SQ, SQE, CU 331, and SP

Submersible pumps, motors, and accessories
60 Hz

be
think
innovate

GRUNDFOS

Table of contents

1. SQ, SQE introduction

3-inch SQ, SQE submersible well pumps for 3-inch and larger wells

SQ, SQE pumps are suitable for both continuous and intermittent operation for a variety of applications:

- Domestic water supply
- light commercial
- irrigation
- tank applications.

SQ, SQE features and benefits

SQ, SQE pumps offer these features:

- Dry-run protection
- high efficiency pump and motor
- protection against up-thrust
- soft-start
- over-voltage and under-voltage protection
- over-temperature protection
- high starting torque.

Additionally, SQE pumps offer these advantages:

- Constant pressure control
- variable speed
- electronic control and communication.

SQ, SQE innovative motor technology

SQ, SQE pumps feature an innovative motor design incorporating permanent-magnet technology. By combining permanent-magnet motors and a Grundfos micro-frequency converter, we are able to deliver unmatched performance and the ability to control and communicate with the pump in ways never before possible. A few of the features that result from this combined technology are Constant Pressure Control, Soft-Start, and Integrated Dry-Run Protection, but these are just a few of the features these pumps offer.

SQ pump models operate at a constant speed much like today's conventional pumps. The difference is that SQ delivers the benefits of an electronically controlled permanent-magnet motor that cannot be achieved with a conventional induction motor.

SQ pumps are available for single-phase power; a simple 2-wire design makes installation easy.

SQE pumps are equipped with a Grundfos "Smart Motor." Like the SQ models, SQ pumps have a high efficiency permanent-magnet motor - but we add the ability to communicate.

The "Smart Motor" communicates via the CU301 status box through the power leads.

It is not necessary to run any additional wires down the well. Communication with the pump provides Constant Pressure Control and the highly useful ability to change the pump performance while the pump is installed in the well. Like the SQ motor, this is also a 2-wire motor designed for single-phase operation.

Dry-running protection

The pumps are protected against dry running. A value of $P_{cut\text{-}out}$ ensures cut-out of the pump in case of lack of water in the borehole thus preventing a burnout of the motor.

$P_{cut\text{-}out}$ is factory-set both for the SQ and SQE pumps.

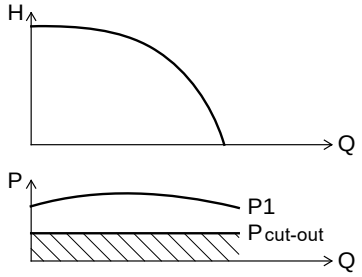

Fig. 1 $P_{cut\text{-}out}$ curve

High pump efficiency

The hydraulic pump components are polyamide reinforced with 30 % glass fiber. The hydraulic design provides for high pump efficiency resulting in low energy consumption and therefore low energy costs.

High motor efficiency

The motors are based on a permanent magnet rotor (PM motor) featuring high efficiency within a wide load range.

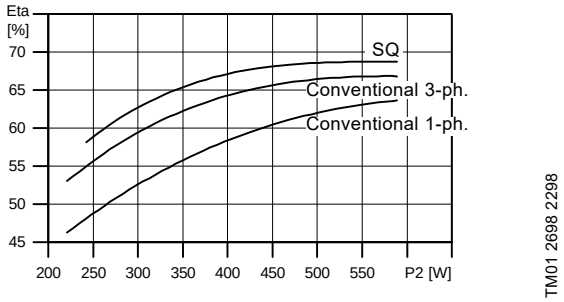

Fig. 2 Efficiency curves of Grundfos SQ motor versus conventional motors

Wear resistance

The pump design features "floating" impellers (not fastened to the shaft). Each impeller has its own tungsten carbide/ceramic bearing. The construction and materials ensure high wear resistance to sand for long product life.

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Fig. 3 Example of Grundfos floating impeller

Protection against upthrust

Starting up a pump with a very low counter pressure involves the risk of the entire impeller stack being lifted, also called upthrust. Upthrust may cause breakdown of both pump and motor.

SQ, SQE motors are fitted with a top bearing protecting both pump and motor against upthrust, thus preventing breakdown during the critical start-up phase.

Excellent starting capabilities

The integrated electronic unit of the motor features soft starting. Soft start reduces the starting current and thus gives the pump a smooth and steady acceleration.

The soft starter minimizes the risk of wear on the pump and prevents overloading of the mains during start-up.

The excellent starting capabilities are a result of the high locked-rotor torque of the permanent magnet motor together with the few pump stages. The high starting reliability also applies in case of low voltage supply.

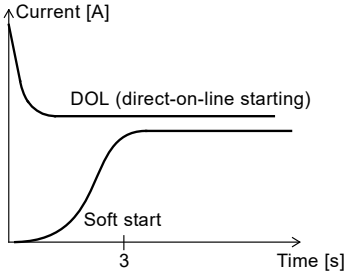

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Fig. 4 Soft-start feature

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable voltage supply.

The integrated protection of all motors prevents damage to the motor in case the voltage moves outside the permissible voltage range.

The pump will cut out if the voltage falls below 150 V or rises above 315 V. The motor is automatically cut in again when the voltage again falls within the permissible voltage range. Therefore no extra protection relay is needed.

Overload protection

Exposure of the pump to heavy load causes the current consumption to rise. The motor will automatically compensate for this by reducing the speed to 3000 rpm. Further overload will lead to stop.

If the rotor is being prevented from rotating, this will automatically be detected and the power supply will be cut out. Consequently, no extra motor protection is needed.

Overtemperature protection

A permanent magnet motor gives off very little heat to its surroundings. In combination with an efficient internal circulation system leading the heat away from the rotor, stator and bearings, this ensures optimum operating conditions for the motor.

As an extra protection, the electronic unit has a built-in temperature sensor. When the temperature rises too high, the motor is cut out; when the temperature has dropped, the motor is automatically cut in again.

Reliability

The motors are built for high reliability and feature:

- Tungsten carbide / ceramic bearings
- thrust bearings protecting against downthrust
- product life time equal to conventional AC motors.

Variable speed

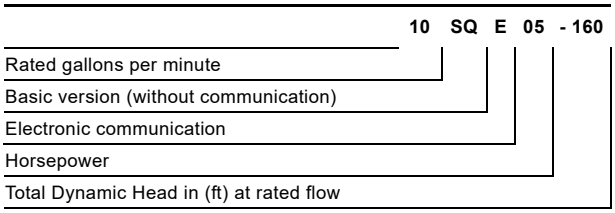
The SQE motor enables continuously variable speed control from 3,000 to 10,700 rpm. The pump can be set to operate in any duty point in the range between the 3,000 and 10,700 rpm performance curves of the pump. Consequently, the pump performance can be adapted to any specific requirement.

The variable speed control facility requires the use of the CU 300 or CU 301 control unit.

For the calculation of pump speed, the program "SQE Speed Calculation" is available on CD-ROM as an accessory.

SQ, SQE identification

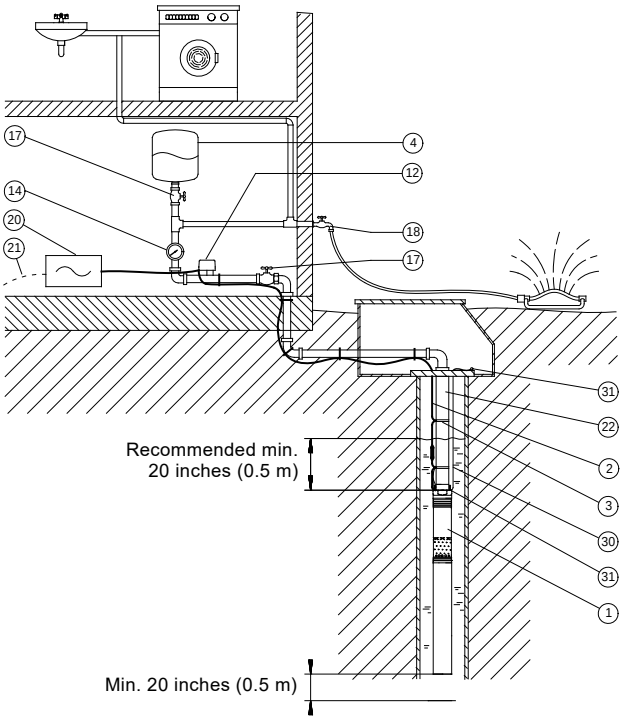
Type key example SQ, SQE



2. SQ, SQE applications

SQ with pressure switch and pressure tank

SQ is ideally suited for domestic water supply in single-family dwellings or summer homes which are not connected to municipal waterworks. SQ is easy to install and operate.



1 Pump, SQ
2 Cable
3 Cable clips
4 Pressure tank
12 Pressure switch
14 Pressure gauge
17 Isolating valve
18 Tap
20 Mains switch
21 Mains connection
22 Riser pipe
30 Safety cable
31 Wire clamp

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Fig. 5 Application example: SQ with pressure switch and pressure tank

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQ				
2	Cable					
3	Cable clips					
4	Pressure tank					
12	Pressure switch					
14	Pressure gauge					
20	Mains switch					
30	Safety cable					
31	Wire clamp					

Constant-pressure control with CU 301, residential water supply

The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

The pressure is registered by the pressure sensor and transmitted to the CU 301. The CU 301 adjusts the pump performance accordingly.

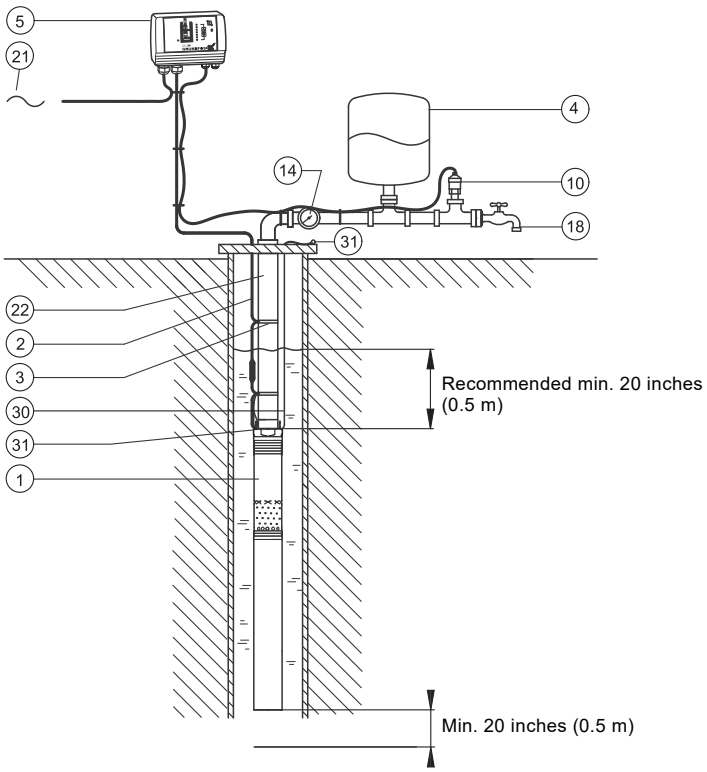
Function

When a tap is opened the pressure in the tank will start to drop. At a flow lower than approximately 1 gpm (0.18 m^3/h), the pressure will drop slowly.

When the pressure in the tank is 7 psi (0.5 bar) below setpoint, the pump will start. The pump will run until the pressure is 7 psi (0.5 bar) above setpoint. This way of operation is called on/off operation.

At a flow higher than approximately 1 gpm (0.18 m^3/h), the pressure will drop quickly and the pump will start immediately and maintain a constant pressure.

During operation, the CU 301 will regulate the pump speed to maintain a constant pressure. If there is no consumption, the pump will boost the pressure to 7 psi (0.5 bar) above setpoint and stop after a few seconds.



1 Pump, SQE
2 Cable
3 Cable clips
4 Pressure tank, 2 gal (8 liters)
5 Control unit, CU 301
10 Pressure sensor, 0-120 psi (0-6 bar)
14 Pressure gauge
18 Tap
21 Mains connection
22 Riser pipe
30 Safety cable
31 Wire clamp

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Fig. 6 Application example: Constant-pressure control with CU 301 - residential water supply

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
4	Pressure tank	2 gal (8 liters)				
5	Control unit	CU 301				
10	Pressure sensor	0-120 psi (0-6 bar)				
14	Pressure gauge					
30	Safety cable					
31	Wire clamp					

Constant-pressure control with CU 301, irrigation

The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

The pressure is registered by means of the pressure sensor and transmitted to the CU 301. The CU 301 adjusts the pump performance accordingly.

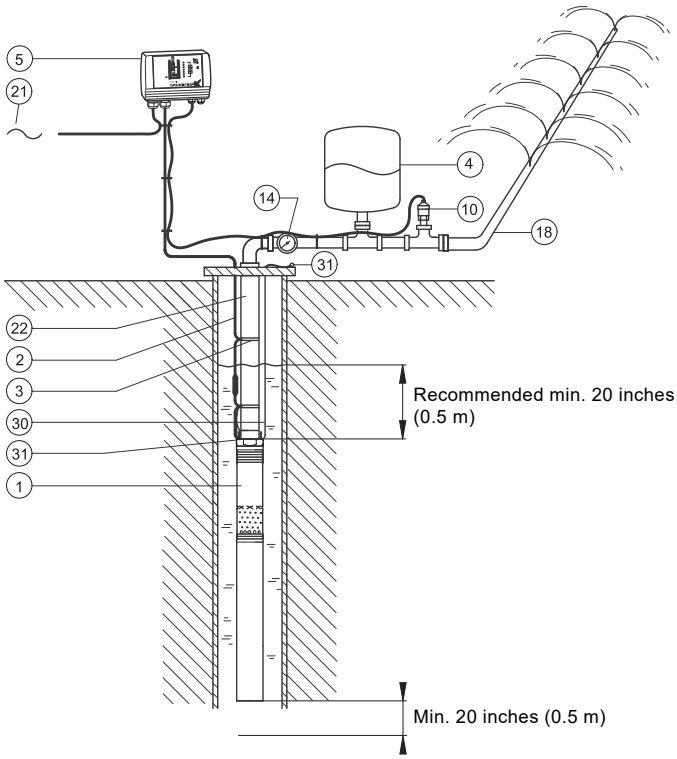
Function

When the sprinkler system is started, the pressure in the tank will start to drop.

At a flow lower than approximately 1 gpm (0.18 m^3/h), the pressure will drop slowly. When the pressure in the tank is 7 psi (0.5 bar) below setpoint, the pump will start. The pump will run until the pressure is 7 psi (0.5 bar) above setpoint. This way of operation is called on/off operation.

At a flow higher than approximately 1 gpm (0.18 m^3/h), the pressure will drop quickly and the pump will start immediately and maintain a constant pressure.

During operation, the CU 301 will regulate the pump speed to maintain a constant pressure. If there is no consumption, the pump will boost the pressure to 7 psi (0.5 bar) above setpoint and stop after a few seconds.



1 Pump, SQE
2 Cable
3 Cable clips
4 Pressure tank 2 gal (8 liter)
5 Control unit, CU 301
10 Pressure sensor, 0 - 120 psi (0-6 bar)
14 Pressure gauge
18 Sprinkler system
21 Mains connection
22 Riser pipe
30 Safety cable
31 Wire clamp

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Fig. 7 Application example: Constant-pressure control with CU 301 - irrigation

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
4	Pressure tank	2 gal (8 liter)				
5	Control unit	CU 301				
10	Pressure sensor	0-120 psi (0-6 bar)				
14	Pressure gauge					
30	Safety cable					
31	Wire clamp					

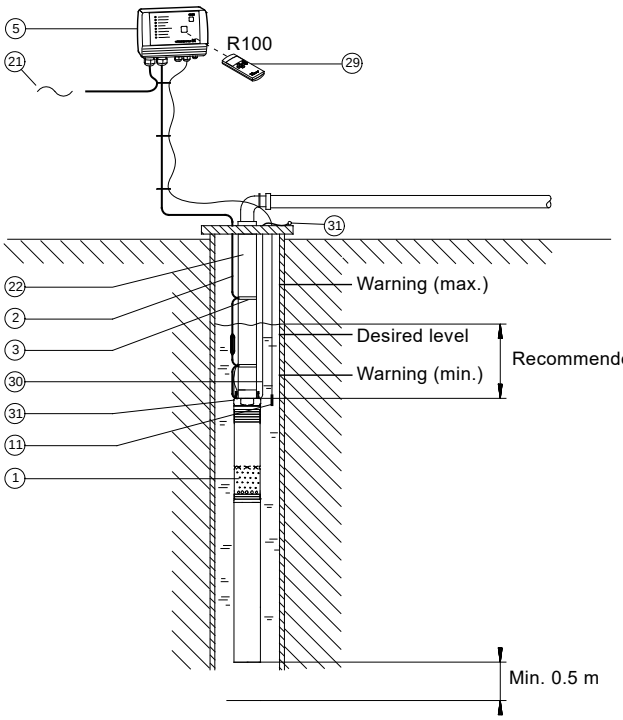
Maintaining a constant water table

A constant water table can be maintained by adjusting pump performance. It may be important to maintain a constant water table, e.g. in connection with keeping out the groundwater on a building site or water remediation projects.

The example shows how to maintain a constant water table by adjusting pump performance.

Sensors

Level	Description	Reaction
Level sensor (pos. 11)		
Warning (max.)	Too high water level. Possible cause: Insufficient pump capacity.	Alarm relay operates.
Desired level	The water level which should be maintained.	
Warning (min.)	Too low water level. Possible cause: Too high pump capacity.	Alarm relay operates.



1 Pump, SQE
2 Cable
3 Cable clips
5 Control unit, CU 300
11 Level sensor
21 Mains connection
22 Riser pipe
29 Remote control, R100
30 Safety cable
31 Wire clamp

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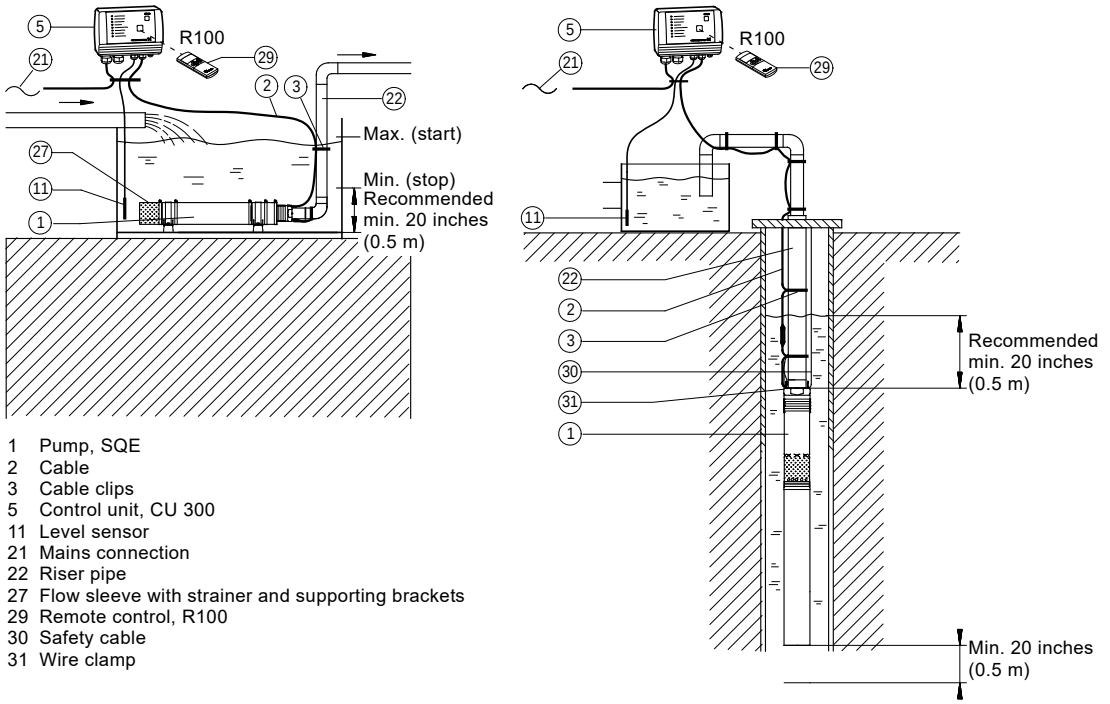
Fig. 8 Application example: Maintaining a constant water table

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
5	Control unit	CU 300				
11	Level sensor					
29	Remote control	R100				
30	Safety cable					
31	Wire clamp					

Emptying or filling a tank

The SQE pump with CU 300 is ideal for emptying or filling a tank.



1 Pump, SQE
2 Cable
3 Cable clips
5 Control unit, CU 300
11 Level sensor
21 Mains connection
22 Riser pipe
27 Flow sleeve with strainer and supporting brackets
29 Remote control, R100
30 Safety cable
31 Wire clamp

Fig. 9 Application example: Emptying or filling a tank

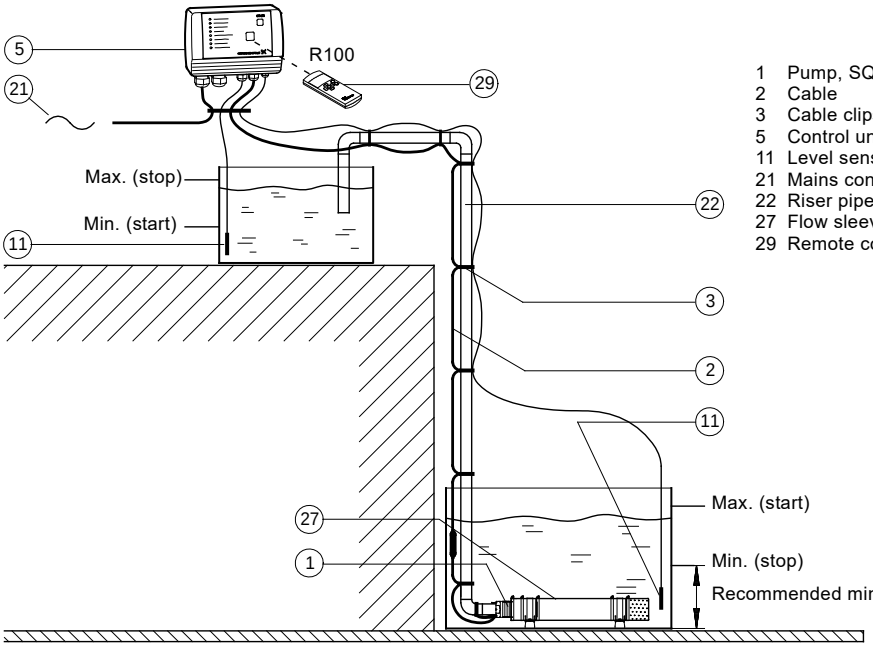
Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
5	Control unit	CU 300				
11	Level sensor					
22	Riser pipe					
27	Flow sleeve with strainer and supporting brackets					
29	Remote control	R100				
30	Safety cable					
31	Wire clamp					

Pumping from one tank to another

The SQE pump is ideal for pumping water from one tank to another.

Sensors

Level	Description	Light indication on CU 300
Level sensor (pos. 11, tank at top)		
Max. (stop)	When the water has reached this level, the pump stops.	Green indicator light in on/off button is flashing.
Min. (start)	When the water has dropped to this level, the pump starts.	Green indicator light in on/off button is permanently on.
Level sensor (pos. 11, tank at bottom)		
Max. (start)	When the water has reached this level, the pump starts.	Green indicator light in on/off button is on.
Min. (stop)	When the water has dropped to this level, the pump stops.	Green indicator light in on/off button is flashing.



1 Pump, SQE
2 Cable
3 Cable clips
5 Control unit, CU 300
11 Level sensor
21 Mains connection
22 Riser pipe
27 Flow sleeve with strainer and supporting brackets
29 Remote control, R100

Fig. 10 Application example: Pumping from one tank to another

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
5	Control unit	CU 300				
11	Level sensor					
27	Flow sleeve with strainer and supporting brackets					
29	Remote control	R100				

Setting of operating parameters

Using the R100 and the CU 300 enables change of the motor speed and thereby setting of the pump to a specific performance.

The software program "SQE Speed Calculation" has been developed for the calculation of the speed in order to obtain the required flow rate and head.

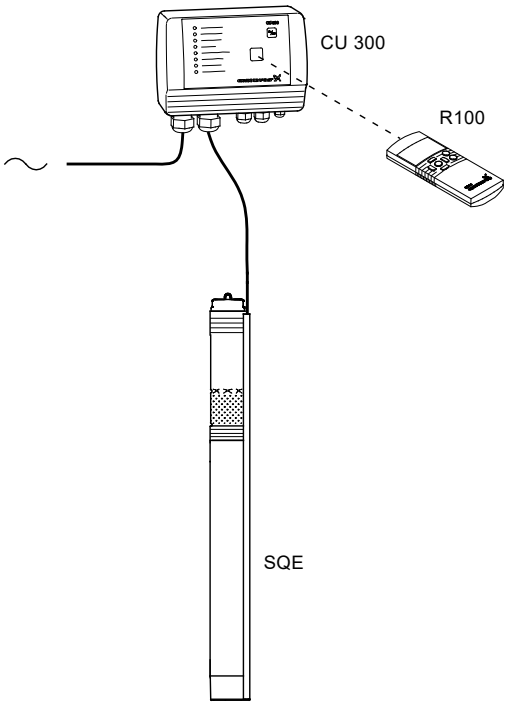


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Fig. 11 Application example: Workshop setting of operating parameters

Dry-running protection

The value $P_{cut\text{-}out,}$ ensuring dry-running protection, is factory-set for the SQE pump.

If the speed of the SQE pump is reduced by more than 1000 rpm, the $P_{cut\text{-}out}$ value must be readjusted by means of the CU 300 and R100.

Note: The SQE pump must not be started until the pump has been completely submerged below the water table. However, the change of the motor speed can be made even if the pump is not submerged.

Part	Type	No. of units	Product number	Unit price	Total price
Pump	SQE				
Remote control	R100				
Control unit	CU 300				
SQE Speed Calculation program					

SQE with manual speed control

Functioning and benefits

Manual speed control of the SQE pumps is possible by means of R100 and an SPP 1 potentiometer.

This application is especially suitable for sampling from groundwater monitoring wells. The monitoring well is purged at high speed and the sample is taken at a low speed (quiet flow). For contaminated groundwater the SQE-NE type range is recommended.

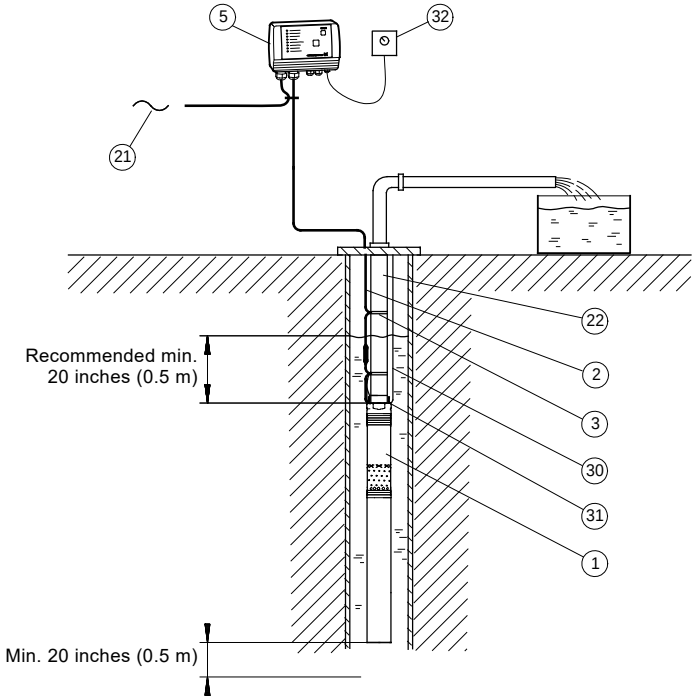
In case frequent sampling is required, dedicated installation of the pump is recommended, thus eliminating wear caused by frequent assembly and dismantling the installation.

Furthermore, dedicated installations saves the costs of assembling and dismantling the installation.

Important: Through dedicated installation the transfer of contamination from one monitoring well to another is avoided.

Dry-running protection

The value $P_{cut\ out}$, ensuring dry-running protection, is factory-set for the SQE pump. If the speed of the pump is reduced more than 1,000 rpm, the value of $P_{cut\ out}$ must be readjusted by means of CU 300 and R100.



1 SQE pump
2 Cable
3 Cable clips
5 Control unit, CU 300
21 Mains connection
22 Riser pipe
30 Stainless-steel safety cable
31 Stainless-steel wire clamps, 2 per lifting eye
32 Potentiometer, SPP 1

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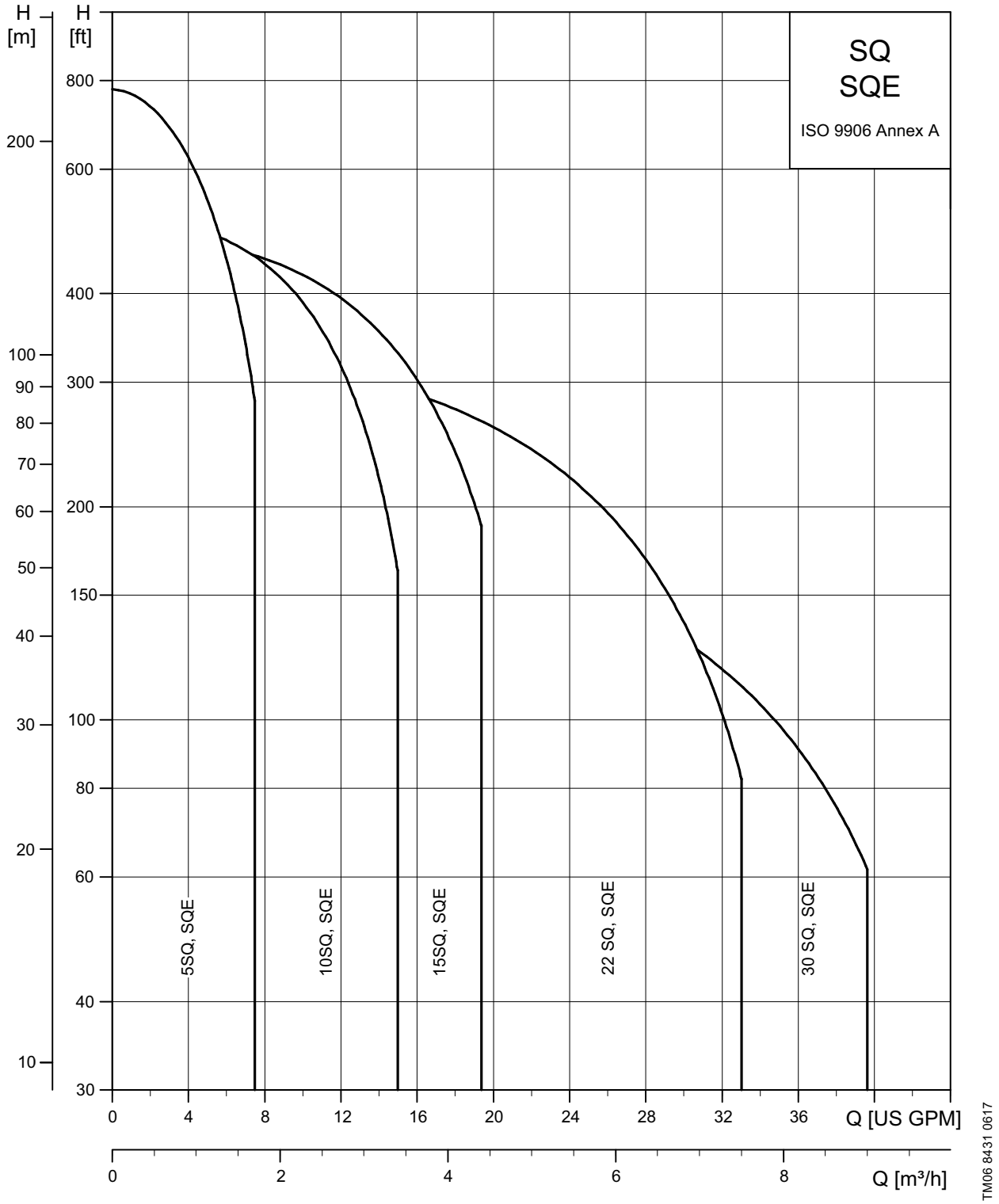
Fig. 12 Application example: Sampling/manual speed control of SQE

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
5	Control unit	CU 300				
22	Riser pipe					
30	Stainless-steel safety cable					
31	Wire clamps	2 per lifting eye				
32	Potentiometer	SPP 1				

3. Performance range



4. SQ, SQE installation

The SQ and SQE may be installed vertically, horizontally or in any position in between.

Note: The pump must not fall below the horizontal level in relation to the motor.

The following features ensure simple installation of the pump:

- Built-in check valve with spring
- low weight ensuring user-friendly handling
- installation in 3" or larger boreholes
- only on/off switch is needed, which means that no extra motor starter / starter box is necessary.

For horizontal installation a flow sleeve is recommended in order to:

- ensure sufficient flow velocity past the motor and thus provide sufficient cooling
- prevent motor and electronic unit from being buried in sand or mud.

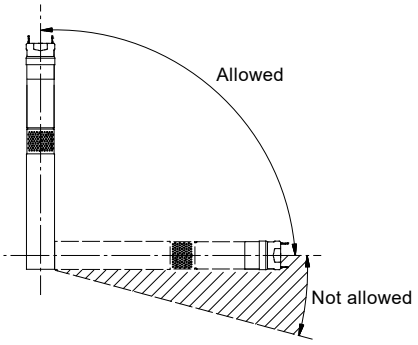


Fig. 13 SQE installation

5. Sizing and selection

System sizing guide

Step 1

Calculate minimum head requirements at no flow conditions:

H_{max} (required) = dynamic head + system pressure (in feet) + above grade elevation + friction loss

Step 2

Select pump from chart as follows:

- Choose model family based on the desired flow rate (i.e. 15SQE for a flow rate of 15 gpm)
- Select the first model with a value in Column 2 greater than the H_{max} calculated in Step 1 (For example: the choice for a 22 gpm model with an H_{max} of 140 ft would be the 22SQE-160).
- Double check your selection in the performance curves; see *SQ, SQE curve charts* on page 19.

System sizing matrix		
	Column 1	Column 2
Pump type Model B	Shutoff head (0 gpm) @ 3000 rpm min. speed	Head @ rated gpm @ 10700 rpm max. speed
	TDH [feet]	TDH [feet]
5SQE-90	11	86
5SQE-140	17	131
5SQE-180	22	177
5SQE-230	28	222
5SQE-270	34	270
5SQE-320	39	315
5SQE-360	45	360
5SQE-410	51	405
5SQE-450	56	450
10SQE-110	12	105
10SQE-160	17	164
10SQE-200	23	215
10SQE-240	29	267
10SQE-290	34	328
10SQE-330	40	390
15SQE-70	10	75
15SQE-110	14	123
15SQE-150	19	164
15SQE-180	24	205
15SQE-220	29	246
15SQE-250	33	287
15SQE-290	38	328
22SQE-40	5	36
22SQE-80	9	77
22SQE-120	14	117
22SQE-160	18	159
22SQE-190	23	200
22SQE-220	27	240
30SQE-40	5	33
30SQE-90	11	82
30SQE-130	16	126

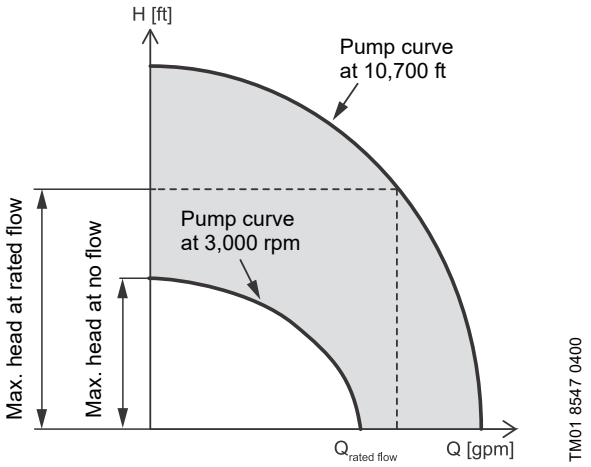


Fig. 14 Recommended sizing

Note: All calculated head requirements must lie between the selected pump models minimum and maximum speed curves.

6. Cable sizing

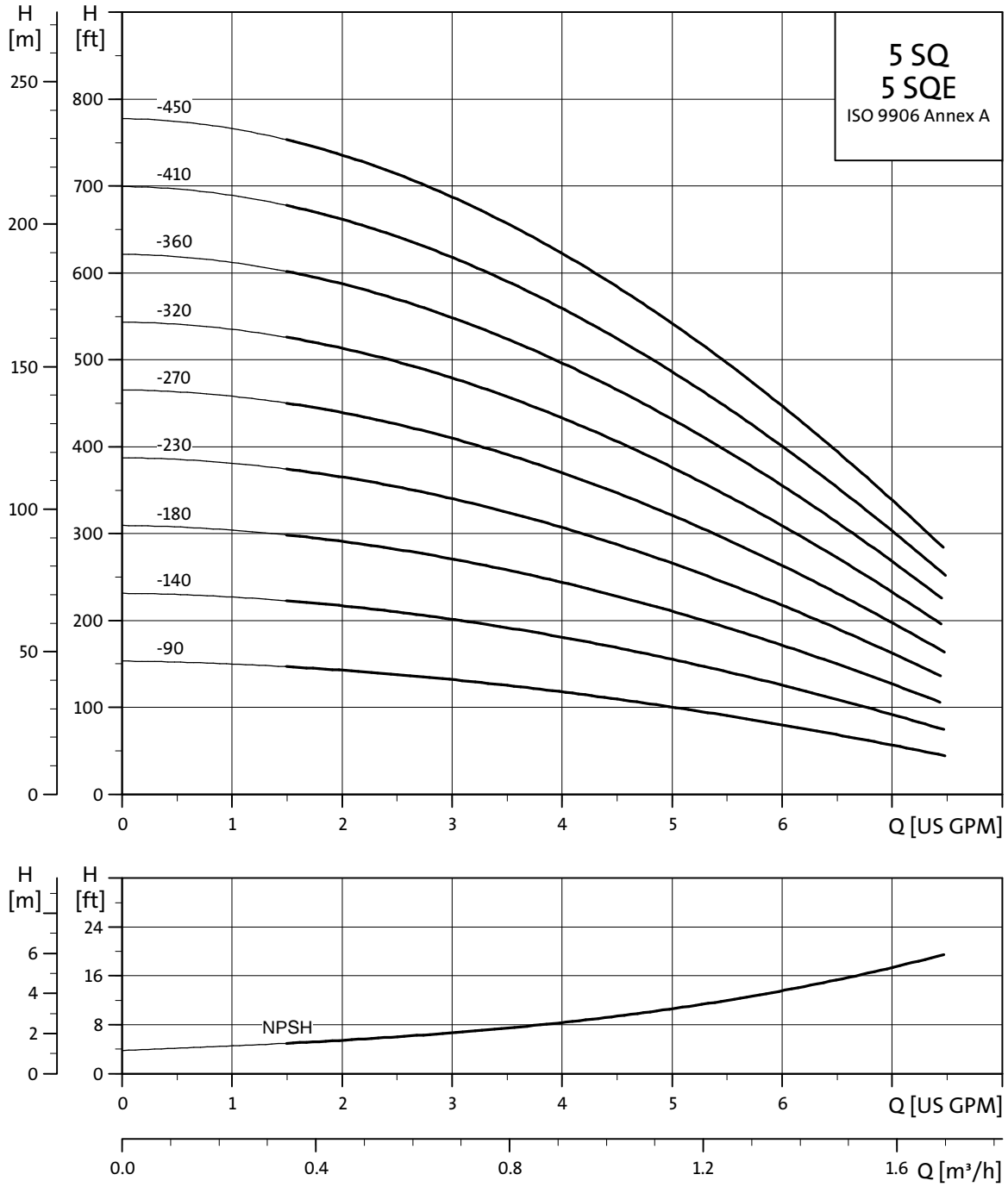
Cable sizing chart

Motor rating			Copper wire size (AWG)						
Volts	**Hp**	**Amps**	**14**	**12**	**10**	**8**	**6**	**4**	**2**
115	0.5	12	140	220	360	550	880	1390	2260
230	0.5	5.2	640	1000	1660	2250	4060	-	-
230	0.75	8.4	400	620	1030	1580	2510	3970	-
230	1	11.2	300	460	770	1190	1890	2980	4850
230	1.5	12	280	430	720	1110	1760	2780	4530

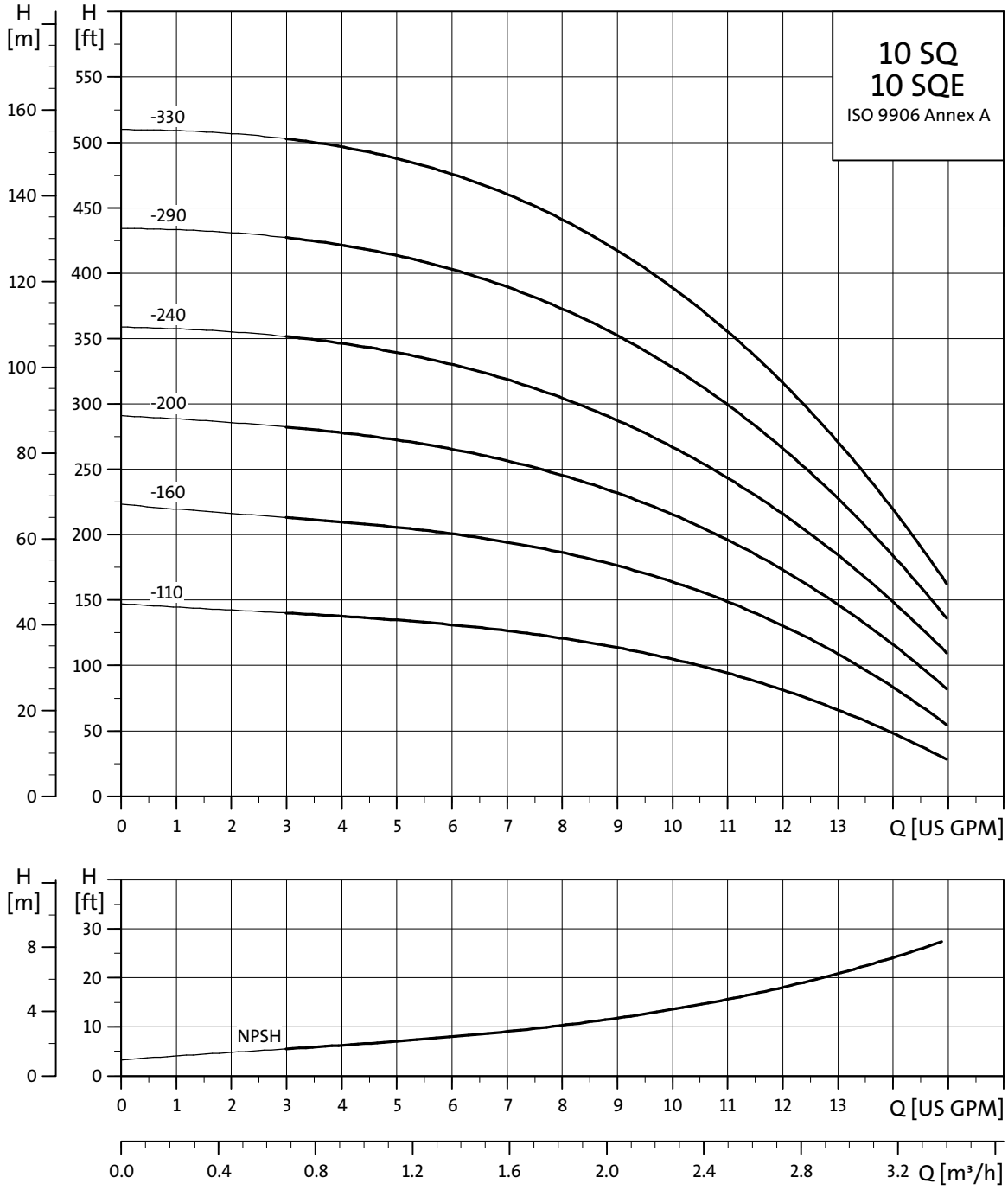
Cable length in feet.
Note: shaded values do not apply when using a CU 301 as its max. recommended cable length is 650 ft.

