

MTS, MTSE

Screw pumps
50/60 Hz



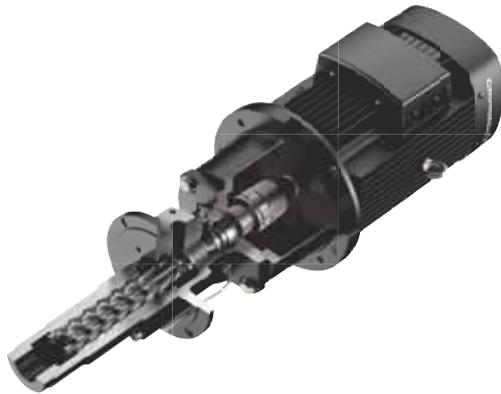
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GRUNDFOS 

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1. Introduction

MTS



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Fig. 1 MTS pump with cutaway

MTS pumps are screw pumps designed for pumping cooling lubricants and cutting oils for machine tool applications.

Depending on which pump you choose, the pump can be mounted on top of tanks with the pump immersed in the pumped liquid or the pump can be dry-installed with pipe connections to the tank, see page 16.

The pumps come in various sizes and screw pitches to provide the flow rate, pressure and length required.

The pumps consist of a motor and a pump unit. The motor is a Grundfos standard MG motor designed to EN standards.

The pump unit consists of optimised hydraulics, various types of connections, a motor stool and various other parts.

MTSE



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Fig. 2 MTSE pump with E-motor

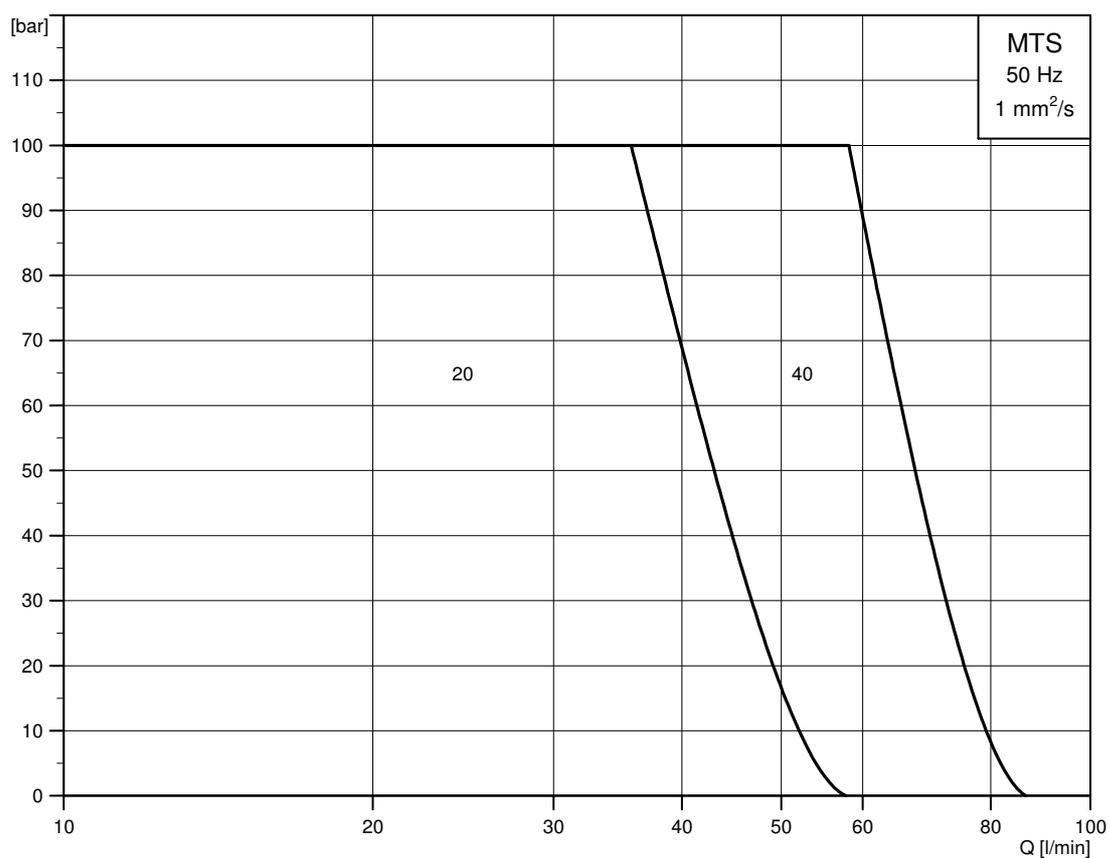
MTSE pumps are MTS pumps with an E-motor, i.e. a motor with built-in frequency control. Frequency control enables continuously variable control of motor speed, which makes it possible to set the pump to operate at any duty point. The motors of the MTSE pumps are Grundfos MGE motors designed to EN standards.

MTSE pumps are ideal for machining centres which operate with different machining processes and tools, as this often results in different needs for flow rate and pressure.

The following features and benefits are typical for choosing an MTSE pump:

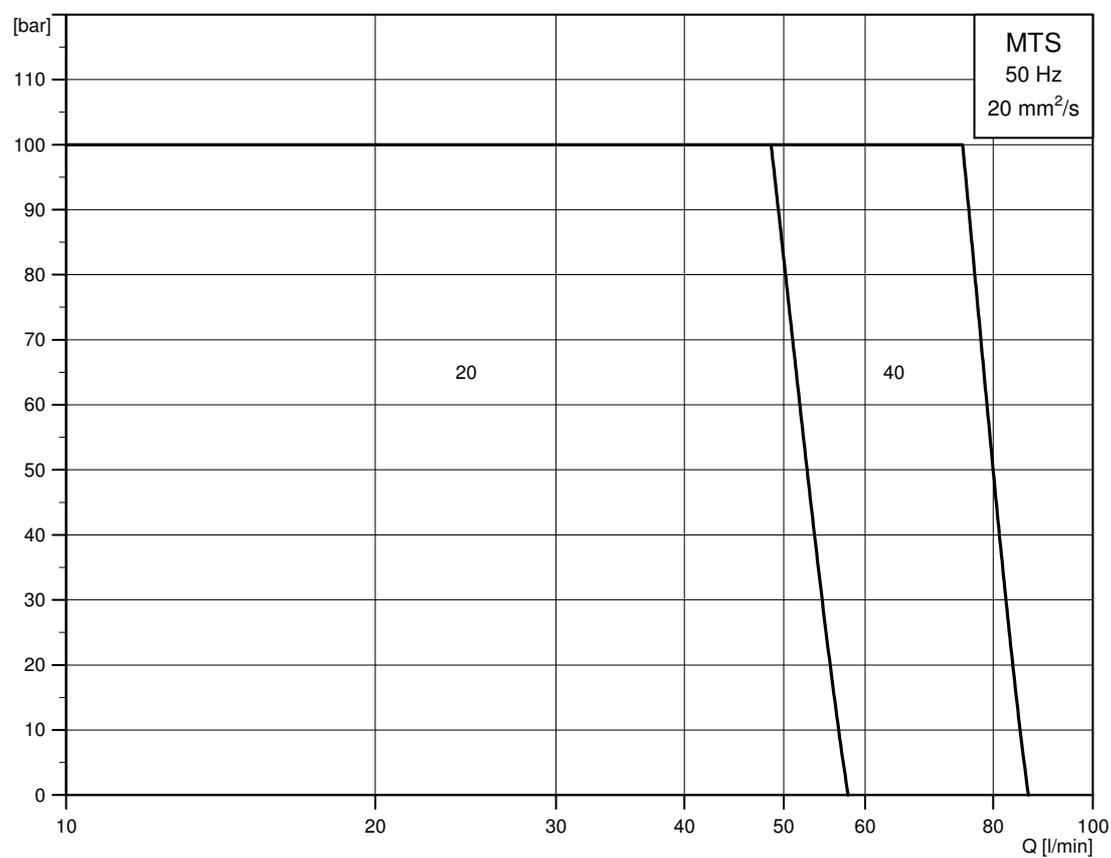
- energy saving
- low heat input into the cooling lubricant
- increased cooling efficiency
- better performance of the machining centre
- simple integration with the machining centre.

Performance range - MTS, 50 Hz



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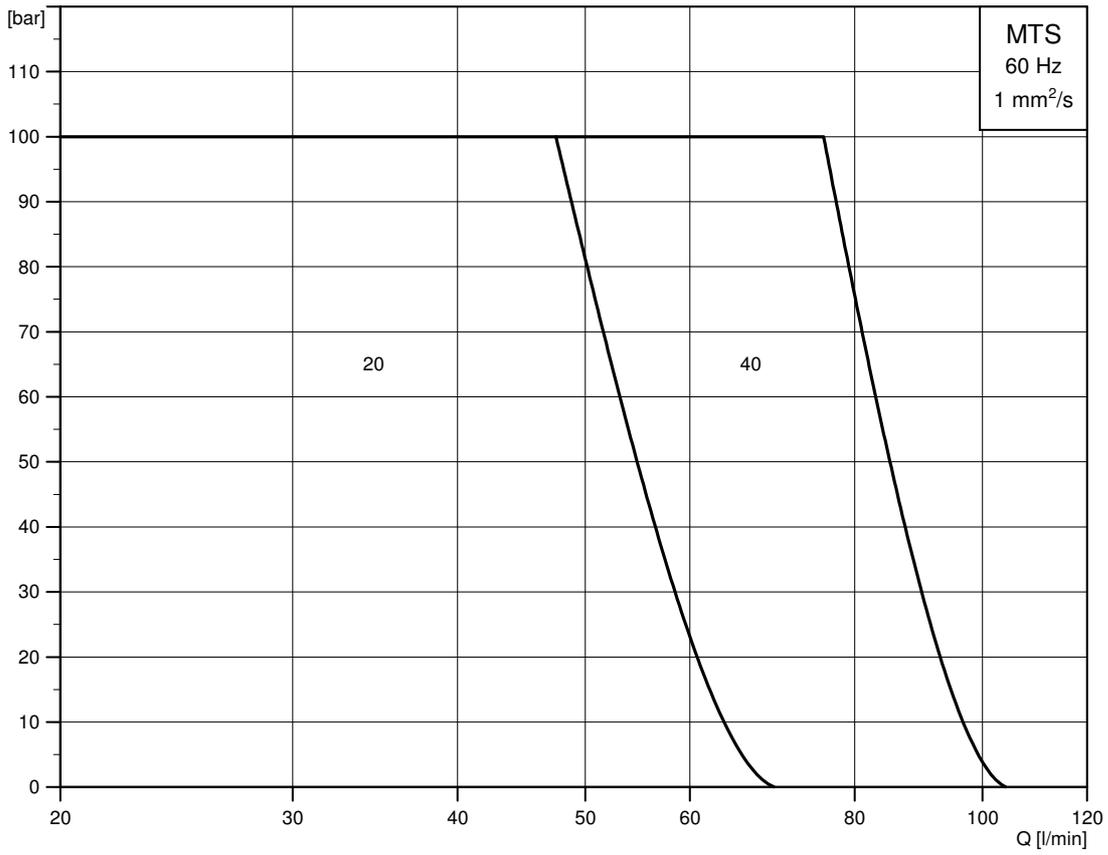
Fig. 3 Performance range - MTS, 50 Hz



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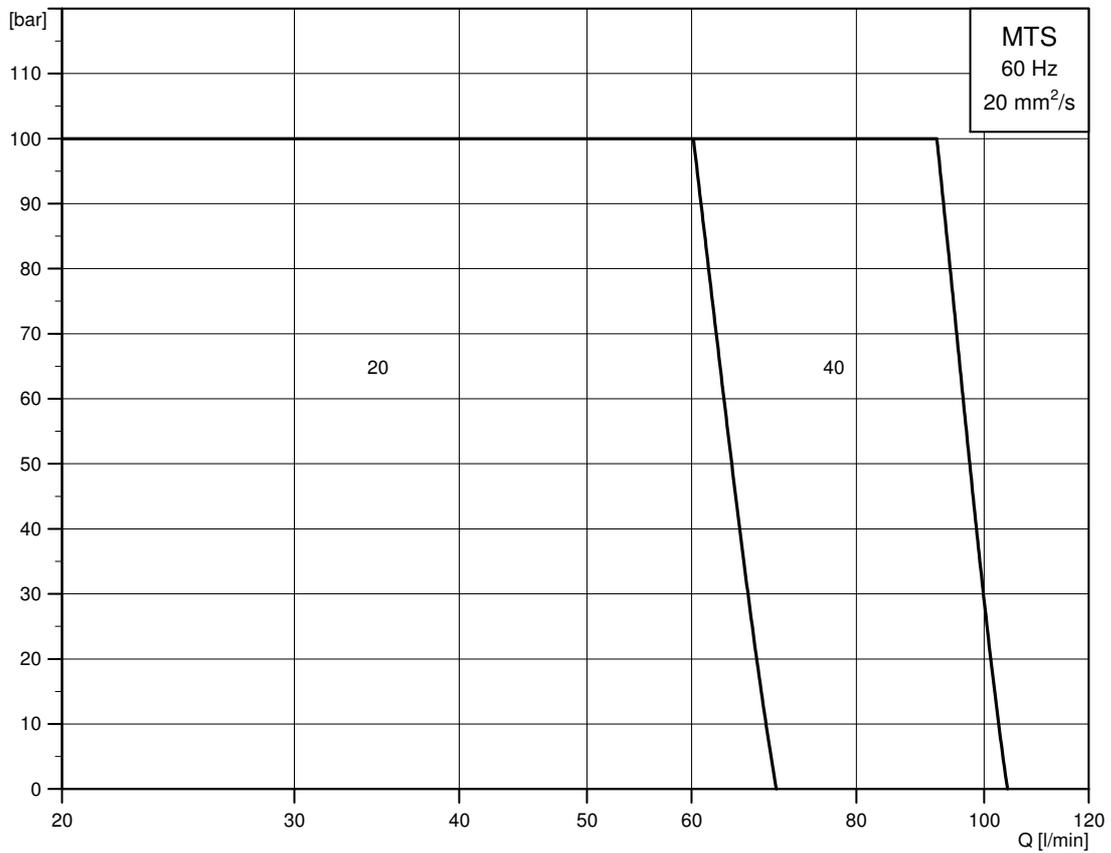
Fig. 4 Performance range - MTS, 50 Hz

Performance range - MTS, 60 Hz



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Fig. 5 Performance range - MTS, 60 Hz



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Fig. 6 Performance range - MTS, 60 Hz

Performance range - MTSE, 50/60 Hz

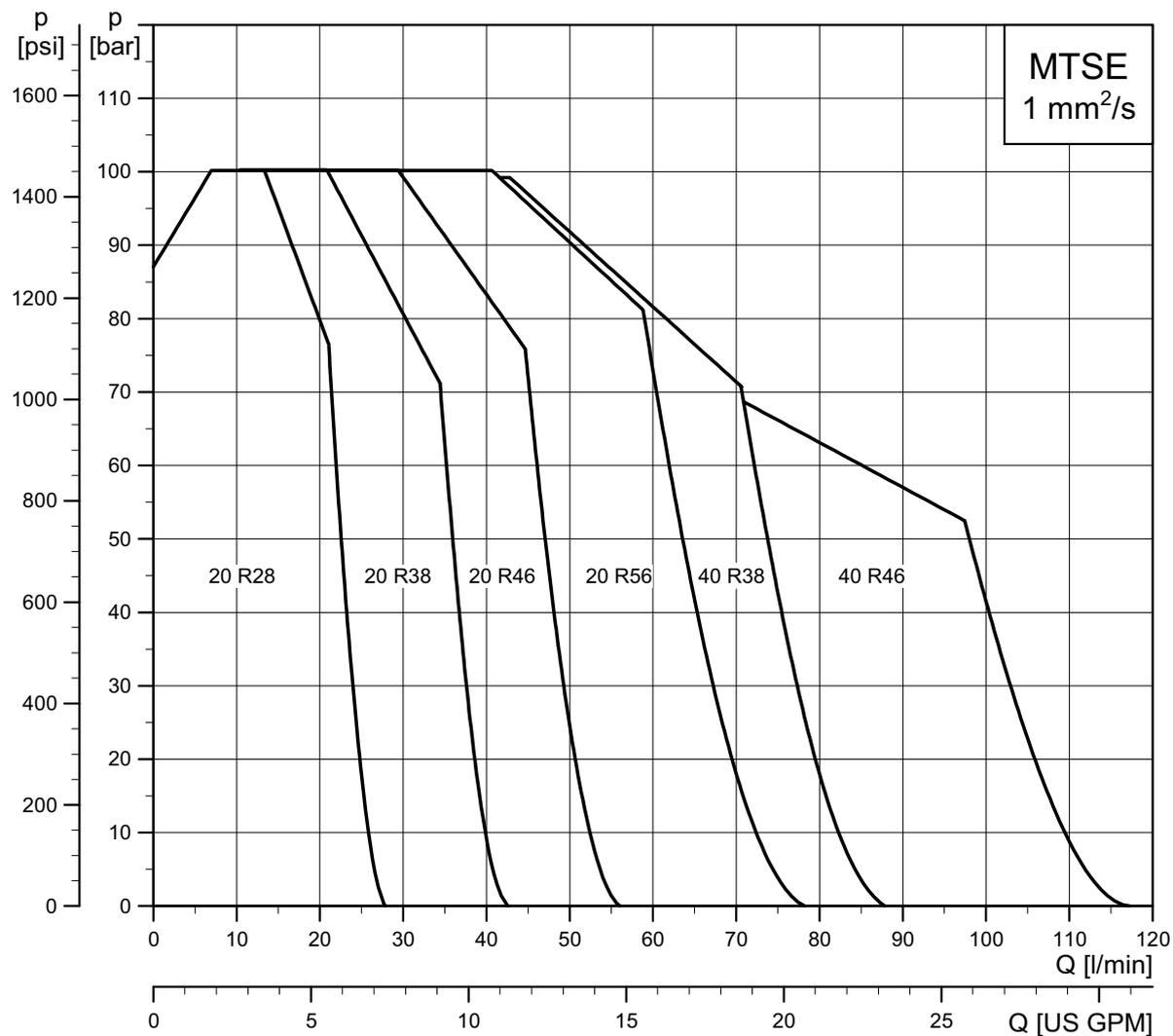


Fig. 7 Performance range - MTSE, 50/60 Hz

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2. General description

Main applications

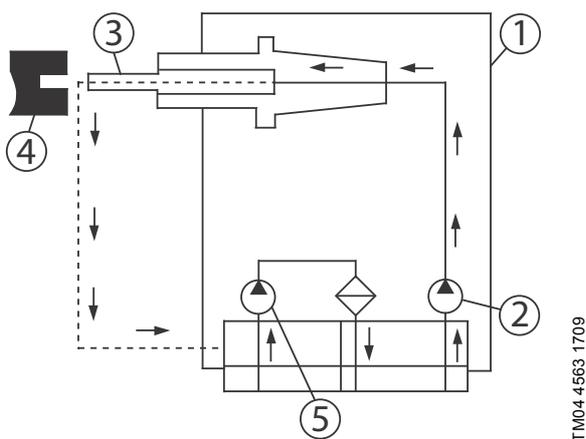
MTS pumps are an important part of modern metal machining centres, transfer lines and grinding and deep-hole drilling machines.

Application

Transfer of well, conditionally or poorly lubricating abrasive liquids in metal working or process engineering, such as cutting, grinding and deep-hole drilling oils, oil-in-water emulsions and cooling lubricant solutions. The pumped liquid must not attack the materials.

Permissible cooling lubricants:

- solutions (inorganic substances in water; organic and synthetic substances in water)
- emulsions (oil-in-water, oil content minimum 2 to 20 %)
- cutting and grinding oils (without additives; with polar physically acting additives; with mildly acting, lubricating film forming additives; with polar and mildly acting additives; with active, chemical additives; with polar and active additives).



