

ENERPAC®

INSTRUCTION SHEET

MPFC-110, 210, 410
WPFC-110, 210, 410
MPTC-110, 210, 410
WPTC-110, 210, 410
Positive Locking Linear
Cylinders
50- 350 Bar, 725 - 5075 psi

EIS57.107-1

1 . Receiving instructions.

Visually inspect all components for shipping damage. If 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 during shipment.

2 . Preliminary procedure.

Read all instructions carefully before attempting to assemble or to operate your hydraulic equipment. Most malfunctions of new equipment are the result of improper operation and/or assembly.

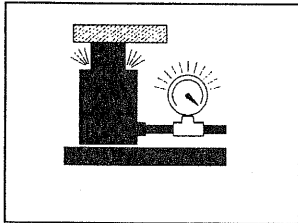
3 . User safety and protection.

3.1 In setting up systems to fit your operations, care must be taken to select the proper components and design to ensure appropriate integration with your operations and existing equipment. Be sure that all safety measurements have been taken to avoid the risk of personal injury and property damage from your application or system.

3.2 ENERPAC can not be held responsible for damage or injury caused by unsafe product use, lack of maintenance or incorrect product and system applications. Contact ENERPAC for guidance when in doubt as to the proper safety precautions to be taken in designing and setting up your applications.

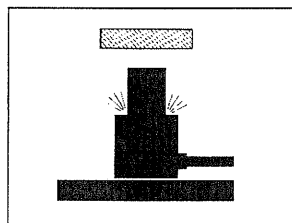
4 . Warning.

DO NOT OVERLOAD CYLINDER.



Be aware of clamping forces and DO NOT exceed them. Overloading causes equipment failure and possible personal injury.

DO NOT OVEREXTEND CYLINDER.



Do not operate cylinder beyond limits of its rated stroke. It will cause unnecessary strain to the cylinder.

RECOMMENDATION.

Use hydraulic gauges to indicate safe operating loads in each hydraulic system.

DO NOT exceed safe limit of lowest rated component within your system.

Use high pressure tubing in high cycle applications.

5 . Product description.

5.1 Principle of MPFC, WPFC, MPTC- and WPTC-cylinder models is a wedge construction with a small angle which is selflocking. After the plunger is hydraulically locked into position, the system must be depressurized. The plunger will remain locked. To release the plunger the cylinder has to be pressurized again, but on a different oilport.

5.2 LOCKING SYSTEM. The holding force of the lock (wedge) system is proportional with the locking pressure as shown in illustration 1, 2 and 3.



Important: Always use an equal or higher locking pressure than the clamping pressure to increase safety.

To achieve optimal safety, limit the time of building up the locking pressure to a maximum of two seconds and keep this pressure for minimal two seconds.



Important: Do not keep pressure on the locking system during machining.

TO PROTECT YOUR WARRANTY, USE ONLY ENERPAC HYDRAULIC OIL.

POUR PROTÉGER VOTRE GARANTIE, UTILISEZ EXCLUSIVEMENT L'HUILE HYDRAULIQUE ENERPAC.

UM IHRE GARANTIE ZU GEWÄHRLEISTEN, VERWENDEN SIE NUR ENERPAC HYDRAULIKÖL.

PER PROTEGGERE LA VOSTA GARANZIA, USATE UNICAMENTE OLIO ENERPAC.

PARA PROTEGER SU GARANTIA, UTILICE EXCLUSIVAMENTE ACEITE HIDRÁULICO ENERPAC.