7. SQ, SQE curve charts

5 SQ, SQE



10 SQ, SQE



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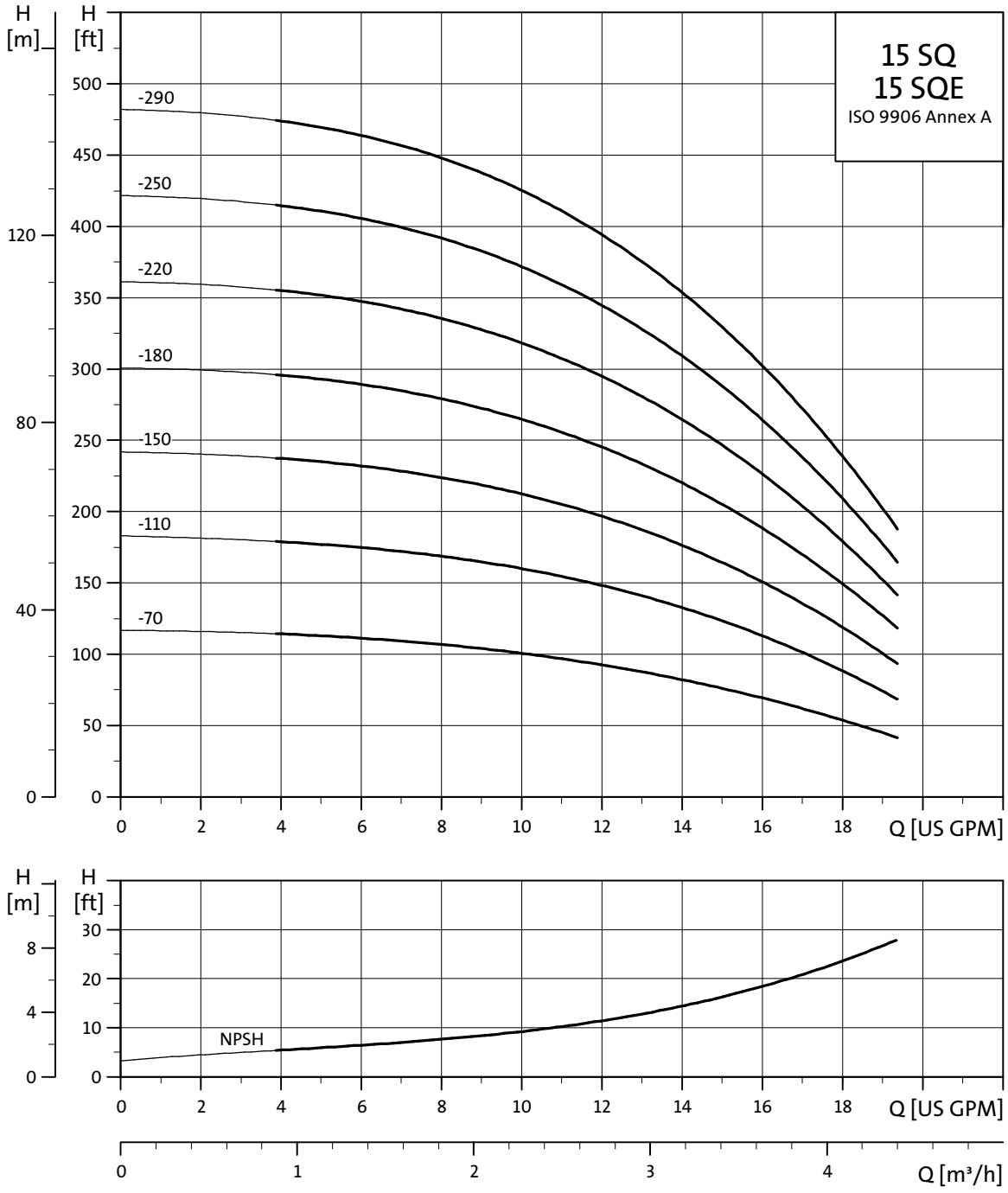
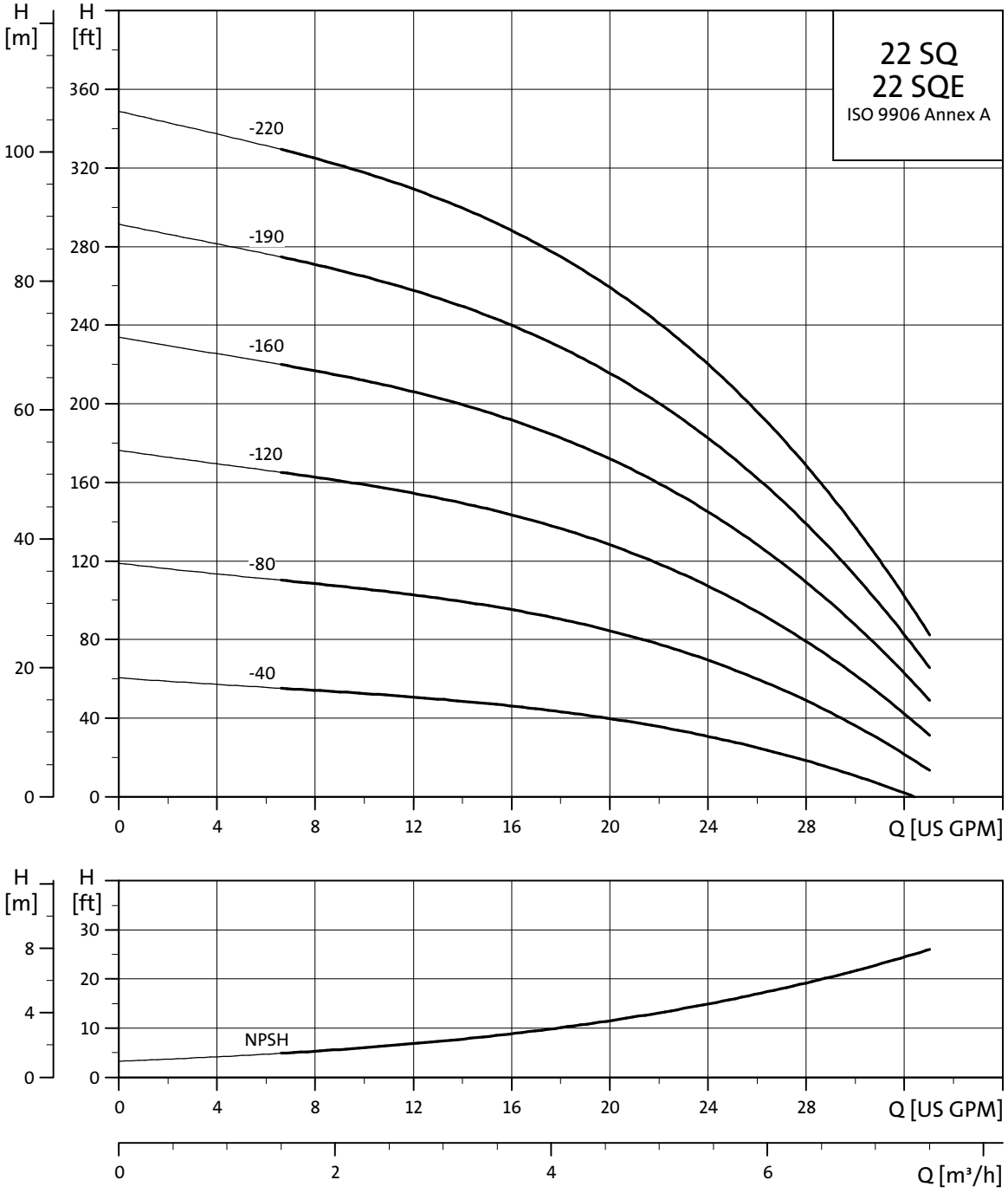
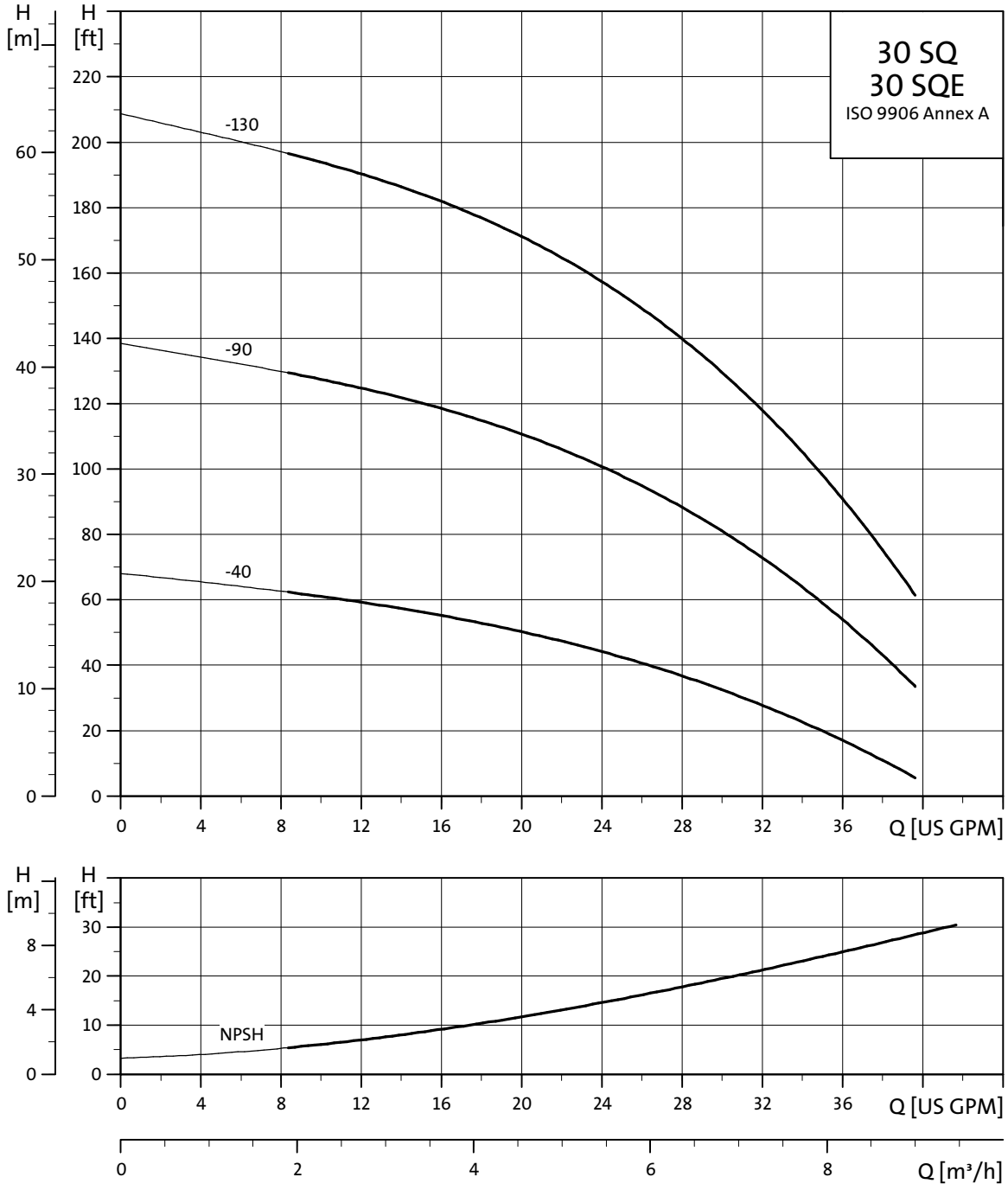
15 SQ, SQE


H [m]
H [ft]
15 SQ
15 SQE
ISO 9906 Annex A
-290
-250
-220
-180
-150
-110
-70
Q [US GPM]
NPSH
Q [m³/h]
TM04 7465 2010

22 SQ, SQE


22 SQ
22 SQE
ISO 9906 Annex A
H [m]
H [ft]
-220
-190
-160
-120
-80
-40
Q [US GPM]
NPSH
Q [m³/h]
TM04 7466 2010

30 SQ, SQE


H [m]
H [ft]
30 SQ
30 SQE
ISO 9906 Annex A
-130
-90
-40
Q [US GPM]
NPSH
Q [m³/h]
TM04 7467 2010

8. SQ, SQE technical data

Electrical data

Supply voltage:	1 x 200-240 V + 6 %/- 10 %, 50/60 Hz, PE 1 x 100-115 V + 6 %/- 10 %, 50/60 Hz, PE
Operation via generator:	As a minimum, the generator output must be equal to the motor P1 [kw] + 10 %
Starting current:	The motor starting current is equal to the highest value stated on the motor nameplate
Starting:	Soft Start
Run-up time:	Maximum: 2 seconds
Motor protection:	Motor is protected against: – Dry running – overvoltage – undervoltage – overload – overtemperature.
Power factor:	PF = 1
Motor cable:	3 wire, 14AWG XLPE, 5 ft
Motor liquid:	Type SML 2
pH Values:	SQ and SQE: 5 to 9 SQE-NE: 2 to 13
Liquid temperature:	The temperature of the pumped liquid must not exceed 86 °F (30 °C)

Note: If liquids with a viscosity higher than that of water are to be pumped, please contact Grundfos.

Control units CU 300 and CU 301

Voltage:	1 x 100-240 V - 10 %/+ 6 %, 50/60 Hz, PE
Power consumption:	5 W
Current consumption:	Maximum 130 mA
Enclosure class:	IP55
Ambient temperature:	During operation: -22 °F to +122 °F (-30 °C to +50 °C) During storage: -22 °F to 140 °F (-30 °C to +60 °C)
Relative air humidity:	95 %.
Pump cable:	Maximum length between CU 300 or CU 301 and pump: 650 ft (198 m)
Back-up fuse:	Maximum: 16 A
Radio noise:	CU 300 and CU 301 comply with EMC Directive 89/336/EEC. Approved according to the standards EN 55014 and EN 55014-2
Marking:	CE, cUL (CU 301)
Load:	Max. 100 mA

Operating conditions

Minimum ambient fluid temperature:	+34 °F (+1 °C)
Maximum ambient fluid temperature:	+86 °F (+30 °C)
Well diameter:	3-inch or larger
Installation depth (maximum):	500 feet below static water level

Storage conditions

Minimum ambient temperature:	-4 °F (-20 °C)
Maximum ambient temperature:	+140 °F (+60 °F)
Frost protection:	If the pump has to be stored after use, it must be stored at a frost-free location, or it must be ensured that the motor liquid is frost-proof.

Motor data

Pump type	Hp	Voltage	Full load amps		Overload amps		Min. well diameter	Discharge
			230 V	115 V	230 V	115 V		
5SQE05-90	1/2	230 V / 115 V	2.1	4.2	5	11	3"	1" NPT
5SQE05-140	1/2	230 V / 115 V	2.9	6.0	5	11	3"	1" NPT
5SQE05-180	1/2	230 V / 115 V	3.7	7.7	5	11	3"	1" NPT
5SQE07-230	3/4	230 V	4.6	-	8	-	3"	1" NPT
5SQE07-270	3/4	230 V	5.3	-	8	-	3"	1" NPT
5SQE07-320	3/4	230 V	6.2	-	8	-	3"	1" NPT
5SQE10-360	1	230 V	7.2	-	11	-	3"	1" NPT
5SQE10-410	1	230 V	8.1	-	11	-	3"	1" NPT
5SQE15-450	1 1/2	230 V	9.2	-	12	-	3"	1" NPT
10SQE05-110	1/2	230 V / 115 V	2.9	6.1	5	11	3"	1 1/4" NPT
10SQE05-160	1/2	230 V / 115 V	4.1	8.6	8	11	3"	1 1/4" NPT
10SQE07-200	3/4	230 V	5.3	-	8	-	3"	1 1/4" NPT
10SQE7-240	3/4	230 V	6.0	-	8	-	3"	1 1/4" NPT
10SQE10-290	1	230 V	7.7	-	11	-	3"	1 1/4" NPT
10SQE15-330	1 1/2	230 V	8.9	-	12		3"	1 1/4" NPT
15SQE05-70	1/2	230 V / 115 V	2.9	6.0	5	11	3"	1 1/4" NPT
15SQE05-110	1/2	230 V / 115 V	4.0	8.3	5	11	3"	1 1/4" NPT
15SQE07-150	3/4	230 V	5.1	-	8	-	3"	1 1/4" NPT
15SQE07-180	3/4	230 V	6.2	-	8	-	3"	1 1/4" NPT
15SQE10-220	1	230 V	7.4	-	11	-	3"	1 1/4" NPT
15SQE10-250	1	230 V	8.4	-	11	-	3"	1 1/4" NPT
15SQE15-290	1 1/2	230 V	9.7	-	12	-	3"	1 1/4" NPT
22SQE05-40	1/2	230 V / 115 V	1.9	3.9	5	-	3"	1 1/2" NPT
22SQE05-80	1/2	230 V / 115 V	3.4	7.2	5	-	3"	1 1/2" NPT
22SQE07-120	3/4	230 V	4.9	-	8	-	3"	1 1/2" NPT
22SQE10-160	1	230 V	6.4	-	8	-	3"	1 1/2" NPT
22SQE10-190	1	230 V	7.9	-	11	-	3"	1 1/2" NPT
22SQE15-220	1 1/2	230 V	9.5	-	12	-	3"	1 1/2" NPT
30SQE05-40	1/2	230 V / 115 V	2.8	5.7	5	-	3"	1 1/2" NPT
30SQE07-90	3/4	230 V	5.2	-	8	-	3"	1 1/2" NPT
30SQE10-130	1	230 V	7.6	-	11	-	3"	1 1/2" NPT

Dimensions and weights

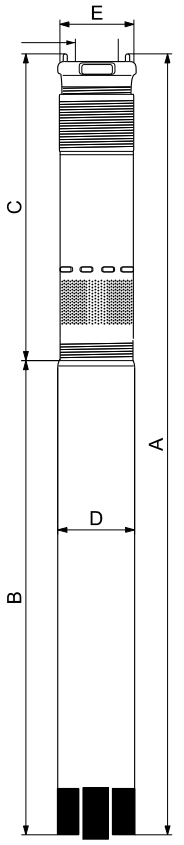
SQ, SQE

Model	Hp	Motor size	Discharge size	Dimensions in inches					Approx. ship. wt.
				A	B	C	D	E	
5SQ/SQE05-90	1/2	3"	1" NPT	30.4	19.8	10.6	2.6	2.9	12
5SQ/SQE05-140	1/2	3"	1" NPT	30.4	19.8	10.6	2.6	2.9	12
5SQ/SQE05-180	1/2	3"	1" NPT	31.5	19.8	11.6	2.6	2.9	12
5SQ/SQE07-230	3/4	3"	1" NPT	33.6	19.8	13.7	2.6	2.9	13
5SQ/SQE07-270	3/4	3"	1" NPT	33.6	19.8	13.7	2.6	2.9	13
5SQ/SQE07-320	3/4	3"	1" NPT	34.6	19.8	14.8	2.6	2.9	13
5SQ/SQE10-360	1	3"	1" NPT	38.2	21.3	16.9	2.6	2.9	16
5SQ/SQE10-410	1	3"	1" NPT	38.2	21.3	16.9	2.6	2.9	16
5SQ/SQE15-450	1 1/2	3"	1" NPT	39.3	21.3	18.0	2.6	2.9	16
10SQ/SQE05-110	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
10SQ/SQE05-160	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
10SQ/SQE07-200	3/4	3"	1 1/4" NPT	31.5	19.8	11.6	2.6	2.9	13
10SQ/SQE07-260	3/4	3"	1 1/4" NPT	33.6	19.8	13.7	2.6	2.9	13
10SQ/SQE10-290	1	3"	1 1/4" NPT	35.0	21.3	13.7	2.6	2.9	16
10SQ/SQE15-330	1 1/2	3"	1 1/4" NPT	36.14	21.3	14.8	2.6	2.9	16
15SQ/SQE05-70	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
15SQ/SQE05-110	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
15SQ/SQE07-150	3/4	3"	1 1/4" NPT	31.5	19.8	11.6	2.6	2.9	13
15SQ/SQE07-180	3/4	3"	1 1/4" NPT	33.6	19.8	13.7	2.6	2.9	13
15SQ/SQE10-220	1	3"	1 1/4" NPT	35.0	21.3	13.7	2.6	2.9	16
15SQ/SQE10-250	1	3"	1 1/4" NPT	36.1	21.3	14.8	2.6	2.9	16
15SQ/SQE10-290	1 1/2	3"	1 1/4" NPT	38.2	21.3	16.9	2.6	2.9	16
22SQ/SQE05-40	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
22SQ/SQE05-80	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
22SQ/SQE07-120	3/4	3"	1 1/2" NPT	31.5	19.8	11.6	2.6	2.9	13
22SQ/SQE10-160	1	3"	1 1/2" NPT	33.6	19.8	13.7	2.6	2.9	13
22SQ/SQE10-190	1	3"	1 1/2" NPT	38.2	21.3	16.9	2.6	2.9	16
22SQ/SQE15-220	1 1/2	3"	1 1/2" NPT	38.2	21.3	16.9	2.6	2.9	16
30SQ/SQE05-40	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
30SQ/SQE07-90	3/4	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	13
30SQ/SQE10-130	1	3"	1 1/2" NPT	35.0	21.3	13.7	2.6	2.9	13

9. SQ, SQE construction

Materials of construction

SQ, SQE	
Component	**Splined shaft**
Valve casing	Polyamide
Discharge chamber	304 stainless steel
Valve guide	Polyamide
Valve spring	316LN stainless steel
Valve cone	Polyamide
Valve seat	NBR rubber
O-ring	NBR rubber
Lock ring	310 stainless steel
Top bearing	NBR rubber
Top chamber	Polyamide
Guide vanes	Polyamide
Impeller	Polyamide w/ tungsten carbide bearings
Bottom chamber	Polyamide
Neck ring	TPU / PBT
Bearing	Aluminum oxide
Suction interconnector	Polyamide
Ring	304 stainless steel
Pump sleeve	304 stainless steel
Pressure equalization cone	Polyamide
Spacer	Polyamide
Sand trap	316 stainless steel
Shaft w/coupling	304 stainless steel
Cable guard	304 stainless steel



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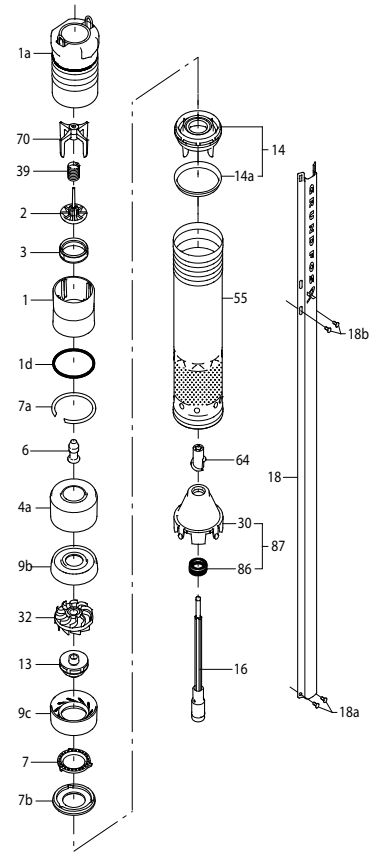
Discharge sizes:

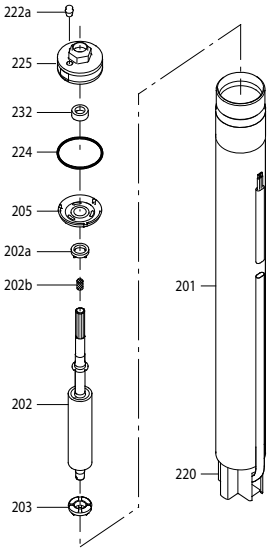
1" NPT	5 SQ/SQE
1 1/4" NPT	10-15 SQ/SQE
1 1/2" NPT	22-30 SQ/SQE

SQ, SQE material specification

Pump				
Pos.	**Component**	**Material**	**DIN W-Nr. SQ/SQE**	**AISI**
1	Valve casing	Polyamide	1.4301	304
1a	Discharge chamber	Stainless steel		
1d	O-ring	NBR rubber		
2	Valve cup	Polyamide		
3	Valve seat	NBR rubber		
4a	Empty chamber	Polyamide		
6	Top bearing	NBR rubber		
7	Neck ring	TPU / PBT		
7a	Lock ring	Stainless spring steel	1.4301	310
7b	Neck ring retainer	Polyamide		
9b	Chamber top	Polyamide		
9c	Chamber bottom	Polyamide		
13	Impeller with tungsten carbide bearing	Polyamide		
14	Suction inter-connector	Polyamide		
14a	Ring	Stainless steel	1.4301	304
16	Shaft with coupling	Stainless steel	1.4301	304
		Sintered steel		
18	Cable guard	Stainless steel	1.4301	304
18a 18b	Screws for cable guard	Stainless steel	1.4301	316
30	Cone for pressure equalization	Polyamide		
32	Guide vanes	Polyamide		
39	Spring	Stainless spring steel	1.4406	316LN
55	Pump sleeve	Stainless steel	1.4301	304
64	Priming screw	Polyamide		
70	Valve guide	Polyamide		
86	Lip seal ring	NBR rubber		
87	Cone for pressure equalization complete	Polyamide / NBR rubber		



Motor				
Pos.	**Component**	**Material**	**DIN W-Nr. SQ-SQE**	**AISI**
201	Stator	Stainless steel	1.4301	304
202	Rotor	Stainless steel	1.4301	304
202a	Stop ring	PP		
202b	Filter	Polyester		
203	Thrust bearing	Carbon		
205	Radial bearing	Ceramic tungsten carbine		
220	Motor cable with plug	EPR		
222a	Filling plug	MS 3: NBR MSE 3: FKM		
224	O-ring	FKM		
225	Top cover	PPS		
232	Shaft seal	MS 3: NBR MSE 3: FKM		
	Motor liquid	SML-2		



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Control units for SQ, SQE

CU 301

The CU 301 is a control and communication unit developed especially for the SQE submersible pumps in constant-pressure applications.

The CU 301 control unit provides:

- Full control of the SQE pumps
- two-way communication with the SQE pumps
- possibility of adjusting the pressure
- alarm indication (LED) when service is needed
- possibility of starting, stopping and resetting the pump simply by means of a push-button
- configuration with R100 remote control.

The CU 301 communicates with the pump via mains borne signalling (Power Line Communication), meaning that no extra cables are required between the CU 301 and the pump.

The CU 301 features the following indications (see drawing in right column):

1. Pump running indicator
2. System pressure setting
3. System ON/OFF
4. Button lock indicator
5. Dry-running indicator
6. Service needed in case of:
   - no contact to pump
   - overvoltage
   - undervoltage
   - speed reduction
   - overtemperature
   - overload
   - sensor defective.

The CU 301 incorporates:

- External signal input for pressure sensor
- connection to an operating relay for indication of pump operation.

Optional R100 remote control

Wireless infrared remote control of the CU 301 is possible by means of the R100.

Using the R100, it is possible to monitor and change the operating parameters, see the R100 menu structure on page 30.

The R100 is a valuable tool in case fault finding is required.

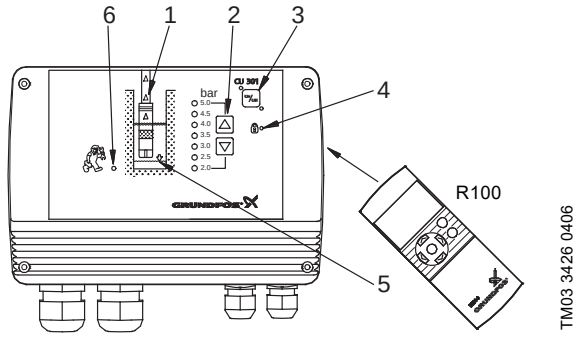


Fig. 15 CU 301 control unit

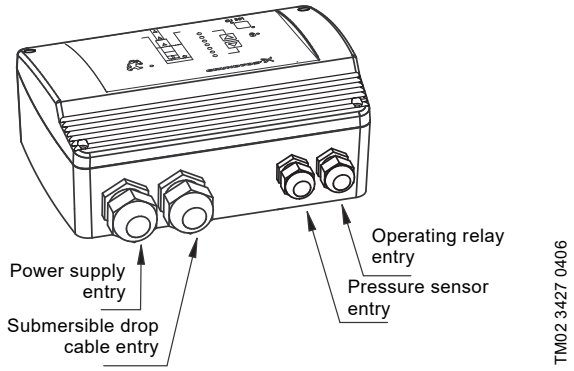


Fig. 16 CU 301 entry ports

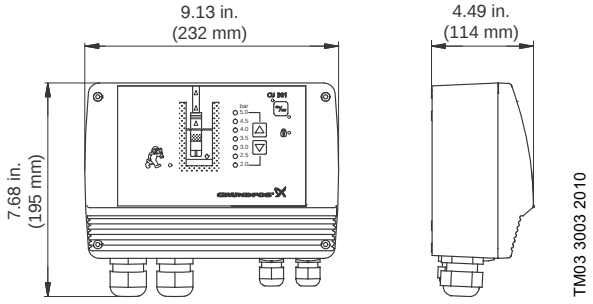
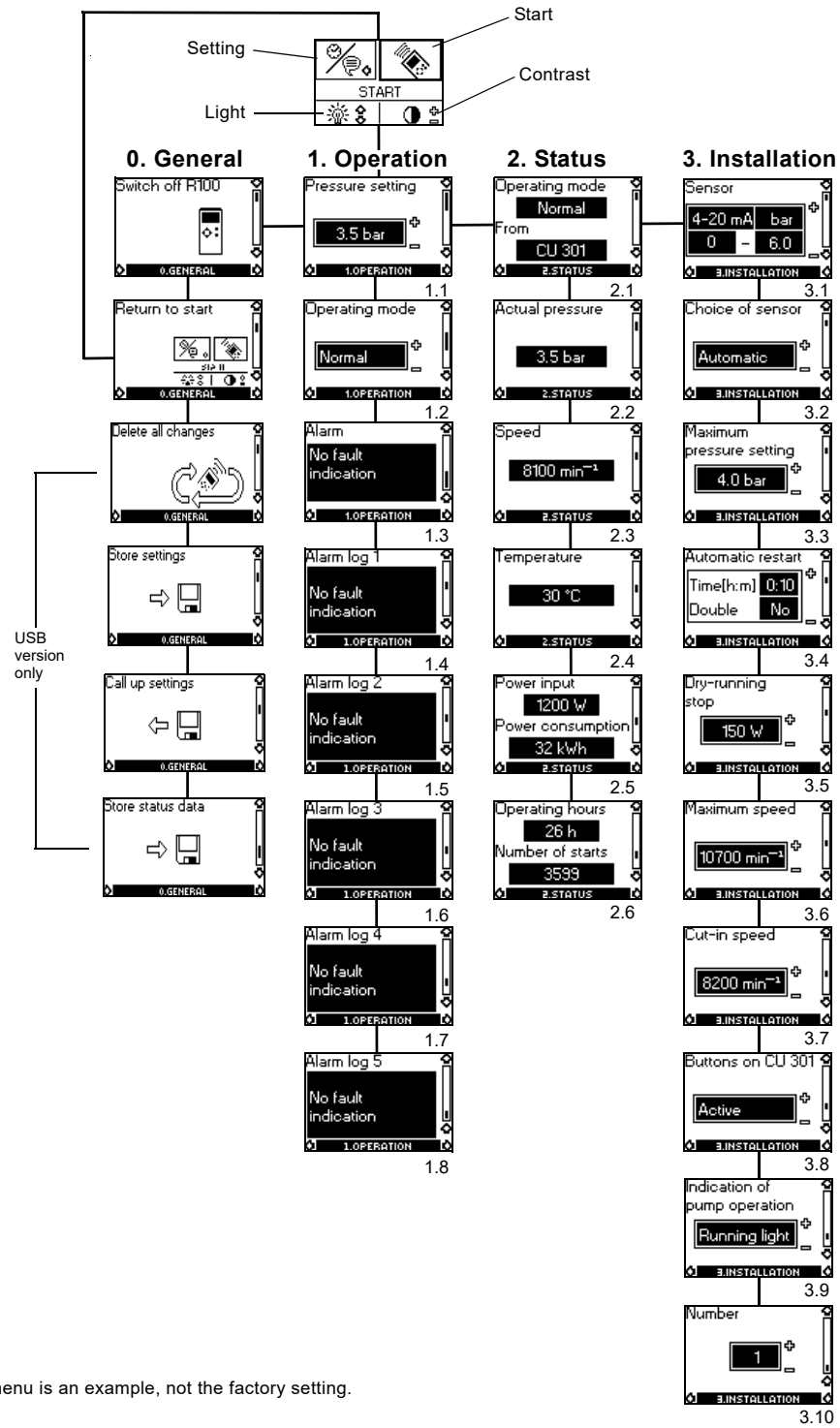


Fig. 17 CU 301 dimensions

R100 menu structure for CU 301 control unit



Note: This menu is an example, not the factory setting.

R100 menus for CU 301

0. General

1. Operation

1.1 Setpoint setting

1.2 Selection of operating mode

1.3 Alarm indication.

2. Status

The indication of:

2.1 Actual operating mode

2.2 Actual pressure

2.3 Actual motor speed

2.4 Actual motor temperature

2.5 Actual power input and accumulated motor power consumption

2.6 Accumulated number of operating hours and accumulated number of starts.

3. Installation

3.1 Sensor parameters

3.2 Choice of sensor

3.3 Setting of maximum pressure setpoint

3.4 Setting of automatic restart time

3.5 Setting of the dry-running stop limit

3.6 Setting of the maximum motor speed

3.7 Setting of the cut-in motor speed

3.8 Activating or deactivating the on/off-button and the buttons for system pressure setting on the CU 301

3.9 Indication of pump operation

3.10 Allocation of identification number.

CU 300

The CU 300 is a control and communication unit developed especially for the SQE submersible pumps for control applications other than constant pressure.

The CU 300 control unit provides:

- Flexible pump control based on various sensor inputs
- two-way communication with the SQE pumps
- alarm indication of pump operation by LED's on the front
- possibility of starting, stopping and resetting the pump simply by means of a push-button
- communication with R100 remote control.

The CU 300 communicates with the pump via mains borne signalling (Power Line Communication), meaning that no extra cables are required between the CU 300 and the pump.

The following alarms can be indicated by the CU 300:

- No contact
- overvoltage
- undervoltage
- dry running
- speed reduction
- overtemperature
- overload
- sensor alarm.

The CU 300 incorporates:

- External signal input for two analog sensors and one digital sensor
- relay output for external alarm indication
- control according to the signals received, e.g. of flow, pressure, water level and conductivity.

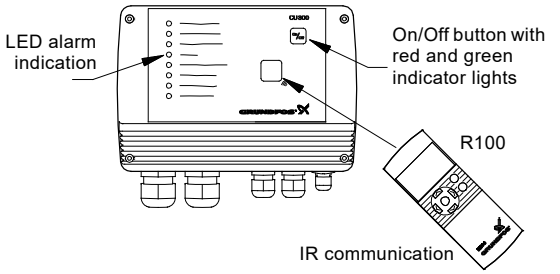


Fig. 18 CU 300 control unit with R100

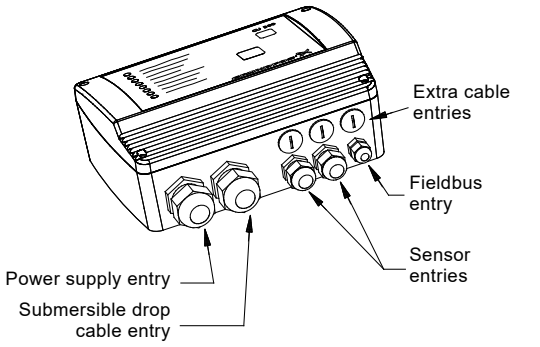


Fig. 19 CU 300 control unit, external entry ports

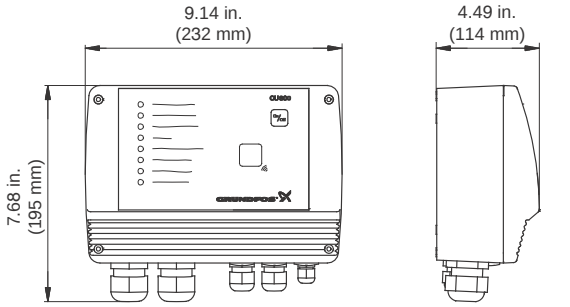


Fig. 20 CU 300 dimensions

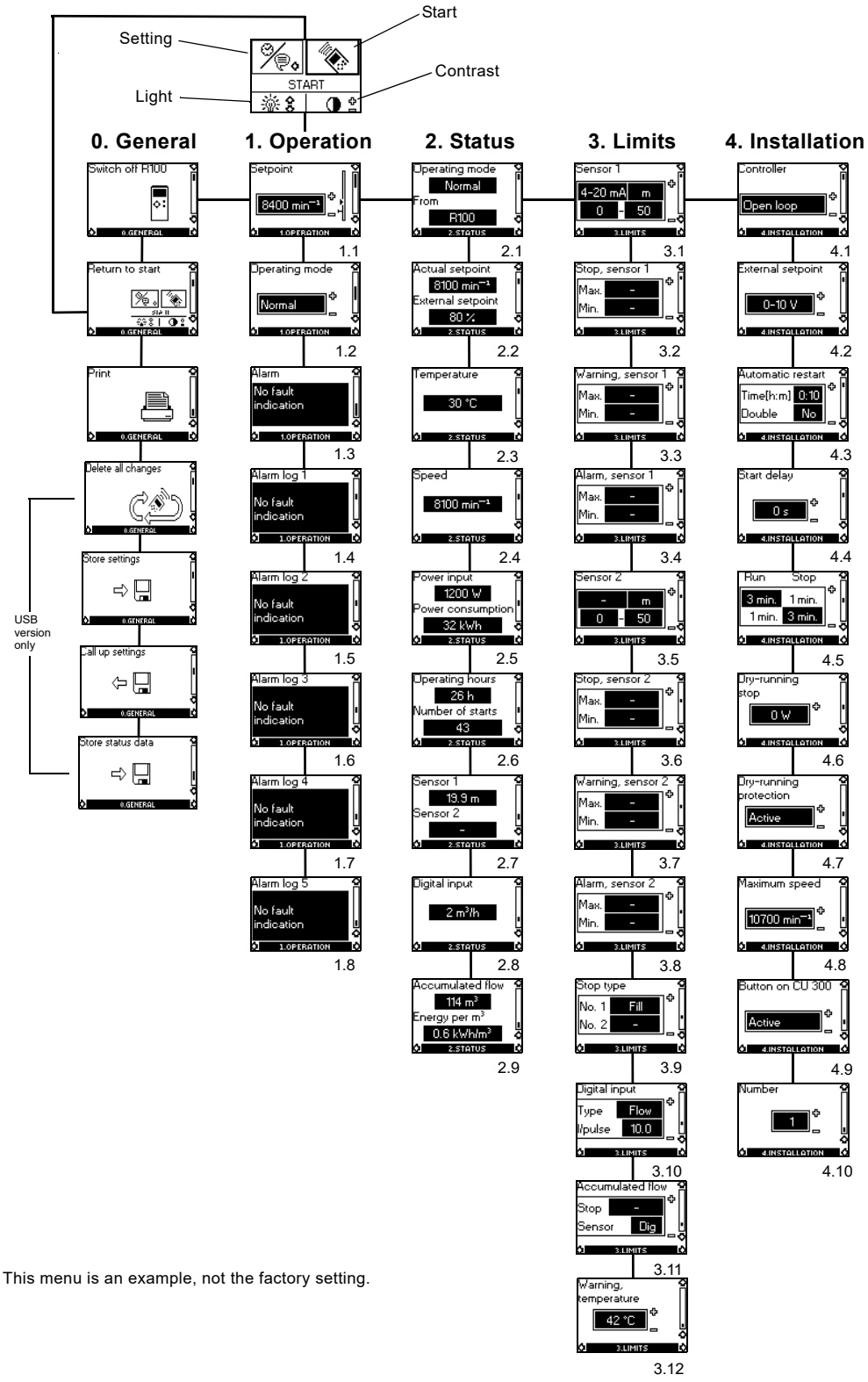
R100 remote control

Wireless infrared remote control of the CU 300 is possible by means of the R100.

Using the R100, it is possible to monitor and change the operating parameters, see the R100 menu structure on page 33.

The R100 is a valuable tool in case fault finding is required.

R100 menu structure for the CU 300



Note: This menu is an example, not the factory setting.

R100 menus for CU 300

0. General

1. Operation

1.1 Setpoint setting
1.2 Selection of operating mode
1.3 Alarm indication.

2. Status

The indication of:

2.1 Actual operating mode
2.2 Actual and external setpoint
2.3 Actual motor temperature
2.4 Actual motor speed
2.5 Actual power input and accumulated motor power consumption
2.6 Accumulated number of operating hours and accumulated number of starts
2.7 Actual values of sensors 1 and 2, respectively
2.8 Actual values of the digital input
2.9 Accumulated flow, and the power used to pump.

R100 offers the possibility of making a number of settings.

3. Limits

The setting of:

3.1 Sensor 1 parameters
3.2 Min. and max. stop limits of sensor 1
3.3 Min. and max. warning limits of sensor 1
3.4 Min. and max. alarm limits of sensor 1
3.5 Sensor 2 parameters
3.6 Min. and max. stop limits of sensor 2
3.7 Min. and max. warning limits of sensor 2
3.8 Min. and max. alarm limits of sensor 2
3.9 Filling or emptying
3.10 Setting of the function of the digital sensor connected to the digital input
3.11 The setting of the water quantity stop limit and the setting of the sensor to detect water quantity
3.12 The setting of the temperature warning limits of the motor electronics.

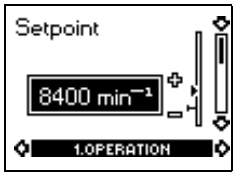
4. Installation

4.1 Selection of controller - open loop, closed loop
4.2 Setting of external setpoint
4.3 Setting of automatic restart time
4.4 Allocation of individual start delays
4.5 Setting of the stop and run times for the dewatering function
4.6 Setting of the dry-running stop limit
4.7 Activating or deactivating the dry-running protection
4.8 Setting of the maximum motor speed
4.9 Activating or deactivating the on/off-button on the CU 300
4.10 Allocation of ID number where more than one CU 300 is installed.

Examples of R100 displays

Menu OPERATION

Setpoint setting



1.1

From factory, the pump is set to maximum speed, 10,700 rpm. R100 makes it possible to reduce the pump speed by changing the setpoint. The speed can be set to 3,000 - 10,700 rpm, at 100 rpm intervals.

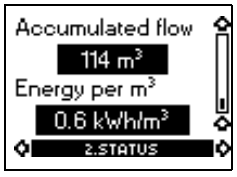
The unit of the setpoint is automatically changed according to the unit of the sensor connected to sensor input 1.

Example: Sensor input 1 is connected to a pressure sensor using the unit feet (ft) and the range 0-60. Consequently, the setpoint of display 1.1 can be set to between 0-60 ft.

Menu STATUS

The displays appearing in this menu are status displays only. It is not possible to change settings in this menu.

Accumulated flow



2.9

In display 2.9, the water quantity (m^3)* pumped is shown. The value shown is the accumulated flow registered by the sensor selected in display 3.11.

The power used to pump 1 m^3 is shown in the display as energy per m^3 (kWh/m^3).

It is possible to read the status of the accumulated flow and energy per m^3 at any time.

* Water quantity in units of gpm can be chosen.

Accumulated number of operating hours and number of starts

2.6

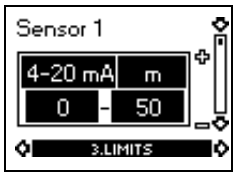
The number of operating hours and the number of starts are values accumulated from the time of installation and they cannot be reset.

Both values are stored in the motor electronics, and they are kept even if the CU 300 is replaced.

The number of operating hours is registered every two hours of continuous operation.

Menu LIMITS

Sensor 1



3.1

The setting of sensor 1.

Depending on the type of sensor, the following settings can be made:

- Sensor outputs:
  – (not active), 0-10 V, 2-10 V, 0-20 mA, 4-20 mA
- setting range unit: m^3/h, m, %, gpm, ft
- sensor minimum value: 0-249 (0, 1, 2, 3.....249)
- sensor maximum value: 1-250 (1, 2, 3, 4.....250).

10. CU331SP variable frequency drive

Features

User interface

The user interface offers these possibilities:

- Local operation via a control panel with graphic display where the menu structure is based on the well-known system from Grundfos E-pumps.
- Monitoring of operating status via indicator lights and signal relays.
- Display of alarm or warning and logging of the last five alarms and warnings.

Functions

Control mode: Constant pressure

The CU331SP has only one control mode, Constant pressure. The pressure is kept constant, independently of the flow rate.

Start-up guide

The CU331SP has a start-up guide, which is launched at the first power up. Parameters are set manually on the basis of the installation. The start-up guide can be repeated, if necessary.

Thanks to the start-up guide, the installer can quickly set a few parameters and put the CU331SP into operation.

Direction of rotation test

During start-up, the CU331SP automatically tests and sets the correct direction of rotation without changing the cable connections. The direction of rotation test can be performed manually if it fails for any reason.

Dry-running protection

To protect the pump, the CU331SP will automatically set up dry-run protection so that water shortage can be detected. The dry-run alarm will automatically reset 30 minutes after the alarm is declared.

Low-flow stop function

The low-flow stop function is used for changing between on/off operation at low flow rate and continuous operation at high flow rate.

