TP, TPD, TPE, TPE2, TPE2 D, TPE3, TPE3 D

In-line circulator pumps

60 Hz

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think
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Table of contents

1. Pump data

Introduction

TP 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 mains-operated motors (TP and TPD) or electronically speed-controlled motors (TPE, TPE2, TPE2 D, TPE3, TPE3 D).

The pumps are all single-stage, in-line centrifugal pumps with mechanical shaft seal. The pumps are of the close-coupled type, that is the pump and the motor are separate units.

TP pumps - mains-operated pumps

The TP range is divided into two groups based on their construction: TP Series 200 and 300 pumps.

TP Series 200 with flange connection

DN 32 to DN 100 and motor sizes from 0.12 to 3 kW.

For further information, see page 26.

TP Series 300 with flange connection

We offer two versions:

- 16-bar version with DN 32 to DN 350 flanges and motor sizes from 0.55 to 250 kW
- 25-bar version with DN 100 to DN 350 flanges and motor sizes from 7.5 to 250 kW.

For further information, see page 28.

TPE, TPE2 and TPE3 speed-controlled pumps

We offer the following speed-controlled pumps which are based on the construction and choice of material of the TP pumps:

- TPE Series 1000 pumps without factory-fitted differential-pressure sensor.
- TPE2 pumps without built-in differential-pressure and temperature sensor.
- TPE3 pumps with built-in differential-pressure sensor and temperature sensor.

All pumps with 2-pole motors up to 11 kW and 4-pole motors up to 7.5 kW are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

TPE Series 1000 pumps

The motors have a built-in frequency converter.

Via an external signal from a sensor or a controller, the pumps allow for any configuration and control method required, that is constant pressure, temperature or flow.

For further information, see page 31.

TPE2 pumps

The permanent magnet motors have built-in frequency converter and the hydraulic components have been specially designed for optimum efficiency.

Via an external signal from a sensor or a controller, the pumps allow for any configuration and control method required, that is constant pressure, temperature, flow or level. For further information, see page 34.

TPE3 pumps

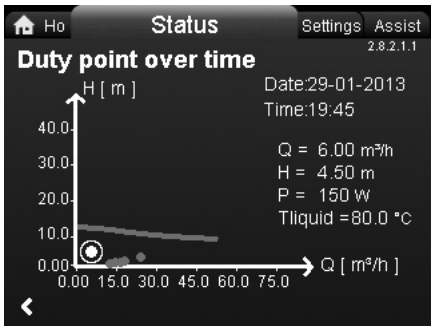


Fig. 1 Example of status display for TPE3 pumps

The pumps have a built-in differential-pressure sensor and temperature sensor.

The pumps are factory-set to $AUTO_{ADAPT}$ control.

The permanent magnet motors of the pumps have a built-in frequency converter for continuous adjustment of the pressure to the flow rate. The hydraulic components have been specially designed for optimum efficiency.

The range is recognised as a preset solution for quick and safe installation. The pumps have a colour display for easy and intuitive pump setup and with full access to all functions. The pumps incorporate the following advanced functions:

- $AUTO_{ADAPT}$
- $FLOW_{ADAPT}$
- automatic night setback
- $FLOW_{LIMIT}$
- heat energy monitor
- flow rate estimation
- proportional pressure
- constant pressure
- constant differential temperature control
- constant temperature control.

For further information, see page 34.

Why select a TPE pump?

A pump with electronic speed control offers these obvious benefits:

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

ATEX-approved TP pumps

On request, Grundfos offers TP and TPD pumps with ATEX-approval.

See section *27. Key application data*.

High-efficiency motors, IE3

TP pumps are fitted with high-efficiency motors.

The pumps are primarily fitted with motors that meet the legislative requirements of the EuP IE3 or IE2 grade depending on voltage and motor size.

For further information, see *Motor* on pages 98.

Energy-optimised pumps

TP pumps are energy-optimised and comply with the EuP Directive (Commission Regulation (EC) No. 547/2012) in which most pumps are classified or graduated in a minimum efficiency index, MEI. See also page 186.

Identification

Type key for TP, TPD, TPE, TPED

Code	Example	TP	E	D	65	-120	/2	S	-A	-F	-A	-BQQE	-G	D	B
	Pump range														
	Electronically speed-controlled pump, Series 1000, 2000														
	Twin-head pump														
	Nominal diameter of inlet and outlet ports, DN														
	Maximum head [dm]														
	Pole number														
	Code for pump with sensor version:														
[Blank]	TPE Series 1000 with MGE motor and without sensor														
S	TPE Series 2000 with factory-fitted differential-pressure sensor														
NC	TPE Series 1000 with Siemens motor with integrated CUE														
SC	TPE Series 2000 with built-in differential-pressure sensor and Siemens motor with integrated CUE														
	Code for pump version. The codes may be combined:														
A	Basic version														
A3	PN 25 flange														
B	Oversize motor														
E	With ATEX approval, certificate or test report, the second character of the code for pump version is an E														
I	PN 6 flange														
X	Special version														
	Code for pipe connection:														
F	DIN flange														
O	Union														
	Code for materials:														
A	Basic version														
I	Stainless steel 1.4308 pump housing and motor stool														
Z	Bronze pump housing and motor stool														
B	Bronze impeller														
S	Stainless steel 1.4408 impeller														
O	Ductile cast-iron pump housing with cast-iron impeller														
Y	Ductile cast-iron pump housing with bronze impeller														
Q	Ductile cast-iron pump housing with stainless steel 1.4408 impeller														
	Code for shaft seal including other plastic and rubber pump parts, except the neck ring. See *Codes for shaft seal* on page 7.														
	Code for rated motor power [kW]. See *Codes for rated motor power* on page 7.														
	Code for phase and voltage [V] or other information. See *Codes for phase and voltage or other information* on page 7.														
	Code for speed variant [rpm]. See *Codes for speed variant* on page 7.														

Type key for TPE2, TPE3

Code	Example	TPE3	D	65	-120	S	-A	-F	-A	-BQQE	-F	A	B
	Pump range, electronically speed-controlled pump												
TPE2	Without built-in sensor												
TPE3	Built-in differential-pressure and temperature sensor												
	Twin-head pump												
	Nominal diameter of inlet and outlet ports, DN												
	Maximum head [dm]												
S	Built-in differential-pressure and temperature sensor												
N	Without built-in sensor												
	Code for pump version:												
A	Basic version												
I	PN 6 flange												
X	Special version												
	Code for pipe connection:												
F	DIN flange												
	Code for materials:												
A	Basic version												
I	Stainless steel 1.4308 pump housing and motor stool												
	Code for shaft seal including other plastic and rubber pump parts, except the neck ring. See *Codes for shaft seal* on page 7												
	Code for rated motor power [kW]. See *Codes for rated motor power* on page 7.												
	Code for phase and voltage [V] or other information. See *Codes for phase and voltage or other information* on page 7.												
	Code for speed variant [rpm]. See *Codes for speed variant* on page 7.												

Codes for shaft seal

Code	Example	B	Q	Q	E
	Grundfos type designation				
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				
	Material of rotating face				
A	Carbon, antimony-impregnated				
B	Carbon, resin-impregnated				
Q	Silicon carbide				
	Material of stationary seat				
B	Carbon, resin-impregnated				
Q	Silicon carbide				
U	Tungsten carbide				
	Material of secondary seal				
E	EPDM				
P	NBR rubber				
V	FKM				
F	FXM				

Codes for rated motor power

Code	Description	
	[hp]	[kW]
A	0.16	0.12
B	0.25	0.18
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
J	4	3
K	5 (5.5[1])	3.7 (4[1])
L	7.5	5.5
M	10	7.5
N	15	11
O	20	15
P	25	18.5
Q	30	22
R	40	30
S	50	37
T	60	45
U	75	55
V	100	75
W	125	90
X	Bare shaft pump	
Y	> 200[2]	> 150[2]
1	150	110
2	175	132
3	200	150
4	215[3]	160[3]
5	250[3]	185[3]

1 Value in bracket is for the standard IEC motor size. Value outside bracket is for the motor size according to NEMA standards.

2 Used for pumps where the pump shaft input power exceeds 200 hp (150 kW) and is not regulated under the DOE pump rule.

3 Special cases with power sizes above 200 hp (150 kW) which are still regulated under the DOE pump rule. For example: Pump has a P2 value of 198 hp (147.6 kW) in its duty point (in DOE scope) but customer wants the 215 hp (160 kW) motor instead of the 200 hp (150 kW). The pump is in scope of the DOE regulation and requires a PEI value and a motor code.

Codes for phase and voltage or other information

Code	Description
A	E-motor (ECM[1]), 1 x 200-240 V
B	E-motor (ECM[1]), 3 x 200-240 V
C	E-motor (ECM[1]), 3 x 440-480 V
D	E-motor (ECM[1]), 3 x 380-500 V
V	Intended for use with external VFD only, asynchronous motor
W	Not for sale in North America
X	No motor or US DOE regulated motor (CC marked motor)
Y	Out of DOE scope
Z	E-motor, asynchronous motor

1 ECM: Electronically Commutated Motor.

Codes for speed variant

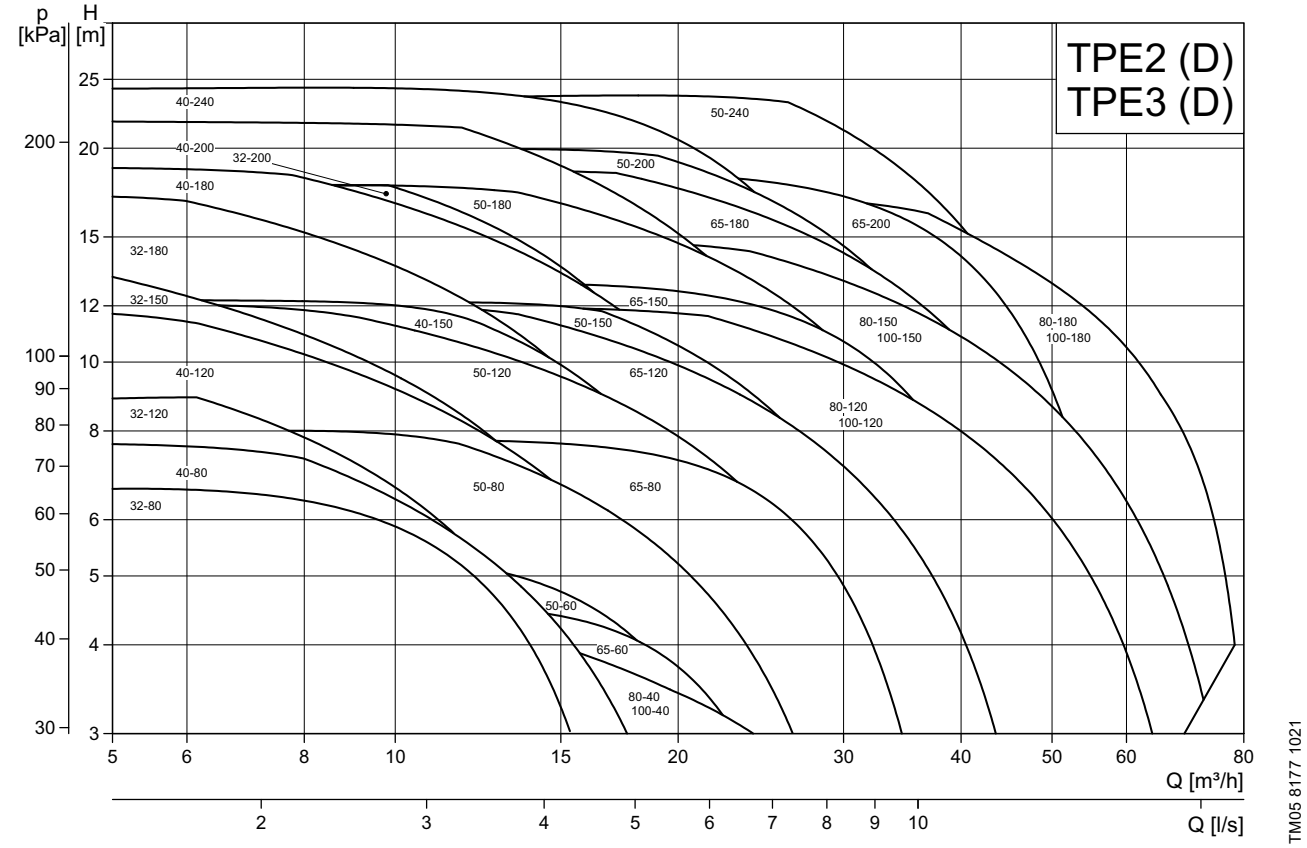
Code	Description
A	1450-2200 RPM, E-motor (ECM[1])
B	2900-4000 RPM, E-motor (ECM[1])
C	4000-5900 RPM, E-motor (ECM[1])
1	2-pole, 50 Hz (Asynchronous motor)
2	2-pole, 60 Hz (Asynchronous motor)
3	4-pole, 50 Hz (Asynchronous motor)
4	4-pole, 60 Hz (Asynchronous motor)
5	6-pole, 50 Hz (Asynchronous motor)
6	6-pole, 60 Hz (Asynchronous motor)
7	8-pole, 50 Hz (Asynchronous motor)
8	8-pole, 50 Hz (Asynchronous motor)

1 ECM: Electronically Commutated Motor.

2. Performance range

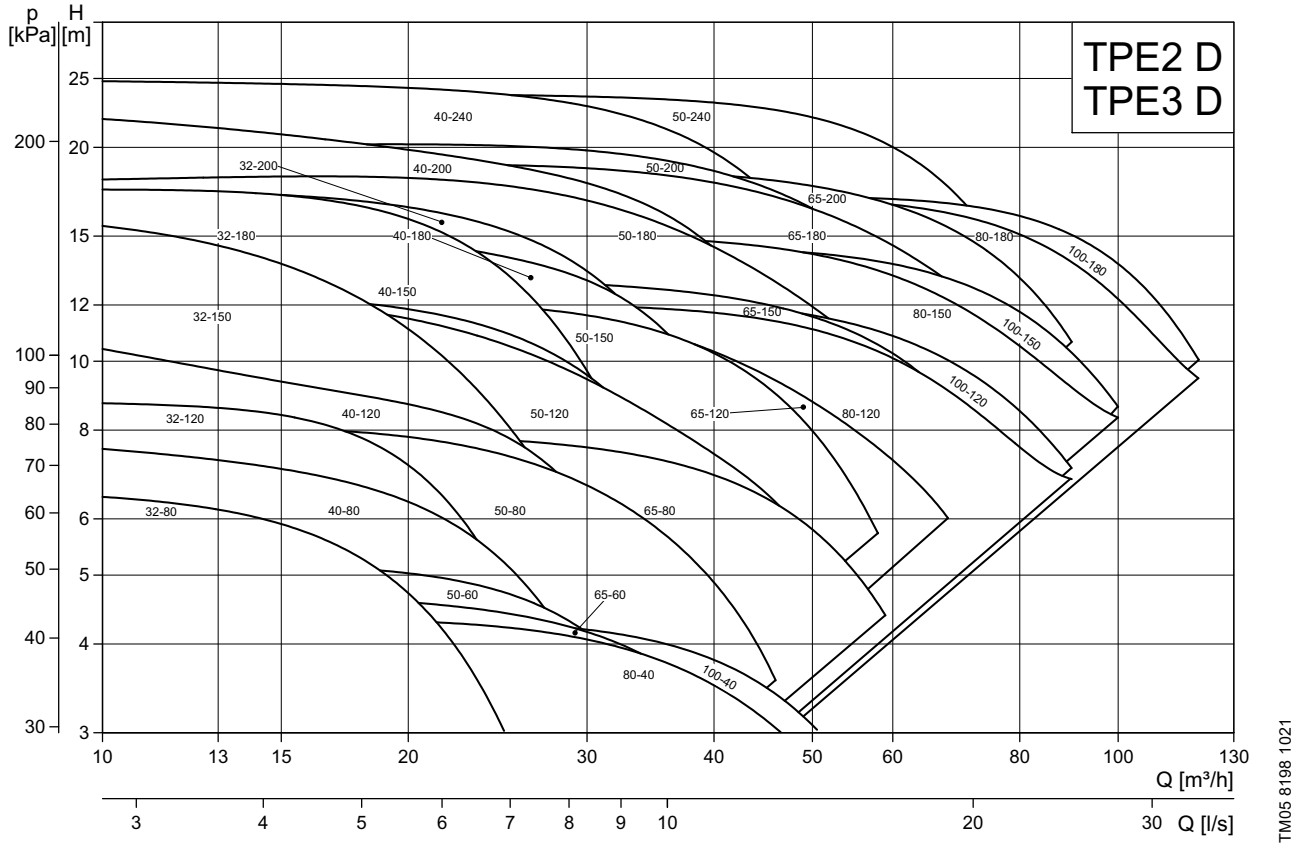
Performance range, TPE2, TPE3, PN 6, 10, 16

See page 120 for performance curves.



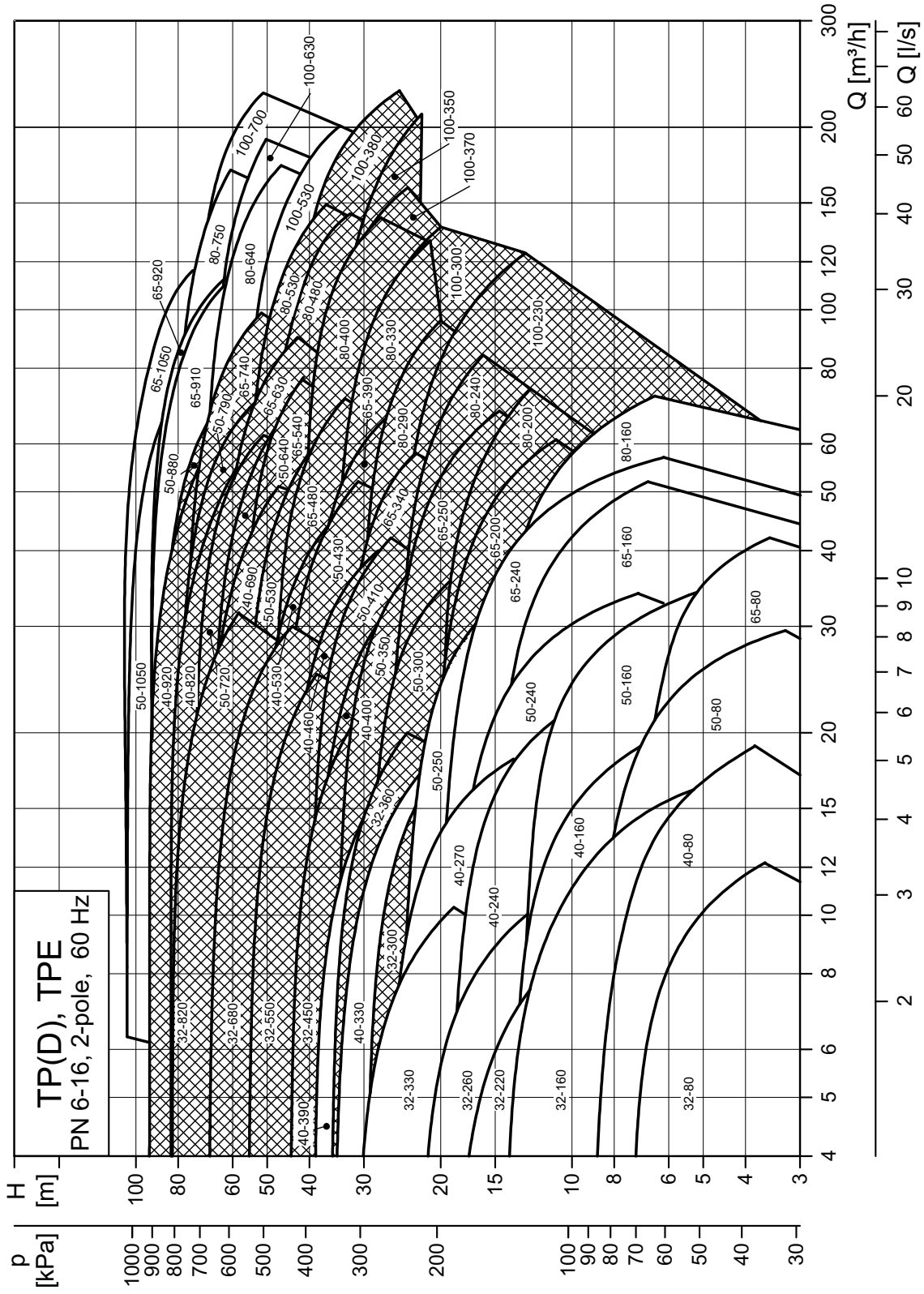
Performance range, TPE2 D, TPE3 D, twin-head operation, PN 6, 10, 16

See page 120 for performance curves.



Performance range, 2-pole, PN 6, 10, 16

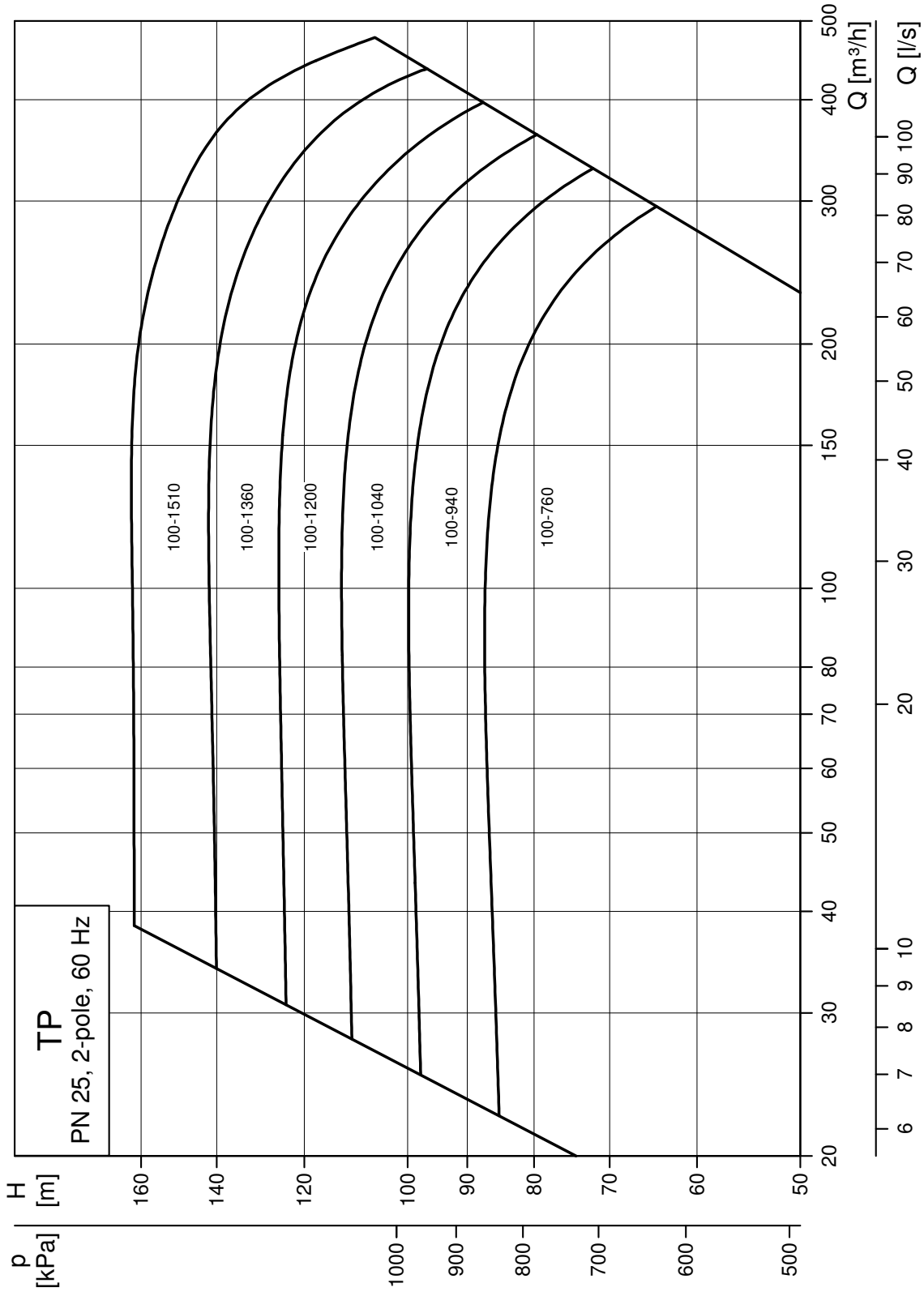
See page 132 for performance curves.



Note: All QH curves apply to single-head pumps. For further information about curve conditions, see page 119.
The hatched area shows the performance range of TPE pumps.

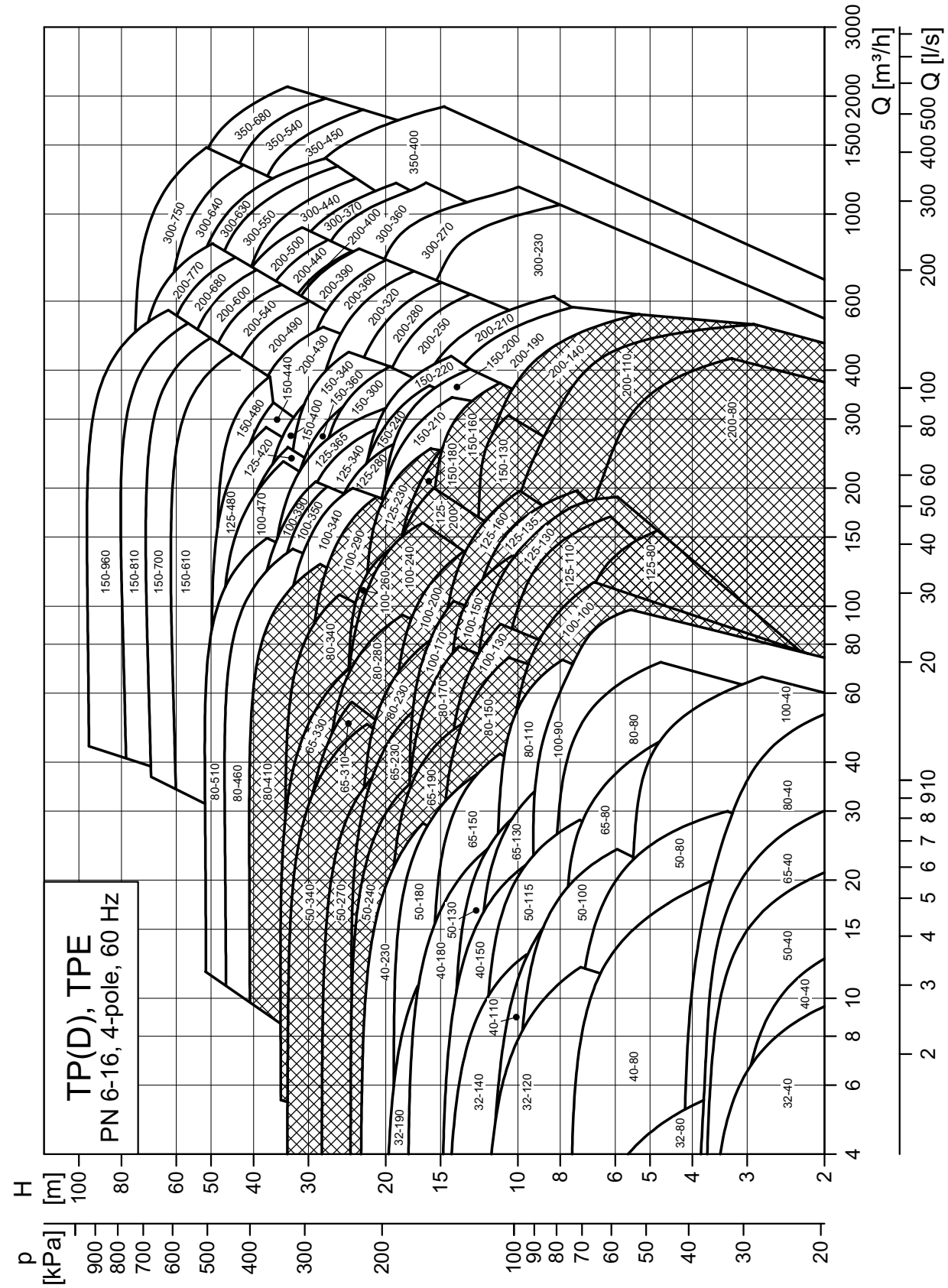
Performance range, 2-pole, PN 25

See page 148 for performance curves.



Performance range, 4-pole, PN 6, 10, 16

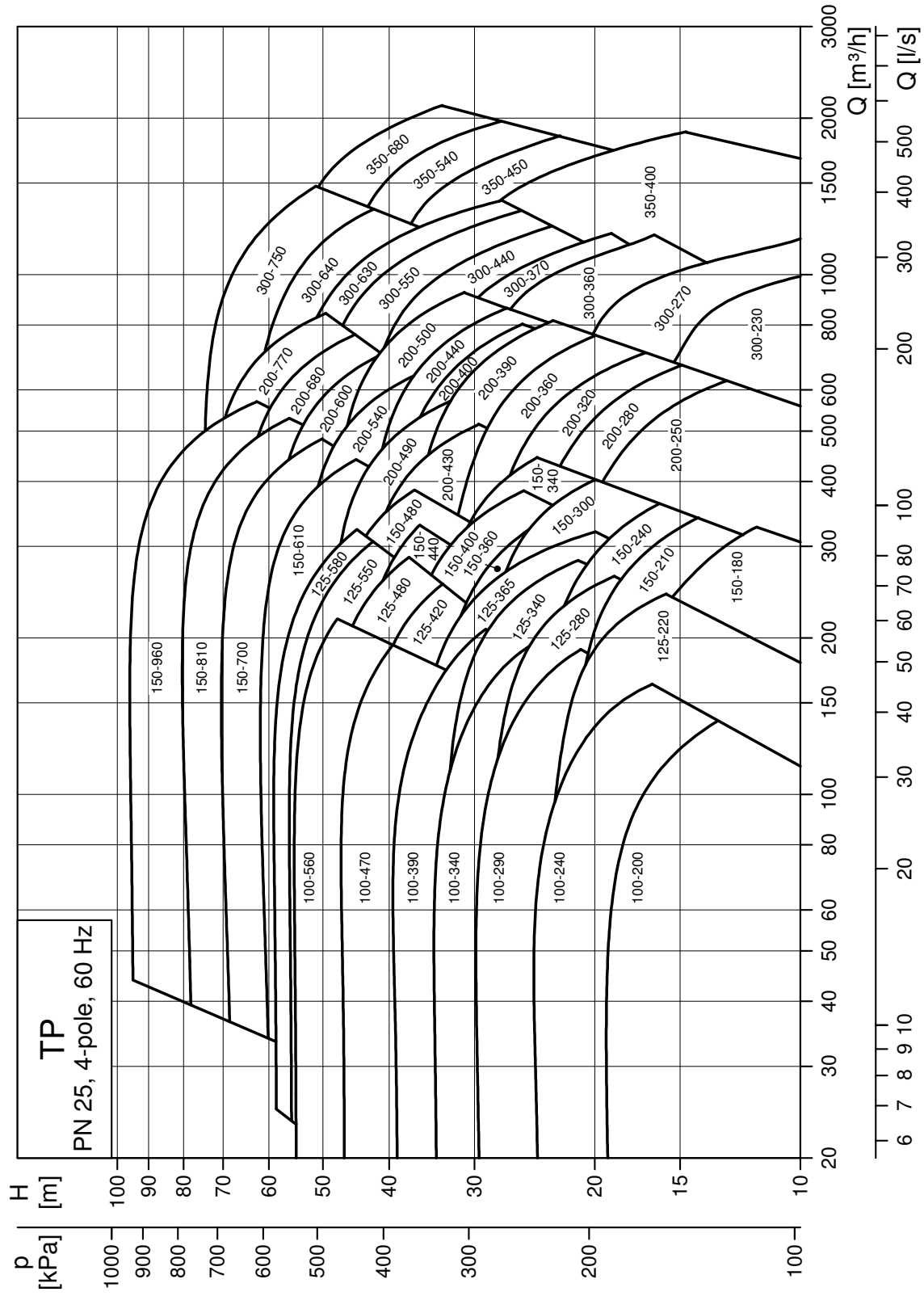
See page 150 for performance curves.



Note: All QH curves apply to single-head pumps. For further information about curve conditions, see page 119.
The hatched area shows the performance range of TPE pumps.

Performance range, 4-pole, PN 25

See page 162 for performance curves.



3. Product range

Product range, TPE2, TPE2 D, TPE3, TPE3 D

Pump type	Design		Shaft seal				Pressure stage				Materials			Electronically speed-controlled motor	
											Pump housing		Impeller	Voltage [V]	
	TPE2, TPE2 D	TPE3, TPE3 D	BQBE	BAQE	BQQE	DBUE	PN 6/10	PN 6	PN 10	PN 16	Cast iron EN-GJL-250	Stainless steel[1]	Composite PES-GF30	1 x 200-240 V	3 x 380-500 V
														P2 [kW]	P2 [kW]
TPE2, TPE2 D, TPE3 TPE3 D 32-80	•	•	•		•		•			•	•	•	•	0.25	0.25
TPE2, TPE2 D, TPE3 TPE3 D 32-120	•	•	•		•		•			•	•	•	•	0.25	0.25
TPE2, TPE2 D, TPE3 TPE3 D 32-150	•	•	•		•		•			•	•	•	•	0.37	0.37
TPE2, TPE2 D, TPE3 TPE3 D 32-180	•	•	•		•		•			•	•	•	•	0.55	0.55
TPE2, TPE2 D, TPE3 TPE3 D 32-200	•	•	•		•		•			•	•	•	•	0.75	0.75
TPE2, TPE2 D, TPE3 TPE3 D 40-80	•	•	•		•		•			•	•	•	•	0.25	0.25
TPE2, TPE2 D, TPE3 TPE3 D 40-120	•	•	•		•		•			•	•	•	•	0.37	0.37
TPE2, TPE2 D, TPE3 TPE3 D 40-150	•	•	•		•		•			•	•	•	•	0.55	0.55
TPE2, TPE2 D, TPE3 TPE3 D 40-180	•	•	•		•		•			•	•	•	•	0.75	0.75
TPE2, TPE2 D, TPE3 TPE3 D 40-200	•	•	•		•		•			•	•	•	•	1.1	1.1
TPE2, TPE2 D, TPE3 TPE3 D 40-240	•	•	•		•		•			•	•	•	•	1.5	1.5
TPE2, TPE2 D, TPE3 TPE3 D 50-60	•	•	•		•		•			•	•	•	•	0.37	0.37
TPE2, TPE2 D, TPE3 TPE3 D 50-80	•	•	•		•		•			•	•	•	•	0.37	0.37
TPE2, TPE2 D, TPE3 TPE3 D 50-120	•	•	•		•		•			•	•	•	•	0.55	0.55
TPE2, TPE2 D, TPE3 TPE3 D 50-150	•	•	•		•		•			•	•	•	•	0.75	0.75
TPE2, TPE2 D, TPE3 TPE3 D 50-180	•	•	•		•		•			•	•	•	•	1.1	1.1
TPE2, TPE2 D, TPE3 TPE3 D 50-200	•	•	•		•		•			•	•	•	•	1.5	1.5
TPE2, TPE2 D, TPE3 TPE3 D 50-240	•	•	•		•		•			•	•	•	•		2.2
TPE2, TPE2 D, TPE3 TPE3 D 65-60	•	•	•		•		•			•	•	•	•	0.37	0.37
TPE2, TPE2 D, TPE3 TPE3 D 65-80	•	•	•		•		•			•	•	•	•	0.55	0.55
TPE2, TPE2 D, TPE3 TPE3 D 65-120	•	•	•		•		•			•	•	•	•	0.75	0.75
TPE2, TPE2 D, TPE3 TPE3 D 65-150	•	•	•		•		•			•	•	•	•	1.1	1.1
TPE2, TPE2 D, TPE3 TPE3 D 65-180	•	•	•		•		•			•	•	•	•	1.5	1.5
TPE2, TPE2 D, TPE3 TPE3 D 65-200	•	•	•		•		•			•	•	•	•		2.2
TPE2, TPE2 D, TPE3 TPE3 D 80-40	•	•	•		•			•	•	•	•		•	0.25	0.25
TPE2, TPE2 D, TPE3 TPE3 D 80-120	•	•	•		•			•	•	•	•		•	1.1	1.1
TPE2, TPE2 D, TPE3 TPE3 D 80-150	•	•	•		•			•	•	•	•		•	1.5	1.5
TPE2, TPE2 D, TPE3 TPE3 D 80-180	•	•	•		•			•	•	•	•		•		2.2
TPE2, TPE2 D, TPE3 TPE3 D 100-40	•	•	•		•			•	•	•	•		•	0.25	0.25
TPE2, TPE2 D, TPE3 TPE3 D100-120	•	•	•		•			•	•	•	•		•	1.1	1.1
TPE2, TPE2 D, TPE3, TPE3 D 100-150	•	•	•		•			•	•	•	•		•	1.5	1.5
TPE2, TPE2 D, TPE3, TPE3 D 100-180	•	•	•		•			•	•	•	•		•		2.2

[1] Stainless-steel versions are only available as single-head pumps and with a combined PN 6/10/16 flange.

Product range, 2-pole, PN 6, 10, 16, 25

Pump type		Design		Shaft seal						Pressure stage				Materials							Mains-operated motor				Electronically speed-controlled motor	
														Pump housing			Impeller				Voltage [V]				Voltage [V]	
	TPE Series 1000[1]	TP Series 200	TP Series 300	BQBE	BAQE	BQQE	DBUE	DQQE	DAQF	PN 6, 10 combination flange	PN 10	PN 16	PN 25	Cast iron EN-GJL-250	Nodular cast iron EN-GJS-400-18	Bronze	Stainless steel	Cast iron	Nodular cast iron EN-GJS-400-15	Bronze	3 x 220-255 ΔV/ 3 x 380-440 YV	3 x 220-277 ΔV/ 3 x 380-480 YV	3 x 380-480 ΔV	3 x 380-480 ΔV/ 3 x 660-690 YV[2]	3 x 380-480 V	3 x 380-500 V
																					P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]
TP 32-80/2		●		●		●				●				●		●	●				0.37					
TP 32-160/2		●		●		●				●				●		●	●				0.55					
TP 32-220/2		●		●		●				●				●		●	●				0.75					
TP 32-260/2		●		●		●				●				●		●	●					1.1				
TP 32-330/2		●		●		●				●				●		●	●					1.5				
TP, TPD 32-300/2	●		●		●	●						●		●				●		●		2.2	2.2			2.2
TP, TPD 32-360/2	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 32-450/2	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 32-550/2	●		●		●	●						●		●				●		●		5.5	5.5		5.5	
TP, TPD 32-680/2	●		●		●	●						●		●				●		●		7.5	7.5		7.5	
TP, TPD 32-820/2	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP 40-80/2		●		●		●				●				●		●	●				0.55					
TP 40-160/2		●		●		●				●				●		●	●				0.75					
TP 40-240/2		●		●		●				●				●		●	●					1.1				
TP 40-270/2		●		●		●						●		●		●	●					1.5				
TP 40-330/2		●		●		●						●		●		●	●					2.2				
TP 40-390/2		●		●		●						●		●		●	●					3.0				
TP, TPD 40-400/2	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 40-460/2	●		●		●	●						●		●				●		●		5.5	5.5		5.5	
TP, TPD 40-530/2	●		●		●	●						●		●				●		●		7.5	7.5		7.5	
TP, TPD 40-690/2	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP, TPD 40-820/2	●		●		●	●						●		●				●		●		15.0		15.0	15.0	
TP, TPD 40-920/2	●		●		●	●						●		●				●		●		18.5		18.5	18.5	
TP 50-80/2		●		●		●				●				●		●	●				0.55					
TP 50-160/2		●		●		●				●				●		●	●					1.1				
TP 50-240/2		●		●		●				●				●		●	●					1.5				
TP, TPD 50-250/2			●		●	●						●		●				●		●		2.2	2.2			
TP, TPD 50-300/2	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 50-350/2	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 50-410/2	●		●		●	●						●		●				●		●		5.5	5.5		5.5	
TP, TPD 50-430/2	●		●		●	●						●		●				●		●		7.5	7.5		7.5	
TP, TPD 50-530/2	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP, TPD 50-640/2	●		●		●	●						●		●				●		●		15.0		15.0	15.0	
TP, TPD 50-720/2	●		●		●	●						●		●				●		●		15.0		15.0	15.0	
TP, TPD 50-790/2	●		●		●	●						●		●				●		●		18.5		18.5	18.5	
TP, TPD 50-880/2	●		●		●	●						●		●				●		●		22.0		22.0	22.0	
TP, TPD 50-1050/2			●		●	●						●		●				●		●		30.0		30.0		
TP 65-80/2		●		●		●				●				●		●	●					1.1				
TP 65-160/2		●		●		●				●				●		●	●					1.5				
TP 65-240/2		●		●		●				●				●		●	●					2.2				
TP, TPD 65-200/2	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 65-250/2	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 65-340/2	●		●		●	●						●		●				●		●		5.5	5.5		5.5	
TP, TPD 65-390/2	●		●		●	●						●		●				●		●		7.5	7.5		7.5	
TP, TPD 65-480/2	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP, TPD 65-540/2	●		●		●	●						●		●				●		●		15.0		15.0	15.0	
TP, TPD 65-630/2	●		●		●	●						●		●				●		●		18.5		18.5	18.5	
TP, TPD 65-740/2	●		●		●	●						●		●				●		●		22.0		22.0	22.0	
TP, TPD 65-910/2			●		●	●						●		●				●		●		30.0		30.0		
TP, TPD 65-920/2			●		●	●						●		●				●		●		37.0		37.0		
TP, TPD 65-1050/2			●		●	●						●		●				●		●		37.0		37.0		
TP 80-160/2		●		●		●				●				●		●	●					3.0				
TP, TPD 80-200/2	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 80-240/2	●		●		●	●						●		●				●		●		5.5	5.5		5.5	
TP, TPD 80-290/2	●		●		●	●						●		●				●		●		7.5	7.5		7.5	
TP, TPD 80-330/2	●		●		●	●						●		●				●		●		11.0		11.0	11.0	

Pump type	Design		Shaft seal						Pressure stage				Materials								Mains-operated motor				Electronically speed-controlled motor	
													Pump housing			Impeller					Voltage [V]				Voltage [V]	
	TPE Series 1000[1]	TP Series 200	TP Series 300	BQBE	BAQE	BQQE	DBUE	DQQE	DAQF	PN 6, 10 combination flange	PN 10	PN 16	PN 25	Cast iron EN-GJL-250	Nodular cast iron EN-GJS-400-18	Bronze	Stainless steel	Cast iron	Nodular cast iron EN-GJS-400-15	Bronze	3 x 220-255 ΔV/ 3 x 380-440 YV	3 x 220-277 ΔV/ 3 x 380-480 YV	3 x 380-480 ΔV	3 x 380-480 ΔV/ 3 x 660-690 YV[2]	3 x 380-480 V	3 x 380-500 V
	P_2 [kW]																				P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]
TP, TPD 80-400/2	•		•		•	•						•		•				•		•		15.0		15.0	15.0	
TP, TPD 80-480/2	•		•		•	•						•		•				•		•		18.5		18.5	18.5	
TP, TPD 80-530/2	•		•		•	•						•		•				•		•		22.0		22.0	22.0	
TP, TPD 80-640/2			•		•	•						•		•				•		•		30.0		30.0		
TP, TPD 80-750/2			•		•	•						•		•				•		•		37.0		37.0		
TP, TPD 100-230/2	•		•		•	•						•		•				•		•		7.5	7.5		7.5	
TP, TPD 100-300/2	•		•		•	•						•		•				•		•		11.0		11.0	11.0	
TP, TPD 100-370/2	•		•		•	•						•		•				•		•		15.0		15.0	15.0	
TP, TPD 100-350/2	•		•		•	•						•		•				•		•		18.5		18.5	18.5	
TP, TPD 100-380/2	•		•		•	•						•		•				•		•		22.0		22.0	22.0	
TP, TPD 100-530/2			•		•	•						•		•				•		•		30.0		30.0		
TP, TPD 100-630/2			•		•	•						•		•				•		•		37.0		37.0		
TP, TPD 100-700/2			•		•	•						•		•				•		•		45.0		45.0		
TP 100-760/2			•					•	•				•		•			•		•				75.0		
TP 100-940/2			•					•	•				•		•			•		•				90.0		
TP 100-1040/2			•					•	•				•		•			•		•				110.0		
TP 100-1200/2			•					•	•				•		•			•		•				132.0		
TP 100-1360/2			•					•	•				•		•			•		•				160.0		
TP 100-1510/2			•					•	•				•		•			•		•				200.0		

• Standard

1) TPE pumps are not available in twin-head versions.

2) 2-pole motors above 7.5 kW can be operated at 3 x 660-690 YV. Smaller motor sizes cannot be operated at 3 X 660-690 YV.

Product range, 4-pole, PN 6, 10, 16, 25

Pump type	TPE Series 1000[1]	Design		Shaft seal						Pressure stage				Materials							Mains-operated motor				Electronically speed-controlled motor	
														Pump housing			Impeller				Voltage [V]				Voltage [V]	
		TP Series 200	TP Series 300	BQBE	BAQE	BQQE	DBUE	DQQE	DAQF	PN 6, 10 combination flange	PN 10	PN 16	PN 25	Cast iron EN-GJL-250	Nodular cast iron EN-GJS-400-18-LT	Bronze	Stainless steel	Cast iron	Nodular cast iron EN-GJS-400-15	Bronze	3 x 220-255 ΔV/ 3 x 380-440 YV	3 x 220-277 ΔV/ 3 x 380-480 YV	3 x 380-480 ΔV	3 x 380-480 ΔV/ 3 x 660-690 YV[2]	3 x 380-480 V	3 x 380-500 V
																					P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]
TP 32-40/4		●		●		●				●	●			●			●				0.12					
TP 32-80/4		●		●		●				●	●			●			●				0.25					
TP, TPD 32-120/4			●		●	●						●		●				●		●	0.55					
TP, TPD 32-140/4			●		●	●						●		●				●		●	0.75					
TP, TPD 32-190/4			●		●	●						●		●				●		●		1.1				
TP 40-40/4		●		●		●				●	●			●			●				0.25					
TP 40-80/4		●		●		●				●	●			●			●				0.55					
TP, TPD 40-110/4			●		●	●						●		●				●		●	0.75					
TP, TPD 40-150/4			●		●	●						●		●				●		●		1.1				
TP, TPD 40-180/4			●		●	●						●		●				●		●		1.5				
TP, TPD 40-230/4			●		●	●						●		●				●		●		2.2	2.2			
TP 50-40/4		●		●		●				●	●			●			●				0.25					
TP 50-80/4		●		●		●				●	●			●			●				0.55					
TP, TPD 50-100/4			●		●	●						●		●				●		●	0.75					
TP, TPD 50-115/4			●		●	●						●		●				●		●		1.1				
TP, TPD 50-130/4			●		●	●						●		●				●		●		1.5				
TP, TPD 50-180/4			●		●	●						●		●				●		●		2.2				
TP, TPD 50-240/4	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 50-270/4	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 50-340/4	●		●		●	●						●		●				●		●		5.5		5.5	5.5	
TP 65-40/4		●		●		●				●	●			●			●				0.37					
TP 65-80/4		●		●		●				●	●			●			●					1.1				
TP, TPD 65-130/4			●		●	●						●		●				●		●		1.5				
TP, TPD 65-150/4			●		●	●						●		●				●		●		2.2	2.2			
TP, TPD 65-190/4	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 65-230/4	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 65-310/4	●		●		●	●						●		●				●		●		5.5		5.5	5.5	
TP, TPD 65-330/4	●		●		●	●						●		●				●		●		7.5		7.5	7.5	
TP 80-40/4		●		●		●				●	●			●			●				0.75					
TP 80-80/4		●		●		●				●	●			●			●					1.5				
TP, TPD 80-110/4			●		●	●						●		●				●		●		2.2	2.2			
TP, TPD 80-150/4	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 80-170/4	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 80-230/4	●		●		●	●						●		●				●		●		5.5		5.5	5.5	
TP, TPD 80-280/4	●		●		●	●						●		●				●		●		7.5		7.5	7.5	
TP, TPD 80-340/4	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP, TPD 80-410/4	●		●		●	●						●		●				●		●		15.0		15.0	15.0	
TP, TPD 80-460/4			●		●	●						●		●				●		●		18.5		18.5		
TP, TPD 80-510/4			●		●	●						●		●				●		●		22.0		22.0		
TP 100-40/4		●		●		●				●	●			●			●					1.1				
TP 100-90/4	●		●			●						●		●				●		●		2.2	1.1		2.2	
TP, TPD 100-100/4	●		●		●	●						●		●				●		●		3.0	3.0		3.0	
TP, TPD 100-130/4	●		●		●	●						●		●				●		●		4.0	4.0		4.0	
TP, TPD 100-150/4	●		●		●	●						●		●				●		●		5.5		5.5	5.5	
TP, TPD 100-170/4	●		●		●	●						●		●				●		●		5.5		5.5	5.5	
TP, TPD 100-200/4*	●		●		●	●		●	●			●	●	●	●			●		●		7.5		7.5	7.5	
TP, TPD 100-240/4*	●		●		●	●		●	●			●	●	●	●			●		●		11.0		11.0	11.0	
TP, TPD 100-260/4	●		●		●	●						●		●				●		●		11.0		11.0	11.0	
TP, TPD 100-290/4*	●		●		●	●		●	●			●	●	●	●			●		●		15.0		15.0	15.0	
TP, TPD 100-340/4*			●		●	●		●	●			●	●	●	●			●		●		18.5		18.5		
TP, TPD 100-350/4			●		●	●						●		●				●		●		22.0		22.0		
TP, TPD 100-390/4*			●		●	●		●	●			●	●	●	●			●		●		22.0		22.0		
TP, TPD 100-470/4*			●		●	●		●	●			●	●	●	●			●		●		30.0		30.0		
TP 100-560/4			●					●	●				●		●			●		●				37.0		

Pump type	TPE Series 1000[1]	Design		Shaft seal						Pressure stage				Materials								Mains-operated motor				Electronically speed-controlled motor	
														Pump housing			Impeller					Voltage [V]				Voltage [V]	
		TP Series 200	TP Series 300	BQBE	BAQE	BQQE	DBUE	DQQE	DAQF	PN 6, 10 combination flange	PN 10	PN 16	PN 25	Cast iron EN-GJL-250	Nodular cast iron EN-GJS-400-18-LT	Bronze	Stainless steel	Cast iron	Nodular cast iron EN-GJS-400-15	Bronze		3 x 220-255 ΔV/ 3 x 380-440 YV	3 x 220-277 ΔV/ 3 x 380-480 YV	3 x 380-480 ΔV	3 x 380-480 ΔV/ 3 x 660-690 YV[2]	3 x 380-480 V	3 x 380-500 V
																						P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]
TP 125-80/4	•		•		•	•						•		•				•		•			3.0		3.0	3.0	
TP 125-110/4	•		•		•	•						•		•				•		•			4.0		4.0	4.0	
TP 125-135/4	•		•		•	•						•		•				•		•			5.5		5.5	5.5	
TP, TPD 125-130/4	•		•		•	•						•		•				•		•			5.5		5.5	5.5	
TP, TPD 125-160/4	•		•		•	•						•		•				•		•			7.5		7.5	7.5	
TP, TPD 125-200/4	•		•		•	•						•		•				•		•			11.0		11.0	11.0	
TP, TPD 125-230/4	•		•		•	•						•		•				•		•			15.0		15.0	15.0	
TP 125-220/4	•		•					•	•				•		•			•		•			15.0		15.0	15.0	
TP, TPD 125-280/4			•		•	•		•	•			•	•	•	•			•		•			18.5		18.5		
TP, TPD 125-340/4			•		•	•		•	•			•	•	•	•			•		•			22.0		22.0		
TP, TPD 125-365/4			•		•	•		•	•			•	•	•	•			•		•			30.0		30.0		
TP, TPD 125-420/4			•		•	•		•	•			•	•	•	•			•		•			30.0		30.0		
TP, TPD 125-480/4			•		•	•		•	•			•	•	•	•			•		•			37.0		37.0		
TP 125-550/4			•					•	•				•		•			•		•					45.0		
TP 125-580/4			•					•	•				•		•			•		•					55.0		
TP 150-130/4	•		•		•	•						•		•				•		•			11.0		11.0	11.0	
TP 150-160/4	•		•		•	•						•		•				•		•			15.0		15.0	15.0	
TP 150-200/4			•		•	•						•		•				•		•			18.5		18.5		
TP 150-220/4			•		•	•						•		•				•		•			22.0		22.0		
TP, TPD 150-180/4	•		•		•	•		•	•			•	•	•	•			•		•			15.0		15.0	15.0	
TP, TPD 150-210/4			•		•	•		•	•			•	•	•	•			•		•			18.5		18.5		
TP, TPD 150-240/4			•		•	•		•	•			•	•	•	•			•		•			22.0		22.0		
TP, TPD 150-300/4			•		•	•		•	•			•	•	•	•			•		•			30.0		30.0		
TP, TPD 150-340/4			•		•	•		•	•			•	•	•	•			•		•			37.0		37.0		
TP 150-360/4			•		•	•		•	•			•	•	•	•			•		•					30.0		
TP 150-400/4			•		•	•		•	•			•	•	•	•			•		•					37.0		
TP 150-440/4			•		•	•		•	•			•	•	•	•			•		•					45.0		
TP 150-480/4			•		•	•		•	•			•	•	•	•			•		•					55.0		
TP 150-610/4			•		•	•		•	•			•	•	•	•			•		•					75.0		
TP 150-700/4			•		•	•		•	•			•	•	•	•			•		•					90.0		
TP 150-810/4			•		•	•		•	•			•	•	•	•			•		•					110.0		
TP 150-960/4			•		•	•		•	•			•	•	•	•			•		•					132.0		
TP 200-80/4	•		•		•	•						•		•				•		•			7.5		7.5	7.5	
TP 200-110/4	•		•		•	•						•		•				•		•			11.0		11.0	11.0	
TP 200-140/4	•		•		•	•						•		•				•		•			15.0		15.0	15.0	
TP 200-190/4			•		•	•						•		•				•		•			18.5		18.5		
TP 200-210/4			•		•	•						•		•				•		•			22.0		22.0		
TP 200-250/4			•		•	•		•	•			•	•	•	•			•		•			30.0		30.0		
TP 200-280/4			•		•	•		•	•			•	•	•	•			•		•					37.0		
TP 200-320/4			•		•	•		•	•			•	•	•	•			•		•					45.0		
TP 200-360/4			•		•	•		•	•			•	•	•	•			•		•					55.0		
TP 200-390/4			•		•	•		•	•			•	•	•	•			•		•					75.0		
TP 200-400/4			•		•	•		•	•			•	•	•	•			•		•					75.0		
TP 200-430/4			•		•	•		•	•			•	•	•	•			•		•					55.0		
TP 200-440/4			•		•	•		•	•			•	•	•	•			•		•					90.0		
TP 200-490/4			•		•	•		•	•			•	•	•	•			•		•					90.0		
TP 200-500/4			•		•	•		•	•			•	•	•	•			•		•					110.0		
TP 200-540/4			•		•	•		•	•			•	•	•	•			•		•					90.0		
TP 200-600/4			•		•	•		•	•			•	•	•	•			•		•					110.0		
TP 200-680/4			•		•	•		•	•			•	•	•	•			•		•					132.0		
TP 200-770/4			•		•	•		•	•			•	•	•	•			•		•					160.0		
TP 300-230/4			•		•	•		•	•			•	•	•	•			•		•					45.0		
TP 300-270/4			•		•	•		•	•			•	•	•	•			•		•					55.0		
TP 300-360/4			•		•	•		•	•			•	•	•	•			•		•					75.0		
TP 300-370/4			•		•	•		•	•			•	•	•	•			•		•					90.0		
TP 300-440/4			•		•	•		•	•			•	•	•	•			•		•					110.0		
TP 300-550/4			•		•	•		•	•			•	•	•	•			•		•					132.0		
TP 300-630/4			•		•	•		•	•			•	•	•	•			•		•					160.0		

Pump type	TPE Series 1000[1]	Design		Shaft seal						Pressure stage				Materials							Mains-operated motor				Electronically speed-controlled motor	
														Pump housing			Impeller				Voltage [V]				Voltage [V]	
		TP Series 200	TP Series 300	BQBE	BAQE	BQQE	DBUE	DQQE	DAQF	PN 6, 10 combination flange	PN 10	PN 16	PN 25	Cast iron EN-GJL-250	Nodular cast iron EN-GJS-400-18-LT	Bronze	Stainless steel	Cast iron	Nodular cast iron EN-GJS-400-15	Bronze	3 x 220-255 ΔV/ 3 x 380-440 YV	3 x 220-277 ΔV/ 3 x 380-480 YV	3 x 380-480 ΔV	3 x 380-480 ΔV/ 3 x 660-690 YV[2]	3 x 380-480 V	3 x 380-500 V
																					P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]	P_2 [kW]
TP 300-640/4			•		•	•		•	•			•	•	•	•			•		•				200.0		
TP 300-750/4			•		•	•		•	•			•	•	•	•			•		•				250.0		
TP 350-400/4			•		•	•		•	•			•	•	•	•			•		•				132.0		
TP 350-450/4			•		•	•		•	•			•	•	•	•			•		•				160.0		
TP 350-540/4			•		•	•		•	•			•	•	•	•			•		•				200.0		
TP 350-680/4			•		•	•		•	•			•	•	•	•			•		•				250.0		

• Standard

* Only TP pumps are available in PN 25.

1) TPE pumps are not available in twin-head versions.

2) 4-pole motors above 4 kW can be operated at 3 x 660-690 YV. Smaller motor sizes cannot be operated at 3 x 660-690 YV.

4. Operating conditions

System and test pressures

Pressure	System pressure		Test pressure	
	[bar]	[MPa]	[bar]	[MPa]
PN 6	6	0.6	10	1.0
PN 10	10	1.0	16	1.6
PN 16	16	1.6	24	2.4
PN 25	25	2.5	38	3.8

Sound pressure level

Motor [kW]	Maximum sound pressure level [dB(A)] - ISO 3743	
	Three-phase motors	
	2-pole	4-pole
0.12	-	-
0.25	-	45
0.37	57	45
0.55	56	45
0.75	57	50.5
1.1	58	50.5
1.5	64	51.5
2.2	65	54.5
3.0	53.5	57
4.0	67.5	56
5.5	68	55
7.5	65	56
11.0	64.5	58
15.0	65	58
18.5	65.5	65
22.0	70.5	65
30.0	75	66
37.0	75	65
45.0	75	65
55.0	75	68
75.0	77	71
90.0	77	71
110.0	81	75
132.0	81	75
160.0	81	75
200.0	81	75
250.0	86	77
315.0	-	77

The values apply only to MG and Siemens motors. The values have a tolerance of 3 dB according to EN ISO 4871. The tolerance is not added to the values in the table.

The audible noise from TP pumps is primarily noise from the motor fan. The selection of TPE pumps will reduce the noise at partial load, as the motor and, consequently, the motor fan runs at a lower speed. Possible flow noise from control valves is also reduced at partial load in the case of the TPE pump.

Ambient temperature

MG IE3 motors: 0.75 - 22 kW motors, 2-pole	-30 to +60 °C
Siemens IE3 motors: 30-315 kW motors, 2-pole 0.55 - 315 kW motors, 4-pole	-20 to +55 °C
MGE motors: 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-20 to +50 °C
MGE motors: 15-22 kW, 2-pole 11-15 kW, 4-pole	-20 to +40 °C
Storage	Down to -30 °C

Installation altitude

Pump with standard motor

If the ambient temperature exceeds maximum values or if the motor is located more than 1000 m above sea level, the motor output, P_2, must be reduced 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 rated output.

Pos.	Description
3	Siemens IE3 motors: 30 - 315 kW motors, 2-pole 0.55 - 315 kW motors, 4-pole
2	MG IE3 motors: 0.75 - 22 kW motors, 2-pole
1	Other motor sizes

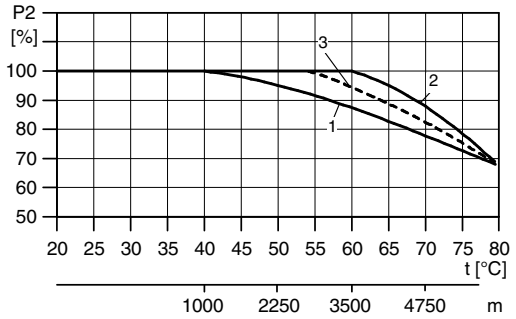


Fig. 2 Maximum motor output in relation to ambient temperature and altitude

Pump with Grundfos MGE motor

Description
MGE motors: 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole

Installation altitude is the height above sea level of the installation site.

Motors installed up to 1000 m above sea level can be loaded 100 %.

The motors can be installed up to 3500 m above sea level.

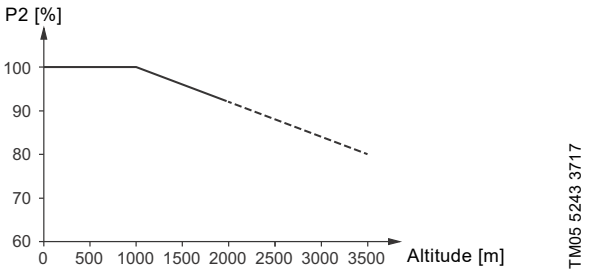


Fig. 3 Motor output power in relation to altitude

In order to maintain the galvanic isolation and ensure correct clearance according to EN 60664-1:2007, you must adapt the supply voltage to the altitude:

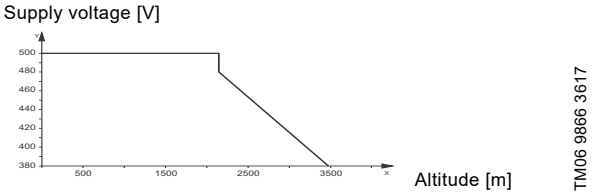


Fig. 4 Supply voltage for three-phase motor in relation to altitude

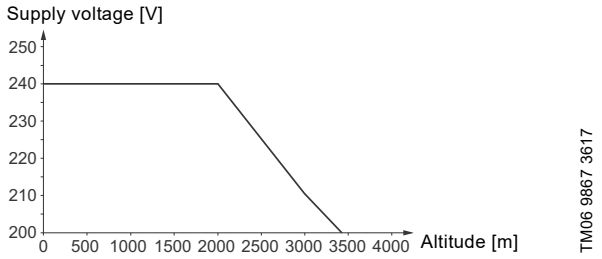


Fig. 5 Supply voltage for single-phase motor in relation to altitude

Note:

Motors installed more than 1000 m above sea level must not be fully loaded due to the low density and consequent low cooling effect of the air.

If the motor is to operate at ambient temperatures between 50 and 60 °C, select an oversized motor. Contact Grundfos.

5. Pumped liquids

The pump is suitable for thin, clean, non-aggressive and non-flammable liquids, not containing solid particles or fibres that may attack the pump mechanically or chemically. See *List of pumped liquids* on page 23.

Examples:

- Central heating system water. The water must meet the requirements of accepted standards on water quality in heating systems.
- cooling liquids
- hot tap 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 BQQE or DQQE type See *Recommended shaft seal for water-glycol mixture* on page 25.

The pumping of liquids with a density and/or kinematic viscosity higher than that of water will have the following effects:

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

In such cases, fit the pump with a bigger motor. If in doubt, contact Grundfos.

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

Liquid temperature

Liquid temperature: -40 to +150 °C.

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

Pump type	Shaft seal	Temperature
TP Series 200	BQBE	0 to +140 °C
	BQQE	-25 to +120 °C
TP Series 300, 16-bar version	BAQE	0 to +120 °C (140 °C)[1]
	BQQE	-25 to +120 °C
TP Series 300, 25-bar version	DQQE	-40 to +120 °C
	DAQF	0 to +150 °C[2]
TPE2, TPE3	BQBE	0 to +120 °C[3]
	BQQE	-25 to +120 °C

1) TP Series 300, PN 16 pumps are designed for a maximum operating temperature of 140 °C. For operation above 120 °C, an alternative shaft seal is to be selected. Contact Grundfos.

2) For operation above 140 °C, contact Grundfos. At 120 to 150 °C, the maximum operating pressure is less than 23 bar.

3) 140 °C for a short period.

Depending on the type of cast-iron version and the pump application, the maximum liquid temperature may be limited by local regulations and laws.

List of pumped liquids

TP and TPD pumps are designed for circulation systems with constant flow, TPE2, TPE2 D, TPE3, TPE3 D and TPE pumps for systems with variable flow.

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

A number of typical liquids are listed below.

You can use other pump versions, 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, we recommend that you fill in the form shown on page 211 and contact Grundfos.

Use the list 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.

Legend

A	May contain additives or impurities that may cause shaft seal problems.
B	The density and/or viscosity differ from those of water. Consider this when calculating motor and pump performance.
C	The liquid must be oxygen-free (anaerobic).
D	Risk of crystallisation or precipitation in shaft seal.
E	Insoluble in water.
F	The shaft seal rubber parts must be replaced with FKM rubber.
G	Bronze housing or impeller required.
H	Risk of formation of ice on the standby pump. The risk only applies to TP, TPE Series 200 pumps.

Pumped liquids	Notes	Additional information	Shaft seal			
			TPE2, TPE3	TP Series 200	TP Series 300 PN 16	TP Series 300 PN 25
Water						
Groundwater		< 120 °C	BQBE BQQE	BQBE BQQE	BQQE	DQQE[4]
		> 120 °C		BQBE	DAQF[2) + 4)]	DAQF[4]
Boiler-feed water		< 120 °C	BQBE BQQE	BQBE BQQE	BAQE BQQE	DAQF DQQE
		< 140 °C		BQBE	DAQF[2)]	DAQF
		< 150 °C				DAUE[2)]
District heating water		< 120 °C	BQBE BQQE	BQBE BQQE	BAQE BQQE	DAQF DQQE
Condensate		< 120 °C	BQBE BQQE	BQBE BQQE	BAQE BQQE	DAQF DQQE
		> 120 °C		BQBE	BAQE DAQF[2)]	DAQF
Softened water	C	< 120 °C	BQBE BQQE	BQBE BQQE	BAQE BQQE	DAQF
		> 120 °C		BQBE	DAQF[2)]	DAQF
Brackish water	G	pH > 6.5, 40 °C, 1000 ppm Cl^-	BQBE BQQE	BQBE BQQE	BQQE	DQQE
Coolants						
Ethylene glycol	B, D, H	< 120 °C	BQQE	BQQE	BQQE	DQQE
Glycerine (glycerol)	B, D, H	< 120 °C	BQQE	BQQE	BQQE	DQQE
Potassium acetate	B, D, C, H	< 120 °C	BQQE	BQQE	BQQE	DQQE
Potassium formate	B, D, C, H	< 120 °C	BQQE	BQQE	BQQE	DQQE
Propylene glycol	B, D, H	< 120 °C	BQQE	BQQE	BQQE	DQQE
Brine sodium chloride	B, D, C, H	< 5 °C, 30 %	BQQE	BQQE	BQQE	DQQE
Synthetic oils						
Silicone oil	B, E		BQBE BQQE	BQBE BQQE	BAQE BQQE	DAQF DQQE

(To be continued)

Pumped liquids	Notes	Additional information	Shaft seal			
			TPE2, TPE3	TP Series 200	TP Series 300 PN 16	TP Series 300 PN 25
Vegetable oils						
Corn oil	B, F, E		BUBV[2) + 3)] BQQV[2) + 3)]	BUBV[2)] BQQV[2)]	BAQV[2)] BQQV[2)]	DAQF
Olive oil	B, F, E	< 80 °C	BUBV[2) + 3)] BQQV[2) + 3)]	BUBV[2)] BQQV[2)]	BAQV[2)] BQQV[2)]	DAQF
Peanut oil	B, F, E		BUBV[2) + 3)] BQQV[2) + 3)]	BUBV[2)] BQQV[2)]	BAQV[2)] BQQV[2)]	DAQF
Rapeseed oil	D, B, F, E		BUBV[2) + 3)] BQQV[2) + 3)]	BUBV[2)] BQQV[2)]	BAQV[2)] BQQV[2)]	DAQF
Soybean oil	B, F, E		BUBV[2) + 3)] BQQV[2) + 3)]	BUBV[2)] BQQV[2)]	BAQV[2)] BQQV[2)]	DAQF
Cleaning agents						
Soap (salts of fatty acids)	A, E, (F)	< 80 °C	BQQE (BQQV)[2)]	BQQE (BQQV)[2)]	BQQE (BQQV)[2)]	DQQE
Alkaline degreasing agent	A, E, (F)	< 80 °C	BQQE (BQQV)[2)]	BQQE (BQQV)[2)]	BQQE (BQQV)[2)]	DQQE
Oxidants						
Hydrogen peroxide		< 40 °C, < 2 %	BQBE BQQE	BQBE BQQE	BQQE	DAQF DQQE
Salts						
Ammonium bicarbonate	A	< 20 °C, < 15 %	BQQE	BQQE	BQQE	DQQE
Calcium acetate	A, B	< 20 °C, < 30 %	BQQE	BQQE	BQQE	DQQE
Potassium bicarbonate	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Potassium carbonate	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Potassium permanganate	A	< 20 °C, < 10 %	BQQE	BQQE	BQQE	DQQE
Potassium sulphate	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Sodium acetate	A	< 20 °C, < 100 %	BQQE	BQQE	BQQE	DQQE
Sodium bicarbonate	A	< 20 °C, < 2 %	BQQE	BQQE	BQQE	DQQE
Sodium carbonate	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Sodium nitrate	A	< 0 °C, < 40 %	BQQE	BQQE	BQQE	DQQE
Sodium nitrite	A	< 20 °C, < 40 %	BQQE	BQQE	BQQE	DQQE
Sodium phosphate (di)	A	< 100 °C, < 30 %	BQQE	BQQE	BQQE	DQQE
Sodium phosphate (tri)	A	< 90 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Sodium sulphate	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Sodium sulphite	A	< 20 °C, < 1 %	BQQE	BQQE	BQQE	DQQE
Alkalis						
Ammonium hydroxide		< 100 °C, < 30 %	BQQE	BQQE	BQQE	DQQE
Calcium hydroxide	A	< 100 °C, < 10 %	BQQE	BQQE	BQQE	DQQE
Potassium hydroxide	A	< 20 °C, < 20 %	BQQE	BQQE	BQQE	DQQE
Sodium hydroxide	A	< 40 °C, < 20 %	BQQE	BQQE	BQQE	DQQE

1) Do not use BAQE for potable water. For potable water, we recommend that you use a BBQE shaft seal.
2) The shaft seal is not standard, but available on request.
3) Applies only for TPE2.
4) Do not use for potable water.

Recommended shaft seal for water-glycol mixture

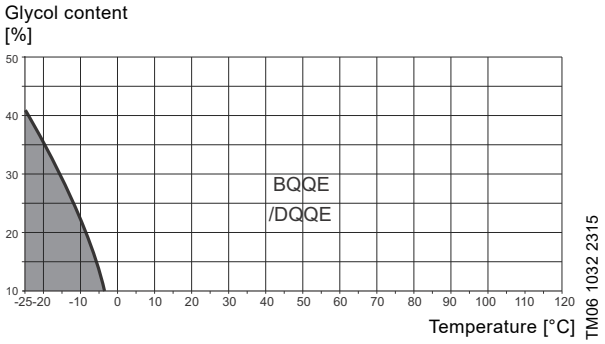


Fig. 6 Operating range of EPDM shaft seals

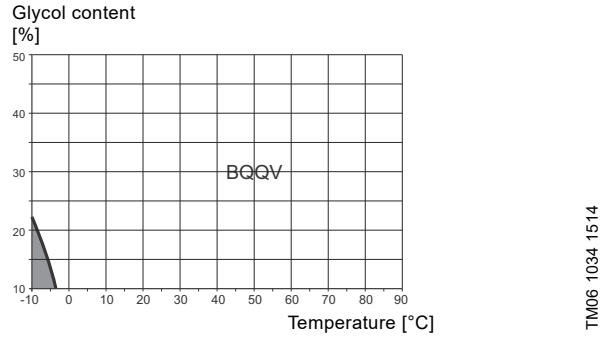


Fig. 7 Operating range of FKM shaft seals

6. TP Series 200 pumps

GR8261

Fig. 8 TP Series 200

Technical data

Flow rate:	Up to 90 m^3/h
Head:	Up to 27 m
Liquid temperature:	-25 to +140 °C
Max. operating pressure:	Up to 16 bar
Direction of rotation:	Counterclockwise

Construction

Grundfos TP Series 200 pumps are single-stage, close-coupled pumps with in-line inlet and outlet ports of identical diameter.

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

The pumps have PN 6 or PN 10 flanges.

The pumps are equipped with an unbalanced mechanical shaft seal.

The pumps are of the top-pull-out design, that is you can remove the power head (motor, pump head and impeller) for maintenance or service while the pump housing remains in the pipe.

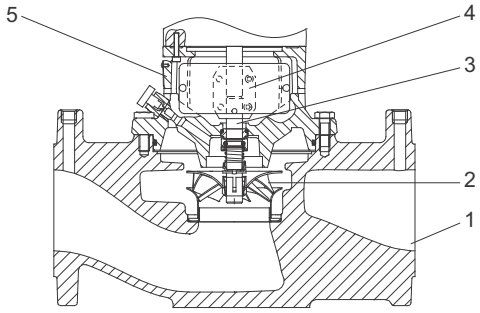
As radial and axial forces are absorbed by the fixed bearing in the motor drive-end, the pump requires no bearing.

The pumps are equipped with high-efficiency motors.

Pumps with bronze pump housing, version B, are suitable for hot water recirculation.

Materials

TP Series 200



TM03 1211 4715

Fig. 9 Sectional drawing of a TP Series 200 (flanged model)

Material specification, Series 200

Pos.	Component	Material	EN/DIN
1	Pump housing	Cast iron EN-GJL-250, bronze CuSn10	0.6020 2.1093
2	Impeller	Stainless steel	1.4301
3	Shaft	Stainless steel	1.4305
4	Coupling	Cast iron EN-GJL-400	0.7040
5	Pump head	Cast iron EN-GJL-250, bronze	0.6025 2.1093
	Secondary seals	EPDM	
	Rotating seal face	Silicon carbide	
	Stationary seat	Carbon (resin-impregnated), silicon carbide	

Mechanical shaft seal

Two types of unbalanced mechanical shaft seals are available as standard:

- **BQBE**
  The BQBE shaft seal is a rubber bellows seal with silicon carbide/carbon seal faces and secondary seals of EPDM.
- **BQQE**
  The BQQE shaft seal is a rubber bellows seal with silicon carbide/silicon carbide seal faces and secondary seals of EPDM.

Information on a selection of common pumped liquids with recommended shaft seals is shown on page 23.

Shaft seal specification

Unbalanced shaft seal	TP Series 200	Version NU according to EN 12756
Shaft diameter		12 and 16 mm
Rubber bellows		EPDM
Seal faces		Silicon carbide/carbon
		Silicon carbide/silicon carbide

Special shaft seals are available for partly conditioned water or other liquids containing abrasive or crystallising particles. See page 23.

Connections

TP Series 200 pumps up to DN 65 are equipped with combination flanges PN 6 / PN 10. DN 80 or DN 100 pumps have either PN 6 or PN 10 flanges. All flanges can be connected to flanges in accordance with EN 1092-2 and ISO 7005-2.

Features and benefits

TP Series 200 pumps have the following product features and benefits:

Optimised hydraulics for high efficiency

– Reduced power consumption.

High-efficiency motors

– TP pumps are fitted with high-efficiency motors. High-efficiency motors offer reduced energy consumption. TP pumps are primarily fitted with motors that meet the legislative requirements of the EuP IE3 grade. For further information, see *Motor*, pages 98.

Top-pull-out design

– Easy dismantling in case of service.

In-line design

– Contrary to end-suction pumps, in-line pumps allow straight pipes and thus often reduced installation costs.

Pump housing and pump head are electrocoated to improve the corrosion resistance

– Electrocoating includes:
  1. Alkaline cleaning.
  2. Pretreatment with zinc phosphate coating.
  3. Cathodic electrocoating, epoxy.
  4. Curing of paint film at 200 to 250 °C.