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Fig. 8 Schematic drawing

Pos.	Description
1	Machining centre
2	MTS high pressure pump
3	Drilling tool
4	Work piece
5	Filter pump

Product range

Range	MTS 20	MTS 40
50 Hz		
Flow range [l/min]	0 - 57.8	0 - 86.6
Motor power P2 [kW]	0.3 - 7.9	0.4 - 12
60 Hz		
Flow range [l/min]	0 - 69.6	0 - 104.2
Motor power P2 [kW]	0.4 - 9.7	0.5 - 14.4
General data		
Maximum temperature [°C]	80	80
Maximum differential pressure (emulsion) [bar]	80	100
Maximum differential pressure (oil) [bar]	80	100
Maximum inlet pressure (DQ version) [bar]	1	1
Maximum inlet pressure (D8.6 version) [bar]	10	10
Pipe connection		
Inlet (DQ version)	G 1 1/4	G 1 1/4
Inlet (D8.6 version)	SAE 1 1/2"	SAE 1 1/2"
Outlet pipe thread	G 3/4	G 3/4
Outlet flange	SAE 1"	SAE 1"
Installation length [mm]	230	280
Shaft seal		
DQ (seal ring)	•	•
D8.6 (mechanical seal)	•	•

Type key

Example	MTS	(E)	20-40	R	46	D	8.6	T
Type range	----- ----- ----- ----- ----- ----- ----- -----							
With integrated frequency converter	----- ----- ----- ----- ----- ----- ----- -----							
Frame size - maximum pressure (bar)	----- ----- ----- ----- ----- ----- ----- -----							
Spindle sense of gradient (R = right)	----- ----- ----- ----- ----- ----- ----- -----							
Spindle pitch angle in degrees	----- ----- ----- ----- ----- ----- ----- -----							
Construction feature	----- ----- ----- ----- ----- ----- ----- -----							
D = External ball bearing, shaft seal unheated, uncooled	----- ----- ----- ----- ----- ----- ----- -----							
Shaft seal/connections	----- ----- ----- ----- ----- ----- ----- -----							
Q = Shaft seal ring/axial inlet, pipe thread as standard	----- ----- ----- ----- ----- ----- ----- -----							
8.6 = Mechanical shaft seal/radial inlet, SAE as standard	----- ----- ----- ----- ----- ----- ----- -----							
T = Pump for tank-top installation	----- ----- ----- ----- ----- ----- ----- -----							
D = Pump for dry installation	----- ----- ----- ----- ----- ----- ----- -----							
H = Pump for horizontal installation	----- ----- ----- ----- ----- ----- ----- -----							

Construction

Three-screw, self-priming, flange-mounted pump (DIN ISO 3019-2) with special surface-hardened drive and idler screws. The idler screws are hydraulically driven, and the axial thrust is completely neutralised hydrostatically. The drive screw is fixed in position with external, permanently lubricated groove ball bearing. The large overall length with its many chambers results in little surface pressure, low pressure differences and thus reduced wear. The rotor housing has been optimised to ensure maximum resistance to wear. The material used is specially hardened grey cast iron (EN-GJL) that is part of a special safety concept. The housing surface in contact with the screws has a ceramic-like hardness. Additionally, unlike with other materials (such as SiC), wear, shocks, vibration or aeration cannot lead to sudden failure of the pump unit. Construction and materials result in little wear, good controllability and high efficiency.

Motors for MTS pumps

The pumps are fitted with a totally enclosed, fan-cooled, 2-pole Grundfos standard MG motor with principal dimensions according to EN and IEC standards.

Electrical tolerances according to EN 60034.

Electrical data

Mounting designation	B5/V1
Insulation class	F
Efficiency class, 50 Hz	MG motors: IE3 Siemens motors: IE3
Efficiency class, 60 Hz	MG motors: IE2/IE3 (see page 42)
Enclosure class	IP55
Supply voltage, 50 Hz (tolerance - 10 %/+ 10 %)	P ₂ : 1.5 - 22 kW: 3 x 220-240D / 380-415Y V P ₂ : 7.5 - 22 kW: 3 x 380-415D / 660-690Y V
Supply voltage, 60 Hz (tolerance - 10 %/+ 10 %)	P ₂ : 1.5 - 22 kW: 3 x 220-277D / 380-480Y V 3 x 380-480D / 660-690Y V
On request	
Supply voltage, 50 Hz	3 x 200-220 / 346-380 V
Supply voltage, 60 Hz	3 x 200-230 / 346-400 V 3 x 208-230 / 460-480 V

On request, Grundfos MG motors are available with cURus approvals carried out by the Underwriters Laboratories Inc. according to the UL 1004 standard for electrical motors.

Motor protection

Three-phase motors must be connected to a motor-protective circuit breaker in accordance with local regulations.

Three-phase Grundfos and Siemens motors from 3 kW and upwards have a built-in thermistor (PTC) according to DIN 44082 (IEC 34-11: TP 211).

Terminal box positions

As standard, the pumps have their terminal box mounted in position 12 o'clock of the pump; however, other positions are possible.

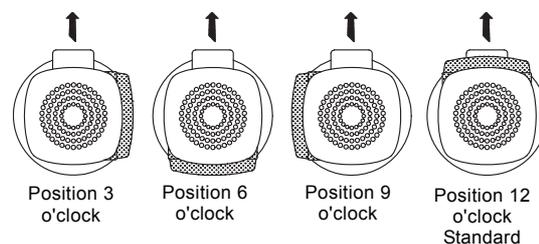


Fig. 9 Terminal box positions

Maximum number of starts

Pump	Motor [kW]	Recommended maximum number of starts per hour
MTS	1.5 - 2.2	250
	3-4	100
	5.5 - 11	50
	15-22	40

Ambient temperature

MG motors (1.5 - 22 kW): Maximum 60 °C.

If the ambient temperature exceeds above maximum value or if the motor is located 1000 metres above sea level, the motor output (P₂) must be reduced due to the low density and consequently low cooling effect of the air. In such cases, it may be necessary to use a motor with a higher output.

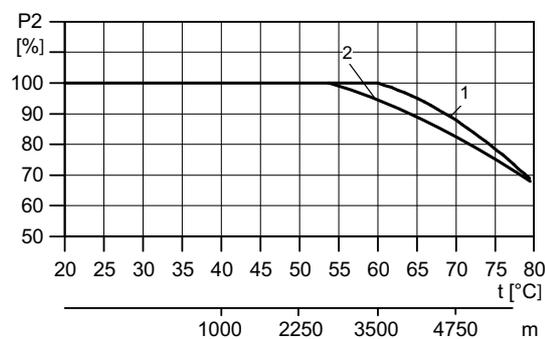


Fig. 10 Relationship between motor output (P₂) and ambient temperature/altitude

Pos.	Description
1	MG motors (1.5 - 22 kW)

Motors for MTSE pumps

The pumps are fitted with a totally enclosed, fan-cooled, 2-pole Grundfos frequency-controlled MGE motor with principal dimensions in accordance with the EN standards.

Electrical tolerances comply with EN 60034. MTSE pumps from 1.5 to 11 kW are fitted with three-phase MGE motors as standard.

See the Grundfos Product Center (<http://product-selection.grundfos.com/>).

Electrical data

Mounting designation	B5/V1
Insulation class	F
Efficiency class	I5
Enclosure class	IP55
Supply voltage (- 10 %/+ 10 %)	380-500 V
Supply frequency	50/60 Hz

Terminal box positions

As standard, the pumps have their terminal box mounted in position 12 o'clock of the pump; however, other positions are possible.

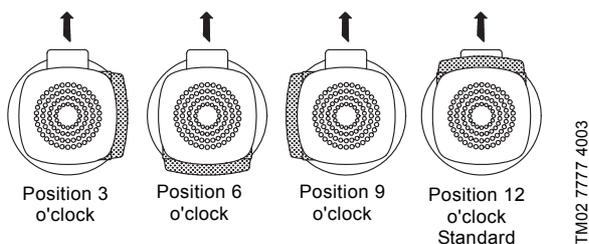


Fig. 11 Terminal box positions

Motor protection

MGE motors incorporate thermal protection against slow overload and blocking (IEC 34-11:TP 211).

MTSE pumps require no external motor protection.

Ambient temperature

Motor power [kW]	Motor make	Phases	Maximum ambient temperature [°C]	Maximum altitude above sea level [m]
1.5 - 11	MGE	3	50	1000

If the ambient temperature exceeds the above maximum ambient temperature or the pump is installed at an altitude exceeding 1000 metres, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air.

In such cases, it may be necessary to use a motor with a higher rated output.

Installation altitude

Installation altitude is the height above sea level of the installation site. Motors installed up to 1000 metres above sea level can be loaded 100 %.

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

MGE 1.5 to 11 kW

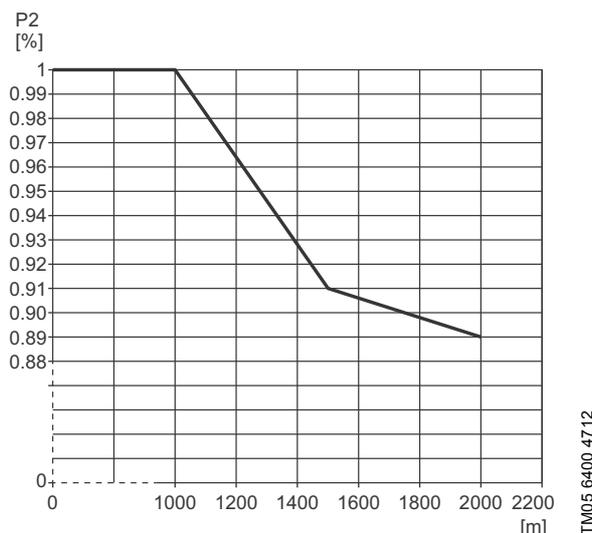


Fig. 12 Derating of motor output (P2) in relation to altitude above sea level

Sound pressure level

Pumps

MTS construction design allows gentle, even, virtually pulsation-free and low-noise pumping. The noise emission lies between 56 and 74 dBA and depends on speed, pump size and installation. MTS pumps operate significantly quieter than rotary lobe and centrifugal pumps with comparable performance.

Measuring conditions:

Distance to the pump: 1 m
 Operation: Cavitation-free
 Motor: IEC standard motor
 Tolerance: ± 3 dB.

Size	Sound pressure level [dB]	
	2900 [rpm]	3500 [rpm]
20	56	58
40	59	61

The data are reference values.

The actual airborne sound level depends especially on the installation conditions.

Motors for MTS

Motor [kW]	Maximum sound pressure level [dB(A)] ISO 3743	
	50 Hz	60 Hz
1.5	55.5	59.8
2.2	55.5	59.8
3	55.3	59.8
4	58.7	63.6
5.5	58.8	63.6
7.5	60.3	65.1
11	60.5	65.1
15	60.6	65.2
18.5	60.7	65.3
22	64.4	69.1

The values apply only to MG motors.

The values for both 50 and 60 Hz have a tolerance of 3 dB(A) according to EN ISO 4871, which is not added to the values in these tables.

Motors for MTSE

Motor [kW]	Maximum sound pressure level [dB(A)] ISO 3743
	50/60 Hz
1.5	64
2.2	64
3	68
4	68
5.5	68
7.5	74
11	74

Overload protection

The pump has no pressure relief valve. Thus the overload protection must be provided in the control system or with a pressure relief.

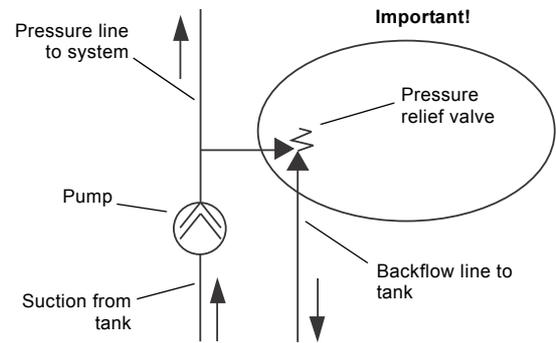


Fig. 13 Overload protection

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Shaft sealing/connections

Design DQ

Shaft sealing with shaft seal ring. Inlet pressure up to 1 bar. Axial inlet with pipe thread connection (DIN EN ISO 228-1). Radial high-pressure outlet flange according to SAE J518C. MTS 20 to 140 additionally with pipe thread connection (DIN EN ISO 228-1).

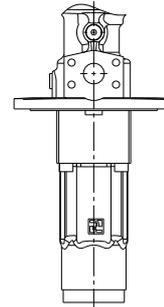


Fig. 14 Design DQ

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Design D8.6

Shaft sealing with maintenance-free highly wear-resistant mechanical shaft seal according to EN 12756. Radial high-pressure inlet and outlet flanges according to SAEJ518C. Optionally, the pump is available with axial inlet connection with pipe thread (DIN ISO 228-1).

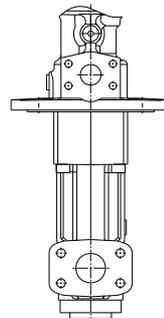


Fig. 15 Design D8.6

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3. Control of MTSE pumps

Control options

You can communicate with MTSE pumps via the following control devices/systems:

- operating panel on the pump
- Grundfos GO
- central management system.

Operating panel on pump

The operating panel on the E-pump terminal box makes it possible to change the setpoint settings manually.

MGE 1.5 to 11 kW

The operating condition of the pump is indicated by the Grundfos Eye on the operating panel. See fig. 16, pos. A.

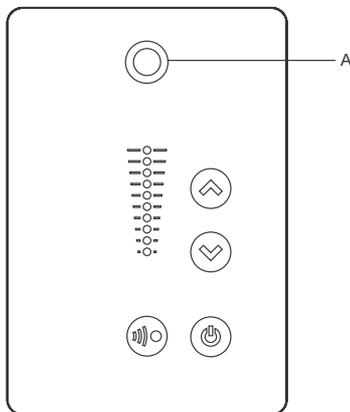


Fig. 16 Operating panel on MTSE pump, 1.5 to 11 kW

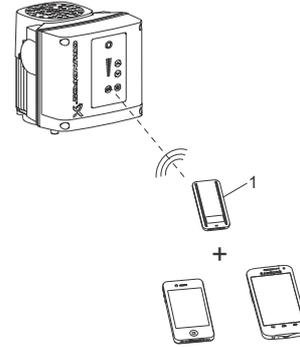
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Grundfos GO Remote

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).



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Fig. 17 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. Use the module together with an Android or iOS-based smart device via a Bluetooth connection.

Communication

Communication must be established using one of these communication types:

- radio communication
- infrared communication.

Radio communication

Radio communication can take place at distances up to 30 metres. You must enable communication by pressing  or  on the pump operating panel.

Infrared communication

When communicating via infrared light, point the Grundfos GO at the pump operating panel.

Central management system

Communication with the E-pump is possible even if the operator is not present near the E-pump. Communication is enabled by connecting the E-pump to a central management system. This allows the operator to monitor the pump and to change control modes and setpoint settings.

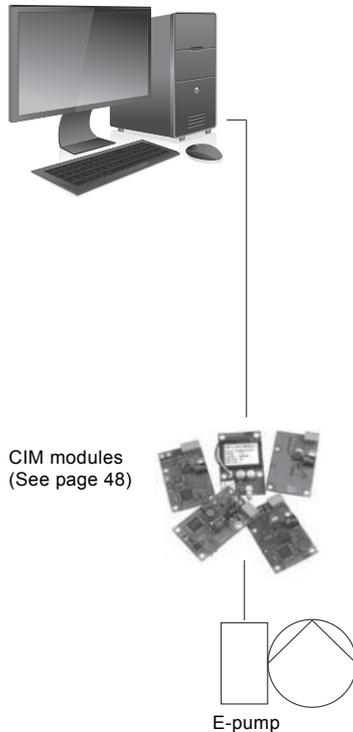


Fig. 18 Structure of a central management system

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Control modes for E-pumps

Grundfos MTSE pumps are only available without pressure sensor.

MTSE without sensor

MTSE pumps without sensor are suitable in these situations:

- Where uncontrolled operation is required.
- You want to retrofit another sensor in order to control the flow rate, temperature, differential temperature, liquid level, pH value, etc. at some arbitrary points in the system.

MGE 1.5 to 11 kW

These MTSE pumps without sensor can be set to either of these control modes:

- constant pressure
- constant curve
- constant other value.

In constant pressure operation mode, the pump adjusts its performance to the desired setpoint. See fig. 19.

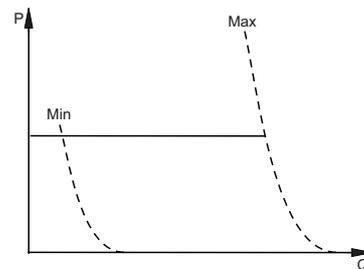


Fig. 19 Constant pressure mode

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In constant curve operation mode (factory setting), the pump operates according to the constant curve set. See fig. 20.

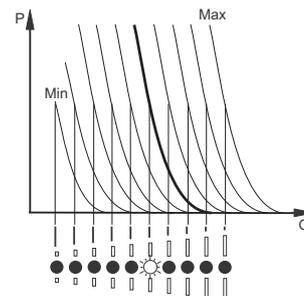


Fig. 20 Constant curve mode

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Functional module for MGE 1.5 to 11 kW

Advanced functional module (FM 300)

FM 300 is factory-fitted in all MTSE pumps from 1.5 to 11 kW.

The module has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required.

FM 300 has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- two Pt100/1000 inputs
- two LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

Connection terminals

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:

Mains supply voltages up to 250 VAC can be connected to this output.

PELV:

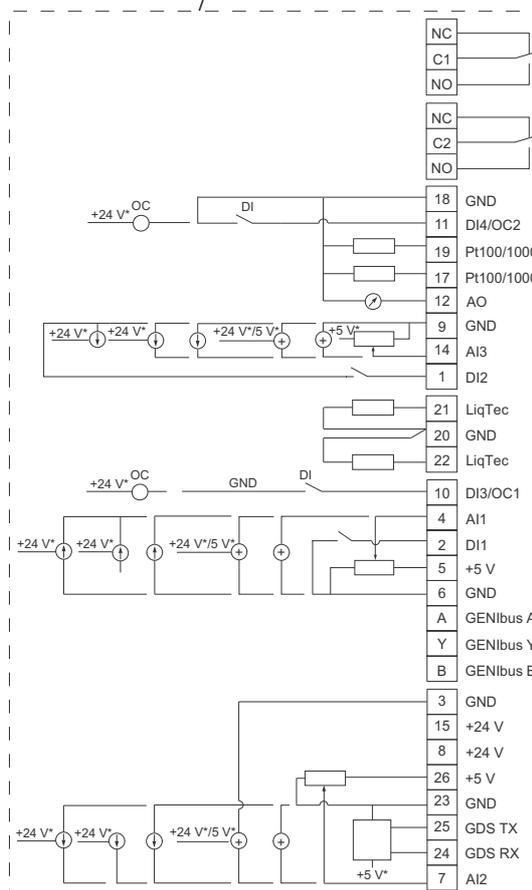
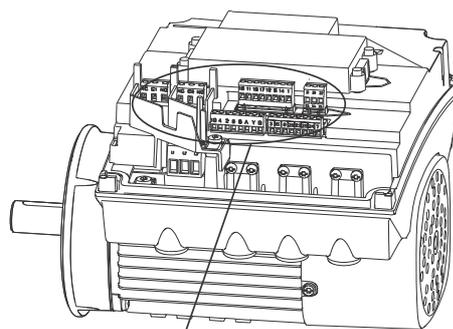
The output is galvanically separated from other circuits. Therefore, the supply voltage or protective extra-low voltage can be connected to the output as desired.

– Signal relay 2:

PELV:

The output is galvanically separated from other circuits. Therefore, the supply voltage or protective extra-low voltage can be connected 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.