The low-flow stop function protects the pump and saves energy.

Applications

For 4" or larger wells. Main applications:

- Domestic and light commercial water supply
- irrigation
- livestock watering
- water transfer.

System components

- Compact, efficient, and reliable variable frequency drive
- rugged stainless steel pump end and proven, reliable, 3-phase motor
- pressure sensor
- diaphragm tank (sold separately).

TM05 5801 4012

Fig. 21 CU331SP variable frequency drive and sensor

Identification

Nameplate

The CU331SP can be identified by means of the nameplate. An example is shown below.

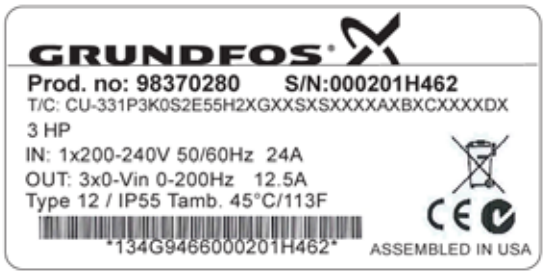


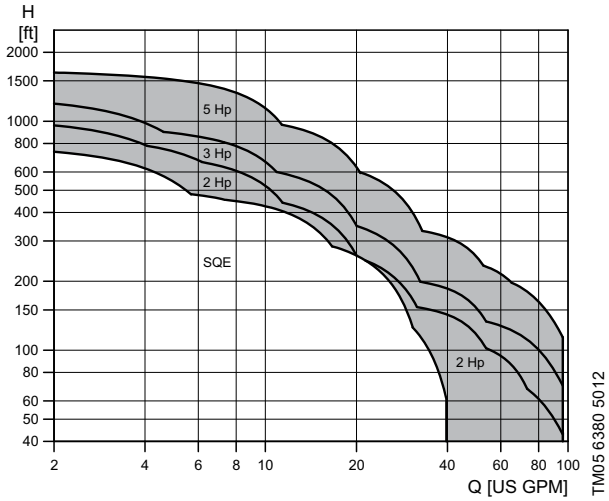
Fig. 22 Example of nameplate

Key	
Text	**Description**
T/C:	CU-331 (product name)
Prod. no:	Product number (98370280)
S/N:	Serial number (000201H462) The last four digits indicate the production date. In this case, 46 is the week, and 2 is the year 2012.
3.0 hp	Typical shaft power on the motor
IN:	Supply voltage, frequency and maximum input current.
OUT:	Motor voltage, frequency and maximum output current. The maximum output frequency usually depends on the pump type.
Type 12 / IP55	Enclosure class
Tamb.	Maximum ambient temperature

CU331SP product range

Enclosure type	NEMA	Hp	Input Ph	Input volts
Indoor	Type 12	2	1	200-240
		3	1	200-240
		5	1	200-240
Outdoor	Type 4X	2	1	200-240
		3	1	200-240
		5	1	200-240

CU331SP performance range



CU331SP sizing

Step 1

Calculate maximum head requirements at rated flow conditions:

H_{max} = dynamic head + system psi (in feet) + friction loss + above grade elevation.

Step 2

Select pump from performance curves as follows:

Select a model in which the calculated value of H_{max} is within the maximum performance curve of the pump. Refer to section *CU331SP curve charts* on page 51.

Step 3

Select the CU331SP that corresponds to the correct motor Hp and enclosure type.

CU331SP operation

Menu structure

The CU331SP has a start-up guide, which is launched at the first power up. After the start-up guide, the CU331SP has a menu structure divided into four main menus:

0. **GENERAL** gives access to the start-up guide for the general setting of the CU331SP.
1. **OPERATION** enables the setting of setpoint and resetting of alarms. It is also possible to see the latest five warnings and alarms.
2. **STATUS** shows the status of the CU331SP and the pump. It is not possible to change or set values.
3. **INSTALLATION** gives access to available parameters.

CU331SP menu overview

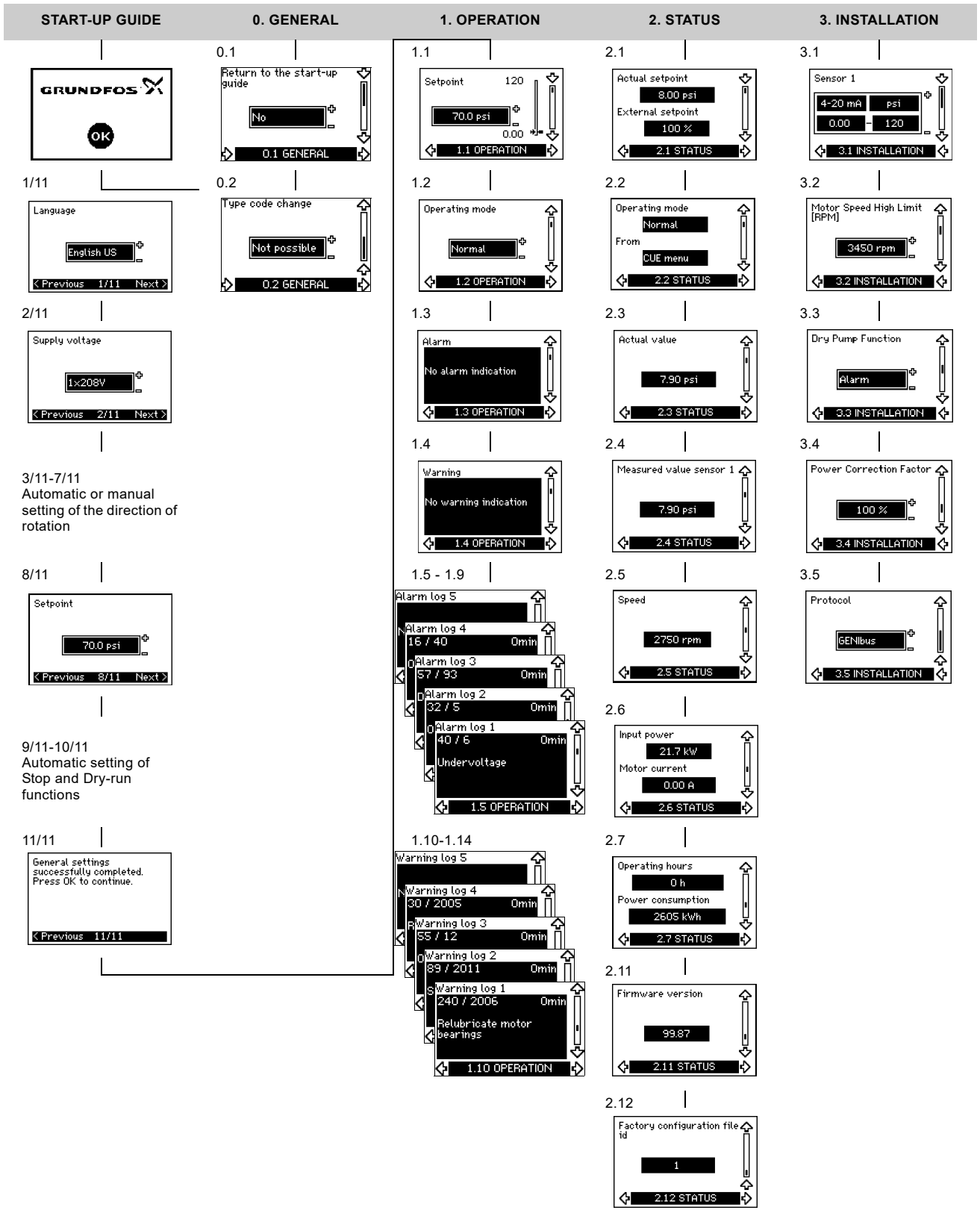


Fig. 23 Menu overview

Operating modes

These operating modes can be selected with the CU331SP:

- Normal
- Stop
- Min.
- Max.

The operating modes can be set without changing the setpoint setting.

Normal

The pump operates in constant pressure mode.

Stop

The pump has been stopped by user.

Min. curve

The pump is running at a set minimum speed value. See fig. 24.

For instance, this operating mode can be used during periods with a very small flow requirement.

Max. curve

The pump is running at a set maximum speed value.

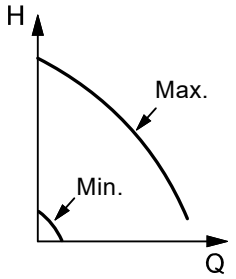


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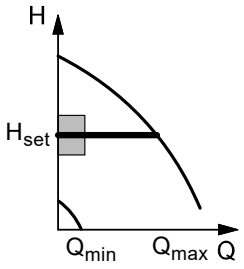
Fig. 24 Min. and max. curves

Control mode

The CU331SP has been developed specifically to operate submersible pumps in Constant Pressure mode. This Closed-Loop control mode uses an analog pressure transducer to provide pressure feedback to the drive.

Constant pressure with stop function

The outlet pressure is kept constant at high flow rate (Q > Qmin). On/off operation at low flow rate. See fig. 25.



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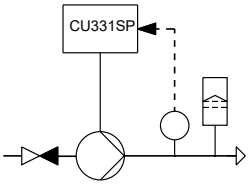

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Fig. 25 Constant pressure with stop function

The pump is controlled according to a constant pressure measured after the pump. This means that the pump offers a constant pressure in the Q-range of Q_{min} to Q_{max}, represented by the horizontal line in the QH diagram.

Setting the setpoint by means of the OPERATION menu

The setpoint can be set or changed during operation using the setpoint display in the "OPERATION" menu shown below. It is not necessary to run the start guide to change the setpoint.

Low flow and stop functions

The pump will check the flow regularly by reducing the speed for a short time. If there is no or only a small change in pressure, this means that there is low flow.

The speed will be increased until the stop pressure (actual setpoint + 0.5 x ΔH) is reached and the pump will stop after a few moments. The pump will restart at the latest when the pressure has fallen to the start pressure (actual setpoint - 0.5 x ΔH).

Operating conditions for the stop function

It is only possible to use the stop function if the system incorporates a pressure sensor, a non-return valve and a diaphragm tank.

The non-return valve must always be installed before the pressure sensor.

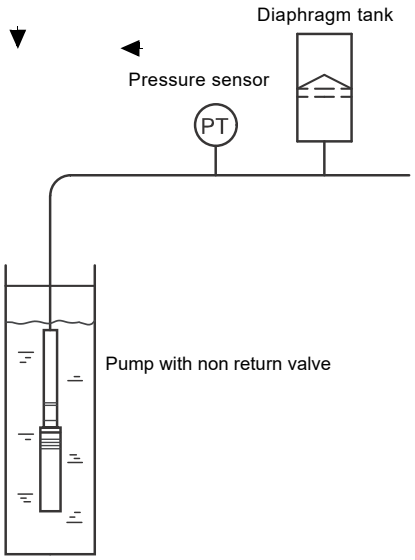

Fig. 26 Position of the pressure sensor and diaphragm tank

Diaphragm tank

The stop function requires a diaphragm tank of a certain minimum size. The tank must be installed as close as possible after the pump and the precharge pressure must be 0.7 x actual setpoint.

Recommended diaphragm tank size:

Rated flow of pump [gpm (m^3/h)]	Typical diaphragm tank size [gal (l)]
0-26 (0-6)	2 (7.5)
27-105 (7-24)	4 (15.1)

If a diaphragm tank of the above size is installed in the system, the factory setting of ΔH is the correct setting.

If the tank installed is too small, the pump will start and stop too often.

Setting the direction of rotation

The start-up guide is started the first time the CU331SP is connected to supply voltage. Then while going through the start-up guide, the CU331SP tests and sets the correct direction of rotation without changing the cable connections to the motor.

The correct direction of rotation can be set in these ways:

- automatic setting.
- manual setting when the direction of rotation is not visible.

Automatic setting

The CU331SP automatically tests and sets the correct direction of rotation without changing the cable connections.

Automatic setting requires a sensor.

This test is not suitable for all pump types and will in certain cases not be able to determine for certainty the correct direction of rotation. In these cases, the CU331SP changes over to manual setting where the direction of rotation is determined on the basis of the installer's observations.

Manual setting when the direction of rotation is not visible

The correct direction of rotation is set manually without changing the cable connections. This requires that it is possible to observe the head or flow rate.

Status functions

The CU331SP shows the following data:

- power consumption
- operating hours
- measured value
- speed
- input power
- motor current.

The status information can be shown in the display.

Power consumption

The value of the power consumption is an accumulated value calculated from the pump's startup date and cannot be reset. No additional sensor is required.

Operating hours

The value of operating hours is an accumulated value calculated from the pump's startup date and cannot be reset. No additional sensor is required.

Measured value

Sensor display will show the actual pressure as received from the pressure transducer.

Speed

Display will show the motor speed in RPM's (calculated).

Input power

Display will show the power consumption in kW.

Motor current

Display will show the actual motor current being used.

Logging functions

Alarm and warning log

The latest five alarms and five warnings are logged with a timestamp corresponding to the power-on time after the fault has occurred. The alarm and warning log can be shown directly on the display.

See section *Warning and alarm list* on page 48.

Signal relays

The table shows the function of the signal relays.

Type	Function
Relay 1	• Pump running
Relay 2	• Alarm

See also fig. 27.

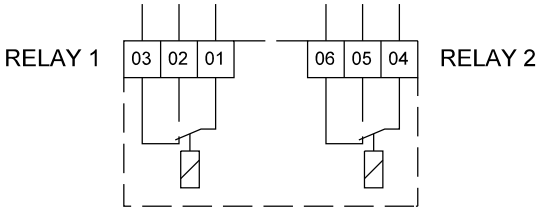

Fig. 27 Terminals for signal relays (normal state, not activated)

Terminal		Function
C1	C2	Common
NO 1	NO 2	Normally open contact
NC1	NC2	Normally closed contact

CU331SP installation

Mechanical installation

The individual CU331SP cabinet sizes are characterized by their enclosures. The table in section *CU331SP technical data* on page 49 shows the relationship of enclosure class and enclosure type.

Reception and storage

Check on receipt that the packaging is intact, and the unit is complete. In case of damage during transport, contact the transport company to file a claim.

Note that the CU331SP is delivered in a packaging which is not suitable for outdoor storage.

Transportation and unpacking

The CU331SP must only be unpacked at the installation site to prevent damage during the transport to the site.

The packaging contains accessory bag(s), documentation and the unit itself. See fig. 28.

Fig. 28 CU331SP packaging

Space requirements and air circulation

CU331SP units can be mounted side by side, but as a sufficient air circulation is required for cooling these requirements must be met:

- Sufficient free space above and below the CU331SP
- Ambient temperature up to 122°F (50 °C)
- Hang the CU331SP directly on the wall, or fit it with a back plate. See fig. 29.

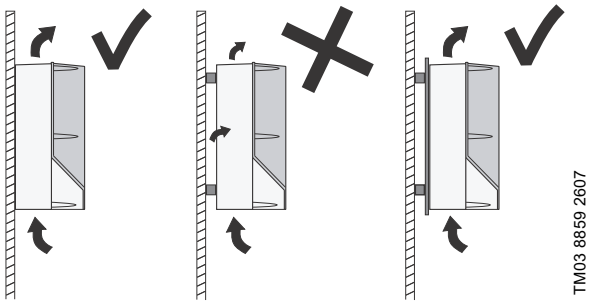

Fig. 29 CU331SP hung directly on the wall or fitted with a back plate

Required free space above and below the CU331SP:

Enclosure	Space [in (mm)]
B1	7.9 (200)

For information about enclosure, see section *Enclosure* on page 49.

Mounting

The CU331SP must be mounted securely on a firm surface. Ensure that screws are sized appropriately for the weight of the CU331SP (approximately 60 lbs) and anchored securely to the mounting surface.

1. Mark and drill holes. See fig. 30; also see section *Main dimensions and weight* on page 49.
2. Fit the screws, but leave loose. Mount the CU331SP, and tighten the four screws.

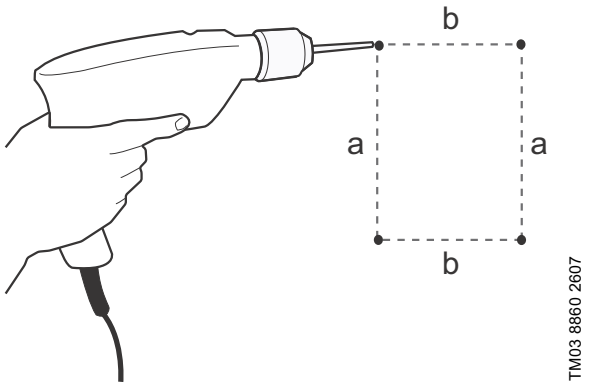

Fig. 30 Drilling holes for mounting

CU331SP electrical connection

Ensure the correct grounding and protection procedures are used for the installation. Before the electrical installation, ensure that the power supply and other voltage inputs are switched off.

Electrical protection

Protection against electric shock, indirect contact

The leakage current to ground exceeds 3.5 mA, and a reinforced ground connection is required.

Protective conductors must always have a yellow/green (PE) or yellow/green/blue (PEN) color marking.

Instructions according to EN IEC 61800-5-1:

- The CU331SP must be stationary, installed permanently and connected permanently to the mains supply.
- The ground connection must be carried out with duplicate protective conductors or with a single reinforced protective conductor with a cross-section of minimum AWG 7 (10 mm^2).

Protection against short-circuit, fuses

The CU331SP and the supply system must be protected against short-circuit.

Grundfos requires that the back-up fuses are used for protection against short-circuit.

The CU331SP offers complete short-circuit protection in case of a short-circuit on the motor output.

Additional protection

The leakage current to ground exceeds 3.5 mA.

If the CU331SP is connected to an electrical installation where an earth leakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols:

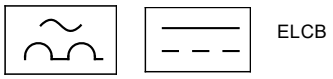

Fig. 31 Circuit breaker **type B**

The total leakage current of all the electrical equipment in the installation must be taken into account.

During start and in asymmetrical supply systems, the leakage current can be higher than normal and may cause the ELCB to trip.

Motor protection

The motor requires no external motor protection. The CU331SP protects the motor against thermal overloading and blocking.

Protection against overcurrent

The CU331SP has an internal overcurrent protection for overload protection on the motor output.

Protection against mains voltage transients

The CU331SP is protected against mains voltage transients according to EN 61800-3, second environment.

Mains and motor connection

The supply voltage and frequency are marked on the CU331SP nameplate. Make sure that the CU331SP is suitable for the power supply of the installation site.

The maximum output voltage of the CU331SP is equal to the input.

Example: if the supply voltage is rated at 208V choose a 208V motor for operation.

Mains switch

A mains switch can be installed before the CU331SP according to local regulations. See fig. 32.

Wiring diagram

The wires in the terminal box must be as short as possible. Excepted from this is the ground wire, which must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

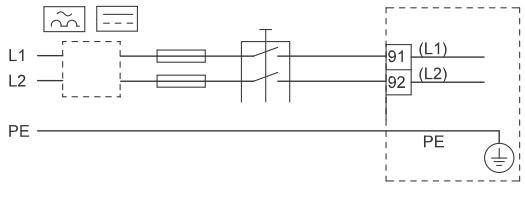

Fig. 32 CU331SP wiring diagram

Terminal		Function
91	(L1)	Single-phase supply
92	(L2)	
95/99	(PE)	Ground connection

For single-phase connection, use L1 and L2.

Mains connection

Check that mains voltage and frequency correspond to the values on the nameplate of the CU331SP and the motor.

1. Connect the ground wire to terminal 95 (PE). See fig. 33.
2. Connect the power leads to the terminals 91 (L1), 92 (L2).
3. Fix the mains cable with a cable clamp.

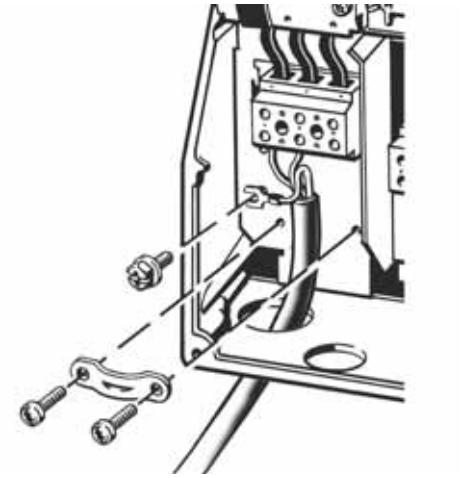

Fig. 33 Mains connection

CU331SP drive is usable with 3-phase input power by connecting leads to 91 (L1), 92 (L2), and 93 (L3).

Motor connection

The motor cable must be screened for the CU331SP to meet EMC requirements.

1. Connect the ground wire to terminal 99 (PE). See fig. 34.
2. Connect the motor leads to the terminals 96 (U), 97 (V), 98 (W).
3. Fix the screened cable with a cable clamp.

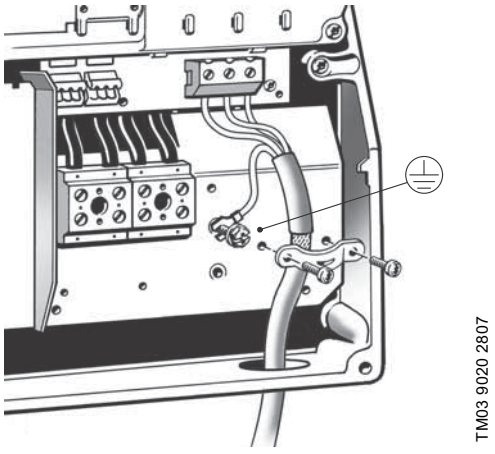

Fig. 34 Motor connection

The cable screen must be exposed and in physical contact with the mounting plate and clamp.

Connecting the signal terminals

As a precaution, signal cables must be separated from other groups by reinforced insulation in their entire lengths.

If no external on/off switch is connected, short-circuit terminals 18 and 20 using a short wire.

Connect the signal cables according to the guidelines for good practice to ensure EMC-correct installation. See section *EMC-correct installation* on page 46.

- Use screened signal cables with a conductor cross-section of min. AWG 20 (0.5 mm^2) and max. AWG 16 (1.5 mm^2).
- Use a 3-conductor screened bus cable in new systems.

Minimum connection, signal terminal

Operation is only possible when the terminals 18 and 20 are connected, for instance by means of an external on/off switch or a short wire.

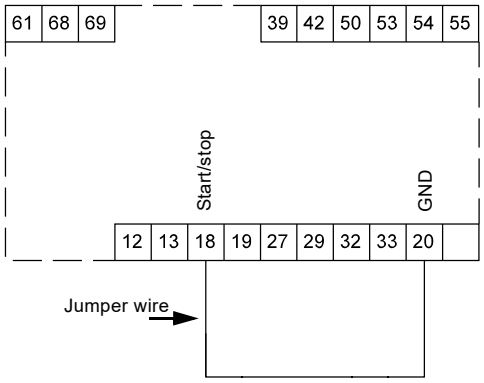

Fig. 35 Required minimum connection, signal terminal

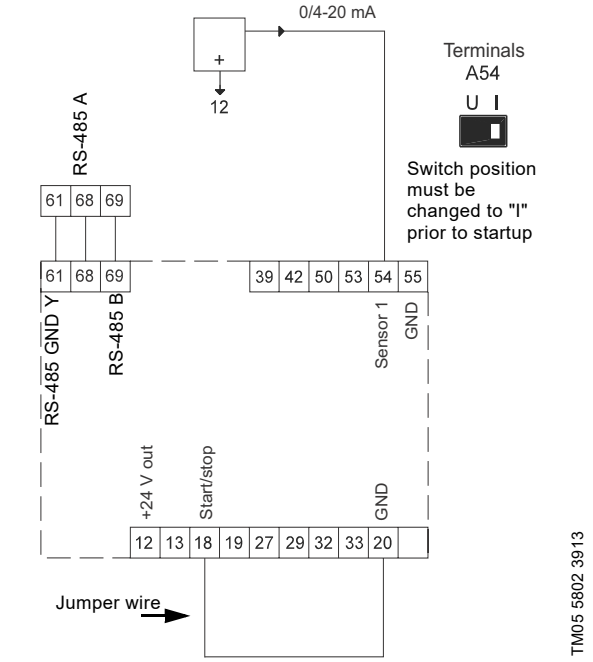

Fig. 36 Wiring diagram for CU331SP

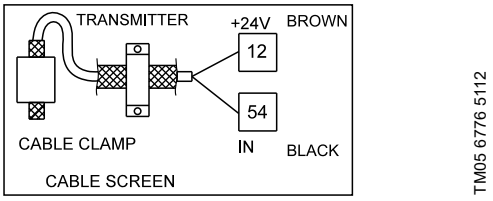

Fig. 37 Sensor wiring diagram

Setting the analog input 54

The contact A54 is positioned behind the control panel and is used for setting the signal type of the analog input.

The factory setting of the inputs is voltage signal "U". This setting must be changed to "I" prior to starting the CU331SP. Be sure the power supply is switched off.

Remove the control panel to set the contact. See fig. 38.

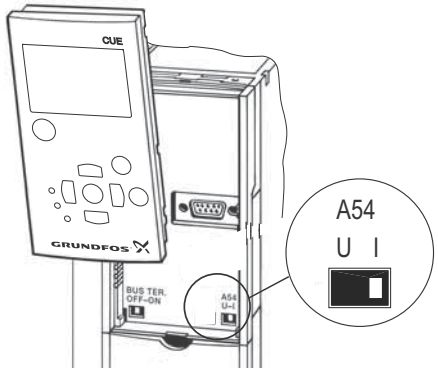

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Fig. 38 Setting contact A54 to current signal "I"

Terminal key

Terminal	Type	Function
12	+24 V out	Supply to sensor
18	DI 1	Digital input, start/stop
20	GND	Common frame for digital inputs
55	GND	Common frame for analog inputs
54	AI 2	Sensor input, sensor 1, 0/4-20 mA
61	RS-485 GND Y	GENIbus, frame
68	RS-485 A	GENIbus, signal A (+)
69	RS-485 B	GENIbus, signal B (-)

The RS-485 screen must be connected to frame.

Access to signal terminals

All signal terminals are behind the terminal cover of the CU331SP front. Remove the terminal cover as shown in fig. 39.

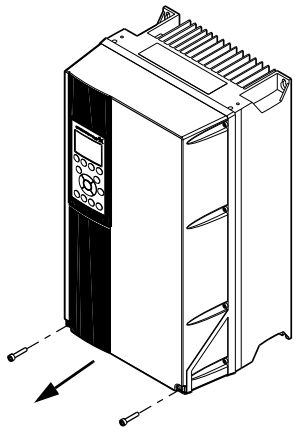

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Fig. 39 Access to signal terminals

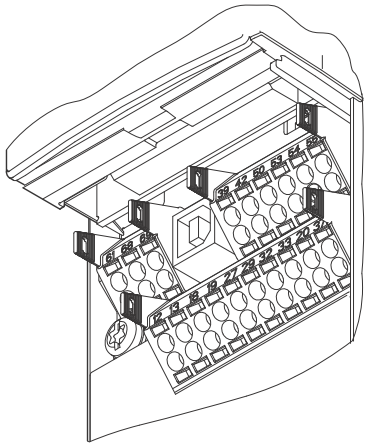

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Fig. 40 Signal terminals

Fitting the conductor

1. Remove the insulation at a length of 0.35 to 0.40 inches (9 to 10 mm).
2. Insert a screwdriver with a tip of maximum 0.015 x 0.1 in (0.4 x 2.5 mm) into the square hole.
3. Insert the conductor into the corresponding round hole. Remove the screwdriver. The conductor is now fixed in the terminal.

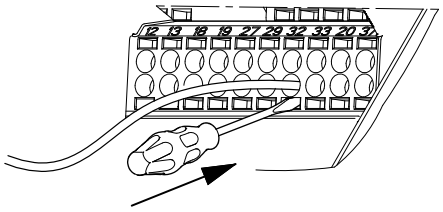

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Fig. 41 Fitting the conductor into the signal terminal

Connecting the signal relays

As a precaution, signal cables must be separated from other groups by reinforced insulation in their entire lengths.

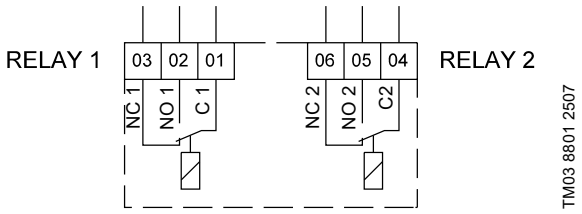


Fig. 42 Terminals for signal relays (normal state, not activated)

Terminal		Function
C 1	C 2	Common
NO 1	NO 2	Normally open contact
NC 1	NC 2	Normally closed contact

Signal relay

The signal relays on the CU331SP are predefined as follows:

Relay 1: Pump running

Relay 2: Alarm

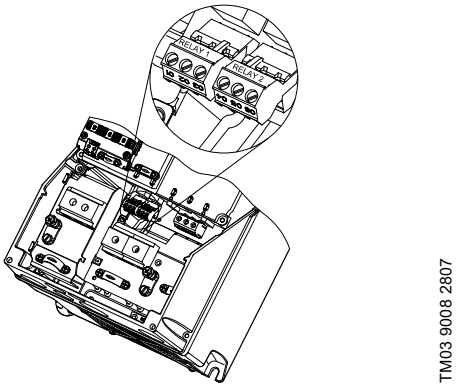


Fig. 43 Terminals for relay connection

EMC-correct installation

This section gives guidelines for good practice when installing the CU331SP. Follow these guidelines to meet EN 61800-3, first environment.

- Use only motor and signal cables with a braided metal screen in applications without output filter.
- There are no special requirements to supply cables, apart from local requirements.
- Leave the screen as close to the connecting terminals as possible. See fig. 44.
- Avoid terminating the screen by twisting the ends. See fig. 45. Use cable clamps or EMC screwed cable entries instead.
- Connect the screen to frame at both ends for both motor and signal cables. If the controller has no cable clamps, connect only the screen to the CU331SP.
- Avoid unscreened motor and signal cables in electrical cabinets with variable frequency drives.
- Make the motor cable as short as possible in applications without output filter to limit the noise level and minimize leakage currents.
- Screws for frame connections must always be tightened whether a cable is connected or not.
- Keep main cables, motor cables and signal cables separated in the installation, if possible.

Other installation methods may give similar EMC results if the above guidelines for good practice are followed.

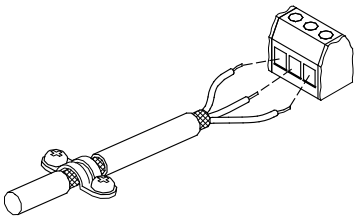


Fig. 44 Example of stripped cable with screen

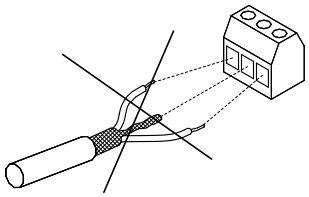


Fig. 45 Do not twist the screen ends

Line disturbance and transient protection

To protect itself from AC line voltage disturbances, the CU331SP monitors the input power supply and interrupts drive operation in the event of phase loss or imbalance. Transients on the AC line are suppressed by MOVs as well as zener diodes for extreme transients. The CU331SP meets VDE 0160 (European standard - 2.3 x line voltage for 1.3 msec) for transient protection.

RFI filters

To meet the EMC requirements, the CU331SP comes with the following types of built-in radio frequency interference filter (RFI).

Voltage	Typical shaft power P2	RFI filter type
1 x 200-240 V*	1.5 - 10 hp	C1

* Single-phase input - three-phase output.

Description of RFI filter types

C1: For use in domestic areas.

RFI filter types are according to EN61800-3

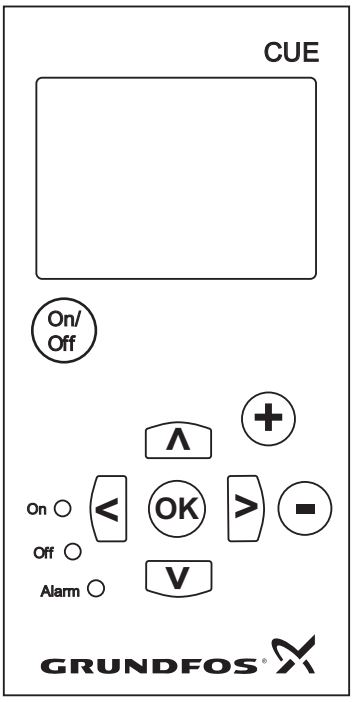
Control panel

The on/off button on the control panel does not disconnect the CU331SP from the power supply and must therefore not be used as a safety switch.

On/ Off

The On/Off button has the highest priority. In "Off" condition, pump operation is not possible.

The control panel is used for local setting of the CU331SP. The functions available are preset in the CU331SP.



TM03 8719 2507

Fig. 46 Control panel of the CU331SP

Editing buttons

Button	Function
On/ Off	Makes the pump ready for operation/starts and stops the pump.
OK	Saves changed values, resets alarms and expands the value field.
+ -	Changes values in the value field.

Navigating buttons

Button	Function
< >	Navigates from one menu to another. When the menu is changed, the display shown will always be the top display of the new menu.
∧ ∨	Navigates up and down in the individual menu.

Adjusting the display contrast

Press OK and + for darker display.

Press OK and - for brighter display.

Button lock

To lock the buttons on the panel press and hold the up and down arrows simultaneously.

Indicator lights

The operating condition of the pump is indicated by the indicator lights on the front of the control panel. See fig. 46.

The table shows the function of the indicator lights.

Indicator light	Function
On (green)	The pump is running or has been stopped by a stop function.
	If flashing, the pump has been stopped by the user (CU331SP menu), external start/stop or bus.
Off (orange)	The pump has been stopped with the on/off button.
Alarm (red)	Indicates an alarm or a warning.

Displays, general terms

Figures 47 and 48 show the general terms of the display.

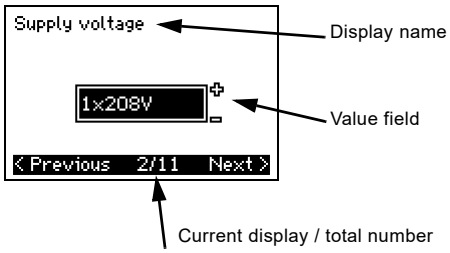


Fig. 47 Example of display in the start-up guide

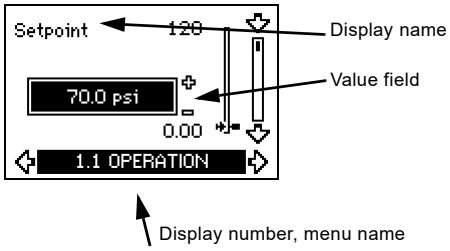


Fig. 48 Example of display in the user menu

Warning and alarm list

	Code and display text	Status: Warning	Status: Alarm	Status: Locked alarm	Operating mode	Resetting
1	Too high leakage current			•	Stop	Man.
2	Mains phase failure		•		Stop	Aut.
3	External fault		•		Stop	Man.
16	Other fault		•		Stop	Aut.
				•	Stop	Man.
32	Overvoltage	•			-	Aut.
			•		Stop	Aut.
40	Undervoltage	•			-	Aut.
			•		Stop	Aut.
48	Overload		•		Stop	Aut.
				•	Stop	Man.
49	Overload		•		Stop	Aut.
55	Overload	•			-	Aut.
			•		Stop	Aut.
57	Dry running		•		Stop	Aut.
64	Too high CU331SP temperature		•		Stop	Aut.
89	Sensor 1 outside range		•		[1]	Aut.
96	Setpoint signal outside range		•		[1]	Aut.
155	Inrush fault		•		Stop	Aut.
241	Motor phase failure	•			-	Aut.
			•		Stop	Aut.

[1] In case of an alarm, the CU331SP will change the operating mode depending on the pump type. Warning is reset in display 3.20.

CU331SP technical data

Enclosure

All CU331SP enclosures are size B1.

The enclosure rating can be either IP55 / TYPE 12 or IP66 / TYPE 4X.

Main dimensions and weight

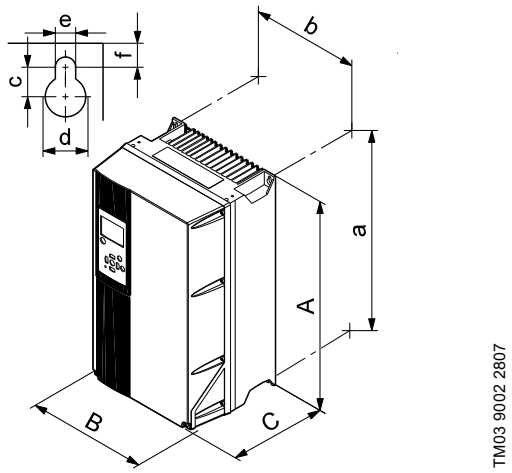


Fig. 49 Enclosure B1

Note: Dimensions shown here for the CU331SP enclosures are maximum height, width and depth.

Enclosure	Height [in]		Width [in]		Depth [in]
	A	a	B	b	C
B1	18.9	17.9	9.5	8.3	10.2

Enclosure	Screw holes [in]				Weight [lbs]
	c	d	e	f	
B1	0.47	0.75	0.35	0.35	50.7

Surroundings

Relative humidity	5-95 % RH
Ambient temperature	Max. 122 °F (50 °C)
Average ambient temperature over 24 hours	Max. 113 °F (45 °C)
Minimum ambient temperature at full operation	32 °F (0 °C)
Minimum ambient temperature at reduced operation	14 °F (-10 °C)
Temperature during storage and transportation	-13 to 150 °F (-25 to 65 °C)
Storage duration	Max. 6 months
Maximum altitude above sea level without performance reduction	3280 ft (1000 m)
Maximum altitude above sea level with performance reduction	9840 ft (3000 m)

The CU331SP comes in a packaging which is not suitable for outdoor storage.

Terminal tightening torques

Enclosure	Tightening torque [ft-lb]			
	Mains	Motor	Earth	Relay
B1	1.3	1.3	2.2	0.4

Cable length

Maximum length, screened motor cable	500 ft (152 m)
Maximum length, unscreened motor cable	1000 ft (305 m)
Maximum length, signal cable	1000 ft (305 m)

Fuses and cable cross-section

Always comply with national and local regulations as to cable cross-sections.

Cable cross-section to signal terminals

Maximum cable cross-section to signal terminals, rigid conductor	AWG 14
Maximum cable cross-section to signal terminals, flexible conductor	AWG 18
Minimum cable cross-section to signal terminals	AWG 20

Non-UL fuses and conductor cross-section to mains and motor

Typical shaft power P2 [Hp]	Maximum fuse size [A]	Fuse type	Maximum conductor cross section[1]	
			[AWG]	[mm^2]
2	40	gG	7	10
3	40	gG	7	10
5	80	gG	7	10

1) Screened motor cable, unscreened supply cable.

UL fuses and conductor cross-section to mains and motor

Typical shaft power P2 [Hp]	Maximum fuse size [A]	Bussmann RK1	Maximum conductor cross section[1] [AWG}
2	40	KTN-R40	7
3	40	KTN-R40	7
5	80	KTN-R80	7

1) Screened motor cable, unscreened supply cable.

Inputs and outputs

Mains supply (L1, L2)

Supply voltage	200-240 V ± 10 %
Supply frequency	60 Hz
Maximum temporary imbalance between phases	3 % of rated value
Leakage current to earth	> 3.5 mA
Number of cut-ins	Max. 1 time/min.

Do not use the power supply for switching the CU331SP on and off.

Motor output (U, V, W)

Output voltage	0-100 %[1)]
Output frequency	0-60 Hz
Switching on output	Not recommended

1) Output voltage in % of supply voltage.

RS-485 GENIbus connection

Terminal number	68 (A), 69 (B), 61 GND (Y)

The RS-485 circuit is functionally separated from other central circuits and galvanically separated from the supply voltage (PELV).

Digital inputs

Terminal number	18
Voltage level	0-24 VDC
Voltage level, open contact	> 19 VDC
Voltage level, closed contact	< 14 VDC
Maximum voltage on input	28 VDC
Input resistance, R_i	Approx. 4 kΩ

All digital inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

Signal relays

Relay 01, terminal number	1 (C), 2 (NO), 3 (NC)
Relay 02, terminal number	4 (C), 5 (NO), 6 (NC)
Maximum terminal load (AC-1)[1)]	240 VAC, 2 A
Maximum terminal load (AC-15)[1)]	240 VAC, 0.2 A
Maximum terminal load (DC-1)[1)]	50 VDC, 1 A
Minimum terminal load	24 VDC 10 mA 24 VAC 20 mA

1) IEC 60947, parts 4 and 5.

C Common

NO Normally open

NC Normally closed

The relay contacts are galvanically separated from other circuits by reinforced insulation (PELV).

Analog input

Terminal number	54
Current signal	A54 = "I"[1)]
Current range	0-20, 4-20 mA
Input resistance, R_i	Approx. 200 Ω
Maximum current	30 mA
Maximum fault, terminals 53, 54	0.5 % of full scale

1) The factory setting is voltage signal "U".

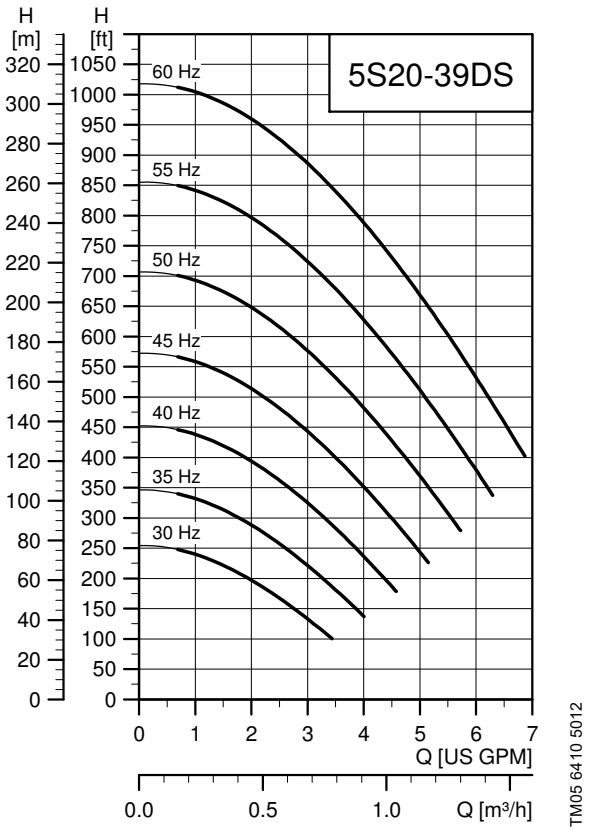
All analog inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

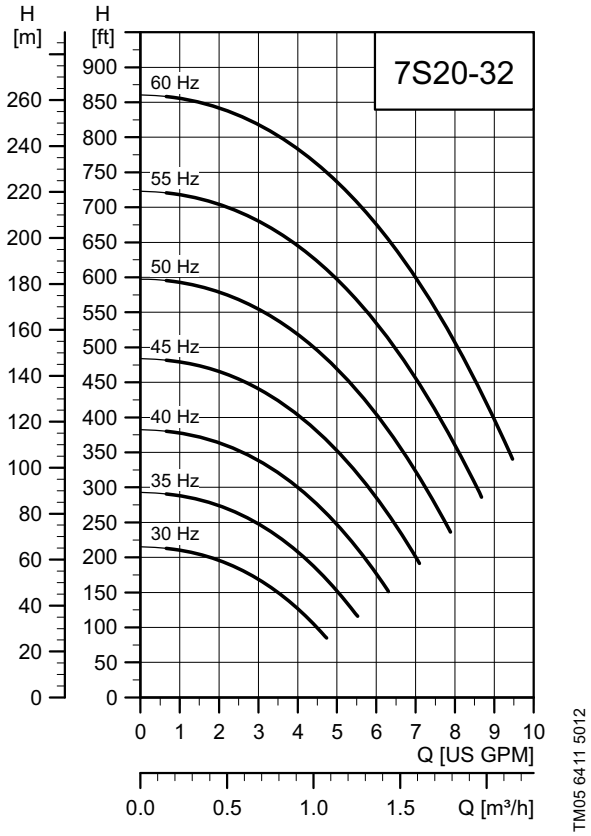
Sound pressure level

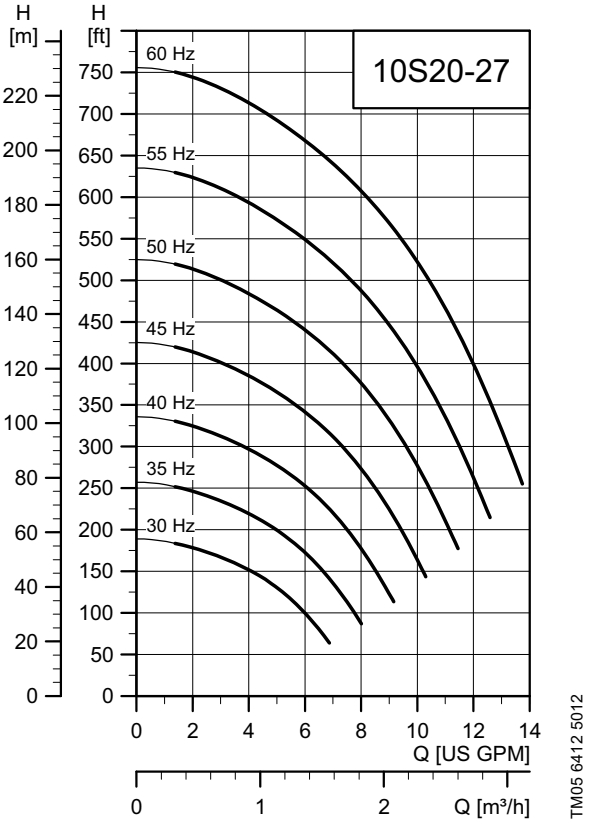
The sound pressure of the CU331SP is maximum 70 dB(A).

