

# TPE E-circulators

In-line circulator pumps with integrated variable frequency drive

## Description

60 Hz



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# 1. Pump data

Cross reference guide: B&G, Taco and Armstrong to Grundfos

Grundfos Model TP	Hp	Port to port length	Flange size	B & G Series 60 & 80	Hp	Port to port length	Flange size	Taco Series 1600	Hp	Port to port length	Flange Size	Armstrong Series H	Hp	Port to port length	Flange size
32-40	1/3	11"	1-1/4"									H-32	1/6	8-1/2"	1-1/4"
32-80	1/2	11"	1-1/4"	6011	1/4	11"	1-1/4"	1600	1/4	10-1/4"	1-1/2"	H-52	1/3	11-1/2"	1-1/4"
32-160	3/4	13-1/2"	1-1/2"	6016	3/4	13-1/2"	1-1/2"	1614	3/4	13-1/2"	1-1/2"	H-64	3/4	13-1/2"	1-1/2"
40-40	1/3	13-1/2"	1-1/2"									H-52	1/3	11-1/2"	1/4"
	1/2	13-1/2"	1-1/2"									H-53	1/2	11-1/2"	1-1/2"
40-80	3/4	13-1/2"	1-1/2"	6013	1/2	11-1/2"	1-1/2"	1612	1/2	13-1/2"	1-1/2"	H-53	1/2	11-1/2"	1-1/2"
40-80	3/4	13-1/2"	1-1/2"	6015	1/2	13-1/2"	1-1/2"	1612	1/2	13-1/2"	1-1/2"	H-63	1/2	13-1/2"	1-1/2"
40-160	3/4	11-1/2"	1-1/2"									H-67	1	14"	2"
40-240	1-1/2	13-1/2"	1-1/2"	6017	1	13-1/2"	1-1/2"	1616	1-1/2	14-1/2"	2"	H-65	1	13-1/2"	1-1/2"
50-40	1/3	14"	2"									H-53	1/2	11-1/2"	1-1/2"
	3/4	11-1/2"	2"									H-54	3/4	11-1/2"	2"
50-80	3/4	11-1/2"	2"	6014	3/4	11-1/2"	2"	1632	3/4	13-1/2"	2"	H-54	3/4	11-1/2"	2"
50-160	1-1/2	14"	2"	6019	1	14"	2"	1634	1	13-1/2"	2"	H-67	1	14"	2"
50-160	1-1/2	14"	2"	6020	1-1/2	14"	2"	1634	1	13-1/2"	2"	H-68	1-1/2	14"	2"
50-240	2	14"	2"	6021	2	14"	2"					10603D	3	18"	3"
80-40	1/2	19"	3" ANSI									105028	1/2	11-1/2"	2"
80-80	1-1/2	19"	3" ANSI	801	1-1/2	19"	3" ANSI					10603D	1-1/2	18"	3"
80-160	3	19"	3" ANSI	802	3	19"	3" ANSI					10603D	3	18"	3"
80-240	3	19"	3" ANSI	803	3	19"	3" ANSI					10603D	3	18"	3"
100-40	1	21"	4" ANSI									10603D	1	18"	3"
100-80	2	21"	4" ANSI	806	2	21"	4" ANSI					10603D	2	18"	3"
100-160	3	21"	4" ANSI	807	3	21"	4" ANSI					10603D	3	18"	3"

## Introduction

TP, TPE pumps are designed for applications such as

- district heating systems
- heating systems
- air-conditioning systems
- district cooling systems
- water supply
- industrial processes
- industrial cooling.

The pumps are available with either standard motors (TP) or electronically speed-controlled motors (TPE).

The pumps are all single-stage, in-line centrifugal pumps with standard motor and mechanical shaft seal. The pumps are of the close-coupled type, i.e. pump and motor are separate units. Consequently, the pumps are less sensitive to impurities in the pumped liquid than similar pumps of the canned rotor type.

The TP, TPE range is divided into the following three groups:

- TP pumps (uncontrolled standard pumps).
- TPE Series 2000 pumps (speed controlled pumps with factory-fitted pressure sensor).
- TPE Series 1000 pumps (speed controlled pumps).

This product guide covers Series 2000 and 1000 speed controlled pumps.

Please see Grundfos publication 99701219 for TP (uncontrolled standard pump) product range and details.

## Pump Energy Index

Pump Energy Index (PEI) was established by the U.S. Department of Energy (DOE) and adopted by Canada as the standard metric used to evaluate pump efficiency. The value is the ratio of the pump efficiency rating (PER) divided by the calculated minimally compliant PER ( $PER_{STD}$ ) for the pump type. This provides a representation of a pump's actual performance compared to the minimal standard performance required by regulation. The lower the PEI value, the more efficient a pump is at the tested operating points.

PER is determined by defined testing parameters required by the DOE. This includes testing a particular pump model at its best efficiency point (BEP).

For PEI values there are two different versions:

- $PEI_{CL}$  (constant load): Applies to a bare-shaft pump, and a pump sold with a motor
- $PEI_{VL}$  (variable load): Applies to pumps sold with a motor and controller (such as VFD, VSD)

The DOE has set the maximum PEI value as 1.00. Any pump, pump and motor, or pump, motor and controller that exceeds a PEI value of 1.00 can no longer be manufactured after January 26, 2020.

PEI is a generalized efficiency value. PEI cannot be used to determine the efficiency of a pump in a specific application.

Product type	Pole	$PEI_{VL}$	Impeller diameter [in (mm)]
TPE1000 40-240	2	0.43	3.86 (98)
TPE1000 50-160		0.41	3.43 (87)
TPE1000 50-240		0.41	3.95 (100)
TPE1000 80-160		0.41	3.56 (90)
TPE1000 80-240		0.41	4.00 (102)
TPE1000 100-160		0.43	3.72 (94)
TPE2000 40-240		0.43	3.86 (98)
TPE2000 50-160		0.41	3.43 (87)
TPE2000 50-240		0.41	3.95 (100)
TPE2000 80-160		0.41	3.56 (90)
TPE2000 80-240		0.41	4.00 (102)
TPE2000 100-160		0.43	3.72 (94)

## TPE Series 2000 pumps

The main differences between the TP and the TPE Series 2000 pump range are the motor and the factory-fitted integrated differential-pressure sensor.

The motors of TPE Series 2000 pumps have a built-in variable frequency drive (VFD) designed to continuously regulate the pressure to the flow.

The TPE Series 2000 range is recognized as a pre-configured solution for quick and safe installation.

TPE Series 2000 pumps are based on TP pumps. The pump materials are the same as those of the TP pump range.

For further information about TPE Series 2000 pumps, see page 15.

## TPE Series 1000 pumps

The difference between the TP and the TPE Series 1000 pump range is the motor. The motors of TPE Series 1000 pumps have a built-in VFD.

Via an external signal (from a sensor or a controller), TPE Series 1000 pumps allow for any configuration and control method required: constant pressure, constant temperature or constant flow.

TPE Series 1000 pumps are based on TP pumps. The pump materials are the same as those of the TP pump range.

For further information about TPE Series 1000 pumps, see page 18.

## Why select a TPE pump?

A TPE pump with electronic, speed-controlled adaptation of performance offers these obvious benefits:

- energy savings
- increased comfort
- control and monitoring of pump performance.
- communication with the pump.

## Type key

Example	TP	E	40	-240	/2	-A	-G	-A	-BUBE	-G	B	B
Pump range												
Electronically speed-controlled pump series 1000/2000												
Nominal diameter of suction and discharge flanges (mm)												
Maximum head [dm (decimeters)]												
Pole number												
S = TPE Series 2000 (with factory-fitted differential pressure sensor)												
U = NEMA motor dimensions												
G = ANSI or US flange												
Code for materials: A = Basic version Z = Bronze pump housing and motor stool												
Code for shaft seal (incl. other plastic and rubber components in the pump except the neck ring)												
Code for NEMA motors [Hp (kW)]:												
Code for phase and voltage (V):												
Code for speed variant (rpm):												

## Codes for shaft seal

Example	B	B	U	E
<b>Grundfos type designation</b>				
A = O-ring seal with fixed seal driver				
B = Rubber bellows seal				
D = O-ring seal, balanced				
G = Bellows seal with reduced seal faces				
R = O-ring seal with reduced seal faces				
<b>Material of rotating face</b>				
A = Carbon, antimony-impregnated				
B = Carbon, synthetic resin-impregnated				
Q = Silicon carbide				
U = Tungsten carbide				
<b>Material of stationary seat</b>				
B = Carbon, synthetic resin-impregnated				
Q = Silicon carbide				
U = Tungsten carbide				
<b>Material of secondary seal</b>				
E = EPDM				
V = FKM				

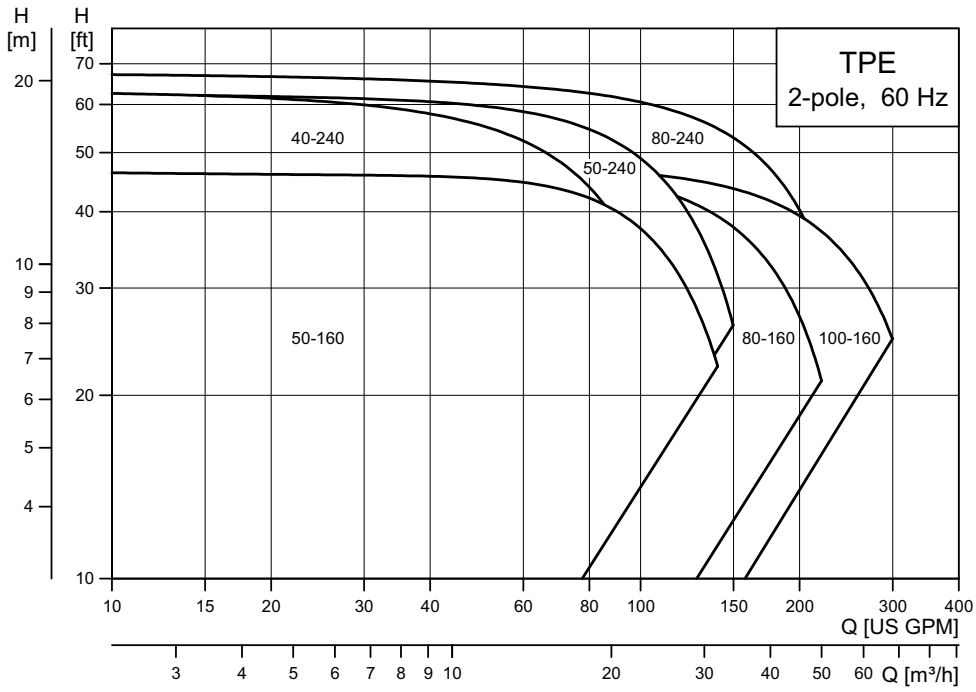
## Key to codes

Code	Description
<b>Code for motors [Hp (kW)]</b>	
C	0.33 (0.25)
D	0.5 (0.37)
E	0.75 (0.55)
F	1 (0.75)
G	1.5 (1.1)
H	2 (1.5)
I	3 (2.2)
<b>Code for phase and voltage (V)</b>	
A	1x200-240V
B	3x200-240V
C	3x440-480V
D	3x380-500V
<b>Code for speed variant (rpm)</b>	
A	1450-2000
B	2900-4000
C	4000-5900