  For low-temperature applications at a high humidity, Grundfos offers TP 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.

7. TP Series 300 pumps

GR8259

Fig. 10 TP Series 300

Technical data

	PN 16 version	PN 25 version
Flow rate [m^3/h]	Up to 2000	Up to 2000
Head [m]	Up to 93	Up to 150
Liquid temperature [°C]	-25 to +140	-40 to +150*
Maximum operating pressure [bar]	16	25
Direction of rotation	Clockwise	

* At 120 to 150 °C, the maximum operating pressure is less than 23 bar.

Construction

Grundfos TP, TPD Series 300 pumps are single-stage, close-coupled pumps with in-line inlet and outlet ports of identical diameter.

The pumps are fitted with a fan-cooled asynchronous motor. Motor and pump shafts are connected via a rigid sleeve coupling.

Most TP Series 300 pumps are available as single-head, TP, and twin-head, TPD pumps.

TP Series 300 pumps have PN 16 flanges or PN 25 flanges.

The pumps are fitted with an unbalanced or a balanced mechanical shaft seal.

The pumps are of the top-pull-out design, that is you can remove the power head (motor, pump head and/or motor stool and impeller) for maintenance or service while the pump housing remains in the pipes.

The pump housing is provided with a replaceable wear ring to ensure high pump efficiency for life.

The twin-head pumps are designed with two parallel power heads. A non-return flap valve in the common outlet port is opened by the flow of the pumped liquid and prevents backflow of liquid into the idle pump head.

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

The impeller is hydraulically balanced to minimise axial forces.

TP, TPD, TPE Series 300 pumps are equipped with high-efficiency motors.

TP Series 300 pumps with bronze impeller are suitable for pumping brine.

Materials

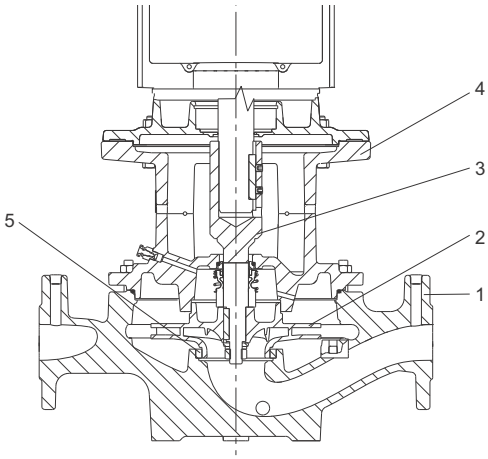


Fig. 11 Sectional drawing of TP Series 300

Material specification

TP Series 300, PN 16

Pos.	Component	Material	EN/DIN
1	Pump housing	Cast iron EN-GJL-250	EN-JL 1040
2	Impeller	Cast iron EN-GJL-200, bronze CuSn10	EN-JL 1030 2.1093
3	Stub shaft Two-part stub shaft	Stainless steel Stainless steel/steel	1.4301 1.4301/1.0301
4	Pump head/motor stool	Cast iron EN-GJL-250	EN-JL 1040
	Secondary seals	EPDM	
	Rotating seal face	Metal-impregnated carbon, silicon carbide	
	Stationary seat	Silicon carbide	
5	Wear ring	Bronze CuSn10/brass CuZn34Mn3Al2Fe1-C	2.1093

TP Series 300, PN 25

Pos.	Component	Material	EN/DIN
1	Pump housing	Ductile cast iron EN-GJS-400-18-LT	EN-JS 1025
2	Impeller	Cast iron EN-GJL-200, bronze CuSn10	EN-JL 1030 2.1093
3	Stub shaft Two-part stub shaft	Stainless steel Stainless steel/steel	1.4301 1.4301/1.0301
4	Motor stool	Cast iron EN-GJL-250	EN-JL 1040
	Secondary seals	EPDM FXM	
	Rotating seal face	Metal-impregnated carbon Silicon carbide	
	Stationary seat	Silicon carbide	
5	Wear ring	Bronze CuSn10/brass CuZn34Mn3Al2Fe1-C	2.1093

Mechanical shaft seal

For 16-bar versions, these types of unbalanced mechanical shaft seals are available as standard:

- **BAQE**
  The BAQE shaft seal is a rubber bellows seal with carbon/silicon carbide seal faces and secondary seals of EPDM.
- **BQQE**
  The BQQE shaft seal is a rubber bellows seal with silicon carbide/silicon carbide seal faces and secondary seals of EPDM.

For 25-bar versions, these types of balanced mechanical shaft seals are available as standard:

- **DAQF**
  The DAQF shaft seal is a balanced O-ring seal with carbon/silicon carbide seal faces and secondary seals of FXM.
- **DQQE**
  The DQQE shaft seal is a balanced O-ring seal with silicon carbide/silicon carbide seal faces and secondary seals of EPDM.

For further information about common pumped liquids with recommended shaft seals, see page 23.

Special shaft seals are available for partly conditioned water or other liquids containing abrasive or crystallising particles. See page 23.

Connections

TP Series 300 pumps have PN 16 or PN 25 flanges. All dimensions are according to ISO 7005-2 or EN 1092-2.

Features and benefits

TP Series 300 pumps have these features and benefits:

Optimised hydraulics for high efficiency

– Reduced power consumption.

High-efficiency motors

– TP pumps are fitted with high-efficiency motors. High-efficiency motors offer reduced energy consumption. TP pumps are primarily fitted with motors that meet the legislative requirements of the EuP IE3 or IE2 grade depending on voltage and motor size. For further information, see *Motor* on pages 98.

Top-pull-out design

– Easy dismantling in case of service.

In-line design

– Contrary to end-suction pumps, in-line pumps allow straight pipes and thus often reduced installation costs.

Motor-pump shaft with sleeve coupling

– Stable and quiet operation.

– Easy dismantling in case of service.

Hydraulically and mechanically balanced impeller

– The impeller is hydraulically and mechanically balanced to increase the life of motor bearings and shaft seal.

Pump housing and pump head or motor stool are electrocoated to improve the corrosion resistance

Electrocoating includes:

1. Alkaline cleaning.
2. Pretreatment with zinc phosphate coating.
3. Cathodic electrocoating, epoxy.
4. Curing of paint film at 200-250 °C.

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

8. TPE Series 1000 pumps

TM07 5844 5119 - TM07 5845 5119

Fig. 12 TPE Series 1000

Technical data

Flow rate:	Up to 340 m^3/h
Head:	Up to 90 m
Liquid temperature:	-25 to +140 °C
Maximum operating pressure:	16 bar
Motor sizes, three-phase:	2.2 to 22 kW

Construction

TPE Series 1000 pumps are based on TP Series 300 pumps.

The main difference between the TP and the TPE Series 1000 pump range is the motor. The MGE motor of TPE Series 1000 pumps has a built-in frequency converter for continuous adjustment of the pressure to the flow rate. All pumps with 2-pole motors up to 11 kW and 4-pole motors up to 7.5 kW are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

The pumps are suitable for applications where the pressure, temperature, flow rate or another parameter is to be controlled on the basis of signals from a sensor at some point in the system.

Note: The pumps are not fitted with a sensor from factory.

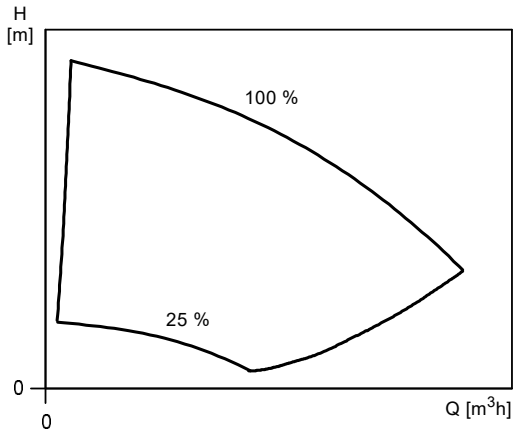
For further information on construction and materials of the pumps, see pages 28 to 30.

Applications

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

The energy consumption is thus kept at a minimum.

The pumps can operate at any duty point within the range between 25 % and 100 % speed.



TM01 4916 1099

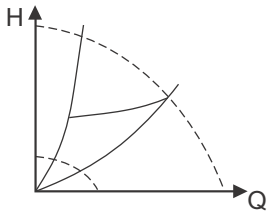
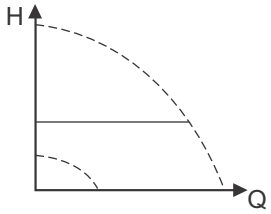
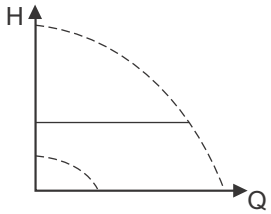
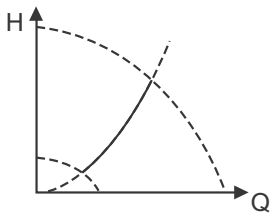
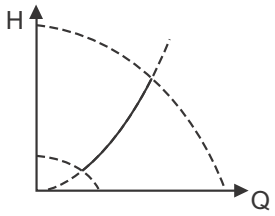
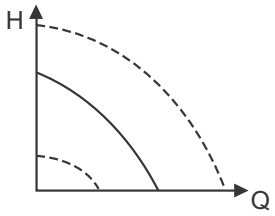
Fig. 13 Duty range of TPE Series 1000 pumps

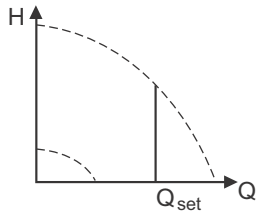
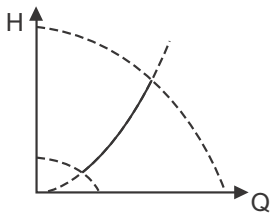
The 100 % curve corresponds to the curve of a pump with a mains-operated motor.

Depending on the application, the pumps offer energy savings, increased comfort or improved processing.

The pumps can be fitted with sensor types meeting the requirements mentioned in section *Accessories* on page 190.

The charts below show possible control modes of the pumps in different applications.

System application	Select this control mode	Pump type
In systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems. • Two-pipe heating systems with thermostatic valves and the following: – very long distribution pipes – strongly throttled pipe balancing valves – differential-pressure regulators – large pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching. • Primary circuit pumps in systems with large pressure losses in the primary circuit. • Air-conditioning systems with the following: – heat exchangers (fan coils) – cooling ceilings – cooling surfaces.	**Constant differential pressure with differential-pressure sensor located in the system** 	All
In systems with relatively small pressure losses in the distribution pipes. • Two-pipe heating systems with thermostatic valves and the following: – sized for natural circulation – small pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching, or modified to a high differential temperature between flow pipe and return pipe, for example district heating. • Underfloor heating systems with thermostatic valves. • One-pipe heating systems with thermostatic valves or pipe balancing valves. • Primary circuit pumps in systems with small pressure losses in the primary circuit.	**Constant differential pressure** 	All
In pressure boosting systems.	**Constant pressure** 	All
In systems with a fixed system characteristic. Examples: • one-pipe heating systems • boiler shunts • systems with three-way valves • hot water recirculation.	**Constant temperature** 	All
	Constant differential temperature 	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole
If an external controller is installed, the pump is able to change from one constant curve to another, depending on the value of the external signal. The pump can also be set to operate according to the maximum or minimum curve: • Use the maximum curve mode in periods in which a maximum flow is required. This operating mode is suitable e.g. for hot-water priority. • Use the minimum curve mode in periods in which a minimum flow is required.	**Constant curve** 	All

System application	Select this control mode	Pump type
In systems requiring a constant flow, independently of pressure drop. Examples: • chillers for air-conditioning • heating surfaces • cooling surfaces.	**Constant flow rate** 	All
In systems requiring a constant tank level, independently of the flow rate. Examples: • process water tanks • boiler condensate tanks.	**Constant level** 	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole
In systems with pumps operating in parallel. The multipump function enables the control of single-head pumps connected in parallel (two to four pumps) and without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.	**"Assist" menu, "Multipump setup"**	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole

Multipump function

All pumps with 2-pole motors up to 11 kW and 4-pole motors up to 7.5 kW have a multipump function.

The multipump function enables the control of single-head pumps connected in parallel or twin-head pumps without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.

For further information on multipump system, see *"Multipump setup" ("Setup of multi-pump system")* on page 83.

Control options

Communication with TPE Series 1000 pumps is possible via a central building management system, remote control (Grundfos GO) or control panel.

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

For further information on control options of the pumps, see page 93.

9. TPE2

TM07 5839 5119 - TM07 5842 5119

Fig. 14 TPE2 and TPE2 D pumps

Technical data

Flow rate:	Up to 120 m^3/h
Head:	Up to 25 m
Liquid temperature:	-25 to +120 °C (140 °C for a short period)
Maximum operating pressure:	16 bar
Motor sizes, single-phase:	0.25 to 1.5 kW
Motor sizes, three-phase:	0.25 to 2.2 kW

Construction

Via an external signal from a sensor or a controller, the pumps allow for any configuration and control method required, that is constant pressure, temperature, flow or level.

The permanent-magnet motor has a built-in frequency converter for continuous adjustment of the pressure to the flow rate. All pumps are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

The range is a preset solution for quick and safe installation.

The pumps are available as single-head, TPE2 and twin-head, TPE2 D pumps.

The pumps have PN 6, PN 10 or PN 16 flanges.

The pumps are fitted with an unbalanced mechanical shaft seal.

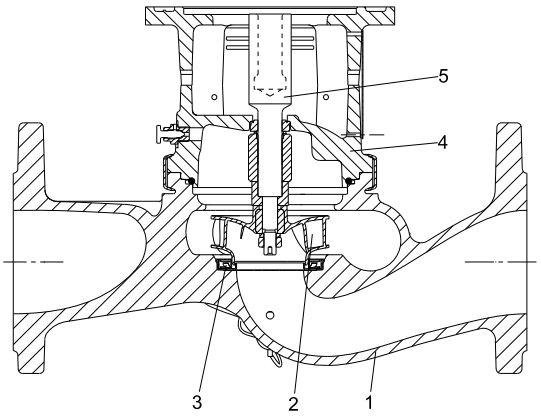
The power head (motor, pump head and impeller) and pump housing are held together by a specially designed clamp. The clamp allows for fast repositioning of the pump housing and fast service of the pump.

The twin-head pumps are designed with two parallel power heads. A flap valve in the common outlet port is opened by the flow of the pumped liquid and prevents backflow of liquid into the idle pump head.

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

Pumps with stainless steel pump housing, version I, are suitable for hot water recirculation.

Materials



TM05 8200 2113

Fig. 15 Sectional drawing of a TPE2 pump

Material specification

Pos.	Component	Material	EN/DIN
1	Pump housing	Cast iron EN-GJL-250 Stainless steel	EN1561 EN 1.4308
2	Impeller	Composite PES-GF30	
3	Neck ring	Stainless steel	EN 1.4404
4	Pump head/motor stool	Cast iron EN-GJL-250 Stainless steel	EN1561 EN 1.4308
	Secondary seals	EPDM	
	Rotating seal face	Silicon carbide	
	Stationary seat	Carbon (resin-impregnated), silicon carbide	
5	Stub shaft	Stainless steel	EN 1.4404

Applications

The pumps have integrated speed control for automatic adaptation of performance to current conditions.

The energy consumption is thus kept at a minimum.

The pumps can operate at any duty point within the range between minimum and maximum speed.

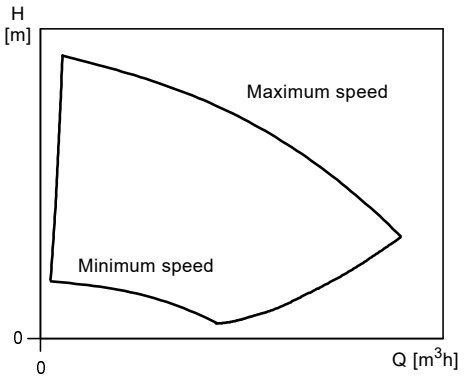


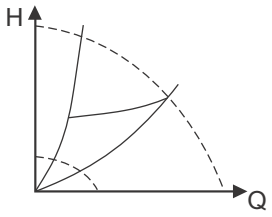
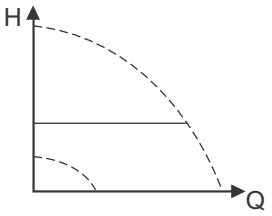
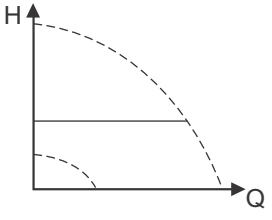
Fig. 16 Duty range of TPE2

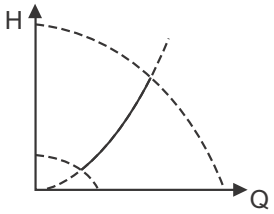
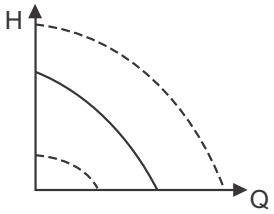
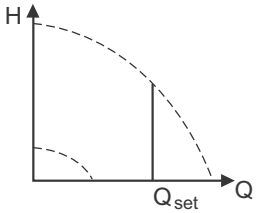
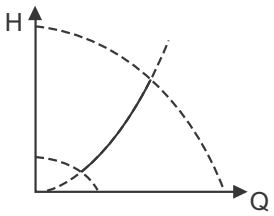
Depending on the application, the pumps offer energy savings, increased comfort or improved processing.

The pumps can be fitted with sensor types meeting the requirements mentioned in section *Accessories* on page 190.

Constant curve

The pumps are factory-set to constant-curve control mode.

System application	Select this control mode	Pump type
In systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems. • Two-pipe heating systems with thermostatic valves and the following: – very long distribution pipes – strongly throttled pipe balancing valves – differential-pressure regulators – large pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching. • primary circuit pumps in systems with large pressure losses in the primary circuit. • air-conditioning systems with the following: – heat exchangers (fan coils) – cooling ceilings – cooling surfaces.	**Constant differential-pressure with differential pressure sensor located in the system** 	All
In systems with relatively small pressure losses in the distribution pipes. • Two-pipe heating systems with thermostatic valves and the following: – dimensioned for natural circulation – small pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching – modified to a high differential temperature between flow pipe and return pipe, for example district heating. • Underfloor heating systems with thermostatic valves. • One-pipe heating systems with thermostatic valves or pipe balancing valves. • Primary circuit pumps in systems with small pressure losses in the primary circuit.	**Constant differential pressure** 	All
In pressure boosting systems.	**Constant pressure** 	All

System application	Select this control mode	Pump type
In systems with a fixed system characteristic. Examples: • one-pipe heating systems • boiler shunts • systems with three-way valves • hot water recirculation.	**Constant temperature and constant differential temperature** 	All
If an external controller is installed, the pump is able to change from one constant curve to another, depending on the value of the external signal. The pump can also be set to operate according to the maximum or minimum curve, like an uncontrolled pump: • Use the maximum curve mode in periods in which a maximum flow is required. This operating mode is for instance suitable for hot-water priority. • Use the minimum curve mode in periods in which a minimum flow is required. This operating mode is for instance suitable for manual night setback instead of automatic night setback.	**Constant curve** 	All
In systems requiring a constant flow, independently of pressure drop. Examples: • chillers for air-conditioning • heating surfaces • cooling surfaces.	**Constant flow rate** 	All
In systems requiring a constant tank level, independently of the flow rate. Examples: • process water tanks • boiler condensate tanks.	**Constant level** 	All
In systems with pumps operating in parallel. The multipump function enables the control of single-head pumps connected in parallel (two to four pumps) and twin-head pumps without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.	**"Assist" menu** **"Multipump setup"**	All

Multipump system

The multipump function enables the control of single-head pumps connected in parallel or twin-head pumps without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.

For further information on multipump system, see *"Multipump setup" ("Setup of multi-pump system")* on page 83.

Control options

Communication with the pumps is possible via a central building management system, Grundfos GO or control panel.

The purpose of controlling TPE2 pumps is to monitor and control the pressure, temperature, flow rate and liquid level of the system.

For further information on control options of TPE2 pumps, see page 93.

10. TPE3

TM07 5841 5119 - TM07 5843 5119

Fig. 17 TPE3 and TPE3 D pumps

Technical data

Flow rate:	Up to 120 m^3/h
Head:	Up to 25 m
Liquid temperature:	-25 to +120 °C (140 °C for a short period)
Maximum operating pressure:	16 bar
Motor sizes, single-phase:	0.25 to 1.5 kW
Motor sizes, three-phase:	0.25 to 2.2 kW

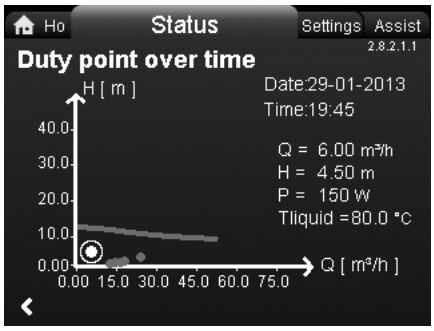
Construction

The pumps have built-in differential-pressure and temperature sensor.

The permanent-magnet motor has a built-in frequency converter for continuous adjustment of the pressure to the flow rate. All pumps are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

The range is a preset solution for quick and safe installation.

The pump has a colour display for easy and intuitive pump setup and with full access to all functions.



TM06 0883 1114

Fig. 18 Example of status display for TPE3 pumps

The pumps are available as single-head, TPE3 and twin-head, TPE3 D pumps.

The pumps have PN 6, PN 10 or PN 16 flanges.

The pumps are fitted with an unbalanced mechanical shaft seal.

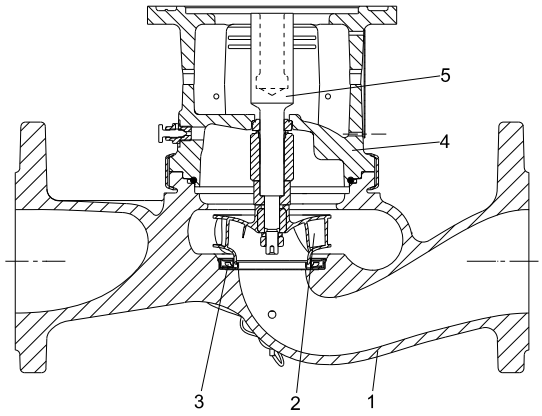
The power head (motor, pump head and impeller) and pump housing are held together by a specially designed clamp. The clamp allows for fast repositioning of the pump housing and fast service of the pump.

The twin-head pumps are designed with two parallel power heads. A flap valve in the common outlet port is opened by the flow of the pumped liquid and prevents backflow of liquid into the idle pump head.

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

Pumps with stainless steel pump housing, version I, are suitable for hot water recirculation.

Materials



TM05 8200 2113

Fig. 19 Sectional drawing of a TPE3 pump

Material specification

Pos.	Component	Material	EN/DIN
1	Pump housing	Cast iron EN-GJL-250 Stainless steel	EN1561 EN 1.4308
2	Impeller	Composite PES-GF30	
3	Neck ring	Stainless steel	EN 1.4404
4	Pump head/motor stool	Cast iron EN-GJL-250 Stainless steel	EN1561 EN 1.4308
	Secondary seals	EPDM	
	Rotating seal face	Silicon carbide	
	Stationary seat	Carbon (resin-impregnated), silicon carbide	
5	Stub shaft	Stainless steel	EN 1.4404

Applications

The pumps have integrated speed control for automatic adaptation of performance to current conditions.

The energy consumption is thus kept at a minimum.

The pumps can operate at any duty point within the range between minimum and maximum speed.

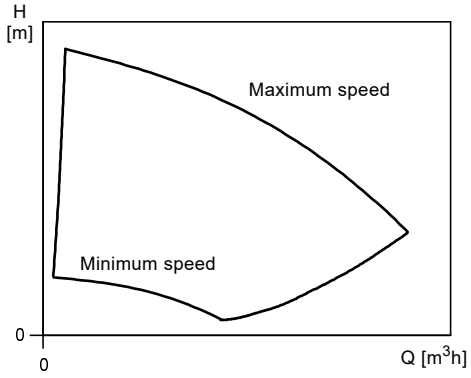


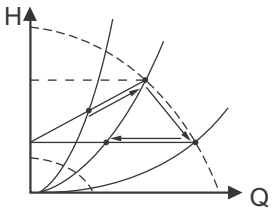
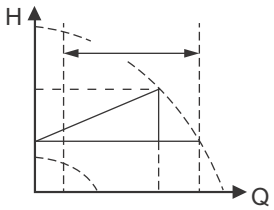
Fig. 20 Duty range of TPE3

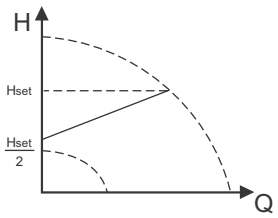
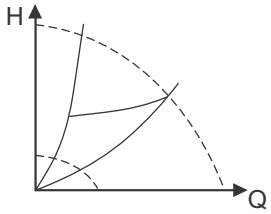
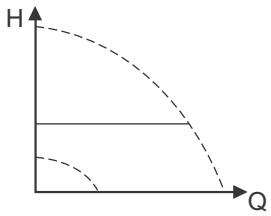
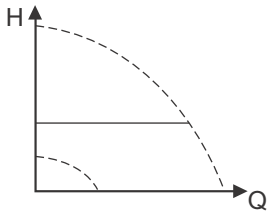
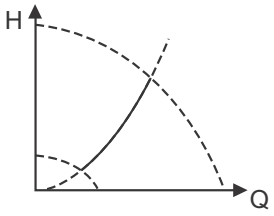
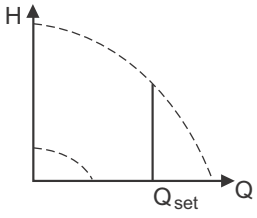
Depending on the application, the pumps offer energy savings, increased comfort or improved processing.

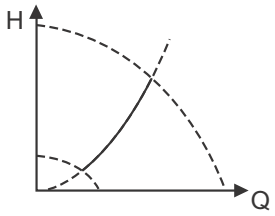
The pumps are suitable for applications requiring pressure control.

$AUTO_{ADAPT}$

TPE3 pumps are factory-set to $AUTO_{ADAPT}$ which continuously adapts the pump performance according to the actual system characteristic.

System application	Select this control mode	Pump type
	"$AUTO_{ADAPT}$"	
Recommended for most heating systems, especially in systems with relatively large pressure losses in the distribution pipes. See description under proportional pressure. In replacement situations where the proportional-pressure duty point is unknown. The duty point has to be within the "$AUTO_{ADAPT}$" operating range. During operation, the pump automatically makes the necessary adjustment to the actual system characteristics. This setting ensures minimum energy consumption and low noise level from the valves, and therefore reduces operating costs and increases comfort.		All
The $FLOW_{ADAPT}$ control mode is a combination of $AUTO_{ADAPT}$ and $FLOW_{LIMIT}$. This control mode is suitable for systems where a maximum flow limit, $FLOW_{LIMIT}$, is desired. The pump continuously monitors and adjusts the flow, thus ensuring that the selected $FLOW_{LIMIT}$ is not exceeded. Main pumps in boiler applications where a steady flow through the boiler is required. No extra energy is used for pumping too much liquid into the system. In systems with mixing loops, the control mode can control the flow in each loop. Benefits: • Enough water for all loops at peak load conditions if each loop has been set to the right maximum flow. • The dimensioned flow for each zone (required heat energy) is determined by the flow from the pump. This value can be set precisely in the $FLOW_{ADAPT}$ control mode without the use of pump throttling valves. • When the flow is set lower than the balancing valve setting, the pump ramps down instead of losing energy by pumping against a balancing valve. • Cooling surfaces in air-conditioning systems operate at high pressure and low flow.	**"$FLOW_{ADAPT}$"** 	All

System application	Select this control mode	Pump type
In systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems. • Two-pipe heating systems with thermostatic valves and the following: – very long distribution pipes – strongly throttled pipe balancing valves – differential-pressure regulators – large pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching. • Primary circuit pumps in systems with large pressure losses in the primary circuit. • Air-conditioning systems with the following: – heat exchangers (fan coils) – cooling ceilings – cooling surfaces.	**Proportional pressure** 	All
In systems with relatively large pressure losses in the distribution pipes and in air-conditioning and cooling systems. • Two-pipe heating systems with thermostatic valves and the following: – very long distribution pipes – strongly throttled pipe balancing valves – differential-pressure regulators – large pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching. • Primary circuit pumps in systems with large pressure losses in the primary circuit. • Air-conditioning systems with the following: – heat exchangers (fan coils) – cooling ceilings – cooling surfaces.	**Constant differential pressure with differential-pressure sensor located in the system** 	All
In systems with relatively small pressure losses in the distribution pipes. • Two-pipe heating systems with thermostatic valves and the following: – dimensioned for natural circulation – small pressure losses in those parts of the system through which the total quantity of water flows, for example boiler, heat exchanger and distribution pipe up to the first branching – modified to a high differential temperature between flow pipe and return pipe, for example district heating. • Underfloor heating systems with thermostatic valves. • One-pipe heating systems with thermostatic valves or pipe balancing valves. • Primary circuit pumps in systems with small pressure losses in the primary circuit.	**Constant differential pressure** 	All
In pressure boosting systems.	**Constant pressure** 	All
In systems with a fixed system characteristic. Examples: • one-pipe heating systems • boiler shunts • systems with three-way valves • hot water recirculation. You can use $FLOW_{LIMIT}$ with advantage to control the maximum circulation flow.	**Constant temperature and constant differential temperature** 	All
In systems requiring a constant flow, independently of pressure drop. Examples: • chillers for air-conditioning • heating surfaces • cooling surfaces.	**Constant flow rate** 	All

System application	Select this control mode	Pump type
In systems requiring a constant tank level, independently of the flow rate. Examples: • process water tanks • boiler condensate tanks.	**Constant level**  	All
In systems with pumps operating in parallel. The multipump function enables the control of single-head pumps connected in parallel (two to four pumps) and twin-head pumps without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.	**"Assist" menu** **"Multipump setup"**	All

Multipump system

The multipump function enables the control of two pumps connected in parallel without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.

For further information on multipump system, see *"Multipump setup" ("Setup of multi-pump system")* on page 83.

Control options

Communication with the pumps is possible via the control panel, Grundfos GO or a central building management system.

The purpose of controlling the pumps is to monitor and control the pressure, temperature, flow rate of the system.

For further information on control options of the pumps, see page 93.

11. User interfaces for TPE pumps

You can make pump settings by means of the following user interfaces:

Control panels

- TPE2 and TPE Series 1000 pumps, 2.2 - 11 kW, 2-pole, 3 - 7.5 kW, 4-pole. See page 43.
- TPE Series 1000 pumps, 15-22 kW, 2-pole and 11-15 kW, 4-pole. See page 45.
- Advanced control panel for TPE3 pumps. See page 46.

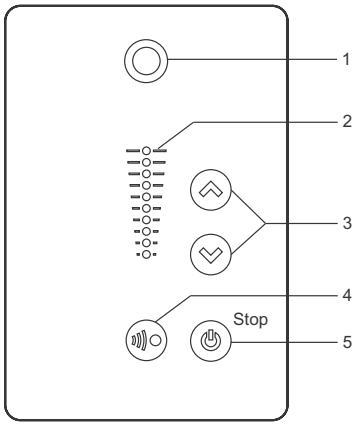
Remote controls

- Grundfos GO.
  See *Grundfos GO* on page 51.

If the power supply to the pump is switched off, the settings will be stored.

Control panel for TPE2 and TPE Series 1000 pumps, 2.2 - 11 kW, 2-pole, 3 - 7.5 kW, 4-pole

Pump variant		Fitted as standard	Option
TPE3, TPE3 D		-	-
TPE2, TPE2 D		•	-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-	-



TM05 4848 3512

Fig. 21 Standard control panel

Pos.	Symbol	Description
1		Grundfos Eye The indicator light shows the operating status of the pump. See page 88 for further information.
2	-	Light fields for indication of setpoint.
3		Up and down. The buttons change the setpoint.
4		The button allows radio communication with Grundfos GO and other products of the same type. When you try to establish radio communication between the pump and Grundfos GO or another pump, the green indicator light in Grundfos Eye on the pump flashes continuously. Press on the pump control panel to allow radio communication with Grundfos GO and other products of the same type.
5		The button makes the pump ready for operation and starts and stops the pump. **Start:** If you press the button when the pump is stopped, the pump will only start if no other functions with higher priority have been enabled. **Stop:** If you press the button when the pump is running, the pump always stops. The "Stop" text next to the button is on.

Setpoint setting

Set the desired setpoint of the pump by pressing ⌃ or ⌄. The light fields on the control panel indicates the setpoint set.

Pump in differential-pressure control mode

The following example applies to a pump in an application where a pressure sensor gives a feedback to the pump. If you retrofit the sensor to the pump, set it manually as the pump does not automatically register a connected sensor.

Figure 22 shows that the light fields 5 and 6 are activated, indicating a desired setpoint of 3 m with a sensor measuring range from 0 to 6 m. The setting range is equal to the sensor measuring range.

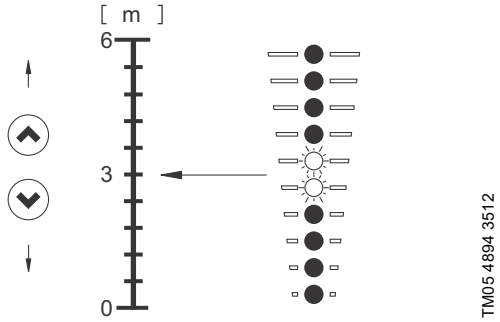


Fig. 22 Setpoint set to 3 m, differential-pressure control

Pump in constant-curve control mode

In constant-curve control mode, the pump performance is between the maximum and minimum curve of the pump. See fig. 23.

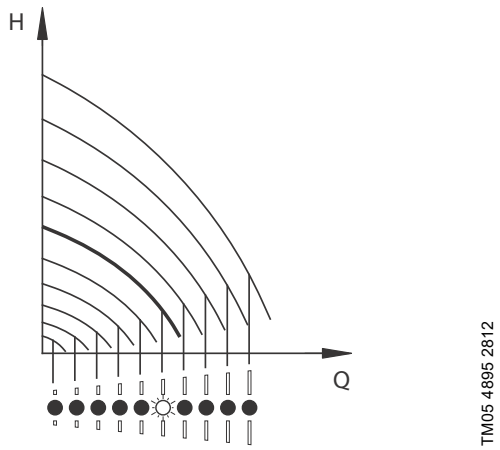


Fig. 23 Pump in constant-curve control mode

Setting to maximum curve:

- Press ⌃ continuously to change over to the maximum curve of the pump. The top light field flashes. When the top light field is on, press ⌃ for 3 seconds until the light field starts flashing.
- To change back, press ⌄ continuously until the desired setpoint is indicated.

Example: Pump set to maximum curve.

Figure 24 shows that the top light field is flashing, indicating maximum curve.

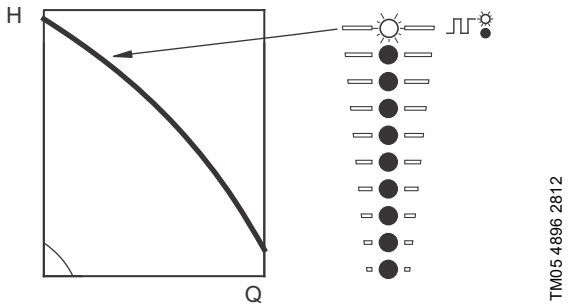


Fig. 24 Maximum curve duty

Setting to minimum curve:

- Press ⌄ continuously to change over to the minimum curve of the pump. The bottom light field flashes. When the bottom light field is on, press ⌄ for 3 seconds until the light field starts flashing.
- To change back, press ⌃ continuously until the light field starts flashing.

Example: Pump set to minimum curve.

Figure 25 shows that the bottom light field is flashing, indicating minimum curve.

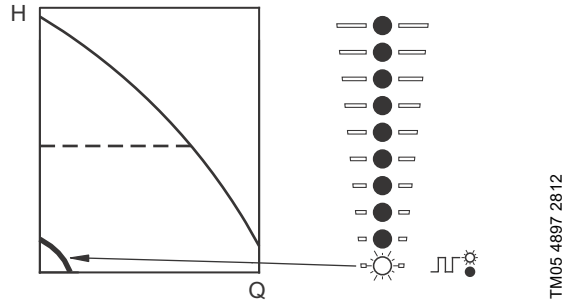


Fig. 25 Minimum curve duty

Start and stop of pump

Note: If you have stopped the pump by pressing ⏻ and the "Stop" text on the control panel is on, you can only give it free to operation by pressing ⏻ again.

If you have stopped the pump by pressing ⌄, you can restart it by pressing ⌃ or by using Grundfos GO.

Start the pump by pressing ⏻ or by continuously pressing ⌃ until the desired setpoint is indicated.

Stop the pump by pressing ⏻. When the pump is stopped, the "Stop" text next to the button will illuminate. You can also stop the pump by continuously pressing ⌄ until none of the light fields are on.

You can also stop the pump with Grundfos GO or via a digital input set to "External stop".

Resetting of fault indications

Reset a fault indication in one of the following ways:

- Via the digital input if it has been set to "Alarm resetting".
- Briefly press ⌃ or ⌄ on the pump. This will not change the setting of the pump.
  You cannot reset a fault indication by pressing ⌃ or ⌄ if the buttons have been locked.
- Switch off the power supply until the indicator lights are off.
- Switch the external start/stop input off and then on again.
- With Grundfos GO.

Control panel for TPE Series 1000 pumps, 15-22 kW, 2-pole and 11-15 kW, 4-pole

Pump variant		Fitted as standard	Option
TPE3, TPE3 D		-	-
TPE2, TPE2 D		-	-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	•	-

The control panel incorporates the following buttons and indicator lights:

- buttons, ⌃ and ⌄, for setpoint setting
- light fields, yellow, for setpoint indication
- indicator lights, green (operation) and red (fault).

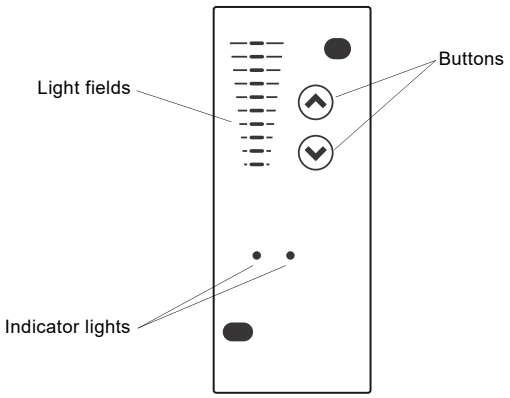


Fig. 26 Control panel for TPE Series 1000 pumps, 15-22 kW, 2-pole and 11-15 kW, 4-pole

Setpoint setting

Note: You can only set the setpoint when the operating mode is "Normal".

Set the desired setpoint by pressing ⌃ or ⌄.

The light fields on the control panel indicates the setpoint set.

Control mode "Differential-pressure control"

Example

Figure 27 shows that light fields 5 and 6 are activated, indicating a desired setpoint of 3.4 m. The sensor measuring range is 0 to 6 m. The setting range is equal to the sensor measuring range. See sensor nameplate.

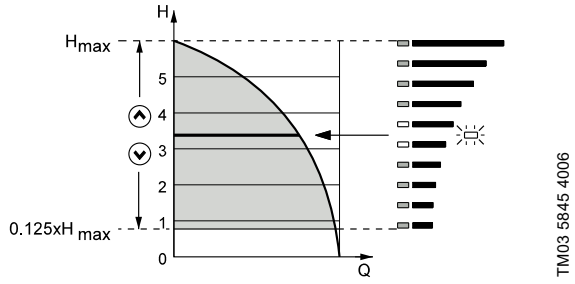


Fig. 27 Setpoint set to 3.4 m, control mode "differential-pressure control"

Control mode "Constant curve"

Example

In this control mode, the pump performance is set within the range from minimum to maximum curve. See fig. 28.

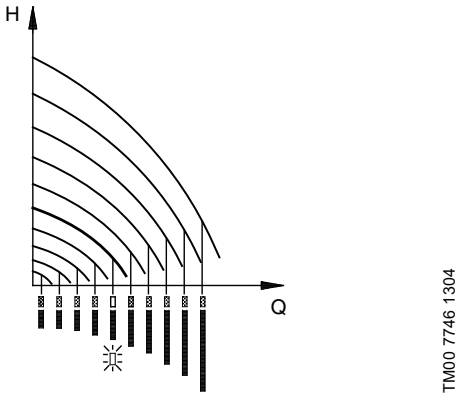


Fig. 28 Pump performance setting, control mode "Constant curve"

Setting to maximum curve duty

Press ⊙ continuously to change over to the maximum curve of the pump. The top light field flashes. See fig. 29.

To change back, press ⊙ continuously until the desired setpoint is indicated.

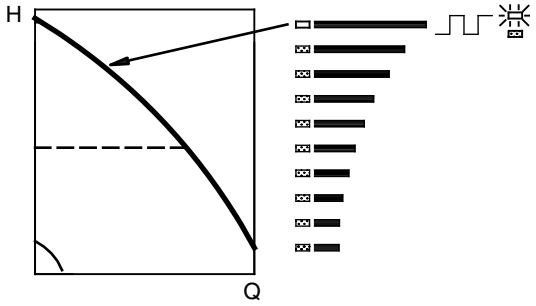


Fig. 29 Maximum curve duty

Setting to minimum curve duty

Press ⊙ continuously to change over to the minimum curve of the pump. The bottom light field flashes. See fig. 30.

To change back, press ⊙ continuously until the desired setpoint is indicated.

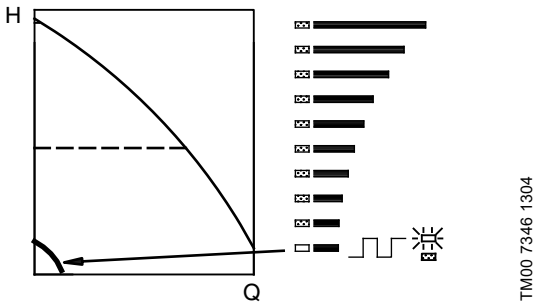


Fig. 30 Minimum curve duty

Start-stop of pump

Press ⊙ continuously until the desired setpoint is indicated to start the pump.

Stop the pump by continuously pressing ⊙ until none of the light fields are activated and the green indicator light flashes.

Advanced control panel for TPE3

Pump variant		Fitted as standard	Option
TPE3, TPE3 D		•	-
TPE2, TPE2 D		-	•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-	-

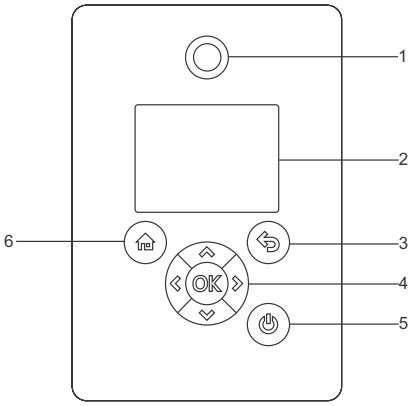


Fig. 31 Advanced control panel

Pos.	Symbol	Description
1		Grundfos Eye The indicator light shows the operating status of the pump. See *Grundfos Eye* on page 88 for further information.
2	-	Graphical colour display.
3		Press the button to go one step back.
4		Press the buttons to navigate between main menus, displays and digits. When you change the menu, the display always shows the top display of the new menu.
		Press the buttons to navigate between submenusor changes value settings. **Note:** If you have disabled the possibility to make settings with the "Enable/disable settings" function, then you can enable it again temporarily by pressing these buttons simultaneously for at least 5 seconds. See *"Buttons on product" ("Enable/disable settings")* on page 79.
	OK	Press this button to save changed values, reset alarms and expand the value field. The button enables radio communication with Grundfos GO and other products of the same type. When you try to establish radio communication between the pump and Grundfos GO or another pump, the green indicator light in Grundfos Eye flashes. A note also appears in the pump display stating that a wireless device wants to connect to the pump. Press OK on the pump control panel to allow radio communication with Grundfos GO and other products of the same type.
5		Press the button to make the pump ready for operation and starts and stops the pump. **Start:** If you press the button when the pump is stopped, the pump will only start if no other functions with higher priority have been enabled. **Stop:** If you press the button when the pump is running, the pump is always stopped. When you stop the pump via this button, the ⏻ icon appears in the bottom of the display.
6		Press the button to go to the "Home" menu.

"Home" display

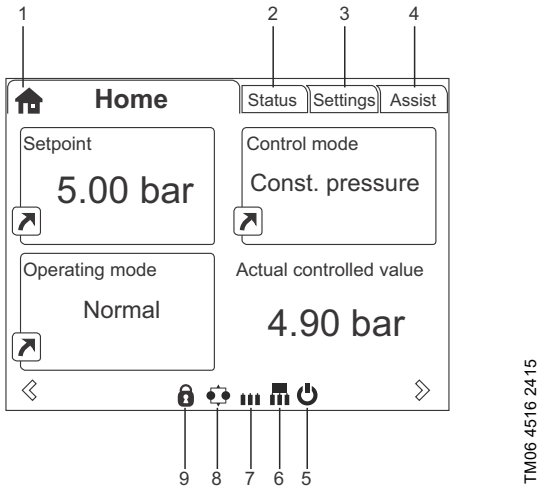


Fig. 32 Example of "Home" display

Pos.	Symbol	Description
1		"Home" This menu shows up to four user-defined parameters. You can select parameters shown as shortcut icon, and when pressing OK you go directly to the "Settings" display for the selected parameter.
2	-	"Status" This menu shows the status of the pump and system as well as warnings and alarms.
3	-	"Settings" This menu gives access to all setting parameters. You can make detailed settings of the pump in this menu. See *Description of selected functions* on page 55.
4	-	"Assist" This menu enables assisted pump setup, provides a short description of the control modes and offers fault advice. See *"Assist"* on page 82.
5		The symbol indicates that the pump has been stopped via the button.
6		The symbol indicates that the pump is functioning as master pump in a multipump system.
7		The symbol indicates that the pump is functioning as a slave pump in a multipump system.
8		The symbol indicates that the pump is operating in a multipump system. See *"Multipump setup" ("Setup of multi-pump system")* on page 83.
9		The symbol indicates that the possibility to make settings has been disabled for protective reasons. See *"Buttons on product" ("Enable/disable settings")* on page 79.

Startup guide

The pump incorporates a startup guide which is started at the first startup. See *"Run start-up guide"* on page 81. After the startup guide, the main menus appear in the display.

Menu overview for advanced control panel

Main menus

Home	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	Multipump system[2]
	•	•	•	•

Status	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	Multipump system[2]
"Operating status"	•	•[1]	•[1]	•
"Operating mode, from"	•	•[1]	•[1]	•
"Control mode"	•	•[1]	•[1]	•
"Pump performance"	•	•[1]	•[1]	•
"Actual controlled value"	•	•[1]	•[1]	•
"Max. curve and duty point"	•			•
"Resulting setpoint"	•	•[1]	•[1]	•
"Liquid temperature"	•			•
"Speed"	•	•[1]	•[1]	•
"Acc. flow and specific energy"	•	•[1]	•[1]	•
"Power and energy consumption"	•	•[1]	•[1]	•
"Measured values"	•	•[1]	•[1]	•
"Analog input 1"	•	•[1]	•[1]	•
"Analog input 2"	•	•[1]	•[1]	•
"Analog input 3"	•	•[1]	•[1]	•
"Pt100/1000 input 1"	•	•[1]	•[1]	•
"Pt100/1000 input 2"	•	•[1]	•[1]	•
"Analog output"	•	•[1]	•[1]	•
"Warning and alarm"	•	•[1]	•[1]	•
"Actual warning and alarm"	•	•[1]	•[1]	•
"Warning log"	•	•[1]	•[1]	•
"Alarm log"	•	•[1]	•[1]	•
"Heat energy monitor"	•			•
"Heat power"	•			•
"Heat energy"	•			•
"Flow rate"	•			•
"Volume"	•			•
"Hour counter"	•			•
"Temperature 1"	•			•
"Temperature 2"	•			•
"Differential temp."	•			•
"Operating log"	•	•[1]	•[1]	•
"Operating hours"	•	•[1]	•[1]	•
"Trend data"	•			•
"Fitted modules"	•	•[1]	•[1]	•
"Date and time"	•	•[1]	•[1]	•
"Product identification"	•	•[1]	•[1]	•
"Motor bearing monitoring"	•	•[1]	•[1]	•

Status	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	Multipump system[2]
"Multipump system"				•
"System operating status"				•
"System performance"				•
"System input power and energy"				•
"Pump 1, multipump sys."				•
"Pump 2, multipump sys."				•
"Pump 3, multipump sys."				•

1) The advanced control panel is available as an option on TPE2 and TPE Series 1000 pumps, 2.2 - 11 kW, 2-pole, 3 - 7.5 kW, 4-pole.

2) Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Settings	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	Multipump system[2]	Section	Page
"Setpoint"	•	•[1]	•[1]	•	*"Setpoint"*	55
"Operating mode"	•	•[1]	•[1]	•	*"Operating mode"*	56
"Set manual speed"	•	•[1]	•[1]	•	*"Set manual speed"*	56
"Set user-defined speed"	•	•[1]	•[1]	•	*"Set user-defined speed"*	56
"Control mode"	•	•[1]	•[1]	•	*"Control mode"*	56
"Flow limit"	•			•	*"$FLOW_{LIMIT}$"*	63
"Automatic night setback"	•			•	*"Automatic night setback"*	64
"Analog inputs"	•	•[1]	•[1]	•	*"Analog inputs"*	64
"Analog input 1, setup"	•	•[1]	•[1]	•		
"Analog input 2, setup"	•	•[1]	•[1]	•		
"Analog input 3, setup"	•	•[1]	•[1]	•		
"Built-in Grundfos sensor"	•			•		
"Pt100/1000 inputs"	•	•[1]	•[1]	•	*"Pt100/1000 inputs"*	66
"Pt100/1000 input 1, setup"	•	•[1]	•[1]	•		
"Pt100/1000 input 2, setup"	•	•[1]	•[1]	•		
"Digital inputs"	•	•[1]	•[1]	•	*"Digital inputs"*	66
"Digital input 1, setup"	•	•[1]	•[1]	•		
"Digital input 2, setup"	•	•[1]	•[1]	•		
"Digital inputs/outputs"	•	•[1]	•[1]	•	*"Digital inputs/outputs"*	68
"Digital input/output 3, setup"	•	•[1]	•[1]	•		
"Digital input/output 4, setup"	•	•[1]	•[1]	•		
"Relay outputs"	•	•[1]	•[1]	•	*"Signal relays 1 and 2" ("Relay outputs")*	69
"Relay output 1"	•	•[1]	•[1]	•		
"Relay output 2"	•	•[1]	•[1]	•		
"Analog output"	•	•[1]	•[1]	•	*"Analog output"*	69
"Output signal"	•	•[1]	•[1]	•		
"Function of analog output"	•	•[1]	•[1]	•		
"Controller setting"	•	•[1]	•[1]	•	*"Controller" ("Controller settings")*	70
"Operating range"	•	•[1]	•[1]	•	*"Operating range"*	71
"Setpoint influence"	•	•[1]	•[1]	•	*"Setpoint influence"*	73
"External setpoint function"	•	•[1]	•[1]	•	*"External setpoint influence"*	72
"Predefined setpoints"	•	•[1]	•[1]	•	*"Predefined setpoints"*	74
"Temperature influence"	•			•	*"Temperature influence"*	74
"Monitoring functions"	•	•[1]	•[1]	•		
"Motor bearing monitoring"	•	•[1]	•[1]	•	*"Motor bearing monitoring"*	76
"Motor bearing maintenance"	•	•[1]	•[1]	•	*"Bearings replaced" ("Motor bearing maintenance")*	77
"Limit-exceeded function"	•	•[1]	•[1]	•	*"Limit-exceeded function"*	75
"Special functions"	•	•[1]	•[1]	•	*Special functions*	76
"Pulse flow meter setup"	•	•[1]	•[1]	•	*"Pulse flowmeter setup"*	76
"Ramps"	•	•[1]	•[1]	•	*"Ramps"*	76
"Standstill heating"	•	•[1]	•[1]	•	*"Standstill heating"*	76
"Communication"	•	•[1]	•[1]	•	*Communication*	78
"Pump number"	•	•[1]	•[1]	•	*"Number" ("Pump number")*	78
"Enable/disable radio communication"	•	•[1]	•[1]	•	*"Radio communication" ("Enable/disable radio comm.")*	78
"General settings"	•	•[1]	•[1]	•	*General settings*	78

[1] The advanced control panel is available as an option on TPE2 and TPE Series 1000 pumps, 2.2 - 11 kW, 2-pole, 3 - 7.5 kW, 4-pole.

[2] Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Assist	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	Multipump system[1]	Section	Page
"Assisted pump setup"	•	•	•	•		
"Setup, analog input"	•	•	•	•		
"Setting of date and time"	•	•	•	•		
"Multipump setup"	•	•	•	•		
"Description of control mode"	•	•	•	•		
"Assisted fault advice"	•	•	•	•		

1) Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Grundfos GO

The pump is designed for wireless radio or infrared communication with Grundfos GO.

Grundfos GO enables setting of functions and gives access to status overviews, technical product information and actual operating parameters.

Grundfos GO offers the following mobile interface, MI.

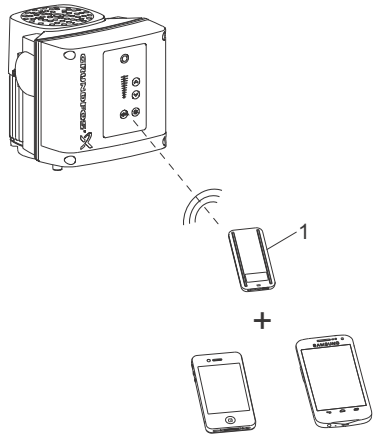


Fig. 33 Grundfos GO communicating with the pump via radio or infrared connection, IR

Pos.	Description
1	Grundfos MI 301: Separate module enabling radio or infrared communication. You can use the module in conjunction with an Android or iOS-based smart device with Bluetooth connection.

Communication

When Grundfos GO initiates communication with the pump, the indicator light in the middle of Grundfos Eye flashes green. See *Priority of settings* on page 87.

Furthermore, on pumps fitted with an advanced control panel a text appears in the display saying that a wireless device is trying to establish connection. Press OK on the pump in order to establish connection with Grundfos GO or press ⌂ to reject connection.

Establish communication using one of these communication types:

- radio communication
- infrared communication.

Radio communication

Radio communication can take place at distances up to 30 metres. The first time Grundfos GO communicates with the pump, you must enable communication by pressing ((o)) or OK on the pump control panel. Later when communication takes place, the pump is recognized by Grundfos GO and you can select the pump from the "List" menu.

Infrared communication

When communicating via infrared light, Grundfos GO must be pointed at the pump control panel.

Menu overview for Grundfos GO

Main menus

Dashboard	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Multipump system[1]
			•	•	•

Status	TPE3, TPE3 D	TPE2, TPE3 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Multipump system[1]	Section	Page
"System mode"					•		
"Resulting setpoint"	•	•	•				
"Resulting system setpoint"					•		
"Actual setpoint"				•			
"External setpoint"				•			
"Actual controlled value"	•	•	•		•		
"Sensor value"				•			
"Motor speed (rpm, %)"	•	•	•	•			
"Power consumption"	•	•	•	•			
"Power consumption system"					•		
"Energy consumption"	•	•	•	•			
"Energy consumption system"					•		
"Acc. flow, specific energy"	•	•	•		•		
"Operating hours"	•	•	•	•			
"Motor current"	•	•	•	•	•		
"Number of starts"	•	•	•	•	•		
"Liquid temperature"	•						
"Analog input 1"	•	•	•				
"Analog input 2"	•	•	•				
"Analog input 3"	•	•	•				
"Pt100/1000 input 1"	•	•	•				
"Pt100/1000 input 2"	•	•	•				
"Analog output"	•	•	•				
"Digital input 1"	•	•	•				
"Digital input 2"	•	•	•	•			
"Digital in/output 3"	•	•	•				
"Digital in/output 4"	•	•	•				
"Motor bearing service"	•	•	•	•	•		
"Fitted modules"	•	•	•	•			
"Trend data"	•						
"Heat energy monitor"	•						
"Controlled from"				•			
"Pump1"					•		
"Pump2"					•		
"Pump3"					•		
"Pump4"					•		

[1] Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Settings	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Multipump system[1]	Section	Page
"Setpoint"	•	•	•	•	•	*"Setpoint"*	55
"Operating mode"	•	•	•	•	•	*"Operating mode"*	56
"Set user-defined speed"	•	•	•	•	•	*"Set user-defined speed"*	56
"Control mode"	•	•	•	•	•	*"Control mode"*	56
"Proportional-pressure setup"	•					*"Proportional-pressure setup"*	63
"Flow limit"	•					*"$FLOW_{LIMIT}$"*	63
"Automatic night setback"	•					*"Automatic night setback"*	64
"Temperature influence"	•					*"Temperature influence"*	74
"Buttons on product"	•	•	•	•	•	*"Buttons on product" ("Enable/disable settings")*	79
"Controller"	•	•	•	•	•	*"Controller" ("Controller settings")*	70
"Operating range"	•	•	•	•	•	*"Operating range"*	71
"Ramps"	•	•	•			*"Ramps"*	76
"Number"	•	•	•	•		*"Number" ("Pump number")*	78
"Radio communication"	•	•	•			*"Radio communication" ("Enable/disable radio comm.")*	78
"Sensor type"				•		*"Sensor type"*	64
"Analog input 1"	•	•	•			*"Analog inputs"*	64
"Analog input 2"	•	•	•				
"Analog input 3"	•	•	•				
"Built-in Grundfos sensor"	•					*"Built-in Grundfos sensor"*	65
"Pt100/1000 input 1"	•	•	•			*"Pt100/1000 inputs"*	66
"Pt100/1000 input 2"	•	•	•				
"Digital input 1"	•	•	•			*"Digital inputs"*	66
"Digital input 2"	•	•	•	•			
"Digital in/output 3"	•	•	•			*"Digital inputs/outputs"*	68
"Digital in/output 4"	•	•	•				
"Pulse flowmeter"	•	•	•				
"Predefined setpoint"	•	•	•		•	*"Predefined setpoints"*	74
"Analog output"	•	•	•			*"Analog output"*	69
"External setpoint funct."	•	•	•	•		*"External setpoint influence"*	72
"Signal relay 1"	•	•	•	•		*"Signal relays 1 and 2" ("Relay outputs")*	69
"Signal relay 2"	•	•	•	•			
"Limit 1 exceeded "	•	•	•		•	*"Limit-exceeded function"*	75
"Limit 2 exceeded "	•	•	•		•		
"Alternating operation, time"					•		
"Time for pump change over"					•		
"Standstill heating"	•	•	•	•		*"Standstill heating"*	76
"Motor bearing monitoring"	•	•	•	•		*"Motor bearing monitoring"*	76
"Service"	•	•	•			*"Service"*	77
"Date and time"	•	•	•		•	*"Date and time"*	78
"Store settings"	•	•	•	•		*"Store settings" ("Store actual settings")*	79
"Recall settings"	•	•	•	•		*"Recall settings" ("Recall stored settings")*	80
"Undo"	•	•	•	•	•	*"Undo"*	80
"Pump name"	•	•	•		•	*"Pump name"*	80
"Connection code"	•	•	•		•	*"Connection code"*	80
"Unit configuration"	•	•	•		•	*"Unit configuration" ("Units")*	78

Alarms and warnings	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Multipump system[1]	Section	Page
"Alarm log"	•	•	•		•	*"Alarm log"*	81
"Warning log"	•	•	•		•	*"Warning log"*	82
"Reset alarm" button	•	•	•		•	*"Warning log"*	

1) Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Assist	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Multipump system[1]	Section	Page
"Assisted pump setup"	•	•	•		•		
"Assisted fault advice"	•	•	•		•		
"Multipump setup"	•	•	•		•	*"Multipump setup" ("Setup of multi-pump system")*	83

1) Pumps above 11 kW, 2-pole and 7.5 kW, 4-pole have no multipump function.

Description of selected functions

"Heat energy monitor"

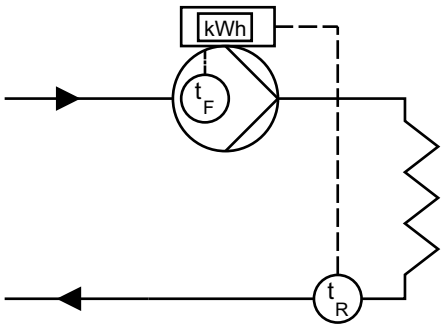
Pump variant		"Heat energy monitor"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The heat energy monitor is a monitoring function that calculates the heat energy consumption within a system. The built-in flow estimation needed for the calculation has an inaccuracy of ± 10 % of the maximum flow in the area down to 10 % flow and down to 12.5 % of the maximum head. The calculations are based on water at a temperature of 20 °C. Also, the temperature measurements needed for the calculation have some inaccuracy depending on the sensor type. Therefore, you cannot use the heat energy value for billing purposes. However, the value is perfect for optimization purposes in order to prevent excessive energy costs caused by system imbalances.

The heat energy monitor requires an additional temperature sensor installed in the flow pipe or return pipe depending on where the pump is installed.

Use the analog inputs and/or Pt100/1000 inputs for measuring the temperatures used for calculation by the heat energy monitor.

The used inputs must not be set to "Not active" and one of the measuring parameters must be set to "Temperature 2".



t_F: Flow pipe temperature

t_R: Return pipe temperature

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Fig. 34 Example: Pump installed in the flow pipe and additional temperature sensor installed in the return pipe.

"Setpoint"

Pump variant		"Setpoint"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

You can set the setpoint for all control modes, except $AUTO_{ADAPT}$ and $FLOW_{ADAPT}$, in this submenu when you have selected the desired control mode. See *"Control mode"* on page 56.

Factory setting

See section *12. Factory settings of E-pumps*.

"Operating mode"

Pump variant		"Operating mode"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

Possible operating modes:

- "Normal"
  The pump runs according to the selected control mode.
- "Stop"
  The pump stops.
- "Min."
  Use the minimum curve mode in periods in which a minimum flow is required.
  This operating mode is for instance suitable for manual night setback if you do not want to use automatic night setback.
- "Max."
  Use the maximum curve mode in periods in which a maximum flow is required.
  This operating mode is for instance suitable for hot-water priority.
- "Manual"
  The pump is operating at a manually set speed.
  In "Manual" the setpoint via bus is overruled. See *"Set manual speed"* on page 56.
- "User-defined speed"
  The motor is operating at a speed set by the user.
  See section *"Set user-defined speed"* on page 56.

All operating modes are illustrated in the fig. 35.

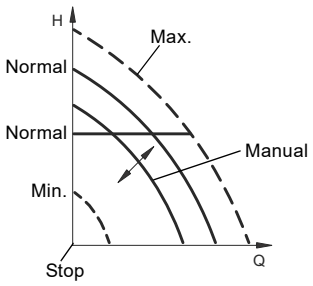

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Fig. 35 Operating modes

Factory setting

See section *12. Factory settings of E-pumps*.

"Set manual speed"

Pump variant		"Set manual speed"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel. With Grundfos GO, you set the speed via the "Setpoint" menu.

You can set the pump speed in % of the maximum speed. When you have set the operating mode to "Manual", the pump starts running at the set speed. The speed can then be changed manually via Grundfos GO or via the advanced control panel.

"Set user-defined speed"

You can set the motor speed in % of the maximum speed. When you have set the operating mode to "User-defined speed", the motor runs at the set speed.

"Control mode"

Pump variant		"Control mode"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 1.1 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

Note: Not all control modes are available for all pump variants.

Possible control modes:

- "AUTO$_{ADAPT}$"
- "FLOW$_{ADAPT}$"
- "Prop. press." (proportional pressure)
- "Const. pressure" (constant pressure)
- "Const. temp." (constant temperature)
- "Con. diff. press." (constant differential pressure)
- "Con. diff. temp." (constant differential temperature)
- "Const. flow rate" (constant flow rate)
- "Const. level" (constant level)
- "Const. other val." (constant other value)
- "Const. curve" (constant curve).

You can change the setpoint for all control modes, except AUTO$_{ADAPT}$ and FLOW$_{ADAPT}$, in the "Setpoint" submenu under "Settings" when you have selected the desired control mode.

Factory setting

See section *12. Factory settings of E-pumps*.

"AUTO$_{ADAPT}$"

Pump variant		"AUTO$_{ADAPT}$"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The AUTO$_{ADAPT}$ control mode continuously adapts the pump performance according to the actual system characteristic.

Manual setting of the setpoint is not possible.

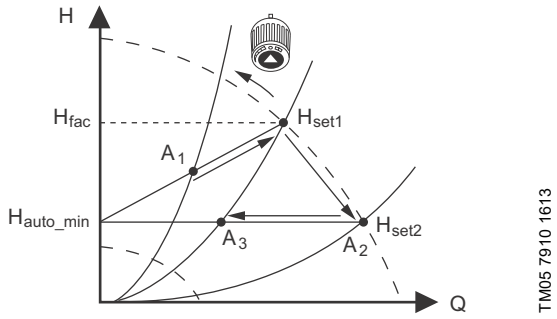


Fig. 36 AUTO$_{ADAPT}$

When the AUTO$_{ADAPT}$ control mode has been enabled, the pump will start with the factory setting, H_{fac} is equal to H_{set1}, and then adjust its performance to A_1. See fig. 36.

When the pump registers a lower head on the maximum curve, A_2, the AUTO$_{ADAPT}$ function automatically selects a correspondingly lower control curve, H_{set2}. If the valves in the system close, the pump adjusts its performance to A_3.

A_1: Original duty point.

A_2: Lower registered head on the max. curve.

A_3: New duty point after AUTO$_{ADAPT}$ control.

H_{set1}: Original setpoint setting.

H_{set2}: New setpoint after AUTO$_{ADAPT}$ control.

H_{fac}: Factory setting.

H_{auto_min}: A fixed value of 1.5 m.

The AUTO$_{ADAPT}$ control mode is a form of proportional-pressure control where the control curves have a fixed origin, H_{auto_min}.

The AUTO$_{ADAPT}$ control mode has been developed specifically for heating systems and we do not recommend that you use it for air-conditioning and cooling systems.

"FLOW$_{ADAPT}$"

Pump variant		"FLOW$_{ADAPT}$"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

When you select FLOW$_{ADAPT}$, the pump runs AUTO$_{ADAPT}$ and ensures that the flow never exceeds the entered FLOW$_{LIMIT}$ value.

The setting range for FLOW$_{LIMIT}$ is 25 to 90 % of the Q_{max} of the pump.

The factory setting of the FLOW$_{LIMIT}$ is the flow where the AUTO$_{ADAPT}$ factory setting meets the maximum curve. See fig. 37.

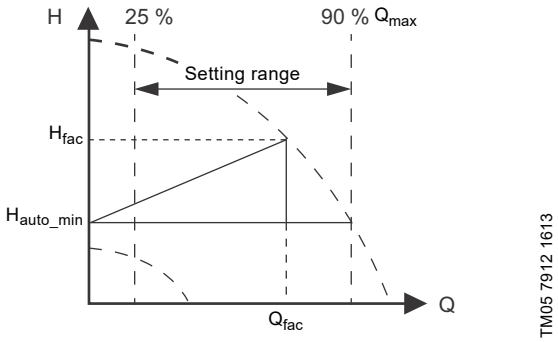


Fig. 37 FLOW$_{ADAPT}$

"Proportional pressure"

Pump variant		"Proportional pressure"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The head of the pump is reduced at decreasing water demand and increased at rising water demand. See fig. 38.

This control mode is especially suitable in systems with relatively large pressure losses in the distribution pipes. The head of the pump increases proportionally to the flow in the system to compensate for the large pressure losses in the distribution pipes.

You can set the setpoint with an accuracy of 0.1 m. The head against a closed valve is half the setpoint. The setting range is between 25 % and 90 % of maximum head.

For more information about settings, see *"Proportional-pressure setup"* on page 63.

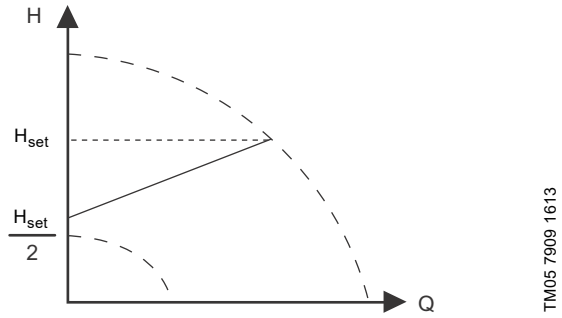


Fig. 38 "Proportional pressure"

Example

- Factory-fitted differential-pressure sensor.

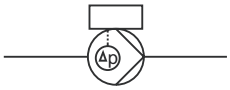


Fig. 39 "Proportional pressure"

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant pressure"

Pump variant		"Constant pressure"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

We recommend this control mode if the pump is to deliver a constant pressure, independently of the flow in the system. The pump maintains a constant pressure independently of the flow rate. See fig. 40.

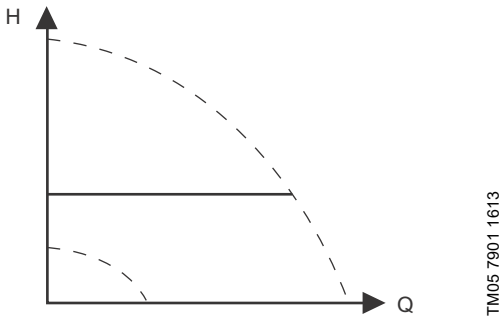


Fig. 40 "Constant pressure"

This control mode requires an external pressure sensor as shown in the examples below. You can set the pressure sensor in the "Assist" menu. See *"Assisted pump setup"* on page 82. The setting range is between 12.5 % of maximum head and maximum head.

Examples

- One external pressure sensor.

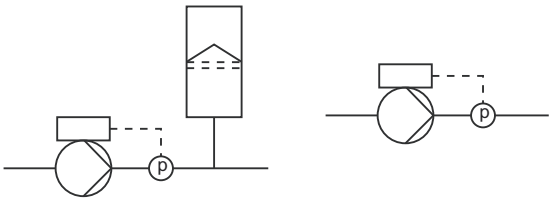


Fig. 41 "Constant pressure"

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant temperature"

Pump variant		"Constant temperature"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

This control mode ensures a constant temperature. Constant temperature is a comfort control mode that you can use in hot water recirculation systems to control the flow to maintain a fixed temperature in the system. See fig. 42.

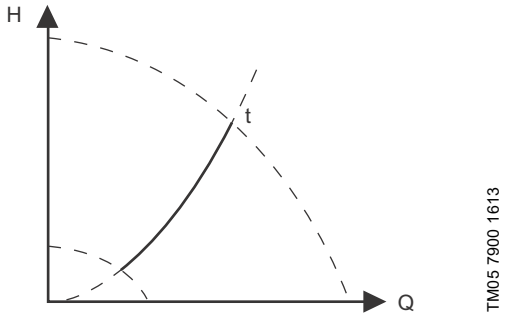
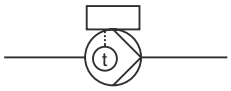


Fig. 42 "Constant temperature"

This control mode requires either an external temperature sensor as shown in the examples below:

Examples

- Factory-fitted temperature sensor. Only TPE3, TPE3 D.



- One external temperature sensor.

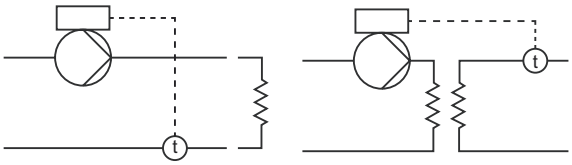


Fig. 43 Constant temperature

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant differential pressure"

Pump variant		"Constant differential pressure"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The pump maintains a constant differential pressure, independently of the flow in the system. See fig. 44. This control mode is primarily suitable for systems with relatively small pressure losses.

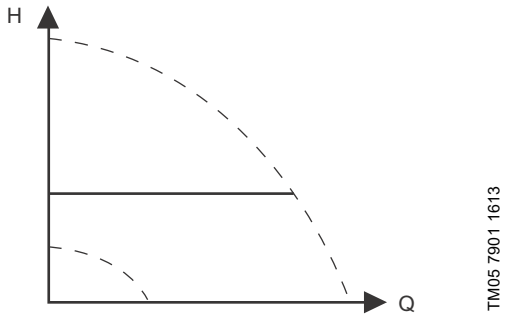
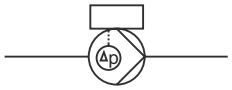


Fig. 44 "Constant differential pressure"

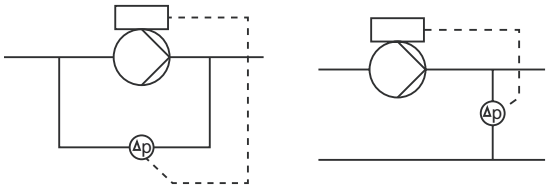
The setting range is between 12.5 % of maximum head and maximum head.This control mode requires either an internal or external differential-pressure sensor or two external pressure sensors. See the examples below.

Examples

- Factory-fitted differential-pressure sensor, only TPE3, TPE3 D.



- One external differential-pressure sensor.
  The pump uses the input from the sensor to control the differential pressure. You can set the sensor manually or by using the "Assist" menu. See *"Assisted pump setup"* on page 82.



- Two external pressure sensors.
  Constant differential-pressure control is achievable with two pressure sensors. The pump uses the inputs from the two sensors and calculates the differential pressure. The sensors must have the same unit and must be set as feedback sensors. You can set the sensors manually, sensor by sensor, or by using the "Assist" menu. See *"Assisted pump setup"* on page 82.

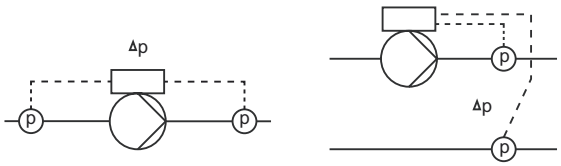


Fig. 45 "Constant differential pressure"

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant differential temperature"

Pump variant		"Constant differential temperature"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The pump maintains a constant differential temperature in the system and the pump performance is controlled according to this. See fig. 46.

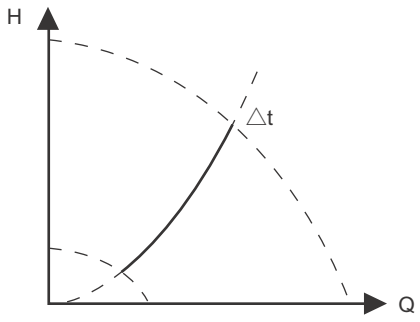


Fig. 46 "Constant differential temperature"

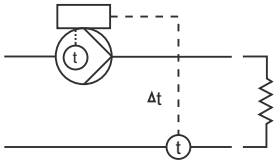
This control mode requires either two temperature sensors or one external differential-temperature sensor. See the examples below.

The temperature sensors can either be analog sensors connected to two of the analog inputs or two Pt100/Pt1000 sensors connected to the Pt100/1000 inputs, if these are available on the specific pump.

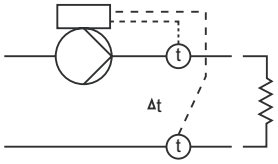
Set the sensor in the "Assist" menu under "Assisted pump setup". See *"Assisted pump setup"* on page 82.

Examples

- Factory-fitted temperature sensor and an external temperature sensor. Only TPE3, TPE3 D.



- Two external temperature sensors. Not available for TPE 15-22 kW 2-pole and 11-15 kW 4-pole. Constant differential-temperature control is achievable with two temperature sensors. The pump uses the inputs from the two sensors and calculates the differential temperature.
  The sensors must have the same unit and must be set as feedback sensors. You can set the sensors manually, sensor by sensor, or by using the "Assist" menu. See *"Assisted pump setup"* on page 82.



- One external differential-temperature sensor.
  The pump uses the input from the sensor to control the differential temperature.
  You can set the sensor manually or by using the "Assist" menu. See *"Assisted pump setup"* on page 82.

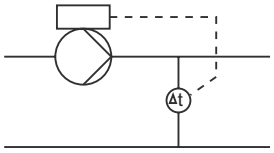


Fig. 47 "Constant differential temperature"

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant flow rate"

Pump variant		"Constant flow rate"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The pump maintains a constant flow in the system, independently of the head. See fig. 48.