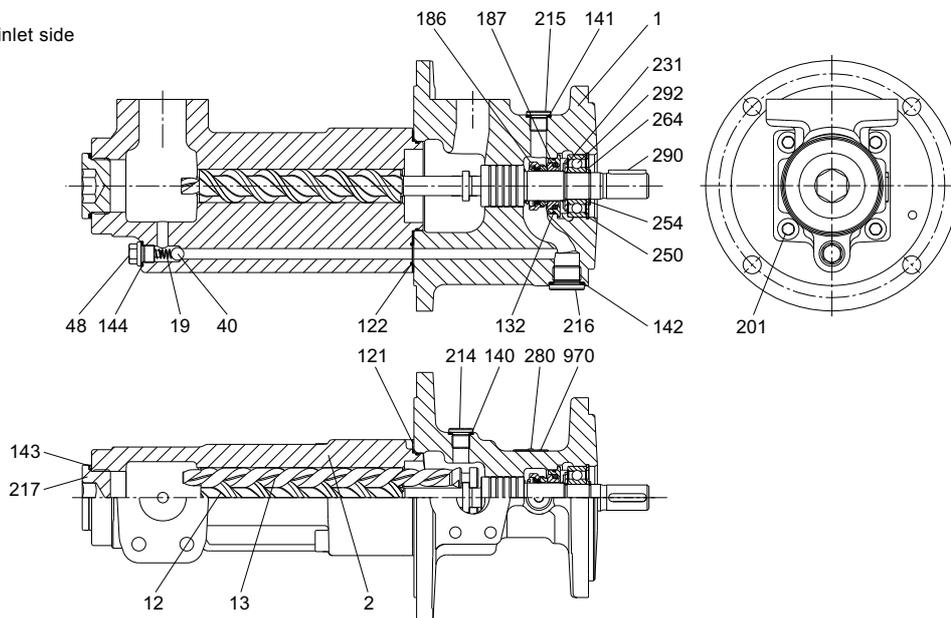
Fig. 21 Connection terminals, FM 300 functional module

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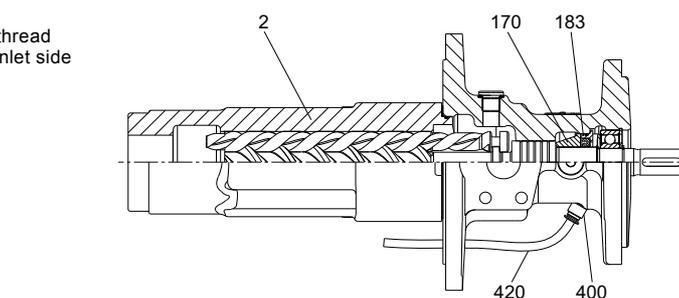
4. Construction

MTS 20 and 40

D8.6
SAE flange on inlet side



DQ
with axial pipe thread
connection on inlet side



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Fig. 22 Sectional drawings of MTS 20 and 40

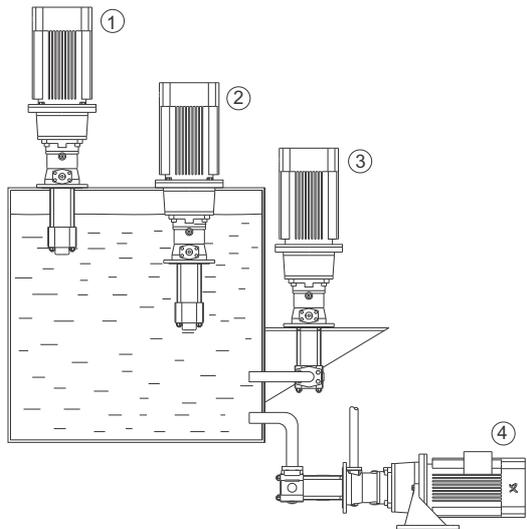
Pos.	Designation	Pos.	Designation	Pos.	Designation
1	Outlet casing	142	Seal ring	231	Washer
2	Rotor housing	143	Seal ring	250	Retaining ring
12	Drive screw	144	Seal ring	254	Retaining ring
13	Idler screw	170	Secondary seal	264	Supporting washer
19	Spring	183	Shaft seal ring	280	Rivet
40	Ball	186	Mechanical seal	290	Key
48	Stop screw	187	Mechanical seal adapter	292	Bearing
121	Gasket	201	Socket head cap screw	400	Adapter
122	O-ring	214	Sealing plug	420	Tube
132	O-ring	215	Sealing plug	970	Nameplate
140	Seal ring	216	Sealing plug		
141	Seal ring	217	Sealing plug		

Material specification

Pos.	Designation	Materials W 110221		
2	Rotor housing (basic material)	EN-GJL-250	GG25	Cast iron
	Rotor housing (active surfaces in the spindle bores)	Specially hardened	Basic hardness	62 HRC
			Surface hardness	1200 HV
4	Inlet casing	EN-GJL-250	GG25	Cast iron
1	Outlet casing	EN-GJL-250	GG25	Cast iron
13	Screw set (basic material)	1.7139	16MnCrS5	Special steel, nitrided 62 HRC
13	Screw set (surface)	specially treated	(PVD)	1200 HV
3	Pump cover	EN-GJL-250	GG25	Cast iron
186	Mechanical shaft seal	Q1Q1VGG	SiC/SiC, FPM, 1.4571	Silicon carbide, fluoroelastomer, stainless steel
183	Shaft seal ring	FPM		Fluoroelastomer
140	Static gaskets	FPM		Fluoroelastomer

Pump designs

The pump designs available as standard and on request are shown in fig. 23.



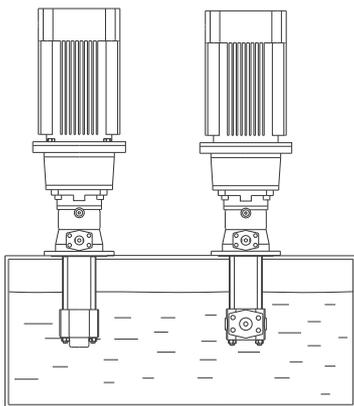
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Fig. 23 Pump designs

Pos.	Description
1	Pump designed for tank-top installation
2	Pump designed for in-tank installation (on request)
3	Pump designed for dry installation with flange
4	Pump designed for dry installation with mounting foot

Pumps for tank-top installation

The pump is equipped with a flange for mounting on the tank top, and the outlet port is above the tank cover. This type of installation is easy and economic to install. The pump is equipped with a seal ring and is well-suited for operation with an inlet pressure up to 1 bar. See page 17 for installation requirements.

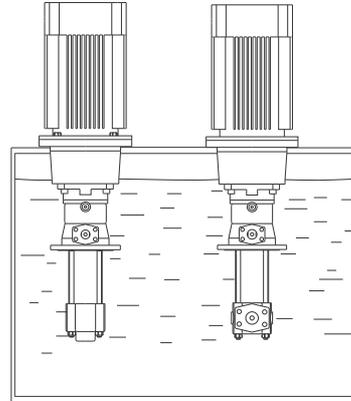


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Fig. 24 Tank-top installation

In-tank installation

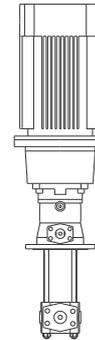
This type of installation saves space compared with pumps which are designed for dry installation. Any leakage remains in the tank. See page 17 for installation requirements.



TM06 3349 5214

Fig. 25 In-tank installation

Pumps for dry installation



TM06 3350 5214

Fig. 26 Pump designed for dry installation with flange

This type of installation is well-suited for operation with an inlet pressure up to 10 bar and it is easy to access the pump. A silicon carbide mechanical shaft seal ensures a long service life.

Pumps for horizontal installation

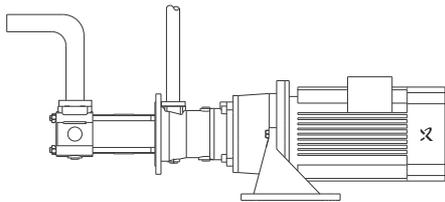


Fig. 27 Pump designed for dry installation with horizontal mounting foot

The pump is equipped with a mounting foot. This type of installation is well-suited for operation with an inlet pressure up to 10 bar, and it is easy to access the pump. A silicon carbide mechanical shaft seal ensures a long service life.

Installation

The following applies for pumps installed in tanks. In order to protect the pump at startup and to ensure correct performance, observe the requirements in the table below.

Pump type	A [mm]	B [mm]
MTS 20	Max. 147	Min. 25
MTS 40	Max. 190	Min. 25

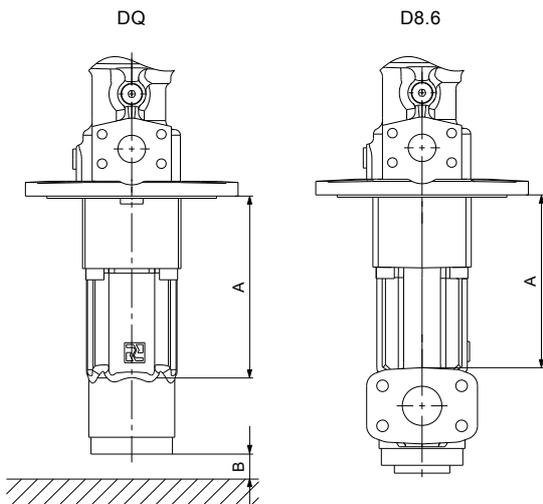


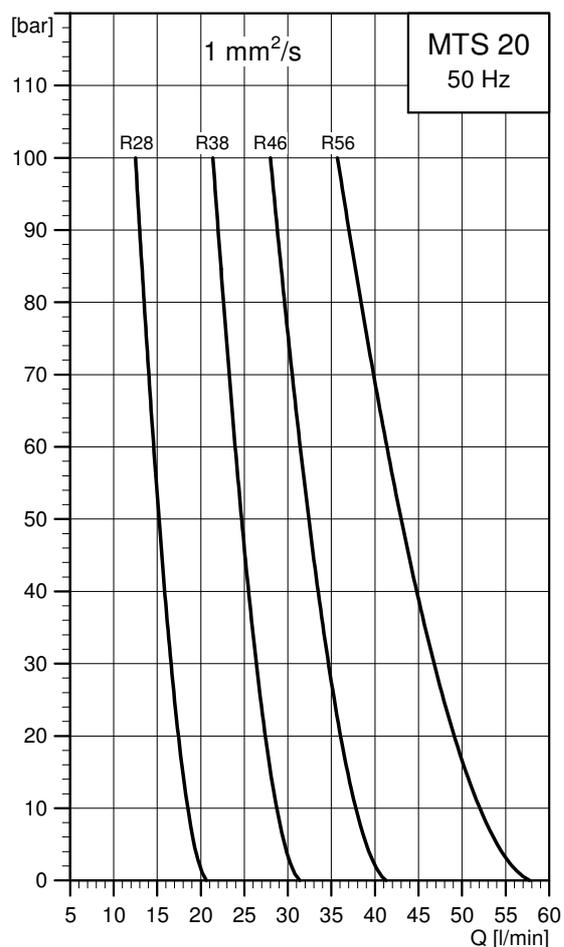
Fig. 28 Design types DQ and D8.6

5. Technical data

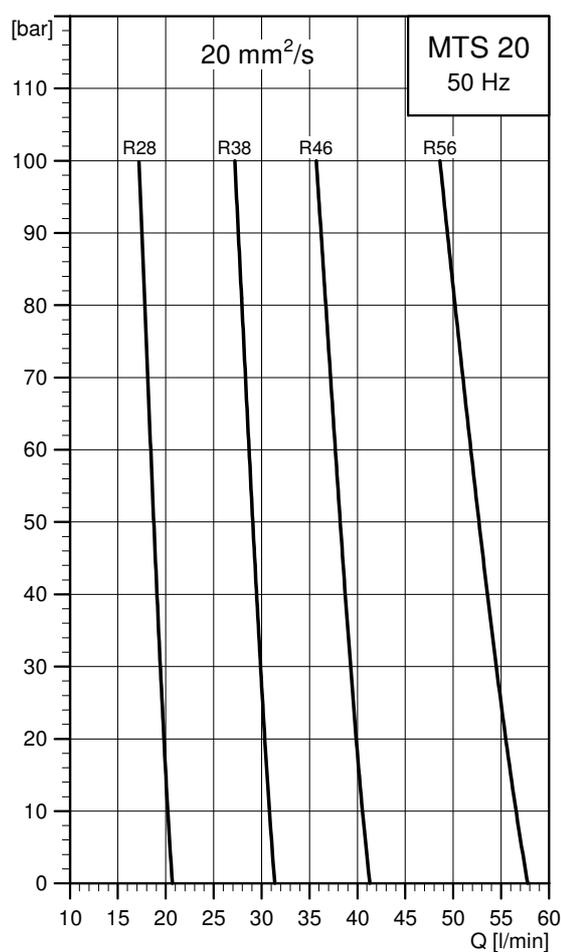
MTS 20, 50 Hz

Performance range

Performance data at 1 mm²/s
(emulsion)



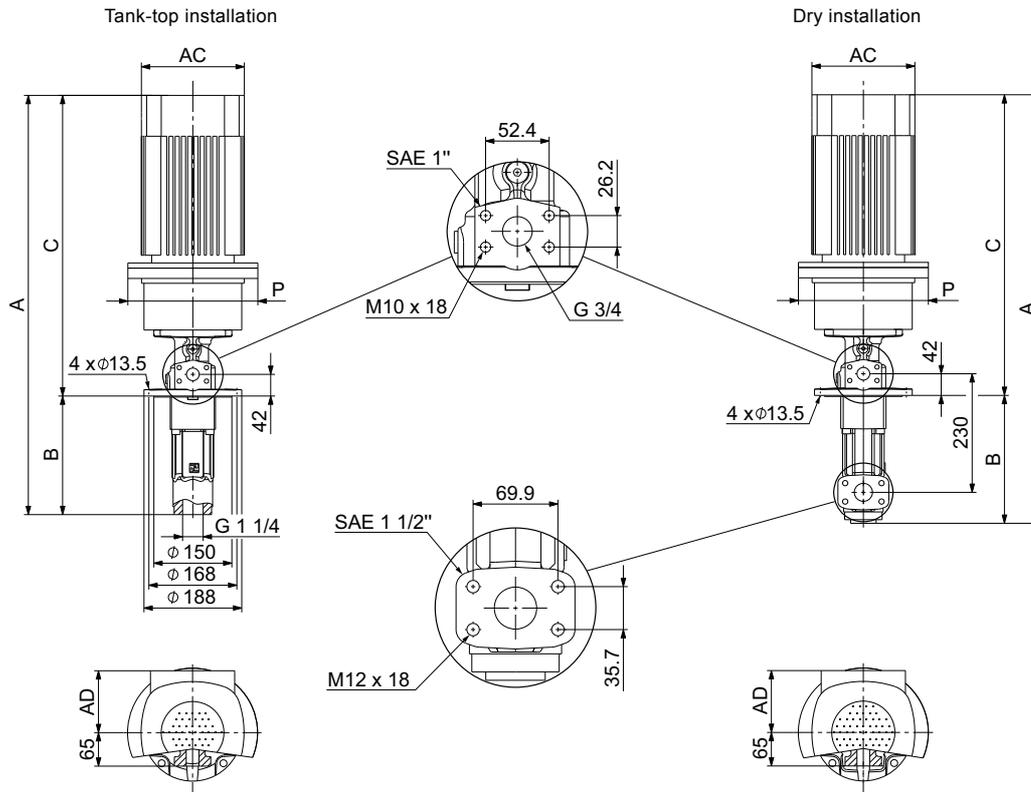
Performance data at 20 mm²/s
(cutting oil with EP additives)



Performance table

Pressure	1 mm ² /s (emulsion)								20 mm ² /s (cutting oil with EP additives)							
	R28		R38		R46		R56		R28		R38		R46		R56	
	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P
[bar]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]
0	20.7	0.3	31.4	0.3	41.3	0.3	57.8	0.3	20.7	0.3	31.4	0.3	41.3	0.3	57.8	0.3
10	18.5	0.7	28.7	0.8	37.8	1.0	52.0	1.3	20.2	0.7	30.8	0.8	40.5	1.0	56.5	1.3
20	17.4	1.0	27.4	1.3	36.0	1.7	49.1	2.2	19.8	1.0	30.3	1.4	39.9	1.7	55.5	2.2
30	16.6	1.4	26.4	1.9	34.7	2.4	46.8	3.2	19.4	1.4	29.9	1.9	39.3	2.4	54.5	3.2
40	15.9	1.7	25.5	2.4	33.5	3.1	44.8	4.2	19.1	1.7	29.5	2.4	38.7	3.1	53.6	4.2
50	15.2	2.0	24.7	2.9	32.4	3.8	43.0	5.1	18.8	2.0	29.1	2.9	38.2	3.8	52.7	5.1
60	14.6	2.4	23.9	3.5	31.4	4.4	41.4	6.1	18.4	2.4	28.7	3.5	37.7	4.4	51.8	6.1
70	14.0	2.7	23.3	4.0	30.5	5.1	39.8	7.1	18.1	2.7	28.3	4.0	37.2	5.1	51.0	7.1
80	13.5	3.1	22.6	4.5	29.6	5.8	38.4	8.0	17.8	3.1	27.9	4.5	36.7	5.8	50.2	8.0
90	13.0	3.4	22.0	5.0	28.8	6.5	37.0	9.0	17.5	3.4	27.6	5.0	36.2	6.5	49.4	9.0
100	12.5	3.8	21.4	5.6	28.0	7.2	35.7	10.0	17.2	3.8	27.2	5.6	35.7	7.2	48.6	10.0

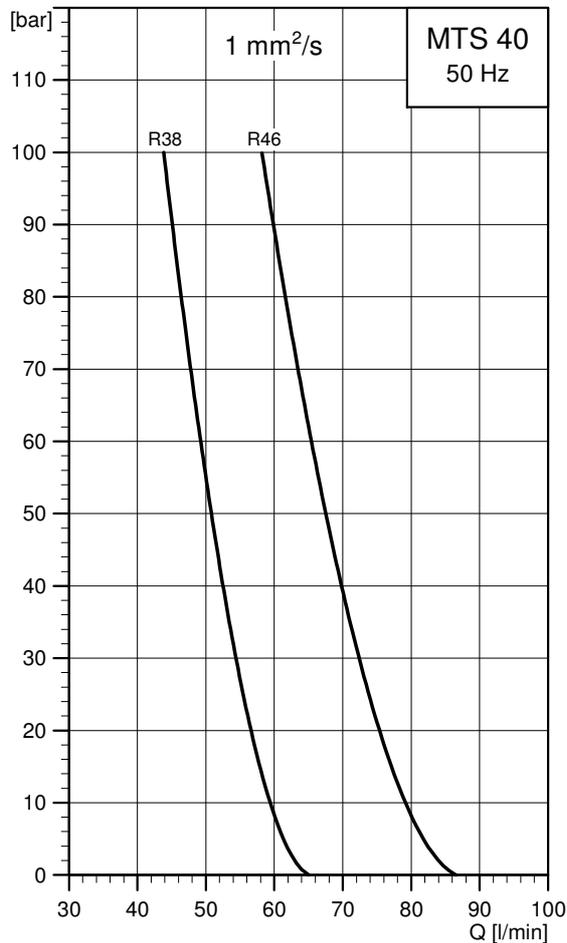
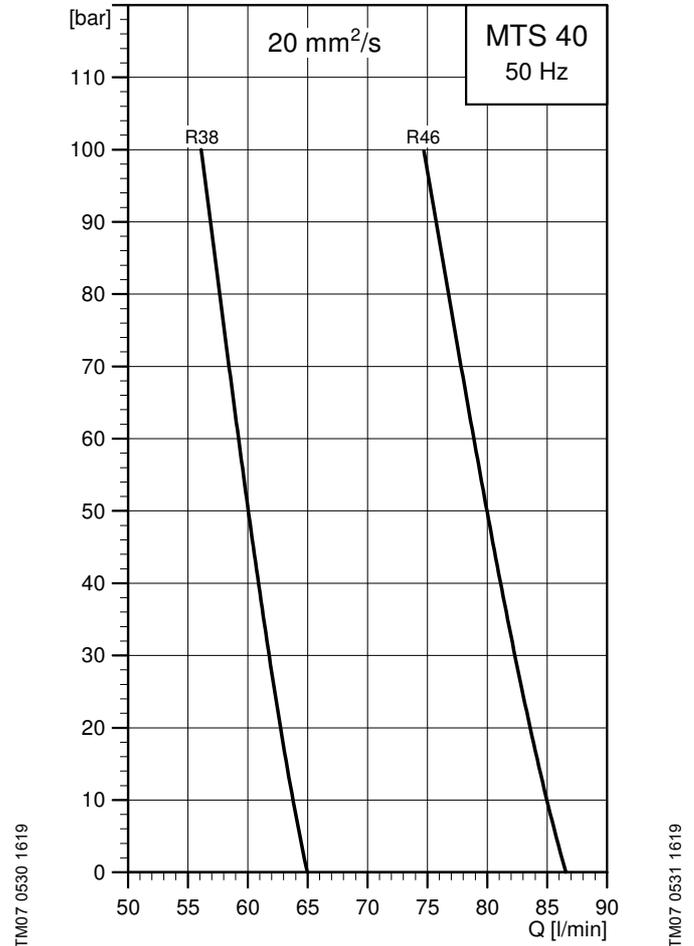
Dimensional sketches



