

140 • 240 • 180 • 280 Series

# Regenerative Turbine Pumps



- Capacities to 55 GPM
- Heads to 700 Feet



**MTH PUMPS**

# 140 • 240 • 180 • 280 Series Regenerative Turbine Pump

**MTH 140 • 240 • 180 • 280 Series** regenerative turbine pumps represent the most economical, high performance alternative for low flow (to 55 GPM) applications involving moderate to high pressures (heads to 700 feet). By combining years of regenerative turbine pump designs with precision computer controlled manufacturing, the 140 • 240 • 180 • 280 Series delivers high efficiency pumping operation, even at low NPSH. High quality parts and an easily serviceable design provide low maintenance and long life.

## WATER PASSAGE DESIGN

MTH has combined sixty years of water passage design with a multistage mechanical concept to achieve maximum capacity and pressure while minimizing horsepower requirements. By optimizing the number of pumping stages with each water passageway, MTH improves both efficiency and pressure in the 140 • 240 • 180 • 280 Series, exceeding the standards realized by previous techniques.

## IMPELLER PROFILE

One of the most notable improvements in regenerative turbine pump technology incorporated in 140 • 240 • 180 • 280 Series pumps involves the ability to determine the optimum impeller width and blade length. These factors have a significant effect on the required horsepower versus pressure curve for regenerative turbine pumps. By optimizing these for each 140 • 240 • 180 • 280 Series pump, peak efficiency is improved and "off peak" horsepower requirements are reduced as well.

## IMPELLER BLADES

After the most favorable impeller profile has been determined for a particular water passageway cross-section, MTH calculates the number of blades needed to maximize the performance of that pump. Current blade design in 140 • 240 • 180 • 280 Series pumps increases both efficiency and design pressure without the manufacturing difficulties associated with producing contoured blade impellers.

State-of-the-art computer controlled machines simplify manufacturing of the various MTH impellers utilized in the 140 • 240 • 180 • 280 Series. The result is a high performance pump providing efficiency characteristics exceeding those of more expensive units.

## NPSH REQUIREMENTS

140 • 240 • 180 • 280 Series regenerative turbine pumps meet low net positive suction head (NPSH) requirements without efficiency loss. This is achieved by keeping the inlet fluid velocity low and then gently accelerating to passageway velocities.

## LOW NPSH REQUIREMENTS

240 • 280 Series regenerative turbine pumps provide exceptionally low NPSH requirements to suit boiler feed water deaerator applications.

This reduced NPSH is obtained by using a first stage centrifugal Francis vane impeller with inlet flow paths shaped to maintain a constant fluid velocity. This reduces entry losses to the impeller as well as maintaining pump efficiency. A multi-vane diffuser is used in conjunction with the centrifugal impeller for balancing radial loads and extracting the maximum pressure from the flow produced by the first stage impeller. Pressure and flow produced by the low NPSH inducer assures that the succeeding stages are adequately fed.

## STANDARD MATERIALS

PART	BRONZE FITTED	ALL IRON	BRONZE RING	ALL BRONZE	316 STAINLESS STEEL
Cover	Cast Iron ASTM A48	Cast Iron ASTM A48	Cast Iron ASTM A48	Bronze ASTM B62	Stainless Steel AISI 316
Seal Cup	Cast Iron ASTM A48	Cast Iron ASTM A48	Cast Iron ASTM A48	Bronze ASTM B62	Stainless Steel AISI 316
Bearing Arm	Cast Iron ASTM A48	Cast Iron ASTM A48	Cast Iron ASTM A48	Bronze ASTM B62	Stainless Steel AISI 316
Channel Ring	Cast Iron ASTM A48	Cast Iron ASTM A48	Bronze ASTM B62	Bronze ASTM B62	Stainless Steel AISI 316
Impeller	Bronze ASTM B62	Carbon Steel	Bronze ASTM B62	Bronze ASTM B62	Stainless Steel Waukesha 88
Shaft	Stainless Steel AISI 416	Stainless Steel AISI 416	Stainless Steel AISI 416	Stainless Steel AISI 316	Stainless Steel AISI 316
"O" Rings	Buna N	Buna N	Buna N	Buna N	Viton A
Seals	EPR/Ceramic	EPR/Ni-Resist	EPR/Ceramic	Buna/Ceramic	Viton/Ceramic
Ball Bearing	#204	#204	#204	#204	#204

