GRUNDFOS **PRODUCT GUIDE**

MTR(E), MTC, MTA

Immersible pumps
60 Hz

BE › THINK › INNOVATE ›

GRUNDFOS

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Mission

It is our mission — the basis of our existence — to successfully develop, produce and sell high-quality pumps and pumping systems world-wide, contributing to a better quality of life and a healthy environment

Bjerringbro, Denmark

Fresno, California

Olathe, Kansas

Monterrey, Mexico

Allentown, Pennsylvania

Oakville, Ontario

- World's leading pump company
- World's largest manufacturer of circulator pumps, covering more than 50 % of the global market
- World headquarters in Denmark
- North American headquarters in Kansas City - Manufacturing in Fresno, California
- 80 companies in 45 countries
- More than 16 million motors and pumps produced annually worldwide
- North American companies operating in USA, Canada and Mexico
- Continuous reinvestment in growth and development enables the company to **BE** responsible, **THINK** ahead, and **INNOVATE**

Introduction

This data booklet deals with MTR, MTRE, MTC and MTA pumps.

TM02 8540 0404

Fig. 1 MTR, MTC and MTA pumps

MTR, MTC, MTA pumps are vertical multistage centrifugal pumps designed for pumping of cooling lubricants for machine tools, condensate transfer and similar applications.

The pumps can be used for applications involving spark machine tools, grinding machines, machine centers, cooling units, industrial washing machines, filtering systems etc. The pumps are designed to be mounted on top of tanks with the pump stack immerged in the pumped liquid.

Grundfos MTR, MTC and MTA pumps come with various pump sizes and numbers of stages to provide the flow, the pressure and the length required.

The pumps consist of two main components: The motor and the pump unit. The motor is a Grundfos standard ML motor or Grundfos specified motor designed to NEMA standards.

The pump unit consists of optimized hydraulics, a variety of connections, a motor stool, a given number of chambers and various other parts.

MTRE - pumps with built-in frequency-converter

TM02 8537 0404

Fig. 2 MTRE pumps

MTRE pumps are built on the basis of MTR pumps.

The difference between the MTR and the MTRE pump range is the motor. MTRE pumps are fitted with an E-motor, i.e. a motor with built-in frequency control.

The motor of the MTRE pump is a Grundfos MLE motor designed to NEMA standards.

Frequency control enables continuously variable control of motor speed, which makes it possible to set the pump to operation to any duty point. Continuously variable control of the motor speed enables adjustment of the performance to a given requirement.

The pump materials are the same as those of the MTR pump range.

Why select a MTRE pump?

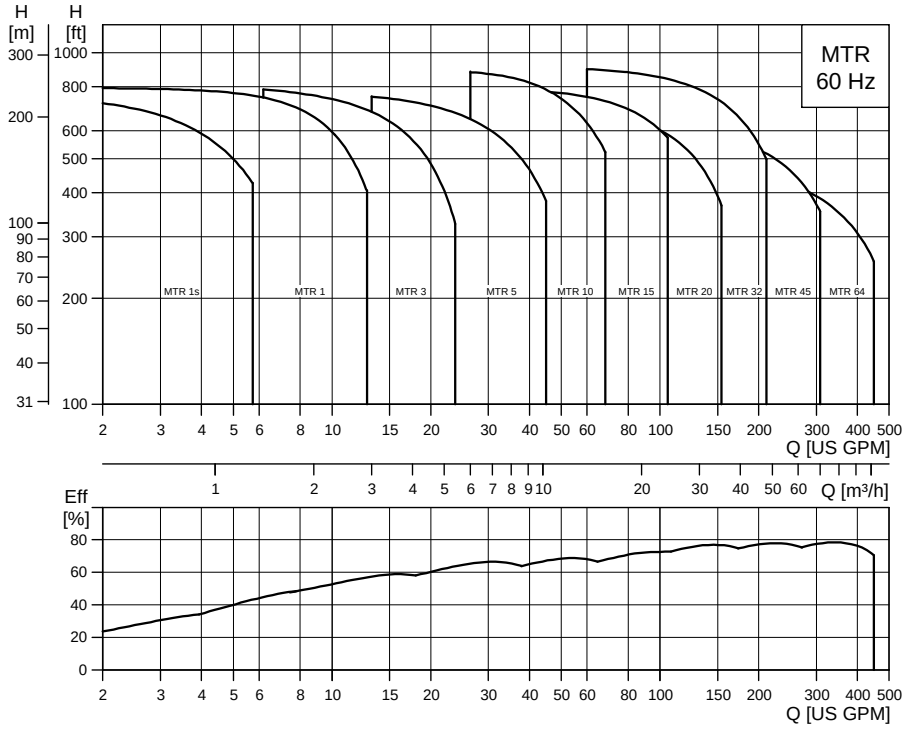
Select a MTRE pump if

- controlled operation is required, i.e. consumption fluctuates;
- constant pressure is required,
- communication with the pump is required.

Adaptation of performance through frequency-controlled speed control offers obvious advantages:

- Energy savings
- Increased comfort
- Control and monitoring of the pump performance.

Performance range - MTR, 60 Hz



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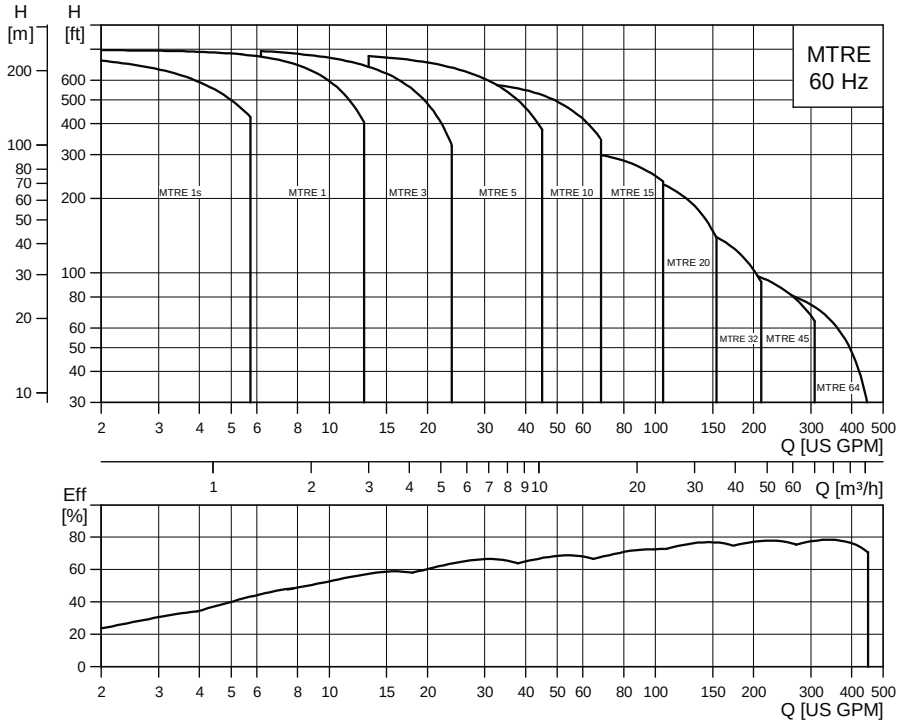
Performance range - MTRE, 60 Hz



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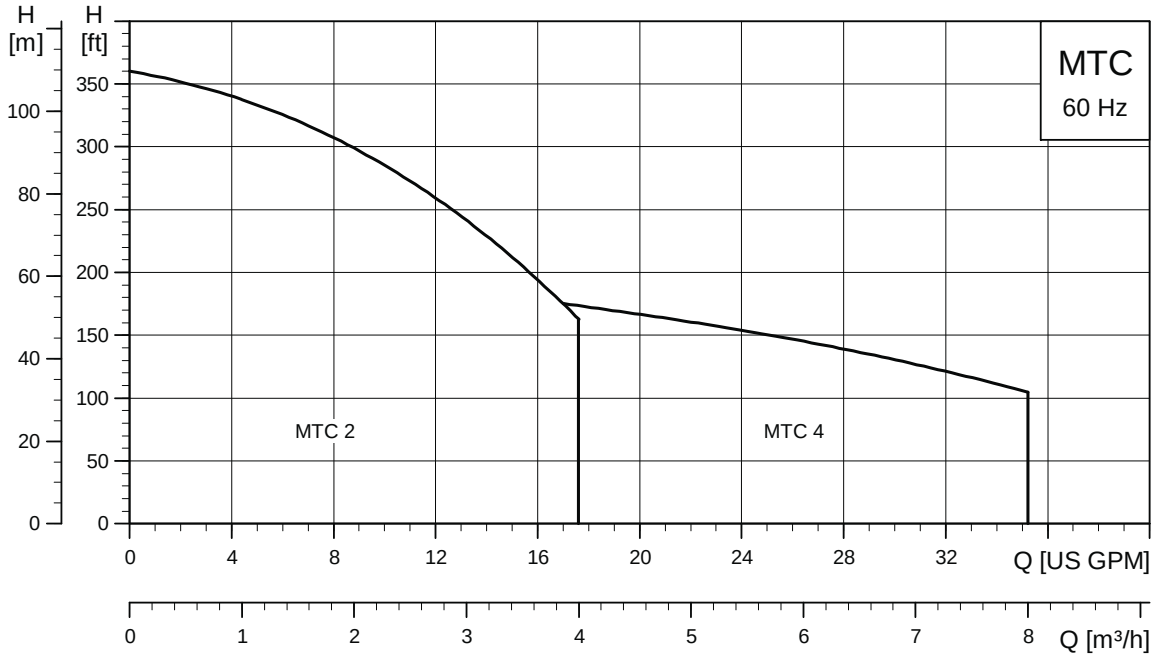
Performance range - MTC, 60 Hz



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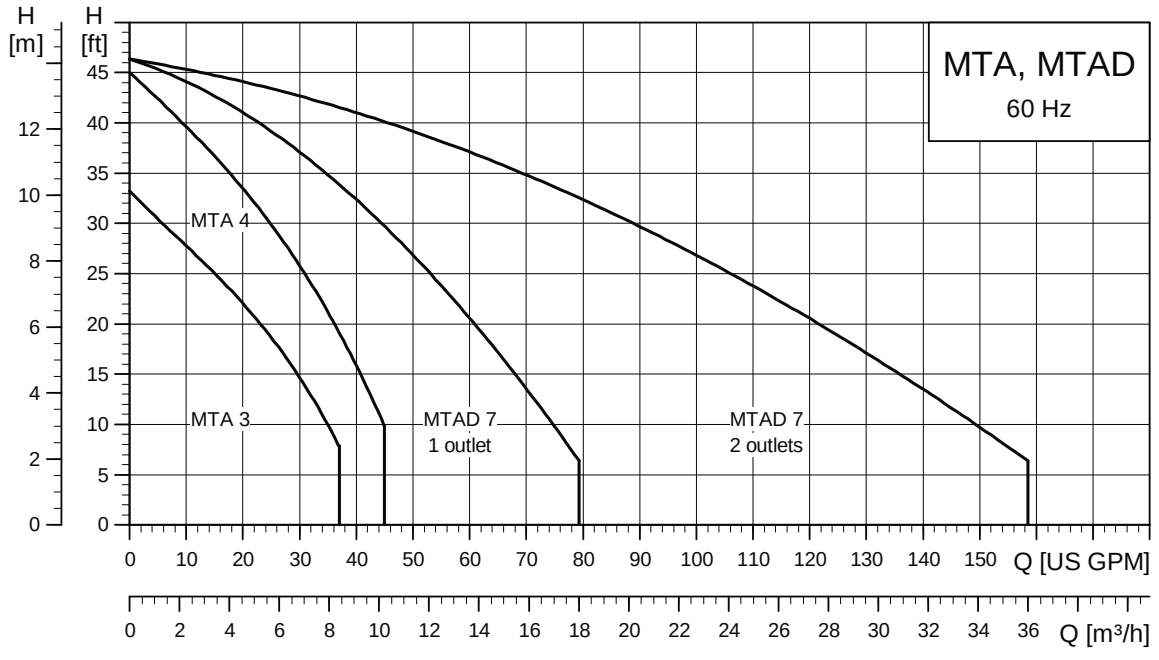
Note: MTC pumps are not available in Canada.

Performance range - MTA, MTAD 60 Hz



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Note: MTA, MTAD pumps are not available in Canada.

Applications

Application	MTR(E)	MTC	MTA
Lathes	-	●	-
Spark machine tools (EDM)	●	-	●
Grinding machines	●	●	●
Swarf conveyors	-	●	-
Machining centers	●	●	●
Cooling units	●	●	●
Industrial washing machines	●	●	●
Filtering systems	●	●	●

● The pump is suitable for his application.

Examples of MTRE applications

An MTRE pump is the ideal solution in a number of applications characterized by a need for variable flow at constant pressure.

Depending on the nature of the application, the pump offers energy-savings, increased comfort or improved processing.

MTRE pumps in the service of industry

Industry uses a large number of pumps in many different applications. Demands on pumps in terms of pump performance and mode of operation make speed control a must in many applications.

Some of the applications in which MTRE pumps are used are mentioned below.

Constant pressure

- Washing systems etc.

Example: Within industrial washing systems, MTRE pumps connected to a pressure sensor ensure a constant pressure in the pipework. From the sensor, the MTRE pump receives input about changes of pressure resulting from changes in the consumption. The MTRE pump responds to this input by adjusting the speed and thus the pressure. The constant pressure is stabilized once more on the basis of a preset setpoint.

Constant temperature

- Industrial cooling systems etc.

Example: In industrial cooling systems, MTRE pumps connected to a temperature sensor will ensure a constant temperature and lower operating costs compared to pumps without speed control.

An MTRE pump continuously adapts its performance to the changing demands reflected in the differences in temperature of the liquid circulating in the cooling system. Thus the lower the demand for cooling, the smaller the quantity of liquid circulated in the system and vice versa.

Constant level control

- Condensate systems etc.

Example: In a condensate system, it is important to monitor and control pump operation to maintain a constant level of condensate in the system.

An MTRE pump connected to a level sensor mounted in the condensate tank makes it possible to maintain a constant liquid level.

A constant liquid level ensures optimum and cost-efficient operation as a result of a stable production.

Product range - MTR(E)

Range	MTR MTRE 1s	MTR, MTRE 1	MTR, MTRE 3	MTR, MTRE 5	MTR, MTRE 10	MTR MTRE 15	MTR MTRE 20	MTR 32	MTR 45	MTR 64
Nominal flow rate [US GPM]	4.4	8.5	15	30	55	95	110	140	220	340
Nominal flow rate [m^3/h]	1.0	1.9	3.6	6.8	12.5	21.6	25.2	31.8	50.0	77.2
Temperature range [°F(°C)]	+14 to +194 °F (–10 to +90 °C)									
Max. pump efficiency [%]	35	49	59	67	70	72	72	76	78	79
MTR pumps										
Flow range [US GMP]	0.5 - 7	0.9 - 12.8	1 5 - 23.8	3 - 45	5.5 - 68	9.5 - 125	11 - 155	14 - 210	22 - 310	34 - 450
Flow range [m^3/h]	0.1 - 1.6	0.2 - 2.9	0.4 - 5.4	0.7 - 10.2	1.3 - 15.4	2.2 - 28.4	2.5 - 35.2	3.2 - 47.7	5.0 - 70.4	7.8 - 102
Maximum head [H(ft)]	760	795	820	780	835	800	700	970	595	455
Maximum head [psi]	329	344	355	337	361	346	303	420	257	197
Motor power [Hp]	0.33 - 2	0.33 - 3	0.5 - 5	0.75 - 7.5	1 - 15	2 - 25	3 - 25	5 - 40	7.5 - 40	10 - 40
MTRE pumps										
Flow range [US GMP]	0 - 7	0 - 12.8	0 - 23.8	0 - 45	0 - 68	0 - 125	0 - 155	0 - 210	0 - 310	0 - 450
Flow range [m^3/h]	0 - 1.6	0 - 2 9	0 - 5.4	0 - 10.2	0 - 15.4	0 - 28.4	0 - 35.2	0 - 47.7	0 - 70.4	0 - 102
Maximum head [H(ft)]	760	795	820	780	585	335	275	240	120	100
Maximum head [psi]	329	344	355	337	253	145	119	103	51	43
Motor power [Hp]	0.5 - 2	0.5 - 3	0.5 - 5	0.75 - 7.5	1 - 10	2 - 10	3 - 10	5 - 10	7.5 - 10	10
Material variants										
MTR (AISI 304/cast iron)	●	●	●	●	●	●	●	●	●	●
MTRI (AISI 316/AISI 304)	●	●	●	●	●	●	●	-	-	-
Pipe connection										
Internal thread [NPT]	1.25"	1.25"	1.25"	1.25"	2"	2"	2"	-	-	-
Flange ANSI Class 125#	-	-	-	-	-	-	-	2 5"	3.0"	3.0"
Flange ANSI Class 250#	-	-	-	-	-	-	-	2.5"★	3.0"★	-
Installation length [inches]										
MTR	6.3-24	6.3-24	6.3-23.3	6.7-30	5 8-29.4	7-33.6	7-33.6	8.8-41.9	9.6-41.1	9.8-42.3
MTRE	7.7-24	7.7-24	7-23.3	7.7-30	5 8-29.4	7-33.6	7-33.6	8.8-41.9	9.6-41.1	9.8-42.3
Shaft seal										
HUUV	●	●	●	●	●	●	●	●	●	●
HUUE★★	●	●	●	●	●	●	●	●	●	●
HUUK★★	●	●	●	●	●	●	●	●	●	●
HQQE★★	●	●	●	●	●	●	●	●	●	●
HQQV★★	●	●	●	●	●	●	●	●	●	●

★ Standard for > 5 impellers for MTR 32, > 3 impellers for MTR 45
★★ On request

Product range - MTC

Range	MTC 2	MTC 4
Nominal flow rate [US GPM]	13	25
Nominal flow rate [m^3/h]	3.0	5.7
Temperature range [°F(°C)]	+14 to +194 °F (–10 to +90 °C)	
Max. pump efficiency [%]	44	44
Flow range [US GPM]	1.3 - 17.5	2.5 - 35.5
Flow range [m^3/h]	0.3 - 4.0	0.6 - 8.1
Maximum head [H(ft)]	360	220
Maximum head [psi]	155	95
Motor power [Hp]	0.25 - 2.0	0.5 - 2.1
Material variants		
MTC (AISI 304/cast iron)	●	●
MTCI (AISI 304/cast iron)	●	●
Pipe connection		
Internal thread [NPT]	0.75"	0.75"
Installation length		
inches	5.7 - 11.4	5.7 - 12.1
Shaft seal		
AUUV	●	●
AUUE★	●	●

★ On request.

Product range - MTA

Range	MTA 3	MTA 4	MTAD 7 - 1 outlet	MTAD 7 - 2 outlets
Nominal flow rate [US GPM]	22	27	80	80
Nominal flow rate [m^3/h]	5.0	6.1	18.2	18.2
Temperature range [°F(°C)]		+14 to +194 °F (–10 to +90 °C)		
Max. pump efficiency [%]	30	32	38	38
Flow range [US GPM]	0 - 37	0 - 51	0 - 80	0 - 160
Flow range [m^3/h]	0 - 8.4	0 - 11.6	0 - 18.2	0 - 36.3
Maximum head [H(ft)]	33	45	46	46
Maximum head [psi]	14	19.5	20	20
Motor power P1 [Hp]	0.35 - 0.45	0.5 - 0.75	1.2 - 2.1	1.2 - 2.1
Material variants				
MTA (AISI 304/cast iron)	●	●	●	●
Pipe connection				
Internal thread [NPT]	0.75"	0.75"	1 25"	1.25"
Installation length				
inches	7.1	9.8	9 8	9.8

Pump

MTR and MTC pumps

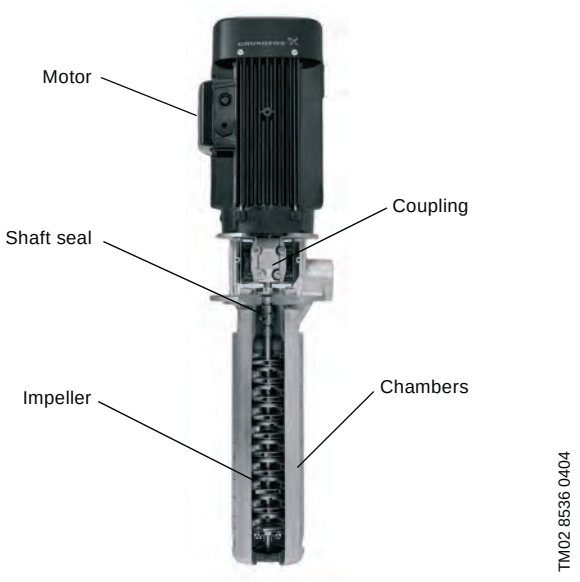


Fig. 3 Photo of an MTR pump

The pump is a vertical multistage centrifugal pump with mechanical shaft seal.

Mounting flange dimensions according to DIN 5440.

Grundfos offers the following types of pipework connection for MTR pumps:

Connection	Code	Description
Threaded	NPT	NPT threads (National Pipe Thread)
Flange	ANSI	Flanged connection

The pump is fitted with closed impellers offering optimum hydraulic efficiency and minimum power consumption.

The pumps are available in two versions

- Standard range with wetted parts of cast iron and stainless steel
- Stainless steel version (MTRI) with all wetted parts of stainless steel AISI 304.

Note: The MTRI version is to be used in applications where the pumped liquid can be corrosive.

To meet specific depths of tanks or containers, the immersible length of the pump can be varied using empty chambers.

MTA pumps

The MTA pumps are one-chamber or two-chamber vertical centrifugal pumps (MTAD). MTAD has two separate outlets.

MTA pumps are fitted with open impellers for use in unfiltered coolants.

A 0.16" strainer is fitted on the retainer. The strainer can be removed by the user if needed.

Mounting flange dimensions are according to DIN 5440.

The MTA pump has no shaft seal.

Motor

Grundfos standard motors - ML and Baldor® motors

MTR and MTRI pumps are fitted with a Grundfos specified motor. The motors are all heavy-duty 2-pole, NEMA C-face motors.

Frequency-controlled motors - MLE motors

MTRE and MTRIE pumps are fitted with a totally enclosed, fan-cooled, 2-pole frequency-controlled motor.

From 0.5 Hp to 1.5 Hp Grundfos offers MTR(E) pumps fitted with single-phase MLE motors (1 x 208-230 V). From 1.0 Hp to 10 Hp Grundfos offers MTRE pumps fitted with three-phase MLE motors (3 x 460-480 V).

Electrical data

Mounting designation	NEMA
Insulation class	F & B
Efficiency class *	Energy efficient / EPAct Premium efficiency - on request
Enclosure class	TEFC - Totally Enclosed Fan Cooled (Grundfos standard) ODP - Open Drip Proof - on request
60 Hz Standard voltages	1 x 115/208-230 V 3 x 208-230/460 V 3 x 575 V
Approvals: Grundfos ML and MLE	The motors are rated for: cURus and CE
Approvals: Baldor®	The motors are rated for: UR and CSA

* 1 - 10 Hp ML motors are premium efficiency as standard

Optional motors

The Grundfos standard range of motors covers a wide variety of application demands. However, for special applications or operating conditions, custom-built motor solutions can be provided.

For special applications or operating conditions, Grundfos offers custom-built motors such as:

- explosion proof motors,
- motors with anti-condensation heating unit,
- low-noise motors,
- premium efficiency motors,
- motors with thermal protection.

Motor protection

ML motors

Three-phase motors **must** be connected to a motor starter in accordance with local regulations.

MLE motors

MTR(E) pumps require no external motor protection. The MLE motor incorporates thermal protection against slow overloading and blocking (IEC 11: TP 211). A circuit breaker is required to protect the power cord to the motor.

MTC pumps

MTC pumps are fitted with an integrated Grundfos motor where the rotor shaft is used as pump shaft. This gives the pump a compact design.

MTC motors are totally enclosed, fan-cooled, 2-pole Grundfos standard motors.

Electrical data of MTC pumps

Insulation class	F
Efficiency class	EFF2 EFF1 available on request
Enclosure class	TEFC - Totally Enclosed Fan Cooled
Supply voltage, 60 Hz (Tolerance ±10%)	3 x 208-230/460 V

As standard all MTC motors are supplied with CE approval.

MTA pumps

The pump is fitted with a totally enclosed, fan-cooled motor.

Electrical data

Insulation class	F	
Efficiency class	Standard efficiency	
Enclosure class	TEFC Totally Enclosed Fan Cooled (IP54)	
60 Hz Standard voltages	ML 63 MTA 3, 4	3 x 208-277/360-480 V
	ML 80 MTAD 7/7	3 x 208-266/360-460 V

Terminal box positions

As standard MTR(E) and MTC pumps have their terminal box mounted in position 6 o'clock of the pump; however other positions are possible.

Note: On MTC pumps it is not possible to mount the terminal box in position 12 as the terminal box does not fit in that position.

On MTA pumps it is only possible to mount the terminal box in position 6 o'clock.

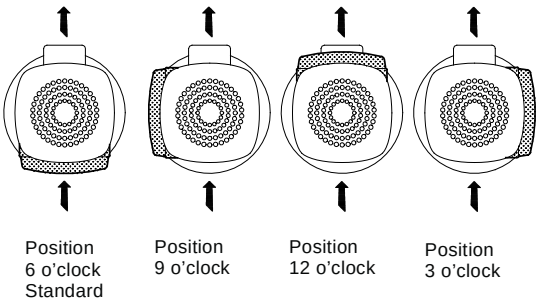


Fig. 4 Terminal box positions

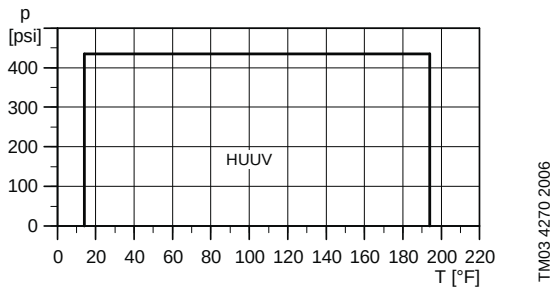
Sound pressure level

All MTR(E), MTC and MTA pumps have a sound pressure level below 70 dB(A).

Shaft seal

The operating range of the shaft seal depends on operating pressure, pump type, type of shaft seal and liquid temperature.

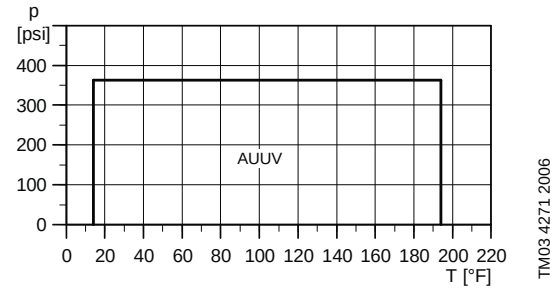
MTR(E)



Shaft seal	Description	Temperature range [°F]
HUUV	O-ring seal (cartridge type), balanced, tungsten carbide/tungstencarbide, FKM	+14 °F to 194 °F

MTR pumps with EPDM elastomers in the shaft seals (HUUE) can run in the temperature range from 194 °F to 248 °F. Closed strap nuts with o-rings and plugging of the shaft seal drain hole may also be required at temperatures above 212 °F (see page 31).

MTC



Shaft seal	Description	Temperature range [°F]
AUUV	O-ring seal with fixed seal driver, tungsten carbide/tungsten carbide, FKM	+14 °F to 194 °F

Ambient temperature

Maximum ambient temperature +104 °F (+40 °C).

If the ambient temperature exceeds +104 °F (+40 °C) or if the motor is located 3280 ft (1000 m) above sea level, the motor output (P_2) must be reduced due to the low density and consequently low cooling effect of the air. In such cases, it may be necessary to use a motor with a higher output.

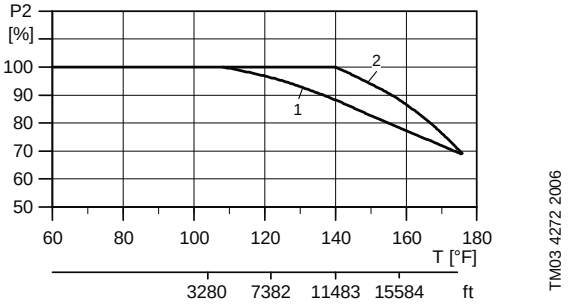


Fig. 5 Relationship between motor output (P_2) and ambient temperature/altitude

Key

Pos.	Description
1	NEMA Energy Efficient motors
2	NEMA Premium Efficiency motors

Example: From the above figure and key appears that P_2 must be reduced to 88 % when a pump with a NEMA Premium Efficiency, ML motor is installed 15584 feet above sea level. At an ambient temperature of 167 °F, P_2 of an Energy Efficient motor must be reduced to 74 % of rated output.

Maximum operating pressure

Immersible Pump Model	Maximum Permissible Operating Pressure	
	NPT Threads	ANSI Flange
MTR(I) 1s --> MTR(I) 5	362 psi	--
MTR(I) 10 --> MTR(I) 20	362 psi	--
MTR(I) 32-2/1-1 --> MTR(I) 32-5	--	232 psi
MTR(I) 32-6 --> MTR(I) 32-8	--	362 psi
MTR(I) 32-9 --> MTR(I) 32-11-2	--	435 psi
MTR(I) 45-2/1 --> MTR(I) 45-3	--	232 psi
MTR(I) 45-4 --> MTR(I) 45-5	--	362 psi
MTR(I) 64-2/1-1 --> MTR(I) 64-4-2	--	232 psi
MTC 2 --> MTC 4	116 psi	--
MTA 3	15 psi	--
MTA 4	20 psi	--
MTAD 7	20 psi	--

Viscosity

MTR 1s, 1, 3, 5 can pump up to 50 cst. MTR 10, 15, 20, 32, 45, 64 can pump up to 100 cst.

The pumping of liquids with densities or kinematic viscosities higher than those of water will cause a considerable pressure drop, a drop in the hydraulic performance and a rise in the power consumption.

In such situations the pump should be equipped with a larger motor. If in doubt, contact Grundfos.

The following examples show the drop in the hydraulic performance of MTR(E) pumps pumping oil with a density of 54.4 lb/ft^3 but with three different kinematic viscosities.