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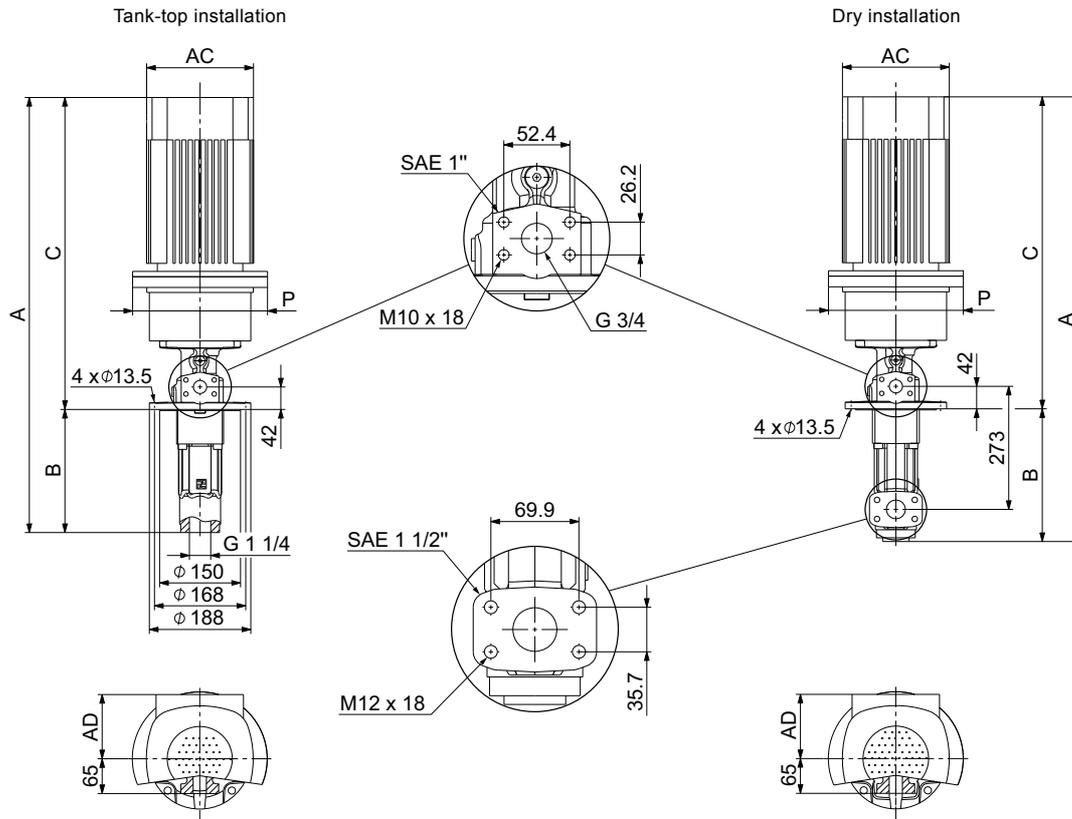
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]						Net weight [kg]				
		A		B		C		AC	AD	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry					
MTS 20-30 R28	1.5	754	772	230	248	524	524	178	110	200	36	39
MTS 20-40 R28	2.2	794	812	230	248	564	564	178	110	200	39	42
MTS 20-50 R28	2.2	794	812	230	248	564	564	178	110	200	39	42
MTS 20-60 R28	3	813	831	230	248	583	583	198	120	250	44	47
MTS 20-70 R28	3	813	831	230	248	583	583	198	120	250	44	47
MTS 20-80 R28	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-90 R28	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-100 R28	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-30 R38	2.2	794	812	230	248	564	564	178	110	200	39	42
MTS 20-40 R38	3	813	831	230	248	583	583	198	120	250	44	47
MTS 20-50 R38	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-60 R38	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-70 R38	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-80 R38	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-90 R38	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-100 R38	7.5	881	899	230	248	651	651	260	159	300	71	74
MTS 20-30 R46	3	813	831	230	248	583	583	198	120	250	44	47
MTS 20-40 R46	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-50 R46	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-60 R46	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-70 R46	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-80 R46	7.5	881	899	230	248	651	651	260	159	300	71	74
MTS 20-90 R46	7.5	881	889	230	248	651	651	260	159	300	71	74
MTS 20-100 R46	11	1017	1035	230	248	787	787	314	204	350	90	93
MTS 20-30 R56	4	850	868	230	248	620	620	220	134	250	56	59
MTS 20-40 R56	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-50 R56	5.5	893	911	230	248	663	663	220	134	300	61	64
MTS 20-60 R56	7.5	881	899	230	248	651	651	260	159	300	71	74
MTS 20-70 R56	7.5	881	899	230	248	651	651	260	159	300	71	74
MTS 20-80 R56	11	1017	1035	230	248	787	787	314	204	350	90	93
MTS 20-90 R56	11	1017	1035	230	248	787	787	314	204	350	90	93
MTS 20-100 R56	11	1017	1035	230	248	787	787	314	204	350	90	93

MTS 40, 50 Hz**Performance range**Performance data at 1 mm²/s
(emulsion)Performance data at 20 mm²/s
(cutting oil with EP additives)**Performance table**

Pressure	1 mm ² /s (emulsion)				20 mm ² /s (cutting oil with EP additives)			
	R38		R46		R38		R46	
	Q	P	Q	P	Q	P	Q	P
[bar]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]
0	65.0	0.4	86.6	0.4	65.0	0.8	86.6	0.8
10	59.4	1.5	79.1	1.8	63.7	1.8	84.9	2.2
20	56.6	2.6	75.4	3.3	62.7	2.9	83.6	3.6
30	54.4	3.7	72.4	4.7	61.8	4.0	82.3	5.1
40	52.5	4.7	69.8	6.2	60.9	5.1	81.1	6.5
50	50.8	5.8	67.5	7.6	60.1	6.2	80.0	8.0
60	49.2	6.9	65.4	9.1	59.2	7.3	78.9	9.4
70	47.8	8.0	63.5	10.5	58.4	8.3	77.8	10.9
80	46.4	9.1	61.6	12.0	57.6	9.4	76.7	12.3
90	45.1	10.2	59.8	13.4	56.9	10.5	75.7	13.7
100	43.8	11.2	58.2	14.8	56.1	11.6	74.7	15.2

Dimensional sketches



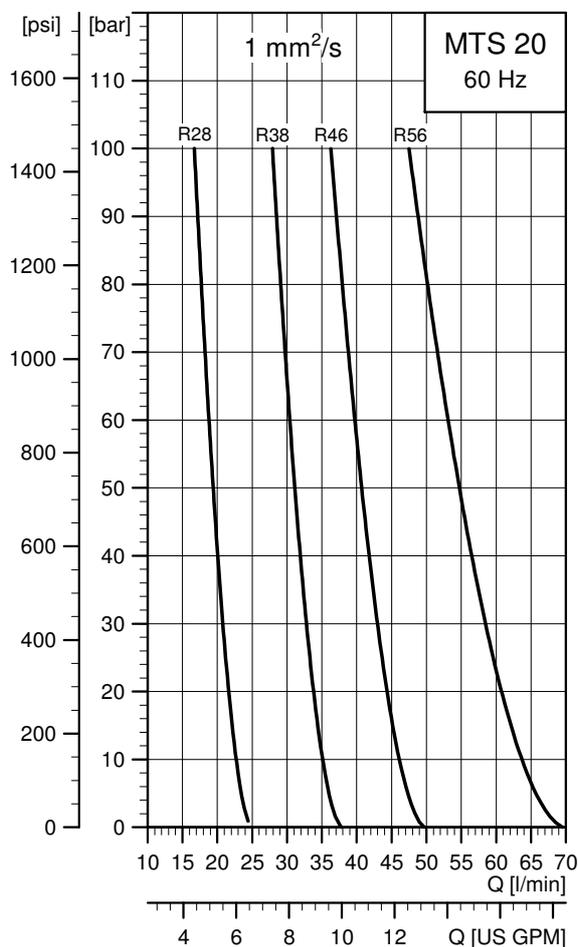
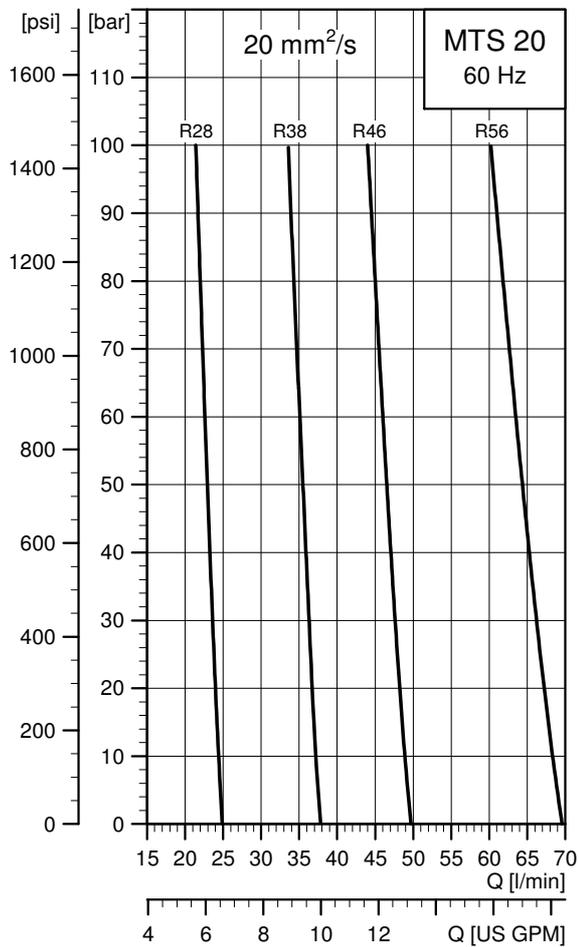
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Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]						Net weight [kg]				
		A		B		C		AC	AD	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry					
MTS 40-30 R38	4	900	911	280	291	620	620	220	134	250	62	65
MTS 40-40 R38	5.5	943	954	280	291	663	663	220	134	300	67	70
MTS 40-50 R38	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-60 R38	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-70 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-80 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-90 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-100 R38	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-30 R46	5.5	943	954	280	291	663	663	220	134	300	67	70
MTS 40-40 R46	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-50 R46	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-60 R46	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-70 R46	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-80 R46	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-90 R46	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-100 R46	18.5	1111	1122	280	291	831	831	314	204	350	140	143

MTS 20, 60 Hz

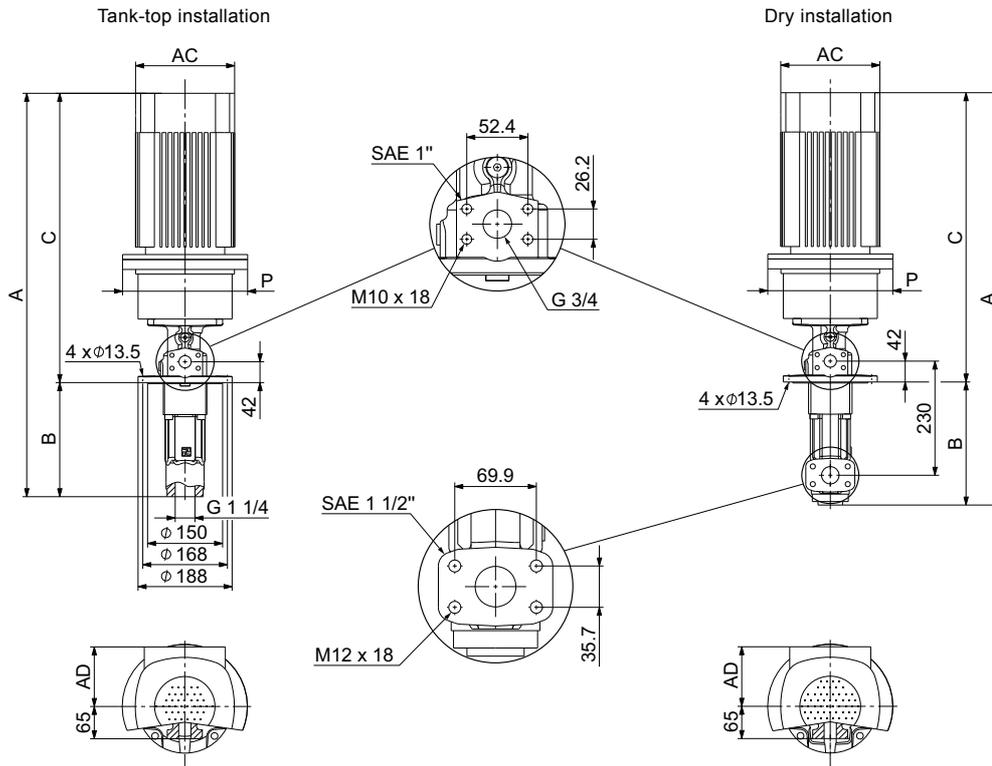
Performance range

Performance data at 1 mm²/s
(emulsion)Performance data at 20 mm²/s
(cutting oil with EP additives)

Performance table

Pressure	1 mm ² /s (emulsion)								20 mm ² /s (cutting oil with EP additives)							
	R28		R38		R46		R56		R28		R38		R46		R56	
	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P	Q	P
[bar]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]
0	24.9	0.4	37.8	0.4	49.7	0.4	69.6	0.4	24.9	0.4	37.8	0.4	49.7	0.4	69.6	0.4
10	22.7	0.8	35.1	1.1	46.1	1.2	63.6	1.6	24.4	0.8	37.2	1.1	48.9	1.2	68.3	1.6
20	21.6	1.2	33.8	1.7	44.3	2.1	60.8	2.7	24.0	1.2	36.7	1.7	48.2	2.1	67.2	2.7
30	20.8	1.7	32.8	2.3	43.0	2.9	58.5	3.9	23.6	1.7	36.3	2.3	47.6	2.9	66.2	3.9
40	20.1	2.1	31.9	2.9	41.8	3.7	56.5	5.1	23.3	2.1	35.9	2.9	47.1	3.7	65.3	5.1
50	19.4	2.5	31.1	3.6	40.7	4.6	54.7	6.2	22.9	2.5	35.5	3.6	46.5	4.6	64.4	6.2
60	18.8	2.9	30.4	4.2	39.7	5.4	53.1	7.4	22.6	2.9	35.1	4.2	46.0	5.4	63.5	7.4
70	18.2	3.3	29.7	4.8	38.8	6.2	51.6	8.5	22.3	3.3	34.7	4.8	45.5	6.2	62.6	8.5
80	17.7	3.7	29.1	5.5	37.9	7.0	50.1	9.7	22.0	3.7	34.3	5.5	45.0	7.0	61.8	9.7
90	17.2	4.1	28.5	6.1	37.1	7.9	48.8	10.9	21.7	4.1	33.9	6.1	44.5	7.9	61.0	10.9
100	16.7	4.6	27.9	6.7	36.3	8.7	47.5	12.0	21.4	4.6	33.6	6.7	44.0	8.7	60.2	12.0

Dimensional sketches



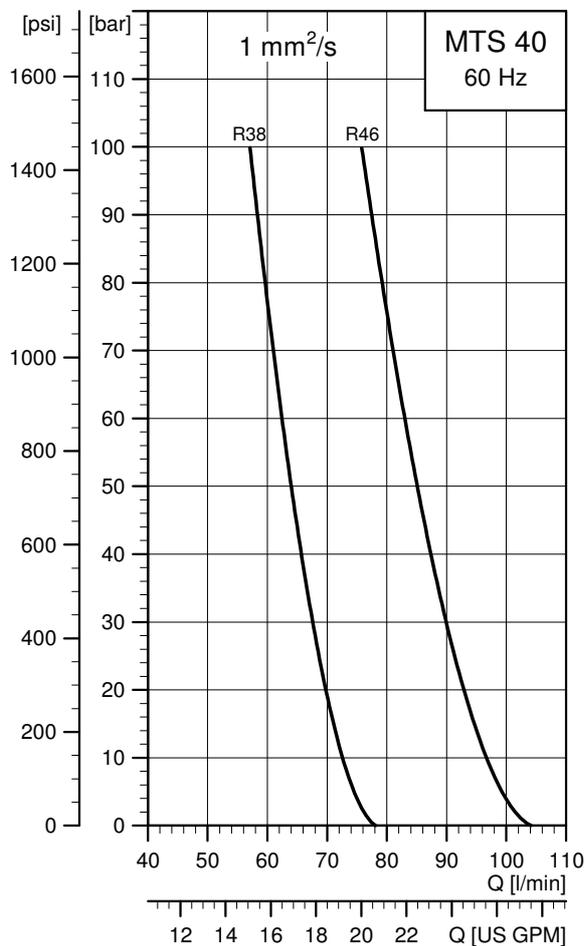
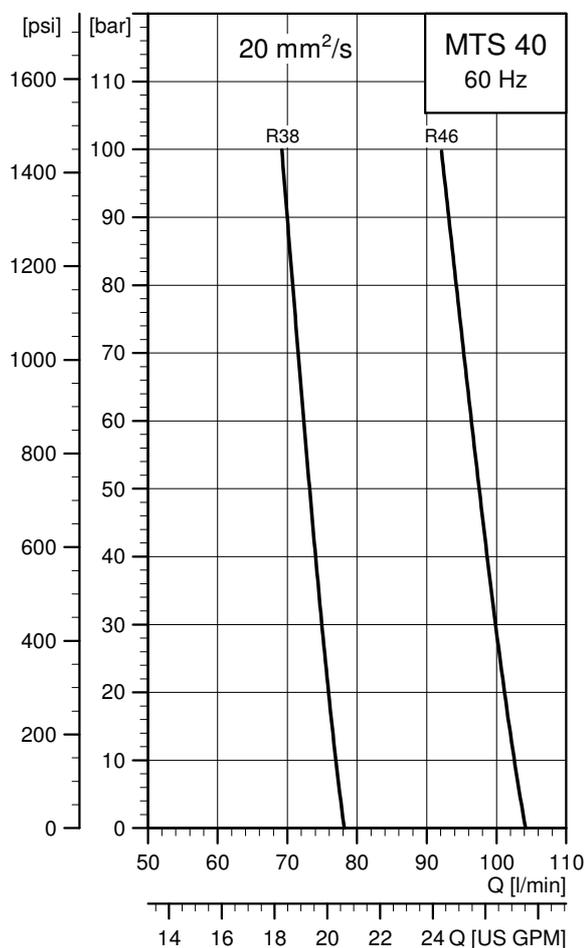
TM07 1995 2518

Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]										Net weight [kg]	
		A		B		C		AC	AD	P	Tank-top	Dry	
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTS 20-30 R28	2.2	794	812	230	248	564	564	178	110	200	39	42	
MTS 20-40 R28	2.2	794	812	230	248	564	564	178	110	200	39	42	
MTS 20-50 R28	3	813	831	230	248	583	583	198	120	250	44	47	
MTS 20-60 R28	3	813	831	230	248	583	583	198	120	250	44	47	
MTS 20-70 R28	4	850	868	230	248	620	620	220	134	250	56	59	
MTS 20-80 R28	4	850	868	230	248	620	620	220	134	250	56	59	
MTS 20-90 R28	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-100 R28	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-30 R38	3	813	831	230	248	583	583	198	120	250	44	47	
MTS 20-40 R38	3	813	831	230	248	583	583	198	120	250	44	47	
MTS 20-50 R38	4	850	868	230	248	620	620	220	134	250	56	59	
MTS 20-60 R38	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-70 R38	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-80 R38	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-90 R38	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-100 R38	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-30 R46	3	813	831	230	248	583	583	198	120	250	44	47	
MTS 20-40 R46	4	850	868	230	248	620	620	220	134	250	56	59	
MTS 20-50 R46	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-60 R46	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-70 R46	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-80 R46	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-90 R46	11	1017	1035	230	248	787	787	314	204	350	90	93	
MTS 20-100 R46	11	1017	1035	230	248	787	787	314	204	350	90	93	
MTS 20-30 R56	4	850	868	230	248	620	620	220	134	250	56	59	
MTS 20-40 R56	5.5	893	911	230	248	663	663	220	134	300	61	64	
MTS 20-50 R56	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-60 R56	7.5	881	899	230	248	651	651	260	159	300	71	74	
MTS 20-70 R56	11	1017	1035	230	248	787	787	314	204	350	90	93	
MTS 20-80 R56	11	1017	1035	230	248	787	787	314	204	350	90	93	
MTS 20-90 R56	11	1017	1035	230	248	787	787	314	204	350	90	93	
MTS 20-100 R56	15	1017	1035	230	248	787	787	314	204	350	102	105	

