The Complete Field Guide to N₂ Oil Well Pumping Systems
The Cryogenic Industries Group of companies consists of a number of companies to fill all your oilfield cryogenic applications. ACD is the worldwide leader in the design and manufacture of reciprocating and centrifugal cryogenic pumps and turbo expanders. Cryoquip is the worldwide leader of heat transfer products including ADFV and pot vaporizers for the oilfield market. Cosmodyne is our manufacturer of small to midsize air separation plants serving both the oilfield and the industrial gas markets.

Cryogenic Industries Service Companies specialize in maintaining and supporting the products of each of the aforementioned manufacturers. Currently Cryogenic Industries has 13 worldwide locations including: four locations in the USA, two in Canada, and one each in Australia, Malaysia, China, Korea, India, Brazil and Europe. Each of these locations is strategically positioned to provide global support for service and repairs.

Enhanced oil and gas recovery including well fracturing services, coiled tubing, acidizing, cementing and coal bed methane processes which require LN₂ pumping and vaporization is our specialty. With over 40 years experience we have the expertise to keep your pumps and vaporizers operational. Our goal is to reduce your maintenance costs and improve your company’s profitability.

If you go beyond the superior reliability of our equipment and service to look at what else we can offer the customer. Cryogenic Industries Service Companies also offers a comprehensive preventative maintenance and service training program to help your mechanics and operators understand the properties of cryogenic fluids and pump operation. Typically, the group holds more than 25 of these seminars annually at locations around the globe.

The goal of the Cryogenic Industries Service Companies is to provide your company with complete pump/vaporizer systems the best possible service, lower your investment and operational costs and keep your systems on-line 100% of the time.

Cryogenic Industries is here to support your oilfield needs today and in the future.

Sincerely,

Jim Estes
Managing Director
ACD/Cryogenic Industries Service Group
Welcome to the Cryogenic Industries world of high pressure reciprocating and centrifugal nitrogen pumping systems for oil and gas well stimulation. We lead the way providing pumping solutions.

- How to identify what pumping system you have?
- What warm and cold ends work with your system?
- How to identify part numbers?
- Who to call to order parts and components?
- How to place orders for replacement components?
- How to correctly install cold ends?
- How to use our exchange program?
- Quick facts along the way to help extend the life of the pump and help you better understand the nitrogen pumping system.
- Utilize our specialized oilfield nitrogen pump training courses to help you better understand procedures for correct installation, operation and maintenance of your pumping systems.

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All GUPD’s are used on trailers, body loaders and offshore skid pumping systems.
ACD is the OEM for power ends, cold ends and boost pumps. Our expertise provides the highest quality and longest life products in today’s N₂ service industry.

Driven by quality and customer satisfaction, Cryogenic Industries offers multiple North American service center locations to provide immediate product support.

**GUPD COLD ENDS**

<table>
<thead>
<tr>
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<th>Size</th>
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<tbody>
<tr>
<td>50888-1</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>50777</td>
<td>1 5/8&quot;</td>
</tr>
<tr>
<td>46080-1</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

The 1 5/8" cold ends are the most popular with the GUPD power end.

**SG COLD ENDS**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>60740-1</td>
<td>1 5/8&quot;</td>
</tr>
</tbody>
</table>

**GMPD COLD ENDS**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Size</th>
</tr>
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<tbody>
<tr>
<td>40386-1</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>15731</td>
<td>1 5/8&quot;</td>
</tr>
</tbody>
</table>

ACD is the OEM for power ends, cold ends and boost pumps. Our expertise provides the highest quality and longest life products in today’s N₂ service industry.

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**QUICK FACTS**

- Clean and dry intermediate then wire brush to ensure no debris is present before lubrication
- Set proper piston head clearance
- A small amount of blue Lock-Tite should be applied to the hex bolts when installing the SLS or LMPD coupler clamp
• Unequaled power end design reduced maintenance costs or increased life cycle which lowers your maintenance costs.
• Flexible high and low flows eliminate redundant pump costs.
• The 3-SLS will pump at rates up to 200 GPM and pressures up to 18,000 psi.
• CI Service Centers can provide repairs or ship exchange cold ends with an easy call, fax, or e-mail.