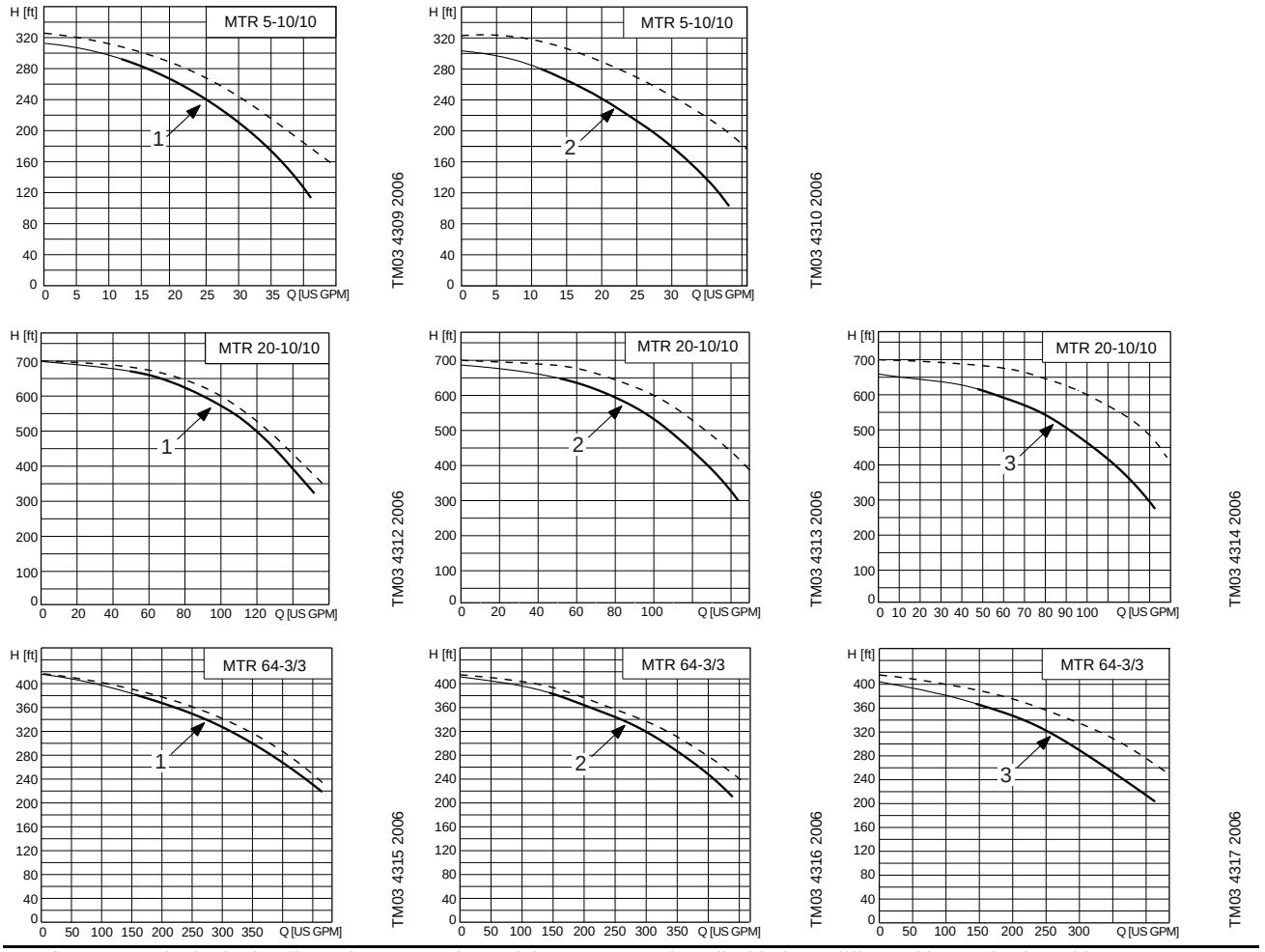


Fig. 6 Drop in the hydraulic performance of MTR(E) pumps pumping oil with three different kinematic viscosities.

Key

Position	Description	
1	Kinematic viscosity: Density:	16 Cst. 54.4 lb/ft^3
2	Kinematic viscosity: Density:	32 Cst. 54.4 lb/ft^3
3	Kinematic viscosity: Density:	75 Cst. 54.4 lb/ft^3

Immersible Pump Model	Maximum Kinematic Viscosity
MTR 1s through MTR 10	50 Cst.
MTR 15 through MTR 64	100 Cst.

Immersible Pump Model	Maximum Kinematic Viscosity
MTC	50 Cst.
MTA / MTAD	50 Cst.

For further information about pump performance when pumping liquids with densities or kinematic viscosities higher than those of water, see WinCAPS.

WinCAPS is a product selection program offered by Grundfos, see page 77.

Viscosity of different oils

The curves below show the viscosity of different oils in relation to oil temperature.

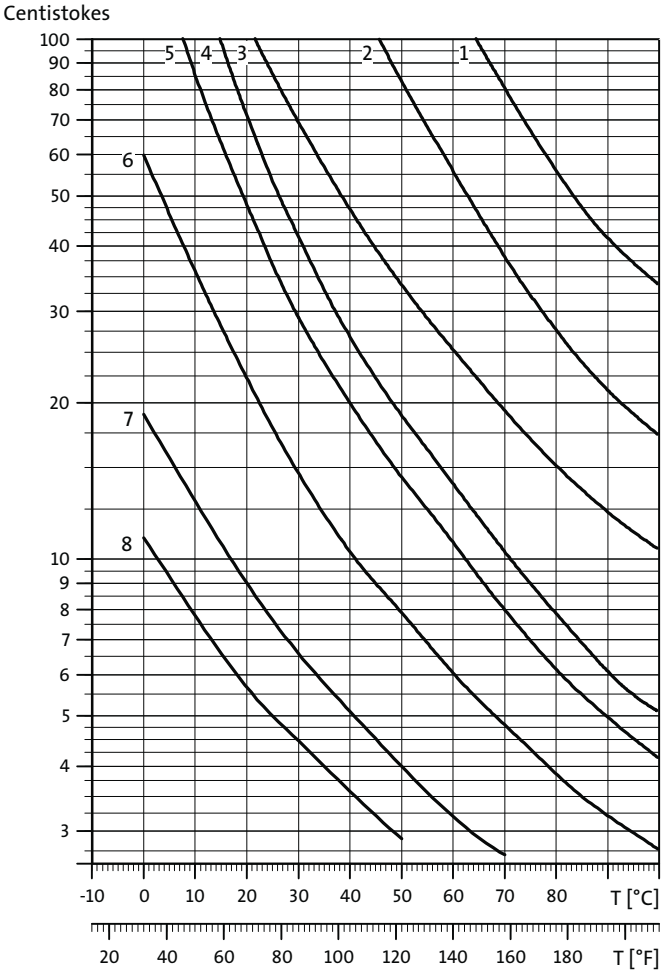


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Fig. 7 Viscosity of different oils in relation to oil temperature

Key to viscosities of different oils

Curve number	Type of oil
1	Gear oil
2	Motor oil (20W-50)
3	Hydraulic oil (ISO VG46)
4	Cutting oil
5	Thermal oil
6	Hydraulic oil (ISO VG10)
7	Grinding oil
8	Honing oil

Pressure loss

During operation pressure losses occur in all centrifugal pumps.

The below curves illustrate the pressure losses for pumped liquid passing through one empty chamber. An empty chamber is a chamber without an impeller.

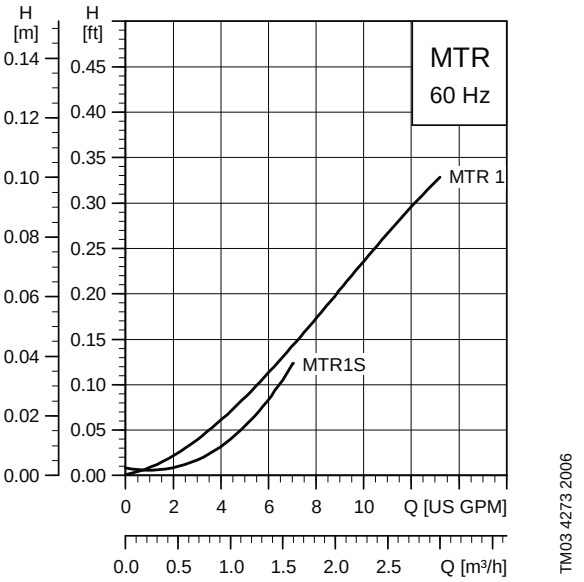


Fig. 8 Pressure losses of pumped liquid passing through an empty chamber for MTR 1s and MTR 1 pumps

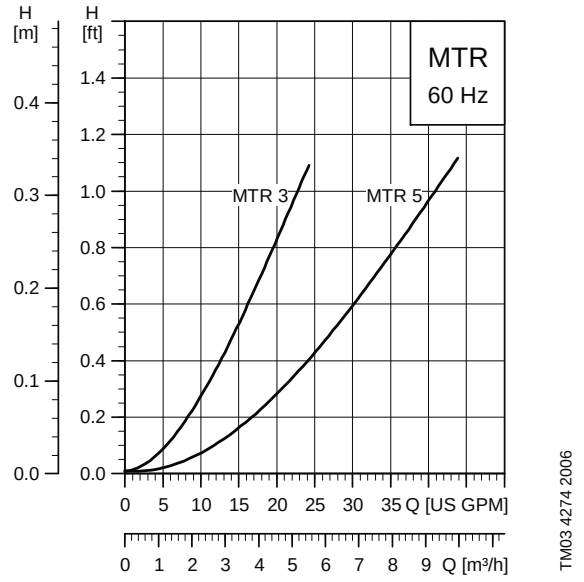


Fig. 9 Pressure losses of pumped liquid passing through an empty chamber for MTR 3 and MTR 5 pumps

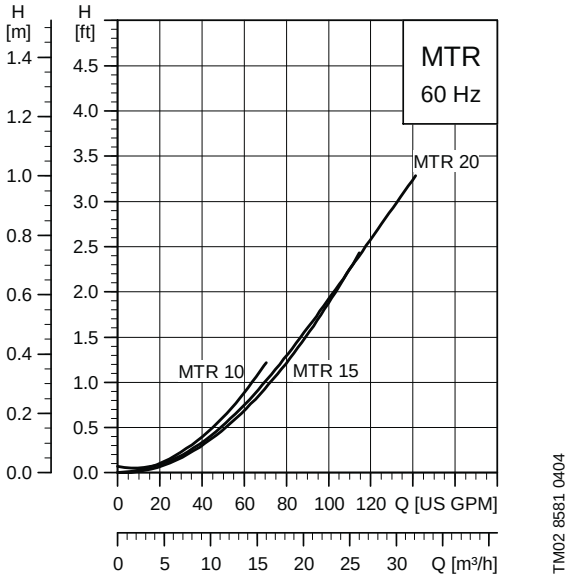


Fig. 10 Pressure losses of pumped liquid passing through an empty chamber for MTR 10, MTR 15 and MTR 20 pumps

As MTR(E) 32, 45 and 64 pumps have holes in the guide vanes, no pressure losses occur in the empty chambers of these pumps.

Calculation of the reduced head of a pump with empty chambers

Calculation of pressure loss in empty chambers

From the pressure loss curves and the pump performance curves, it is possible to calculate the reduced head of a pump with empty chambers.

The calculation can be made as shown below.

Example:

Pump type	MTR 5-18/7
Flow Q (duty point)	25 [gpm]
Head (duty point)	180 [ft]

The selected pump is an MTR 5-18/7 with 11 empty chambers. From the above pressure loss curve of MTR 5, it appears that the pressure loss of each empty chamber at 25 [gpm] is 0.46 [ft]. This results in a total pressure loss of:

$$\text{Total pressure loss} = 0.46 \times 11 = 5 \text{ [ft]}$$

The reduced head of the MTR 5-18/7 pump including pressure losses caused by empty chambers is:

$$\text{Head} = 185 - 5 = 180 \text{ [ft]}$$

The head 185 ft is read from the performance curve for an MTR 5-7.

Control options for MTRE pumps

Communication with MTRE pumps is possible by means of

- a control panel,
- remote control (Grundfos R100),
- external digital or analog control signals,
- an RS485 bus interface.

The purpose of controlling a MTRE pump is to monitor and control the pressure, temperature, flow or liquid level of the system.

Control panel

The control panel of the MTRE pump terminal box makes it possible to change the setpoint settings manually.

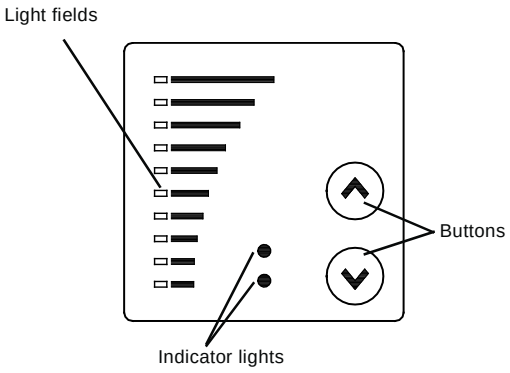


Fig. 11 Control panel on MTRE pump

Remote control

The R100 remote control produced by Grundfos is available as an accessory. See page 75.

The operator communicates with the MTRE pump by pointing the IR-signal transmitter at the control panel of the MTRE pump terminal box.

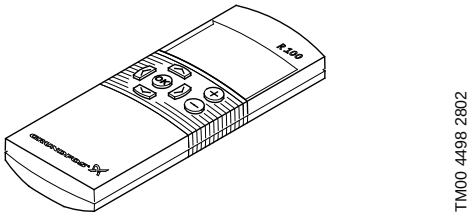


Fig. 12 R100 remote control

On the R100 display it is possible to monitor and change control modes and settings of the MTRE pump.

External control signals

Communication with the MTRE pump is possible even though the operator is not present near the MTRE pump. Communication is enabled by connecting the MTRE pump to an external control or monitoring system allowing the operator to monitor and change control modes and setpoint settings of the MTRE pump.

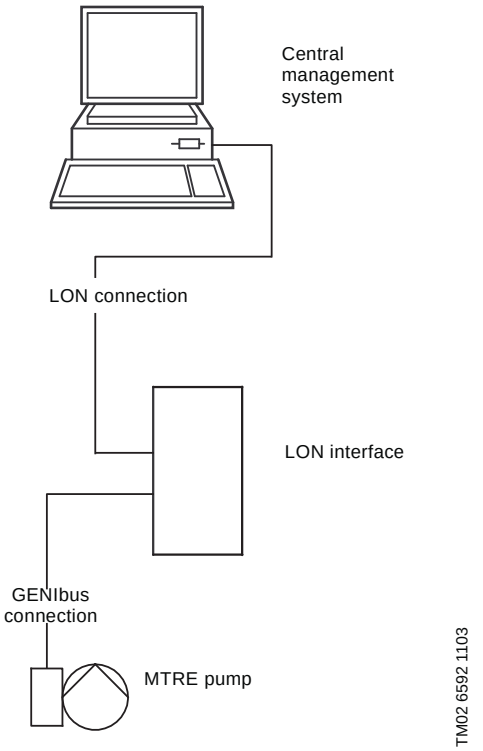


Fig. 13 Example of a central management system with LON interface

Control of MTRE pumps

Control modes of MTRE pumps

MTRE pumps can be connected to an external sensor enabling control of pressure, differential pressure, temperature, level, differential temperature or flow.

MTRE pumps can be set to two control modes - controlled or uncontrolled operation.

In **controlled** operating mode the pump is automatically operating according to the desired setpoint of the control parameter. The illustration below shows a pump with flow control as an example of controlled operation.

In **uncontrolled** operating mode the pump operates according to the constant curve set.

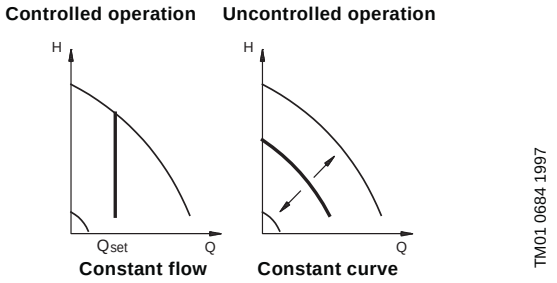


Fig. 14 Controlled and uncontrolled operating modes

The pumps are set to uncontrolled operation from factory.

Besides normal duty (constant flow and constant curve) the operating modes **Stop, Min.** or **Max.** are available.

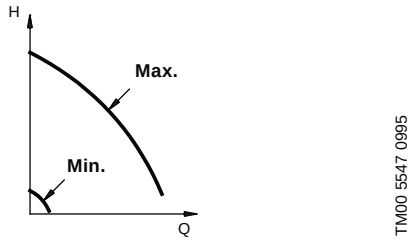
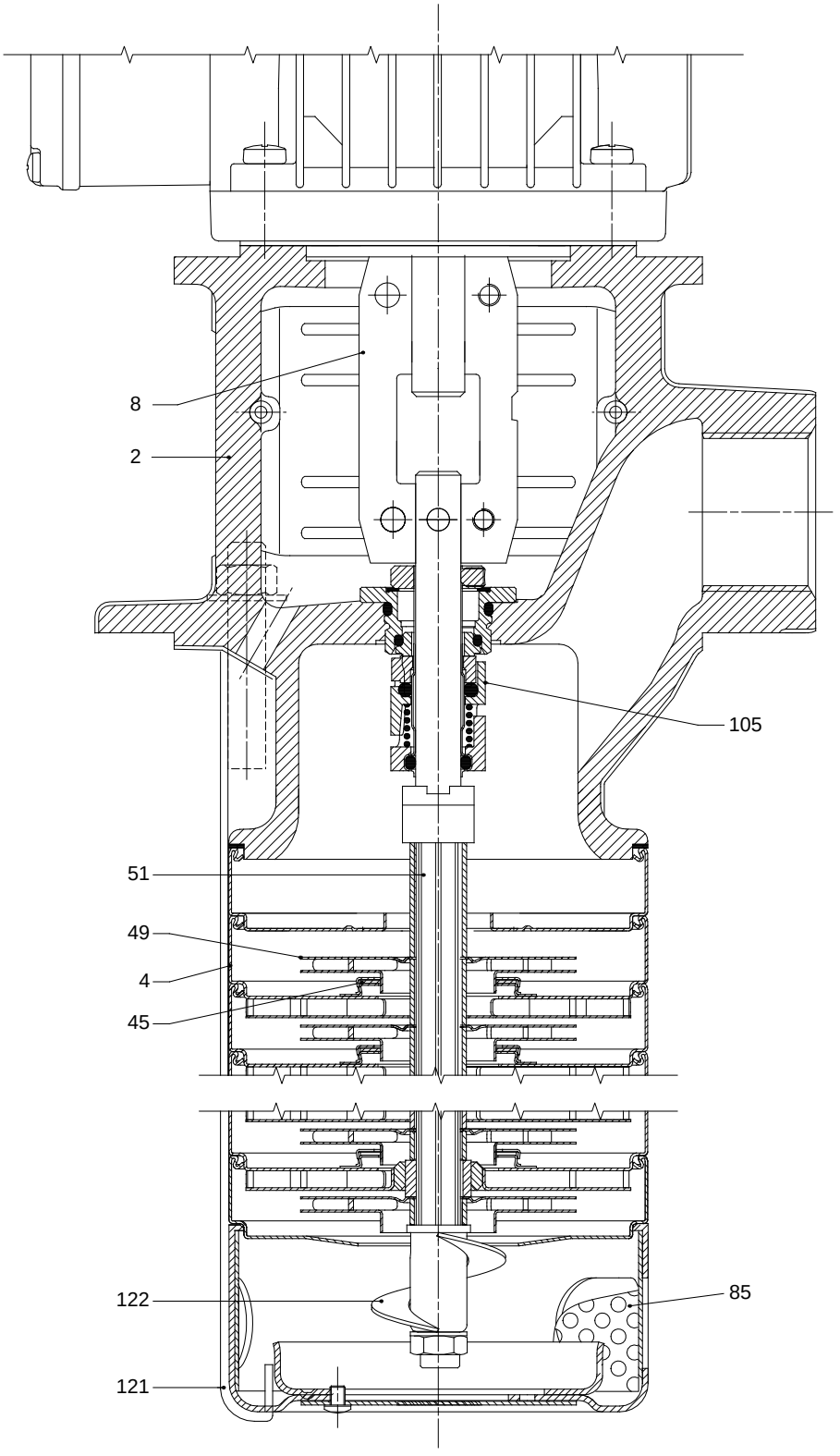
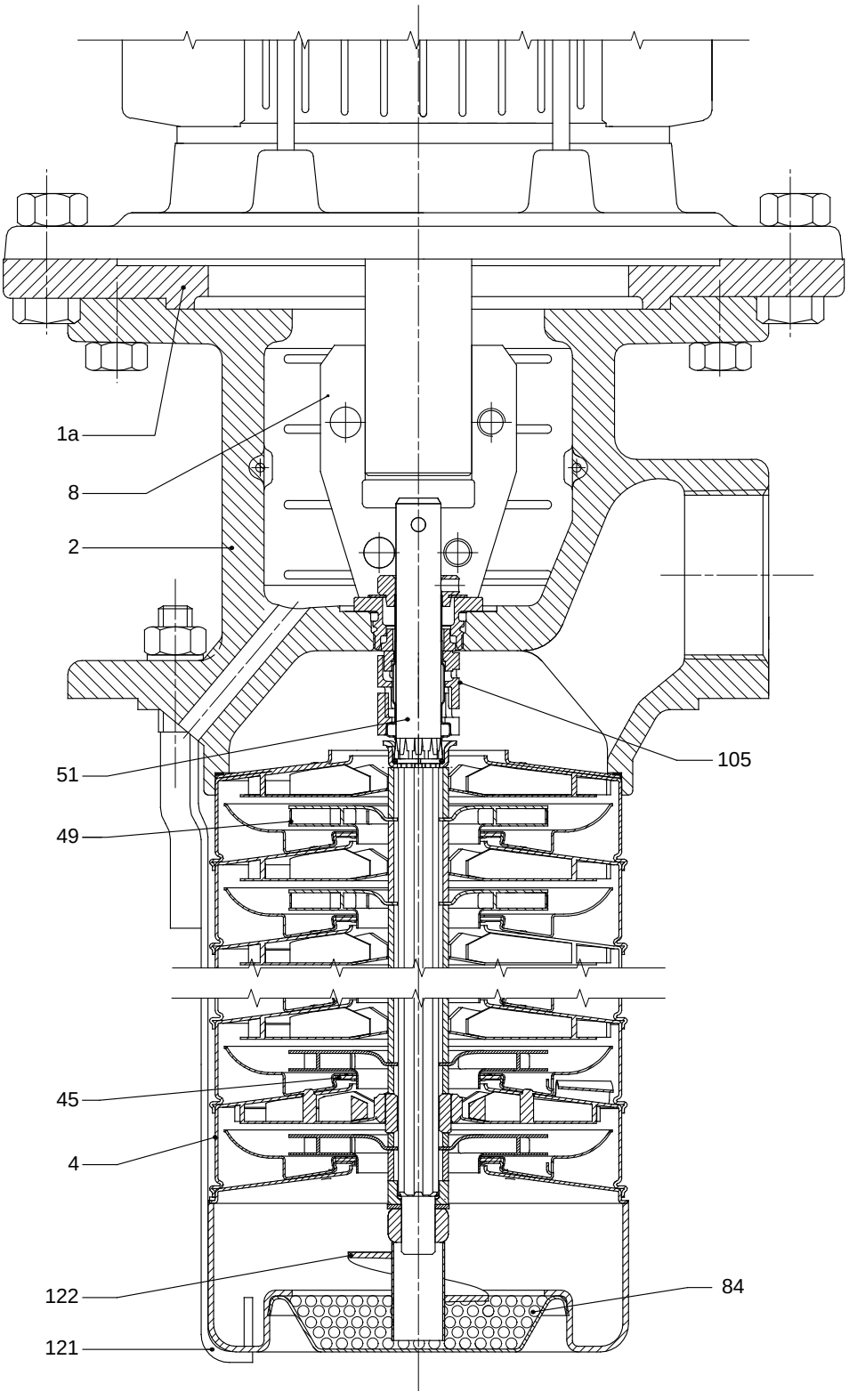


Fig. 15 Max. and min. curves

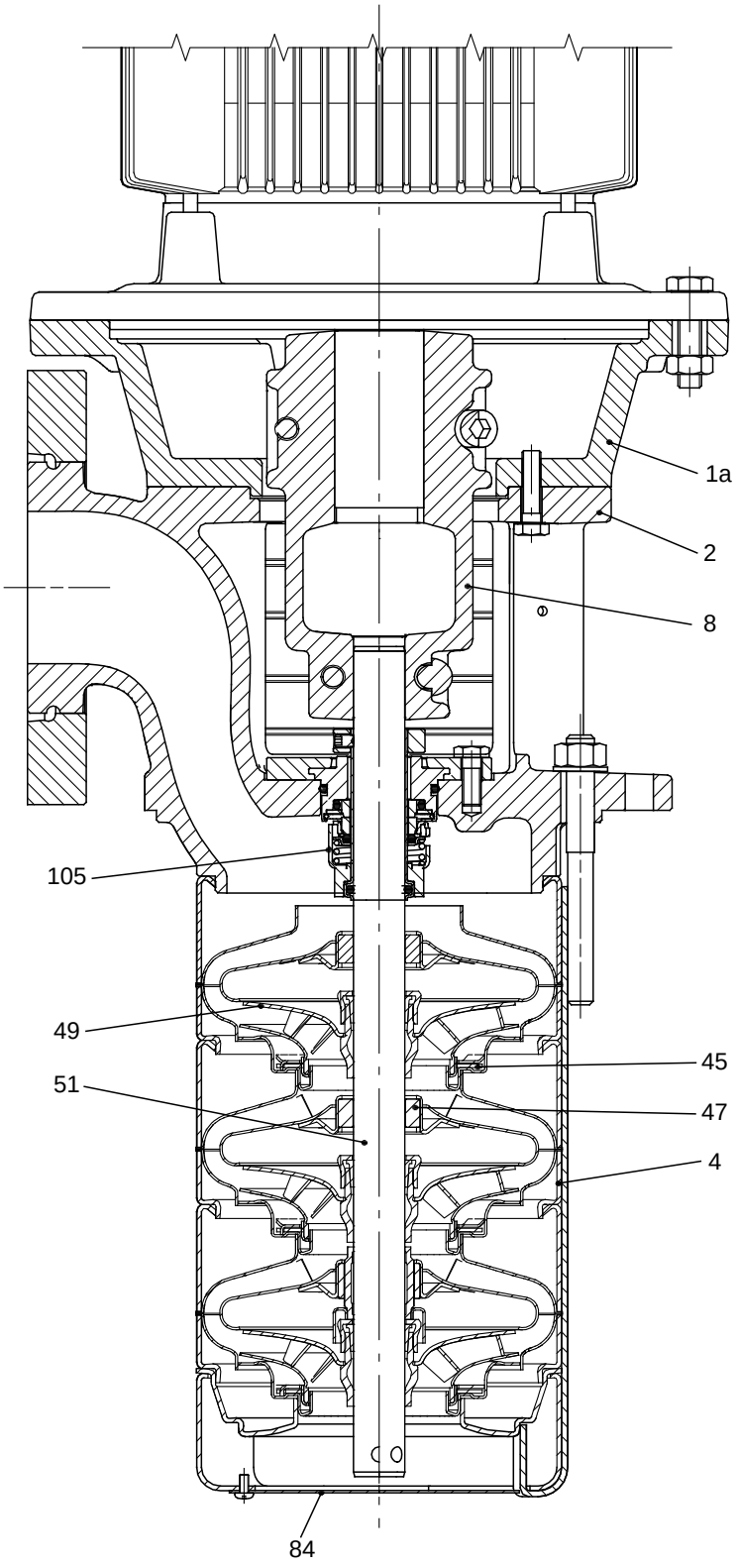
Sectional drawing of MTR(E) 1s, 1, 3 and 5



Sectional drawing of MTR(E) 10, 15 and 20



Sectional drawing of MTR(E) 32, 45 and 64



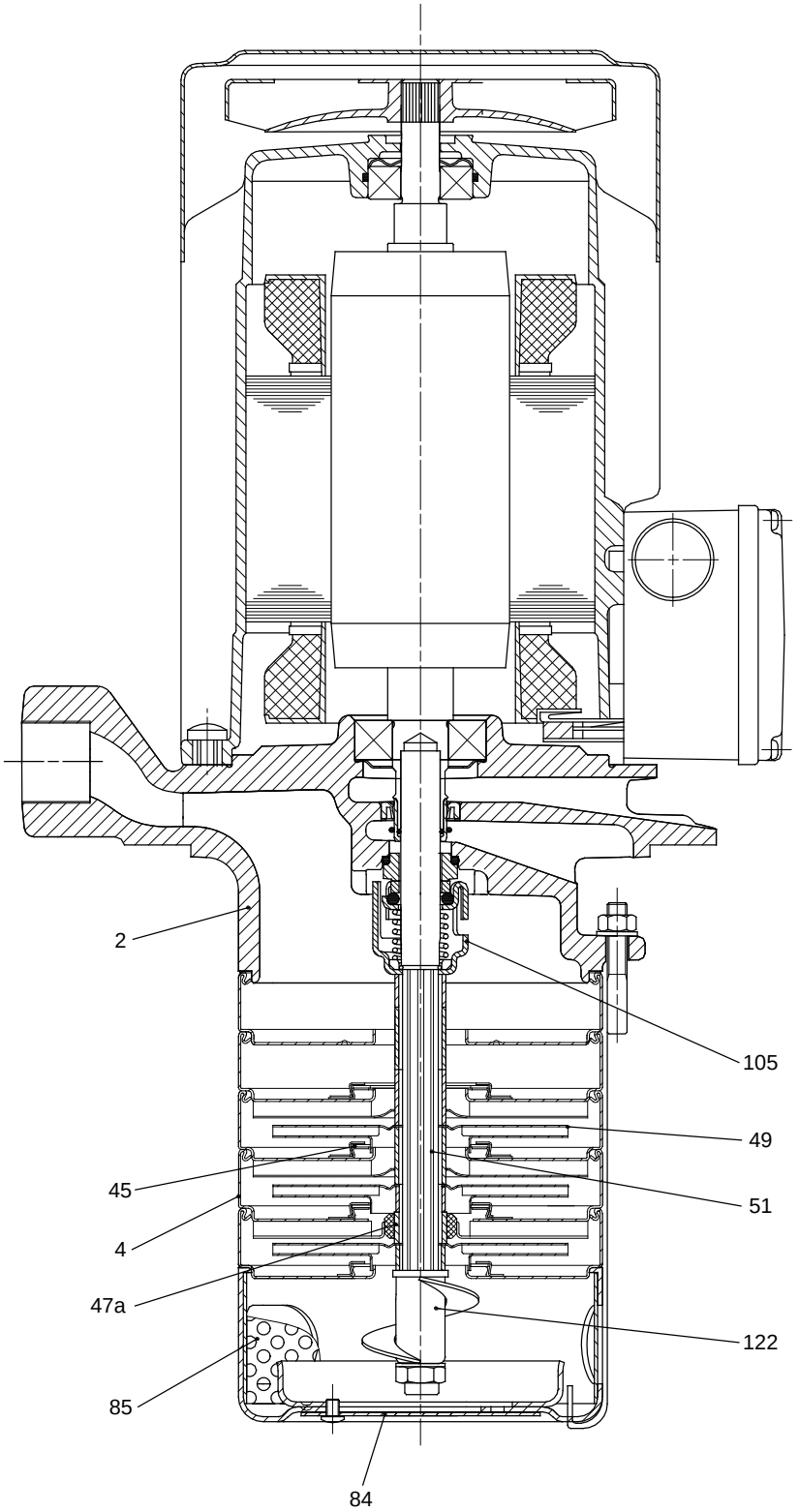
TM02 8689 0704

Material specification - MTR(E) - MTRI(E)