MTS 40, 60 Hz

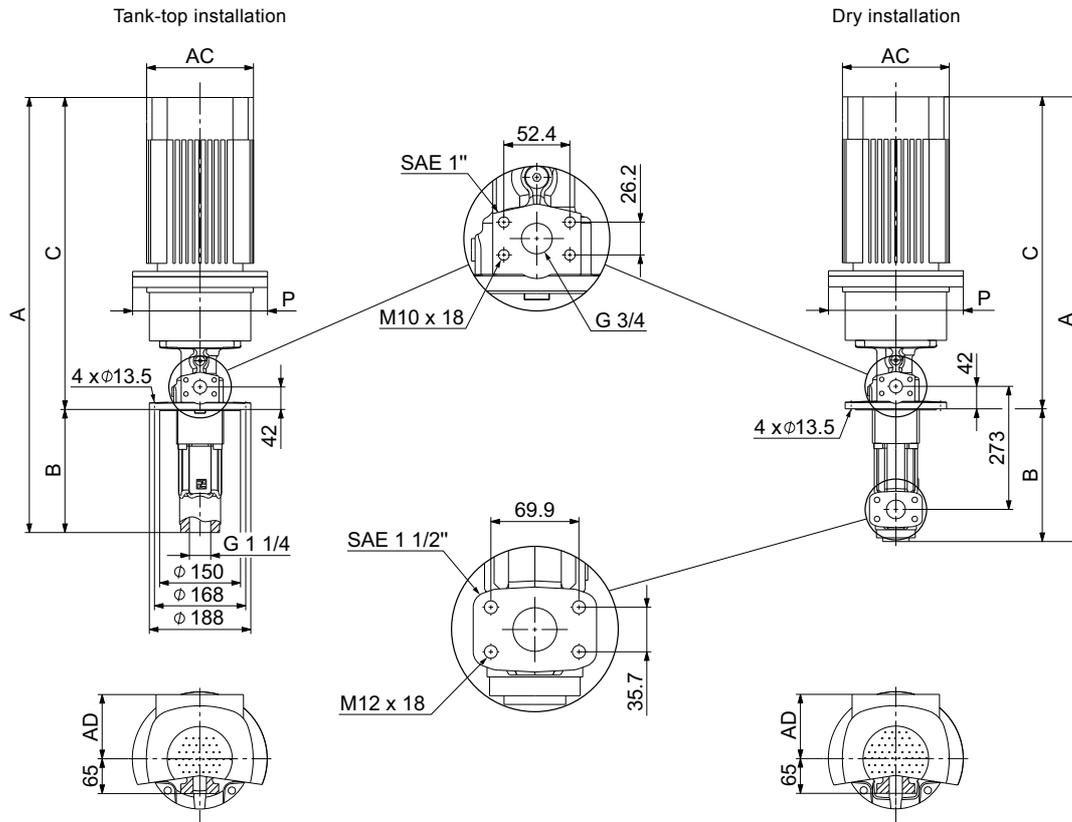
Performance range

Performance data at 1 mm²/s
(emulsion)Performance data at 20 mm²/s
(cutting oil with EP additives)

Performance table

Pressure	1 mm ² /s (emulsion)				20 mm ² /s (cutting oil with EP additives)			
	R38		R46		R38		R46	
	Q	P	Q	P	Q	P	Q	P
[bar]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]	[l/min]	[kW]
0	78.2	0.5	104.2	0.5	78.2	1.0	104.2	1.0
10	72.5	1.8	96.6	2.3	76.9	2.3	102.5	2.7
20	69.8	3.1	92.9	4.0	75.9	3.6	101.1	4.5
30	67.6	4.4	89.9	5.7	74.9	4.9	99.9	6.2
40	65.7	5.7	87.4	7.5	74.1	6.2	98.7	7.9
50	64.0	7.1	85.1	9.2	73.2	7.5	97.5	9.7
60	62.4	8.4	83.0	11.0	72.4	8.8	96.4	11.4
70	61.0	9.7	81.0	12.7	71.5	10.1	95.3	13.2
80	59.6	11.0	79.2	14.4	70.7	11.4	94.2	14.9
90	58.3	12.3	77.4	16.2	70.0	12.7	93.1	16.6
100	57.1	13.6	75.8	17.9	69.2	14.0	92.1	18.4

Dimensional sketches



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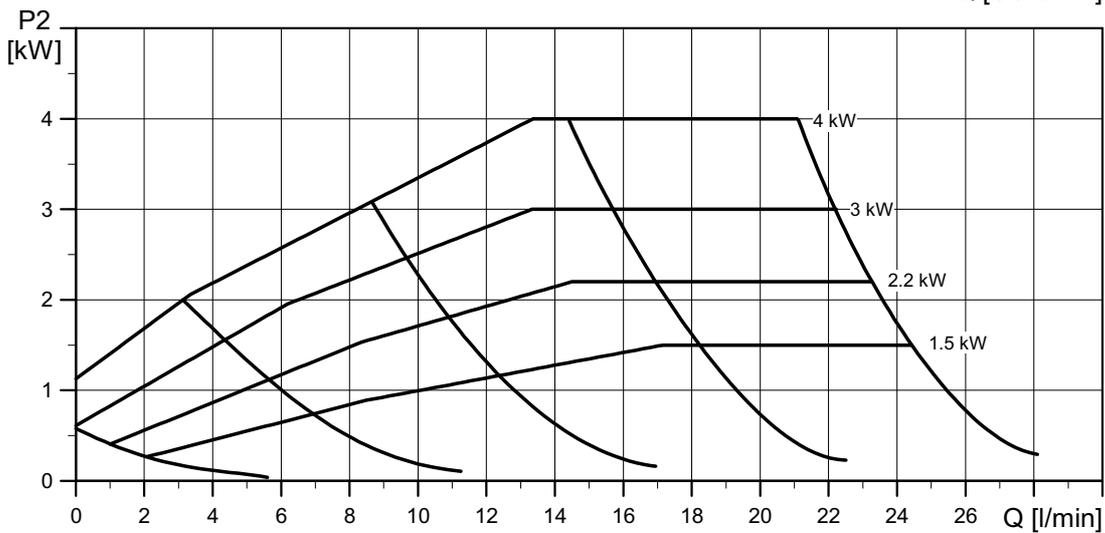
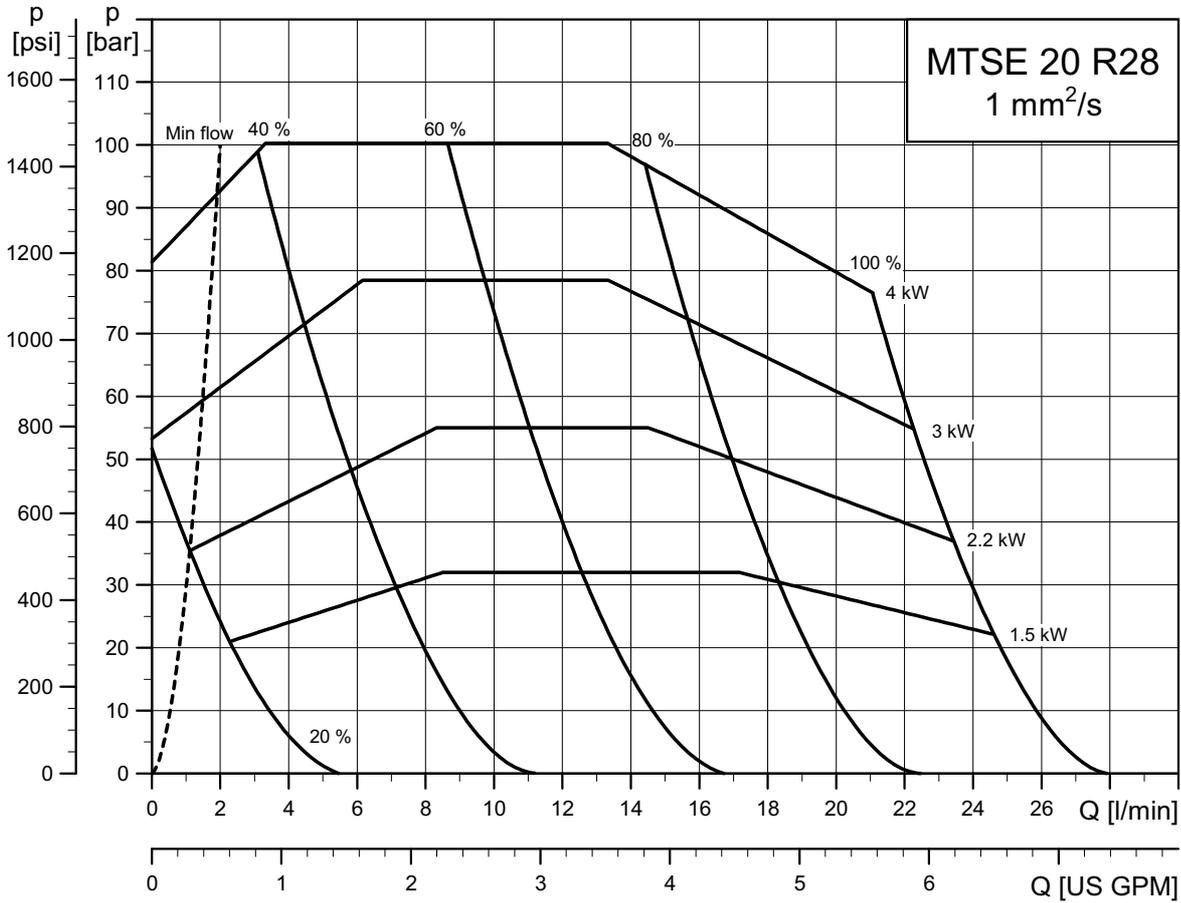
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]						Net weight [kg]				
		A		B		C		AC	AD	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry					
MTS 40-30 R38	5.5	943	954	280	291	663	663	220	134	300	67	70
MTS 40-40 R38	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-50 R38	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-60 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-70 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-80 R38	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-90 R38	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-100 R38	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-30 R46	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-40 R46	7.5	931	942	280	291	651	651	260	159	300	77	80
MTS 40-50 R46	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-60 R46	11	1067	1078	280	291	787	787	314	204	350	114	117
MTS 40-70 R46	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-80 R46	15	1067	1078	280	291	787	787	314	204	350	126	129
MTS 40-90 R46	18.5	1111	1122	280	291	831	831	314	204	350	140	140
MTS 40-100 R46	18.5	1111	1122	280	291	831	831	314	204	350	140	140

MTSE 20 R28, 50/60 Hz

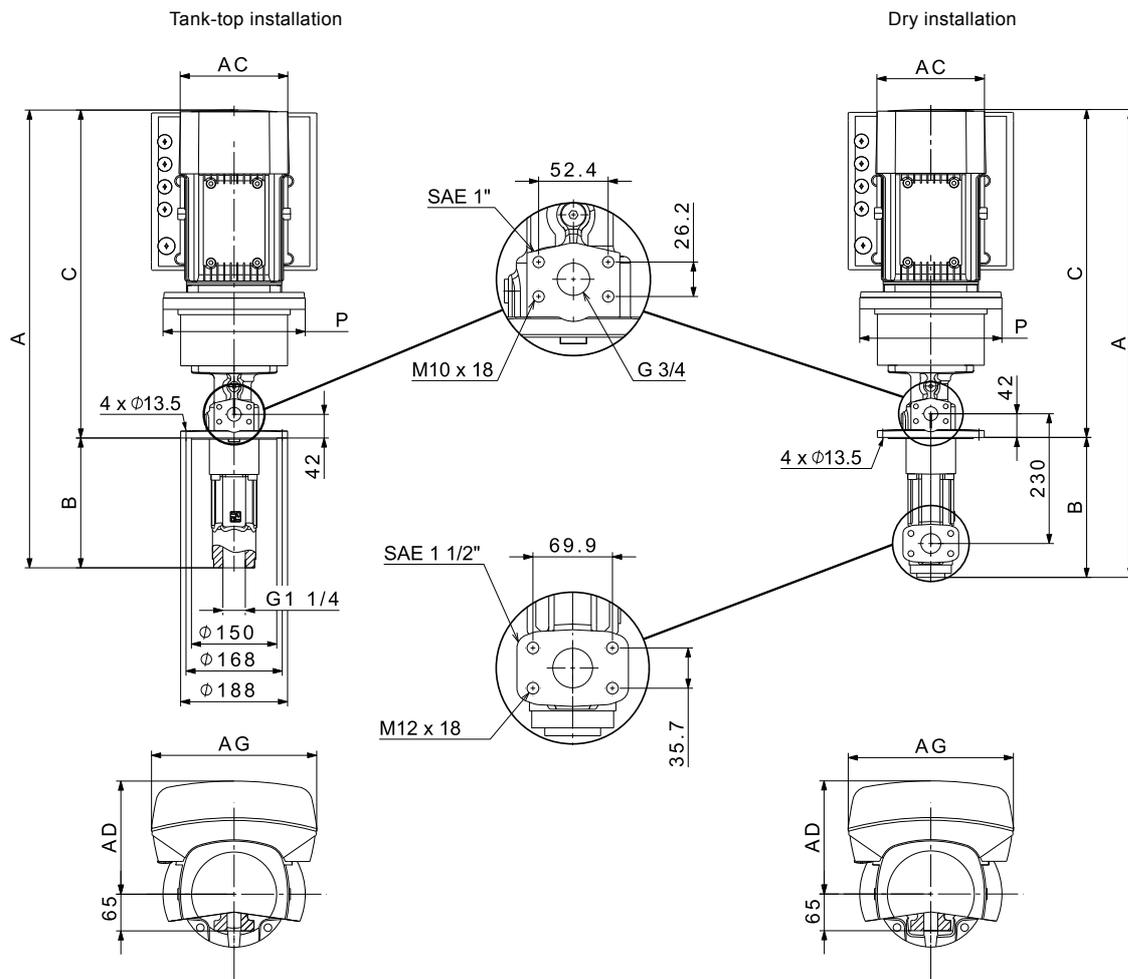
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4863 2719

Dimensional sketches



TM07 4997 2819

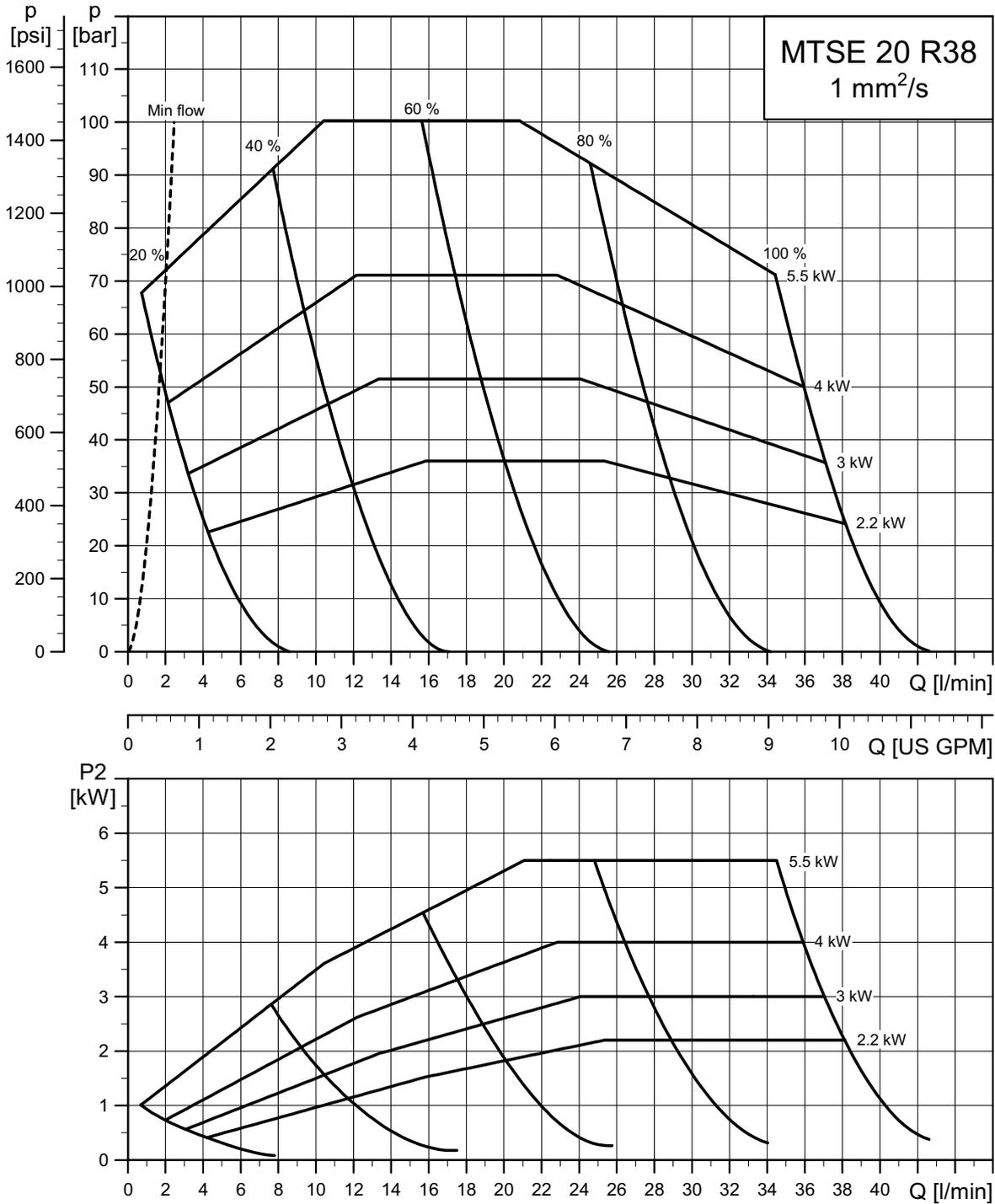
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]								Net weight [kg]			
		A		B		C		AC	AD	AG	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 20-32 R28	1.5	747	765	230	248	517	517	122	158	268	200	32	35
MTSE 20-55 R28	2.2	747	765	230	248	517	517	122	158	268	200	34	37
MTSE 20-78 R28	3.0	812	830	230	248	582	582	191	201	291	250	41	44
MTSE 20-100 R28	4.0	812	830	230	248	582	582	191	201	291	250	48	51

MTSE 20 R38, 50/60 Hz

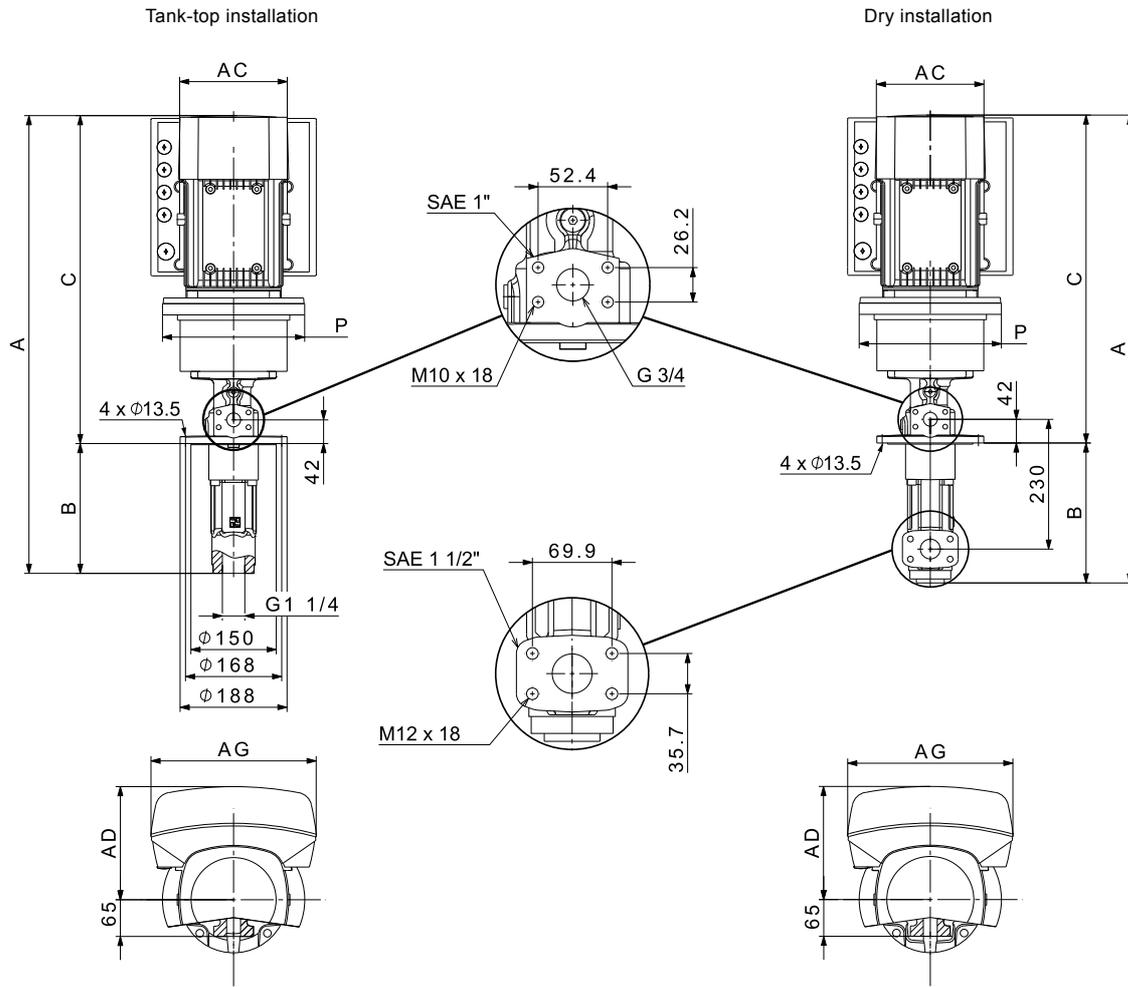
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4883 2719