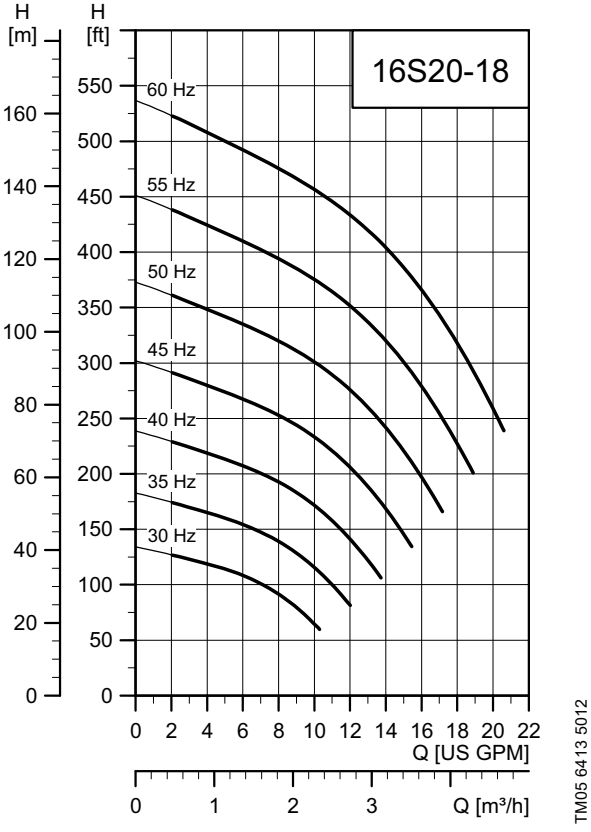
The sound pressure level of a motor controlled by a Variable frequency drive may be higher than that of a corresponding motor which is not controlled by a variable frequency drive.

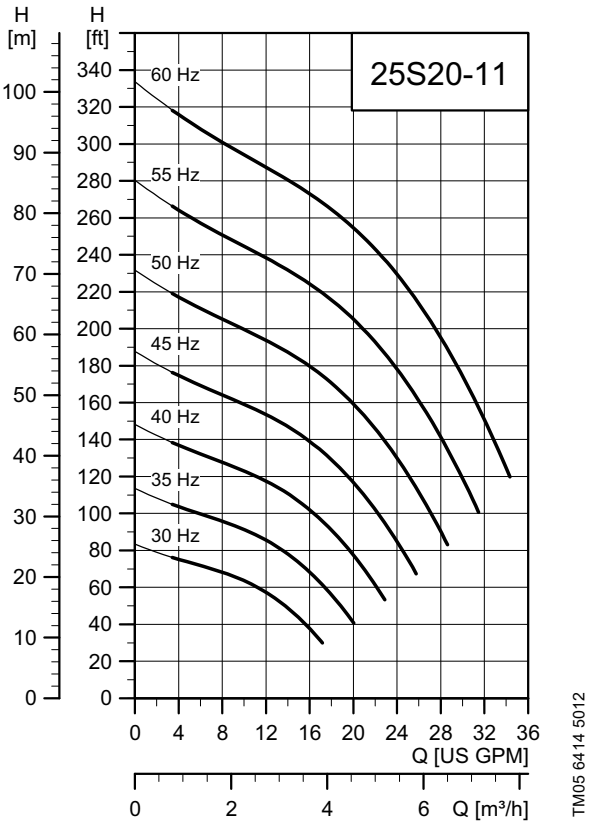
CU331SP curve charts

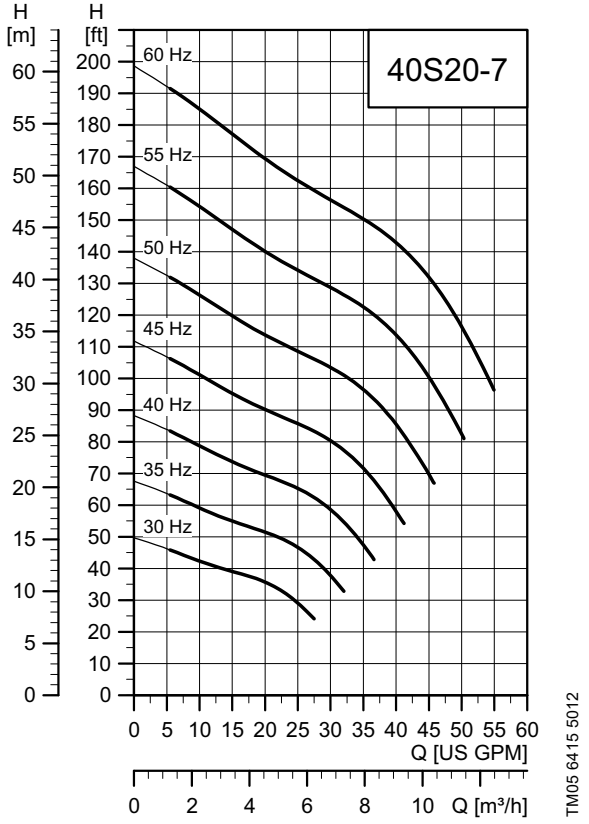


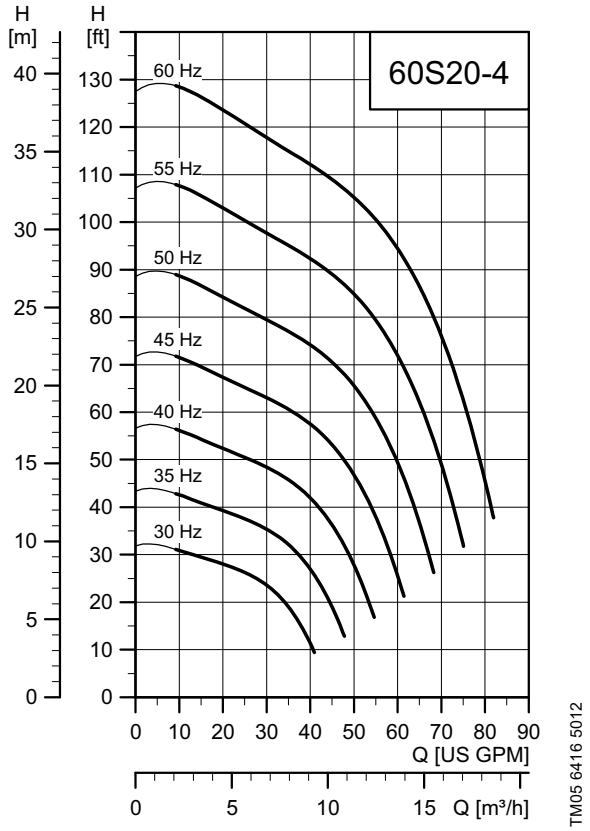


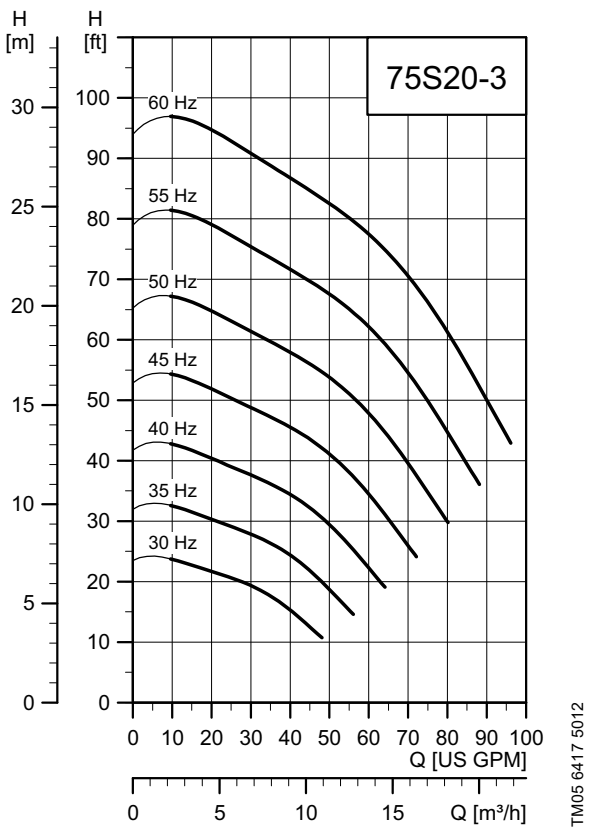


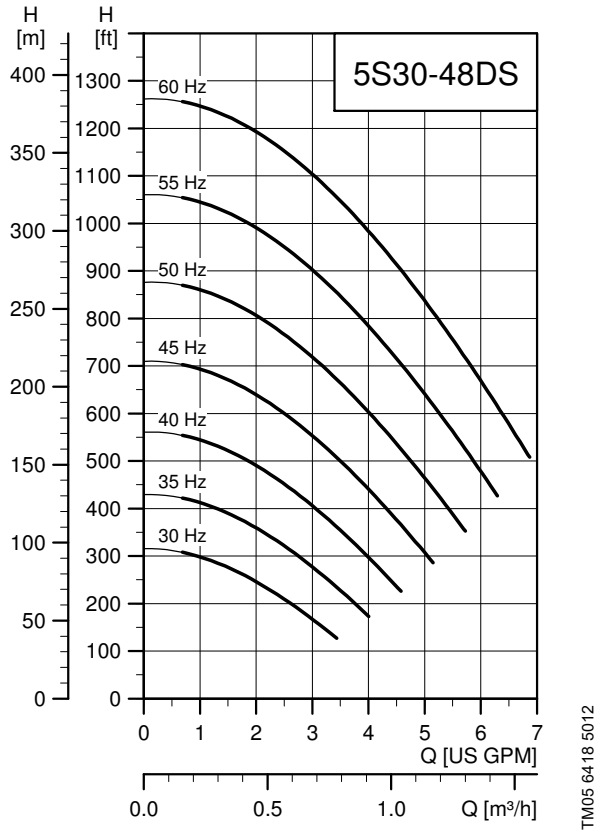


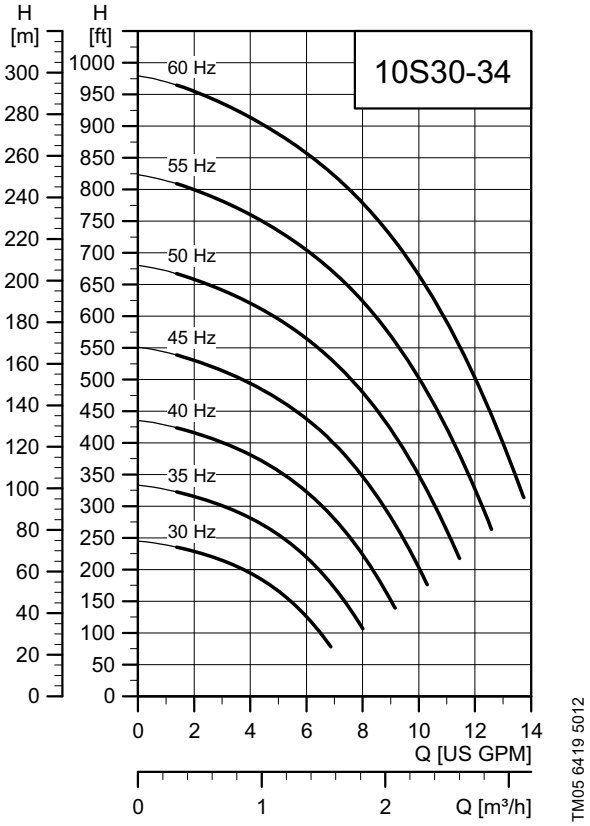

25S20-11
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6414 5012

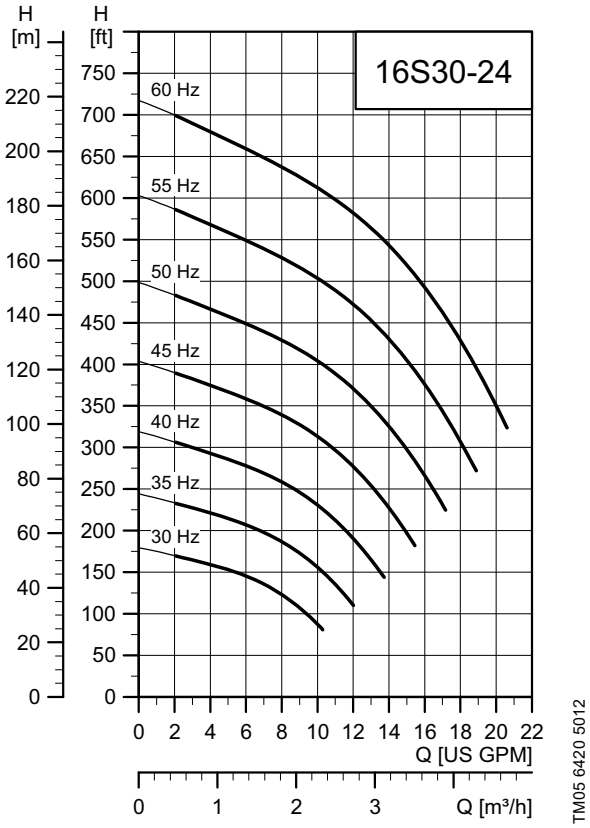

40S20-7
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6415 5012

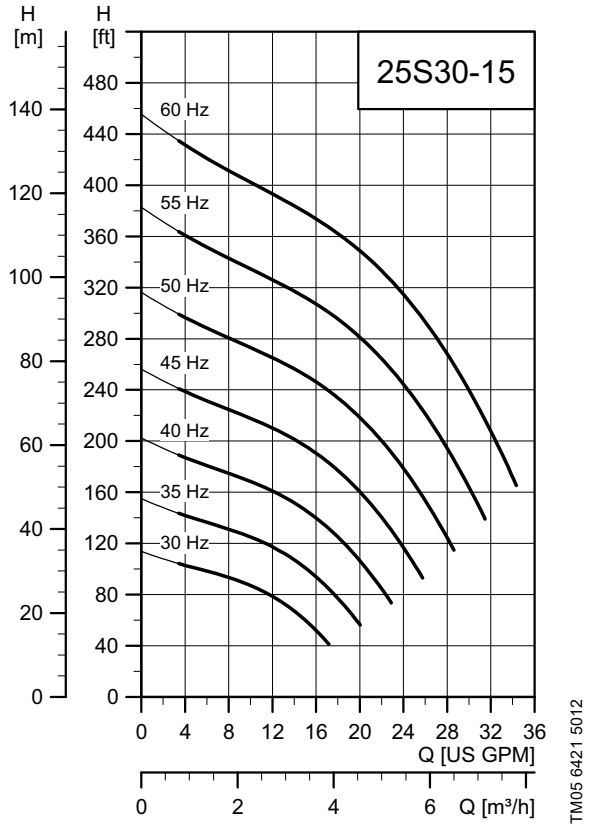

60S20-4
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6416 5012

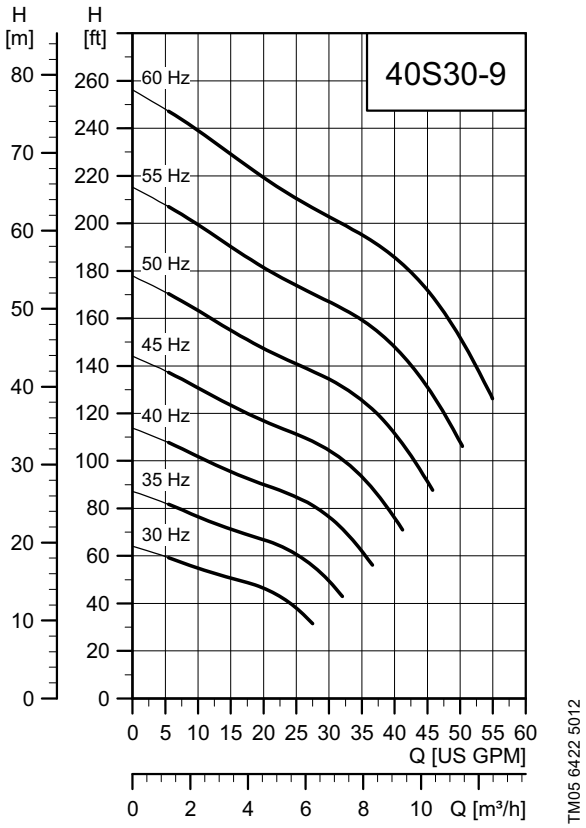

75S20-3
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6417 5012

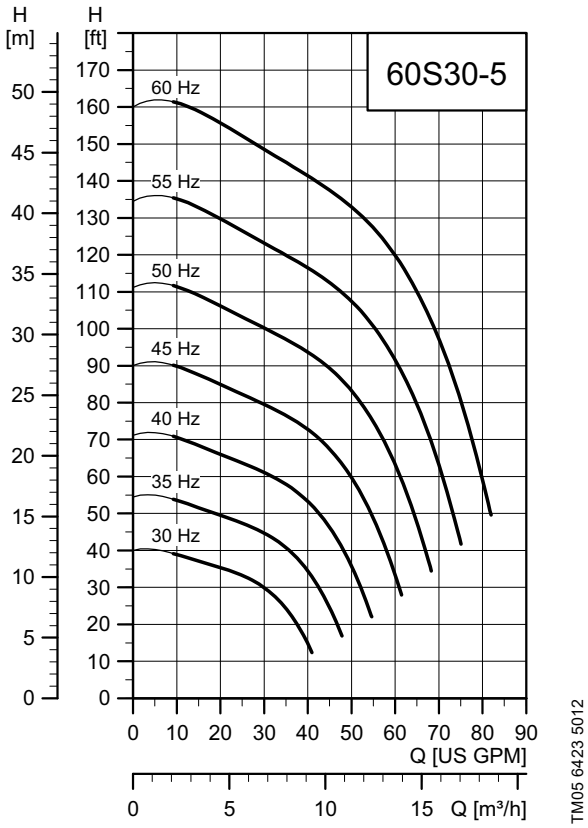

5S30-48DS
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6418 5012

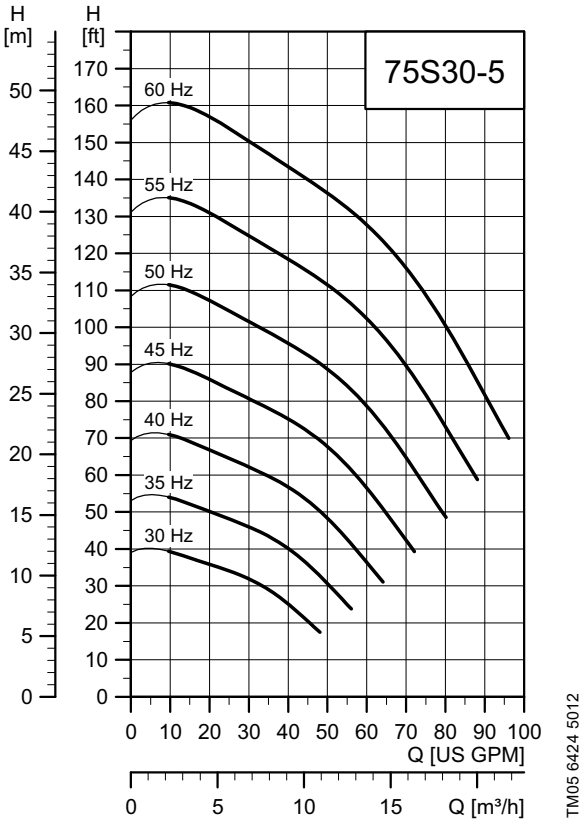

10S30-34
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6419 5012

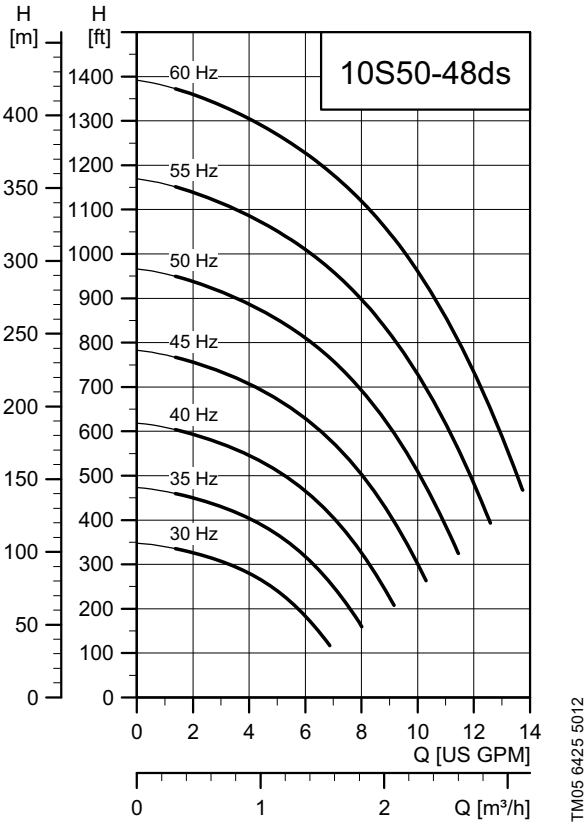

16S30-24
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6420 5012

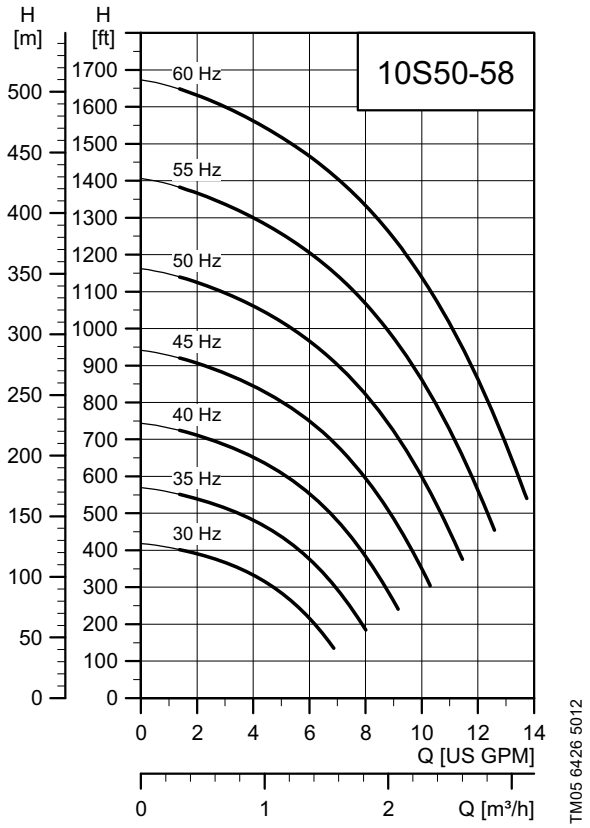

25S30-15
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6421 5012

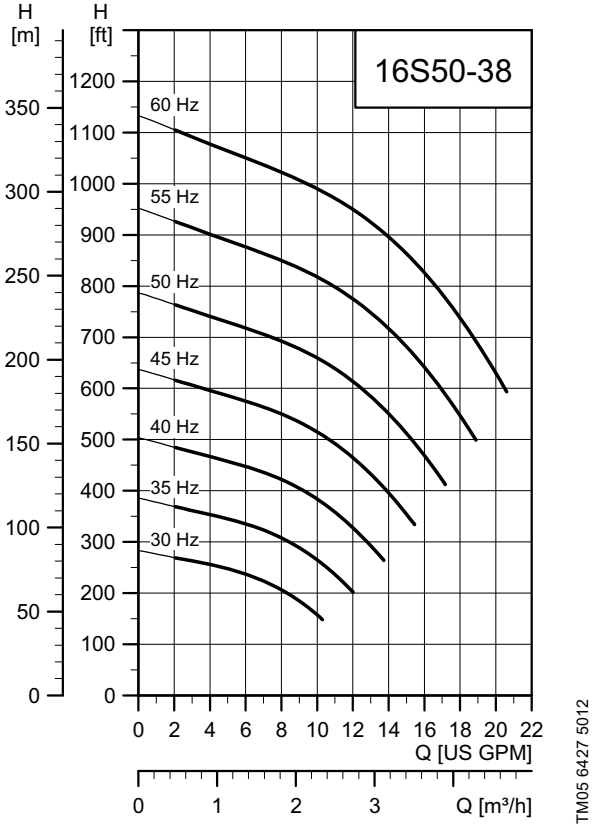

40S30-9
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6422 5012

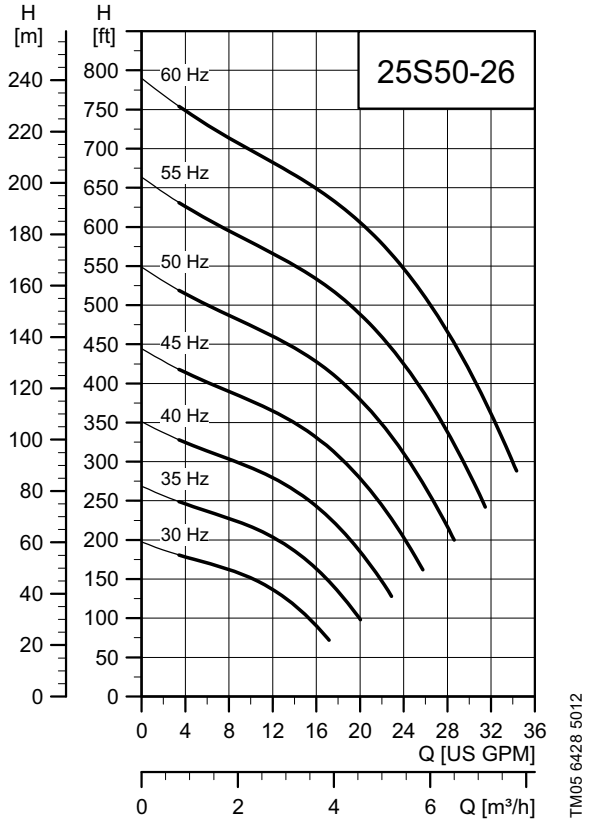

60S30-5
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6423 5012

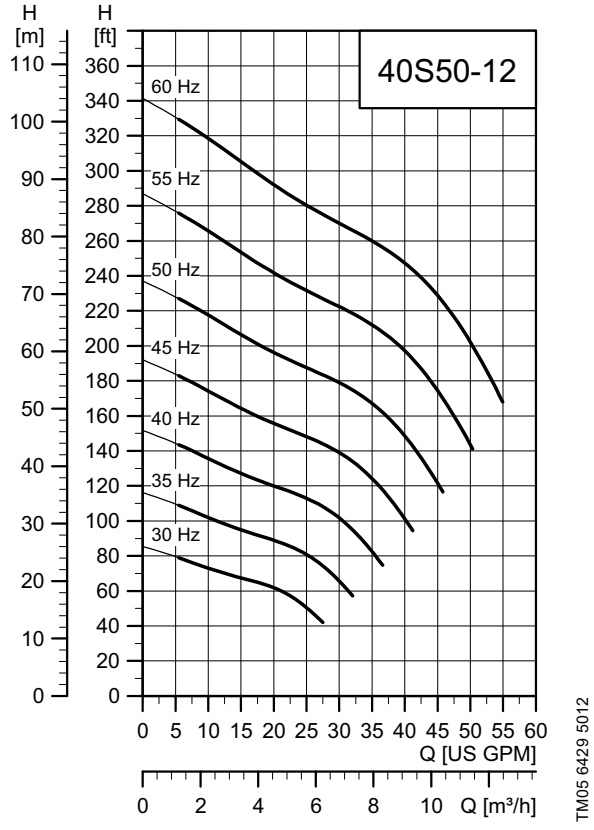

75S30-5
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6424 5012

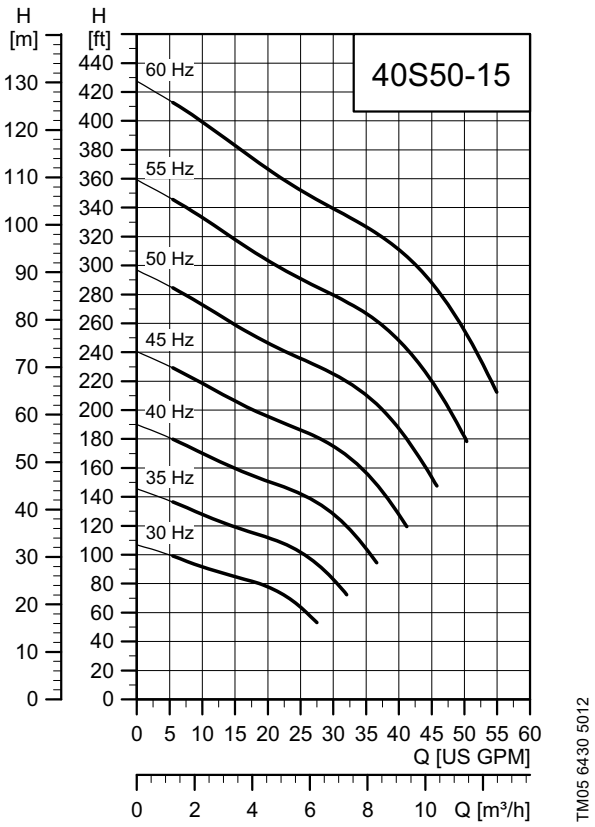

10S50-48ds
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6425 5012

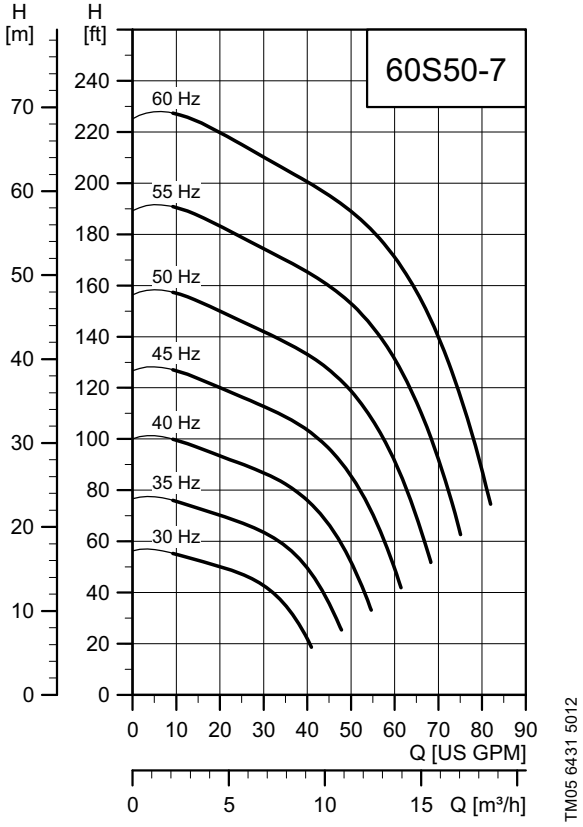

10S50-58
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6426 5012

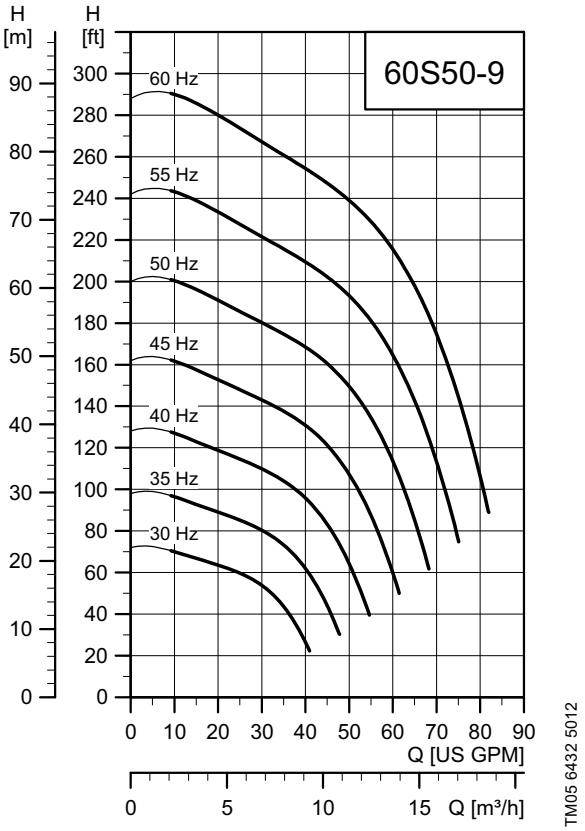

16S50-38
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6427 5012

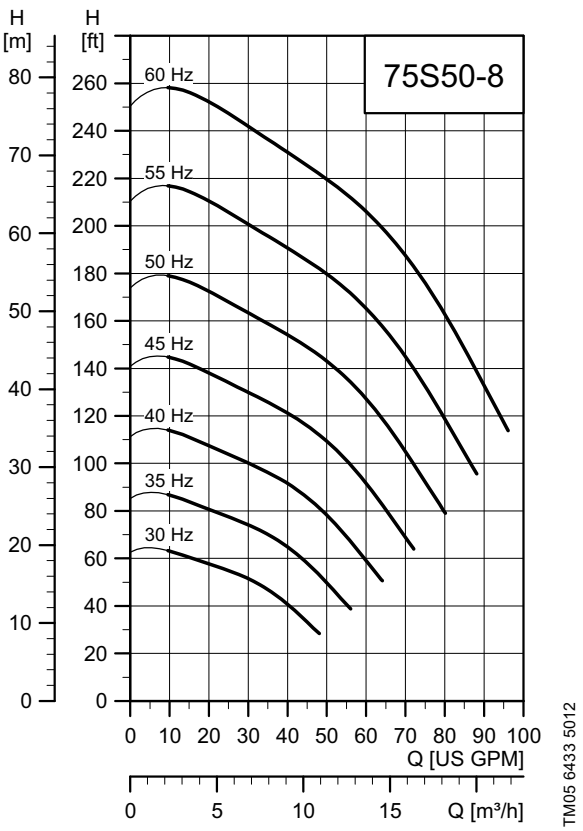

25S50-26
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6428 5012


40S50-12
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6429 5012


40S50-15
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6430 5012


60S50-7
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6431 5012


60S50-9
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6432 5012


75S50-8
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6433 5012

11. Accessories

CU 301 Constant Pressure System

TM04 7509 2110

Description	Product number
Constant Pressure Kit (CU 301 and Transducer)	96438895

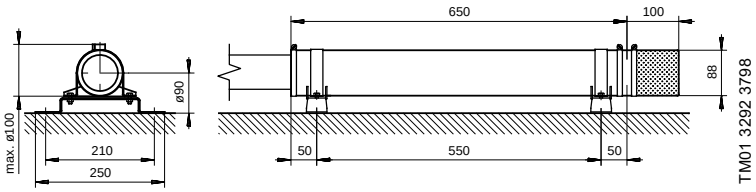
CU 300 Status Box & R100

TM04 7508 2110

Description	Product number
CU300 Status Box	96422776

Description	Product number
R100 (for wireless infrared communication with the CU 301 / CU 300)	96615297

SQ, SQE flow sleeves



TM01 3292 3798

Description	Product number
SQ, SQE flow sleeve, complete	98148594

12. Product data

Introduction

The Grundfos SP range of submersible pumps is renowned for high efficiency and reliability. SP pumps are ideal for a wide variety of applications and are made entirely of corrosion resistant stainless steel.

Grundfos SP pumps represent state-of-the-art hydraulic design. SP pumps are built to deliver optimum efficiency during periods of high demand, and they provide low long-term costs and high operating reliability regardless of the application.

The SP range offers high efficiency, high resistance to sand and other abrasives, motor burnout protection, and easy maintenance. A complete monitoring and control system is available for constant optimization of the pumping system.

TM06 4950 3315

Fig. 1 Grundfos SP pumps

Pump Energy Index

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

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

For PEI values there are two different versions:

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

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

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

Pump type	Pole	PEI_{CL} bare-shaft pump	PEI_{CL} pump with motor	PEI_{VL} pump with motor plus controller*	Impeller diameter [in (mm)]
25S	2	0.93	0.93	0.59	2.87 (72)
35S		0.85	0.87	0.54	2.88 (73)
45S		0.84	0.84	0.54	2.87 (72)
62S		0.88	0.88	0.54	2.78 (71)
77S		0.89	0.91	0.54	2.78 (71)
85S		0.82	0.85	0.52	3.49 (89)
150S		0.91	0.91	0.56	3.52 (89)
230S		0.92	0.92	0.54	3.87 (98)
300S		0.92	0.92	0.53	3.90 (99)

*Grundfos CUE continuous controls.

Applications

Grundfos large SP submersible pumps are suitable for:

- Groundwater supply to waterworks
- irrigation in horticulture and agriculture
- groundwater lowering (dewatering)
- pressure boosting
- industrial applications
- domestic water supply.

Pumped liquids

Grundfos SP pumps are suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibers.

SP offers stainless steel construction which ensures good wear resistance and a reduced risk of corrosion where the water has minor chloride content.

Optional, upgraded stainless steel construction is available for pumping more aggressive liquids:

- A complete range of zinc anodes for cathodic protection is available. See page 196 for applications, for example, sea water applications.
- For slightly polluted liquids, such as containing oil, Grundfos offers a complete range of stainless steel SP NE pumps with all rubber parts made of FKM.

Features and benefits

Grundfos SP submersible pumps offer these features and benefits:

- State-of-the-art hydraulics provide high efficiency and low operating costs
- 100 % stainless steel components inside and outside for long service life
- sand resistant
- resistant to aggressive water
- dry-running protection
- monitoring, protection and communication via
  - protection unit MP 204
  - Grundfos GO.

A wide pump range

Grundfos offers energy-efficient SP submersible pumps with a performance range of up to 1,400 gpm (318 m^3/h) and 2,100 ft (640 m) of head.

The pump range consists of many pump sizes, and each pump size is available with an optional number of stages to match any duty point.

High pump efficiency

Often pump efficiency is given less consideration than the price of a pump; however, owners who choose efficiency will find substantial savings in energy costs over time. See fig. 2 for an illustration of SP efficiencies in relation to flow rate.

Example

For example, a pump and motor with a 10 % higher efficiency than a cheaper, less efficient pump, can save its owner more than $80,000 over 10 years*.

* If producing 880 gpm at 325 ft of head for 10 years at 13.8 cents per kWh. U.S. kWh costs range from 6 cents to more than 20 cents, depending on region.

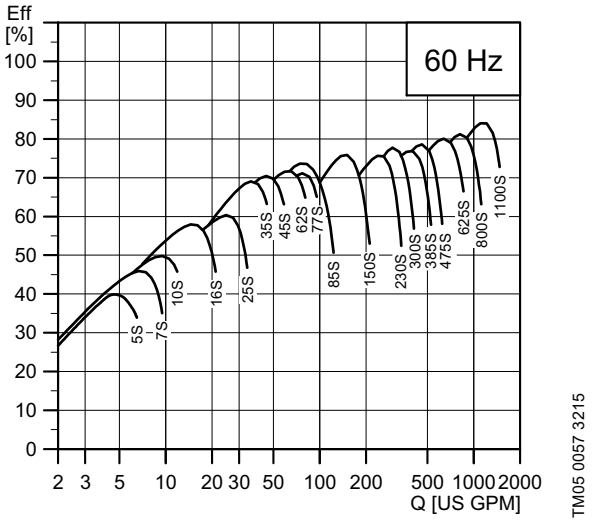


Fig. 2 SP pump and motor efficiencies in relation to flow rate

Pump design

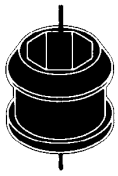
Grundfos SP submersible pumps feature components that contribute to the superior performance and durability of the range.

Lower installation costs

Stainless steel means low weight for ease in the handling of pumps, resulting in lower equipment costs and reduced installation and service time.

Bearings with sand channels

All bearings are water-lubricated and have a squared shape enabling sand particles, if any, to leave the pump together with the pumped liquid.

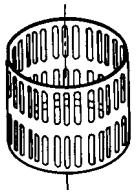


TM00 7301 1096

Fig. 3 Bearing

Inlet strainer

The inlet strainer prevents particles over a certain size from entering the pump.



TM00 7302 1096

Fig. 4 Inlet strainer

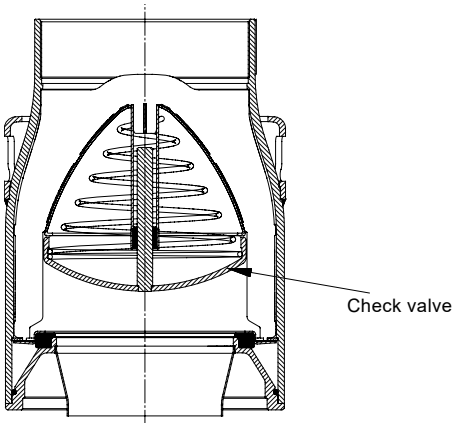
Check valve

All pumps are equipped with a reliable check valve in the valve casing preventing back flow in connection with pump stoppage.

Furthermore, the short closing time of the check valve means that the risk of destructive water hammer is reduced to a minimum.

The valve casing is designed for optimum hydraulic properties to minimize the pressure loss across the valve and thus to contribute to the high efficiency of the pump.

Note: As shown in fig. 5 the check valve is spring-assisted intended for vertical pump applications. When installing pump at an angle, installation requires an additional check valve installed in the outlet piping. This prevents misalignment or failure to seat the pump check valve at an angle. Additional check valves in outlet piping are sold separately.



TM01 2499 1798

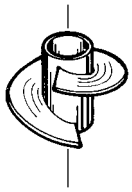
Fig. 5 Check valve

Priming screw

All Grundfos 4" pumps with radial impellers are fitted with a priming screw. Consequently, dry running is prevented because the priming screw will make sure that pump bearings are always lubricated.

Due to the semi-axial impellers of large SP pumps, this priming is provided automatically.

However, it applies to all pump types that if the water table is lowered to a level below the pump inlet, neither pump nor motor will be protected against dry running.



TM00 7304 1096

Fig. 6 Priming screw

Stop ring

The stop ring prevents damage to the pump during transport and in case of up-thrust in connection with startup.

The stop ring, which is designed as a thrust bearing, limits axial movements of the pump shaft.

Example: SP 385S

The stationary part of the stop ring (A) is secured in the upper intermediate chamber.

The rotating part (B) is fitted above the split cone (C).

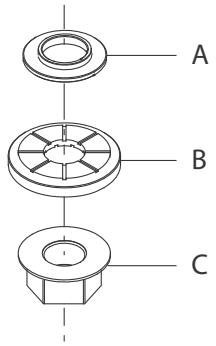


Fig. 7 Stop ring (rotating and stationary part) and the split cone

Grundfos submersible motors

A complete motor range

Grundfos offers a complete submersible motor range in different voltages. For an overview of motor types, sizes and voltages, see page 160.

- MS 402 is designed for the domestic ground water market and covers outputs.
- The MS 4000 and MS 6000C series are designed for use in a variety of applications in water supply. When equipped with features like oversized motor, temperature measurement, cooling jacket, and SiC/SiC mechanical shaft seals, these motors are suitable for heavy-duty industrial applications, such as dewatering operations.

As a standard, all external surfaces of Grundfos MS motors in contact with water are made of AISI 304 stainless steel. For aggressive water, such as seawater or brackish water, R versions made of AISI 904L are available.

Grundfos rewindable MMS motor range

Grundfos MMS motors are suitable for any submersible installation, including heavy-duty industrial applications and dewatering operations (when equipped with temperature control, oversized motor, cooling jacket, and SiC/SiC mechanical shaft seals).

As standard MMS motors are supplied with black cast-iron end-bells. Optionally, the range is available in all-stainless steel AISI 316 or AISI 904L versions.

The 2-pole Grundfos MMS submersible motors are all easy to rewind. The windings of the stator are made of a special waterproof wire of pure electrolytic copper sheathed with special non-hydroscopic thermoplastic material. The fine dielectric properties of this material allow direct contact between the windings and the liquid for efficient cooling of the windings.

Fig. 8 Grundfos MS motors

Fig. 9 Grundfos MMS motors

Industrial submersible motors and MS 6000C T60 versions

For heavy-duty applications Grundfos offers a complete motor range of industrial motors with up to 5 % higher efficiency than that of Grundfos' standard motors.