QUICK FACTS
• Always clean and lubricate the intermediate threads before installing the cold end
• Always use filtration on the oil system
• Stop use if power end seals are leaking excessively
• Never let the cold end freeze the intermediate
• Keep the power end oil pressure above 100 psi
**QUICK FACTS**

- Blow nitrogen through all lines before filling
- Don’t lift the cold end by the piston
- Don’t handle any parts that will be exposed to N₂ with bare hands

**3-SLS COLD ENDS**

**2 7/8" ACD COLD END**

The 2 7/8" ACD cold end is the most popular in the industry today. Look for pressure output of 9000 psi and 161 gallons per minute. This rate indicates a 2 7/8" cold end.

Part # 784880-1

**HOW DO I KNOW WHICH 3-SLS COLD END I HAVE?**

Look for the part number etched on the unit. You can also reference the table below – determine the rate and match the cold end performance.

<table>
<thead>
<tr>
<th>Cold End Performance – Flow/Pressure</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td>Flow (gpm) at 1000 rpm</td>
</tr>
<tr>
<td>2.0&quot; 78 15,000</td>
<td>78</td>
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<tr>
<td>2.0&quot; 78 18,000</td>
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<tr>
<td>64mm 123 10,000</td>
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</tr>
<tr>
<td>64mm 123 11,600</td>
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<tr>
<td>2.7&quot; 135 10,000</td>
<td>135</td>
</tr>
<tr>
<td>2.875&quot; 161 9,000</td>
<td>161</td>
</tr>
<tr>
<td>3.25&quot; 206 7,000</td>
<td>206</td>
</tr>
</tbody>
</table>

*There are two types of cold end styles – the “STANDARD” and “UNLOADER” – the unloader is only available on 3SLS cold ends. The cold ends may be supplied with an optional pump unloader to accommodate a customer’s requirement of a lower pump flow.
The 5SLS is the most popular high rate pump in Canada. The new heavy duty shaft design provides extreme durability in today’s nitrogen service industry needs.

5-SLS

Part # 59565-1 Power End Left Hand
Part # 59565-2 Power End Right Hand

Refer to the table on page 7 for cold end information.

3-HD4

Part # 60600 Complete Pump Assembly
Part # 60495 Power End
Part # 60610 Cold End

The LMPD reciprocating pump assembly has been discontinued but units are still in service. This 2.875" bore x 2 inch stroke requires an external oil pump for the right hand power end. The LMPD is rated for 129 gpm at 5000 psi in nitrogen service at 900 rpm. The minimum NPSH required is 60 psi.

LMPD

Part # 47150-1 Cold End 17,000 psi 1.5"
Part # 46900-1 Cold End 10,000 psi 2.0"
Part # 47250-1 Cold End 7,400 psi 2.5"
Part # 57690-1 Cold End 10,000 psi 2.7" Standard
Part # 57470-1 Cold End 10,000 psi 2.7" Unloader
Part # 47288-1 Cold End 5,000 psi 2 7/8"
NOTE: The replacement cold end assembly has been cleaned for service at the factory. Extreme caution should be exercised to prevent contaminating any internal fitting or tubing connection during replacement.

- Rotate the pump shaft until the crosshead piston is at the top-dead-center position.
- Apply thread lubricant to the female threads of the drive housing. Press the cold end piston fully forward until it contacts the suction valve plate.
- Screw the cold end into the intermediate until the knobs touch. Facing the cold end, check the position of the blow-by vent port on top of the cold end. If the port is between 3:00 to 12:00 o’clock, turn counterclockwise one full turn and then to vertical. (Clearance between crosshead knob and the cold end knob is 0.025 inches to 0.125 inches maximum).
- Install the coupling clamp, the lockwasher, and the cap screw. Rotate the pump drive by hand to assure that the pump head does not hit the cylinder head at top-dead-center position. Should the shaft not be able to rotate because of interference, unscrew the cold end assembly one complete turn and rotate the pump drive again.
- Tighten the jam nut against the intermediate to lock the cold end assembly. Tighten jam nut by hammering 2-3 hits with a 5-10 pound brass hammer.
- Connect suction, discharge and vent lines (unloader lines, if used).
AC-18 BOOST PUMPS

Our heavy duty series of boost pumps will reduce downtime and increase consistent flow to meet all of your N₂ supply requirements. Simple installation and removal reduces maintenance hours.