## 2. Performance range

### Performance range, 2-pole, 3400 RPM

(See page 24 for performance curves)



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## 3. Product range

### TPE Series 2000

TPE SERIES 2000 with differential pressure sensor						
	Cast iron product number	Bronze product number	Motor			
			Hp	Type	Ph	Volt
GF 40/43 flange mount						
TPE40-240/2	99430151	99430196	1.5	TEFC	3	200-240V
GF 50 flange mount						
TPE50-160/2	99430152	99430197	1.5	TEFC	3	200-240V
TPE50-240/2	99430163	99430198	2	TEFC	3	200-240V
GF 80 flange mount						
TPE80-160/2	99430164	99430199	3	TEFC	3	200-240V
TPE80-240/2	99430165	99430201	3	TEFC	3	200-240V
GF 100 flange mount						
TPE100-160/2	99430167	99430202	3	TEFC	3	200-240V

### TPE Series 1000

TPE SERIES 1000 without differential pressure sensor						
	Cast iron product number	Bronze product number	Motor			
			Hp	Type	Ph	Volt
GF 40/43 flange mount						
TPE40-240/2	99430129	99430168	1.5	TEFC	3	200-240V
GF 50 flange mount						
TPE50-160/2	99430143	99430169	1.5	TEFC	3	200-240V
TPE50-240/2	99430146	99430171	2	TEFC	3	200-240V
GF 80 flange mount						
TPE80-160/2	99430148	99430172	3	TEFC	3	200-240V
TPE80-240/2	99430149	99430193	3	TEFC	3	200-240V
GF 100 flange mount						
TPE100-160/2	99430150	99430195	3	TEFC	3	200-240V



## 4. Speed regulation

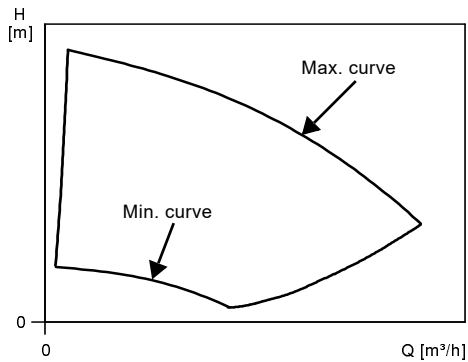
### Affinity equations

Normally, TPE pumps are used in applications characterized by a **variable** flow. Consequently, it is not possible to select a pump that is constantly operating at optimum efficiency.

In order to achieve optimum operating economy, select the pump on the basis of the following criteria:

- The max. required duty point should be as close as possible to the QH curve of the pump.
- The flow rate at the duty point required should be close to the optimum efficiency ( $\eta$ ) for most operating hours.

Between the min. and max. performance curve TPE 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.



TM01 4916 4803

Fig. 1 Min. and max. performance curves

In situations where it is not possible to select a duty point close to the max. curve, affinity equations can be used. The head (H), the flow (Q) and the input power (P) are 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 variable frequency drive 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.

The two programs make it possible to calculate a TPE pump's specific duty point and energy consumption.

By entering the dimensional data of the pump, [Grundfos Product Center](#) can calculate the exact duty point and energy consumption. For further information, please contact Grundfos or see Grundfos' homepage [us.grundfos.com](http://us.grundfos.com).

## 5. Operating conditions

### Working pressure

Maximum working pressure 145 psi (10 bar).

### Fluid temperature

Maximum fluid temperature +284 °F (140 °C).

### Relative humidity

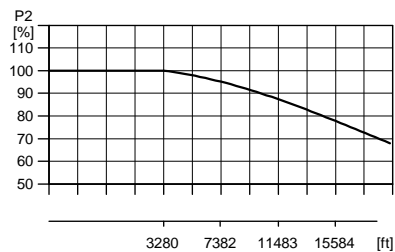
Maximum 95%.

### Ambient temperature

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

#### Note:

When motors installed more than 3000 ft (914 m) above sea level, the rated motor output will fall due to the low density and consequent low cooling effect of the air. In such cases, it may be necessary to use an oversize motor with a higher output.



**Fig. 2** Relationship between motor output (P<sub>2</sub>) and altitude.

TMD03 344E 0506

## 6. Pumped liquids

### Pumped liquids

TP, TPE pumps are suitable for pumping thin, clean, non-aggressive and non-explosive liquids, not containing solid particles or fibers that may mechanically or chemically attack the pump; please see "List of pumped liquids" below.

#### Examples of liquids:

- Central heating system water (we recommend that the water meets the requirements of accepted standards on water quality in heating systems).
- cooling liquids.
- domestic hot water.
- industrial liquids.
- softened water.

If glycol or another antifreeze agent is added to the pumped liquid, the pump must have a shaft seal of the type RUUE.

The pumping of liquids with densities or kinematic viscosities higher than those of water can cause

- a considerable pressure drop
- a drop in the hydraulic performance
- a rise in the power consumption.

In these situations, equip the pump with an oversize motor. If in doubt, contact Grundfos.

If the water contains mineral oils or chemicals, or if other liquids than water are pumped, choose the O-rings accordingly.

### Liquid temperature

Liquid temperature:

–13 °F (–25 °C) to +284 °F (+140 °C).

Please note that shaft seals operating close to their maximum temperature will require regular maintenance, i.e. replacement.

Pump type	Shaft seal	Temperature
TP, TPE	BUBE	32°F to +284 °F (0 °C to 140 °C)
	AUUE	32°F to +194 °F (0 °C to 90 °C)
	RUUE	–13 °F to +194 °F (–25 °C to 90 °C)

### List of pumped liquids

Grundfos TP pumps are designed for circulation systems with constant flow; TPE pumps are for systems with variable flow.

Thanks to their design, these pumps can be used in a wider liquid temperature range than pumps of the canned rotor type.

A number of typical liquids are listed page 12.

Other pump versions may be used, but we consider the ones stated in the list to be the best choices.

The list is intended as a general guide only, and it cannot replace actual testing of the pumped liquids and pump materials under specific working conditions. If in doubt, contact Grundfos.

However, use the list with some caution as these or other factors may affect the chemical resistance of a specific pump version:

- concentration of the pumped liquid
- liquid temperature or
- pressure.

#### Legend for notes in the list

<b>A</b>	May contain additives or impurities that may cause shaft seal problems.
<b>B</b>	The density and/or viscosity differ from those of water. Consider this when calculating motor and pump performance.
<b>C</b>	The liquid must be oxygen-free (anaerobic).
<b>D</b>	Risk of crystallization/precipitation in shaft seal.
<b>E</b>	Insoluble in water.
<b>F</b>	The shaft seal rubber parts must be replaced with FKM rubber.
<b>G</b>	Bronze housing/impeller required.
<b>H</b>	Risk of formation of ice on the standby pump.

## Pumped liquids

Pumped liquids	Notes	Additional information	Shaft seal
			TP
<b>Water</b>			
Groundwater		<+194 °F (+90 °C)	AUUE
		>+194 °F (+90 °C)	BUBE
Boiler feed water		<+248 °F (+120 °C)	BUBE
District heating water		<+248 °F (+120 °C)	BUBE
Condensate		<+194 °F (+90 °C)	AUUE
		>+194 °F (+90 °C)	BUBE
Softened water	C	<+194 °F (+90 °C)	AUUE
		>+194 °F (+90 °C)	BUBE
Brackish water	G	pH>6.5, +40 °F (+4 °C), 1000 ppm Cl <sup>-</sup>	BUBE AUUE
<b>Coolants</b>			
Ethylene glycol	B, D, H	+122 °F (+50 °C), 50 %	AUUE RUUE
Glycerine (glycerol)	B, D, H	+122 °F (+50 °C), 50 %	AUUE RUUE
Potassium acetate	B, D, C, H	+122 °F (+50 °C), 50 %	AUUE RUUE
Potassium formate	B, D, C, H	+122 °F (+50 °C), 50 %	AUUE RUUE
Propylene glycol	B, D, H		AUUE RUUE
Brine-sodium chloride	B, D, C, H	+41 °F (+5 °C), 30 %	AUUE RUUE
<b>Synthetic oils</b>			
Silicone oil	B, E		BUBE AUUE
<b>Vegetable oils</b>			
Corn oil	B, F, E		BUBV <sup>3)</sup> AUUV <sup>3)</sup>
Olive oil	B, F, E	<+176 °F (80 °C)	BUBV <sup>3)</sup> AUUV <sup>3)</sup>
Peanut oil	B, F, E		BUBV <sup>3)</sup> AUUV <sup>3)</sup>
Grape seed oil	D, B, F, E		BUBV <sup>3)</sup> AUUV <sup>3)</sup>
Soya bean oil	B, F, E		BUBV <sup>3)</sup> AUUV <sup>3)</sup>
<b>Cleaning agents</b>			
Soap (salts of fatty acids)	A, E, (F)	<+176 °F (80 °C)	AUUE (AUUV <sup>3)</sup> )
Alkaline degreasing agent	A, E, (F)	<+176 °F (80 °C)	AUUE (AUUV <sup>3)</sup> )
<b>Oxidants</b>			
Hydrogen peroxide		<+104 °C, <2 %	BUBE AUUE
<b>Salts</b>			
Ammonium bicarbonate	A	<+68 °F (+14 °C), <15 %	AUUE
Calcium acetate	A, B	<+68 °F (+14 °C), <30 %	AUUE
Potassium bicarbonate	A	<+68 °F (+14 °C), <20 %	AUUE
Potassium carbonate	A	<+68 °F (+14 °C), <20 %	AUUE
Potassium permanganate	A	<+68 °F (+14 °C), <10 %	AUUE
Potassium sulfate	A	<+68 °F (+14 °C), <20 %	AUUE
Sodium acetate	A	<+68 °F (+14 °C), <100 %	AUUE
Sodium bicarbonate	A	<+68 °F (+14 °C), <2 %	AUUE
Sodium carbonate	A	<+68 °F (+14 °C), <20 %	AUUE

Pumped liquids	Notes	Additional information	Shaft seal
			TP
Sodium nitrate	A	<+68 °F (+14 °C), <40 %	AUUE
Sodium nitrite	A	<+68 °F (+14 °C), <40 %	AUUE
Sodium phosphate (di)	A	<+212 °F (100 °C), <30%	AUUE
Sodium phosphate (tri)	A	<+194 °F (90 °C), <20%	AUUE
Sodium sulfate	A	<+68 °F (+14 °C), <20%	AUUE
Sodium sulfite	A	<+68 °F (+14 °C), <1%	AUUE
<b>Alkalis</b>			
Ammonium hydroxide		<+212 °F (100 °C), <30%	AUUE
Calcium hydroxide	A	<+212 °F (100 °C), <10%	AUUE
Potassium hydroxide	A	<+68 °F (+14 °C), <20%	AUUE
Sodium hydroxide	A	<+104 °F (40 °C), <20%	AUUE

<sup>3)</sup> The shaft seal is not standard, but available on request.