The cooling of the motor is very efficient due to the large motor surface. The efficient cooling makes it possible to increase the liquid temperature on T60 motors to 140 °F (60 °C) at a minimum flow rate of 3.3 fps (1.0 m/s) past the motor.

The industrial motors are for customers who value low operating costs and long life higher than price.

Grundfos industrial motors are developed for difficult operating conditions. These motors will stand a higher thermal load than standard motors and thus have a longer life when subjected to high load. This applies whether the high load is caused by bad power supply, hot water, bad cooling conditions, high pump load etc.

Please note that heavy duty motors are longer than motors for standard conditions.

Overtemperature protection

Accessories for protection against overtemperature are available for both Grundfos MS and MMS submersible motors. When the temperature becomes too high, the protection device will cut out so damage to the pump and motor can be avoided.

Restart of the motor after cut-out can be achieved in two ways:

- manual restart
- automatic restart.

Automatic restart means that MP 204 attempts to restart the motor after 15 minutes. If the first attempt is not successful, restarting will be reattempted at 30-minute intervals.

MS: The Grundfos MS submersible motors (with the exception of MS 402) are available with a built-in Tempcon temperature transmitter for protection against overtemperature. By means of the transmitter, it is possible to read out and/or monitor the motor temperature via an MP 204.

The Grundfos MS 402, MS 4000, and MS 6000C submersible motors can be fitted with a Pt100/Pt1000. Pt100/Pt1000 is fitted in the motor and connected directly to MP 204 or monitored by the PR 5714 relay.

MMS: For the protection of the Grundfos MMS submersible motors against overtemperature, Grundfos offers the Pt100/Pt1000 temperature sensor as an optional extra.

Pt100/Pt1000 is fitted in the motor and connected directly to MP 204 or monitored by the PR 5714 relay.

Protection against upthrust

In case of a very low counter pressure in connection with startup, there is a risk that the entire chamber stack may rise. This is called upthrust. Upthrust may damage both pump and motor. Grundfos pumps and motors are protected against upthrust as standard, preventing upthrust from occurring during the critical startup phase. The protection consists of either a built-in stop ring or hydraulic balancing.

Built-in cooling chambers

In all Grundfos MS submersible motors, efficient cooling is ensured by cooling chambers at the top and at the bottom of the motor, and by an internal circulation of motor liquid. See fig. 10.

As long as the required flow velocity past the motor is maintained, cooling of the motor will be efficient.

Lightning protection

The smallest Grundfos submersible motors, such as MS 402, are all insulated in order to minimize the risk of motor burnout caused by lightning strike.

Reduced risk of short-circuit

The embedded stator winding in the Grundfos MS submersible motor is hermetically enclosed in stainless steel. The result is high mechanical stability and optimum cooling. Also, this eliminates the risk of short-circuit of the windings caused by water condensation.

Shaft seal

MS 402

The shaft seal is of the lip seal type characterized by low friction against the rotor shaft.

The rubber material offers good wear resistance, good elasticity and resistance to particles, and it is approved for use in drinking water.

MS 4000

Ceramic/carbon materials provide the MS shaft seals with optimum sealing, optimum wear resistance and long life.

MS 6000C

The MS 6000C shaft seal material is SiC/SiC. The spring loaded shaft seal is designed with a large surface and a sand shield. The result is a minimum exchange of pumped and motor liquids and no penetration of particles.

Motors, version R, are supplied with a SiC/SiC shaft seal. Other combinations are available on request. See figs 10 and 11 for an illustration of shaft seal components and configuration.

MMS rewindable motors

The standard shaft seal is a SiC/SiC mechanical shaft seal. The shaft seal is replaceable.

The material features good wear resistance and resistance to particles.

Together with the shaft seal housing, the sand shield forms a labyrinth seal, which during normal operating conditions prevents penetration of sand particles into the shaft seal.

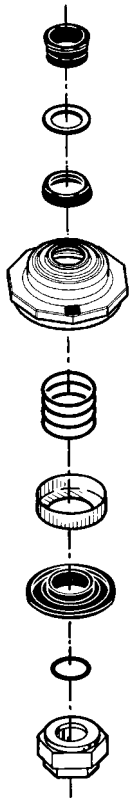


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Fig. 10 Shaft seal, MS 4000

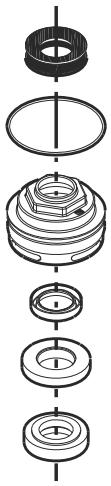

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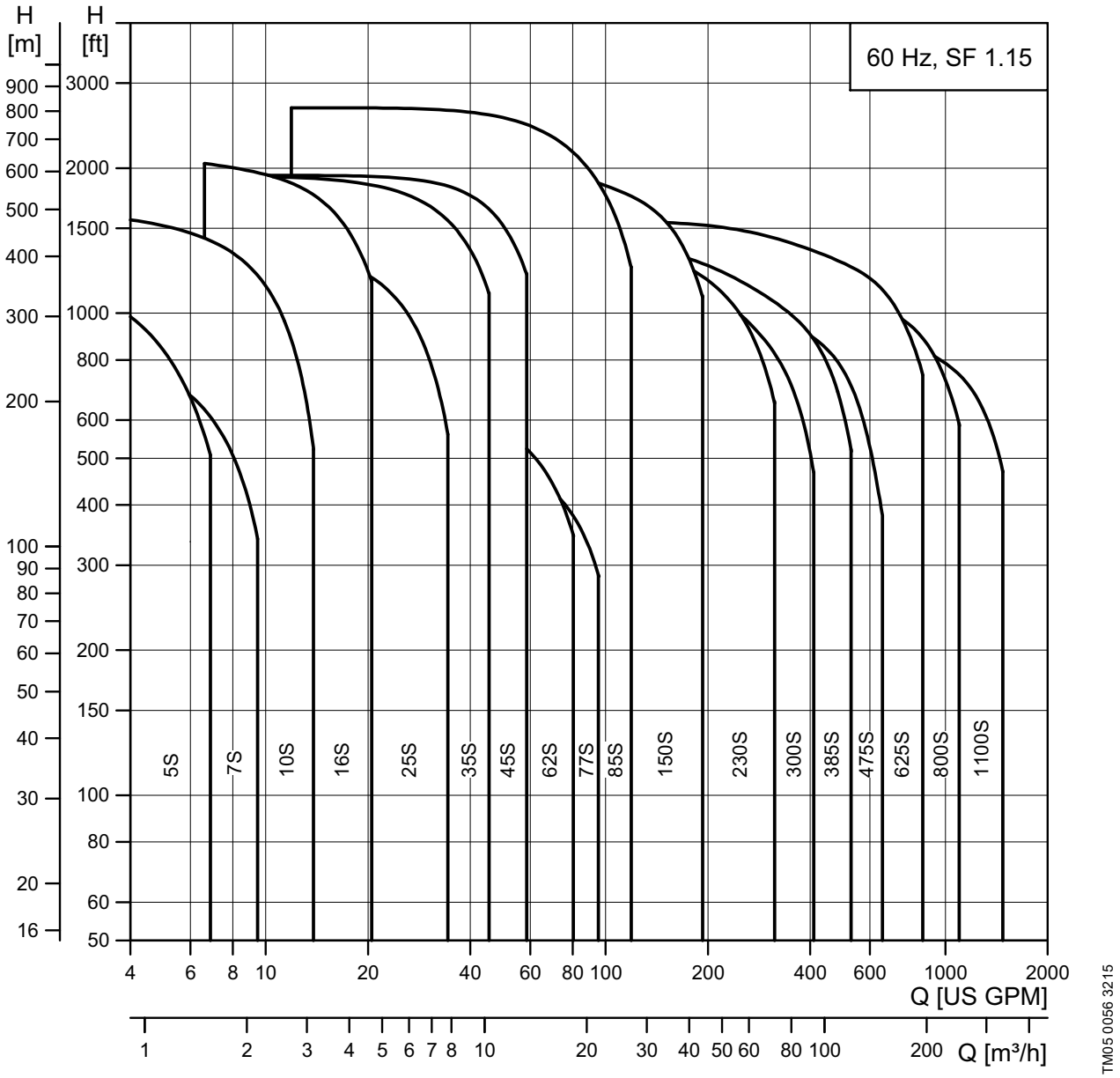
Fig. 11 Shaft seal, MS 6000C

Performance range 60 Hz



Pump range

Type		5S	10S	16S	25S	35S	45S	62S	77S	85S	150S	230S	300S	385S	475S	625S	800S	1100S
AISI 304 (EN 1.4301) stainless steel		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AISI 316 (EN 1.4401) stainless steel				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AISI 904L (EN 1.4539) stainless steel					•	•	•	•	•	•	•	•	•	•	•	•	•	•
Connection ★	NPT	1"	1.25"	1.25"	1.5"	1.5" (2")	2" (2")	2"	2"	(3")	(3")	3" (4")	3" 4"	4"	6"	6"	6"	6"
Flange connection: Grundfos flange														4"	6"	6"	6"	6"

★ Figures in brackets ( ) indicate connection for pumps including sleeve and male thread.

Motor protection and controllers range

Motor output [Hp]	0.5	0.75	1.0	1.5	1.5	3.0	5.0	7.5	10.0	15	20	25	30	40	50	60	75	100	125	150	175	200	250
MP 204	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pt100							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pt1000	•	•	•	•	•	•	•	•															
Zinc anode				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vertical flow sleeve	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Horizontal flow sleeve	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SA-SPM6	•	•	•	•	•	•	•																
GO remote	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RS-485 communication module	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Motor protection of single-phase motors, see page 160.

Identification

Type key, SP pumps

Example	475	S	500 -	5 -	A	B

Rated flow rate in gpm

Type range
Stainless steel parts of material
- S = AISI 304 (EN 1.4301) SS
- N = AISI 316 (EN 1.4401) SS
- R = AISI 904L (EN 1.4539) SS

Hp of motor

Number of impellers

First reduced-diameter impeller (A, B or C)

Second reduced-diameter impeller (A, B or C)

Type key, MS 402 motors

Example	MS	4	02	

Motor submersible

Minimum well casing diameter in inches

Generation

= AISI 304 (EN 1.4301) stainless steel

Type key, MS 4000 motors

Example	MS	4	000	R

Motor submersible

Minimum well casing diameter in inches

Generation

= AISI 304 (EN 1.4301) stainless steel
R = AISI 904L (EN 1.4539) stainless steel
I = AISI 304 (EN 1.4301) + Derated
RE = AISI 904L (EN 1.4539) + FKM
EI = AISI 304 (EN 1.4301) + Derated + FKM

Type key, MS 6000C

Example pump: MS 6000CQFT40 3 x 460/60 25 Hp

Description	MS 6000C	Q	F	T40	3 x 460/60	25 Hp

Motor type

Material type
- = AISI 304 stainless steel (EN 1.4301)
- R = AISI 904L stainless steel (EN 1.4539)

Rubber
- = NBR
- E = FKM

Shaft seal

=	Ceramic/carbon	BXPFF/NBR
S =	SiC/SiC	Q1Q1VFF/FKM
Q =	SiC/SiC	Q1Q1PFF/NBR

Radial bearings
- = Ceramic/hard metal
- W = SIC/Tungsten carbide

Motor liquid
- = SML-3
- D = Demineralized water
- H = Glycol 60 vol % HTF

Flange extension
- = Without
- F = With

Tempcon
- = With
- X = Without

Maximum liquid temperature
- T40 = 104 °F (40 °C)
- T60 = 140 °F (60 °C)

Voltage

3 x 460/60	= 3 x 440-460-480 V, 60 Hz
3 x 208-230/60	= 3 x 208-220-230 V, 60 Hz
3 x 575/60	= 3 x 575 V, 60 Hz

Method of starting
- = DOL
- SD = SD

Motor power

5 Hp	3.7 kW	6"
7.5 Hp	5.5 kW	6"
10 Hp	7.5 kW	6"
15 Hp	11 kW	6"
20 Hp	15 kW	6"
25 Hp	18.5 kW	6"
30 Hp	22 kW	6"
40 Hp	30 kW	6"

Type key, MMS motors

Example pump: MMS 3 x 460/60 75 Hp

Example	MMS	6	000	N	3 x 460/60	75 Hp

Motor type

Minimum well casing diameter in inches

Generation

Material type

= Cast iron EN-JL1040
N = AISI 316 (EN 1.4401) SS

Voltage

3 x 460/60 = 3 x 440-460-480 V, 60 Hz

Method of starting

= DOL
SD = SD

Motor power

40 Hp	30 kW	8"
50 Hp	37 kW	6"
50 Hp	37 kW	8"
60 Hp	45 kW	6"
60 Hp	45 kW	8"
75 Hp	55 kW	8"
100 Hp	75 kW	8"
125 Hp	92 kW	8"
150 Hp	110 kW	8"
175 Hp	132 kW	10"
200 Hp	147 kW	10"
250 Hp	190 kW	10"

13. Construction

Sectional drawing, SP pump 4" spline shaft (SP 5S - 25S)

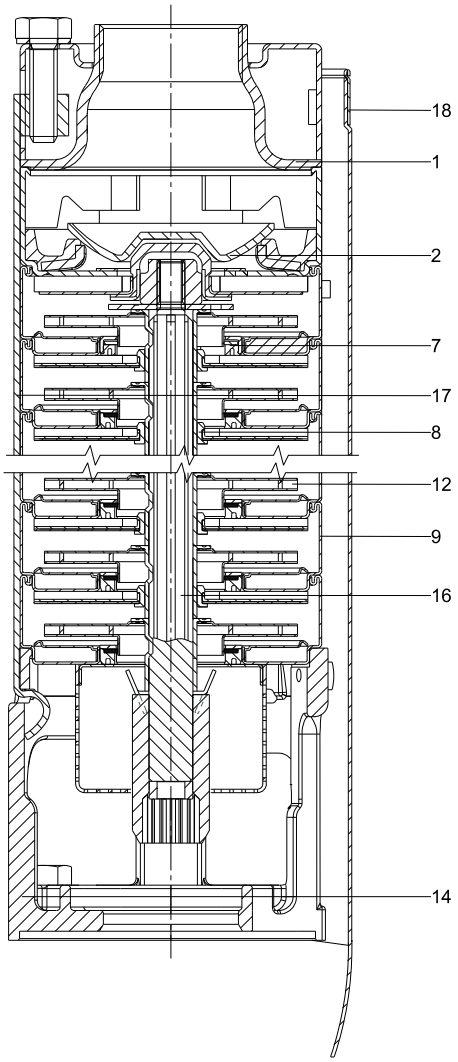


Fig. 12 SP pump, 4" spline shaft (SP 5S - 25S)

Material specification

Pos.	Component	Material	Standard	N-version	R-version
			[AISI (EN)]		
1	Valve casing	Stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
2	Valve cup	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
7	Neck ring	Elastomer	NBR/TPU	NBR/TPU	NBR/TPU
8	Bearing	Elastomer	NBR	NBR	NBR
9	Chamber	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
12	Impeller	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
14	Suction interconnector	Cast stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
16	Shaft complete	Stainless steel	431 (1.4057)	329 (1.4460)	904L (1.4462)
17	Strap	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
18	Cable guard	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
	Washer for stop ring	Carbon/graphite	HY22 in PTFE mass	HY22 in PTFE mass	HY22 in PTFE mass
	Strainer	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
	Valve seat	Elastomer	NBR	NBR-FKM	NBR-FKM

Sectional drawing, SP pump 4" smooth shaft (SP 35S - 77S)

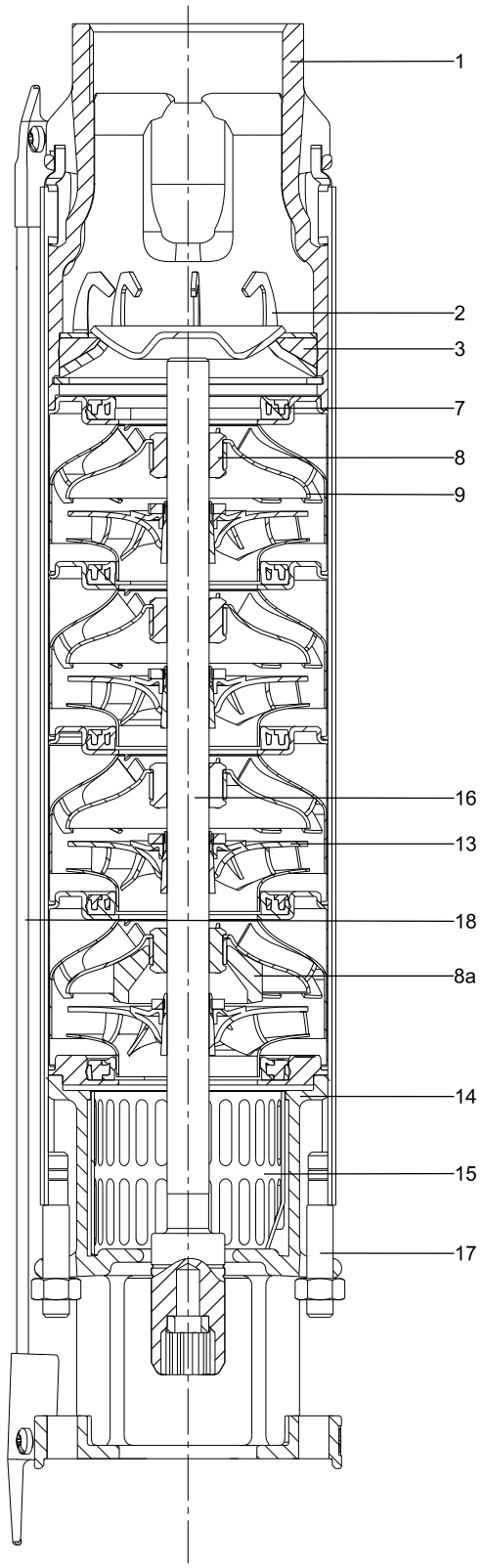


Fig. 13 SP pump, 4" smooth shaft (SP 35S - 77S)

Material specification

Pos.	Component	Material	Standard	N-version	R-version
			[AISI (EN)]		
1	Valve casing	Cast stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
2	Valve cup	Cast stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
3	Valve seat	NBR-FKM	NBR-FKM	NBR-FKM	NBR-FKM
7	Neck ring	TPU/PPS-FKM	TPU/ PPS-FKM	TPU/ PPS-FKM	TPU/ PPS-FKM
8	Bearing	LSR-FKM	LSR/FKM	LSR/FKM	LSR/FKM
8a	Washer for stop ring	Carbon/graphite	HY22 in PTFE mass	HY22 in PTFE mass	HY22 in PTFE mass
9	Chamber	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
13	Impeller	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
14	Suction interconnector	Cast stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
15	Strainer	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
16	Shaft complete	Stainless steel	1.4057	1.4460	1.4462
17	Strap	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
18	Cable guard	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)

Sectional drawing, SP pump 6" (SP 85S - 300S)

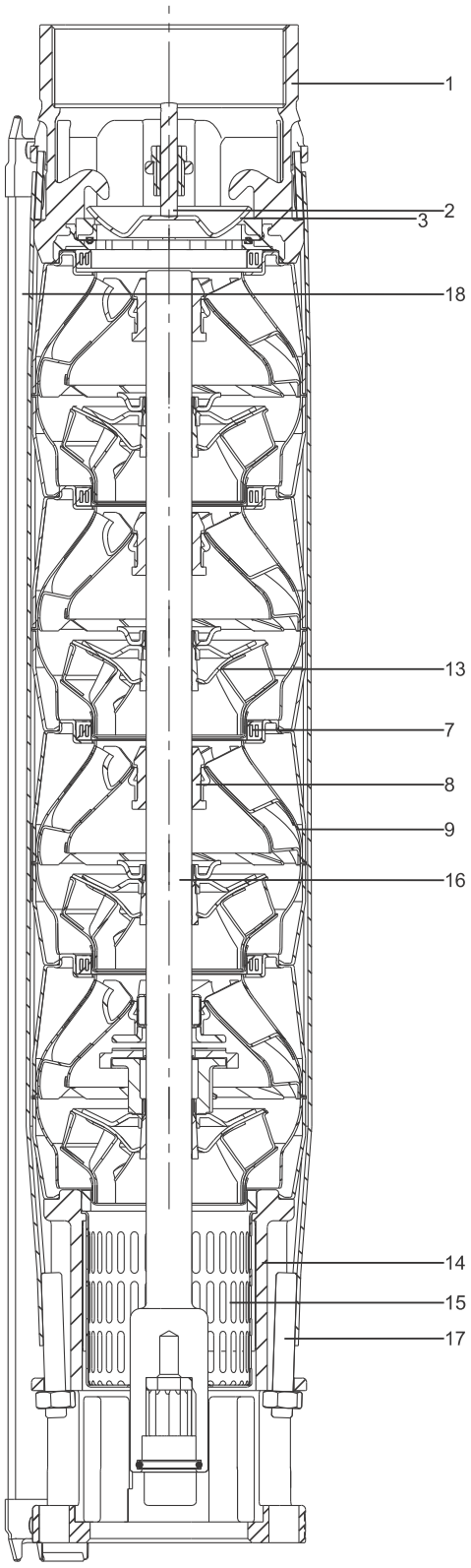


Fig. 14 Example, SP pump, 6" (SP 85S - 300S)

Material specification

Pos.	Component	Material	Standard	N-version	R-version
			[AISI (EN)]		
1	Valve casing	Stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
2	Valve cup	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
3	Valve seat	Elastomer	NBR-FKM	NBR-FKM	NBR-FKM
7	Neck ring	Elastomer	NBR-FKM	NBR-FKM	NBR-FKM
8	Bearing	NBR-FKM-LSR	NBR-FKM-LSR	NBR-FKM-LSR	NBR-FKM-LSR
9	Chamber	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
13	Impeller	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
14	Suction interconnector	Cast stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
15	Strainer	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
16	Shaft complete	Stainless steel	431 (1.4057)	329 (1.4460)	904L (1.4462)
17	Strap	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
18	Cable guard	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)

Sectional drawing, SP pump 8" (SP 385S - 475S)

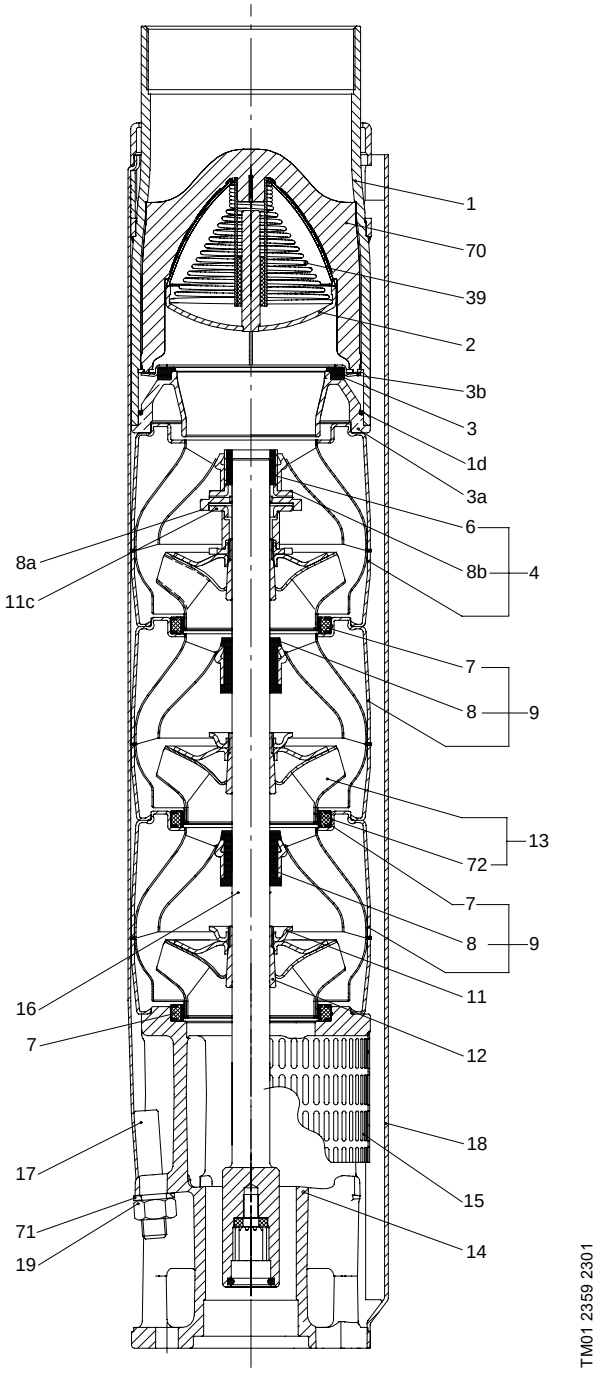


Fig. 15 SP pump, 8" (SP 385S - 475S)

Material specification

Pos.	Component	Materials	Standard	N version	R version
			[AISI (EN)]		
1	Valve casing	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
1d	O-ring	Elastomer	NBR	NBR	NBR
2	Valve cup	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
3	Valve seat	Elastomer	NBR	NBR	FKM
3a	Lower valve seat retainer	Stainless steel	316 (1.4401)	316 (1.4401)	904L (1.4517)
3b	Upper valve seat retainer	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
4	Top chamber	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
6	Upper bearing	Stainless steel/NBR	304 (1.4301)	316 (1.4401)	904L (1.4539)
7	Neck ring	Elastomer (optional FKM)	NBR/PPS	NBR/PPS	NBR/PPS
8	Bearing	Elastomer (optional FKM)	NBR	NBR	NBR
8a	Washer for stop ring	Carbon	graphite HY22 in PTFE mass	graphite HY22 in PTFE mass	graphite HY22 in PTFE mass
8b	Stop ring	Stainless steel	316 (1.4401)	316 (1.4401)	904L (1.4539)
9	Chamber	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
11	Split cone nut	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
11c	Nut for stop ring	Stainless steel	316 (1.4401)	316 (1.4401)	904L (1.4539)
12	Split cone	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
13	Impeller	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
14	Suction interconnector	Stainless steel	304 (1.4308)	316 (1.4408)	904L (1.4517)
15	Strainer	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
16	Shaft complete	Stainless steel	431 (1.4057)	329 (1.4460)	329 (1.4460)
17	Strap	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
18	Cable guard	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
19	Nut for strap	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
39	Spring for valve cup	Stainless steel	304 (1.4301)	316 (1.4401)	SAF 2205
70	Valve guide	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)
71	Washer	Stainless steel	316 (1.4401)	316 (1.4401)	904L (1.4539)
72	Wear ring	Stainless steel	304 (1.4301)	316 (1.4401)	904L (1.4539)

Sectional drawing, SP pump 10" (SP 625S - 1100S)

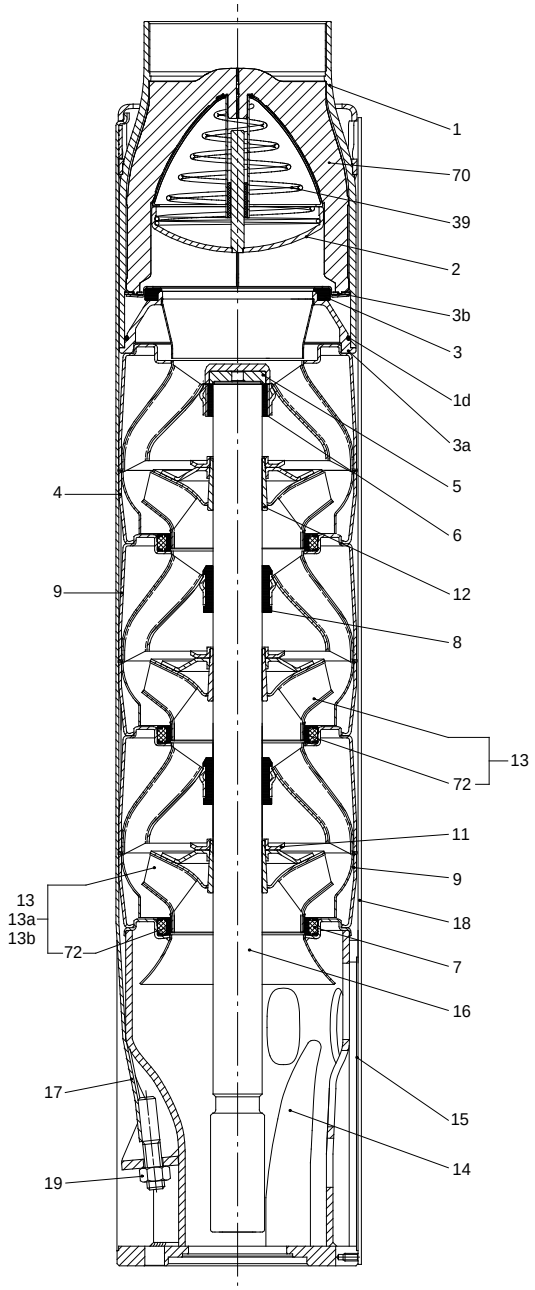


Fig. 16 SP pump, 10" (SP 625S - 1100S)

Material specification

Pos.	Description	Material	Standard	N version
			[AISI (EN)]	
		Valve casing		
1	Valve casing	Stainless steel	304 (1.4301)	316 (1.4401)
1d	O-ring	Elastomer	NBR	NBR
2	Valve cup	Stainless steel	304 (1.4301)	316 (1.4401)
3	Valve seat	Stainless steel	304 (1.4301)	316 (1.4401)
3a	Lower valve seat retainer	Stainless steel	304 (1.4301)	316 (1.4401)
3b	Upper valve seat retainer	Stainless steel	304 (1.4301)	316 (1.4401)
39	Spring for valve cup	Stainless steel	301 (1.4310)	316 (1.4401)
70	Valve guide	Stainless steel	304 (1.4301)	316 (1.4401)
78	Nameplate	Stainless steel	304 (1.4301)	316 (1.4401)
79	Rivet	Stainless steel	304 (1.4301)	316 (1.4401)
63	Connecting piece	Stainless steel	304 (1.4301)	316 (1.4401)
		Chamber stack		
4	Top chamber	Stainless steel	304 (1.4301)	316 (1.4401)
5	Upthrust disc	Carbon/graphite HY22 in PTFE mass		
6	Top bearing	Stainless steel/ NBR	304 (1.4301)	316 (1.4401)
7	Neck ring	Elastomer	NBR/PPS	NBR/PPS
8	Bearing	Elastomer	NBR	NBR
9	Chamber	Stainless steel	304 (1.4301)	316 (1.4401)
11	Nut for split cone	Stainless steel	304 (1.4301)	316 (1.4401)
12	Split cone	Stainless steel	304 (1.4301)	316 (1.4401)
13	Impeller	Stainless steel	304 (1.4301)	316 (1.4401)
16	Shaft with coupling	Stainless steel	431 (1.4057)	329 (1.4460)
18	Cable guard	Stainless steel	304 (1.4301)	316 (1.4401)
18a, 18b	Screw for cable guard	Stainless steel	304 (1.4301)	316 (1.4401)
23	Rubber guard	Elastomer	NBR	NBR
72	Wear ring	Stainless steel	304 (1.4301)	316 (1.4401)
		Suction interconnector		
14	Suction interconnector	Stainless steel	304 (1.4308)	316 (1.4408)
15	Strainer	Stainless steel	304 (1.4301)	316 (1.4401)
17	Strap	Stainless steel	304 (1.4301)	316 (1.4401)
19	Nut for strap	Stainless steel	304 (1.4301)	316 (1.4401)
19a	Nut	Stainless steel	316 (1.4401)	316 (1.4401)
22	Bolts	Stainless steel	316 (1.4401)	316 (1.4401)
28, 28a	Lock for strainer	Stainless steel	329 (1.4460)	329 (1.4460)

Sectional drawing, MS motors

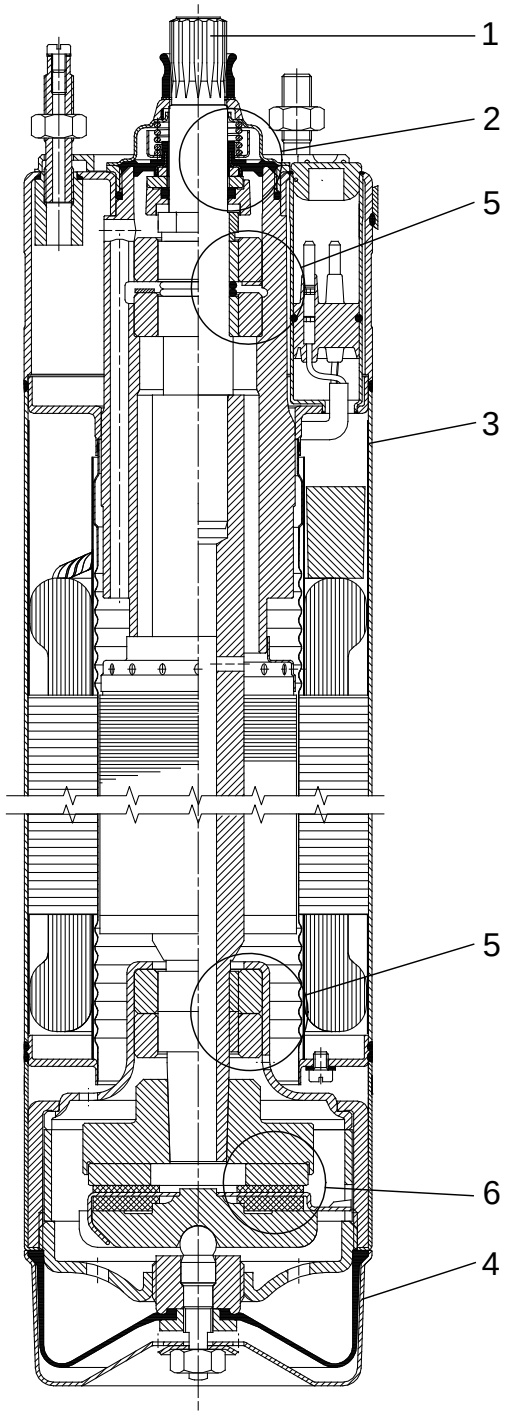


Fig. 17 MS 4000 motor

Material specification, MS 402, MS 4000, and MS 6000C motors

Pos.	Part	MS 402	MS 4000 MS 6000C
		[AISI (EN)]	
1	Shaft	431	431
2	Shaft seal	NBR	NBR/SiC/SiC
3	Motor sleeve	304 (1.4301)	304 (1.4301)
4	Motor end shield	304 (1.4301)	304 (1.4301)
5	Radial bearing	Ceramic	Ceramic/ tungsten carbide
6	Axial bearing	Ceramic/carbon	Ceramic/carbon
	Rubber parts	NBR	NBR

R-version motor

Pos.	Part	MS 4000 MS 6000C
1	Shaft	318 LN
2	Shaft seal	SiC/SiC
3	Motor sleeve	904L (1.4539)
4	Motor end shield	904L (1.4539)
5	Radial bearing	Ceramic/tungsten carbide
6	Thrust bearing	Ceramic/carbon
	Rubber parts	NBR

Sectional drawing, MMS motors

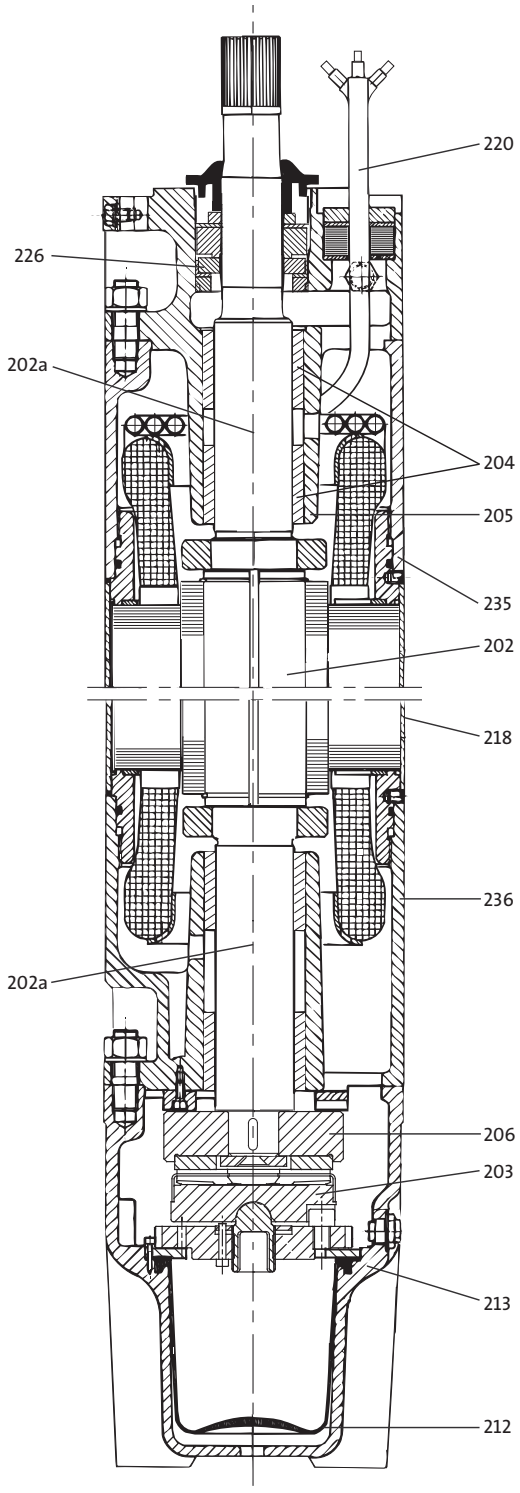


Fig. 18 MMS 10000 motor

Material specification

MMS motors, submersible rewindable versions

Pos.	Component		Material	[AISI (EN)]
202	Shaft		Steel	(1.0533)
202a	Shaft ends		Stainless steel	316/329 (1.4401/1.4460)
203/206	Thrust bearing Stationary/ rotating part	6", 0.5 - 20 Hp	Hardened steel/EPDM	
		6", 25-50 Hp	Ceramic/ carbon	
		8" - 10"		
204	Bearing bush	6" - 10"	Carbon	
205	Bearing housing, upper		Cast iron	A126 Class B
212	Diaphragm		CR	
213	Motor end shield		Cast iron	A126 Class B
218	Motor sleeve		Stainless steel	304 (1.4301)
220	Motor cable		EPR	
226	Shaft seal		SiC/SiC	
235	Intermediate housing		Cast iron	A126 Class B
236	Bearing housing, lower		Cast iron	A126 Class B

MMS motors, N and R versions

Pos.	Component		Material	Version	
				N	R
				[AISI (EN)]	
202	Shaft		Steel	(1.0533)	
202a	Shaft ends		Stainless steel	316/329 (1.4401/1.4460)	318LN (1.4462)
203/206	Thrust bearing Stationary/ rotating part	6", 0.5 - 20 Hp	Hardened steel/EPDM		
		6", 25-50 Hp	Ceramic/ carbon		
		8" - 10"			
204	Bearing bush	6" - 10"	Carbon		
205	Bearing housing, upper		Stainless steel	316 (1.4401)	904L (1.4539)
212	Diaphragm		CR		
213	Motor end shield		Stainless steel	316 (1.4401)	904L (1.4539)
218	Motor sleeve		Stainless steel	316 (1.4401)	904L (1.4539)
220	Motor cable		EPR		
226	Shaft seal		SiC/SiC		
235	Intermediate housing		Stainless steel	316 (1.4401)	904L (1.4539)
236	Bearing housing, lower		Stainless steel	316 (1.4401)	904L (1.4539)

14. Operating conditions

Operating conditions

Flow rate, Q: 0.44 - 1475 gpm (0.1 - 335 m^3/h).
Head, H: Maximum 2657 ft (810 m).

Maximum liquid temperature

Motor cooling requirements*: Maximum liquid temperature / minimum velocity / flow past the motor					
Motor type	**Min. well casing or sleeve diameter**	**Minimum velocity**	**Minimum flow**	**Maximum temperature of pumped liquid**	
				Vertical installation	**Horizontal installation**
	in. (mm)	**fps (m/s)**	**gpm (m^3/h)**	**° F (° C)**	**° F (° C)**
MS402, MS4000	4 (102)	If at 0.0	If at 0.0	86 (30)	Flow sleeve recommended
MS402, MS4000	4 (102)	0.25 (0.08)	1.2 (0.27)	104 (40)	104 (40)
MS6000C (T40) (Standard)	6 (152)	0.50 (0.15)	9 (2)	104 (40)	104 (40)
MS6000C (T60) (High temperature)	6 (152)	3.3 (1.0)	30 (6.8)	140 (60)	140 (60)
MMS6	6 (152)	0.15 (0.05)	13 (3)	86 (30)	86 (30)
MMS8000	8 (203)	0.50 (0.15)	25 (5.7)	86 (30)	86 (30)
MMS10000 (175, 200 HP)	10 (254)	0.50 (0.15)	55 (12.5)	86 (30)	86 (30)
MMS10000 (250 HP)	10 (254)	0.50 (0.15)	41 (9.3)	86 (30)	86 (30)

Note: For MMS 6, 50 Hp; MMS 8000, 150 Hp; the maximum liquid temperature is 9 °F (5 °C) lower than the values stated in the table.
For MMS 10000, 250 Hp, the temperature is 18 °F (10 °C) lower.

Operating pressure

Motor	Maximum operating pressure
MS 402, 4"	217 psi (1.5 Mpa) (15 bar)
MS4000, 4" MS6000C, 6"	870 psi (6 Mpa) (60 bar)
MMS 6" to 10" rewindable	

15. Selection

5S - 25S easy selection charts

5 gpm easy selection chart

Flow range 1.2 to 7 gpm

Pump outlet 1" NPT

Ratings in gallons per minute (gpm)

Pump model	Hp	psi	Depth to pumping water level (lift) in ft																									
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
5S03-9	0.33	0				7.1	6.7	6.2	5.8	5.3	4.8	4.3	3.2	2.1													
		20		7.0	6.6	6.1	5.7	5.2	4.6	4.0	2.8	1.6															
		30		6.5	6.0	5.6	5.1	4.6	3.8	2.9	1.5																
		40	6.7	6.0	5.5	5.1	4.4	3.8	2.4																		
		50	6.2	5.5	4.9	4.4	3.4	2.5	1.3																		
		60	4.6	4.9	4.2	3.5	1.9																				
Shut-off psi			102	94	85	76	68	59	50	42	33	24	16	7													
5S05-13	0.5	0						7.1	6.8	6.4	6.1	5.8	5.5	5.2	4.8	4.5	3.9	2.3									
		20			7.3	7.0	6.7	6.3	6.0	5.7	5.4	5.1	4.7	4.3	3.7	3.1	2.0										
		30		7.2	6.9	6.6	6.3	6.0	5.7	5.4	5.0	4.7	4.2	3.7	2.8	2.0											
		40	7.2	6.9	6.6	6.3	5.9	5.6	5.3	5.0	4.6	4.2	3.5	2.8	1.6												
		50	6.8	6.5	6.2	5.9	5.6	5.3	4.9	4.6	4.0	3.5	2.6	1.6													
		60	6.5	6.2	5.8	5.5	5.2	4.9	4.5	4.0	3.3	2.6	1.3														
Shut-off psi			152	143	134	126	117	108	100	91	82	74	65	56	48	39	30	13									
5S07-18	0.75	0								7.1	6.9	6.7	6.4	6.2	6.0	5.8	5.6	5.1	4.2	2.7							
		20						7.1	6.8	6.6	6.4	6.2	5.9	5.7	5.5	5.3	5.0	4.5	3.2								
		30					7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.2	5.0	4.7	4.0	2.5								
		40			7.2	7.0	6.8	6.5	6.3	6.1	5.9	5.6	5.4	5.2	4.9	4.7	4.4	3.5	1.5								
		50		7.2	7.0	6.7	6.5	6.3	6.1	5.8	5.6	5.4	5.1	4.9	4.6	4.3	3.9	2.9									
		60	7.1	6.9	6.7	6.5	6.2	6.0	5.8	5.6	5.3	5.1	4.9	4.6	4.3	3.9	3.4	2.1									
Shut-off psi			213	204	195	187	178	169	161	152	143	135	126	117	109	100	91	74	48	22							
5S10-22	1.0	0										7.1	6.9	6.7	6.6	6.4	6.2	5.8	5.3	4.7	3.8	1.7					
		20								7.1	6.9	6.7	6.5	6.3	6.1	6.0	5.8	5.4	4.8	4.0	2.8						
		30							7.0	6.8	6.7	6.5	6.3	6.1	5.9	5.7	5.6	5.2	4.6	3.6	2.1						
		40						7.0	6.8	6.6	6.5	6.3	6.1	5.9	5.7	5.5	5.4	5.0	4.3	3.1	1.3						
		50				7.2	7.0	6.8	6.6	6.4	6.2	6.1	5.9	5.7	5.5	5.3	5.1	4.7	3.9	2.5							
		60			7.1	6.9	6.8	6.6	6.4	6.2	6.0	6.0	5.7	5.5	5.3	5.1	4.9	4.4	3.5	1.7							
Shut-off psi					245	237	228	219	211	202	194	185	176	168	159	150	142	124	98	72	46	12					
5S15-26	1.5	0												7.1	7.0	6.8	6.7	6.4	5.9	5.4	4.9	4.1	2.1				
		20										7.1	6.9	6.8	6.6	6.5	6.3	6.0	5.5	5.1	4.5	3.4					
		30									7.1	6.9	6.7	6.6	6.4	6.3	6.1	5.8	5.4	4.8	4.2	2.9					
		40								7.0	6.9	6.7	6.6	6.4	6.3	6.1	6.0	5.6	5.2	4.6	5.6	2.4					
		50							7.0	6.9	6.7	6.5	6.4	6.2	6.1	5.9	5.8	5.5	5.0	4.4	3.6	1.7					
		60						7.0	6.8	6.7	6.5	6.4	6.2	6.1	5.9	5.8	5.6	5.3	4.8	4.1	3.1						
Shut-off psi								269	260	252	243	234	226	217	208	200	191	174	148	122	96	61	18				
5S15-31	1.5	0														7.1	7.0	6.7	6.3	5.9	5.5	6.7	4.1	2.6			
		20												7.1	6.9	6.8	6.7	6.4	6.0	5.6	5.2	4.6	3.5	1.6			
		30											7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.5	5.1	4.4	3.2	0.9			
		40										7.0	6.9	6.8	6.6	6.5	6.4	6.1	5.7	5.3	4.9	4.2	2.8				
		50								7.1	7.0	6.9	6.7	6.6	6.5	6.3	6.2	6.0	5.6	5.2	4.7	4.0	2.3				
		60							7.1	7.0	6.8	6.7	6.6	6.5	6.3	6.2	6.1	5.8	5.4	5.0	4.5	3.7	1.7				
Shut-off psi									320	311	303	294	285	277	268	259	251	233	207	181	155	121	77	34			

See 5S performance curves for higher head models.
Specifications are subject to change without notice.
These values are approximate. For more precise values, see the performance curves in section *17. Curve charts and technical data*.