## LIMITATIONS

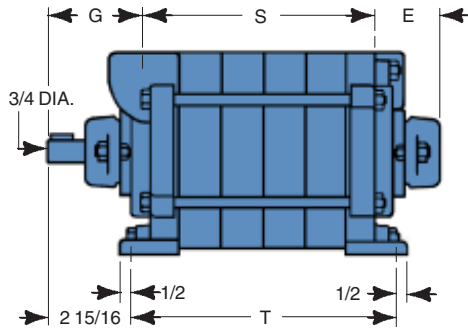
Discharge Pressure	400 PSI
Seal Pressure*	200 PSI
Suction Pressure (Min)	26" Hg. Vac.
Speed	1750 RPM
Horsepower	15 HP

### Temperature

Standard Construction	-20° F
Ceramic Seal Seat - Water	+230° F
Ni-Resist Seal Seat - Water	+230° F
Silicon Carbide Seal Seat & External Seal Flush	+250° F

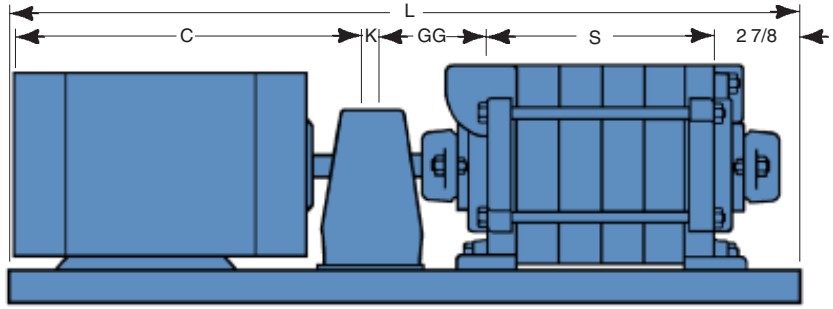
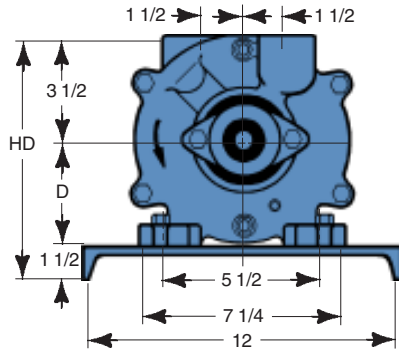
\* Suction Pressure Plus a Percentage of Differential Pressure

# Dimensions



## PUMP ONLY

PUMP SERIES	INLET	DISCHARGE	E	G	S	T
141	1 1/4	1 1/4	2 1/8	3 13/16	4 1/4	6
142	1 1/4	1 1/4	2 1/8	3 13/16	6 1/4	8
143	1 1/4	1 1/4	2 1/8	3 13/16	8 1/4	10
144	1 1/4	1 1/4	2 1/8	3 13/16	10 1/4	12
181	1 1/2	1 1/2	2 1/4	3 11/16	5 1/2	7
182	1 1/2	1 1/2	2 1/4	3 11/16	8 1/2	10
183	1 1/2	1 1/2	2 1/4	3 11/16	11 1/2	13
184	1 1/2	1 1/2	2 1/4	3 11/16	14 1/2	16



## 140 SERIES

ALL 140 MODELS						MODEL 141			MODEL 142			MODEL 143			MODEL 144		
FRAME	CPLG	K	D	HD	C	S	GG	L	S	GG	L	S	GG	L	S	GG	L
56	3J	3/8	3 1/2	8 1/2	12	4 1/4	3 13/16	24	6 1/4	3 13/16	26	8 1/4	3 13/16	28	10 1/4	3 13/16	30
143T	4J	5/8	3 1/2	8 1/2	13	4 1/4	3 13/16	24	6 1/4	3 13/16	26	8 1/4	3 13/16	28	10 1/4	3 13/16	30
145T	4J	5/8	3 1/2	8 1/2	14	4 1/4	3 13/16	24	6 1/4	3 13/16	26	8 1/4	3 13/16	28	10 1/4	3 13/16	30
182T	5J	3/4	4 1/2	9 1/2	16	4 1/4	3 13/16	26	6 1/4	3 13/16	30	8 1/4	3 13/16	32	10 1/4	3 13/16	35
184T	5J	3/4	4 1/2	9 1/2	17	---	---	---	6 1/4	3 13/16	30	8 1/4	3 13/16	32	10 1/4	3 13/16	35
213T	6J	7/8	5 1/4	10 1/4	19	---	---	---	---	---	---	8 1/4	---	35	10 1/4	3 13/16	40
215T	6J	7/8	5 1/4	10 1/4	20	---	---	---	---	---	---	---	---	---	10 1/4	3 13/16	40

