil	1. Worn or damaged plunger. Replace plunger and seals. 2. Seals damaged. Replace seals. 3. Leaking or loose oil connections.
Cylinder will not retract.	1. Pump release valve closed. Open this valve. 2. Couplers not completely connected. Check hydraulic line. 3. Internally damaged plunger. Check parts.

TABLE A

Model No.	Operating Pressure (bar)	Maximum Clamping Force (kN)	Maximum Stroke (mm)	Effective Working Stroke (mm)	Oil Capacity (cm3)	Maximum Oil flow (l/min)	Weight (kg)
MRS-1	50 - 350	8,6	2,2	2,2	0,7	2	0,5
MRS-2	50 - 350	22,5	2,2	2,2	1,6	2	0,9
MRS-5	50 - 350	45,9	2,2	2,2	3,2	2	1,8
MRS-1001	135 - 350	9,8	4,8	2,4	3,4	2	1,2
MRS-2001	185 - 350	17,4	5,3	2,6	5,1	2	2,1
MRS-3001	180 - 350	26,7	5,6	2,8	8,9	3	3,0
MRS-5001	235 - 350	39,6	5,6	2,8	8,9	3	3,5

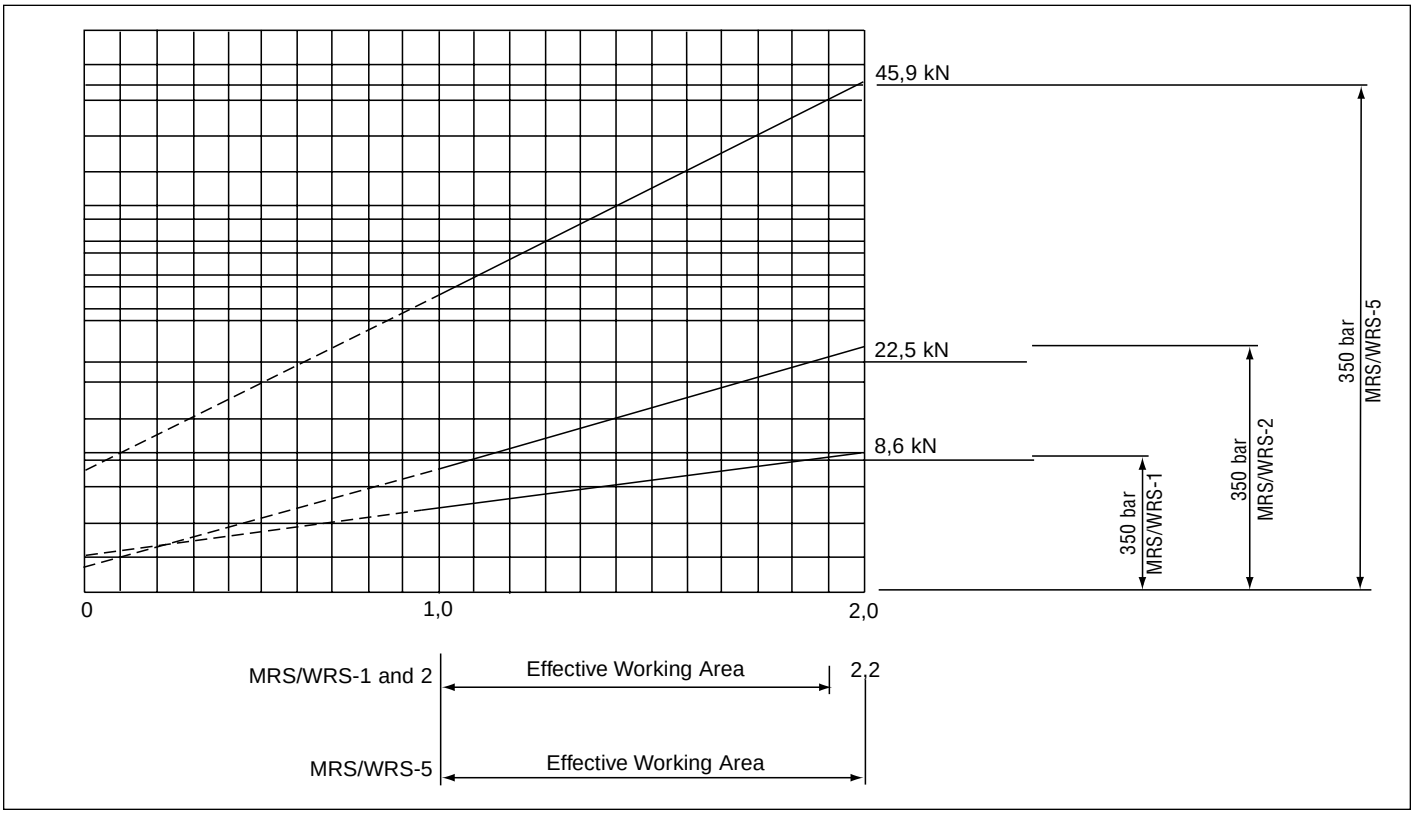


Figure 2, MRS-1, 2 and 3

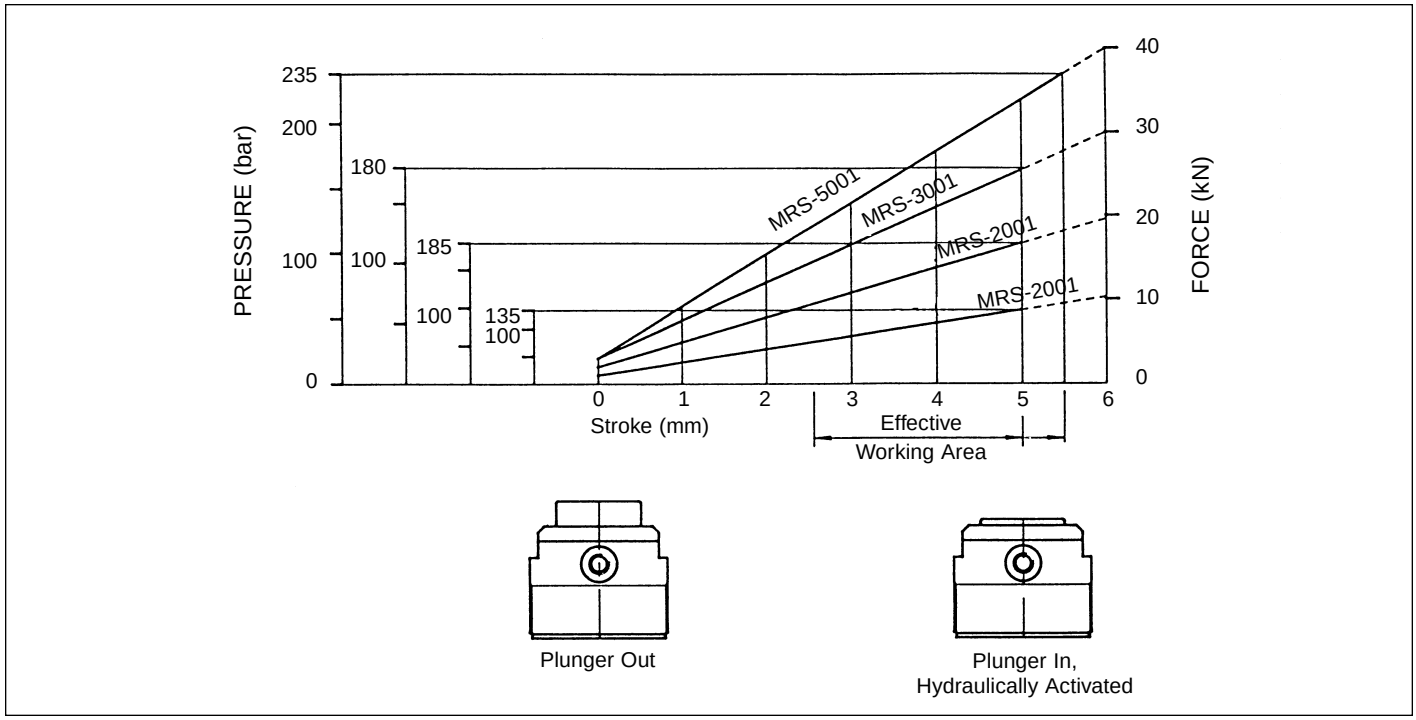


Figure 3, MRS-1001, 2001, 3001, and 4001

Enerpac Worldwide Locations ✦ **e-mail**: info@enerpac.com ✦ **internet**: www.enerpac.com

