



# Oil-Well Service Models

## 3-SLS

### Applications

- ▶ Oil-well service
- ▶ Mobile pumping equipment
- ▶ High pressure purging
- ▶ High pressure and high flow requirements

### Features & Benefits

- ▶ Rugged, compact heavy-duty construction ensures smooth running performance over a wide range of flows and pressures
- ▶ Improved drive end design allows for longer life and cooler temperatures during operation
- ▶ Multiple configurations enable adaptability and conformity to mobile and/or stationary applications using a standard base model
- ▶ Better than 30 to 1 turndown ratios allows for a wide range of operating parameters, including low enough flows to meet coil-tubing applications

### Liquids Pumped

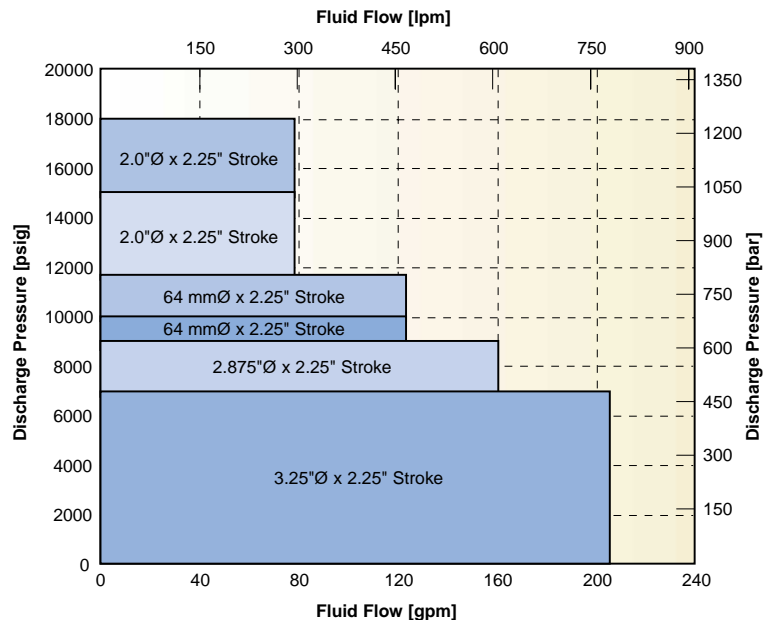
- ▶ LN<sub>2</sub>, LO<sub>2</sub>, Lar
- ▶ CO<sub>2</sub>, N<sub>2</sub>O
- ▶ LNG, Ethylene, Hydrogen



Also available in a "Sub Zero" Model.

### Pump Performance Map

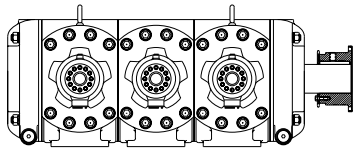
3-SLS 1100 Horsepower Cryogenic Reciprocating Pump



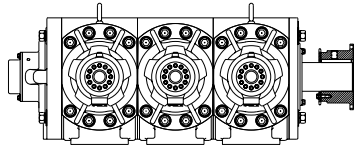
# 3-SLS specifications & Configurations

Piston Dia In. (mm)	Gal/Rev (SCF REV) LN2	Pump RPM x 2.250" Stroke (85% Eff.)									
		100	200	300	400	500	600	700	800	900	1000
		GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI	GPM / PSI
2.000 (50.8)	0.078 (7.265)	7.8 18,000	15.6 18,000	23.4 18,000	31.2 18,000	39.0 18,000	46.8 18,000	54.6 18,000	62.4 18,000	70.2 18,000	78.0 18,000
2.520 (64)	0.124 (11.533)	12.4 11,600	24.8 11,600	37.2 11,600	49.6 11,600	61.9 11,600	74.3 11,600	86.7 11,600	99.1 11,600	111.5 11,600	123.9 11,600
2.875 (73)	0.161 (15.012)	16.1 8,900	32.2 8,900	48.4 8,900	64.5 8,900	80.6 8,900	96.7 8,900	112.9 8,900	129.0 8,900	145.1 8,900	161.2 8,900
3.250 (82.5)	0.206 (19.183)	20.6 7,000	41.2 7,000	61.8 7,000	82.4 7,000	103.0 7,000	123.6 7,000	144.2 7,000	164.8 7,000	185.4 7,000	206.0 7,000
Brake HP @ Max. PSI		110	220	330	440	550	660	770	880	990	1,100