## 7. TP, TPE pumps



Fig. 3 TP Series pumps

TM03 4875 3206

### Technical data

Flow rate: up to 300 gpm (68 m<sup>3</sup>h)

Head: up to 65 ft (20 m)

Liquid temperature: -13 (-25 °C) to +284 °F (140 °C)

Max. operating pressure: up to 145 psi (10 bar)

**Note:** See Grundfos product guide L-TP-PG-001 for performance range.

### Construction

Grundfos TP, TPE pumps are single-stage, close-coupled pumps with in-line suction and discharge ports flanges of identical diameter.

The pumps are equipped with a fan-cooled asynchronous motor. Motor and pump shafts are connected via a rigid two-part coupling.

The pumps are equipped with an unbalanced mechanical shaft seal.

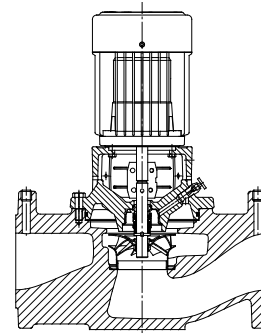
The pumps are of the top-pull-out design, i.e. the power head (motor, pump head and impeller) can be removed for maintenance or service while the pump housing remains in the pipework.

As radial and axial forces are absorbed by the fixed bearing in the motor drive-end, the pump requires no bearing.

Pumps with bronze pump housing are suitable for circulation of domestic hot water.

## Materials

### TP, TPE



TM 00 9274 2002

Fig. 4 Sectional drawing of a single-phase TP, TPE pump

### Material specification

Pos.	Component	Material	AISI, ASTM
1	Pump housing	Cast iron	EN-JL 1040 ASTM 48 CL 30
2	Impeller	Stainless steel	304
3	Shaft	Stainless steel	431
4	Coupling	Cast iron	
5	Pump head	Cast iron	EN-JL 1040 ASTM 48 CL 30
	Secondary seals	EPDM	ASTM 48 CL30
	Rotating seal face	Tungsten carbide	
	Stationary seat	Carbon (synthetic resin-impregnated) tungsten carbide	

## Mechanical shaft seal

Three types of unbalanced mechanical shaft seal are available as standard:

- **BUBE**

The BUBE shaft seal is a Grundfos rubber bellows seal with tungsten carbide/carbon seal faces and secondary seals of EPDM (standard seal).

- **RUUE**

The RUUE shaft seal is a Grundfos O-ring seal with reduced tungsten carbide/tungsten carbide seal faces and secondary seals of EPDM.

- **AUUE**

The AUUE shaft seal is a Grundfos O-ring seal with fixed seal driver, tungsten carbide/tungsten carbide seal faces and secondary seals of EPDM.

Information on a selection of common pumped liquids with recommended shaft seals is shown on page 12.

### Shaft seal specification

Unbalanced shaft seal	TPE	Version NU according to EN 12756
Shaft diameter		12 and 16 mm
Rubber bellows		EPDM
Seal faces		Tungsten carbide/carbon
		Tungsten carbide/ tungsten carbide
		Silicon carbide/ silicon carbide

Special shaft seals are available for partly conditioned water or other liquids containing abrasive or crystallizing particles. See page 12.

## Connections

Pumps up to 2" discharge has US standard flanges; 3" and higher discharge flanges are 125 lb. ANSI connection.

## Control

Electronically controlled TPE pumps are suitable for demand-dependent performance control.

TPE pumps have the following features and benefits:

### Optimized hydraulics for high efficiency

- reduced power consumption.

### TPE pumps with built-in variable frequency drive

- 2-pole TP pumps from 1.5-3 Hp three phase are available as TPE pumps with variable frequency drive. For further information, see page 23.

### Top-pull-out design

- easy dismantling in case of service.

### In-line design

- contrary to end-suction pumps, in-line pumps allow a straight pipework and thus often reduced installation costs.

### Pump housing and pump head are electrocoated

- high corrosion resistance.

Electrocoating includes:

1. Alkaline cleaning
2. Pre-treatment with zinc phosphate coating
3. Cathodic electrocoating (epoxy)
4. Curing of paint film at 392-482 °F (200-250 °C).

For low-temperature applications at a high humidity, Grundfos offers pumps with extra surface treatment to avoid corrosion. These pumps are available on request.

### Stainless steel impeller and neck ring

- wear-free operation with high efficiency.

## 8. TPE Series 2000 pumps



Fig. 5 TPE

### Technical data

Flow rate: up to 300 gpm (68 m<sup>3</sup>h)  
 Head: up to 65 ft (20 m)  
 Liquid temperature: -13 to +284 °F  
 (-25 ° to 140 °C)  
 Max. operating pressure: 145 psi (10 bar)  
 Motor sizes (single-phase): 1.5-3 hp

### Construction

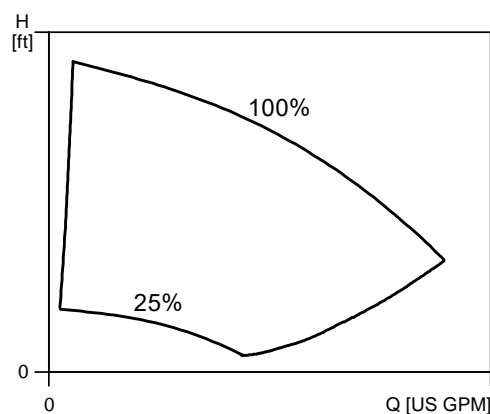
TPE Series 2000 pumps are based on TP pumps. The main differences between the TP and the TPE Series 2000 pump range are the motor and the factory-fitted integrated differential pressure sensor. The motor of TPE Series 2000 pumps has a built-in variable frequency drive designed to continuously regulate the pressure based on the flow demand. The TPE Series 2000 range is recognized as a pre-configured solution for quick and safe installation. For further information on construction and materials of TPE Series 2000 pumps, see page 13.

### Applications

TPE Series 2000 pumps have integrated speed control for automatic adaptation of performance to current conditions.

This ensures that the energy consumption is kept at a minimum.

TPE Series 2000 pumps can operate in any duty point within the range between 25 % and 100 % speed.



In the QH-chart the 100 %-curve corresponds to the curve for a pump fitted with a standard fixed-speed motor.

Depending on the nature of the application, TPE Series 2000 pumps offer energy-savings, increased comfort or improved processing.

TPE Series 2000 pumps are suitable for applications where you want to control the pressure.

TM03 0348 4904

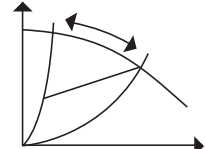
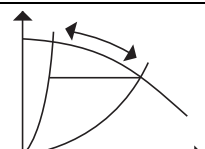
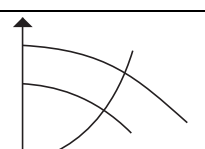
TM03 3609 0506

### Differential proportional pressure

TPE Series 2000 pumps are factory-set to proportional pressure. We recommend proportional pressure control in systems with relatively large pressure losses as it is the most economical control mode.

TPE Series 2000 pumps set to proportional pressure control continuously adjust the pump head to the system water requirement.

The charts below show possible control modes of TPE Series 2000 pumps in different applications.

Control mode	Application
<b>Differential proportional pressure</b>	
	Systems with two-way valves - the head against closed valve is half the setpoint.
<b>Differential constant pressure</b>	
	Systems with two-way valves.
<b>Constant curve</b>	
	Single-pipe heating system. Systems with three-way valves. Heating and cooling surfaces. Chiller pumps

### Control options

Communication with TPE Series 2000 pumps is possible via:

- a central building management system
- remote control (Grundfos R100) or
- a control panel.

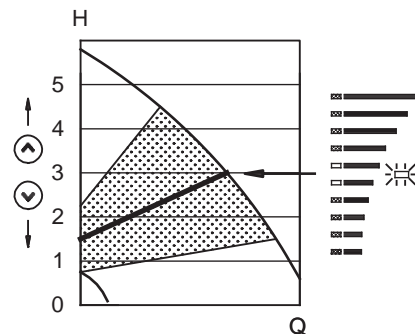
The purpose of controlling TPE Series 2000 pumps is to monitor and control the pressure.

For further information on control options of TPE pumps, see page 21.

### Pump selection guidelines

#### Differential proportional pressure control

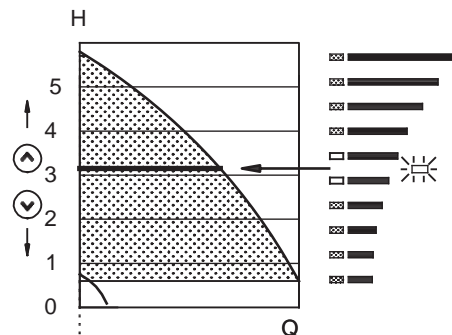
TPE 2000 pump operating range in differential pressure control mode is between 3/4th of the maximum head (shut off) to 1/4th of the maximum head. Select pump to operate within this range when pump is running full load speed. With differential proportional control, pump will follow a straight line between set point and half of the set point at closed valve as shown below.



TM03 3670 0606

#### Constant differential pressure control

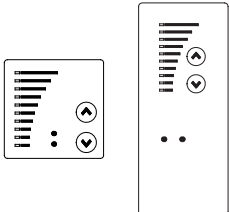
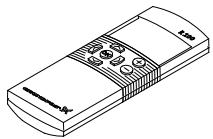
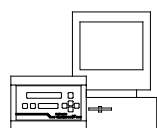
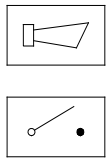
The setting range for constant pressure control is between maximum head to 1/8th of the maximum head.



TM03 3671 0606



## Overview of functions

E-pump functions		TPE Series 2000 with single-phase MLE
	<b>Setting via control panel:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Alarm reset	
	Constant/proportional pressure	
	<b>Reading via control panel:</b>	
	Setpoint	
	Operating indication	
Fault indication		
	<b>Setting via R100:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Alarm reset	
	Controlled/uncontrolled	
	Constant/proportional pressure, constant curve	
	Controller constants Kp, Ti	
	External setpoint signal	
	Signal relay function	
	Pump number (for bus communication)	
	Stop function	
	Sensor range and signal	
	Duty/standby	
	Operating range (min./max. speed)	
	<b>Reading via R100:</b>	
	Setpoint	
	Operating mode	
	Actual sensor value	
Pump speed		
Actual power consumption		
Energy consumption		
Running hours		
	<b>Setting via GENibus:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Controlled/uncontrolled	
	Constant/proportional pressure, constant curve	
	<b>Reading via GENibus:</b>	
	Setpoint	
	Operating indication	
	Pump status	
	<b>Additional functions:</b>	
	Parallel operation	
	Clock program	
		<b>Settings via external signal:</b>
Setpoint		
Start/stop		
Min./max. curve via digital input		
Min./max. curve, external fault, Flow switch via digital input		
<b>Readings via external signal:</b>		
Fault signal (relay)		
Fault, Operation or Ready signal (relay)		

● Available

## 9. TPE Series 1000 pumps



Fig. 6 TPE Series 1000

### Technical data

Flow rate: up to 300 gpm (68 m<sup>3</sup>h)

Head: up to 65 ft (20 m)

Liquid temperature: -13 to +284 °F  
(-25 ° to 140 °C)

Max. operating pressure: 145 psi (10 bar)

Motor sizes (single-phase): 1.5-3 hp

Construction

TPE Series 1000 pumps are based on TP pumps.