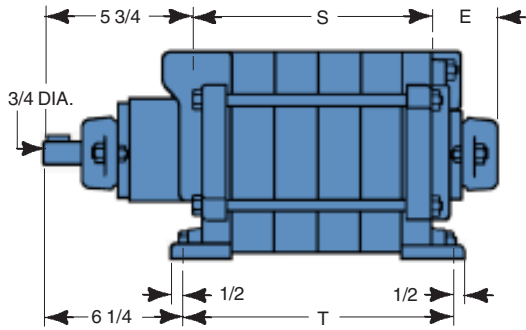
## 180 SERIES

ALL 180 MODELS						MODEL 181			MODEL 182			MODEL 183			MODEL 184		
FRAME	CPLG	K	D	HD	C	S	GG	L	S	GG	L	S	GG	L	S	GG	L
56	3J	3/8	3 1/2	8 1/2	12	5 1/2	3 11/16	26	8 1/2	3 11/16	28	11 1/2	3 11/16	30	14 1/2	3 11/16	35
143T	4J	5/8	3 1/2	8 1/2	13	5 1/2	3 11/16	26	8 1/2	3 11/16	28	11 1/2	3 11/16	30	14 1/2	3 11/16	35
145T	4J	5/8	3 1/2	8 1/2	14	5 1/2	3 11/16	26	8 1/2	3 11/16	28	11 1/2	3 11/16	30	14 1/2	3 11/16	35
182T	5J	3/4	4 1/2	9 1/2	16	5 1/2	3 11/16	28	8 1/2	3 11/16	30	11 1/2	3 11/16	32	14 1/2	3 11/16	40
184T	5J	3/4	4 1/2	9 1/2	17	5 1/2	3 11/16	28	8 1/2	3 11/16	30	11 1/2	3 11/16	32	14 1/2	3 11/16	40
213T	6J	7/8	5 1/4	10 1/4	19	---	---	---	8 1/2	3 11/16	35	11 1/2	3 11/16	40	14 1/2	3 11/16	45
215T	6J	7/8	5 1/4	10 1/4	20	---	---	---	8 1/2	3 11/16	35	11 1/2	3 11/16	40	14 1/2	3 11/16	45

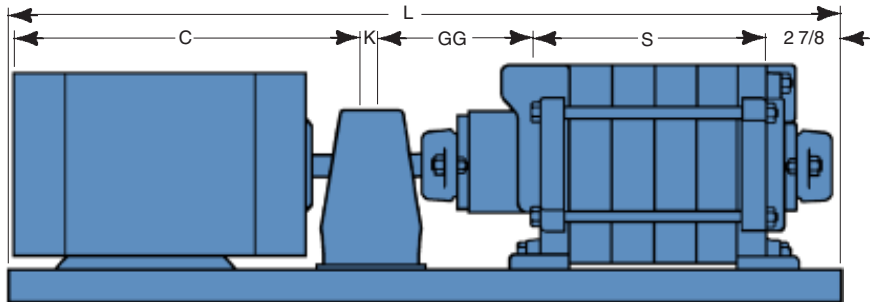
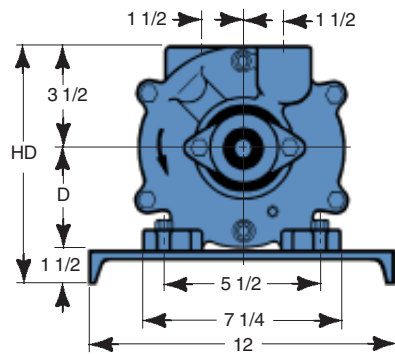
All dimensions in inches. May vary ± 1/4 inches.

# Dimensions

## PUMP ONLY



PUMP SERIES	INLET	DISCHARGE	E	S	T
241	1 1/2	1 1/4	2 1/8	5 5/8	6
242	1 1/2	1 1/4	2 1/8	7 5/8	8
243	1 1/2	1 1/4	2 1/8	9 5/8	10
244	1 1/2	1 1/4	2 1/8	11 5/8	12
281	1 1/2	1 1/2	2 1/4	6 5/8	7
282	1 1/2	1 1/2	2 1/4	9 5/8	10
283	1 1/2	1 1/2	2 1/4	12 5/8	13
284	1 1/2	1 1/2	2 1/4	15 5/8	16