When identifying the centrifugal pump size the first number 1 1/2" is the discharge line size – 2 1/2" is the suction line size – 6” is the pump nominal impeller size.

**AC-18  1 1/2" x 2 1/2" x 6"**
Used on low rate units
You can always identify this pump with it’s square flanges.
Part # 41340    No hydraulic motor
Part # 41340-1  Includes hydraulic motor

**AC-18  2" x 3" x 6"**
Used on all types of units
Round flange
Part # 45780    No hydraulic motor
Part # 45780-1  Includes hydraulic motor

Canadian units have boost pumps that are 2”x4”x6” – 8 bolt suction flange.
Part # 58685

**CORRECT BOOST PUMP INSTALLATION/orIENTATION**
other installation configuration will void warranty

**QUICK FACTS**
- Never leave liquid in the pump when not in use
- Never rotate the pump without liquid nitrogen
- Replace pump if you see the seal leaking
ACD trailer off load pumps will give you the maximum product flow rates with the best performance to meet the demands of the well service industry.

**TC-21**  $1\frac{1}{2}" \times 2\frac{1}{2}" \times 10"$
- Part # 3408430-5  Jackshaft Model (TC-21J)
- Part # 3408434-5  Hydraulic Model (TC-21HD)

**TOP 215**  $3" \times 4" \times 8\frac{1}{2}"$
- Part # 59410-1  Hydraulic Model (TOP 215HD)
- Part # 57811-1  Jackshaft Model (TOP-215J)

Cryogenic Industries Service Centers can repair and/or exchange all brands of trailer off load pumps.

**QUICK FACTS**
- Always use braided stainless steel flexible hose sections to connect pump suction/discharge lines
- Make sure that all pump foot mount bolts are tight
- Never use air tools to tighten bolts on cast parts

ACD’s new cartridge seal and superior pump design ensures longer life with the TOP series.
Our North American complete Exchange Program is designed to keep your pumps operating with little or no downtime. Our service and repair centers maintain inventories of new and rebuilt warm and cold ends to quickly replace inoperable components. The spares are repaired with OEM parts set to OEM factory specifications and are exchanged in like-new condition. This unique program virtually eliminates downtime.

Here’s how simple it is:

• Identify your pump’s warm or cold end needing repair or replacement, and send that information to your nearest Cryogenic Industries Service Center. If you don’t have a part number, a digital photo or description is all we need to get a replacement to you to get your pump operational. When you contact a service center they’ll open an invoice for the job.

• The service center will receive your information and immediately expedite the correct component to you.

• You then have seven days to send the service center your broken or worn pump part. But in the meantime, we’ve already shipped a replacement.

• When we receive your worn or broken component, our expert technicians will evaluate the failure and determine if the part is repairable or needs replacement.

• The open invoice created when you sent the information on the worn component will now be reconciled and complete documentation will be issued.

IT’S EASY, FAST AND ALL OEM.
Cryogenic Industries Service Companies are committed to your pumping efficiency and productivity. Frequent pump training workshops are offered to your managers, engineers, operators, mechanics and technicians. At the workshop they will learn to expertly install, replace and maintain your pumps, saving you time and money.

Our free two-day seminars are held twice a year at each of our regional service center locations. Our group of highly trained pump specialists provide complete training for pump installation, on-site maintenance and operation. We can also schedule one-day on-site oil field training.