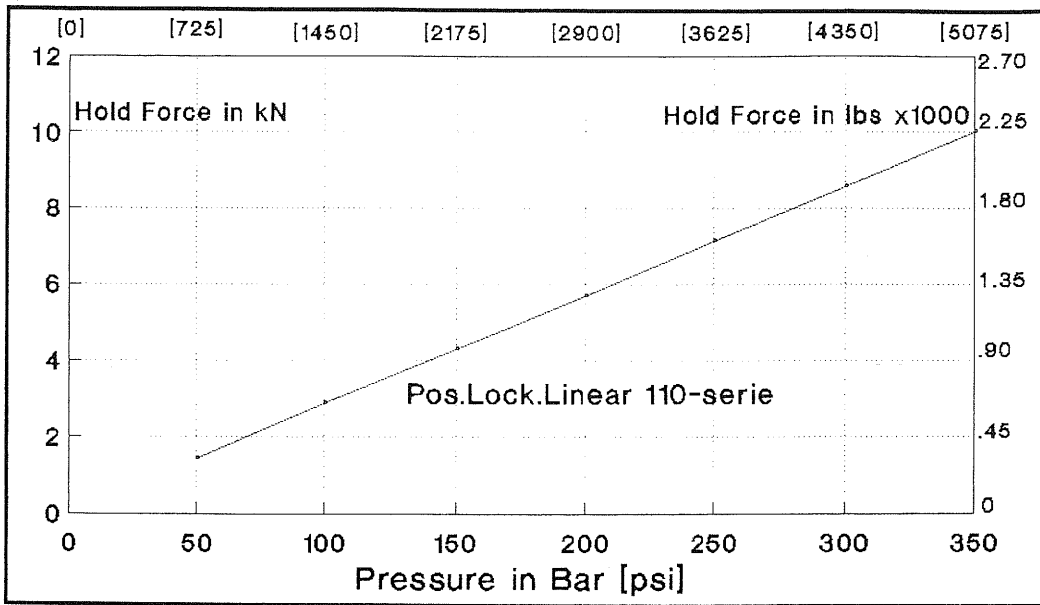


Illustration 1. Hold Force of MPFC-, WPFC-, MPTC- and WPTC-110.

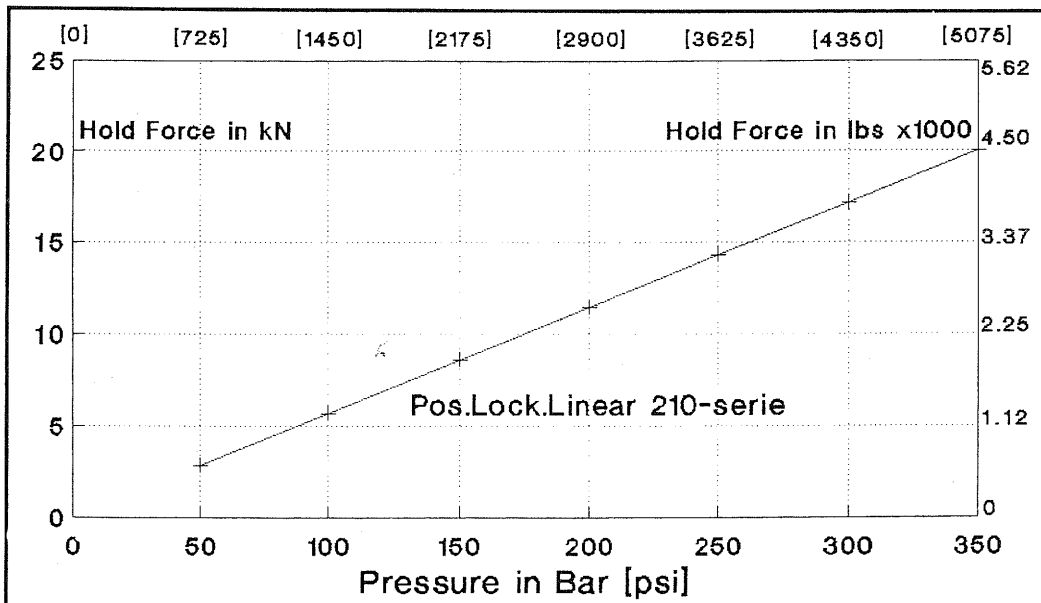


Illustration 2. Hold Force of MPFC-, WPFC-, MPTC- and WPTC-210.