The main difference between the TP and the TPE Series 1000 pump range is the motor.

The motor of TPE Series 1000 pumps has a built-in variable frequency drive designed to continuously regulate the pressure and the flow.

TPE Series 1000 pumps are suitable for applications where you want to retrofit a sensor in order to control e.g. the pressure, temperature, flow etc. at some arbitrary point in the system. Sensors shall be supplied by others.

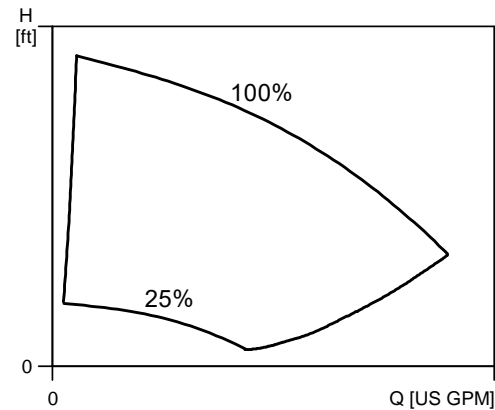
For further information on construction and materials of TPE Series 1000 pumps, see page 13 and 14.

### Applications

TPE Series 1000 pumps have integrated speed control for automatic adaptation of performance to current conditions.

This ensures that the energy consumption is kept at a minimum.

TPE Series 1000 pumps can operate in any duty point within the range between 25 % and 100 % speed.



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TM03 3609 0506

In the QH-chart the 100 %-curve corresponds to the curve for a pump fitted with a standard fixed speed motor.

Depending on the nature of the application, TPE Series 1000 pumps offer energy-savings, increased comfort or improved processing.

The pumps can be fitted with sensor types meeting the requirements mentioned below:

#### Start/stop

External potential-free switch.

Voltage: 5 VDC.

Current: < 5 mA.

Screened cable: 0.5 - 1.5 mm<sup>2</sup> / 28-16 AWG.

#### Digital

External potential-free switch.

Voltage: 5 VDC.

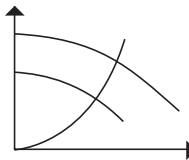
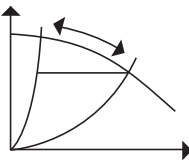
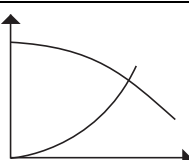
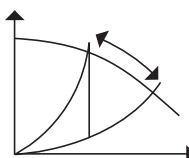
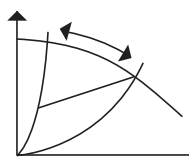
Current: < 5 mA.

Screened cable: 0.5 - 1.5 mm<sup>2</sup> / 28-16 AWG.

#### Setpoint signals

- Potentiometer  
0-10 VDC, 10 k $\Omega$  (via internal voltage supply).  
Screened cable: 0.5 - 1.5 mm<sup>2</sup> / 28-16 AWG.  
Maximum cable length: 328 ft (100 m).
- Voltage signal  
0-10 VDC,  $R_i > 10$  k $\Omega$ .  
Tolerance: +0%/-3% at maximum voltage signal.  
Screened cable: 0.5 - 1.5 mm<sup>2</sup> / 28-16 AWG.  
Maximum cable length: 1640 ft (500 m).
- Current signal  
DC 0-20 mA/4-20 mA,  $R_i = 175$   $\Omega$ .  
Tolerance: +0%/-3% at maximum current signal.  
Screened cable: 0.5 - 1.5 mm<sup>2</sup> / 28-16 AWG.  
Maximum cable length: 1640 ft (500 m).  
Power source for sensor: 24 VDC is available from VFD. Max 40 mA

The charts below show possible control modes of TPE Series 1000 pumps in different applications.

Control mode	Application
<b>Constant curve</b>	
	<ul style="list-style-type: none"> <li>Single-pipe heating systems.</li> <li>Systems with three-way valves.</li> <li>Heating and cooling surfaces.</li> <li>Chiller pumps.</li> </ul>
<b>Constant differential pressure</b>	
	<ul style="list-style-type: none"> <li>Systems with two-way valves.</li> <li>(Sensor is needed)</li> </ul>
<b>Temperature control</b>	
	<ul style="list-style-type: none"> <li>Single-pipe heating systems.</li> <li>Systems with three-way valves.</li> <li>Cooling towers.</li> <li>Chiller pumps.</li> <li>Domestic hot water recirculation systems.</li> <li>(Sensor is needed)</li> </ul>
<b>Constant flow</b>	
	<ul style="list-style-type: none"> <li>Heating and cooling surfaces.</li> <li>Cooling towers.</li> <li>Flow filters.</li> <li>(Sensor is needed)</li> </ul>
<b>Proportional differential pressure (measured)</b>	
	<ul style="list-style-type: none"> <li>System with two-way valves.</li> <li>(Differential pressure sensor is located in the system)</li> <li>(Sensor is needed)</li> </ul>

## Control options

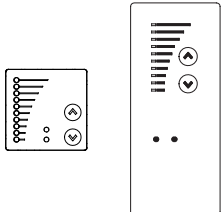
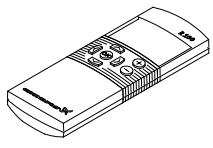
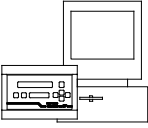
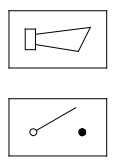
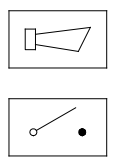
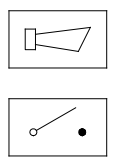
Communication with TPE Series 1000 pumps is possible via:

- a central building management system
- a remote control (Grundfos R100)
- a control panel.

The purpose of controlling a TPE Series 1000 pumps is to monitor and control the pressure, temperature, flow and liquid level of the system.

For further information on control options of TPE pumps, see page [21](#).

## Overview of functions

	E-pump functions	TPE Series 1000, without sensor
	<b>Setting via control panel:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Alarm reset	
	Constant/proportional pressure	
	<b>Reading via control panel:</b>	
	Setpoint	
	Operating indication	
Fault indication		
	<b>Setting via R100:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Alarm reset	
	Controlled/uncontrolled	
	Constant/proportional pressure, constant curve	
	Controller constants Kp, Ti	
	External setpoint signal	
	Signal relay function	
	Pump number (for bus communication)	
	Stop function	
	Sensor range and signal	
	Duty/standby	
	Operating range (min./max. speed)	
	<b>Reading via R100:</b>	
	Setpoint	
	Operating mode	
	Actual sensor value	
Pump speed		
Actual power consumption		
Energy consumption		
Running hours		
	<b>Setting via GENIbus:</b>	
	Setpoint	
	Start/stop	
	Max. curve	
	Min. curve	
	Controlled/uncontrolled	
	Constant/proportional pressure, constant curve	
	<b>Reading via GENIbus:</b>	
	Setpoint	
	Operating indication	
Pump status		
	<b>Additional functions:</b>	
	Parallel operation	
	Clock program	
	<b>Settings via external signal:</b>	
	Setpoint	
	Start/stop	
	Min./max. curve via digital input	
	Min./max. curve, external fault, Flow switch via digital input	
	<b>Readings via external signal:</b>	
	Fault signal (relay)	
	Fault, Operation or Ready signal (relay)	

● Available

## 10. Communication

### Communication with TPE pumps

Communication with TPE pumps is possible via a central building management system, remote control (Grundfos R100) or a control panel.

#### Central building management system

The operator can communicate with a TPE pump even when he is not present near the pump.

Communication can take place via a central building management system allowing the operator to monitor and change control modes and setpoint settings.

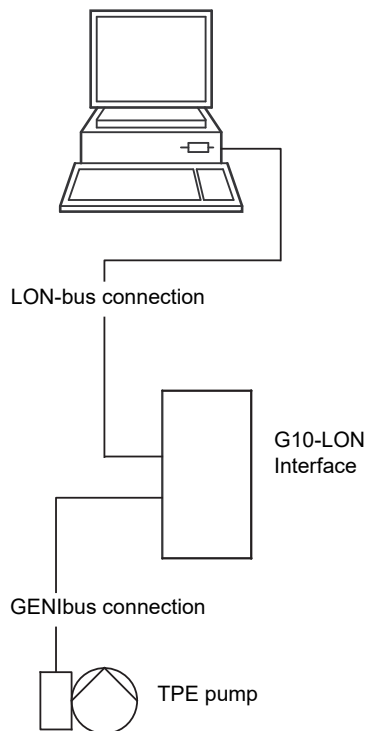


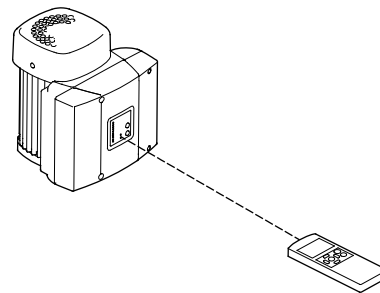
Fig. 7 Structure of a central building management system

TM02 6592 1103

#### Remote control

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

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



TM02 0936 0501

Fig. 8 R100 remote control

The operator can monitor and change control modes and settings of the TPE pump via the R100 display.

#### Control panel

The operator can change the setpoint settings manually on the control panel of the TPE pump terminal box.



TM00 7600 0304

Fig. 9 Control panel of a TPE pump

## 11. Motors for TPE pumps

### Motor

The motor fitted on TPE pumps is a totally enclosed, fan-cooled standard motor with main dimensions and electrical tolerances to NEMA standards.

Relative humidity:Max. 95 %

Enclosure class:TEFC

Insulation class:F, to IEC 85

Ambient temperature:Max. +104 °F



TMM06 9830 0817

### 2 pole

HP	Voltage [V]	PH	NEMA frame Size	Service Factor	Motor full load efficiency [%]	Full load current amps <sup>3)</sup> [A]	Service factor current amps [A]	Power factor	Full load speed [rpm]	Sound pressure level [dB(A)]
1 1/2 <sup>1)</sup>	200-240	3	56C	1.15	89.3*	4.00 - 3.40	4.60 - 3.90	0.91	3480	55
2 <sup>1)</sup>	200-240	3	56C	1.00	88.90*	5.40 - 4.50	-	0.92	3480	55
3 <sup>1)</sup>	200-240	3	182TC	1.15	88.70*	7.90 - 6.60	9.10 - 7.60	0.94	3480	62

<sup>1)</sup> Permanent-magnet motor

\* Efficiency of motor and VFD

## Grundfos variable frequency drive

The variable frequency drive in the MLE motor of the TPE-pump is a highly integrated electronic unit. It is based on an integrated hybrid module developed by Grundfos.

The functional blocks of the single-phase MLE motor variable frequency drive with PFC-circuit (Power Factor Correction) are shown in figure 10.