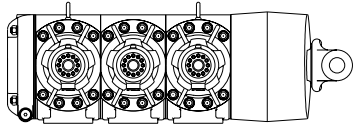
## SLS Warm Ends



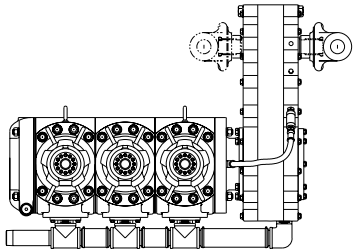
- 3-SLSCB**
- counter balance
  - no internal oil pump



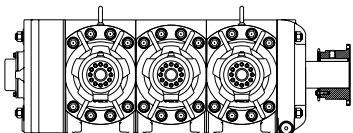
- 3-SLSOP**
- internal oil pump



- 3-SLSCBGR**
- counter balance
  - gear reduction
  - no internal oil pump

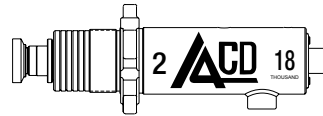


- 3-SLSCBGR0**
- counter balance
  - gear reduction
  - internal oil pump
  - diverted cooling

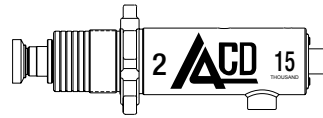


- 3-SLSCBOPD**  
**3-SLSCBOP**
- counter balance
  - internal oil pump
  - diverted cooling

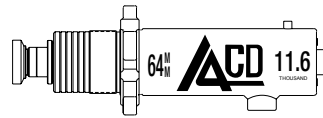
## SLS Cold Ends



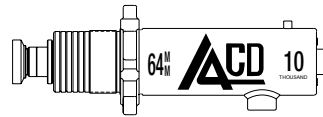
- Cryogenic Cold End**  
2" DIA.  
18,000 PSIG MAX. W.P.  
78 GPM



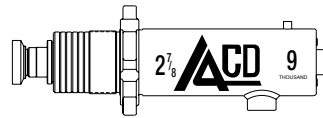
- Cryogenic Cold End**  
2" DIA.  
15,000 PSIG MAX. W.P.  
78 GPM



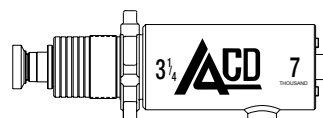
- Cryogenic Cold End**  
64mm DIA.  
11,600 PSIG MAX. W.P.  
123 GPM



- Cryogenic Cold End**  
64mm DIA.  
10,000 PSIG MAX. W.P.  
123 GPM



- Cryogenic Cold End**  
2 7/8" DIA.  
9,000 PSIG MAX. W.P.  
161 GPM

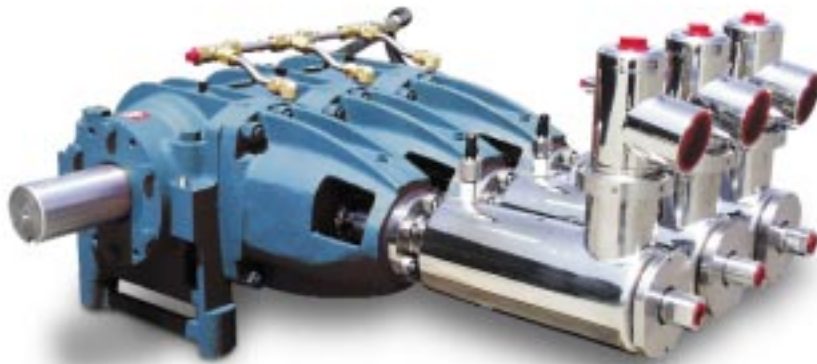


- Cryogenic Cold End**  
3 1/4" DIA.  
7,000 PSIG MAX. W.P.  
206 GPM

Unloading feature is available for all cold end sizes. This allows an improved range from 10 to 1 and 30 to 1 turndown.