### 240 SERIES

ALL 240 MODELS						MODEL 241			MODEL 242			MODEL 243			MODEL 244		
FRAME	CPLG	K	D	HD	C	S	GG	L	S	GG	L	S	GG	L	S	GG	L
56	3J	3/8	3 1/2	8 1/2	12	5 5/8	5 3/4	28	7 5/8	5 3/4	30	9 5/8	5 3/4	32	11 5/8	5 3/4	35
143T	4J	5/8	3 1/2	8 1/2	13	5 5/8	5 3/4	28	7 5/8	5 3/4	30	9 5/8	5 3/4	32	11 5/8	5 3/4	35
145T	4J	5/8	3 1/2	8 1/2	14	5 5/8	5 3/4	28	7 5/8	5 3/4	30	9 5/8	5 3/4	32	11 5/8	5 3/4	35
182T	5J	3/4	4 1/2	9 1/2	16	5 5/8	5 3/4	30	7 5/8	5 3/4	32	9 5/8	5 3/4	35	11 5/8	5 3/4	38
184T	5J	3/4	4 1/2	9 1/2	17	5 5/8	5 3/4	30	7 5/8	5 3/4	32	9 5/8	5 3/4	35	11 5/8	5 3/4	38
213T	6J	7/8	5 1/4	10 1/4	19	---	---	---	---	---	---	9 5/8	5 3/4	40	11 5/8	5 3/4	40
215T	6J	7/8	5 1/4	10 1/4	20	---	---	---	---	---	---	9 5/8	5 3/4	40	11 5/8	5 3/4	40

### 280 SERIES

ALL 280 MODELS						MODEL 281			MODEL 282			MODEL 283			MODEL 284		
FRAME	CPLG	K	D	HD	C	S	GG	L	S	GG	L	S	GG	L	S	GG	L
56	3J	3/8	3 1/2	8 1/2	12	6 5/8	5 3/4	28	9 5/8	5 3/4	32	12 5/8	5 3/4	35	15 5/8	5 3/4	38
143T	4J	5/8	3 1/2	8 1/2	13	6 5/8	5 3/4	28	9 5/8	5 3/4	32	12 5/8	5 3/4	35	15 5/8	5 3/4	38
145T	4J	5/8	3 1/2	8 1/2	14	6 5/8	5 3/4	28	9 5/8	5 3/4	32	12 5/8	5 3/4	35	15 5/8	5 3/4	38
182T	5J	3/4	4 1/2	9 1/2	16	6 5/8	5 3/4	30	9 5/8	5 3/4	35	12 5/8	5 3/4	38	15 5/8	5 3/4	40
184T	5J	3/4	4 1/2	9 1/2	17	6 5/8	5 3/4	30	9 5/8	5 3/4	35	12 5/8	5 3/4	38	15 5/8	5 3/4	40
213T	6J	7/8	5 1/4	10 1/4	19	---	---	---	---	---	---	12 5/8	5 3/4	40	15 5/8	5 3/4	42
215T	6J	7/8	5 1/4	10 1/4	20	---	---	---	---	---	---	12 5/8	5 3/4	40	15 5/8	5 3/4	42

All dimensions in inches. May vary ± 1/4 inches.

## Design Features

**Steep Head/Capacity Curve.** Pumping capacity varies only slightly as pressure changes. Steep pressure characteristic overcomes temporary line resistances.

**Self Adjusting Impeller.** 140/180 Series impellers utilize balancing holes to promote hydraulic self-centering and to eliminate the need for external adjustment. The impeller exerts no thrust load on the bearings, thereby extending service life.

**400# Case Working Pressure.** Rigid structure is designed for maximum casing strength.

**100% Tested.** Every pump is fully tested to verify performance prior to shipment.

**Volitile Fluid Handling.** The turbine impeller handles vapors up to 20% by volume, minimizing the possibility of vapor lock.

**Mechanical Seals.** Bronze fitted pumps have EPR rubber, high temperature carbon and ceramic seats for best hot water service. Optional seats and materials are available.

