



**MINING  
FORESTRY  
MOBILE TRUCK  
AGRICULTURE  
CONSTRUCTION  
MARINE  
MATERIAL HANDLING**

# **OPTIMUM X Series**

*Muncie Power Products' OPTIMUM Series gear pumps/motors offer premier performance for a wide variety of applications across several industries. Featuring the innovative OPTI-Grip™ technology, the OPTIMUM Series exemplifies strength, endurance and rigidity making for long lasting units even in the most extreme conditions. The X Series is the middle range of the OPTIMUM Series fleet, providing 9 displacements to cover light to heavy flow and pressure requirements.*



## X Series Features

### 9 Pump Displacements Available

- 14, 16, 19, 23, 25, 27, 30, 33, 36 GPM @ 1,000 RPM (53, 61, 72, 87, 95, 102, 114, 125, 136 LPM @ 1,000 RPM)

### OPTI-Grip™ (Patent Pending) design

- 2-piece, pressure holding construction delivers enhanced structural integrity to achieve higher pressures and superior performance

### Long life, High Performance Bushings

- Ultra-premium bushings last up to 30% longer than typical DU™ style bushings providing greater pump endurance in any application

### Noise reducing, quiet design

- 13 tooth gear design reduces the noise producing pressure ripple caused per gear tooth

### Bi-Rotational, 4 Port Design Standard (SAE straight thread only)

- SAE ports on the side and rear of the pump allow plumbing flexibility for user friendly installations
- Bi-rotational, 4-port design allows for pump or motor capabilities and reduces inventory requirements

### Pressures up to 4350 PSI (300 BAR)

- High pressure capabilities coupled with an innovative, rugged design make the Optimum Series a long lasting, top performer in all types of applications.

### Speeds up to 3000 RPM

- A wide range of speeds from 600-3000 RPM cover a broad range of application needs while still providing long product life

### High Quality, Tested Design

- Tight tolerances in a highly engineered design result in high pump efficiencies and long lasting performance
- All pumps are 100% tested to ensure expected performance prior to shipment.

### Additional Features & Benefits

- 5 different shaft options and 3 different mounting flange options provide flexibility when connecting to your power source.
- Bi-Rotational or Uni-Rotational Design
- SAE straight thread or split flange porting available
- Pressure balanced wear-plates standard
- Pump or Motor capability
- High temperature/High pressure shaft seals
- Buna N Body & Thrust Plate seals
- High strength cast iron housings
- Tandem and Triple capabilities

## X 23-02 B JO-HE HE-A 1 5-T0-23 HE

Series: X

### GPM (LPM) @ 1000 RPM, 1st unit:

14 (53), 16 (60), 19 (72), 23 (87), 25 (95), 27(102), 30 (114), 33 (125), 36 (136)

### Shaft Size & Type

01 - SAE "BB" 1.0"rnd shaft w/ 1/4 key (25.4rnd w/ 6.35 key)  
 02 - SAE "B" 7/8"-13T spline  
 05 - SAE "C" 1-1/4"-14T spline  
 07 - SAE "C" 1-1/4"rnd w/ 5/16 key (31.75rnd w/ 7.94 key)  
 17 - SAE "BB" 1.0"-15T spline

### Mounting Flange & Type:

B - SAE "B" 2/4-Bolt, 4" Pilot Dia.  
 C - SAE "C" 4-Bolt, 5" Pilot Dia.  
 R - Remote Foot Mount

### Mounting Flange configuration\*:

#### Bi-rotational internals (pump or motor)

J0 - bi-rot, w/o O.B. Bearing, w/ 1/4 SAE drain  
 J1 - bi-rot, w/ O.B. Bearing, w/ 1/4 SAE drain

#### Uni-rotational internals (pump or motor)

K0 - CW without O.B. Bearing, w/ 1/4 SAE drain  
 K1 - CCW without O.B. Bearing, w/ 1/4 SAE drain  
 K2 - CW with O.B. Bearing, w/ 1/4 SAE drain  
 K3 - CCW with O.B. Bearing, w/ 1/4 SAE drain

For multiple units only. Delete for single units and repeat for triple units.