Components of Power electronics are;

- RFI filter (Radio Frequency Interference)
- Rectifier, PFC-circuit and intermediate circuit (1 ph)
- Inrush circuit
- Inverter

### EMC (electromagnetic compatibility)

The Grundfos MLE motors fulfill the EMC directive 89/336/EEC and are tested according to standard EN 61 800-3. All Grundfos MLE motors are equipped with radio interference filter and varistors in the mains supply input to protect the electronics against voltage peaks and noise present in the mains supply (immunity). All inputs included in the electronic unit are protected against peaks and noise which can damage or disturb the function of the unit.

Grundfos MLE motors are designed to operate under a radiated electromagnetic disturbance well above requirements in EN61 800-3. MLE motors can be used in both residential areas and industrial areas.

### Integrated RFI filter

The integrated radio interference filter (RFI) limits the amount of electrical noise which the MLE motor emits to the mains supply network (emission). At the same time the filter ensures that noise signals in the mains generated by other equipment do not enter the electronic devices of the variable frequency drive causing damage or disturbances.

### Rectifier, PFC-circuit and intermediate circuit, single-phase E-pumps

Single-phase MLE motors are equipped with PFC-circuit (Power Factor Correction). The purpose of this circuit is to ensure that the current input from the mains is sinusoidal and the power factor is close to 1.

The single phase MLE motor range is not covered by EMC directive and not required to comply with it. Grundfos chose to include the PFC -circuit with the variable frequency drive design in order to comply with the EMC directive standard EN 61000-3-2 stipulating the limits for harmonic current emissions.

The purpose of PFC is to ensure that the mains are not "contaminated" by non-sinusoidal loads which have a tendency to distort the waveform of the mains voltage and furthermore cause unnecessarily high peak currents in the mains.

Benefits of PFC circuit:

- Low reactive load on power supply
- the current will have 40-50% lower RMS
- smaller fuses are required in the installation
- when connecting several pumps supplied by different phases in parallel, the current in the common neutral lead will be balanced so that the neutral lead current will never exceed the current in any one of the mains phases.
- the pump is less sensitive to variations in the mains voltage.

### Inrush circuit

When the variable frequency drive is connected to the mains voltage, the intermediate circuit capacitor is charged to achieve its normal operating voltage. A series resistor ensures that the charging happens slowly to avoid large charge spike in supply power and intermediate capacitors.

### Inverter

The inverter consists of six transistors which are "switched on/off" by control signals from the control electronics. The transistors have a diode placed in parallel and are arranged in three branches each consisting of a series connection comprising two transistors.

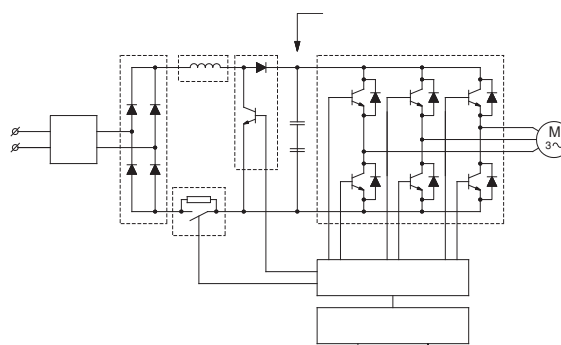
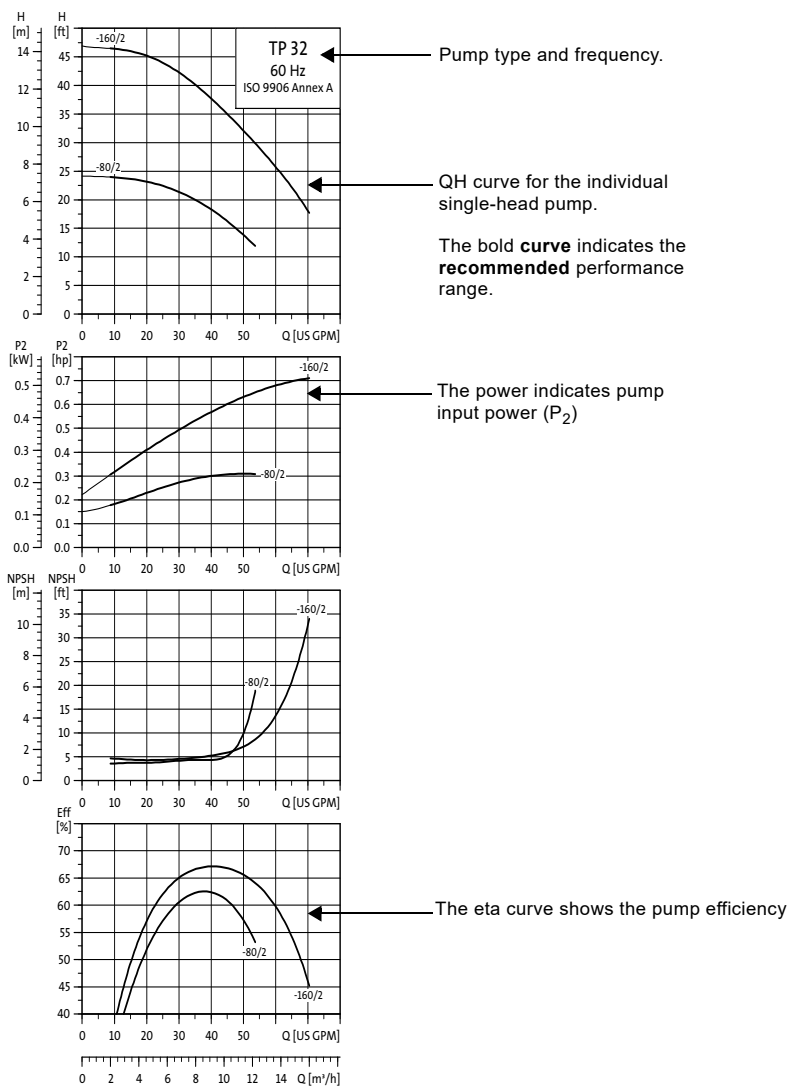


Fig. 10 Block diagram showing the functional blocks of the frequency converter of a single-phase MLE motor

# 12. Curve charts

## How to read the curve charts



### Curve conditions

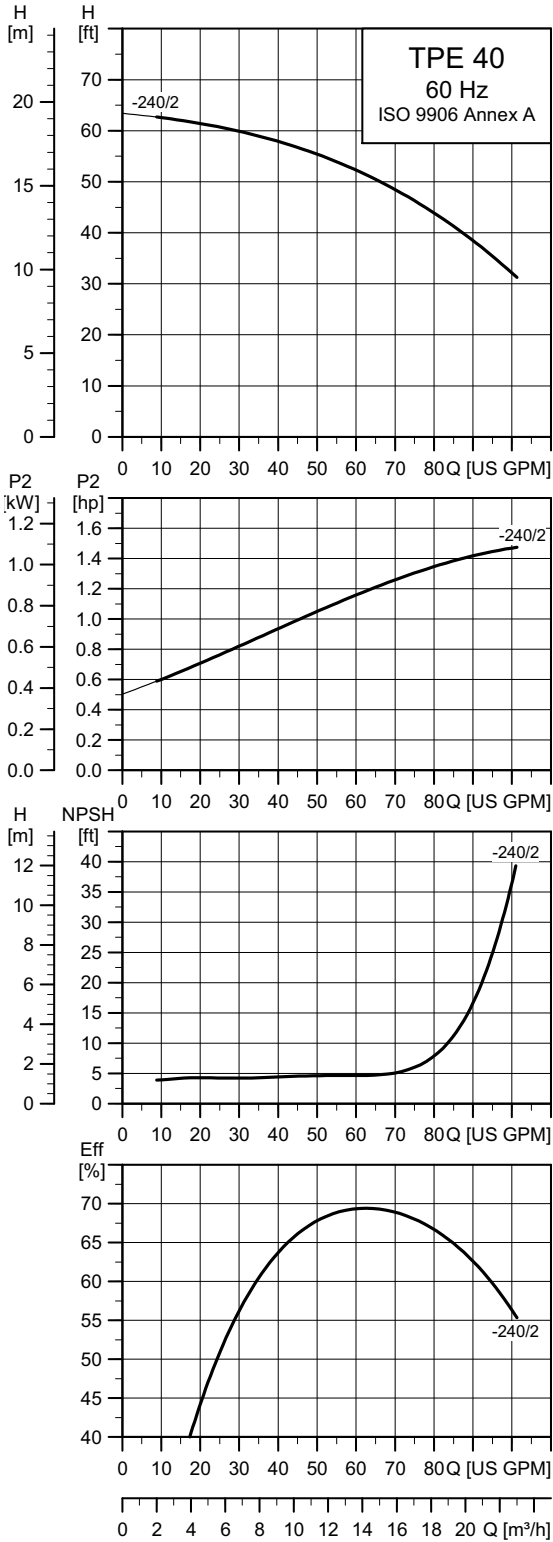
The guidelines below apply to the curves shown on the following pages:

1. Tolerances to ISO 9906, Annex A.
2. The curves apply to the performance of **single-phase pumps**. For other versions, please see the exact curves in [Grundfos Product Center](#).
3. Measurements have been made with airless water at a temperature of +68 °F (20 °C).
4. The curves apply to a kinematic viscosity of 1 St (1 mm<sup>2</sup>/s).
5. Due to the risk of pump overheating, the pumps should not be used below the minimum flow rate indicated by the **bold-faced** curves.  
**Note:** We do not recommend constant operation at a flow rate below 10 %.
6. If the pumped liquid density and/or viscosity is higher than that of water, it may be necessary to use a motor with a higher performance.
7. Motor speed:  
2-pole = 3480 RPM