OIL WELL SERVICE/PUMP TRAINING PROGRAM

PARTNERS IN PUMPING SOLUTIONS

Cryogenic Industries Service Companies are committed to your pumping efficiency and productivity. Frequent pump training workshops are offered to your managers, engineers, operators, mechanics and technicians. At the workshop they will learn to expertly install, replace and maintain your pumps, saving you time and money.

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OIL WELL SERVICE PUMP
- Cryogenic Principles
- theory
- operation
- installation
- hands-on disassembly

TRAILER OFF LOAD PUMP
- Cryogenic Principles
- theory
- operation
- installation
- hands-on disassembly

COMPLETE PUMP MAINTENANCE TRAINING
Contact Your Local Center For Details
# CUSTOMER PUMP INVENTORY

## UNIT INFORMATION

UNIT # ____________________________________________

## HIGH RATE

<table>
<thead>
<tr>
<th>Model</th>
<th>Hand</th>
<th>Internal Oil</th>
<th>External Oil</th>
<th>Gear End</th>
<th>Keyed Shaft</th>
<th>Part #</th>
<th>Power End Serial</th>
<th>Cold End Serial</th>
<th>Size</th>
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</thead>
<tbody>
<tr>
<td>3-SLS</td>
<td>Left Hand</td>
<td>q</td>
<td>Right Hand</td>
<td>q</td>
<td>Internal Oil</td>
<td>q</td>
<td>External Oil</td>
<td>q</td>
<td>Gear End</td>
</tr>
<tr>
<td>5-SLS</td>
<td>Left Hand</td>
<td>q</td>
<td>Right Hand</td>
<td>q</td>
<td>Internal Oil</td>
<td>q</td>
<td>External Oil</td>
<td>q</td>
<td>Gear End</td>
</tr>
<tr>
<td>LMPD</td>
<td>Left Hand</td>
<td>q</td>
<td>Right Hand</td>
<td>q</td>
<td>Part #</td>
<td>____________</td>
<td>Power End Serial</td>
<td>Cold End Serial</td>
<td>____________</td>
</tr>
<tr>
<td>3-HD4</td>
<td>Left Hand</td>
<td>q</td>
<td>Right Hand</td>
<td>q</td>
<td>Part #</td>
<td>____________</td>
<td>Power End Serial</td>
<td>Cold End Serial</td>
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<tr>
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## LOW RATE

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<th>Gear End</th>
<th>Keyed Shaft</th>
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<th>Power End Serial</th>
<th>Cold End Serial</th>
<th>Size</th>
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<tbody>
<tr>
<td>GUPD</td>
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<td>____________</td>
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<td>Cold End Serial</td>
<td>____________</td>
</tr>
<tr>
<td>GMPD</td>
<td>Left Hand</td>
<td>q</td>
<td>Right Hand</td>
<td>q</td>
<td>Part #</td>
<td>____________</td>
<td>Power End Serial</td>
<td>Cold End Serial</td>
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</tr>
<tr>
<td>SG</td>
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## BOOST PUMP

<table>
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<th>Model</th>
<th>Size</th>
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<th>Part #</th>
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<tbody>
<tr>
<td>AC-18</td>
<td>1½” x 2½” x 6”</td>
<td>Serial #</td>
<td>Part #</td>
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<td>AC-18</td>
<td>2” x 3” x 6”</td>
<td>Serial #</td>
<td>Part #</td>
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<tr>
<td>AC-18</td>
<td>2” x 4” x 6”</td>
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<td>Part #</td>
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## TRAILER OFF LOAD PUMP

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</thead>
<tbody>
<tr>
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<td>Serial #</td>
<td>Part #</td>
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<tr>
<td>TC-21HD</td>
<td>1½” x 2½” x 10”</td>
<td>Serial #</td>
<td>Part #</td>
</tr>
<tr>
<td>TOP 215J</td>
<td>3” x 4” x 8½”</td>
<td>Serial #</td>
<td>Part #</td>
</tr>
<tr>
<td>TOP 215HD</td>
<td>3” x 4” x 8½”</td>
<td>Serial #</td>
<td>Part #</td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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14 Cryogenic Industries Service Companies
**ORDER FORM**