Pos.	Description	Materials	EN/DIN	AISI/ASTM
1a	Motor stool	Cast iron EN-GJL-200	0.6020	ASTM 25B
2	Pump head	Cast iron EN-GJS-500-7	0.7050	ASTM 80-55-06
		Stainless steel (MTRI)	1.4408	CF 8M*
4	Chamber complete	Stainless steel	1.4301	AISI 304
8	Coupling	Sinter metal		
		Cast iron	0.7040	ASTM 60-40-18
121	Retainer for suction strainer	Stainless steel	1.4301	AISI 304
45	Neck ring	PTFE		
47	Bearing ring	SIC		
49	Impeller	Stainless steel	1.4301	AISI 304
51	Pump shaft, MTR 1s, 1, 3, 5	Stainless steel	1.4401	AISI 316
	Pump shaft, MTR 10, 15, 20 MTR 32, 45, 64	Stainless steel	1.4057	AISI 431
84	Suction strainer, ø0.16" holes	Stainless steel	1.4301	AISI 304
85	Strainer	Stainless steel	1.4301	AISI 304
105	Shaft seal	HUUV/HUUE		
122	Priming screw	Stainless steel	1.4301	AISI 304

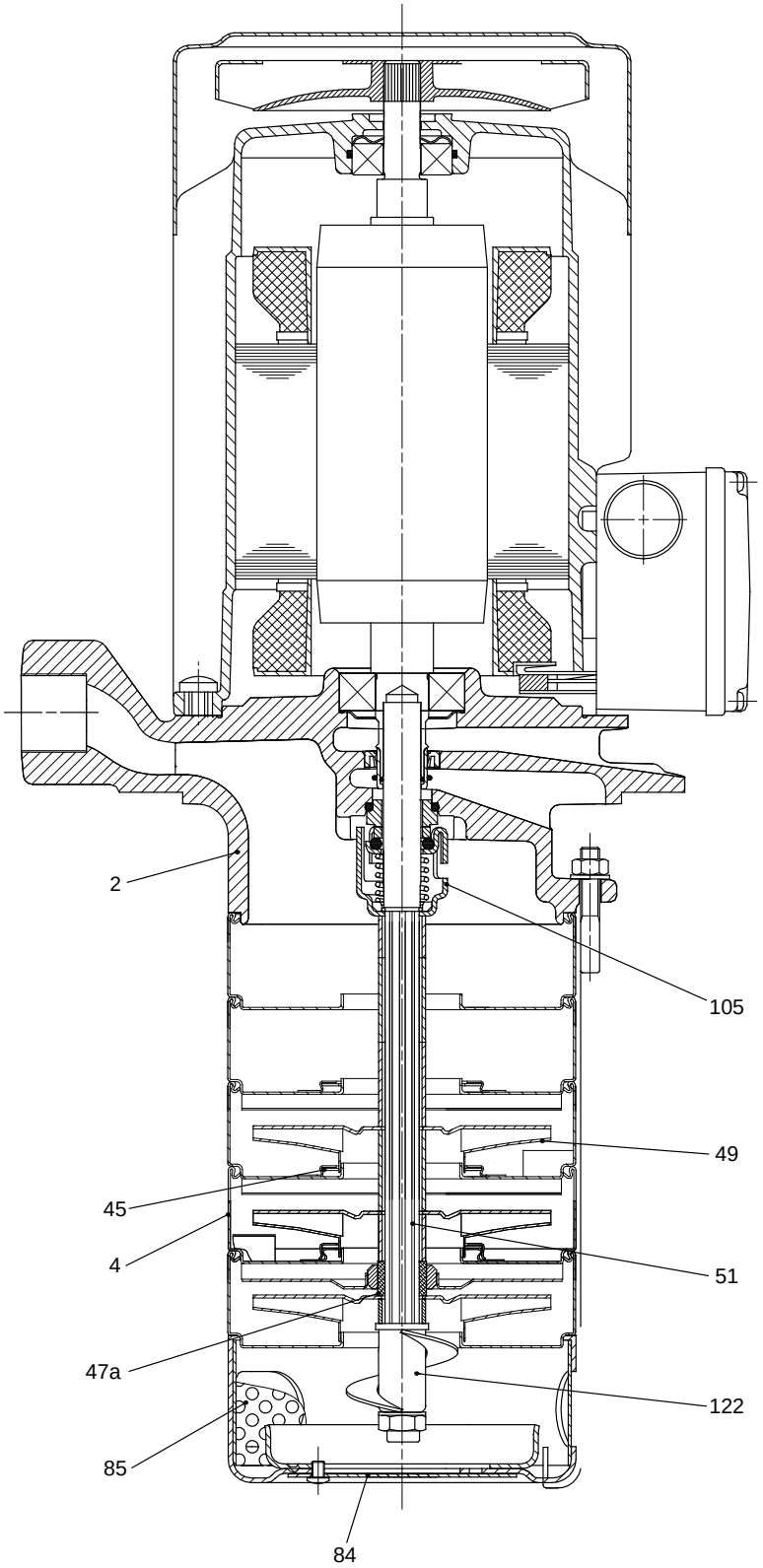
* CF 8M is cast equivalent of AISI 316 stainless steel

Sectional drawing of MTC 2



TM02 8690 0704

Sectional drawing of MTC 4



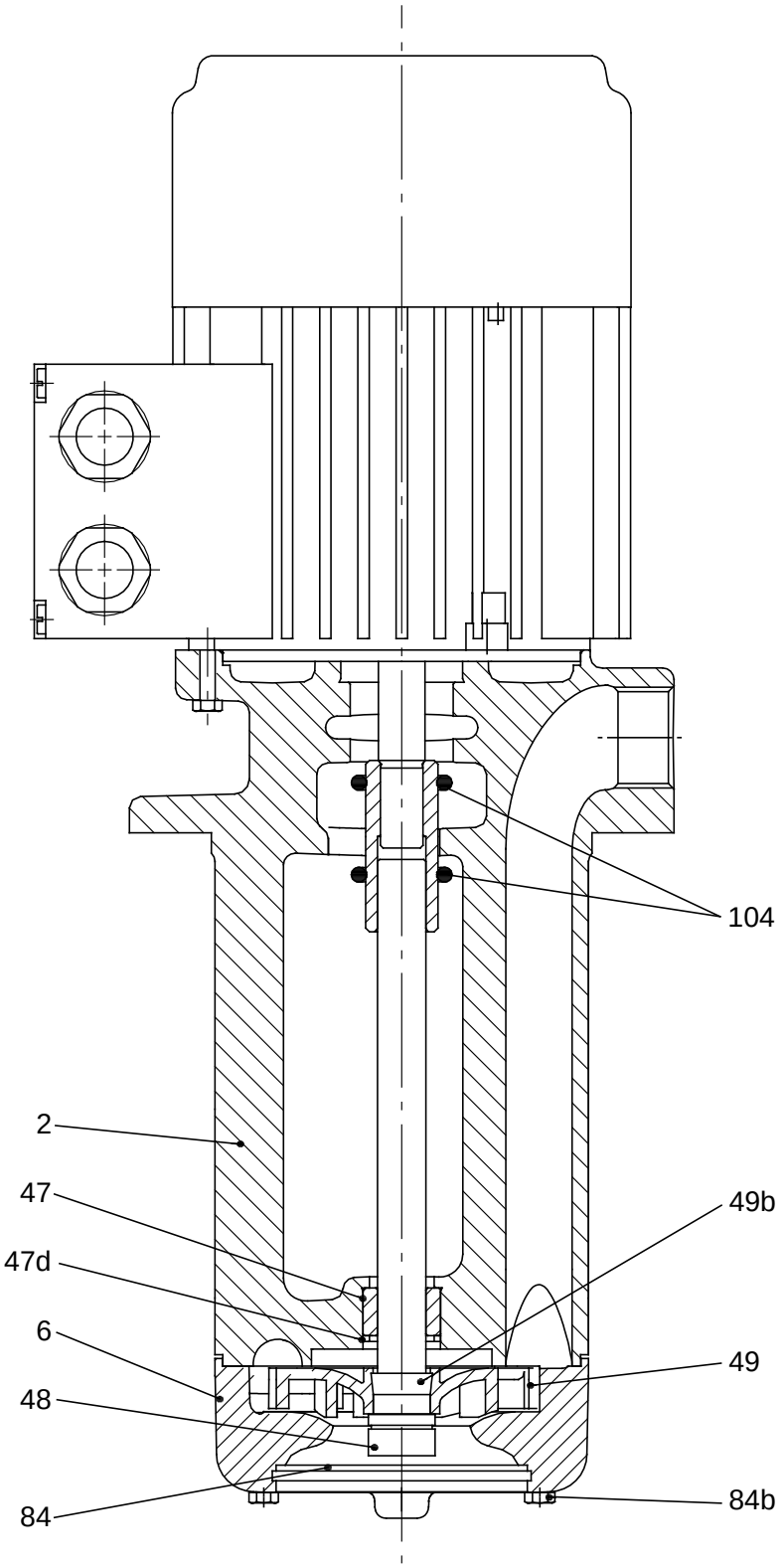
TM02 8691 0704

Material specification - MTC, MTCI

Pos.	Description	Materials	EN/DIN	AISI/ASTM
2	Pump head	Cast iron EN-GJL-200	0.6020	ASTM 25B
		Stainless steel (MTCI)	1.4408	CF 8M*
4	Chamber	Stainless steel	1.4301	AISI 304
45	Neck ring	PTFE (only MTC 2)		
47a	Bearing ring	Tungsten carbide		
49	Impeller	Stainless steel	1.4301	AISI 316
51	Pump shaft	Stainless steel	1.4057	AISI 431
84	Suction trainer, ø0.08" holes	Stainless steel	1.4301	AISI 304
85	Strainer	Stainless steel	1.4301	AISI 304
105	Shaft seal	AUUV		
122	Priming screw	Stainless steel	1.4301	AISI 304

* CF 8M is cast equivalent of AISI 316 stainless steel

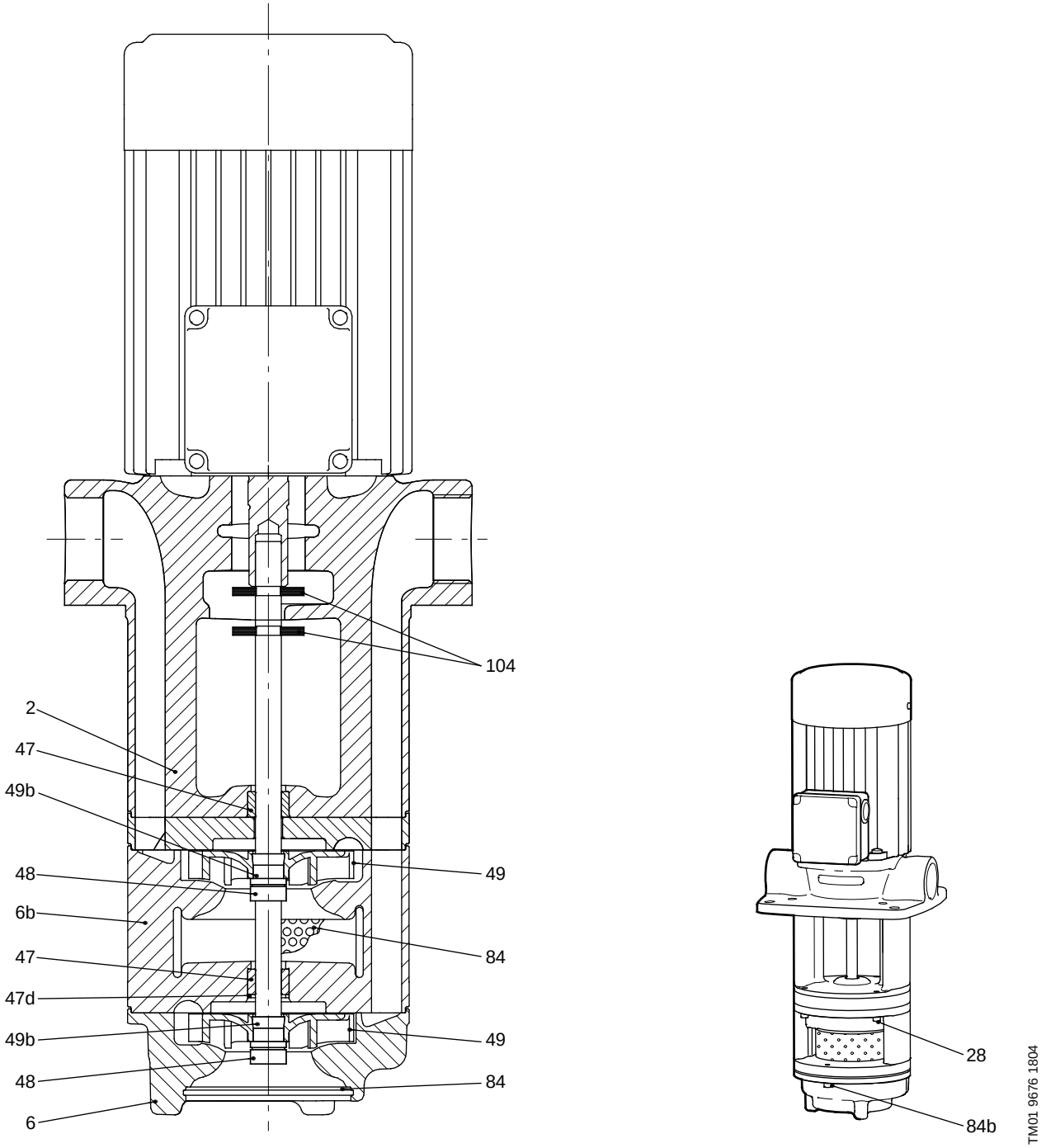
Sectional drawing of MTA 3, MTA 4



Material specification - MTA 3, MTA 4

Pos.	Description	Materials	EN/DIN	AISI/ASTM
2	Pump head	Cast iron EN-GJL-150	0.6015	ASTM 30B
6	Pump housing	Cast iron EN-GJL-150	0.6015	ASTM 30B
47	Bearing ring	Filled PTFE		
47d	Retaining ring	Stainless steel	1.4305	AISI 304
48	Split cone nut	Stainless steel	1.4401	AISI 316
49	Impeller	Stainless steel	1.4408	AISI 316
49b	Split cone	Stainless steel	1.4301	AISI 304
84	Strainer, ø0.16” holes	Stainless steel	1.4301	AISI 304
84b	Hexagon socket head screw	Stainless steel	1.4301	AISI 304
104	O-ring	NBR		

Sectional drawing of MTAD 7/7



Material specification - MTAD 7/7

Pos.	Description	Materials	EN/DIN	AISI/ASTM
2	Pump head	Cast iron EN-GJL-150	0.6015	ASTM 30B
6	Pump housing lower	Cast iron EN-GJL-150	0.6015	ASTM 30B
6b	Pump housing upper	Cast iron EN-GJL-150	0.6015	ASTM 30B
28	Screw	Stainless steel		
47	Bearing ring	Filled PTFE		
47d	Retaining ring	Stainless steel	1.4305	
48	Split cone nut	Stainless steel	1.4401	AISI 316
49	Impeller	Stainless steel	1.4408	AISI 316
49b	Split cone	Stainless steel	1.4301	AISI 304
84	Strainer, ø0.16” holes	Stainless steel	1.4301	AISI 304
84b	Hexagon socket head screw	Stainless steel	1.4301	AISI 304
104	Diverting disc	NBR		

Type keys

MTR(E)

Example	MTR	E	32	(s)	-2	/1	-1	-A	-G	-A	-HUUV
Pump type											
Pump with integrated frequency control											
Rated flow rate [m^3/h]											
All impellers with reduced diameter (applies only to MTR 1s)											
Number of chambers											
Number of impellers											
Number of impellers with reduced diameter											
Code for pump version A: Basic											
Code for pipe connection A: Basic WB: NPT G: ANSI flange											
Code for materials											
Code for shaft seal											

MTC

Example	MTC	2	-6	/3	-A	-W	-A	-AUUV
Pump type								
Rated flow rate [m^3/h]								
Number of chambers								
Number of impellers								
Code for pump version A: Basic								
Internal thread (NPT)								
Code for materials A: Basic								
Code for shaft seal								

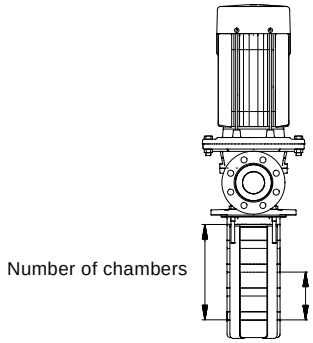
MTA

Example	MT	A	D	7/7	-250
Pump range: (**M**achine **T**ool)					
Product type					
Two-chamber pump					
Rated flow rate [m^3/h]					
Installation length [mm]					

Shaft seal

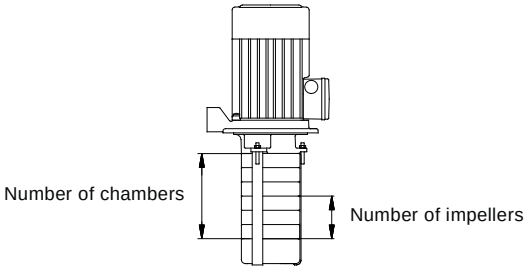
Example	H	U	U	V
A: O-ring seal with fixed driver				
H: Balanced cartridge seal				
Q: Silicone carbide				
U: Cemented tungsten carbide				
E: EPDM				
V: FKM				

MTR(E)



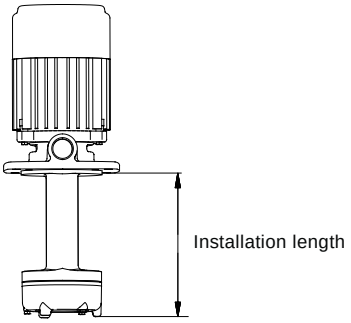
TM01 4991 1299

MTC



TM01 4992 1299

MTA

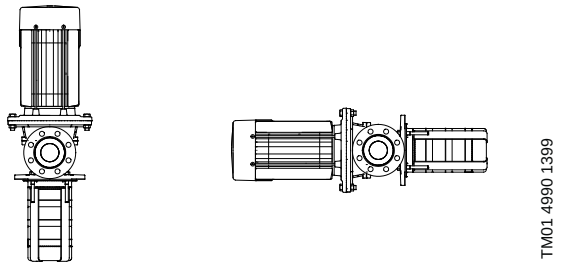


TM01 8521 0500

Installation of MTR(E) pumps

MTR(I)(E) 1s, 1, 3, 5, 10, 15 and 20 pumps can only be installed vertically. MTRI 1s - 20 can be installed horizontally as well (see note below).

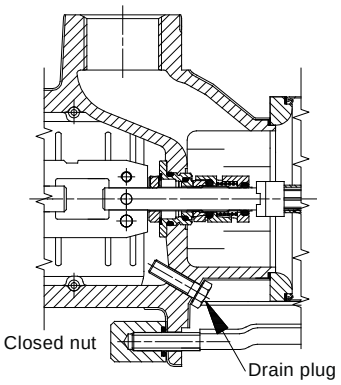
MTR(E) 32, 45, 64 pumps must be installed in a vertical position.



TM01 4990 1399

Fig. 16 Installation of an MTR(E) pump

Note: If the MTR(E) pump is to be installed horizontally, the drain hole in the pump head must be fitted with a plug, and four closed nuts with O-rings must be fitted to the straps.



TM02 8043 4503

Fig. 17 Horizontal installation

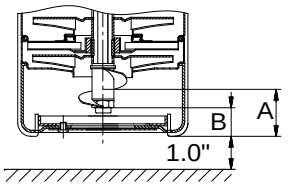
The pumps are designed to provide full performance down to a level of A inches above the bottom of the strainer.

At a liquid level between A and B mm above the bottom of the strainer, the built-in priming screw will protect the pump against dry running.

Note: MTR(E) 32, 45 and 64 pumps have no priming screw.

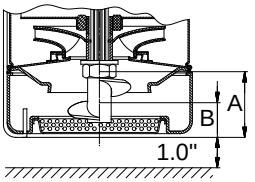
Pump type	A [inch]	B [inch]
MTR(E) 1s, 1, 3, 5	1.6	1.1
MTR(E) 10, 15, 20	2.0	1.0
MTR(E) 32, 45, 64	2.8	-

The distance between the pump and the tank bottom must be minimum 1 inch.



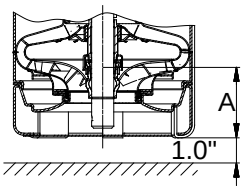
TM03 4871 3206

Fig. 18 MTR(E) 1s, 1, 3 and 5



TM03 4872 3206

Fig. 19 MTR(E) 10, 15 and 20

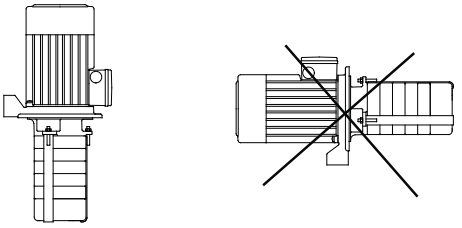


TM03 4873 3206

Fig. 20 MTR(E) 32, 45 and 64

Installation of MTC pumps

MTC must be installed vertically.

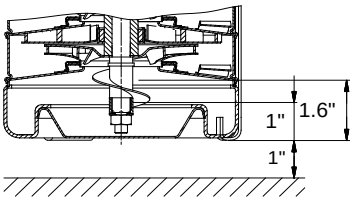


TM00 1923 3297

Fig. 21 Installation of an MTC pump

To enable a low liquid level of 1.6 inches above the bottom of the strainer, a priming screw is fitted below the bottom chamber. This helps to protect the pump against dry running down to 1 inch above the bottom of the strainer.

The distance between the pump and tank bottom must be minimum 1 inch.

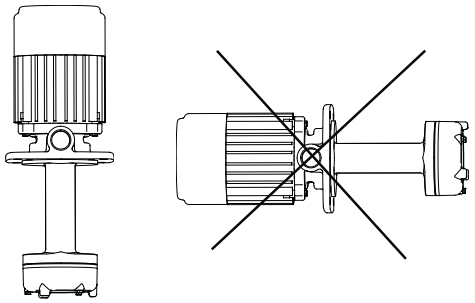


TM03 4304 2006

Fig. 22 MTC 2 and MTC 4

Installation of MTA pumps

MTA pumps are designed for vertical mounting in a tank.



TM01 8522 2203

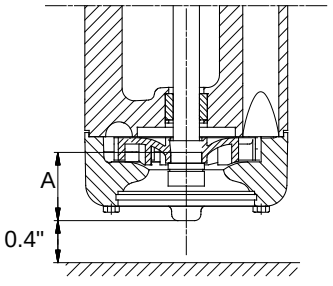
Fig. 23 Installation of MTA pump

The distance between the bottom of the pump and the bottom of the tank must be at least 0.4 inch.

The pumps are designed to provide full performance down to a level of A inch above the bottom of the pump, see below.

	MTA 3	MTA 4	MTAD 7/7
A [inch]	1.4	1 8	4.9

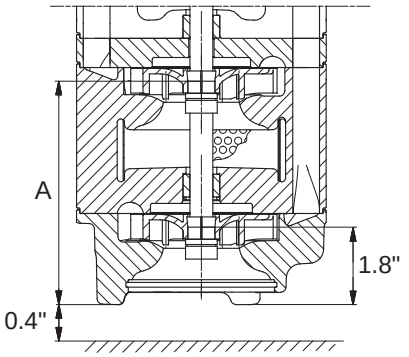
MTA 3, MTA 4



TM03 4305 2006

Fig. 24 Minimum distance between pump and tank

MTAD 7/7

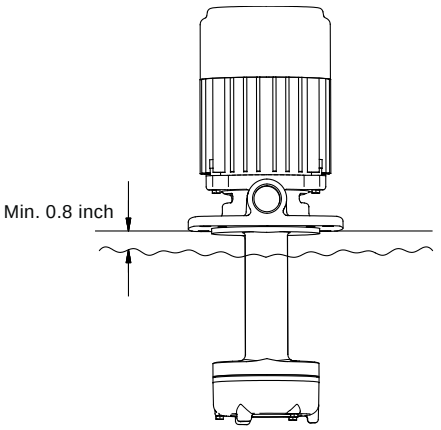


TM03 4306 0607

Fig. 25 Minimum distance between pump and tank

Maximum liquid level

To protect the motor of the MTA pump from the pumped liquid, the maximum liquid level in the installation tank must be 0.8 inch below the top of the tank.



TM01 9076 1000

Fig. 26 Maximum liquid level

Selection of pumps

Selection of pumps should be based on

- the duty point of the pump
- sizing data such as pressure loss as a result of height differences, friction loss in the pipework, pump efficiency etc.
- minimum inlet pressure - NPSHR.

1. Duty point of the pump

From a duty point it is possible to select a pump on the basis of the curve charts shown in the chapter of "Performance curves/Technical data starting on page 38.

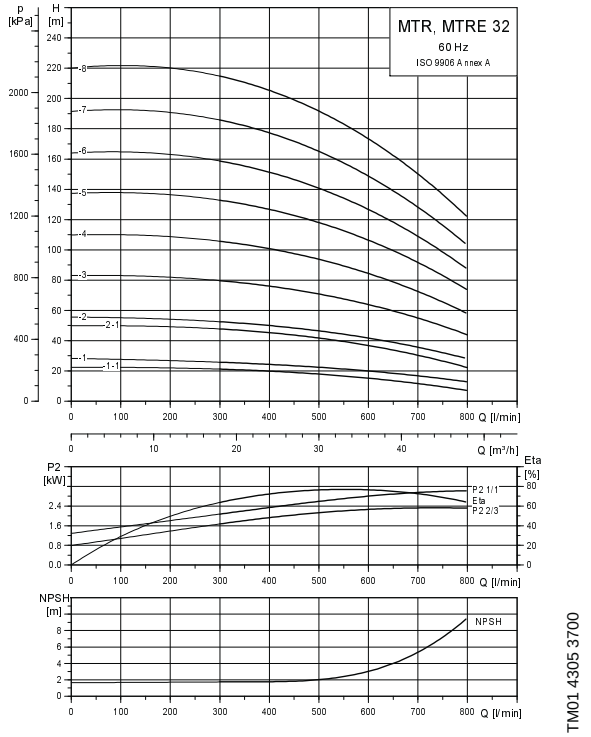


Fig. 27 Example of a curve chart

2. Sizing data

When sizing a pump the following must be taken into account:

- Required flow rate and pressure at the point of use.
- Pressure loss as a result of height differences (H_{geo}).
- Friction loss in the pipework (H_f).
  It may be necessary to account for pressure loss in connection with long pipes, bends or valves, etc.
- Best efficiency at the estimated duty point.
- NPSHR value.
  For calculation of the NPSHR value, see "Minimum inlet pressure - NPSHR" on page 36.

Efficiency

Before determining the point of best efficiency the operation pattern of the pump needs to be identified.

Is the pump expected always to operate at the **same** duty point, select an MTR, MTC, MTA pump which is operating at a duty point corresponding to the best efficiency of the pump.

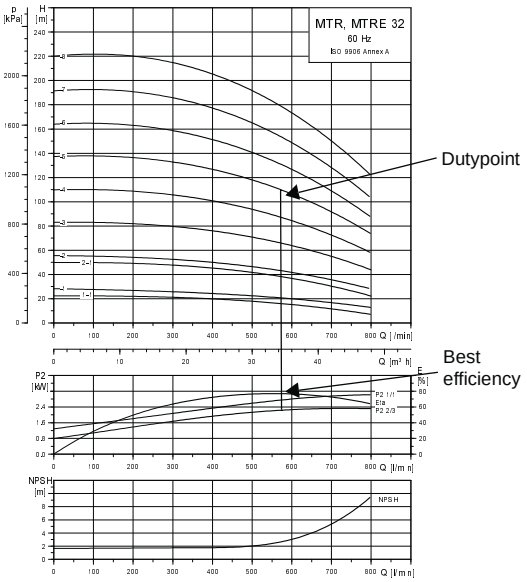


Fig. 28 Example of an MTR pump's duty point

As the pump is sized on the basis of the highest possible flow, it is important always to have the duty point to the right of the optimum efficiency point (see fig. 29, range with check mark). This must be considered in order to keep efficiency high when the flow drops.

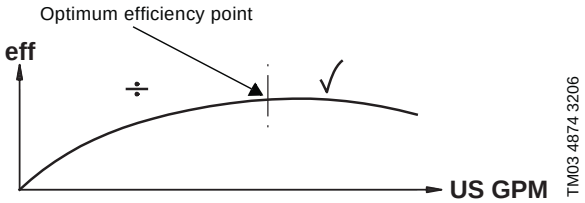


Fig. 29 Best efficiency

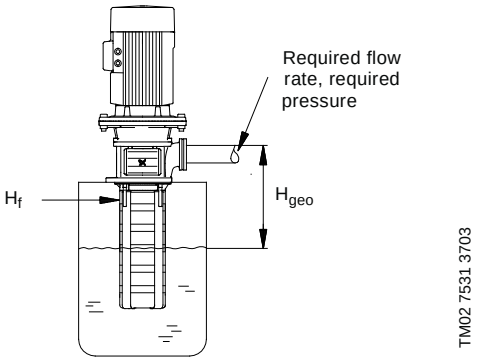


Fig. 30 Dimensional data

Normally, MTRE pumps are used in applications characterized by a **variable** flow rate. Consequently, it is not possible to select a pump that is operating constantly at optimum efficiency. In order to achieve optimum operating economy, the pump should be selected on the basis of the following criteria:

- The maximum duty point should be as close as possible to the QH curve of the pump.
- The required duty point should be positioned so that P_2 is close to the max. point of the QH curve.

Between the minimum and maximum performance curves, MTRE pumps have an infinite number of performance curves each representing a specific speed. Therefore it may not be possible to select a duty point close to the max. curve.

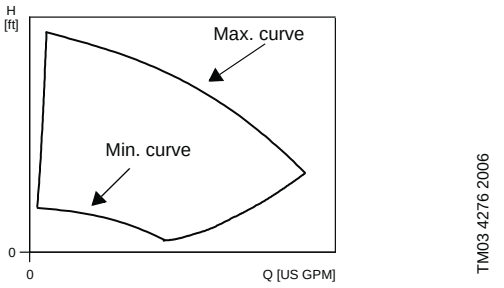


Fig. 31 Min. and max. performance curves

In situations where it is not possible to select a duty point close to the max. curve, the affinity equations following can be used. The head (H), the flow rate (Q) and the input power (P) are all the appropriate variables you need to be able to calculate the motor speed (n).

Note:

The approximated formulas apply on condition that the system characteristic remains unchanged for n_n and n_x and that it is based on the formula $H = k \times Q^2$ where k is a constant.

The power equation implies that the pump efficiency is unchanged at the two speeds. In practice this is **not** quite correct.

Finally, it is worth noting that the efficiencies of the frequency converter and the motor **must** be taken into account if a precise calculation of the power saving resulting from a reduction of the pump speed is wanted.