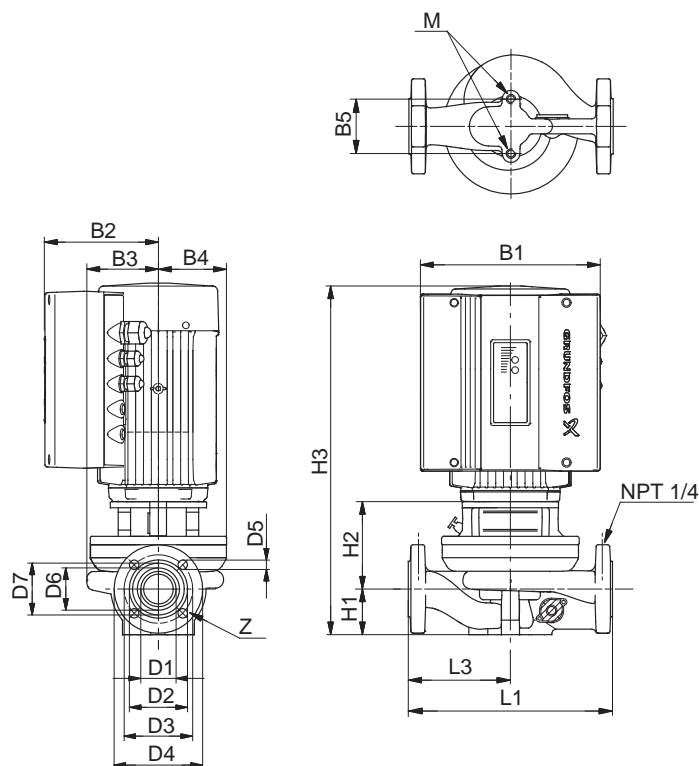
TM02 5553 2102



**TPE 40-240/2**



TM02 5554 0320



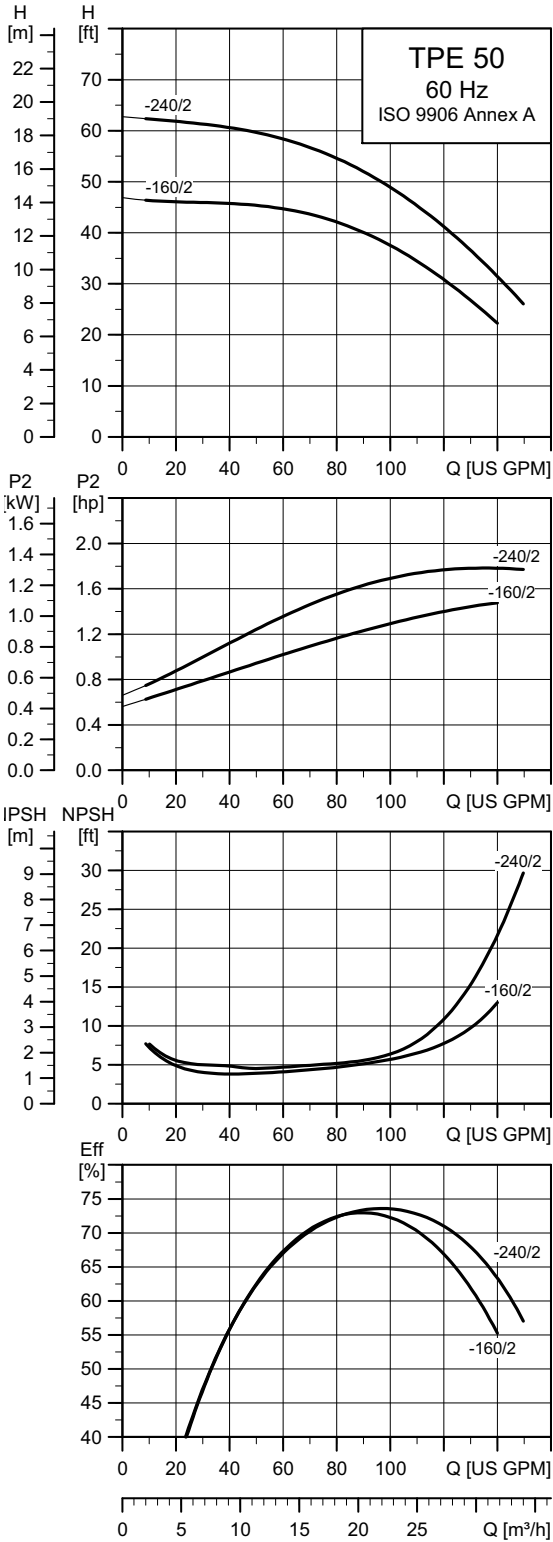
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### Technical data

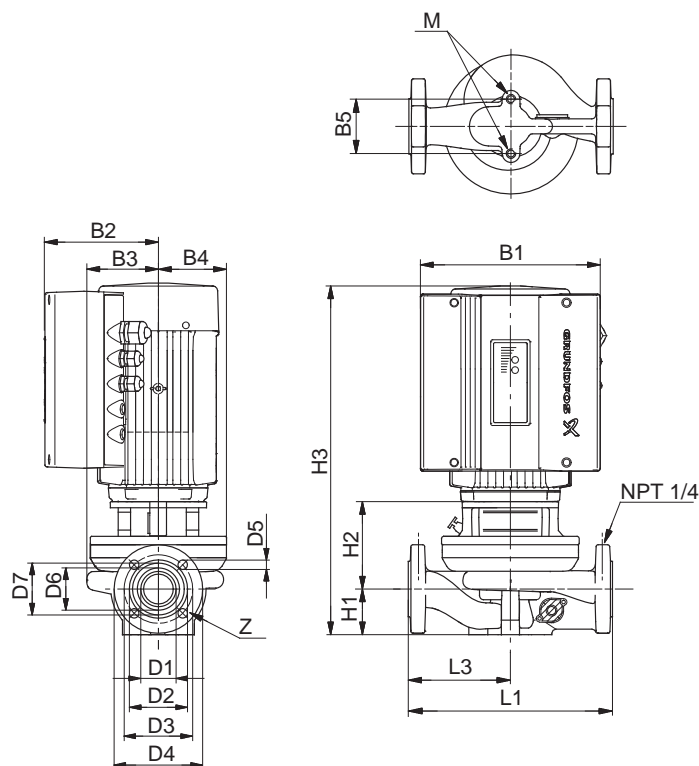
Pump type	TPE40-240/2	
Motor type	NEMA 56C	
P2 [HP] / Max speed [rpm]	1.5	3480
Motor flange	56C	
Flange type	US (1)	
D1 [Inch] / [mm]	1.65	41.8
D2 [Inch] / [mm]	2.87	73
D3 [Inch] / [mm]	3.90	99
D4 [Inch] / [mm]	5.00	127
D5 [Inch] / [mm]	0.63	16
D6 [Inch] / [mm]	2.05	52
D7 [Inch] / [mm]	2.54	64.6
B1 [Inch] / [mm]	10.55	268.0
B2 [Inch] / [mm]	6.22	158.0
B3 [Inch] / [mm]	3.94	100
B4 [Inch] / [mm]	3.94	100
B5 [Inch] / [mm]	3.15	80
H1 [Inch] / [mm]	2.68	68
H2 [Inch] / [mm]	6.17	156.6
H3 [Inch] / [mm]	18.88	479.6
L1 [Inch] / [mm]	13.50	342.9
L3 [Inch] / [mm]	6.75	171.5
M	M12	M12
Net weight [lbs]/[kg]	102	46.4
Gross weight [lbs] / [kg]	104	47.3

(1) 1-1/2", 2 bolt with 5/82 dia. holes

**TPE 50-XX/2**



TM02 5555 0320



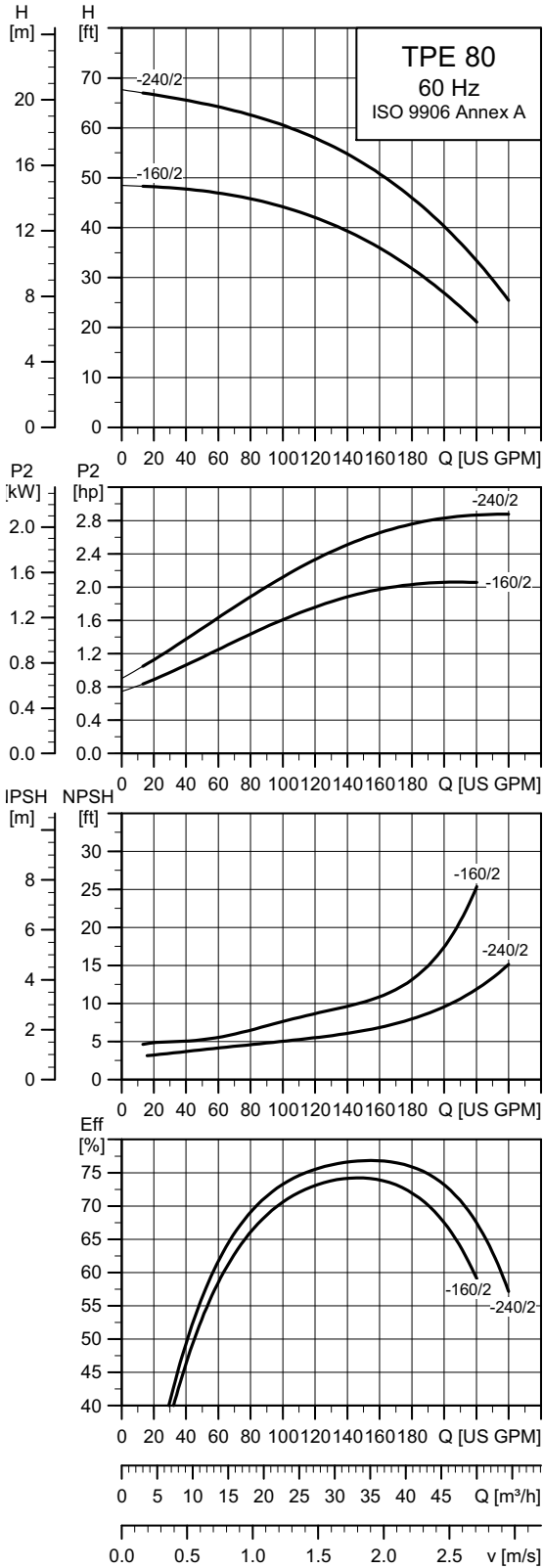
TM03 3669 0606

Technical data

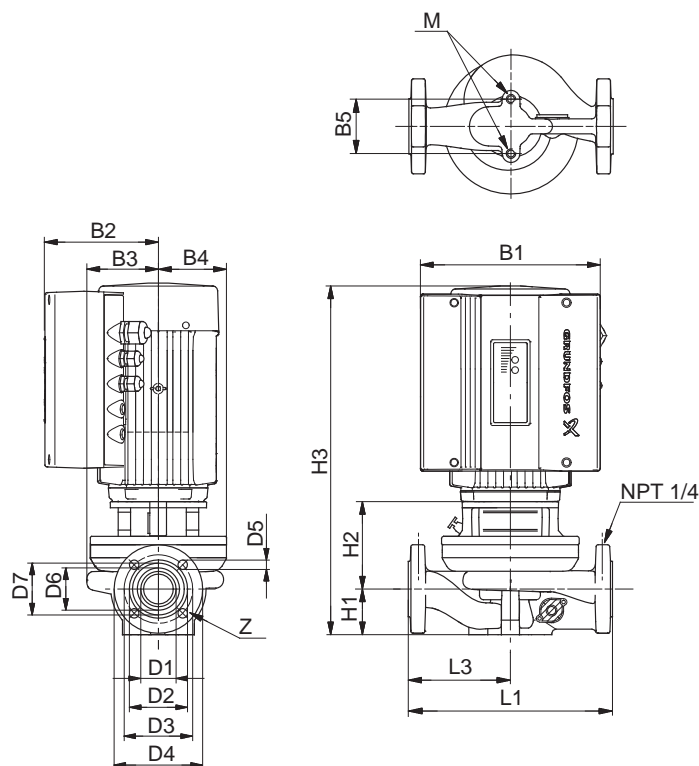
Pump type	TPE 50-160/2		TPE 50-240/2	
	Motor type	NEMA 56C		NEMA 56C
P2 [HP] / Max speed [rpm]	1.5	3480	2	3480
Motor flange	56C		56C	
Flange type	US (1)		US (1)	
D1 [Inch] / [mm]	2.09	53	2.09	53
D2 [Inch] / [mm]	3.43	87	3.43	87
D3 [Inch] / [mm]	4.06	103	4.06	103
D4 [Inch] / [mm]	5.24	133	5.24	133
D5 [Inch] / [mm]	0.55	14	0.55	14
D6 [Inch] / [mm]	2.48	63	2.48	63
D7 [Inch] / [mm]	3.07	78	3.07	78
B1 [Inch] / [mm]	10.55	268.0	10.55	268
B2 [Inch] / [mm]	6.22	158.0	6.22	158
B3 [Inch] / [mm]	3.94	100	3.94	100
B4 [Inch] / [mm]	3.94	100	3.94	100
B5 [Inch] / [mm]	4.72	120	4.72	120
H1 [Inch] / [mm]	2.95	75	2.95	75
H2 [Inch] / [mm]	5.83	148.1	5.83	148.1
H3 [Inch] / [mm]	18.82	478.1	19.61	498.1
L1 [Inch] / [mm]	14.00	355.6	14.00	355.6
L3 [Inch] / [mm]	7.00	177.8	7.00	177.8
M	M12	M12	M12	M12
Net weight [lbs]/[kg]	78	35.5	76	34.5
Gross weight [lbs] / [kg]	100	45.3	98	44.3

