

WARMAN®
Centrifugal Slurry Pumps

Excellent
Minerals
Solutions



Horizontal Slurry Pumps



Specialists in delivering and supporting slurry and dewatering equipment solutions for global mining and mineral processing, the power sector, and general industry.

Excellent
Minerals
Solutions



WARMAN®
Centrifugal Slurry Pumps

GEHO®
PD Slurry Pumps

VULCO®
Wear Resistant Linings

CAVEX®
Hydrocyclones

**FLOWAY®
PUMPS**
Vertical Turbine Pumps

ISOGATE®
Slurry Valves

MULTIFLO®
Mine Dewatering Pumps

HAZLETON®
Specialty Slurry Pumps

LEWIS PUMPS™
Vertical Chemical Pumps

**BEGEMANN
PUMPS™**
Centrifugal Process Pumps

Weir Minerals Division

Weir Minerals is the world leader in the design and manufacture of pumps, mill liners, hydrocyclones and slurry valves for the mining and minerals processing industries.

Weir Minerals is the world leader in the design and manufacture of dewatering and the world standard for sulfur chemical handling vertical and horizontal pumps for general industry.

Based on advanced, patented materials and design, our products and support services add value to virtually any aggressive, corrosive process.

Best wear life, lowest cost of operation

In slurry pumping, processing and control applications where the cost of ownership often outweighs capital cost as a priority, we help our customers address such issues as longevity, capacity, efficiency of operation, and maintenance.

Product strength lies in the superiority of Weir Minerals' advanced hydraulic design plus highest performing wear and corrosion resistant materials. Our leading research and materials scientists, plus our state of the art material production facilities, support our world class products and materials for the best wear life and lowest cost of operation.

Weir Minerals North America

Located in Madison WI, Weir Minerals North America is one of the many Weir Minerals facilities around the world. These facilities include foundries, rubber molding shops, and machining centers.



Above top: World class manufacturing facilities are part of Weir Minerals on five continents of the world

Above bottom: A 20 ton fixture enables Weir Minerals to produce the largest slurry pumps in the world



Right: A state-of-the-art hydraulic test laboratory is located in Madison, Wisconsin

Far right: A Warman 600 HTP being prepared for hydraulic testing. The massive rib reinforced casing and 102,000 lb bare weight illustrate the robust design and inherent safety of this 580 psi rated pump



Warman horizontal slurry pump models offer the most diverse designs for the toughest duties.

Warman pumps deliver exceptional performance

Warman horizontal slurry pumps are the world's most comprehensive range of centrifugal slurry pumps for use in mining, chemical and industrial applications. These horizontal slurry pumps are designed for ultra heavy duty applications such as mill discharge, process plant and tailings, high pressure pipelines, as well as other specialty applications.

Typical applications and Warman pump models most suitable for these applications are shown below. For special applications not listed, contact Weir Minerals North America or your local representative. Since particle size, concentration and abrasivity may affect your final selection, consult factory for final selection.



Warman horizontal pump model										
AH	Series MC	HTP	AHP AHPP	XU	MD	AHF LF MF	Series 1000	HH H HRM	L	GSL
page 4	page 5	page 6	page 7	page 8	page 9	page 10	page 11	page 12	page 13	page 14
wet crushers	■									
SAG mill discharge	■	■								
ball mill discharge	■	■						■	■	
Rod mill discharge	■	■					■	■	■	
Ni acid slurry	■	■					■		■	
coarse sand	■	■	■	■	■	■	■	■	■	
coarse tailings	■	■	■	■	■		■	■	■	
phosphate matrix	■	■	■	■	■				■	
minerals concentrate	■	■	■	■	■	■	■	■	■	
heavy media	■	■		■				■	■	
dredging	■	■		■	■					
bottom/fly ash, lime grinding	■	■	■	■	■		■	■	■	
oil sands	■	■	■	■	■	■	■	■	■	
mineral sands	■	■	■	■	■	■	■	■	■	
fine tailings	■		■	■	■	■	■	■	■	
phosphoric acid	■		■	■			■	■	■	
coal	■	■		■	■	■		■	■	
flotation	■			■		■	■		■	
sugar beets				■	■					
process chemical	■					■	■		■	
pulp and paper	■			■	■	■	■		■	
FGD	■			■			■		■	■
waste water				■			■	■	■	■

Warman AH

Heavy duty slurry pumps for a range of mill duties, from dirty water to the most difficult water flushed crusher services