# Sub Zero (SZ) Models

## 3-SZGU

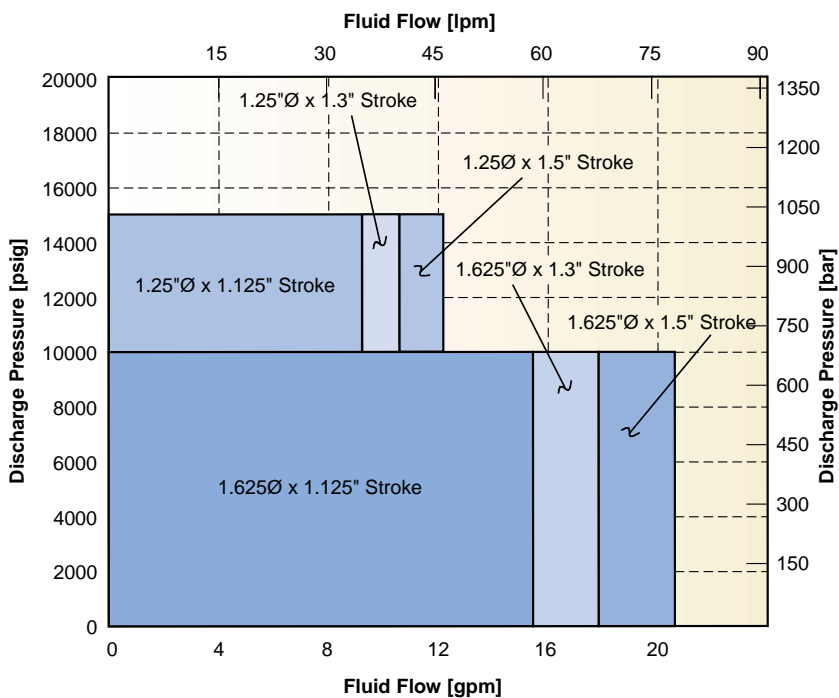


### Features & Benefits

- ▶ No boost pump required
- ▶ Two-stage cold end design provides sub-cooling and allows for very low NPSH requirements
- ▶ Distributed rod loading yields longer life for all wearing parts of the cold end
- ▶ Sub Zero lowers overall maintenance costs and operating costs two ways:
  - 1) No money spent on boost pump and associated piping
  - 2) No boost pump means no mechanical seal failures or down-time associated with a centrifugal pump
- ▶ Perfect pump for coiled-tubing applications
- ▶ 3-SLS pump is available in a Sub Zero Model (3-SZSLS)

### Pump Performance Map

Expected Performance Map  
SZGU "Triplex" Cryogenic Reciprocating Pump

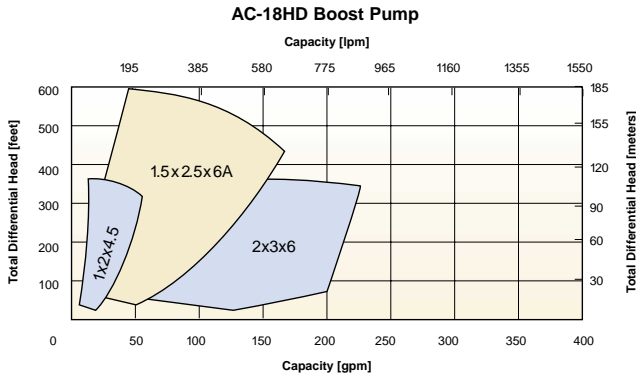


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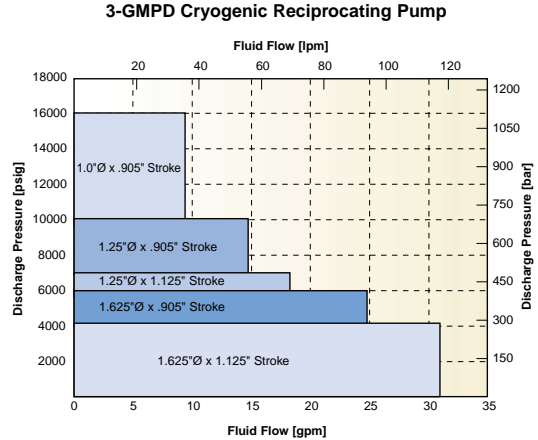
## Other Pumps Available