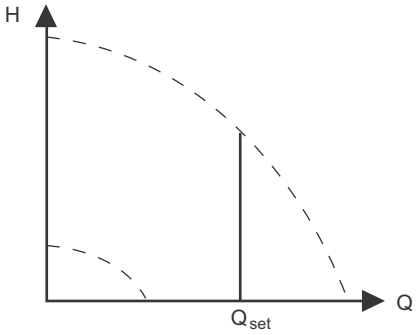


Fig. 48 "Constant flow rate"

This control mode requires an external flow sensor. See the example below.

Example

- One external flow sensor.

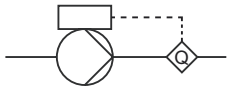


Fig. 49 Constant flow rate

TPE3 is able to perform constant flow control based on internal flow estimation without using a flow sensor.

The Grundfos sensor must in this case be set to "Other" instead of "Feedback" and the control mode must be "Constant flow".

The built-in flow estimation needed for the calculation has an inaccuracy of ±10 % of the maximum flow rate in the area down to 10 % flow and down to 12.5 % of the maximum head.

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant level"

Pump variant		"Constant level"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The pump maintains a constant level, independently of the flow rate. See fig. 50.

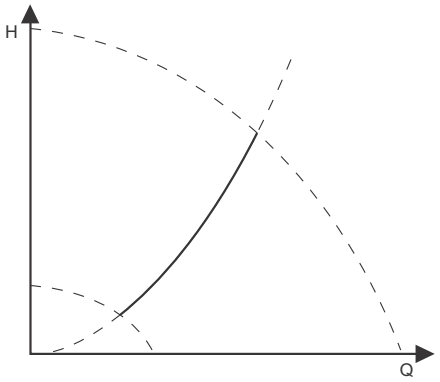


Fig. 50 "Constant level"

This control mode requires an external level sensor.

The pump can control the level in a tank in two ways:

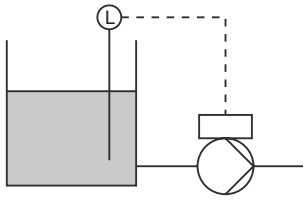
- As an emptying function where the pump draws the liquid from the tank.
- As a filling function where the pump pumps the liquid into the tank.

See fig. 51.

The type of level control function depends on the setting of the built-in controller. See *"Controller" ("Controller settings")* on page 70.

Examples

- One external level sensor.
  – emptying function.



- One external level sensor.
  – filling function.

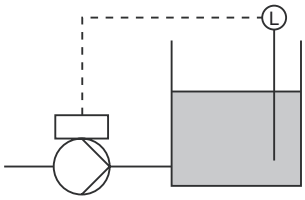


Fig. 51 Constant level

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Constant other value"

Pump variant		"Constant other value"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Any other value is kept constant.

Use this control mode if you want to control a value which is not available in the "Control mode" menu. Connect a sensor measuring the controlled value to one of the analog inputs of the pump. The controlled value will be shown in percentage of sensor range.

"Constant curve"

Pump variant		"Constant curve"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

You can set the pump to operate according to a constant curve, like an uncontrolled pump. See fig. 52.

You can set the desired speed can be set in % of maximum speed in the range from 13 to 100 %.

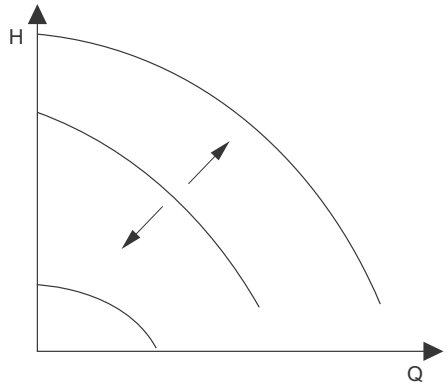


Fig. 52 "Constant curve"

Depending on the system characteristic and the duty point, the 100 % setting may be slightly smaller than the actual maximum curve of the pump even though the display shows 100 %. This is due to the power and pressure limitations built into the pump. The deviation varies according to pump type and pressure loss in the pipes.

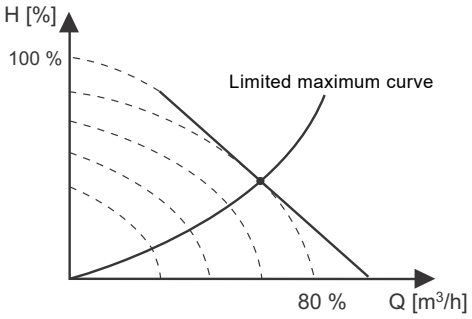


Fig. 53 Power and pressure limitations influencing the maximum curve

Controller settings

For recommended controller settings, see *"Controller" ("Controller settings")* on page 70.

"Proportional-pressure setup"

Pump variant		"Proportional-pressure setup"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

"Control-curve function"

You can set the curve either to quadratic or linear.

"Zero-flow head"

You can set this value in % of the setpoint. With a setting of 100 %, the control mode is equal to constant differential pressure.

"$FLOW_{LIMIT}$"

Pump variant		"$FLOW_{LIMIT}$"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

$FLOW_{LIMIT}$

- Enable $FLOW_{LIMIT}$ function.
- Set $FLOW_{LIMIT}$.

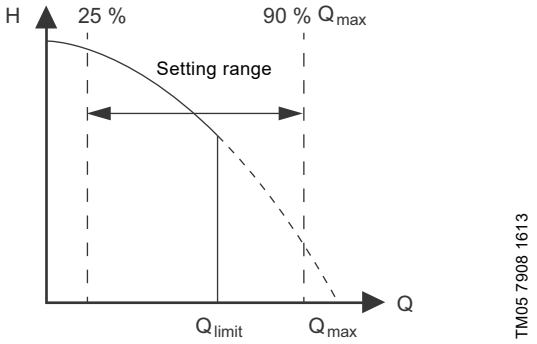


Fig. 54 $FLOW_{LIMIT}$

You can combine the $FLOW_{LIMIT}$ function with the following control modes:

- Proportional pressure
- Constant differential pressure
- Constant differential temperature
- Constant temperature
- Constant curve.

A flow-limiting function ensures that the flow never exceeds the entered $FLOW_{LIMIT}$ value.

The setting range for $FLOW_{LIMIT}$ is 25 to 90 % of the Q_{max} of the pump.

The factory setting of the $FLOW_{LIMIT}$ is the flow where the $AUTO_{ADAPT}$ factory setting meets the maximum curve. See fig. 37.

"Automatic night setback"

Pump variant		"Automatic night setback"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Once you have enabled automatic night setback, the pump automatically changes between normal duty and night setback, duty at low performance.

Changeover between normal duty and night setback depends on the flow-pipe temperature.

The pump automatically changes over to night setback when the built-in sensor registers a flow-pipe temperature drop of more than 10 to 15 °C within approximately two hours. The temperature drop must be at least 0.1 °C/min.

Changeover to normal duty takes place without a time lag when the temperature has increased by approximately 10 °C.

Note: You cannot enable automatic night setback when the pump is in constant-curve mode.

"Sensor type"

Pump variant		"Sensor type"
TPE3, TPE3 D		-
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The setting of the sensor is only relevant in the case of controlled operation.

Select among the following values:

- Sensor output signal
  0-10 V
  0-20 mA
  4-20 mA.
- Unit of measurement of sensor:
  bar, mbar, m, kPa, psi, ft, m^3/h, m^3/s, l/s, gpm, °C, °F, %.
- Sensor measuring range.

"Analog inputs"

Pump variant		"Analog inputs"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Function	Terminals*
"Analog input 1, setup"	4
"Analog input 2, setup"	7
"Analog input 3, setup"	14

* See *Connection terminals, advanced functional module, FM 300* on page 109.

Set the analog input for a feedback sensor via the "Assisted pump" setup menu. See *"Assisted pump setup"* on page 82.

If you want to set an analog input for other purposes, you can do this manually.

You can set the analog inputs via the "Setup, analog input" menu. See *"Setup, analog input"* on page 83.

If you perform the manual setting via Grundfos GO, you need to enter the menu for the analog input under the "Settings" menu.

Function

You can set the analog inputs to these functions:

- "Not active"
- "Feedback sensor"
- "Ext. setpoint infl."
  See *"External setpoint influence"* on page 72.
- "Other function".

Measured parameter

Select one of the parameters, that is the parameter to be measured in the system by the sensor connected to the actual analog input. See fig. 55.

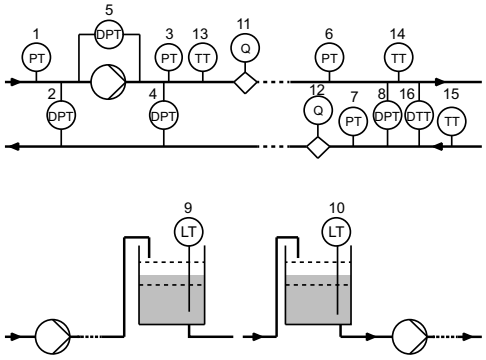


Fig. 55 Overview of sensor locations

Sensor function, measured parameter	Pos.
"Inlet pressure"	1
"Diff. press., inlet"	2
"Liquid temp."	3
"Diff. press.,outlet"	4
"Diff. press.,pump"	5
"Operating mode"	6
"Press. 2, external"	7
"Diff. press., ext."	8
"Other parameter"	9
"Feed tank level"	10
"Pump flow"	11
"Flow, external"	12
"Liquid temp."	13
"Temperature 1"	14
"Temperature 2"	15
"Date and time"	16
"Ambient temp."	Not shown
"Other parameter"	Not shown

"Unit"

Available measuring units:

Parameter	Possible units
Pressure	bar, m, kPa, psi, ft
Pump flow	m^3/h, l/s, yd^3/h, gpm
Liquid temperature	°C, °F
Other parameter	%

Electrical signal

Select signal type:

- "0.5 - 3.5 V"
- "0-5 V"
- "0-10 V"
- "0-20 mA"
- "4-20 mA".

Sensor range, minimum value

Set the minimum value of the connected sensor.

Sensor range, maximum value

Set the maximum value of the connected sensor.

Factory setting

See section *12. Factory settings of E-pumps*.

Setting two sensors for differential measurement

In order to measure the difference of a parameter between two points, set the corresponding sensors as follows:

Parameter	Analog input for sensor 1	Analog input for sensor 2
Pressure, option 1	Differential pressure, inlet	Differential pressure, outlet
Pressure, option 2	Pressure 1, external	Pressure 2, external
Flow	Pump flow	Flow, external
Temperature	Temperature 1	Temperature 2

If you want to use the control mode "constant differential pressure", you must choose the function "Feedback sensor" for the analog input of both sensors.

"Built-in Grundfos sensor"

Pump variant		"Built-in Grundfos sensor"
TPE3, TPE3 D		•
TPE2, TPE 2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

You can select the function of the built-in sensor in the "Built-in Grundfos sensor" menu.

Set the "Built-in Grundfos sensor" via the "Assisted pump setup" menu. See *"Assisted pump setup"* on page 82.

If you perform the setting manually in the advanced control panel, you must enter the "Analog inputs" menu under the "Settings" menu in order to access the "Built-in Grundfos sensor" menu.

If you perform the setting manually via Grundfos GO, you need to enter the menu for the "Built-in Grundfos sensor" under the "Settings" menu.

Function

You can set the built-in sensor to these functions:

- "Grundfos diff.-pressure sensor"

- "Not active"
- "Feedback sensor"
- "Setpoint influence"
- "Other function".

- "Grundfos temperature sensor"

- "Not active"
- "Feedback sensor"
- "Setpoint influence"
- "Other function".

Factory setting

See section *12. Factory settings of E-pumps*.

"Pt100/1000 inputs"

Pump variant		"Pt100/1000 inputs"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Function	Terminals*
"Pt100/1000 input 1, setup"	17 and 18
"Pt100/1000 input 2, setup"	18 and 19

* See *Connection terminals, advanced functional module, FM 300* on page 109.

Set the Pt100/1000 input for a feedback sensor via the Assisted pump setup menu. See *"Assisted pump setup"* on page 82.

If you want to set a Pt100/1000 input for other purposes, you can do this manually.

You can set the analog inputs via the "Setup, analog input" menu. See *"Setup, analog input"* on page 83.

If you perform the manual setting via Grundfos GO, you need to enter the menu for the Pt100/1000 input under the Settings menu.

Function

You can set the Pt100/1000 inputs to these functions:

- "Not active"
- "Feedback sensor"
- "Ext. setpoint infl."
  See *"External setpoint influence"* on page 72.
- "Other function".

Measured parameter

Select one of the parameters, such as the parameter to be measured in the system by the Pt100/1000 sensor connected to the actual Pt100/1000 input. See fig. 56.

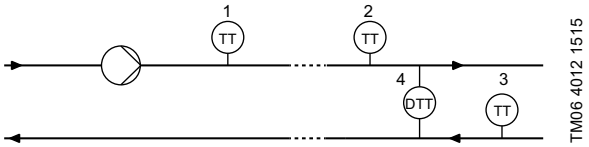


Fig. 56 Overview of Pt100/1000 sensor locations

Parameter	Pos.
"Liquid temp."	1
"Temperature 1"	2
"Temperature 2"	3
"Ambient temp."	Not shown

Measuring range

-50 to +204 °C.

Factory setting

See section *12. Factory settings of E-pumps*.

"Digital inputs"

Pump variant		"Digital inputs"
TPE3, TPE3 D		•
TPE2, TPE 2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

TPE2, TPE3 pumps and TPE Series 1000 2.2 - 11 kW, 2-pole and 3 - 7.5 kW, 4-pole pumps

Function	Terminals*
"Digital input 1, setup"	2 and 6
"Digital input 2, setup"	1 and 9

* See *Connection terminals, advanced functional module, FM 300* on page 109.

To set up a digital input, make the settings below.

Function

Select one of these functions:

- "Not active"
  When set to "Not active", the input has no function.
- "External stop"
  When the input is deactivated, open circuit, the pump stops.
- "Min." (minimum speed)
  When the input is activated, the pump runs at the set minimum speed.
- "Max." (maximum speed)
  When the input is activated, the pump runs at the set maximum speed.
- "User-defined speed"
  When the input is activated, the motor runs at a speed set by the user.
- "External fault"
  When the input is activated, a timer starts. If the input is activated for more than 5 seconds, the pump stops and a fault is indicated. This function depends on input from external equipment.
- "Alarm resetting"
  When the input is activated, a possible fault indication is reset.

- "Dry running"
  When this function has been selected, lack of inlet pressure or water shortage can be detected.
  When lack of inlet pressure or water shortage, dry running, is detected, the pump stops. The pump cannot restart as long as the input is activated.
  This requires the use of an accessory, such as these:
  – a pressure switch installed on the inlet side of the pump
  – a float switch installed on the inlet side of the pump.
- "Accumulated flow"
  When this function is selected, you can register the accumulated flow. This requires the use of a flowmeter which can give a feedback signal as a pulse per defined flow of water.
  See *"Pulse flowmeter setup"* on page 76.
- "Predefined setpoint digit 1" (applies only to digital input 2)
  When digital inputs are set to a predefined setpoint, the pump operates according to a setpoint based on the combination of the activated digital inputs.
  See *"Predefined setpoints"* on page 74.
- "Activate output"
  When the input is activated, the related digital output is activated. See *"Digital inputs/outputs"* on page 68. This is done without any changes to pump operation.
- "Local motor stop"
  When the input is activated, the given pump in a multipump system stops without affecting the performance of the other pumps in the system.

The priority of the selected functions in relation to each other appears from section *Priority of settings* on page 87.

A stop command always has the highest priority.

Activation delay

Pump variant		Activation delay
TPE3, TPE3 D		•
TPE2, TPE 2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Select the activation delay, T1.

It is the time between the digital signal and the activation of the selected function.

Range: 0 to 6000 seconds.

Duration timer mode

Select the mode. See fig. 57.

- "Not active"
- active with interrupt, mode A
- active without interrupt, mode B
- active with after-run, mode C.

Select the duration time, T2.

It is the time which, together with the mode, determines how long the selected function is active.

Range: 0 to 15,000 seconds.

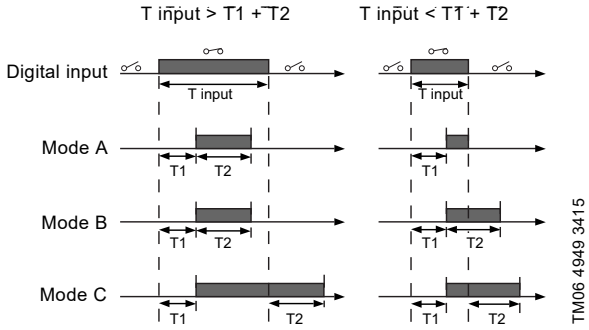


Fig. 57 Duration timer function of digital inputs

Factory setting

See section *12. Factory settings of E-pumps*.

Motors from 15-22 kW, 2-pole and 11-15 kW, 4-pole

You can set the digital input of the pump can be set to different functions. Select one of the following functions:

- "Min." (minimum curve)
- "Max." (maximum curve).

You activate the selected function by closing the contact between terminals 1 and 9.

"Min.":

When the input is activated, the pump operates according to the minimum curve.

"Max.":

When the input is activated, the pump operates according to the maximum curve.

"Digital inputs/outputs"

Pump variant		"Digital inputs/outputs"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Function	Terminals*
"Digital input/output 3, setup"	10 and 16
"Digital input/output 4, setup"	11 and 18

* See *Connection terminals, advanced functional module, FM 300* on page 109.

You can select if the interface must be used as input or output. The output is an open collector and you can connect it to for example an external relay or controller such as a PLC.

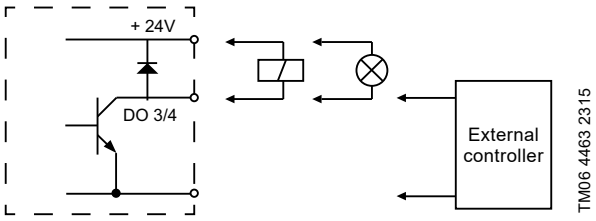


Fig. 58 Example of configurable digital inputs or outputs

To set a digital input or output, make the settings below.

Mode

You can set the digital input or output 3 and 4 to act as digital input or digital output:

- "Digital input"
- "Digital output".

Function

You can set the digital input or output 3 and 4 to the functions mentioned below.

Possible functions, digital input or output 3

"Function if input" See details in section *"Digital inputs"* on page 66	"Function if output" See details in section *"Signal relays 1 and 2" ("Relay outputs")* on page 69
• "Not active" • "External stop" • "Min." • "Max." • "User-defined speed" • "External fault" • "Alarm resetting" • "Dry running" • "Accumulated flow" • "Predefined setpoint 2" • "Activate output" • "Local motor stop"	• "Not active" • "Ready" • "Alarm" • "Operation" • "Pump running" • "Warning" • "Limit 1 exceeded" • "Limit 2 exceeded" • "Digital input 1, state" • "Digital input 2, state" • "Digital input 3, state" • "Digital input 4, state"

Possible functions, digital input or output 4

"Function if input" See details in section *"Digital inputs"* on page 66	"Function if output" See details in section *"Signal relays 1 and 2" ("Relay outputs")* on page 69
• "Not active" • "External stop" • "Min." • "Max." • "User-defined speed" • "External fault" • "Alarm resetting" • "Dry running" • "Accumulated flow" • "Predefined setpoint 3" • "Activate output" • "Local motor stop"	• "Not active" • "Ready" • "Alarm" • "Operation" • "Pump running" • "Warning" • "Limit 1 exceeded" • "Limit 2 exceeded" • "Digital input 1, state" • "Digital input 2, state" • "Digital input 3, state" • "Digital input 4, state"

Activation delay

Pump variant		Activation delay
TPE3, TPE3 D		-
TPE2, TPE 2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Select the activation delay, T1.

It is the time between the digital signal and the activation of the selected function.

Range: 0 to 6000 seconds.

Duration timer mode

Select the mode. See fig. 59.

- "Not active"
- active with interrupt, mode A
- active without interrupt, mode B
- active with after-run, mode C.

Select the duration time, T2.

It is the time which, together with the mode, determines how long the selected function is active.

Range: 0 to 15,000 seconds.

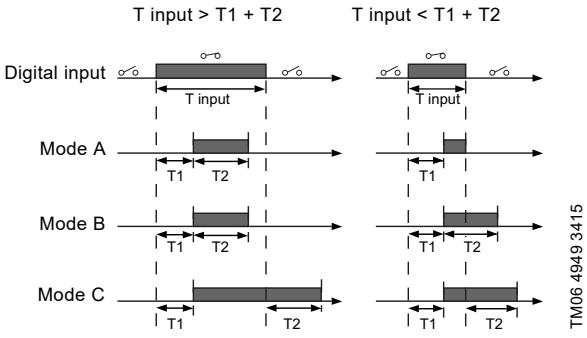


Fig. 59 Duration timer function of digital inputs

Factory setting

See section *12. Factory settings of E-pumps*.

"Signal relays 1 and 2" ("Relay outputs")

Pump variant		"Relay outputs"	
		Signal relay 1	Signal relay 2
TPE3, TPE3 D		•	•
TPE2, TPE2 D		•	•
TPE Series 1000	2.2 kW, 2-pole	•	•
	3 - 7.5 kW, 2-pole 3 - 7.5 kW, 4-pole	•	•
	11-22 kW, 2-pole 11-15 kW, 4-pole	•	•

Function	Terminals*
"Relay output 1"	NC, C1, NO
"Relay output 2"	NC, C2, NO

* See *Connection terminals, advanced functional module, FM 300* on page 109.

The pump incorporates two signal relays for potential-free signalling. For further information, see *Indicator lights and signal relays* on page 89.

Function

You can configure the signal relays to be activated by one of the following incidents:

- "Not active"
- "Ready"
  The pump can be running or is ready to run and no alarms are present.
- "Alarm"
  There is an active alarm and the pump is stopped.
- "Operating" ("Operation")
  "Operating" equals "Running" but the pump is still in operation when it has been stopped due to a warning.
- "Running" ("Pump running")
- "Warning"
  There is an active warning.
- "Limit 1 exceeded"*
  When the "Limit 1 exceeded" function is activated, the signal relay is activated. See *"Limit-exceeded function"* on page 75.
- "Limit 2 exceeded"*
  When the "Limit 2 exceeded" function is activated, the signal relay is activated. See *"Limit-exceeded function"* on page 75.
- "Relubricate"
- "External fan control" ("Control of external fan")
  When you select "External fan control", the relay is activated if the internal temperature of the motor electronics reach a preset limit value.

* This function is only available for TPE3, TPE2 and TPE Series 1000 pumps with motor sizes from 2.2 to 11 kW, 2-pole and 3 - 7.5 kW, 4-pole.

Factory setting

See section *12. Factory settings of E-pumps*.

"Analog output"

Pump variant		"Analog output"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

Function	Terminals*
"Analog output"	12

* See *Connection terminals, advanced functional module, FM 300* on page 109.

The analog output enables the transfer of certain operating data to external control systems.

To set the analog output, make the settings below.

"Output signal"

- "0-10 V"
- "0-20 mA"
- "4-20 mA".

"Function of analog output"

- "Actual speed"

Signal range [V, mA]	"Actual speed" [%]		
	0	100	200
"0-10 V"	0 V	5 V	10 V
"0-20 mA"	0 mA	10 mA	20 mA
"4-20 mA"	4 mA	12 mA	20 mA

The reading is a percentage of nominal speed.

- "Actual value"

Signal range [V, mA]	"Actual value"	
	$Sensor_{min}$	$Sensor_{max}$
"0-10 V"	0 V	10 V
"0-20 mA"	0 mA	20 mA
"4-20 mA"	4 mA	20 mA

The reading is a percentage of the range between $sensor_{min}$ and $sensor_{max}$.

- "Resulting setpoint"

Signal range [V, mA]	"Resulting setpoint" [%]	
	0	100
"0-10 V"	0 V	10 V
"0-20 mA"	0 mA	20 mA
"4-20 mA"	4 mA	20 mA

The reading is a percentage of the external setpoint range.

- "Motor load"

Signal range [V, mA]	"Motor load" [%]	
	0	100
"0-10 V"	0 V	10 V
"0-20 mA"	0 mA	20 mA
"4-20 mA"	4 mA	20 mA

The reading is a percentage of the range between 0 and 100 % of the maximum permissible load at the actual speed.

- "Motor current"

Signal range [V, mA]	"Motor current" [%]	
	0	100
0-10 V	0 V	10 V
0-20 mA	0 mA	20 mA
4-20 mA	4 mA	20 mA

The reading is a percentage of the range between 0 and 200 % of the rated current.

- "Limit 1 exceeded" and "Limit 2 exceeded"

Signal range [V, mA]	"Limit-exceed function"	
	Output not active	Output active
"0-10 V"	0 V	10 V
"0-20 mA"	0 mA	20 mA
"4-20 mA"	4 mA	20 mA

The "Limit-exceeded function" is typically used for monitoring of secondary parameters in the system. If the limit is exceeded, an output, warning or alarm is activated.

- "Flow rate"

Signal range [V, mA]	"Flow rate" [%]		
	0	100	200
"0-10 V"	0 V	5 V	10 V
"0-20 mA"	0 mA	10 mA	20 mA
"4-20 mA"	4 mA	12 mA	20 mA

The reading is a percentage of the range between 0 and 200 % of the nominal flow.

Factory setting

See section *12. Factory settings of E-pumps*.

"Controller" ("Controller settings")

Pump variant		Controller settings
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The pumps have a factory default setting of gain, K_p, and integral time, T_i.

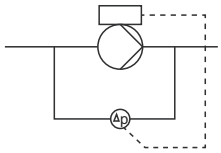
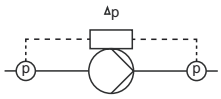
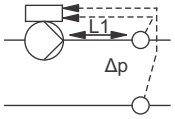
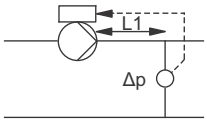
However, if the factory setting is not the optimum setting, you can change the gain and the integral time:

- Set the gain within the range from 0.1 to 20.
- Set the integral time within the range from 0.1 to 3600 s.
  If you select 3600 s, the controller functions as a P controller.

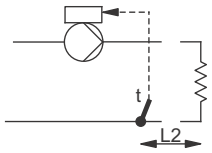
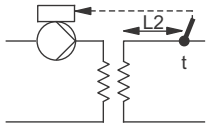
Furthermore, you can set the controller to inverse control. This means that if the setpoint is increased, the speed is reduced. In the case of inverse control, set the gain within the range from -0.1 to -20.

Guidelines for setting of PI controller

The tables below show the recommended controller settings:

Differential-pressure control	K_p	T_i
	0.5	0.5
		
	0.5	L1 < 5 m: **0.5** L1 > 5 m: 3 L1 > 10 m: 5
		

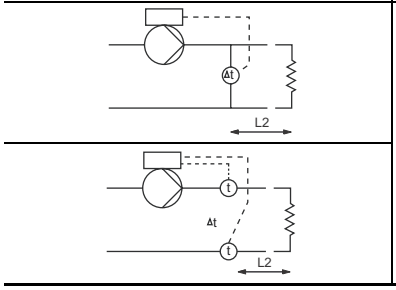
L1: Distance in metres between pump and sensor.

Temperature control	K_p		T_i
	Heating system[1]	Cooling system[2]	
	0.5	-0.5	10 + 5L2
	0.5	-0.5	30 + 5L2

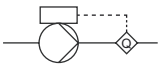
1) In heating systems, an increase in pump performance results in a rise in temperature at the sensor.

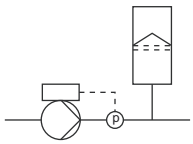
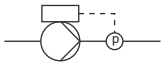
2) In cooling systems, an increase in pump performance results in a drop in temperature at the sensor.

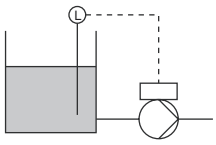
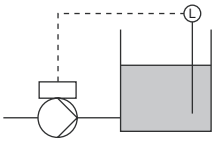
L2: Distance in metres between heat exchanger and sensor.

Differential-temperature control	K_p	T_i
	-0.5	10 + 5L2

L2: Distance in metres between heat exchanger and sensor.

Flow control	K_p	T_i
	0.5	0.5

Constant-pressure control	K_p	T_i
	0.5	0.5
	0.1	0.5

Level control	K_p	T_i
	-2.5	100
	2.5	100

Rules of thumb

If the controller is too slow-reacting, increase the gain.

If the controller is hunting or unstable, dampen the system by reducing the gain or increasing the integral time.

Factory setting

See section *12. Factory settings of E-pumps*.

"Operating range"

Pump variant		"Operating range"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

Set the operating range as follows:

- Set the minimum speed within the range from fixed minimum speed to user-set maximum speed.
- Set the maximum speed within the range from user-set minimum speed to fixed maximum speed.

The range between the user-set minimum and maximum speeds is the operating range.

Note: Speeds below 25 % may result in noise from the shaft seal.

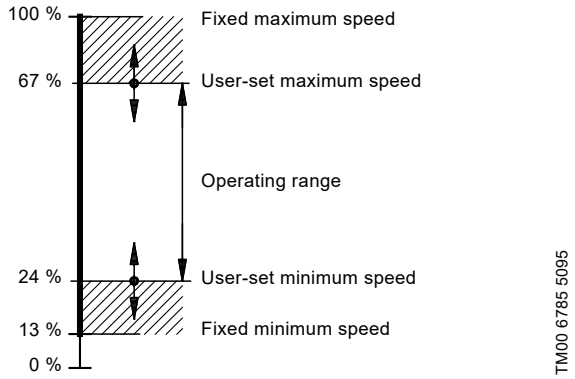


Fig. 60 Example of minimum and maximum settings

Factory setting

See section *12. Factory settings of E-pumps*.

"External setpoint influence"

Pump variant		"External setpoint influence"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

TPE2, TPE3 pumps and TPE Series 1000 2.2 - 11 kW, 2-pole and 3 - 7.5 kW, 4-pole pumps

You can influence the setpoint by an external signal, either via one of the analog inputs or, if an advanced functional module is fitted, via one of the Pt100/1000 inputs.

Note: Before you can enable the "External setpoint function", set one of the analog inputs or Pt100/1000 inputs to "Setpoint influence".

See *"Analog inputs"* on page 64 and *"Pt100/1000 inputs"* on page 66.

If more than one input has been set to "Setpoint influence", the function selects the analog input with the lowest number, for example "Analog input 2", and ignores the other inputs, for example "Analog input 3" or "Pt100/1000 input 1".

Motors from 15-22 kW, 2-pole and 11-15 kW, 4-pole

You can set the input for external setpoint signal to different signal types. Select one of the following types:

- "0-10 V"
- "0-20 mA"
- "4-20 mA"
- "Not active".

If you select one of the signal types, the actual setpoint is influenced by the signal connected to the external setpoint input.

Example with constant pressure with linear influence

Actual setpoint: actual input signal x (setpoint - sensor min.) + sensor min.

At a lower sensor value of 0 bar, a setpoint of 2 bar and an external setpoint of 60 %, the actual setpoint is 0.60 x (2 - 0) + 0 = 1.2 bar.

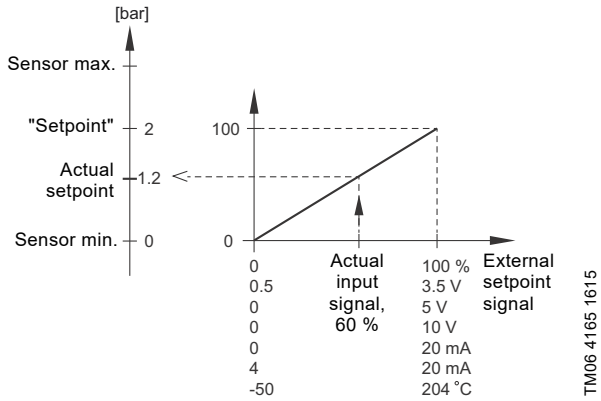


Fig. 61 Example of setpoint influence with sensor feedback

Example with constant curve with linear influence

Actual setpoint: actual input signal x (setpoint - user-set minimum speed) + user-set minimum speed.

At a user-set minimum speed of 25 %, a setpoint of 85 % and an external setpoint of 60 %, the actual setpoint is 0.60 x (85 - 25) + 25 = 61 %. See fig. 62.

In some cases, the maximum curve is limited to a lower speed. See fig. 62.

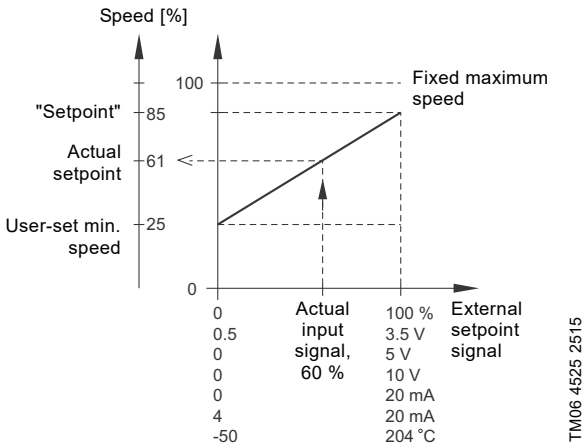


Fig. 62 Example of setpoint influence with constant curve

Factory setting

See section *12. Factory settings of E-pumps*.

"Setpoint influence"

Pump variant		"External setpoint influence"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

The table below gives an overview of the types of setpoint influence and the availability depending on pump type.

Type of setpoint influence	TPE3	TPE2	TPE Series 1000	
			2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	15-22 kW, 2-pole 11-15 kW, 4-pole
"Not active"	•	•	•	•
"Linear function"	•	•	•	•
"Linear with Stop"	•	•	•	-
"Influence table"	•	•	•	-

You can select these functions:

- "Not active"
  When set to "Not active", the setpoint is not influenced from any external function.
- "Linear function"
  The setpoint is influenced linearly from 0 to 100 %. See fig. 63.

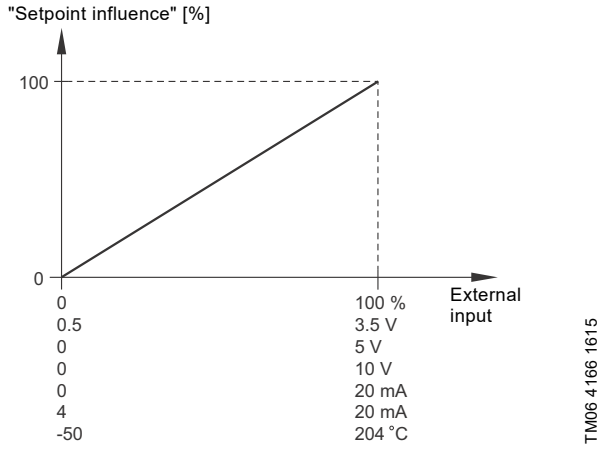


Fig. 63 "Linear function"

– "Linear with Stop"
  In the input signal range from 20 to 100 %, the setpoint is influenced linearly.
  If the input signal is below 10 %, the pump changes to operating mode "Stop".
  If the input signal is increased above 15 %, the operating mode is changed back to "Normal". See fig. 64.

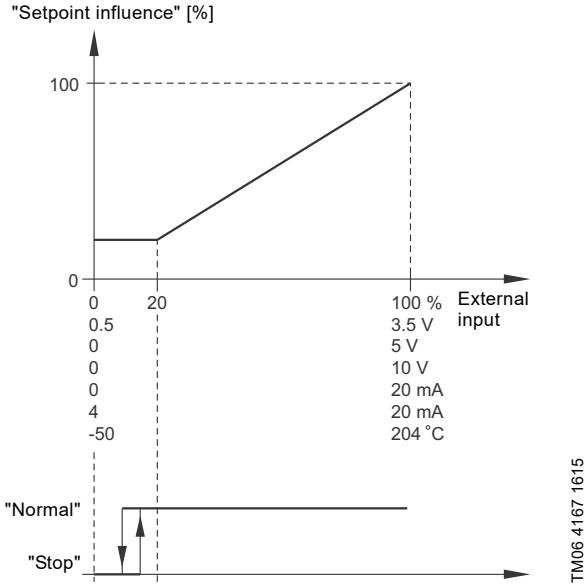


Fig. 64 "Linear with Stop"

- "Influence table"
  The setpoint is influenced by a curve made out of two to eight points. There will be a straight line between the points and a horizontal line before the first point and after the last point.

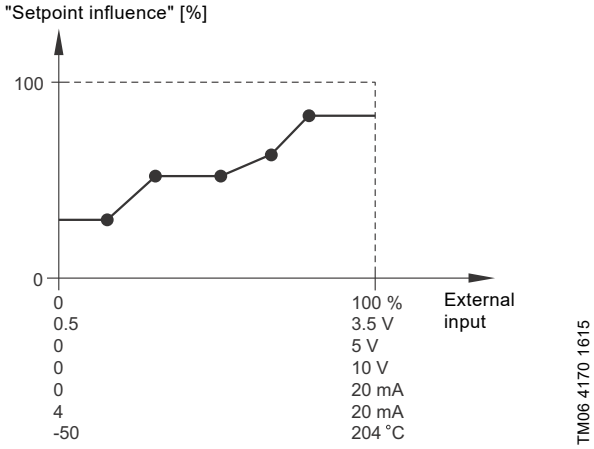


Fig. 65 "Influence table", example with five points

"Predefined setpoints"

Pump variant		"Predefined setpoints"
TPE3, TPE3 D		-
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

You can set and activate seven predefined setpoints by combining the input signals to digital inputs 2, 3 and 4 as shown in the table below.

Set the digital inputs 2, 3 and 4 to "Predefined setpoints" if all seven predefined setpoints are to be used. You can also set one or two of the digital inputs to "Predefined setpoints" but this will limit the number of predefined setpoints available.

"Digital inputs"			"Setpoint"
2	3	4	
0	0	0	Normal setpoint or stop
1	0	0	Predefined setpoint 1
0	1	0	Predefined setpoint 2
1	1	0	Predefined setpoint 3
0	0	1	Predefined setpoint 4
1	0	1	Predefined setpoint 5
0	1	1	Predefined setpoint 6
1	1	1	Predefined setpoint 7

0: Open contact
1: Closed contact

Example

Figure 66 shows how you can use the digital inputs to set seven predefined setpoints. Digital input 2 is open and digital inputs 3 and 4 are closed. If you compare with the table above, you can see that "Predefined setpoint 6" is activated.

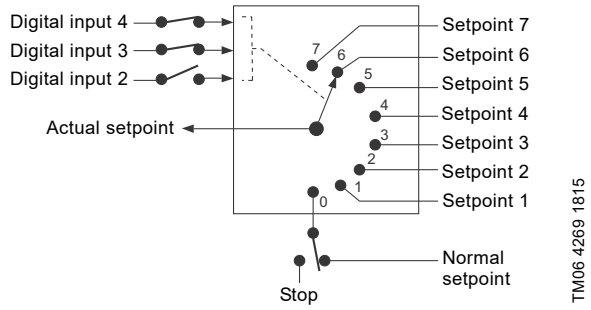


Fig. 66 Principle sketch showing how predefined setpoints function

If all digital inputs are open, the pump either stops or runs at the normal setpoint. Set the desired action with Grundfos GO or with the advanced control panel.

Factory setting

See section *12. Factory settings of E-pumps*.

"Temperature influence"

Pump variant		"Temperature influence"
TPE3, TPE3 D		•
TPE2, TPE2 D		-
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	-
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

When this function is enabled in proportional- or constant-pressure control mode, the setpoint for head is reduced according to the liquid temperature.

You can set the temperature influence to function at liquid temperatures below 80 or 50 °C. These temperature limits are called $T_{max.}$ The setpoint is reduced in relation to the head set which is equal to 100 % according to the characteristics below.

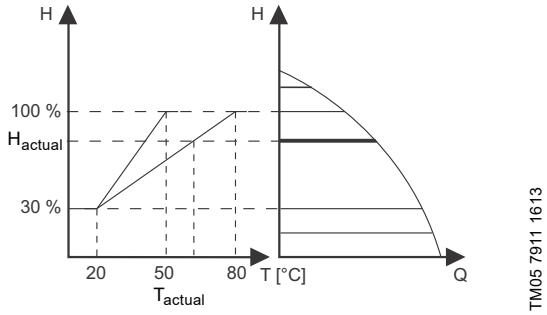


Fig. 67 Temperature influence

In the above example, $T_{max.}$ which is equal to 80 °C has been selected. The actual liquid temperature, T_{actual}, causes the setpoint for head to be reduced from 100 % to H_{actual}.

The temperature influence function requires the following:

- proportional-pressure or constant-pressure control mode
- pump installed in flow pipe
- system with flow-pipe temperature control.

Temperature influence is suitable for the following systems:

- Systems with variable flows, for example two-pipe heating systems, in which the enabling of the temperature influence function will ensure a further reduction of the pump performance in periods with small heating demands and consequently a reduced flow-pipe temperature.
- Systems with almost constant flows, for example one-pipe heating systems and underfloor heating systems, in which variable heating demands cannot be registered as changes in the head as it is the case with two-pipe heating systems. In such systems, you can only adjust the pump performance by enabling the temperature influence function.

Selection of the maximum temperature

In systems with a dimensioned flow-pipe temperature of:

- up to and including 55 °C, select $T_{max.}$ equal to 50 °C
- above 55 °C, select $T_{max.}$ equal to 80 °C.

Note: You cannot use the temperature function in air-conditioning and cooling systems.

Factory setting

See section *12. Factory settings of E-pumps*.

"Limit-exceeded function"

Pump variant		"Limit-exceeded function"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This function can monitor a measured parameter or one of the internal values such as speed, motor load or motor current. If a set limit is reached, a selected action can take place. You can set two limit-exceeded functions meaning that you can monitor two parameters or two limits of the same parameter simultaneously.

The function requires setting of the following:

Measured

Here you set the measured parameter to be monitored.

"Limit"

Here you set the limit which activates the function.

"Hysteresis band"

Here you set the hysteresis band.

"Limit exceeded when"

Here you can set if you want the function to be activated when the selected parameter exceeds or drops below the set limit.

- "Above limit"
  The function is activated if the measured parameter exceeds the set limit.
- "Below limit"
  The function is activated if the measured parameter drops below the set limit.

Action

If the value exceeds a limit, you can define an action. You can select the following actions:

- "No action"
  The pump remains in its current state. Use this setting if you only want to have a relay output when the limit is reached. See *"Signal relays 1 and 2" ("Relay outputs")* on page 69.
- "Warning/alarm"
  There is a warning.
- "Stop"
  The pump stops.
- "Min."
  The pump reduces speed to minimum.
- "Max."
  The pump increases speed to maximum.
- "User-defined speed"
  The pump runs at a speed set by the user.

"Detection delay"

You can set a detection delay which ensures that the monitored parameter stays above or below a set limit in a set time before the function is activated.

"Resetting delay"

The resetting delay is the time from which the measured parameter differs from the set limit including the set hysteresis band and until the function is reset.

Example

The function is to monitor the outlet pressure of a pump. If the pressure is below 5 bar for more than 5 seconds, a warning must be given. If the outlet pressure is above 7 bar for more than 8 seconds, you must reset the warning.

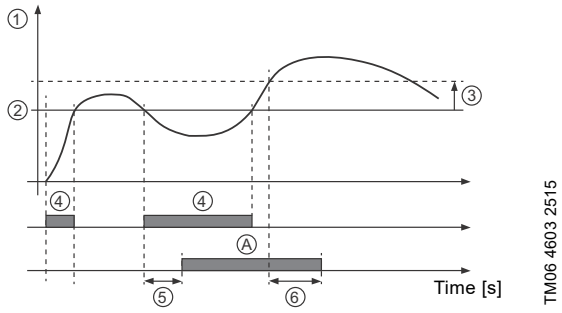


Fig. 68 Limit exceeded, example

Pos.	Setting parameter	Setting
1	Measured	Outlet pressure
2	"Limit"	5 bar
3	"Hysteresis band"	2 bar
4	"Limit exceeded when"	Below limit
5	"Detection delay"	5 seconds
6	"Resetting delay"	8 seconds
A	Limit-exceeded function active	-
-	Action	Warning

Factory setting

See section *12. Factory settings of E-pumps*.

Special functions

"Pulse flowmeter setup"

Pump variant		"Pulse flowmeter setup"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

You can connect an external pulse flowmeter to one of the digital inputs in order to register the actual and accumulated flows. Based on this, you can also calculate the specific energy.

To enable a pulse flowmeter, set one of the digital inputs to "Accumulated flow" and set the pumped volume per pulse. See *"Digital inputs"* on page 66.

"Ramps"

Pump variant		"Ramps"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The ramps determine how quickly the motor can accelerate and decelerate, during start-stop or setpoint changes.

You can set the following:

- acceleration time, 0.1 to 300 seconds
- deceleration time, 0.1 to 300 seconds.

The times apply to the acceleration from 0 rpm to fixed maximum speed and the deceleration from fixed maximum speed to 0 rpm.

At short deceleration times, the deceleration of the motor may depend on load and inertia as there is no possibility of actively braking the motor.

If the power supply is switched off, the deceleration of the motor only depends on load and inertia.

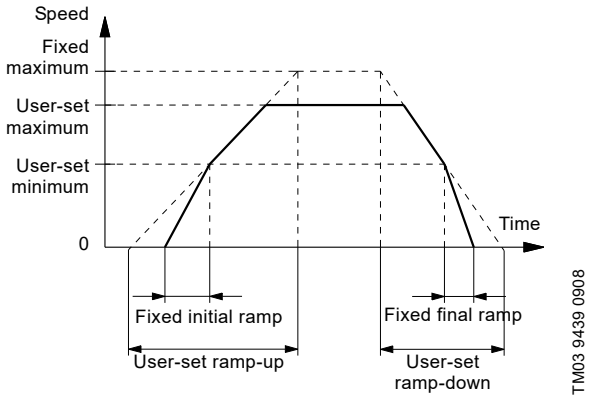


Fig. 69 Ramp-up and ramp-down

Factory setting

See section *12. Factory settings of E-pumps*.

"Standstill heating"

Pump variant		"Standstill heating"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

You can use this function to avoid condensation in humid environments. When you set the function to "Active" and the pump is in operating mode "Stop", a low AC voltage will be applied to the motor windings. The voltage is not high enough to make the motor rotate but ensures that sufficient heat is generated to avoid condensation in the motor including the electronic parts in the drive.

Note: Remember to remove the drain plugs and fit a cover over the motors.

Factory setting

See section *12. Factory settings of E-pumps*.

"Alarm handling"

Pump variant		"Alarm handling"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	0.12 - 11 kW, 2-pole 0.12 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The alarm handling determines how the pump must react in case of a sensor failure.

Input	Alarm handling
"Analog input 1"	**Warning**: no change of operation. **Stop**: an alarm is given, and the pump stops. **Min**: an alarm is given, and the pump reduces speed to minimum. **Max**: an alarm is given, and the pump increases speed to maximum. **User-defined speed**: an alarm is given, and the pump runs at a speed set by the user.
"Analog input 2"	
"Analog input 3"	
"Built-in Grundfos sensor"	
"Liqtec input"	

"Motor bearing monitoring"

Pump variant		"Motor bearing monitoring"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

You can set the motor bearing monitoring function to these values:

- "Active"
- "Not active"

When the function is set to "Active", a counter in the controller will start counting the mileage of the bearings.

The counter continues counting even if the function is changed to "Not active", but a warning is not given when it is time for replacement or relubrication.

When the function is changed to "Active again", the accumulated mileage is again used to calculate the replacement or relubrication time.

Factory setting

See section *12. Factory settings of E-pumps*.

"Service"

Pump variant		"Service"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

"Motor bearing monitoring" must be activated in order for the motor to indicate that bearings must be replaced or relubricated. See *"Motor bearing monitoring"* on page 76.

For motors of 7.5 kW and below, it is not possible to relubricate the bearings.

Bearings on motors of 11 kW and above can be relubricated.

"Time until next service" ("Motor bearing service")

This display shows when to replace or relubricate the motor bearings. The controller monitors the operating pattern of the motor and calculates the period between bearing replacements or relubrications.

Displayable values:

- "in 2 years"
- "in 1 year"
- "in 6 months"
- "in 3 months"
- "in 1 month"
- "in 1 week"
- "Now"

"Bearing replacements"

This display shows the number of bearing replacements that have been done during the lifetime of the motor.

"Bearings replaced" ("Motor bearing maintenance")

When the bearing monitoring function is active, the controller gives a warning when the motor bearings are to be replaced.

When you have replaced the motor bearings, confirm this action by pressing [Bearings replaced].

"Bearing relubrications"

The following applies only for 11 kW motors.

This display shows the number of bearing relubrications that have been done since the last bearing replacement.

"Bearings relubricated" ("Motor bearing maintenance")

The following applies only for 11 kW motors.

When the bearing monitoring function is active, the controller gives a warning when the motor bearings are due to be relubricated.

When you have relubricated the motor bearings, press [Bearings relubricated].

The factory-set interval between relubrications is stated on the bearing nameplate which is placed on the motor. The relubrication interval can be changed by a Grundfos service technician.

It is possible to relubricate the bearings five times according to the preset interval. When the preset interval has been reached after the fifth relubrication, a warning will be given to replace the bearings.

Communication

"Number" ("Pump number")

Pump variant		"Pump number"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

You can allocate a unique number to the pump. This makes it possible to distinguish between pumps in connection with bus communication.

Factory setting

See section *12. Factory settings of E-pumps*.

"Radio communication" ("Enable/disable radio comm.")

Pump variant		"Radio communication"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

You can set the radio communication to either enabled or disabled. You can use this function in areas where radio communication is not allowed.

IR communication remains active.

Factory setting

See section *12. Factory settings of E-pumps*.

General settings

"Language"

Pump variant		"Language"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

This menu is only available in the advanced control panel.

In this menu you can select the desired language. A number of languages is available.

"Date and time"

Pump variant		"Date and time"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

You can set date and time as well as how they are to be shown in the display:

- "Select date format"
  "YYYY-MM-DD"
  "DD-MM-YYYY"
  "MM-DD-YYYY"
- "Select time format":
  "HH:MM 24-hour clock"
  "HH:MM am/pm 12-hour clock".
- "Set date"
- "Set time"..

"Unit configuration" ("Units")

Pump variant		"Unit configuration"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

In this menu you can select between SI and US units. The setting can be made generally for all parameters or customised for each parameter.

Factory setting

See section *12. Factory settings of E-pumps*.

"Buttons on product" ("Enable/disable settings")

Pump variant		"Buttons on product"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

In this display, you can disable the possibility of making settings.

Grundfos GO

If you set the buttons to "Not active", the buttons on the standard control panel are disabled. If you set the buttons to "Not active" on pumps with an advanced control panel, see below.

Advanced control panel

If you have disabled the settings, you can still use the buttons to navigate through the menus but you cannot make changes in the "Settings" menu.

When you have disabled the possibility to make settings, the 🔒 symbol appears in the display.

To unlock the pump and allow settings, press ⌄ and ⌃ simultaneously for at least 5 seconds.

Standard control panel

The ⓒ button always remains active but you can only unlock all other buttons on the pump with Grundfos GO.

"Delete history"

Pump variant		"Delete history"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

In this menu, you can delete the following historic data:

- "Delete work log."
- "Delete heat energy data".
- "Delete energy consumption".

"Define Home display"

Pump variant		"Define Home display"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

In this menu, you can set the "Home" display to show up to four user-set parameters.

"Display settings"

Pump variant		"Display settings"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

In this menu you can adjust the display brightness and set whether or not the display is to turn off if no buttons have been activated for a period of time.

"Store settings" ("Store actual settings")

Pump variant		"Store settings"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

Grundfos GO

In this menu, you can store the actual settings for later use in the same pump or in other pumps of the same type.

Advanced control panel

In this menu, you can store the actual settings for later use in the same pump.

"Recall settings" ("Recall stored settings")

Pump variant		"Recall settings"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

Grundfos GO

In this menu, you can recall stored settings from a number of previously stored settings that the pump then uses.

Advanced control panel

In this menu, you can recall the last stored settings that the pump then uses.

"Undo"

Pump variant		"Undo"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	•

This menu is only available in Grundfos GO.

In this display, you can undo all settings that have been made with Grundfos GO in the current communication session. You cannot undo a "Recall stored settings" action.

"Pump name"

Pump variant		"Pump name"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in Grundfos GO.

In this display, you can give the pump a name. In this way, you can easily identify the pump when connecting with Grundfos GO.

Factory setting

See section *12. Factory settings of E-pumps*.

"Connection code"

Pump variant		"Connection code"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in Grundfos GO.

You can set a connection code to avoid having to press the connection button each time and to restrict remote access to the product.

Setting the code in the product using Grundfos GO

1. Connect Grundfos GO to the product.
2. In the product dashboard, select "Settings".
3. Choose "Connection code".
4. Enter the wanted code and press [OK].
   The code must be a character string, ASCII. You can always modify the code. The old code is not needed.

Setting the code in Grundfos GO

You can set a default connection code in Grundfos GO so that it automatically attempts to connect to the selected product via this code.

When you select a product with the same connection code in Grundfos GO, Grundfos GO automatically connects to the product and you do not have to press the connection button on the module.

Set the default code in Grundfos GO in this way:

1. In the main menu, under "General", select "Settings".
2. Choose "Remote".
3. Enter the connection code in the field "Preset connection code". The field now says "Connection code set".

You can always modify the default connection code by pressing [Delete] and entering a new one.

If Grundfos GO fails to connect and ask you to press the connection button on the product, it means that the product has no connection code or has a different connection code. In this case, you can only establish connection via the connection button.

After setting a connection code, you must switch off the product until the light in Grundfos Eye turns off before you can use the new connection code.

Factory setting

See section *12. Factory settings of E-pumps*.

"Run start-up guide"

Pump variant		"Run start-up guide"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

The startup guide automatically starts when you start the pump for the first time.

You can always run the startup guide later via this menu.

The startup guide guides you through the general settings of the pump.

- "Language". See *"Language"* on page 78.
- "Select date format".*
  See *"Date and time"* on page 78.
- "Set date".*
  See *"Date and time"* on page 78.
- "Select time format".*
  See *"Date and time"* on page 78.
- "Set time".*
  See *"Date and time"* on page 78.
- "Setting of pump"
  - "Go to Home"
  - "Run with Constant curve"/"Run with Constant pressure".
    See *"Control mode"* on page 56
  - "Go to Assisted pump setup".
    See *"Assisted pump setup"* on page 82.
  - "Return to factory settings".

* Applies only for pumps with advanced functional module, FM 300. For further information, see *Identification of functional module* on page 114.

"Alarm log"

Pump variant		"Alarm log"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu contains a list of logged alarms from the product. The log shows the name of the alarm, when the alarm occurred and when it was reset.

"Warning log"

Pump variant		"Warning log"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu contains a list of logged warnings from the product. The log shows the name of the warning, when the warning occurred and when it was reset.

"Assist"

Pump variant		"Assist"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The menu consist of functions which take you through the steps needed to set the pump.

"Assisted pump setup"

Pump variant		"Assisted pump setup"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The menu guides you through the following:

Setting of pump

- Selection of control mode. See page 56.
- Configuration of feedback sensors.
- Adjusting the setpoint. See page 55.
- Controller settings. See page 70.
- Summary of settings.

Example of how to use the "Assisted pump setup" for setting up the pump to constant pressure:

Grundfos GO

1. Open the "Assist" menu.
2. Select "Assisted pump setup".
3. Select the control mode "Constant pressure".
4. Read the description of this control mode.
5. Select which analog input to use as sensor input.
6. Select sensor function according to where the sensor is installed in the system. See fig. 55.
7. Select electrical input signal according to the sensor specifications.
8. Select measuring unit according to the sensor specifications.
9. Set the minimum and maximum sensor values according to the sensor specifications.
10. Set the desired setpoint.
11. Set the controller settings K_p and T_i. See the recommendations in section *"Controller" ("Controller settings")* on page 70.
12. Type the pump name.
13. Check the summary of settings and confirm them.

Advanced control panel

1. Open the "Assist" menu.
2. Select "Assisted pump setup".
3. Select the control mode "Const. pressure".
4. Select which analog input to be used as sensor input.
5. Select the measured parameter to be controlled. See fig. 55.
6. Select measuring unit according to the sensor specifications.
7. Set the minimum and maximum sensor values according to the sensor specifications.
8. Select electrical input signal according to the sensor specifications.
9. Set the setpoint.
10. Set the controller settings K_p and T_i. See recommendations in section *"Controller" ("Controller settings")* on page 70.
11. Check the summary of settings and confirm them by pressing [OK].

"Setup, analog input"

Pump variant		"Setup, analog input"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

The menu guides you through the following:

"Setup, analog input"

- Analog inputs 1 to 3. See page 64.
- Pt100/1000 input 1 and 2. See page 66.
- Adjusting the setpoint. See page 55.
- Summary.

"Setting of date and time"

Pump variant		"Setting of date and time"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu guides you through the following:

- "Select date format". See *"Date and time"* on page 78.
- "Set date". See *"Date and time"* on page 78.
- "Select time format". See *"Date and time"* on page 78.
- "Set time". See *"Date and time"* on page 78.

"Multipump setup" ("Setup of multi-pump system")

Pump variant		"Multipump setup"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

The multipump function enables the control of two pumps connected in parallel without the use of external controllers. The pumps in a multipump system communicate with each other via the wireless GENIair connection or the wired GENI connection.

A multipump system is set via a selected pump, such as the master pump which is the first selected pump.

If two pumps in the system are configured with an outlet-pressure sensor, both pumps can function as master pumps and take over the master pump function if the other fails. This provides additional redundancy in the multipump system.

The multipump functions are described in the following sections.

Alternating operation

Alternating operation functions as a duty-standby operating mode and is possible with two pumps of same size and type connected in parallel. The main purpose of the function is to ensure an even amount of running hours and to ensure that the standby pump takes over if the running pump stops due to an alarm.

Each pump requires a non-return valve in series with the pump.

You can choose between two alternating operation modes:

- Alternating operation, time
  Pump changeover to the other is based on time.
- Alternating operation, energy
  Pump changeover to the other is based on energy consumption.

If the duty pump fails, the other pump takes over automatically.

Backup operation

Backup operation is possible with two pumps of same size and type connected in parallel. Each pump requires a non-return valve in series with the pump.

One pump is operating continuously. The backup pump is operated for a short time each day to prevent seizing up. If the duty pump stops due to a fault, the backup pump starts automatically.

Cascade operation

Cascade operation ensures that the pump performance is automatically adapted to the consumption by switching pumps on or off. The system thus runs as energy-efficiently as possible with a constant value depending on control mode and a limited number of pumps.

When two pumps are running, for example in constant pressure control mode, the second pump head starts at 97.5 % speed and stops at 40 % speed.

All pumps in operation run at equal speed. Pump changeover is automatic and depends on operating hours and fault.

Pump systems:

- Twin-head pump (only TPE2 D or TPE3 D)
- Up to four single-head pumps connected in parallel.

The following control modes can be selected:

- Constant pressure
- Constant differential pressure
- Constant proportional pressure (not TPE2 D, TPE3 D, TPE/TPED Series 1000)
- Constant temperature
- Constant differential temperature
- Constant flow (not TPE2 D or TPE3 D)
- Constant level
- Constant curve, in constant curve all pumps will run at the same time.

This function is available with up to 4 motors installed in parallel. The motors must be of the same size and the pumps must be of the same model.

Each single pump requires a non-return valve in series with the pump

- The performance is adjusted to the demand through cutting pumps in or out and through parallel control of the pumps in operation.
- The controller maintains a constant pressure through continuous adjustment of the speed of the pumps.
- Pump changeover is automatic and depends on load, operating hours and fault detection.
- All pumps in operation run at the same speed.
- The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will run at a lower speed if this results in a lower energy consumption.
- If several motors in the system have a sensor, they can all function as master and take over the master function if the other fails.

"Sensor to be used"

Define the sensor to be used for controlling the pump system. If a sensor is placed in a way that it is able to measure the sensor output from all pumps in the system, for example, in the manifold, then select "Master pump sensor".

If a sensor is placed on, or across the individual pumps, for example, installed behind non-return valves and not able to measure the sensor output from all pumps, then select "Running pump sensor".

Setting a multipump system

You can set a multipump system in the following ways:

- *Grundfos GO and wireless pump connection*
- *Grundfos GO and wired pump connection*
- *Advanced control panel and wireless pump connection*
- *Advanced control panel and wired pump connection*.

See step-by-step descriptions below.

Grundfos GO and wireless pump connection

1. Power on both pumps.
2. Establish contact to one of the pumps with Grundfos GO.
3. Set the needed analog and digital inputs via Grundfos GO according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
4. Assign a pump name to the pump using Grundfos GO. See *"Pump name"* on page 80.
5. Disconnect Grundfos GO from the pump.
6. Establish contact to the other pump.
7. Set the needed analog and digital inputs via Grundfos GO according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
8. Assign a pump name to the pump using Grundfos GO. See *"Pump name"* on page 80.
9. Select the "Assist" menu and "Multipump setup".
10. Select the desired multipump function. See *Alternating operation* on page 83, *Backup operation* on page 83 and *Cascade operation* on page 84.
11. Press [>] to continue.
12. Set the time for pump changeover such as the time at which the alternation between the two pumps is to take place. This step applies only if you have selected "Alternating operation, time" and if the pumps are fitted with FM 300.
13. Press [>] to continue.
14. Select "Radio" as the communication method to be used between the two pumps.
15. Press [>] to continue.
16. Press "Select pump 2".
17. Select the pump from the list.
    Use the [OK] or button to identify the pump.
18. Press [>] to continue.
19. Confirm the multipump setup by pressing [Send].
20. Press [Finish] in the "Setup complete" dialog box.
21. Wait for the green indicator light in the middle of Grundfos Eye to light up.

The multipump system has now been set.

Grundfos GO and wired pump connection

1. Connect the two pumps with each other with a 3-core screened cable between the GENIbus terminals A, Y, B.
2. Power on both pumps.
3. Establish contact to one of the pumps with Grundfos GO.
4. Set the needed analog and digital inputs via Grundfos GO according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
5. Assign a pump name to the pump using Grundfos GO. See *"Pump name"* on page 80.
6. Assign pump number 1 to the pump. See *"Number" ("Pump number")* on page 78.
7. Disconnect Grundfos GO from the pump.
8. Establish contact to the other pump.
9. Set the needed analog and digital inputs via Grundfos GO according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
10. Assign a pump name to the pump using Grundfos GO. See *"Pump name"* on page 80.
11. Assign pump number 2 to the pump. See *"Number" ("Pump number")* on page 78.
12. Select the "Assist" menu and choose "Multipump setup".
13. Select the desired multipump function. See *Alternating operation* on page 83, *Backup operation* on page 83 and *Cascade operation* on page 84.
14. Press [>] to continue.
15. Set the time for pump changeover such as the time at which the alternation between the two pumps is to take place. This step applies only if you have selected "Alternating operation, time" and if the pumps are fitted with FM 300.
16. Press [>] to continue.
17. Select "BUS cable" as the communication method to be used between the two pumps.
18. Press [>] to continue.
19. Press "Select pump 2".
20. Select the additional pump from the list.
    Use the [OK] or button to identify the additional pump.
21. Press [>] to continue.
22. Press [Send].
23. Press [Finish] in the "Setup complete" dialog box.
24. Wait for the green indicator light in the middle of Grundfos Eye to light up.

The multipump system has now been set.

Advanced control panel and wireless pump connection

1. Power on both pumps.
2. On both pumps, set the needed analog and digital inputs according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
3. Select the "Assist" menu on one of the pumps and choose "Setup of multi-pump system".
4. Press [>] to continue.
5. Select "Wireless" as the communication method to be used between the two pumps.
6. Press [>] to continue.
7. Select the desired multipump function. See *Alternating operation* on page 83, *Backup operation* on page 83 and *Cascade operation* on page 84.
8. Press [>] three times to continue.
9. Press [OK] to search for other pumps.
   The green indicator light in the middle of Grundfos Eye flashes on the other pumps.
10. Press the connect button on the pump which is to be added to the multipump system.
11. Press [>] to continue.
12. Set the time for pump changeover such as the time at which the alternation between the two pumps is to take place. This step applies only if you have selected "Alternating operation, time" and if the pumps are fitted with FM 300.
13. Press [>] to continue.
14. Press [OK].
    The multipump function icons appear in the bottom of the control panels.

The multipump system has now been set.

Advanced control panel and wired pump connection

1. Connect the two pumps with each other with a 3-core screened cable between the GENIbus terminals A, Y, B.
2. Set the needed analog and digital inputs according to the connected equipment and the required functionality. See *"Assisted pump setup"* on page 82.
3. Assign pump number 1 to the first pump. See *"Number" ("Pump number")* on page 78.
4. Assign pump number 2 to the other pump. See *"Number" ("Pump number")* on page 78.
5. Select the "Assist" menu on one of the pumps and choose "Setup of multi-pump system".
6. Press [>] to continue.
7. Select Wired GENIbus as the communication method to be used between the two pumps.
8. Press [>] twice to continue.
9. Select the desired multipump function. See *Alternating operation* on page 83, *Backup operation* on page 83 and *Cascade operation* on page 84.
10. Press [>] to continue.
11. Press [OK] to search for other pumps.
12. Select the additional pump from the list.
13. Press [>] to continue.
14. Set the time for pump changeover such as the time at which the alternation between the two pumps is to take place.
    This step applies only if you have selected "Alternating operation, time" and if the pumps are fitted with FM 300.
15. Press [>] to continue.
16. Press [OK].
    The multipump function icons appear in the bottom of the control panels.

The multipump system has now been set.

Disabling the multipump function via Grundfos GO

1. Select the "Assist" menu.
2. Select "Multipump setup".
3. Select "Disable".
4. Press [>] to continue.
5. Confirm the multipump setup by pressing [Send].
6. Press [Finish].

The multipump function has now been disabled.

Disabling a multipump via advanced control panel

1. Select the "Assist" menu.
2. Select "Setup of multi-pump system".
3. Press [>] to continue.
4. Confirm No multi-pump function by pressing [OK].
5. Press [>] to continue.
6. Press [OK].

The multipump system has now been disabled.

"Description of control mode"

Pump variant		"Description of control mode"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu is only available in the advanced control panel.

This menu describes each of the possible control modes. See also section *"Control mode"* on page 56.

"Assisted fault advice"

Pump variant		"Assisted fault advice"
TPE3, TPE3 D		•
TPE2, TPE2 D		•
TPE Series 1000	2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	•
	15-22 kW, 2-pole 11-15 kW, 4-pole	-

This menu gives guidance and corrective actions in case of pump failures.

Priority of settings

You can always set the pump to stop by pressing on the pump control panel. When the pump is not in "Stop" mode, you can always stop the pump by continuously pressing . Furthermore, you can set the pump to maximum speed by continuously pressing . You can always set the pump to operation at maximum speed or to stop with Grundfos GO.

If two or more functions are enabled at the same time, the pump will operate according to the function with the highest priority.

Example

If you have set the pump to maximum speed via the digital input, the pump control panel or Grundfos GO can only set the pump to "Manual" or "Stop".

The priority of the settings appears from the table below.

Priority	Start-stop button	Grundfos GO or control panel on the motor	Digital input	Bus communication
1	"Stop"			
2		"Stop"*		
3		"Manual"		
4		"Max. speed"*/"User-defined speed"		
5			"Stop"	
6			"User-defined speed"	
7				"Stop"
8				"Max. speed"
9				"Min. speed"
10				"Start"
11			"Max. speed"	
12		"Min. speed"		
13			"Min. speed"	
14			"Start"	
15		"Start"		

* "Stop" and "Max. speed" settings made with Grundfos GO or on the motor control panel can be overruled by another operating-mode command sent from a bus, for example "Start". If the bus communication is interrupted, the motor resumes its previous operating mode, for example "Stop", selected with Grundfos GO or on the motor control panel.

Grundfos Eye

The operating condition of the motor is indicated by Grundfos Eye on the control panel. See fig. 70 (A).

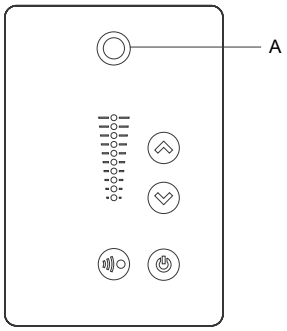


Fig. 70 Grundfos Eye

Grundfos Eye	Indication	Description
	No lights are on.	The power is off. The pump is not running.
	The two opposite green indicator lights are rotating in the direction of rotation of the pump when seen from the non-drive end.	The power is on. The pump is running.
	The two opposite green indicator lights are permanently on.	The power is on. The pump is not running.
	One yellow indicator light is rotating in the direction of rotation of the pump when seen from the non-drive end.	Warning. The pump is running.
	One yellow indicator light is permanently on.	Warning. The pump has stopped.
	The two opposite red indicator lights flash simultaneously.	Alarm. The pump has stopped.
	The green indicator light in the middle flashes quickly four times. 	This is a feedback signal which the pump gives in order to ensure identification of itself.
	The green indicator light in the middle flashes continuously. 	Grundfos GO or another pump is trying to communicate with the pump. Press on the pump control panel to allow communication.
	The green indicator light in the middle is permanently on. 	Remote control with Grundfos GO via radio. The pump is communicating with Grundfos GO via radio connection.
	The green indicator light in the middle flashes quickly while Grundfos Go is exchanging data with the pump. It takes a few seconds. 	Remote control with Grundfos GO via infrared light. The pump is receiving data from Grundfos GO via infrared communication.

Indicator lights and signal relays

The following applies to the pumps below:

- TPE3, TPE3 D pumps
- TPE2, TPE2 D pumps
- TPE Series 1000 pumps with the following motor sizes:
  2.2 - 11 kW, 2-pole
  3 - 7.5 kW, 4-pole.

The pump has two outputs for potential-free signals via two internal relays.

You can set the signal outputs to "Operation", "Pump running", "Ready", "Alarm" and "Warning".

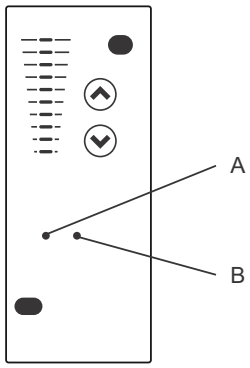
The functions of the two signal relays appear from the table below:

Description	Grundfos Eye	Contact position for signal relays when activated					"Operating mode"
		"Operation"	"Pump running"	"Ready"	"Alarm"	"Warning"	
The power is off.	 Off						-
The pump runs in "Normal" mode.	 Green, rotating						"Normal", "Min." or "Max."
The pump runs in "Manual" mode.	 Green, rotating						"Manual"
The pump is in operating mode "Stop".	 Green, steady						"Stop"
Warning, but the pump runs.	 Yellow, rotating						"Normal", "Min." or "Max."
Warning, but the pump runs in "Manual" mode.	 Yellow, rotating						"Manual"
Warning, but the pump was stopped via "Stop" command.	 Yellow, steady						"Stop"
Alarm, but the pump runs.	 Red, rotating						"Normal," "Min." or "Max."
Alarm, but the pump runs in "Manual" mode.	 Red, rotating						"Manual"
The pump has stopped due to an alarm.	 Red, flashing						"Stop"

The following applies to the pumps below:

- TPE Series 1000 pumps with the following motor sizes:
  3-22 kW, 2-pole
  3-15 kW, 4-pole.

The operating condition of the pump is indicated by the green (A) and red (B) indicator lights on the pump control panel and inside the terminal box. See fig. 71.

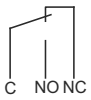
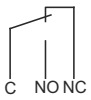
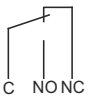
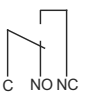
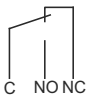
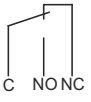
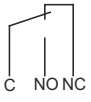
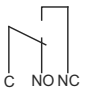
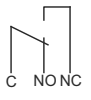
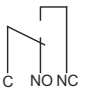
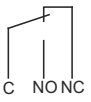
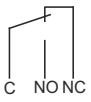


TM06 7513 3616

Fig. 71 Position of indicator lights

Furthermore, the pump incorporates an output for a potential-free signal via an internal relay.

The functions of the two indicator lights and the signal relay are as shown in the following table:

Indicator lights		Signal relay activated during:				
Fault red	**Operation green**	**"Fault"/"Alarm", "Warning" and "Relubricate"**	**"Operating"**	**"Ready"**	**"Pump running"**	**Description**
Off	Off					The power supply has been switched off.
Off	Permanently on					The pump runs.
Off	Flashing					The pump has been set to stop.
Permanently on	Off					The pump has stopped because of a "Fault" or "Alarm". Or the pump runs with a "Warning" or "Relubricate" indication. If the pump was stopped, restarting will be attempted. It may be necessary to restart the pump by resetting the "Fault" indication.
Permanently on	Permanently on					The pump runs, but it has or has had a "Fault" or "Alarm" allowing the pump to continue operation. Or the pump runs with a "Warning" or "Relubricate" indication. If the cause is "Sensor signal outside signal range", the pump continues to run according to the maximum curve, and you cannot reset the fault indication until the signal is inside the signal range. If the cause is "Setpoint signal outside signal range", the pump continues to run according to the minimum curve, and you cannot reset the fault indication until the signal is inside the signal range.
Permanently on	Flashing					The pump has been set to stop, but it has been stopped because of a "Fault".

Resetting of fault indication

You can reset a fault indication in one of the following ways:

- Briefly press ⊙ or ⊙ on the pump. This will not change the setting of the pump.
  You cannot reset a fault indication by pressing ⊙ or ⊙ if the buttons have been locked.
- Switch off the power supply until the indicator lights are off.
- Switch the external start-stop input off and then on again.
- Use Grundfos GO.

12. Factory settings of E-pumps

- • Function is enabled.
- ❍ Function is disabled.
- - Function is not available.

Settings	TPE3, TPE3 D	TPE2, TPE2 D	TPE Series 1000 2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	TPE Series 1000 15-22 kW, 2-pole 11-15 kW, 4-pole	Comments	Function description
"Setpoint"	Auto	67 %	67 %	67 %		Page 55
"Operating mode"	Normal	Normal	Normal	Normal		Page 56
"Control mode"	AutoAdapt	Constant curve	Constant curve	Constant curve		Page 56
"Date and time"	•	•	•	-		Page 78
"Flow limit"	❍	-	-	-		Page 63
"Automatic night setback"	❍	-	-	-		Page 64
"Temperature influence"	❍	-	-	-		Page 74
"Buttons on product"	•	•	•	•		Page 79
"Controller"						
"Kp"	1.0	0.5	0.5	0.5		Page 70
"Ti"	8.0	0.5	0.5	0.5		
"Operating range"						
"Min."	25 %	25 %	25 %	25 %		Page 71
"Max."	100 %	100 %	110 %	110 %		
"Ramps"	-	❍	❍	-		Page 76
"Pump number"	1	1	1	1		Page 78
"Radio communication"	•	•	•	-		Page 78
"Sensor type"	-	-	-	❍		Page 64
"Analog input 1"	❍	❍	❍	-		Page 64
"Analog input 2"	❍	❍	❍	-		
"Analog input 3"	❍	❍	❍	-		
"Built-in Grundfos sensor"	•	-	-	-		Page 65
"Pt100/1000 input 1"	❍	❍	❍	-		Page 66
"Pt100/1000 input 2"	❍	❍	❍	-		
"Digital input 1"	❍	❍	❍	-		Page 66
"Digital input 2"	❍	❍	❍	❍		
"Digital in/output 3"	❍	❍	❍	-		Page 68
"Digital in/output 4"	❍	❍	❍	-		
"Pulse flowmeter"	❍	❍	❍	-		Page 76
"Predefined setpoint"	❍	❍	❍	-		Page 74
"Analog output"[1)]	❍	❍	❍	-		Page 69
"External setpoint funct."	❍	❍	❍	❍		Page 72
"Signal relay 1"	❍	❍	❍	Alarm		Page 69
"Signal relay 2"	❍	❍	❍	Operation		
"Limit 1 exceeded"	❍	❍	❍	-		Page 75
"Limit 2 exceeded"	❍	❍	❍	-		
"Standstill heating"	❍	❍	❍	❍		Page 76
"Motor bearing monitoring"	❍	❍	❍	❍		Page 76
"Pump name"	Grundfos	Grundfos	Grundfos	-		Page 80
"Connect code"	-	-	-	-		Page 80
"Unit configuration"	SI units	SI units	SI units	SI units		Page 78

Multipump factory setting for twin-pumps: Alternating operation on time.