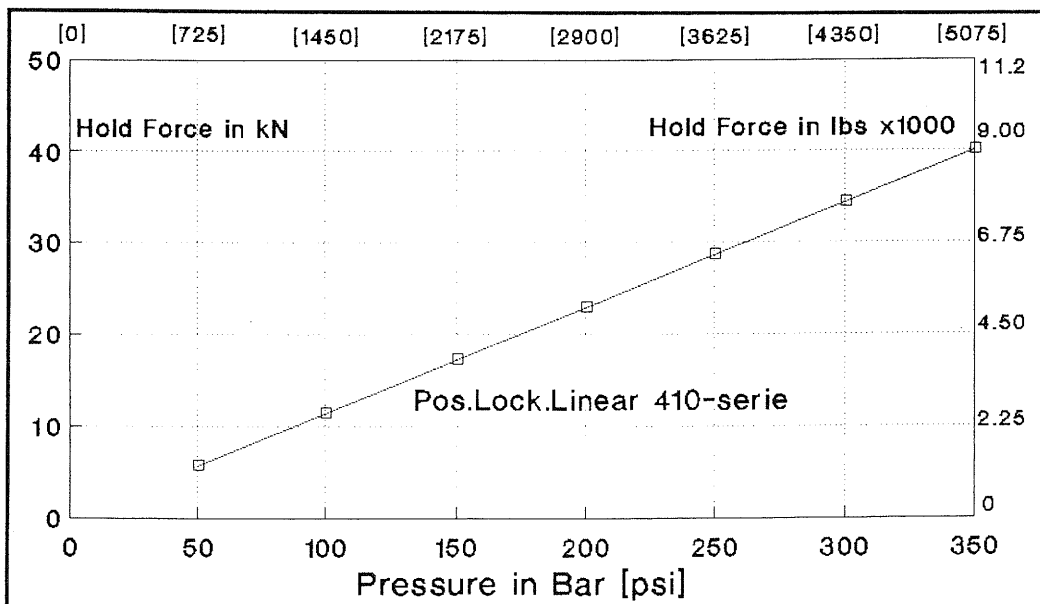


Illustration 3. Hold Force of MPFC-, WPFC-, MPTC- and WPTC-410.

6. Application.

6.1 POWER SOURCES. ENERPAC Positive locking linear cylinders should be used with electric or air driven hydraulic pumps. Always check pump specifications to ensure adequate flow and pressure ratings. Cylinder specifications are mentioned in table 1 and 2. For applications demanding a different flow or pressure contact your ENERPAC representative.

| Cylinder Model | Maximum Flow l/min (in ³ /min) | Minimum Pressure bar (psi) | Maximum Pressure bar (psi) | Temperature Range °C (°F) | Flange Mountings |
|----------------|--|-------------------------------|-------------------------------|------------------------------|------------------------------------|
| MPFC-110 | 10 (610) | 50 (725) | 350 (5000) | 5 - 60 (41-140) | --- |
| WPFC-110 | | | | | --- |
| MPTC-110 | | | | | BAW-39, MAW-15 |
| WPTC-110 | | | | | AW-95 |
| MPFC-210 | 10 (610) | 50 (725) | 350 (5000) | 5 - 60 (41-140) | --- |
| WPFC-210 | | | | | --- |
| MPTC-210 | | | | | BAD-183 |
| WPTC-210 | | | | | AW-11, AW-50, AW-88, AW-89, AW-121 |
| MPFC-410 | 10 (610) | 50 (725) | 350 (5000) | 5 - 60 (41-140) | --- |
| WPFC-410 | | | | | --- |
| MPTC-410 | | | | | --- |
| WPTC-410 | | | | | AW-95 |

Table 1

6.2 ACCESSORIES AND INSTALLATION. Install linear cylinders by threading them into fixtures or mounted flanges. ENERPAC linear cylinders can be mounted in any position. For accessories such as flange mountings see table 1.