(1) 2", 4 bolt with (4) 9/16" dia. holes

**TPE 80-XX/2**



TM07 5950 0320

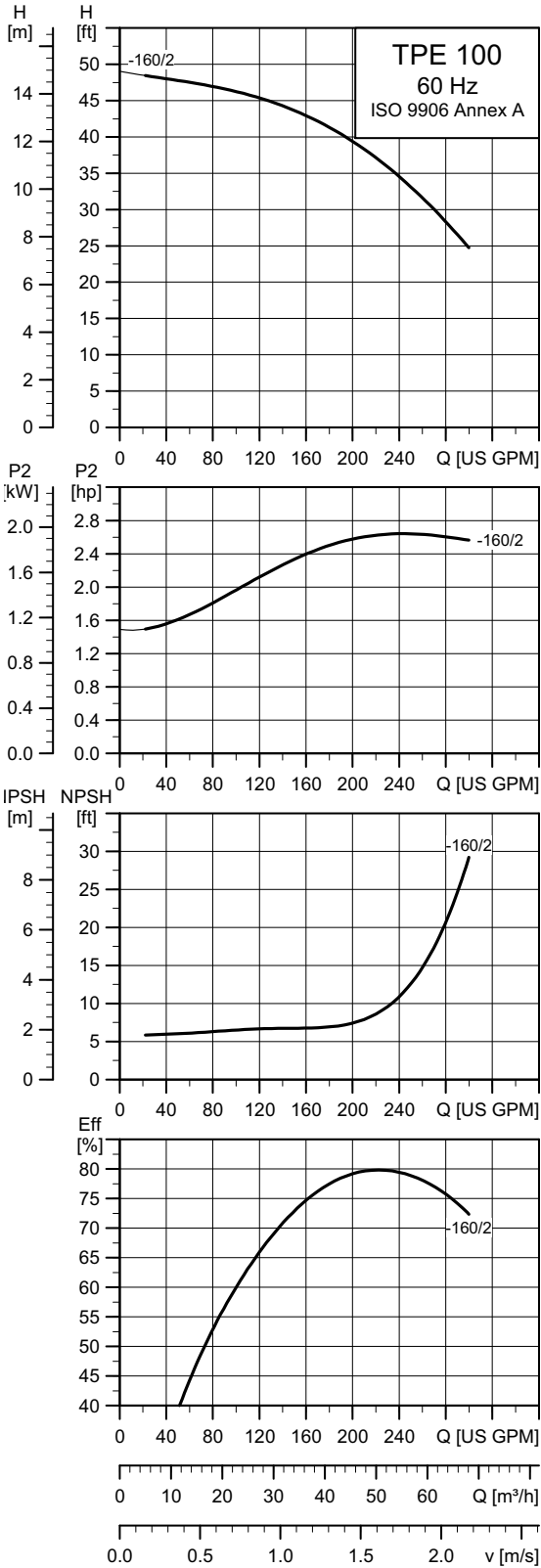


TM03 3669 0606

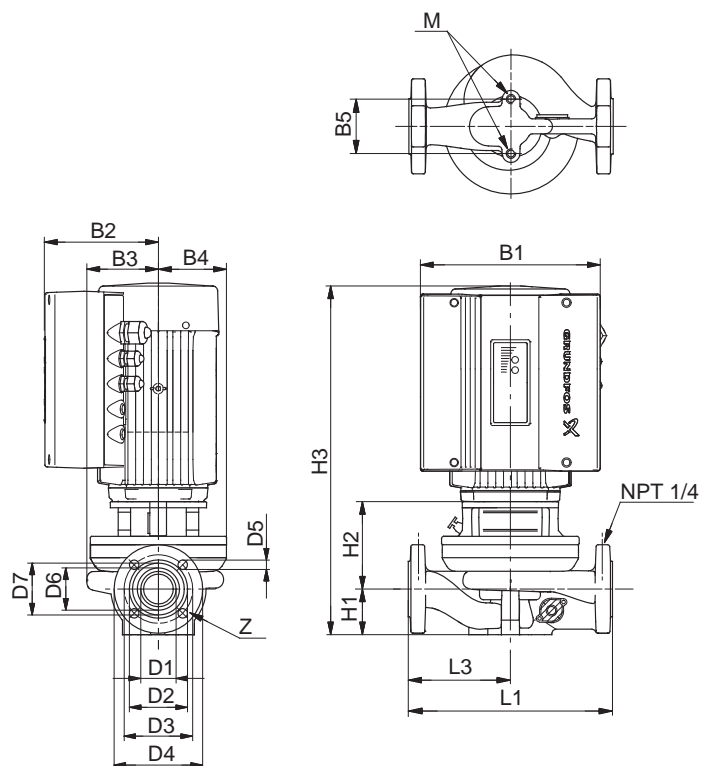
Technical data

Pump type	TPE 80-160/2		TPE 80-240/2	
	Motor type	NEMA 56C		NEMA 56C
P2 [HP] / Max speed [rpm]	3	3480	3	3480
Motor flange	56C		56C	
Flange type	3" ANSI 125lb..RF.		3" ANSI 125lb..RF.	
D1 [Inch] / [mm]	3.19	81	3.19	81
D2 [Inch] / [mm]	5.00	127	5.00	127
D3 [Inch] / [mm]	5.98	152	5.98	152
D4 [Inch] / [mm]	7.52	191	7.52	191
D5 [Inch] / [mm]	0.75	19	0.75	19
B1 [Inch] / [mm]	11.46	291	11.46	291
B2 [Inch] / [mm]	7.91	201	7.91	201
B3 [Inch] / [mm]	3.94	100	3.94	100
B4 [Inch] / [mm]	3.94	100	3.94	100
B5 [Inch] / [mm]	6.30	160	4.72	120
H1 [Inch] / [mm]	3.82	97	3.82	97
H2 [Inch] / [mm]	7.04	178.8	6.84	173.7
H3 [Inch] / [mm]	24.01	609.8	23.81	604.7
L1 [Inch] / [mm]	19.00	482.6	19.00	482.6
L3 [Inch] / [mm]	9.50	241.3	9.50	241.3
M	M16	M16	M12	M12
Net weight [lbs] / [kg]	136	61.6	90	40.6
Gross weight [lbs] / [kg]	157	71.4	111	50.4

**TPE 100-160/2**



TM07 5951 0320



TM03 3669 0606

### Technical data

Pump type	TPE 100-160/2	
Motor type	NEMA 56C	
P2 [HP] / Max speed [rpm]	3	3480
Motor flange	56C	
Flange type	3" ANSI 125lb..RF.	
D1 [Inch] / [mm]	4.15	105.3
D2 [Inch] / [mm]	6.18	157
D3 [Inch] / [mm]	7.52	191
D4 [Inch] / [mm]	9.02	229
D5 [Inch] / [mm]	0.75	19
B1 [Inch] / [mm]	11.46	291
B2 [Inch] / [mm]	7.91	201
B3 [Inch] / [mm]	3.94	100
B4 [Inch] / [mm]	4.92	125
B5 [Inch] / [mm]	6.30	160
H1 [Inch] / [mm]	4.21	107
H2 [Inch] / [mm]	7.22	183.4
H3 [Inch] / [mm]	24.58	624.4
L1 [Inch] / [mm]	21.00	533.4
L3 [Inch] / [mm]	10.50	266.7
M	M16	M16
Net weight [lbs] / [kg]	137	62.2
Gross weight [lbs] / [kg]	159	72



## 13. Installation

### Mechanical installation

TP, TPE pumps can be installed in horizontal and vertical pipes.

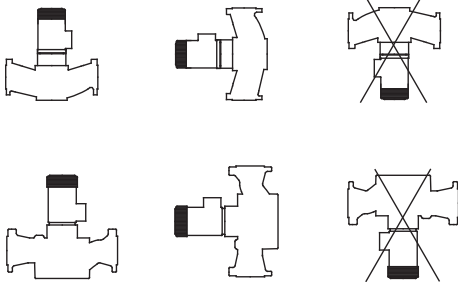


Fig. 11 Installation

Install the pumps in such a way that strain from the pipework is not transferred to the pump housing.

To ensure sufficient cooling of motor and electronics, observe the following:

- Place the pump in such a way that sufficient cooling is ensured.
- Make sure that the temperature of the cooling air does not exceed +104 °F (40 °C).
- Keep the motor cooling fins, holes in fan cover and fan blades clean.

### Condensation cover for TPE pumps

When installing TPE pumps outdoors, provide the motor with a suitable cover to avoid condensation on the electronic components and to protect the pump and motor against the direct effects of the elements.

When mounting the condensation cover on top of the motor, make sure to leave enough space for the air to cool the motor.

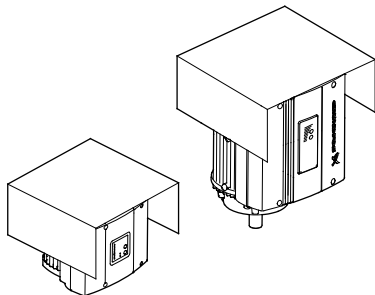


Fig. 12 MGE and MLE motors with condensation cover

### Elimination of noise and vibrations

In order to achieve optimum operation and minimum noise and vibration, consider vibration dampening of the pump.

Noise and vibration are generated by the revolutions of the motor and pump and by the flow in pipes and fittings. The effect on the environment is subjective and depends on correct installation and the state of the remaining system.

Elimination of noise and vibrations is best achieved by means of a concrete foundation, vibration dampers and expansion joints.

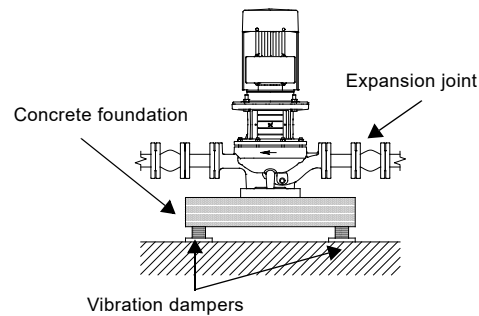


Fig. 13 Foundation of TP pump

### Concrete foundation

Install the pump on a plane and rigid concrete foundation. This is the optimum solution for vibration dampening. As a rule of thumb, the weight of a concrete foundation should be 1.5 times the pump weight.