Dimensional sketches



TM07 4997 2819

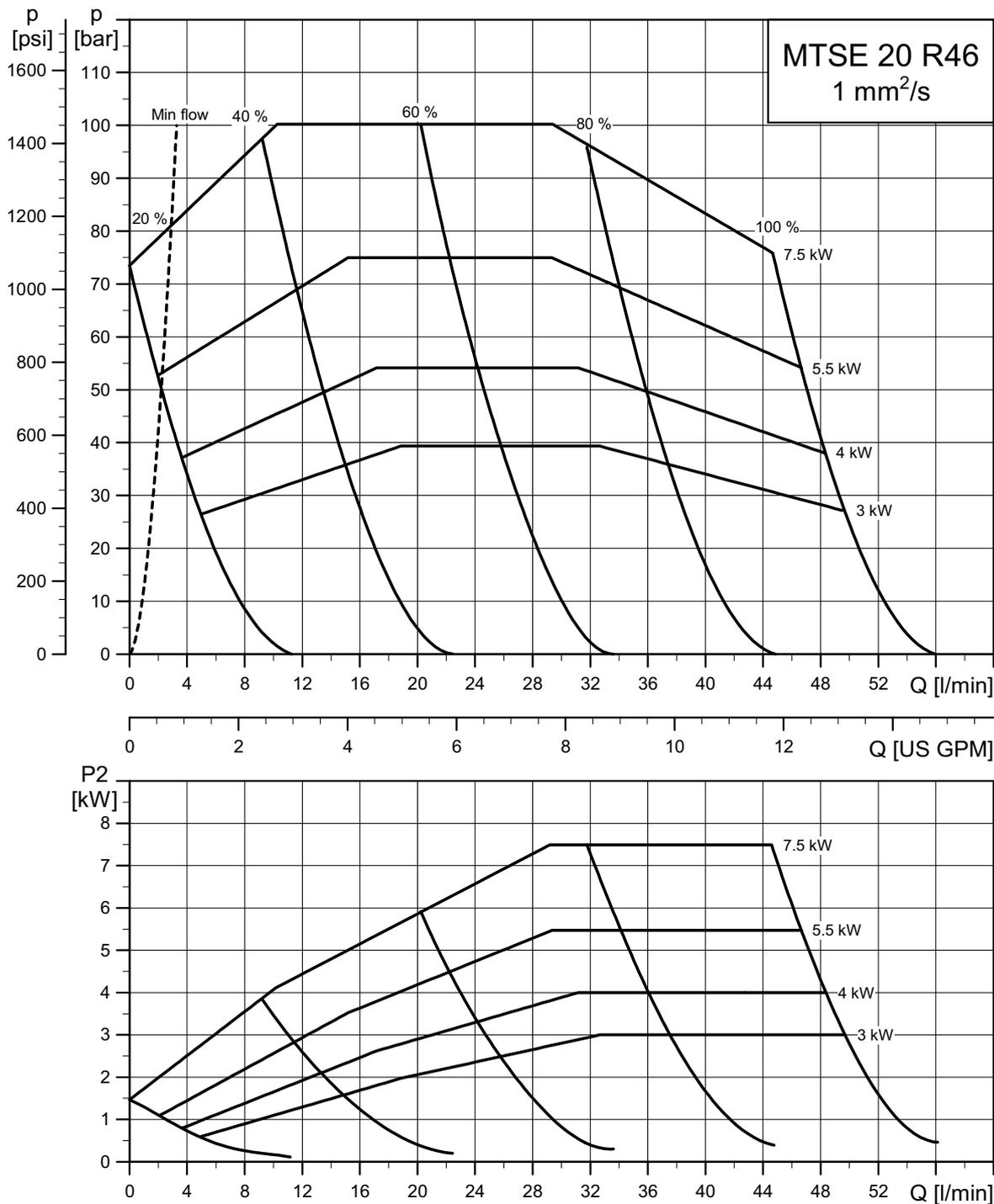
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]								Net weight [kg]			
		A		B		C		AC	AD	AG	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 20-36 R38	2.2	747	765	230	248	517	517	122	158	268	200	34	37
MTSE 20-51 R38	3.0	812	830	230	248	582	582	191	201	291	250	41	44
MTSE 20-71 R38	4.0	812	830	230	248	582	582	191	201	291	250	48	51
MTSE 20-100 R38	5.5	867	885	230	248	637	637	191	201	291	300	56	59

MTSE 20 R46, 50/60 Hz

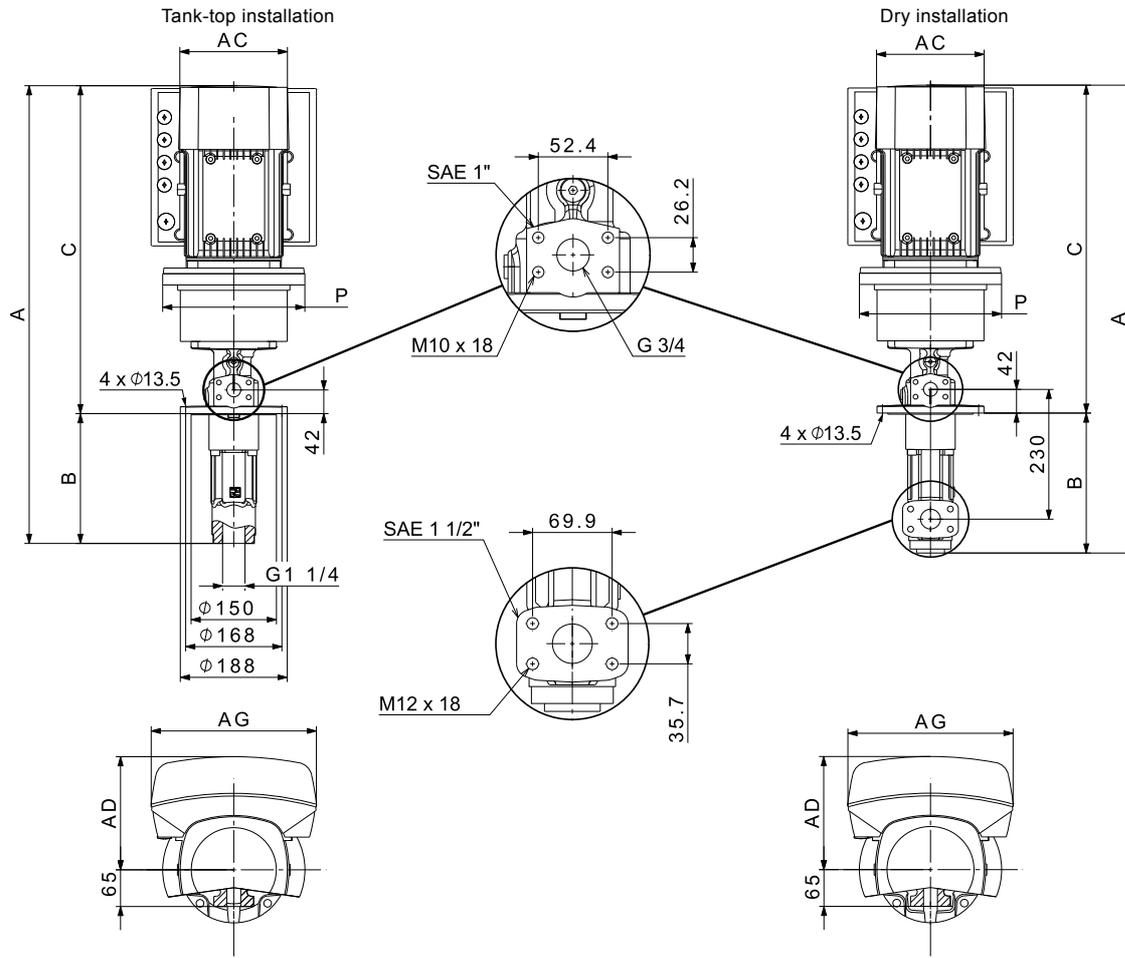
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4883 2719

Dimensional sketches



TM07 4997 2819

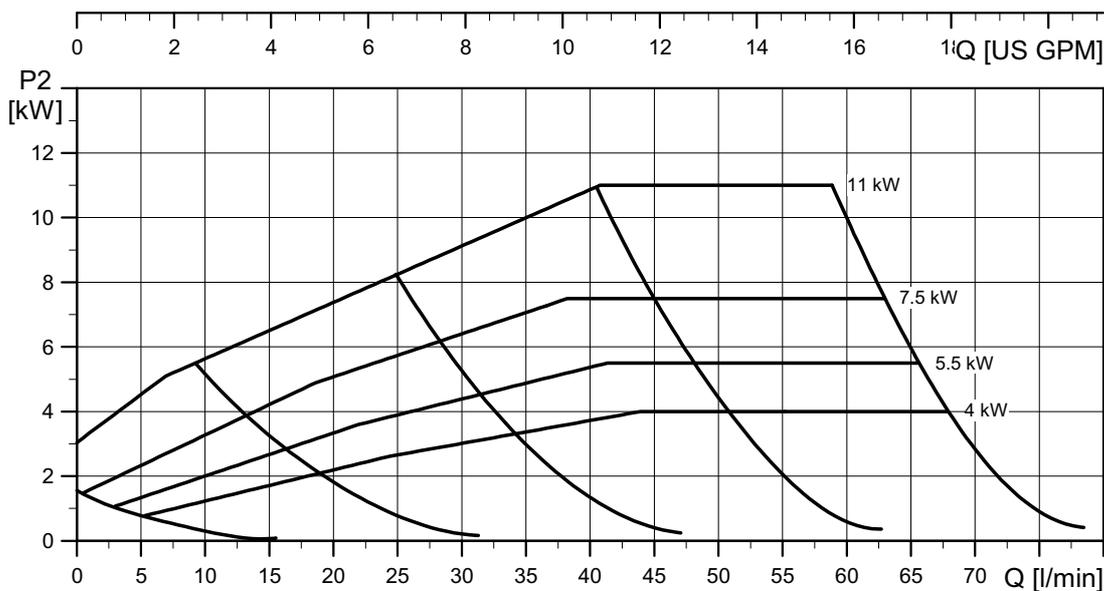
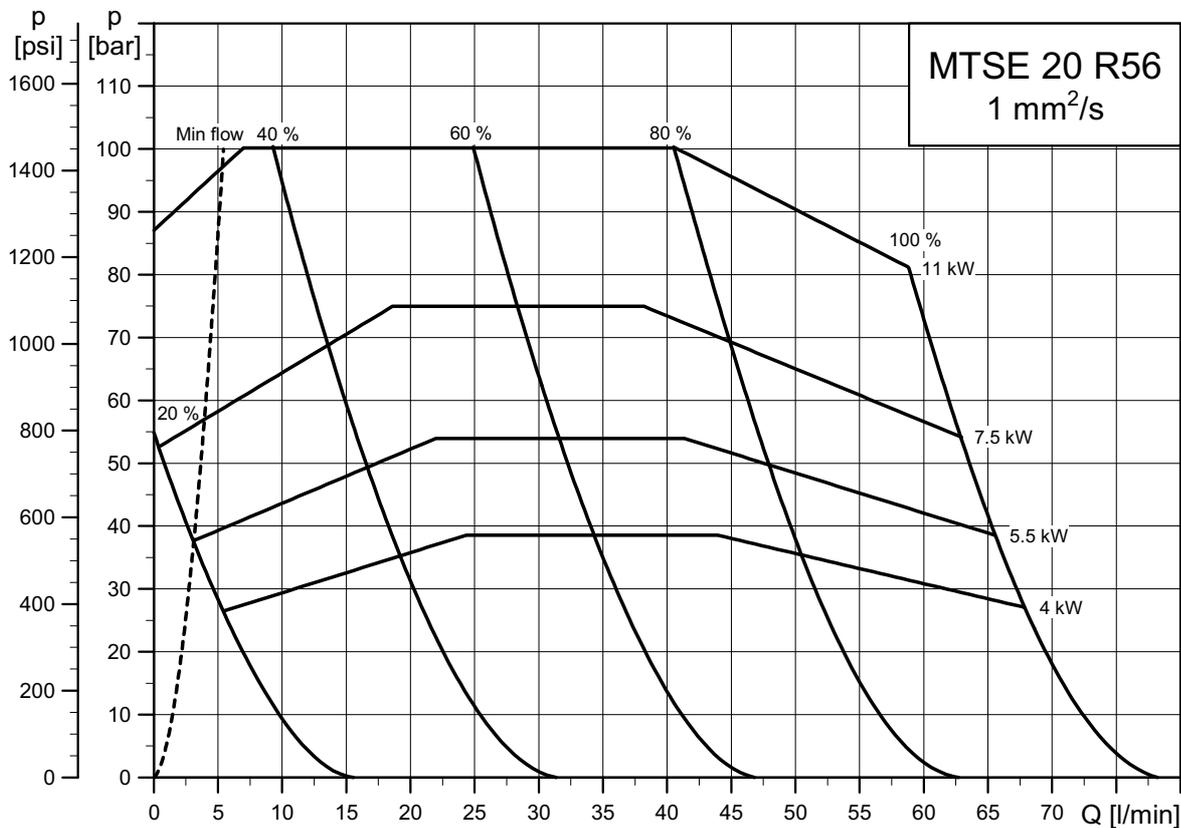
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]										Net weight [kg]	
		A		B		C		AC	AD	AG	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 20-39 R46	3.0	812	830	230	248	582	582	191	201	291	250	41	44
MTSE 20-54 R46	4.0	812	830	230	248	582	582	191	201	291	250	48	51
MTSE 20-75 R46	5.5	867	885	230	248	637	637	191	201	291	300	56	59
MTSE 20-100 R46	7.5	891	909	230	248	661	661	255	237	346	300	66	69

MTSE 20 R56, 50/60 Hz

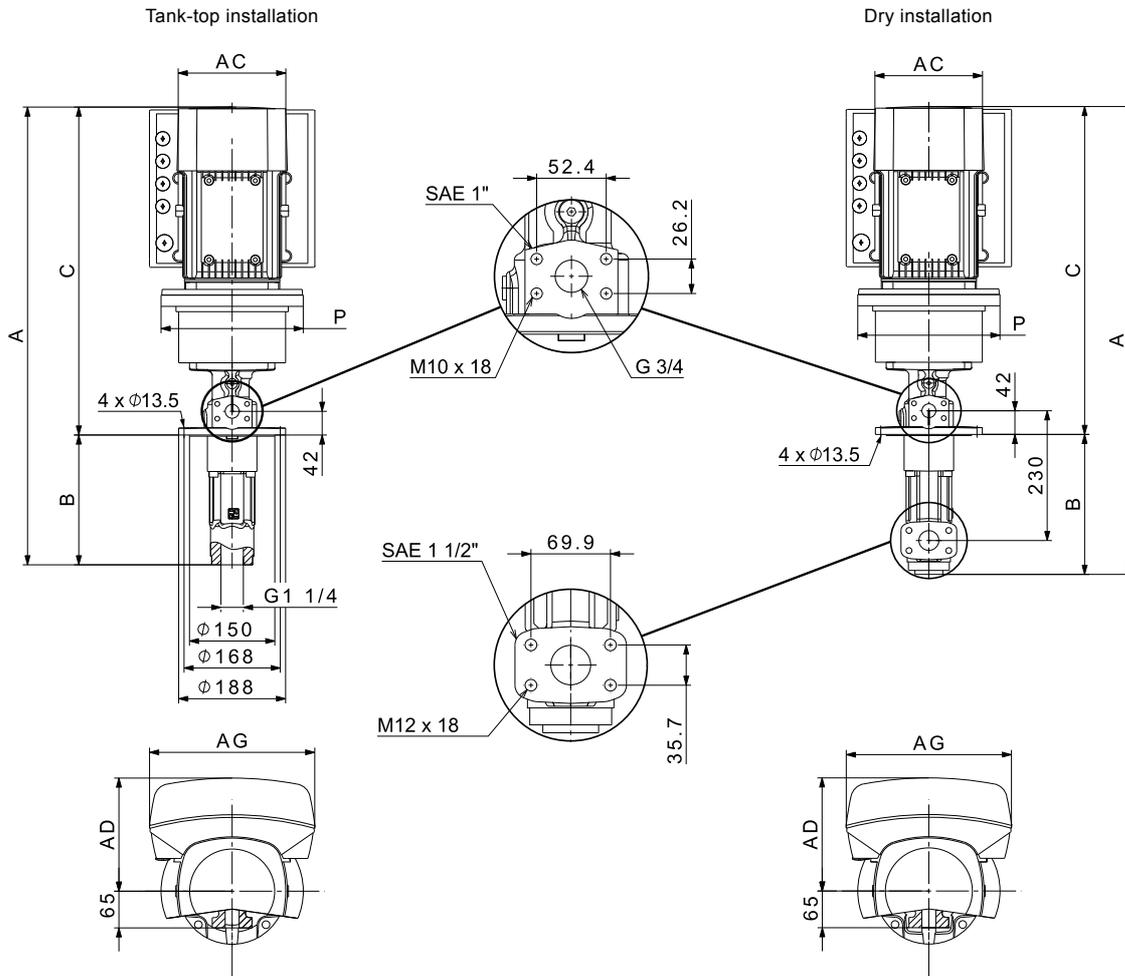
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4883 2719

Dimensional sketches



TM07 4997 2819

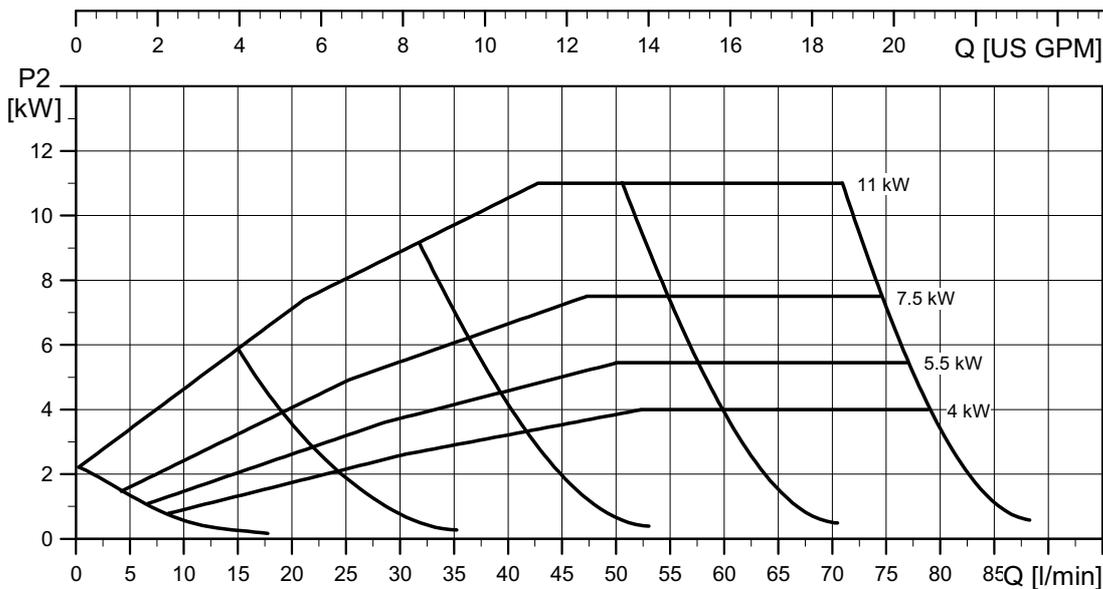
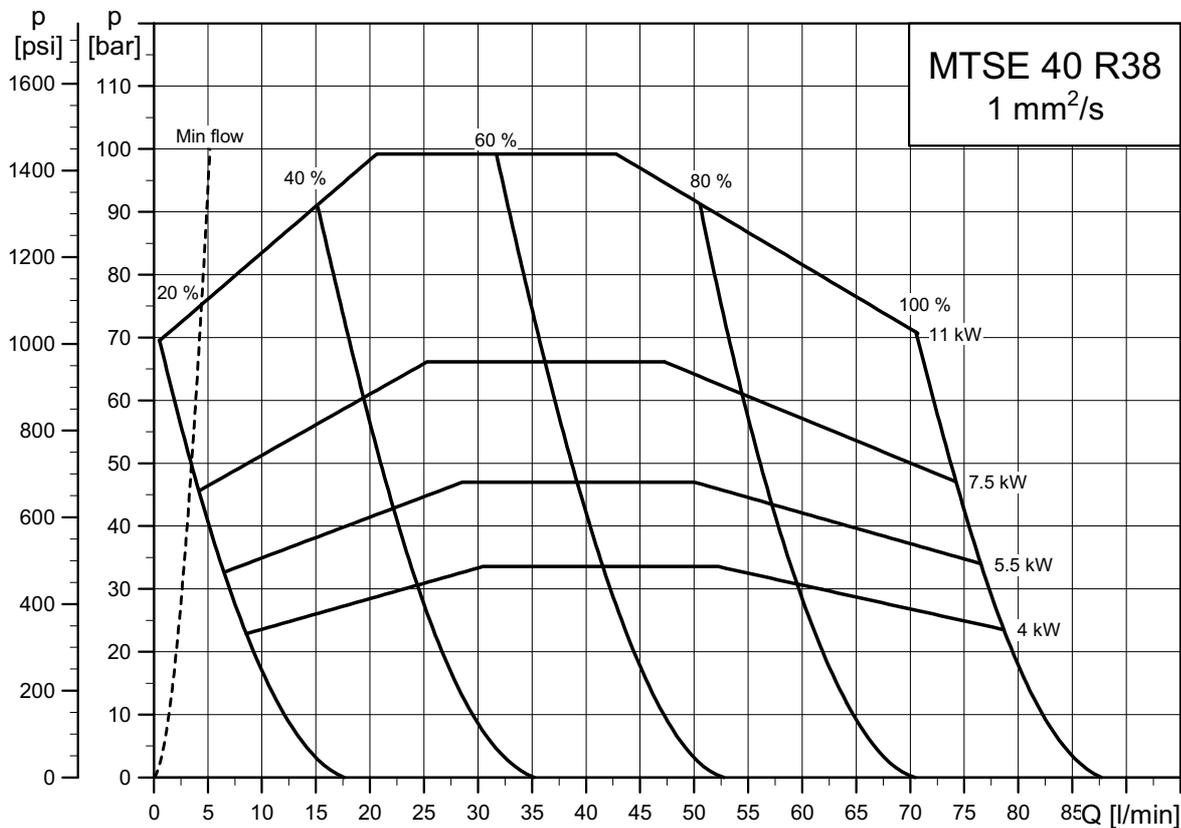
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]								Net weight [kg]			
		A		B		C		AC	AD	AG	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 20-38 R56	4.0	812	830	230	248	582	582	191	201	291	250	48	51
MTSE 20-54 R56	5.5	867	885	230	248	637	637	191	201	291	300	56	59
MTSE 20-75 R56	7.5	891	909	230	248	661	661	255	237	346	300	66	69
MTSE 20-100 R56	11.0	952	970	230	248	722	722	255	237	346	350	83	86