13. Communication

Communication with TPE2, TPE2 D, TPE3, TPE3 D and TPE pumps

Communication with TPE2, TPE2 D, TPE3, TPE3 D and TPE pumps is possible via a central building management system, remote control, Grundfos GO or control panel.

Central building management system

The operator can communicate with a TPE2, TPE2 D, TPE3, TPE3 D and TPE pump at a distance. Communication can take place via a central building management system allowing the operator to monitor and change control modes and setpoint settings.

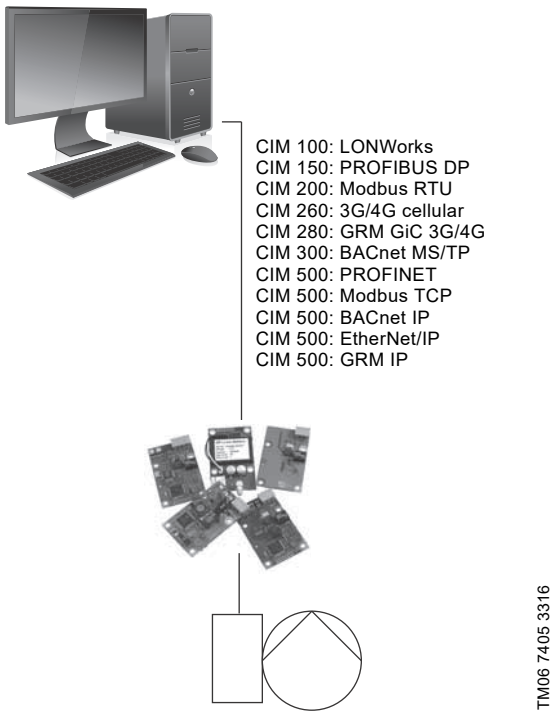


Fig. 72 Structure of a central building management system

Remote control

The operator can monitor and change control modes and settings of the pump with Grundfos GO. See *Grundfos GO* on page 51.

14. Speed regulation of TPE, TPE2, TPE2 D, TPE3, TPE3 D pumps

Affinity equations

Normally, the pumps are used in applications characterised by a variable flow. Consequently, you cannot to select a pump that is constantly operating at its optimum efficiency.

In order to achieve optimum operating economy, the duty pump must be close to the optimum efficiency, eta, for most operating hours.

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

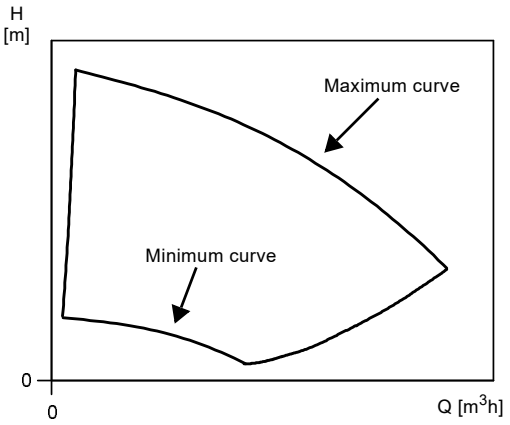


Fig. 73 Minimum and maximum performance curves

In situations where you can select a duty point close to the maximum curve, use the affinity equations below. The head, H, the flow rate, Q and the input power, P, are the appropriate variables you need for calculating the motor speed, n.

Note: The approximated formulas apply on condition that the system characteristic remains unchanged for the rated motor speed and the current motor speed, and that it is based on the following formula: H is equal to k x 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 also be taken into account if you want a precise calculation of the power saving resulting from a reduction of the pump speed.

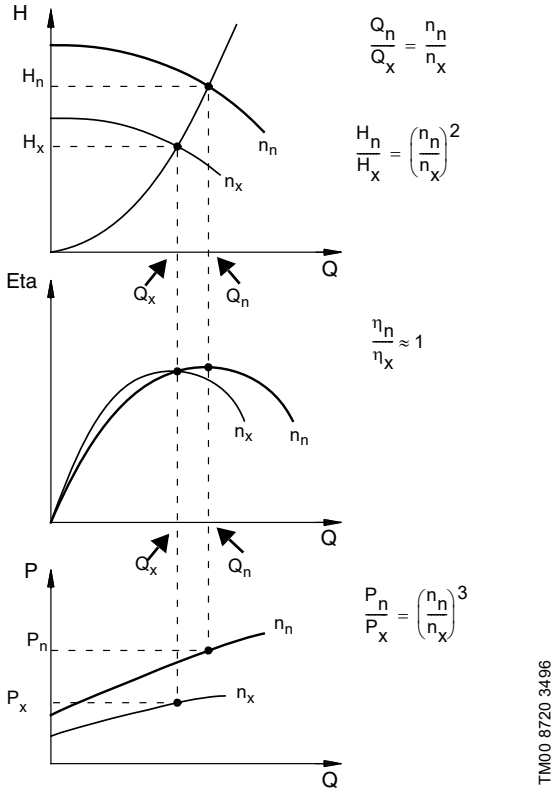


Fig. 74 Affinity equations

Legend

H_n	Rated head in metres
H_x	Current head in metres
Q_n	Rated flow rate in m^3/h
Q_x	Current flow rate in m^3/h
n_n	Rated motor speed in min^{-1}
n_x	Current motor speed in min^{-1}
ηn	Rated efficiency in %
η_x	Current efficiency in %
P_n	Rated power in kW
P_x	Current power in kW

Grundfos Product Center

Grundfos Product Center can help you select the right pump according to your requirements. See page 213.

15. Control of pumps in parallel

In some applications, parallel pump operation is required for one or more of the following reasons:

- One pump cannot achieve the required performance, flow rate.
- Standby performance is required to ensure reliability of supply.
- Overall efficiency needs to be improved in case of big variations in the flow demand.

The table below lists the different possibilities of controlling pumps connected in parallel.

Parallel-operation control possibilities	TP	TPE2	TPE2 D	TPE3	TPE3 D	TPE Series 1000	
						2.2 - 11 kW, 2-pole 3 - 7.5 kW, 4-pole	15-22 kW, 2-pole 11-15 kW, 4-pole
Built-in alternation/standby function		•	•	•	•	•	❍
Built-in parallel operation function		•	•	•	•	•	
Control MPC 	•	•				•	•
Control MPC Series 2000 				•			

• Available.
❍ Available on request.

Alternation/standby function

The alternation/standby function is activated from factory and "Alternating" mode is selected as default.

Pumps connected to Control MPC

You can connect TP, TPE, TPE2, TPE3 pumps directly to Grundfos Control MPC.

Control MPC incorporates a CU 352 control unit that can control up to six pumps.

By means of an external sensor, Control MPC can ensure optimum adaptation of the performance to the demand by closed-loop control of these parameters:

- proportional differential pressure
- constant differential pressure
- differential pressure (remote)
- flow rate
- temperature.

The CU 352 incorporates features such as those below:

Startup wizard

Correct installation and commissioning is a prerequisite for attaining optimum performance of the system and trouble-free operation year in and year out.

During commissioning of the system, a startup wizard is shown on the display of CU 352. The wizard guides the operator through the various steps via a series of dialogue boxes to ensure that all settings are done in the correct sequence.

Application-optimised software

The CU 352 incorporates application-optimised software which helps you set your system to the application in question.

Furthermore, navigating through the menus of the control unit is done in a user-friendly way. You do not need any training to be able to set and monitor the system.

Ethernet connection

The CU 352 incorporates an ethernet connection which makes it possible to get full and unlimited access to the setting and monitoring of the system via a remote PC.

Service port, GENI TTL

The service port of the CU 352 enables easy access to updating software and data logging in service situations.

External communication

Control MPC enables communication with other fieldbus protocols. In order to communicate with other fieldbus protocols, a GENIbus module and a gateway are required.

Control MPC can communicate with LonWorks, PROFIBUS, Modbus, BACnet, GSM/GPRS or GRM via Grundfos CIU.

Pumps connected to Control MPC Series 2000

TPE3 pumps are connected directly to Grundfos Control MPC Series 2000 via GENIbus.

Control MPC Series 2000 incorporates a CU 352 control unit that can control up to six pumps.

All pumps must be of the same type and size.

Control MPC Series 2000 is used for controlling circulator pumps in heating and air-conditioning applications.

Control MPC Series 2000 ensures optimal adaptation of the performance to the demand by closed-loop control of these parameters:

- proportional differential pressure
- constant differential pressure.

By means of an external sensor Control MPC Series 2000 can also ensure optimum adaptation of the performance to the demand by closed-loop control of these parameters:

- differential pressure (remote)
- flow rate
- temperature.

Note: For further information about Control MPC and Control MPC Series 2000, see the data booklet "Control MPC". The data booklet is available online in Grundfos Product Center. See page 213.

16. Grundfos CUE

TP pumps connected to Grundfos CUE, external frequency converters

Gr-1031505

Fig. 75 Grundfos CUE product range

Grundfos CUE is a complete range of wall-mounted frequency converters for pump control in a wide range of applications.

The frequency converter provides a variety of benefits such as these:

- Grundfos E-pump functionality and user interface.
- application- and pump family-related functions.
- increased comfort compared to fixed-speed pump solutions.
- simple installation and commissioning compared to standard frequency converters.
- speed control of pumps up to 250 kW.

Functions

Intuitive startup guide

The startup guide enables easy installation and commissioning as well as plug-and-pump convenience. Few settings need to be made by the installer as the rest is done automatically or preset from the factory.

Smart user interface

Gr-1031498

Fig. 76 Grundfos CUE user interface

The frequency converter features a unique user-friendly control panel with graphic display and easy-to-use buttons.

Controlling the value you choose

The frequency converter has a built-in PI controller offering closed-loop control of a desired value.

The values include:

- constant differential pressure
- proportional pressure
- constant temperature
- constant pressure
- constant flow.

Wide product range

The CUE product range is quite comprehensive, covering five different voltage ranges, enclosure classes IP20/21 (Nema 1) and IP54/55 (Nema 12), and a wide range of output powers.

The table below provides a general overview.

Input voltage [V]	Output voltage [V]	Motor [kW]
1 x 200-240	3 x 200-240	1.1 - 7.5
3 x 200-240	3 x 200-240	0.75 - 45
3 x 380-500	3 x 380-500	0.55 - 250
3 x 525-600	3 x 525-600	0.75 - 7.5
3 x 525-690	3 x 525-690	11-250

External communication

The frequency converter can communicate with LON, PROFIBUS, Modbus, BACnet or GSM/GPRS via Grundfos CIU.

17. Motor data

Motor

The motor fitted on TP pumps is a totally enclosed, fan-cooled motor with main dimensions to IEC and DIN standards. Electrical tolerances to IEC 34.

Mounting designation

Pump type	Mounting designation - IEC 34-7
TP Series 200	IM 3601 (IM B 14) / IM 3611 (IM V 18)
TP Series 300	IM 3001 (IM B 5) / IM 3011 (IM V 1)

Relative humidity: Maximum 95 %
Enclosure class: IP55
Insulation class: F (IEC 85)
Ambient temperature: See page 20.

If the pump is installed in humid locations, open the lowest drain hole in the motor. This will reduce the motor enclosure class to IP44.

High-efficiency motors

TP, TPD pumps with three-phase motors from 0.25 to 0.37 kW are fitted with IE2 motors and from 0.55 to 375 kW are fitted with IE3 motors.

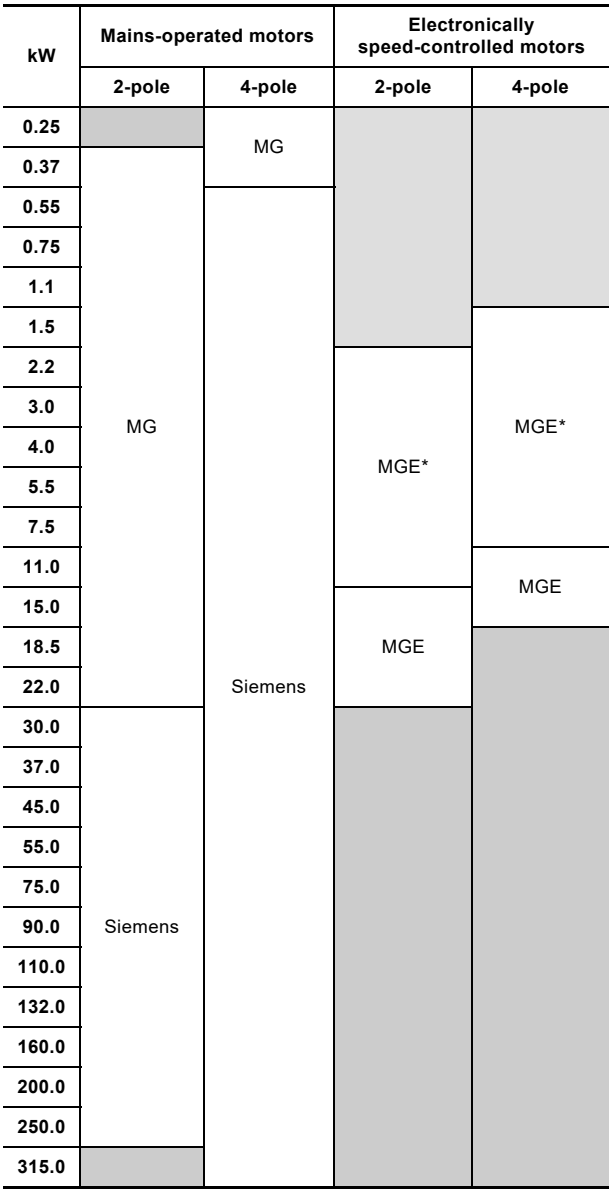
TPE2, TPE2 D, TPE3, TPE3 D pumps are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

TPE pumps with 2-pole motors up to 11 kW and 4-pole motors up to 7.5 kW are fitted with Grundfos permanent-magnet MGE motors that have motor efficiency class IE5 according to IEC 60034-30-2.

TPE pumps with three-phase 2-pole motors from 15 to 22 kW are fitted with motors equivalent to IE3.

TPE pumps with three-phase 4-pole motors from 11 to 15 kW are fitted with motors equivalent to IE3.

Motor range



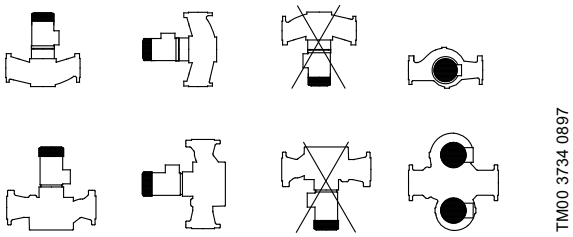
* IE5 motors

MG and MGE are Grundfos motor brands.
Siemens is a sourced high-quality motor brand.
The grey-shaded areas indicate non-available motors.

18. Installation

Mechanical installation

You can install TP pumps with motors smaller than 11 kW in horizontal or vertical pipes.

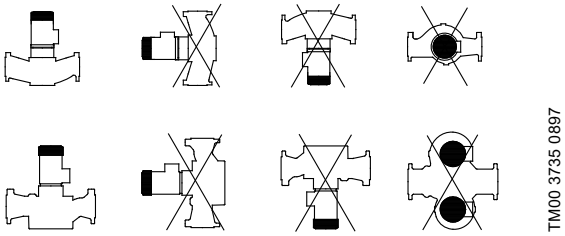


TM00 3734 0897

Fig. 77 Installation of motor sizes smaller than 11 kW

You can suspend pumps with motors smaller than 11 kW directly in the pipes, provided the pipes can support the pump. If not, install the pump on a mounting bracket or base plate.

Only install TP pumps with motors of 11 kW and up in horizontal pipes with the motor in vertical position. Always install the pump on an even and rigid foundation.



TM00 3735 0897

Fig. 78 Installation of motor sizes of 11 kW and up

Note: The motor must never point downwards.

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

However, you can suspend some TP, TPE pumps of 11 kW and up directly in the pipes, either horizontally or vertically. See the table *TP, TPE pumps from 11 kW and up suspended in the pipes* on page 100.

TP, TPE pumps from 11 kW and up suspended in the pipes

Pump type	PN 16	PN 25	P2 [kW]		
60 Hz					
TP, TPE 65-480/2	●	-	11	-	●
TP, TPE 65-540/2	●	-	15	-	●
TP, TPE 65-630/2	●	-	18.5	-	●
TP, TPE 65-740/2	●	-	22	-	●
TP, TPE 80-330/2	●	-	11	-	●
TP, TPE 80-400/2	●	-	15	-	●
TP, TPE 80-480/2	●	-	18.5	-	●
TP, TPE 80-530/2	●	-	22	-	●
TP, TPE 100-300/2	●	-	11	-	●
TP, TPE 100-370/2	●	-	15	-	●
TP, TPE 100-350/2	●	-	18.5	-	●
TP, TPE 100-380/2	●	-	22	-	●
TP, TPE 80-340/4	●	-	11	-	●
TP, TPE 80-410/4	●	-	15	-	●
TP 80-460/4	●	-	18.5	-	●
TP 80-510/4	●	-	22	-	●
TP, TPE 100-240/4	●	●	11	●	●
TP, TPE 100-260/4	●	-	11	-	●
TP, TPE 100-290/4	●	●	15	●	●
TP 100-340/4	●	●	18.5	●	●
TP 100-350/4	●	-	22	-	●
TP 100-390/4	●	●	22	●	●
TP 100-470/4	-	●	30	●	-
TP 100-560/4	-	●	37	●	-
TP, TPE 125-200/4	●	-	11	-	●
TP, TPE 125-230/4	●	-	15	-	●
TP, TPE 125-220/4	-	●	15	-	●
TP 125-280/4	●	●	18.5	-	●
TP 125-340/4	●	●	22	-	●
TP 125-365/4	-	●	30	●	-
TP 125-420/4	-	●	30	●	-
TP 125-480/4	-	●	37	●	-
TP 125-550/4	-	●	45	●	-
TP 125-580/4	-	●	55	●	-
TP, TPE 150-180/4	●	●	15	-	●
TP 150-210/4	●	●	18.5	-	●
TP 150-240/4	●	●	22	-	●
TP 150-300/4	-	●	30	●	-
TP 150-340/4	-	●	37	●	-
TP 150-360/4	-	●	30	●	-
TP 150-400/4	-	●	37	●	-
TP 150-440/4	-	●	45	●	-
TP 150-480/4	-	●	55	●	-
TP 150-610/4	-	●	75	●	-
TP 150-810/4	-	●	110	●	-
TP 150-960/4	-	●	132	●	-
TP 200-250/4	-	●	30	●	-
TP 200-400/4	-	●	75	●	-
TP 200-430/4	-	●	55	●	-
TP 300-230/4	-	●	45	●	-
TP 300-270/4	-	●	55	●	-
TP 300-360/4	-	●	75	●	-
TP 300-370/4	-	●	90	●	-
TP 300-440/4	-	●	110	●	-
TP 300-550/4	-	●	132	●	-
TP 300-630/4	-	●	160	●	-
TP 300-640/4	-	●	200	●	-
TP 300-750/4	-	●	250	●	-
TP 350-400/4	-	●	132	●	-
TP 350-450/4	-	●	160	●	-
TP 350-540/4	-	●	200	●	-
TP 350-680/4	-	●	250	●	-

In installations where the pump is suspended directly in the pipes, the pump can support the pipe length L on both sides of the pump. L is less than 3 x DN. See fig. 79. In installations where the pump is suspended directly in the pipes, the pump must be lifted and held in correct position by means of ropes or similar until both pump flanges are completely fastened to the pipe flanges.

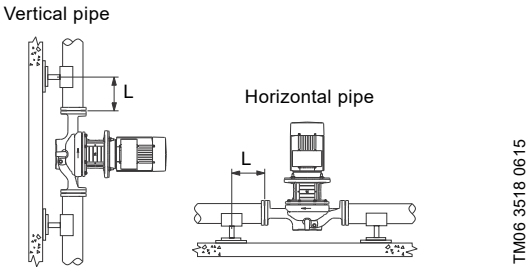


Fig. 79 Pump suspended directly in the pipes

When installing a twin-head pump in a horizontal pipe and with horizontal shaft, fit the upper pump housing with an automatic vent.

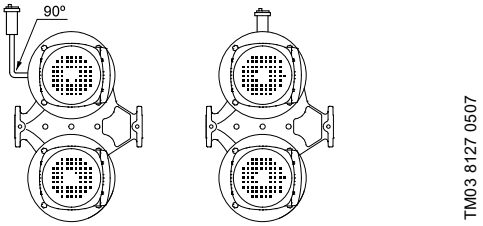


Fig. 80 Twin-head pumps with automatic vent

Twin-head pump housings have two Rp 1/4 tappings, TP Series 200, TPE2 D, TPE3 D, or four Rp 1/8 tappings, TP Series 300 for mounting of automatic vents.

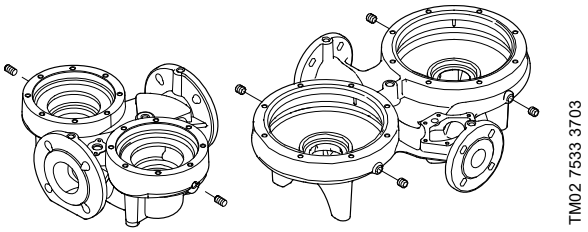


Fig. 81 Tappings for mounting of automatic vents in TP Series 200,TPE2 D, TPE3 D and TP Series 300

For further information about identification of TP Series 300 models, see pages 26 to 28.

If the liquid temperature falls below the ambient temperature or if the pump is installed outside, condensation may form in the motor during inactivity. In this case, the drain hole in the motor flange must be open and point downwards. See fig. 82.

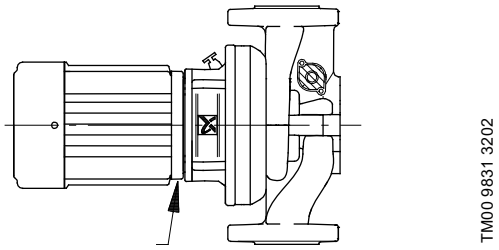


Fig. 82 Drain hole

If twin-head pumps are used for pumping liquids with a temperature below 0 °C / 32 °F, condensed water may freeze and cause the coupling to get stuck. You can remedy the problem by installing heating elements. Whenever possible, install pumps with motors smaller than 11 kW with horizontal motor shaft. See fig. 80.

Cooling

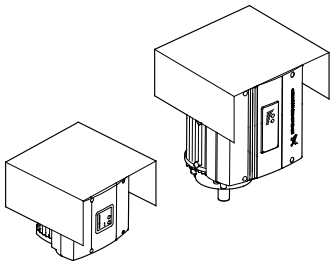
To ensure sufficient cooling of motor and electronics, observe the following:

- Place the pump in such a way that sufficient cooling is ensured.
- Keep the motor cooling fins, holes in fan cover and fan blades clean.
- Make sure the frequency for the motor is at least 6 Hz, 12 % of maximum speed. The shaft seal may generate noise at speeds below 25 % of maximum speed.

Condensation cover

When installing the pumps outdoors, provide the motor with a suitable cover 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.



TM02 8514 0304

Fig. 83 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. Generally, always consider this for pumps with motors of 11 kW and up, but for motors of 90 kW and up as well as the pumps stated in the table below, vibration dampening is mandatory. Smaller motor sizes, however, may also cause undesirable noise and vibration.

Pump type	Frequency [Hz]
TP 200-280/4	60
TP 200-320/4	60
TP 200-360/4	60
TP 200-390/4	60

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.

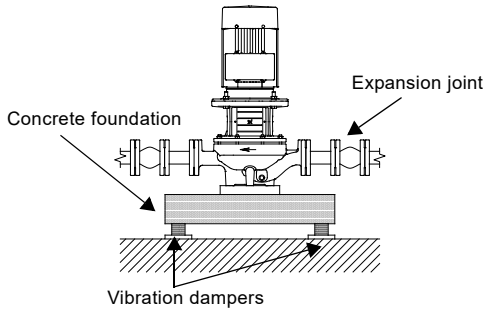


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Fig. 84 Foundation of TP pump

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 must be 1.5 times the pump weight.

Recommended concrete foundations for TP, TPD Series 300 pumps

For TP Series 300 pumps with weights of 150 kg or more, we recommend that you mount the pump on a concrete foundation with the dimensions stated in the table below. The same recommendation applies to TPD Series 300 pumps with weights of 300 kg or more.

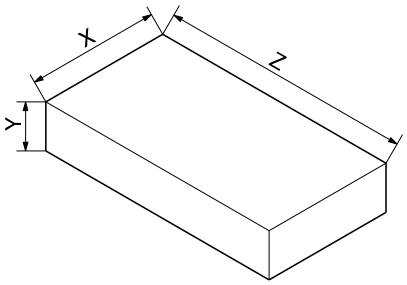

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Fig. 85 Foundation for TP, TPD Series 300 pumps

Pump mass [kg]		Concrete foundation dimensions		
		X (Height) [mm]	Y (Length) [mm]	Z (Width) [mm]
150	≤ DN 200	280	565	565
200		310	620	620
250		330	670	670
300		360	710	710
350		375	750	750
400		390	780	780
450		410	810	810
500		420	840	840
550		440	870	870
600		450	900	900
650		460	920	920
700		470	940	940
750		480	970	970
800		490	990	990
850		500	1010	1010
900		510	1030	1030
950		520	1050	1050
1000		530	1060	1060
1050		540	1080	1080
1100		550	1100	1100
1150		560	1100	1100
1200		560	1130	1130
1250		570	1150	1150
1300		580	1160	1160
1350		590	1180	1180
1400		600	1190	1190
1450		600	1200	1200
1500		610	1220	1220
1550		620	1230	1230
1600		620	1250	1250
1650		630	1250	1250
1700		635	1270	1270

Pump mass [kg]		Concrete foundation dimensions		
		X (Height) [mm]	Y (Length) [mm]	Z (Width) [mm]
800	DN 300 / DN 350 / DN 400	450	1400	800
1000		450	1400	1000
1200		450	1400	1200
1400		500	1600	1200
1600		500	1600	1350
1800		500	1600	1500
2000		550	1600	1600
2200		550	1700	1700
2400		550	1800	1800
2600		600	1800	1800
3000		600	2000	2000
3400		680	2000	2000
3800		760	2000	2000
4200		840	2000	2000
4600		920	2000	2000
5000		1000	2000	2000
5400		1080	2000	2000

Vibration dampers

To prevent the transmission of vibrations to buildings, we recommend that you 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 %. The suggested value is 70 %.

The right damper varies from installation to installation, and a wrong damper may increase the vibration level. Vibration dampers must 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

Expansion joints do the following:

- absorb expansions or contractions in the pipes caused by changing liquid temperature.
- reduce mechanical strains in connection with pressure surges in the pipes.
- isolate mechanical structure-borne noise in the pipes. Only rubber bellows expansion joints.

Note: Do not install expansion joints to compensate for inaccuracies in the pipes such as centre displacement of flanges.

Fit expansion joints at a distance of minimum 1 to 1.5 times the nominal flange diameter away from the pump on the inlet as well as on the outlet side. This prevents the development of turbulence in the expansion joints, resulting in better suction conditions and a minimum pressure loss on the outlet side. At high water velocities, greater than 5 m/s, we recommend that you install larger expansion joints corresponding to the pipes. See fig. 86.

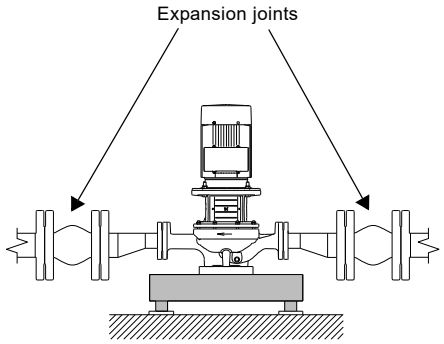

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Fig. 86 TP pump installed with larger expansion joints

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

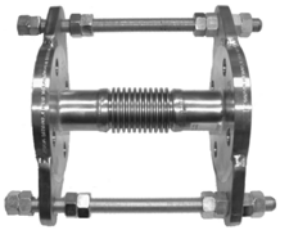
TM02 4979 1902 - TM02 4981 1902

Fig. 87 Examples of rubber bellows expansion joints

You can use expansion joints with limit rods to reduce the effects of the expansion or contraction forces on the pipes. We always recommend expansion joints with limit rods for flanges larger than DN 100.

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.



TM02 4980 1902

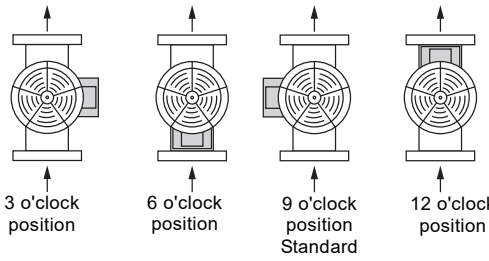
Fig. 88 Example of metal expansion joint

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

Terminal box positions

TP single-head pumps

As standard, the terminal boxes of TP and TPE, TPE2, TPE3 pumps are mounted in 9 o'clock position. The possible terminal box positions are shown below.



TM03 0565 2005

Fig. 89 Possible terminal box positions

Note: Due to the motor construction, the terminal boxes of some TP pumps with motor sizes above 250 kW are mounted in 10:30 position.

TPD twin-head pumps

As standard, the terminal boxes of all TPD pumps are mounted in 12 o'clock position. See fig. 89.

On TPE2 D, TPE3 D pumps the terminal box is installed in a position different from 12 o'clock.

Electrical installation

Mains-operated motors

The operating voltage and frequency are marked on the pump nameplate. Make sure that the motor is suitable for the power supply on which it will be used.

Single-phase standard motors incorporate a thermal switch and require no additional motor protection.

Three-phase motors must be connected to a motor starter.

Motors of 3 kW and up incorporate thermistors, PTC. The thermistors are designed according to DIN 44082.

The electrical connection must be carried out as shown in the diagram inside the terminal box cover.

The motors of twin-head pumps are to be connected separately.

Frequency converter operation

Motors types Siemens, MG 71 and MG 80 for supply voltages up to and including 440 V must be protected against voltage peaks higher than 650 V between the supply terminals. See the motor nameplate.

Grundfos motors:

You can connect all three-phase Grundfos motors from frame size 90 and up to a frequency converter.

The connection of a frequency converter often has the effect that the motor insulation system is loaded more and that the motor is more noisy than during normal operation. In addition, large motors are loaded by bearing currents caused by the frequency converter.

In the case of frequency converter operation, consider the following:

In 2-pole motors from 45 kW, 4-pole motors from 37 kW and 6-pole motors from 30 kW, one of the motor bearings must be electrically isolated to prevent damaging currents from passing through the motor bearings.

In the case of noise-critical applications, reduce the motor noise by fitting a dU/dt filter between the motor and the frequency converter. In particularly noise-critical applications, we recommend that you fit a sinusoidal filter.

The length of the cable between the motor and frequency converter affects the motor load. Therefore check that the cable length meets the specifications laid down by the frequency converter supplier.

For supply voltages between 500 and 690 V, fit either a dU/dt filter to reduce voltage peaks or use a motor with reinforced insulation.

For supply voltages of 690 V, use a motor with reinforced insulation, and fit a dU/dt filter.

For other motor makes than Grundfos, contact Grundfos or the motor manufacturer.

19. MGE motors

Motors for TPE2, TPE2 D, TPE3, TPE3 D pumps and 2.2 - 11 kW 2-pole motors and 1.5 - 7.5 kW 4-pole motors fitted on TPE Series 1000 pumps

Single-phase supply voltage

1 x 200-240 V - 10 %/+ 10 %, 50/60 Hz, PE.

Recommended fuse size

Motor size [kW]	Min. [A]	Max. [A]
0.25 - 0.75	6	10
1.1 - 1.5	10	16

You can use standard as well as quick-blow or slow-blow fuses.

Leakage current

Earth leakage current less than 3.5 mA, AC.

Earth leakage current less than 10 mA, DC supply.

The leakage currents are measured in accordance with EN 61800-5-1:2007.

Three-phase supply voltage

3 x 380-500 V - 10 %/+ 10 %, 50/60 Hz, PE.

Recommended fuse size

Motor size [kW]	Min. [A]	Max. [A]
1.5	6	10
2.2	6	16
3	10	16
4	13	16
5.5	16	32
7.5	20	32
11	32	32

You can use standard as well as quick-blow or slow-blow fuses.

Leakage current, AC

Speed [min^{-1}]	Power [kW]	Mains voltage [V]	Leakage current [mA]
1400-2000 1450-2200	0.25 - 1.5	≤ 400	< 3.5
		> 400	< 5
	2.2 - 4	≤ 400	< 3.5
		> 400	< 3.5
	5.5 - 7.5	≤ 400	< 3.5
		> 400	< 5
2900-4000	0.25 - 2.2	≤ 400	< 3.5
		> 400	< 5
	3 - 5.5	≤ 400	< 3.5
		> 400	< 3.5
	7.5 - 11	≤ 400	< 3.5
		> 400	< 5

The leakage currents are measured without any load on the shaft and in accordance with EN 61800-5-1:2007.

Inputs and outputs

Earth reference, GND

All voltages refer to GND.

All currents return to GND.

Absolute maximum voltage and current limits

Exceeding the following electrical limits may result in severely reduced operating reliability and motor life:

Relay 1:

Maximum contact load: 250 VAC, 2 A or 30 VDC, 2 A.

Relay 2:

Maximum contact load: 30 VDC, 2 A.

GENI terminals: -5.5 to 9.0 VDC or less than 25 mADC.

Other input or output terminals: -0.5 to 26 VDC or less than 15 mADC.

Digital inputs, DI

Internal pull-up current greater than 10 mA at V_i equal to 0 VDC.

Internal pull-up to 5 VDC (currentless for V_i greater than 5 VDC).

Certain low logic level: V_i less than 1.5 VDC.

Certain high logic level: V_i greater than 3.0 VDC.

Hysteresis: No.

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Maximum cable length: 500 m.

Open-collector digital outputs, OC

Current sinking capability: 75 mADC, no current sourcing.

Load types: Resistive or/and inductive.

Low-state output voltage at 75 mADC: Maximum 1.2 VDC.

Low-state output voltage at 10 mADC: Maximum 0.6 VDC.

Overcurrent protection: Yes.

Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.

Maximum cable length: 500 m.

Analog inputs, AI

Voltage signal ranges:

- 0.5 - 3.5 VDC, AL AU.
- 0-5 VDC, AU.
- 0-10 VDC, AU.

Voltage signal: R_i greater than 100 kΩ at 25 °C.

Leak currents may occur at high operating temperatures. Keep the source impedance low.

Current signal ranges:

- 0-20 mADC, AU.
- 4-20 mADC, AL AU.

Current signal: R_i equal to 292 Ω.

Current overload protection: Yes. Change to voltage signal.

Measurement tolerance: - 0/+ 3 % of full scale (maximum-point coverage).

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Maximum cable length: 500 m, excl. potentiometer.

Potentiometer connected to +5 V, GND, any AI:

Use maximum 10 kΩ.

Maximum cable length: 100 m.

Analog output, AO

Current sourcing capability only.

Voltage signal:

- Range: 0-10 VDC.
- Minimum load between AO and GND: 1 kΩ.
- Short-circuit protection: Yes.

Current signal:

- Ranges: 0-20 and 4-20 mADC.
- Maximum load between AO and GND: 500 Ω.
- Open-circuit protection: Yes.

Tolerance: - 0/+ 4 % of full scale (maximum-point coverage).

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Maximum cable length: 500 m.

Pt100/1000 inputs, PT

Temperature range:

- Minimum -30 °C, 88 Ω / 882 Ω.
- Maximum 180 °C, 168 Ω / 1685 Ω.

Measurement tolerance: ± 1.5 °C.

Measurement resolution: less than 0.3 °C.

Automatic range detection, Pt100 or Pt1000: Yes.

Sensor fault alarm: Yes.

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Use Pt100 for short wires.

Use Pt1000 for long wires.

LiqTec sensor inputs*

Use Grundfos LiqTec sensor only.

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Grundfos Digital Sensor input and output, GDS

Use Grundfos Digital Sensor only*.

* Only applicable for TPE3, TPE3 D pumps.

Power supplies

+5 V:

- Output voltage: 5 VDC - 5 %/+ 5 %.
- Maximum current: 50 mADC, sourcing only.
- Overload protection: Yes.

24 V:

- Output voltage: 24 VDC - 5 %/+ 5 %.
- Maximum current: 60 mADC, sourcing only.
- Overload protection: Yes.

Digital outputs, relays

Potential-free changeover contacts.

Minimum contact load when in use: 5 VDC, 10 mA.

Screened cable: 0.5 - 2.5 mm^2, 28-12 AWG.

Maximum cable length: 500 m.

Bus input

Grundfos GENIbus protocol, RS-485.

Screened 3-core cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Maximum cable length: 500 m.

EMC (electromagnetic compatibility)

Standard used: EN 61800-3.

The table below shows the emission category of the motor.

C1 fulfils the requirements for residential areas.

Note: When connected to a public network, 11 kW motors do not comply with the partial weighted harmonic distortion (PWHD) requirements of EN 61000-3-12. If required by the distribution network operator, compliance can be obtained in the following way:

The impedance of the mains cables between the motor and the point of common coupling (PCC) must be equivalent to the impedance of a 50 m cable with a cross-section of 0.5 mm.

C3 fulfils the requirements for industrial areas.

Note: When the motors are installed in residential areas, supplementary measures may be required as the motors may cause radio interference.

Motor [kW]	Emission category	
	1450-2000 min^{-1}	2900-4000 min^{-1} 4000-5900 min^{-1}
0.25	C1	C1
0.37	C1	C1
0.55	C1	C1
0.75	C1	C1
1.1	C1	C1
1.5	C1	C1
2.2	C1	C1
3	C1	C1
4	C1	C1
5.5	C3/C1*	C1
7.5	C3/C1*	C3/C1*
11	-	C3/C1*

* C1, if equipped with an external Grundfos EMC filter.

Immunity: The motor fulfils the requirements for industrial areas.

Contact Grundfos for further information.

Enclosure class

Standard: IP55 (IEC 34-5).

Optional: IP66 (IEC 34-5).

Insulation class

F (IEC 85).

Ambient temperature

During operation: -20 to 50 °C.

During storage and transportation: -30 to 60 °C.

Standby power consumption

5-10 W.

Cable entries

TPE Series 1000

Motor [kW]	Number and size of cable entries	
	1400-2000 1450-2200 min^{-1}	2900-4000 min^{-1}
1.5	4 x M20	4 x M20
2.2	1 x M25 + 4 x M20	4 x M20
3.0 - 4.0	1 x M25 + 4 x M20	1 x M25 + 4 x M20
5.5	1 x M32 + 5 x M20	1 x M25 + 4 x M20
7.5 - 11	1 x M32 + 5 x M20	1 x M32 + 5 x M20

TPE2, TPE2 D, TPE3, TPE3 D

Number and size of cable entries: 4 x M20.

Sound pressure level

TPE Series 1000

Motor [kW]	Maximum speed stated on nameplate [min^{-1}]	Speed [min^{-1}]	Sound pressure level ISO 3743 [dB(A)]
			3-phase motors
1.5	2000	1500	42
		2000	47
	4000	3000	57
		4000	64
2.2	2000	1500	48
		2000	55
	4000	3000	57
		4000	64
3	2000	1500	48
		2000	55
	4000	3000	60
		4000	69
4	2000	1500	48
		2000	55
	4000	3000	61
		4000	69
5.5	2000	1500	58
		2000	61
	4000	3000	61
		4000	69
7.5	2000	1500	58
		2000	61
	4000	3000	66
		4000	73
11	4000	3000	66
		4000	73

TPE2, TPE2 D, TPE3, TPE3 D

Pump size	Sound pressure level ISO 3743 [dB(A)]
TPE2/TPE3 32-80	55
TPE2/TPE3 32-120	60
TPE2/TPE3 32-150	65
TPE2/TPE3 32-180	66
TPE2/TPE3 32-200	66
TPE2/TPE3 40-80	52
TPE2/TPE3 40-120	59
TPE2/TPE3 40-150	60
TPE2/TPE3 40-180	63
TPE2/TPE3 40-200	65
TPE2/TPE3 40-240	66
TPE2/TPE3 50-60	48
TPE2/TPE3 50-80	56
TPE2/TPE3 50-120	60
TPE2/TPE3 50-150	60
TPE2/TPE3 50-180	63
TPE2/TPE3 50-200	64
TPE2/TPE3 50-240	66
TPE2/TPE3 65-60	44
TPE2/TPE3 65-80	51
TPE2/TPE3 65-120	59
TPE2/TPE3 65-150	62
TPE2/TPE3 65-180	62
TPE2/TPE3 65-200	62
TPE2/TPE3 80-40	43
TPE2/TPE3 80-120	53
TPE2/TPE3 80-150	62
TPE2/TPE3 80-180	64
TPE2/TPE3 100-40	43
TPE2/TPE3 100-120	53
TPE2/TPE3 100-150	62
TPE2/TPE3 100-180	64

Motor protection

The motor requires no external motor protection. The motor incorporates thermal protection against slow overloading and blocking.

Additional protection

The residual-current circuit breaker must be marked with the following symbol:

The total leakage current of all the electrical equipment in the installation must be taken into account. You find the leakage current of the motor in *Leakage current* and *Leakage current, AC*, see page 105.

This product can cause a direct current in the protective-earth conductor.

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable power supply or a faulty installation. The motor is stopped if the voltage falls outside the permissible voltage range. The motor restarts automatically when the voltage is again within the permissible voltage range. Therefore, no additional protection relay is required.

Note: The motor is protected against transients from the power supply according to EN 61800-3. In areas with high lightning intensity, we recommend external lightning protection.

Overload protection

If the upper load limit is exceeded, the motor automatically compensates for this by reducing the speed and stops if the overload condition persists.

The motor remains stopped for a set period. After this period, the motor automatically attempts to restart. The overload protection prevents damage to the motor. Consequently, no additional motor protection is required.

Overtemperature protection

The electronic unit has a built-in temperature sensor as an additional protection. When the temperature rises above a certain level, the motor automatically compensates for this by reducing the speed and stops if the temperature keeps rising. The motor remains stopped for a set period. After this period, the motor automatically attempts to restart.

Protection against phase unbalance

Three-phase motors must be connected to a power supply with a quality corresponding to IEC 60146-1-1, class C, to ensure correct motor operation at phase unbalance. This also ensures long life of the components.

Maximum number of starts and stops

The number of starts and stops via the power supply must not exceed four times per hour.

When switched on via the power supply, the pump starts after approximately 5 seconds.

If you want a higher number of starts and stops, use the input for external start-stop when starting or stopping the pump.

When you start the pump via an external on/off switch, the pump starts immediately.

Wiring diagrams

Single-phase supply:

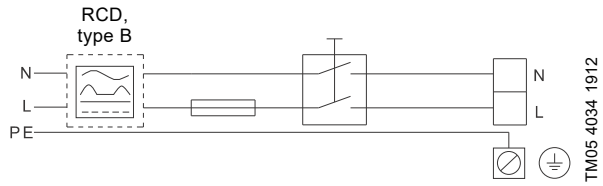


Fig. 90 Example of a mains-connected motor with mains switch, backup fuse and additional protection

Three-phase supply:

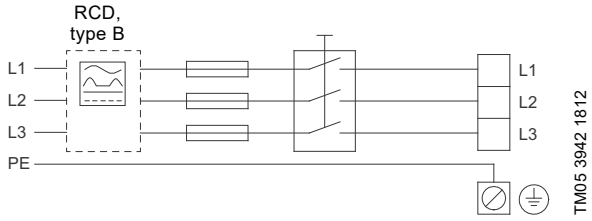


Fig. 91 Example of a mains-connected motor with mains switch, backup fuse and additional protection

Connection terminals

The descriptions and terminal overviews in this section apply to both single-phase and three-phase motors.

Connection terminals, advanced functional module, FM 300

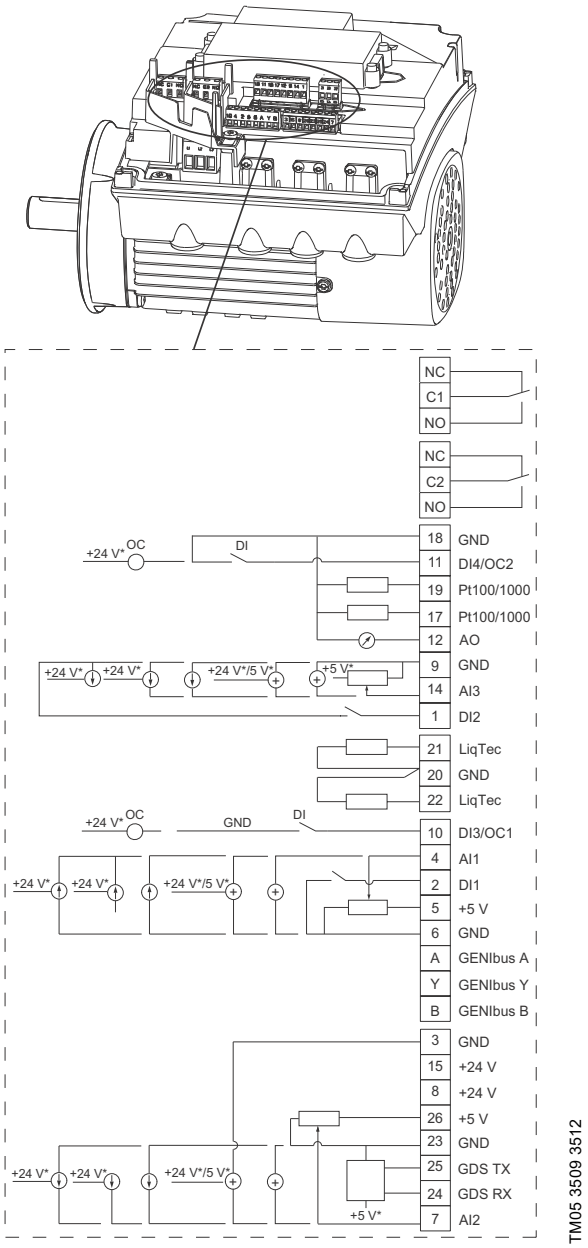
The advanced module has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Input and output for Grundfos Digital Sensor
  Not applicable for TPE Series 1000 and TPE2, TPE2 D pumps.
  The factory-fitted differential-pressure sensor for TPE3, TPE3 D pumps is connected to this input.
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

See fig. 92.

Note: Digital input 1 is factory-set to be start-stop input where open circuit results in stop. A jumper has been factory-fitted between terminals 2 and 6. Remove the jumper if digital input 1 is to be used as external start-stop or any other external function.

- **Inputs and outputs**
  All inputs and outputs are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits.
  All control terminals are supplied by protective extra-low voltage, PELV, thus ensuring protection against electric shock.
- **Signal relay outputs**
  – Signal relay 1:
  LIVE:
  You can connect supply voltages up to 250 VAC.
  PELV:
  The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.
  – Signal relay 2:
  PELV:
  The output is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.
- **Mains supply,** terminals N, PE, L or L1, L2, L3, PE.



* If an external supply source is used, there must be a connection to GND.

Fig. 92 Connection terminals, FM 300

Terminal	Type	Function
NC	Normally closed contact	Signal relay 1 LIVE or PELV
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2 PELV only
C2	Common	
NO	Normally open contact	
18	GND	Earth
11	DI4/OC2	Digital input/output, configurable. Open collector: Maximum 24 V resistive or inductive.
19	Pt100/1000 input 2	Pt100/1000 sensor input
17	Pt100/1000 input 1	Pt100/1000 sensor input
12	AO	Analog output: 0-20 mA / 4-20 mA 0-10 V
9	GND	Earth
14	AI3	Analog input: 0-20 mA / 4-20 mA 0-10 V
1	DI2	Digital input, configurable
21	LiqTec sensor input 1	LiqTec sensor input White conductor
20	GND	Earth Brown and black conductors
22	LiqTec sensor input 2	LiqTec sensor input Blue conductor
10	DI3/OC1	Digital input/output, configurable. Open collector: Maximum 24 V resistive or inductive.
4	AI1	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V
2	DI1	Digital input, configurable
5	+5 V	Supply to potentiometer and sensor
6	GND	Earth
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Earth
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Earth
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor input
7	AI2	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V

MGE motors, 11 to 15 kW, 4-pole, and 15 to 22 kW, 2-pole

Grundfos MGE 100, MGE 112, MGE 132, MGE 160 and MGE 180 motors offer these features:

- Three-phase mains connection.
- Three-phase, asynchronous squirrel-cage induction motors designed to current IEC, DIN and VDE guidelines and standards. The motors incorporate a frequency converter and PI controller.
- Used for continuously variable speed control of Grundfos E-pumps available in power sizes 11 to 18.5 kW, 4-pole, and 15 to 22 kW, 2-pole.

Supply voltage

3 x 380-480 V - 10 %/+ 10 %, 50/60 Hz, PE.

Backup fuse

Motor size [kW]	Maximum fuse [A]
11	26
15	36
18.5	43
22	51

You can use standard as well as quick-blow or slow-blow fuses.

Leakage current

Motor size [kW]	Leakage current [mA]
11-22	> 10

The leakage currents are measured in accordance with EN 61800-5-1.

Input/output

Start/stop

- External potential-free switch.
  Voltage: 5 VDC.
  Current: less than 5 mA.
  Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.

Digital input

- External potential-free switch.
  Voltage: 5 VDC.
  Current: less than 5 mA.
  Screened cable: 0.5 - 1.5 mm^2 / 28-16 AWG.

Setpoint signals

- Potentiometer
  0-10 VDC, 10 kΩ via internal voltage supply.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 100 m.
- Voltage signal
  0-10 VDC, R_i greater than 50 kΩ.
  Tolerance: + 0 %/- 3 % at maximum voltage signal.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 500 m.
- Current signal
  DC 0-20 mA / 4-20 mA, R_i equal to 175 Ω.
  Tolerance: + 0 %/- 3 % at maximum current signal.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 500 m.

Sensor signals

- Voltage signal
  0-10 VDC, R_i greater than 50 kΩ via internal voltage supply.
  Tolerance: + 0 %/- 3 % at maximum voltage signal.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 500 m.
- Current signal
  DC 0-20 mA / 4-20 mA, R_i = 175 Ω.
  Tolerance: + 0 %/- 3 % at maximum current signal.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 500 m.
- Power supply to sensor
  +24 VDC, maximum 40 mA.

Signal output

- Potential-free changeover contact.
  Maximum contact load: 250 VAC, 2 A.
  Minimum contact load: 5 VDC, 10 mA.
  Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.
  Maximum cable length: 500 m.

Bus input

Grundfos GENIbus protocol, RS-485.

Screened cable: 0.5 - 1.5 mm^2, 28-16 AWG.

Maximum cable length: 500 m.

EMC, electromagnetic compatibility to EN 61800-3

Motor [kW]	Emission/immunity
11 15 18.5 22	**Emission:** The motors are category C3, corresponding to CISPR11, group 2, class A, and may be installed in industrial areas (second environment). If fitted with an external Grundfos EMC filter, the motors are category C2, corresponding to CISPR11, group 1, class A, and may be installed in residential areas (first environment). **Note:** When the motors are installed in residential areas, supplementary measures may be required as the motors may cause radio interference. **Immunity:** The motors fulfil the requirements for both the first and second environment.

For further information about EMC, see *Electromagnetic compatibility and proper installation*, page 116.

Enclosure class

Standard: IP55 (IEC 34-5).

Insulation class

F (IEC 85).

Ambient temperature

During operation: -20 to +40 °C

During storage/transport: -25 to +70 °C

Relative humidity

Maximum 95 %.

Sound pressure level

Motor [kW]	Speed stated on the nameplate [min^{-1}]	Sound pressure level [dB(A)]
11	1400-1500	54
	1700-1800	59
15	1400-1500	54
	1700-1800	59
	2800-3000	65
	3400-3600	70
18.5	2800-3000	69
	3400-3600	74
22	2800-3000	73
	3400-3600	78

Motor protection

The motor requires no external motor protection. The motor incorporates thermal protection against slow overloading and blocking.

Additional protection

The residual-current circuit breaker must be marked with the following symbol:

The total leakage current of all the electrical equipment in the installation must be taken into account. You find the leakage current of the motor in *Leakage current* and *Leakage current, AC*, see page 105.

This product can cause a direct current in the protective-earth conductor.

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable power supply or a faulty installation. The motor is stopped if the voltage falls outside the permissible voltage range. The motor restarts automatically when the voltage is again within the permissible voltage range. Therefore, no additional protection relay is required.

Note: The motor is protected against transients from the power supply according to EN 61800-3. In areas with high lightning intensity, we recommend external lightning protection.

Overload protection

If the upper load limit is exceeded, the motor automatically compensates for this by reducing the speed and stops if the overload condition persists.

The motor remains stopped for a set period. After this period, the motor automatically attempts to restart. The overload protection prevents damage to the motor. Consequently, no additional motor protection is required.

Overtemperature protection

The electronic unit has a built-in temperature sensor as an additional protection. When the temperature rises above a certain level, the motor automatically compensates for this by reducing the speed and stops if the temperature keeps rising. The motor remains stopped for a set period. After this period, the motor automatically attempts to restart.

Protection against phase unbalance

Three-phase motors must be connected to a power supply with a quality corresponding to IEC 60146-1-1, class C, to ensure correct motor operation at phase unbalance. This also ensures long life of the components.

Maximum number of starts and stops

The number of starts and stops via the power supply must not exceed four times per hour.

When switched on via the power supply, the pump starts after approximately 5 seconds.

If a higher number of starts and stops is desired, use the input for external start-stop when starting or stopping the pump.

When started via an external on/off switch, the pump starts immediately.

Wiring diagram, 11-22 kW

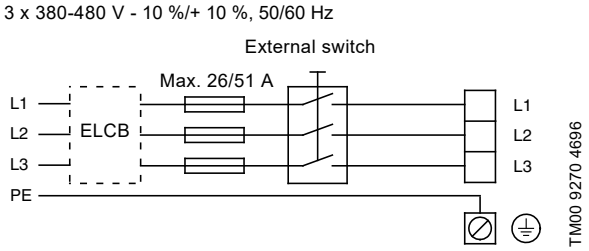


Fig. 93 Wiring diagram, three-phase MGE motors, 11-22 kW

Other connections

Note: As a precaution, make sure that the wires to be connected to the connection groups are separated from each other by reinforced insulation in their entire lengths.

Group 1: Inputs

- Start or stop, terminals 2 and 3
- digital input, terminals 1 and 9
- setpoint input, terminals 4, 5 and 6
- sensor input, terminals 7 and 8
- GENIbus, terminals B, Y and A.

All inputs, group 1, are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits.

All control terminals are supplied by protective extra-low voltage, PELV, thus ensuring protection against electric shock.

- **Group 2:** Output (relay signal, terminals NC, C, NO).
  The output, group 2, is galvanically separated from other circuits. Therefore, you can connect the supply voltage or protective extra-low voltage to the output as desired.
- **Group 3: Mains supply** (terminals L1, L2, L3).
  A galvanically safe separation must fulfil the requirements for reinforced insulation including creepage distances and clearances specified in EN 61800-5-1.

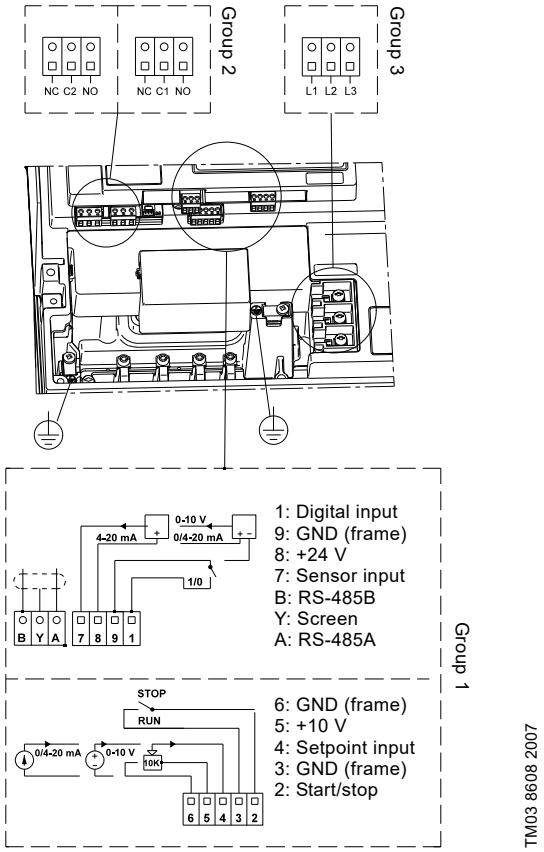


Fig. 94 Connection terminals

Identification of functional module

You can identify the module in one of the following ways:

Grundfos GO

Select the "Fitted modules" menu under "Status".

Pump display

If the pump is fitted with the advanced control panel, select "Fitted modules" menu under "Status".

Motor nameplate

You can identify the fitted module on the motor nameplate. See fig. 95.

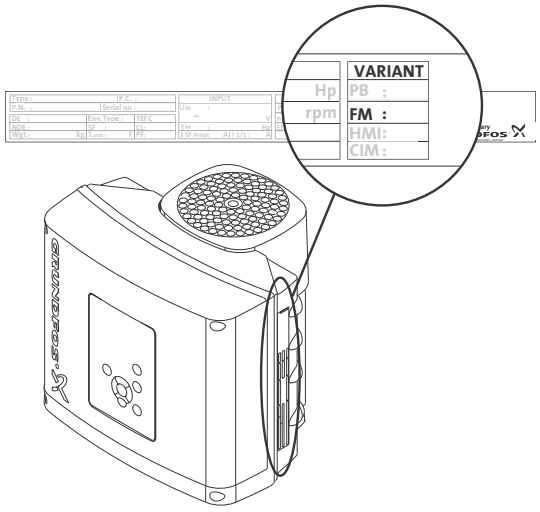


Fig. 95 Identification of functional module

Variant	Description
FM 200	Standard functional module
FM 300	Advanced functional module

20. Electromagnetic compatibility, EMC

Electromagnetic compatibility and proper installation

General information

The growing use of electric or electronic controls and electronic equipment including PLCs and computers within all business areas require these products to fulfil the existing standards within electromagnetic compatibility. Make sure that the equipment is mounted properly.

This section deals with these issues.

What is electromagnetic compatibility?

Electromagnetic compatibility is the ability of an electric or electronic to function in a given electromagnetic environment without disturbing the surroundings and without being disturbed by other devices in the surroundings. Electromagnetic compatibility is normally split into emission and immunity.

Emission

Emission is defined as the electric or electromagnetic noise emitted by a device during operation and which can reduce the function of other devices or disturb various radio communications, including radio or TV.

Immunity

Immunity is the ability of a device to function in spite of the presence of electric or electromagnetic noise, such as sparking noise from contactors or high-frequency fields from various transmitters or mobile phones.

E-pumps and electromagnetic compatibility

All Grundfos E-pumps are CE- and C-tick-marked indicating that the product is designed to meet the EMC requirements defined by the European Union and Australia/New Zealand.

EMC and CE

All E-pumps fulfil the EMC directive 2004/108/EC and are tested according to standard EN 61800-3. All E-pumps are fitted with a 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). At the same time, the filter limits the amount of electrical noise which the E-pump emits to the mains supply network (emission). All remaining inputs included in the electronic unit are also protected against peaks and noise which can damage or disturb the function of the unit.

On top of that, the mechanical and electronic designs are made in such a way that the unit can operate sufficiently under a certain level of radiated electromagnetic disturbance.

The limits which the E-pumps are tested against are listed in standard EN 61800-3.

Where to install E-pumps?

You can use all E-pumps with MGE motors in both residential areas (first environment) and industrial areas (second environment) within certain limitations.

What is meant by the first and the second environment?

The first environment, residential areas, includes establishments directly connected to a low-voltage power supply network which supplies domestic buildings.

The second environment, industrial areas, includes establishments which are not connected to a low-voltage network that supplies domestic buildings.

The level of electromagnetic disturbance can be much higher than in the first environment.

EMC and C-tick

All E-pumps marked with the C-tick logo fulfil the requirements for EMC in Australia and New Zealand.

The C-tick approval is based on the EN standards, and the units are therefore tested according to the European standard EN 61800-3.

Only E-pumps with MGE motors are marked with C-tick.

The C-tick only covers emission.

Electromagnetic compatibility and proper installation

With the CE and C-tick marks, the E-pumps live up to and have been tested to meet specific EMC requirements. This, however, does not mean that E-pumps are immune to all the sources of noise to which they can be exposed in practice. In some installations, the impact may exceed the level to which the product is designed and tested.

Furthermore, unproblematic operation in a noisy environment presupposes that the installation of the E-pump is made properly.

Below you will find a description of a correct E-pump installation.

Connection of mains supply in MGE

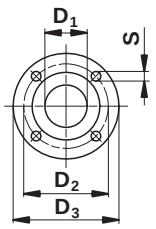
Practice shows that large cable loops are often made inside the terminal box to get some "spare cable". Of course, this can be useful. However, with regard to electromagnetic compatibility, it is a poor solution as these cable loops will function as antennas inside the terminal box.

To avoid problems with electromagnetic compatibility, the mains supply cable and its individual conductors in the terminal box of the E-pump must be as short as possible. If required, you can establish a spare cable outside the E-pump.

21. Flanges for TP pumps

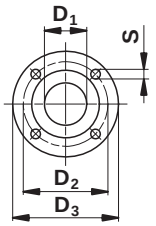
Flange dimensions

PN 6 and PN 10 flanges



	EN 1092-2 PN 6 (0.6 MPa)						EN 1092-2 PN 10 (1.0 MPa)									
	Nominal diameter (DN)						Nominal diameter (DN)									
	32	**40**	**50**	**65**	**80**	**100**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
D_1	32	40	50	65	80	100	32	40	50	65	80	100	125	150	200	250
D_2	90	100	110	130	150	170	100	110	125	145	160	180	210	240	295	350
D_3	120	130	140	160	190	210	140	150	165	185	200	220	250	285	340	395
S	4 x 14	4 x 14	4 x 14	4 x 14	4 x 19	4 x 19	4 x 19	4 x 19	4 x 19	4 x 19	8 x 19	8 x 19	8 x 19	8 x 23	8 x 23	12 x 23

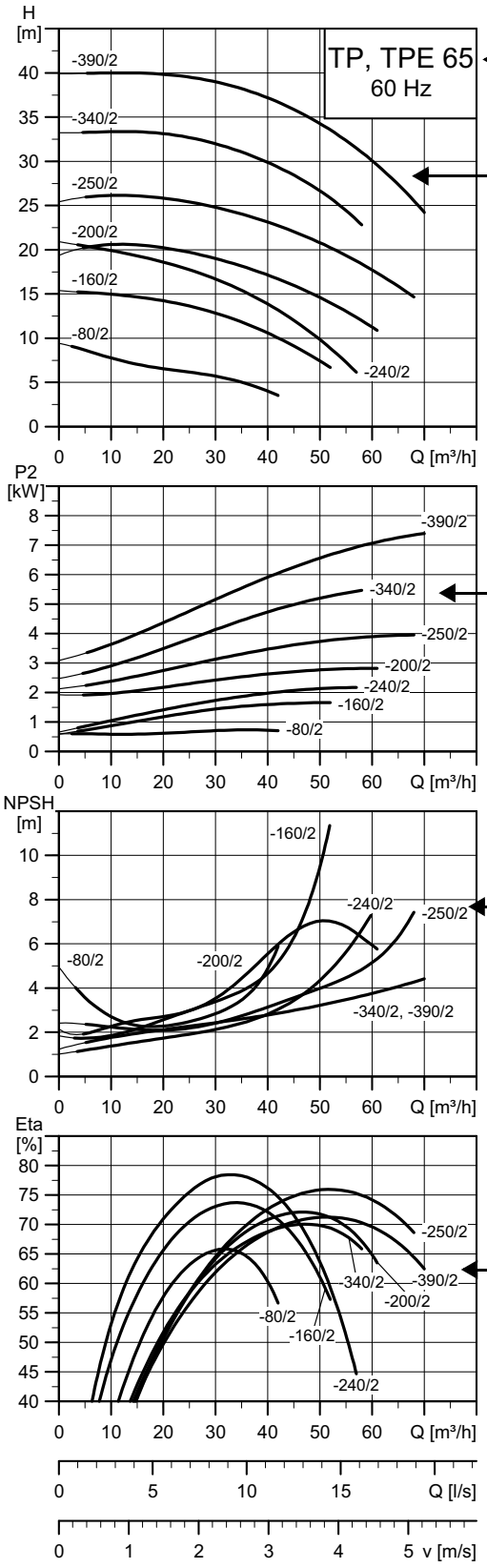
PN 16 and PN 25 flanges



	EN 1092-2 PN 16 (1.6 MPa)									EN 1092-2 PN 25 (2.5 MPa)					
	Nominal diameter (DN)									Nominal diameter (DN)					
	32	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**100**	**125**	**150**	**200**	**250**	**300**
D_1	32	40	50	65	80	100	125	150	200	100	125	150	200	250	300
D_2	100	110	125	145	160	180	210	240	295	190	220	250	310	370	430
D_3	140	150	165	185	200	220	250	285	340	235	270	300	360	425	485
S	4 x 19	4 x 19	4 x 19	4 x 19	8 x 19	8 x 19	8 x 19	8 x 23	12 x 23	8 x 23	8 x 28	8 x 28	12 x 28	12 x 31	16 x 31

22. Curve charts

How to read the curve charts



Pump type and frequency

QH curve for the individual single-head pump. The bold curve indicates the recommended performance range.

The power curve indicates pump input power [P_2].

The NPSH (3 %) curve shows the maximum net positive suction head (NPSH) required to ensure that the pump head is not reduced by more than 3 %. The available system pressure at the pump inlet must be according to the NPSH (3 %) curve.

The eta curve shows the pump efficiency.

TM02 5040 0521

Curve conditions

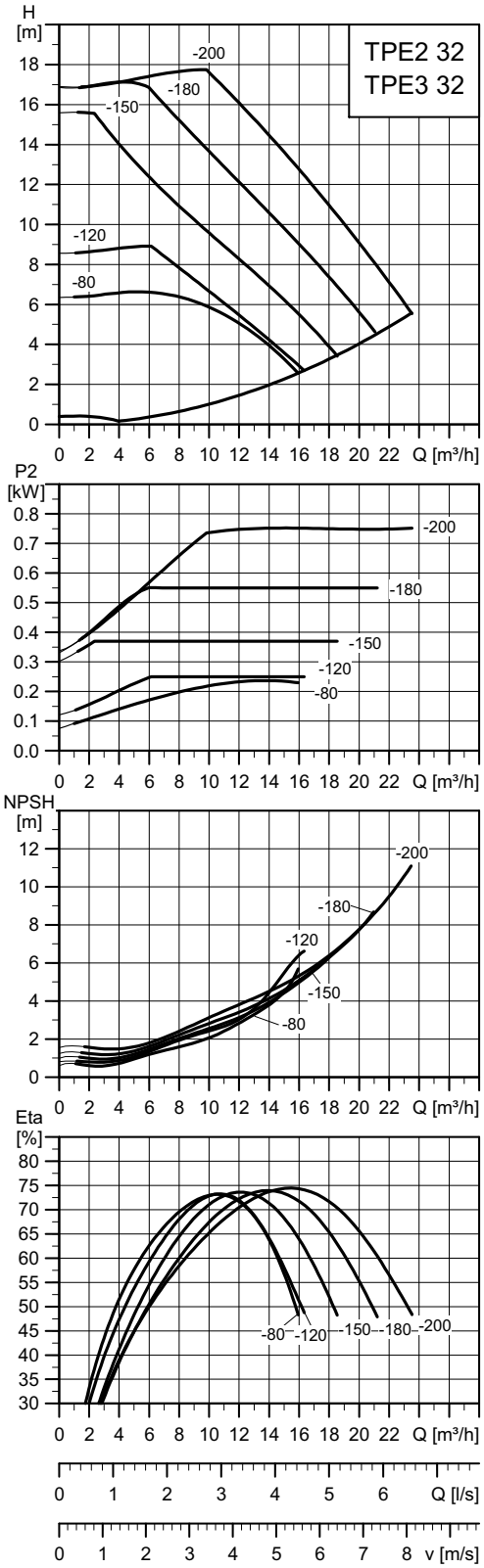
The guidelines below apply to the curves shown on the following pages:

- Tolerances to ISO 9906:2012 Grade 3B.
- The curves apply to the performance of **single-head, three-phase pumps**. For other pump versions, please see the exact curves in Grundfos Product Center. See page 213. For other pump versions, the performance may differ for the following reasons:
  - The valve in twin-head pumps may cause losses.
  - **Note:** Grundfos does not recommend continuous parallel operation of twin-head pumps, except TPE2 D, TPE3 D due to the increased flow in the pump. An excessive flow results in noisy operation, increased wear of the impeller due to cavitation, etc.
- QH curves of the individual single-head pumps are shown with expected speed of a three-phase mains-operated motor. For further information, see the tables of technical data on the following pages.
- Curves of TPE Series 1000 pumps are shown as maximum curves (100 % curves) only. Please refer to Grundfos Product Center for the exact curves. See page 213.
- Measurements have been made with airless water at a temperature of 20 °C.
- The curves apply to a kinematic viscosity of υ equal to 1 mm^2/s (1 cSt).
- Due to the risk of overheating, the pump must not run constantly below the minimum flow rate indicated by the bold curves.
- If the pumped liquid density and/or viscosity are higher than those of water, it may be necessary to use a motor with a higher performance.