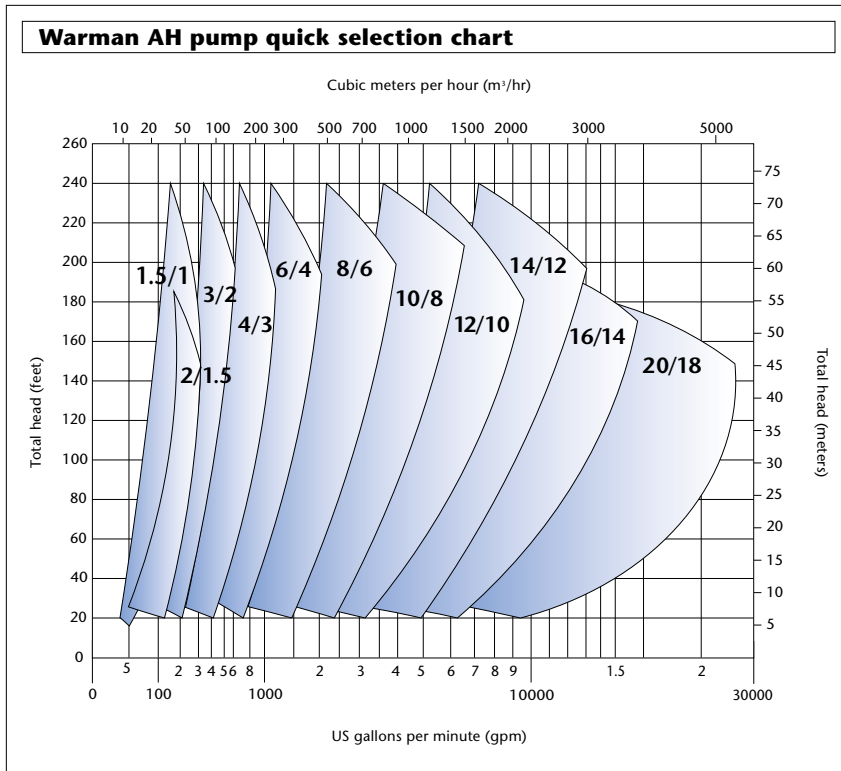
The Warman AH is the world's standard for the most difficult mill duties. A wide variety of impellers and shaft seals provide a perfect fit for a wide range of applications. The AH provides excellent wear life while maintaining efficiency during the wear cycle providing the best total operating cost. The Warman AH, together with the Warman series MC, provides a complete selection for most all duties in the mill. From cyclone feed to grind, flotation and tailings, the Warman AH is the best choice.

size range (discharge)
1" to 18" (25 mm to 450 mm)

capacities to
22,000 gpm (5,000 m³/hr)

heads to
240 ft (73 m)

pressures to
300 psi (2,020 kPa)



Note: High pressure designs, AHP and AHPP are available and shown on page 7.

- Heavy duty construction with through-bolt design provides ease of maintenance and less down time
- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Large diameter, slow turning, high efficiency impellers (89% on the GAM1414SHN1) result in maximum wear life and lower operating costs
- Large, open internal passages reduce internal velocities maximizing wear life resulting in lower operating costs
- Thick elastomer or alloy bolt-in liners provide superior corrosion resistance plus offer ease of liner change-out and intermixability to reduce over all maintenance costs and maximize wear life
- Minimal shaft/impeller overhang reduces shaft deflection and increases packing life
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- Grease or oil lubrication bearing assembly options offer ease of maintenance and reduced down time
- Optional dry running shaft seal reduces or eliminates flush water requirements
- Effective expeller prolongs packing life while reducing or eliminating flush water requirement



Warman AH

Warman Series MC

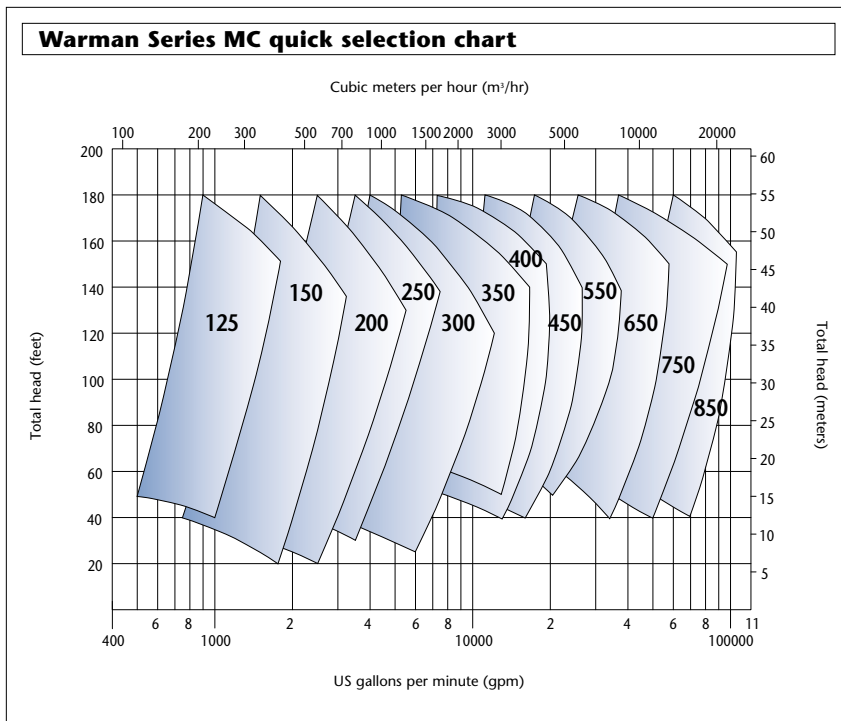
Severe duty lined pump designed for the most aggressive applications, such as mill circuit

The Warman MC is for the most aggressive wear applications. The MC pump easily manages large size particles in dense abrasive slurries and offers the right combination of ruggedness, durability, hydraulics and materials.

From the most difficult mill discharge to water flushed crusher, the Warman MC is the best choice.