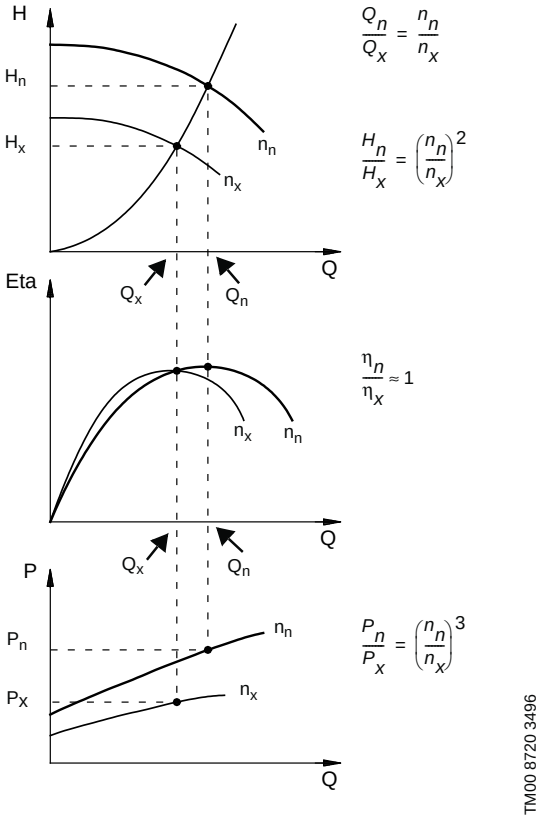


Fig. 32 Affinity equations

Legend

H_n	Rated head in feet
H_x	Current head in feet
Q_n	Flow rate in gpm
Q_x	Current flow rate in gpm
n_n	Rated motor speed in min^{-1}
n_x	Current motor speed in min^{-1}
η_n	Rated efficiency in %
η_x	Current efficiency in %

WinCAPS and WebCAPS

WinCAPS and WebCAPS are both selection programs offered by Grundfos.

The two programs make it possible to calculate an MTR(E) pump's specific duty point and energy consumption.

By entering the sizing data of the pump, WinCAPS and WebCAPS can calculate the exact duty point and energy consumption. For further information see page 77 and page 78.

Minimum inlet pressure - NPSHR

Calculation of the inlet pressure "H" is recommended when ....

- the liquid temperature is high,
- the flow is significantly higher than the rated flow,
- inlet conditions are poor.

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump. The maximum suction lift "H" in feet of head can be calculated as follows:

$H = p_b - NPSHR - H_f - H_v - H_s$

p_b = Barometric pressure in feet absolute. (Barometric pressure can be set to 33.9 feet). In closed systems, p_b indicates the system pressure in feet.

NPSHR = Net Positive Suction Head in feet of head. (To be read from the NPSHR curve at the highest flow rate the pump will be delivering).

H_f = Friction loss in suction pipe in feet of head. (At the highest flow rate the pump will be delivering.)

H_v = Vapor pressure in feet. (To be read from the vapor pressure scale. "H_v" depends on the liquid temperature "T_m").

H_s = Safety margin = minimum 2.0 feet.

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" feet of head.

If the "H" calculated is negative, an inlet pressure of minimum "H" feet of head is required.

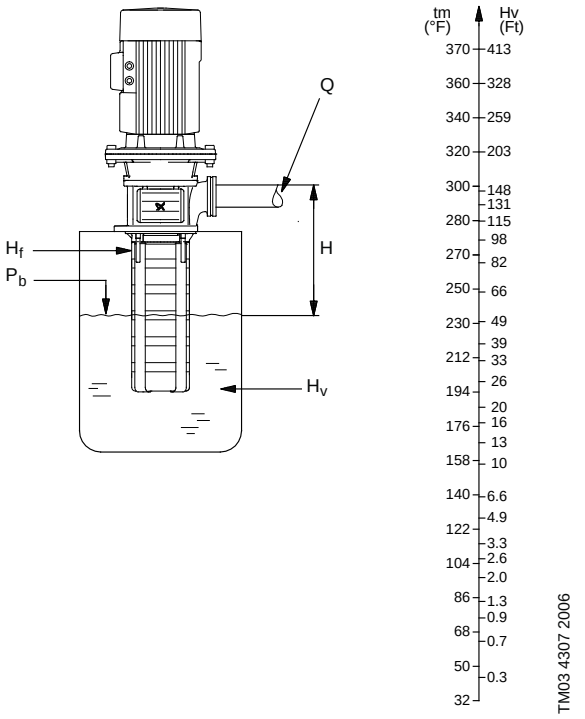


Fig. 33 Minimum inlet pressure - NPSHR

Note: In order to avoid cavitation, **never** select a pump whose duty point is too far to the right on the NPSHR curve.

Always check the NPSHR value of the pump at the highest possible flow rate.

How to read the curve charts

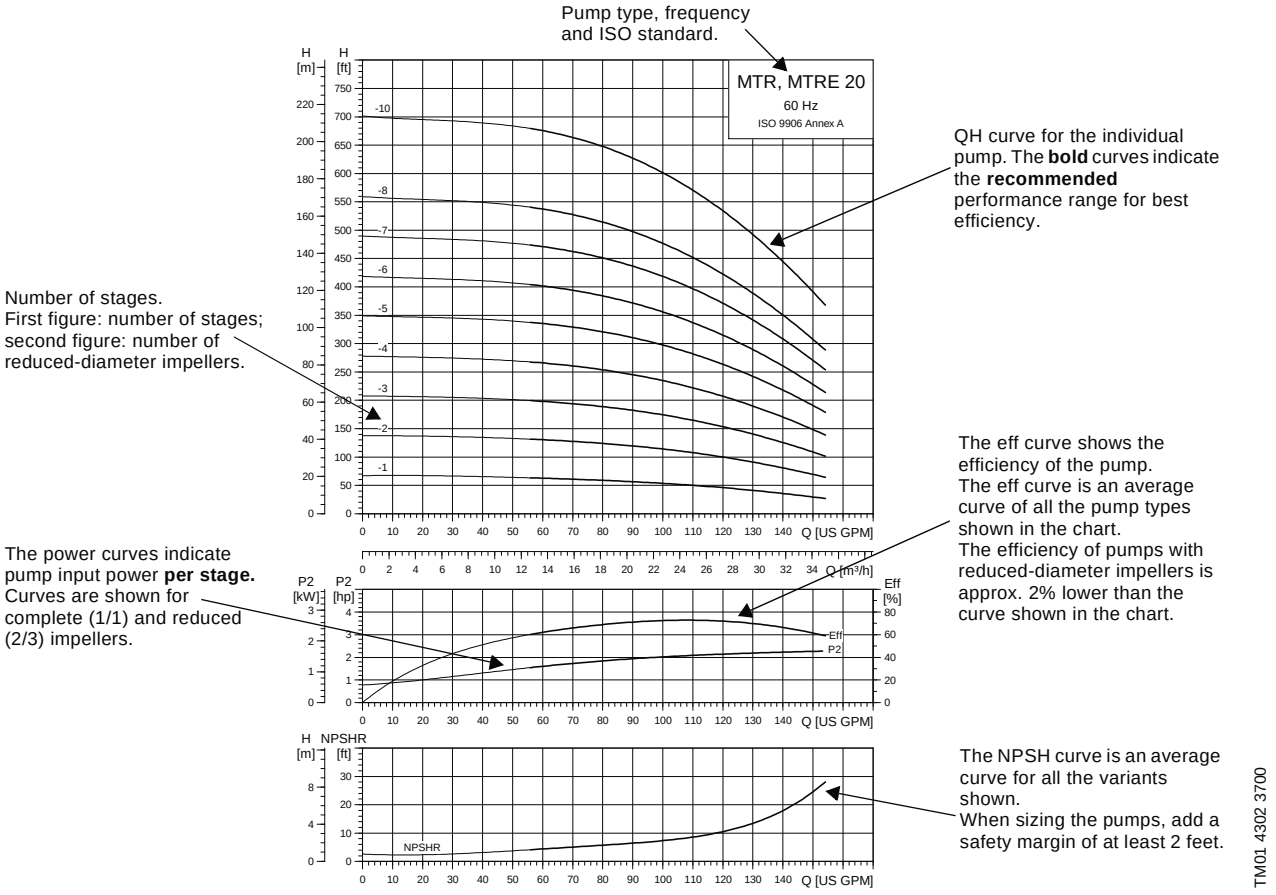


Fig. 34 Example of an MTR, MTRE curve chart

Guidelines to performance curves

The guidelines below apply to the curves shown on the following pages:

1. Tolerances to ISO 9906, Annex A, if indicated.
2. The motors used for the measurements are standard Grundfos motors (ML or MLE).
3. Measurements have been made with airless water at a temperature of 68 °F.
4. The curves apply to a kinematic viscosity of $\upsilon = 1\ mm^2/s$ (1 cSt).
5. Due to the risk of overheating, the pumps should not be used at a flow below the minimum flow rate.
6. QH curves of the individual pumps are based on current motor speeds.

The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature. Only pumps with EPDM elastomers in the shaft seals can run in the temperature range from 194 °F to 248 °F. Closed strap nuts with o-rings and plugging of the shaft seal drain hole, may also be required at temperatures above 212 °F (see page 31).

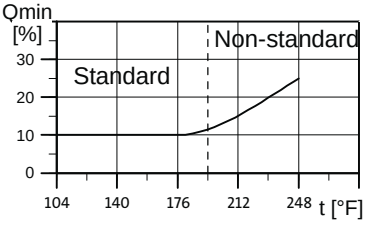
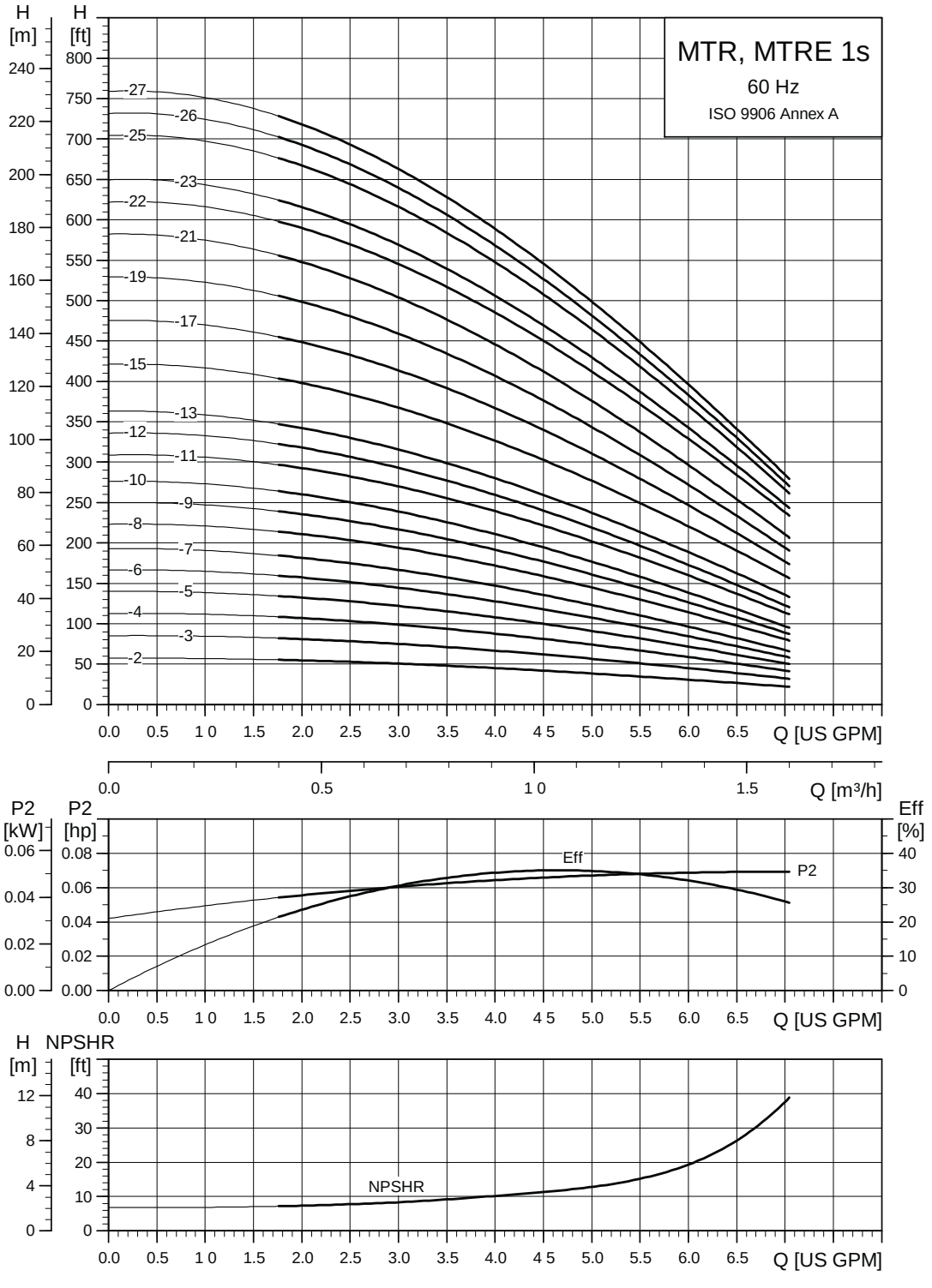


Fig. 35 Minimum flow rate

MTR, MTRI, MTRE 1s, 60 Hz



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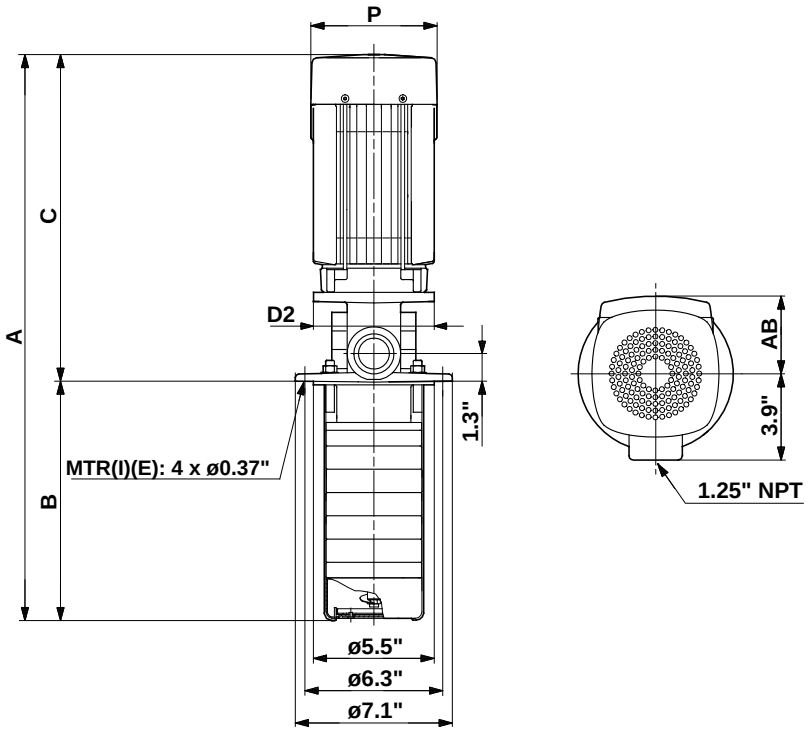
Dimensional sketches

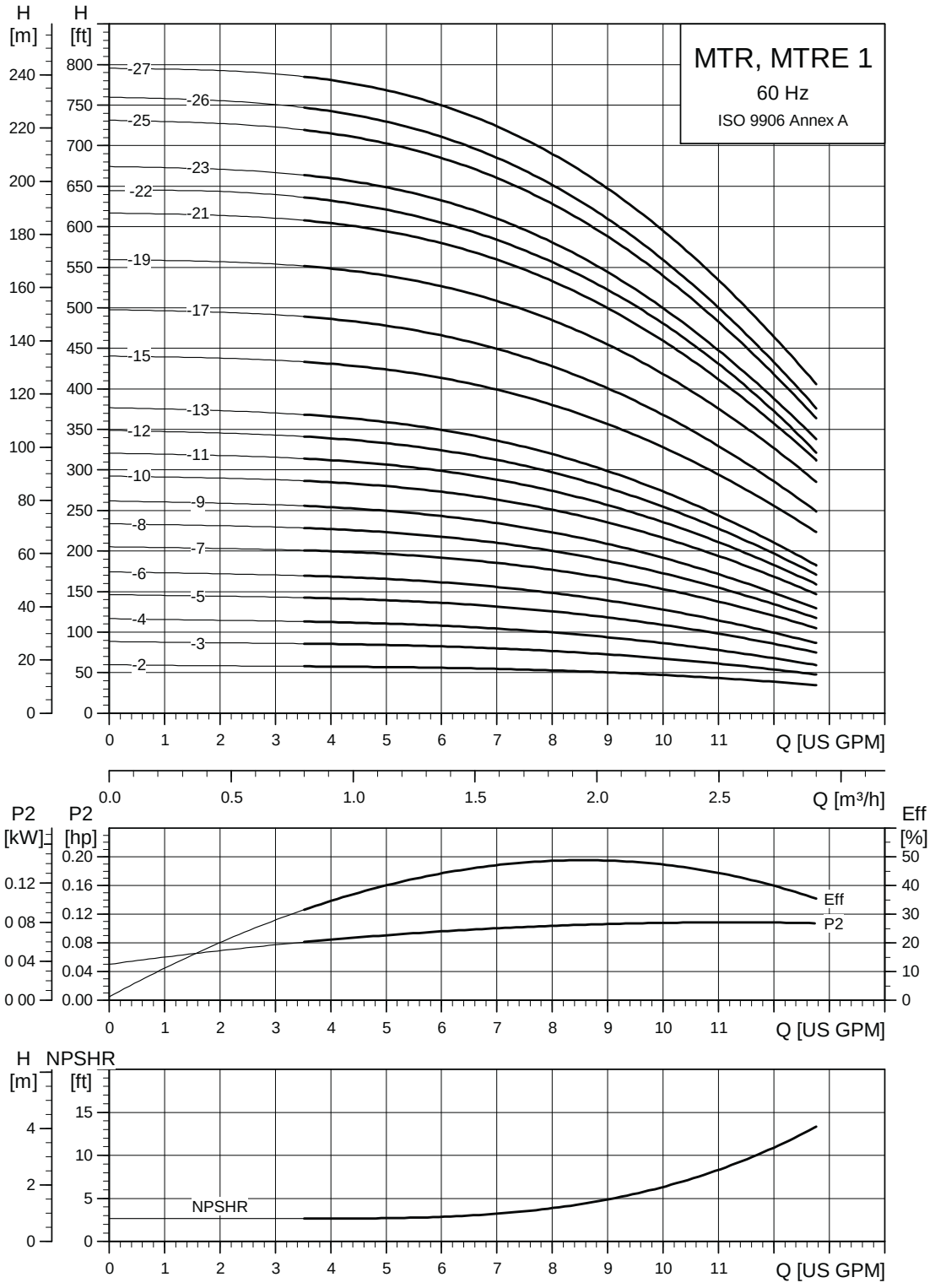


Dimensions and weights

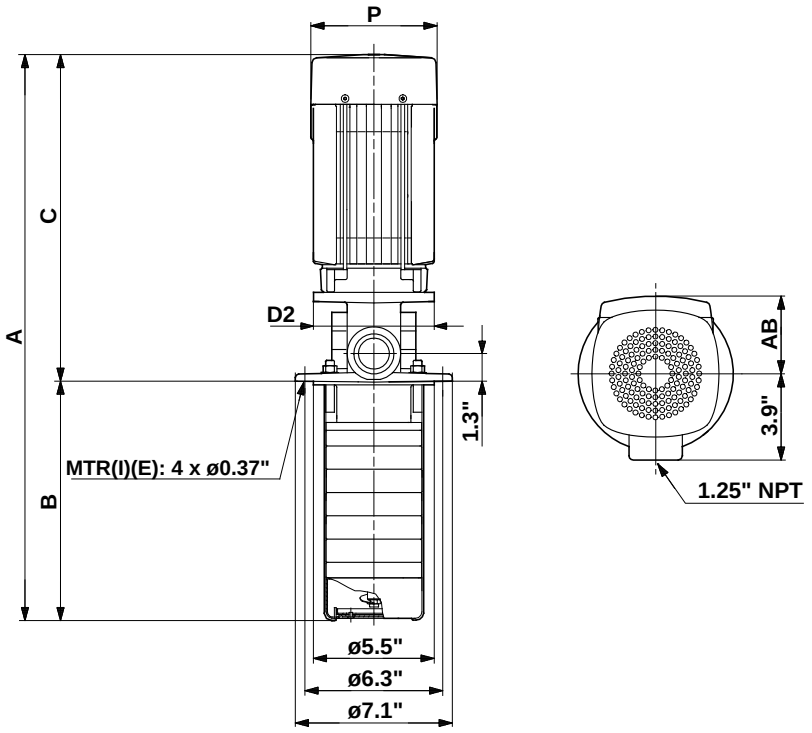
Pump type	P_2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI 1s-2/2	0.33	18.3	6.3	12.0	5.5	6.5	4.6	27	-	-	-	-	-	-	-
MTR, MTRI 1s-3/3	0.33	19.0	7.0	12.0	5.5	6.5	4.6	28	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-4/4	0.33	19.7	7.7	12.0	5.5	6 5	4.6	28	25.1	7.7	17.4	7.0	6.5	6.6	71
MTR, MTRI 1s-5/5	0 5	20.4	8.4	12.0	5.5	6.5	4.6	29	-	-	-	-	-	-	-
MTR, MTRI 1s-6/6	0 5	21.1	9.1	12.0	5.5	6.5	4.6	30	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-7/7	0 5	21.8	9.8	12.0	5.5	6 5	4.6	30	27.2	9.8	17.4	7.0	6.5	6.6	73
MTR, MTRI 1s-8/8	0.75	22.6	10.6	12.0	5.5	6.5	4.6	32	-	-	-	-	-	-	-
MTR, MTRI 1s-9/9	0.75	23.3	11.3	12.0	5.5	6.5	4.6	33	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-10/10	0.75	24	12.0	12.0	5.5	6 5	4.6	33	29.4	12	17.4	7.0	6.5	6.6	76
MTR, MTRI 1s-11/11	0.75	24.7	12.7	12.0	5.5	6.5	4.6	36	-	-	-	-	-	-	-
MTR, MTRI 1s-12/12	1 0	25.4	13.4	12.0	5.5	6.5	4.6	36	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-13/13	1 0	26.1	14.1	12.0	5.5	6 5	4.6	35	31.5	14.1	17.4	7.0	6.5	6.6	79
MTR, MTRI 1s-15/15	1 5	28.7	15.5	13.2	5.5	6.5	4.3	41	-	-	-	-	-	-	-
MTR, MTRI 1s-17/17	1 5	30.1	16.9	13.2	5.5	6.5	4.3	43	-	-	-	-	-	-	-
MTR, MTRI 1s-19/19	1 5	31.6	18.4	13.2	5.5	6.5	4.3	44	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-21/21	1 5	33.0	19.8	13.2	5.5	6 5	4.3	45	37.2	19.8	17.4	7.0	6.5	6.6	91
MTR, MTRI 1s-22/22	2 0	36.3	20.5	15.8	7.0	6.5	4.3	60	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-23/23	2 0	37.0	21.2	15.8	7.0	6 5	4.3	61	38.6	21.2	17.4	7.0	6.5	6.6	85
MTR, MTRI 1s-25/25	2 0	38.4	22.6	15.8	7.0	6.5	4.3	62	-	-	-	-	-	-	-
MTR, MTRI 1s-26/26	2 0	39.1	23.3	15.8	7.0	6.5	4.3	63	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1s-27/27	2 0	39.8	24	15.8	7.0	6 5	4.3	64	41.4	24	17.4	7.0	6.5	6.6	92

For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 1, 60 Hz



Dimensional sketches

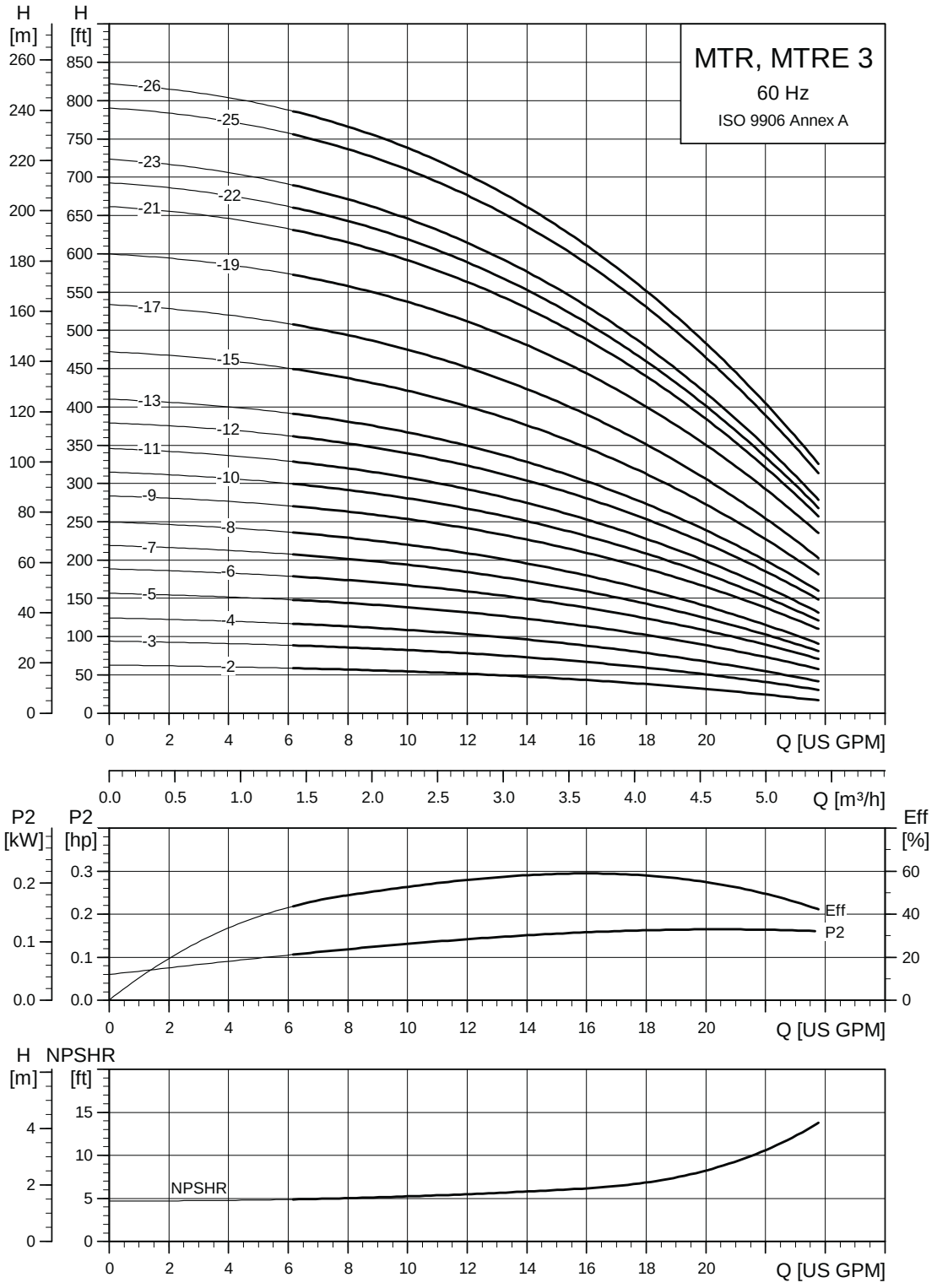


Dimensions and weights

Pump type	P_2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI 1-2/2	0 33	18.3	6.3	12.0	5.5	6.5	4.6	27	-	-	-	-	-	-	-
MTR, MTRI 1-3/3	0.5	19.0	7.0	12.0	5.5	6.5	4.6	28	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-4/4	0.5	19.7	7.7	12.0	5.5	6.5	4.6	28	25.1	7.7	17.4	7.0	6.5	6 6	71
MTR, MTRI 1-5/5	0.75	20.4	8.4	12.0	5.5	6.5	4.6	30	-	-	-	-	-	-	-
MTR, MTRI 1-6/6	0.75	21.1	9.1	12.0	5.5	6.5	4.6	31	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-7/7	0.75	21.8	9.8	12.0	5.5	6.5	4.6	33.	27.2	9.8	17.4	7 0	6.5	6 6	73
MTR, MTRI 1-8/8	1	22.6	10.6	12.0	5.5	6.5	4.6	34	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-9/9	1	23.3	11.3	12.0	5.5	6.5	4.6	34	28.7	11.3	17.4	7.0	6.5	6 6	77
MTR, MTRI 1-10/10	1.5	25.2	12.0	13.2	5.5	6.5	4.3	38	-	-	-	-	-	-	-
MTR, MTRI 1-11/11	1.5	25.9	12.7	13.2	5.5	6.5	4.3	39	-	-	-	-	-	-	-
MTR, MTRI 1-12/12	1.5	26.6	13.4	13.2	5.5	6.5	4.3	40	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-13/13	1.5	27.3	14.1	13.2	5.5	6.5	4.3	40	31.5	14.1	17.4	7.0	6.5	6 6	84
MTR, MTRI 1-15/15	2	31.3	15.5	15.8	7.0	6.5	4.3	56	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-17/17	2	32.7	16.9	15.8	7.0	6.5	4.3	57	34.3	16.9	17.4	7.0	6.5	6 6	81
MTR, MTRI 1-19/19	3	36.2	18.4	17.8	7.0	9.8	4.3	66	-	-	-	-	-	-	-
MTR, MTRI 1-21/21	3	37.6	19.8	17.8	7.0	9.8	4.3	67	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-22/22	3	38.3	20.5	17.8	7.0	9.8	4.3	68	38.4	20.5	17.9	7.0	9.9	6 6	101
MTR, MTRI 1-23/23	3	39.0	21.2	17.8	7.0	9.8	4.3	68	-	-	-	-	-	-	-
MTR, MTRI 1-25/25	3	40.4	22.6	17.8	7.0	9.8	4.3	69	-	-	-	-	-	-	-
MTR, MTRI 1-26/26	3	41.1	23.3	17.8	7.0	9.8	4.3	70	-	-	-	-	-	-	-
MTR, MTRI, MTRE 1-27/27	3	41.8	24.0	17.8	7.0	9.8	4.3	71	41.9	24.0	17.9	7.0	9.9	6 6	109

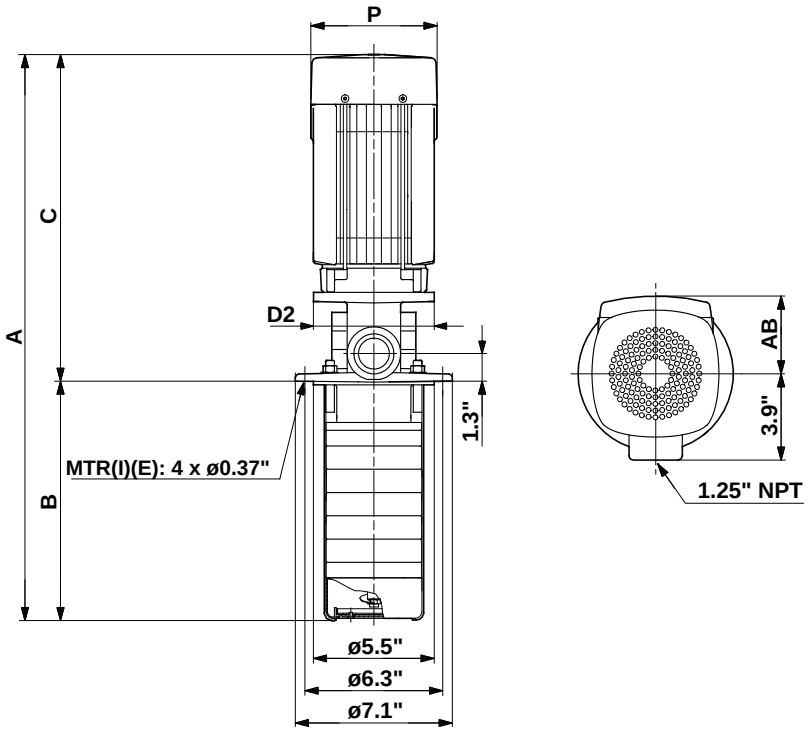
For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 3, 60 Hz