| Cylinder Model | Oil Port Connections | Cylinder Displacement | | | Viscosity Range cSt | Oil Type |
|----------------|----------------------|---|--|--|------------------------|-------------------------|
| | | advance cm ³ (in ³) | retract + unlock cm ³ (in ³) | lock cm ³ (in ³) | | |
| MPFC-110 | G 1/4" | 5 (.31) | 6 (.37) | 4 (.24) | 15-250 | HLP 32 ISO 3448-1975 |
| WPFC-110 | SAE #4 7/16"-20 UNF | | | | | |
| MPTC-110 | G 1/8" | | | | | |
| WPTC-110 | SAE #2 5/16"-24 UNF | | | | | |
| MPFC-210 | G 1/4" | 10 (.61) | 10 (.61) | 6 (.37) | 15-250 | HLP 32 ISO 3448-1975 |
| WPFC-210 | SAE #4 7/16"-20 UNF | | | | | |
| MPTC-210 | G 1/8" | | | | | |
| WPTC-210 | SAE #2 5/16"-24 UNF | | | | | |
| MPFC-410 | G 1/4" | 17 (1.04) | 16 (.98) | 11 (.67) | 15-250 | HLP 32 ISO 3448-1975 |
| WPFC-410 | SAE #4 7/16"-20 UNF | | | | | |
| MPTC-410 | G 1/8" | | | | | |
| WPTC-410 | SAE #2 5/16"-24 UNF | | | | | |

Table 2

6.3 WORKSUPPORT or CLAMP CYLINDER. Normally MPFC, WPFC, MPTC and WPTC- cylinders are used as clamp cylinders: hold force as a function of pressure. They can also be used as worksupport cylinders. This in applications whereby the plunger of the support cylinder must be in retracted position during the installation of the workpiece: pressure on cylinder advance (oilport #1) must be reduced to prevent a high force working on the workpiece.

6.4 DEFLECTION. Applying a load on the total construction results in an elastic deformation. When the external force on the plunger increases the plunger retracts more in the base. This deflection is shown in illustration 4, 5 and 6. The deflection is measured on top of the plunger when the cylinder will be under load.

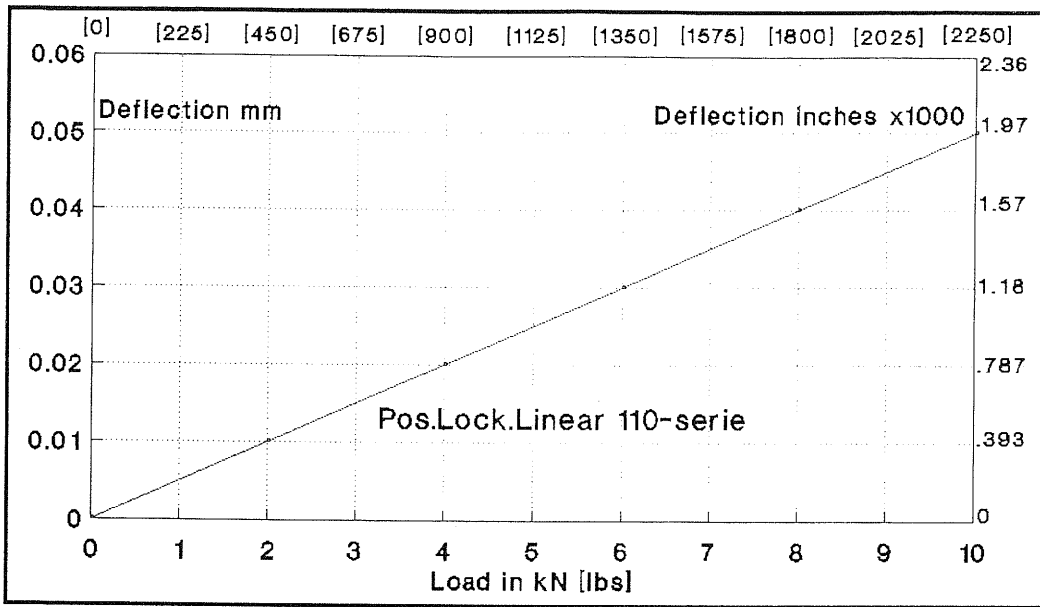


Illustration 4. Deflection of MPFC-, WPFC-, MPTC- and WPTC-110.