When paired with the Warman AH, all the duties in your mill can be satisfied.

size range (discharge) 5" to 34" (125 mm to 850 mm)	capacities to 100,000 gpm (22,700 m ³ /hr)	heads to 180 ft (55 m)	pressures to 130 psi (900 kPa)
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- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Large diameter, slow turning, high efficiency impellers (up to 87%+) result in maximum wear life and lower operating costs
- Large, open internal passages reduce internal velocities maximizing wear life resulting in lower operating costs
- Unique, easily centered stuffing box (MCR/MCM/MCU) reduces gland seal maintenance and extends packing life
- Adjustable side liner maintains efficiency and extends service life (adjustable while running)
- Quick wet end exchange minimizes downtime
- Thick elastomer liners with alloy impellers provide superior wear life on the most difficult cyclone feed and screen feed services
- Interchangeable elastomer and alloy bolt-in liner offer ease of liner change-out and reduced maintenance costs
- Heavy duty construction with through-bolt design provides ease of maintenance and results in less down time
- Minimal shaft/impeller overhang reduces shaft deflection and increases packing life
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- Separate fully removable suction cover on 400MCR and larger facilitates access and replacement of the impeller, throatbush, and shaft sleeve without disturbing coverplate or discharge piping
- Left or right hand operation available



Warman Series MC

Warman HTP

Fully lined pump for severe multi-stage applications which offers numerous ease of maintenance features

The Warman HTP line represents the highest pressure-rated, large, lined pumps available with priority given to increased safety, wear life, and reliability.

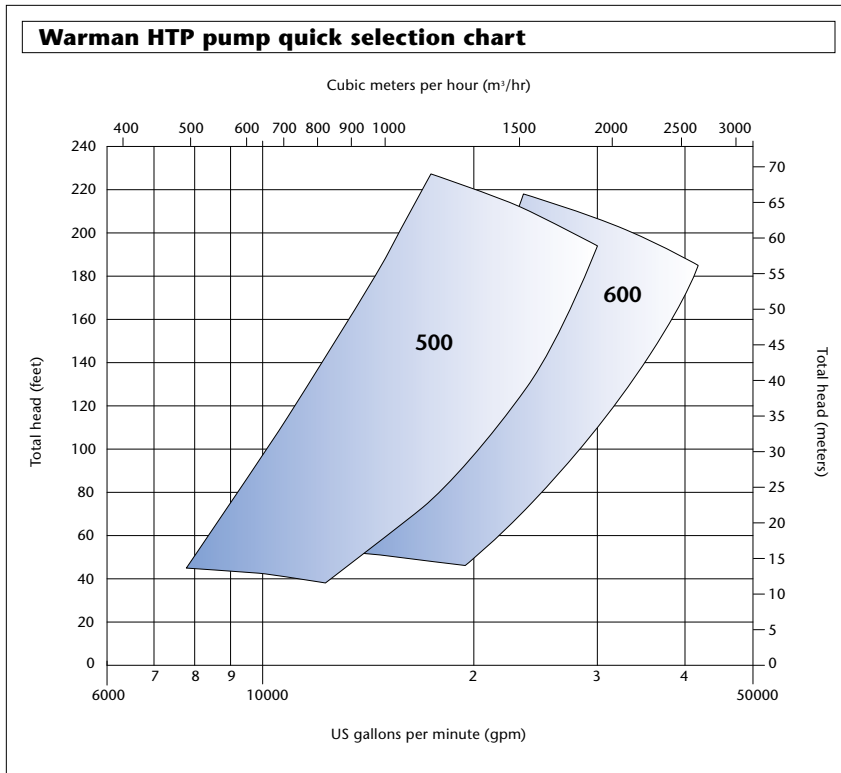
The HTP is rapidly establishing itself as the dominant pump in the Canadian oil sands, providing an efficient and durable solution to long distance hydrotransport and tailings duties.

size range (discharge)
20" to 24" (500 mm to 600 mm)

capacities to
40,000 gpm (9100 m³/hr)

heads to
220 ft (67 m)

pressures to
580 psi (4,000 kPa)



- Specifically designed hydraulics emphasize solid passing capability, head generation, wear life, and efficiency to deliver overall outstanding performance
- Multi-stage high pressure operation to 580 psi
- Major components designed with lifting points located with respect to center of gravity and specialized lifting tools enable rapid pump maintenance and turn arounds
- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Separate fully removable suction cover facilitates access and replacement of impeller, throatbush, and shaft sleeve without disturbing coverplate or discharge piping
- Unique, easily centered stuffing box reduces gland seal maintenance and extends packing life
- Grease or oil lubrication bearing assembly options offer ease of maintenance and reduced down time
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- Liner design reduces operating costs by allowing replacement of individual components
- Erosion and corrosion resistant elastomers or alloys are available to handle solids laden and/or corrosive slurries