TM03 4254 2006

Dimensional sketches



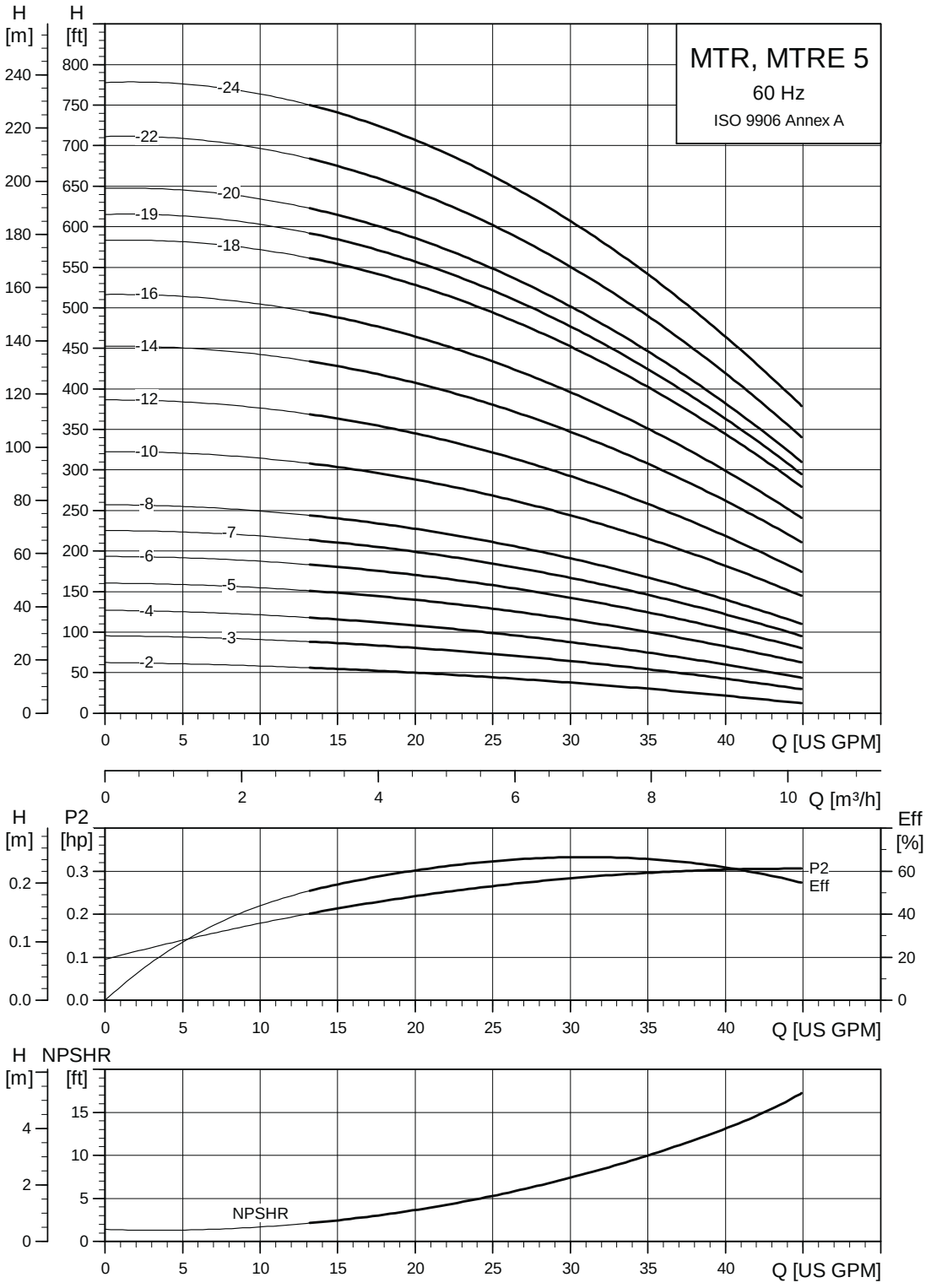
TM03 4297 2006

Dimensions and weights

Pump type	P_2 [Hp]	MTR, MTRI						Ship weight [lbs]	MTRE						Ship weight [lbs]
		Dimensions [inches]							Dimensions [inches]						
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI 3-2/2	0.5	18.3	6.3	12.0	5.5	6.5	4.6	27	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-3/3	0.5	19.0	7.0	12.0	5.5	6.5	4.6	29	24.4	7.0	17.4	7.0	6.5	6.6	70
MTR, MTRI, MTRE 3-4/4	0.75	19.7	7.7	12.0	5.5	6.5	4.6	29	25.1	7.7	17.4	7.0	6.5	6.6	71
MTR, MTRI 3-5/5	1.0	20.4	8.4	12.0	5.5	6.5	4.6	32	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-6/6	1.0	21.1	9.1	12.0	5.5	6.5	4.6	36	26.5	9.1	17.4	7.0	6.5	6.6	74
MTR, MTRI 3-7/7	1.5	23.0	9.8	13.2	5.5	6.5	4.3	36	-	-	-	-	-	-	-
MTR, MTRI 3-8/8	1.5	23.8	10.6	13.2	5.5	6.5	4.3	37	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-9/9	1.5	24.5	11.3	13.2	5.5	6.5	4.3	53	28.7	11.3	17.4	7.0	6.5	6.6	80
MTR, MTRI 3-10/10	2.0	27.8	12.0	15.8	7.0	6.5	4.3	54	-	-	-	-	-	-	-
MTR, MTRI 3-11/11	2.0	28.5	12.7	15.8	7.0	6.5	4.3	55	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-12/12	2.0	29.2	13.4	15.8	7.0	6.5	4.3	61	30.8	13.4	17.4	7.0	6.5	6.6	82
MTR, MTRI 3-13/13	3.0	32.0	14.1	17.9	7.0	9.8	4.3	62	-	-	-	-	-	-	-
MTR, MTRI 3-15/15	3.0	33.4	15.5	17.9	7.0	9.8	4.3	63	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-17/17	3.0	34.8	16.9	17.9	7.0	9.8	4.3	64	34.8	16.9	17 9	7.0	9.9	6.6	98
MTR, MTRI 3-19/19	5.0	38.8	18.4	20.4	8.7	9.8	5.3	80	-	-	-	-	-	-	-
MTR, MTRI 3-21/21	5.0	40.2	19.8	20.4	8.7	9.8	5.3	82	-	-	-	-	-	-	-
MTR, MTRI 3-22/22	5.0	38.9	20.5	20.4	8.7	9.8	5.3	82	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-23/23	5.0	41.6	21.2	20.4	8.7	9.8	5.3	83	39.5	21.2	18 3	8.7	9.9	7.4	143
MTR, MTRI 3-25/25	5.0	43.0	22.6	20.4	8.7	9.8	5.3	90	-	-	-	-	-	-	-
MTR, MTRI, MTRE 3-26/26	5.0	43.7	23.3	20.4	8.7	9.8	5.3	91	41.6	23.3	18 3	8.7	9.9	7.4	155

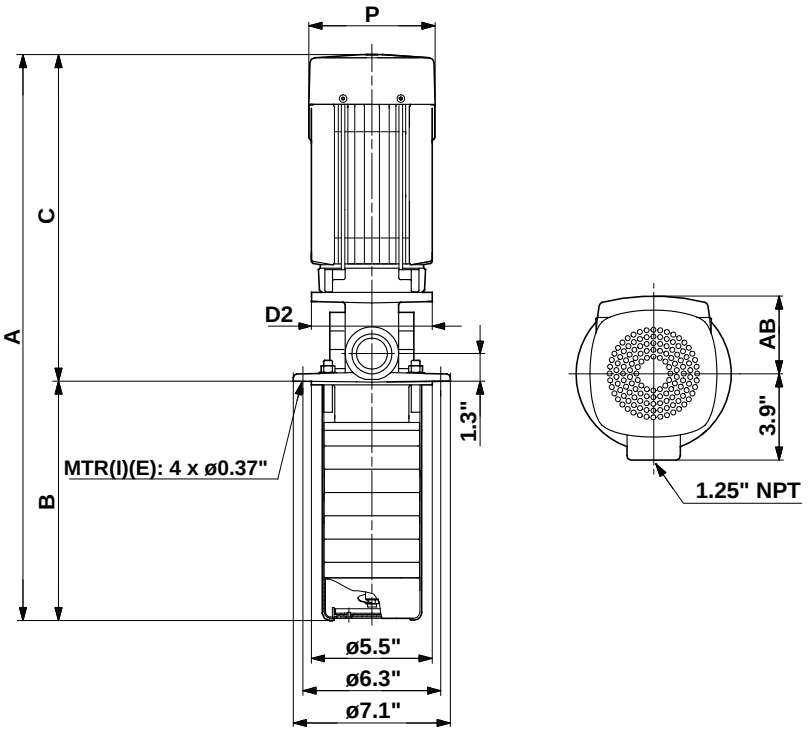
For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 5, 60 Hz



TM03 4255 2006

Dimensional sketches



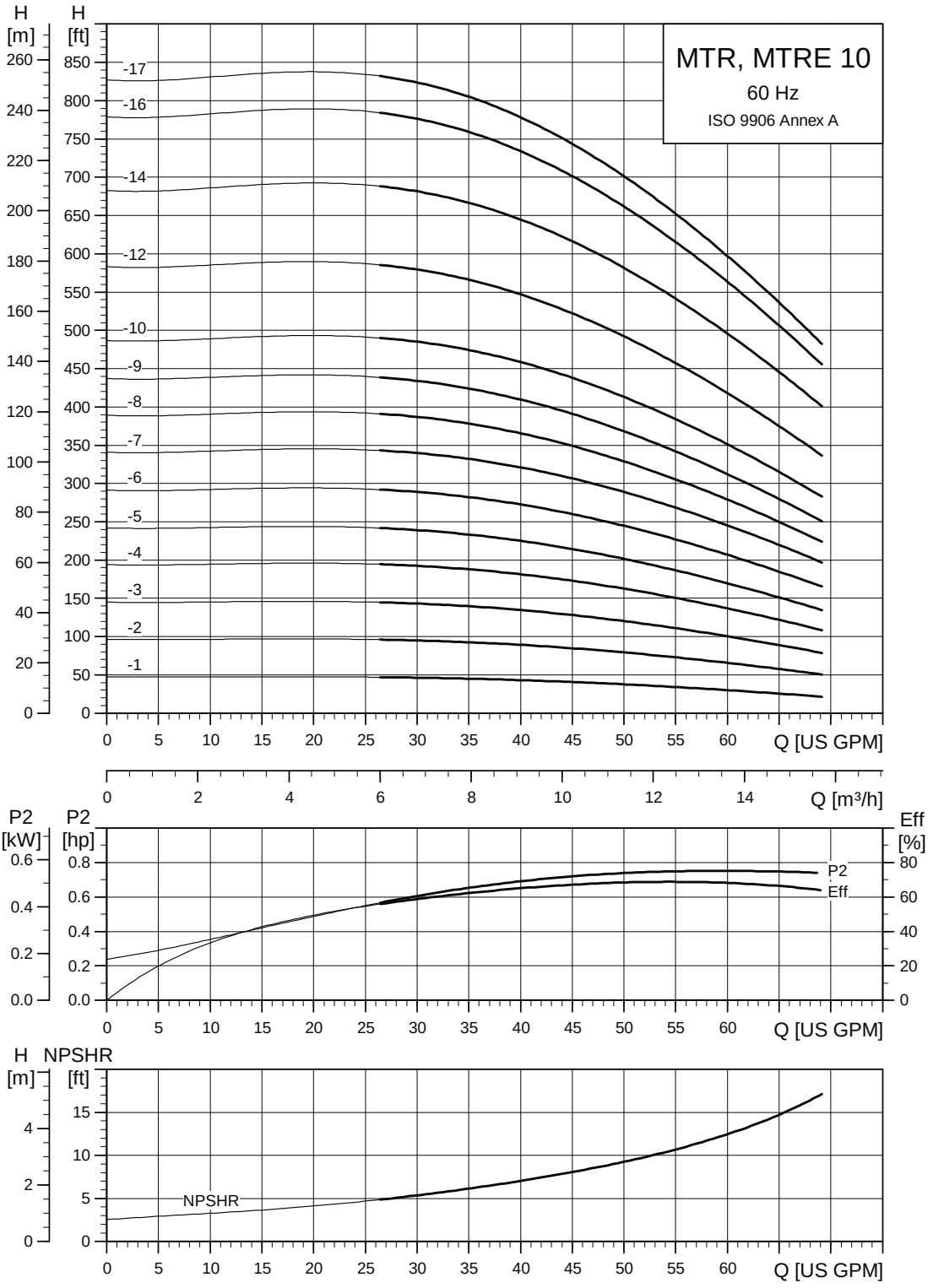
TM03 4297 2006

Dimensions and weights

Pump type	P_2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI 5-2/2	0.75	18.7	6.7	12.0	5.5	6.5	4.6	28	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-3/3	1.0	19.7	7.7	12.0	5.5	6.5	4.6	34	25.1	7.7	17.4	7.0	6.5	6.6	76
MTR, MTRI 5-4/4	1.5	22.0	8.8	13.2	5.5	6.5	4.3	35	-	-	-	-	-	-	-
MTR, MTRI 5-5/5	2.0	25.6	9.8	15.8	7.0	6.5	4.3	55	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-6/6	2.0	26.7	10.9	15.8	7.0	6.5	4.3	62	28.3	10.9	17.4	7 0	6.5	6.6	82
MTR, MTRI 5-7/7	3.0	29.8	12.0	17.9	7.0	9.8	4.3	62	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-8/8	3.0	30.8	13.0	17.9	7.0	9.8	4.3	63	30.9	13	17.9	7 0	9.9	6.6	95
MTR, MTRI 5-10/10	5.0	35.6	15.2	20.4	8.7	9.8	5.3	73	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-12/12	5.0	37.7	17.3	20.4	8.7	9.8	5.3	74	35.6	17.3	18.3	8.7	9.9	7.4	135
MTR, MTRI 5-14/14	5.0	39.8	19.4	20.4	8.7	9.8	5.3	80	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-16/16	5.0	41.9	21.5	20.4	8.7	9.8	5.3	82	39.8	21.5	18.3	8.7	9.9	7.4	146
MTR, MTRI 5-18/18	7.5	44.6	23.7	20.9	8.7	9.8	5.3	96	-	-	-	-	-	-	-
MTR, MTRI 5-19/19	7.5	45.6	24.7	20.9	8.7	9.8	5.3	97	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-20/20	7.5	46.7	25.8	20.9	8.7	9.8	5.3	98	44.7	25.8	18.9	8.7	9.9	7.4	120
MTR, MTRI 5-22/22	7.5	48.8	27.9	20.9	8.7	9.8	5.3	100	-	-	-	-	-	-	-
MTR, MTRI, MTRE 5-24/24	7.5	50.9	30.0	20.9	8.7	9.8	5.3	102	48.9	30	18.9	8.7	9.9	7.4	124

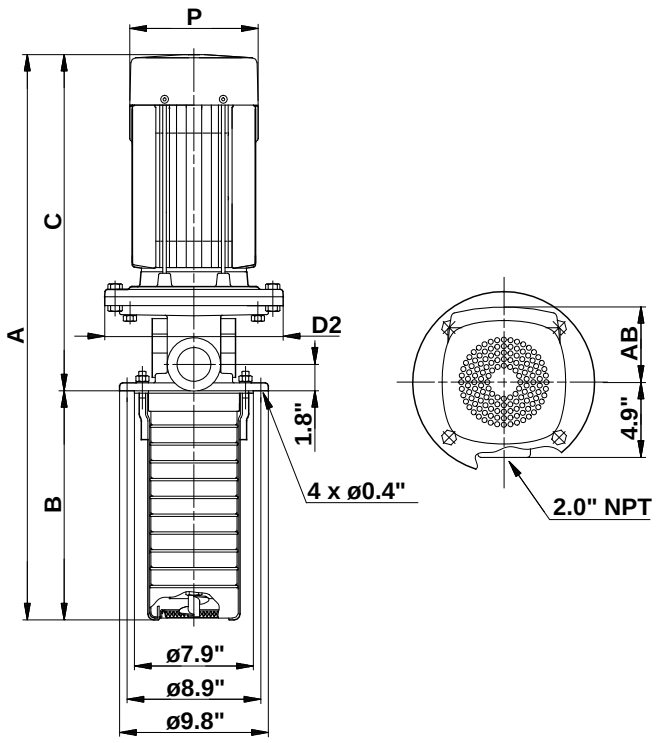
For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 10, 60 Hz



TM03 4256 2006

Dimensional sketches



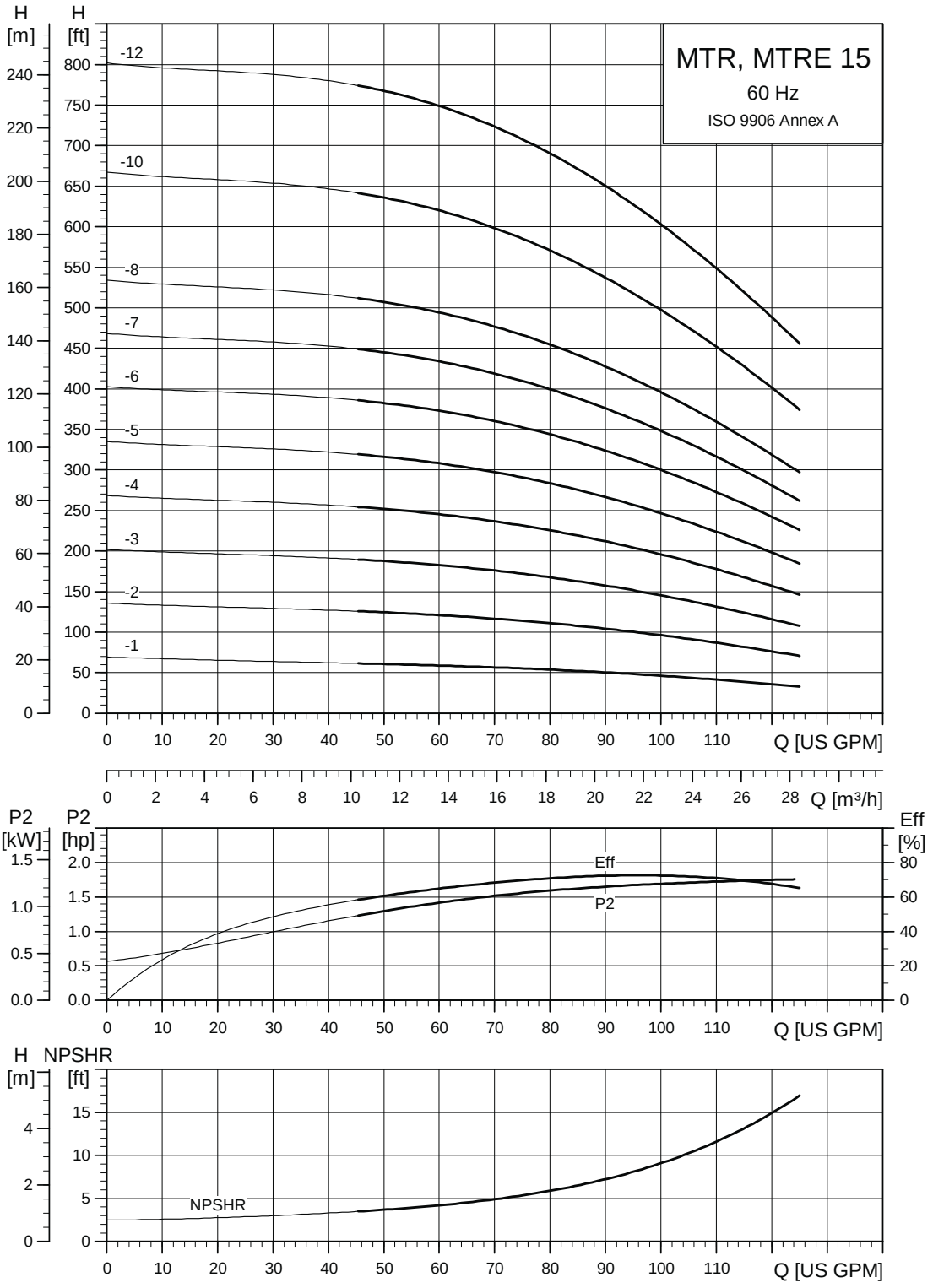
TM03 4298 2006

Dimensions and weights

Pump type	P_2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI 10-2/1	1.0	18.9	5.8	13.1	5.5	6.5	4 6	84	-	-	-	-	-	-	-
MTR, MTRI, MTRE 10-2/2	2.0	22.7	5.8	16.9	7.0	6.5	4 3	91	24.3	5.8	18.5	7.0	6.5	6.6	107
MTR, MTRI, MTRE 10-3/3	3.0	26.9	7.0	19.9	7.0	9.8	4 3	100	27.5	7.0	20.5	7.0	9.9	6 6	125
MTR, MTRI 10-4/4	5.0	30.5	8.2	22.3	8.7	9.8	5 3	109	-	-	-	-	-	-	-
MTR, MTRI, MTRE 10-5/5	5.0	31.7	9.4	22.3	8.7	9.8	5 3	113	30.2	9.4	20.8	8.7	9.9	7.4	165
MTR, MTRI, MTRE 10-6/6	5.0	32.9	10.6	22.3	8.7	9.8	5 3	115	31.4	10.6	20.8	8.7	9.9	7.4	167
MTR, MTRI 10-7/7	7.5	34.7	11.7	23.0	8.7	9.8	5 3	175	-	-	-	-	-	-	-
MTR, MTRI, MTRE 10-8/8	7.5	35.9	12.9	23.0	8.7	9.8	5 3	177	34.9	12.9	22.0	8.7	9.9	7.4	186
MTR, MTRI, MTRE 10-9/9	7.5	37.1	14.1	23.0	8.7	9.8	5 3	188	36.1	14.1	22.0	8.7	9.9	7.4	197
MTR, MTRI, MTRE 10-10/10	10.0	38.3	15.3	23.0	8.7	9.8	5 3	190	37.3	15.3	22.0	8.7	9.9	7.4	207
MTR, MTRI, MTRE 10-12/12	10.0	40.6	17.6	23.0	8.7	9.8	5 3	192	39.6	17.6	22.0	8.7	9.9	7.4	209
MTR, MTRI 10-14/14	15.0	45.3	20.0	25.3	10 2	9.8	8.7	261	-	-	-	-	-	-	-
MTR, MTRI 10-16/16	15.0	47.7	22.4	25.3	10 2	9.8	8.7	263	-	-	-	-	-	-	-
MTR, MTRI 10-18/17	15.0	50.0	24.7	25.3	10 2	9.8	8.7	267	-	-	-	-	-	-	-
MTR, MTRI 10-20/17	15.0	52.4	27.1	25.3	10 2	9.8	8.7	269	-	-	-	-	-	-	-
MTR, MTRI 10-22/17	15.0	54.8	29.5	25.3	10 2	9.8	8.7	272	-	-	-	-	-	-	-

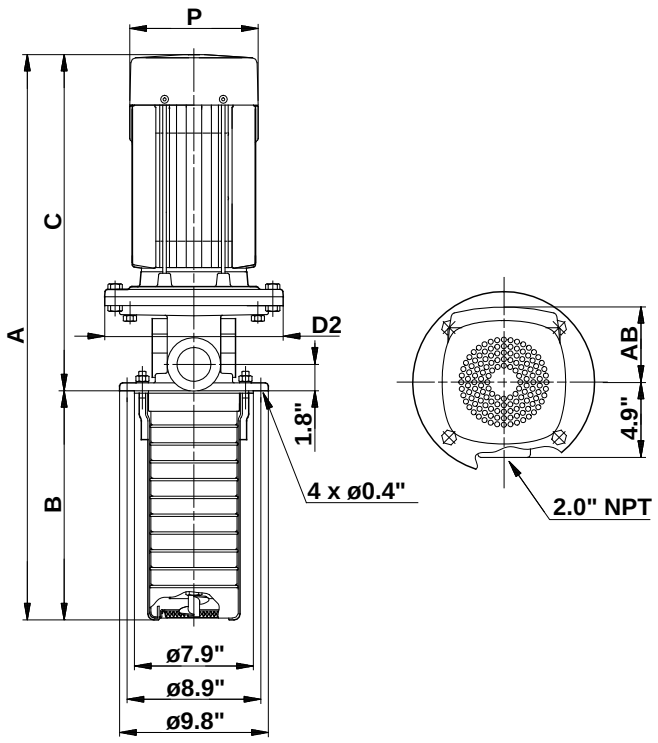
For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 15, 60 Hz



TM03 4257 2006

Dimensional sketches



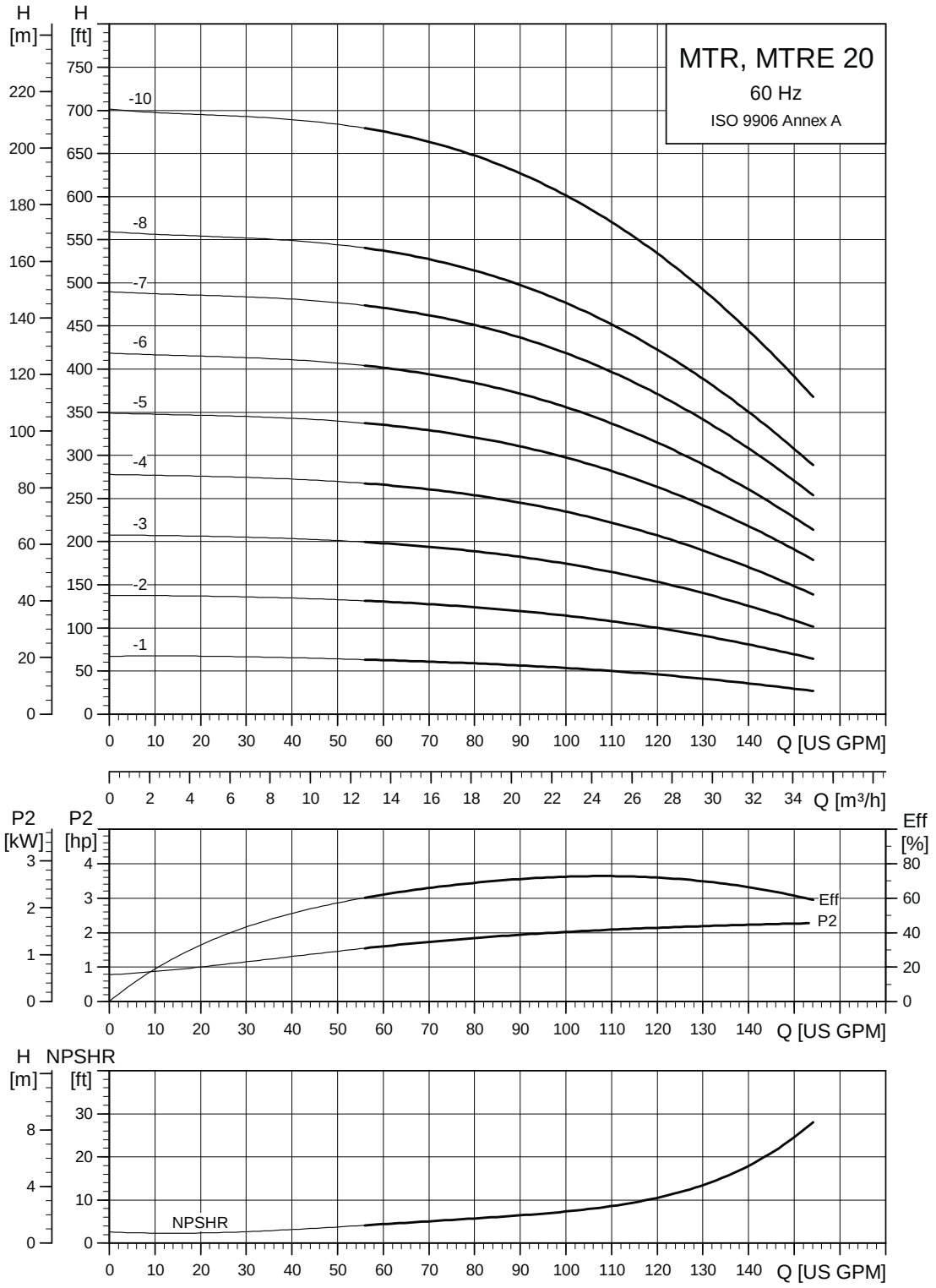
TM03 4298 2006

Dimensions and weights

Pump type	P2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI, MTRE 15-2/1	2.0	23.9	7.0	16.9	7.0	6.5	4.3	86	25.5	7.0	18.5	7.0	6.5	6.6	103
MTR, MTRI, MTRE 15-2/2	5.0	29.3	7.0	22.3	8.7	9.8	5.3	124	27.8	7.0	20.8	8.7	9.9	7.4	176
MTR, MTRI, MTRE 15-3/3	7.5	31.9	8.9	23.0	8.7	9.8	5.3	131	30.9	8.9	22	8.7	9.9	7.4	140
MTR, MTRI, MTRE 15-4/4	7.5	33.6	10.6	23.0	8.7	9.8	5.3	175	32.6	10.6	22	8.7	9.9	7.4	184
MTR, MTRI, MTRE 15-5/5	10.0	35.3	12.3	23.0	8.7	9.8	5.3	186	34.3	12.3	22	8.7	9.9	7.4	202
MTR, MTRI 15-6/6	15.0	39.4	14.1	25.3	10.2	9.8	8.7	254	-	-	-	-	-	-	-
MTR, MTRI 15-7/7	15.0	41.2	15.9	25.3	10.2	9.8	8.7	256	-	-	-	-	-	-	-
MTR, MTRI 15-8/8	15.0	42.9	17.6	25.3	10.2	9.8	8.7	258	-	-	-	-	-	-	-
MTR, MTRI 15-10/10	20.0	46.5	21.2	25.3	10.2	9.8	8.7	360	-	-	-	-	-	-	-
MTR, MTRI 15-12/12	25.0	50.8	24.7	26.1	12.6	11.3	11.6	364	-	-	-	-	-	-	-
MTR, MTRI 15-14/12	25.0	54.4	28.3	26.1	12.6	11.3	11.6	375	-	-	-	-	-	-	-
MTR, MTRI 15-16/12	25.0	57.9	31.8	26.1	12.6	11.3	11.6	380	-	-	-	-	-	-	-
MTR, MTRI 15-17/12	25.0	59.7	33.6	26.1	12.6	11.3	11.6	382	-	-	-	-	-	-	-

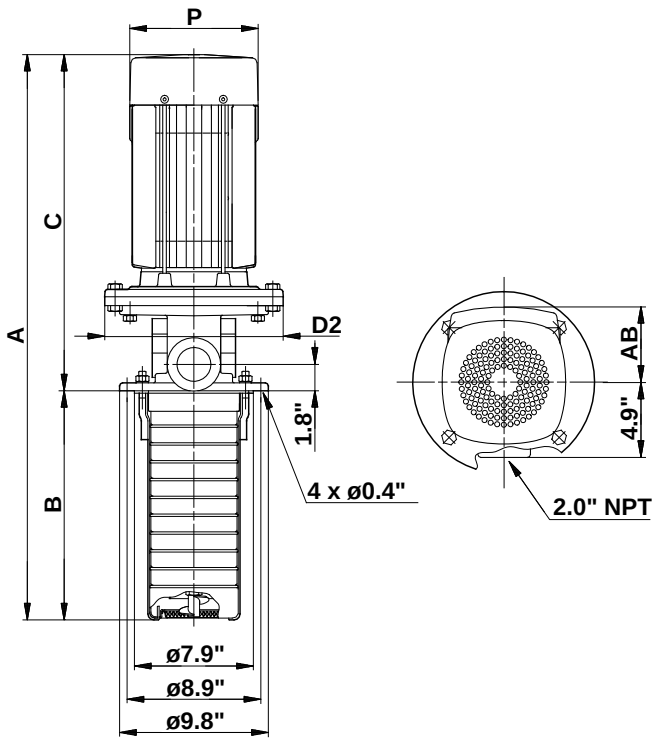
For information about electrical data see "Motor data" on page 70-71.