MTSE 40 R38, 50/60 Hz

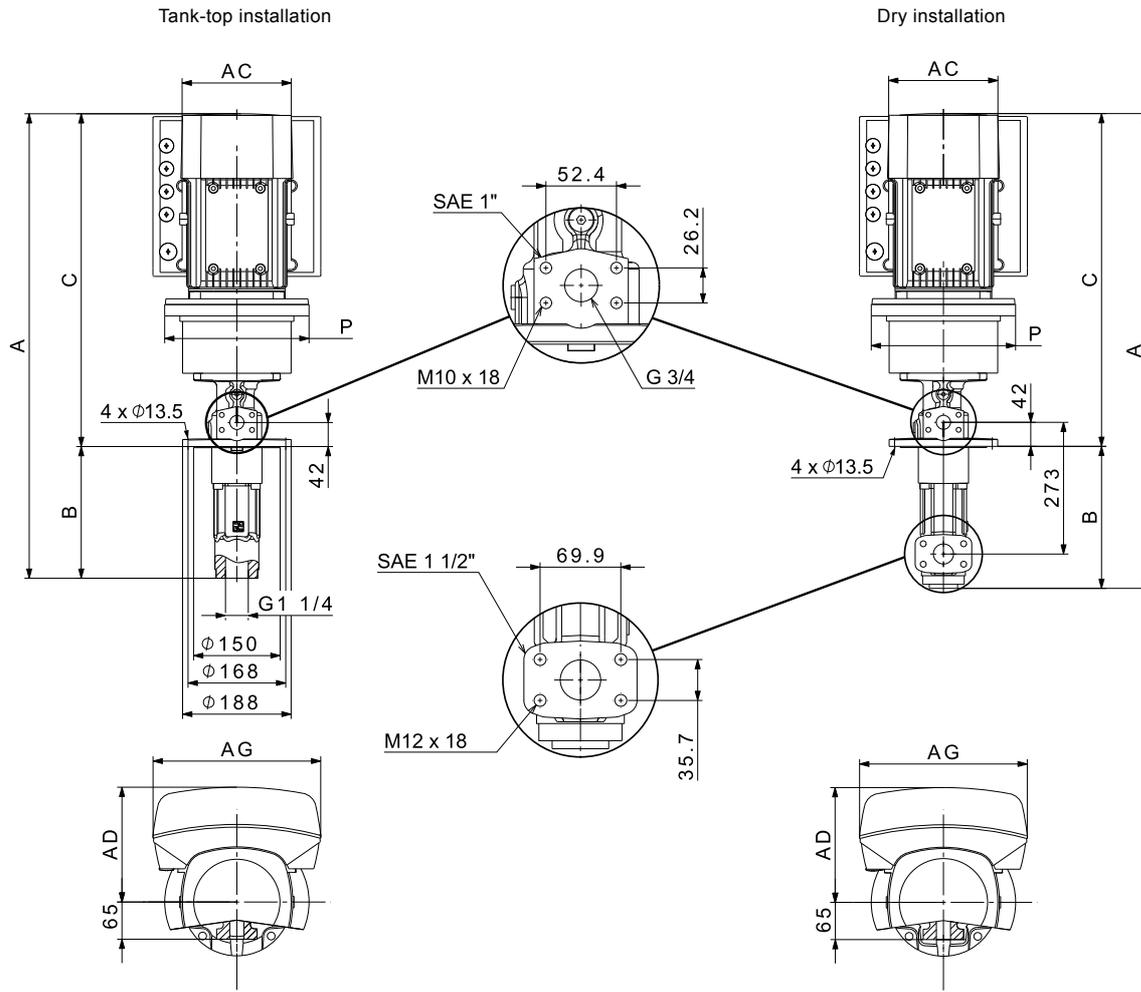
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4883 2719

Dimensional sketches



TM07 4998 2819

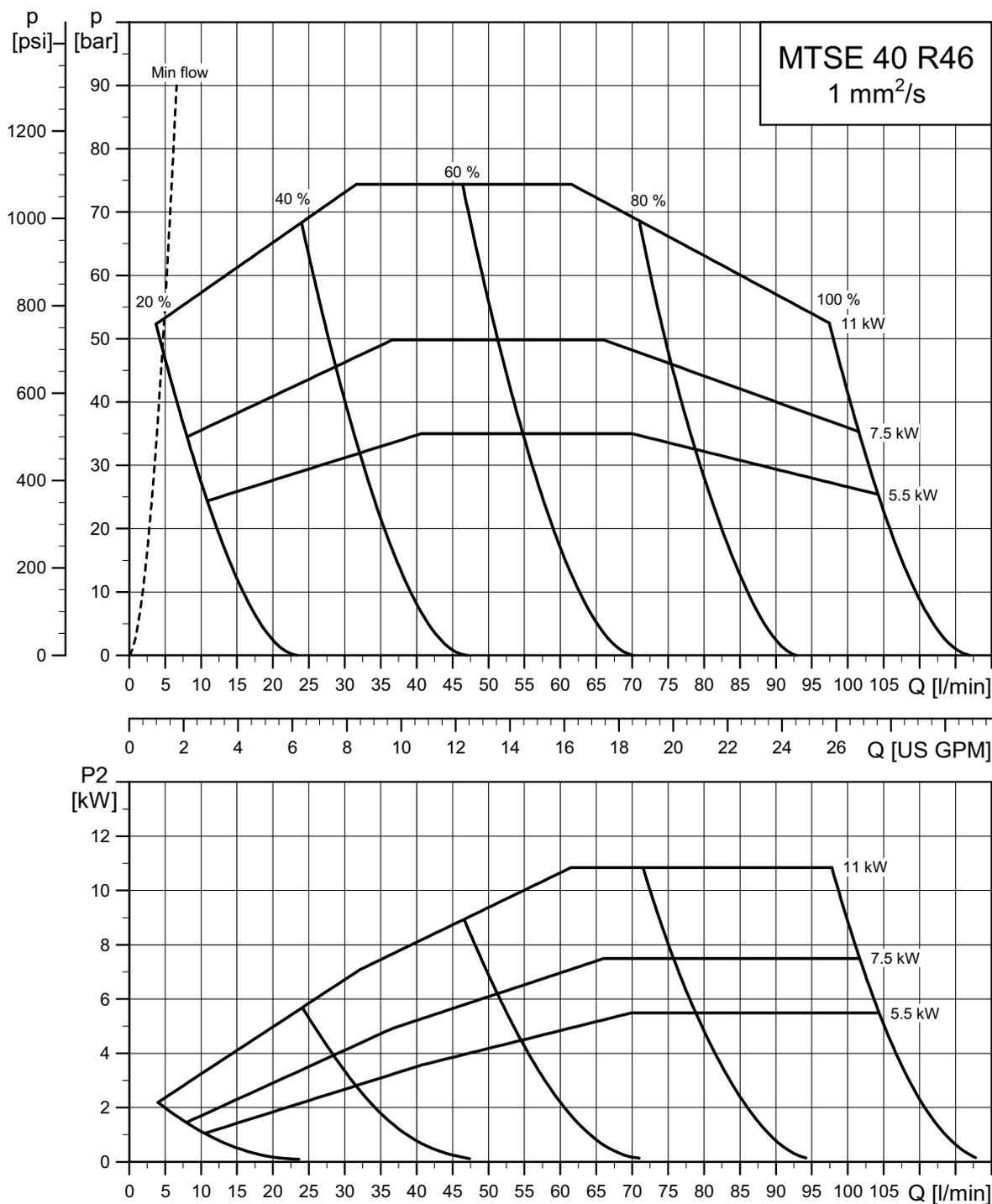
Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]								Net weight [kg]			
		A		B		C		AC	AD	AG	P		
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 40-33 R38	4.0	862	873	280	291	582	582	191	201	291	250	54	57
MTSE 40-47 R38	5.5	917	928	280	291	637	637	191	201	291	300	62	65
MTSE 40-66 R38	7.5	941	952	280	291	661	661	255	237	346	300	72	75
MTSE 40-100 R38	11.0	1002	1013	280	291	722	722	255	237	346	350	89	92

MTSE 40 R46, 50/60 Hz

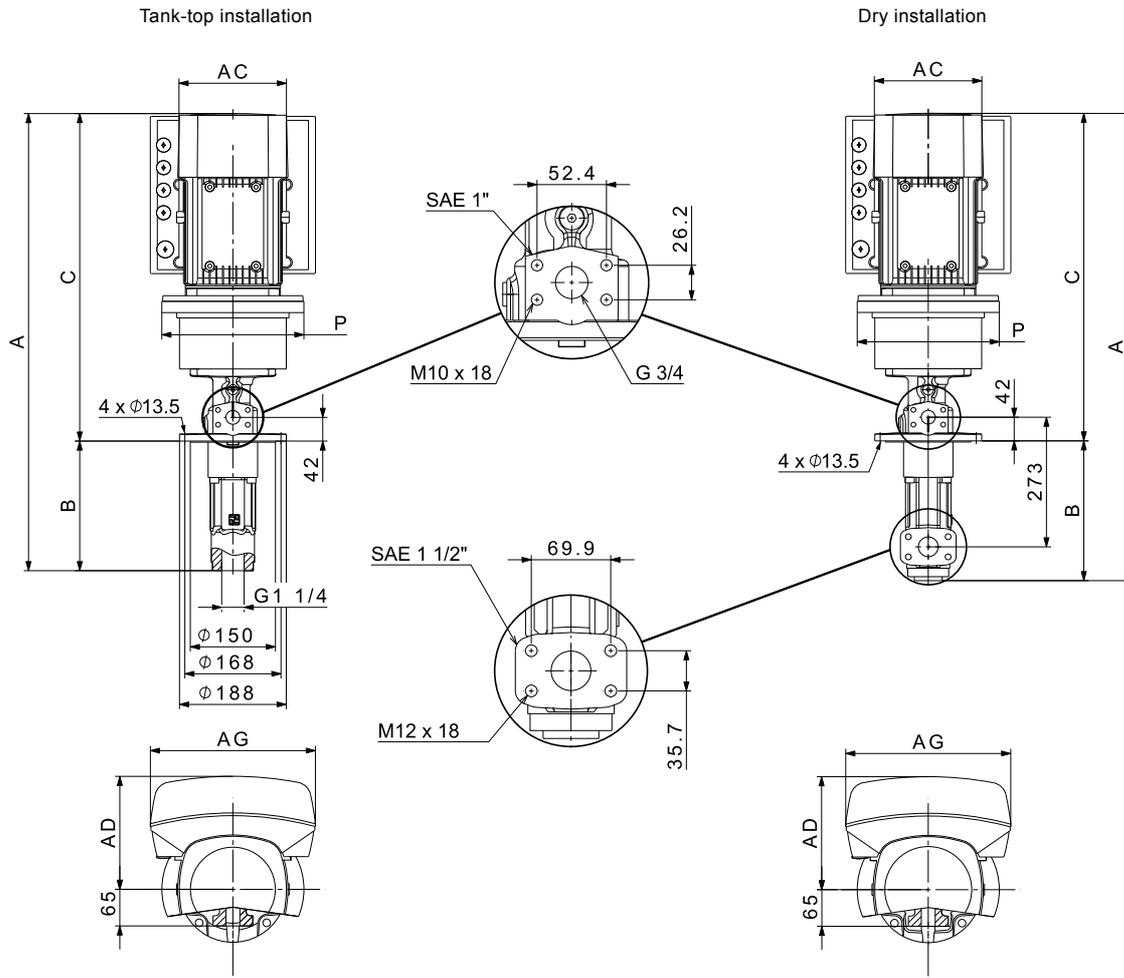
Performance range

Performance data at 1 mm²/s
(emulsion)



TM07 4863 2719

Dimensional sketches



TM07 4898 2819

Dimensions and weights

Pump type	P2 [kW]	Dimensions [mm]								Net weight [kg]			
		A		B		C		AC	AD	AG	P	Tank-top	Dry
		Tank-top	Dry	Tank-top	Dry	Tank-top	Dry						
MTSE 40-35 R46	5.5	917	928	280	291	637	637	191	201	291	300	62	65
MTSE 40-50 R46	7.5	941	952	280	291	661	661	255	237	346	300	72	75
MTSE 40-74 R46	11.0	1002	1013	280	291	722	722	255	237	346	350	89	92

6. NPSH curves for MTS pumps

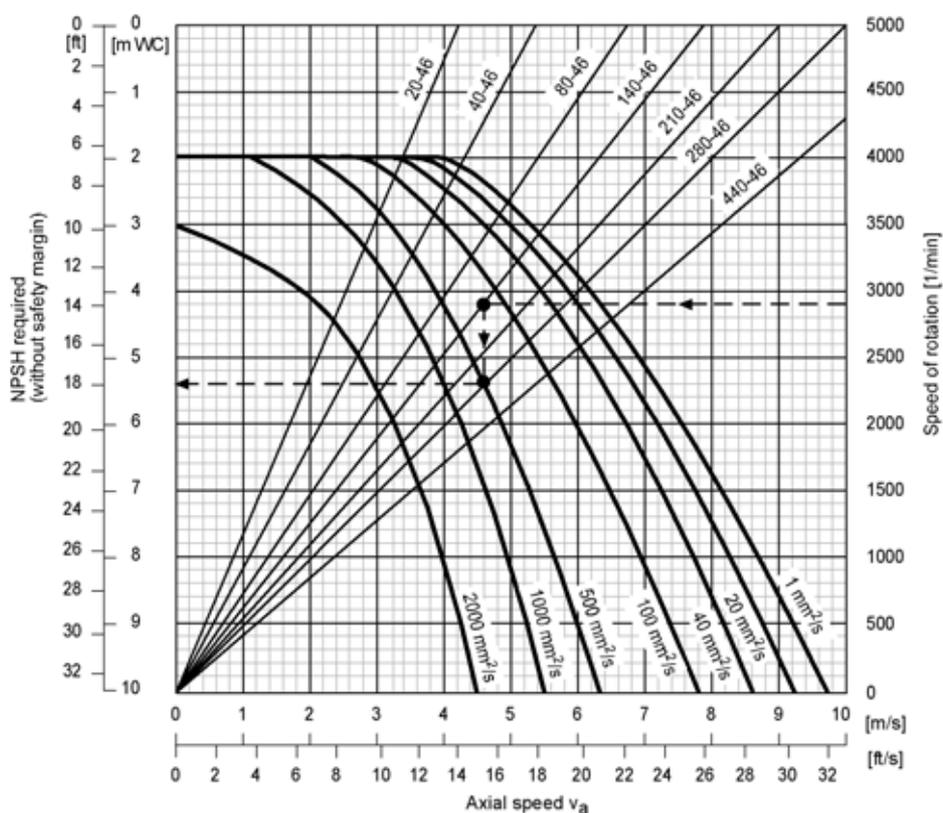
The performance curves refer to liquids without any air enclosed and show the beginning of aeration. For this reason, a safety margin of 0.5 m must be added to the NPSH value taken from the curve. For liquids with air inclusions (undissolved air), an additional value must be added to the NPSH value derived. When dealing with critical conditions in your plant, always consult Grundfos.

Maximum allowable air content

Emulsion: 10 %

Oil: 7 %.

Spindle pitch angle 46 degrees



TM04 4807 2109

Example

Given:

Size 140-46

Speed $n = 2900 \text{ min}^{-1}$

Viscosity $v = 500 \text{ mm}^2/\text{s}$

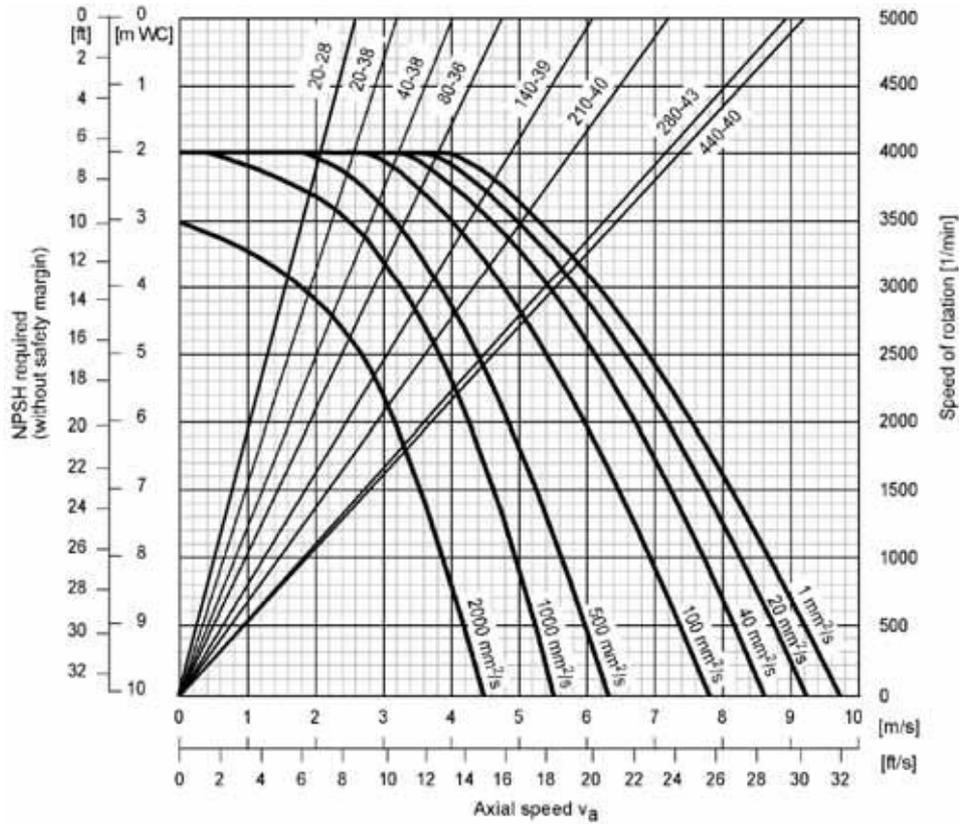
Wanted:

NPSH required.