Warman HTP

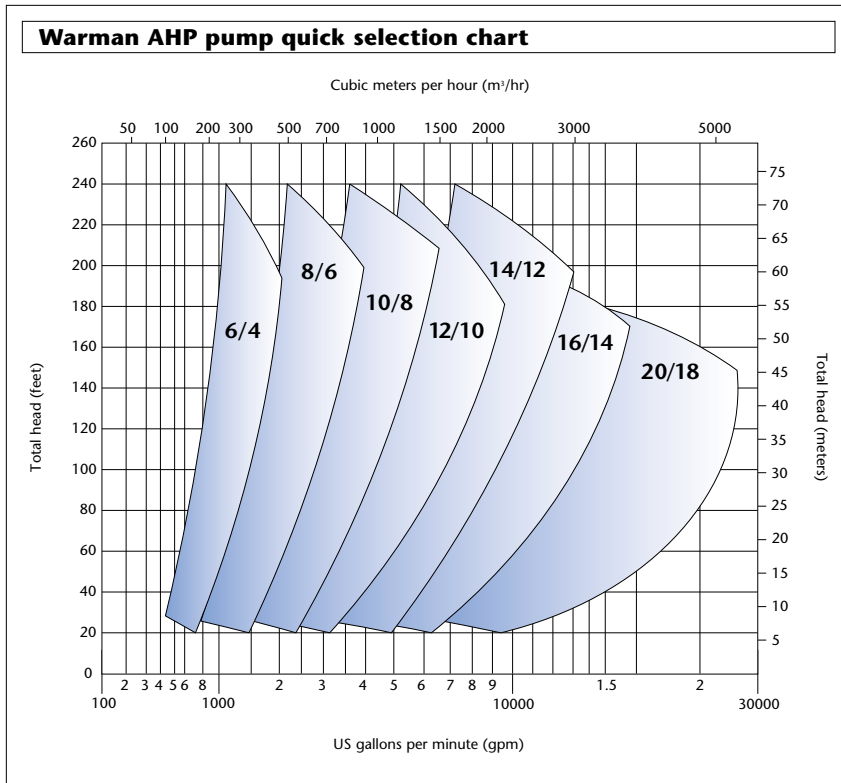
Warman AHP/AHPP

Fully lined high pressure pump for multi-stage applications

Built upon the popular Warman AH series pump, the Warman AHP/AHPP series high pressure pump offers the same features and benefits as the AH, including identical hydraulics at up to 1000 psi.

The higher pressure capability allows the user to operate several pumps in series all consolidated into one pump house saving the expense of supporting systems like gland water supply systems in the alternative design of several pump houses along the transport line.

size range (discharge) 4" to 18" (100 mm to 450 mm)	capacities to 22,000 gpm (5000 m ³ /hr)	heads to 240 ft (73 m)	pressures to 1,000 psi (6900 kPa)
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- Multi-stage high pressure operation to 1000 psi
- Heavy duty construction with through-bolt design provides ease of maintenance and less down time
- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Large diameter, slow turning, high efficiency impellers (89% on the GAM14145HN1) result in maximum wear life and lower operating costs
- Large, open internal passages reduce internal velocities maximizing wear life and lowering operating costs
- Thick elastomer or alloy bolt-in liners provide superior corrosion resistance plus offer ease of liner change-out and intermixability to reduce over all maintenance costs and maximize wear life
- Minimal shaft/impeller overhang reduces shaft deflection and increases packing life
- Grease or oil lubricated bearing options offer ease of maintenance and reduced down time
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life



Warman AHP

Warman XU

Heavy duty slurry pump

The Warman XU is Weir Mineral's most recently released all metal unlined pump range that integrates newly designed wet end wear components with the long proven Warman mechanical end. Casing, impeller and liner have been optimized to provide the lowest possible wear while delivering outstanding efficiency over a wide range of medium to heavy slurry applications such as coal and sand and gravel.

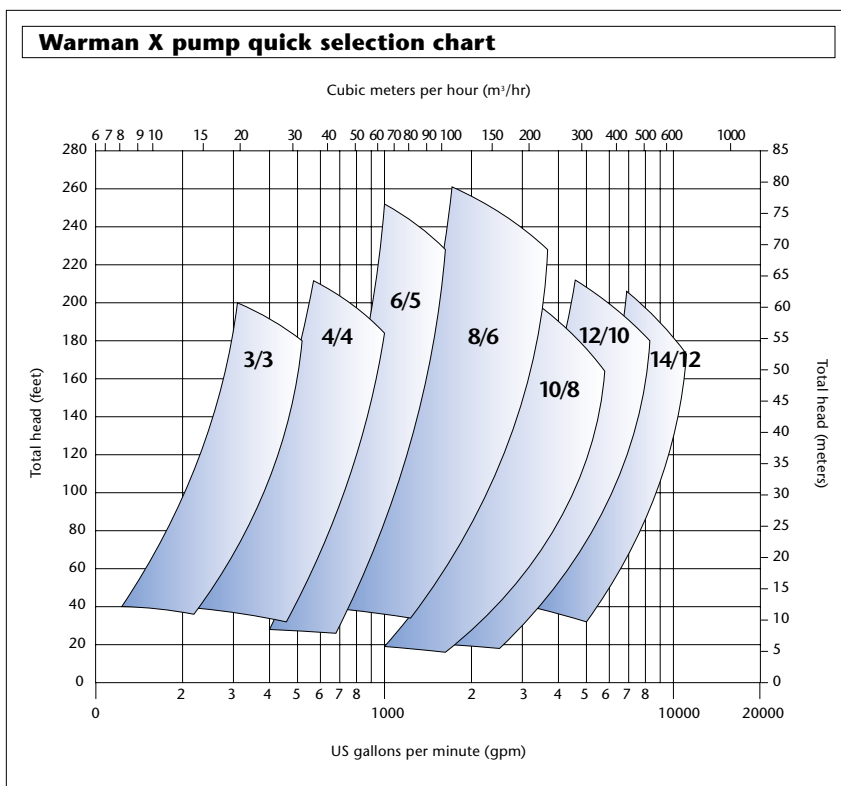
With many unique features, the XU is easy to maintain and offers the lowest cost of ownership in its class.

size range (discharge)
3" to 12" (75 mm to 300 mm)

capacities to
10,000 gpm (2275 m³/hr)

heads to
240 ft (73 m)

pressures to
150 psi (1,035 kPa)



- Configured volute casing distributes material at point of maximum wear to extend life when pumping large solids
- Low V cutwater design reduces slurry velocities and wear in the casing allowing operation over a wide range of flows
- Five vane, thick sectioned, high efficiency impellers offer maximum wear life and lower operating costs
- Patented impeller wear ring profile reduces wear on impeller and throatbush area by restricting recirculation
- Unique "tear drop" shaped frame plate liner insert insures any localized side wall wear occurs on liner and not on casing
- Wet end components constructed of abrasion resistant solid chrome iron providing excellent wear life in most slurry applications
- Multiple shaft sealing configurations are available to best suit application requirements and are easily converted from one to another without expensive mechanical end changes
- Compact cartridge-style bearing assemblies offer reduced shaft/impeller overhang and minimize shaft deflection resulting in increased packing life and the ability to accept a range of mechanical seals
- Exceptional dry gland sealing performance due to improved expeller/impeller ratios reduces flush water requirements and lowers operating costs
- Full and low flush gland sealing options allows precise matching of seal water consumption to application needs
- Grease or oil lubrication bearing assembly options offer ease of maintenance and reduced down time
- Quick release clamping collar design facilitates impeller removal
- Hydraulically interchangeable with long proven AH designs