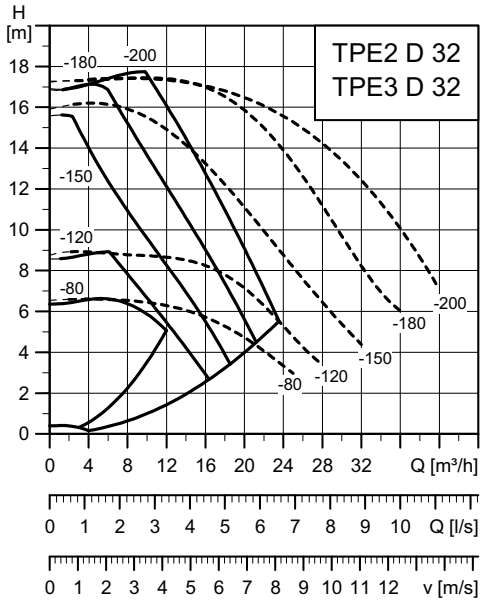
23. Performance curves and technical data

TPE2, TPE2 D, TPE3, TPE3 D, PN 6, 10, 16

TPE2, TPE2 D, TPE3, TPE3 D 32

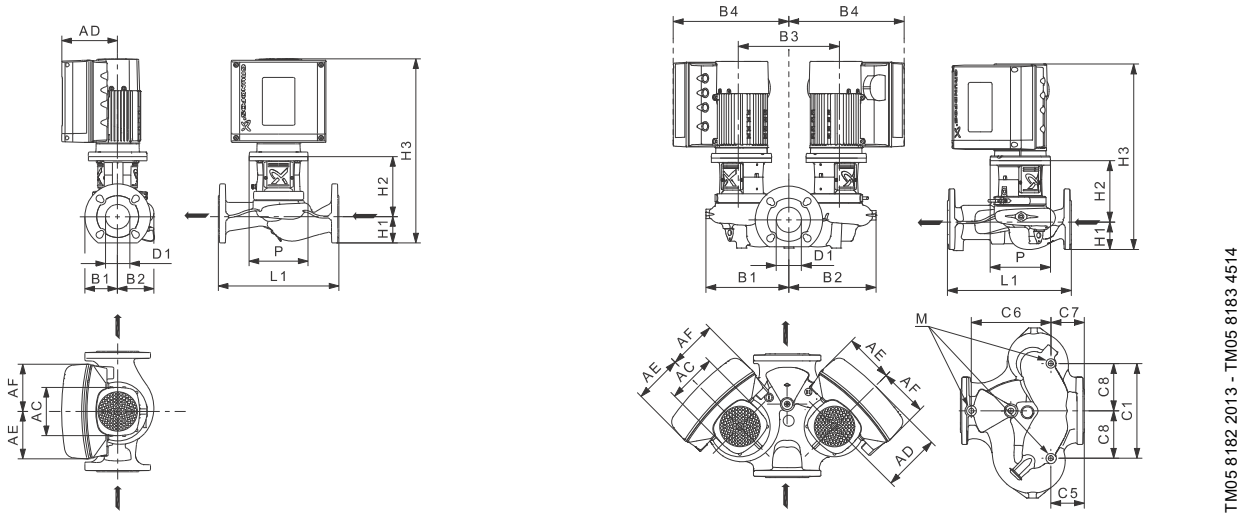


TM05 8171 0221



TM05 8191 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



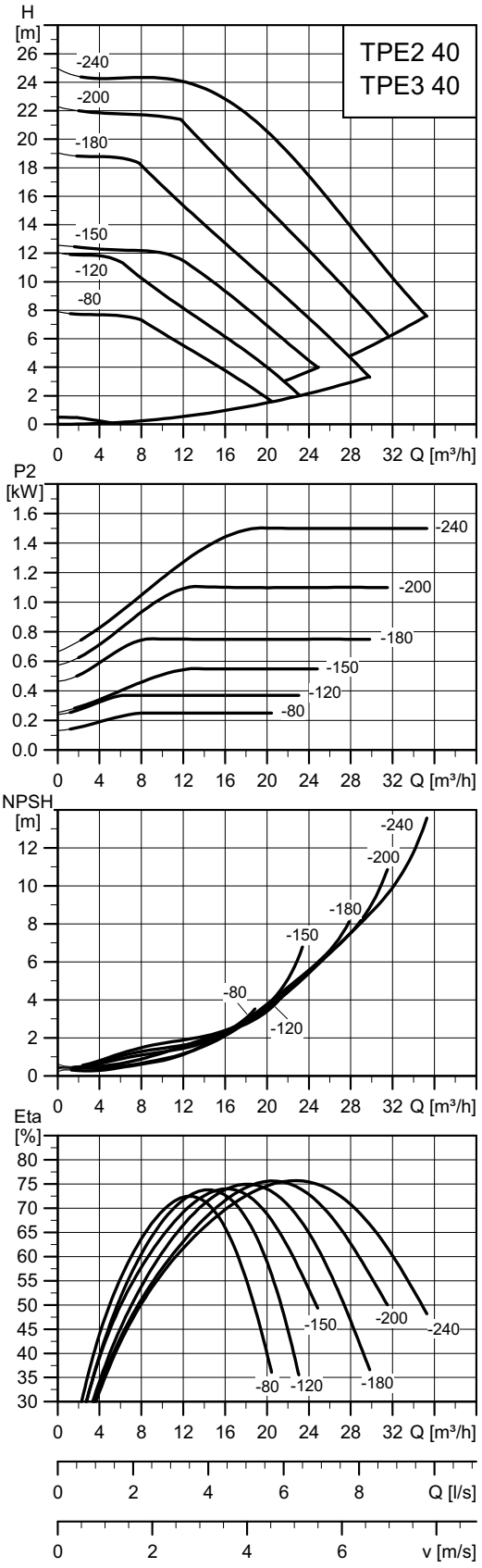
TM05 8182 2013 - TM05 8183 4514

Technical data

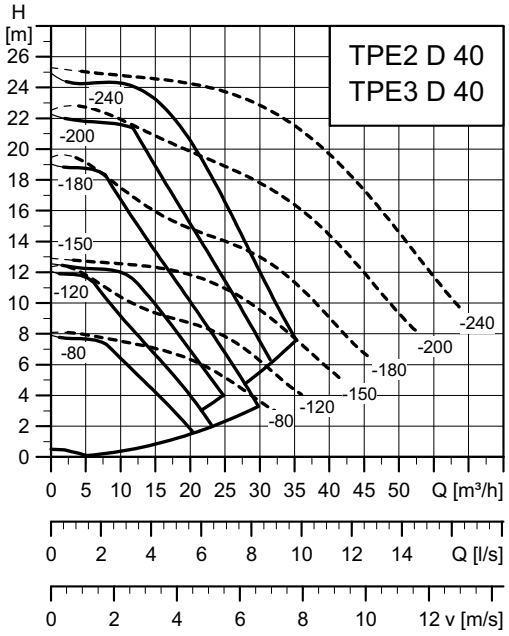
TPE2, TPE3 32			-80	-120	-150	-180	-200
TPE2, TPE3			●	●	●	●	●
TPE2 D, TPE3 D			●	●	●	●	●
P2	1~/3~	kW	0.25	0.25	0.37	0.55	0.75
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	32	32	32	32	32
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134
AF	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134
P		[mm]	165	165	165	165	165
B1★		[mm]	73/210	73/210	73/210	73/210	73/210
B2★		[mm]	73/209	73/209	73/209	73/209	73/209
B3		[mm]	260	260	260	260	260
B4★	1~	[mm]	-/317	-/317	-/317	-/317	-/317
	3~	[mm]	-/337	-/337	-/337	-/337	-/337
C1★		[mm]	-/263	-/263	-/263	-/263	-/263
C5★		[mm]	-/50	-/50	-/50	-/50	-/50
C6★		[mm]	-/97	-/97	-/97	-/97	-/97
C7★		[mm]	-/90	-/90	-/90	-/90	-/90
C8★		[mm]	-/130	-/130	-/130	-/130	-/130
L1		[mm]	220	220	220	220	220
H1★		[mm]	65/68	65/68	65/68	65/68	65/68
H2		[mm]	159	159	159	159	159
H3★	1~	[mm]	439/442	439/442	439/442	439/442	439/442
	3~	[mm]	479/482	479/482	479/482	479/482	479/482
M			M12	M12	M12	M12	M12

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TPE2, TPE2 D, TPE3, TPE3 D 40

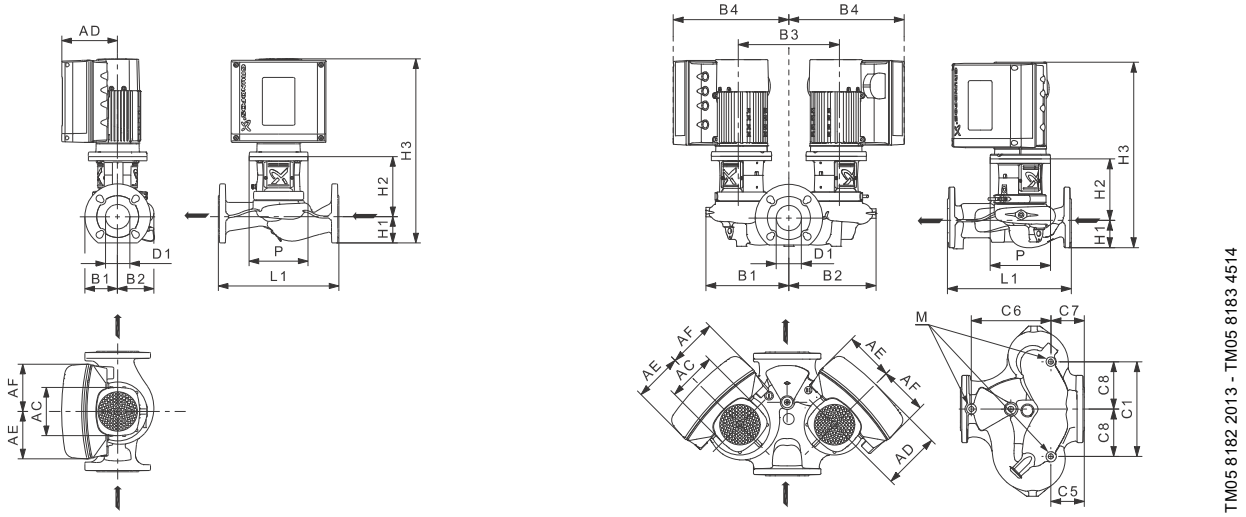


TM05 8172 0221



TM05 8192 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



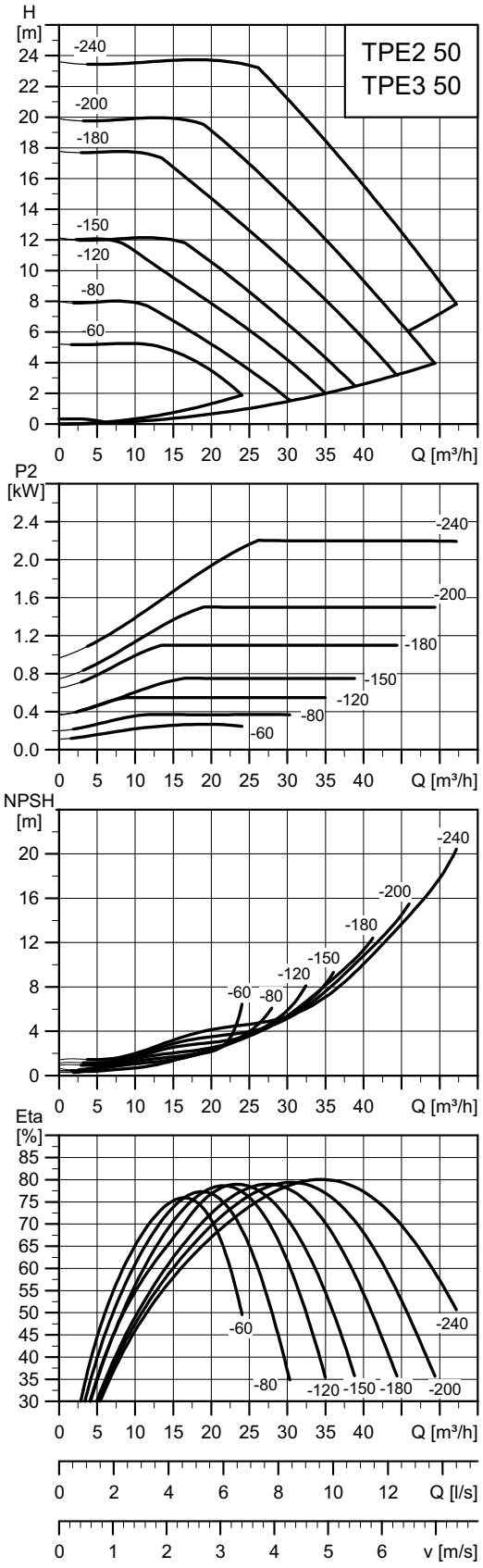
TM05 8182 2013 - TM05 8183 4514

Technical data

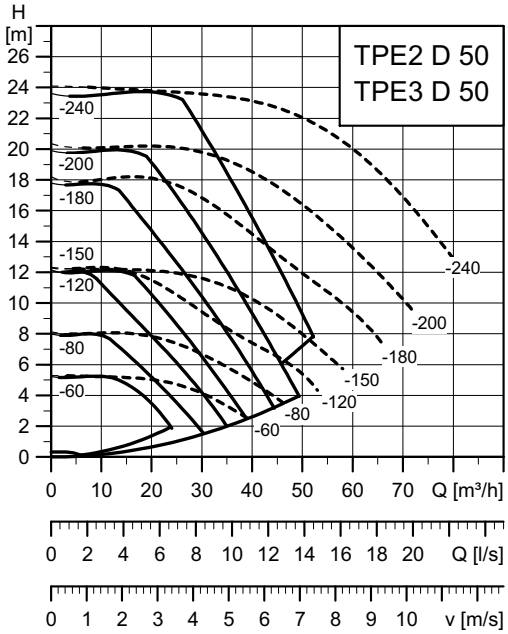
TPE2, TPE3 40			-80	-120	-150	-180	-200	-240
TPE2, TPE3			●	●	●	●	●	●
TPE2 D, TPE3 D			●	●	●	●	●	●
P2	1~/3~	kW	0.25	0.37	0.55	0.75	1.1	1.5
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	40	40	40	40	40	40
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	106/134
AF	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	106/134
P		[mm]	165	165	165	165	165	165
B1★		[mm]	72/218	72/218	72/218	72/218	72/218	72/218
B2★		[mm]	82/220	82/220	82/220	82/220	82/220	82/220
B3		[mm]	260	260	260	260	260	260
B4★	1~	[mm]	-/317	-/317	-/317	-/317	-/317	-/317
	3~	[mm]	-/337	-/337	-/337	-/337	-/337	-/337
C1★		[mm]	-/260	-/260	-/260	-/260	-/260	-/260
C5★		[mm]	-/75	-/75	-/75	-/75	-/75	-/75
C6★		[mm]	-/58	-/58	-/58	-/58	-/58	-/58
C7★		[mm]	-/155	-/155	-/155	-/155	-/155	-/155
C8★		[mm]	-/130	-/130	-/130	-/130	-/130	-/130
L1		[mm]	216	216	216	216	216	216
H1★		[mm]	65/69	65/69	65/69	65/69	65/69	65/69
H2		[mm]	162	162	162	162	162	162
H3★	1~	[mm]	442/446	442/446	442/446	442/446	442/446	462/466
	3~	[mm]	482/486	482/486	482/486	482/486	482/486	502/506
M			M12	M12	M12	M12	M12	M12

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TPE2, TPE2 D, TPE3, TPE3 D 50

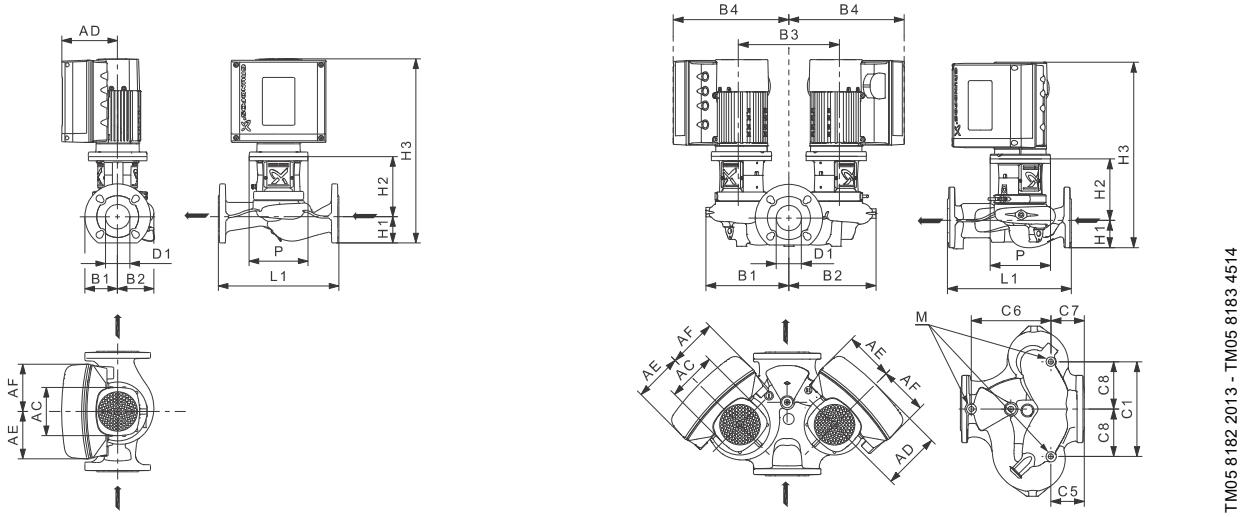


TM05 8173 0221



TM05 8193 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



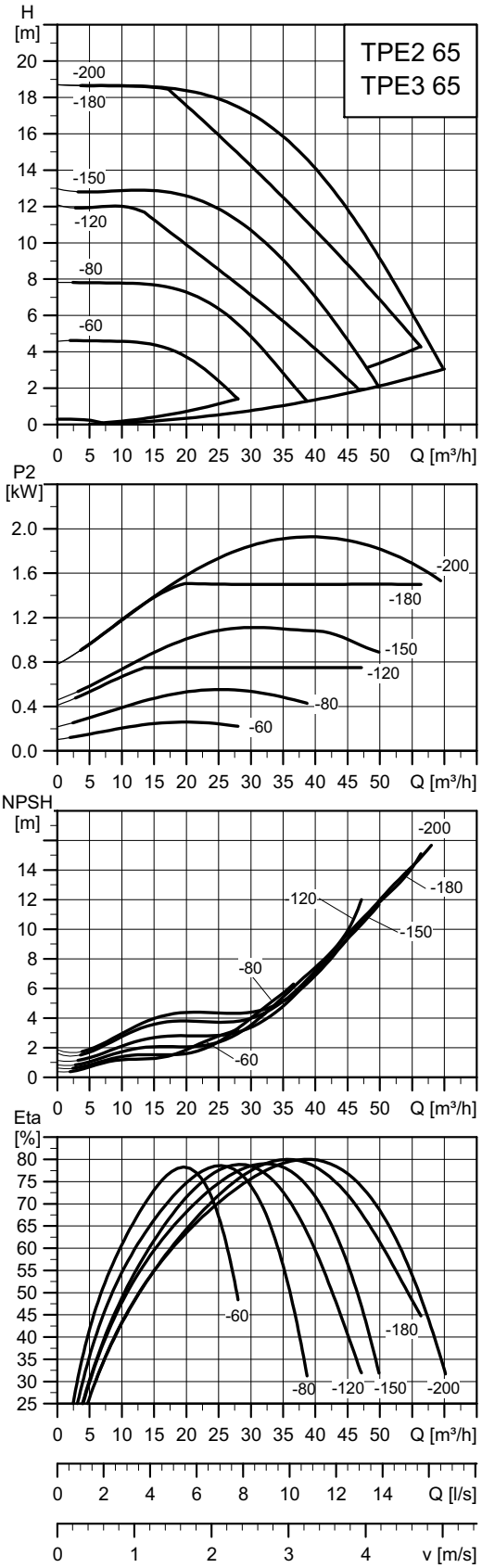
TM05 8182 2013 - TM05 8183 4514

Technical data

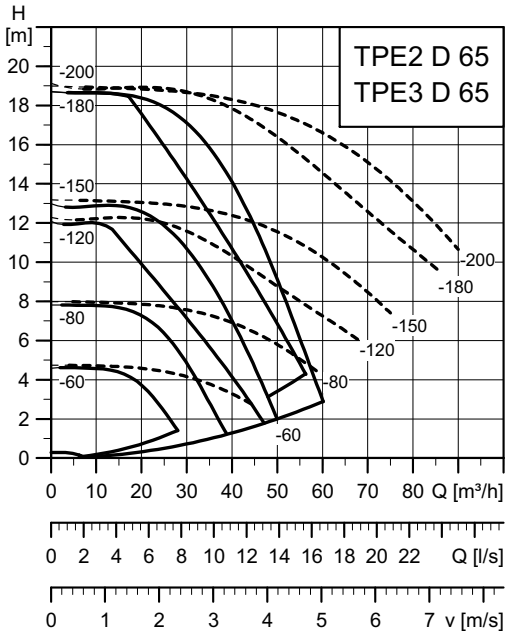
TPE2, TPE3 50			-60	-80	-120	-150	-180	-200	-240
TPE2, TPE3			•	•	•	•	•	•	•
TPE2 D, TPE3 D			•	•	•	•	•	•	•
P2	1~/3~	kW	0.37	0.37	0.55	0.75	1.1	1.5	2.2
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	50	50	50	50	50	50	50
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	106/134	-/134
AF	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	106/134	-/134
P		[mm]	165	165	165	165	165	165	165
B1★		[mm]	75/223	75/223	75/223	75/223	75/223	75/223	75/223
B2★		[mm]	91/227	91/227	91/227	91/227	91/227	91/227	91/227
B3		[mm]	260	260	260	260	260	260	260
B4★	1~	[mm]	-/317	-/317	-/317	-/317	-/317	-/317	-/317
	3~	[mm]	-/337	-/337	-/337	-/337	-/337	-/337	-/337
C1★		[mm]	-/260	-/260	-/260	-/260	-/260	-/260	-/260
C5★		[mm]	-/75	-/75	-/75	-/75	-/75	-/75	-/75
C6★		[mm]	-/175	-/175	-/175	-/175	-/175	-/175	-/175
C7★		[mm]	-/75	-/75	-/75	-/75	-/75	-/75	-/75
C8★		[mm]	-/130	-/130	-/130	-/130	-/130	-/130	-/130
L1		[mm]	280	280	280	280	280	280	280
H1★		[mm]	72/75	72/75	72/75	72/75	72/75	72/75	72/75
H2		[mm]	162	162	162	162	162	162	162
H3★	1~	[mm]	449/451	449/451	449/451	449/451	449/451	469/471	-
	3~	[mm]	489/491	489/491	489/491	489/491	489/491	509/511	509/511
M			M12	M12	M12	M12	M12	M12	M12

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TPE2, TPE2 D, TPE3, TPE3 D 65

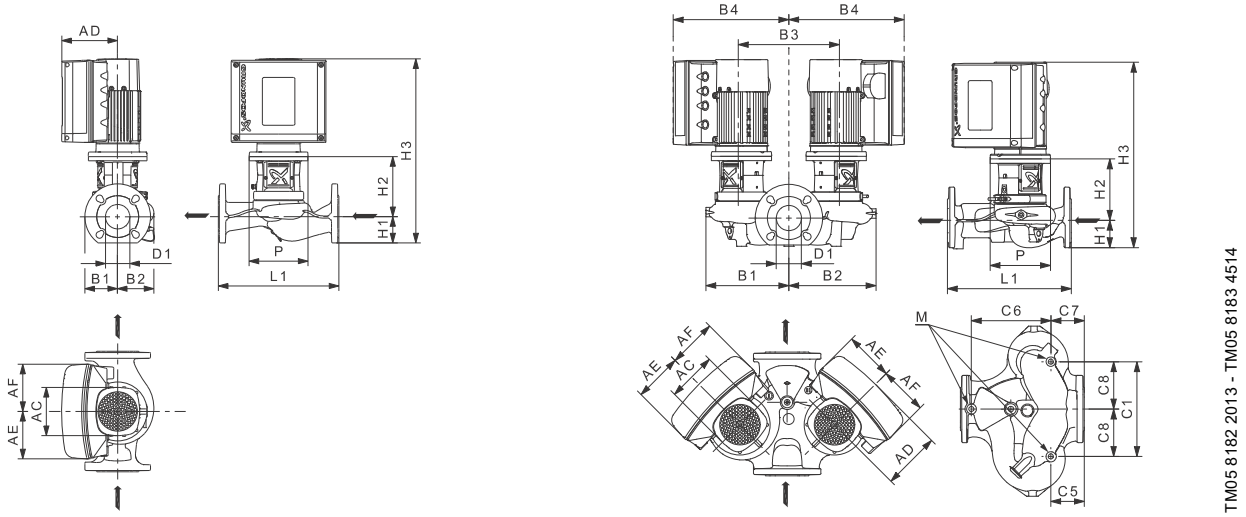


TM05 8174 0221



TM05 8194 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



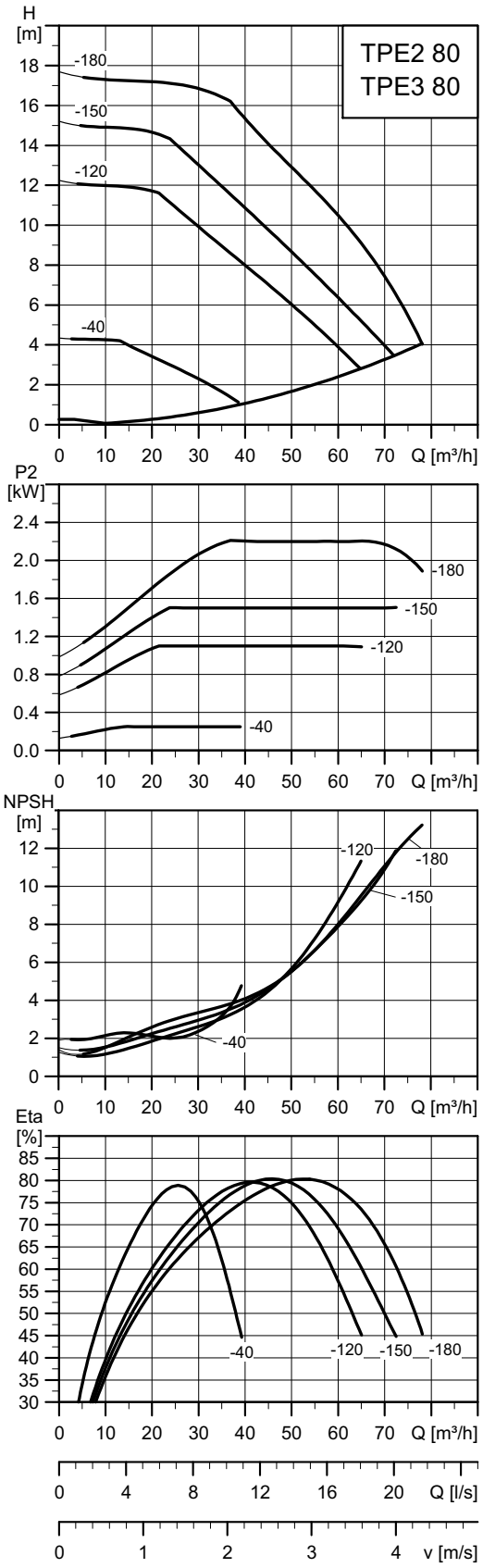
TM05 8182 2013 - TM05 8183 4514

Technical data

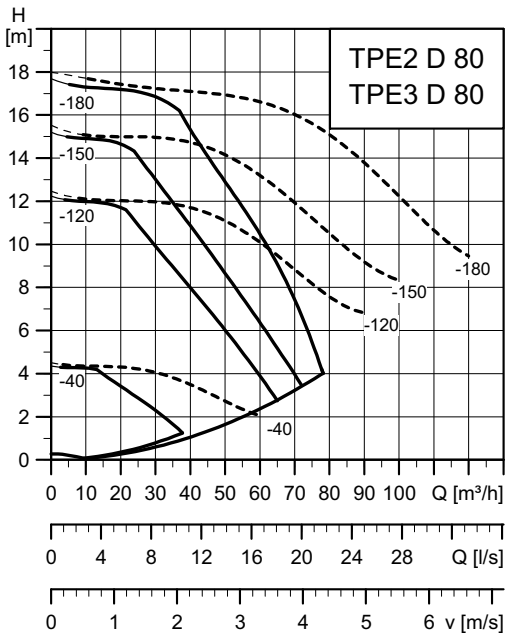
TPE2, TPE3 65			-60	-80	-120	-150	-180	-200
TPE2, TPE3			●	●	●	●	●	●
TPE2 D, TPE3 D			●	●	●	●	●	●
P2	1~/3~	kW	0.37	0.55	0.75	1.1	1.5	2.2
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	65	65	65	65	65	65
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	-/134
AF	1~/3~	[mm]	106/134	106/134	106/134	106/134	106/134	-/134
P		[mm]	165	165	165	165	165	165
B1★		[mm]	81/228	81/228	81/228	81/228	81/228	81/228
B2★		[mm]	102/240	102/240	102/240	102/240	102/240	102/240
B3		[mm]	260	260	260	260	260	260
B4★	1~	[mm]	-/317	-/317	-/317	-/317	-/317	-/317
	3~	[mm]	-/337	-/337	-/337	-/337	-/337	-/337
C1★		[mm]	-/260	-/260	-/260	-/260	-/260	-/260
C5★		[mm]	-/92	-/92	-/92	-/92	-/92	-/92
C6★		[mm]	-/218	-/218	-/218	-/218	-/218	-/218
C7★		[mm]	-/92	-/92	-/92	-/92	-/92	-/92
C8★		[mm]	-/130	-/130	-/130	-/130	-/130	-/130
L1		[mm]	340	340	340	340	340	340
H1★		[mm]	74/78	74/78	74/78	74/78	74/78	74/78
H2		[mm]	169	169	169	169	169	169
H3★	1~	[mm]	458/462	458/462	458/462	458/462	478/482	-
	3~	[mm]	498/502	498/502	498/502	498/502	518/522	518/522
M			M12	M12	M12	M12	M12	M12

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TPE2, TPE2 D, TPE3, TPE3 D 80

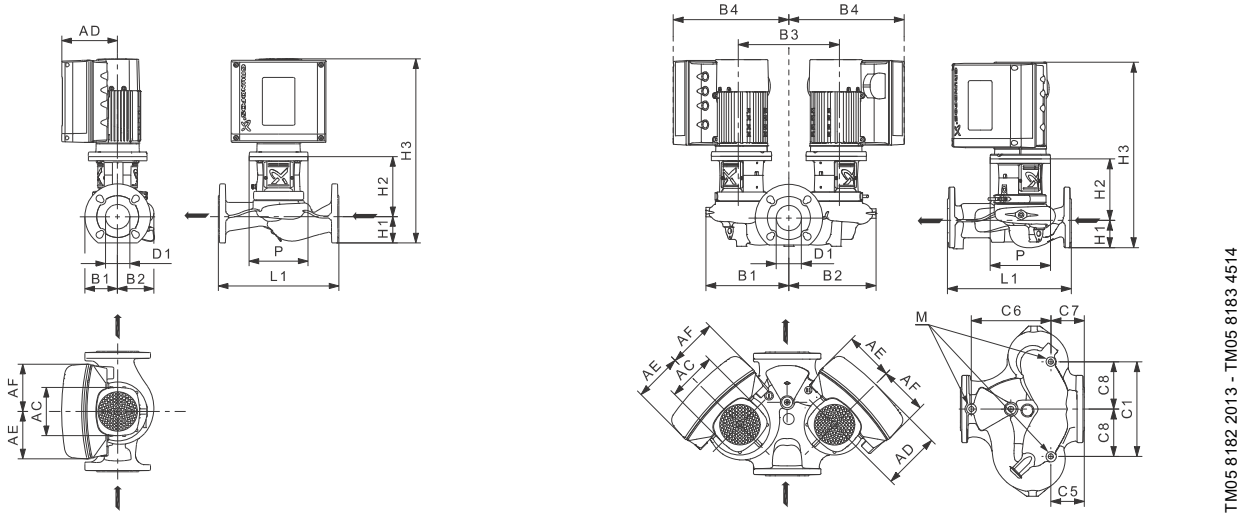


TM05 8175 0221



TM05 8195 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



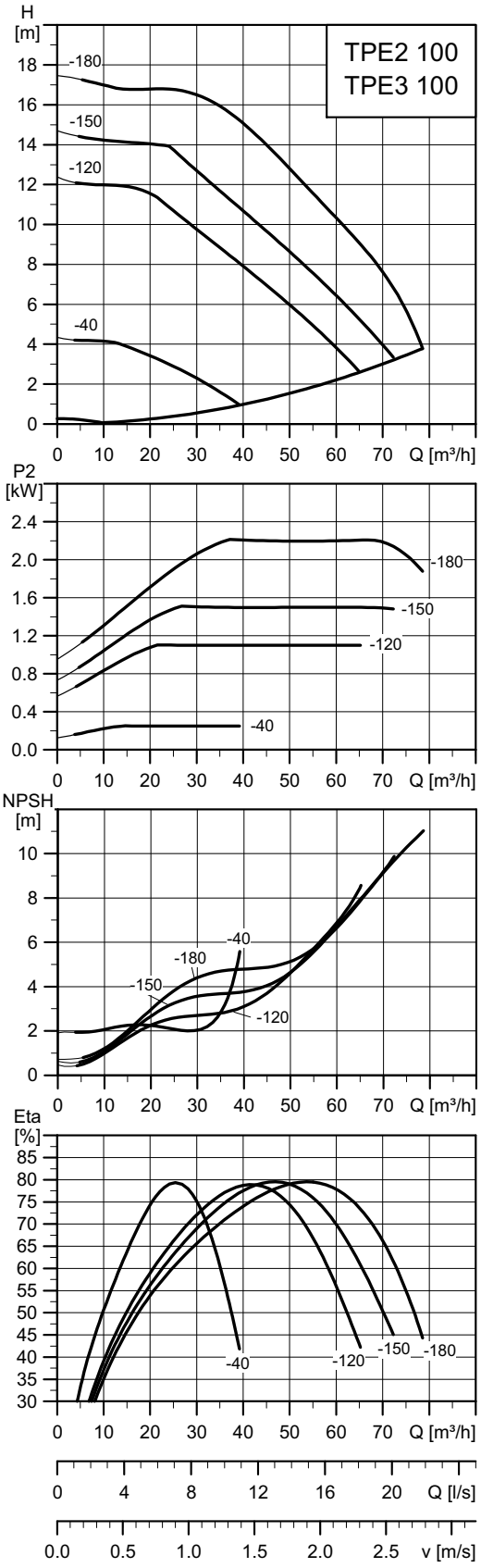
TM05 8182 2013 - TM05 8183 4514

Technical data

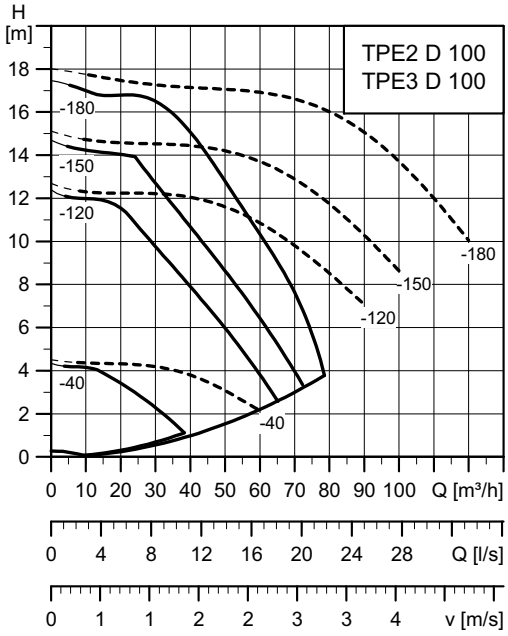
TPE2, TPE3 80			-40	-120	-150	-180
TPE2, TPE3			•	•	•	•
TPE2 D, TPE3 D			•	•	•	•
P2	1~/3~	kW	0.25	1.1	1.5	2.2
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	80	80	80	80
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	-/134
AF	1~/3~	[mm]	106/134	106/134	106/134	-/134
P		[mm]	165	165	165	165
B1★		[mm]	97/244	97/244	97/244	97/244
B2★		[mm]	123/254	123/254	123/254	123/254
B3		[mm]	260	260	260	260
B4★	1~	[mm]	-/317	-/317	-/317	-/317
	3~	[mm]	-/337	-/337	-/337	-/337
C1★		[mm]	-/260	-/260	-/260	-/260
C5★		[mm]	-/102	-/102	-/102	-/102
C6★		[mm]	-/218	-/218	-/218	-/218
C7★		[mm]	-/102	-/102	-/102	-/102
C8★		[mm]	-/130	-/130	-/130	-/130
L1		[mm]	360	360	360	360
H1★		[mm]	94/97	94/97	94/97	94/97
H2		[mm]	176	176	176	176
H3★	1~	[mm]	485/488	485/488	505/508	-
	3~	[mm]	525/528	525/528	545/548	545/548
M			M12	M12	M12	M12

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TPE2, TPE2 D, TPE3, TPE3 D 100

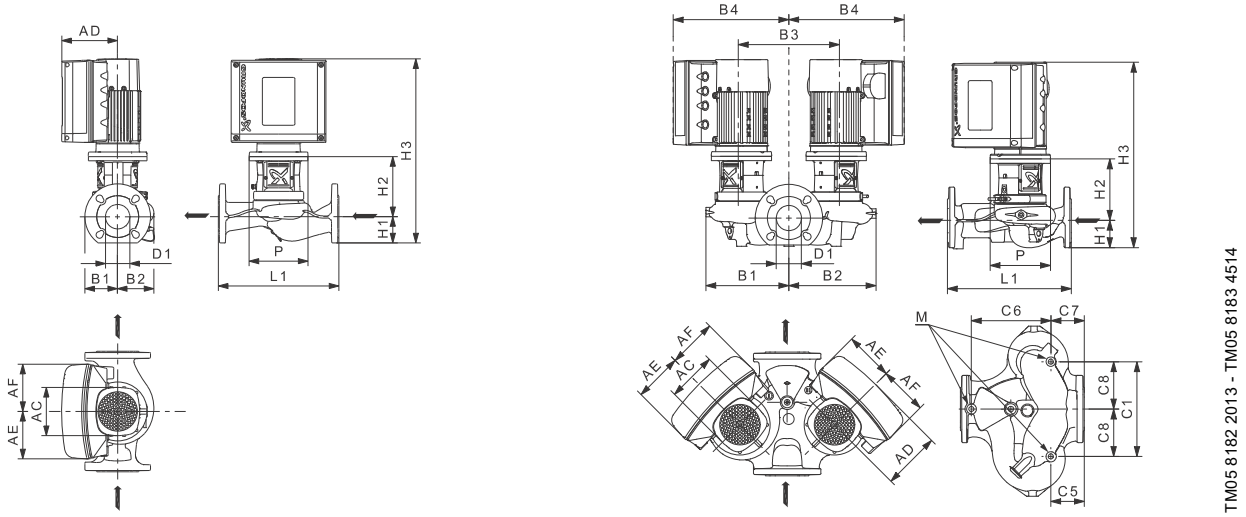


TM05 8176 0221



TM05 8196 0221

Note: The dotted Q, H curves apply to TPE2 D, TPE3 D in parallel operation.



TM05 8182 2013 - TM05 8183 4514

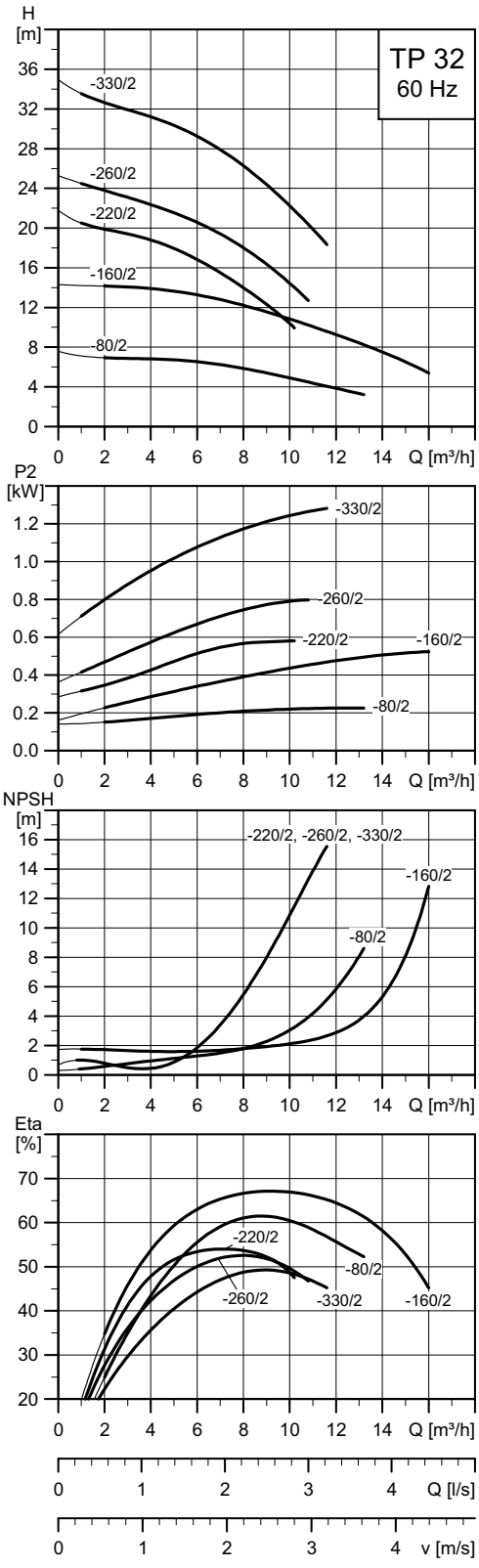
Technical data

TPE2, TPE3 100			-40	-120	-150	-180
TPE2, TPE3			•	•	•	•
TPE2 D, TPE3 D			•	•	•	•
P2	1~/3~	kW	0.25	1.1	1.5	2.2
PN			PN 6/10/16	PN 6/10/16	PN 6/10/16	PN 6/10/16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	100	100	100	100
AC	1~/3~	[mm]	122/122	122/122	122/122	122/122
AD	1~/3~	[mm]	158/158	158/158	158/158	158/158
AE	1~/3~	[mm]	106/134	106/134	106/134	-/134
AF	1~/3~	[mm]	106/134	106/134	106/134	-/134
P		[mm]	165	165	165	165
B1★		[mm]	98/ 252	98/ 252	98/ 252	98/ 252
B2★		[mm]	125/ 265	125/ 265	125/ 265	125/ 265
B3		[mm]	270	270	270	270
B4★	1~	[mm]	-/322	-/322	-/322	-/322
	3~	[mm]	-/342	-/342	-/342	-/342
C1★		[mm]	-/270	-/270	-/270	-/270
C5★		[mm]	-/147	-/147	-/147	-/147
C6★		[mm]	-/243	-/243	-/243	-/243
C7★		[mm]	-/147	-/147	-/147	-/147
C8★		[mm]	-/135	-/135	-/135	-/135
L1		[mm]	450	450	450	450
H1★		[mm]	102/104	102/104	102/104	102/104
H2		[mm]	189	189	189	189
H3★	1~	[mm]	506/508	506/508	526/528	-
	3~	[mm]	546/548	546/548	566/568	566/568
M			M12	M12	M12	M12

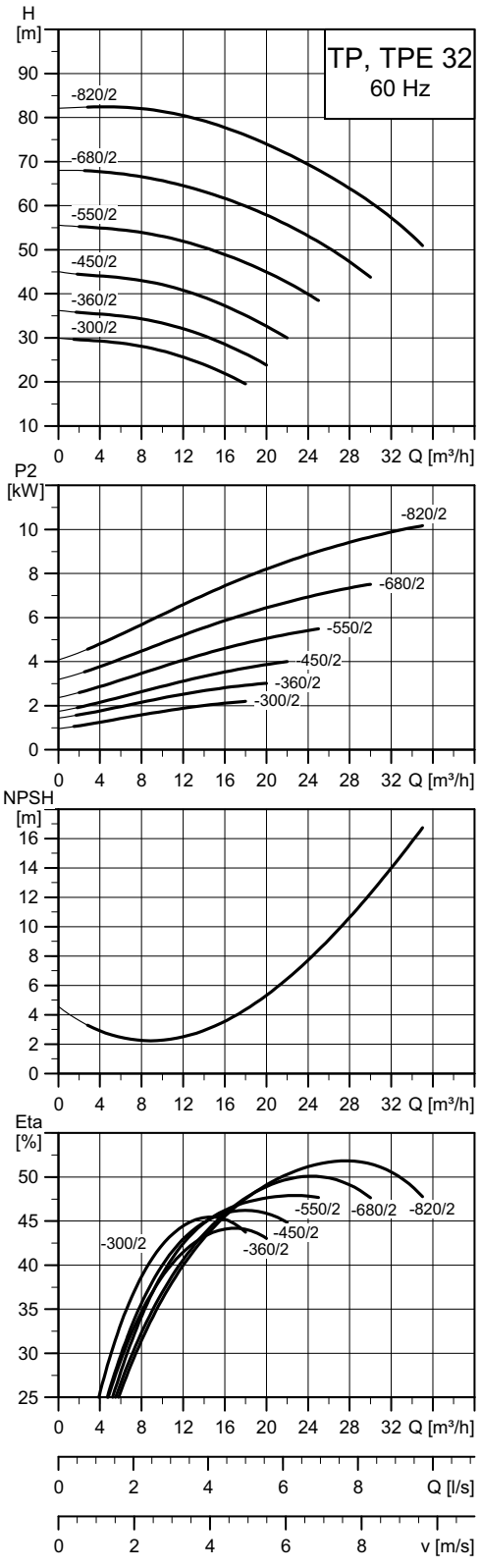
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE, 2-pole, PN 6, 10, 16, 25

TP, TPD, TPE 32-XX/2

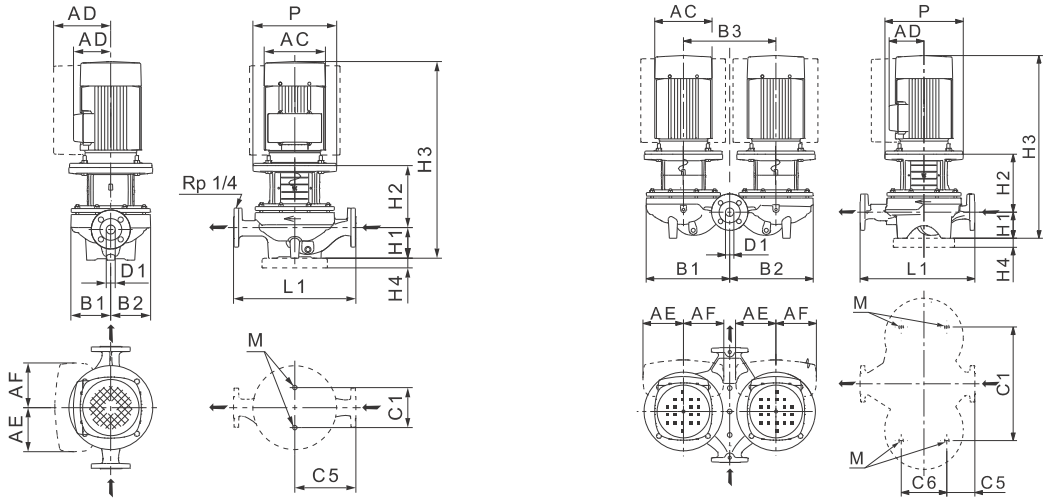


TM02 5034 0521



TM02 5035 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



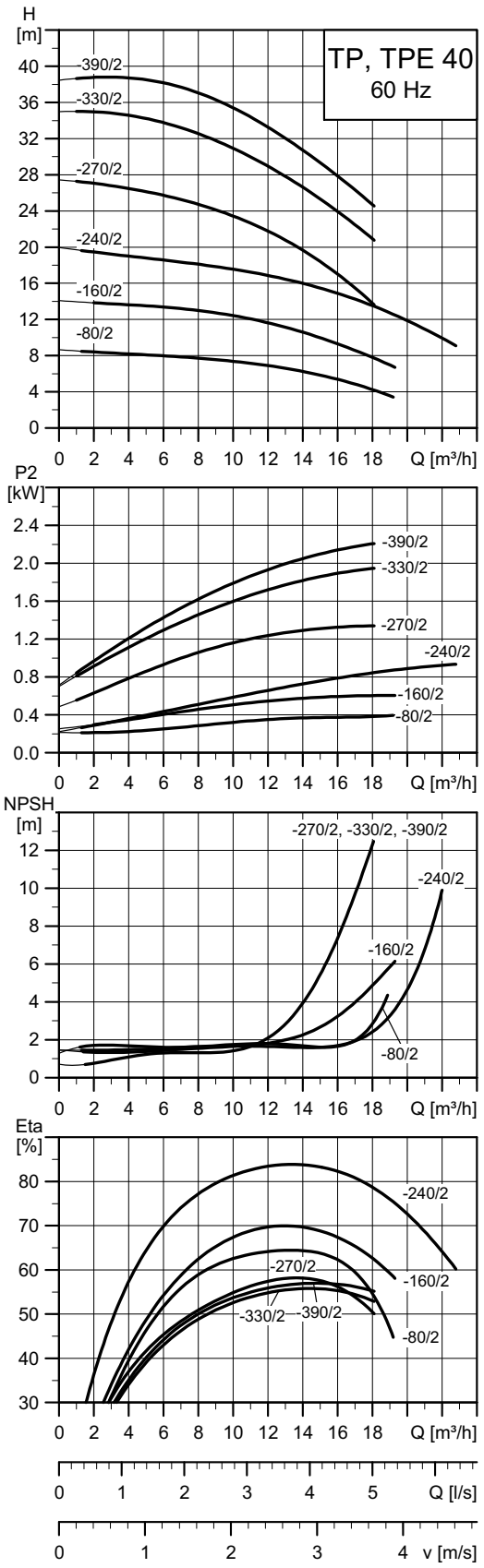
TM02 8632 2614 - TM02 8631 2614

Technical data

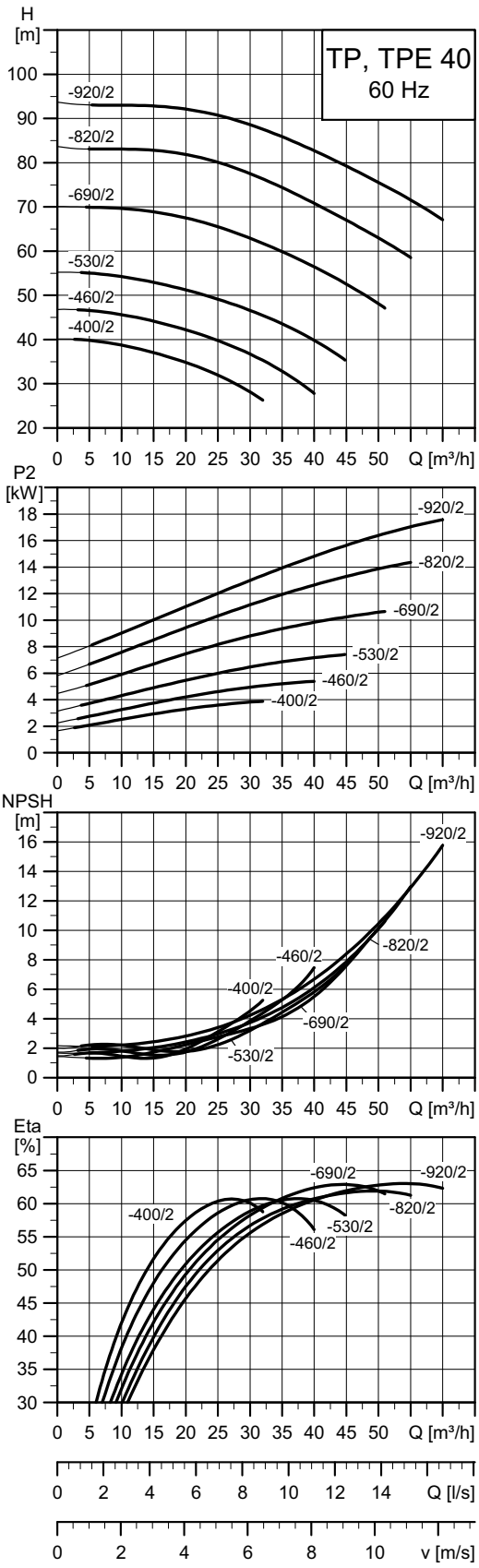
TP 32			-80/2	-160/2	-220/2	-260/2	-330/2	-300/2	-360/2	-450/2	-550/2	-680/2	-820/2
TPD			-	-	-	-	-	●	●	●	●	●	●
TPE			-	-	-	-	-	●	●	●	●	●	●
TPED			-	-	-	-	-	-	-	-	-	-	-
Series			200	200	200	200	200	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-	-
	3~ TP		71	71	80	90	90	90	100	112	132	132	160
	1~ TPE		-	-	-	-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	90	100	112	132	132	160
P2	1~/3~ TP	[kW]	-/0.37	-/0.55	-/0.75	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5	-/7.5	-/11
	1~/3~ TPE	[kW]	-	-	-	-	-	-/2.2	-/3	-/4	-/5.5	-/7.5	-/11
PN			PN 6/10	PN 6/10	PN 6/10	PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;140]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	32	32	32	32	32	32	32	32	32	32	32
AC	1~/3~ TP	[mm]	-/142	-/142	-/142	-/142	-/178	-/178	-/198	-/220	-/220	-/260	-/314
	1~/3~ TPE	[mm]	-	-	-	-	-	-/122	-/191	-/191	-/191	-/255	-/255
AD	1~/3~ TP	[mm]	-/109	-/109	-/109	-/109	-/110	-/167	-/120	-/134	-/134	-/159	-/204
	1~/3~ TPE	[mm]	-	-	-	-	-	-/158	-/201	-/201	-/201	-/237	-/237
AE	1~/3~ TPE	[mm]	-	-	-	-	-	132	146	146	146	237	237
AF	1~/3~ TPE	[mm]	-	-	-	-	-	132	146	146	146	237	237
P		[mm]	-	-	-	-	-	200	250	250	300	300	350
B1 ★		[mm]	75/-	75/-	102/-	102/-	102/-	144/321	144/321	144/321	144/321	144/321	144/321
B2 ★		[mm]	75/-	75/-	102/-	102/-	102/-	144/321	144/321	144/321	144/321	144/321	144/321
B3		[mm]	-	-	-	-	-	355	355	355	355	355	355
C1 ★		[mm]	80/-	80/-	80/-	80/-	80/-	144/435	144/435	144/435	144/435	144/435	144/435
C5 ★		[mm]	110	110	140	140	140	220/46	220/46	220/46	220/46	220/46	220/46
C6		[mm]	-	-	-	-	-	175	175	175	175	175	175
L1		[mm]	220	220	280	280	280	440	440	440	440	440	440
H1		[mm]	68	68	79	79	79	100	100	100	100	100	100
H2		[mm]	125	125	137	137	147	156	184	184	223	223	253
H3	1~/3~ TP	[mm]	-/395	-/395	-/447	-/517	-/507	-/577	-/619	-/656	-/714	-/702	-/824
	1~/3~ TPE	[mm]	-	-	-	-	-	-/530	-/618	-/618	-/712	-/736	-/759
H4		[mm]	-	-	-	-	-	-	-	-	-	-	35
M		[mm]	M12	M12	M12	M12	M12	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 40-XX/2

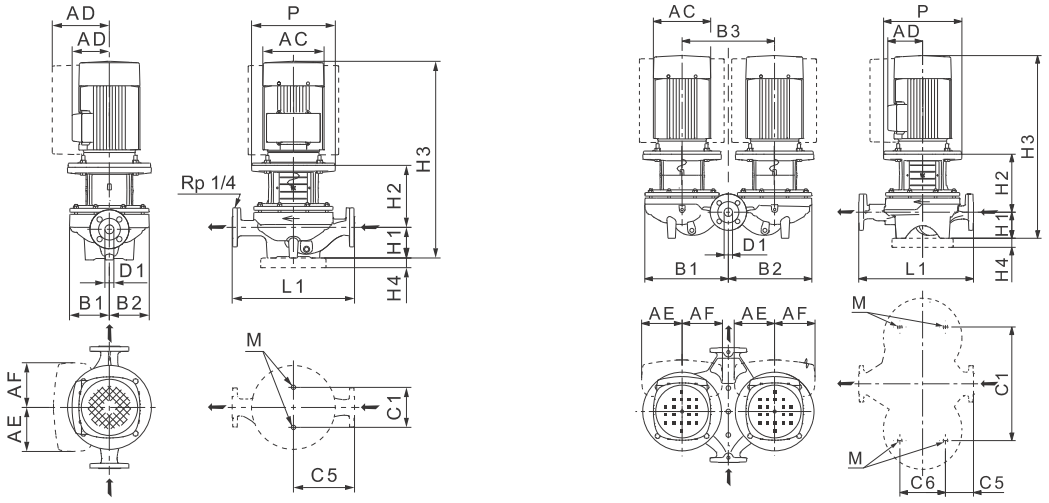


TM02 5036 0521



TM02 5037 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



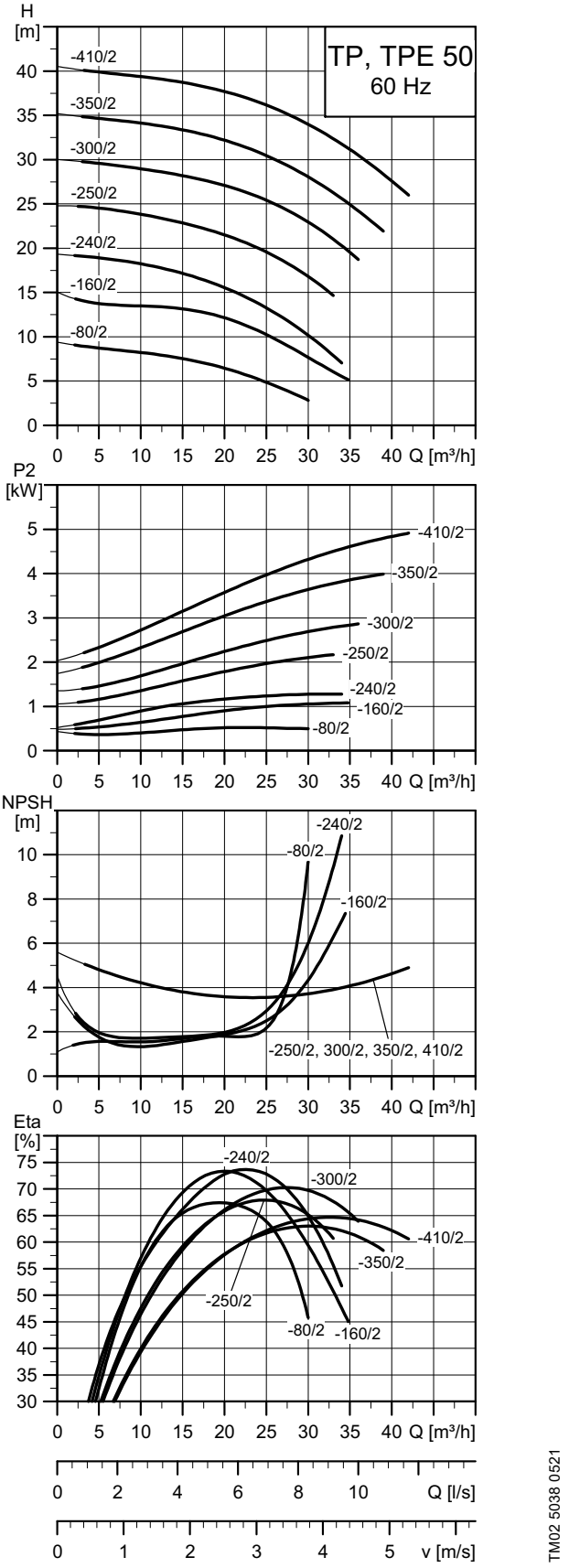
TM02 8632 2614 - TM02 8631 2614

Technical data

TP 40			-80/2	-160/2	-240/2	-270/2	-330/2	-390/2	-400/2	-460/2	-530/2	-690/2	-820/2	-920/2
TPD			-	-	-	-	-	-	●	●	●	●	●	●
TPE			-	-	-	-	-	-	●	●	●	●	●	●
TPED			-	-	-	-	-	-	-	-	-	-	-	-
Series			200	200	200	200	200	200	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-	-	-
	3~ TP		71	80	90	90	90	100	112	132	132	160	160	160
	1~ TPE		-	-	-	-	-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-	112	132	132	160	160	160
P2	1~/3~ TP	[kW]	-/0.55	-/0.75	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5
	1~/3~ TPE	[kW]	-	-	-	-	-	-	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5
PN			PN 6/10	PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;140]	[-25;140]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	40	40	40	40	40	40	40	40	40	40	40	40
AC	1~/3~ TP	[mm]	-/142	-/142	-/142	-/178	-/178	-/178	-/220	-/220	-/260	-/314	-/314	-/314
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/191	-/191	-/255	-/255	-/314	-/314
AD	1~/3~ TP	[mm]	-/109	-/109	-/109	-/110	-/110	-/110	-/134	-/134	-/159	-/204	-/204	-/204
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/201	-/201	-/237	-/237	-/308	-/308
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-	146	146	173	173	210	210
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-	146	146	173	173	210	210
P		[mm]	-	-	-	-	-	-	250	300	300	350	350	350
B1 ★		[mm]	85/-	75/-	101/-	102/-	102/-	102/-	150/325	150/325	150/325	150/325	150/325	150/325
B2 ★		[mm]	75/-	75/-	101/-	102/-	102/-	102/-	147/325	147/325	147/325	147/325	147/325	147/325
B3		[mm]	-	-	-	-	-	-	355	355	355	355	355	355
C1 ★		[mm]	120/-	80/-	80/-	120/-	120/-	120/-	144/435	144/435	144/435	144/435	144/435	144/435
C5 ★		[mm]	125	125	125	160	160	160	220/108	220/108	220/108	220/108	220/108	220/108
C6		[mm]	-	-	-	-	-	-	175	175	175	175	175	175
L1		[mm]	250	250	250	320	320	320	440	440	440	440	440	440
H1		[mm]	67	67	68	68	68	68	110	110	110	110	110	110
H2		[mm]	132	139	144	150	150	160	184	223	223	253	253	253
H3	1~/3~ TP	[mm]	-/390	-/437	-/513	-/500	-/540	-/564	-/666	-/724	-/724	-/834	-/834	-/878
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/628	-/722	-/746	-/769	-/834	-/878
H4		[mm]	-	-	-	-	-	-	-	-	-	35	35	35
M		[mm]	M12	M12	M12	M12	M12	M12	M16	M16	M16	M16	M16	M16

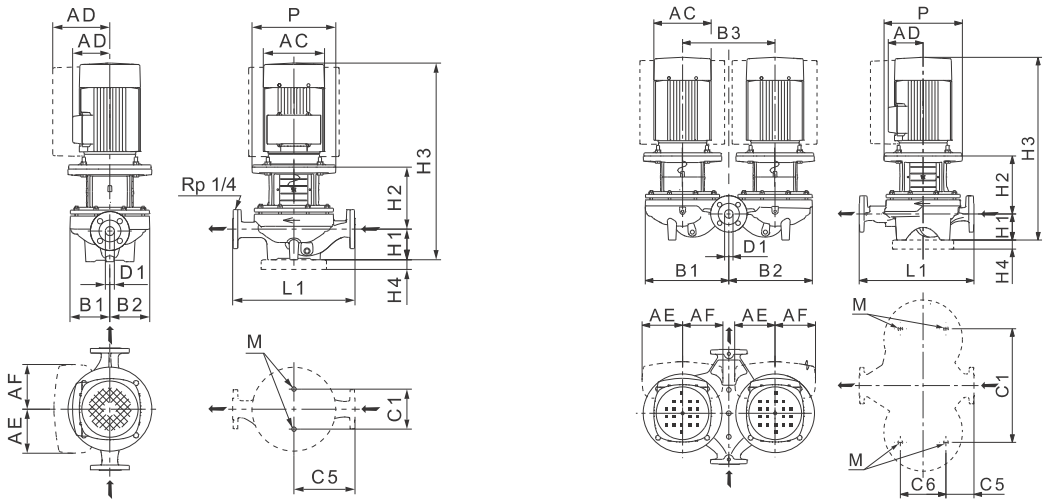
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 50-XX/2



TM02 5038 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



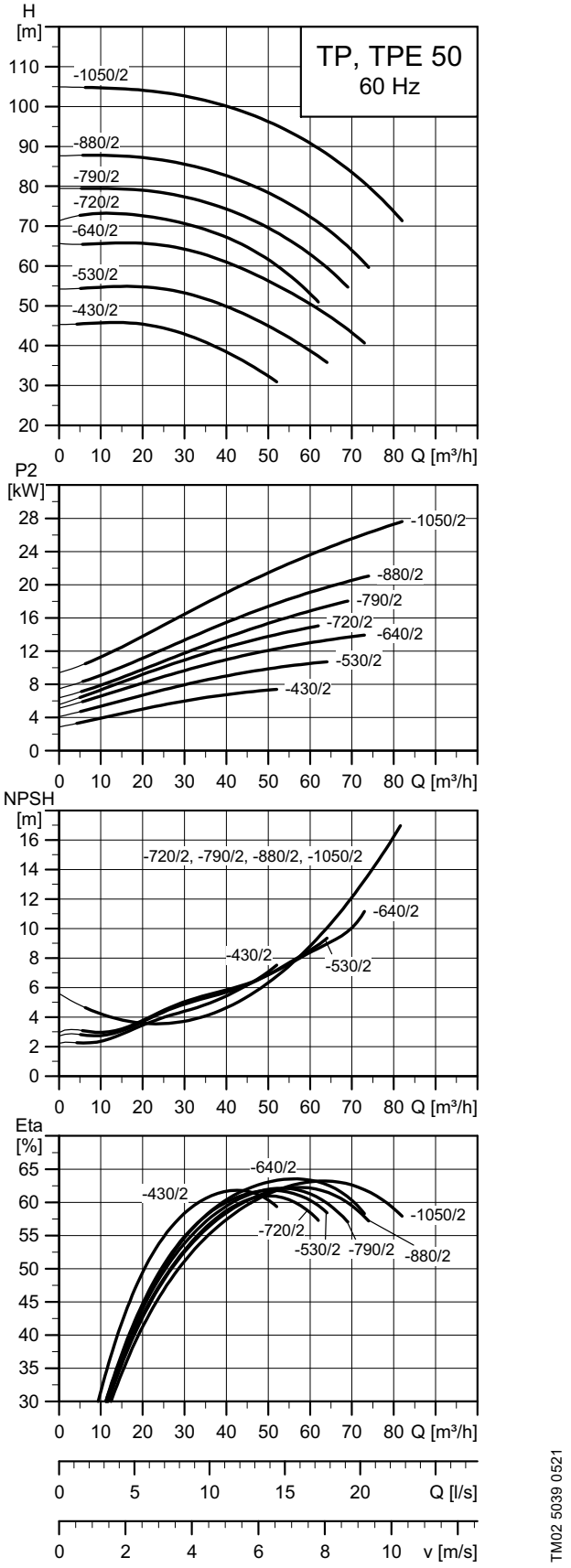
TM02 8632 2614 - TM02 8631 2614

Technical data

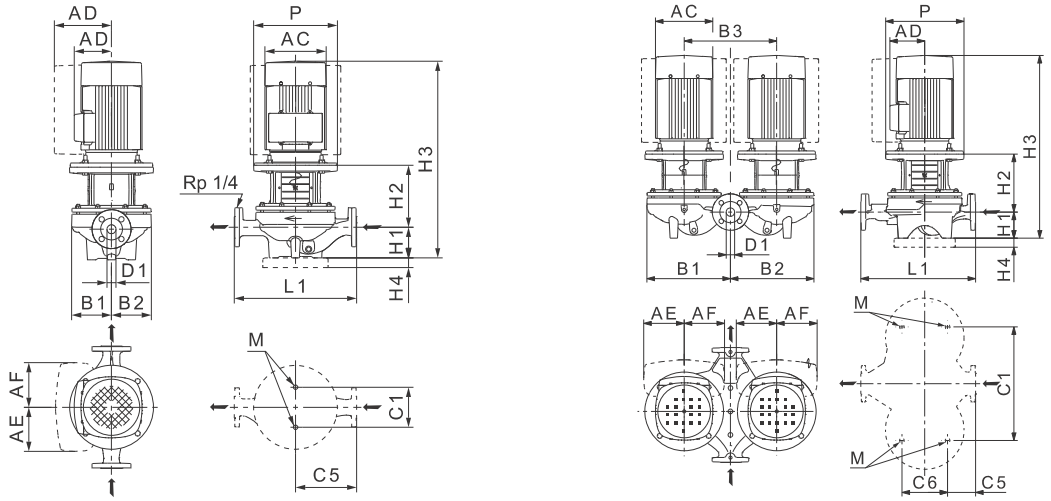
TP 50			-80/2	-160/2	-240/2	-250/2	-300/2	-350/2	-410/2
TPD			-	-	-	●	●	●	●
TPE			-	-	-	-	●	●	●
TPED			-	-	-	-	-	-	-
Series			200	200	200	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-
	3~ TP		71	90	90	90	100	112	132
	1~ TPE		-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	100	112	132
P2	1~/3~ TP	[kW]	-/0.55	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5
	1~/3~ TPE	[kW]	-	-	-	-	-/3	-/4	-/5.5
PN			PN 6/10	PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	50	50	50	50	50	50	50
AC	1~/3~ TP	[mm]	-/142	-/142	-/175	-/178	-/198	-/220	-/220
	1~/3~ TPE	[mm]	-	-	-	-	-/191	-/191	-/191
AD	1~/3~ TP	[mm]	-/109	-/109	-/110	-/110	-/120	-/134	-/134
	1~/3~ TPE	[mm]	-	-	-	-	-/201	-/201	-/201
AE	1~/3~ TPE	[mm]	-	-	-	-	146	146	146
AF	1~/3~ TPE	[mm]	-	-	-	-	146	146	146
P		[mm]	-	-	-	200	250	250	300
B1 ★		[mm]	95/-	100/-	100/-	117/252	117/252	133/290	133/290
B2 ★		[mm]	83/-	100/-	100/-	117/252	117/252	119/284	119/284
B3		[mm]	-	-	-	270	270	320	320
C1 ★		[mm]	120/-	120/-	120/-	144/350	144/350	144/400	144/400
C5 ★		[mm]	140	140	140	170/60	170/60	170/52	170/52
C6		[mm]	-	-	-	175	175	175	175
L1		[mm]	280	280	280	340	340	340	340
H1		[mm]	75	75	75	115	115	115	115
H2		[mm]	137	135	145	152	180	189	228
H3	1~/3~ TP	[mm]	-/403	-/511	-/501	-/588	-/630	-/676	-/734
	1~/3~ TPE	[mm]	-	-	-	-	-/629	-/638	-/708
H4		[mm]	-	-	-	-	-	-	-
M		[mm]	M12	M12	M12	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 50-XX/2



Note: All QH-curves apply to single-head pumps. For further information, see page 119.



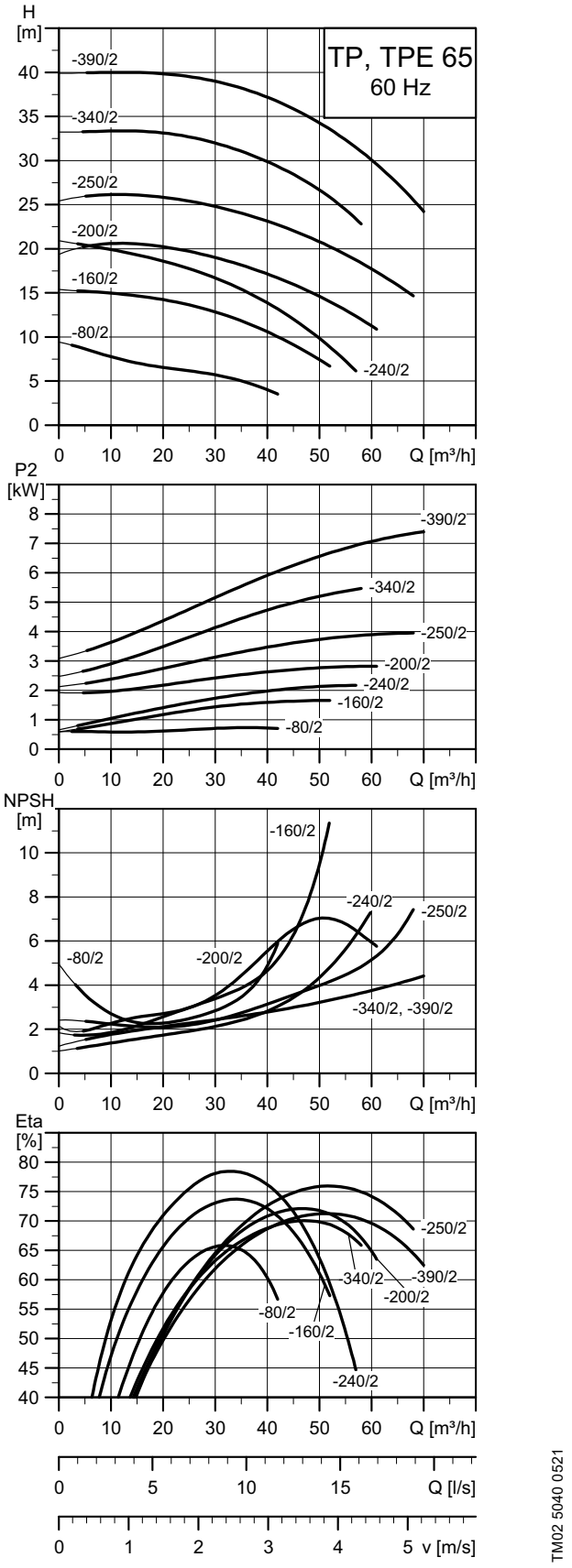
TM02 8632 2614 - TM02 8631 2614

Technical data

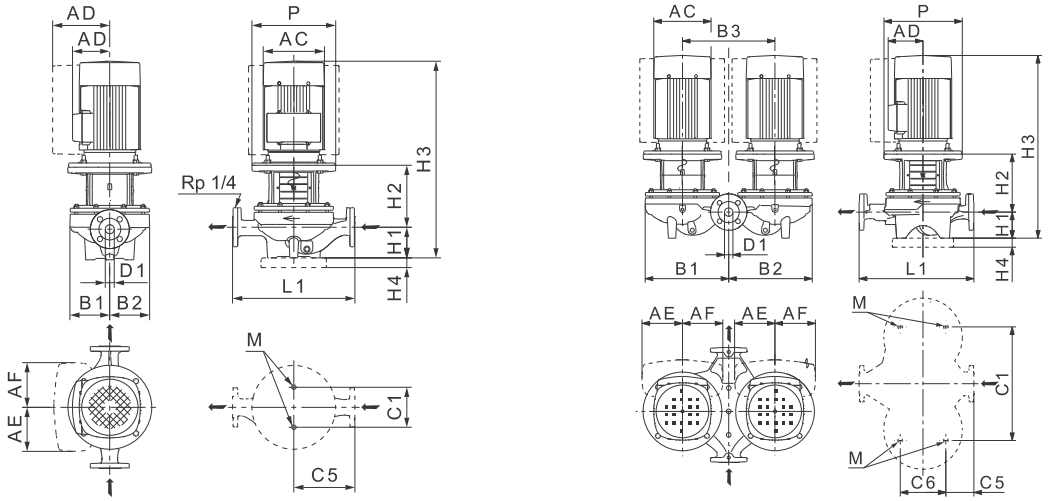
TP 50			-430/2	-530/2	-640/2	-720/2	-790/2	-880/2	-1050/2
TPD			●	●	●	●	●	●	●
TPE			●	●	●	●	●	●	-
TPED			-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-
	3~ TP		132	160	160	160	160	180	200
	1~ TPE		-	-	-	-	-	-	-
	3~ TPE		132	160	160	160	160	180	-
P2	1~/3~ TP	[kW]	-/7.5	-/11	-/15	-/15	-/18.5	-/22	-/30
	1~/3~ TPE	[kW]	-/7.5	-/11	-/15	-/15	-/18.5	-/22	-
PN			PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	50	50	50	50	50	50	50
AC	1~/3~ TP	[mm]	-/260	-/314	-/314	-/314	-/314	-/314	-/396
	1~/3~ TPE	[mm]	-/255	-/255	-/314	-/314	-/314	-/314	-
AD	1~/3~ TP	[mm]	-/159	-/204	-/204	-/204	-/204	-/204	-/315
	1~/3~ TPE	[mm]	-/237	-/237	-/308	-/308	-/308	-/308	-
AE	1~/3~ TPE	[mm]	173	173	210	210	210	210	-
AF	1~/3~ TPE	[mm]	173	173	210	210	210	210	-
P		[mm]	300	350	350	350	350	350	400
B1 ★		[mm]	162/373	162/373	162/373	180/386	180/386	180/386	180/386
B2 ★		[mm]	162/373	162/373	162/373	164/379	164/379	164/379	164/379
B3		[mm]	420	420	420	420	420	420	420
C1 ★		[mm]	144/500	144/500	144/500	144/500	144/500	144/500	144/500
C5 ★		[mm]	220/123	220/123	220/123	220/123	220/123	220/123	220/123
C6		[mm]	175	175	175	175	175	175	175
L1		[mm]	440	440	440	440	440	440	440
H1		[mm]	115	115	115	115	115	115	115
H2		[mm]	228	257	257	264	264	264	264
H3	1~/3~ TP	[mm]	-/734	-/843	-/843	-/850	-/894	-/894	-/942
	1~/3~ TPE	[mm]	-/731	-/778	-/843	-/850	-/894	-/920	-
H4		[mm]	-	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 65-XX/2



Note: All QH-curves apply to single-head pumps. For further information, see page 119.



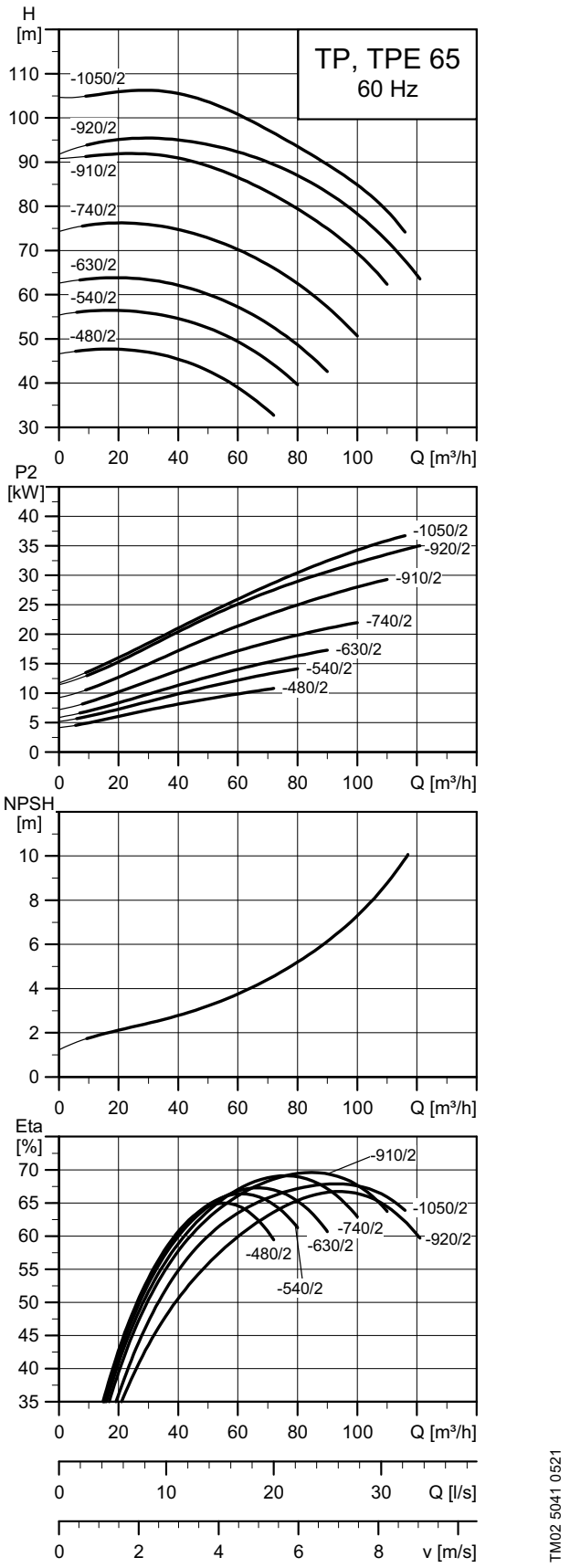
TM02 8632 2614 - TM02 8631 2614

Technical data

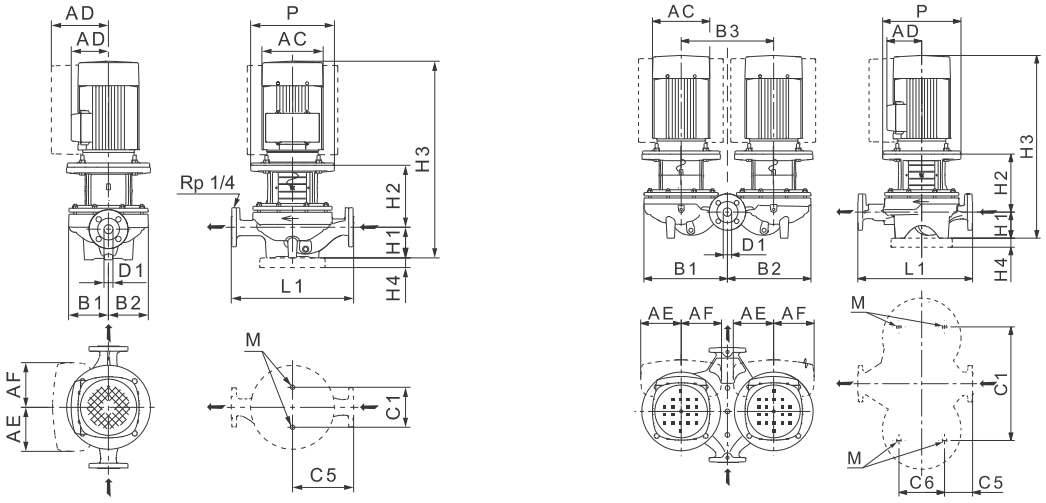
TP 65			-80/2	-160/2	-240/2	-200/2	-250/2	-340/2	-390/2
TPD			-	-	-	●	●	●	●
TPE			-	-	-	●	●	●	●
TPED			-	-	-	-	-	-	-
Series			200	200	200	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-
	3~ TP		90	90	90	100	112	132	132
	1~ TPE		-	-	-	-	-	-	-
	3~ TPE		-	-	-	100	112	132	132
P2	1~/3~ TP	[kW]	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5	-/7.5
	1~/3~ TPE	[kW]	-	-	-	-/3	-/4	-/5.5	-/7.5
PN			PN 6/10	PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	65	65	65	65	65	65	65
AC	1~/3~ TP	[mm]	-/142	-/175	-/175	-/198	-/220	-/220	-/260
	1~/3~ TPE	[mm]	-	-	-	-/191	-/191	-/191	-/255
AD	1~/3~ TP	[mm]	-/109	-/110	-/110	-/120	-/134	-/134	-/159
	1~/3~ TPE	[mm]	-	-	-	-/201	-/201	-/201	-/237
AE	1~/3~ TPE	[mm]	-	-	-	146	146	146	173
AF	1~/3~ TPE	[mm]	-	-	-	146	146	146	173
P		[mm]	-	-	-	250	250	300	300
B1 ★		[mm]	93/-	100/-	100/-	134/288	134/288	142/298	142/298
B2 ★		[mm]	93/-	100/-	100/-	122/282	122/282	124/290	124/290
B3		[mm]	-	-	-	320	320	320	320
C1 ★		[mm]	120/-	120/-	120/-	144/400	144/400	144/400	144/400
C5 ★		[mm]	170	170	170	180/65	180/65	180/65	180/65
C6		[mm]	-	-	-	175	175	175	175
L1		[mm]	340	340	340	360	360	360	360
H1		[mm]	82	82	82	105	105	105	105
H2		[mm]	156	154	154	192	192	239	239
H3	1~/3~ TP	[mm]	-/539	-/517	-/557	-/632	-/669	-/735	-/723
	1~/3~ TPE	[mm]	-	-	-	-/631	-/631	-/709	-/733
H4		[mm]	-	-	-	-	-	-	-
M		[mm]	M12	M12	M12	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 65-XX/2



Note: All QH-curves apply to single-head pumps. For further information, see page 119.