MTR, MTRI, MTRE 20, 60 Hz



TM03 4258 2006

Dimensional sketches



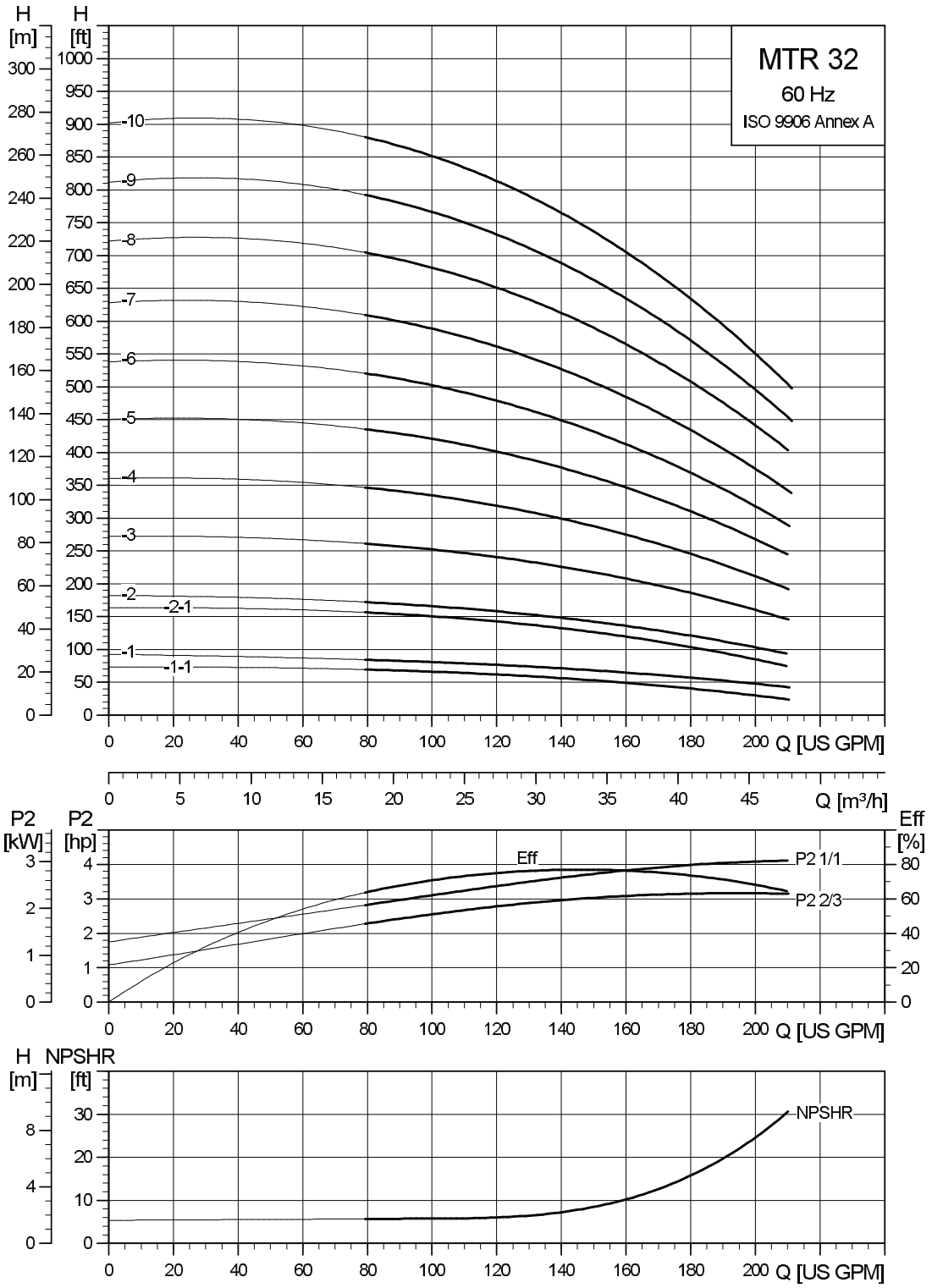
TM03 4298 2006

Dimensions and weights

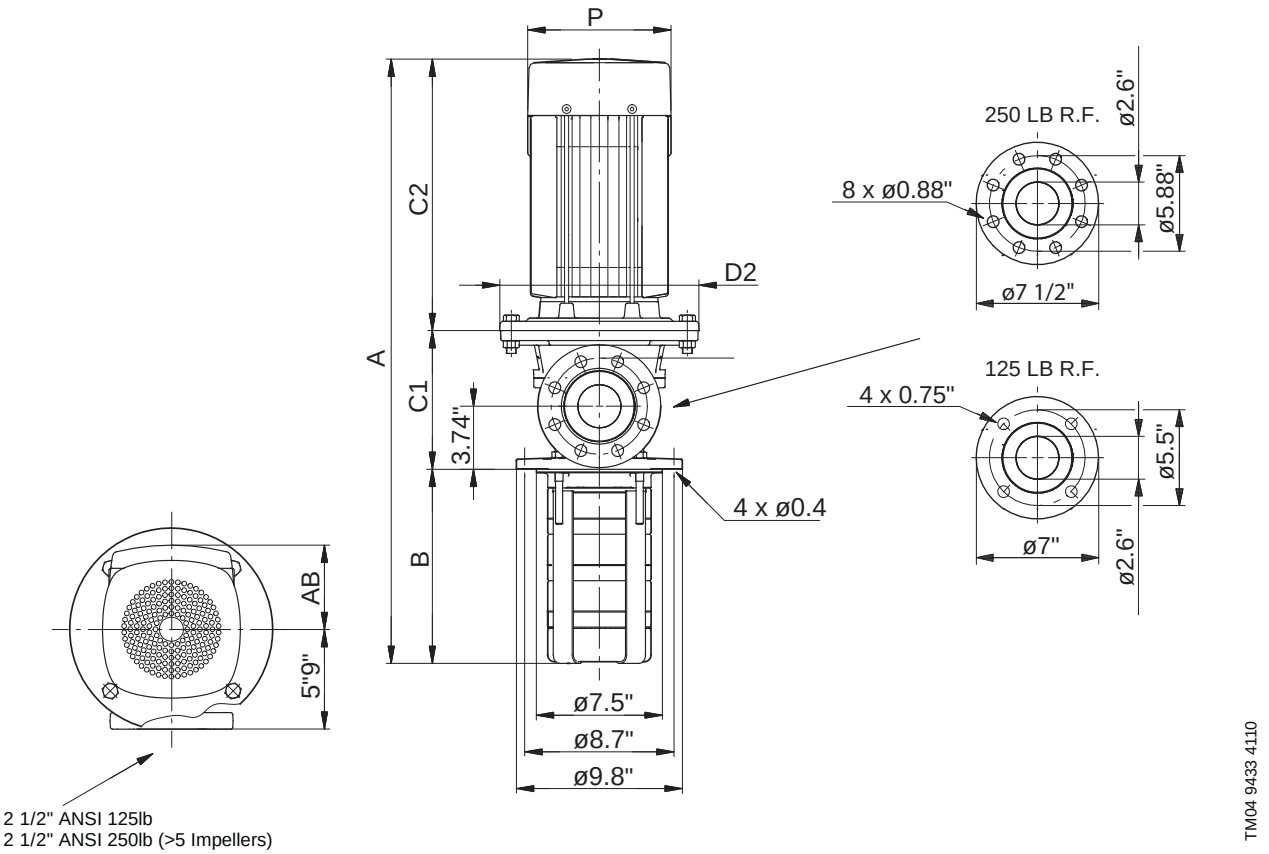
Pump type	P2 [Hp]	MTR, MTRI							MTRE						
		Dimensions [inches]						Ship weight [lbs]	Dimensions [inches]						Ship weight [lbs]
		A	B	C	P	D2	AB		A	B	C	P	D2	AB	
MTR, MTRI, MTRE 20-2/1	3 0	26.9	7.0	19 9	7.0	9.8	4.3	122	27.5	7.0	20.5	7.0	9.9	6.6	147
MTR, MTRI, MTRE 20-2/2	5 0	29.3	7.0	22 3	8.7	9.8	5.3	126	27.8	7.0	20.8	8.7	9.9	7.4	178
MTR, MTRI, MTRE 20-3/3	7 5	31.8	8.8	23 0	8.7	9.8	5.3	164	30.8	8.8	22.0	8.7	9.9	7.4	173
MTR, MTRI, MTRE 20-4/4	10.0	33.6	10.6	23 0	8.7	9.8	5.3	183	32.6	10.6	22.0	8.7	9.9	7.4	200
MTR, MTRI 20-5/5	15.0	37.6	12.3	25 3	10.2	9.8	8.7	250	-	-	-	-	-	-	-
MTR, MTRI 20-6/6	15.0	39.4	14.1	25 3	10.2	9.8	8.7	252	-	-	-	-	-	-	-
MTR, MTRI 20-7/7	20.0	41.2	15.9	25 3	10.2	9.8	8.7	351	-	-	-	-	-	-	-
MTR, MTRI 20-8/8	20.0	42.9	17.6	25 3	10.2	9.8	8.7	353	-	-	-	-	-	-	-
MTR, MTRI 20-10/10	25.0	47.3	21.2	26.1	12.6	11.3	11.6	380	-	-	-	-	-	-	-
MTR, MTRI 20-12/10	25.0	50.8	24.7	26.1	12.6	11.3	11.6	386	-	-	-	-	-	-	-
MTR, MTRI 20-14/10	25.0	54.4	28.3	26.1	12.6	11.3	11.6	391	-	-	-	-	-	-	-
MTR, MTRI 20-16/10	25.0	57.9	31.8	26.1	12.6	11.3	11.6	402	-	-	-	-	-	-	-
MTR, MTRI 20-17/10	25.0	59.7	33.6	26.1	12.6	11.3	11.6	404	-	-	-	-	-	-	-

For information about electrical data see "Motor data" on page 70-71.

MTR, MTRE 32, 60 Hz



Dimensional sketches

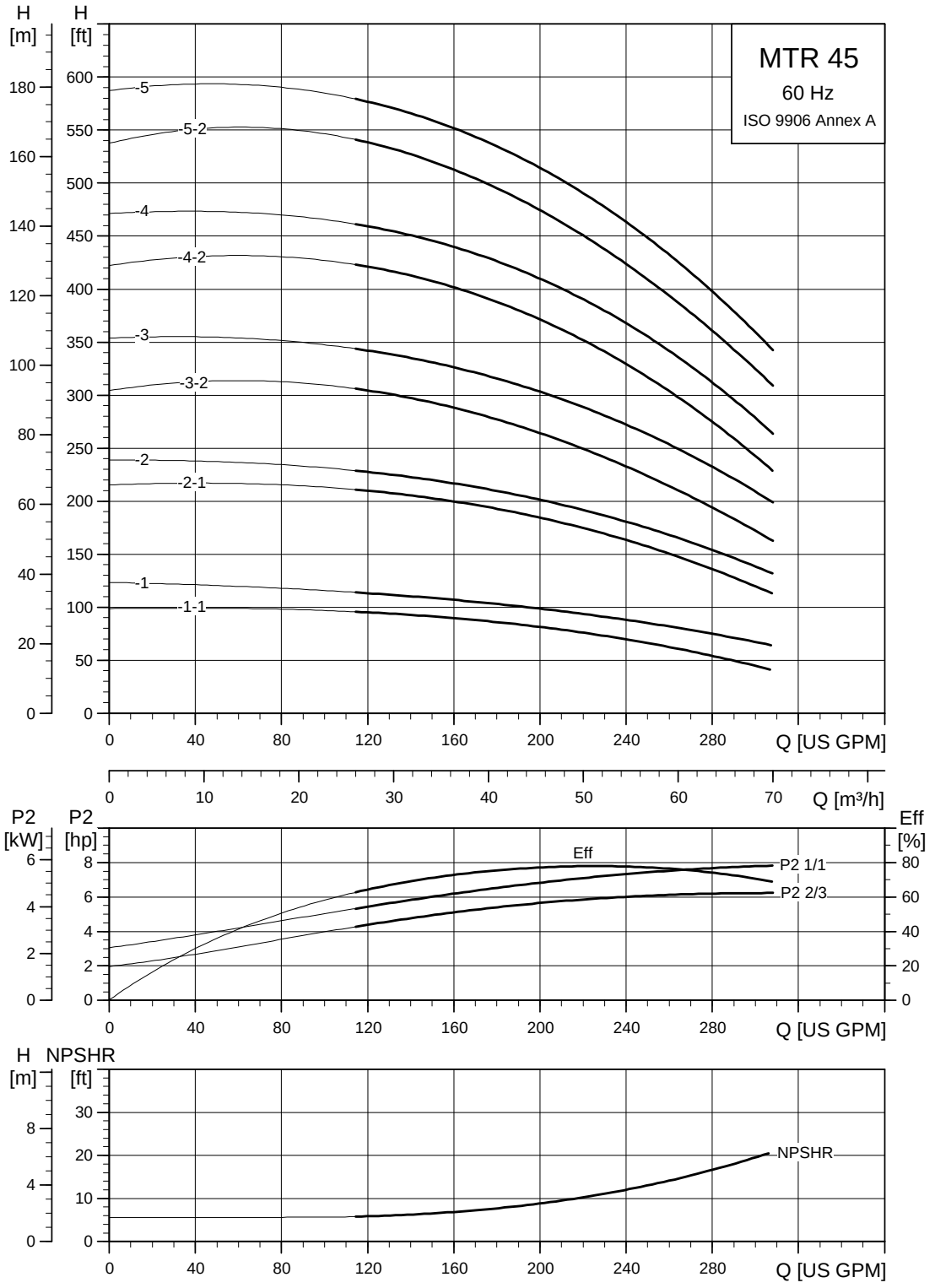


Dimensions and weights

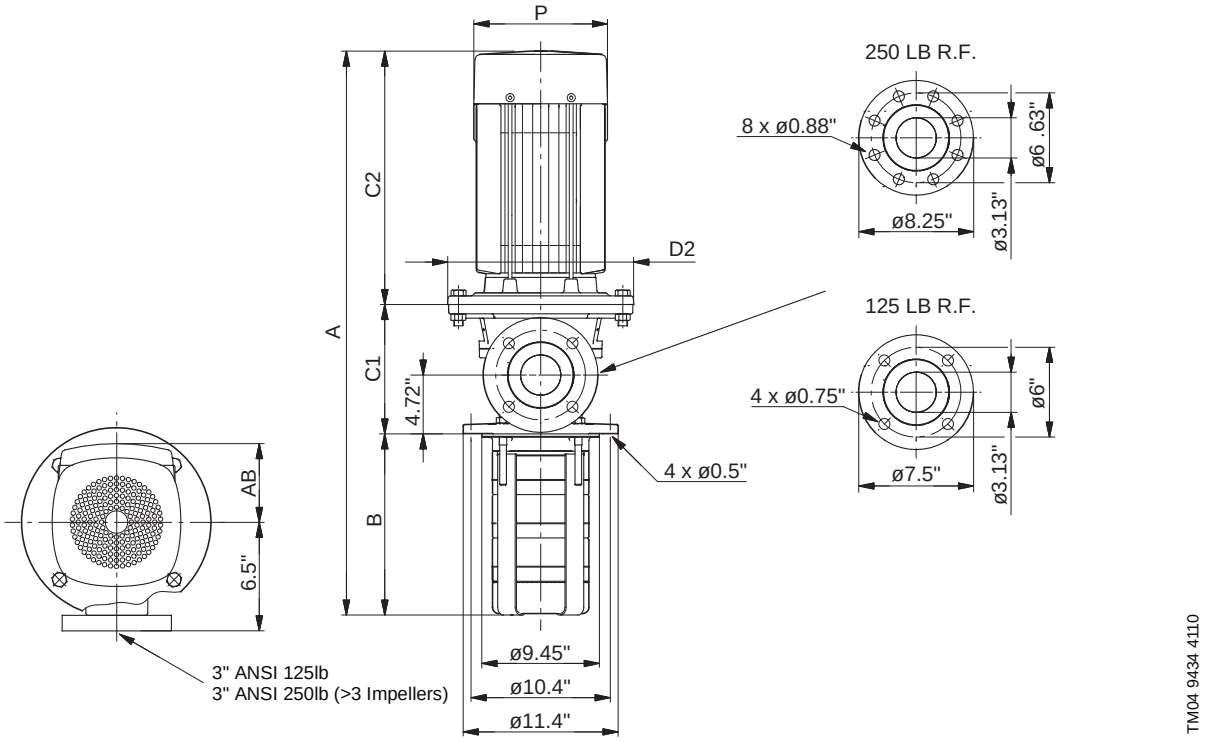
Pump type	P2 [Hp]	MTR, MTRI								MTRE							
		Dimensions [inches]							Ship weight [lbs]	Dimensions [inches]							Ship weight [lbs]
		A	B	C1	C2	P	D2	AB		A	B	C1	C2	P	D2	AB	
MTR, MTRE 32-2/1-1	5.0	32.3	8.8	8.0	15.5	8.7	9.0	5.3	192	29.8	8.8	8.0	13.0	7.0	9.0	6.6	218
MTR, MTRE 32-2/1	5.0	32.3	8.8	8.0	15.5	8.7	9.0	5.3	204	30.1	8.8	8.0	13.3	8.7	9.0	7.4	256
MTR, MTRE 32-2/2-1	7.5	32.3	8.8	8.0	15.5	8.7	9.0	5.3	228	30.1	8.8	8.0	13.3	8.7	9.0	7.4	238
MTR, MTRE 32-2/2	10.0	32.3	8.8	8.0	15.5	8.7	9.0	5.3	228	30.1	8.8	8.0	13.3	8.7	9.0	7.4	245
MTR 32-3/3	15.0	36.1	11.5	8.0	16.6	10.2	9.0	8.7	332	-	-	-	-	-	-	-	-
MTR 32-4/4	20.0	38.9	14.3	8.0	16.6	10.2	9.0	8.7	448	-	-	-	-	-	-	-	-
MTR 32-5/5	20.0	41.7	17.1	8.0	16.6	10.2	9.0	8.7	525	-	-	-	-	-	-	-	-
MTR 32-6/6	25.0	47.2	19.8	8.0	19.4	12.6	11.3	11.5	612	-	-	-	-	-	-	-	-
MTR 32-7/7	30.0	53.8	22.6	8.0	23.2	15.3	11.3	13.1	799	-	-	-	-	-	-	-	-
MTR 32-8/8	40.0	56.5	25.3	8.0	23.2	15.3	11.3	13.1	808	-	-	-	-	-	-	-	-
MTR 32-9/9	40.0	59.3	28.1	8.0	23.2	15.3	11.3	13.1	833	-	-	-	-	-	-	-	-
MTR 32-10/10	40.0	62.0	30.8	8.0	23.2	15.3	11.3	13.1	842	-	-	-	-	-	-	-	-
MTR 32-11/10	40.0	64.8	33.6	8.0	23.2	15.3	11.3	13.1	851	-	-	-	-	-	-	-	-
MTR 32-12/10	40.0	67.5	36.3	8.0	23.2	15.3	11.3	13.1	853	-	-	-	-	-	-	-	-
MTR 32-13/10	40.0	70.3	39.1	8.0	23.2	15.3	11.3	13.1	855	-	-	-	-	-	-	-	-
MTR 32-14/10	40.0	73.1	41.9	8.0	23.2	15.3	11.3	13.1	857	-	-	-	-	-	-	-	-

For information about electrical data see "Motor data" on page 70-71.

MTR, MTRE 45, 60 Hz



Dimensional sketches

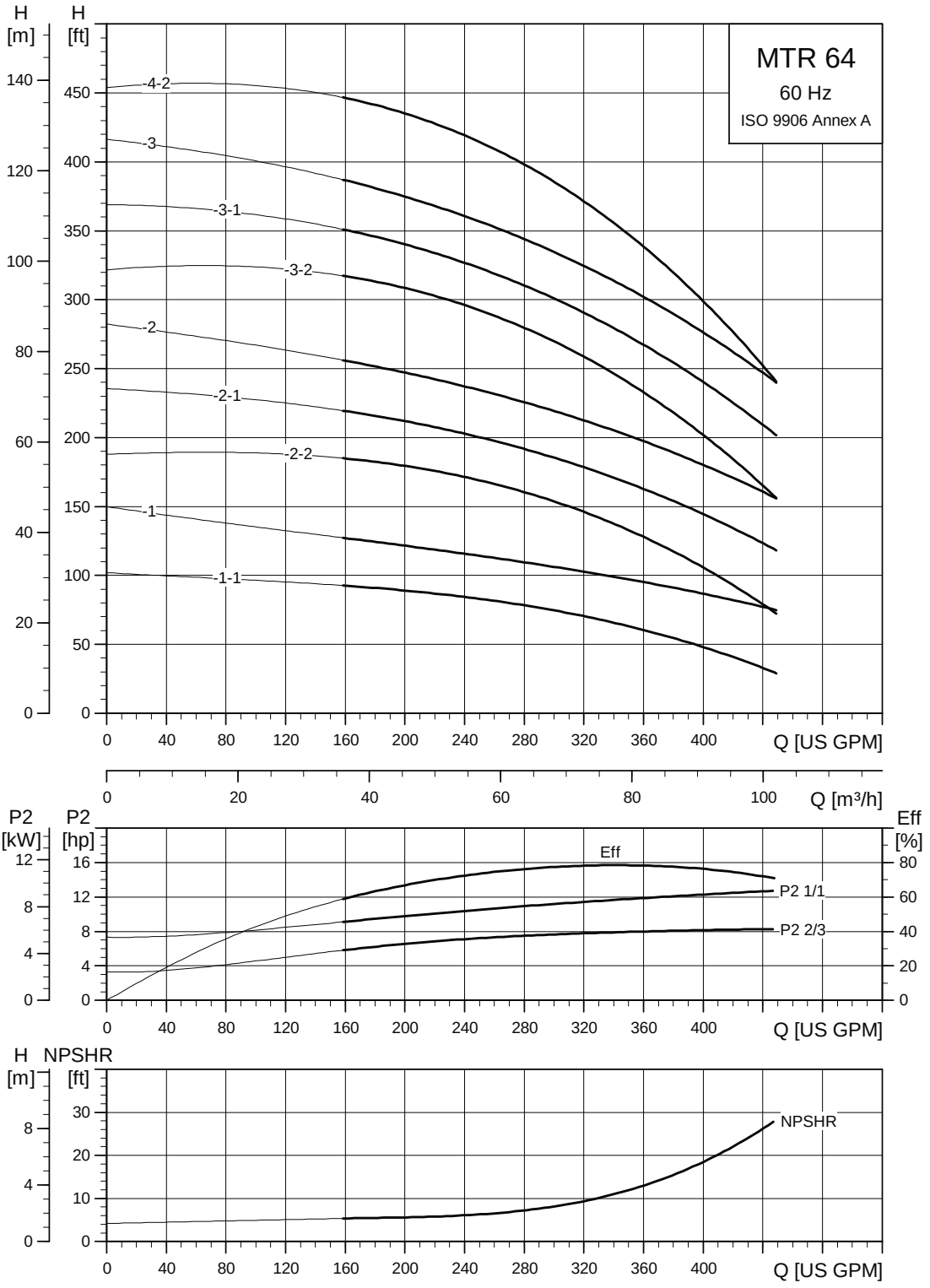


Dimensions and weights

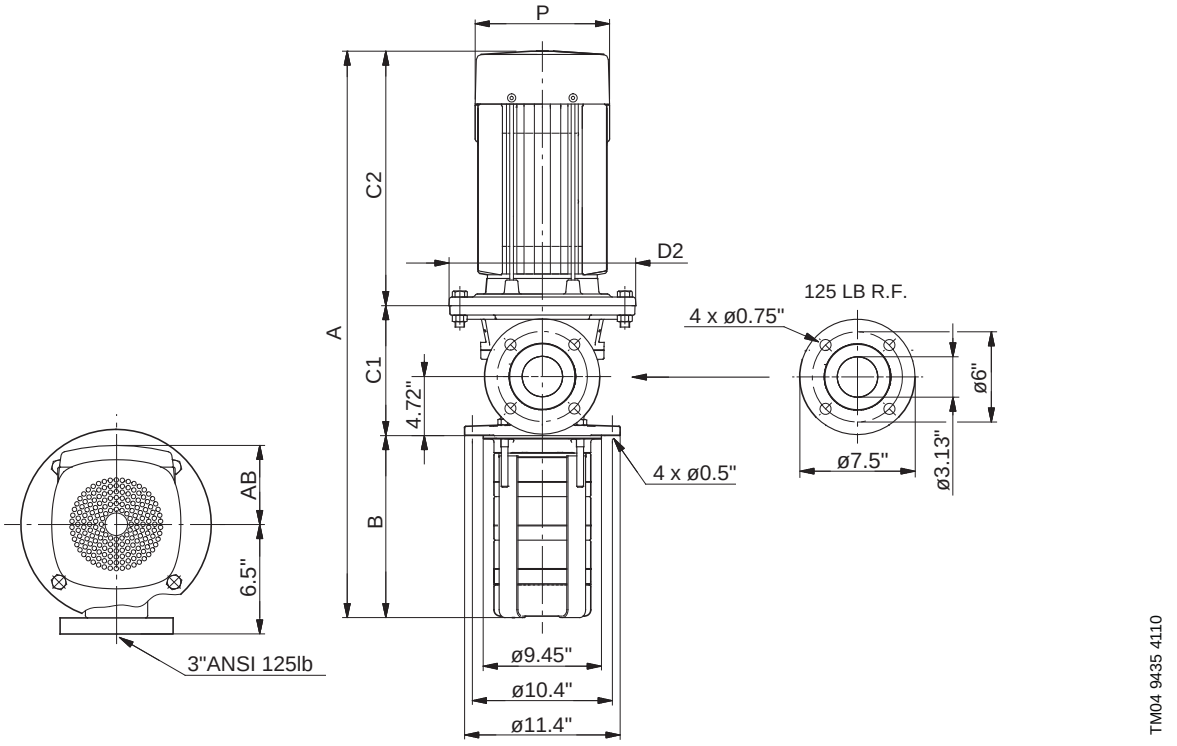
Pump type	P_2 [Hp]	MTR, MTRI								MTRE							
		Dimensions [inches]							Ship weight [lb]	Dimensions [inches]							Ship weight [lb]
		A	B	C1	C2	P	D2	AB		A	B	C1	C2	P	D2	AB	
MTR, MTRE 45-2/1-1	7 5	34.3	9.6	9.2	15.5	8.7	9.0	5.3	241	32.1	9.6	13.3	9 2	8.7	9.0	7.4	251
MTR, MTRE 45-2/1	10.0	34.3	9.6	9.2	15.5	8.7	9.0	5.3	241	32.1	9.6	13.3	9 2	8.7	9.0	7.4	251
MTR 45-2/2-1	15.0	35.4	9.6	9.2	16.6	10.2	9.0	8.7	347	-	-	-	-	-	-	-	-
MTR 45-2/2	15.0	35.4	9.6	9.2	16.6	10.2	9.0	8.7	347	-	-	-	-	-	-	-	-
MTR 45-3/3-2	20.0	38.6	12.8	9.2	16.6	10.2	9.0	8.7	495	-	-	-	-	-	-	-	-
MTR 45-3/3	25.0	41.4	12.8	9.2	19.4	12.6	11 3	11.5	582	-	-	-	-	-	-	-	-
MTR 45-4/4-2	30.0	48.3	15.9	9.2	23.2	15.3	11 3	13.1	767	-	-	-	-	-	-	-	-
MTR 45-4/4	30.0	48.3	15.9	9.2	23.2	15.3	11 3	13.1	767	-	-	-	-	-	-	-	-
MTR 45-5/5-2	40.0	51.5	19.1	9.2	23.2	15.3	11 3	13.1	769	-	-	-	-	-	-	-	-
MTR 45-5/5	40.0	51.5	19.1	9.2	23.2	15.3	11 3	13.1	823	-	-	-	-	-	-	-	-
MTR 45-6/5	40.0	54.6	22.2	9.2	23.2	15.3	11 3	13.1	825	-	-	-	-	-	-	-	-
MTR 45-7/5	40.0	57.8	25.4	9.2	23.2	15.3	11 3	13.1	827	-	-	-	-	-	-	-	-
MTR 45-8/5	40.0	60.9	28.5	9.2	23.2	15.3	11 3	13.1	829	-	-	-	-	-	-	-	-
MTR 45-9/5	40.0	64.1	31.7	9.2	23.2	15.3	11 3	13.1	831	-	-	-	-	-	-	-	-
MTR 45-10/5	40.0	67.2	34.8	9.2	23.2	15.3	11 3	13.1	833	-	-	-	-	-	-	-	-
MTR 45-11/5	40.0	70.4	38.0	9.2	23.2	15.3	11 3	13.1	835	-	-	-	-	-	-	-	-
MTR 45-12/5	40.0	73.5	41.1	9.2	23.2	15.3	11 3	13.1	837	-	-	-	-	-	-	-	-

For information about electrical data see "Motor data" on page 70-71.