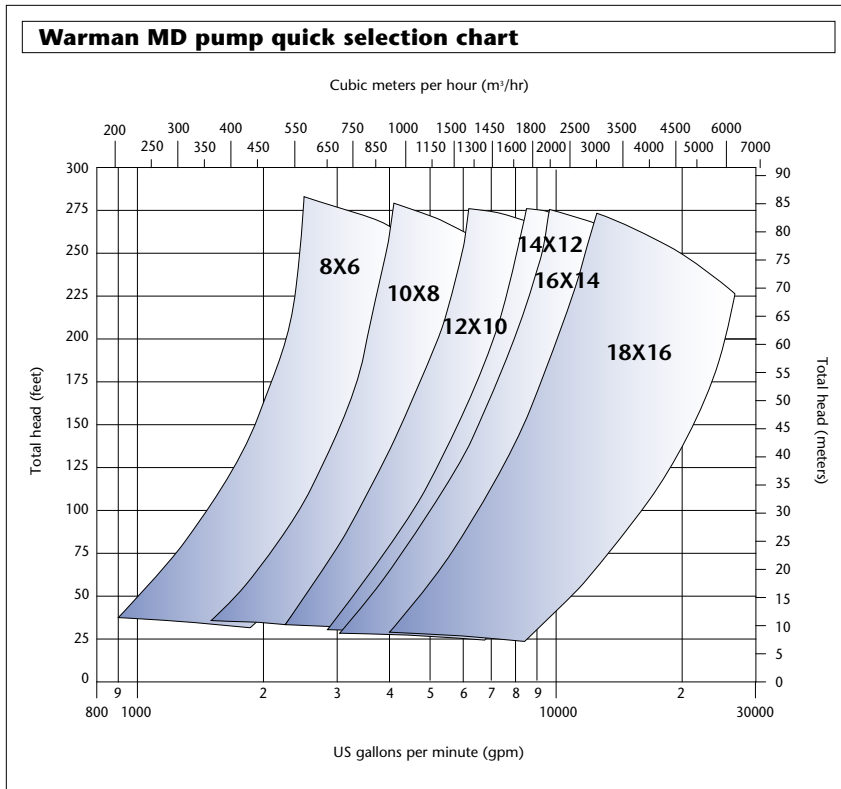
Warman XU

Warman MD

Heavy duty dredge pump

The Warman MD is a new product offering, designed specifically to meet the demands/rigors of contractor and aggregate dredging. Employing the latest design techniques these pumps will provide superior resistance to wear, increased efficiencies, increased ease of maintenance and enhance the overall production of your operation.

size range (discharge) 8/6 (150 mm) to 18/16 (400 mm)	capacities to 20,000 gpm (4,545 m ³ /hr)	heads to 275 ft (84 m)	pressures to 174 psi (1200 kPa)
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- Large diameter, slow turning, high efficiency impellers offer maximum wear life, lower operating costs and reduce the need for in line boosters
- Oversized internal passages provide enhanced sphere clearance resulting in increased production and reduced down time
- Left and right hand rotation available to simplify set up and operation with diesel engines
- Solid chrome iron or alternate wear resistant metallurgy to best suit application enabling long wear and ease of maintenance
- Heavy duty low profile mechanical ends conserve space and weight to assure easy integration of pump into ladders and confined hulls
- Compact cartridge-style bearing assemblies offer reduced shaft/impeller overhang and minimize shaft deflection resulting in increased packing life
- Unique, easily centered stuffing box reduces gland sealing maintenance and extends packing life
- Quick release clamping collar design facilitates impeller removal
- Top mounted adjusting screw for easy impeller adjustment
- Integrated gland seal guard minimizing risk of rotating elements
- Non shimming design of underwater bearing housing seals reduces set up time and increases reliability