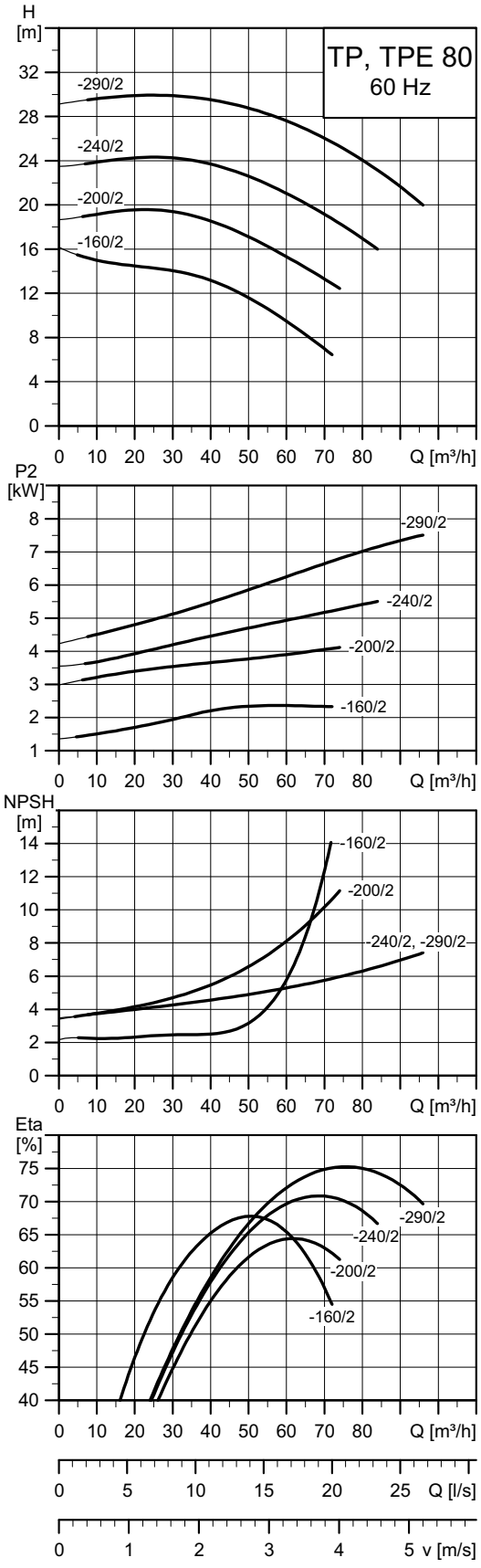
TM02 8632 2614 - TM02 8631 2614

Technical data

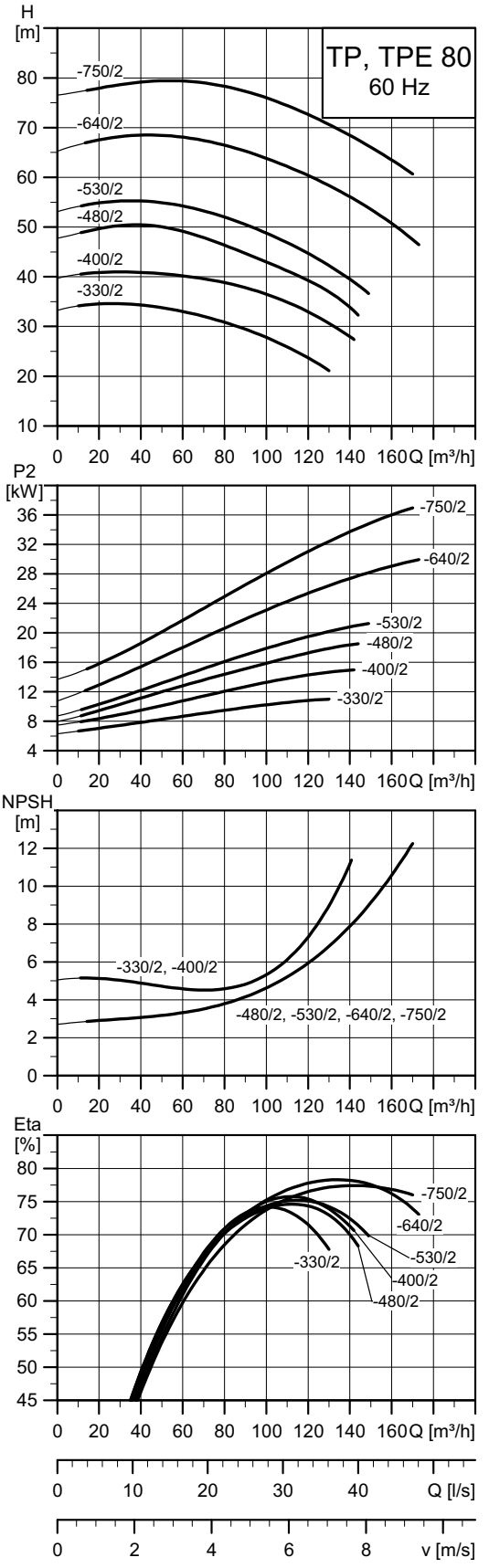
TP 65			-480/2	-540/2	-630/2	-740/2	-910/2	-920/2	-1050/2
TPD			●	●	●	●	●	●	●
TPE			●	●	●	●	-	-	-
TPED			-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-
	3~ TP		160	160	160	180	200	200	200
	1~ TPE		-	-	-	-	-	-	-
	3~ TPE		160	160	160	180	-	-	-
P2	1~/3~ TP	[kW]	-/11	-/15	-/18.5	-/22	-/30	-/37	-/37
	1~/3~ TPE	[kW]	-/11	-/15	-/18.5	-/22	-	-	-
PN			PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	65	65	65	65	65	65	65
AC	1~/3~ TP	[mm]	-/314	-/314	-/314	-/314	-/396	-/407	-/396
	1~/3~ TPE	[mm]	-/255	-/314	-/314	-/314	-	-	-
AD	1~/3~ TP	[mm]	-/204	-/204	-/204	-/204	-/315	-/315	-/315
	1~/3~ TPE	[mm]	-/237	-/308	-/308	-/308	-	-	-
AE	1~/3~ TPE	[mm]	173	210	210	210	-	-	-
AF	1~/3~ TPE	[mm]	173	210	210	210	-	-	-
P		[mm]	350	350	350	350	400	400	400
B1 ★		[mm]	178/349	178/349	178/349	178/349	178/349	178/349	178/349
B2 ★		[mm]	164/383	164/383	164/383	164/383	164/383	164/383	164/383
B3		[mm]	440	440	440	440	440	440	440
C1 ★		[mm]	144/520	144/520	144/520	144/520	144/520	144/520	144/520
C5 ★		[mm]	238/111	238/111	238/111	238/111	238/111	238/111	238/111
C6		[mm]	175	175	175	175	175	175	175
L1		[mm]	475	475	475	475	475	475	475
H1		[mm]	125	125	125	125	125	125	125
H2		[mm]	263	263	263	263	263	263	263
H3	1~/3~ TP	[mm]	-/859	-/859	-/903	-/903	-/951	-/999	-/976
	1~/3~ TPE	[mm]	-/794	-/859	-/903	-/929	-	-	-
H4		[mm]	35	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 80-XX/2

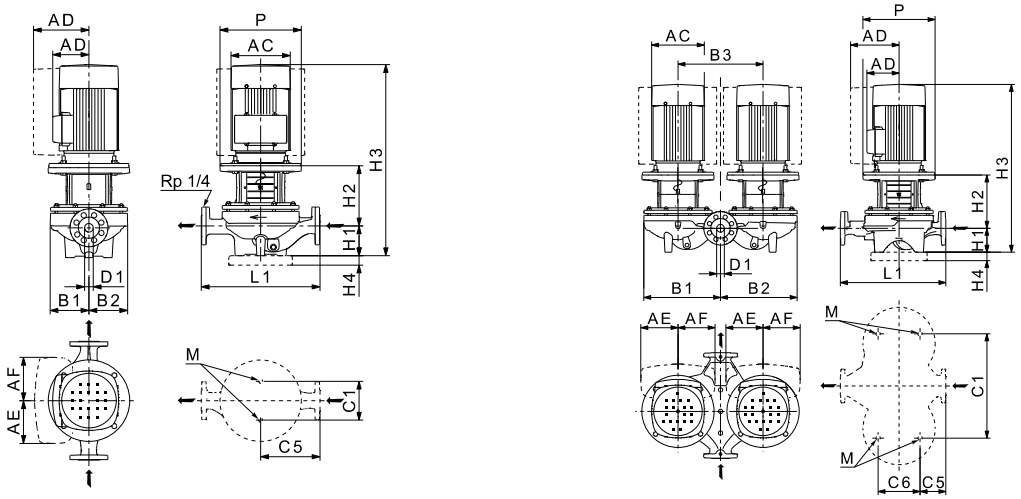


TM02 5042 0521



TM02 8769 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



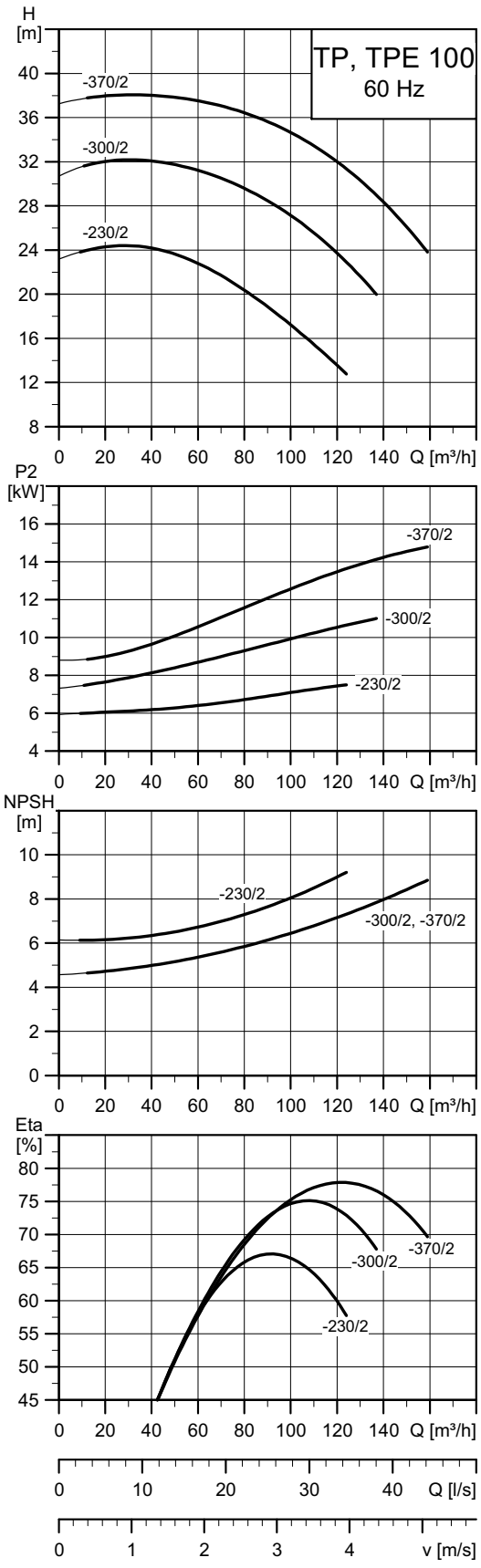
TM03 5348 2614 - TM03 5349 2614

Technical data

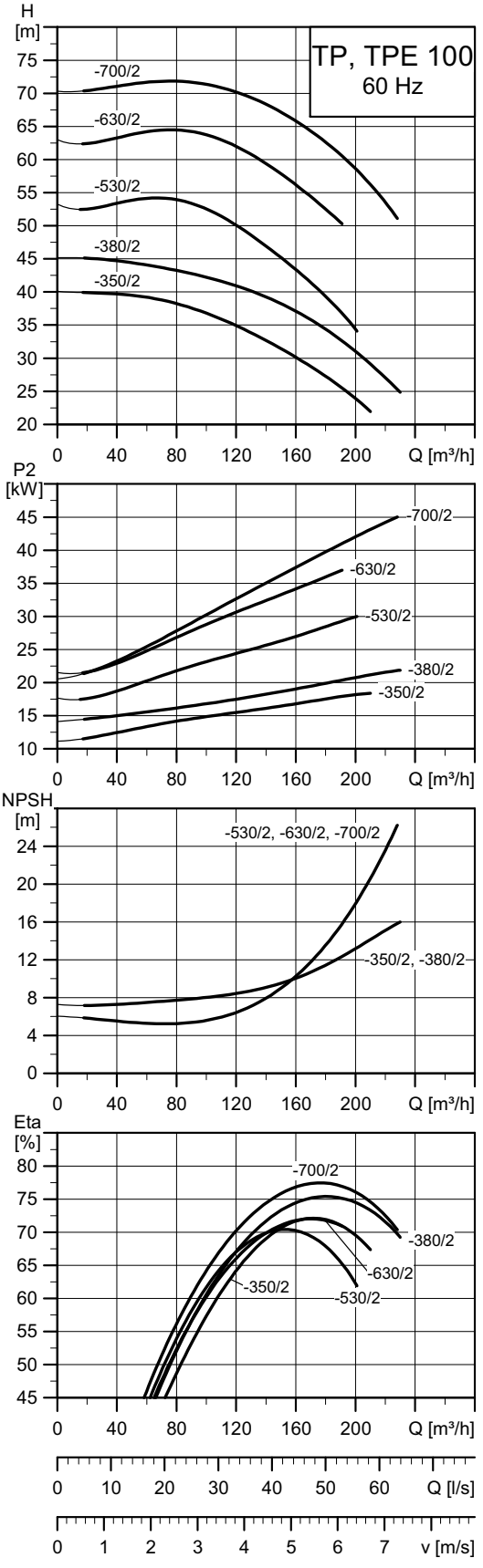
TP 80			-160/2	-200/2	-240/2	-290/2	-330/2	-400/2	-480/2	-530/2	-640/2	-750/2
TPD			-	●	●	●	●	●	●	●	●	●
TPE			-	●	●	●	●	●	●	●	-	-
TPED			-	-	-	-	-	-	-	-	-	-
Series			200	300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-
	3~ TP		100	112	132	132	160	160	160	180	200	200
	1~ TPE		-	-	-	-	-	-	-	-	-	-
	3~ TPE		-	112	132	132	160	160	160	180	-	-
P2	1~/3~ TP	[kW]	-/3	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5	-/22	-/30	-/37
	1~/3~ TPE	[kW]	-	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5	-/22	-	-
PN			PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
$T_{min};T_{max}$		[°C]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	80	80	80	80	80	80	80	80	80	80
AC	1~/3~ TP	[mm]	-/175	-/220	-/220	-/260	-/314	-/314	-/314	-/314	-/396	-/396
	1~/3~ TPE	[mm]	-	-/191	-/191	-/255	-/255	-/314	-/314	-/314	-	-
AD	1~/3~ TP	[mm]	-/110	-/134	-/134	-/159	-/204	-/204	-/204	-/204	-/315	-/315
	1~/3~ TPE	[mm]	-	-/201	-/201	-/237	-/237	-/308	-/308	-/308	-	-
AE	1~/3~ TPE	[mm]	-	146	146	173	173	210	210	210	-	-
AF	1~/3~ TPE	[mm]	-	146	146	173	173	210	210	210	-	-
P		[mm]	-	250	300	300	350	350	350	350	400	400
B1 ★		[mm]	125/-	125/260	125/260	125/260	176/366	176/366	187/416	187/416	187/416	187/416
B2 ★		[mm]	100/-	119/290	119/290	119/290	144/354	144/354	162/405	162/405	162/405	162/405
B3		[mm]	-	340	340	340	400	400	470	470	470	470
C1 ★		[mm]	160/-	144/420	144/420	144/420	144/480	144/480	144/550	144/550	144/550	144/550
C5 ★		[mm]	180	180/78	180/78	180/78	220/93	220/93	250/133	250/133	250/133	250/133
C6		[mm]	-	175	175	175	175	175	175	175	175	175
L1		[mm]	360	360	360	360	440	440	500	500	500	500
H1		[mm]	97	105	105	105	115	115	115	115	115	115
H2		[mm]	174	204	243	243	273	273	273	273	273	273
H3	1~/3~ TP	[mm]	-/606	-/681	-/739	-/727	-/859	-/859	-/903	-/903	-/951	-/976
	1~/3~ TPE	[mm]	-	-/643	-/713	-/737	-/794	-/859	-/903	-/929	-	-
H4		[mm]	-	-	-	-	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 100-XX/2

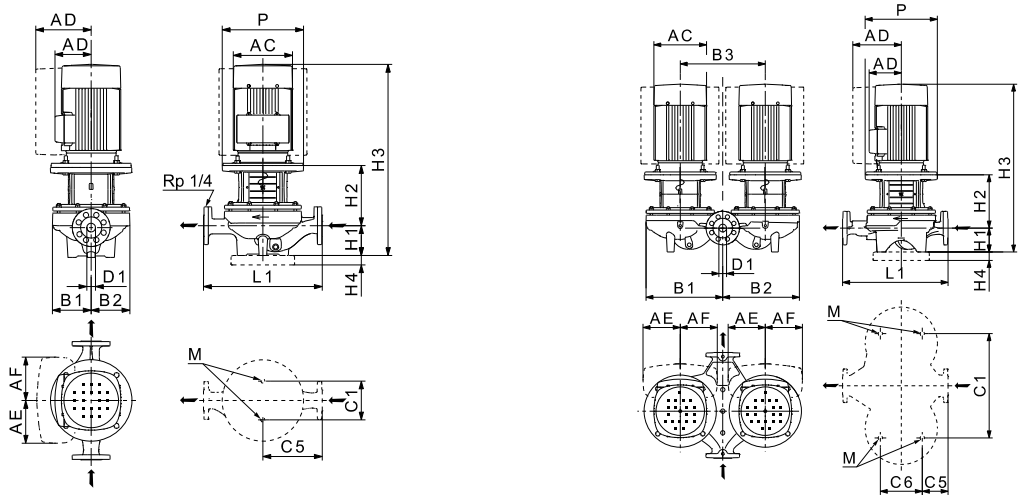


TM02 8770 0521



TM02 8771 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



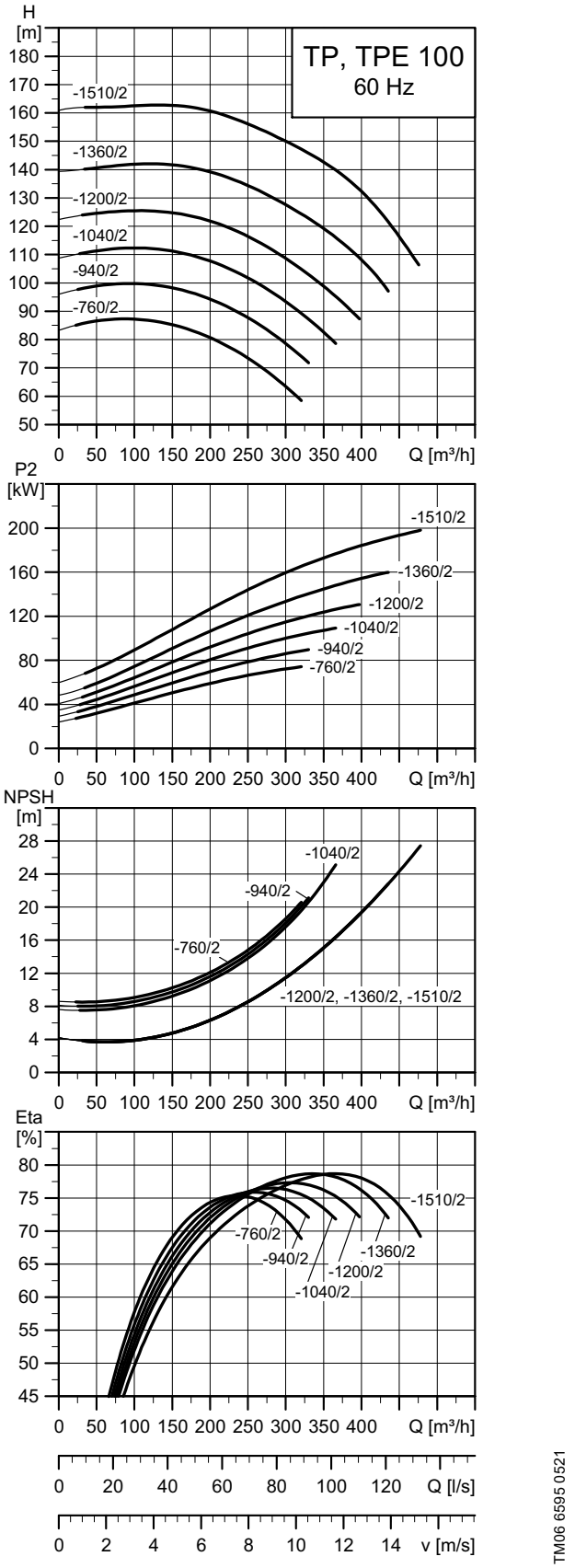
TM03 5348 2614 - TM03 5349 2614

Technical data

TP 100			-230/2	-300/2	-370/2	-350/2	-380/2	-530/2	-630/2	-700/2
TPD			●	●	●	●	●	●	●	●
TPE			●	●	●	●	●	-	-	-
TPED			-	-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-
	3~ TP		132	160	160	160	180	200	200	225
	1~ TPE		-	-	-	-	-	-	-	-
	3~ TPE		132	160	160	160	180	-	-	-
P2	1~/3~ TP	[kW]	-/7.5	-/11	-/15	-/18.5	-/22	-/30	-/37	-/45
	1~/3~ TPE	[kW]	-/7.5	-/11	-/15	-/18.5	-/22	-	-	-
PN			PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	100	100	100	100	100	100	100	100
AC	1~/3~ TP	[mm]	-/260	-/314	-/314	-/314	-/314	-/396	-/396	-/449
	1~/3~ TPE	[mm]	-/255	-/255	-/314	-/314	-/314	-	-	-
AD	1~/3~ TP	[mm]	-/159	-/204	-/204	-/204	-/204	-/315	-/315	-/338
	1~/3~ TPE	[mm]	-/237	-/237	-/308	-/308	-/308	-	-	-
AE	1~/3~ TPE	[mm]	173	173	210	210	210	-	-	-
AF	1~/3~ TPE	[mm]	173	173	210	210	210	-	-	-
P		[mm]	300	350	350	350	350	400	400	450
B1 ★		[mm]	156/347	156/347	156/347	190/414	190/414	201/443	201/443	201/443
B2 ★		[mm]	124/332	124/332	124/332	151/395	151/395	173/429	173/429	173/429
B3		[mm]	400	400	400	470	470	500	500	500
C1 ★		[mm]	144/480	144/480	144/480	230/550	230/550	230/550	230/550	230/550
C5 ★		[mm]	250/104	250/104	250/104	275/110	275/110	275/110	275/110	275/110
C6		[mm]	175	175	175	230	230	230	230	230
L1		[mm]	500	500	500	550	550	550	550	550
H1		[mm]	140	140	140	140	140	140	140	140
H2		[mm]	245	275	275	270	270	307	307	337
H3	1~/3~ TP	[mm]	-/764	-/886	-/886	-/925	-/925	-/1018	-/1035	-/1184
	1~/3~ TPE	[mm]	-/774	-/821	-/886	-/925	-/951	-	-	-
H4		[mm]	-	35	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16

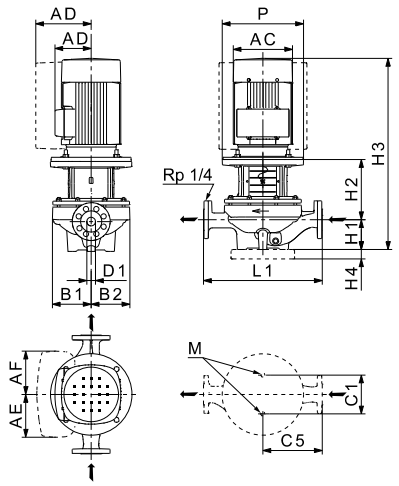
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 100-XX/2



TM06 6595 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



TM03 5348 2614

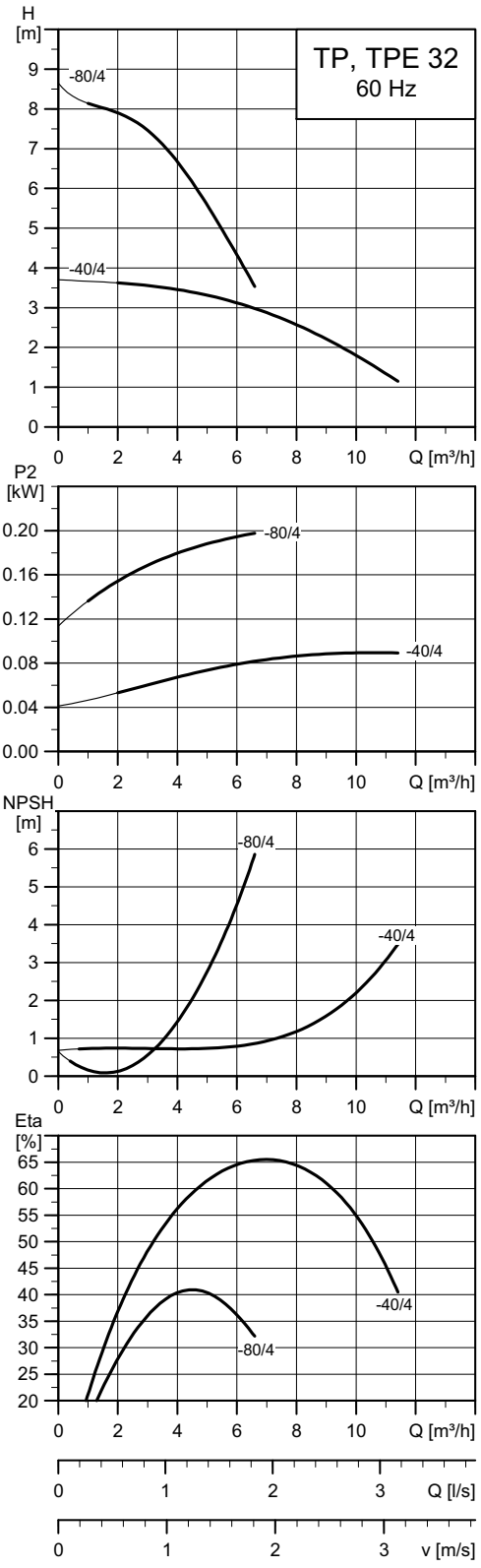
Technical data

TP 100			-760/2	-940/2	-1040/2	-1200/2	-1360/2	-1510/2
TPD			-	-	-	-	-	-
TPE			-	-	-	-	-	-
TPED			-	-	-	-	-	-
Series			300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-
	3~ TP		280S	280M	315S	315M	315L	315L
	1~ TPE		-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-
P2	1~/3~ TP	[kW]	-/75	-/90	-/110	-/132	-/160	-/200
	1~/3~ TPE	[kW]	-	-	-	-	-	-
PN			PN 25	PN 25	PN 25	PN 25	PN 25	PN 25
T_{min};T_{max}		[°C]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]
D1		[mm]	100	100	100	100	100	100
AC	1~/3~ TP	[mm]	-/555	-/555	-/610	-/610	-/610	-/610
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/432	-/432	-/495	-/495	-/495	-/495
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-
P		[mm]	550	550	660	660	660	658
B1 ★		[mm]	281/-	281/-	281/-	281/-	281/-	281/-
B2 ★		[mm]	246/-	246/-	246/-	246/-	246/-	246/-
B3		[mm]	-	-	-	-	-	-
C1 ★		[mm]	230	230	230	230	230	230
C5 ★		[mm]	335	335	335	335	335	335
C6		[mm]	-	-	-	-	-	-
L1		[mm]	670	670	670	670	670	670
H1		[mm]	175	175	175	175	175	175
H2		[mm]	338	338	366	366	366	366
H3	1~/3~ TP	[mm]	-/1333	-/1443	-/1473	-/1633	-/1633	-/1360
	1~/3~ TPE	[mm]	-	-	-	-	-	-
H4		[mm]	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16

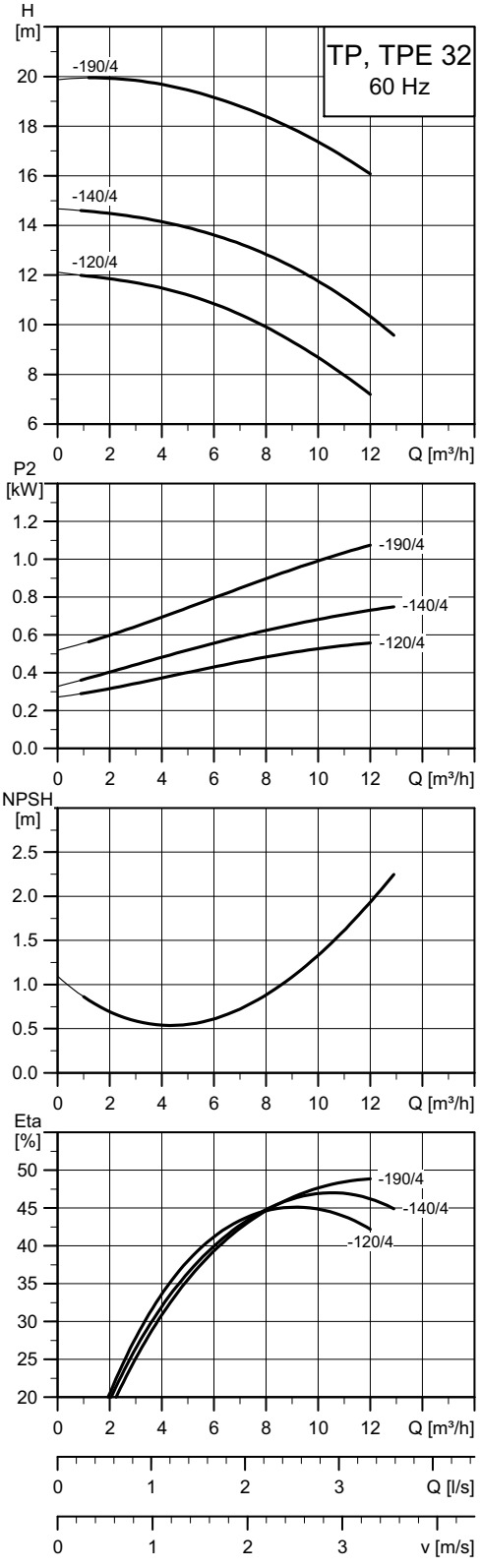
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE, 4-pole, PN 6, 10, 16, 25

TP, TPD, TPE 32-XXX/4

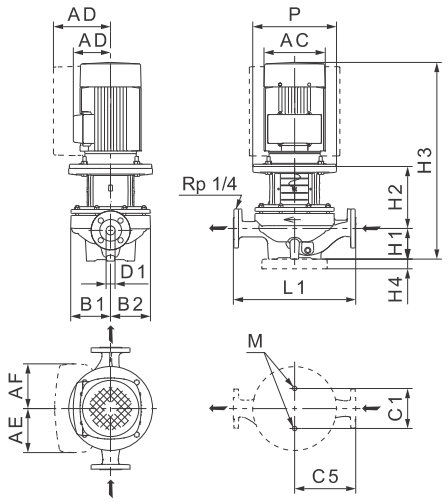


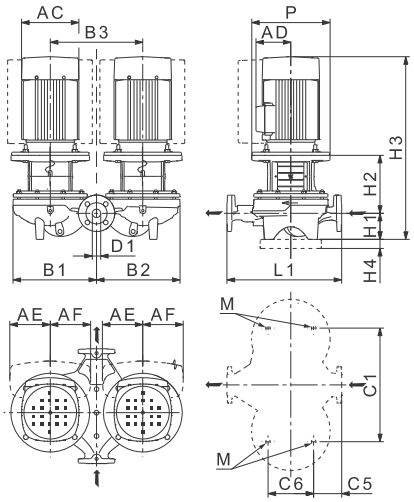
TM02 5046 0521



TM02 5047 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.





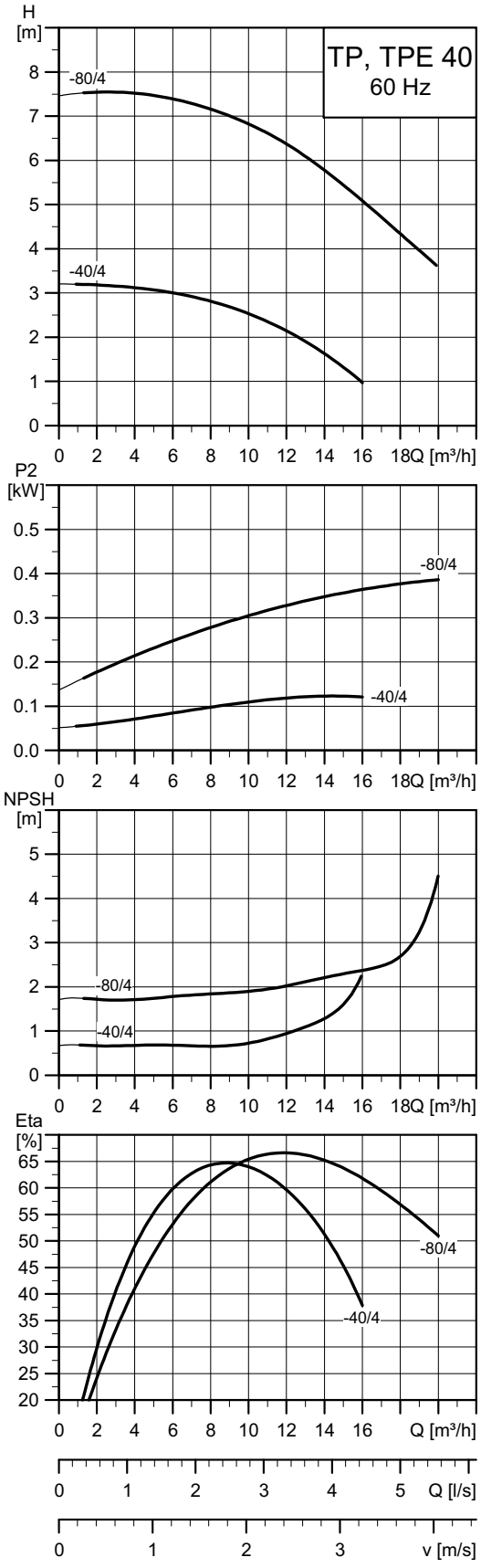
TM02 8632 2614 - TM02 8631 2614

Technical data

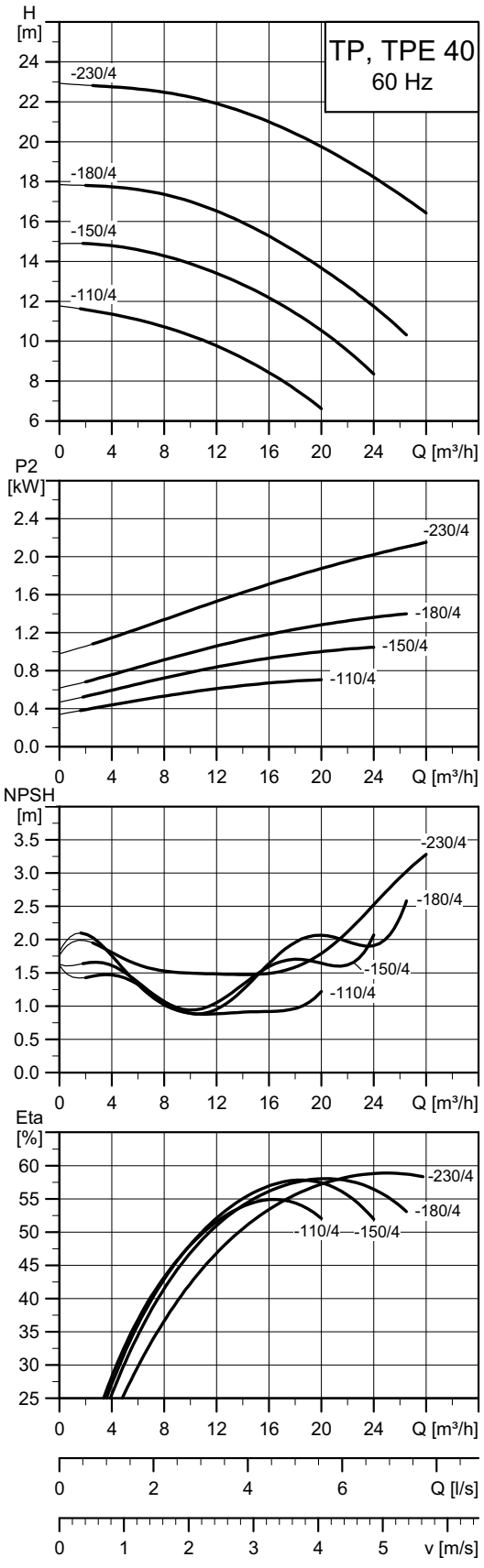
TP 32			-40/4	-80/4	-120/4	-140/4	-190/4
TPD			-	-	•	•	•
TPE			-	-	-	-	-
TPED			-	-	-	-	-
Series			200	200	300	300	300
IEC size	1~ TP		-	-	-	-	-
	3~ TP		71	71	80	80	90
	1~ TPE		-	-	-	-	-
	3~ TPE		-	-	-	-	-
P2	1~/3~ TP	[kW]	-/0.12	-/0.25	-/0.55	-/0.75	-/1.1
	1~/3~ TPE	[kW]	-	-	-	-	-
PN			PN 6/10	PN 6/10	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	32	32	32	32	32
AC	1~/3~ TP	[mm]	-/128	-/125	-/159	-/159	-/178
	1~/3~ TPE	[mm]	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/387	-/395	-/121	-/121	-/126
	1~/3~ TPE	[mm]	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-	-	-
P		[mm]	-	-	200	200	200
B1 ★		[mm]	75/-	102/-	144/321	144/321	144/321
B2 ★		[mm]	75/-	102/-	144/321	144/321	144/321
B3		[mm]	-	-	355	355	355
C1 ★		[mm]	80/-	80/-	144/435	144/435	144/435
C5 ★		[mm]	110	140	220/46	220/46	220/46
C6		[mm]	-	-	175	175	175
L1		[mm]	220	280	440	440	440
H1		[mm]	68	79	100	100	100
H2		[mm]	142	137	156	156	156
H3	1~/3~ TP	[mm]	-/401	-/407	-/508	-/543	-/553
	1~/3~ TPE	[mm]	-	-	-	-	-
H4		[mm]	-	-	-	-	-
M		[mm]	M12	M12	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 40-XXX/4

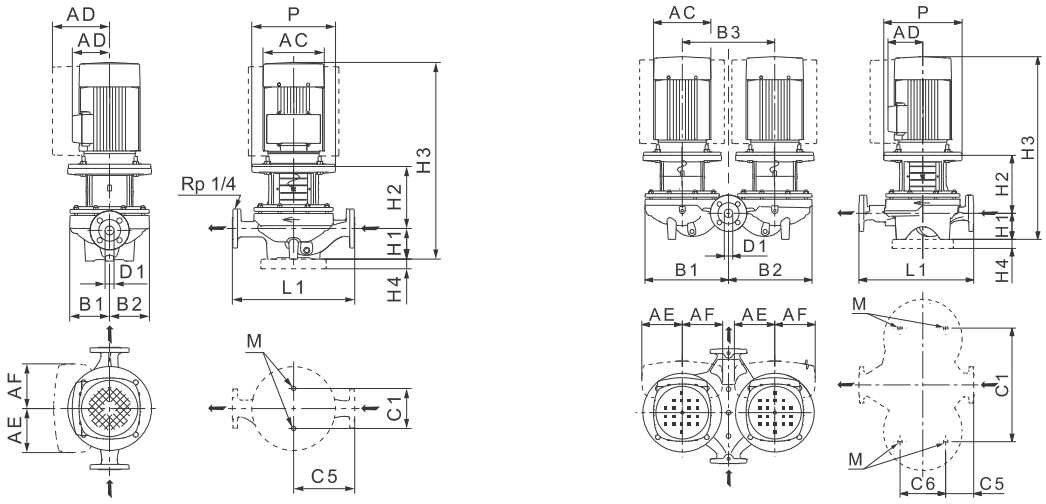


TM02 5048 0521



TM02 5049 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



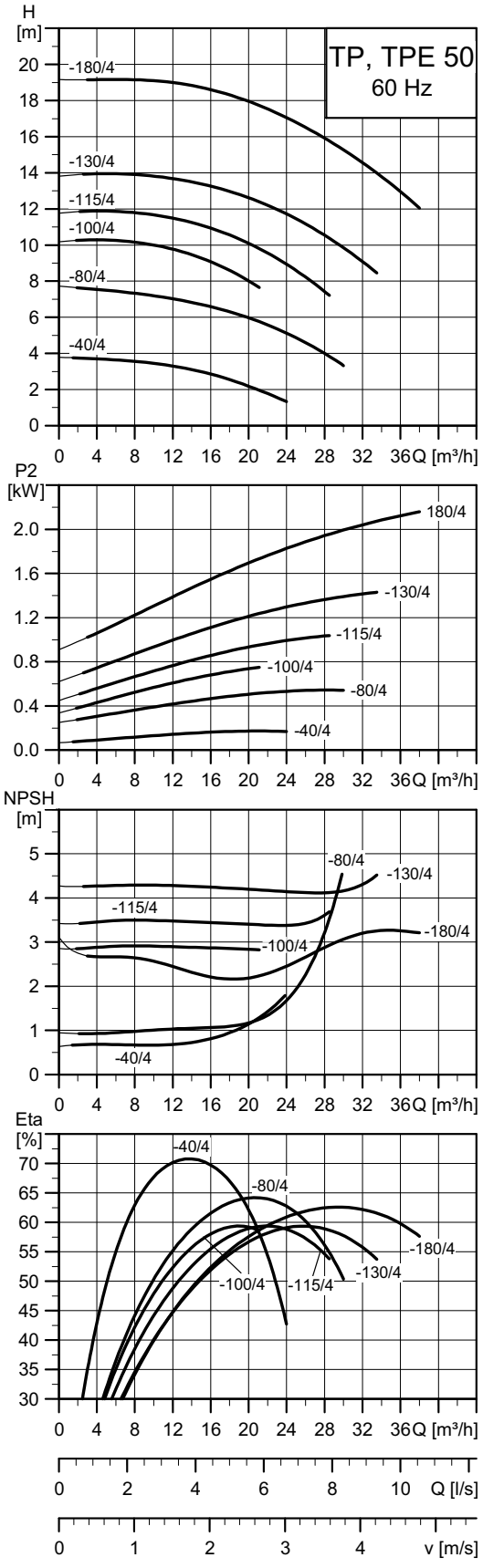
TM02 8632 2614 - TM02 8631 2614

Technical data

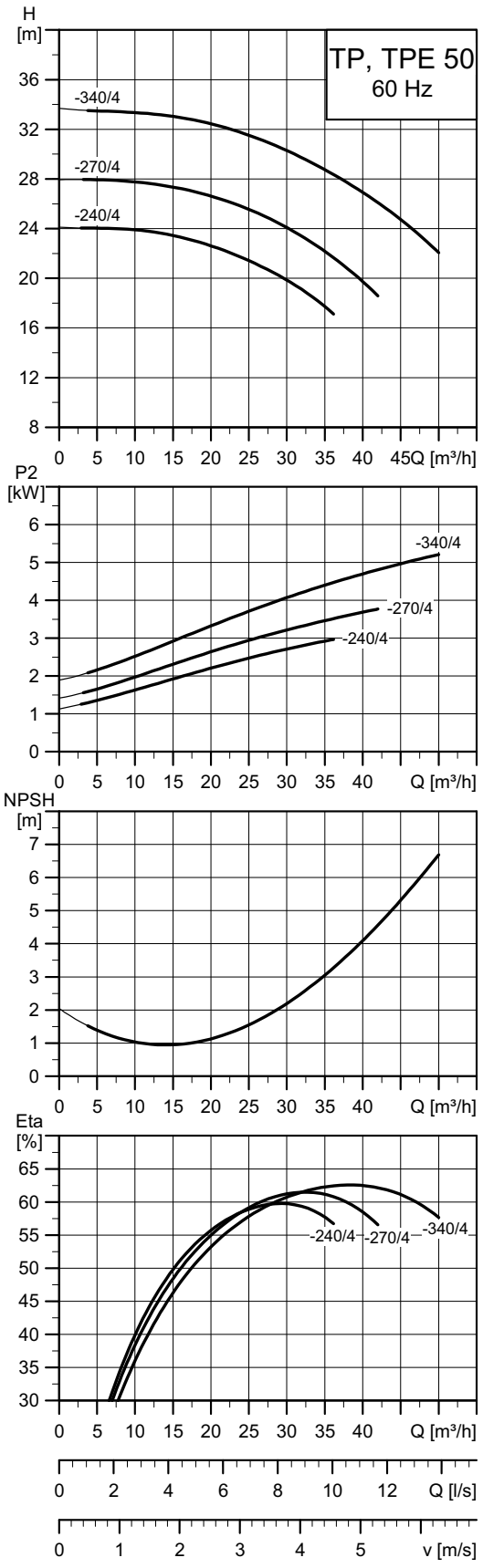
TP 40			-40/4	-80/4	-110/4	-150/4	-180/4	-230/4
TPD			-	-	●	●	●	●
TPE			-	-	●	-	-	-
TPED			-	-	-	-	-	-
Series			200	200	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-
	3~ TP		71	80	80	90	90	100
	1~ TPE		-	-	-	-	-	-
	3~ TPE		-	-	80	-	-	-
P2	1~/3~ TP	[kW]	-/0.25	-/0.55	-/0.75	-/1.1	-/1.5	-/2.2
	1~/3~ TPE	[kW]	-	-	-	-	-	-
PN			PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	40	40	40	40	40	40
AC	1~/3~ TP	[mm]	-/142	-/159	-/159	-/178	-/178	-/198
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/109	-/121	-/121	-/126	-/126	-/166
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-
P		[mm]	-	-	200	200	200	250
B1 ★		[mm]	85/-	100/-	150/325	150/325	150/325	150/325
B2 ★		[mm]	75/-	100/-	147/325	147/325	147/325	147/325
B3		[mm]	-	-	355	355	355	355
C1 ★		[mm]	120/-	120/-	144/435	144/435	144/435	144/435
C5 ★		[mm]	125	125	220/108	220/108	220/108	220/108
C6		[mm]	-	-	175	175	175	175
L1		[mm]	250	250	440	440	440	440
H1		[mm]	67	75	110	110	110	110
H2		[mm]	132	135	156	156	156	184
H3	1~/3~ TP	[mm]	-/390	-/462	-/553	-/563	-/603	-/664.5
	1~/3~ TPE	[mm]	-	-	-	-	-	-
H4		[mm]	-	-	-	-	-	-
M		[mm]	M12	M12	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 50-XXX/4

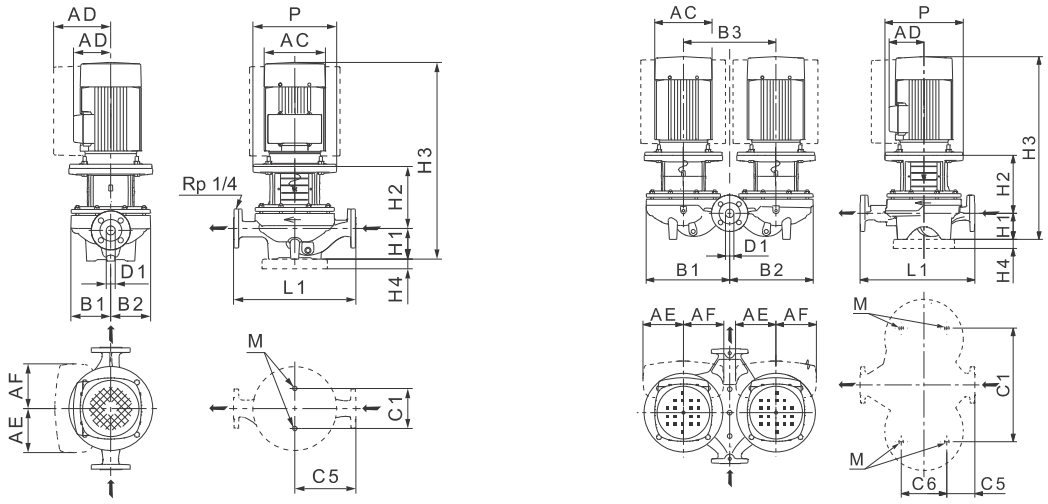


TM02 5050 0521



TM02 5051 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



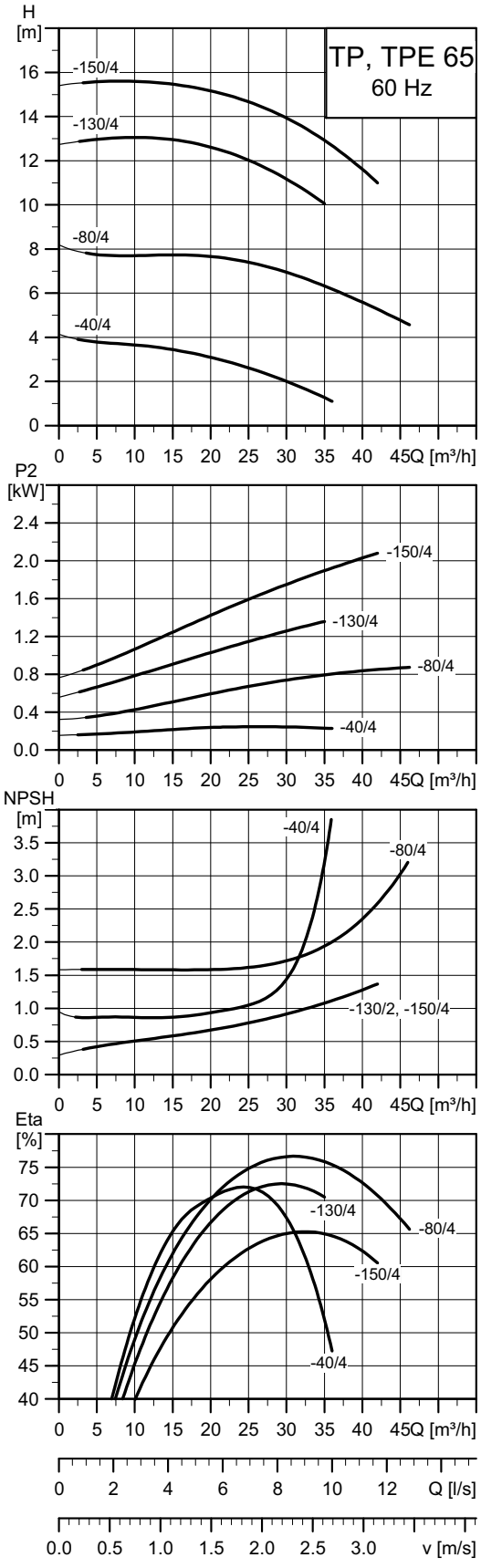
TM02 8632 2614 - TM02 8631 2614

Technical data

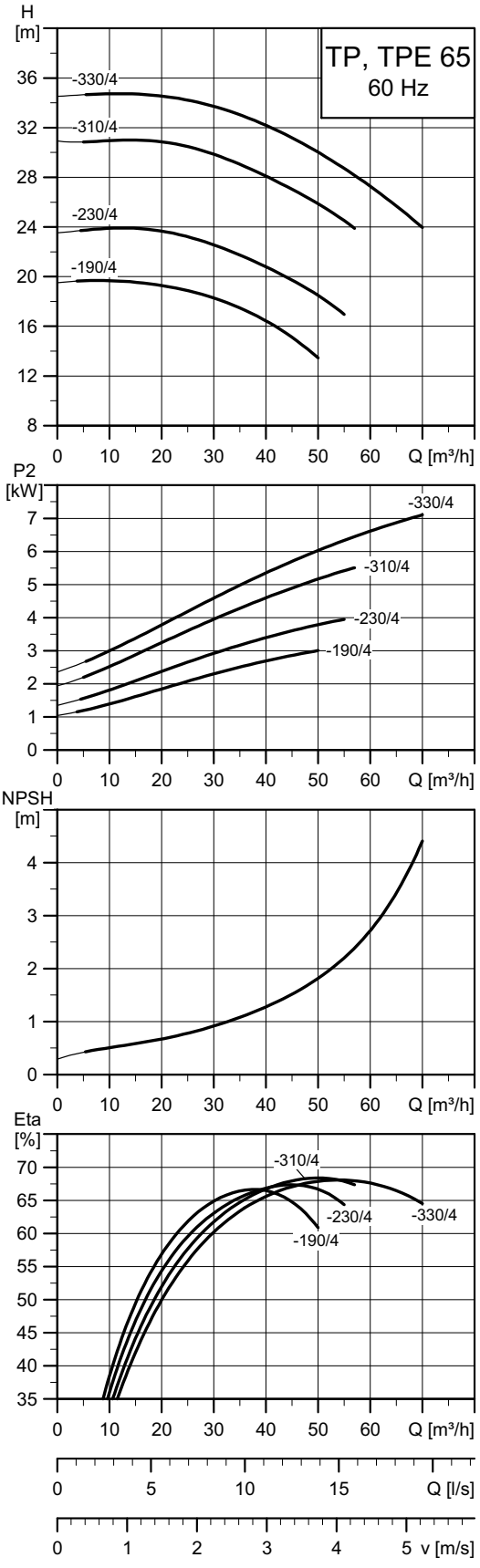
TP 50			-40/4	-80/4	-100/4	-115/4	-130/4	-180/4	-240/4	-270/4	-340/4
TPD			-	-	●	●	●	●	●	●	●
TPE			-	-	-	-	-	-	●	●	●
TPED			-	-	-	-	-	-	-	-	-
Series			200	200	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-
	3~ TP		71	80	80	90	90	100	100	112	132
	1~ TPE		-	-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-	100	112	132
P2	1~/3~ TP	[kW]	-/0.25	-/0.55	-/0.75	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5
	1~/3~ TPE	[kW]	-	-	-	-	-	-	-/3	-/4	-/5.5
PN			PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	50	50	50	50	50	50	50	50	50
AC	1~/3~ TP	[mm]	-/142	-/159	-/159	-/178	-/178	-/198	-/198	-/222	-/262
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/191	-/191	-/255
AD	1~/3~ TP	[mm]	-/109	-/121	-/121	-/126	-/126	-/166	-/166	-/177	-/177
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/201	-/201	-/237
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-	146	146	173
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-	146	146	173
P		[mm]	-	-	200	200	200	250	250	250	300
B1 ★		[mm]	90/-	110/-	162/373	162/373	162/373	162/373	180/386	180/386	180/386
B2 ★		[mm]	75/-	100/-	162/373	162/373	162/373	162/373	164/379	164/379	164/379
B3		[mm]	-	-	420	420	420	420	420	420	420
C1 ★		[mm]	120/-	120/-	144/500	144/500	144/500	144/500	144/500	144/500	144/500
C5 ★		[mm]	140	140	220/123	220/123	220/123	220/123	220/123	220/123	220/123
C6		[mm]	-	-	175	175	175	175	175	175	175
L1		[mm]	280	280	440	440	440	440	440	440	440
H1		[mm]	82	82	115	115	115	115	115	115	115
H2		[mm]	136	140	160	160	167	188	195	195	234
H3	1~/3~ TP	[mm]	-/409	-/474	-/562	-/572	-/619	-/673.5	-/680.5	-/664	-/784
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-/644	-/644	-/738
H4		[mm]	-	-	-	-	-	-	-	-	-
M		[mm]	M12	M12	M16	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 65-XXX/4

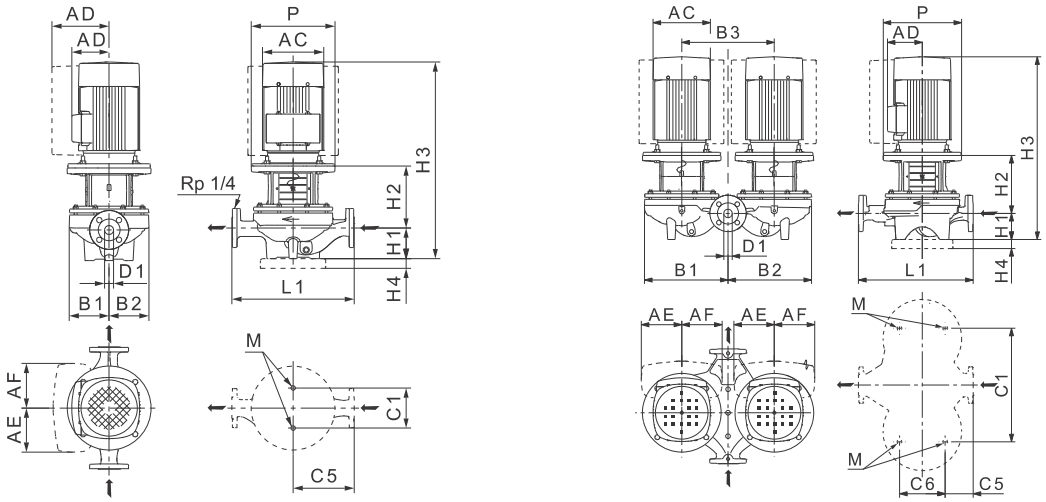


TM02 5052 0521



TM02 5053 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



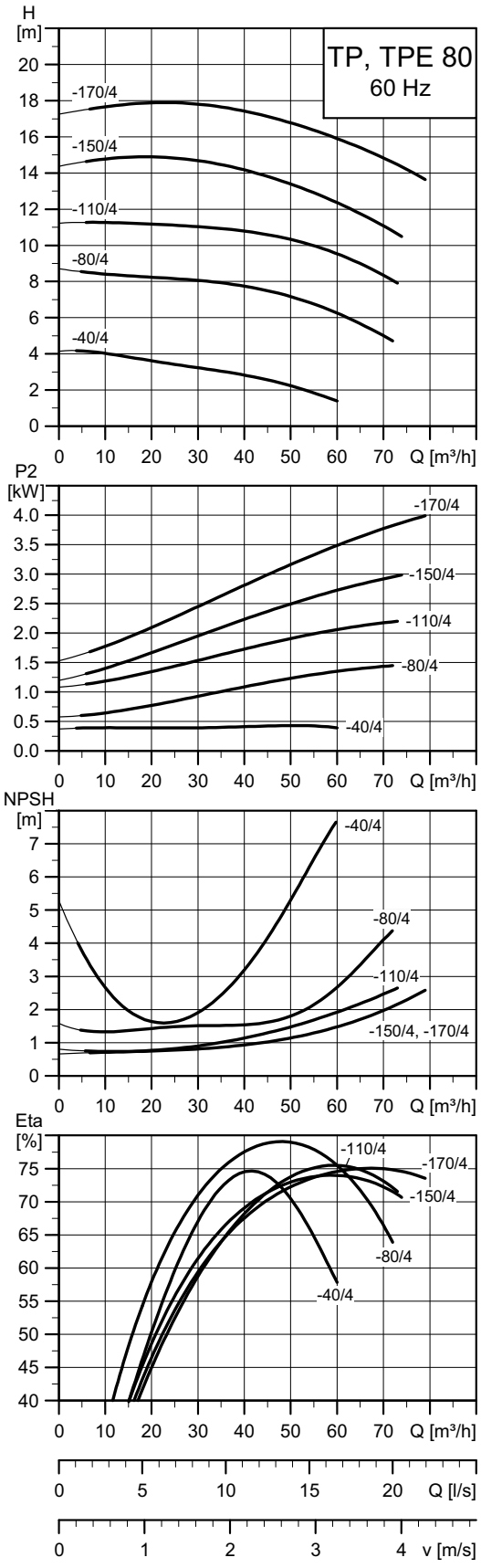
TM02 8632 2614 - TM02 8631 2614

Technical data

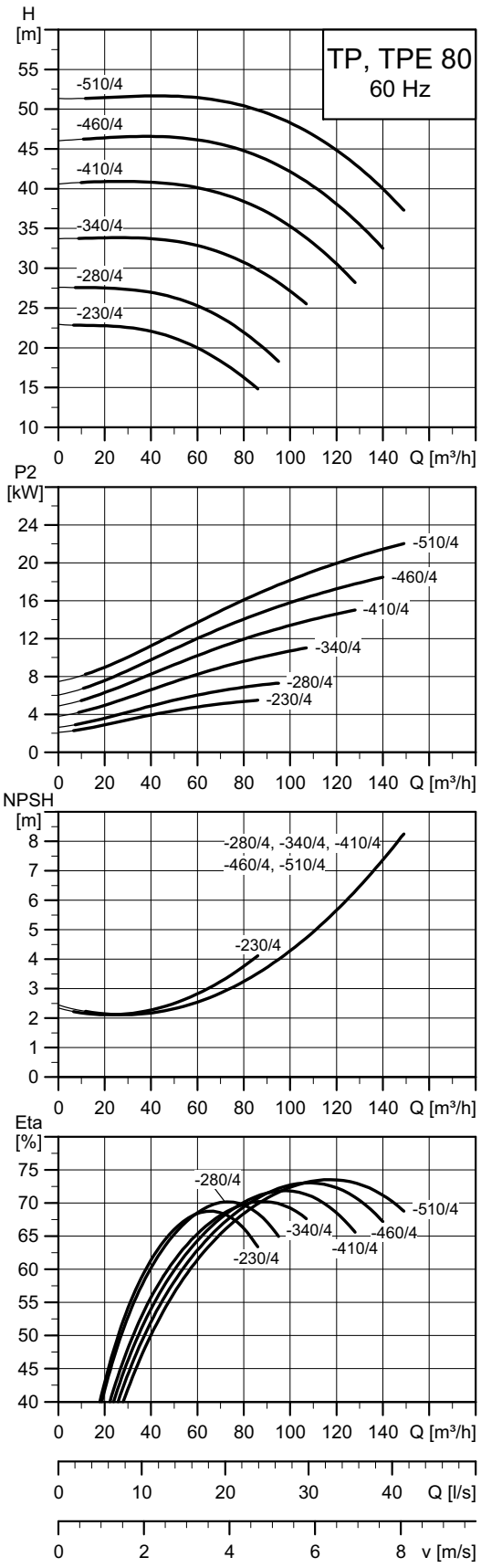
TP 65			-40/4	-80/4	-130/4	-150/4	-190/4	-230/4	-310/4	-330/4
TPD			-	-	●	●	●	●	●	●
TPE			-	-	-	-	●	●	●	●
TPED			-	-	-	-	-	-	-	-
Series			200	200	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-
	3~ TP		71	90	90	100	100	112	132	132
	1~ TPE		-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	100	112	132	160
P2	1~/3~ TP	[kW]	-/0.37	-/1.1	-/1.5	-/2.2	-/3	-/4	-/5.5	-/7.5
	1~/3~ TPE	[kW]	-	-	-	-	-/3	-/4	-/5.5	-/7.5
PN			PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	65	65	65	65	65	65	65	65
AC	1~/3~ TP	[mm]	-/142	-/178	-/178	-/198	-/198	-/222	-/262	-/262
	1~/3~ TPE	[mm]	-	-	-	-	-/191	-/191	-/255	-/255
AD	1~/3~ TP	[mm]	-/125	-/126	-/126	-/166	-/166	-/177	-/202	-/202
	1~/3~ TPE	[mm]	-	-	-	-	-/201	-/201	-/237	-/237
AE	1~/3~ TPE	[mm]	-	-	-	-	146	146	173	173
AF	1~/3~ TPE	[mm]	-	-	-	-	146	146	173	173
P		[mm]	-	-	200	250	250	250	300	300
B1 ★		[mm]	125/-	125/-	178/349	178/349	178/349	178/349	178/349	178/349
B2 ★		[mm]	100/-	100/-	164/383	164/383	164/383	164/383	164/383	164/383
B3		[mm]	-	-	440	440	440	440	440	440
C1 ★		[mm]	160/-	160/-	144/520	144/520	144/520	144/520	144/520	144/520
C5 ★		[mm]	170	170	238/111	238/111	238/111	238/111	238/111	238/111
C6		[mm]	-	-	175	175	175	175	175	175
L1		[mm]	340	340	475	475	475	475	475	475
H1		[mm]	97	97	125	125	125	125	125	125
H2		[mm]	136	158	166	194	194	194	233	233
H3	1~/3~ TP	[mm]	-/424	-/552	-/628	-/689.5	-/689.5	-/673	-/793	-/793
	1~/3~ TPE	[mm]	-	-	-	-	-/653	-/653	-/747	-/747
H4		[mm]	-	-	-	-	-	-	-	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 80-XXX/4

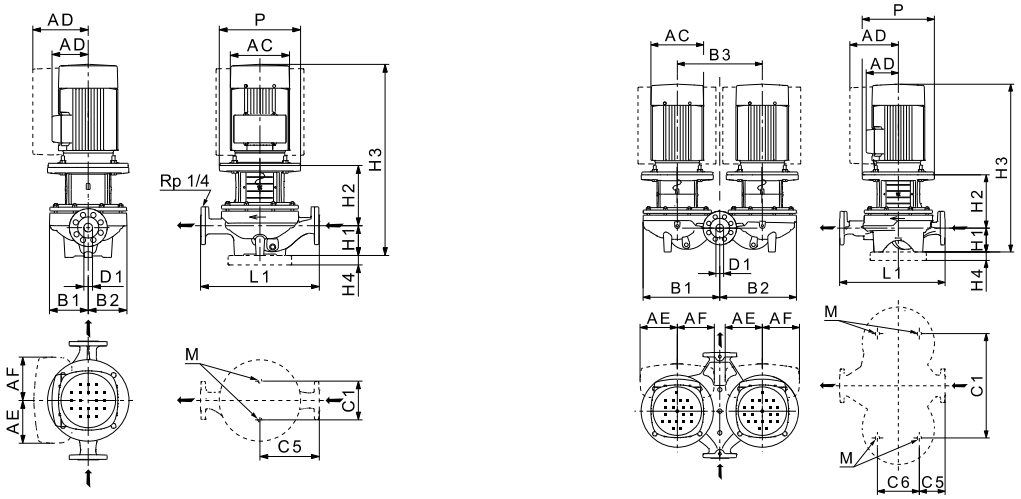


TM02 5054 0521



TM02 8772 2115

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



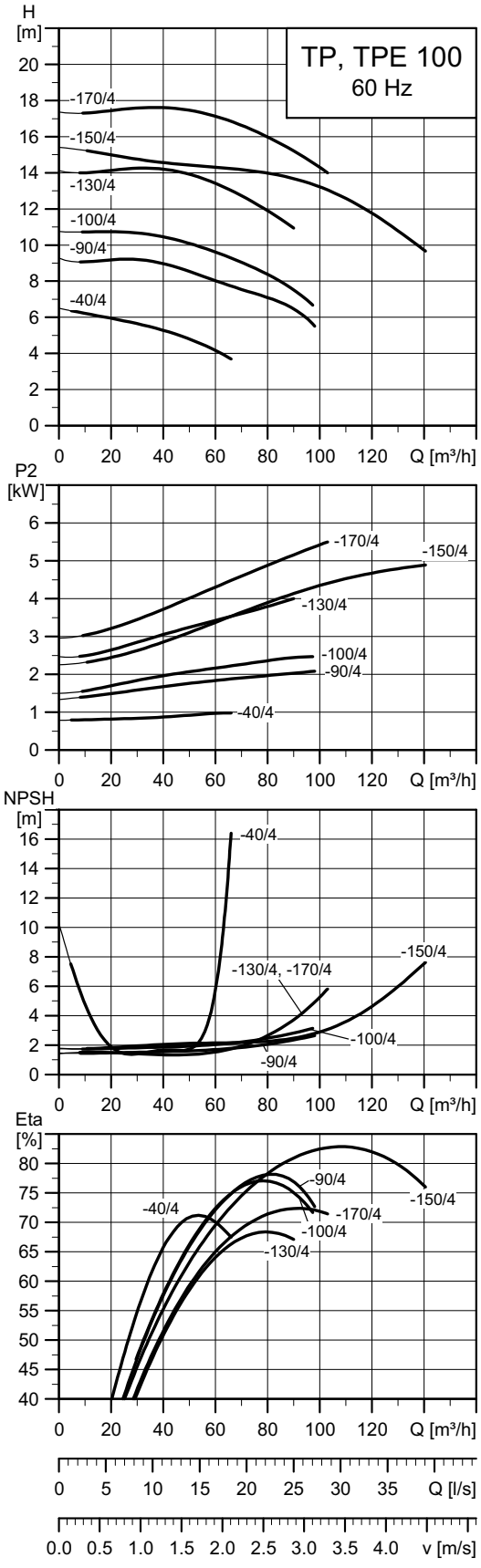
TM03 5348 2614 - TM03 5349 2614

Technical data

TP 80			-40/4	-80/4	-110/4	-150/4	-170/4	-230/4	-280/4	-340/4	-410/4	-460/4	-510/4
TPD			-	-	●	●	●	●	●	●	●	●	●
TPE			-	-	-	●	●	●	●	●	●	●	-
TPED			-	-	-	-	-	-	-	-	-	-	-
Series			200	200	300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-	-
	3~ TP		80	90	100	100	112	132	132	160	160	180	180
	1~ TPE		-	-	-	-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	112	112	132	160	160	160	180	-
P2	1~/3~ TP	[kW]	-/0.75	-/1.5	-/2.2	-/3	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5	-/22
	1~/3~ TPE	[kW]	-	-	-	-/3	-/4	-/5.5	-/7.5	-/11	-/15	-/18.5	-/-
PN			PN 6/10	PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	80	80	80	80	80	80	80	80	80	80	80
AC	1~/3~ TP	[mm]	-/159	-/178	-/198	-/198	-/222	-/262	-/262	-/314	-/314	-/368	-/368
	1~/3~ TPE	[mm]	-	-	-	-/191	-/191	-/255	-/255	-/314	-/314	-/314	-/-
AD	1~/3~ TP	[mm]	-/110	-/135	-/120	-/120	-/134	-/167	-/159	-/204	-/204	-/286	-/268
	1~/3~ TPE	[mm]	-	-	-	-/201	-/201	-/237	-/237	-/308	-/308	-/308	-/-
AE	1~/3~ TPE	[mm]	-	-	-	146	146	173	173	210	210	210	-/-
AF	1~/3~ TPE	[mm]	-	-	-	146	146	173	173	210	210	210	-/-
P		[mm]	115	-	250	250	250	300	300	350	350	350	350
B1 ★		[mm]	130/-	135/-	176/366	187/416	187/416	243/491	243/491	243/491	243/491	243/491	243/491
B2 ★		[mm]	100/-	100/-	144/354	162/405	162/405	226/480	226/480	226/480	226/480	226/480	226/480
B3		[mm]	-	-	400	470	470	470	470	470	470	470	470
C1 ★		[mm]	160/-	160/-	144/480	144/550	144/550	230/550	230/550	230/550	230/550	230/550	230/550
C5 ★		[mm]	180	180	220/93	250/133	250/133	310/105	310/105	310/105	310/105	310/105	310/105
C6		[mm]	-	-	175	175	175	350	350	350	350	350	350
L1		[mm]	360	360	440	500	500	620	620	620	620	620	620
H1		[mm]	107	107	115	115	115	140	140	140	140	140	140
H2		[mm]	175	164	204	204	204	273	273	303	303	303	303
H3	1~/3~ TP	[mm]	-/569	-/608	-/689.5	-/689.5	-/673	-/848	-/848	-/937	-/997	-/958	-/1049
	1~/3~ TPE	[mm]	-	-	-	-/654	-/654	-/802	-/802	-/914	-/958	-/-	-/-
H4		[mm]	-	-	-	-	-	-	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16

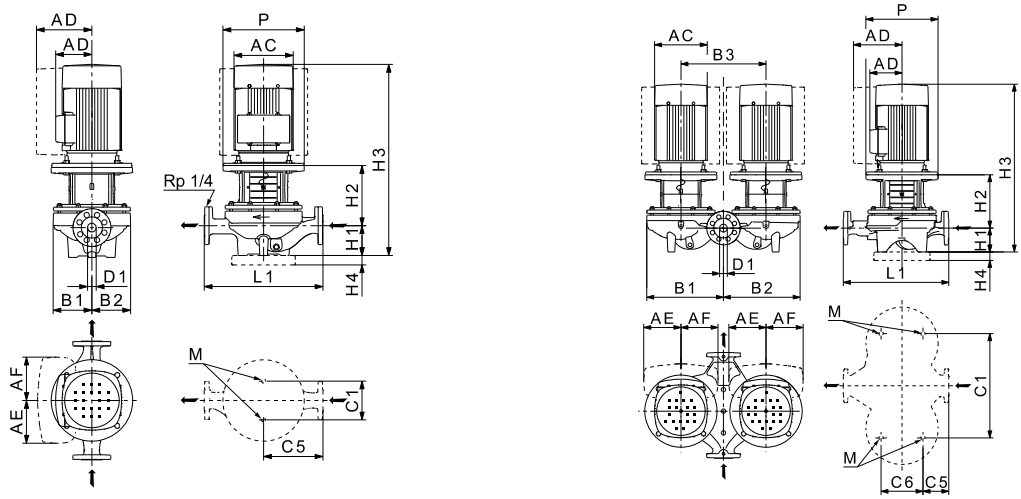
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 100-XXX/4



TM02 5055 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



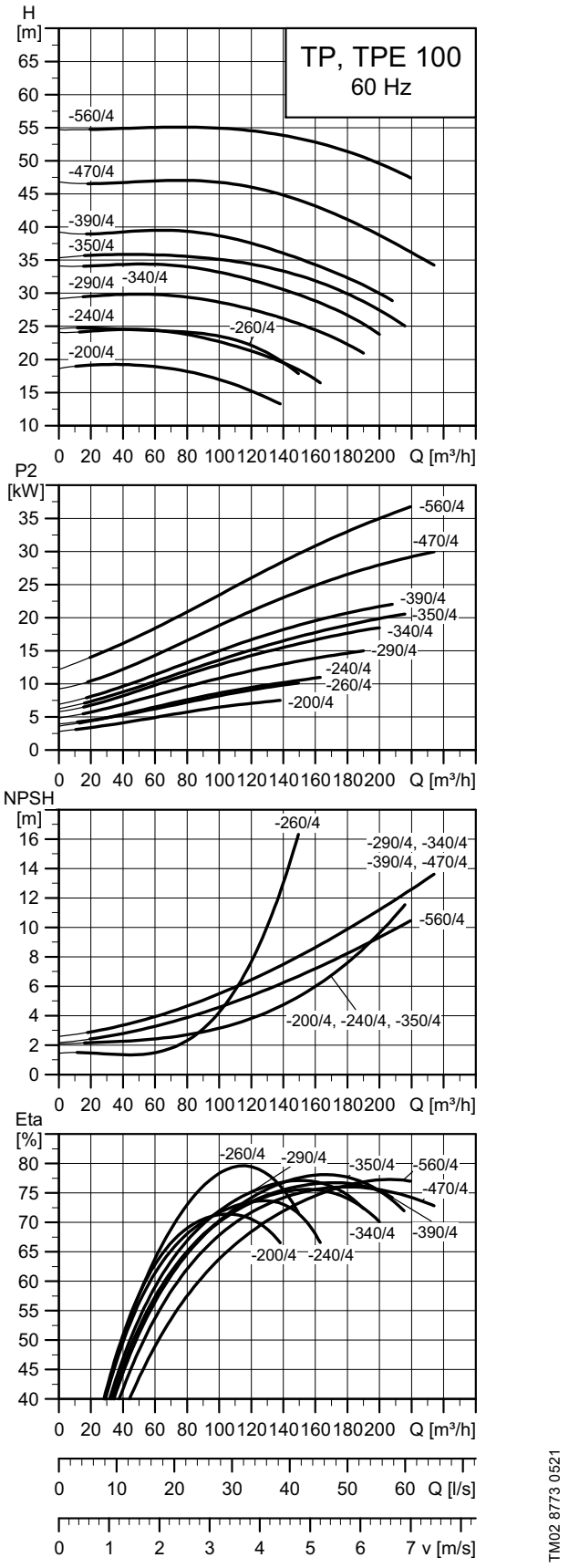
TM03 5348 2614 - TM03 5349 2614

Technical data

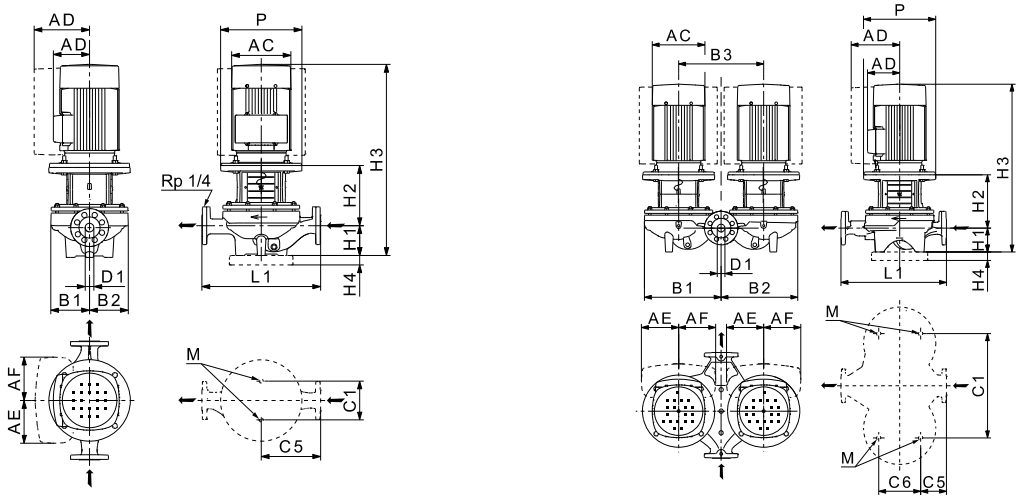
TP 100			-40/4	-90/4	-100/4	-130/4	-150/4	-170/4
TPD			-	●	●	●	●	●
TPE			-	●	●	●	●	●
TPED			-	-	-	-	-	-
Series			200	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-
	3~ TP		90	100	100	112	132	132
	1~ TPE		-	-	-	-	-	-
	3~ TPE		-	-	112	112	113	132
P2	1~/3~ TP	[kW]	-/1.1	-/2.2	-/3	-/4	-/5.5	-/5.5
	1~/3~ TPE	[kW]	-	-	-/3	-/4	-/5.5	-/5.5
PN			PN 6/10	PN 16	PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;140]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	100	100	100	100	100	100
AC	1~/3~ TP	[mm]	-/178	-/198	-/198	-/222	-/262	-/262
	1~/3~ TPE	[mm]	-	-	-/191	-/191	-/255	-/255
AD	1~/3~ TP	[mm]	-/126	-/166	-/166	-/177	-/202	-/202
	1~/3~ TPE	[mm]	-	-	-/201	-/201	-/237	-/237
AE	1~/3~ TPE	[mm]	-	-	146	146	173	173
AF	1~/3~ TPE	[mm]	-	-	146	146	173	173
P		[mm]	-	-	250	250	300	300
B1 ★		[mm]	174/-	190/414	190/414	201/443	190/414	201/443
B2 ★		[mm]	120/-	151/395	151/395	173/429	151/395	173/429
B3		[mm]	-	470	470	500	470	500
C1 ★		[mm]	200/-	230/550	230/550	230/550	230/550	230/550
C5 ★		[mm]	225	275/110	275/110	275/110	275/110	275/110
C6		[mm]	-	-	230	230	230	230
L1		[mm]	450	550	550	550	550	550
H1		[mm]	122	140	140	140	140	140
H2		[mm]	183	201	201	261	240	277
H3	1~/3~ TP	[mm]	-/602	-/711.5	-/711.5	-/755	-/815	-/852
	1~/3~ TPE	[mm]	-	-/675	-/675	-/731	-/769	-/806
H4		[mm]	-	-	-	-	-	-
M		[mm]	M16	M16	M16	M16	M16	M16

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 100-XXX/4



Note: All QH curves apply to single-head pumps. For further information, see page 119.