Solution:

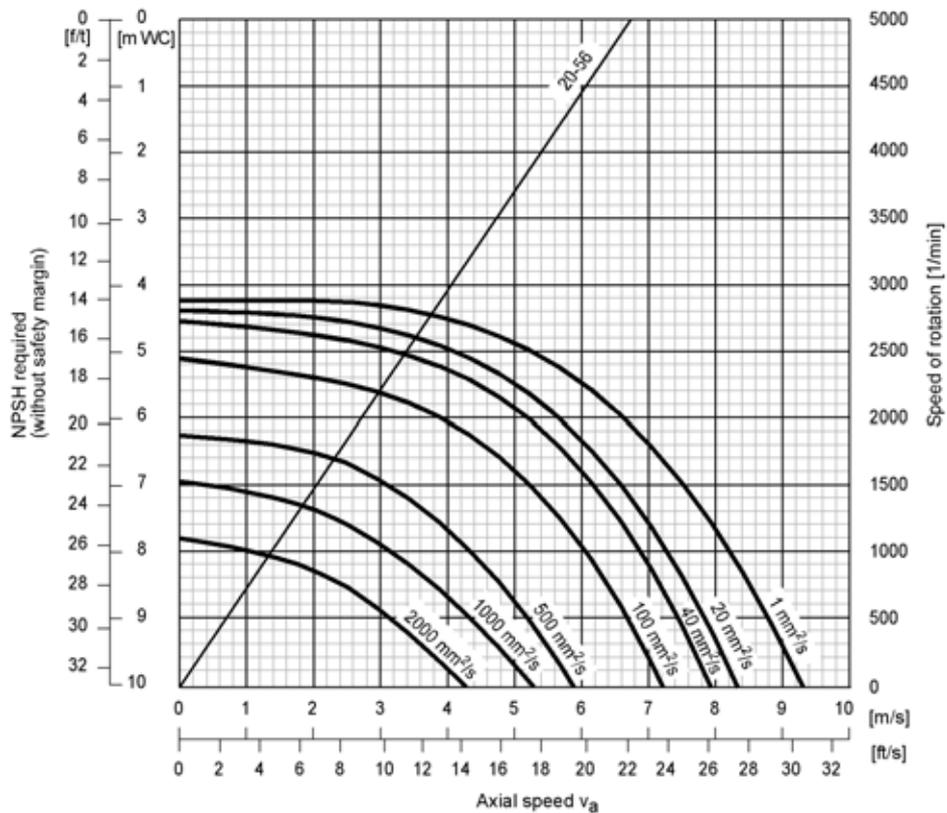
NPSH taken from curve = 5.4 m H + safety margin 0.5 m = 5.9 m H.

Spindle pitch angle smaller than 46 degrees



TM06 3113 4814

Spindle pitch angle 56 degrees



TM04 4809 2109

7. Pumped liquids

List of pumped liquids

The composition, oil content (ability to provide lubrication) and cooling effect of the liquid determine the pump maintenance intervals and maximum permissible performance data.

Cooling lubricants according to DIN 51 385 are divided into three groups according to water and oil content. The pump also pumps cooling lubricants with a very low lubricating effect, but very high cooling performance.

Cooling lubricant main group	Subgroup	Effect at the processing spot
L Solutions	Solutions of inorganic materials in water	Higher cooling effect, lower lubricating effect
	Solutions, dispersions of organic and synthetic materials in water	
E Emulsions	Oil-in-water emulsions (Oil content E 2 to E 20 %)	Cooling-lubricating effect
S Petroleum-based cutting and grinding oils (natural and synthetic)	Cutting oils without additives (pure)	Higher lubricating effect, lower cooling effect
	Cutting oils with polar (physically effective) additives	
	Cutting oils with mild-effect (lubricating film forming) EP additives	Better surface adhesion provides protection against corrosion
	Cutting oils with polar and mild-effect EP additives	
	Cutting oils with active (chemical) EP additives	Higher temperature and pressure resistance
Cutting oils with polar and active EP additives		

Filtration

To reach an acceptable pump life, we recommend that you filtrate the cooling lubricants to following cleanness classes according to ISO 4406/99. The recommended cleanness class depends on pumping pressure and abrasive class 1 to 7.

There are process examples for abrasive classes given in the table below.

The additional specifications to filter mesh and mass proportion are guide values for orientation. The decisive factor is the cleanness of the liquid indicated by the cleanness class.

To avoid damage by coarse particles, we recommend that you use a filter mesh of 65 µm (nominal, two dimensional) or finer.

	Abrasive class						
	1	2	3	4	5	6	7
Material	steel, GG, Al	steel, GG, Al	Al (Si > 5 %)	steel	steel, hard	hard metal	titanium
Process	drilling	turning/milling	turning/milling	grinding	grinding	grinding	grinding
Tool	HSS	hard metal	hard metal	corundum	corundum	CBN	diamond
Pressure stage							
≤ 120 bar	21/19/16	21/19/16	21/19/16	20/18/15	20/18/15	19/17/14	18/16/13
	≤ 30 µm ≤ 30 mg/l	≤ 25 µm ≤ 25 mg/l	≤ 20 µm ≤ 20 mg/l	≤ 17 µm ≤ 15 mg/l	≤ 15 µm ≤ 10 mg/l	≤ 10 µm ≤ 5 mg/l	≤ 6 µm ≤ 3 mg/l
≤ 90 bar	22/20/17	22/20/17	22/20/17	21/19/16	21/19/16	20/18/15	19/17/14
	≤ 50 µm ≤ 60 mg/l	≤ 45 µm ≤ 50 mg/l	≤ 40 µm ≤ 40 mg/l	≤ 30 µm ≤ 30 mg/l	≤ 20 µm ≤ 20 mg/l	≤ 15 µm ≤ 10 mg/l	≤ 10 µm ≤ 5 mg/l
≤ 60 bar	23/21/18	23/21/18	23/21/18	22/20/17	22/20/17	21/19/16	20/18/15
	≤ 80 µm ≤ 120 mg/l	≤ 75 µm ≤ 100 mg/l	≤ 60 µm ≤ 80 mg/l	≤ 50 µm ≤ 60 mg/l	≤ 40 µm ≤ 40 mg/l	≤ 20 µm ≤ 20 mg/l	≤ 15 µm ≤ 10 mg/l
≤ 30 bar	24/22/19	24/22/19	24/22/19	23/21/18	23/21/18	22/20/17	21/19/16
	≤ 150 µm ≤ 250 mg/l	≤ 120 µm ≤ 200 mg/l	≤ 100 µm ≤ 160 mg/l	≤ 80 µm ≤ 120 mg/l	≤ 60 µm ≤ 80 mg/l	≤ 40 µm ≤ 40 mg/l	≤ 20 µm ≤ 20 mg/l

8. Motor data

Mains-operated motors for MTS, 50 Hz

MG motors



TM03 1711 2805

Motor make	P2 [kW]	Frame size	Phase	Standard voltage [V]	I _{1/1} [A]	$\frac{I_{start}}{I_{1/1}}$ [%]	Cos $\phi_{1/1}$	η [%]	Motor efficiency class		
Grundfos MG	1.50	90SD	3	3 x 220-240 Δ / 380-415Y	5.70 / 3.30	700-750	0.84 - 0.78	84.2	IE3		
Grundfos MG	2.20	90LE			8.00 / 4.60	790-860	0.86 - 0.80	85.9			
Grundfos MG	3.00	100LC			11.0 / 6.30	840-1100	0.87 - 0.82	87.1			
Grundfos MG	4.00	112MC			13.6 / 7.90	1000-1470	0.87	88.1			
Grundfos MG	5.50	132SC			19.0 / 11.0	1080-1480	0.87 - 0.82	89.2			
Grundfos MG	7.50	132SB			25.0 - 24.2 / 14.4 - 14.0	780-1050	0.88 - 0.82	90.1 - 90.4			
Grundfos MG	11.0	160MB			36.0 - 34.5 / 20.8 - 19.8	660-890	0.88 - 0.84	91.2			
Grundfos MG	15.0	160MD			48.5 - 45.0 / 28.0 - 26.0	660-890	0.89 - 0.87	91.9			
Grundfos MG	18.5	160LB			59.5 - 56.5 / 34.5 - 32.5	830-1100	0.89 - 0.85	92.4			
Grundfos MG	22.0	180MB			68.5 / 39.5	830-1040	0.90	92.7			
Grundfos MG	1.50	90SD			3	3 x 380-415 Δ	3.30	700-750		0.84 - 0.78	84.2
Grundfos MG	2.20	90LE					4.60	790-860		0.86 - 0.80	85.9
Grundfos MG	3.00	100LC					6.30	840-1100		0.87 - 0.82	87.1
Grundfos MG	4.00	112MC					7.90	1000-1470		0.87	88.1
Grundfos MG	5.50	132SC					11.0	1080-1480		0.87 - 0.82	89.2
Grundfos MG	7.50	132SB	14.4 - 14.0 / 8.30 - 8.10	780-1050			0.88 - 0.86	90.4			
Grundfos MG	11.0	160MB	20.8 - 19.8 / 12.0 - 11.8	660-890			0.88 - 0.84	91.2			
Grundfos MG	15.0	160MD	28.0 - 26.0 / 16.2 - 15.6	660-890			0.89 - 0.87	91.9			
Grundfos MG	18.5	160LB	34.5 - 32.5 / 20.0 - 18.8	830-1100			0.89 - 0.85	92.4			
Grundfos MG	22.0	180MB	39.5 / 22.8	830-1040	0.90	92.7					

Mains-operated motors for MTS, 60 Hz

MG motors



TM03 1711 2805

Motor make	P2 [kW]	Frame size	Phase	Standard voltage [V]	$I_{1/1}$ [A]	$\frac{I_{start}}{I_{1/1}}$ [%]	$\cos \phi_{1/1}$	η [%]	Motor efficiency class	
Grundfos MG	1.50	90SD	3	3 x 230-277 Δ / 400-480Y	5.30 - 5.00 / 3.5 - 2.90	730-900	0.85 - 0.75	85.5	IE3	
Grundfos MG	2.20	90LE		3 x 230-277 Δ / 400-480Y	7.50 - 6.95 / 4.30 - 4.00	750-950	0.88 - 0.80	86.5	IE3	
Grundfos MG	3.00	100LC			10.8 - 9.35 / 6.20 - 5.40	840-1100	0.91 - 0.84	87.1	IE2 - IE3	
Grundfos MG	4.00	112MC			13.6 - 11.8 / 7.80 - 6.80	1000-1470	0.91 - 0.82	88.1	IE3	
Grundfos MG	5.50	132SC			18.4 - 16.2 / 10.6 - 9.30	1080-1480	0.90 - 0.80	89.2	IE3	
Grundfos MG	7.50	132SB			24.6 - 20.8 / 14.2 - 12.0	780-1050	0.90 - 0.82	90.4	IE2 - IE3	
Grundfos MG	11.0	160MB			36.0 - 30.0 / 20.8 - 17.2	660-890	0.89 - 0.83	91.2	IE2 - IE3	
Grundfos MG	15.0	160MD			48.5 - 39.0 / 28.0 - 22.4	660-890	0.90 - 0.86	91.9	IE2 - IE3	
Grundfos MG	18.5	160LB			59.5 - 48.5 / 34.5 - 28.0	830-1100	0.89 - 0.84	92.4	IE2 - IE3	
Grundfos MG	22.0	180MB			69.5 - 56.5 / 40.0 - 32.5	830-1040	0.91	92.7	IE3	
Grundfos MG	1.50	90SD			3 x 400-480Y	3.05 - 2.90	730-900	0.85 - 0.75	85.5	IE3
Grundfos MG	2.20	90LE			3 x 400-480Y	4.30 - 4.00	750-950	0.88 - 0.80	86.5	IE3
Grundfos MG	3.00	100LC				6.20 - 5.40	840-1100	0.91 - 0.84	87.1	IE2 - IE3
Grundfos MG	4.00	112MC				7.80 - 6.80	1000-1470	0.91 - 0.82	88.1	IE3
Grundfos MG	5.50	132SC				10.6 - 9.30	1080-1480	0.90 - 0.80	89.2	IE3
Grundfos MG	7.50	132SB			3 x 380-480 Δ / 660-690Y	14.2 - 12.0 / 8.20 - 8.10	780-1050	0.90 - 0.82	90.1 - 90.4	IE2 - IE3
Grundfos MG	11.0	160MB				20.8 - 17.2 / 12.0 - 11.6	660-890	0.89 - 0.83	91.2	IE2 - IE3
Grundfos MG	15.0	160MD				28.0 - 22.4 / 16.2 - 15.6	660-890	0.90 - 0.86	91.9	IE2 - IE3
Grundfos MG	18.5	160LB				34.5 - 28.0 / 20.0 - 16.6	830-1100	0.89 - 0.84	92.4	IE2 - IE3
Grundfos MG	22.0	180MB				40.0 - 32.5 / 23.0 - 22.2	830-1040	0.91	92.7	IE3

Mains-operated motors for MTSE, 50/60 Hz

MGE motors



TM03 1712 2805

Motor make	P2 [kW]	Frame size	Phase	Standard voltage [V]	I _{1/1} [A]	Cos φ _{1/1}	η [%]	Motor efficiency class
Grundfos MGE	1.5	90	3	380-500	2.9 - 2.4	0.92 - 0.85	88.9	IE5
Grundfos MGE	2.2	90		380-500	4.15 - 3.4	0.93 - 0.87	90.1	
Grundfos MGE	3	100		380-500	5.8 - 4.8	0.91 - 0.86	90.7	
Grundfos MGE	4	112		380-500	7.6 - 6.2	0.92 - 0.87	92.2	
Grundfos MGE	5.5	132		380-500	10.3 - 8.2	0.92 - 0.88	92.7	
Grundfos MGE	7.5	132		380-500	14.1 - 11.2	0.93 - 0.89	92.5	
Grundfos MGE	11	160		380-500	20.3 - 16.0	0.93 - 0.90	93.1	

9. System solutions

MTS pump system

Assembled MTS pump system with MTS screw pump, mounting plate, pressure relief valve and piping.



TM05 4422 2312

Features and benefits

Fully integrated all-in-one system

All components, including valves, are preassembled to customer specifications.

Pump design

The pumps are screw pumps designed for pumping cooling lubricants and cutting oils for machine tool applications.

Long lifetime

Highly wear-resistant, PVD coated spindles and special, hardened rotor housing extend the lifetime.

High-efficiency motor

IE3 motors are standard, and MTSE with IE5 motors are optional.

Economical pump operation

- Pump efficiency above 80 %
- low heat transfer into the coolant system
- low cooling requirements.

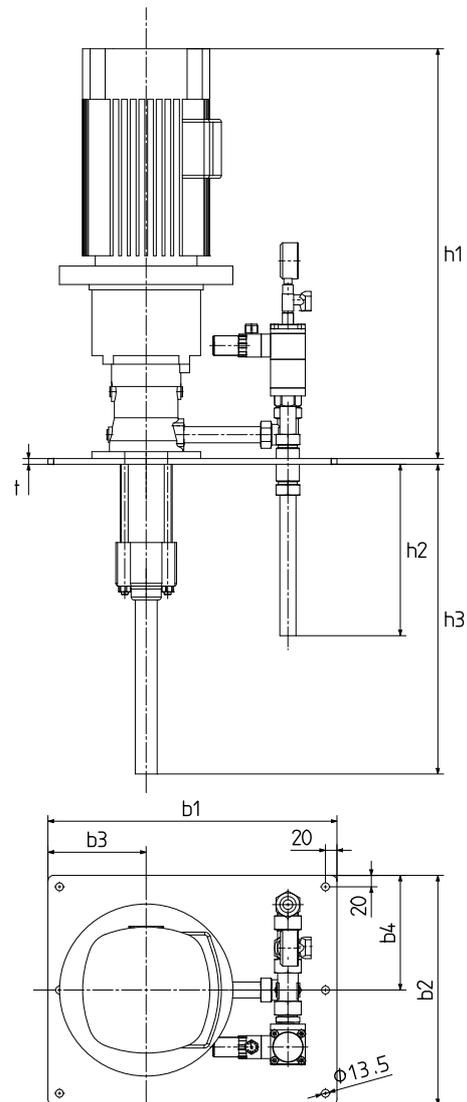
Noiseless

The design of MTS allows gentle, pulsation-free and low-noise pumping.

Wide pump range

- Seven pump sizes
- 16 versions.

Dimensional sketches



TM05 4423 2212

Dimensions

Pump type	Dimensions [mm]						
	t	h1	h2	h3	b1	b2	b3
MTS 20	10	*	250	**	500	400	170
MTS 40	10		290		500	400	170

* See *Technical data* on page 18.

** On request

Pressure relief valves

Screw spindle pumps are positive-displacement pumps which must be pressure controlled in order to protect the motor and pipe system. The pumped liquid which is not needed is returned to the tank via the pressure relief valve. Selection of valves depends on the following factors:

- required pressure, flow rate and viscosity of the pumped liquid
- required valve adjustability/control.

The pressure relief valves below are especially designed for use in coolant applications.

Type	Description	Product number		
H	<p>Manually operated, continuously adjustable pressure relief valve.</p> <ul style="list-style-type: none"> • The valve working pressure can be adjusted by means of a hand wheel. 	98784405		TM05 4391 2212
P	<p>Manually operated, continuously adjustable pressure relief valve with air pilot valve and solenoid valve for pressureless circulation.</p> <ul style="list-style-type: none"> • The valve working pressure can be adjusted by means of a hand wheel. • Circulation with minimised pressure can be electrically activated. The valve is open at zero current and pressure. 	98784432		TM05 4390 2212
E	<p>Electrically controlled, continuously adjustable pressure relief valve with proportional solenoid air pilot valve.</p> <ul style="list-style-type: none"> • The vario valve type enables the setting of any pressure from 5 to 120 bar. For pressure regulation, the machine control sends an analogue signal (0-10 V). The pneumatic control pressure is changed in proportion to the analogue signal and regulates the working pressure. • The valve is open in case of power loss or loss of pressure. 	98784436		TM05 4392 2212
-	<p>Manually operated, safety valve.</p> <ul style="list-style-type: none"> • The valve working pressure can be adjusted by means of a hexagon key. 	98659731		

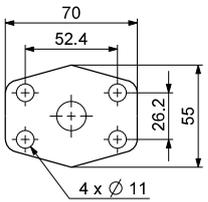
Customisation

The pump system can be customised to fit your special needs. Please contact Grundfos.

10. Accessories

Counter flanges for outlet port

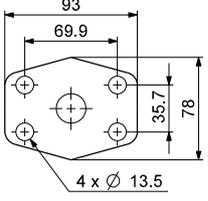
A set consists of one counter flange, one O-ring, bolts and lock washers.

SAE flange	Pump type	SAE size	Description	Rated pressure	Pipe connection	Product number
	MTS 20	1"	Threaded For welding	345 bar	G1 25 mm, nominal	96397165
	MTS 40			160 bar		96397171

TM04 1963 1508

Counter flanges for inlet port (only D8.6)

A set consists of one counter flange, one O-ring, bolts and lock washers.

SAE flange	Pump type	SAE size	Description	Rated pressure	Pipe connection	Product number
	MTS 20	1 1/2"	Threaded For welding	207 bar	G1 1/2 38 mm, nominal	96397166
	MTS 40			160 bar		96397176

TM04 1964 1508

CIM communication interface modules



GrA 6121

Fig. 29 Grundfos CIM communication interface module

The CIM modules enable communication of operating data, such as measured values and setpoints, between CRE, CRIE or CRNE pumps of 11-22 kW and a building management system. The CIM modules are add-on communication modules which are fitted in the terminal box of CRE, CRIE, CRNE pumps of 11-22 kW.

Note: CIM modules must be fitted by authorised persons

We offer the following CIM modules:

CIM 100

For communication via LONWorks.

CIM 150

For communication via PROFIBUS DP.

CIM 200

For communication via Modbus RTU.

CIM 260

3G/4G cellular data connection to SCADA systems or for monitoring and control via SMS.

CIM 280

For connection to Grundfos iSOLUTIONS CLOUD/ GRM.

CIM 300

For communication via BACnet MS/TP.

Description	Fieldbus protocol	Product number
CIM 100	LONWorks	96824797
CIM 150	PROFIBUS DP	96824793
CIM 200	Modbus RTU	96824796
CIM 300	BACnet MS/TP	Contact Grundfos

CIM 500

Ethernet module for communication via PROFINET, Modbus TCP, BACnet IP, EtherNet/IP GRM IP, and Grundfos iSOLUTIONS CLOUD.

Description	Product number
CIM 260-EU 3G/4G cellular	99439302
CIM 280-EU GiC/GRM 3G/4G	99439724
CIM 500 ethernet	98301408
CIM 260-US 3G/4G cellular	99439306
CIM 280-US GiC/GRM 3G/4G	99439725

Antennas for CIM 260 and 270

Description	Product number
Antenna (puck) 3G/4G	99518079

For further information about data communication via CIM modules and fieldbus protocols, see the CIM documentation available in Grundfos Product Center at www.grundfos.com.

11. Grundfos Product Center

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

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



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

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

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

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

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

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

All the information you need in one place

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

Downloads

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

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