Warman MD

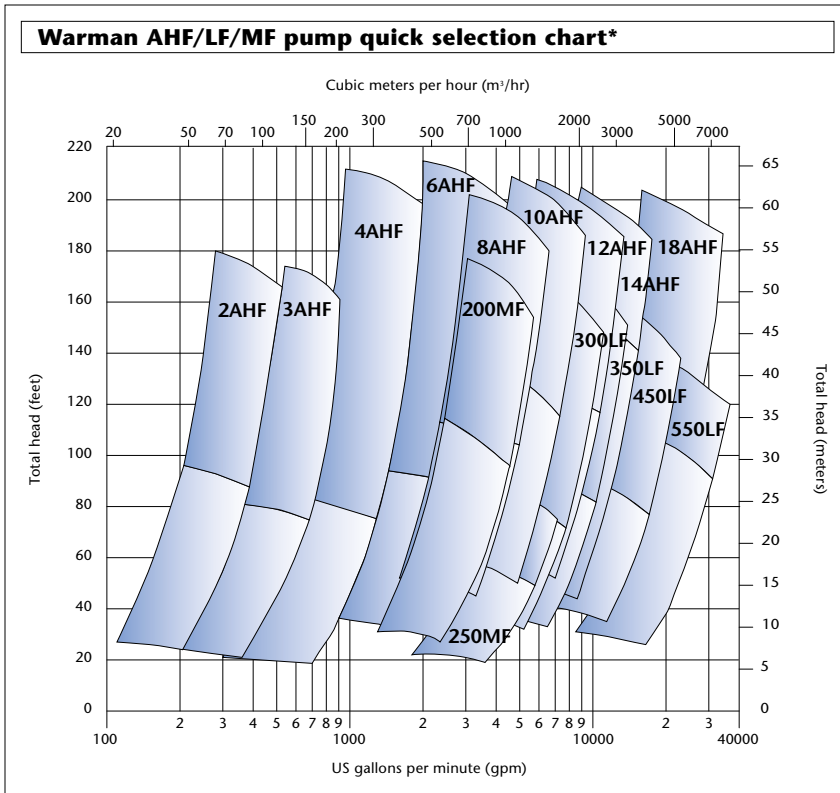
AHF/LF/MF

Heavy duty froth pump for tough flotation froth duties

Designed to handle heavy froth, the Warman Horizontal Froth pump has a unique inlet and impeller design that is very successful where others fail.

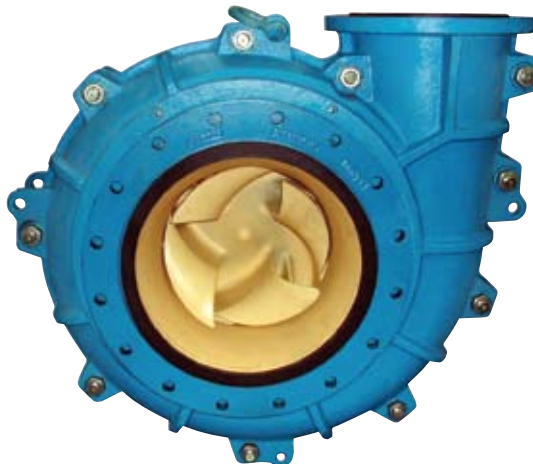
A large oversized inlet with a unique impeller inducer blade handles heavy froth and higher viscosity dense slurries with ease. The Warman AHF/LF/MF line of horizontal froth pumps has proven valuable for very dense slurries where viscosity starts to become a pumping issue for the standard slurry pump.

size range (discharge) 2" to 22" (50 mm to 550 mm)	capacities to 20,000 gpm (3,150 m ³ /hr)	heads to 120 ft (37 m)	pressures to 500 psi (3,445 kPa)
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*Lower light blue areas: recommended maximum operating range on aerated slurries

- Heavy duty construction with through-bolt design provides ease of maintenance and less down time
- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Large diameter, slow turning, high efficiency impellers maximize wear life and lower TOC
- Large, open internal passages reduce internal velocities maximizing wear life resulting in lower operating costs
- Unique impeller design for most difficult froth applications
- Thick elastomer or alloy bolt-in liners provide superior corrosion resistance plus offer ease of liner change-out and intermixability to reduce over all maintenance costs and maximize wear life
- Minimal shaft/impeller overhang reduces shaft deflection and increases packing life
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- Standard AH and L can be converted by replacing cover plate, throat bush and impeller
- Full flush, low flow or dry running centrifugal seals minimize water usage and operating costs



Warman AHF/LF/MF

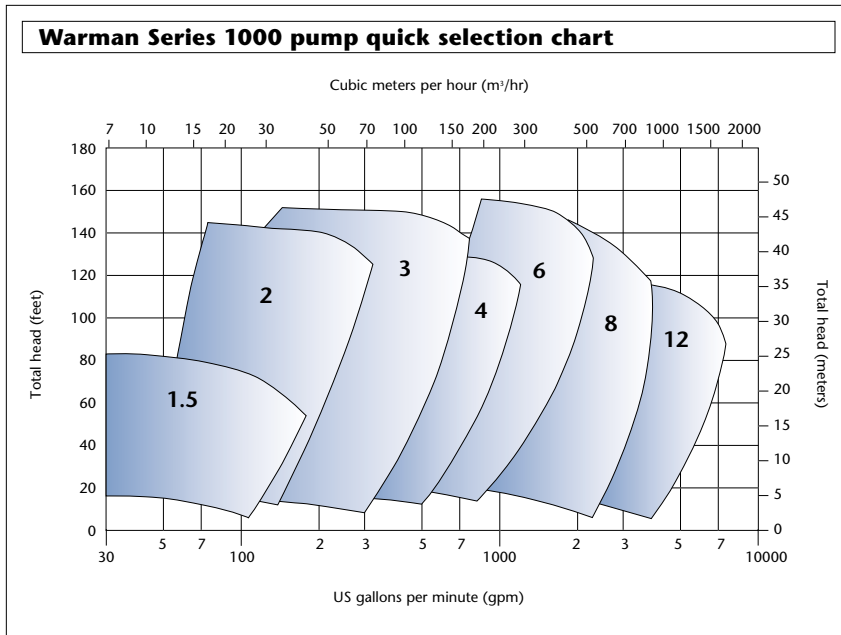
Warman 1000

General purpose slurry pump

Warman Series 1000 is a long proven horizontal end suction centrifugal pump that will reliably and economically handle abrasive and corrosive medium duty services.