MTR, MTRE 64, 60 Hz



Dimensional sketches

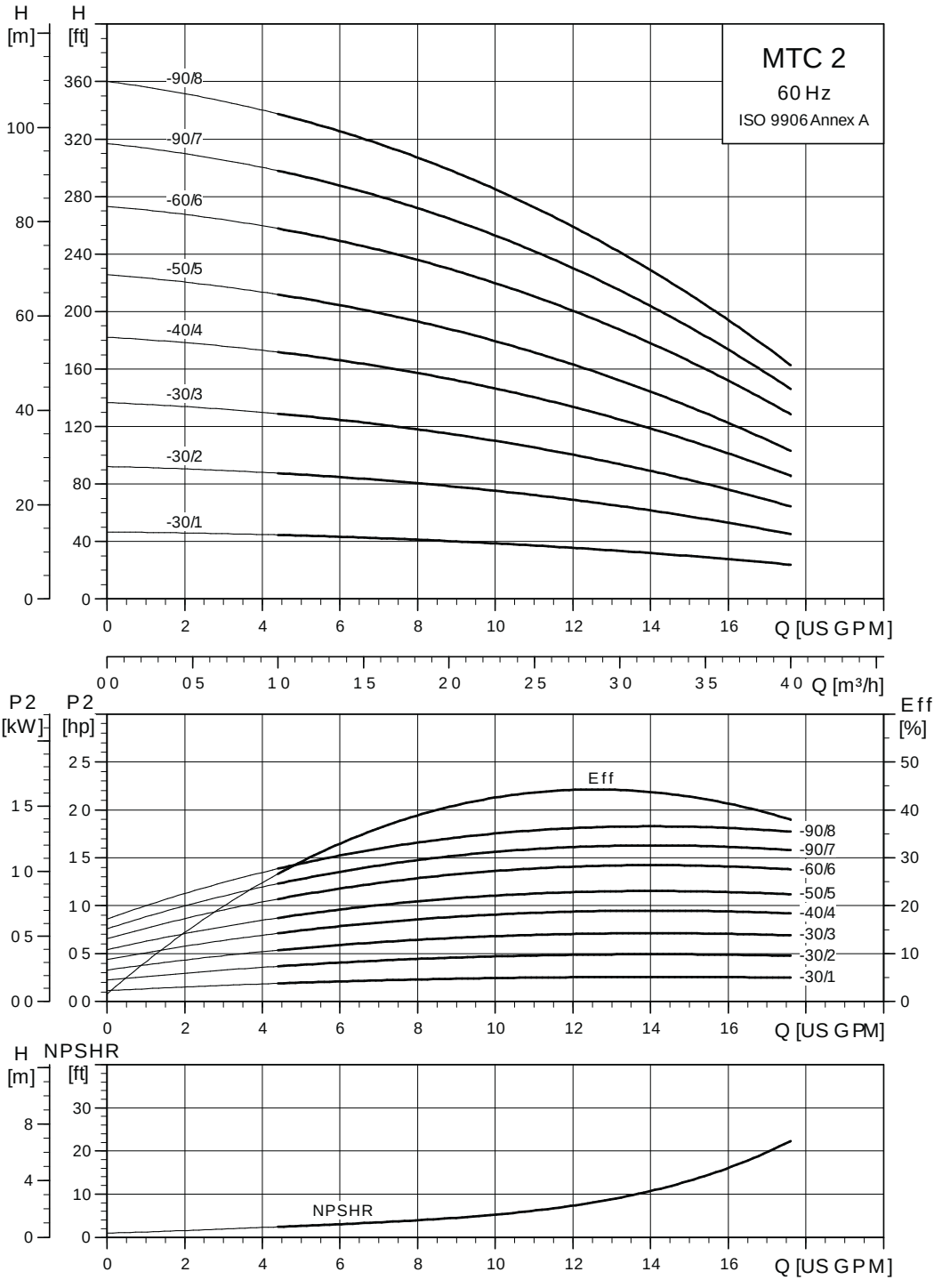


Dimensions and weights

Pump type	P_2 [Hp]	MTR, MTRI								MTRE							
		Dimensions [inches]							Ship weight [lbs]	Dimensions [inches]							Ship weight [lbs]
		A	B	C1	C2	P	D2	AB		A	B	C1	C2	P	D2	AB	
MTR, MTRE 64-2/1-1	10.0	34.5	9.8	9.2	15.5	8.7	9.0	5.3	250	32.3	9.8	9.2	13.3	8.7	9.0	7.4	260
MTR 64-2/1	15.0	35.6	9.8	9.2	16.6	10.2	9.0	8.7	345	-	-	-	-	-	-	-	-
MTR 64-2/2-2	20.0	35.6	9.8	9.2	16.6	10.2	9.0	8.7	345	-	-	-	-	-	-	-	-
MTR 64-2/2-1	20.0	35.6	9.8	9.2	16.6	10.2	9.0	8.7	397	-	-	-	-	-	-	-	-
MTR 64-2/2	25.0	38.4	9.8	9.2	19.4	12.6	11.3	11.5	580	-	-	-	-	-	-	-	-
MTR 64-3/3-2	30.0	45.5	13.1	9.2	23.2	15.3	11.3	13.1	728	-	-	-	-	-	-	-	-
MTR 64-3/3-1	40.0	45.5	13.1	9.2	23.2	15.3	11.3	13.1	784	-	-	-	-	-	-	-	-
MTR 64-3/3	40.0	45.5	13.1	9.2	23.2	15.3	11.3	13.1	784	-	-	-	-	-	-	-	-
MTR 64-4/4-2	40.0	48.7	16.3	9.2	23.2	15.3	11.3	13.1	815	-	-	-	-	-	-	-	-
MTR 64-5/4-2	40.0	52.0	19.6	9.2	23.2	15.3	11.3	13.1	818	-	-	-	-	-	-	-	-
MTR 64-6/4-2	40.0	55.2	22.8	9.2	23.2	15.3	11.3	13.1	821	-	-	-	-	-	-	-	-
MTR 64-7/4-2	40.0	58.5	26.1	9.2	23.2	15.3	11.3	13.1	824	-	-	-	-	-	-	-	-
MTR 64-8/4-2	40.0	61.7	29.3	9.2	23.2	15.3	11.3	13.1	827	-	-	-	-	-	-	-	-
MTR 64-9/4-2	40.0	65.0	32.6	9.2	23.2	15.3	11.3	13.1	830	-	-	-	-	-	-	-	-
MTR 64-10/4-2	40.0	68.2	35.8	9.2	23.2	15.3	11.3	13.1	833	-	-	-	-	-	-	-	-
MTR 64-11/4-2	40.0	71.5	39.1	9.2	23.2	15.3	11.3	13.1	836	-	-	-	-	-	-	-	-
MTR 64-12/4-2	40.0	74.7	42.3	9.2	23.2	15.3	11.3	13.1	839	-	-	-	-	-	-	-	-

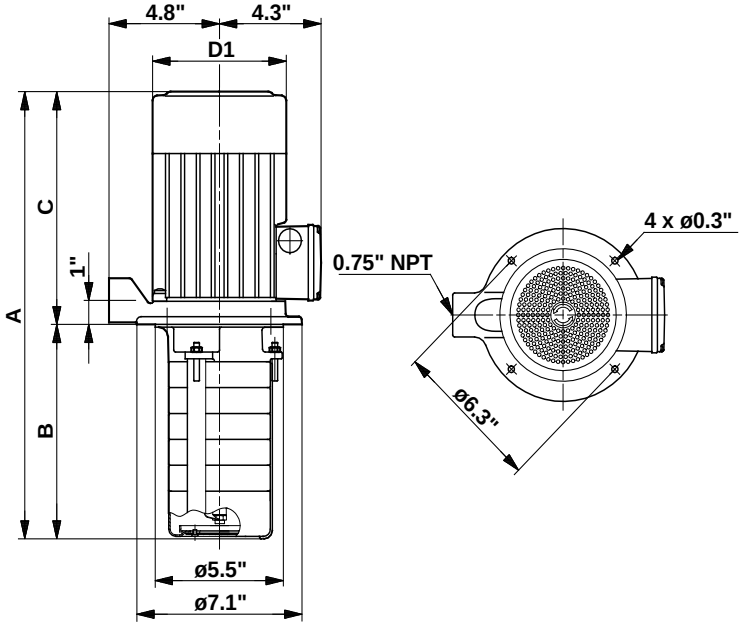
For information about electrical data see "Motor data" on page 70-71.

MTC 2, 60 Hz



TM03 4262 4110

Dimensional sketch and technical data



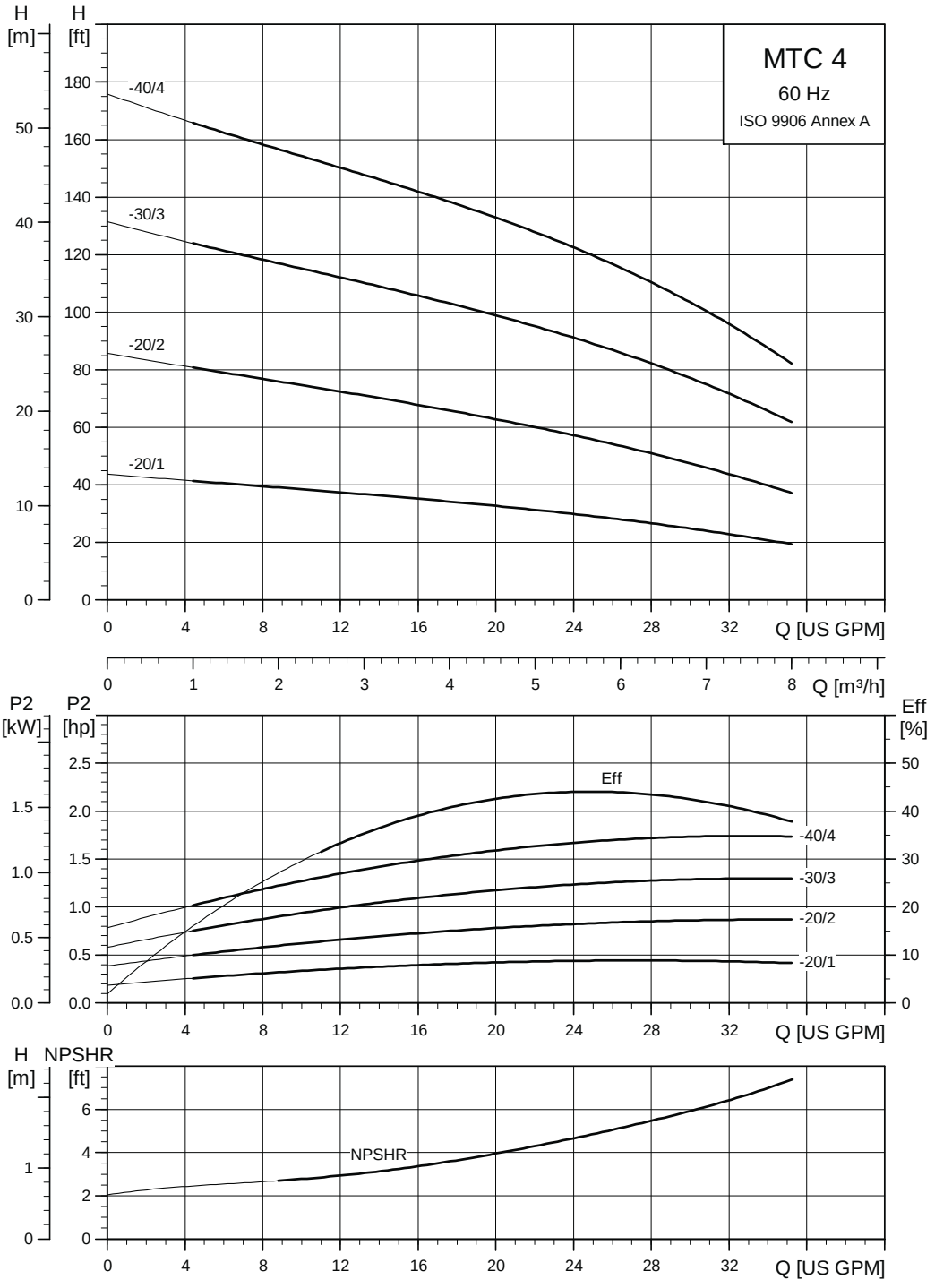
TM03 4300 2006

Technical data - 3x208-230 ΔV/460 YV, 60 Hz - USA

Pump type	Motor power P1 [W]	Electrical data				Dimensions [inches]				Ship. weight [lbs]
		SF	Eff. [%]	Full load current at 230V / 460V [A]	Start current at 230V / 460V [A]	A	B	C	D1	
MTC 2-30/1	340	1.0	72	1.8 / 1.0	18 / 9	13.7	5.7	8.0	5.3	23
MTC 2-30/2	540	1.0	72	2.1 / 1.2	18 / 9	13.7	5.7	8.0	5.3	24
MTC 2-30/3	740	1.0	74	2.5 / 1.4	18 / 9	13.7	5.7	8.0	5.3	24
MTC 2-40/1	340	1.0	72	1.8 / 1.0	18 / 9	14.4	6.4	8.0	5.3	24
MTC 2-40/2	540	1.0	72	2.1 / 1.2	18 / 9	14.4	6.4	8.0	5.3	24
MTC 2-40/3	740	1.0	74	2.5 / 1.4	18 / 9	14.4	6.4	8.0	5.3	24
MTC 2-40/4	980	1.0	74	4.0 / 2.3	31 / 15.5	15.9	6.4	9.5	5.6	27
MTC 2-50/1	340	1.0	72	1.8 / 1.0	18 / 9	15.1	7.1	8.0	5.3	24
MTC 2-50/2	540	1.0	72	2.1 / 1.2	18 / 9	15.1	7.1	8.0	5.3	25
MTC 2-50/3	740	1.0	74	2.5 / 1.4	18 / 9	15.1	7.1	8.0	5.3	25
MTC 2-50/4	980	1.0	74	4.0 / 2.3	31 / 15.5	16.7	7.1	9.5	5.6	27
MTC 2-50/5	1155	1.0	74	4.3 / 2.5	31 / 15.5	16.7	7.1	9.5	5.6	27
MTC 2-60/1	340	1.0	72	1.8 / 1.0	18 / 9	15.8	7.8	8.0	5.3	25
MTC 2-60/2	540	1.0	72	2.1 / 1.2	18 / 9	15.8	7.8	8.0	5.3	25
MTC 2-60/3	740	1.0	74	2.5 / 1.4	18 / 9	15.8	7.8	8.0	5.3	25
MTC 2-60/4	980	1.0	74	4.0 / 2.3	31 / 15.5	17.4	7.8	9.5	5.6	31
MTC 2-60/5	1155	1.0	74	4.3 / 2.5	31 / 15.5	17.4	7.8	9.5	5.6	31
MTC 2-60/6	1365	1.0	74	4.7 / 2.7	31 / 15.5	17.4	7.8	9.5	5.6	32
MTC 2-90/1	340	1.0	72	1.8 / 1.0	18 / 9	17.9	10.0	8.0	5.3	26
MTC 2-90/2	540	1.0	72	2.1 / 1.2	18 / 9	17.9	10.0	8.0	5.3	26
MTC 2-90/3	740	1.0	74	2.5 / 1.4	18 / 9	17.9	10.0	8.0	5.3	27
MTC 2-90/4	980	1.0	74	4.0 / 2.3	31 / 15.5	19.5	10.0	9.5	5.6	32
MTC 2-90/5	1155	1.0	74	4.3 / 2.5	31 / 15.5	19.5	10.0	9.5	5.6	32
MTC 2-90/6	1365	1.0	74	4.7 / 2.7	31 / 15.5	19.5	10.0	9.5	5.6	33
MTC 2-90/7	1572	1.0	74	5.0 / 2.9	31 / 15.5	19.5	10.0	9.5	5.6	33

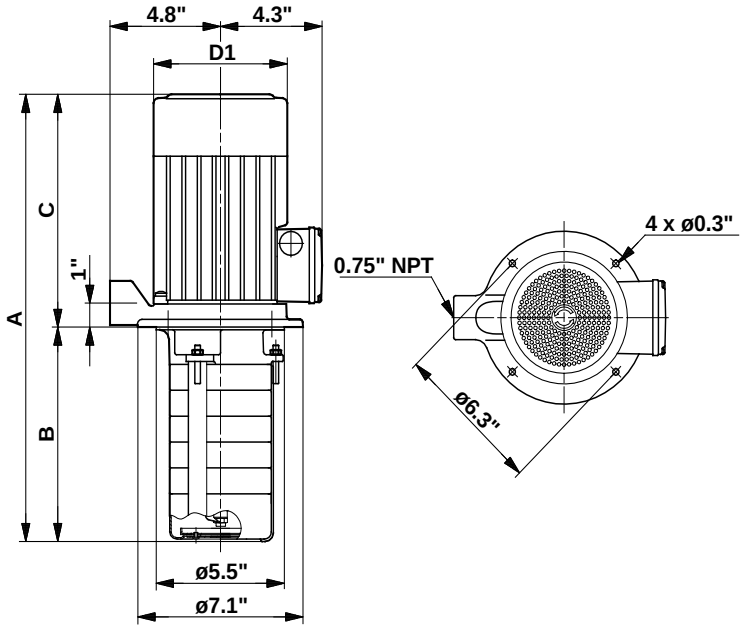
Pump type	Motor power P1 [W]	Electrical data				Dimensions [inches]				Ship. weight [lbs]
		SF	Eff. [%]	Full load current at 230V / 460V [A]	Start current at 230V / 460V [A]	A	B	C	D1	
MTC 2-90/8	1779	1.0	74	5.4 / 3.2	31 / 15.5	19.5	10.0	9.5	5.6	33
MTC 2-100/1	340	1.0	72	1.8 / 1.0	18 / 9	18.6	10.7	8.0	5.3	27
MTC 2-100/2	540	1.0	72	2.1 / 1.2	18 / 9	18.6	10.7	8.0	5.3	27
MTC 2-100/3	740	1.0	74	2.5 / 1.4	18 / 9	18.6	10.7	8.0	5.3	27
MTC 2-100/4	980	1.0	74	4.0 / 2.3	31 / 15.5	20.2	10.7	9.5	5.6	33
MTC 2-100/5	1155	1.0	74	4.3 / 2.5	31 / 15.5	20.2	10.7	9.5	5.6	33
MTC 2-100/6	1365	1.0	74	4.7 / 2.7	31 / 15.5	20.2	10.7	9.5	5.6	33
MTC 2-100/7	1572	1.0	74	5.0 / 2.9	31 / 15.5	20.2	10.7	9.5	5.6	34
MTC 2-100/8	1779	1.0	74	5.4 / 3.2	31 / 15.5	20.2	10.7	9.5	5.6	34
MTC 2-110/1	340	1.0	72	1.8 / 1.0	18 / 9	19.3	11.4	8.0	5.3	27
MTC 2-110/2	540	1.0	72	2.1 / 1.2	18 / 9	19.3	11.4	8.0	5.3	27
MTC 2-110/3	740	1.0	74	2.5 / 1.4	18 / 9	19.3	11.4	8.0	5.3	27
MTC 2-110/4	980	1.0	74	4.0 / 2.3	31 / 15.5	20.9	11.4	9.5	5.6	33
MTC 2-110/5	1155	1.0	74	4.3 / 2.5	31 / 15.5	20.9	11.4	9.5	5.6	34
MTC 2-110/6	1365	1.0	74	4.7 / 2.7	31 / 15.5	20.9	11.4	9.5	5.6	34
MTC 2-110/7	1572	1.0	74	5.0 / 2.9	31 / 15.5	20.9	11.4	9.5	5.6	34
MTC 2-110/8	1779	1.0	74	5.4 / 3.2	31 / 15.5	20.9	11.4	9.5	5.6	34

MTC 4, 60 Hz



TM03 4263 0607

Dimensional sketch and technical data

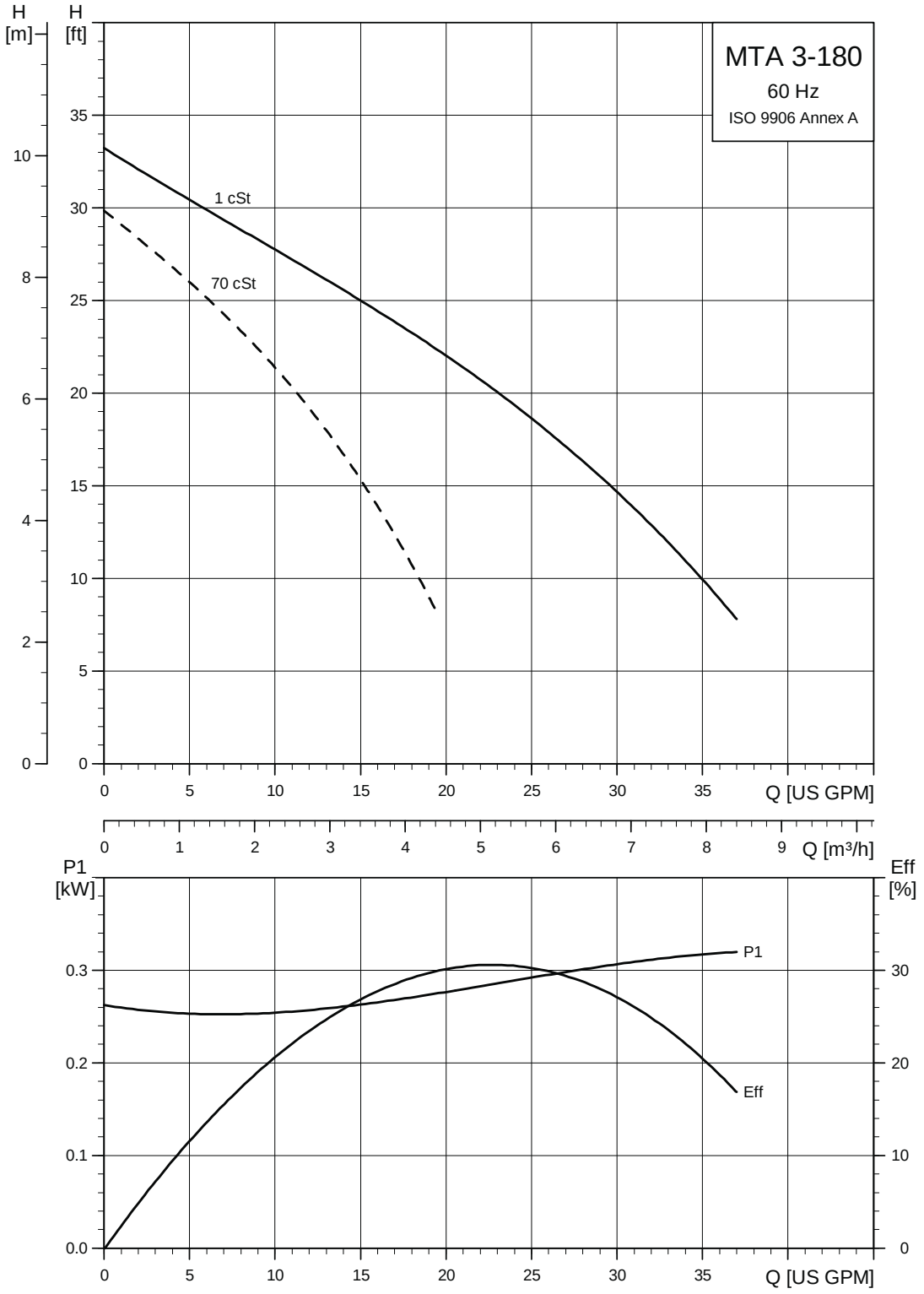


TM03 4300 2006

Technical data - 3x208-230 ΔV/460 YV, 60 Hz - USA

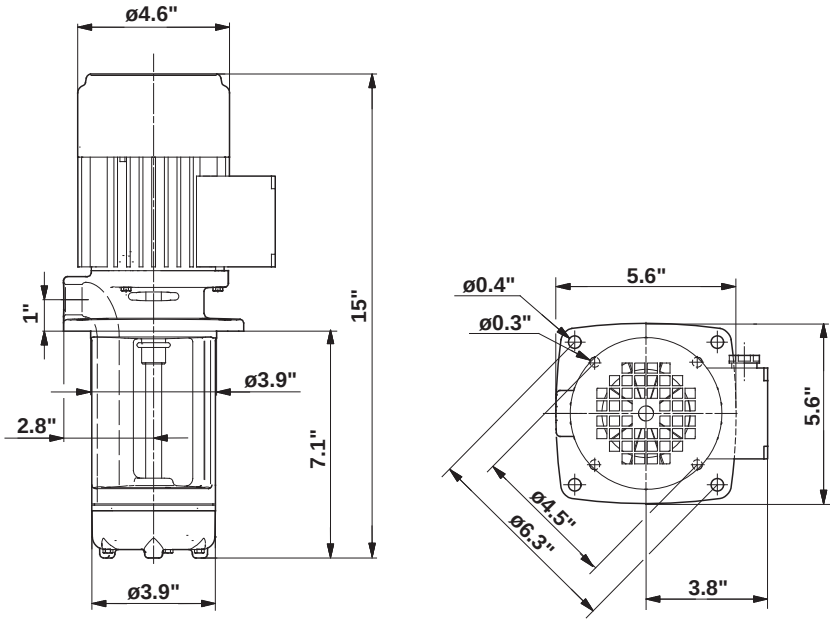
Pump type	Motor power P1 [W]	Electrical data				Dimensions [inches]				Ship. weight [lbs]
		SF	Eff. [%]	Full load current at 230V / 460V [A]	Start current at 230V / 460V [A]	A	B	C	D1	
MTC 4-20/1	505	1.0	72	2.0 / 1.2	18 / 9	13.7	5.7	8.0	5.3	27
MTC 4-20/2	870	1.0	74	2.8 / 1.6	18 / 9	13.7	5.7	8.0	5.3	27
MTC 4-30/1	505	1.0	72	2.0 / 1.2	18 / 9	14.7	6.8	8.0	5.3	27
MTC 4-30/2	870	1.0	74	2.8 / 1.6	18 / 9	14.7	6.8	8.0	5.3	27
MTC 4-30/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	14.7	6.8	8.0	5.3	31
MTC 4-40/1	505	1.0	72	2.0 / 1.2	18 / 9	15.8	7.8	8.0	5.3	27
MTC 4-40/2	870	1.0	74	2.8 / 1.6	18 / 9	15.8	7.8	8.0	5.3	27
MTC 4-40/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	15.8	7.8	8.0	5.3	31
MTC 4-40/4	1600	1.0	74	5.2 / 3.0	39 / 19.5	17.4	7.8	9.5	5.6	42
MTC 4-50/1	505	1.0	72	2.0 / 1.2	18 / 9	16.9	8.9	8.0	5.3	28
MTC 4-50/2	870	1.0	74	2.8 / 1.6	18 / 9	16.9	8.9	8.0	5.3	28
MTC 4-50/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	16.9	8.9	8.0	5.3	32
MTC 4-50/4	1600	1.0	74	5.2 / 3.0	39 / 19.5	18.4	8.9	9.5	5.6	42
MTC 4-60/1	505	1.0	72	2.0 / 1.2	18 / 9	17.9	10.0	8.0	5.3	29
MTC 4-60/2	870	1.0	74	2.8 / 1.6	18 / 9	17.9	10.0	8.0	5.3	29
MTC 4-60/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	17.9	10.0	8.0	5.3	32
MTC 4-60/4	1600	1.0	74	5.2 / 3.0	39 / 19.5	19.5	10.0	9.5	5.6	42
MTC 4-70/1	505	1.0	72	2.0 / 1.2	18 / 9	19.0	11.0	8.0	5.3	29
MTC 4-70/2	870	1.0	74	2.8 / 1.6	18 / 9	19.0	11.0	8.0	5.3	29
MTC 4-70/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	19.0	11.0	8.0	5.3	33
MTC 4-70/4	1600	1.0	74	5.2 / 3.0	39 / 19.5	20.6	11.0	9.5	5.6	42
MTC 4-80/1	505	1.0	72	2.0 / 1.2	18 / 9	20.0	12.1	8.0	5.3	29
MTC 4-80/2	870	1.0	74	2.8 / 1.6	18 / 9	20.0	12.1	8.0	5.3	29
MTC 4-80/3	1250	1.0	74	4.5 / 2.1	31 / 15.5	20.0	12.1	8.0	5.3	33
MTC 4-80/4	1600	1.0	74	5.2 / 3.0	39 / 19.5	21.6	12.1	9.5	5.6	43

MTA 3-180, 60 Hz



TM03 4264 2006

Dimensional sketches

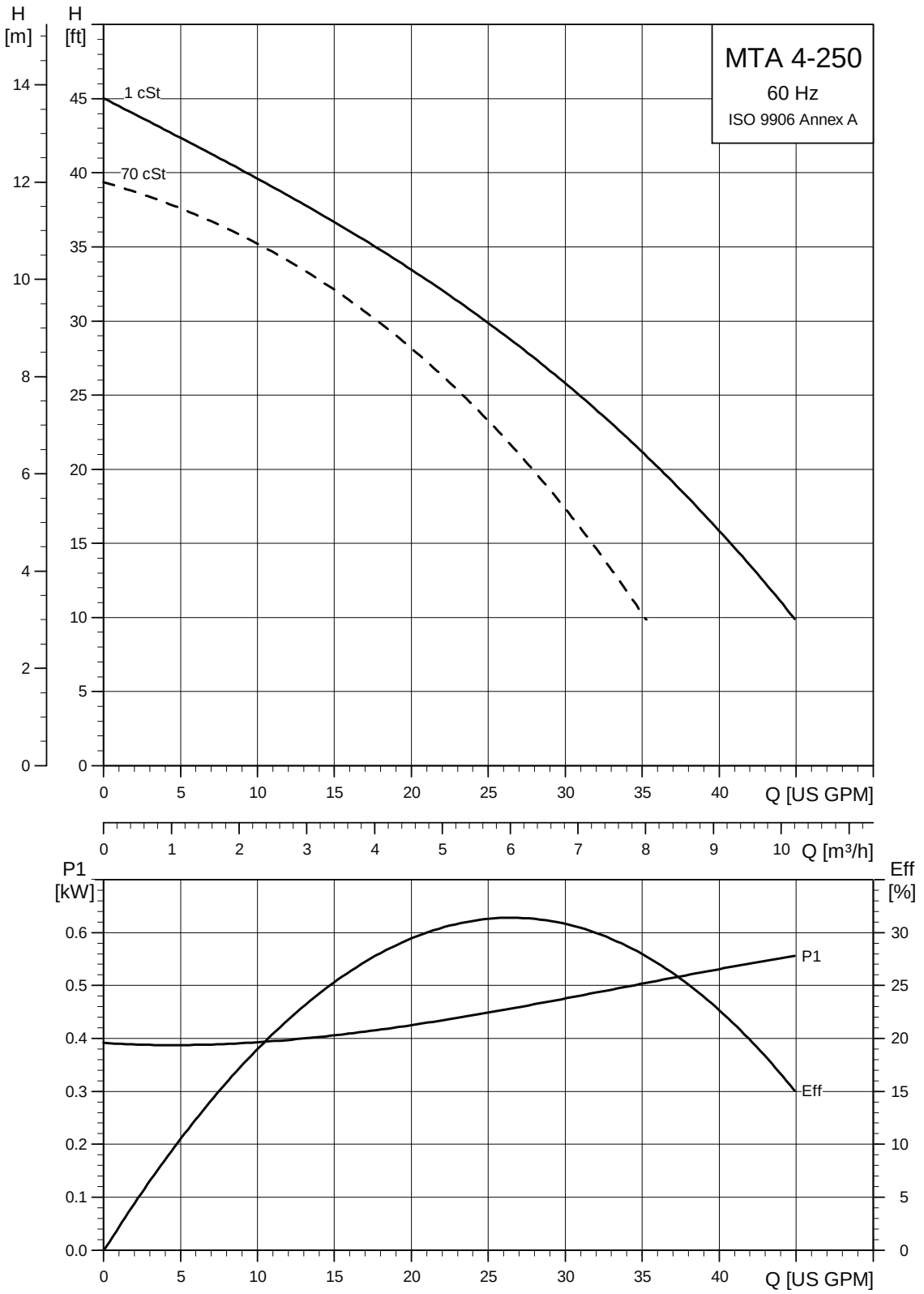


TM03 4301 2006

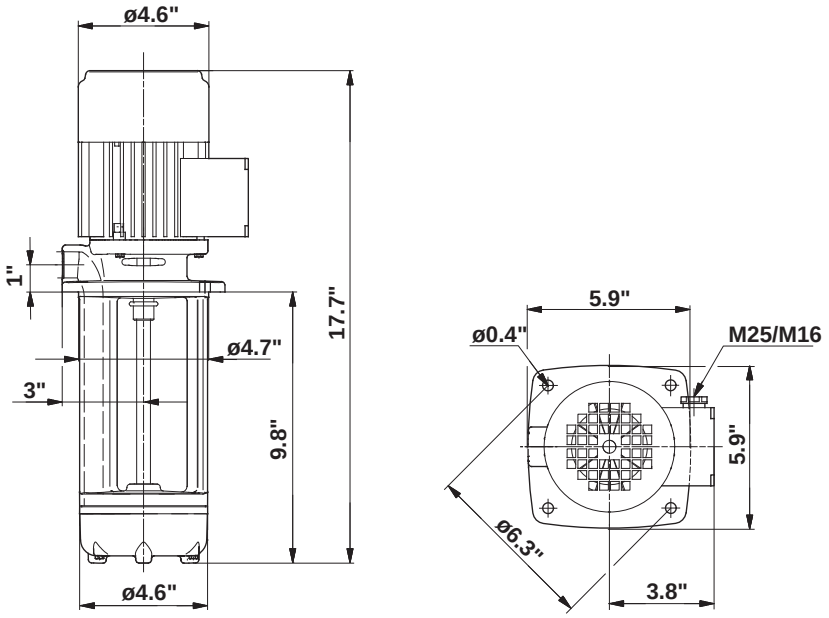
Electrical data

Electrical data	USA
Supply voltage	3 x 208-277 ΔV/360-480 YV, 60 Hz
Motor power P_1 [W]	220 - 320
Maximum current [A]	1.2/0.7
Full load current [A]	1.0/0.6
Shipping weight [lbs]	21
Connections	0.75" NPT