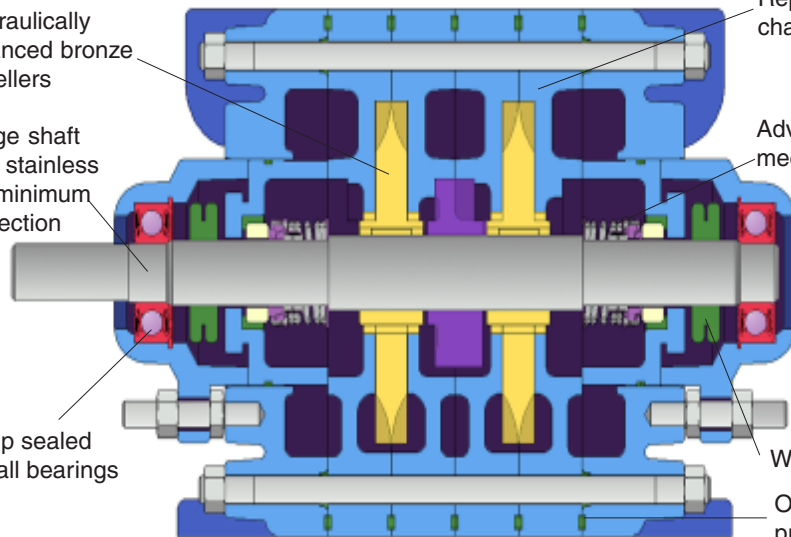
**"O" Ring Gaskets.** "O" ring seals are used throughout the 140/180 Series pumps to assure positive sealing.

**Shaft.** Pump shaft is high strength 416 stainless steel material.

Hydraulically balanced bronze impellers

Large shaft 416 stainless for minimum deflection

Lip sealed ball bearings



Replaceable channel rings

Advanced design mechanical seals

Water flinger

O-ring gaskets prevent leakage

**Bearings.** Heavy duty sealed ball bearings on inboard and outboard ends of the shaft are permanently lubricated for maintenance free service.

**Water Flingers.** Water flingers provide added protection to ball bearings in the event of seal leakage.

**Best Efficiency.** New pump designs optimize efficiency for each size available.

**Non-Cavitating.** 140/180 Series pumps may be operated under adverse inlet conditions without audible or measurable cavitation.

**Low NPSH.** New inlet design provides superior fluid handling ability with low head inlet condition.

## Optional Features

**Construction Materials.** Bronze fitted, all iron, all bronze and 316 stainless steel are available as stock materials.

**"O" Ring Gaskets.** Buna, EPR, viton, neoprene or teflon are all available.

**Mechanical Seals.** Buna, EPR, viton, Neoprene or teflon elastomers, tungsten or silicone carbide seats and balanced or double seal arrangements are all available.

**Flush Line.** External flush line from pump discharge to seal faces.

**Water Seal Connection.** Tapped openings can be provided for seal flushing from an external source.

## 200 Series Inducer for Low NPSH



The 200 Series inducer style pumps are ideally suited to applications where available NPSH at the pump inlet is limited, such as boiler feed water deaerator service.

A centrifugal impeller with low NPSH characteristics is utilized as the pump's first stage impeller, accounting for the lower inlet head requirement.

This first stage impeller is used in

conjunction with a multi-vane diffuser to provide the NPSH required by the second stage regenerative turbine.

Available NPSH as low as one foot can be effectively handled with 240 • 280 Series pumps, depending on the pump model and capacity.

# Selection Chart

HEAD IN FEET	U.S. GALLONS PER MINUTE											
	4	5	6	8	10	12	15	20	25	30	40	50
	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP	Model HP
25	*	*	*	141D .5	141E .5	141F .5	141G .5	141H .75	141I .75	141IA 1	181M 1.5	181P 1.5
50	*	*	141D .5	141E .5	141F .5	141G .5	141H .75	141I 1	141IA 1	181M 1.5	181P 1.5	181R 2
75	*	*	141D .5	141E .5	141F .75	142F .75	141H 1	141I 1	141IA 1.5	181M 2	181R 3	182R 5
100	*	141D .5	141E .5	141F .75	142F .75	141H 1	141I 1	141IA 1.5	182K 2	181P 2	182P 3	183R 5
125	141D .75	141E .75	141E .75	141G 1	142F 1	142G 1.5	142H 1.5	142I 2	182K 2	182M 3	182P 3	183R 5
150	141E .75	141E .75	142D 1	143E 1	142G 1.5	143G 1.5	142H 2	143I 3	142IA 3	182M 5	182R 5	184R 7.5
175	141E 1	142D 1	142E 1	142F 1.5	142G 1.5	142H 2	142I 2	182K 3	143IA 3	182P 5	183P 5	**
200	141E 1	142D 1	142E 1	142F 1.5	143F 1.5	142H 2	142I 3	142IA 3	183K 3	183M 5	183R 7.5	**
225	142D 1.5	143D 1.5	142E 1.5	142F 1.5	143G 2	143H 3	142I 3	142IA 3	143IA 5	183P 5	184P 7.5	**
250	142D 1.5	143D 1.5	142E 1.5	143F 2	143G 2	143H 3	143I 3	143IA 5	144IA 5	183P 5	184R 10	**
300	143D 1.5	142E 1.5	143E 1.5	143F 2	143H 3	142I 3	143I 5	143IA 5	183P 7.5	184P 7.5	**	**
350	144D 2	144D 2	143E 2	144F 3	144H 5	144H 5	143I 5	144IA 5	184M 7.5	184P 7.5	**	**
400	144D 2	143E 2	144E 2	144G 3	144H 5	143I 5	144I 5	144IA 5	184P 7.5	Selections based on coldwater flooded suction 1.0 S.G. Open Dripproof Motor. Consult individual pump curve for final selection.		
450	144D 2	143E 2	144E 2	144G 3	143I 5	144I 5	183K 7.5	184P 10	184R 15	*Refer to T41 Series Bulletin.		
500	144D 3	144E 3	144F 3	143I 7.5	143I 7.5	144I 7.5	144IA 7.5	**	**			