### Side Ports, 2nd unit:

See "side ports, 1st section" for codes

### GPM (LPM) @ 1,000 RPM, 2nd unit:

See "GPM (LPM) @ 1,000 RPM, 1st unit" for codes

### Thru Drive (multiple units only):

T0 - No thru ports  
 T1 - CW thru port configuration (inlet port)  
 T2 - CCW thru port configuration (inlet port)

### Assembly Sections:

4 - Single unit, with extended studs  
 5 - Tandem unit, with extended studs  
 6 - Triple unit, with extended studs

### Design Number: 1

### Additional Attributes:

A - High pressure shaft seal\*\*

### Rear Ports, Size & Type:

#### SAE Ports

GT - SAE-20 x SAE-20 (X14-16)  
 HE - SAE-24 x SAE-24 (X19+)

#### Split Flange Ports

XX - No rear ports

### Side Ports, 1st section:

#### SAE Ports

GT - SAE-20 x SAE-20 (X14-16)  
 HE - SAE-24 x SAE-24 (X19+)

#### Split Flange Ports

JC - 2.00" SF x 1.25" SF (X14-27)  
 JD - 2.00" SF x 1.50" SF (X30+)

## X Series Performance Specs

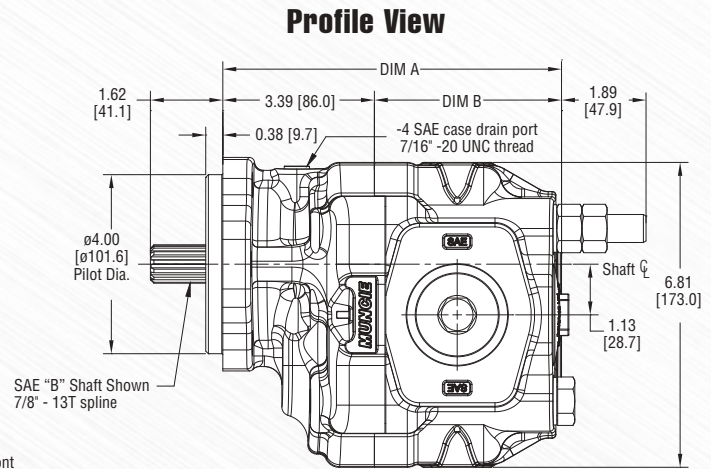
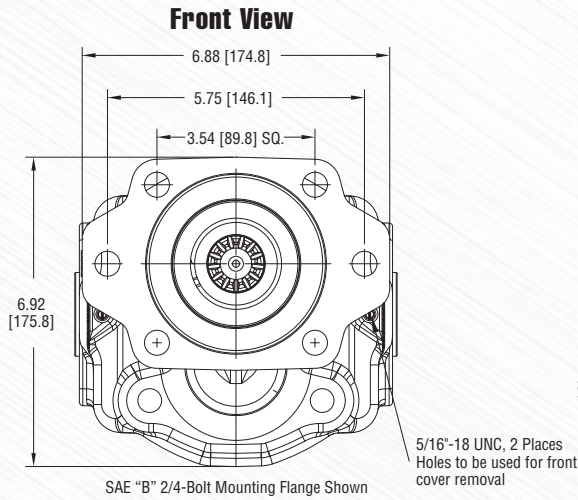
Model	Disp. in <sup>3</sup> (cc)	MAX RPM	MIN RPM	MAX Pres. PSI (BAR)	Ports (ODT) Side & Rear	Ports (SF) Side Only	Approx. Wt. Lbs. (Kg)
X14	3.18 (52.1)	3,000	800	4,350 (300)	-20	2.0" x 1.25"	52.9 (24.0)
X16	3.83 (62.9)	3,000	600	4,350 (300)	-20	2.0" x 1.25"	54.7 (24.8)
X19	4.44 (72.8)	3,000	600	3,750 (260)	-24	2.0" x 1.25"	55.9 (25.3)
X23	5.20 (85.3)	2,750	600	3,500 (240)	-24	2.0" x 1.25"	58.0 (26.3)
X25	5.69 (93.4)	2,750	600	3,250 (225)	-24	2.0" x 1.25"	59.3 (26.9)
X27	6.35 (104)	2,500	600	3,000 (210)	-24	2.0" x 1.25"	61.1 (27.7)
X30	7.01 (115)	2,500	600	2,500 (190)	-24	2.0" x 1.5"	62.9 (28.5)
X33	7.78 (128)	2,500	600	2,500 (172)	-24	2.0" x 1.5"	65.0 (29.5)
X36	8.43 (138)	2,250	600	2,250 (155)	-24	2.0" x 1.5"	67.0 (30.4)