### Pump Performance Map

#### AC-18 HD Boost Pump

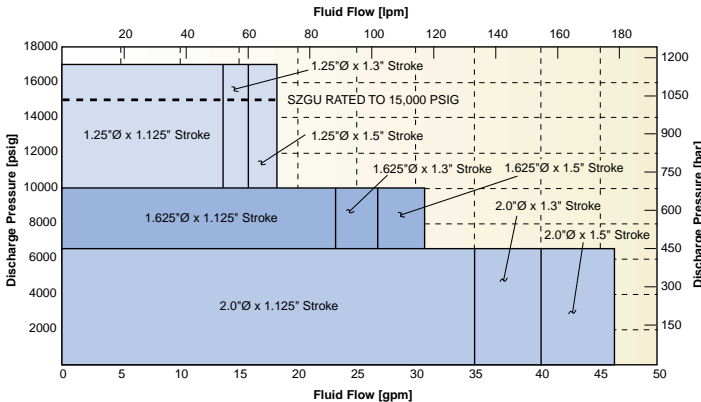


#### 3-GMPD Splashed Lubed



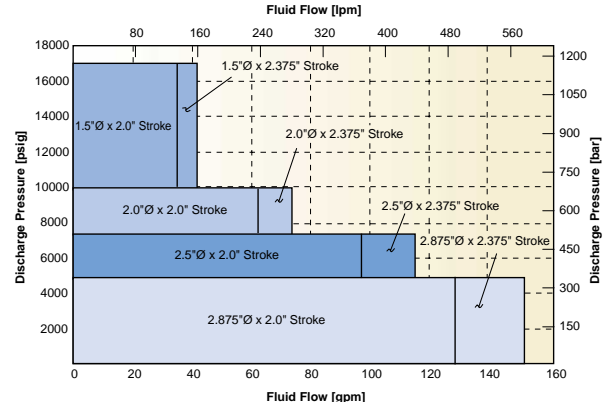
#### 3-GUPD Force Oil Lubed

##### 3-GUPD/3SZGU Cryogenic Reciprocating Pump



#### 3-LMPD Force Oil Lubed

##### 3-LMPD Cryogenic Reciprocating Pump



### Worldwide Sales & Service Centers



2321 S. Pullman Street  
Santa Ana, CA 92705 USA  
Tel 800.525.4216 (USA only)  
Tel +1.949.261.7533  
Fax +1.949.261.6285  
acd@acdcom.com  
www.acdcom.com



Gutenbergstrasse 1  
CH-4142 Muenchenstein  
Switzerland  
Tel +41.61.413.0230  
Fax +41.61.413.0233  
sales@acdcrysto.com  
www.acdcrysto.com

Rheinauenstrasse 2  
D-79415 Bad Bellingen  
Germany  
Tel +49.7635.8105.0  
Tel +49.7635.8965  
info@acdcrysto.com  
www.acdcrysto.com

**Cryogenic Industries—Headquarters**  
25720 Jefferson Avenue  
Murrieta, CA 92562 USA  
Tel +1 909.696.7840  
Fax +1 909.698.7484  
info@cryoind.com  
www.cryoind.com

**CryoAtlanta, Inc.**  
370 Great Southwest Parkway, Suite F  
Atlanta, GA 30336 USA  
Tel 888.217.9355 (USA only)  
Tel +1 404.696.8113  
Fax +1 404.696.8116  
tfarmer@bellsouth.net  
www.cryoatlanta.com

**CryoCal, Inc.**  
2110 S. Lyon Street, Unit H  
Santa Ana, CA 92705 USA  
Tel +1 949.724.8636  
Fax +1 714.641.1921  
cryocal@mgi.com  
www.cryocal.com

**CryoCanada Incorp.**  
530 McNicoll Avenue  
North York, Ontario M2H 2E1, Canada  
Tel +1 416.502.1950  
Fax +1 416.502.1952  
cryocan@istar.ca  
www.cryocanada.com

**Cryogenic Industries - Houston**  
14014 Interdrive East  
Houston, TX 77032 USA  
Tel +1 281.590.4800  
Fax +1 281.590.4801  
sales@cihouston.com  
www.cihouston.com

**Cryogenic Industries—Malaysia**  
Lot 35, Jalan Selat Selatan 21  
Sobena Jaya, Pandamaran  
42000 Port Klang, Selangor, Malaysia  
Tel +60 (3) 3165.4801  
Fax +60 (3) 3165.4798  
rmross1@attglobal.net

**Cryogenic Industries—China**  
218 Tian Mu Shan Road  
Hangzhou, 310007, China  
Tel +86 571.888.59026  
Fax +86 571.888.59025  
hci@mail.hz.zj.cn

**Cryoquip - Australia**  
14 Zenith Road  
Dandenong, Victoria 3175, Australia  
Tel +61.3.9791.7888  
Fax +61.3.9769.2788  
rday@iwi.com.au  
www.cryoquip.com

**Pittsburgh Cryogenic Services, Inc.**  
767 State Route 30  
Imperial, PA 15126 USA  
Tel 800.327.6461 (USA only)  
Tel +1 724.695.1910  
Fax +1 724.695.1926  
pittcryo@pittcryogenic.com  
www.pittcryogenic.com