140 • 240 • 180 • 280 SERIES

## Engineering Specifications

### 140 • 180 Series

The contractor shall furnish (and install as shown on the plans) an MTH Turboflex regenerative type pump model \_\_\_\_\_ size \_\_\_\_\_ of (BRONZE FITTED) (BRONZE RING) (ALL IRON) (ALL BRONZE) (316 STAINLESS STEEL) construction. Each pump shall have a capacity of \_\_\_\_\_ GPM when operating at a total head of \_\_\_\_\_ feet at the specified temperature, viscosity, specific gravity, and with \_\_\_\_\_ feet NPSHA. The maximum speed shall not exceed 1750 RPM. Pump shall be of the vertically split case design with removable bearing housings and is to be furnished with mechanical seals. The channel rings shall be replaceable external type. The suction connection shall be \_\_\_\_\_" NPT located in the top vertical position and be cast separately from the discharge. The discharge shall be \_\_\_\_\_" NPT in the top vertical position and the pump shall be self-venting. The impeller(s) shall be located on a stainless steel shaft between sealed grease lubricated ball bearings. The impeller(s) shall be hydraulically self positioning with no external adjustment necessary. Each pump shall be tested at the specified capacity and head prior to shipment.

The pump shall be mounted on a steel baseplate, flexibly coupled with aluminum guard to a \_\_\_\_\_ HP \_\_\_\_\_ phase \_\_\_\_\_ Hertz \_\_\_\_\_ volt \_\_\_\_\_ RPM horizontal (DRIP-PROOF) (TOTALY ENCLOSED) (EXPLOSION PROOF) motor. The motor is to be sized to prevent overloading at the highest head condition listed in the specification.

### 240 • 280 Series

The contractor shall furnish (and install as shown on the plans) an MTH Turboflex low NPSH inducer style regenerative type pump model \_\_\_\_\_ size \_\_\_\_\_ of (BRONZE FITTED) (BRONZE RING) (ALL IRON) (ALL BRONZE) (316 STAINLESS STEEL) construction. Each pump shall have a capacity of \_\_\_\_\_ GPM when operating at a total head of \_\_\_\_\_ feet at the specified temperature, viscosity, specific gravity, and with \_\_\_\_\_ feet NPSHA. The maximum speed shall not exceed 1750 RPM. Pump shall be low NPSHR inducer style design with a centrifugal Francis vane design impeller and a multi-vane diffuser for balancing radial loads. Pump shall be of the vertically split case design with removable bearing housings and is to be furnished with

mechanical seals. The channel rings shall be replaceable external type. The suction connection shall be \_\_\_\_\_" NPT located in the top vertical position and be cast separately from the discharge. The discharge shall be \_\_\_\_\_" NPT in the top vertical position and the pump shall be self-venting. The impeller(s) shall be located on a stainless steel shaft between sealed grease lubricated ball bearings. The impeller(s) shall be hydraulically self positioning with no external adjustment necessary. Each pump shall be tested at the specified capacity and head prior to shipment. The pump shall be mounted on a steel baseplate, flexibly coupled with aluminum guard to a \_\_\_\_\_ HP \_\_\_\_\_ phase \_\_\_\_\_ Hertz \_\_\_\_\_ volt \_\_\_\_\_ RPM horizontal (DRIP-PROOF) (TOTALY ENCLOSED) (EXPLOSION PROOF) motor. The motor is to be sized to prevent overloading at the highest head condition listed in the specification.



# MTH PUMPS

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