- MAX RPM is shown at 0 in.hg. and with an appropriately sized inlet hose
- MAX motor back pressure is not to exceed 150 PSI (10BAR)
- MAX inlet vacuum is not to exceed 5in.hg. (0.17 BAR)
- Weights shown are for single, direct mount pumps

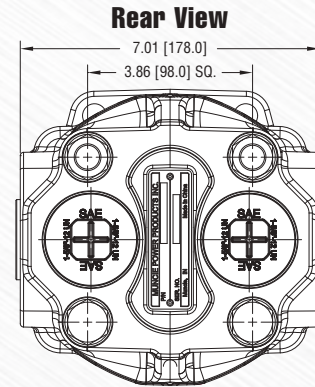
- Porting shown is standard pump porting, other porting configurations are available
- Motor applications will require a case drain to be plumbed directly back to the reservoir due to excessive return line pressures or surges

The 3-D diamond-like design appearing on Muncie's hydraulic pumps is a trademark of Muncie Power Products, Inc., Muncie, Indiana (USA), registered in the United States and various foreign countries.



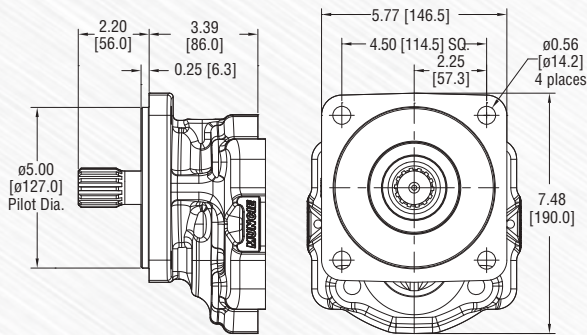


MODEL	DIM. A	DIM. B
X14	7.33 [186.2]	3.94 [100.2]
X16	7.57 [192.2]	4.18 [106.2]
X19	7.78 [197.7]	4.40 [111.7]
X23	8.06 [204.7]	4.67 [118.7]
X25	8.24 [209.2]	4.85 [123.2]
X27	8.47 [215.2]	5.09 [129.2]
X30	8.71 [221.2]	5.32 [135.2]
X33	8.98 [228.2]	5.60 [142.2]
X36	9.22 [232.2]	5.83 [148.2]



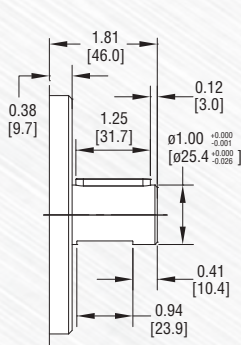
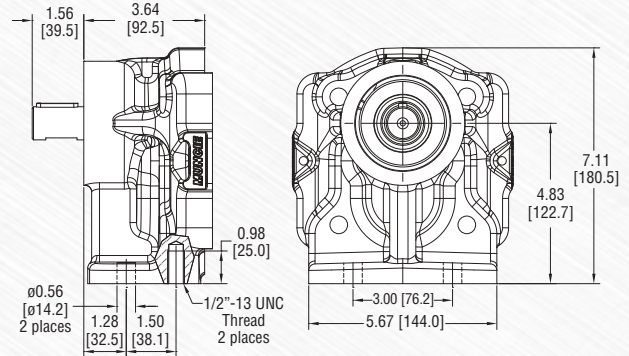
## SAE "C" 4-Bolt Mounting Flange