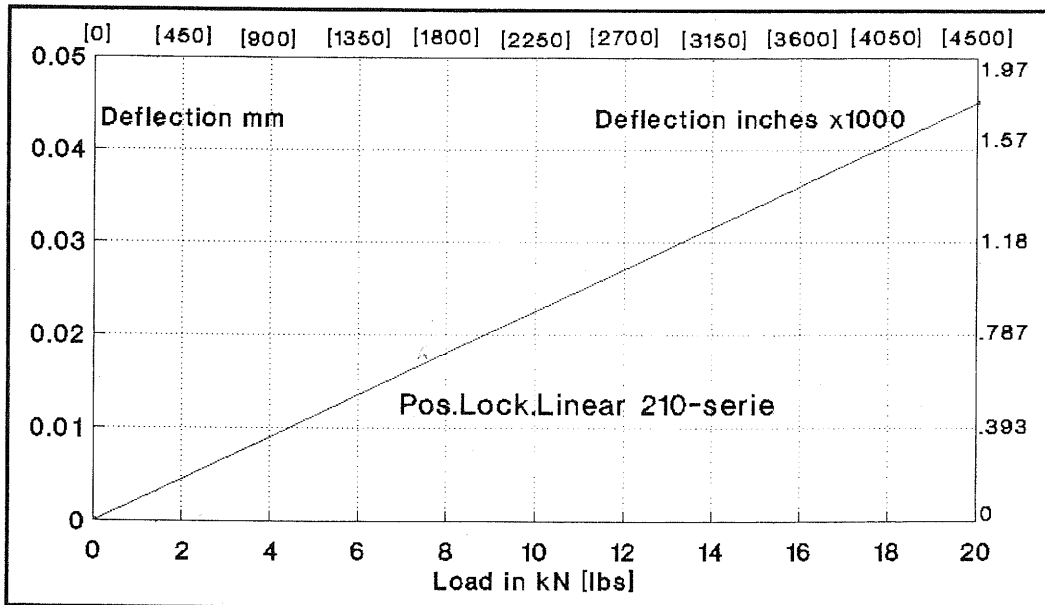


Illustration 5. Deflection of MPFC-, WPFC-, MPTC- and WPTC-210.

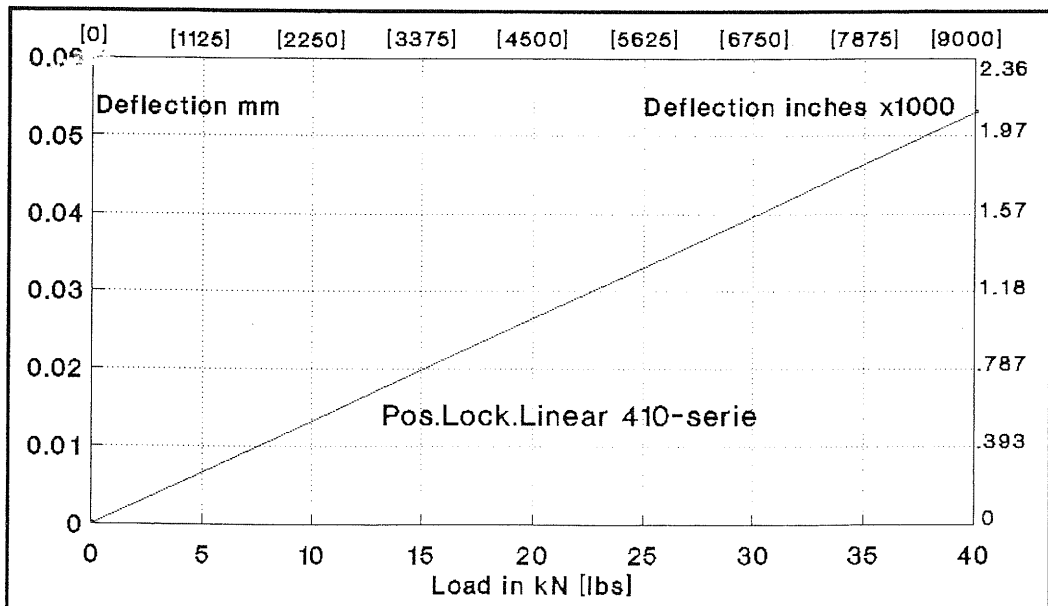


Illustration 6. Deflection of MPFC-, WPFC-, MPTC- and WPTC-410.

7. Operation.

7.1 SEQUENCE. MPFC, WPFC, MPTC and WPTC- cylinders function the same. Each oilport activates a specific cylinder function as shown in illustration 7A and 7B.