Several unique features make the 1000 series ideal for handling stringy/fibrous slurries, low NPSHA applications and services that require minimum dilution due to gland seal water.

size range (discharge) 1.5" to 12" (40 mm to 300 mm)	capacities to 6,500 gpm (1,480 m ³ /hr)	heads to 140 ft (43 m)	pressures to 232 psi (1,600 kPa)
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- Heavy duty construction with through-bolt casing design provides ease of maintenance and results in less down time
- Erosion and corrosion resistant elastomers or metal alloy liners are available to handle solids laden and/or corrosive slurries
- Semi-open impeller easily passes large or stringy particles and is well suited for froth laden slurries.
- Unique impeller hydraulic design allows operation in systems with low NPSHA
- Cartridge-style bearing assemblies offer compact reliable design that reduces shaft/impeller overhang decreasing deflection for improved packing life and allows for easy rebuilds
- Multiple shaft sealing configurations are available to best suit application requirements including standard wet and dry glands as well as mechanical seals
- Effective expeller prolongs packing life while reducing or eliminating flush water requirement
- Casing drain plug allows for component wear inspection as well as draining slurry from the pump to prevent freezing or corrosion after flushing
- Grease or oil lubricated bearing assemblies offer ease of maintenance and reduce down time



Warman Series 1000

HH/H/HRM

Heavy duty high head lined slurry pump

The Warman HH/H/HRM pump lines were designed to produce high heads per stage at high pressures.

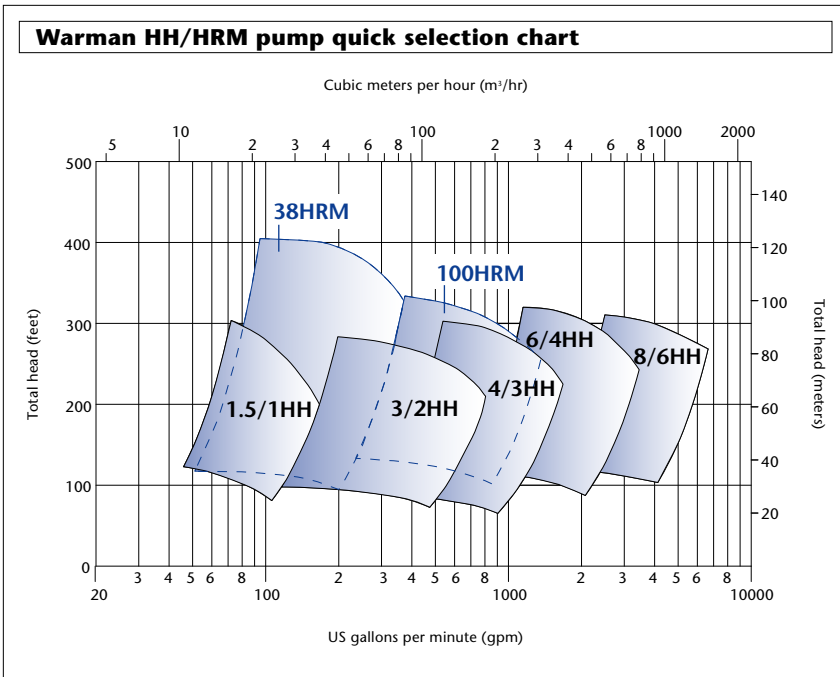
Commonly used for long distance transport lines, the HH/H/HRM lines can often satisfy application duties with a single pump where others require multiple pumps in series.

size range (discharge)
1.5" to 6" (25 mm to 150 mm)

capacities to
4500 gpm (1025 m³/hr)

heads to
325 ft (100 m)

pressures to
750 psi (5170 kPa)



- Ductile iron fully lined casing provides durability, strength and long service life
- Multi-stage high pressure operation to 750 psi (H to 1000 psi)
- Heavy duty construction with through-bolt design provides ease of maintenance and results in less down time
- Large diameter, slow turning, high efficiency impellers result in maximum wear life and lower operating costs
- Large, open internal passages maximize wear life and lower operating costs
- Thick elastomer HRM and alloy liners provide superior corrosion resistance and maximum wear life
- Full flush gland, low flow, and dry running centrifugal seals reduce flush water usage minimizing pump operating costs



Warman HH/HRM

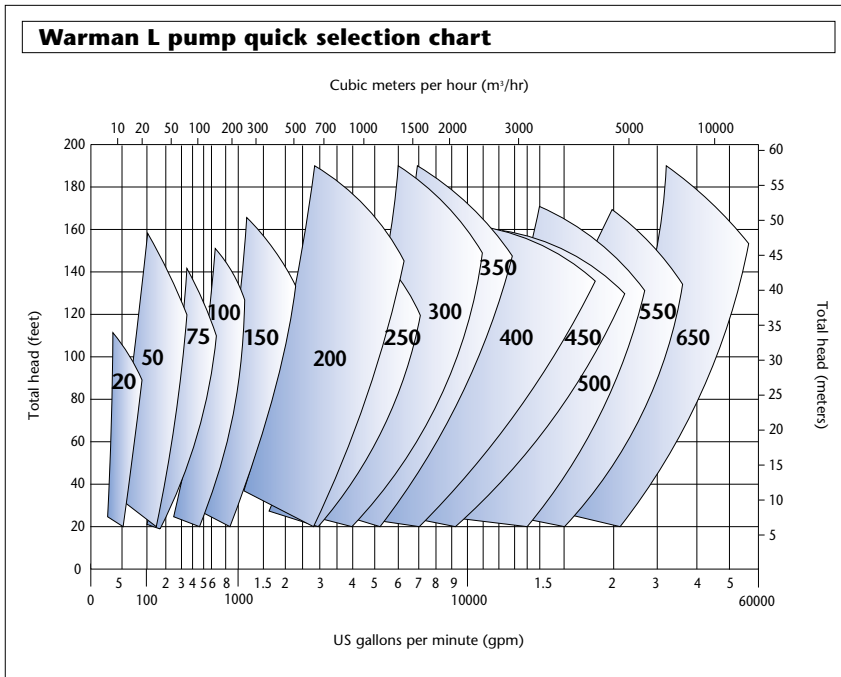
Warman L

Rugged heavy duty slurry pump for medium to lower heads

Warman L series incorporates the same design points of the Warman AH plus higher efficiency impellers at an attractive initial cost.