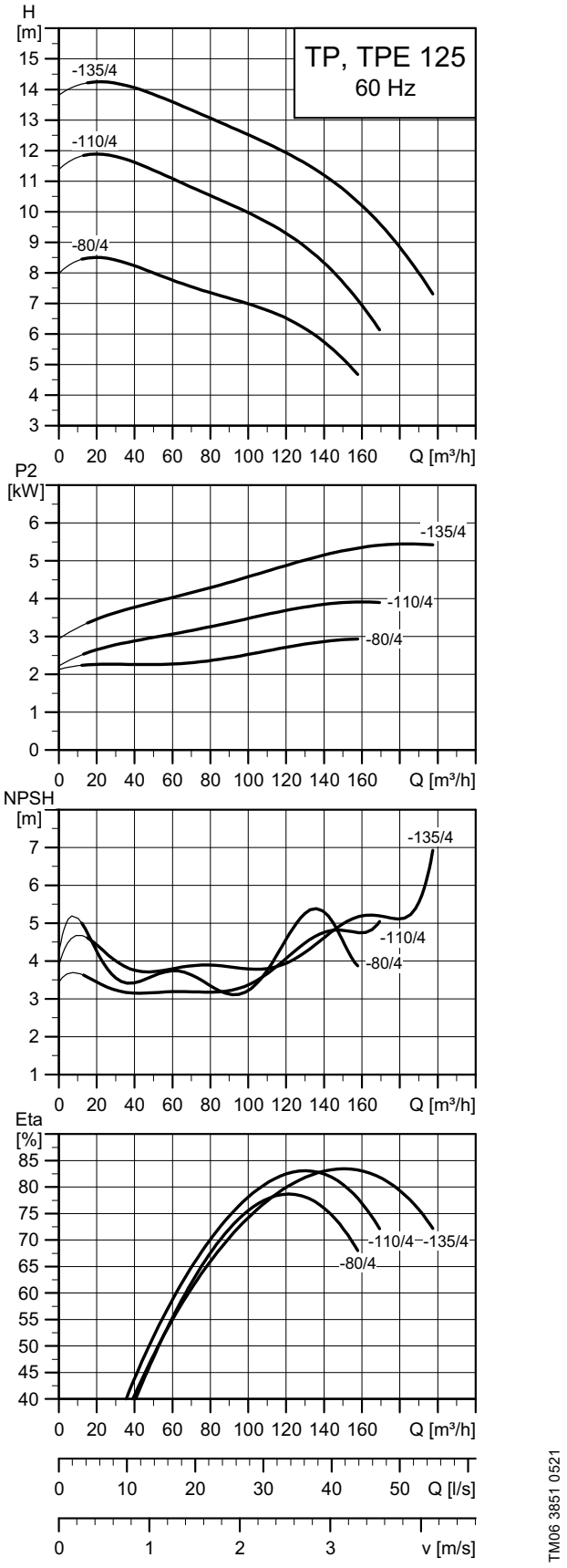
TM03 5348 2614 - TM03 5349 2614

Technical data

TP 100			-200/4	-240/4	-260/4	-290/4	-340/4	-350/4	-390/4	-470/4	-560/4
TPD			●	●	●	●	●	●	●	●	-
TPE			●	●	●	●	-	-	-	-	-
TPED			-	-	-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-
	3~ TP		132	160	160	160	180	160	180	200	225S
	1~ TPE		-	-	-	-	-		-	-	-
	3~ TPE		160	160	161	160	180		180	-	-
P2	1~/3~ TP	[kW]	-/7.5	-/11	-/11	-/15	-/18.5	-/22	-/22	-/30	-/37
	1~/3~ TPE	[kW]	-/7.5	-/11	-/11	-/15	-/18.5	-	-/22	-	-
PN			PN16/25	PN16/25	PN 16	PN16/25	PN16/25	PN 16	PN16/25	PN16/25	PN 25
T_{min};T_{max}		[°C]	[-40;150]	[-40;150]	[-25;120]	[-40;150]	[-40;150]	[-25;120]	[-40;150]	[-40;150]	[-40;150]
D1		[mm]	100	100	100	100	100	100	100	100	100
AC	1~/3~ TP	[mm]	-/262	-/314	-/314	-/314	-/368	-/363	-/368	-/408	-/442
	1~/3~ TPE	[mm]	-/255	-/314	-/314	-/314	-/314	-	-/350	-	-
AD	1~/3~ TP	[mm]	-/202	-/236.5	-/236.5	-/236.5	-/286	-/262	-/286	-/315	-/325
	1~/3~ TPE	[mm]	-/237	-/308	-/308	-/308	-/308	-	-/439	-	-
AE	1~/3~ TPE	[mm]	173	210	210	210	210	-	164	-	-
AF	1~/3~ TPE	[mm]	173	210	210	210	210	-	164	-	-
P		[mm]	300	350	350	350	350	350	350	400	450
B1 ★		[mm]	290/579	290/579	201/443	290/579	290/579	290/579	290/579	290/579	281/-
B2 ★		[mm]	249/561	249/561	173/429	249/561	249/561	249/561	249/561	249/561	246/-
B3		[mm]	600	600	500	600	600	600	600	600	-
C1 ★		[mm]	230/680	230/680	230/550	230/680	230/680	230/680	230/680	230/680	230
C5 ★		[mm]	335/110	335/110	275/110	335/110	335/110	335/110	335/110	335/110	335
C6		[mm]	350	350	230	350	350	350	350	350	-
L1		[mm]	670	670	550	670	670	670	670	670	670
H1		[mm]	175	175	140	175	175	175	175	175	175
H2		[mm]	254	308	307	308	308	308	308	308	313
H3	1~/3~ TP	[mm]	-/864	-/977	-/941	-/1037	-/998	-/1093	-/1079	-/1128	-/1150
	1~/3~ TPE	[mm]	-/842	-/954	-/826	-/998	-/-	-/-	-/-	-/-	-/-
H4		[mm]	-	35	35	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16	M16

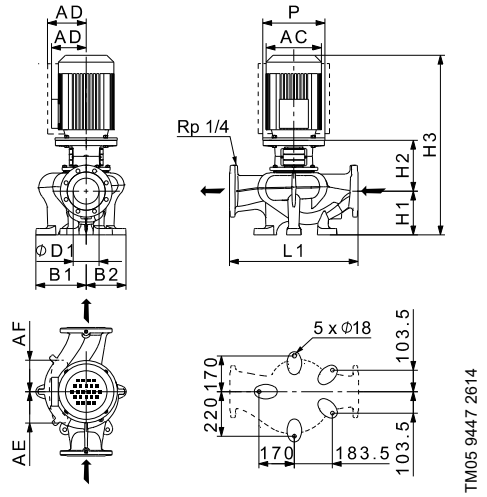
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 125-XXX/4



TM06 3851 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.

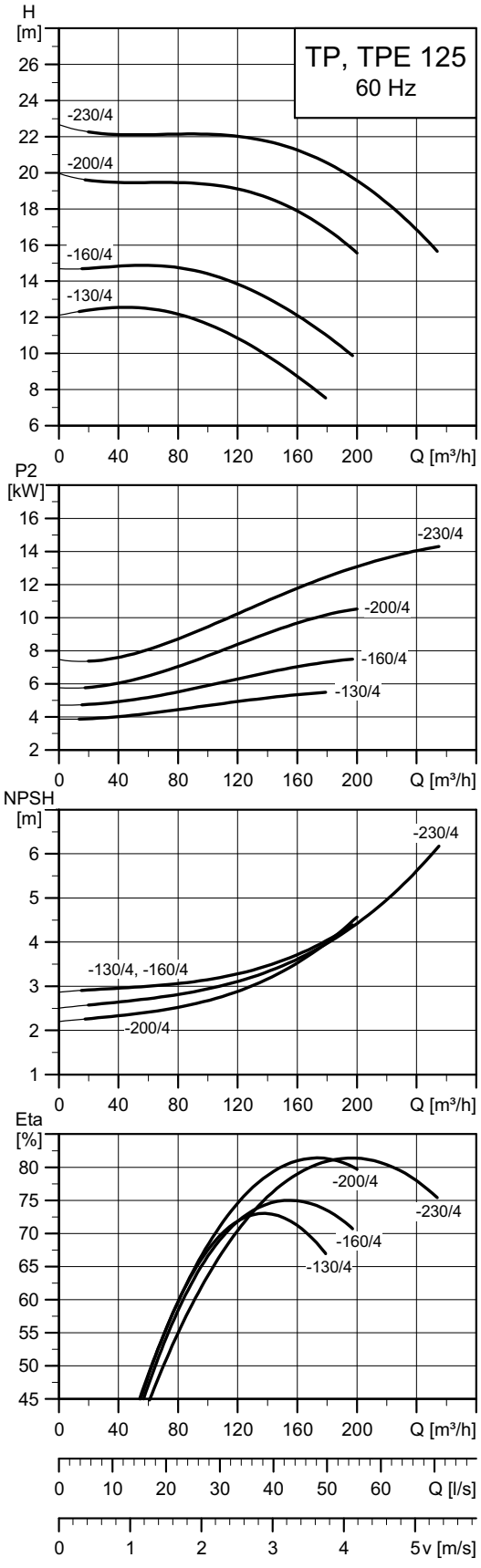


Technical data

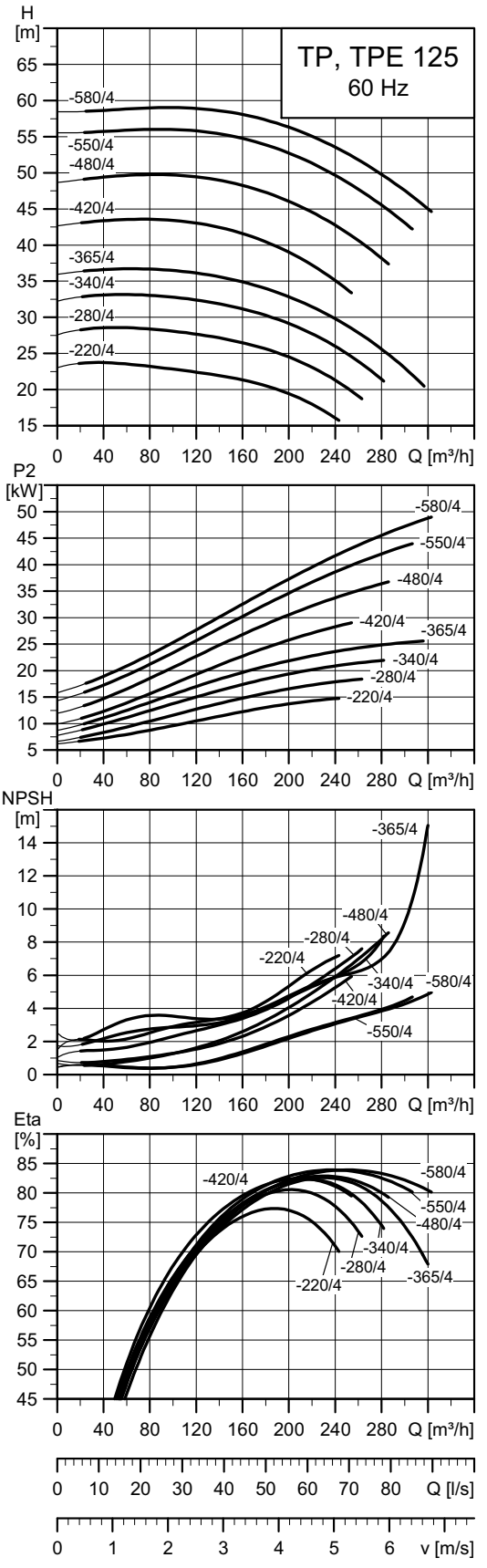
TP 125			-80/4	-110/4	-135/4
TPD			-	-	-
TPE			•	•	•
TPED			-	-	-
Series			300	300	300
IEC size	1~ TP		-	-	-
	3~ TP		100	112	132
	1~ TPE		-	-	-
	3~ TPE		100	112	132
P2	1~/3~ TP	[kW]	-/3	-/4	-/5.5
	1~/3~ TPE	[kW]	-/3	-/4	-/5.5
PN			PN 16	PN 16	PN 16
$T_{min};T_{max}$		[°C]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	125	125	125
AC	1~/3~ TP	[mm]	-/198	-/222	-/262
	1~/3~ TPE	[mm]	-/191	-/191	-/255
AD	1~/3~ TP	[mm]	-/166	-/177	-/202
	1~/3~ TPE	[mm]	-/201	-/201	-/237
AE	1~/3~ TPE	[mm]	-/146	-/146	-/173
AF	1~/3~ TPE	[mm]	-/146	-/146	-/173
P		[mm]	250	250	300
B1 ★		[mm]	243/-	243/-	243/-
B2 ★		[mm]	193/-	193/-	193/-
L1		[mm]	620	620	620
H1		[mm]	210	210	210
H2		[mm]	-/225	-/225	-/245
H3	1~/3~ TP	[mm]	-/789	-/870	-/890
	1~/3~ TPE	[mm]	-/769	-/769	-/844

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 125-XXX/4

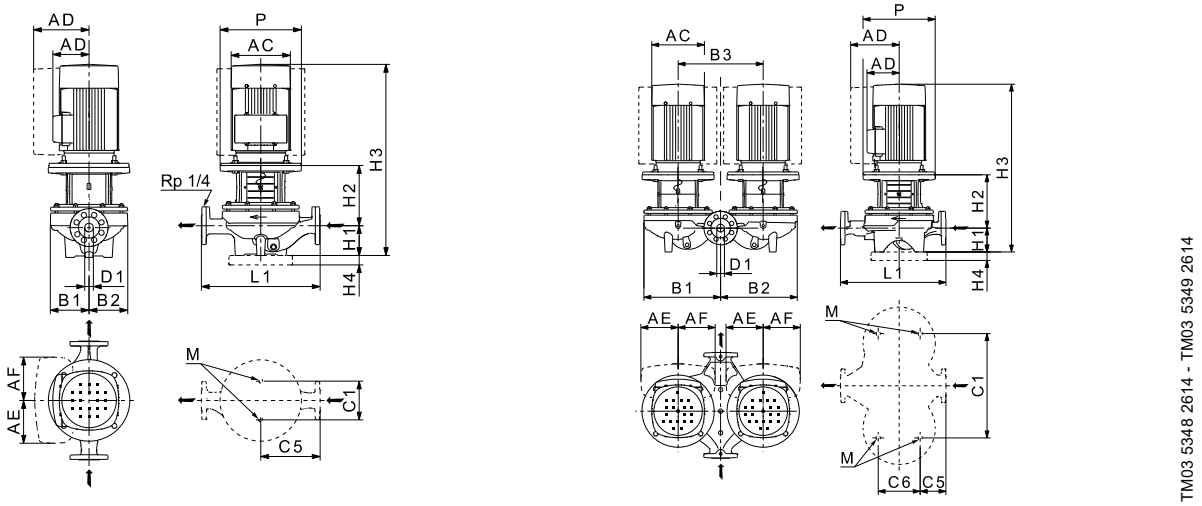


TM02 8774 0521



TM02 8775 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.



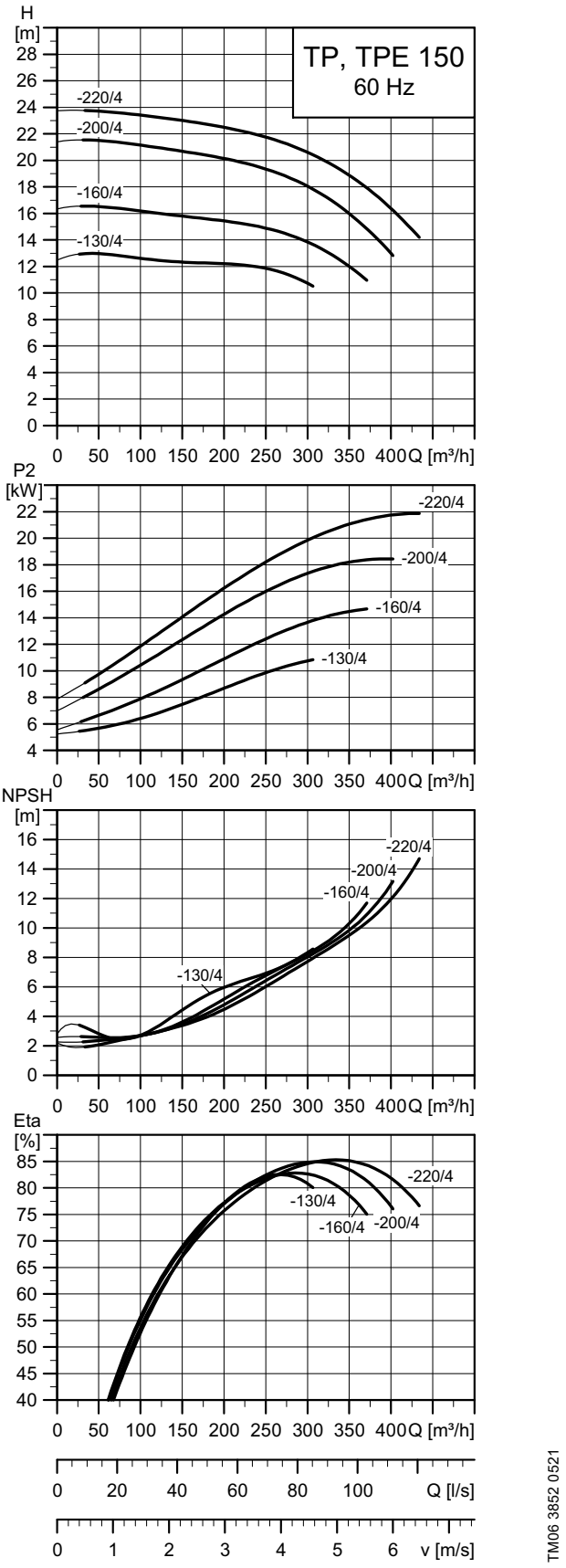
TM03 5348 2614 - TM03 5349 2614

Technical data

TP 125			-130/4	-160/4	-200/4	-230/4	-220/4	-280/4	-340/4	-365/4	-420/4	-480/4	-550/4	-580/4
TPD			●	●	●	●	-	●	●	●	●	●	-	-
TPE			●	●	●	●	●	-	-	-	-	-	-	-
TPED			-	-	-	-	-	-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-	-	-
	3~ TP		132	132	160	160	160	180	180	200	200	225	225M	225M
	1~ TPE		-	-	-	-	-	-	-	-	-	-	-	-
	3~ TPE		132	132	160	160	160	180	-	-	-	-	-	-
P2	1~/3~ TP	[kW]	-/5.5	-/7.5	-/11	-/15	-/15	-/18.5	-/22	-/30	-/30	-/37	-/45	-/55
	1~/3~ TPE	[kW]	-/5.5	-/7.5	-/11	-/15	-/15	-/18.5	-	-	-	-	-	-
PN			PN 16	PN 16	PN 16	PN 16	PN 25	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;150]	[-40;150]
D1		[mm]	125	125	125	125	125	125	125	125	125	125	125	125
AC	1~/3~ TP	[mm]	-/262	-/262	-/314	-/314	-/314	-/368	-/368	-/408	-/408	-/449	-/442	-/495
	1~/3~ TPE	[mm]	-/255	-/255	-/314	-/314	-/314	-/314	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/202	-/202	-/236.5	-/236.5	-/236.5	-/286	-/286	-/315	-/315	-/338	-/325	-/392
	1~/3~ TPE	[mm]	-/237	-/237	-/308	-/308	-/308	-/308	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-/173	-/173	-/210	-/210	-/210	-/210	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-/173	-/173	-/210	-/210	-/210	-/210	-	-	-	-	-	-
P		[mm]	300	300	350	350	350	350	350	350	400	450	450	550
B1 ★		[mm]	250/537	250/537	250/537	250/537	244/537	244/537	244/537	244/537	273/568	273/568	271/-	271/-
B2 ★		[mm]	220/518	220/518	220/518	220/518	220/516	220/516	220/516	220/516	236/545	236/545	243/-	243/-
B3		[mm]	600	600	600	600	600	600	600	600	600	600	-	-
C1 ★		[mm]	230/680	230/680	230/680	230/680	230/680	230/680	230/680	230/680	230/680	230/680	230	230
C5 ★		[mm]	310/84	310/84	310/84	310/84	400/175	400/175	400/175	400/175	400/175	400/175	400	400
C6		[mm]	300	300	300	300	-/350	-/350	-/350	-/350	350	350	-	-
L1		[mm]	620	620	620	620	800	800	800	800	800	800	800	800
H1		[mm]	215	215	215	215	215	215	215	215	215	215	215	215
H2		[mm]	283	283	283	312.5	315	315	315	315	312	342	348	353
H3	1~/3~ TP	[mm]	-/933	-/933	-/992	-/1081.5	-/1184	-/1088	-/1118	-/1166	-/1163	-/1205	-/1271	-/1384
	1~/3~ TPE	[mm]	-/887	-/887	-/873	-/1042.5	-/1045	-/-	-/-	-/-	-/-	-/-	-/-	-/-
H4		[mm]	-	35	35	35	35	35	35	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16	M16

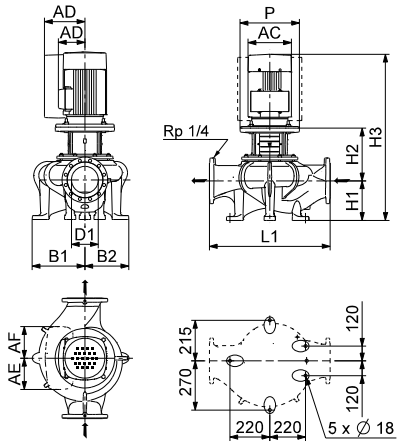
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 150-XXX/4



TM06 3852 0521

Note: All QH curves apply to single-head pumps. For further information, see page 119.



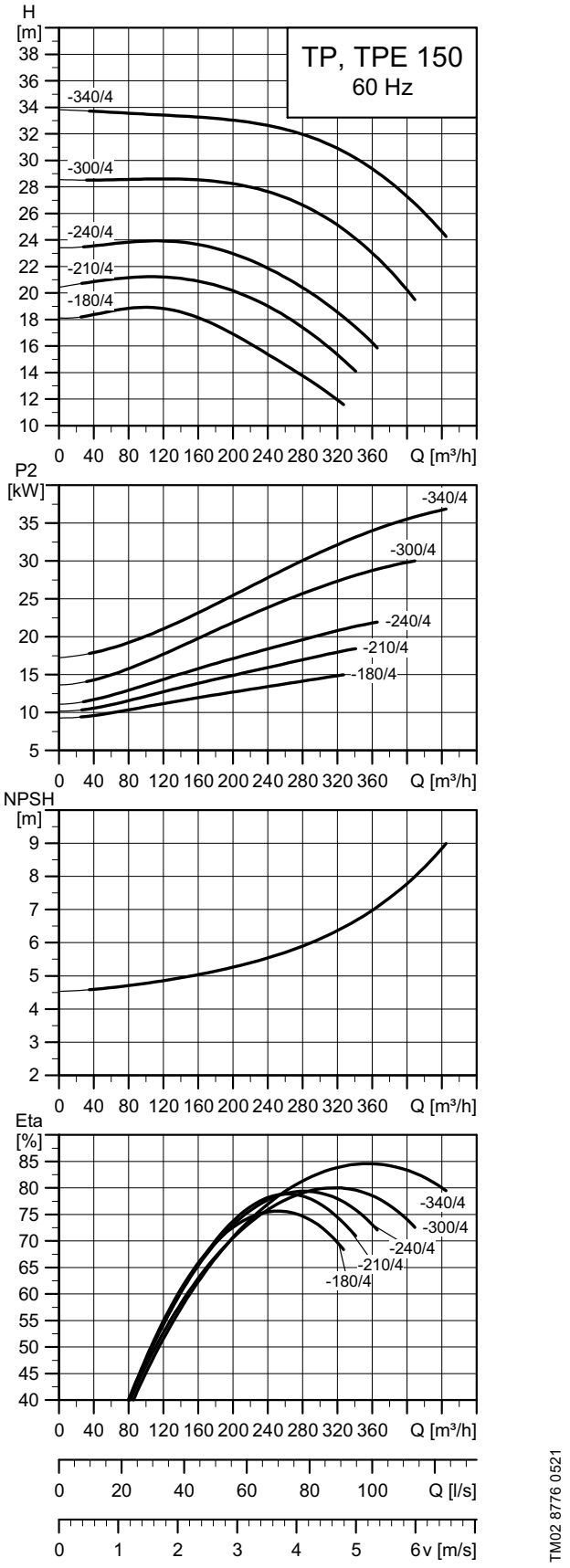
TM05 0661 2614

Technical data

TP 150			-130/4	-160/4	-200/4	-220/4
TPD			-	-	-	-
TPE			•	•	-	-
TPED			-	-	-	-
Series			300	300	300	300
IEC size	1~ TP		-	-	-	-
	3~ TP		160	160	180	180
	1~ TPE		-	-	-	-
	3~ TPE		160	160	180	-
P2	1~/3~ TP	[kW]	-/11	-/15	-/18.5	-/22
	1~/3~ TPE	[kW]	-/11	-/15	-/18.5	-
PN			PN 16	PN 16	PN 16	PN 16
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]
D1		[mm]	150	150	150	150
AC	1~/3~ TP	[mm]	-/314	-/314	-/368	-/368
	1~/3~ TPE	[mm]	-/314	-/314	-/314	-
AD	1~/3~ TP	[mm]	-/236.5	-/236.5	-/286	-/286
	1~/3~ TPE	[mm]	-/308	-/308	-/308	-
AE	1~/3~ TPE	[mm]	-/210	-/210	-/210	-
AF	1~/3~ TPE	[mm]	-/210	-/210	-/210	-
P		[mm]	350	350	350	350
B1 ★		[mm]	295/-	295/-	295/-	295/-
B2 ★		[mm]	240/-	240/-	240/-	240/-
L1		[mm]	800	800	800	800
H1		[mm]	250	250	250	250
H2		[mm]	314	314	314	314
H3	1~/3~ TP	[mm]	-/1058	-/1118	-/1122	-/1152
	1~/3~ TPE	[mm]	-/1079	-/1079	-/-	-/-

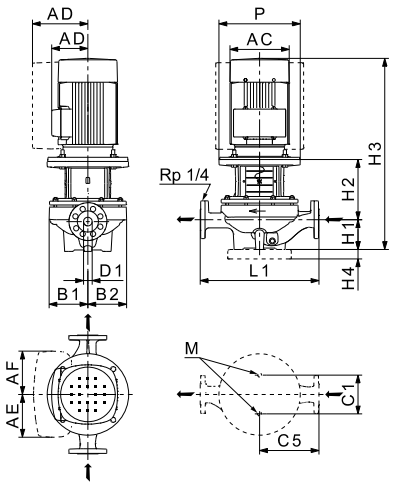
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

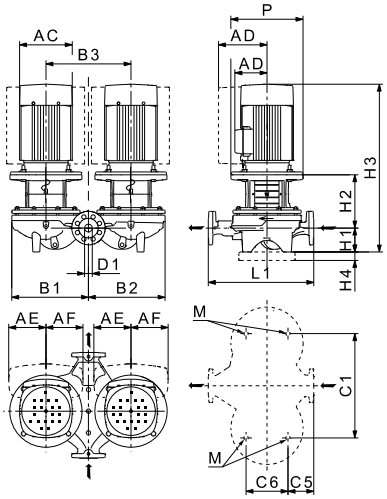
TP, TPD, TPE 150-XXX/4



TM02 8776 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.





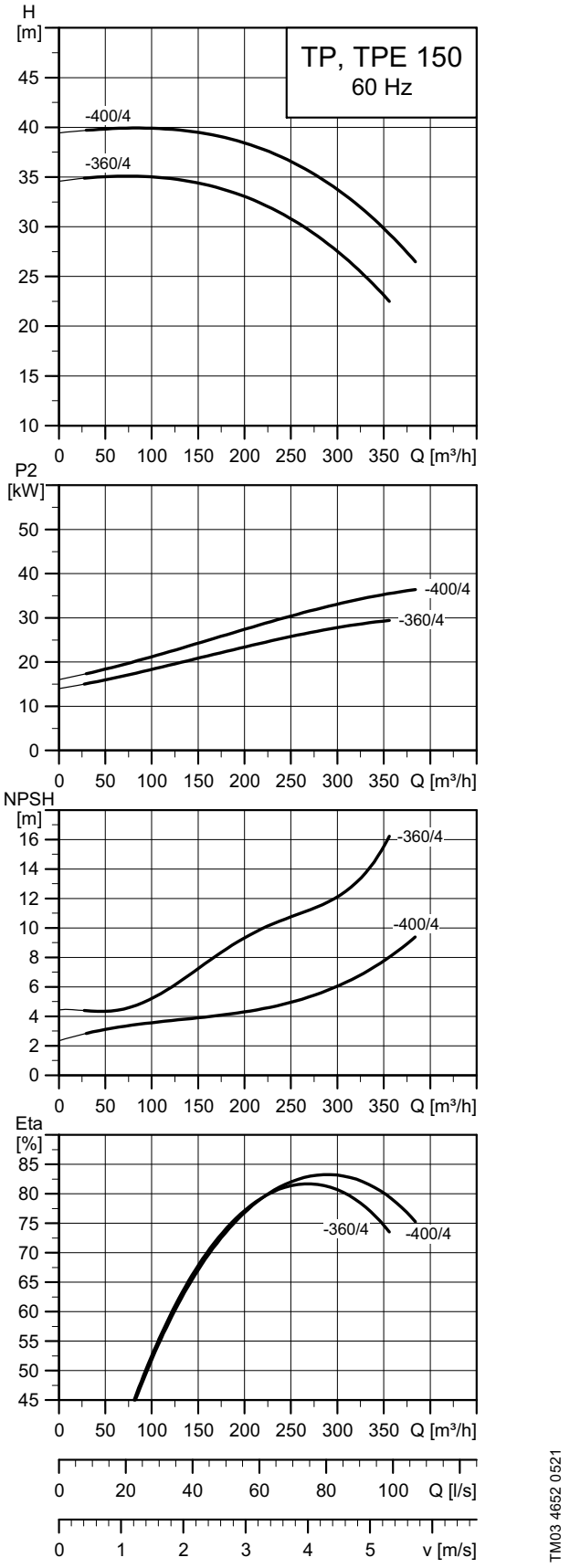
TM03 5348 2614 - TM03 5349 2614

Technical data

TP 150			-180/4	-210/4	-240/4	-300/4	-340/4
TPD			●	●	●	●	●
TPE			●	-	-	-	-
TPED			-	-	-	-	-
Series			300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-
	3~ TP		160	180	180	200	225
	1~ TPE		-	-	-	-	-
	3~ TPE		160	180	180	-	-
P2	1~/3~ TP	[kW]	-/15	-/18.5	-/22	-/30	-/37
	1~/3~ TPE	[kW]	-/15	-/18.5	-/22	-	-
PN			PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]
D1		[mm]	150	150	150	150	150
AC	1~/3~ TP	[mm]	-/314	-/368	-/368	-/408	-/442
	1~/3~ TPE	[mm]	-/314	-/314	-/350	-	-
AD	1~/3~ TP	[mm]	-/236.5	-/286	-/286	-/315	-/325
	1~/3~ TPE	[mm]	-/308	-/308	-/439	-	-
AE	1~/3~ TPE	[mm]	210	210	164	-	-
AF	1~/3~ TPE	[mm]	210	210	164	-	-
P		[mm]	350	350	350	400	450
B1 ★		[mm]	296/583	296/583	296/583	296/583	296/583
B2 ★		[mm]	237/553	237/553	237/553	237/553	237/553
B3		[mm]	600	600	600	600	600
C1 ★		[mm]	230/680	230/680	230/680	230/680	230/680
C5 ★		[mm]	400/153	400/153	400/153	400/153	400/153
C6		[mm]	350	350	350	350	350
L1		[mm]	800	800	800	800	800
H1		[mm]	215	215	215	215	215
H2		[mm]	321	321	321	321	351.5
H3	1~/3~ TP	[mm]	-/1090	-/1052	-/1133	-/1182	-/1215.5
	1~/3~ TPE	[mm]	-/1052	-/-	-/-	-/-	-/-
H4		[mm]	35	35	35	35	35
M		[mm]	M16	M16	M16	M16	M16

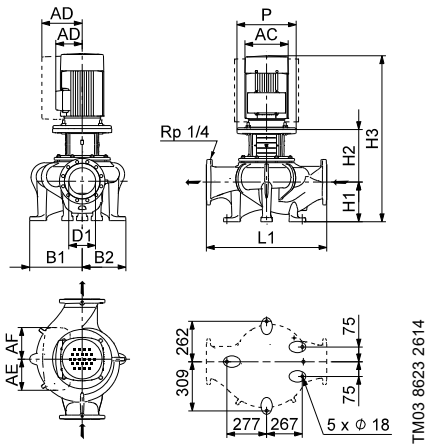
★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPE 150-XXX/4



TM03 4652 0521

Note: All QH-curves apply to single-head pumps. For further information, see page 119.

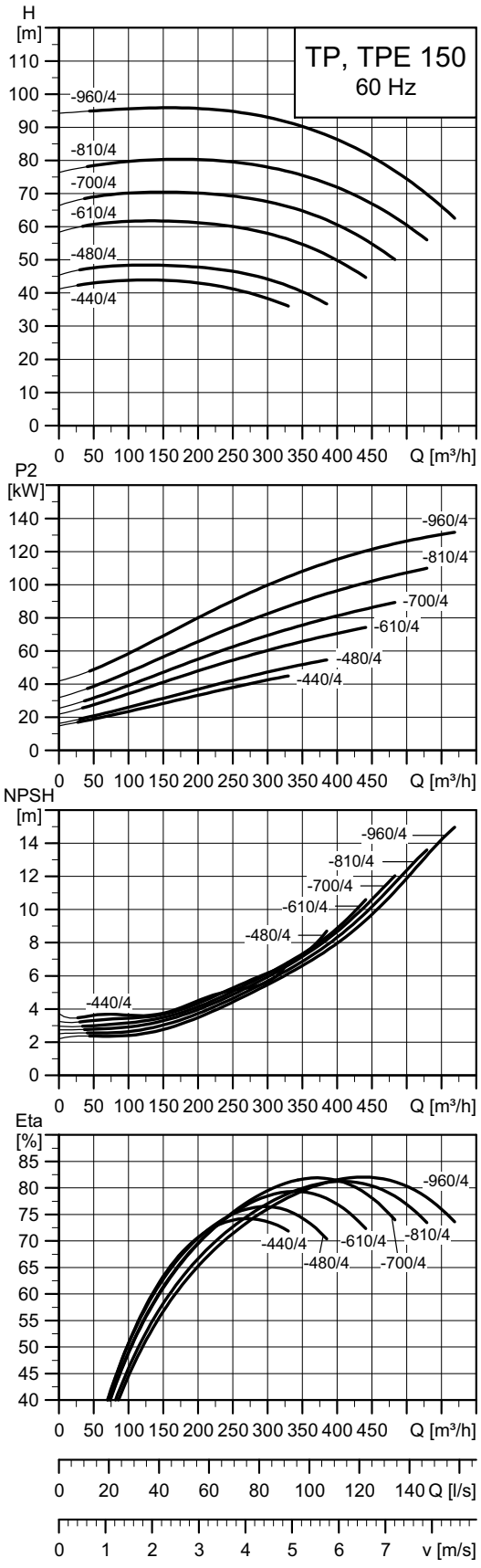


Technical data

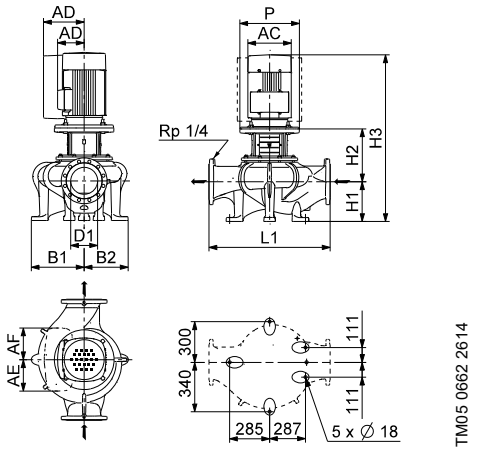
TP 150			-360/4	-400/4
TPD			-	-
TPE			-	-
TPED			-	-
Series			300	300
IEC size	1~ TP		-	-
	3~ TP		200	225
	1~ TPE		-	-
	3~ TPE		-	-
P2	1~/3~ TP	[kW]	-/30	-/37
	1~/3~ TPE	[kW]	-	-
PN			PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-40;140]	[-40;140]
D1		[mm]	150	150
AC	1~/3~ TP	[mm]	-/408	-/449
	1~/3~ TPE	[mm]	-	-
AD	1~/3~ TP	[mm]	-/315	-/338
	1~/3~ TPE	[mm]	-	-
AE	1~/3~ TPE	[mm]	-	-
AF	1~/3~ TPE	[mm]	-	-
P		[mm]	400	450
B1 ★		[mm]	335/-	335/-
B2 ★		[mm]	288/-	288/-
L1		[mm]	800	800
H1		[mm]	235	235
H2		[mm]	319	349
H3	1~/3~ TP	[mm]	-/1199	-/1232
	1~/3~ TPE	[mm]	-	-

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP, TPD, TPE 150-XXX/4



TM05 0539 0521

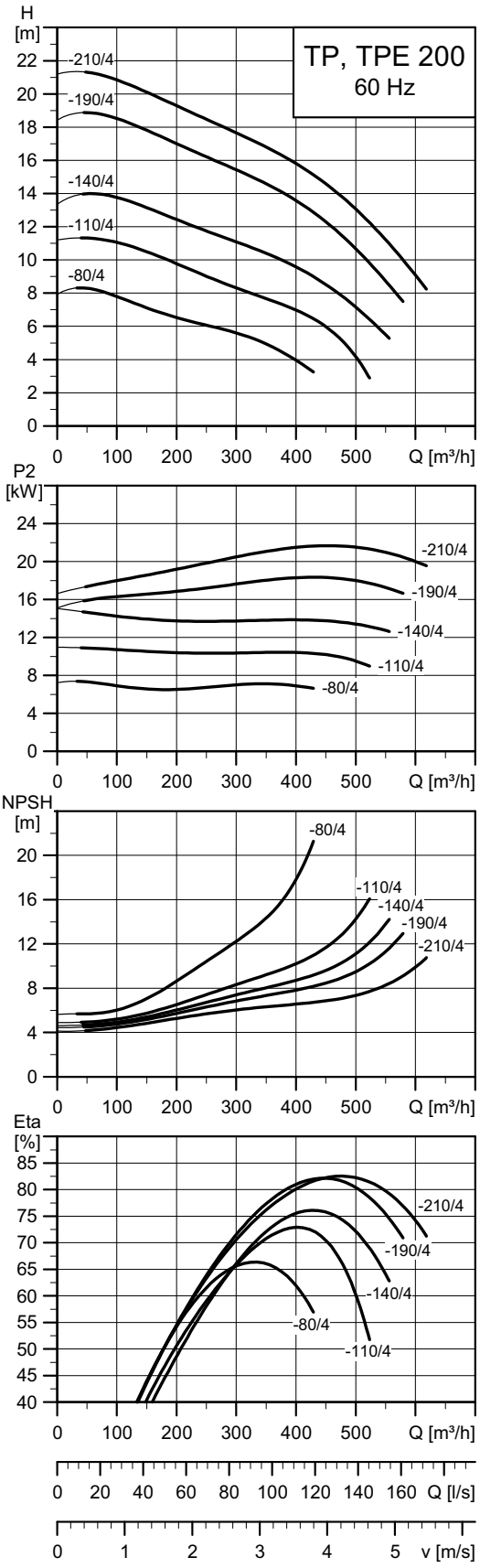


Technical data

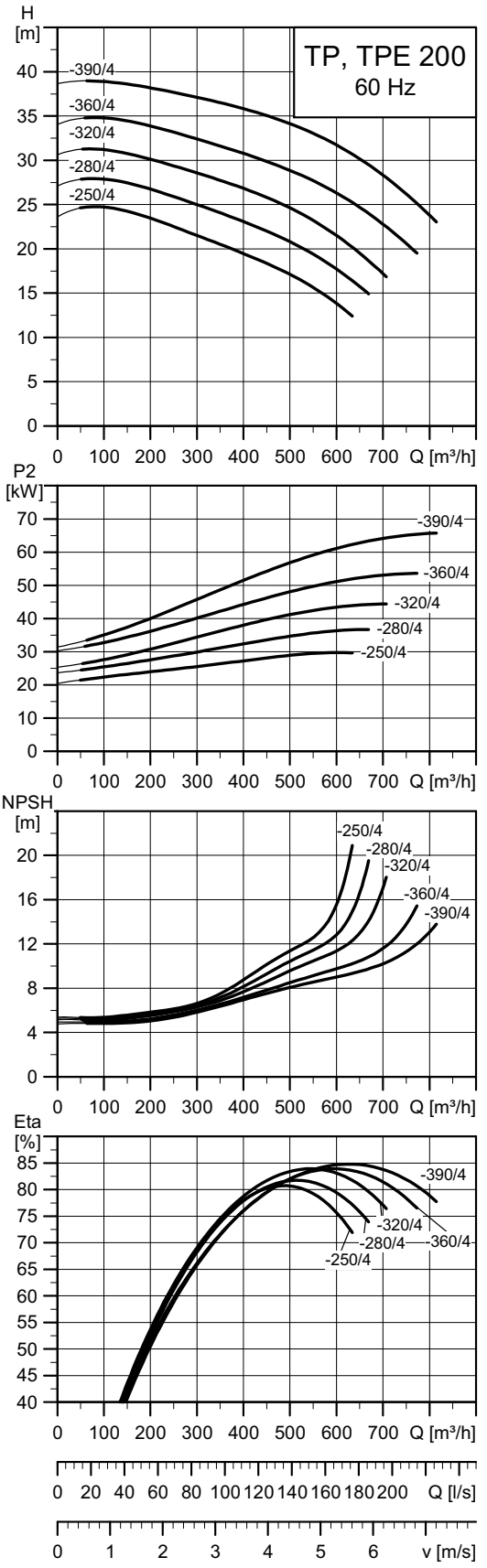
TP 150			-440/4	-480/4	-610/4	-700/4	-810/4	-960/4
TPD			-	-	-	-	-	-
TPE			-	-	-	-	-	-
TPED			-	-	-	-	-	-
Series			300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-
	3~ TP		225	250	280	280	315	315
	1~ TPE		-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-
P2	1~/3~ TP	[kW]	-/45	-/55	-/75	-/90	-/110	-/132
	1~/3~ TPE	[kW]	-	-	-	-	-	-
PN			PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]
D1		[mm]	150	150	150	150	150	150
AC	1~/3~ TP	[mm]	-/449	-/497	-/551	-/551	-/610	-/610
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/338	-/410	-/433	-/433	-/495	-/495
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-
P		[mm]	450	550	550	550	660	660
B1 ★		[mm]	373/-	373/-	373/-	373/-	373/-	373/-
B2 ★		[mm]	333/-	333/-	333/-	333/-	333/-	333/-
L1		[mm]	1000	1000	1000	1000	1000	1000
H1		[mm]	250	250	250	250	250	250
H2		[mm]	352	352	352	352	377	377
H3	1~/3~ TP	[mm]	-/1315	-/1349	-/1422	-/1532	-/1589	-/1749
	1~/3~ TPE	[mm]	-	-	-	-	-	-

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP 200-XXX/4

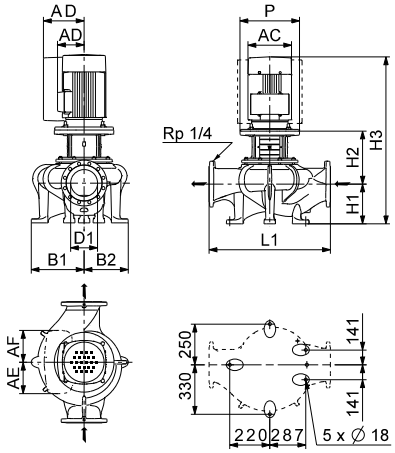


TM05 0541 0521

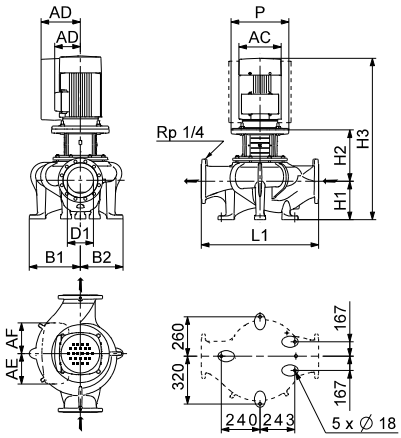


TM05 0543 0521

TP 200-80/4
TP 200-110/4
TP 200-140/4
TP 200-190/4
TP 200-210/4



TP 200-250/4
TP 200-280/4
TP 200-320/4
TP 200-360/4
TP 200-390/4



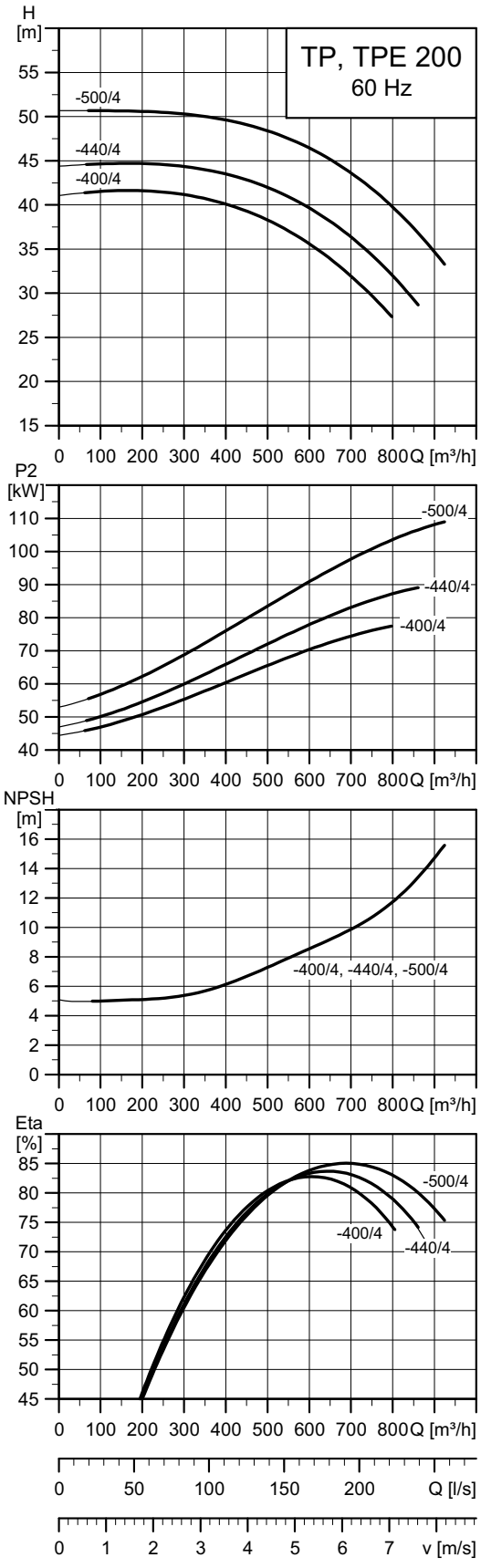
TM05 0663 2614 - TM05 0664 2614

Technical data

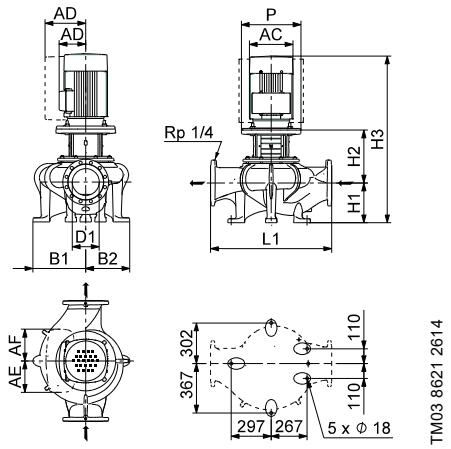
TP 200			-80/4	-110/4	-140/4	-190/4	-210/4	-250/4	-280/4	-320/4	-360/4	-390/4
TPD			-	-	-	-	-	-	-	-	-	-
TPE			•	•	•	-	-	-	-	-	-	-
TPED			-	-	-	-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-	-
	3~ TP		132	160	160	180	180	200	225	225	250	280
	1~ TPE		-	-	-	-	-	-	-	-	-	-
	3~ TPE		132	160	160	180	-	-	-	-	-	-
P2	1~/3~ TP	[kW]	-/7.5	-/11	-/15	-/18.5	-/22	-/30	-/37	-/45	-/55	-/75
	1~/3~ TPE	[kW]	-/7.5	-/11	-/15	-/18.5	-	-	-	-	-	-
PN			PN16	PN16	PN16	PN16	PN16	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-25;120]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]
D1		[mm]	200	200	200	200	200	200	200	200	150	150
AC	1~/3~ TP	[mm]	-/262	-/314	-/314	-/368	-/368	-/408	-/449	-/449	-/497	-/551
	1~/3~ TPE	[mm]	-/255	-/314	-/314	-/314	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/202	-/236.5	-/236.5	-/286	-/286	-/315	-/338	-/338	-/410	-/433
	1~/3~ TPE	[mm]	-/237	-/308	-/308	-/308	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-/173	-/210	-/210	-/210	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-/173	-/210	-/210	-/210	-	-	-	-	-	-
P		[mm]	300	350	350	350	350	400	450	450	550	550
B1 ★		[mm]	296/-	363/-	363/-	363/-	363/-	348/-	348/-	348/-	348/-	348/-
B2 ★		[mm]	237/-	283/-	283/-	283/-	283/-	288/-	288/-	288/-	288/-	288/-
L1		[mm]	900	900	900	900	900	900	900	900	900	900
H1		[mm]	280	280	280	280	280	280	280	280	280	280
H2		[mm]	-/336	-/336	-/336	-/336	-/336	-/331	-/361	-/361	-/361	-/361
H3	1~/3~ TP	[mm]	-/1051	-/1110	-/1170	-/1130	-/1160	-/1256	-/1298	-/1358	-/1397	-/1470
	1~/3~ TPE	[mm]	-/975	-/1094	-/1134	-/-	-/-	-/-	-/-	-/-	-/-	-/-

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP 200-XXX/4



TM03 8592 0521

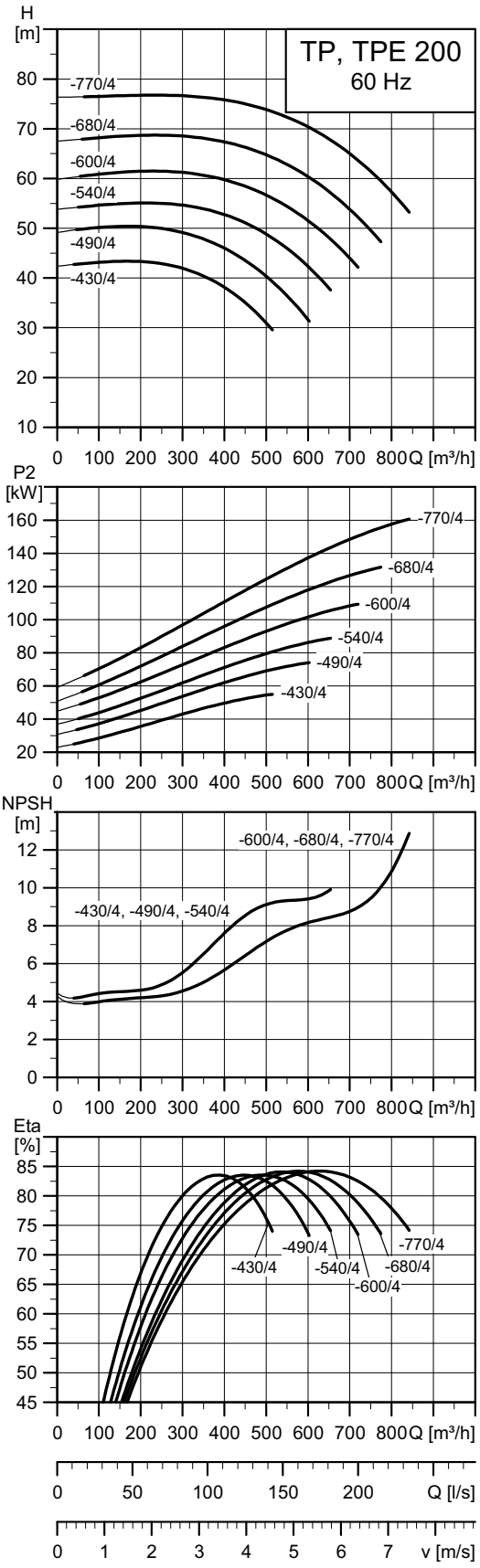


Technical data

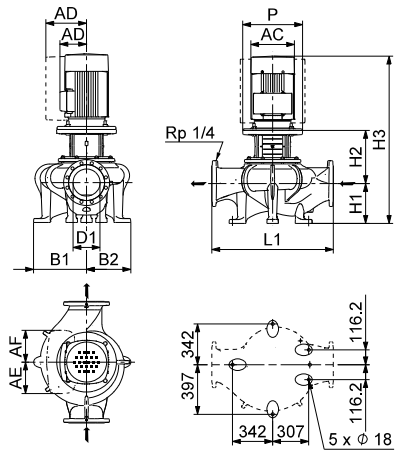
TP 200			-400/4	-440/4	-500/4
TPD			-	-	-
TPE			-	-	-
TPED			-	-	-
Series			300	300	300
IEC size	1~ TP		-	-	-
	3~ TP		280	280	315
	1~ TPE		-	-	-
	3~ TPE		-	-	-
P2	1~/3~ TP	[kW]	-/75	-/90	-/110
	1~/3~ TPE	[kW]	-	-	-
PN			PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-40;140]	[-40;140]	[-40;140]
D1		[mm]	200	200	200
AC	1~/3~ TP	[mm]	-/551	-/551	-/616
	1~/3~ TPE	[mm]	-	-	-
AD	1~/3~ TP	[mm]	-/433	-/433	-/515
	1~/3~ TPE	[mm]	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-
P		[mm]	550	550	660
B1 ★		[mm]	393/-	393/-	393/-
B2 ★		[mm]	328/-	328/-	328/-
L1		[mm]	900	900	900
H1		[mm]	295	295	295
H2		[mm]	377	377	407
H3	1~/3~ TP	[mm]	-/1492	-/1602	-/1614
	1~/3~ TPE	[mm]	-	-	-

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

TP 200-XXX/4



TM03 8593 0521



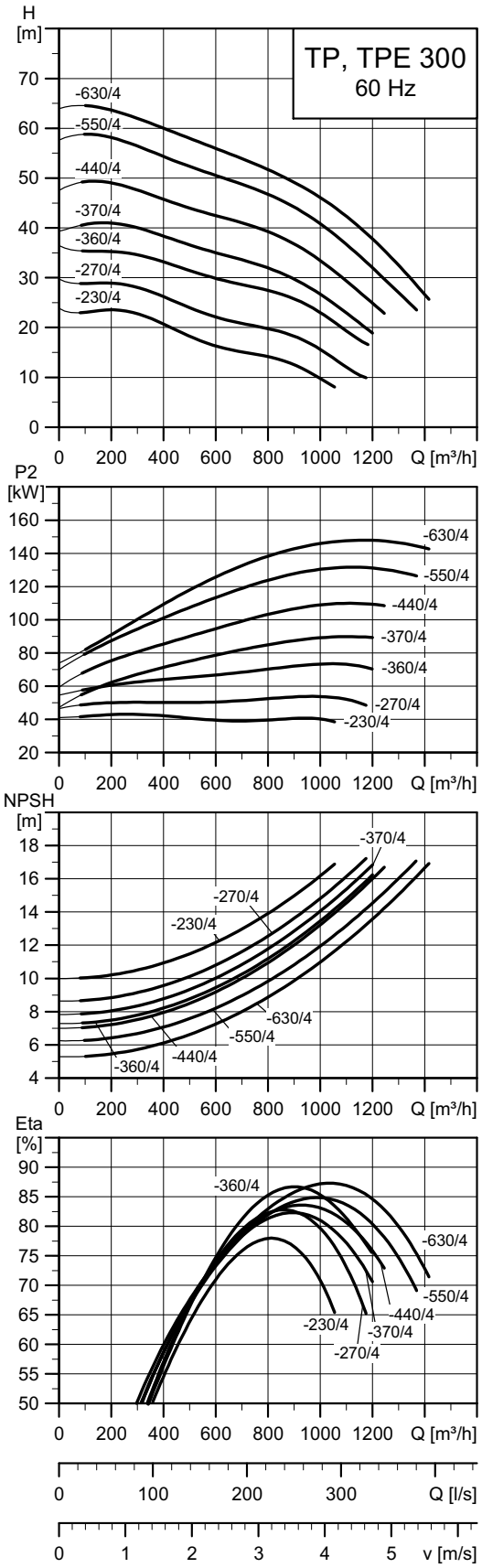
TM03 8622 2614

Technical data

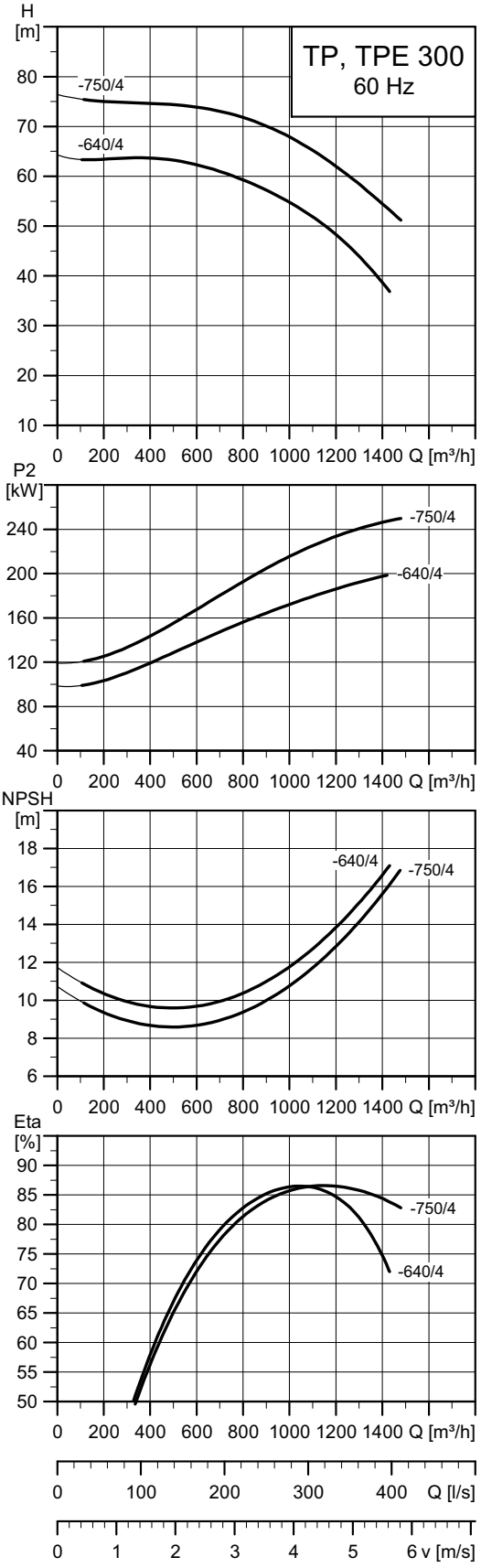
TP 200			-430/4	-490/4	-540/4	-600/4	-680/4	-770/4
TPD			-	-	-	-	-	-
TPE			-	-	-	-	-	-
TPED			-	-	-	-	-	-
Series			300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-
	3~ TP		250	280	280	315	315	315
	1~ TPE		-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-
P2	1~/3~ TP	[kW]	-/55	-/75	-/90	-/110	-/132	-/160
	1~/3~ TPE	[kW]	-	-	-	-	-	-
PN			PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25	PN 16/25
T_{min};T_{max}		[°C]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]	[-40;140]
D1		[mm]	200	200	200	200	200	200
AC	1~/3~ TP	[mm]	-/497	-/551	-/551	-/616	-/616	-/616
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/433	-/433	-/433	-/515	-/515	-/515
	1~/3~ TPE	[mm]	-	-	-	-	-	-
AE	1~/3~ TPE	[mm]	-	-	-	-	-	-
AF	1~/3~ TPE	[mm]	-	-	-	-	-	-
P		[mm]	550	550	550	660	660	660
B1 ★		[mm]	423/-	423/-	423/-	423/-	423/-	423/-
B2 ★		[mm]	368/-	368/-	368/-	368/-	368/-	368/-
L1		[mm]	1000	1000	1000	1000	1000	1000
H1		[mm]	295	295	295	295	295	295
H2		[mm]	382	382	382	412	412	412
H3	1~/3~ TP	[mm]	-/1424	-/1497	-/1607	-/1619	-/1784	-/1784
	1~/3~ TPE	[mm]	-	-	-	-	-	-

★ The dimension before the slash applies to the single-head pump and the dimension after the slash applies to the twin-head pump.

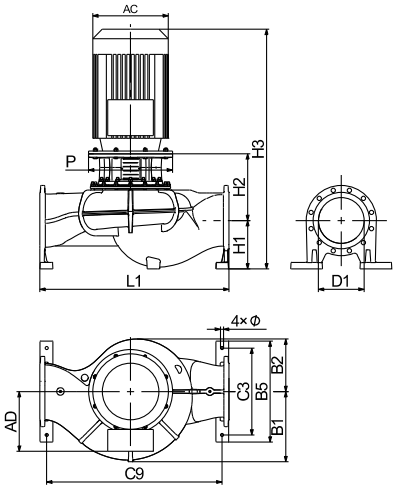
TP 300-XXX/4



TM06 6596 0521



TM06 6622 0521

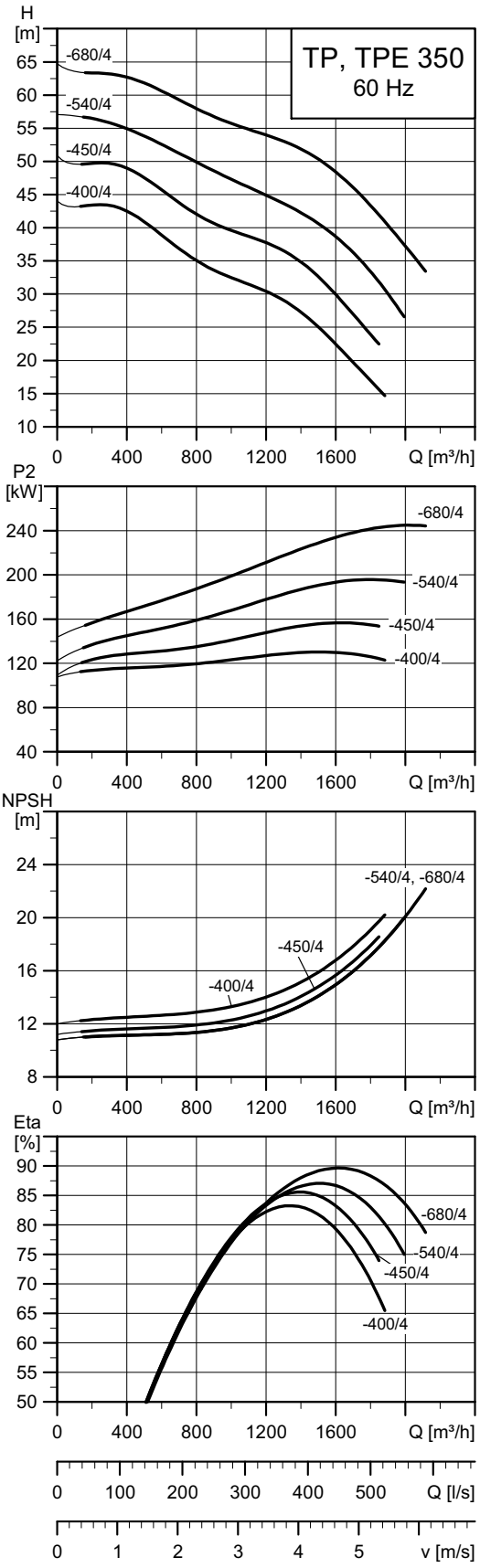


TM06 6532 1716

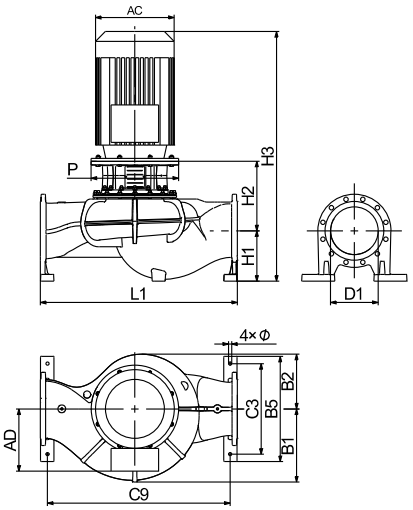
Technical data

TP 300			-230/4	-270/4	-360/4	-370/4	-440/4	-550/4	-630/4	-640/4	-750/4
TPD			-	-	-	-	-	-	-	-	-
TPE			-	-	-	-	-	-	-	-	-
TPED			-	-	-	-	-	-	-	-	-
Series			300	300	300	300	300	300	300	300	300
IEC size	1~ TP		-	-	-	-	-	-	-	-	-
	3~ TP		225M	250M	280S	280M	315S	315M	315M	315L	315L
	1~ TPE		-	-	-	-	-	-	-	-	-
	3~ TPE		-	-	-	-	-	-	-	-	-
P2	3~ TP	[kW]	-/45	-/55	-/75	-/90	-/110	-/132	-/160	-/200	-/250
	3~ TPE	[kW]	-	-	-	-	-	-	-	-	-
PN			PN16/25	PN16/25	PN16/25	PN16/25	PN16/25	PN16/25	PN16/25	PN16/25	PN16/25
T_{min};T_{max}		[°C]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]	[-40;150]
D1		[mm]	300	300	300	300	300	300	300	300	300
AC	1~/3~ TP	[mm]	-/442	-/495	-/555	-/555	-/610	-/610	-/610	-/610	-/702
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-	-	-
AD	1~/3~ TP	[mm]	-/325	-/392	-/432	-/432	-/495	-/495	-/495	-/495	-/619
	1~/3~ TPE	[mm]	-	-	-	-	-	-	-	-	-
P		[mm]	450	550	550	550	660	660	660	660	660
B1		[mm]	438/-	438/-	438/-	460/-	460/-	460/-	460/-	438/-	438/-
B2		[mm]	320/-	320/-	320/-	345/-	345/-	345/-	345/-	338/-	338/-
B5		[mm]	663	663	663	663	663	663	663	666	666
C3		[mm]	570	570	570	570	570	570	570	570	570
C9		[mm]	1150	1150	1150	1150	1150	1150	1150	1150	1150
L1		[mm]	1240	1240	1240	1240	1240	1240	1240	1240	1240
H1		[mm]	348	348	348	317	317	317	317	340	340
H2		[mm]	423	423	423	443	468	468	468	455	460
H3		[mm]	-/1480	-/1588	-/1591	-/1690	-/1717	-/1877	-/1877	-/2027	-/2040
∅		[mm]	20	20	20	20	20	20	20	20	20

TP 350-XXX/4



TM06 6623 0521



TM06 6532 1716

Technical data

TP 350			-400/4	-450/4	-540/4	-680/4
TPD			-	-	-	-
TPE			-	-	-	-
TPED			-	-	-	-
Series			300	300	300	300
IEC size	1~ TP		-	-	-	-
	3~ TP		315M	315M	315L	315L
	1~ TPE		-	-	-	-
	3~ TPE		-	-	-	-
P2	3~ TP	[kW]	-/132	-/160	-/200	-/250
	3~ TPE	[kW]	-	-	-	-
PN			PN16/25	PN16/25	PN16/25	PN16/25
T_{min};T_{max}		[°C]	[-40;150]	[-40;150]	[-40;150]	[-40;150]
D1		[mm]	350	350	350	350
AC	1~/3~ TP	[mm]	-/610	-/610	-/610	-/702
	1~/3~ TPE	[mm]	-	-	-	-
AD	1~/3~ TP	[mm]	-/495	-/495	-/495	-/619
	1~/3~ TPE	[mm]	-	-	-	-
P		[mm]	660	660	660	660
B1		[mm]	521/-	521/-	521/-	521/-
B2		[mm]	373/-	373/-	373/-	373/-
B5		[mm]	735	735	735	735
C3		[mm]	660	660	660	660
C9		[mm]	1310	1310	1310	1310
L1		[mm]	1400	1400	1400	1400
H1		[mm]	361	361	361	361
H2		[mm]	509	509	509	514
H3		[mm]	-/1962	-/1962	-/2102	-/2125
∅		[mm]	20	20	20	20

24. Minimum efficiency index

Minimum efficiency index, MEI, means the dimensionless scale unit for hydraulic pump efficiency at best efficiency point, part load and overload. The Commission Regulation, EU, sets efficiency requirements to MEI greater than or equal to 0.10 as from 1 January 2013 and MEI greater than or equal to 0.40 as from 1 January 2015. An indicative benchmark for best-performing water pump available on the market as from 1 January 2013 is determined in the regulation.

- The benchmark for most efficient water pumps is MEI greater than or equal to 0.70.
- The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index, MEI, is based on the full impeller diameter.
- The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable-speed drive that matches the pump duty to the system.
- Information on benchmark efficiency is available at http://europump.eu/efficiencycharts.