7 gpm easy selection chart

Flow range 3 to 10 gpm

Pump outlet 1" NPT

Ratings in gallons per minute (gpm)

Pump model	Hp	psi	Depth to pumping water level (lift) in ft																									
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
7S03-8	0.33	20	10.0	9.5	8.7	8.0	7.2	6.4	5.0	3.7	1.8																
		30	9.3	8.7	7.9	7.1	6.1	5.1	2.6																		
		40	8.5	7.8	7.0	6.1	4.5	2.9	1.5																		
		50	7.6	6.9	5.8	4.7	2.3																				
		60	6.7	5.8	3.9	2.0																					
Shut-off psi			86	77	69	60	52	43	34	26	17	8															
7S05-11	0.5	0					9.9	9.5	8.9	8.4	7.8	7.3	6.7	6.0	5.0	4.0											
		20			9.8	9.3	8.8	8.2	7.7	7.1	6.5	5.8	4.7	3.5	1.8												
		30	10.1	9.7	9.2	8.7	8.1	7.6	7.0	6.4	5.6	4.7	2.9														
		40	9.6	9.2	8.6	8.1	7.5	6.9	6.2	5.6	4.3	3.0	1.5														
		50	9.1	8.5	8.0	7.4	6.8	6.2	5.3	4.3	2.2																
		60	8.4	7.9	7.3	6.8	6.0	5.3	3.8	2.3																	
Shut-off psi			122	113	105	96	87	79	70	61	53	44	35	27	18	10											
7S07-15	0.75	0						10.2	9.9	9.5	9.2	8.8	8.4	8.0	7.6	7.1	6.7	5.6	2.9								
		20				10.1	9.8	9.4	9.0	8.6	8.2	7.8	7.4	7.0	6.5	6.1	5.4	3.6									
		30			10.0	9.7	9.4	9.0	8.6	8.2	7.8	7.4	6.9	6.5	5.9	5.4	4.5	1.8									
		40		10.0	9.7	9.3	8.9	8.5	8.1	7.7	7.3	6.9	6.4	5.9	5.2	4.5	3.2	1.0									
		50	9.9	9.6	9.2	8.9	8.5	8.1	7.6	7.2	6.8	6.4	5.8	5.2	4.2	3.2	1.6										
		60	9.5	9.2	8.8	8.4	8.0	7.6	7.2	6.7	6.2	5.7	4.9	4.2	2.8	1.4											
Shut-off psi			170	101	153	144	135	127	118	110	101	92	84	75	66	58	49	32	6								
7S10-19	1.0	0								10.1	9.8	9.6	9.3	9.0	8.7	8.4	8.0	7.4	6.4	4.8							
		20						10.0	9.8	9.5	9.2	8.9	8.6	8.3	7.9	7.6	7.3	6.6	5.3	2.8							
		30					10.0	9.7	9.5	9.2	8.9	8.5	8.2	7.9	7.6	7.3	6.9	6.2	4.6	1.4							
		40				10.0	9.7	9.4	9.1	8.8	8.5	8.2	7.8	7.5	7.2	6.9	6.5	5.6	3.7								
		50		10.2	9.9	9.7	9.4	9.1	8.8	8.4	8.1	7.8	7.5	7.2	6.8	6.5	6.0	5.0	2.4								
		60	10.1	9.9	9.6	9.3	9.0	8.7	8.4	8.1	7.8	7.4	7.1	6.8	6.4	6.0	5.5	4.2									
Shut-off psi			218	209	200	192	183	174	166	157	148	140	131	123	114	105	97	79	53	27							
7S15-26	1.5	0											10.1	9.9	9.7	9.5	9.3	8.8	8.1	7.4	6.7	5.5					
		20									10.0	9.8	9.6	9.4	9.2	9.0	8.8	8.3	7.6	6.9	6.1	4.4					
		30								10.0	9.8	9.6	9.4	9.2	9.0	8.7	8.5	8.0	7.3	6.6	5.7	3.7					
		40						10.1	10.0	9.8	9.6	9.4	9.1	8.9	8.7	8.5	8.2	7.8	7.1	6.3	5.2	2.9					
		50					10.1	9.9	9.7	9.6	9.3	9.1	8.9	8.7	8.4	8.2	8.0	7.5	6.8	5.9	4.7	1.9					
		60				10.1	9.9	9.7	9.5	9.3	9.1	8.9	8.6	8.4	8.2	7.9	7.7	7.2	6.5	5.5	4.1						
Shut-off psi						274	265	257	248	239	231	222	213	205	196	187	179	161	135	110	84	49					
7S20-32	2.0	0											10.6	10.5	10.4	10.4	10.3	10.1	9.6	9.1	8.4	7.3	5.7				
		20									10.5	10.5	10.4	10.3	10.3	10.2	10.0	9.8	9.2	8.6	7.8	6.6	4.8				
		30								10.5	10.5	10.4	10.3	10.2	10.1	10.0	9.9	9.6	9.0	8.3	7.5	6.2	4.3				
		40							10.5	10.5	10.4	10.3	10.2	10.1	10.0	9.9	9.7	9.4	8.8	8.0	7.2	5.8	3.9				
		50							10.5	10.4	10.3	10.2	10.1	10.0	9.8	9.7	9.5	9.1	8.5	7.7	6.8	5.4	3.3				
		60						10.5	10.4	10.3	10.2	10.1	10.0	9.8	9.7	9.5	9.3	8.9	8.2	7.4	6.4	5.0					
Shut-off psi							343	334	326	317	308	300	291	282	274	265	256	239	213	187	161	126	83				

See 7S performance curves for higher head models.
Specifications are subject to change without notice.
These values are approximate. For more precise values, see the performance curves in section *17. Curve charts and technical data*.

10 gpm easy selection chart

Flow range 5 to 14 gpm

Pump outlet 1.25" NPT

Ratings in gallons per minute (gpm)

Pump model	Hp	psi	Depth to pumping water level (lift) in ft																									
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
10S03-6	0.33	20	14.0	13.2	12.4	10.6	8.9	5.3																			
		30	13.2	11.8	10.4	8.4																					
		40	11.9	10.1	8.3																						
		50	9.8	7.5																							
		60	7.7	3.9																							
Shut-off psi			64	55	47	38	29	21	12	3																	
10S05-9	0.5	0				14.1	13.4	12.4	11.4	10.4	9.5	8.3	6.6	3.5													
		20		13.9	13.1	12.1	11.1	10.1	9.2	7.9	5.8	2.0															
		30	13.8	13.0	12.0	11.0	10.0	9.0	7.6	5.3	1.2																
		40	12.8	11.8	10.8	9.8	8.8	7.3	4.8																		
		50	11.7	10.7	9.7	8.6	7.0	4.3																			
		60	10.5	9.5	8.4	6.7	3.7																				
Shut-off psi			100	92	83	74	66	57	48	40	31	23	14	5													
10S07-12	.75	0					14.3	13.8	13.2	12.5	11.7	11.0	10.2	9.5	8.7	7.6	6.0										
		20			14.2	13.6	12.9	12.2	11.5	10.7	10.0	9.3	8.4	7.2	5.4	2.6											
		30		14.1	13.5	12.9	12.1	11.4	10.6	9.9	9.2	8.2	7.0	5.0	2.0												
		40	14.0	13.4	12.8	12.0	11.3	10.5	9.8	9.0	8.1	6.7	4.7	1.4													
		50	13.3	12.6	11.9	11.1	10.4	9.7	8.9	7.9	6.5	4.2															
		60	12.5	11.8	11.0	10.3	9.6	8.8	7.7	6.2	3.8																
Shut-off psi			137	129	120	111	103	94	85	77	68	59	51	42	33	25	16										
10S10-15	1.0	0							14.1	13.6	13.1	12.5	11.9	11.3	10.7	10.1	9.6	8.2	3.8								
		20					13.9	13.5	12.9	12.3	11.7	11.1	10.5	10.0	9.4	8.7	7.9	5.2									
		30				13.9	13.4	12.8	12.2	11.6	11.0	10.5	9.9	9.3	8.6	7.7	6.6	2.6									
		40		14.2	13.8	13.3	12.7	12.1	11.5	10.9	10.4	9.8	9.2	8.5	7.6	6.3	4.6										
		50	14.1	13.7	13.2	12.6	12.1	11.4	10.9	10.3	9.7	9.1	8.3	7.4	6.1	4.3	1.7										
		60	13.6	13.1	12.6	12.0	11.4	10.8	10.2	9.6	9.0	8.2	7.2	5.9	3.9												
Shut-off psi			174	165	157	148	139	131	122	113	105	96	87	79	70	61	53	35	10								
10S15-21	1.5	0									14.2	13.9	13.6	13.3	12.9	12.5	12.0	11.2	9.9	8.5	6.3						
		20							14.1	13.9	13.5	13.1	12.7	12.3	11.9	11.5	11.0	10.2	8.9	6.9	2.9						
		30						14.1	13.8	13.5	13.1	12.7	12.3	11.8	11.4	11.0	10.5	9.7	8.3	5.7							
		40					14.1	13.8	13.4	13.0	12.6	12.2	11.8	11.3	10.9	10.5	10.1	9.2	7.5	4.1							
		50				14.0	13.7	13.3	13.0	12.5	12.1	11.7	11.3	10.8	10.4	10.0	9.6	8.7	6.5	2.0							
		60		14.2	14.0	13.6	13.3	12.9	12.5	12.1	11.6	11.2	10.8	10.4	9.9	9.5	9.1	8.0	5.1								
Shut-off psi				237	229	220	211	203	194	185	177	168	159	151	142	133	125	107	81	55	29						
10S30-27	2.0	0												14.1	13.9	13.7	13.4	12.8	11.8	10.8	9.8	8.3	4.7				
		20										14.1	13.8	13.6	13.3	13.0	12.7	12.0	11.0	10.0	9.0	7.1	1.5				
		30									14.0	13.8	13.5	13.3	12.9	12.6	12.3	11.6	10.6	9.7	8.6	6.2					
		40							14.2	14.0	13.8	13.5	13.2	12.9	12.6	12.2	11.9	11.2	10.3	9.3	8.1	5.2					
		50						14.2	14.0	13.7	13.5	13.2	12.8	12.5	12.2	11.9	11.5	10.9	9.9	8.9	7.4	3.8					
		60					14.1	13.9	13.7	13.4	13.1	12.8	12.5	12.1	11.8	11.5	11.1	10.5	9.5	8.4	6.6	2.1					
Shut-off psi							285	276	268	259	250	242	233	224	216	207	198	181	155	129	103	68	25				
10S30-34	3.0	0																13.8	13.2	12.5	11.9	10.9	9.6	7.9	4.8		
		20														13.9	13.7	13.3	12.7	12.0	11.3	10.3	8.9	6.7	2.7		
		30													13.9	13.7	13.5	13.1	12.4	11.7	11.0	10.0	8.5	6.0	1.3		
		40											14.0	13.8	13.7	13.5	13.3	12.8	12.2	11.5	10.8	9.7	8.0	5.1			
		50										14.0	13.8	13.6	13.4	13.2	13.0	12.6	11.9	11.2	10.5	9.4	7.5	4.2			
		60										13.8	13.6	13.4	13.2	13.0	12.8	12.3	11.6	10.9	10.2	9.0	6.9	3.1			
Shut-off psi												332	324	315	306	298	289	272	246	220	194	159	116	73	29		

See 10S performance curves for higher head models.
Specifications are subject to change without notice.
These values are approximate. For more precise values, see the performance curves in section *17. Curve charts and technical data*.

16 gpm easy selection chart

Flow range 10 to 20 gpm

Pump outlet 1.25" NPT

Ratings in gallons per minute (gpm)

Pump model	Hp	psi	Depth to pumping water level (lift) in ft																									
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
16205-5	.5	20	20.3	18.2	14.1	10.0	5.0																				
		30	17.3	14.4	8.0	1.6																					
		40	12.7	8.0	4.0																						
		50	6.5																								
		60	2.9																								
Shut-off psi			58	49	40	32	23	14																			
16S07-8	.75	0					20.5	19.2	17.5	15.8	12.8	9.8	5.2														
		20			20.1	18.8	16.9	15.2	11.8	8.5	4.3																
		30	21.2	19.9	18.4	16.9	14.3	11.8	7.5	3.2	1.6																
		40	19.7	18.3	16.3	14.3	10.8	7.2	3.6																		
		50	17.9	16.3	13.5	10.7	6.2	1.7																			
		60	15.7	13.5	9.6	5.8	2.9																				
Shut-off psi			97	88	80	71	62	54	45	36	28	19	10														
16S10-10	1.0	0						20.8	19.8	18.8	17.3	15.9	13.7	11.4	8.0	4.7											
		20				20.5	19.4	18.3	16.8	15.3	12.9	10.5	7.0	3.5	1.8												
		30			20.3	19.3	18.1	16.8	14.8	12.8	9.8	6.7	3.3														
		40		20.2	19.1	18.0	16.4	14.8	12.2	9.6	5.9	2.3															
		50	20.0	19.0	17.7	16.3	14.2	12.0	8.8	5.6	2.8																
		60	18.8	17.6	15.8	14.1	11.3	8.6	4.8																		
Shut-off psi			123	115	106	97	89	80	71	63	54	45	37	28	19	11											
16S15-14	1.5	0								21.0	20.3	19.6	18.8	18.0	16.9	15.8	14.3	10.7	3.3								
		20							20.1	19.3	18.5	17.7	16.6	15.4	13.8	12.2	10.0	5.1									
		30					20.7	20.0	19.2	18.4	17.4	16.5	15.1	13.7	11.8	9.8	7.3	2.4									
		40				20.6	19.8	19.1	18.3	17.4	16.0	15.0	13.3	11.6	9.3	7.0	4.3										
		50			20.4	19.8	18.9	18.2	17.2	16.1	14.7	13.2	11.2	9.1	6.5	3.9	2.0										
		60		20.3	19.6	18.8	18.0	17.1	15.8	14.5	12.8	11.0	8.6	6.3	3.4												
Shut-off psi				167	158	149	141	132	123	115	106	97	89	80	71	63	54	37	28								
16S20-18	2.0	0										21.2	20.6	20.0	19.5	18.9	18.2	16.7	13.5	8.8	2.7						
		20									20.4	19.8	19.3	18.7	18.0	17.3	16.4	14.3	10.0	4.2							
		30								20.3	19.8	19.2	18.6	17.9	17.2	16.3	15.3	12.8	7.9	1.9							
		40							20.3	19.7	19.1	18.5	17.8	17.1	16.1	15.2	13.9	11.1	5.7								
		50						20.2	19.6	19.0	18.3	17.7	16.8	16.0	14.9	13.8	12.3	9.2	3.2								
		60					20.1	19.5	18.9	18.3	17.5	16.8	15.8	14.8	13.5	12.3	10.6	7.0									
Shut-off psi							194	186	177	168	160	151	142	134	125	116	108	90	65	39	13						
16S30-24	3.0	0																19.6	18.3	16.5	14.2	9.8	2.1				
		20													20.3	19.9	19.5	18.6	17.0	14.8	11.8	6.5					
		30												20.3	19.8	19.4	19.0	18.0	16.3	13.7	10.4	4.7					
		40											20.2	19.8	19.3	18.9	18.4	17.3	15.3	12.5	8.9	2.8					
		50										20.2	19.8	19.3	18.8	18.3	17.8	16.7	14.3	11.3	7.3						
		60									20.1	19.7	19.2	18.8	18.3	17.8	17.2	15.8	13.3	9.8	5.5						
Shut-off psi											239	230	221	213	204	195	187	169	143	117	91	57	13				
16S50-38	5.0	0																			21.5	20.4	18.7	16.5	13.4	8.9	2.1
		20																			20.9	19.6	17.7	15.2	11.5	6.1	
		30																		21.4	20.5	19.2	17.2	14.5	10.5	4.5	
		40																		21.1	20.2	18.8	16.7	13.7	9.3	2.7	
		50																	21.6	20.7	19.8	18.4	16.1	12.8	8.0	0.8	
		60																	21.3	20.4	19.4	17.9	15.4	11.9	6.6		
Shut-off psi																			314	288	262	227	184	141	98	54	11

See 16S performance curves for higher head models.
Specifications are subject to change without notice.
These values are approximate. For more precise values, see the performance curves in section *17. Curve charts and technical data*.

25 gpm easy selection chart

Flow range 18 to 32 gpm

Pump outlet 1.5" NPT

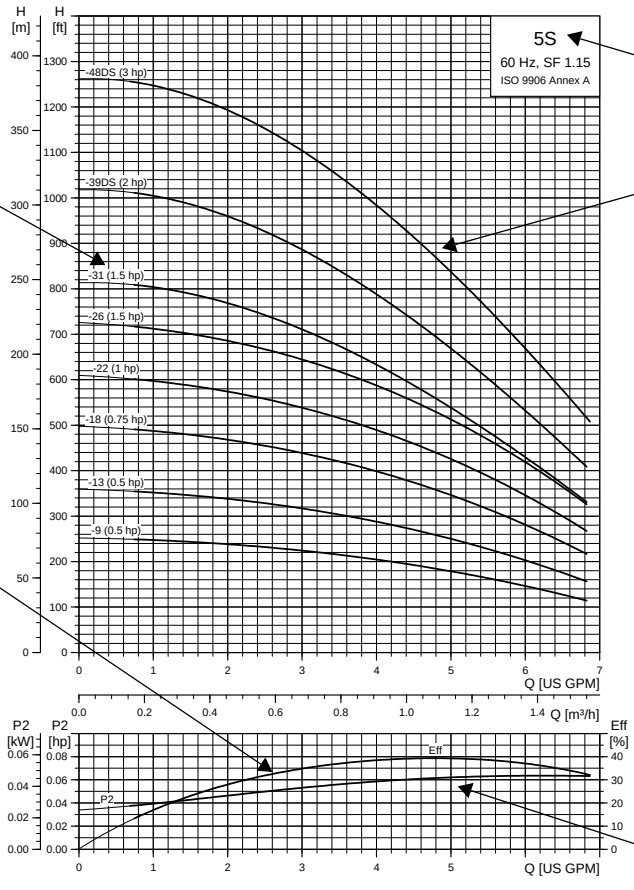
Ratings in gallons per minute (gpm)

Pump model	Hp	psi	Depth to pumping water level (lift) in ft																										
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
25S05-3	.5	20	18.6	6.5	3.3																						
		30	10.5																								
		40																									
		50																									
		60																									
Shut-off psi			31	22	13	5																					
25S07-5	.75	0			34.5	29.8	23.9	18.1																			
		20	32.9	28.6	21.8	15.1	7.5																				
		30	27.1	22.5	12.3	2.0																					
		40	19.5	11.8	5.8																						
		50	10.1																								
		60	4.1																								
Shut-off psi			57	48	39	31	22	13																			
25S10-7	1.0	0					31.3	28.5	24.3	20.2	12.7	5.1															
		20		33.2	30.3	27.6	22.9	18.3	10.4	2.5	1.3																
		30	33.0	29.9	26.5	23.1	13.0	9.6	4.8																		
		40	29.4	26.6	21.3	16.2	8.2																				
		50	25.3	21.5	14.3	7.0	3.5																				
		60	19.7	13.9	7.0																						
Shut-off psi			83	74	65	57	48	39	31	22	13	5															
25S15-9	1.5	0						32.2	30.0	27.9	24.8	21.6	16.3	10.8													
		20				31.5	29.3	27.2	23.7	20.3	14.5	8.8	4.4														
		30			31.3	29.1	26.4	23.7	18.9	14.2	7.8	1.5															
		40		30.8	28.6	26.3	22.6	18.8	12.8	6.8	3.4																
		50	30.6	28.4	25.5	22.5	17.4	12.3	6.2																		
		60	27.8	25.5	21.3	17.2	11.0	4.8	2.4																		
Shut-off psi			109	100	91	83	74	65	57	48	39	31	22	13													
25S20-11	2.0	0						33.1	31.1	29.3	27.6	25.1	22.5	18.5	14.5	9.3											
		20					32.5	30.6	28.8	27.0	24.3	21.5	17.3	13.0	7.8	2.5											
		30				32.0	30.3	28.7	26.4	24.2	20.6	16.9	12.0	7.0	3.5												
		40			31.8	30.1	28.2	26.3	23.3	20.4	15.9	11.4	6.3														
		50		31.5	29.8	28.1	25.7	23.3	19.4	15.6	10.4	5.3	2.7														
		60	31.3	29.6	27.6	25.6	22.4	19.3	14.5	9.8	4.9																
Shut-off psi			135	126	118	109	100	92	83	74	66	57	48	40	31	23											
25S30-15	3.0	0										32.3	31.0	29.8	28.4	27.1	25.2	20.7									
		20								31.8	30.6	29.3	28.0	26.6	24.6	22.7	19.8	13.5									
		30						33.0	31.7	30.4	29.2	27.8	26.2	24.5	22.1	19.7	16.4	9.3									
		40					32.8	31.5	30.3	29.0	27.5	26.0	24.0	21.9	19.0	16.1	12.4	4.9									
		50				32.6	31.3	30.0	28.7	27.4	25.7	23.8	21.3	18.8	15.3	12.0	8.2	2.2									
		60			32.4	31.1	29.8	28.6	27.0	25.5	23.3	21.2	18.1	15.0	11.3	7.6	3.8										
Shut-off psi					170	161	152	144	135	126	118	109	100	92	83	74	66	48									
25S50-26	5.0	0																32.5	30.3	28.0	25.3	19.9	10.2				
		20															32.3	30.8	28.6	25.9	22.5	15.8	5.0				
		30														32.1	31.3	29.9	27.7	24.7	20.8	13.5	2.5				
		40													32.0	31.3	30.5	29.1	26.7	23.3	18.9	11.0					
		50											32.7	31.8	31.2	30.4	29.7	28.2	25.5	21.8	16.8	8.5					
		60										32.5	31.8	31.0	30.3	29.6	28.8	27.3	24.3	20.0	14.6	5.8					
Shut-off psi												253	245	236	227	219	210	193	167	141	115	80	37				

See 25S performance curves for higher head models.
Specifications are subject to change without notice.
These values are approximate. For more precise values, see the performance curves in section *17. Curve charts and technical data*.

16. Performance curves and technical data

How to read the curve charts



Pump type, frequency, and service factor.

Number of stages. First figure: number of stages; second figure: impeller trim(s).

QH curve for the individual pump. The **bold** curves indicate the **recommended** performance range for best efficiency.

The efficiency curve (Eff) shows the efficiency of the pump. The efficiency curve is an average curve of all the pump types shown in the chart.
The efficiency of pumps with reduced-diameter impellers is approximately 2 % lower than the efficiency curve shown in the chart.

The power curves (P2) indicate pump input power **per stage**. Curves are shown for complete (1/1) and for reduced-diameter (2/3) impellers.

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Curve conditions

The conditions below apply to the curves shown in section *6. Curve charts and technical data* on pages 29-105:

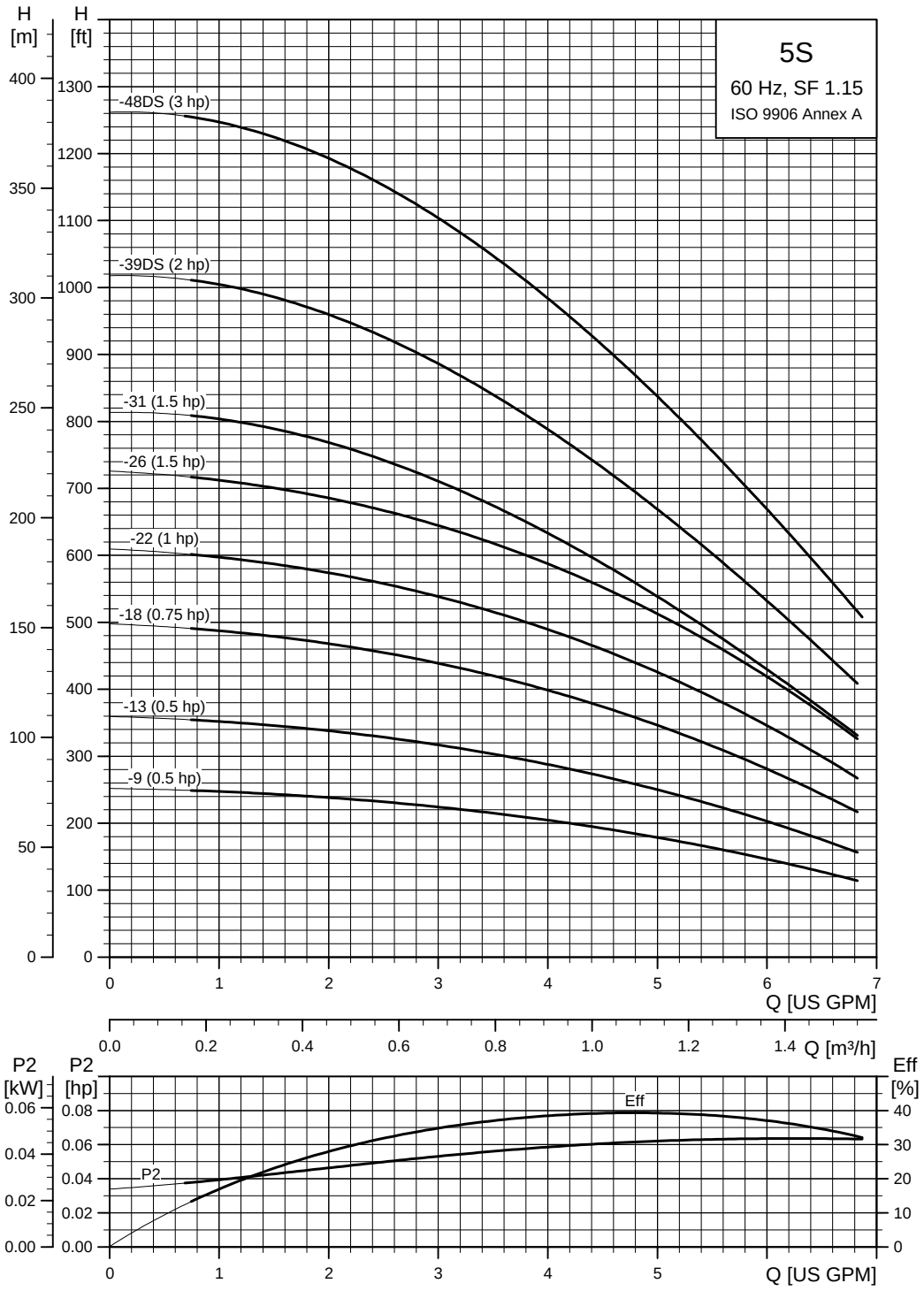
General

- Curve tolerances according to ISO 9906, Annex A.
- The performance curves show pump performance at actual speed, cf. standard motor range.
  The motor speeds are listed in the data tables in section *6. Curve charts and technical data*.
- The measurements were made with airless water at a temperature of 68 °F (20 °C). The curves apply to a kinematic viscosity of 1 mm^2/s (1 cSt). When pumping liquids with a density higher than that of water, use motors with correspondingly higher outputs.
- The **bold** curves indicate the recommended performance range.
- The performance curves are inclusive of possible losses such as check valve loss.
- **Pump rpm:** The curves include the actual motor rpm. The actual motor rpm is listed in the data charts in section *6. Curve charts and technical data*.
- **Q/H:** The curves are inclusive of valve and inlet losses at the actual speed.
  Operation without check valve will increase the actual head at rated performance by 1.6 to 3.3 ft (0.5 to 1.0 m).
- **NPSH:** The curve is inclusive of pressure loss in the suction interconnector and shows required inlet pressure.
- **Power curve:** P_2 shows pump power input [Hp] at the actual speed of each individual pump size.
- **Efficiency curve:** Eta shows pump stage efficiency. If Eta for the actual pump size is needed, please consult Grundfos Product Center.

17. Curve charts and technical data

4" and larger wells

SP 5S (5 gpm)



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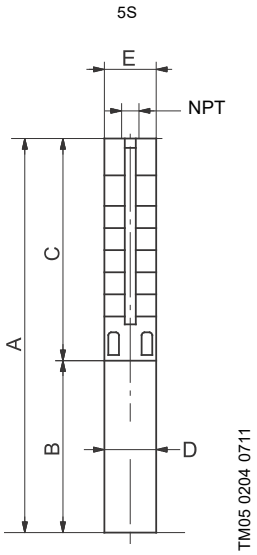
4" and larger wells - continued

SP 5S (5 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
5S, motor diameter 4-inch, 2-wire motor, 60 Hz - rated flow rate 5 gpm (1" NPT)												
5S05-9	184	1	230	0.5	■	3517	24.57 (624)	11.03 (280)	13.55 (344)	3.74 (95)	3.98 (101)	21.6
5S05-13	258	1	115	0.5	■	3360	27.88 (708)	11.03 (280)	16.86 (428)	3.74 (95)	3.98 (101)	26.9
			230	0.5	■	3474	27.88 (708)	11.03 (280)	16.86 (428)	3.74 (95)	3.98 (101)	26.1
5S07-18	357	1	230	0.75	■	3465	32.60 (828)	11.62 (295)	20.99 (533)	3.74 (95)	3.98 (101)	29.7
5S10-22	439	1	230	1	■	3400	36.50 (927)	12.21 (310)	24.30 (617)	3.74 (95)	3.98 (101)	32.4
5S15-26	529	1	230	1.5	■	3439	41.30 (1049)	13.71 (348)	27.60 (701)	3.74 (95)	3.98 (101)	41.4
5S15-31	585	1	230	1.5	■	3410	47.21 (1199)	13.71 (348)	33.51 (851)	3.74 (95)	3.98 (101)	47.7
5S, motor diameter 4-inch, 3-wire motor, 60 Hz - rated flow rate 5 gpm (1" NPT)												
5S05-9	184	1	230	0.5	■	3450	24.57 (624)	11.03 (280)	13.55 (344)	3.74 (95)	3.98 (101)	22.5
5S05-13	258	1	115	0.5	■	3382	27.88 (708)	11.03 (280)	16.86 (428)	3.74 (95)	3.98 (101)	26.9
			230	0.5	■	3352	27.88 (708)	11.03 (280)	16.86 (428)	3.74 (95)	3.98 (101)	25.2
5S07-18	357	1	230	0.75	■	3346	32.60 (828)	11.62 (295)	20.99 (533)	3.74 (95)	3.98 (101)	28.8
5S10-22	439	1	230	1	■	3379	36.50 (927)	12.21 (310)	24.30 (617)	3.74 (95)	3.98 (101)	32.4
5S15-26	529	1	230	1.5	■	3459	41.30 (1049)	13.71 (348)	27.60 (701)	3.74 (95)	3.98 (101)	37.8
		3	230	1.5	■	3465	39.81 (1011)	12.21 (310)	27.60 (701)	3.74 (95)	3.98 (101)	38.7
			460	1.5	■	3465	39.81 (1011)	12.21 (310)	27.60 (701)	3.74 (95)	3.98 (101)	38.7
5S15-31	585	1	230	1.5	■	3423	47.21 (1199)	13.71 (348)	33.51 (851)	3.74 (95)	3.98 (101)	47.7
		3	230	1.5	■	3437	45.71 (1161)	12.21 (310)	33.51 (851)	3.74 (95)	3.98 (101)	45.0
			460	1.5	■	3437	45.71 (1161)	12.21 (310)	33.51 (851)	3.74 (95)	3.98 (101)	45.0
5S20-39DS	730	1	230	2	•	3428	59.61 (1514)	19.49 (495)	40.12 (1019)	3.74 (95)	4.25 (108)	57.6
		3	230	2	■	3426	53.82 (1367)	13.71 (348)	40.12 (1019)	3.74 (95)	4.25 (108)	54.0
			460	2	■	3426	53.82 (1367)	13.71 (348)	40.12 (1019)	3.74 (95)	4.25 (108)	54.0
5S30-48DS	909	1	230	3	•	3450	70.16 (1782)	22.60 (574)	47.56 (1208)	3.74 (95)	4.25 (108)	77.4
		3	208	3	•	3485	65.56 (1665)	18.00 (457)	47.56 (1208)	3.74 (95)	4.25 (108)	77.4
			230	3	•	3485	65.56 (1665)	18.00 (457)	47.56 (1208)	3.74 (95)	4.25 (108)	77.4
			460	3	•	3485	65.56 (1665)	18.00 (457)	47.56 (1208)	3.74 (95)	4.25 (108)	77.4



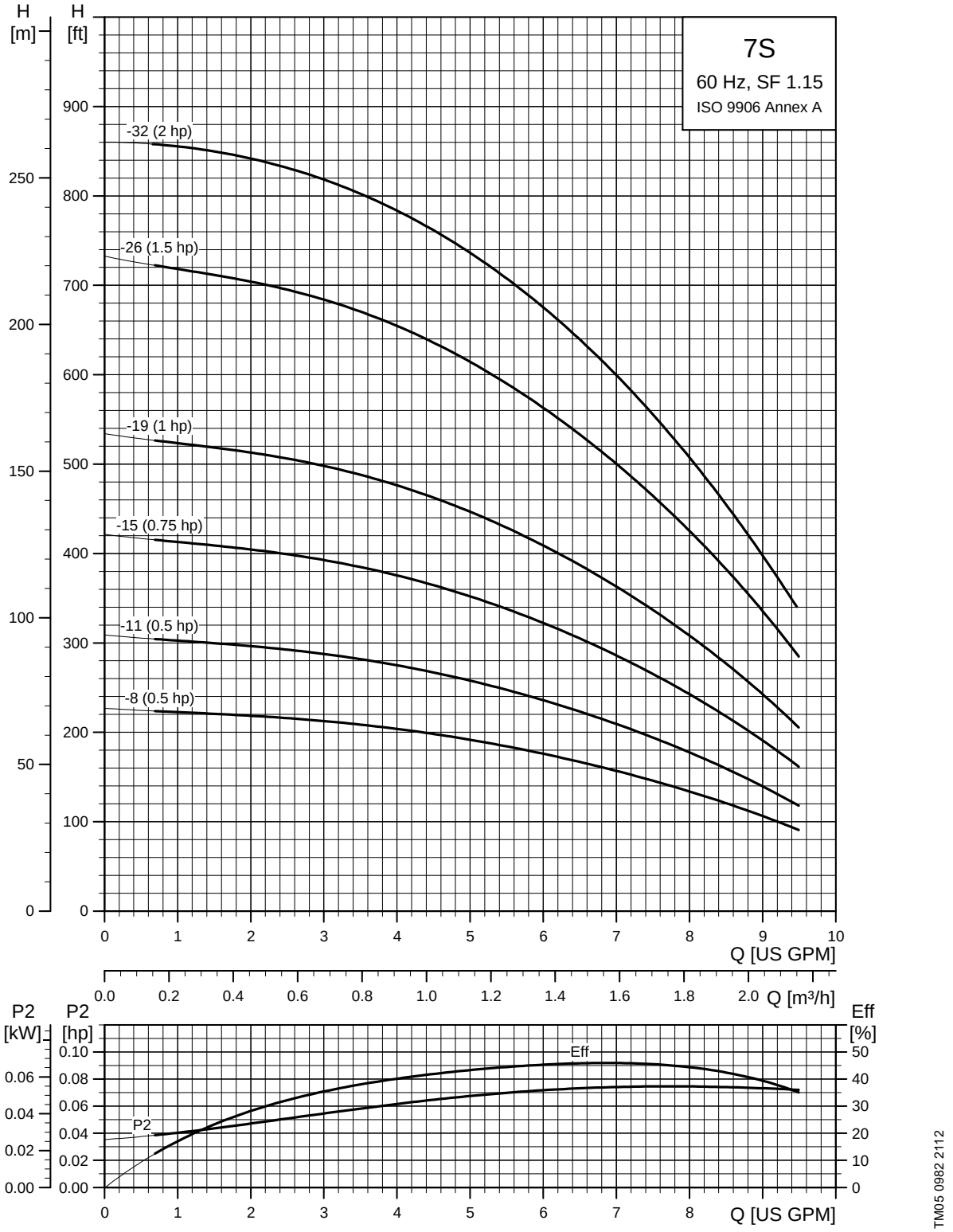
E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 1 - 1/2" NPT, 6" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 2 ft (0.6 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

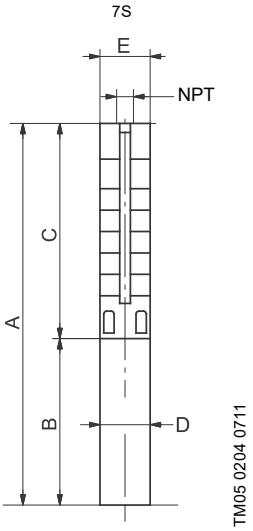
SP 7S (7 gpm)



4" and larger wells - continued

SP 7S (7 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E
7S, motor diameter 4-inch, 2-wire motor, 60 Hz - rated flow rate 7 gpm (1" NPT)											
7S05-8	164	1	230	.5	■	3512	23.75 (603)	11.03 (280)	12.72 (323)	3.74 (95)	3.98 (101)	21.6
7S05-11	222	1	115	.5	■	3359	26.23 (666)	11.03 (280)	15.20 (386)	3.74 (95)	3.98 (101)	29.7
			230	.5	■	3472	26.23 (666)	11.03 (280)	15.20 (386)	3.74 (95)	3.98 (101)	24.3
7S07-15	303	1	230	.75	■	3467	30.12 (765)	11.62 (295)	18.51 (470)	3.74 (95)	3.98 (101)	29.7
7S10-19	385	1	230	1	■	3394	34.02 (864)	12.21 (310)	21.82 (554)	3.74 (95)	3.98 (101)	32.4
7S15-26	525	1	230	1.5	■	3408	41.3 (1049)	13.71 (348)	27.60 (701)	3.74 (95)	3.98 (101)	41.4
7S, motor diameter 4-inch, 3-wire motor, 60 Hz - rated flow rate 7 gpm (1" NPT)											
7S05-8	164	1	230	.5	■	3438	23.75 (603)	11.03 (280)	12.72 (323)	3.74 (95)	3.98 (101)	21.6
7S05-11	222	1	115	.5	■	3380	26.23 (666)	11.03 (280)	15.20 (386)	3.74 (95)	3.98 (101)	21.6
			230	.5	■	3349	26.23 (666)	11.03 (280)	15.20 (386)	3.74 (95)	3.98 (101)	30.6
7S07-15	303	1	230	.75	■	3349	30.12 (765)	11.62 (295)	18.51 (470)	3.74 (95)	3.98 (101)	27.9
7S10-19	385	1	230	1	■	3369	34.02 (864)	12.21 (310)	21.82 (554)	3.74 (95)	3.98 (101)	39.6
7S15-26	525	1	230	1.5	■	3419	41.30 (1049)	13.71 (348)	27.60 (701)	3.74 (95)	3.98 (101)	38.7
		3	230	1.5	■	3435	39.81 (1011)	12.21 (310)	27.60 (701)	3.74 (95)	3.98 (101)	38.7
			460	1.5	■	3435	39.81 (1011)	12.21 (310)	27.60 (701)	3.74 (95)	3.98 (101)	38.7
7S20-32	630	1	230	2	•	3590	52.05 (1322)	19.49 (495)	32.56 (827)	3.74 (95)	3.98 (101)	48.5
		3	230	2	■	3596	46.26 (1175)	13.71 (348)	32.56 (827)	3.74 (95)	3.98 (101)	48.5
			460	2	■	3596	46.26 (1175)	13.71 (348)	32.56 (827)	3.74 (95)	3.98 (101)	48.5



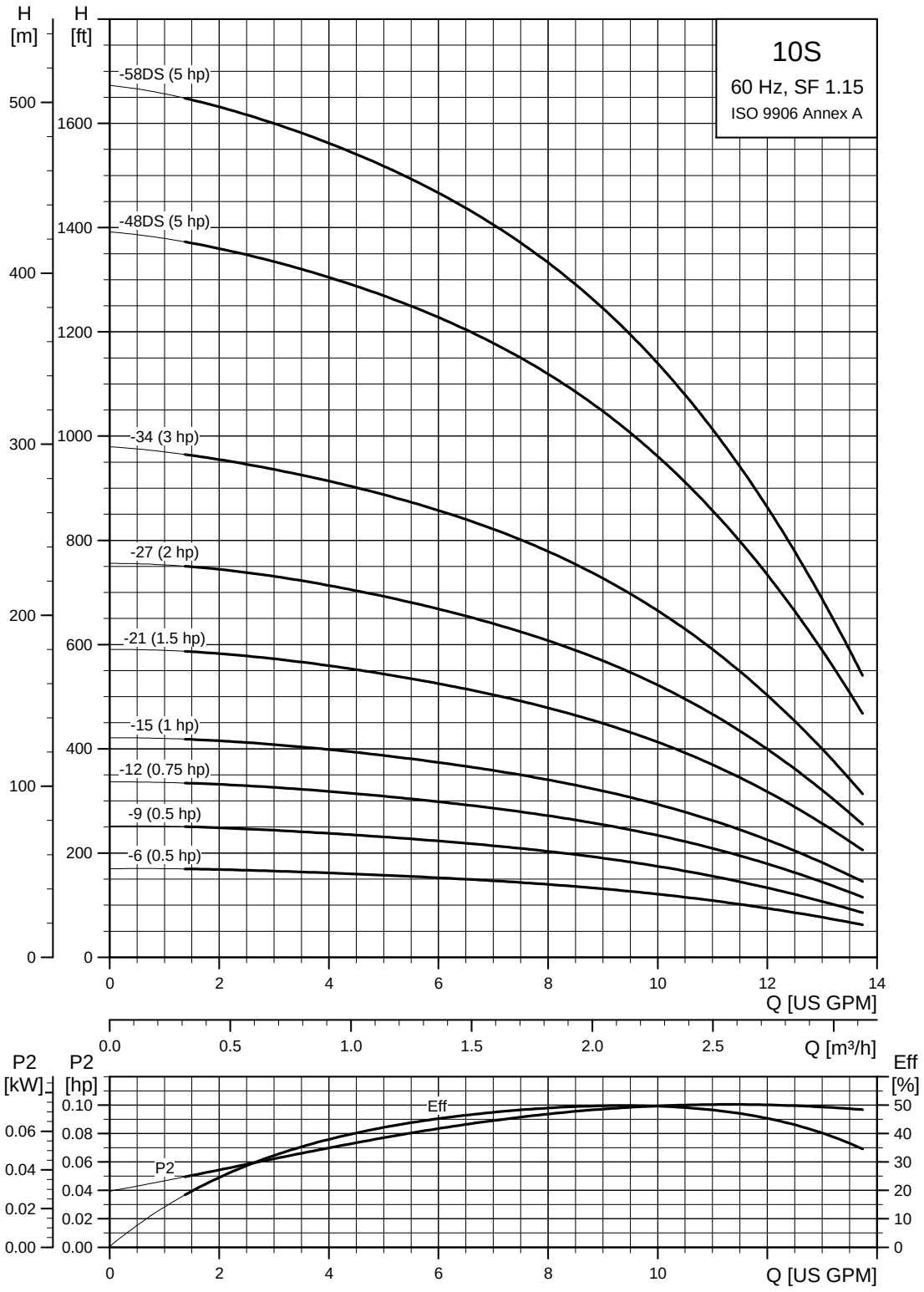
E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 1 - 1/2" NPT, 6" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 2 ft (0.6 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 10S (10 gpm)