7.2 Sequence of operation: linear cylinder used as clamp cylinder:

- step 1: Pressurize oilport #1. The plunger extends and clamps the product.
- step 2: Keep oilport #1 pressurized and pressurize oilport #2. The plunger will be locked in the clamping position.
- step 3: Depressurize oilport #1 and #2. Cylinder must be depressurized before machining starts.
- step 4: Pressurize oilport #3. The plunger will be unlocked and the clamping force will be released. The plunger retracts to its original position.

7.3 Sequence of operation: linear cylinder used as worksupport cylinder:

The plunger is in retracted position. The workpiece must now be installed.

- step 1: Pressurize oilport #1 at a reduced pressure of minimal 10 bar (145 psi), depending on workpiece-weight.
- step 2: Keep oilport #1 pressurized and pressurize oilport #2: the plunger will be locked in supporting position.
- step 3: Depressurize oilport #1 and #2. Cylinder must be depressurized before machining starts.
- step 4: Pressurize oilport #3: the plunger will be unlocked and retracts to its original position.

7.4 Operation conditions when a linear cylinder is used as clamp cylinder or worksupport cylinder:

- Pressure on port #2 equal or higher then pressure on port #1.
- Pressure on port #3 equal or higher then pressure on port #2.
- Maximum time of pressurizing locking system (port #2): 2 seconds.
- Minimum time at locking pressure: 2 seconds.

Illustration 7A.

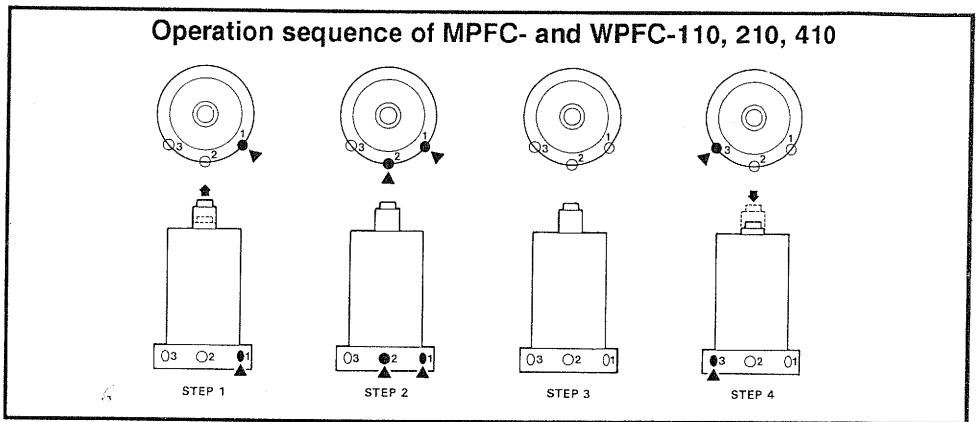
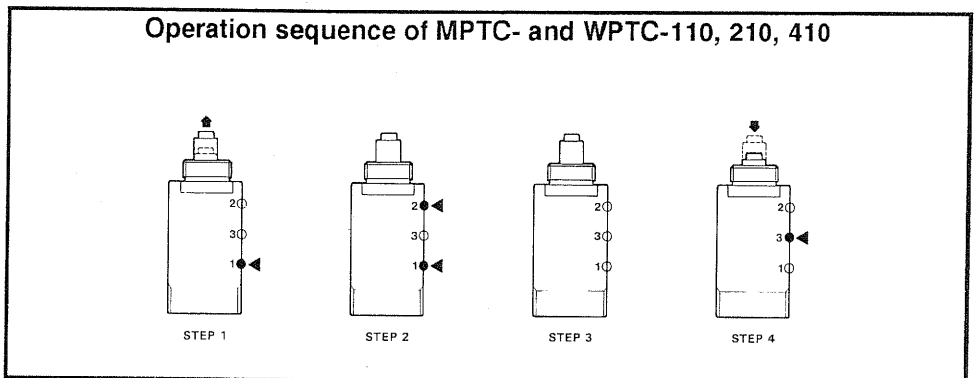


Illustration 7B.