TPE2, TPE2 D, TPE3, TPE3 D

TPE2, TPE3	P2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TPE2, TPE2 D, TPE3, TPE3 D	All			•	≥ 0.70

TP, TPD, TPE, 2-pole, PN 6, 10, 16

TP Series 200, 2-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP 32-80/2	0.37			•	≥ 0.60
TP 32-160/2	0.55			•	≥ 0.70
TP 32-220/2	0.75	32-136 / 111	•		≥ 0.40
TP 32-260/2	1.1	32-136 / 118	•		
TP 32-330/2	1.5	32-136 / 136		•	
TP 40-80/2	0.55			•	≥ 0.49
TP 40-160/2	0.75			•	≥ 0.70
TP 40-240/2	1.1			•	≥ 0.70
TP 40-270/2	1.5			•	≥ 0.53
TP 40-330/2	2.2			•	≥ 0.43
TP 40-390/2	3.0			•	≥ 0.66
TP 50-80/2	0.55			•	≥ 0.70
TP 50-160/2	1.1			•	≥ 0.56
TP 50-240/2	1.5			•	≥ 0.70
TP 65-80/2	1.1			•	≥ 0.64
TP 65-160/2	1.5			•	≥ 0.70
TP 65-240/2	2.2			•	≥ 0.70
TP 80-160/2	3.0			•	≥ 0.70

TP Series 300, 2-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP, TPD, TPE 32-300/2	2.2	32-200.1 / 137	•		≥ 0.46
TP, TPD, TPE 32-360/2	3	32-200.1 / 148	•		
TP, TPD, TPE 32-450/2	4	32-200.1 / 160	•		
TP, TPD, TPE 32-550/2	5.5	32-200.1 / 174	•		
TP, TPD, TPE 32-680/2	7.5	32-200.1 / 191	•		
TP, TPD, TPE 32-820/2	11	32-200.1 / 205		•	
TP, TPD, TPE 40-400/2	4	32-200 / 150	•		≥ 0.70
TP, TPD, TPE 40-460/2	5.5	32-200 / 162	•		
TP, TPD, TPE 40-530/2	7.5	32-200 / 176	•		
TP, TPD, TPE 40-690/2	11	32-200 / 194	•		
TP, TPD, TPE 40-820/2	15	32-200 / 208	•		
TP, TPD, TPE 40-920/2	18.5	32-200 / 219		•	
TP, TPD 50-250/2	2.2	32-125 / 113	•		≥ 0.70
TP, TPD, TPE 50-300/2	3	32-125 / 123		•	
TP, TPD, TPE 50-350/2	4	32-160 / 137	•		≥ 0.40
TP, TPD, TPE 50-410/2	5.5	32-160 / 146		•	
TP, TPD, TPE 50-430/2	7.5	40-200 / 161	•		≥ 0.57
TP, TPD, TPE 50-530/2	11	40-200 / 176	•		
TP, TPD, TPE 50-640/2	15	40-200 / 188		•	

TP Series 300, 2-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP, TPD, TPE 50-720/2	15	40-250 / 184	•		≥ 0.60
TP, TPD, TPE 50-790/2	18.5	40-250 / 204	•		
TP, TPD, TPE 50-880/2	22	40-250 / 213	•		
TP, TPD 50-1050/2	30	40-250 / 232		•	
TP, TPD, TPE 65-200/2	3	40-125 / 107	•		≥ 0.70
TP, TPD, TPE 65-250/2	4	40-125 / 118		•	
TP, TPD, TPE 65-340/2	5.5	40-160 / 133	•		≥ 0.54
TP, TPD, TPE 65-390/2	7.5	40-160 / 145		•	
TP, TPD, TPE 65-480/2	11	50-200 / 157	•		≥ 0.52
TP, TPD, TPE 65-540/2	15	50-200 / 170	•		
TP, TPD, TPE 65-630/2	18.5	50-200 / 180	•		
TP, TPD 65-920/2	37	50-200 / 219		•	
TP, TPD, TPE 65-740/2	22	50-250 / 196	•		≥ 0.48
TP, TPD 65-910/2	30	50-250 / 215	•		
TP, TPD 65-1050/2	37	50-250 / 230		•	
TP, TPD, TPE 80-200/2	4	50-125 / 105	•		≥ 0.53
TP, TPD, TPE 80-240/2	5.5	50-125 / 115	•		
TP, TPD, TPE 80-290/2	7.5	50-125 / 127		•	
TP, TPD, TPE 80-330/2	11	65-160 / 137	•		≥ 0.44
TP, TPD, TPE 80-400/2	15	65-160 / 149		•	
TP, TPD, TPE 80-480/2	18.5	65-200 / 160	•		≥ 0.65
TP, TPD, TPE 80-530/2	22	65-200 / 167	•		
TP, TPD 80-640/2	30	65-200 / 184	•		
TP, TPD 80-750/2	37	65-200 / 197		•	
TP, TPD, TPE 100-230/2	7.5	65-125 / 120-110	•		≥ 0.60
TP, TPD, TPE 100-300/2	11	65-125 / 130	•		
TP, TPD, TPE 100-370/2	15	65-125 / 141		•	
TP, TPD, TPE 100-350/2	18.5	80-160 / 145	•		≥ 0.70
TP, TPD, TPE 100-380/2	22	80-160 / 152		•	
TP, TPD 100-530/2	30	80-200 / 166	•		≥ 0.50
TP, TPD 100-630/2	37	80-200 / 180	•		
TP, TPD 100-700/2	45	80-200 / 190		•	

TP, TPD, TPE, 4-pole, PN 6, 10, 16

TP Series 200, 4-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP 32-40/4	0.12			•	≥ 0.70
TP 32-80/4	0.25			•	≥ 0.70
TP 40-40/4	0.25			•	≥ 0.70
TP 40-80/4	0.55			•	≥ 0.69
TP 50-40/4	0.25			•	≥ 0.70
TP 50-80/4	0.55			•	≥ 0.70
TP 65-40/4	0.37			•	≥ 0.70
TP 65-80/4	1.1			•	≥ 0.70
TP 80-40/4	0.75			•	≥ 0.70
TP 80-80/4	1.5			•	≥ 0.70
TP 100-40/4	1.1			•	≥ 0.45

TP Series 300, 4-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP, TPD, TPE 32-120/4	0.55	32-200.1 / 168	•		≥ 0.70
TP, TPD, TPE 32-140/4	0.75	32-200.1 / 180	•		
TP, TPD 32-190/4	1.1	32-200.1 / 203		•	
TP, TPD 40-110/4	0.75	32-200 / 165	•		≥ 0.70
TP, TPD 40-150/4	1.1	32-200 / 180	•		
TP, TPD 40-180/4	1.5	32-200 / 194	•		
TP, TPD 40-230/4	2.2	32-200 / 219		•	
TP, TPD 50-100/4	0.75	40-200 / 155	•		≥ 0.70
TP, TPD 50-115/4	1.1	40-200 / 167	•		
TP, TPD 50-130/4	1.5	40-200 / 181	•		
TP, TPD 50-180/4	2.2	40-200 / 206		•	
TP, TPD, TPE 50-240/4	3	40-250 / 224	•		≥ 0.44
TP, TPD, TPE 50-270/4	4	40-250 / 240	•		
TP, TPD, TPE 50-340/4	5.5	40-250 / 260		•	
TP, TPD 65-130/4	1.5	50-200 / 164	•		≥ 0.55
TP, TPD 65-150/4	2.2	50-200 / 180	•		
TP, TPD, TPE 65-190/4	3	50-200 / 200		•	

TP Series 300, 4-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP, TPD, TPE 65-230/4	4	50-250 / 220	•		≥ 0.70
TP, TPD, TPE 65-310/4	5.5	50-250 / 250	•		
TP, TPD, TPE 65-330/4	7.5	50-250 / 263		•	
TP, TPD 80-110/4	2.2	65-160 / 157		•	≥ 0.51
TP, TPD, TPE 80-150/4	3	65-200 / 174	•		≥ 0.62
TP, TPD, TPE 80-170/4	4	65-200 / 190		•	
TP, TPD, TPE 80-230/4	5.5	65-250 / 220	•		≥ 0.41
TP, TPD, TPE 80-280/4	7.5	65-250 / 240		•	
TP, TPD, TPE 80-340/4	11	65-315 / 265	•		≥ 0.70
TP, TPD, TPE 80-410/4	15	65-315 / 288	•		
TP, TPD 80-460/4	18.5	65-315 / 305	•		
TP, TPD 80-510/4	22	65-315 / 320		•	
TP, TPD, TPE 100-90/4	2.2	80-160 / 143	•		≥ 0.70
TP, TPD, TPE 100-100/4	3	80-160 / 151-153	•		
TP, TPD, TPE 100-150/4	5.5	80-160 / 177		•	
TP, TPD, TPE 100-130/4	4	80-200 / 172	•		≥ 0.70
TP, TPD, TPE 100-170/4	5.5	80-200 / 190	•		
TP, TPD, TPE 100-260/4	11	80-200 / 222		•	
TP, TPD, TPE 100-200/4	7.5	80-250 / 202	•		≥ 0.63
TP, TPD, TPE 100-240/4	11	80-250 / 226	•		
TP, TPD 100-350/4	22	80-250 / 270		•	
TP, TPD, TPE 100-290/4	15	80-315 / 248	•		≥ 0.59
TP, TPD 100-340/4	18.5	80-315 / 267	•		
TP, TPD 100-390/4	22	80-315 / 285	•		
TP, TPD 100-470/4	30	80-315 / 310		•	
TP 100-560/4	37	80-315 / 334		•	≥ 0.60
TP, TPE 125-80/4	3.0	100-160 / 160-124	•		≥ 0.70
TP, TPE 125-110/4	4.0	100-160 / 161	•		
TP, TPE 125-135/4	5.5	100-160 / 174		•	
TP, TPD, TPE 125-130/4	5.5	100-200 / 168	•		≥ 0.67
TP, TPD, TPE 125-160/4	7.5	100-200 / 183	•		
TP, TPD, TPE 125-200/4	11	100-200 / 205	•		
TP, TPD, TPE 125-230/4	15	100-200 / 217		•	
TP, TPE 125-220/4	15	100-250 / 219	•		≥ 0.70
TP, TPD 125-280/4	18.5	100-250 / 238	•		
TP, TPD 125-340/4	22	100-250 / 256	•		
TP, TPD 125-365/4	30	100-250 / 269		•	
TP, TPD 125-420/4	30	100-315 / 290	•		≥ 0.60
TP, TPD 125-480/4	37	100-315 / 309	•		
TP 125-550/4	45	100-315 / 329	•		
TP 125-580/4	55	100-315 / 334		•	
TP, TPE 150-130/4	11	125-200 / 180-160	•		≥ 0.70
TP, TPE 150-160/4	15	125-200 / 196-188	•		
TP 150-200/4	18.5	125-200 / 218	•		
TP 150-220/4	22	125-200 / 226		•	
TP, TPD, TPE 150-180/4	15	125-250 / 204	•		≥ 0.70
TP, TPD 150-210/4	18.5	125-250 / 216	•		
TP, TPD 150-240/4	22	125-250 / 228	•		
TP, TPD 150-300/4	30	125-250 / 247	•		
TP, TPD 150-340/4	37	125-250 / 265		•	
TP 150-360/4	30	125-315 / 270	•		≥ 0.70
TP 150-400/4	37	125-315 / 286		•	
TP 150-440/4	45	125-400 / 293	•		≥ 0.70
TP 150-480/4	55	125-400 / 306	•		
TP 150-610/4	75	125-400 / 345	•		
TP 150-700/4	90	125-400 / 369	•		
TP 150-810/4	110	125-400 / 395	•		
TP 150-960/4	132	125-400 / 434		•	
TP, TPE 200-80/4	7.5	150-200 / 191-121	•		≥ 0.70
TP, TPE 200-110/4	11	150-200 / 200-138	•		
TP, TPE 200-140/4	15	150-200 / 210-166	•		
TP 200-190/4	18.5	150-200 / 218-206	•		
TP 200-210/4	22	150-200 / 224		•	
TP 200-250/4	30	150-250 / 232	•		≥ 0.70
TP 200-280/4	37	150-250 / 245	•		
TP 200-320/4	45	150-250 / 262	•		
TP 200-360/4	55	150-250 / 273	•		
TP 200-390/4	75	150-250 / 286		•	

TP Series 300, 4-pole	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP 200-270/4	37	150-315 / 242	•		≥ 0.70
TP 200-290/4	45	150-315 / 255	•		
TP 200-330/4	55	150-315 / 267	•		
TP 200-400/4	75	150-315 / 290	•		
TP 200-440/4	90	150-315 / 305	•		
TP 200-500/4	110	150-315 / 322		•	
TP 200-430/4	55	150-400 / 299	•		≥ 0.70
TP 200-490/4	75	150-400 / 322	•		
TP 200-540/4	90	150-400 / 337	•		
TP 200-600/4	110	150-400 / 355	•		
TP 200-680/4	132	150-400 / 374	•		
TP 200-770/4	160	150-400 / 394		•	
TP 300-230/4	45	250-315 / 233	•		≥ 0.70
TP 300-270/4	55	250-315 / 254	•		
TP 300-360/4	75	250-315 / 282		•	
TP 300-370/4	90	250-350 / 301	•		≥ 0.70
TP 300-440/4	110	250-350 / 327	•		
TP 300-550/4	132	250-350 / 353	•		
TP 300-630/4	160	250-350 / 370		•	
TP 300-640/4	200	250-400 / 363	•		≥ 0.70
TP 300-750/4	250	250-400 / 392		•	
TP 350-400/4	132	300-350 / 308	•		≥ 0.70
TP 350-450/4	160	300-350 / 328	•		
TP 350-540/4	200	300-350 / 347	•		
TP 350-680/4	250	300-350 / 367		•	

TP, PN 25

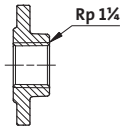
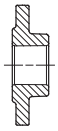
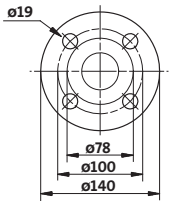
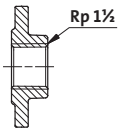
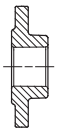
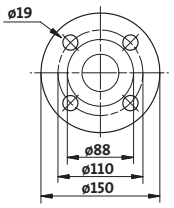
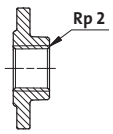
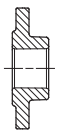
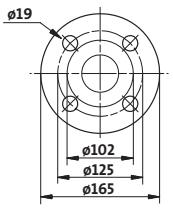
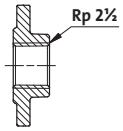
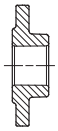
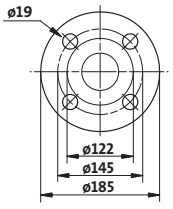
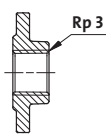
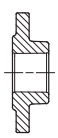
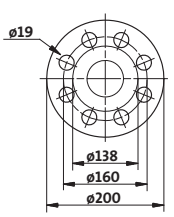
PN 25	P_2 [kW]	Nominal impeller size / actual impeller size	Trimmed impeller	Maximum impeller	MEI
TP Series 300, PN 25	All				*

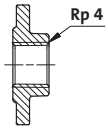
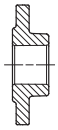
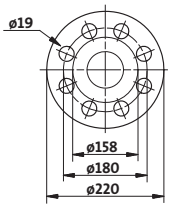
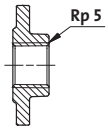
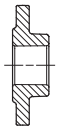
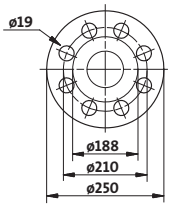
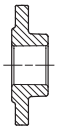
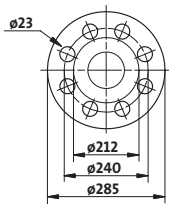
* Not in MEI classification because PN 25 is not a part of the MEI classification.

25. Accessories

Counterflanges

A flange kit consists of two steel flanges, two gaskets of asbestos-free material IT 200, and the requisite number of bolts.

Counterflange				Pump type	Description	Rated pressure	Pipe connection	Product number
 Threaded	 For welding	 TM03 0478 5204		**TP, TPE 32 TPD 32**	Threaded	10 bar, EN 1092-2	Rp 1 1/4	539703
					For welding	10 bar, EN 1092-2	32 mm, nominal	539704
					Threaded	16 bar, EN 1092-2	Rp 1 1/4	539703
					For welding	16 bar, EN 1092-2	32 mm, nominal	539704
 Threaded	 For welding	 TM03 0479 5204		**TP, TPE 40 TPD 40**	Threaded	10 bar, EN 1092-2	Rp 1 1/2	539701
					For welding	10 bar, EN 1092-2	40 mm, nominal	539702
					Threaded	16 bar, EN 1092-2	Rp 1 1/2	539701
					For welding	16 bar, EN 1092-2	40 mm, nominal	539702
 Threaded	 For welding	 TM03 0480 5204		**TP, TPE 50 TPD 50**	Threaded	10 bar, EN 1092-2	Rp 2	549801
					For welding	10 bar, EN 1092-2	50 mm, nominal	549802
					Threaded	16 bar, EN 1092-2	Rp 2	549801
					For welding	16 bar, EN 1092-2	50 mm, nominal	549802
 Threaded	 For welding	 TM03 0481 5204		**TP, TPE 65 TPD 65**	Threaded	10 bar, EN 1092-2	Rp 2 1/2	559801
					For welding	10 bar, EN 1092-2	65 mm, nominal	559802
					Threaded	16 bar, EN 1092-2	Rp 2 1/2	559801
					For welding	16 bar, EN 1092-2	65 mm, nominal	559802
 Threaded	 For welding	 TM03 0482 5204		**TP, TPE 80 TPD 80**	Threaded	6 bar, EN 1092-2	Rp 3	569902
					For welding	6 bar, EN 1092-2	80 mm, nominal	569901
					Threaded	10 bar, EN 1092-2	Rp 3	569802
					For welding	10 bar, EN 1092-2	80 mm, nominal	569801
					Threaded	16 bar, EN 1092-2	Rp 3	569802
					For welding	16 bar, EN 1092-2	80 mm, nominal	569801

Counterflange				Pump type	Description	Rated pressure	Pipe connection	Product number
 Threaded	 For welding		TM03 0483 5204	**TP, TPE 100 TPD 100**	Threaded	6 bar, EN 1092-2	Rp 4	579901
					For welding	6 bar, EN 1092-2	100 mm, nominal	579902
					Threaded	10 bar, EN 1092-2	Rp 4	99558423
					For welding	10 bar, EN 1092-2	100 mm, nominal	579802
					Threaded	16 bar, EN 1092-2	Rp 4	99558423
					For welding	16 bar, EN 1092-2	100 mm, nominal	579802
 Threaded	 For welding		TM03 0484 5204	**TP, TPE 125 TPD 125**	Threaded	10 bar, EN 1092-2	Rp 5	485367
					For welding	10 bar, EN 1092-2	125 mm, nominal	485368
					Threaded	16 bar, EN 1092-2	Rp 5	485367
					For welding	16 bar, EN 1092-2	125 mm, nominal	485368
 For welding			TM03 0485 5204	**TP, TPE 150 TPD 150**	For welding	10 bar, EN 1092-2	150 mm, nominal	S1111600
					For welding	16 bar, EN 1092-2	150 mm, nominal	S1111600

Adapter flanges for various port-to-port lengths

DN	Height (H) [mm]	Diameter D [mm]		Pitch circle diameter D1 [mm]		Adapter flange	Product number	
		PN 6	PN 10/16	PN 6	PN 10/16		PN 6	PN 10/16
32	1 x 220	-	-	90	100		98848068	98849069
	1 x 120	-	-	90	100		98387529	98387530
	1 x 60	70	78	-	-		98387527	98387528
	1 x 30	70	78	-	-		98387531	98387588
40	1 x 70	-	-	100	110		539921	539721
	1 x 90	-	-	100	110		98387590	98387591
	1 x 190	-	-	100	110		98387592	98387593
50	1 x 160	-	-	110	125		98387594	98387595
	1 x 60	-	-	110	125		549924	549824
	1 x 40	90	102	-	-		96281077	96608516
65	1 x 135	-	-	130	145		98391271	98391272
	1 x 20	110	122	-	-		98391273	98391274
80	1 x 80	-	-	150	160		98391275	98391276
100	1 x 100	-	-	170	180		98391277	98391278

Base plates

Note: TPE2, TPE3 pumps are not designed to be supplied with a base plate. Base plates are supplied as standard with TP, TPE pumps with 11 kW motors and above.

Some of the TP Series 300 pumps are provided with mounting feet and cannot be supplied with a base plate. See fig. 96.

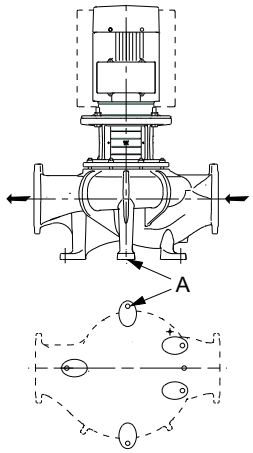
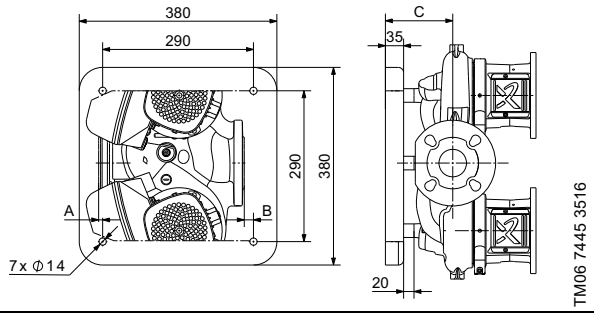


Fig. 96 Principal sketch of a Series 300 pump designed with mounting feet (A)

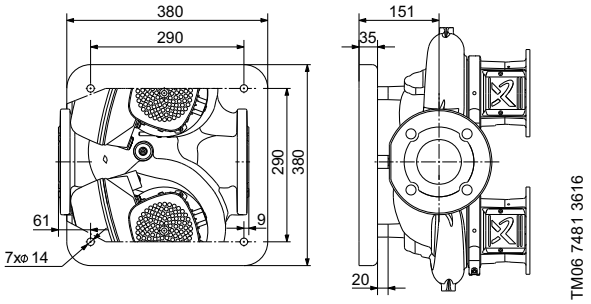
TPE2 D, TPE3 D

Pump type	Hexagon head screws	Product number
TPE2 D, TPE3 D 32	3 x M12 x 40 mm	99150053
TPE2 D, TPE3 D 40		99150054
TPE2 D, TPE3 D 50		99150055
TPE2 D, TPE3 D 65 TPE2 D, TPE3 D 80		99150056
TPE2 D, TPE3 D 100	3 x M12 x 16 mm	99150057

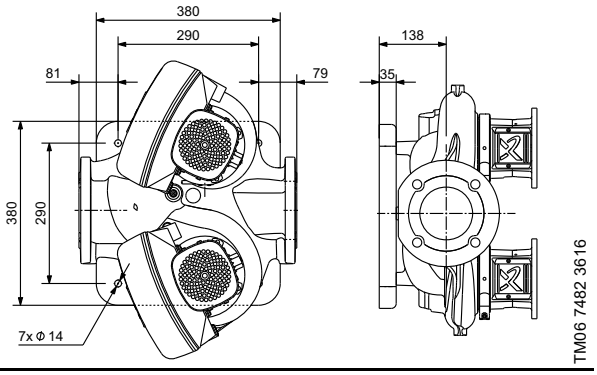
Drawing, TPE2 D, TPE3 D 32, 40, 50, 65



Drawing, TPE2 D, TPE3 D 80



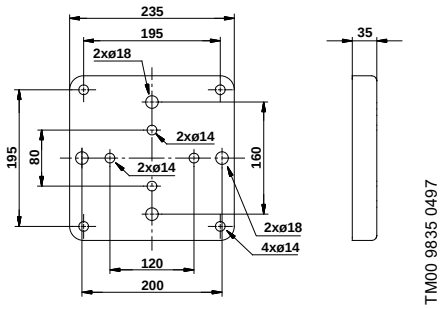
Drawing, TPE2 D, TPE3 D 100



Pump type	Dimensions [mm]			Product number
	A	B	C	
TPE2 D, TPE3 D 32	0	69	123	99150053
TPE2 D, TPE3 D 40	5	45	124	99150054
TPE2 D, TPE3 D 50	8	18	130	99150055
TPE2 D, TPE3 D 65	50	0	132	99150056
TPE2 D, TPE3 D 80				99150056
TPE2 D, TPE3 D 100				99150057

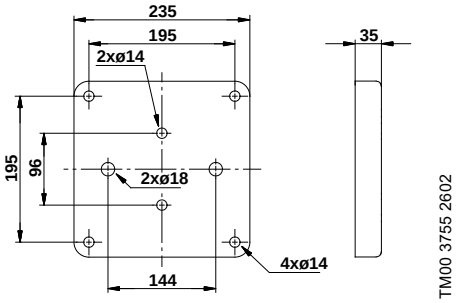
TP Series 200

Pump type	Hexagon head screws	Product number
TP 32 TP 40 TP 50 TP 65-80/2, 65-160/2, 65-240/2	2 x M12 x 20 mm	96591246
TP 65-40/4, 65-80/4 TP 80 TP 100	2 x M16 x 30 mm	96591245

Drawing	Product number
	96591246 96591245

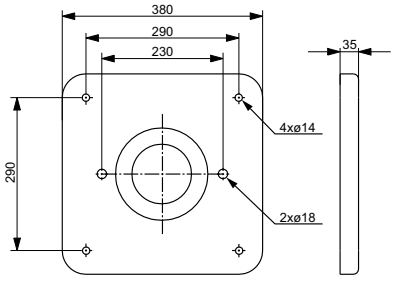
TP, TPE Series 300

Pump type	Hexagon head screws	Product number
TP, TPE 32 TP, TPE 40 TP, TPE 50 TP, TPE 65 TP, TPE 80-xx/2 TP 80-110/4 TP, TPE 80-150/4 TP, TPE 80-170/4 TP, TPE 100-230/2 TP, TPE 100-300/2 TP, TPE 100-370/2	2 x M16 x 30 mm	00485031

Drawing	Product number
	00485031

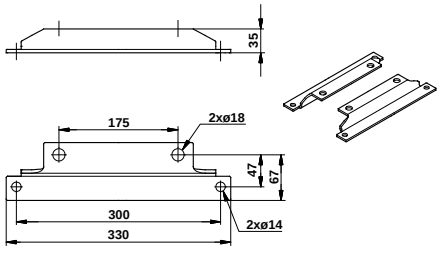
TP, TPE Series 300

Pump type	Hexagon head screws	Product number
TP, TPE 80-230/4 TP, TPE 80-280/4 TP, TPE 80-340/4 TP, TPE 80-410/4 TP, TPE 80-460/4 TP, TPE 80-510/4 TP, TPE 100-350/2 TP, TPE 100-380/2 TP, TPE 100-530/2 TP, TPE 100-630/2 TP, TPE 100-700/2 TP 100-760/2 TP 100-940/2 TP 100-1040/2 TP 100-1200/2 TP 100-1360/2 TP 100-1510/2 TP, TPE 100-xx/4 TP, TPE 125-xx/4 TP, TPE 150-xx/4	2 x M16 x 30 mm	96536246
TP, TPE 100-260/4 TP 100-350/4	2 x M16 x 30 mm	98522984

Drawing	Product number
	96536246 98522984

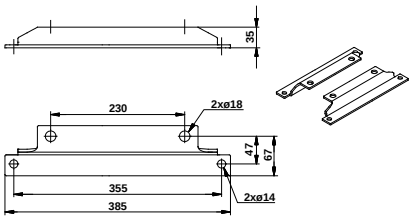
TPD Series 300

Pump type	Hexagon head screws	Product number
TPD 32 TPD 40 TPD 50 TPD 65 TPD 80-xx/2 TPD 80-110/4 TPD 80-150/4 TPD 80-170/4 TPD 100-230/2 TPD 100-300/2 TPD 100-370/2	4 x M16 x 30 mm	96489381

Drawing	Product number
	96489381

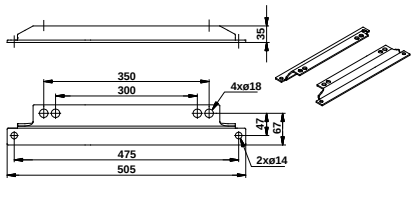
TPD Series 300

Pump type	Hexagon head screws	Product number
TPD 100-350/2 TPD 100-380/2 TPD 100-530/2 TPD 100-630/2 TPD 100-700/2 TPD 100-90/4 TPD 100-100/4 TPD 100-130/4 TPD 100-150/4 TPD 100-170/4	4 x M16 x 30 mm	96536247

Drawing	Product number
 TM02 8870 1004	96536247

TPD Series 300

Pump type	Hexagon head screws	Product number
TPD 80-230/4 TPD 80-280/4 TPD 80-340/4 TPD 80-410/4 TPD 80-460/4 TPD 80-510/4 TPD 100-200/4 TPD 100-240/4 TPD 100-260/4 TPD 100-290/4 TPD 100-340/4 TPD 100-350/4 TPD 100-390/4 TPD 100-470/4 TPD 125-xx/4 TPD 150-xx/4	4 x M16 x 30 mm	96536248

Drawing	Product number
 TM02 8871 1004	96536248

Blanking flanges

Normally used with twin-head pumps.

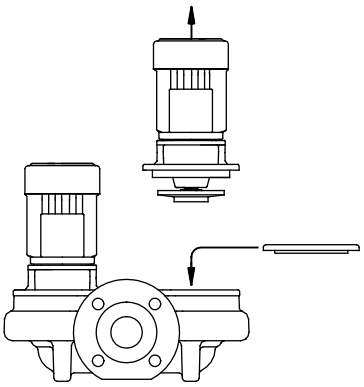


Fig. 97 Blanking flange

TPE2 D, TPE3 D

Pump type	Product number
All TPE2 D, TPE3 D pumps	98159372

TPD 2-pole

Pump type	96495694	96495695	96495696	96525962	96525963	96525964
TPD 32-300/2		•				
TPD 32-360/2		•				
TPD 32-450/2		•				
TPD 32-550/2		•				
TPD 32-680/2		•				
TPD 32-820/2		•				
TPD 40-400/2		•				
TPD 40-460/2		•				
TPD 40-530/2		•				
TPD 40-690/2		•				
TPD 40-820/2		•				
TPD 40-920/2		•				
TPD 50-250/2	•					
TPD 50-300/2	•					
TPD 50-350/2	•					
TPD 50-410/2	•					
TPD 50-430/2			•			
TPD 50-530/2			•			
TPD 50-640/2			•			
TPD 50-720/2			•			
TPD 50-790/2			•			
TPD 50-880/2			•			
TPD 50-1050/2			•			
TPD 65-200/2	•					
TPD 65-250/2	•					
TPD 65-340/2	•					
TPD 65-390/2	•					
TPD 65-480/2			•			
TPD 65-540/2			•			
TPD 65-630/2			•			
TPD 65-740/2			•			
TPD 65-910/2			•			
TPD 65-920/2			•			
TPD 65-1050/2			•			
TPD 80-200/2	•					
TPD 80-240/2	•					
TPD 80-290/2	•					
TPD 80-330/2	•					
TPD 80-400/2	•					
TPD 80-480/2		•				
TPD 80-530/2		•				
TPD 80-640/2		•				
TPD 80-750/2		•				

Pump type	96495694	96495695	96495696	96525962	96525963	96525964
TPD 100-230/2	•					
TPD 100-300/2	•					
TPD 100-370/2	•					
TPD 100-350/2	•					
TPD 100-380/2	•					
TPD 100-530/2	•					
TPD 100-630/2				•		
TPD 100-700/2				•		

TPD 4-pole

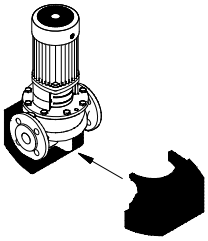
Pump type	96495694	96495695	96495696	96525962	96525963	96525964
TPD 32-120/4		•				
TPD 32-140/4		•				
TPD 32-190/4		•				
TPD 40-110/4		•				
TPD 40-150/4		•				
TPD 40-180/4		•				
TPD 40-230/4		•				
TPD 50-100/4			•			
TPD 50-115/4			•			
TPD 50-130/4			•			
TPD 50-180/4			•			
TPD 50-240/4			•			
TPD 50-270/4			•			
TPD 50-340/4			•			
TPD 65-130/4			•			
TPD 65-150/4			•			
TPD 65-190/4			•			
TPD 65-230/4			•			
TPD 65-310/4			•			
TPD 65-330/4			•			
TPD 80-110/4	•					
TPD 80-150/4		•				
TPD 80-170/4		•				
TPD 80-230/4						•
TPD 80-280/4						•
TPD 80-340/4						•
TPD 80-410/4						•
TPD 80-460/4						•
TPD 80-510/4						•
TPD 100-90/4	•					
TPD 100-100/4	•					
TPD 100-150/4	•					
TPD 100-130/4				•		
TPD 100-170/4				•		
TPD 100-260/4				•		
TPD 100-200/4						•
TPD 100-240/4						•
TPD 100-290/4						•
TPD 100-340/4						•
TPD 100-350/4						•
TPD 100-390/4						•
TPD 100-470/4						•
TPD 125-200/4						•
TPD 125-230/4						•
TPD 125-280/4						•
TPD 125-340/4						•
TPD 125-365/4						•
TPD 125-420/4						•
TPD 125-480/4						•
TPD 150-180/4					•	
TPD 150-210/4					•	
TPD 150-240/4					•	
TPD 150-300/4					•	
TPD 150-340/4					•	

Insulating kits

Insulating kits are available for TPE2 and TPE3 pumps.

The insulating kit consists of two shells.

The insulating kit is tailored to the individual pump model and encloses the entire pump housing, thus providing optimum insulation.



TM00 8095 2496

Fig. 98 Insulating kit

Kits for TPE2, TPE3 pumps

Pump type	Product number
TPE2, TPE3 32-80/120/150/180/200	98159366
TPE2, TPE3 40-80/120/150/180/200/240	98159368
TPE2, TPE3 50-60/80/120/150/180/200/240	98159367
TPE2, TPE3 65-60/80/120/150/180/200	98159361
TPE2, TPE3 80-40/120/150/180	98159363
TPE2, TPE3 100-40/120/150/180	98159362

Sensors

Flow sensors

Grundfos Vortex flow sensor, VFI[1]	Type	Flow range [m^3/h]	Pipe connection	O-ring		Connection type		Product number
				EPDM	FKM	Cast-iron flange	Stainless-steel flange	
	VFI 1.3-25 DN32 020 E	1.3 - 25	DN 32	•		•		97686141
	VFI 1.3-25 DN32 020 F				•	•		97686142
	VFI 1.3-25 DN32 020 E			•			•	97688297
	VFI 1.3-25 DN32 020 F				•		•	97688298
	VFI 2-40 DN40 020 E	2-40	DN 40	•		•		97686143
	VFI 2-40 DN40 020 F				•	•		97686144
	VFI 2-40 DN40 020 E			•			•	97688299
	VFI 2-40 DN40 020 F				•		•	97688300
	VFI 3.2-64 DN50 020 E	2-64	DN 50	•		•		97686145
	VFI 3.2-64 DN50 020 F				•	•		97686146
	VFI 3.2-64 DN50 020 E			•			•	97688301
	VFI 3.2-64 DN50 020 F				•		•	97688302
	VFI 5.2-104 DN65 020 E	5.2 - 104	DN 65	•		•		97686147
	VFI 5.2-104 DN65 020 F				•	•		97686148
	VFI 5.2-104 DN65 020 E			•			•	97688303
	VFI 5.2-104 DN65 020 F				•		•	97688304
	VFI 8-160 DN80 020 E	8-160	DN 80	•		•		97686149
	VFI 8-160 DN80 020 F				•	•		97686150
	VFI 8-160 DN80 020 E			•			•	97688305
	VFI 8-160 DN80 020 F				•		•	97688306
	VFI 12-240 DN100 020 E	12-240	DN 100	•		•		97686151
	VFI 12-240 DN100 020 F				•	•		97686152
	VFI 12-240 DN100 020 E			•			•	97688308
	VFI 12-240 DN100 020 F				•		•	97688309

- Sensor tube with sensor sensor tube of 1.4408 and sensor of 1.4404
- 4-20 mA output signal
- 2 flanges
- 5 m cable with M12 connection in one end
- quick guide.

[1] For more information about the VFI sensor, see the data booklet "Grundfos direct sensors", publication number 97790189.

Temperature sensors

Temperature sensor, TTA

Temperature sensor with Pt100 temperature sensor fitted in a ∅6 x 100 mm measuring tube made of stainless steel, DIN 1.4571 and a 4-20 mA sensor built into a type B head DIN 43.729.

The connecting head is made of painted pressure die-cast aluminium with Pg 16 screwed connection, stainless screws and neoprene rubber gasket.

The sensor is built into the system either by means of a cutting ring bush or by means of one of the two matching protecting tubes ∅9 x 100 mm or ∅9 x 50 mm, respectively.

The protecting tube has G 1/2 connection.

Cutting ring bush or protecting tube must be ordered separately.

Technical data

Type		TTA (-25) 25	TTA (0) 25	TTA (0) 150	TTA (50) 100
Product number		96430194	96432591	96430195	96432592
Measuring range		-25 to +25 °C	0 to +25 °C	0 to +150 °C	50 to +100 °C
Measuring accuracy		According to IEC 751, class B, 0.3 °C at 0 °C			
Response time, τ (0.9) in water 0.2 m/s	Without protecting tube:	28 seconds			
	With oil-filled protecting tube:	75 seconds			
Enclosure class		IP55			
Output signal		4-20 mA			
Supply voltage		8-35 VDC			
EMC, electromagnetic compatibility	Emission:	According to EN 50081			
	Immunity:	According to EN 50082			

Accessories

Type	Protecting tube Ø9 x 50 mm	Protecting tube Ø9 x 100 mm	Cutting ring bush
Product number	96430201	96430202	96430203
Description	Protecting tube of stainless steel SINOX SSH 2 for ∅6 mm measuring tube. Pipe connection G 1/2.		Cutting ring bush for ∅6 mm measuring tube. Pipe connection G 1/2.

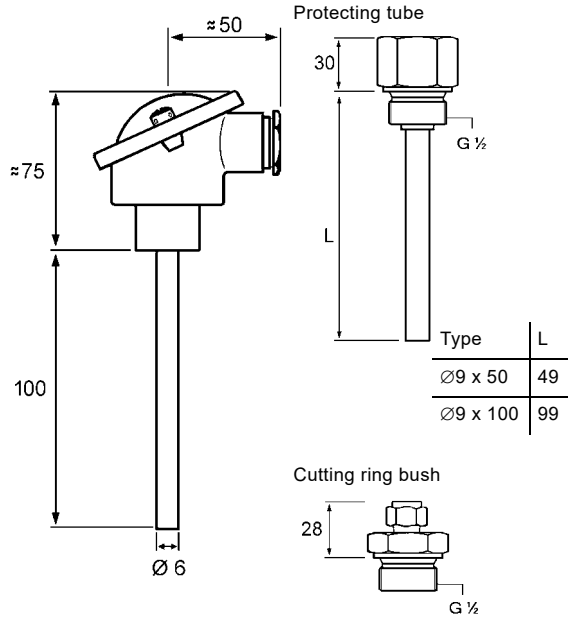


Fig. 99 Dimensional sketch

Differential-temperature sensor, HONSBERG

The temperature sensors T1 and T2 measure the temperature in their respective location at the same time. Besides the temperature measurement, the T1 features an electronic unit calculating the temperature difference between T1 and T2 and transmitting the result as a 4-20 mA signal via a current amplifier.

As the measured signal transmitted from the T2 is also a current signal, a relatively large distance is allowed between T2 and T1.

As appears from fig. 100, it has no effect on the output signal, I_{out}, which of the sensors that measures the highest temperature.

Thus, the current signal generated will always be positive between 4 and 20 mA.

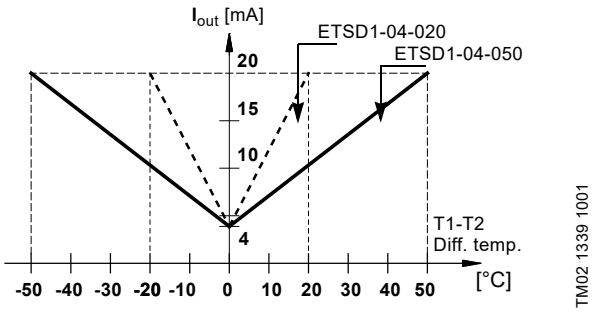


Fig. 100 Sensor characteristics

Technical data

Type	ETSD1-04-020K045 + ETSD2-K045	ETSD1-04-050K045 + ETSD2-K045
Product number	96409362	96409363
Measuring range: Temperature difference (T1-T2) or (T2-T1)	0 to +20 °C	0 to +50 °C
Supply voltage	15-30 VDC	
Output signal	4-20 mA	
Measuring accuracy	± 0.3 % FS	
Repeatability	± 1 % FS	
Response time, τ (0.9)	2 minutes	
Ambient temperature	-25 to +85 °C	
Operating temperature of T1 and T2	-25 to +105 °C	
Maximum distance between T1 and T2	300 m with screened cable	
Electrical connection	Between T1 and T2: M12 x 1 plug (including in kit), output signal with DIN 43650-A plug type	
Storage temperature	-45 to +125 °C	
Short-circuit-proof	Yes	
Protected against polarity reversal	Yes, up to 40 V	
Materials in contact with liquid	Stainless steel, DIN 1.4571	
Enclosure class	IP65	
EMC, electromagnetic compatibility	Emission: According to EN 50081	
	Immunity: According to EN 50082	

ETSD1-	04-	020	K	045	Specification
ETSD1-					Reference temperature, T1.
	04-				0 °C corresponds to 4 mA.
		020			20 °C corresponds to 20 mA.
		050			50 °C corresponds to 20 mA.
			K		Material in contact with liquid: Stainless steel, DIN 1.4571.
				045	Length of sensing element: 45 mm.

ETSD2-	K	045	Specification
ETSD2-			Reference temperature, T2.
	K		Material in contact with liquid: Stainless steel, DIN 1.4571.
		045	Length of sensing element: 45 mm.

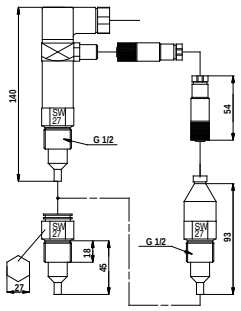
Installing the sensor

Fit the two sensors in such a way that the sensing elements are located in the middle of the flow of the liquid to be measured.

For tightening, use only the hexagon nut.

You can turn the upper part of the sensors to any position suitable for the connection of cables.

The sensors have G 1/2 thread. See fig. 101.



TM02 0705 5000

Fig. 101 Dimensional sketch

Ambient temperature sensor

Sensor type	Type	Supplier	Measuring range	Product number
Temperature sensor, ambient temperature	WR 52	tmg DK: Plesner	-50 to +50 °C	ID8295

Pressure sensors

Sensors for boosting applications

Danfoss pressure sensor kit	Pressure range	Product number
• Connection: G 1/2 A, DIN 16288 - B6kt • Electrical connection: plug DIN 43650	0 - 2.5 bar	96478188
	0-4 bar	91072075
	0-6 bar	91072076
	0-10 bar	91072077
	0-16 bar	91072078
• Pressure sensor, type MBS 3000, with 2 m screened cable Connection: G 1/4 A, DIN 16288 - B6kt • 5 cable clips, black • Fitting instructions PT, 00400212	0 - 2.5 bar	405159
	0-4 bar	405160
	0-6 bar	405161
	0-10 bar	405162
	0-16 bar	405163

Sensors for circulation applications

Grundfos differential pressure sensor, DPI	Pressure range	Product number
• 1 sensor including 0.9 m screened cable, 7/16" connections • 1 original DPI bracket for wall mounting • 1 Grundfos bracket for mounting on motor • 2 M4 screws for mounting of sensor on bracket • 1 M6 screw, self-cutting, for mounting on MGE 90/100 • 1 M8 screw, self-cutting, for mounting on MGE 112/132 • 1 M10 screw, self-cutting, for mounting on MGE 160 • 1 M12 screw, self-cutting, for mounting on MGE 180 • 3 capillary tubes, short/long • 2 fittings, 1/4" - 7/16" • 5 cable clips, black • Installation and operating instructions • Service kit instruction	0 - 0.6 bar	96611522
	0 - 1.0 bar	96611523
	0 - 1.6 bar	96611524
	0 - 2.5 bar	96611525
	0 - 4.0 bar	96611526
	0 - 6.0 bar	96611527
	0-10 bar	96611550

Select the differential pressure sensor so that the maximum pressure of the sensor is higher than the maximum differential pressure of the pump.

Sensor interface

Sensor interface, SI 001 PSU[1)]	Description	Product number
	Grundfos Direct Sensors™, type SI 001 PSU, is an external power supply for the VFI, DPI and other transmitters with 24 VDC supply voltage. The power supply is used when the cable between transmitter and controller is more than 30 m long.	96915820

1) For further information about the PSU sensor interface, see the installation and operating instructions "SI 001 PSU - sensor interface", publication number 96944355, or quick guide, publication number 96944356.

MP 204, advanced motor protection

MP 204 is an electronic motor protection for pumps. One unit covers all electrical motors from 3 to 999 A as well as voltages from 100 to 480 VAC.

Installation of MP 204 is by means of screws onto a wall or back plate, or on a mounting rail.

Component	Description	Functions
MP 204  TM03 0150 4204	MP 204 is an electronic motor protector and data collecting unit. Apart from protecting the motor, it can also send information to a CIU unit via GENIbus, like for instance: • trip • warning • energy consumption • input power • motor temperature. 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. MP 204 is designed for single- and three-phase motors.	**Features** • Phase-sequence monitoring • indication of current or temperature • input for PTC sensor or thermal switch • indication of temperature in °C or °F • 4-digit, 7-segment display • setting and status reading with Grundfos R100 remote control • setting and status reading via 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.

Control MP 204

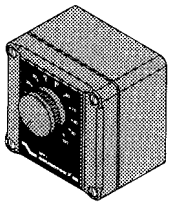
Control MP 204 is supplied as a plug-and-play control cabinet solution.

You can see the main switch and LED panel showing the power consumption on the front. Inside you find the MP 204 unit and optional communication interface units.

Cabinet type	Description	Functions
Control MP 204  TM04 9512 4410	The Control MP 204 control cabinets are supplied with all necessary components. Three types of control cabinets are available, depending on functions and starting method. Control MP 204 is designed for installation in a control cabinet for outdoor use. The control cabinets have a built-in main switch and a thermal magnetic circuit breaker.	**Digital input** • Float switch or pressure relay, if no IO 112 is used. **Analog input** • Too high motor temperature, Tempcon • thermistor/PTC, pump • pressure sensor, 4-20 mA, with IO 112. **Relay output** • Pump alarm. **Communication** • Grundfos Remote Management. • GSM/GPRS IO 112 is not supported. • Modbus RTU wired IO 112 is not supported. • PROFIBUS DP IO 112 not supported. **Protection** • Protects the pump against short-circuit.

For more information about MP 204 and Control MP 204, see the data booklet "Control MP 204", publication number 97770915.

Potentiometer



TM02 1630 5102

Fig. 102 Potentiometer

Potentiometer for setpoint setting and start/stop of the pump.

Product	Product number
External potentiometer with cabinet for wall mounting.	625468

Grundfos GO

Grundfos GO is used for wireless infrared or radio communication with the pumps.

MI 301

MI 301 is a module with built-in infrared and radio communication. Use MI 301 in conjunction with Android or iOS-based smart devices with a Bluetooth connection. MI 301 has rechargeable Li-ion battery and you must charge it separately.

TM05 3890 1712

Fig. 103 MI 301

Supplied with the product:

- Grundfos MI 301
- sleeve
- battery charger
- quick guide.

Product numbers

Grundfos GO variant	Product number
Grundfos MI 301	98046408

CIU communication interface units

GrA 6118

Fig. 104 Grundfos CIU communication interface unit

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

For further information see section *13. Communication*.

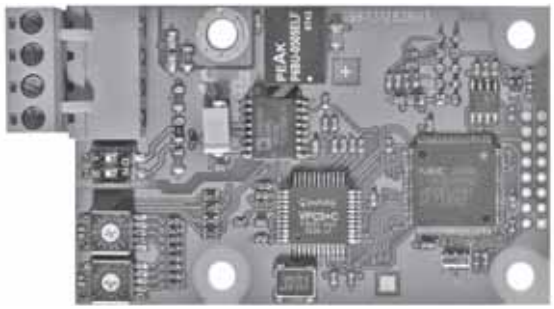
We offer the following CIU units:

Description	Fieldbus protocol	Product number
CIU 100	LONWorks for pumps	96753735
CIU 150	PROFIBUS DP	96753081
CIU 200	Modbus RTU	96753082
CIU 250[1]	GSM	96787106
CIU 270[1]	GRM	96898819
CIU 300	BACnet MS/TP	96893769
CIU 500	Ethernet, BACnet IP	96753894
CIU 500	Ethernet, Modbus TCP	
CIU 500	Ethernet, PROFINET IO	
CIU 500	Ethernet, GRM IP	
CIU 500	Ethernet, EtherNet/IP	
CIU 900	CIU box without CIM	99448387
CIU 901	CIU box with IO 270 only	99448389

[1] Antenna not included. See *Antennas and battery*.

For further information about data communication via CIU units and fieldbus protocols, see the CIU documentation available in Grundfos Product Center. See page 213.

CIM communication interface modules



GrA 6121

Fig. 105 Grundfos CIM communication interface module

The CIM modules enable communication of operating data, such as measured values and setpoints, between TPE pumps and a building management system. The CIM modules are add-on communication modules which are fitted in the terminal box of TPE pumps.

For further information see section *13. Communication*.

Note: CIM modules must be fitted by authorised personnel.

We offer the following CIM modules:

Description	Fieldbus protocol	Product number
CIM 100	LONWorks for pumps	96824797
CIM 110	LONWorks for multipump	96824798
CIM 150	PROFIBUS DP	96824793
CIM 200	Modbus RTU	96824796
CIM 250[1]	GSM	96824795
CIM 260-EU[1]	3G/4G cellular	99439302
CIM 260-US[1]	3G/4G cellular	99439306
CIM 270[1]	GRM	96898815
CIM 280-EU[1]	GiC/GRM 3G/4G	99439724
CIM 280-US[1]	GiC/GRM 3G/4G	99439725
CIM 300	BACnet MS/TP	96893770
CIM 500	Ethernet, BACnet IP	98301408
CIM 500	Ethernet, Modbus TCP	
CIM 500	Ethernet, PROFINET IO	
CIM 500	Ethernet, GRM IP	
CIM 500	Ethernet, EtherNet/IP	

[1] Antenna not included. See *Antennas and battery*.

For further information about data communication via CIM modules and fieldbus protocols, see the CIM documentation available in Grundfos Product Center. See page 213.

Antennas and battery

Description	Product number
Antenna for roof for CIM/CIU 250/270	97631956
Antenna for desk for CIM/CIU 250/270	97631957
Antenna (rod) 3G/4G for CIM 260/280	99043061
Antenna (puc) 3G/4G for CIM 260/280	99518079
CIM 250 battery	99499908

EMC filter

EMC, electromagnetic compatibility to EN 61800-3

Motor [kW]		Emission/immunity
2-pole	4-pole	
0.37	0.37	**Emission:** Motors may be installed in residential areas (first environment), unrestricted distribution, corresponding to CISPR11, group 1, class B. **Immunity:** Motors fulfil the requirements for both the first and second environment.
0.55	0.55	
0.75	0.75	
1.1	1.1	
1.5	1.5	
2.2	2.2	
3.0	3.0	
4.0	4.0	
5.5	-	
-	5.5	**Emission:** The motors are category C3, corresponding to CISPR11, group 2, class A, and may be installed in industrial areas (second environment). If equipped with an external Grundfos EMC filter, the motors are category C2, corresponding to CISPR11, group 1, class A, and may be installed in residential areas (first environment).
7.5	7.5	
11	11	
15	15	
18.5	-	
22	-	

TM02 9198 1203

Fig. 106 EMC filter

The EMC filter for residential areas is available as a complete kit ready for installation.

Product	Product number
EMC filter, TPE 5.5 kW, 4-pole and 7.5 kW	96041047
EMC filter, TPE 11-22 kW	96478309

26. Minimum inlet pressure - NPSH

To ensure optimum and noiseless operation we recommend that you use the minimum inlet pressure values shown on pages 209 to 210.

A minimum inlet pressure is required to avoid pressure drops that may cause cavitation.

Use the following formula to calculate the minimum inlet pressure, p_s in bar relative. The pressure gauge value on the pump inlet side.

Note: Base the calculation of the minimum inlet pressure on the maximum required flow.

$$p_s \geq \left(NPSH_R \times \rho \times g - \frac{1}{2} \times \rho \times c^2\right) \times 0{,}00001 - p_b + p_d \quad \text{[bar relative]}$$

p_s	=	Minimum inlet pressure in bar.
$NPSH_R$	=	The required Net Positive Suction Head in m head, to be read from the NPSH curve at the highest flow the pump will be delivering.
ρ	=	Density of the pumped liquid measured in kg/m^3.
g	=	Gravitational acceleration measured in m/s. For estimated calculations, use the value 9.81 m/s^2.
c	=	Flow velocity of the pumped liquid at the pressure gauge. Insert the flow velocity as the unit [m/s]. See individual curve charts from page 118.
p_b	=	Barometric pressure in bar. Set the barometric pressure to 0.97 bar. **Note:** Only occasionally is the pressure as high as 1 bar. Furthermore, this value is at sea level.
p_d	=	Vapour pressure in bar. See fig. 107.

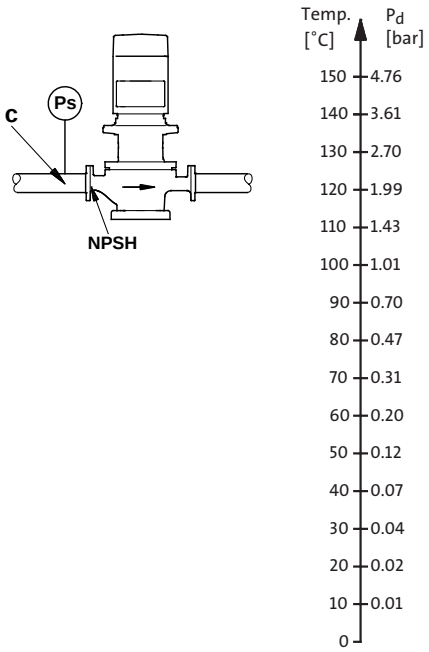


Fig. 107 Minimum inlet pressure

TPE2, TPE2 D, TPE3, TPE3 D

Pump type	p [bar]				
	20 °C	60 °C	90 °C	110 °C	120 °C
TPE2, TPE2 D, TPE3, TPE3 D 32-80	0.1	0.1	0.2	0.9	1.5
TPE2, TPE2 D, TPE3, TPE3 D 32-120	0.1	0.1	0.2	0.9	1.5
TPE2, TPE2 D, TPE3, TPE3 D 32-150	0.1	0.1	0.4	1.1	1.7
TPE2, TPE2 D, TPE3, TPE3 D 32-180	0.1	0.2	0.6	1.3	1.9
TPE2, TPE2 D, TPE3, TPE3 D 32-200	0.2	0.4	0.9	1.6	2.2
TPE2, TPE2 D, TPE3, TPE3 D 40-80	0.1	0.1	0.2	0.9	1.5
TPE2, TPE2 D, TPE3, TPE3 D 40-120	0.1	0.1	0.2	0.9	1.5
TPE2, TPE2 D, TPE3, TPE3 D 40-150	0.1	0.1	0.5	1.2	1.8
TPE2, TPE2 D, TPE3, TPE3 D 40-180	0.1	0.1	0.6	1.3	1.9
TPE2, TPE2 D, TPE3, TPE3 D 40-200	0.1	0.2	0.7	1.4	2.0
TPE2, TPE2 D, TPE3, TPE3 D 40-240	0.1	0.3	0.8	1.5	2.1
TPE2, TPE2 D, TPE3, TPE3 D 50-60	0.1	0.1	0.5	1.2	1.8
TPE2, TPE2 D, TPE3, TPE3 D 50-80	0.1	0.3	0.8	1.5	2.1
TPE2, TPE2 D, TPE3, TPE3 D 50-120	0.4	0.6	1.1	1.8	2.4
TPE2, TPE2 D, TPE3, TPE3 D 50-150	0.6	0.8	1.3	2.0	2.6
TPE2, TPE2 D, TPE3, TPE3 D 50-180	0.7	0.9	1.4	2.1	2.7
TPE2, TPE2 D, TPE3, TPE3 D 50-200	0.9	1.1	1.6	2.3	2.9
TPE2, TPE2 D, TPE3, TPE3 D 50-240	0.9	1.1	1.6	2.3	2.9
TPE2, TPE2 D, TPE3, TPE3 D 65-60	0.1	0.1	0.2	0.9	1.5
TPE2, TPE2 D, TPE3, TPE3 D 65-80	0.1	0.1	0.3	1.1	1.7
TPE2, TPE2 D, TPE3, TPE3 D 65-120	0.1	0.2	0.6	1.4	2.0
TPE2, TPE2 D, TPE3, TPE3 D 65-150	0.1	0.2	0.7	1.5	2.1
TPE2, TPE2 D, TPE3, TPE3 D 65-180	0.3	0.5	1.0	1.8	2.4
TPE2, TPE2 D, TPE3, TPE3 D 65-200	0.6	0.8	1.3	2.1	2.7
TPE2, TPE2 D, TPE3, TPE3 D 80-40	0.1	0.1	0.3	1	1.6
TPE2, TPE2 D, TPE3, TPE3 D 80-120	0.1	0.3	0.9	1.5	2.1
TPE2, TPE2 D, TPE3, TPE3 D 80-150	0.1	0.3	0.9	1.5	2.1
TPE2, TPE2 D, TPE3, TPE3 D 80-180	0.3	0.5	1.1	1.7	2.3
TPE2, TPE2 D, TPE3, TPE3 D 100-40	0.1	0.1	0.4	1.1	1.7
TPE2, TPE2 D, TPE3, TPE3 D 100-120	0.1	0.1	0.6	1.3	1.9
TPE2, TPE2 D, TPE3, TPE3 D 100-150	0.1	0.2	0.7	1.4	2.0
TPE2, TPE2 D, TPE3, TPE3 D 100-180	0.1	0.3	0.8	1.5	2.1

TP, TPE, TPD 2-pole, PN 6, 10, 16, 25

Pump type	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 32-80/2	0.4	0.4	0.4	1.2	1.7	3.4	-
TP 32-160/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 32-220/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 32-260/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 32-330/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 32-300/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-360/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-450/2	0.1	0.1	0.1	0.7	1.2	2.8	-
TP, TPD 32-550/2	0.1	0.1	0.1	0.7	1.2	2.9	-
TP, TPD 32-680/2	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 32-820/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP 40-80/2	0.1	0.3	0.8	1.6	2.1	3.8	-
TP 40-160/2	0.1	0.2	0.7	1.5	2.0	3.7	-
TP 40-240/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 40-270/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 40-330/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP 40-390/2	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 40-400/2	0.1	0.1	0.1	0.9	1.4	3.1	-
TP, TPD 40-460/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 40-530/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 40-690/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 40-820/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP, TPD 40-920/2	0.4	0.6	1.1	1.8	2.4	4.0	-
TP 50-80/2	0.1	0.1	0.6	1.4	1.9	3.6	-
TP 50-160/2	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 50-240/2	0.3	0.5	1.0	1.8	2.3	4.0	-
TP, TPD 50-250/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 50-300/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-350/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-410/2	0.1	0.1	0.4	1.1	1.6	3.3	-
TP, TPD 50-430/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 50-530/2	0.1	0.1	0.5	1.3	1.8	3.5	-
TP, TPD 50-640/2	0.1	0.1	0.6	1.4	1.9	3.5	-
TP, TPD 50-720/2	0.1	0.3	0.8	1.6	2.1	3.7	-
TP, TPD 50-790/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP, TPD 50-880/2	0.8	1.0	1.5	2.2	2.8	4.4	-
TP 50-1050/2	1.1	1.3	1.8	2.5	3.1	4.7	-
TP 65-80/2	0.6	0.8	1.3	2.1	2.6	4.3	-
TP 65-160/2	1.1	1.3	1.8	2.6	3.1	4.8	-
TP 65-240/2	0.9	1.1	1.6	2.4	2.9	4.6	-
TP, TPD 65-200/2	0.1	0.1	0.3	1.0	1.5	3.2	-
TP, TPD 65-250/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 65-340/2	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 65-390/2	0.1	0.1	0.3	1.0	1.5	3.2	-
TP, TPD 65-480/2	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 65-540/2	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 65-630/2	0.1	0.1	0.4	1.1	1.7	3.3	-
TP, TPD 65-740/2	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 65-910/2	0.1	0.2	0.7	1.5	2.0	3.6	-
TP, TPD 65-920/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 65-1050/2	0.1	0.2	0.7	1.5	2.0	3.6	-

Pump type	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 80-160/2	2.1	2.3	2.8	3.6	4.1	5.8	-
TP, TPD 80-200/2	0.5	0.7	1.2	1.9	2.5	4.1	-
TP, TPD 80-240/2	0.1	0.2	0.7	1.4	2.0	3.6	-
TP, TPD 80-290/2	0.1	0.3	0.8	1.5	2.1	3.7	-
TP, TPD 80-330/2	0.2	0.4	0.9	1.7	2.2	3.8	-
TP, TPD 80-400/2	0.6	0.8	1.3	2.1	2.6	4.2	-
TP, TPD 80-480/2	0.1	0.3	0.8	1.5	2.1	3.7	-
TP, TPD 80-530/2	0.2	0.4	0.9	1.6	2.1	3.8	-
TP, TPD 80-640/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 80-750/2	0.6	0.8	1.3	2.0	2.6	4.2	-
TP, TPD 100-230/2	0.4	0.6	1.1	1.9	2.4	4.0	-
TP, TPD 100-300/2	0.2	0.4	0.9	1.6	2.2	3.8	-
TP, TPD 100-370/2	0.3	0.5	1.0	1.7	2.3	3.9	-
TP, TPD 100-350/2	0.9	1.1	1.6	2.3	2.9	4.5	-
TP, TPD 100-380/2	1.2	1.4	1.9	2.6	3.2	4.8	-
TP, TPD 100-530/2	1.7	1.9	2.4	3.2	3.7	5.3	-
TP, TPD 100-630/2	1.4	1.6	2.1	2.8	3.3	5.0	-
TP, TPD 100-700/2	3.0	3.2	3.7	4.4	5.0	6.6	-
TP 100-760/2	1.7	1.9	2.3	3.3	3.8	5.4	6.7
TP 100-940/2	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 100-1040/2	1.6	1.8	2.2	3.2	3.7	5.3	6.6
TP 100-1200/2	1.9	2.1	2.5	3.5	4.0	5.6	6.9
TP 100-1360/2	1.8	2.0	2.4	3.4	3.9	5.5	6.8
TP 100-1510/2	1.8	2.0	2.4	3.4	3.9	5.5	6.8

TP, TPE, TPD 4-pole, PN 6, 10, 16, 25

Pump type	p [bar]						
	20 °C	60 °C	90 °C	110 °C	120 °C	140 °C	150 °C
TP 32-40/4	0.1	0.1	0.1	0.9	1.4	3.1	-
TP 32-80/4	0.1	0.1	0.5	1.3	1.8	3.5	-
TP, TPD 32-120/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 32-140/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 32-190/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP 40-40/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP 40-80/4	0.1	0.1	0.2	1.0	1.5	3.2	-
TP, TPD 40-110/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 40-150/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 40-180/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 40-230/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP 50-40/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP 50-80/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP, TPD 50-100/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 50-115/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 50-130/4	0.1	0.1	0.1	0.9	1.4	3.0	-
TP, TPD 50-180/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 50-240/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 50-270/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 50-340/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 65-40/4	0.4	0.6	1.1	1.9	2.4	4.1	-
TP 65-80/4	0.7	0.9	1.4	2.2	2.7	4.4	-
TP, TPD 65-130/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-150/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-190/4	0.1	0.1	0.1	0.6	1.2	2.8	-
TP, TPD 65-230/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 65-310/4	0.1	0.1	0.1	0.7	1.3	2.9	-
TP, TPD 65-330/4	0.1	0.1	0.1	0.3	0.8	2.5	-
TP 80-40/4	1.5	1.7	2.2	3.0	3.5	5.2	-
TP 80-80/4	1.6	1.8	2.3	3.1	3.6	5.3	-
TP, TPD 80-110/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP, TPD 80-150/4	0.1	0.1	0.1	0.8	1.3	2.9	-
TP, TPD 80-170/4	0.1	0.1	0.1	0.8	1.3	3.0	-
TP, TPD 80-230/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 80-280/4	0.1	0.1	0.2	1.0	1.5	3.1	-
TP, TPD 80-340/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 80-410/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP, TPD 80-460/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 80-510/4	0.1	0.2	0.7	1.5	2.0	3.6	-
TP 100-40/4	1.4	1.6	2.1	2.9	3.4	5.1	-
TP 100-90/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 100-100/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP, TPD 100-130/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 100-150/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-170/4	0.1	0.1	0.6	1.3	1.9	3.5	-
TP, TPD 100-200/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP, TPD 100-240/4	0.1	0.1	0.6	1.3	1.9	3.5	4.8
TP, TPD 100-260/4	0.6	0.8	1.3	2.1	2.7	4.3	5.6
TP, TPD 100-290/4	0.5	0.7	1.2	2.0	2.5	4.1	5.4
TP, TPD 100-340/4	0.6	0.8	1.3	2.0	2.6	4.2	5.5
TP, TPD 100-350/4	0.2	0.4	0.9	1.7	2.3	3.9	5.2
TP, TPD 100-390/4	0.7	0.9	1.4	2.1	2.7	4.3	5.6
TP, TPD 100-470/4	0.9	1.1	1.6	2.3	2.9	4.5	5.8
TP 100-560/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 125-80/4	0.1	0.1	0.1	0.8	1.4	3.0	-
TP 125-110/4	0.1	0.1	0.2	0.9	1.5	3.1	-
TP 125-135/4	0.1	0.1	0.3	1.1	1.6	3.3	-
TP, TPD 125-130/4	0.1	0.1	0.3	1.0	1.6	3.2	-
TP, TPD 125-160/4	0.1	0.1	0.3	1.1	1.6	3.2	-
TP, TPD 125-200/4	0.1	0.1	0.2	0.9	1.4	3.1	-
TP, TPD 125-230/4	0.1	0.1	0.4	1.1	1.7	3.3	-
TP 125-220/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, TPD 125-280/4	0.1	0.1	0.4	1.1	1.7	3.3	4.5
TP, TPD 125-340/4	0.1	0.1	0.5	1.2	1.8	3.4	4.6
TP, TPD 125-365/4	0.3	0.5	1.0	1.7	2.3	3.9	5.2
TP, TPD 125-420/4	0.1	0.1	0.3	1.0	1.6	3.2	4.5
TP, TPD 125-480/4	0.1	0.1	0.5	1.2	1.8	3.4	4.7
TP 125-550/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 125-580/4	0.1	0.3	0.7	1.7	2.2	3.8	5.1
TP 150-130/4	0.1	0.1	0.5	1.2	1.8	3.4	-
TP 150-160/4	0.1	0.2	0.7	1.5	2.0	3.6	-
TP 150-200/4	0.2	0.4	0.9	1.6	2.1	3.8	-
TP 150-220/4	0.3	0.5	1.0	1.7	2.3	3.9	-
TP, TPD 150-180/4	0.1	0.2	0.7	1.4	1.9	3.6	4.9
TP, TPD 150-210/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP, TPD 150-240/4	0.1	0.2	0.7	1.5	2.0	3.6	4.9
TP, TPD 150-300/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP, TPD 150-340/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP 150-360/4	0.3	0.5	1.0	1.8	2.3	4.0	5.3
TP 150-400/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 150-440/4	0.1	0.1	0.4	1.1	1.7	3.3	4.6
TP 150-480/4	0.1	0.1	0.5	1.3	1.8	3.4	4.7
TP 150-610/4	0.1	0.2	0.7	1.4	2.0	3.6	4.9
TP 150-700/4	0.1	0.3	0.8	1.5	2.1	3.7	5.0
TP 150-810/4	0.3	0.4	0.9	1.7	2.2	3.8	5.1
TP 150-960/4	0.4	0.6	1.1	1.8	2.3	3.8	5.1
TP 200-80/4	0.9	1.1	1.6	2.3	2.9	4.5	-
TP 200-110/4	0.5	0.6	1.1	1.9	2.4	4.0	-
TP 200-140/4	0.3	0.5	1.0	1.7	2.3	3.9	-
TP 200-190/4	0.2	0.4	0.9	1.6	2.2	3.8	-
TP 200-210/4	0.1	0.2	0.7	1.4	2.0	3.6	-
TP 200-250/4	0.9	1.0	1.5	2.3	2.8	4.4	5.7
TP 200-280/4	0.7	0.9	1.4	2.1	2.7	4.3	5.6
TP 200-320/4	0.6	0.8	1.3	2.0	2.6	4.2	5.5
TP 200-360/4	0.4	0.6	1.1	1.8	2.4	4.0	5.3
TP 200-390/4	0.3	0.5	1.0	1.7	2.2	3.9	5.2
TP 200-400/4	0.1	0.1	0.6	1.3	1.9	3.6	4.9
TP 200-430/4	0.1	0.1	0.6	1.4	1.9	3.6	4.9
TP 200-440/4	0.1	0.2	0.7	1.5	2.0	3.7	5.0
TP 200-490/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-500/4	0.2	0.4	0.9	1.6	2.2	3.9	5.2
TP 200-540/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-600/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-680/4	0.1	0.1	0.1	0.8	1.4	3.1	4.4
TP 200-770/4	0.1	0.2	0.7	1.4	2.0	3.7	5.0
TP 300-230/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-270/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-360/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-370/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-440/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-550/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-630/4	0.8	1.0	1.4	2.4	2.9	4.5	5.8
TP 300-640/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 300-750/4	0.7	0.9	1.3	2.3	2.8	4.4	5.7
TP 350-400/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-450/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-540/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0
TP 350-680/4	2.0	2.2	2.6	3.6	4.1	5.7	7.0

27. Key application data

Dear customer, if you need an ATEX certificate or if you cannot select the pump on the basis of the guidelines in section *5. Pumped liquids* on page 22, please fill in the following form in cooperation with a Grundfos representative. This will help to ensure that Grundfos supplies you with a pump solution adapted to meet exactly your needs in terms of pump type, pump materials, shaft seal type, elastomers and accessories.

Customer information

Company name:	Project title:
Customer number:	Reference number:
Phone number:	Customer contact:
Fax number:	
Email address:	

Quotation made by:

Company name:	Prepared by:	
Phone number:	Date:	Page 1 of
Fax number:	Quotation number:	
Email address:		

Operating conditions

Pumped liquid

Type of liquid:				
Chemical composition, if available:				
Distilled or demineralised water?	Yes:		No:	
Conductivity of distilled/demineralised water:		[µS/cm]		
Minimum liquid temperature:		[°C]		
Maximum liquid temperature:		[°C]		
Vapour pressure of liquid:		[bar]		
Liquid concentration:		%		
Liquid pH value:				
Dynamic liquid viscosity:		[cP] = [mPa s]		
Kinematic liquid viscosity:		[cSt] = [mm^2/s]		
Liquid density:		[kg/m^3]		
Specific heat capacity of liquid:		[kJ/(kg·K)]		
Air or gas in liquid?	Yes:		No:	
Solids in liquid?	Yes:		No:	
Contents of solids in liquid, if available:		% of mass		
Additives in liquid?	Yes:		No:	
Does the liquid crystallise?	Yes:		No:	
When does crystallisation happen?				

Does the liquid get sticky when volatiles evaporate from the pumped liquid? Yes: No:

Description of 'sticky' circumstances:

Is the liquid hazardous or poisonous? Yes: No:

Special measures to be taken into account when dealing with this hazardous or poisonous liquid:

Special measures for handling this liquid:

CIP liquid, cleaning-in-place

Type of liquid:		
Chemical composition, if available:		
Liquid temperature during operation:		[°C]
Maximum liquid temperature:		[°C]
Vapour pressure of liquid:		[bar]
Liquid concentration:		%
Liquid pH value:		

Pump sizing

Main duty point: Q: _____ [m^3/h] H: _____ [m]
Maximum duty point: Q: _____ [m^3/h] H: _____ [m]
Minimum duty point: Q: _____ [m^3/h] H: _____ [m]

Ambient operating conditions

Ambient temperature: _____ [°C]
Altitude above sea level: _____ [m]

Pressure

Minimum inlet pressure: _____ [bar]
Maximum inlet pressure: _____ [bar]
Outlet pressure, inlet pressure and head: _____ [bar]

ATEX marking

Required marking of the pump

Customer's equipment group, e.g. II: _____
Customer's equipment category, e.g. 2, 3: _____
Gas, G, and/or dust, D: Gas (G): _____ Dust (D): _____ Gas and dust (G/D): _____

Required marking of the motor

Protection type, e.g. d, de, e, nA:
Maximum experimental safe gap, e.g. B, C:
Temperature class
– gas, e.g. T3, T4, T5: _____
– dust, e.g. 125 °C: _____ [°C]

Description/sketch

Detailed description of ATEX application
Attach a drawing, if possible:

_____
_____
_____

ATEX certificate required Yes: _____ No: _____

Frequency converter

Frequency converter option wanted? Yes: _____ No: _____
Control parameter: Pressure: _____ Temperature: _____ Flow rate: _____ Other: _____
Detailed description of requirements
Attach a drawing, if possible:

_____
_____
_____

System information

Please provide us with information about your system and a simple sketch if possible. This gives us an idea as to whether you need accessories or monitoring equipment, or whether you already have a suitable system which makes it unnecessary to attach any further equipment.

28. Grundfos Product Center

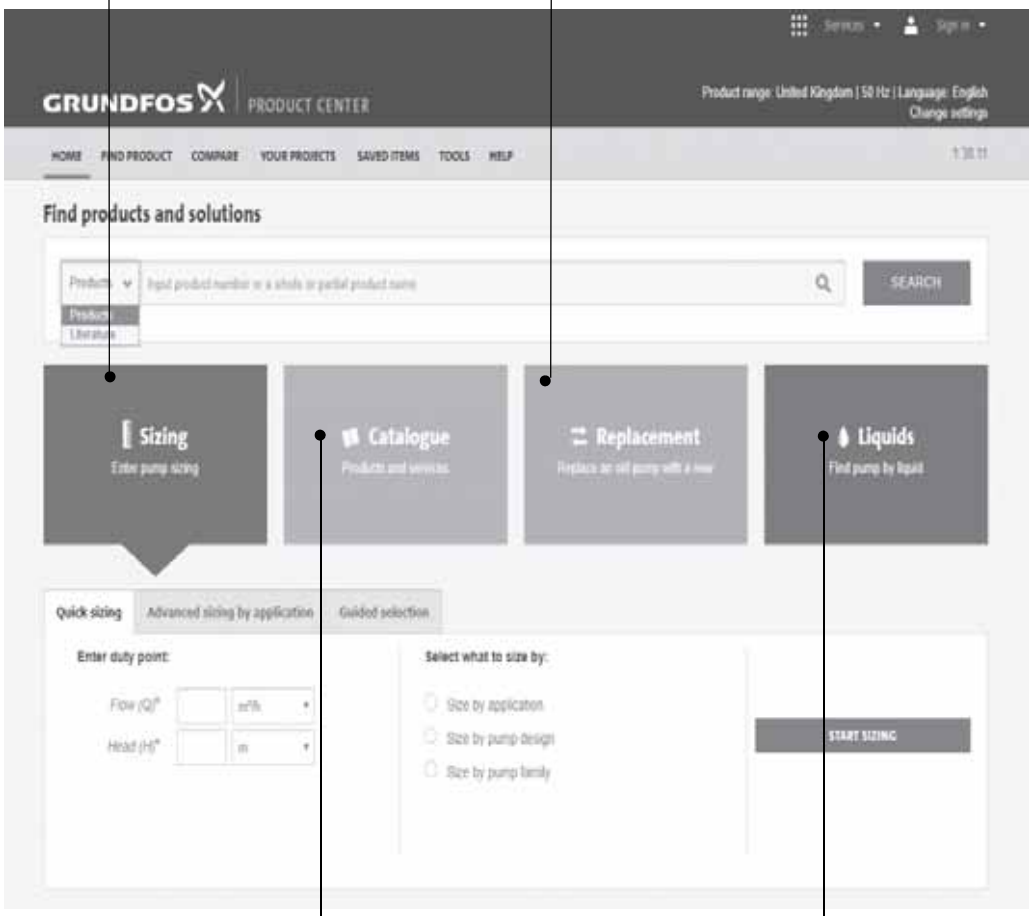
Online search and sizing tool to help you make the right choice.

http://product-selection.grundfos.com

"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.

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