Shown with SAE "C" 1.25" - 14T shaft

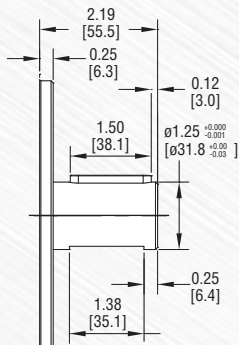


## Muncie's Remote Mount "R" Mounting Flange

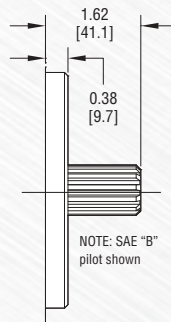
Shown with SAE "BB" 1.0" Round Shaft



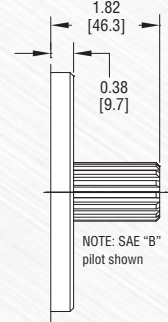
**SHAFT CODE 01**  
SAE "BB" 1.0" Rd.  
Shaft with 1/4" key  
NOTE: SAE "B" pilot shown



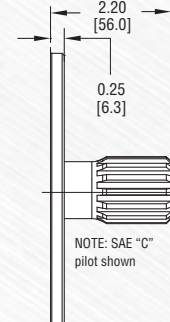
**SHAFT CODE 07**  
SAE "C" 1.25" Rd.  
Shaft with 5/16" key  
NOTE: SAE "C" pilot shown



**SHAFT CODE 02**  
SAE "B" 7/8" - 13T Spline  
• SAE external involute spline  
• 7/8" nominal diameter, 13 teeth  
• 16/32 diametrical pitch  
• Flat root side fit  
• Major diameter = 0.853" - 0.858"  
[21.67 - 21.80mm]  
• Minor diameter = 0.721" - 0.732"  
[18.32 - 18.60mm]



**SHAFT CODE 17**  
SAE "BB" 1.0" - 15T Spline  
• SAE external involute spline  
• 1.0" nominal diameter, 15 teeth  
• 16/32 diametrical pitch  
• Flat root side fit  
• Major diameter = 0.978" - 0.983"  
[24.84 - 24.97mm]  
• Minor diameter = 0.847" - 0.858"  
[21.52 - 21.80mm]



**SHAFT CODE 05**  
SAE "C" 1.25" - 14T Spline  
• SAE external involute spline  
• 1.25" nominal diameter, 14 teeth  
• 12/24 diametrical pitch  
• Flat root side fit  
• Major diameter = 1.223" - 1.228"  
[31.06 - 31.19mm]  
• Minor diameter = 1.049" - 1.063"  
[26.66 - 26.99mm]

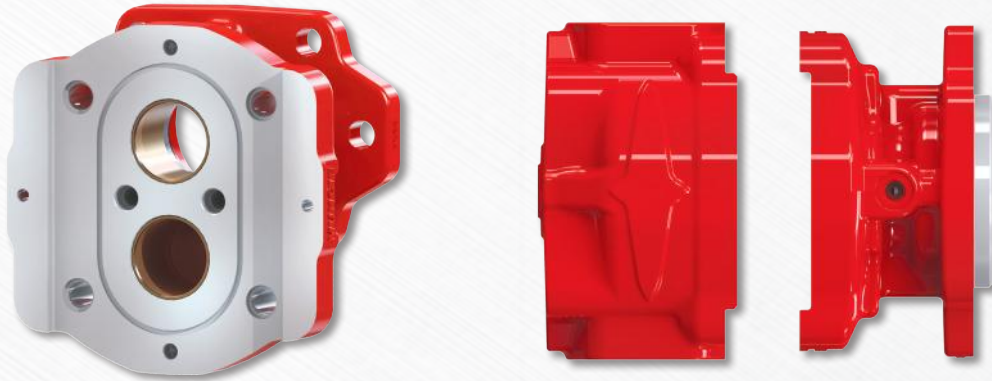


# OPTI-Grip™ DESIGN

THE FUTURE OF GEAR PUMP TECHNOLOGY

The OPTIMUM Series' integral, two piece castings are press fit together for greater structural integrity over other traditional designs.

Muncie's OPTI-Grip™ technology allows for higher pressure capabilities and a more rigid pump design for long life and maintained performance.



## OPTIMUM Series General Information

### Oil Recommendations

Muncie Power Products does not promote specific manufacturer's brands of oil, but does recommend the use of quality, petroleum-based hydraulic fluids. Different climate temperatures require that the oil viscosity be appropriate for the operating conditions. Consult the oil manufacturer for your exact application needs.