Designed for rugged duties while offering higher efficiencies, the Warman L series is a combination of the proven Warman AH unique features. The Warman L series provides the widest range of hydraulics from the 3/4" to a 26" discharge pumps. The 3/4" is perfect for the laboratory or in demonstration plants.

size range (discharge) .75" to 26" (20 mm to 650 mm)	capacities to 45,000 gpm (10,225 m ³ /hr)	heads to 180 ft (55 m)	pressures to 250 psi (1,725 kPa)
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- Heavy duty construction with through-bolt design provides ease of maintenance and results in less down time
- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Large diameter, slow turning, high efficiency impellers (up to 90%+) result in maximum wear life and lower operating costs
- Large, open internal passages reduce internal velocities maximizing wear life resulting in lower operating costs
- Thick elastomer or alloy bolt-in liners provide superior corrosion resistance plus offer ease of liner change-out and intermixability to reduce over all maintenance costs and maximize wear life
- Designed for rugged duties while offering higher efficiencies
- Minimal shaft/impeller overhang reduces shaft deflection and increases packing life
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- Grease or oil lubrication bearing assembly options offer ease of maintenance and reduced down time
- Full flush gland, low flow, and dry running centrifugal seals reduce flush water usage minimizing pump operating costs
- Mechanical seals reduce flush water usage minimizing pump operating costs



Warman L

Warman GSL

Gas scrubber pumps

Since the introduction of the first Flue Gas Desulfurization (FGD) systems in the 1970s, Weir Minerals has led the world in the supply of more than 4,000 specially designed FGD pumps.

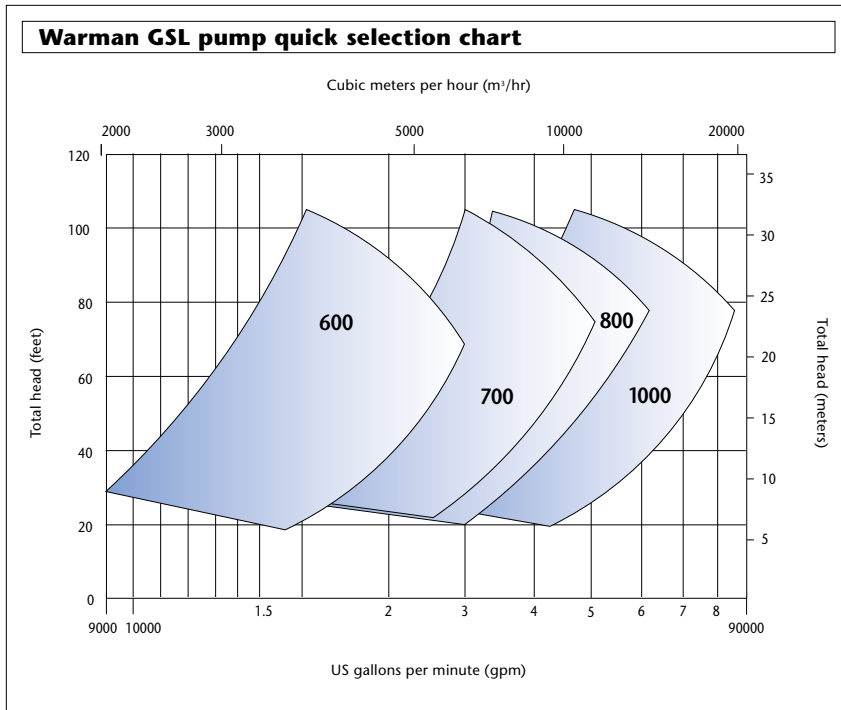
Realizing that modern absorber technology would require new and innovative pump designs, Weir Minerals developed the new high performance Warman GSL pump.

size range (discharge)
24" to 40" (600 mm to 1000 mm)

capacities to
80,000 gpm (18,180 m³/hr)

heads to
105 ft (32 m)

pressures to
125 psi (860 kPa)



- Ductile iron fully lined casing provides durability, strength, safety, and long service life
- Cartridge-style bearing assembly allows for maintenance in a clean environment without removal of the pump, resulting in reliable operation and prolonged bearing life
- High efficiency design (92%+) minimizes energy consumption and reduces operating costs
- Liner design reduces operating costs by allowing replacement of individual components
- Back pull design affords easy maintenance
- Mechanical seals reduce flush water usage minimizing pump operating costs
- GSL design provides the newest technological development incorporating the features of the Warman L pump, latest material development, hydraulic design improvements and modern manufacturing methods



Warman GSL

WARMAN® Centrifugal Slurry Pumps
GEHO® Positive Displacement Slurry Pumps
VULCO® Wear Resistant Linings
CAVEX® Hydrocyclones
FLOWAY® PUMPS Vertical Turbine Pumps
ISOGATE® Slurry Valves
MULTIFLO® Mine Dewatering Pumps
HAZLETON® Specialty Slurry Pumps
LEWIS PUMPS™ Vertical Chemical Pumps
BEGEMANN PUMPS™ Centrifugal Process Pumps



For further information on Weir Minerals products or services, contact the nearest sales office or visit www.weirminerals.com

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