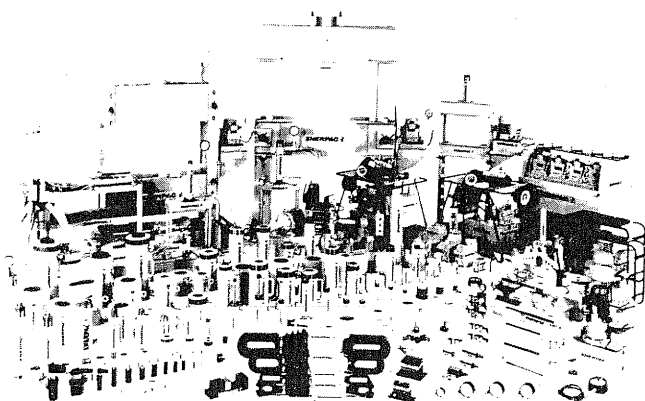


8. Service.

Enerpac offers ready-to-use spare parts kits for repairs and/or replacements. Repair Parts Sheets are also available. Contact your nearest ENERPAC representative for more details.

9. Trouble shooting.

| PROBLEM | POSSIBLE CAUSE | PROBLEM | POSSIBLE CAUSE |
|---|---|--|--|
| 1. Cylinder will not advance | A. Pump release valve open B. No oil in pump C. Air bound D. Couplers not fully tightened E. Blocked hydraulic line | 5. Cylinder advances but will not hold pressure | A. Cylinder seals leaking B. Leaking connection C. Pump malfunctioning |
| 2. Cylinder advances partly | A. Oil level in pump is low B. Cylinder plunger binding | 6. Cylinder leaks oil | A. Worn or damaged plunger B. Leaking or loose connection C. Internal leakage |
| 3. Cylinder advances in spurts | A. Air in hydraulic system B. Cylinder plunger binding | 7. Cylinder will not retract or retract slower than normal | A. Pump-release closed B. Coupler not fully closed C. Blocked hydraulic line D. Pump reservoir over-filled |
| 4. Cylinder advances slower than normal | A. Leaking connection B. Restricted hydraulic line or fitting C. Loose coupler D. Pump malfunctioning | 8. Cylinder will not fully retract | A. Pump reservoir over-filled B. Partially blocked hydraulic line C. Cylinder damaged internally or externally |



Enerpac Product Line

This is the most comprehensive selection of portable high-pressure hydraulic tools, equipment, components, controls and systems, available from a single manufacturer.

And since the foremost manufacturing objective at ENERPAC is, to set the standards of quality and efficiency for the hydraulic equipment industry, every product is designed and built for the safe, simple and most cost-efficient application of accurately controlled hydraulic power.

These advanced products utilize remotely controlled hydraulic power sources to activate specialized tools and attachments for the multi-directional

application of force.

Their high power-to-weight ratios, compactness, flexibility and adaptability add up to the most rational and effective methods for dealing with most power needs in most industries today. Even future requirements are being anticipated and resolved. In addition to adapting, updating and improving existing products, ENERPAC research and development engineers are constantly advancing design concepts and applying new technology to predetermine the progressive demands of industry.

Product literature

A comprehensive range of explanatory technical literature is freely available to anyone, interested in any aspect of ENERPAC

hydraulic products and systems. Separate product group catalogues deal respectively and extensively with the construction industry, civil engineering and utilities, manufacturing industries and with production tooling applications. In addition, there is a broad selection of brochures - featuring specific hydraulic systems, such as torque wrenches, fairing tools, cylinders, presses and many more.

Sales and service

The extent and adaptability of ENERPAC hydraulic power products make each application highly specific - if not unique. We stress, the more specifically the power system is matched to the job, the greater is its operating cost-efficiency.

And to achieve that, you can count on the full before and after sales services of your local authorized distributor. Each link in the ENERPAC chain of supply in your country - be it subsidiary company, importer, distributor or technical service center - is run by experienced professionals, who speak your language, who know your local conditions and who can come up with their recommendations and the hardware to match your particular requirement or solve any application problem.

To this end, ENERPAC even carries out its R & D programmes

on a decentralized basis - to facilitate the development of products, designed to meet the local conditions and requirements of engineers and manufacturers.

And whatever the product, wherever the work location, you can always count on the total commitment of this sales and service organization to make sure, that you gain the best possible returns on your ENERPAC investment.

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