**Note:** NEVER dilute the hydraulic fluid for cold weather operation with, including but not limited to, diesel fuel, kerosene, etc.

- **Oil Viscosity:** 60-1,000 SSU (10.5-215 cST) for continuous operation. Viscosity should not exceed 7,500 SSU (1,600 cST) at start-up.
- **Special Fluids:** Biodegradable and water-glycol type fluids are acceptable for use with the Optimum Series Pumps/Motors.

### Inlet/Outlet Condition

- Maximum inlet vacuum should not exceed 5 in.Hg. across all operating RPM's and temperature conditions.
- An undersized inlet port size could have maximum RPM limitations.
- An oversized outlet port size could have maximum pressure limitations.

### Operating Temperatures

Proper control of the system operating temperature is critical for long product life and the protection of all other hydraulic components.

- Ideal operating temperatures: 100°F-140°F (37.8°-60°C)
- MAX Continuous temperature: 180°F (82.2°C)
- MAX Intermittent temperature: 200°F (93.3°C)

### Hose Sizing

Hydraulic hose must be properly sized based on the oil velocity in feet per second (FPS) and of the appropriate type (SAE rating) for the specified rate of flow and pressure. The following are hose recommendations for common applications; hose requirements may differ for non-standard applications.

- Inlet hose: 2-4 FPS, SAE 100R4 type
- Pressure hose: 7-15 FPS, SAE 100R2 type
- Return hose: 4-8 FPS, SAE 100R1 type

### Filtration Recommendations

Proper filtration is vital to the life of any hydraulic system, as it helps protect hydraulic components from foreign objects which may have entered the system.

- **Return Line Filters:** Return filters are always recommended with a minimum 10 micron rating. Some applications require better filtration with an absolute rating and possibly 3 or 6 micron media.
- **Pressure Filters:** Pressure filters are not typically required for gear pump applications, but they are available if desired.
- **Suction Strainers:** Suction strainers are very useful in catching large objects. Strainers should never be sized smaller than 100 mesh (149 micron), and should always include a 3 PSI (0.2 BAR) bypass.

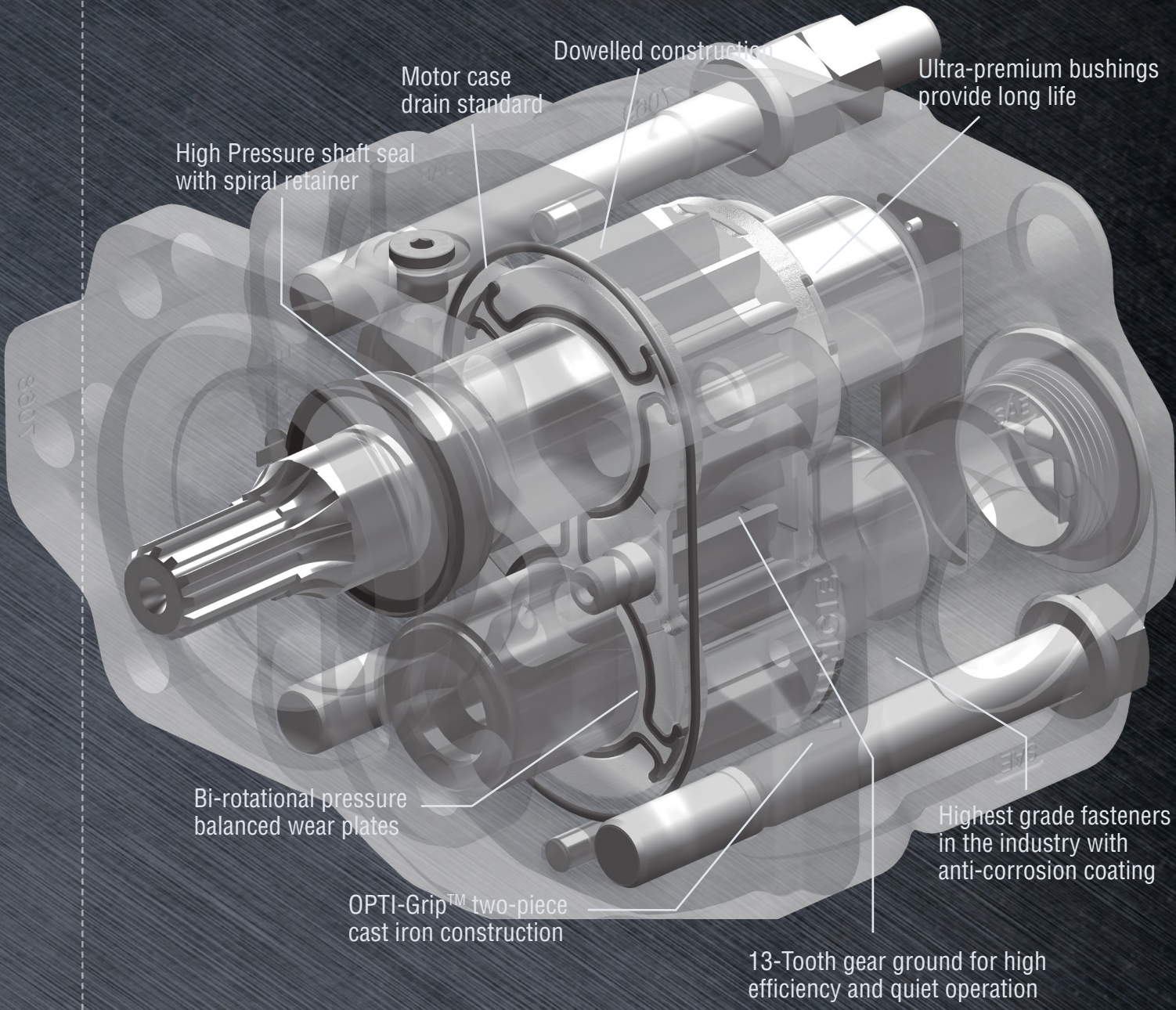
### Oil Cleanliness Recommendations (ISO 4406-1999)