TM03 3064 0206

TM02 4993 2102

TM02 8514 0304

**Vibration dampers**

To prevent the transmission of vibrations to buildings, we recommend you to isolate the pump foundation from building parts by means of vibration dampers.

The selection of the right vibration damper requires the following data:

- forces transmitted through the damper
- motor speed considering speed control, if any
- required dampening in % (suggested value is 70 %).

Which is the right damper varies from installation to installation, and a wrong damper may increase the vibration level. Vibration dampers should therefore be sized by the supplier.

If you install the pump on a foundation with vibration dampers, always fit expansion joints on the pump flanges. This is important to prevent the pump from "hanging" in the flanges.

**Expansion joints**

Install expansion joints to:

- absorb expansions/contractions in the pipework caused by changing liquid temperature
- reduce mechanical strains in connection with pressure surges in the pipework
- isolate mechanical structure-borne noise in the pipework (only rubber bellows expansion joints).

**Note:** Do not install expansion joints to compensate for inaccuracies in the pipework such as center displacement of flanges.

Fit expansion joints at a distance of minimum 1 to 1½ times the nominal flange diameter away from the pump on the suction as well as on the discharge side. This will prevent the development of turbulence in the expansion joints, resulting in better suction conditions and a

minimum pressure loss on the pressure side. At high water velocities (> 16 ft/s) we recommend you to install larger expansion joints corresponding to the pipework.

The illustration below shows examples of rubber bellows expansion joints with or without limit rods.

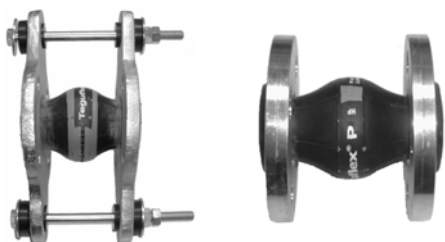


Fig. 14 Examples of rubber bellows expansion joints

TM02 4879 1902 - TM02 4981 1902

Expansion joints with limit rods can be used to reduce the effects of the expansion/contraction forces on the pipework.

Anchor the pipes in such a way that they do not stress the expansion joints and the pump. Follow the supplier's instructions and pass them on to advisers or pipe installers.

The illustration below shows an example of a metal bellows expansion joint with limit rods.

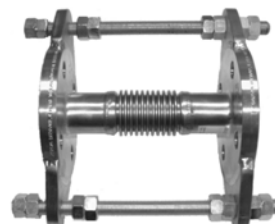


Fig. 15 Example of metal expansion joint

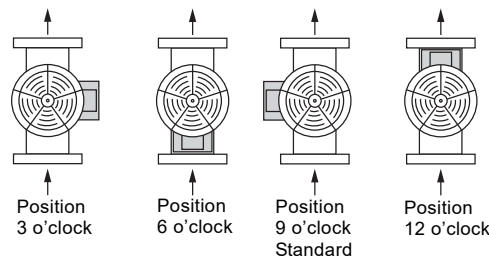
TM02 4980 1902

Due to the risk of rupture of the rubber bellows, metal bellows expansion joints may be preferred at temperatures above +212 °F (100 °C) combined with high pressure.

**Control panel positions**

As standard, the control panels of TP and TPE pumps are mounted in position 9 o'clock.

The possible terminal box positions are shown below.



TM03 0565 2005

Control panel face has an infrared receiver. There should be sufficient space between any obstruction and the control panel.

## 14. Accessories

### Sensors for circulation applications

Differential pressure sensor kit	Pressure range	Product number
<ul style="list-style-type: none"> <li>• 1 sensor incl. 4.5 ft screened cable (7/16" connections)</li> <li>• 1 bracket (for wall mounting)</li> </ul>	0 - 9 psi ( 0 - 0.6 bar)	485450
<ul style="list-style-type: none"> <li>• 1 Grundfos bracket (for mounting on motor)</li> <li>• 2 M4 screws for mounting of sensor on bracket</li> </ul>	0 - 14.5 psi ( 0 - 1 bar)	485441
<ul style="list-style-type: none"> <li>• 1 M6 screw (self-cutting) for mounting on</li> <li>• 1 M8 screw (self-cutting) for mounting on</li> </ul>	0 - 23 psi ( 0 - 1.6 bar)	485442
<ul style="list-style-type: none"> <li>• 2 capillary tubes (short/long)</li> <li>• 2 bracket (1/4" - 7/16")</li> <li>• 5 cable clips (black)</li> </ul>	0 - 36 psi ( 0 - 2.5 bar)	485443

### Optional shaft seal kits

For use with these models	Type, seal faces, elastomers	Designation	Product number
All TP, TPE	O-ring Type, tungsten carbide/tungsten carbide, EPDM	AUUE	96409266
All TP, TPE	Reduced Face O-ring Type, tungsten carbide/tungsten carbide, EPDM & FKM (FOR USE WITH GLYCOL/WATER MIXTURES)	RUUE/V	985844

# 15. Submittal data sheet



Company name: \_\_\_\_\_  
 Prepared by: \_\_\_\_\_  
 Phone number: ( ) - \_\_\_\_\_  
 Fax number: ( ) - \_\_\_\_\_  
 Date: \_\_\_\_\_ Page 1 of: \_\_\_\_\_  
 Quote number: \_\_\_\_\_

## Submittal Data Sheet

### Client Information

Project title: _____	Client name: _____
Reference number: _____	Client number: _____
Client contact: _____	Client phone no: ( ) - _____

### Location Information

For: _____	Unit: _____
Site: _____	Service: _____
Address: _____	City: _____ State: _____ Zip Code: _____

### Technical Data

Flow (GPM) \_\_\_\_\_  
 Head (Ft) \_\_\_\_\_  
 Motor \_\_\_\_\_  
 Max Fluid Temp \_\_\_\_\_  
 Min Fluid Temp \_\_\_\_\_  
 Max Working Pressure \_\_\_\_\_  
 Min Required Inlet Pressure \_\_\_\_\_  
 Connection Type and Size \_\_\_\_\_

### Motor Information

HP: \_\_\_\_\_  
 Phase: \_\_\_\_\_  
 Voltage: \_\_\_\_\_  
 Enclosure: \_\_\_\_\_

### Pump Information

Model Information from Type Key and Codes: _____	
Quantity Required: _____	Example: UP-S-15-58-FC
Minimum required flow: _____	NPSH required at duty point: _____
<b>Product Guide additional information pages</b>	
Materials page number: _____	Performance curve page number: _____
Technical data page number: _____	Motor data page number: _____

Custom-built pump information (optional): \_\_\_\_\_

### Additional Information

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## 16. Grundfos Product Center

Online search and sizing tool to help you make the right choice.

<http://product-selection.grundfos.com>

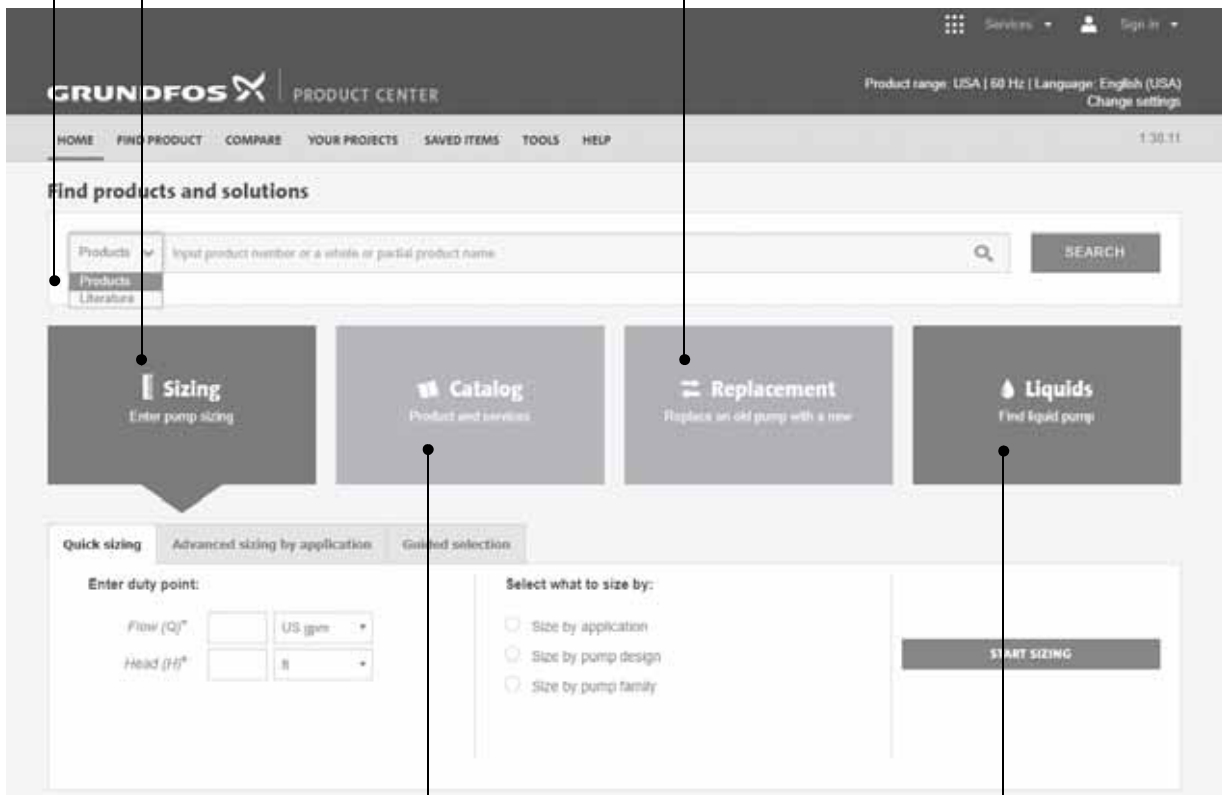


This drop-down menu enables you to set the search function to "Products" or "Literature".

"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product. Search results will include information on the following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



"CATALOGUE" gives you access to the Grundfos product catalogue.

"LIQUIDS" enables you to find pumps designed for aggressive, flammable or other special liquids.

### All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

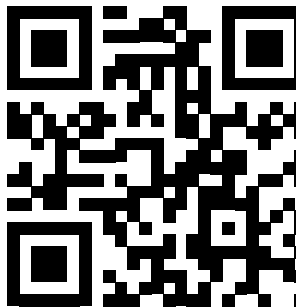
### Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

## Grundfos GO

### Mobile solution for professionals on the GO!

Grundfos GO is the mobile tool box for professional users on the go. It is the most comprehensive platform for mobile pump control and pump selection including sizing, replacement and documentation. It offers intuitive, handheld assistance and access to Grundfos online tools, and it saves valuable time for reporting and data collection.





L-TPE-PG-01

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ECM: 1278342
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