MTA 4-250, 60 Hz



Dimensional sketches

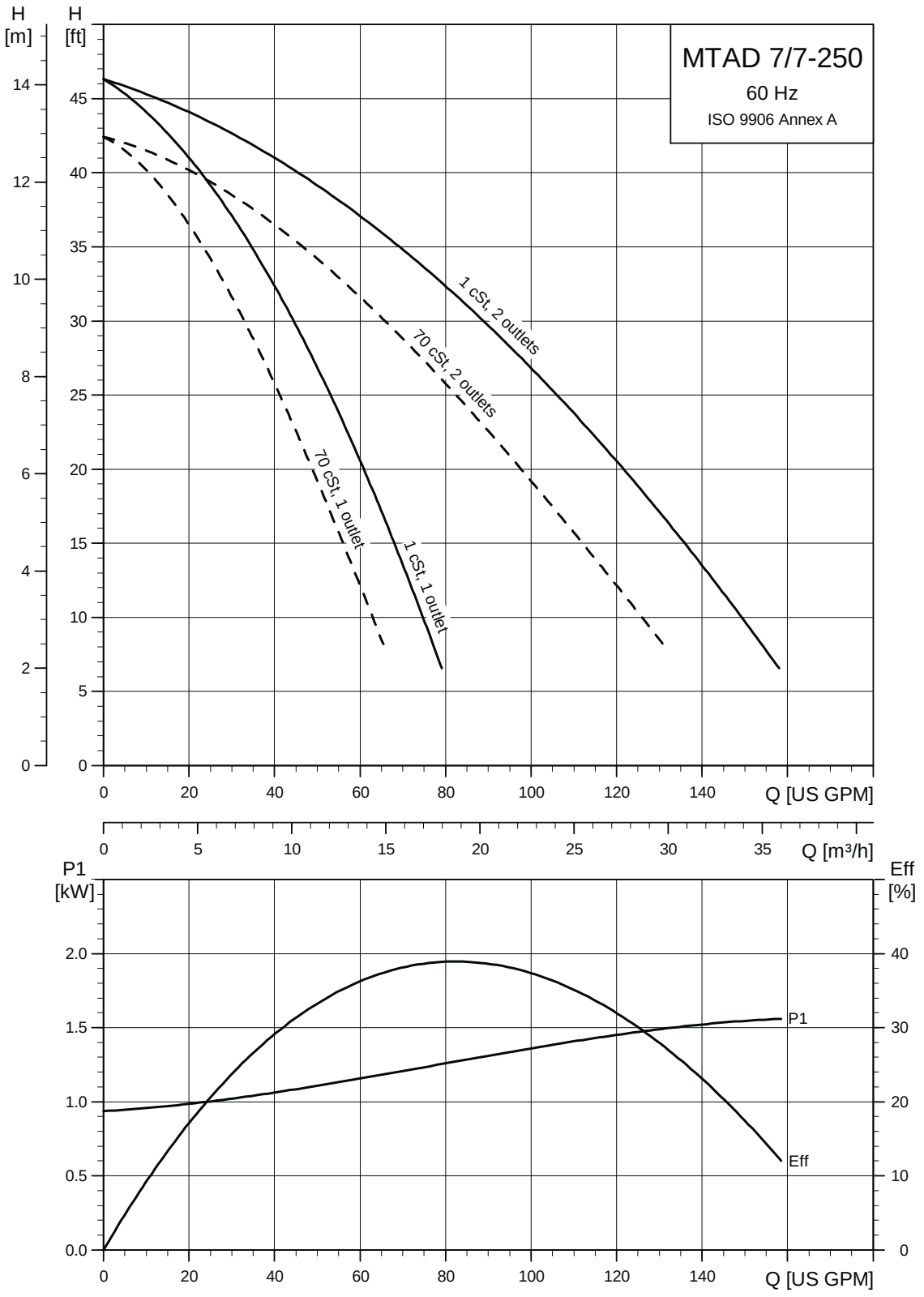


TM03 4302 2006

Electrical data

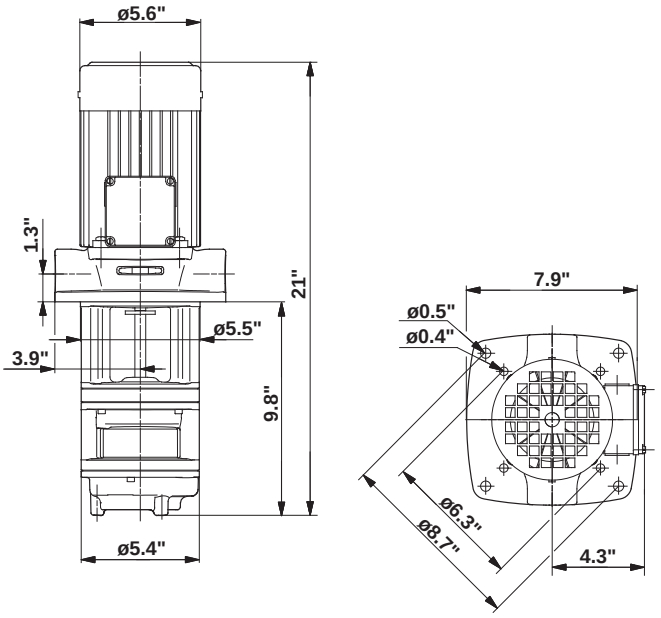
Electrical data	USA
Supply voltage	3 x 208-277 ΔV/360-480 YV, 60 Hz
Motor power P_1 [W]	360 - 560
Maximum current [A]	1.8/1.05
Full load current [A]	1.65/0.95
Shipping weight [lbs]	26
Connections	0.75" NPT

MTAD 7/7-250, 60 Hz



TM03 4266 2006

Dimensional sketches



TM03 4303 2006

Electrical data

Electrical data	USA
Supply voltage	3 x 208-266 ΔV/360-460 YV, 60 Hz
Motor power P_1 [W]	1600
Maximum current [A]	5.7/3.3
Full load current [A]	5.4/3.1
Shipping weight [lbs]	55
Connections	1.25" NPT

MTR motor data

TEFC motors

(Totally Enclosed Fan Cooled, constant speed)

Hp	PH	Frame	S.F.	Voltage [V]	Mtr. Eff. [%]	Insul. class	KVA code	Full load current [A]	Service Factor current [A]	Start current [A]	Motor type
1/3	1	56C	1.35	115/230	55	B	K	6 0/3 0	7.6/3.8	28/14	Baldor
	3	56C	1.35	208-230/460	78 5	F	L	1.12-1.1/0.55	1.5-1.45/0.75	7.1-7.7/3.9	ML
1/2	1	56C	1 6	115/230	62	B	K	7.4/3.7	9.8/4.9	39/19 5	Baldor
	3	56C	1.25	208-230/460	78 5	F	K	1 64-1.55/0.78	2.0-1.9/0.95	9.7-10.1/5.1	ML
3/4	1	56C	1.25	115/230	66	B	K	9 6/4.8	11.4/5.7	56/28	Baldor
	3	56C	1.25	208-230/460	79	F	K	2.4-2.3/1.2	2.9-2.75/1.4	14.2-15/7.8	ML
1	1	56C	1.25	115/230	66	B	K	12/6.0	14.4/7 2	77/38 5	Baldor
	3	56C	1.25	208-230/460	80	F	J	3 25-3.35/1 68	4.0-3.9/1.95	19.2-21 8/10.9	ML
1 1/2	1	56C	1 3	115/208-230	71	B	K	17/9 5-8.6	20.4/11.3-10.2	106/58.6-53	Baldor
	3	56C	1.15	208-230/460	84	F	M	4.7-4.6/2.3	5.2-5.1/2.55	33.8-36 8/18.4	ML
2	1	56C	1.15	115/208-230	74	F	K	23/12.7-11.5	25.4/14.0-12.7	156/86-78	Baldor
	3	56C	1.15	208-230/460	85 5	F	G	5.7-5.4/2.7	6.55-6.1/3.05	46.2-48 6/24.3	ML
3	1	182TC	1.15	115/208-230	75	F	H	29/16-14.5	31 8/18-15 9	170/94-85	Baldor
	3	182TC	1.15	208-230/460	86 5	F	M	8.4-7.7/3.9	9 5-8.6/4.3	79.0-80.1/40.6	ML
5	1	213TCZ	1.15	208-230	80	F	J	24-22	27-25	188-170	Baldor
	3	182TC	1.15	208-230/460	88 5	F	L	13 8-13.0/6.5	15 6-14.6/7.3	124-129/64.4	ML
7 1/2	1	213TC	1.15	208-230	82	F	F	33.8-31	38 5-35.5	244-220	Baldor
	3	213TC	1.15	208-230/460	90	F	N	20.4-19.4/9.7	23-21.5/10 8	192-202/101	ML
10	1	213TC	1.15	230	85 5	F	F	40	46	284	Baldor
	3	213TC	1.15	208-230/460	90 2	F	L	26.5-25 5/12.8	30.5-28 5/14.5	239-252/127	ML
15	3	254TCZ	1.15	208-230/460	90 2	F	K	37.5-34/17	42 5-39/19 5	270-304/152	Baldor
20	3	254TCZ	1.15	208-230/460	90 2	F	K	47-46/23	53-52/26	355-412/206	Baldor
25	3	284TSCZ	1.15	230/460	91	F	J	56/28	64/32	498/249	Baldor
30	3	286TSCZ	1.15	230/460	91	F	G	70/35	78/39	450/225	Baldor
40	3	286TSC	1.15	230/460	91.7	F	G	88/44	102/51	614/307	Baldor
50	3	326TSCZ	1.15	230/460	93	F	G	110/55	128/64	746/393	Baldor
60	3	364TSCZ	1.15	230/460	93	F	G	134/67	154/77	918/459	Baldor

Baldor motor

TM02 7696 3803

ML motor

GR 7845

Notes:

1. The information in this chart applies to **Grundfos ML motors and Grundfos specified Baldor® motors.**

   ML motors: Three-phase, 0.33-10 Hp
   Baldor motors: Single-phase, 0.33-10 Hp and Three-phase, 15-60 Hp.

   Grundfos MT pumps are supplied with heavy-duty 2-pole, NEMA C-frame motors built or selected to our rigid specifications. All MT pump motors have heavy-duty bearings in them for maximum thrust requirements.
   It is not recommended that an off-the-shelf standard Baldor motor be used on a Grundfos pump. Ideally, the best motor choice would be the Grundfos specified motor.

2. Other motor types are available (i.e., Explosion proof, Mill and Chem duty, High Efficiency, etc.), consult local Grundfos company for more information.
3. Pumps supplied by Grundfos Canada are normally supplied with motors from other manufacturers. 575 volt motors meet EPAct/NRC efficiency tandards. Dimensions and data will vary, contact local Grundfos company for more information.
4. All values are subject to change without notice.

MTR motor data

ODP motors

(Open Drip Proof, constant speed)

Hp	PH	ODP Frame	ODP S.F.	ODP Voltage	ODP Mtr. Eff. %	ODP Insul. class	ODP KVA code	ODP Full load current	ODP service Factor current	ODP Start current
15	3	254TCZ	1.15	208-230/460	89.5	F	H	37-35/17.5	40-39.4/19.7	225-248/124
20	3	254TC	1.15	230/460	90.2	B	G	48/24	55/27.5	306/153
25	3	284TSCZ	1.15	208-230/460	91	B	G	64-59/29.5	74-67/33.5	335-374/187
30	3	284TSC	1.15	230/460	91	F	H	70/35	80/40	480/240
40	3	286TSCZ	1.15	230/460	91.7	F	F	94/47	108/54	542/271
50	3	324TSCZ	1.15	230/460	92.4	F	G	116/58	134/67	732/366
60	3	324TSCZ	1.15	230/460	93	B	G	132/66	152/76	876/438

Baldor motor

TM02 7696

MLE motors

(Integrated variable frequency drive)

Hp	Voltage	Ph	NEMA frame	Service factor	Full load eff [%] *	Ins. class	Full load amps **	Service factor amps
1/2	208-230	1	56C	1.0	71 0	F	2.80	-
3/4	208-230	1	56C	1.0	74 0	F	3.90	-
1	208-230	1	56C	1.0	76 0	F	5.20	-
	460-480	3	56C	1.25	78 0	F	1.70	2.10
1 1/2	208-230	1	56C	1.0	77 0	F	7.50	-
	208-230	3	56C	1.0	76 8	F	4.20	-
	460-480	3	56C	1.15	80 0	F	2.15	2 50
2	208-230	3	56C	1.0	78 3	F	5.60	-
	460-480	3	56C	1.15	82 0	F	2.70	3.10
3	208-230	3	182TC	1.0	79 5	F	8.10	-
	460-480	3	182TC	1.15	84 0	F	3.70	4 30
5	208-230	3	184TC	1.0	79.7	F	13.4	-
	460-480	3	184TC	1.15	85 0	F	6.10	7 00
7 1/2	208-230	3	215TC	1.0	82 5	F	19.7	-
	460-480	3	215TC	1.15	85 0	F	8.90	10.3
10	460-480	3	215TC	1.15	86 0	F	12.0	13.8

GR 8972_p

Note: MTR Eff. Is the total efficiency for the motor and variable frequency drive.

Notes

1. The information in this chart applies to **Grundfos MLE motors and Grundfos specified Baldor® motors.**

   MLE motors: Single-phase, 0.5-1.5 Hp
   Three-phase, 1.0-10 Hp
   Baldor motors: Three-phase, 15-60 Hp.

   Grundfos MT pumps are supplied with heavy-duty 2-pole, NEMA C-frame motors built or selected to our rigid specifications. All MT pump motors have heavy-duty bearings in them for maximum thrust requirements.
   It is not recommended that an off-the-shelf standard Baldor motor be used on a Grundfos pump. Ideally, the best motor choice would be the Grundfos specified motor.
2. Other motor types are available (i.e., Explosion proof, Mill and Chem duty, High Efficiency, etc.), consult local Grundfos company for more information.
3. Pumps supplied by Grundfos Canada are normally supplied with motors from other manufactures. 575 volt motors meet EPAct/NRC efficiency standards. Dimensions and data will vary, contact local Grundfos company for more information.
4. All values are subject to change without notice.

Pumped liquids

MTR(E), MTC and MTA pumps are designed to pump non-explosive liquids that do not chemically attack the pump materials.

When pumping liquids with a density and/or viscosity higher than that of water, oversized motors may be required.

Whether a pump is suitable for a particular liquid depends on a number of factors of which the most important are the chloride content, pH-value temperature and content of chemicals, oils, etc.

Please note that aggressive liquids may attack or dissolve the protective oxide film of the stainless steel and thus cause corrosion.

Pumping of solid particles

MTR(E), MTC and MTA pumps are fitted with a suction strainer. The strainer prevents large solid particles from entering and damaging the pump.

The table below describes the size of the passage in the strainer and the impeller.

Pump type	Strainer passage [ø in.]	Free strainer passage [in^2]	Impeller passage [in.]
MTR(E) 1s	0.08	3.6	0.09
MTR(E) 1	0.08	3.6	0.09
MTR(E) 3	0.08	3.6	0.12
MTR(E) 5	0.16	4 3	0.21
MTR(E) 10	0.16	6.7	0.21
MTR(E) 15	0.16	6.7	0.23
MTR(E) 20	0.16	6.7	0.31
MTR(E) 32	0.16	8.7	0.31
MTR(E) 45	0.16	8.7	0.37
MTR(E) 64	0.16	8.7	0.51
MTC 2	0.08	3.6	0.10
MTC 4	0.08	3.6	0.11
MTA 3	0.16		
MTA 4	0.16		
MTAD 7	0.16		

If the pumped liquid contains solid particles larger than the size of the holes in the strainer, the passage of the strainer may be blocked. In such situations the performance will drop as a result of a reduced flow through the pump.

Note: If the strainer is removed from the suction port, solid particles may enter the pump and cause a seizure or even damage the pump.

In grinding applications Grundfos recommends that the pumped liquid is screened for abrasive particles before entering the pump. When pumped, abrasive particles reduce the life of the pump components.

Wear of the pump components caused by abrasive particles starts when the concentration exceeds 20 ppm.

List of pumped liquids

A number of typical liquids are listed below.

Other pump versions may be applicable, but those stated in the list are considered to be the best choices.

The table is intended as a general guide only, and it cannot replace actual testing of the pumped liquids and pump materials under specific working conditions.

The list should, however, be applied with some caution as factors such as concentration of the pumped liquid, liquid temperature or pressure may affect the chemical resistance of a specific pump version.

Safety precautions must be made when pumping dangerous liquids.

Notes

D	Often with additives.
E	Density and/or viscosity differ from that of water. Allow for this when calculating motor output and pump performance.
F	Pump selection depends on many factors. Contact Grundfos.
H	Risk of crystallization/precipitation in shaft seal.
1	The pumped liquid is easily ignited.
2	The pumped liquid highly inflammable.
3	Insoluble in water.
4	Low self-ignition point.

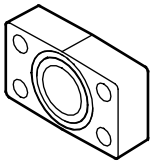
Pumped liquids

Pumped liquid	Note	Liquid concentration, liquid temperature	MTR(E)			MTRI(E)	
			1s, 1, 3, 5	10, 15, 20	32, 45, 64	1s, 1, 3, 5	10, 15, 20
Acetic acid, CH_3COOH	-	5 %, +68 °F	-	-	-	HUUE	HUUE
Alkaline degreasing agent	D, F	-	HUUE	HUUE	HUUE	-	-
Ammonium bicarbonate, NH_4HCO_3	E	20 %, +86 °F	-	-	-	HUUE	HUUE
Ammonium hydroxide, NH_4OH	-	20 %, +104 °F	HUUE	HUUE	HUUE	-	-
Benzoic acid, C_6H_5COOH	H	0.5 %, +68 °F	-	-	-	HUUV	HUUV
Boiler water	-	<+194 °F	HUUE	HUUE	HUUE	-	-
Calcareous water	-	<+194 °F	HUUE	HUUE	HUUE	-	-
Calcium acetate (as coolant with inhibitor) $Ca(CH_3COO)_2$	D, E	30 %, +122 °F	HUUE	HUUE	HUUE	-	-
Calcium hydroxide, $Ca(OH)_2$	E	Saturated solution, +122 °F	HUUE	HUUE	HUUE	-	-
Chloride-containing water	F	<+86 °F, max. 500 ppm	-	-	-	HUUE	HUUE
Citric acid, $HOC(CH_2CO_2H)_2COOH$	H	5 %, +104 °F	-	-	-	HUUE	HUUE
Completely desalinated water (demineralized water)	-	<+194 °F	-	-	-	HUUE	HUUE
Condensate	-	<+194 °F	HUUE	HUUE	HUUE	-	-
Copper sulfate, $CuSO_4$	E	10 %, +86 °F	-	-	-	HUUE	HUUE
Corn oil	D, E, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Domestic hot water (potable water)	-	<+248 °F	HUUE	HUUE	HUUE	-	-
Ethylene glycol, $HOCH_2CH_2OH$	D, E	50 %, +122 °F	HUUE	HUUE	HUUE	-	-
Formic acid, HCOOH	-	2 %, +68 °F	-	-	-	HUUE	HUUE
Glycerine (glycerol), $OHCH_2CH(OH)CH_2OH$	D, E	50 %, +122 °F	HUUE	HUUE	HUUE	-	-
Hydraulic oil (mineral)	E, 2, 3	100 %, +212 °F	HUUV	HUUV	HUUV	-	-
Hydraulic oil (synthetic)	E, 2, 3	100 %, +212 °F	HUUV	HUUV	HUUV	-	-
Lactic acid, $CH_3CH(OH)COOH$	E, H	10 %, +68 °F	-	-	-	HUUV	HUUV
Linoleic acid, $C_{17}H_{31}COOH$	E, 3	100 %, +68 °F	HUUV	HUUV	HUUV	-	-
Motor oil	E, 2, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Cutting oil	E	+194 °F	HUUV	HUUV	HUUV	-	-
Water based cooling lubricant	E	+194 °F	HUUV	HUUV	HUUV	-	-
Naphthalene, $C_{10}H_8$	E, H	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Nitric acid, HNO_3	F	1 %, +68 °F	-	-	-	HUUE	HUUE
Oil-containing water	-	<+194 °F	HUUV	HUUV	HUUV	-	-
Olive oil	D, E, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Oxalic acid, $(COOH)_2$	H	1 %, +68 °F	-	-	-	HUUE	HUUE
Peanut oil	D, E, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Phosphoric acid, H_3PO_4	E	20 %, +68 °F	-	-	-	HUUE	HUUE
Propylene glycol, $CH_3CH(OH)CH_2OH$	D, E	50 %, +194 °F	HUUE	HUUE	HUUE	-	-
Potassium carbonate, K_2CO_3	E	20 %, +122 °F	HUUE	HUUE	HUUE	-	-
Potassium formate (as coolant with inhibitor), KOOCH	D, E	30 %, +122 °F	HUUE	HUUE	HUUE	-	-
Potassium hydroxide, KOH	E	20 %, +122 °F	-	-	-	HUUE	HUUE
Potassium permanganate, $KMnO_4$	-	1 %, +68 °F	-	-	-	HUUE	HUUE
Rape seed oil	D, E, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Salicylic acid, $C_6H_4(OH)COOH$	H	0.1 %, +68 °F	-	-	-	HUUE	HUUE
Silicone oil	E, 3	100 %	HUUV	HUUV	HUUV	-	-
Sodium bicarbonate, $NaHCO_3$	E	10 %, +148 °F	-	-	-	HUUE	HUUE
Sodium chloride (as coolant), NaCl	D, E	30 %, <+41°F, pH>8	HUUE	HUUE	HUUE	-	-
Sodium hydroxide, NaOH	E	20 %, +122 °F	-	-	-	HUUE	HUUE
Sodium nitrate, $NaNO_3$	E	10 %, +148 °F	-	-	-	HUUE	HUUE
Sodium phosphate, Na_3PO_4	E, H	10 %, +148 °F	-	-	-	HUUE	HUUE
Sodium sulfate, Na_2SO_4	E, H	10 %, +148 °F	-	-	-	HUUE	HUUE
Softened water	-	<+168 °F	-	-	-	HUUE	HUUE
Soya oil	D, E, 3	100 %, +176 °F	HUUV	HUUV	HUUV	-	-
Unsalted swimming pool water	-	Approx. 2 ppm free chlorine (Cl_2)	HUUE	HUUE	HUUE	-	-

Square flange* for MTR(E) 1s, 1, 3 and 5

Grundfos offers square flange kit for MTR(E) 1s, 1, 3 and 5 with G 1.25" threads.

A set of the square flange kit consists of one flange, four bolts, four nuts and an O-ring.

Drawing	Product number
 TM02 8027 4503	405178

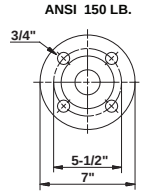
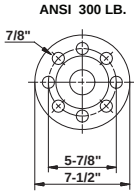
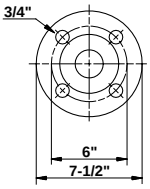
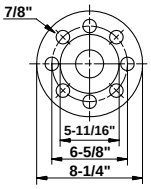
* Square flange will only fit special MTR pumps with square flange pump head.

Pipework connection

For pipework connection, various sets of counter flanges and couplings are available.

Counter flanges for MTR(E) 32, 45, and 64

A set consists of one counter flange, one gasket, bolts and nuts.

Counter flange			Pump type	Description	Pressure class	Pipework connection	Product number
		TM02 5693 + 5694 3802	MTR(E) 32	Threased	ANSI 125 lb.	2½" NPT	91136523
				Threaded	ANSI 250 lb.	2½" NPT	91136524
		TM02 5695 + 5696 3802	MTR(E) 45, 64	Threaded	ANSI 125 lb.	3" NPT	91136525
				Threaded	ANSI 250 lb.	3" NPT	91136526

R100 remote control

GrA5953

Fig. 36 R100 remote control

Use the R100 for wireless communication with the MTRE pump. The communication takes place by means of infrared light.

Product	Product number
R100	00625333

Potentiometer for MTRE

The potentiometer is for setpoint setting and start/stop of the MTRE pump.

Product	Product number
External potentiometer with cabinet for wall mounting	00625468

Sensors

Accessory	Measuring range		Product number
	[psi]	[bar]	
Pressure sensor Connection: 1/4" NPT	0-200	0-13.8	91120777
	0-58	0-4	96026029
	0-87	0-6	96026030
	0-145	0-10	96026031
	0-232	0-16	96026032
	0-362	0-25	96026033

CIU communication interface units

GrA 6118

Fig. 37 Grundfos CIU communication interface unit

The CIU units enable communication of operating data, such as measured values and setpoints, between pumps and a building management system. The CIU unit incorporates a 24-240 VAC/VDC power supply module and a CIM module. It can either be mounted on a DIN rail or on a wall.

We offer the following CIU units:

CIU 100

For communication via LON.

CIU 150

For communication via PROFIBUS DP.

CIU 200

For communication via Modbus RTU.

CIU 300

For communication via BACnet MS/TP.

Unit type	Fieldbus protocol	Product number
CIU 100	LON	96753735
CIU 150	PROFIBUS DP	96753081
CIU 200	Modbus RTU	96753082
CIU 300	BACnet MS/TP	Contact Grundfos

For further information about data communication via CIU units and fieldbus protocols, see the CIU documentation available in WebCAPS.

MP 204 motor protector

TM03 1471 2205

Fig. 38 MP 204

The MP 204 is an electronic motor protector and data collecting unit. Apart from protecting the motor, it can also send information to a control unit via GENIbus, like for instance:

- trip
- warning
- energy consumption
- input power
- motor temperature.

The MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement.

The pump is protected secondarily by measuring the temperature with a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

The MP 204 is designed for single- and three-phase motors.

Note: The MP 204 must not be used together with frequency converters.

Features

- Phase-sequence monitoring
- indication of current or temperature
- input for PTC sensor/thermal switch
- indication of temperature in °F or °C
- 4-digit, 7-segment display
- setting and status reading with the Grundfos R100 remote control
- setting and status reading via the Grundfos GENIbus fieldbus.

Tripping conditions

- Overload
- underload (dry running)
- temperature
- missing phase
- phase sequence
- overvoltage
- undervoltage
- power factor (cos φ)
- current unbalance.

Warnings

- Overload
- underload
- temperature
- overvoltage
- undervoltage
- power factor (cos φ)
- run capacitor (single-phase operation)
- starting capacitor (single-phase operation)
- loss of communication in network
- harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- run capacitor (single-phase operation)
- starting capacitor (single-phase operation)
- identification and measurement of Pt100/Pt1000 sensor circuit.

Product number

Description	Product number
MP 204 motor protection	96079927

Further product documentation

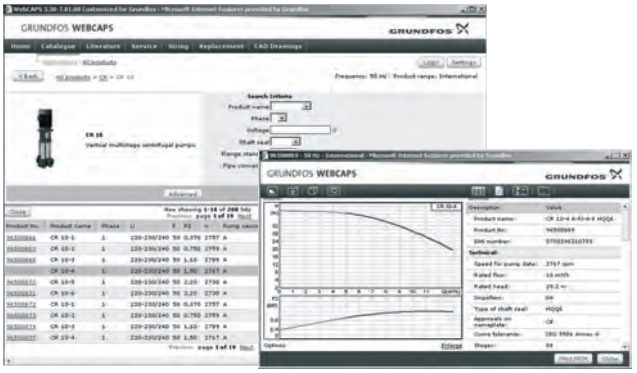
WebCAPS

WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 22 languages.

In WebCAPS, all information is divided into 6 sections:

- Catalog
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.

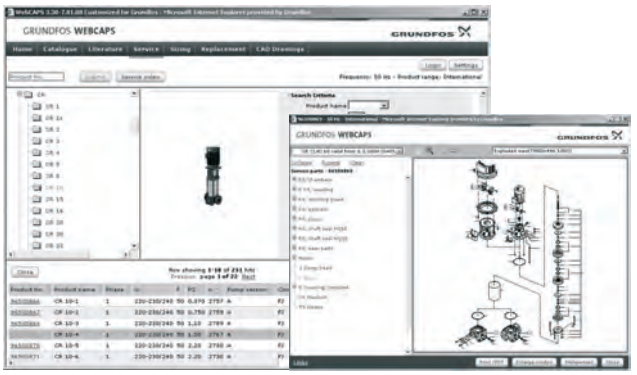


Catalog

With a star ing point in areas of applica ions and pump types, this section contains
- technical data
- curves (QH, Eta, P1, P2, etc) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.

Literature

In this section you can access all the lastest documents of a given pump, such as
- data booklets
- Installation and operating instructions
- service documentation, such as Service kit catalog and Service kit instructions
- quick guides
- product brochures, etc.



Service

This section contains an easy-to-use interactive service catalog. Here you can find and identify service parts of both existing and cancelled Grundfos pumps.
Furthermore, his section contains service videos showing you how to replace service parts.

Further product documentation

Sizing

With a star ing point in different application areas and installation examples, this section gives easy step-by-step instructions in how to

- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, lifecycle costs, etc.
- analyze your selected pump via the built-in lifecycle cost tool
- determine the flow velocity in wastewater applications, etc.

Replacement

In this section you find a guide to select and compare replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.
The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. After having specified the installed pump, the guide suggests a number of Grundfos pumps which can improve both comfort and efficiency.

CAD drawings

In this section it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

The following formats are available in WebCAPS:

<u>2-dimensional drawings</u>
- .dxf, wireframe drawings
- .dwg, wireframe drawings.

<u>3-dimensional drawings</u>
- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.

WinCAPS

WinCAPS CD-ROM

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed information on more than 185 000 Grundfos products in more than 22 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no Internet connection is available.

WinCAPS is available on CD-ROM and updated once a year.

BE > THINK > INNOVATE >

Being responsible is our foundation
Thinking ahead makes it possible
Innovation is the essence

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Subject to alterations.

GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario L6H 6C9 Canada
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

Bombas GRUNDFOS de Mexico S.A. de C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. Mexico 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

www.grundfos.com

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