- @ 2,000 PSI (138 BAR): 20/17/15
- @ 3,000 PSI (207 BAR): 19/17/14
- @ 4,000+ PSI (276+ BAR): 17/15/12



OPTIMUM  
**X Series**

# Internal Component Features



High Pressure shaft seal with spiral retainer

Motor case drain standard

Dowelled construction

Ultra-premium bushings provide long life

Bi-rotational pressure balanced wear plates

OPTI-Grip™ two-piece cast iron construction

Highest grade fasteners in the industry with anti-corrosion coating

13-Tooth gear ground for high efficiency and quiet operation



# X Series Warranty

## ONE YEAR PUMP WARRANTY

Muncie's OPTIMUM Series pump/motor series "X" is warranted against any defect in material and workmanship which existed at the time of sale by Muncie Power Products, Inc., according to the following provisions, subject to the requirements that the pump/motor must be used only in accordance with catalog and package instructions.



The pump/motor is warranted for a period of one year from the date of installation. If, during the warranty period, the pump/motor fails to operate to Muncie's specifications due to a defect in any part, material or workmanship that existed at the time of sale by Muncie, the defective part will be repaired or replaced, at Muncie's election, at no charge, if the defective part is returned to Muncie with transportation prepaid.

**WARNING:** The above warranty shall terminate if any alterations or repairs are made to the pump/motor other than at a Service Center owned by Muncie, or if the pump/motor is used on any equipment other than the equipment upon which it is first installed.

**THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER OBLIGATIONS AND LIABILITIES, INCLUDING NEGLIGENCE AND ALL WARRANTIES OF MERCHANTABILITY AND SUITABILITY, EXPRESSED OR IMPLIED, AND STATE MUNCIE'S ENTIRE AND EXCLUSIVE LIABILITY AND THE BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM OF DAMAGES IN CONNECTION WITH THE SALE, REPAIR OR REPLACEMENT OF THE ABOVE GOODS, THEIR DESIGN, INSTALLATION OR OPERATION. MUNCIE WILL IN NO EVENT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND OUR LIABILITY WILL UNDER NO CIRCUMSTANCES EXCEED THE CONTRACT PRICE FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED.**

*Distributed By:*

---