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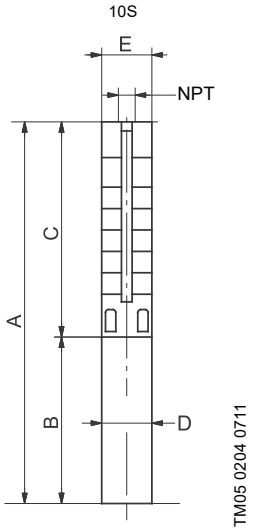
4" and larger wells - continued

SP 10S (10 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
10S, motor diameter 4-inch, 2-wire motor, 60 Hz - rated flow rate 10 gpm (1.25" NPT)												
10S05-6	126	1	230	.5	■	3454	22.05 (560)	10.99 (279)	11.07 (281)	3.74 (95)	3.98 (101)	20.7
10S05-9	185	1	115	.5	■	3336	24.53 (623)	10.99 (279)	13.55 (344)	3.74 (95)	3.98 (101)	24.3
			230	.5	■	3457	24.53 (623)	10.99 (279)	13.55 (344)	3.74 (95)	3.98 (101)	23.4
10S07-12	246	1	230	.75	■	3453	27.60 (701)	11.58 (294)	16.03 (407)	3.74 (95)	3.98 (101)	24.3
10S10-15	309	1	230	1	■	3382	30.67 (779)	12.17 (309)	18.51 (470)	3.74 (95)	3.98 (101)	29.7
10S15-21	433	1	230	1.5	■	3392	37.17 (944)	13.71 (348)	23.47 (596)	3.74 (95)	3.98 (101)	35.1
10S, motor diameter 4-inch, 3-wire motor, 60 Hz - rated flow rate 10 gpm (1.25" NPT)												
10S05-6	126	1	230	.5	■	3279	24.77 (629)	13.71 (348)	11.07 (281)	3.74 (95)	3.98 (101)	21.6
10S05-9	185	1	115	.5	■	3350	24.53 (623)	10.99 (279)	13.55 (344)	3.74 (95)	3.98 (101)	25.4
			230	.5	■	3313	24.53 (623)	10.99 (279)	13.55 (344)	3.74 (95)	3.98 (101)	24.3
10S07-12	246	1	230	.75	■	3320	27.60 (701)	11.58 (294)	16.03 (407)	3.74 (95)	3.98 (101)	28.8
10S10-15	309	1	230	1	■	3348	30.67 (779)	12.17 (309)	18.51 (470)	3.74 (95)	3.98 (101)	29.7
10S15-21	433	1	230	1.5	■	3398	37.17 (944)	13.71 (348)	23.47 (596)	3.74 (95)	3.98 (101)	35.1
		3	230	1.5	■	3419	35.63 (905)	12.17 (309)	23.47 (596)	3.74 (95)	3.98 (101)	32.4
			460	1.5	■	3419	35.63 (905)	12.17 (309)	23.47 (596)	3.74 (95)	3.98 (101)	36.0
10S20-27	554	1	230	2	•	3400	47.92 (1217)	19.49 (495)	28.43 (722)	3.74 (95)	3.98 (101)	45.9
		3	230	2	■	3399	42.13 (1070)	13.71 (348)	28.43 (722)	3.74 (95)	3.98 (101)	44.1
			460	2	■	3399	42.13 (1070)	13.71 (348)	28.43 (722)	3.74 (95)	3.98 (101)	44.1
10S30-34	716	1	230	3	•	3418	58.59 (1488)	22.6 (574)	35.99 (914)	3.74 (95)	3.98 (101)	81.9
		3	208	3	•	3465	53.98 (1371)	18.00 (457)	35.99 (914)	3.74 (95)	3.98 (101)	74.7
			230	3	•	3465	53.98 (1371)	18.00 (457)	35.99 (914)	3.74 (95)	3.98 (101)	74.7
			460	3	•	3465	53.98 (1371)	18.00 (457)	35.99 (914)	3.74 (95)	3.98 (101)	74.7
10S50-48DS	1020	1	230	5	•	3476	74.18 (1884)	26.62 (676)	47.56 (1208)	3.74 (95)	4.25 (108)	103.5
		3	208	5	•	3499	70.16 (1782)	22.60 (574)	47.56 (1208)	3.74 (95)	4.25 (108)	103.5
			230	5	•	3499	70.16 (1782)	22.60 (574)	47.56 (1208)	3.74 (95)	4.25 (108)	103.5
			460	5	•	3497	70.16 (1782)	22.60 (574)	47.56 (1208)	3.74 (95)	4.25 (108)	103.5
10S50-58DS	1225	1	230	5	•	3441	89.49 (2272)	26.62 (676)	62.88 (1597)	3.74 (95)	4.25 (108)	132.3
		3	208	5	•	3473	85.48 (2171)	22.60 (574)	62.88 (1597)	3.74 (95)	4.25 (108)	132.3
			230	5	•	3473	85.48 (2171)	22.60 (574)	62.88 (1597)	3.74 (95)	4.25 (108)	132.3
			460	5	•	3470	85.48 (2171)	22.60 (574)	62.88 (1597)	3.74 (95)	4.25 (108)	132.3



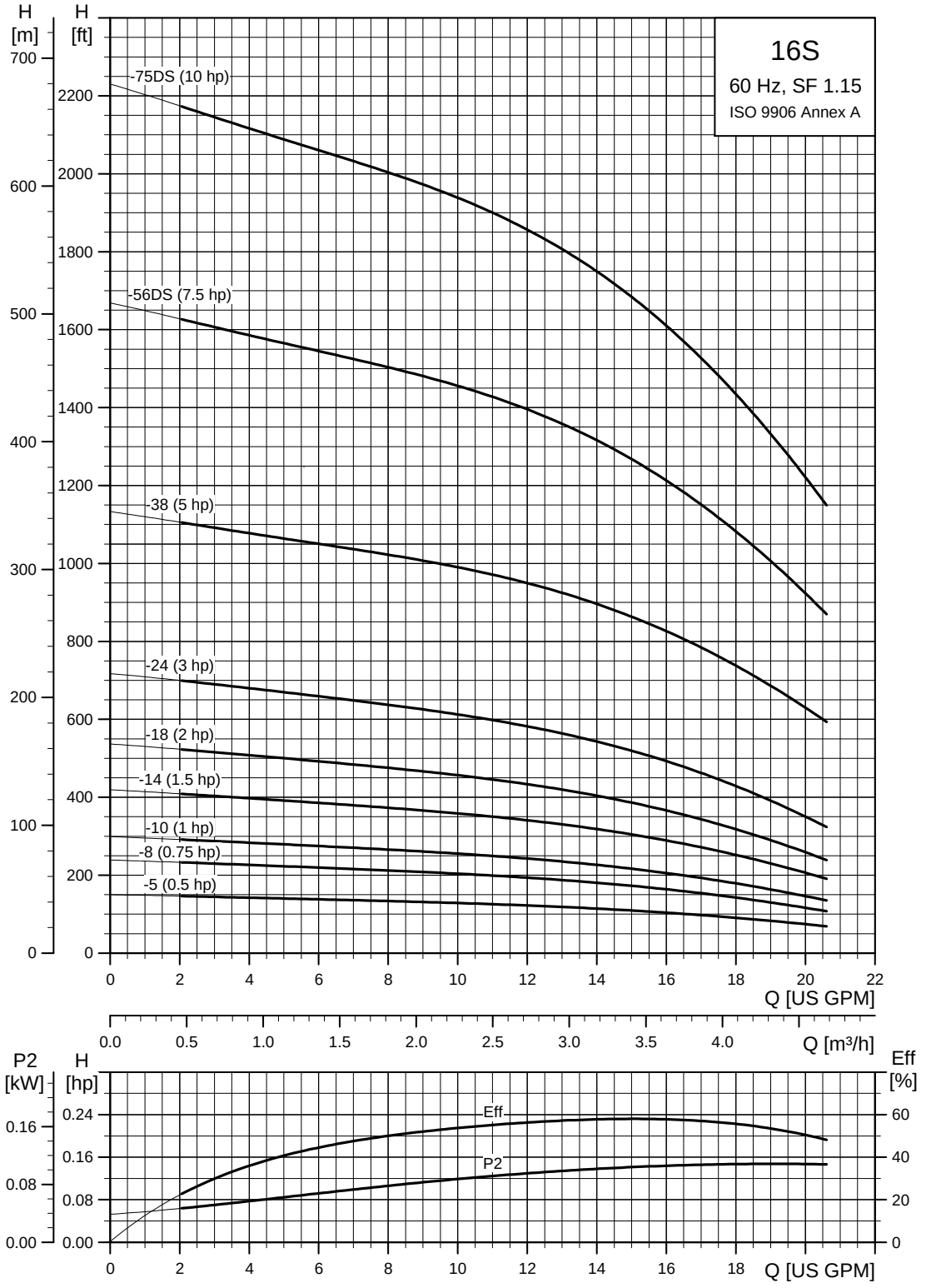
E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 1 - 1/2" NPT, 6" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 2 ft (0.6 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 16S (16 gpm)



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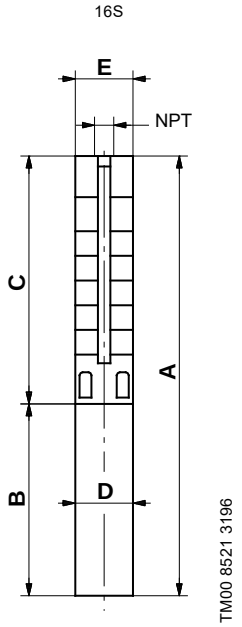
4" and larger wells - continued

SP 16S (16 gpm) pump with 4", 6" motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
16S, motor diameter 4-inch, 2-wire motor, 60 Hz - rated flow rate 16 gpm (1.25" NPT)												
16S05-5	112	1	115	.5	■	3391	21.26 (540)	11.03 (280)	10.24 (260)	3.74 (95)	3.98 (101)	21.6
			230	.5	■	3393	21.26 (540)	11.03 (280)	10.24 (260)	3.74 (95)	3.98 (101)	23.4
16S07-8	177	1	230	.75	■	3464	24.34 (618)	11.62 (295)	12.72 (323)	3.74 (95)	3.98 (101)	24.3
16S10-10	223	1	230	1	■	3394	26.58 (675)	12.21 (310)	14.38 (365)	3.74 (95)	3.98 (101)	27.9
16S15-14	313	1	230	1.5	■	3403	31.38 (797)	13.71 (348)	17.68 (449)	3.74 (95)	3.98 (101)	36.0
16S, motor diameter 4-inch, 3-wire motor, 60 Hz - rated flow rate 16 gpm (1.25" NPT)												
16S05-5	112	1	115	.5	■	3419	21.26 (540)	11.03 (280)	10.24 (260)	3.74 (95)	3.98 (101)	21.6
			230	.5	■	3396	21.26 (540)	11.03 (280)	10.24 (260)	3.74 (95)	3.98 (101)	21.6
16S07-8	177	1	230	.75	■	3343	24.34 (618)	11.62 (295)	12.72 (323)	3.74 (95)	3.98 (101)	27.0
16S10-10	223	1	230	1	■	3369	26.58 (675)	12.21 (310)	14.38 (365)	3.74 (95)	3.98 (101)	27.9
16S15-14	313	1	230	1.5	■	3414	31.38 (797)	13.71 (348)	17.68 (449)	3.74 (95)	3.98 (101)	32.4
		3	230	1.5	■	3430	29.89 (759)	12.21 (310)	17.68 (449)	3.74 (95)	3.98 (101)	28.8
			460	1.5	■	3430	29.89 (759)	12.21 (310)	17.68 (449)	3.74 (95)	3.98 (101)	28.8
16S20-18	397	1	230	2	•	3414	40.48 (1028)	19.49 (495)	20.99 (533)	3.74 (95)	3.98 (101)	36.0
		3	230	2	■	3413	34.69 (881)	13.71 (348)	20.99 (533)	3.74 (95)	3.98 (101)	36.0
			460	2	■	3413	34.69 (881)	13.71 (348)	20.99 (533)	3.74 (95)	3.98 (101)	36.0
16S30-24	533	1	230	3	•	3416	48.55 (1233)	22.60 (574)	25.95 (659)	3.74 (95)	3.98 (101)	62.1
		3	208	3	•	3464	43.94 (1116)	18.00 (457)	25.95 (659)	3.74 (95)	3.98 (101)	57.6
			230	3	•	3464	43.94 (1116)	18.00 (457)	25.95 (659)	3.74 (95)	3.98 (101)	57.6
			460	3	•	3464	43.94 (1116)	18.00 (457)	25.95 (659)	3.74 (95)	3.98 (101)	57.6
16S50-38	832	1	230	5	•	3449	65.91 (1674)	26.62 (676)	39.30 (998)	3.74 (95)	3.98 (101)	97.2
		3	208	5	•	3479	62.01 (1575)	22.72 (577)	39.30 (998)	3.74 (95)	3.98 (101)	90.0
			230	5	•	3479	62.01 (1575)	22.72 (577)	39.30 (998)	3.74 (95)	3.98 (101)	90.0
			460	5	•	3476	62.01 (1575)	22.72 (577)	39.30 (998)	3.74 (95)	3.98 (101)	90.0
SP 16S, motor diameter 6 inch, 60 Hz - rated flow rate 16 gpm (1.25" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
16S75-56DS	1224	3	208	7.5	▲	3478	92.28 (2344)	23.51 (597)	68.78 (1747)	5.63 (143)	5.51 (140)	165.1
			230	7.5	▲	3478	92.28 (2344)	23.51 (597)	68.78 (1747)	5.63 (143)	5.51 (140)	165.1
			460	7.5	▲	3491	92.28 (2344)	23.51 (597)	68.78 (1747)	5.63 (143)	5.51 (140)	165.1
16S100-75DS	1636	3	460	10	▲	3482	109.18 (2773)	24.69 (627)	84.49 (2146)	5.63 (143)	5.51 (140)	190.0



E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

DS designation = Built into sleeve, 1 - 1/2" NPT, 6" minimum well diameter.

Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 2 ft (0.6 ft).

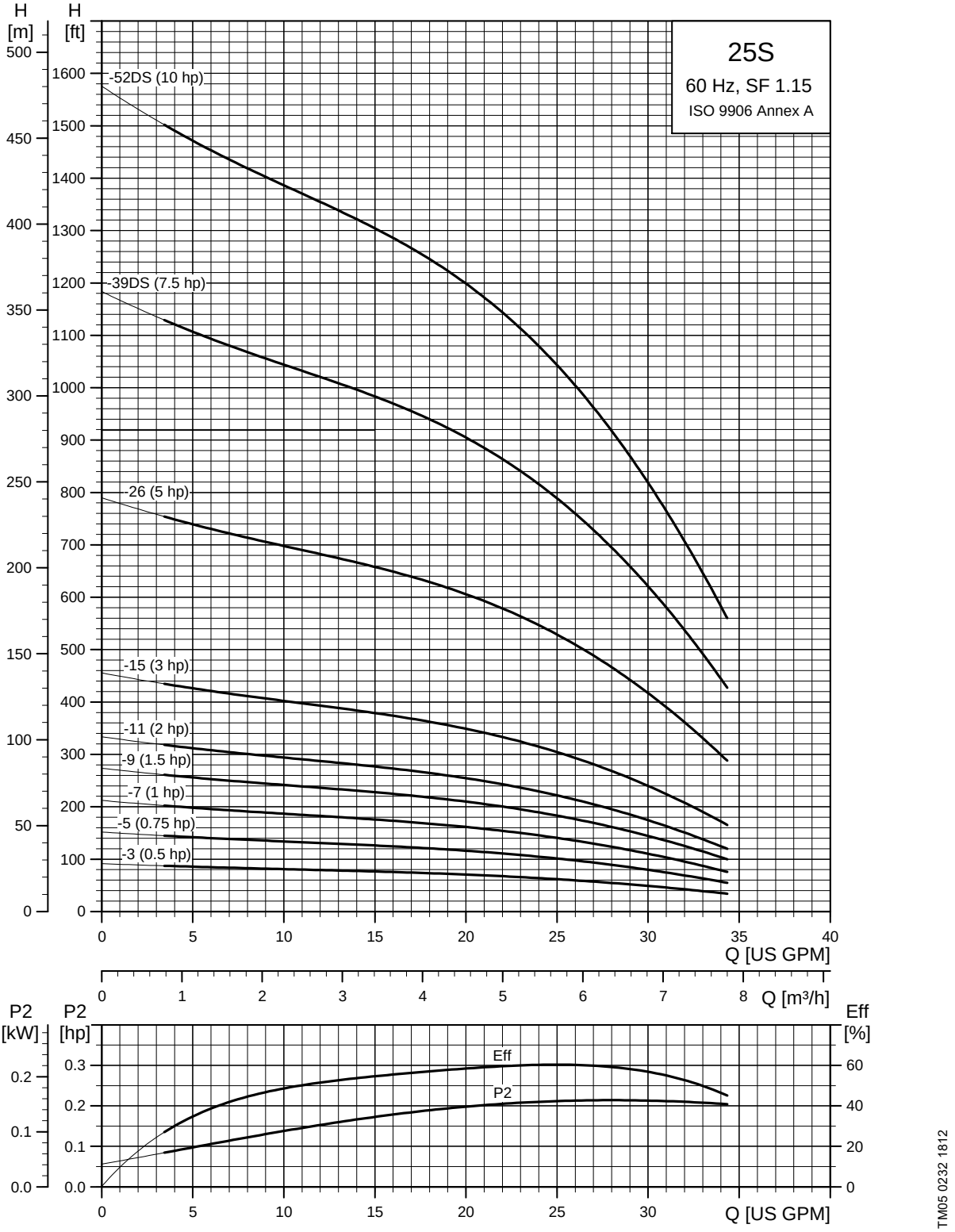
■ MS 402 motor.

• MS 4000 motor.

▲ MS 6000C motor.

4" and larger wells - continued

SP 25S (25 gpm)



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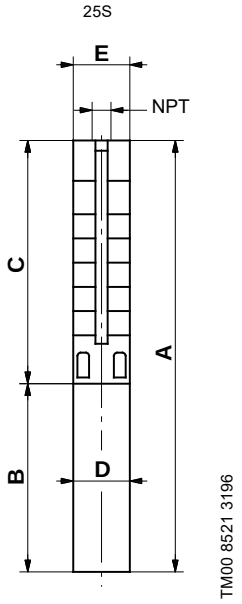
4" and larger wells - continued

SP 25S (25 gpm) pump with 4", 6" inch motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
25S, motor diameter 4-inch, 2-wire motor, 60 Hz - rated flow rate 25 gpm (1.5" NPT)												
25S05-3	64	1	115	.5	■	3411	19.61 (498)	11.03 (280)	8.59 (218)	3.74 (95)	3.98 (101)	21.6
			230	.5	■	3505	19.61 (498)	11.03 (280)	8.59 (218)	3.74 (95)	3.98 (101)	21.6
25S07-5	105	1	230	.75	■	3474	21.86 (555)	11.62 (295)	10.24 (260)	3.74 (95)	3.98 (101)	23.4
25S10-7	146	1	230	1	■	3383	24.10 (612)	12.21 (310)	11.89 (302)	3.74 (95)	3.98 (101)	25.2
25S15-9	189	1	230	1.5	■	3410	27.25 (692)	13.71 (348)	13.55 (344)	3.74 (95)	3.98 (101)	28.8
25S, motor diameter 4-inch, 3-wire motor, 60 Hz - rated flow rate 25 gpm (1.5" NPT)												
25S05-3	64	1	115	.5	■	3441	19.61 (498)	11.03 (280)	8.59 (218)	3.74 (95)	3.98 (101)	21.6
			230	.5	■	3423	19.61 (498)	11.03 (280)	8.59 (218)	3.74 (95)	3.98 (101)	21.6
25S07-5	105	1	230	.75	■	3365	21.86 (555)	11.62 (295)	10.24 (260)	3.74 (95)	3.98 (101)	23.4
25S10-7	146	1	230	1	■	3349	24.10 (612)	12.21 (310)	11.89 (302)	3.74 (95)	3.98 (101)	25.2
25S15-9	189	1	230	1.5	■	3422	27.25 (692)	13.71 (348)	13.55 (344)	3.74 (95)	3.98 (101)	29.7
		3	230	1.5	■	3437	25.75 (654)	12.21 (310)	13.55 (344)	3.74 (95)	3.98 (101)	27.0
			460	1.5	■	3437	25.75 (654)	12.21 (310)	13.55 (344)	3.74 (95)	3.98 (101)	28.8
25S20-11	229	1	230	2	•	3434	34.69 (881)	19.49 (495)	15.20 (386)	3.74 (95)	3.98 (101)	33.1
		3	230	2	■	3431	28.90 (734)	13.71 (348)	15.20 (386)	3.74 (95)	3.98 (101)	37.0
			460	2	■	3431	28.90 (734)	13.71 (348)	15.20 (386)	3.74 (95)	3.98 (101)	33.3
25S30-15	314	1	230	3	•	3432	41.11 (1044)	22.60 (574)	18.51 (470)	3.74 (95)	3.98 (101)	61.2
		3	208	3	•	3474	36.50 (927)	18.00 (457)	18.51 (470)	3.74 (95)	3.98 (101)	53.1
			230	3	•	3474	36.50 (927)	18.00 (457)	18.51 (470)	3.74 (95)	3.98 (101)	53.1
			460	3	•	3474	36.50 (927)	18.00 (457)	18.51 (470)	3.74 (95)	3.98 (101)	53.1
25S50-26	546	1	230	5	•	3449	54.22 (1377)	26.62 (676)	27.60 (701)	3.74 (95)	3.98 (101)	72.9
		3	208	5	•	3479	50.32 (1278)	22.72 (577)	27.60 (701)	3.74 (95)	3.98 (101)	72.9
			230	5	•	3479	50.32 (1278)	22.72 (577)	27.60 (701)	3.74 (95)	3.98 (101)	72.9
			460	5	•	3476	50.32 (1278)	22.72 (577)	27.60 (701)	3.74 (95)	3.98 (101)	72.9
SP 25S, motor diameter 6 inch, 60 Hz - rated flow rate 25 gpm (1.5" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
25S75-39DS	815	3	208	7.5	▲	3475	66.06 (1678)	23.51 (597)	42.56 (1081)	5.63 (143)	5.43 (138)	122.1
			230	7.5	▲	3475	66.06 (1678)	23.51 (597)	42.56 (1081)	5.63 (143)	5.43 (138)	122.1
			460	7.5	▲	3488	66.06 (1678)	23.51 (597)	42.56 (1081)	5.63 (143)	5.43 (138)	122.1
25S100-52DS	1082	3	460	10	▲	3480	90.17 (2290)	24.69 (627)	65.48 (1663)	5.63 (143)	5.51 (140)	163.1



E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

DS designation = Built into sleeve, 1 - 1/2" NPT, 6" minimum well diameter.

Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 2 ft (0.6 m).

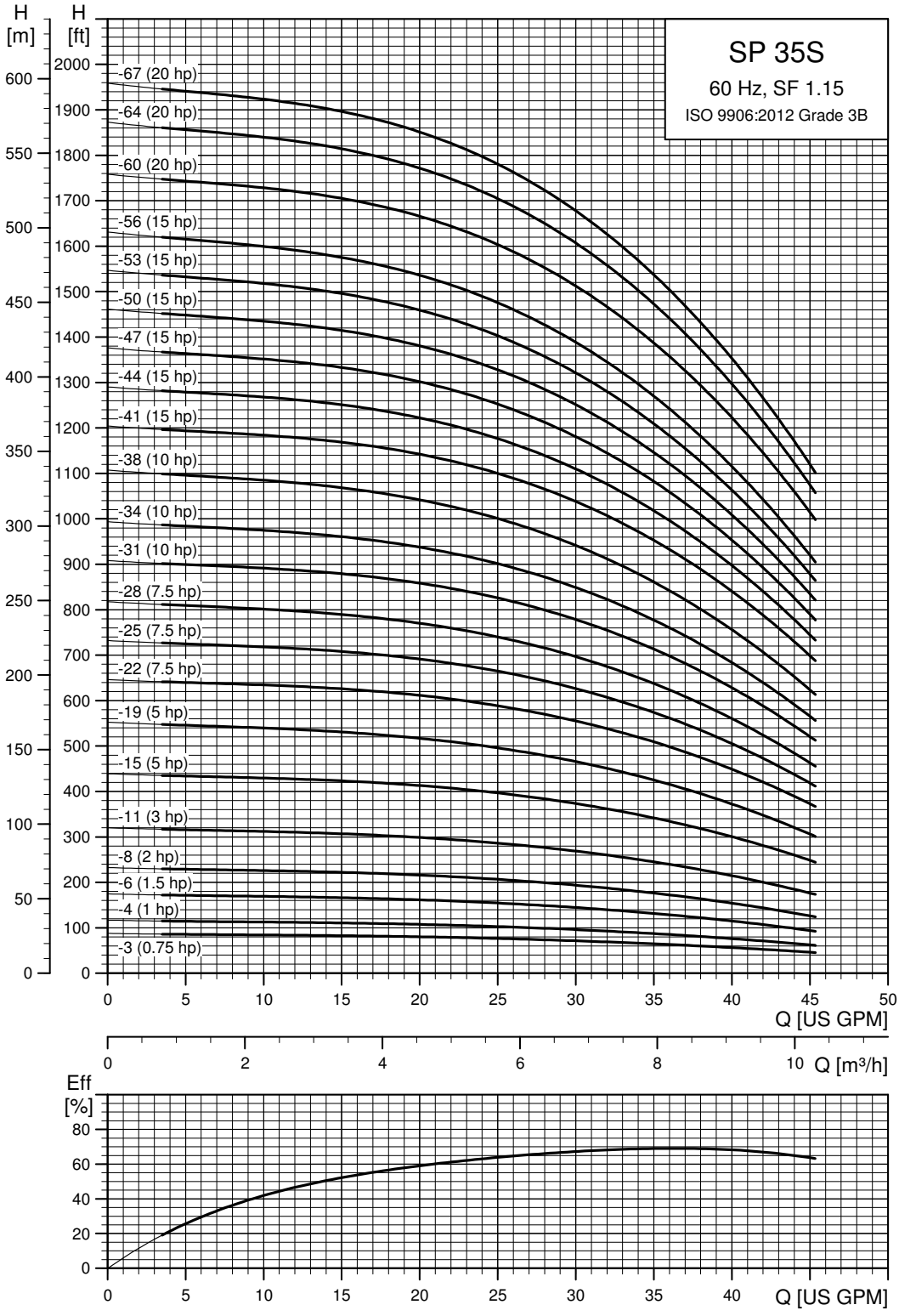
■ MS 402 motor.

• MS 4000 motor.

▲ MS 6000C motor.

4" and larger wells - continued

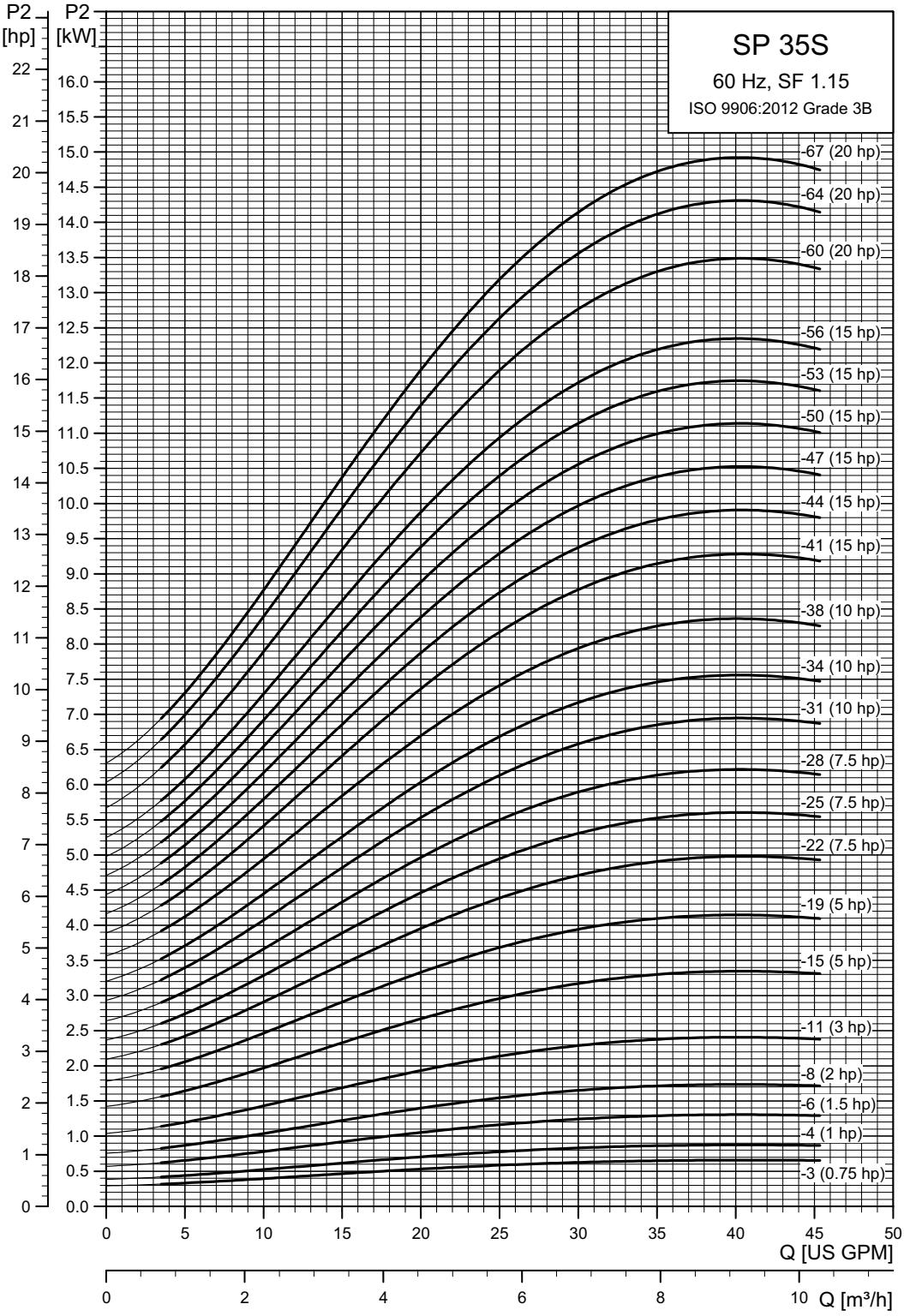
SP 35S (35 gpm)



TM06 4614 3215

4" and larger wells - continued

SP 35S (35 gpm) pump power requirement (P2)

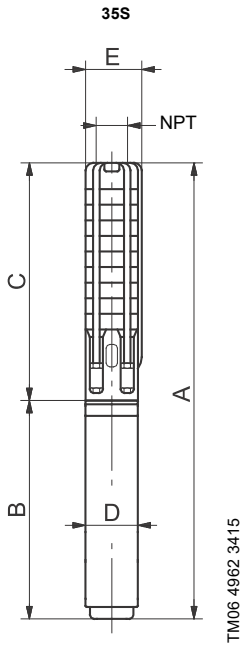


TM06 4615 3215

4" and larger wells - continued

SP 35S (35 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
35S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 35 gpm (1 1/2" NPT)												
35S07-3	61	1	230	.75	■	3427	28.35 (720)	13.08 (332)	15.28 (388)	3.75 (95)	3.98 (101)	29.9
		3	230	.75	■	3439	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.9
		3	460	.75	■	3439	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.9
		3	575	.75	■	3428	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.9
35S10-4	82	1	230	1	■	3429	30.91 (785)	13.67 (347)	17.25 (438)	3.75 (95)	3.98 (101)	32.8
	83	3	230	1	■	3445	29.73 (755)	12.49 (317)	17.25 (438)	3.75 (95)	3.98 (101)	30.1
	83	3	460	1	■	3445	29.73 (755)	12.49 (317)	17.25 (438)	3.75 (95)	3.98 (101)	29.9
	82	3	575	1	■	3431	29.73 (755)	12.49 (317)	17.25 (438)	3.75 (95)	3.98 (101)	29.9
35S15-6	126	1	230	1.5	■	3442	36.42 (925)	15.24 (387)	21.19 (538)	3.75 (95)	3.98 (101)	39.1
	126	3	230	1.5	■	3451	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	35.5
	126	3	460	1.5	■	3451	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	35.5
	125	3	575	1.5	■	3427	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	35.3
35S20-8	168	1	230	2	•	3434	44.69 (1135)	19.57 (497)	25.12 (638)	3.75 (95)	3.98 (101)	57.3
		3	230	2	■	3432	40.36 (1025)	15.24 (387)	25.12 (638)	3.75 (95)	3.98 (101)	41.9
		3	460	2	■	3432	40.36 (1025)	15.24 (387)	25.12 (638)	3.75 (95)	3.98 (101)	42.1
		3	575	2	■	3430	40.36 (1025)	15.24 (387)	25.12 (638)	3.75 (95)	3.98 (101)	41.9
35S30-11	232	1	230	3	•	3431	53.75 (1365)	22.72 (577)	31.03 (788)	3.75 (95)	3.98 (101)	69.9
	233	3	208	3	•	3440	49.02 (1245)	18.00 (457)	31.03 (788)	3.75 (95)	3.98 (101)	56.7
	233	3	230	3	•	3440	49.02 (1245)	18.00 (457)	31.03 (788)	3.75 (95)	3.98 (101)	56.7
	237	3	460	3	•	3468	49.02 (1245)	18.00 (457)	31.03 (788)	3.75 (95)	3.98 (101)	56.7
35S50-15	327	1	230	5	•	3483	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	86.1
	331	3	208	5	•	3502	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	75.1
	331	3	230	5	•	3502	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	75.1
	331	3	460	5	•	3501	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	75.1
35S50-19	407	1	230	5	•	3446	73.43 (1865)	26.66 (677)	46.78 (1188)	3.75 (95)	3.98 (101)	91.2
	413	3	208	5	•	3473	69.49 (1765)	22.72 (577)	46.78 (1188)	3.75 (95)	3.98 (101)	80.2
	413	3	230	5	•	3473	69.49 (1765)	22.72 (577)	46.78 (1188)	3.75 (95)	3.98 (101)	80.2
	413	3	460	5	•	3471	69.49 (1765)	22.72 (577)	46.78 (1188)	3.75 (95)	3.98 (101)	80.2
35S75-22	485	3	208	7.5	•	3495	79.34 (2015)	26.66 (677)	52.68 (1338)	3.75 (95)	3.98 (101)	95.0
		3	230	7.5	•	3495	79.34 (2015)	26.66 (677)	52.68 (1338)	3.75 (95)	3.98 (101)	95.0
		3	460	7.5	•	3495	79.34 (2015)	26.66 (677)	52.68 (1338)	3.75 (95)	3.98 (101)	95.0
		3	575	7.5	•	3495	79.34 (2015)	26.66 (677)	52.68 (1338)	3.75 (95)	3.98 (101)	95.0
35S75-25	547	3	208	7.5	•	3479	85.24 (2165)	26.66 (677)	58.59 (1488)	3.75 (95)	3.98 (101)	98.9
		3	230	7.5	•	3479	85.24 (2165)	26.66 (677)	58.59 (1488)	3.75 (95)	3.98 (101)	98.9
		3	460	7.5	•	3479	85.24 (2165)	26.66 (677)	58.59 (1488)	3.75 (95)	3.98 (101)	98.9
		3	575	7.5	•	3479	85.24 (2165)	26.66 (677)	58.59 (1488)	3.75 (95)	3.98 (101)	98.9
35S75-28	607	3	208	7.5	•	3463	91.15 (2315)	26.66 (677)	64.49 (1638)	3.75 (95)	3.98 (101)	102.7
		3	230	7.5	•	3463	91.15 (2315)	26.66 (677)	64.49 (1638)	3.75 (95)	3.98 (101)	102.7
		3	460	7.5	•	3463	91.15 (2315)	26.66 (677)	64.49 (1638)	3.75 (95)	3.98 (101)	102.7
		3	575	7.5	•	3463	91.15 (2315)	26.66 (677)	64.49 (1638)	3.75 (95)	3.98 (101)	102.7
35S100-31	682	3	460	10	•	3487	100.99 (2565)	30.60 (777)	70.40 (1788)	3.75 (95)	3.98 (101)	115.4
		3	575	10	•	3487	100.99 (2565)	30.60 (777)	70.40 (1788)	3.75 (95)	3.98 (101)	115.4
35S100-34	743	3	460	10	•	3475	106.89 (2715)	30.60 (777)	76.30 (1938)	3.75 (95)	3.98 (101)	119.2
		3	575	10	•	3475	106.89 (2715)	30.60 (777)	76.30 (1938)	3.75 (95)	3.98 (101)	119.2
35S100-38	823	3	460	10	•	3459	114.77 (2915)	30.60 (777)	84.18 (2138)	3.75 (95)	3.98 (101)	124.3
		3	575	10	•	3459	114.77 (2915)	30.60 (777)	84.18 (2138)	3.75 (95)	3.98 (101)	124.3



E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

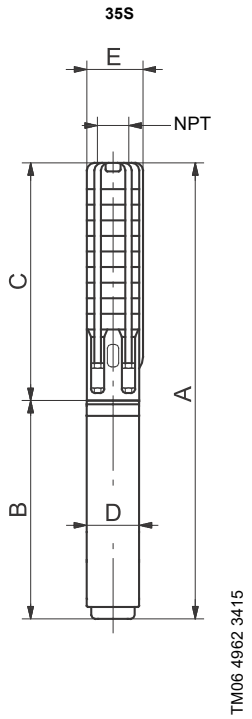
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 35S (35 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
35S - Motor diameter 6 inch, 60 Hz, rated flow rate 35 gpm (1 1/2" NPT)											
-	-	3	208	5 ▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5 ▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5 ▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
35S75-22	487	3	208	7.5 ▲	3502	78.67 (1998)	23.51 (597)	55.16 (1401)	5.50 (140)	5.50 (140)	123.6
	487	3	230	7.5 ▲	3502	78.67 (1998)	23.51 (597)	55.16 (1401)	5.50 (140)	5.50 (140)	123.6
	490	3	460	7.5 ▲	3510	78.67 (1998)	23.51 (597)	55.16 (1401)	5.50 (140)	5.50 (140)	123.6
	489	3	575	7.5 ▲	3509	78.67 (1998)	23.51 (597)	55.16 (1401)	5.50 (140)	5.50 (140)	123.6
35S75-25	549	3	208	7.5 ▲	3487	84.57 (2148)	23.51 (597)	61.07 (1551)	5.50 (140)	5.50 (140)	127.5
	549	3	230	7.5 ▲	3487	84.57 (2148)	23.51 (597)	61.07 (1551)	5.50 (140)	5.50 (140)	127.5
	553	3	460	7.5 ▲	3498	84.57 (2148)	23.51 (597)	61.07 (1551)	5.50 (140)	5.50 (140)	127.5
	552	3	575	7.5 ▲	3496	84.57 (2148)	23.51 (597)	61.07 (1551)	5.50 (140)	5.50 (140)	127.5
35S75-28	611	3	208	7.5 ▲	3472	90.48 (2298)	23.51 (597)	66.97 (1701)	5.50 (140)	5.50 (140)	131.4
	611	3	230	7.5 ▲	3472	90.48 (2298)	23.51 (597)	66.97 (1701)	5.50 (140)	5.50 (140)	131.4
	615	3	460	7.5 ▲	3484	90.48 (2298)	23.51 (597)	66.97 (1701)	5.50 (140)	5.50 (140)	131.4
	614	3	575	7.5 ▲	3483	90.48 (2298)	23.51 (597)	66.97 (1701)	5.50 (140)	5.50 (140)	131.4
35S100-31	688	3	208	10 ▲	3489	97.56 (2478)	24.69 (627)	72.88 (1851)	5.50 (140)	5.50 (140)	142.0
	687	3	230	10 ▲	3489	97.56 (2478)	24.69 (627)	72.88 (1851)	5.50 (140)	5.50 (140)	142.0
	687	3	460	10 ▲	3499	97.56 (2478)	24.69 (627)	72.88 (1851)	5.50 (140)	5.50 (140)	142.0
	687	3	575	10 ▲	3498	97.56 (2478)	24.69 (627)	72.88 (1851)	5.50 (140)	5.50 (140)	142.0
35S100-34	744	3	208	10 ▲	3476	103.47 (2628)	24.69 (627)	78.78 (2001)	5.50 (140)	5.50 (140)	145.9
	744	3	230	10 ▲	3476	103.47 (2628)	24.69 (627)	78.78 (2001)	5.50 (140)	5.50 (140)	145.9
	749	3	460	10 ▲	3488	103.47 (2628)	24.69 (627)	78.78 (2001)	5.50 (140)	5.50 (140)	145.9
	749	3	575	10 ▲	3488	103.47 (2628)	24.69 (627)	78.78 (2001)	5.50 (140)	5.50 (140)	145.9
35S100-38	824	3	208	10 ▲	3459	111.34 (2828)	24.69 (627)	86.66 (2201)	5.50 (140)	5.50 (140)	151.1
	824	3	230	10 ▲	3459	111.34 (2828)	24.69 (627)	86.66 (2201)	5.50 (140)	5.50 (140)	151.1
	830	3	460	10 ▲	3474	111.34 (2828)	24.69 (627)	86.66 (2201)	5.50 (140)	5.50 (140)	151.1
	830	3	575	10 ▲	3473	111.34 (2828)	24.69 (627)	86.66 (2201)	5.50 (140)	5.50 (140)	151.1



E = Maximum diameter of pump including cable guard and motor.

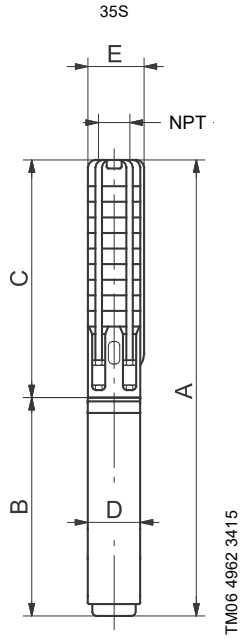
Notes: Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

▲ MS 6000C motor.