Australia
ENERPAC, Applied Power Australia Ltd.
Block V Unit 3
Regents Park Estate
391 Park Road
Regents Park NSW 2143
(P.O. Box 261) Australia
Tel: +61 297 438 988
Fax: +61 297 438 648

Canada
Applied Power Canada Ltd.
6615 Ordan Drive, Unit 14-15
Mississauga, Ontario L5T 1X2
Tel: +1 905 564 5749
Fax: +1 905 564 0305

Toll Free:
Tel: +1 800 268 4987
Fax: +1 800 461 2456

China
Applied Power China Ltd.
1F, 269 Fute N. Road
Waigaoqiao Free Trade Zone
Pudong New District
Shanghai, 200 131
China
Tel: +86 21 5866 9099
Fax: +86 21 5866 7156

France, Turkey, Greece, Africa, Middle East
ENERPAC S.A.
B.P. 200
Parc d'Activités
du Moulin de Massy
F-91882 Massy CEDEX (Paris) France
Tel: +33 1 601 368 68
Fax: +33 1 692 037 50

Germany, Switzerland, Austria, Eastern Europe
ENERPAC
Applied Power GmbH
P.O. Box 300113
D-40401 Düsseldorf
Germany
Tel: +49 211 471 490
Fax: +49 211 471 49 28

Hong Kong
ENERPAC
Room 907 Workingberg
Commercial Building
41-47 Marble Road
North Point
Tel: +852-2561 6295
Fax: +852-2561 6772

India
ENERPAC
Hydraulics (India) Pvt Ltd
Plot No. A-571
MIDC, TTC Industrial Area
Mahape-400 701
Navi Mumbai, India
Tel: +91 22 769 47 78
Fax: +91 22 769 84 73

Italy
ENERPAC
Applied Power Italiana S.p.A.
Via Canova 4
20094 Corsico (Milano)
Tel: +39 2 486 111 00
Fax: +39 2 486 012 88

Japan
Applied Power Japan Ltd.
1-1-11, Shimomae
Toda-shi
Saitama Pref.
Japan 335-0016
Tel: +81-48-430-2311
Fax: +81-48-430-1117

Mexico
ENERPAC Applied Power
Mexico S.A. de C.V.
Avenida Principal
La Paz #100
Fracc. Industrial La Paz
42092 Pachuca, Hidalgo
Tel: +52 771 337 00
Fax: +52 771 838 00

The Netherlands, Belgium, Luxembourg, Sweden, Denmark, Norway, Finland
ENERPAC B.V.
Storkstraat 25
P.O. Box 269, 3900 AG Veenendaal
The Netherlands
Tel: +31 318 535 911
Fax: +31 318 525 613
+31 318 535 848

Singapore
Applied Power Asia Pte Ltd
No. 8, Ang Mo Kio,
Industrial Park 2
#01-00
Singapore 569500
Thomson Road
P.O. Box 114
Singapore 915704
Tel: +65 484 5108
Fax: +65 484 5669

South Korea
ENERPAC
Applied Power Korea Ltd.
163-12 Dodang-Dong
Wonmi-Ku, Buchun-shi
Kyunggi-Do
Republic of Korea
Tel: +82 32 675 08 36
Fax: +82 32 675 30 02/73

Spain, Portugal
ENERPAC
Applied Power International S.A.
Avda. Camino de lo Cortao
21 - Nave 3
San Sebastian de los Reyes
28709 Madrid
Spain
Tel: +34 91 661 11 25
Fax: +34 91 661 47 89

United Kingdom, Ireland
ENERPAC Limited
Unit 3, Colemeadow Road
North Moons Moat
Redditch
Worcester B98 9BP
United Kingdom
Tel: +44 01527 598 900
Fax: +44 01527 585 500

USA, Latin America and Caribbean
ENERPAC
P.O. Box 3241
6101 N. Baker Road
Milwaukee, WI 53209 USA
Tel: +1 262 781 6600
Fax: +1 262 781 1049

User inquiries:
+1 800 433 2766
Distributor inquiries/orders:
+1 800 558 0530

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