**FAX/EMAIL TO:**

- **Cryocal:** 714-641-1921 sales@cryocal.com
- **Pittsburgh:** 724-695-1926 pittcryo@pittcryogenic.com
- **Houston:** 281-590-4801 sales@cihouston.com
- **Red Deer:** 403-352-4439 info@cryocanada.com
- **Toronto:** 416-502-1952 info@cryocanada.com

**Date:** ____________________  **Contact:** ____________________  **Phone:** ____________________  **Fax:** ____________________

**SHIPPING ADDRESS:**

<p>| |</p>
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**BILLING ADDRESS:**

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<tbody>
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</tbody>
</table>

**SHIP VIA:** (circle one from each column)

- [ ] UPS
- [ ] Next Day
- [ ] Fed Ex
- [ ] 2nd Day
- [ ] Truck
- [ ] Ground
- [ ] Other ____________________

---

**HIGH RATE - LOW RATE**

**Power End:**

- **3-SLS**
  - Part # 59216
  - Part # 78276-1
  - Part # 78430-1
  - Part # 57170

- **5-SLS**
  - Part # 59565-1
  - Part # 59565-2

**Cold End:**

- **SLS**
  - 2.0” 15,000 psi Part # 782762-1 (Oty.) Unloader Part # 783311-1 (Oty.)
  - 2.0” 18,000 psi Part # 782762-2 (Oty.) Unloader Part # 783311-2 (Oty.)
  - 64mm 10,000 psi Part # 784850-1 (Oty.) Unloader Part # 784380-1 (Oty.)
  - 64mm 11,600 psi Part # 786355-1 (Oty.) Unloader Part # 786350-1 (Oty.)
  - 2.875” 9,000 psi Part # 784880-1 (Oty.) Unloader Part # 783309-1 (Oty.)
  - 3.25” 7,000 psi Part # 782763-1 (Oty.)

- **LMPD**
  - 2.7” 10,000 psi Part # 57690-1 (Oty.) Unloader Part # 57470-1 (Oty.)
  - 1.5” 17,000 psi Part # 47150-1 (Oty.) 2.0” 10,000 psi Part # 46900-1 (Oty.)
  - 2.5” 7,400 psi Part # 47250-1 (Oty.)

**Power End:**

- **GUPD**
  - Part # 45970
- **SG**
  - Part # 57575
- **GMPD**
  - Part # 57148

**Cold End:**

- **GUPD**
  - 1 5/8” Part # 50777 (Oty.)
  - 1 1/4” Part # 50888-1 (Oty.) 2” Part # 46080-1 (Oty.)
- **GMPD**
  - 1 5/8” Part # 15731 (Oty.)
  - 1 1/4” Part # 40386-1 (Oty.)
- **SG**
  - 1 5/8” Part # 67040-1 (Oty.)

**OTHER**

**BOOST PUMP**

- **AC-18**
  - 1 1/2” x 2 1/2” x 6” No hydraulic motor Part # 41340
  - Includes hydraulic motor Part # 41340-1
- **AC-18**
  - 2” x 3” x 6” No hydraulic motor Part # 45780
  - Includes hydraulic motor Part # 45780-1
- **AC-18**
  - 2” x 4” x 6” Part # 58685

**TRAILER OFF LOAD PUMP**

- **TC-21**
  - 1 1/2” x 2 1/2” x 10” Jackshaft model (TC-21J) Part # 3408430-5
  - Hydraulic model (TC-21HD) Part # 3408434-5
- **TOP 215**
  - 3” x 4” x 8 1/2” Jackshaft model (TOP-215J) Part # 57811-1
  - Hydraulic model (TOP-215HD) Part # 59410-1

**OTHER**

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**Cryogenic Industries Service Companies 15**
Cryogenic Industries Global Service and Sales Companies

North America

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www.cryoindservice.com

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