4" and larger wells - continued

SP 35S (35 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
35S - Motor diameter 6 inch, 60 Hz, rated flow rate 35 gpm (2" NPT)											
35S150-41DS	912	3	208	15 ▲	3503	131.23 (3333)	27.05 (687)	104.18 (2646)	5.50 (140)	5.50 (140)	217.3
	912	3	230	15 ▲	3503	131.23 (3333)	27.05 (687)	104.18 (2646)	5.50 (140)	5.50 (140)	217.3
	914	3	460	15 ▲	3507	131.23 (3333)	27.05 (687)	104.18 (2646)	5.50 (140)	5.50 (140)	217.3
	913	3	575	15 ▲	3506	131.23 (3333)	27.05 (687)	104.18 (2646)	5.50 (140)	5.50 (140)	217.3
35S150-44DS	975	3	208	15 ▲	3496	137.13 (3483)	27.05 (687)	110.08 (2796)	5.50 (140)	5.50 (140)	223.1
	975	3	230	15 ▲	3496	137.13 (3483)	27.05 (687)	110.08 (2796)	5.50 (140)	5.50 (140)	223.1
	977	3	460	15 ▲	3500	137.13 (3483)	27.05 (687)	110.08 (2796)	5.50 (140)	5.50 (140)	223.1
	976	3	575	15 ▲	3499	137.13 (3483)	27.05 (687)	110.08 (2796)	5.50 (140)	5.50 (140)	223.1
35S150-47DS	1037	3	208	15 ▲	3488	143.04 (3633)	27.05 (687)	115.99 (2946)	5.50 (140)	5.50 (140)	228.8
	1037	3	230	15 ▲	3488	143.04 (3633)	27.05 (687)	115.99 (2946)	5.50 (140)	5.50 (140)	228.8
	1040	3	460	15 ▲	3493	143.04 (3633)	27.05 (687)	115.99 (2946)	5.50 (140)	5.50 (140)	228.8
	1039	3	575	15 ▲	3491	143.04 (3633)	27.05 (687)	115.99 (2946)	5.50 (140)	5.50 (140)	228.8
35S150-50DS	1098	3	208	15 ▲	3480	148.94 (3783)	27.05 (687)	121.89 (3096)	5.50 (140)	5.50 (140)	234.6
	1098	3	230	15 ▲	3480	148.94 (3783)	27.05 (687)	121.89 (3096)	5.50 (140)	5.50 (140)	234.6
	1101	3	460	15 ▲	3485	148.94 (3783)	27.05 (687)	121.89 (3096)	5.50 (140)	5.50 (140)	234.6
	1100	3	575	15 ▲	3484	148.94 (3783)	27.05 (687)	121.89 (3096)	5.50 (140)	5.50 (140)	234.6
35S150-53DS	1159	3	208	15 ▲	3472	154.85 (3933)	27.05 (687)	127.80 (3246)	5.50 (140)	5.50 (140)	240.3
	1159	3	230	15 ▲	3472	154.85 (3933)	27.05 (687)	127.80 (3246)	5.50 (140)	5.50 (140)	240.3
	1163	3	460	15 ▲	3478	154.85 (3933)	27.05 (687)	127.80 (3246)	5.50 (140)	5.50 (140)	240.3
	1161	3	575	15 ▲	3476	154.85 (3933)	27.05 (687)	127.80 (3246)	5.50 (140)	5.50 (140)	240.3
35S150-56DS	1218	3	208	15 ▲	3464	160.75 (4083)	27.05 (687)	133.71 (3396)	5.50 (140)	5.50 (140)	246.1
	1218	3	230	15 ▲	3464	160.75 (4083)	27.05 (687)	133.71 (3396)	5.50 (140)	5.50 (140)	246.1
	1223	3	460	15 ▲	3470	160.75 (4083)	27.05 (687)	133.71 (3396)	5.50 (140)	5.50 (140)	246.1
	1222	3	575	15 ▲	3468	160.75 (4083)	27.05 (687)	133.71 (3396)	5.50 (140)	5.50 (140)	246.1
35S200-60DS	1329	3	208	20 ▲	3494	171.19 (4348)	29.61 (752)	141.58 (3596)	5.50 (140)	5.50 (140)	269.2
	1329	3	230	20 ▲	3494	171.19 (4348)	29.61 (752)	141.58 (3596)	5.50 (140)	5.50 (140)	269.2
	1337	3	460	20 ▲	3503	171.19 (4348)	29.61 (752)	141.58 (3596)	5.50 (140)	5.50 (140)	269.2
	1338	3	575	20 ▲	3506	171.19 (4348)	29.61 (752)	141.58 (3596)	5.50 (140)	5.50 (140)	269.2
35S200-64DS	1412	3	208	20 ▲	3486	179.06 (4548)	29.61 (752)	149.45 (3796)	5.50 (140)	5.50 (140)	276.9
	1412	3	230	20 ▲	3486	179.06 (4548)	29.61 (752)	149.45 (3796)	5.50 (140)	5.50 (140)	276.9
	1420	3	460	20 ▲	3497	179.06 (4548)	29.61 (752)	149.45 (3796)	5.50 (140)	5.50 (140)	276.9
	1422	3	575	20 ▲	3499	179.06 (4548)	29.61 (752)	149.45 (3796)	5.50 (140)	5.50 (140)	276.9
35S200-67DS	1473	3	208	20 ▲	3491	184.97 (4698)	29.61 (752)	155.36 (3946)	5.50 (140)	5.50 (140)	282.7
	1473	3	230	20 ▲	3491	184.97 (4698)	29.61 (752)	155.36 (3946)	5.50 (140)	5.50 (140)	282.7
	1482	3	460	20 ▲	3480	184.97 (4698)	29.61 (752)	155.36 (3946)	5.50 (140)	5.50 (140)	282.7
	1485	3	575	20 ▲	3494	184.97 (4698)	29.61 (752)	155.36 (3946)	5.50 (140)	5.50 (140)	282.7



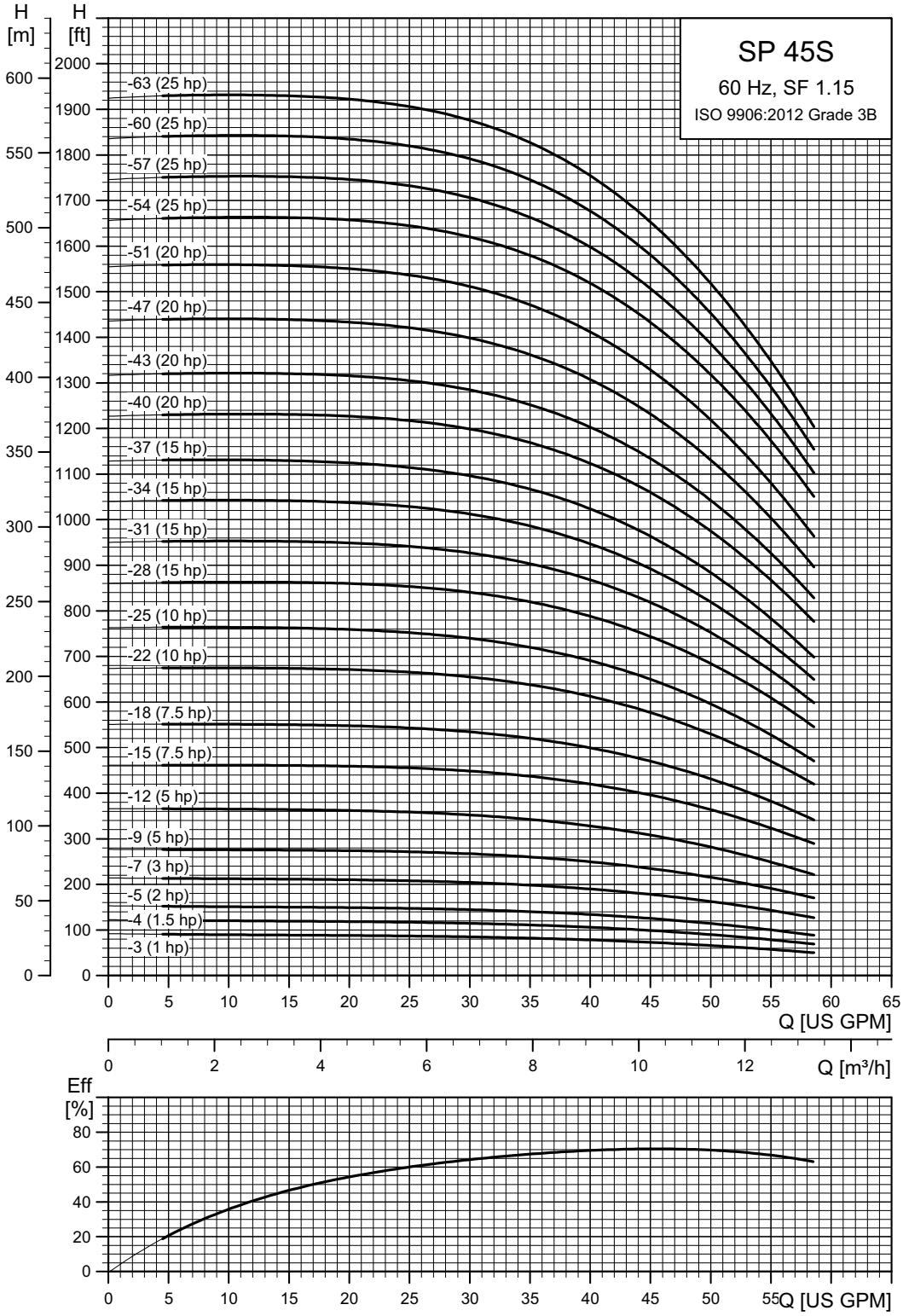
E = Maximum diameter of pump including cable guard and motor.

Notes:
DS designation = Built into sleeve, 2" NPT, 6" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

▲ MS 6000C motor.

4" and larger wells - continued

SP 45S (45 gpm)



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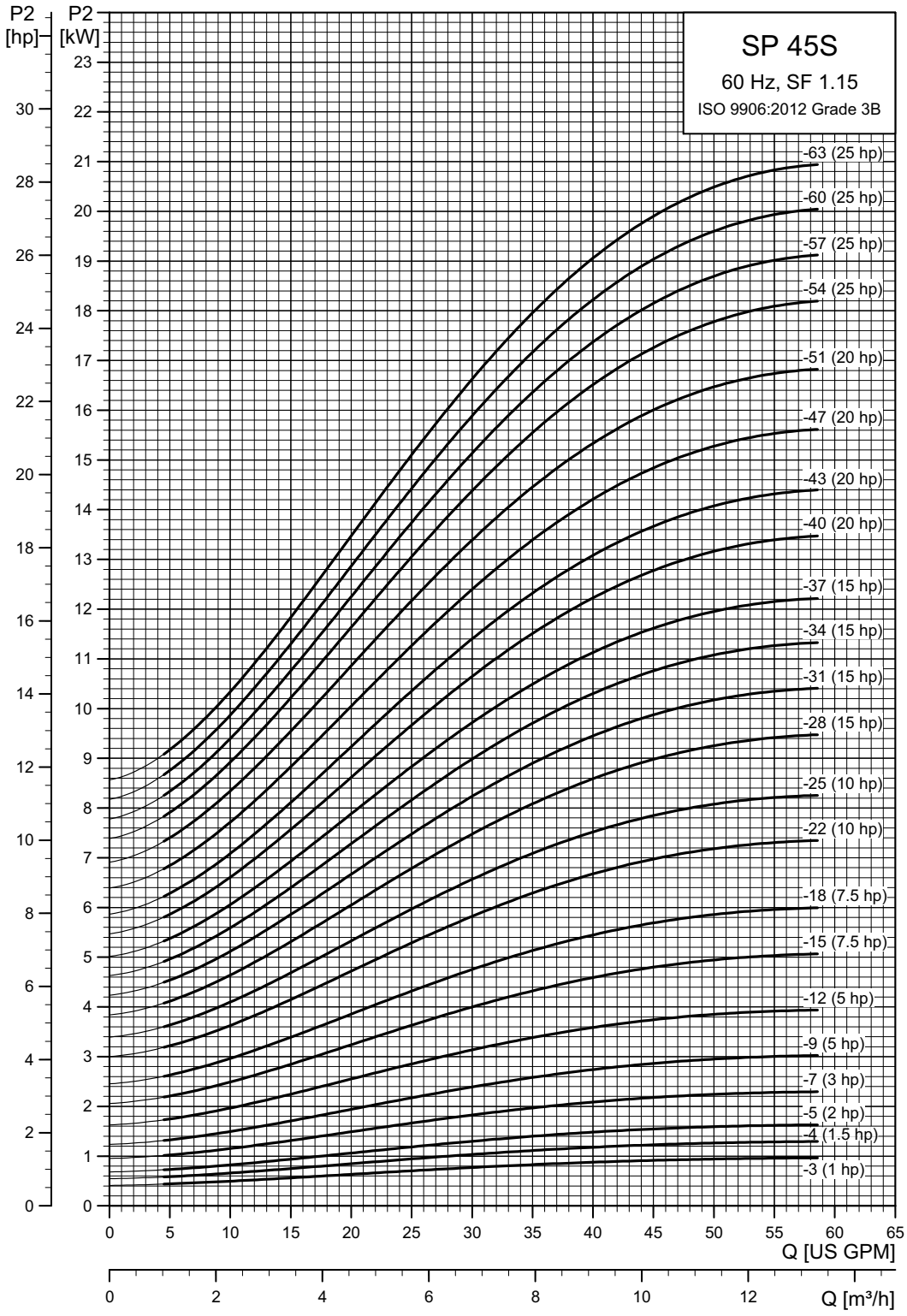
4" and larger wells - continued

SP 45S (45 gpm) pump power requirement (P2)

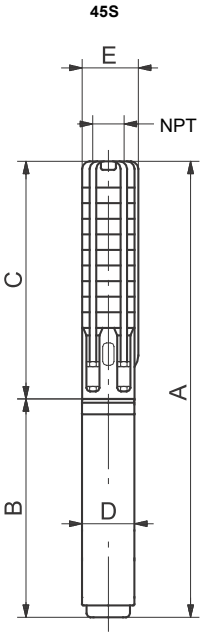


TM06 4617 3215

4" and larger wells - continued

SP 45S (45 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
45S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 45 gpm (2" NPT)												
45S10-3	72	1	230	1	■	3416	28.94 (735)	13.67 (347)	15.28 (388)	3.75 (95)	3.98 (101)	31.5
	73	3	230	1	■	3435	27.76 (705)	12.49 (317)	15.28 (388)	3.75 (95)	3.98 (101)	28.8
	73	3	460	1	■	3435	27.76 (705)	12.49 (317)	15.28 (388)	3.75 (95)	3.98 (101)	28.6
	72	3	575	1	■	3422	27.76 (705)	12.49 (317)	15.28 (388)	3.75 (95)	3.98 (101)	28.6
45S15-4	98	1	230	1.5	■	3451	32.49 (825)	15.24 (387)	17.25 (438)	3.75 (95)	3.98 (101)	36.5
	99	3	230	1.5	■	3458	30.91 (785)	13.67 (347)	17.25 (438)	3.75 (95)	3.98 (101)	33.0
	99	3	460	1.5	■	3458	30.91 (785)	13.67 (347)	17.25 (438)	3.75 (95)	3.98 (101)	33.0
	97	3	575	1.5	■	3435	30.91 (785)	13.67 (347)	17.25 (438)	3.75 (95)	3.98 (101)	32.8
45S20-5	124	1	230	2	•	3454	38.78 (985)	19.57 (497)	19.22 (488)	3.75 (95)	3.98 (101)	53.4
	124	3	230	2	■	3451	34.45 (875)	15.24 (387)	19.22 (488)	3.75 (95)	3.98 (101)	38.0
	124	3	460	2	■	3451	34.45 (875)	15.24 (387)	19.22 (488)	3.75 (95)	3.98 (101)	38.2
	123	3	575	2	■	3446	34.45 (875)	15.24 (387)	19.22 (488)	3.75 (95)	3.98 (101)	38.0
45S30-7	174	1	230	3	•	3448	45.87 (1165)	22.72 (577)	23.15 (588)	3.75 (95)	3.98 (101)	64.8
	174	3	208	3	•	3452	41.15 (1045)	18.00 (457)	23.15 (588)	3.75 (95)	3.98 (101)	51.6
	174	3	230	3	•	3452	41.15 (1045)	18.00 (457)	23.15 (588)	3.75 (95)	3.98 (101)	51.6
	178	3	460	3	•	3481	41.15 (1045)	18.00 (457)	23.15 (588)	3.75 (95)	3.98 (101)	51.6
	185	3	575	3	•	**3530**	41.15 (1045)	18.00 (457)	23.15 (588)	3.75 (95)	3.98 (101)	51.4
45S50-9	232	1	230	5	•	3502	53.75 (1365)	26.66 (677)	27.09 (688)	3.75 (95)	3.98 (101)	78.4
	234	3	208	5	•	3517	49.81 (1265)	22.72 (577)	27.09 (688)	3.75 (95)	3.98 (101)	67.4
	234	3	230	5	•	3517	49.81 (1265)	22.72 (577)	27.09 (688)	3.75 (95)	3.98 (101)	67.4
	234	3	460	5	•	3516	49.81 (1265)	22.72 (577)	27.09 (688)	3.75 (95)	3.98 (101)	67.4
	237	3	575	5	•	**3515**	49.81 (1265)	22.72 (577)	27.09 (688)	3.75 (95)	3.98 (101)	67.2
45S50-12	301	1	230	5	•	3462	59.65 (1515)	26.66 (677)	33.00 (838)	3.75 (95)	3.98 (101)	82.2
	306	3	208	5	•	3486	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	71.2
	306	3	230	5	•	3486	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	71.2
	306	3	460	5	•	3483	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	71.2
	308	3	575	5	•	**3485**	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	71.0
45S75-15	386	3	208	7.5	•	3497	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	86.1
	386	3	230	7.5	•	3497	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	86.1
	386	3	460	7.5	•	3497	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	86.1
	386	3	575	7.5	•	3497	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	86.1
45S75-18	458	3	208	7.5	•	3474	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	89.9
	458	3	230	7.5	•	3474	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	89.9
	458	3	460	7.5	•	3474	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	89.9
	458	3	575	7.5	•	3474	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	89.9
45S100-22	564	3	460	10	•	3484	83.27 (2115)	30.60 (777)	52.68 (1338)	3.75 (95)	3.98 (101)	103.8
	564	3	575	10	•	3484	83.27 (2115)	30.60 (777)	52.68 (1338)	3.75 (95)	3.98 (101)	103.8
45S100-25	632	3	460	10	•	3466	89.18 (2265)	30.60 (777)	58.59 (1488)	3.75 (95)	3.98 (101)	107.7
	632	3	575	10	•	3466	89.18 (2265)	30.60 (777)	58.59 (1488)	3.75 (95)	3.98 (101)	107.7



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E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

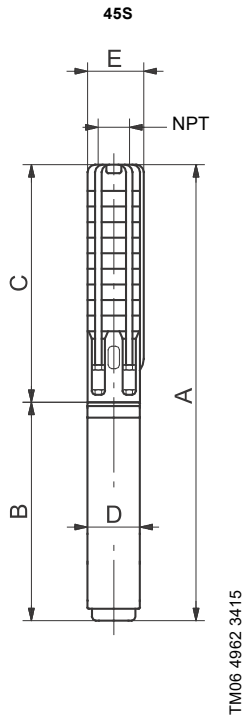
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 45S (45 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
45S - Motor diameter 6 inch, 60 Hz, rated flow rate 45 gpm (2" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
45S75-15	388	3	208	7.5	▲	3504	64.89 (1648)	23.51 (597)	41.38 (1051)	5.50 (140)	5.50 (140)	114.4
	388	3	230	7.5	▲	3504	64.89 (1648)	23.51 (597)	41.38 (1051)	5.50 (140)	5.50 (140)	114.4
	390	3	460	7.5	▲	3512	64.89 (1648)	23.51 (597)	41.38 (1051)	5.50 (140)	5.50 (140)	114.4
	390	3	575	7.5	▲	3511	64.89 (1648)	23.51 (597)	41.38 (1051)	5.50 (140)	5.50 (140)	114.4
45S75-18	460	3	208	7.5	▲	3482	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	118.3
	460	3	230	7.5	▲	3482	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	118.3
	463	3	460	7.5	▲	3493	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	118.3
	462	3	575	7.5	▲	3492	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	118.3
45S100-22	564	3	208	10	▲	3485	79.85 (2028)	24.69 (627)	55.16 (1401)	5.50 (140)	5.50 (140)	130.2
	564	3	230	10	▲	3485	79.85 (2028)	24.69 (627)	55.16 (1401)	5.50 (140)	5.50 (140)	130.2
	568	3	460	10	▲	3496	79.85 (2028)	24.69 (627)	55.16 (1401)	5.50 (140)	5.50 (140)	130.2
	568	3	575	10	▲	3496	79.85 (2028)	24.69 (627)	55.16 (1401)	5.50 (140)	5.50 (140)	130.2
45S100-25	632	3	208	10	▲	3467	85.75 (2178)	24.69 (627)	61.07 (1551)	5.50 (140)	5.50 (140)	134.1
	632	3	230	10	▲	3467	85.75 (2178)	24.69 (627)	61.07 (1551)	5.50 (140)	5.50 (140)	134.1
	640	3	460	10	▲	3481	85.75 (2178)	24.69 (627)	61.07 (1551)	5.50 (140)	5.50 (140)	134.1
	640	3	575	10	▲	3480	85.75 (2178)	24.69 (627)	61.07 (1551)	5.50 (140)	5.50 (140)	134.1
45S150-28	727	3	208	15	▲	3505	94.02 (2388)	27.05 (687)	66.97 (1701)	5.50 (140)	5.50 (140)	160.6
	727	3	230	15	▲	3505	94.02 (2388)	27.05 (687)	66.97 (1701)	5.50 (140)	5.50 (140)	160.6
	729	3	460	15	▲	3508	94.02 (2388)	27.05 (687)	66.97 (1701)	5.50 (140)	5.50 (140)	160.6
	728	3	575	15	▲	3507	94.02 (2388)	27.05 (687)	66.97 (1701)	5.50 (140)	5.50 (140)	160.6
45S150-31	801	3	208	15	▲	3494	99.93 (2538)	27.05 (687)	72.88 (1851)	5.50 (140)	5.50 (140)	164.7
	801	3	230	15	▲	3494	99.93 (2538)	27.05 (687)	72.88 (1851)	5.50 (140)	5.50 (140)	164.7
	803	3	460	15	▲	3498	99.93 (2538)	27.05 (687)	72.88 (1851)	5.50 (140)	5.50 (140)	164.7
	802	3	575	15	▲	3497	99.93 (2538)	27.05 (687)	72.88 (1851)	5.50 (140)	5.50 (140)	164.7
45S150-34	869	3	208	15	▲	3482	105.83 (2688)	27.05 (687)	78.78 (2001)	5.50 (140)	5.50 (140)	168.8
	869	3	230	15	▲	3482	105.83 (2688)	27.05 (687)	78.78 (2001)	5.50 (140)	5.50 (140)	168.8
	876	3	460	15	▲	3487	105.83 (2688)	27.05 (687)	78.78 (2001)	5.50 (140)	5.50 (140)	168.8
	875	3	575	15	▲	3486	105.83 (2688)	27.05 (687)	78.78 (2001)	5.50 (140)	5.50 (140)	168.8
45S150-37	939	3	208	15	▲	3470	111.74 (2838)	27.05 (687)	84.69 (2151)	5.50 (140)	5.50 (140)	172.9
	939	3	230	15	▲	3470	111.74 (2838)	27.05 (687)	84.69 (2151)	5.50 (140)	5.50 (140)	172.9
	942	3	460	15	▲	3476	111.74 (2838)	27.05 (687)	84.69 (2151)	5.50 (140)	5.50 (140)	172.9
	941	3	575	15	▲	3474	111.74 (2838)	27.05 (687)	84.69 (2151)	5.50 (140)	5.50 (140)	172.9
45S200-40DS	1037	3	208	20	▲	3498	131.82 (3348)	29.61 (752)	102.21 (2596)	5.50 (140)	5.50 (140)	230.8
	1037	3	230	20	▲	3498	131.82 (3348)	29.61 (752)	102.21 (2596)	5.50 (140)	5.50 (140)	230.8
	1043	3	460	20	▲	3507	131.82 (3348)	29.61 (752)	102.21 (2596)	5.50 (140)	5.50 (140)	230.8
	1044	3	575	20	▲	3509	131.82 (3348)	29.61 (752)	102.21 (2596)	5.50 (140)	5.50 (140)	230.8
45S200-43DS	1105	3	208	20	▲	3489	137.72 (3498)	29.61 (752)	108.12 (2746)	5.50 (140)	5.50 (140)	236.6
	1105	3	230	20	▲	3489	137.72 (3498)	29.61 (752)	108.12 (2746)	5.50 (140)	5.50 (140)	236.6
	1117	3	460	20	▲	3500	137.72 (3498)	29.61 (752)	108.12 (2746)	5.50 (140)	5.50 (140)	236.6
	1118	3	575	20	▲	3502	137.72 (3498)	29.61 (752)	108.12 (2746)	5.50 (140)	5.50 (140)	236.6
45S200-47DS	1199	3	208	20	▲	3478	145.60 (3698)	29.61 (752)	115.99 (2946)	5.50 (140)	5.50 (140)	244.2
	1208	3	230	20	▲	3489	145.60 (3698)	29.61 (752)	115.99 (2946)	5.50 (140)	5.50 (140)	244.2
	1208	3	460	20	▲	3489	145.60 (3698)	29.61 (752)	115.99 (2946)	5.50 (140)	5.50 (140)	244.2
	1216	3	575	20	▲	3492	145.60 (3698)	29.61 (752)	115.99 (2946)	5.50 (140)	5.50 (140)	244.2
45S200-51DS	1291	3	208	20	▲	3466	153.47 (3898)	29.61 (752)	123.86 (3146)	5.50 (140)	5.50 (140)	251.9
	1291	3	230	20	▲	3466	153.47 (3898)	29.61 (752)	123.86 (3146)	5.50 (140)	5.50 (140)	251.9
	1392	3	460	20	▲	3479	153.47 (3898)	29.61 (752)	123.86 (3146)	5.50 (140)	5.50 (140)	251.9
	1302	3	575	20	▲	3482	153.47 (3898)	29.61 (752)	123.86 (3146)	5.50 (140)	5.50 (140)	251.9



E = Maximum diameter of pump including cable guard and motor.

Notes: DS designation = Built into sleeve, 2" NPT, 6" minimum well diameter.

Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

▲ MS 6000C motor.

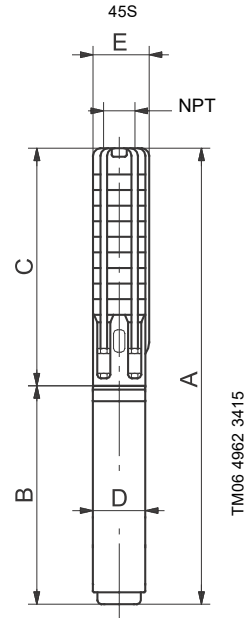
4" and larger wells - continued

SP 45S (45 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
45S - Motor diameter 6 inch, 60 Hz, rated flow rate 45 gpm (2" NPT)											
45S250-54DS	1389	3	208	25 ▲	3490	161.54 (4103)	31.78 (807)	129.77 (3296)	5.50 (140)	5.50 (140)	267.6
	1389	3	230	25 ▲	3490	161.54 (4103)	31.78 (807)	129.77 (3296)	5.50 (140)	5.50 (140)	267.6
	1404	3	460	25 ▲	3501	161.54 (4103)	31.78 (807)	129.77 (3296)	5.50 (140)	5.50 (140)	267.6
	1405	3	575	25 ▲	3501	161.54 (4103)	31.78 (807)	129.77 (3296)	5.50 (140)	5.50 (140)	267.6
45S250-57DS	1460	3	208	25 ▲	3484	167.45 (4253)	31.78 (807)	135.67 (3446)	5.50 (140)	5.50 (140)	273.4
	1460	3	230	25 ▲	3484	167.45 (4253)	31.78 (807)	135.67 (3446)	5.50 (140)	5.50 (140)	273.4
	1471	3	460	25 ▲	3494	167.45 (4253)	31.78 (807)	135.67 (3446)	5.50 (140)	5.50 (140)	273.4
	1471	3	575	25 ▲	3495	167.45 (4253)	31.78 (807)	135.67 (3446)	5.50 (140)	5.50 (140)	273.4
45S250-60DS	1530	3	208	25 ▲	3477	173.35 (4403)	31.78 (807)	141.58 (3596)	5.50 (140)	5.50 (140)	279.1
	1530	3	230	25 ▲	3477	173.35 (4403)	31.78 (807)	141.58 (3596)	5.50 (140)	5.50 (140)	279.1
	1542	3	460	25 ▲	3488	173.35 (4403)	31.78 (807)	141.58 (3596)	5.50 (140)	5.50 (140)	279.1
	1543	3	575	25 ▲	3489	173.35 (4403)	31.78 (807)	141.58 (3596)	5.50 (140)	5.50 (140)	279.1
45S250-63DS	1599	3	208	25 ▲	3470	167.64 (4258)	31.78 (807)	135.87 (3451)	5.50 (140)	5.50 (140)	233.7
	1599	3	230	25 ▲	3470	167.64 (4258)	31.78 (807)	135.87 (3451)	5.50 (140)	5.50 (140)	233.7
	1612	3	460	25 ▲	3482	167.64 (4258)	31.78 (807)	135.87 (3451)	5.50 (140)	5.50 (140)	233.7
	1613	3	575	25 ▲	3483	167.64 (4258)	31.78 (807)	135.87 (3451)	5.50 (140)	5.50 (140)	233.7

Notes:
DS designation = Built into sleeve, 2" NPT, 6" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

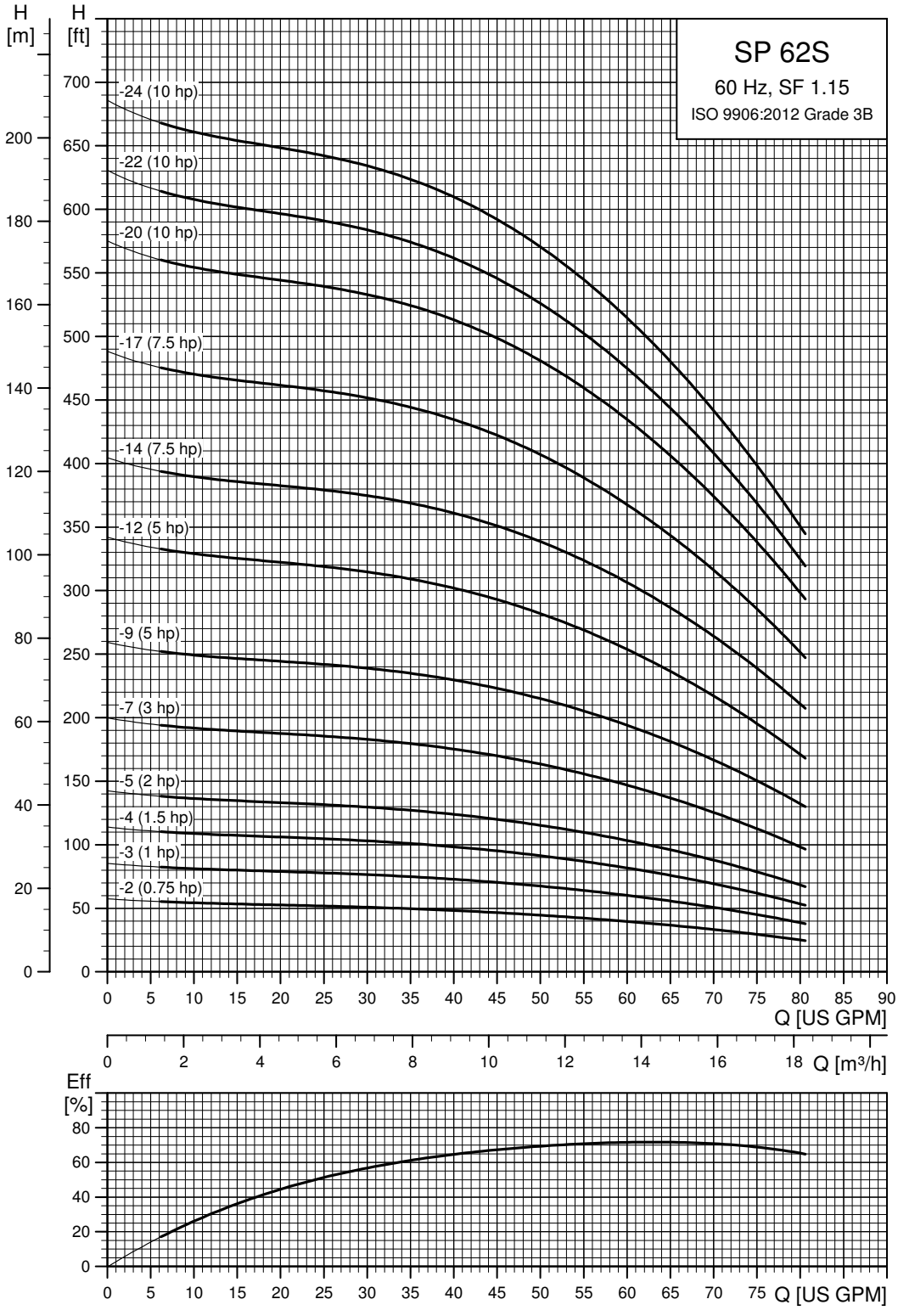
▲ MS 6000C motor.



E = Maximum diameter of pump including cable guard and motor.

4" and larger wells - continued

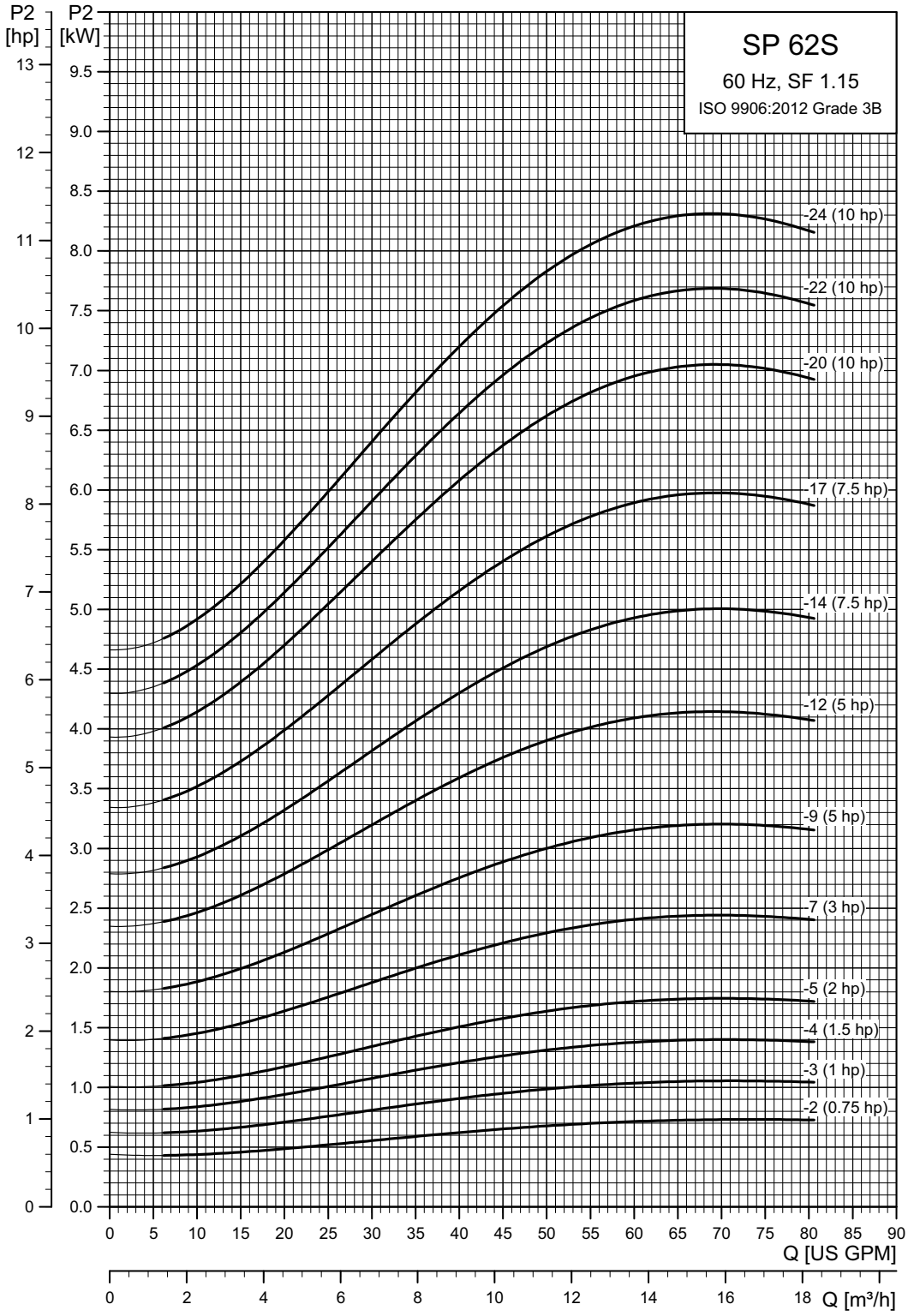
SP 62S (62 gpm)



TM06 4618 3215

4" and larger wells - continued

SP 62S (62 gpm) pump power requirement (P2)

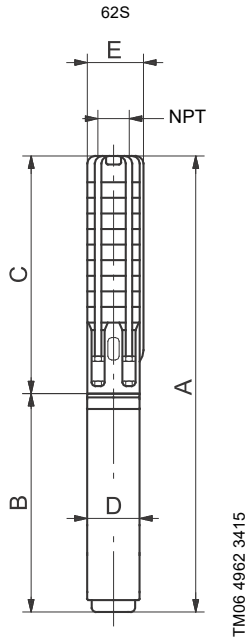


TM06 4619 3215

4" and larger wells - continued

SP 62S (62 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
62S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 62 gpm (2" NPT)												
62S07-2	40	1	230	.75	■	3407	28.35 (720)	13.08 (332)	15.28 (388)	3.75 (95)	3.98 (101)	29.7
	40	3	230	.75	■	3423	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
	40	3	460	.75	■	3423	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
	40	3	575	.75	■	3414	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
62S10-3	57	1	230	1	■	3381	31.89 (810)	13.67 (347)	18.23 (463)	3.75 (95)	3.98 (101)	33.0
	58	3	230	1	■	3407	30.71 (780)	12.49 (317)	18.23 (463)	3.75 (95)	3.98 (101)	30.4
	58	3	460	1	■	3407	30.71 (780)	12.49 (317)	18.23 (463)	3.75 (95)	3.98 (101)	30.2
	57	3	575	1	■	3398	30.71 (780)	12.49 (317)	18.23 (463)	3.75 (95)	3.98 (101)	30.2
62S15-4	78	1	230	1.5	■	3427	36.42 (925)	15.24 (387)	21.19 (538)	3.75 (95)	3.98 (101)	38.5
	79	3	230	1.5	■	3439	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	35.0
	79	3	460	1.5	■	3439	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	35.0
	78	3	575	1.5	■	3415	34.85 (885)	13.67 (347)	21.19 (538)	3.75 (95)	3.98 (101)	34.8
62S20-5	98	1	230	2	•	3433	43.71 (1110)	19.57 (497)	24.14 (613)	3.75 (95)	3.98 (101)	56.0
	98	3	230	2	■	3431	39.38 (1000)	15.24 (387)	24.14 (613)	3.75 (95)	3.98 (101)	40.5
	98	3	460	2	■	3431	39.38 (1000)	15.24 (387)	24.14 (613)	3.75 (95)	3.98 (101)	40.7
	98	3	575	2	■	3430	39.38 (1000)	15.24 (387)	24.14 (613)	3.75 (95)	3.98 (101)	40.5
62S30-7	136	1	230	3	•	3427	52.76 (1340)	22.72 (577)	30.04 (763)	3.75 (95)	3.98 (101)	68.3
	138	3	208	3	•	3437	48.04 (1220)	18.00 (457)	30.04 (763)	3.75 (95)	3.98 (101)	55.1
	138	3	230	3	•	3437	48.04 (1220)	18.00 (457)	30.04 (763)	3.75 (95)	3.98 (101)	55.1
	141	3	460	3	•	3466	48.04 (1220)	18.00 (457)	30.04 (763)	3.75 (95)	3.98 (101)	55.1
	141	3	575	3	•	3470	48.04 (1220)	18.00 (457)	30.04 (763)	3.75 (95)	3.98 (101)	54.9
62S50-9	184	1	230	5	•	3490	62.60 (1590)	26.66 (677)	35.95 (913)	3.75 (95)	3.98 (101)	82.8
	186	3	208	5	•	3507	58.67 (1490)	22.72 (577)	35.95 (913)	3.75 (95)	3.98 (101)	71.8
	186	3	230	5	•	3507	58.67 (1490)	22.72 (577)	35.95 (913)	3.75 (95)	3.98 (101)	71.8
	186	3	460	5	•	3506	58.67 (1490)	22.72 (577)	35.95 (913)	3.75 (95)	3.98 (101)	71.8
	182	3	575	5	•	3470	58.67 (1490)	22.72 (577)	35.95 (913)	3.75 (95)	3.98 (101)	71.6
62S50-12	237	1	230	5	•	3446	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	88.1
	242	3	208	5	•	3473	67.52 (1715)	22.72 (577)	44.81 (1138)	3.75 (95)	3.98 (101)	77.1
	242	3	230	5	•	3473	67.52 (1715)	22.72 (577)	44.81 (1138)	3.75 (95)	3.98 (101)	77.1
	242	3	460	5	•	3471	67.52 (1715)	22.72 (577)	44.81 (1138)	3.75 (95)	3.98 (101)	77.1
	244	3	575	5	•	3470	67.52 (1715)	22.72 (577)	44.81 (1138)	3.75 (95)	3.98 (101)	76.9
62S75-14	287	3	208	7.5	•	3494	77.37 (1965)	26.66 (677)	50.71 (1288)	3.75 (95)	3.98 (101)	91.6
	287	3	230	7.5	•	3494	77.37 (1965)	26.66 (677)	50.71 (1288)	3.75 (95)	3.98 (101)	91.6
	287	3	460	7.5	•	3494	77.37 (1965)	26.66 (677)	50.71 (1288)	3.75 (95)	3.98 (101)	91.6
	287	3	575	7.5	•	3494	77.37 (1965)	26.66 (677)	50.71 (1288)	3.75 (95)	3.98 (101)	91.6
62S75-17	342	3	208	7.5	•	3469	86.23 (2190)	26.66 (677)	59.57 (1513)	3.75 (95)	3.98 (101)	96.9
	342	3	230	7.5	•	3469	86.23 (2190)	26.66 (677)	59.57 (1513)	3.75 (95)	3.98 (101)	96.9
	342	3	460	7.5	•	3469	86.23 (2190)	26.66 (677)	59.57 (1513)	3.75 (95)	3.98 (101)	96.9
	342	3	575	7.5	•	3469	86.23 (2190)	26.66 (677)	59.57 (1513)	3.75 (95)	3.98 (101)	96.9
62S100-20	407	3	460	10	•	3485	99.02 (2515)	30.60 (777)	68.43 (1738)	3.75 (95)	3.98 (101)	111.0
	407	3	575	10	•	3485	99.02 (2515)	30.60 (777)	68.43 (1738)	3.75 (95)	3.98 (101)	111.0
62S100-22	445	3	460	10	•	3472	104.93 (2665)	30.60 (777)	74.34 (1888)	3.75 (95)	3.98 (101)	114.5
	445	3	575	10	•	3472	104.93 (2665)	30.60 (777)	74.34 (1888)	3.75 (95)	3.98 (101)	114.5
62S100-24	478	3	460	10	•	3460	110.83 (2815)	30.60 (777)	80.24 (2038)	3.75 (95)	3.98 (101)	118.0
	478	3	575	10	•	3460	110.83 (2815)	30.60 (777)	80.24 (2038)	3.75 (95)	3.98 (101)	118.0



E = Maximum diameter of pump including cable guard and motor.

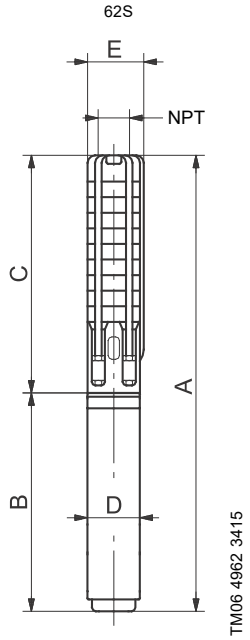
Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 62S (62 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
62S - Motor diameter 6 inch, 60 Hz, rated flow rate 62 gpm (2" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
62S75-14	288	3	208	7.5	▲	3501	76.70 (1948)	23.51 (597)	53.19 (1351)	5.50 (140)	5.50 (140)	119.3
	288	3	230	7.5	▲	3501	76.70 (1948)	23.51 (597)	53.19 (1351)	5.50 (140)	5.50 (140)	119.3
	292	3	460	7.5	▲	3510	76.70 (1948)	23.51 (597)	53.19 (1351)	5.50 (140)	5.50 (140)	119.3
	291	3	575	7.5	▲	3509	76.70 (1948)	23.51 (597)	53.19 (1351)	5.50 (140)	5.50 (140)	119.3
62S75-17	344	3	208	7.5	▲	3478	85.56 (2173)	23.51 (597)	62.05 (1576)	5.50 (140)	5.50 (140)	124.6
	344	3	230	7.5	▲	3478	85.56 (2173)	23.51 (597)	62.05 (1576)	5.50 (140)	5.50 (140)	124.6
	347	3	460	7.5	▲	3489	85.56 (2173)	23.51 (597)	62.05 (1576)	5.50 (140)	5.50 (140)	124.6
	347	3	575	7.5	▲	3488	85.56 (2173)	23.51 (597)	62.05 (1576)	5.50 (140)	5.50 (140)	124.6
62S100-20	408	3	208	10	▲	3486	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	408	3	230	10	▲	3486	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	411	3	460	10	▲	3497	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	410	3	575	10	▲	3496	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
62S100-22	445	3	208	10	▲	3474	101.50 (2578)	24.69 (627)	76.82 (1951)	5.50 (140)	5.50 (140)	139.9
	445	3	230	10	▲	3474	101.50 (2578)	24.69 (627)	76.82 (1951)	5.50 (140)	5.50 (140)	139.9
	449	3	460	10	▲	3486	101.50 (2578)	24.69 (627)	76.82 (1951)	5.50 (140)	5.50 (140)	139.9
	448	3	575	10	▲	3485	101.50 (2578)	24.69 (627)	76.82 (1951)	5.50 (140)	5.50 (140)	139.9
62S100-24	478	3	208	10	▲	3460	107.41 (2728)	24.69 (627)	82.72 (2101)	5.50 (140)	5.50 (140)	143.4
	478	3	230	10	▲	3460	107.41 (2728)	24.69 (627)	82.72 (2101)	5.50 (140)	5.50 (140)	143.4
	486	3	460	10	▲	3474	107.41 (2728)	24.69 (627)	82.72 (2101)	5.50 (140)	5.50 (140)	143.4
	486	3	575	10	▲	3473	107.41 (2728)	24.69 (627)	82.72 (2101)	5.50 (140)	5.50 (140)	143.4



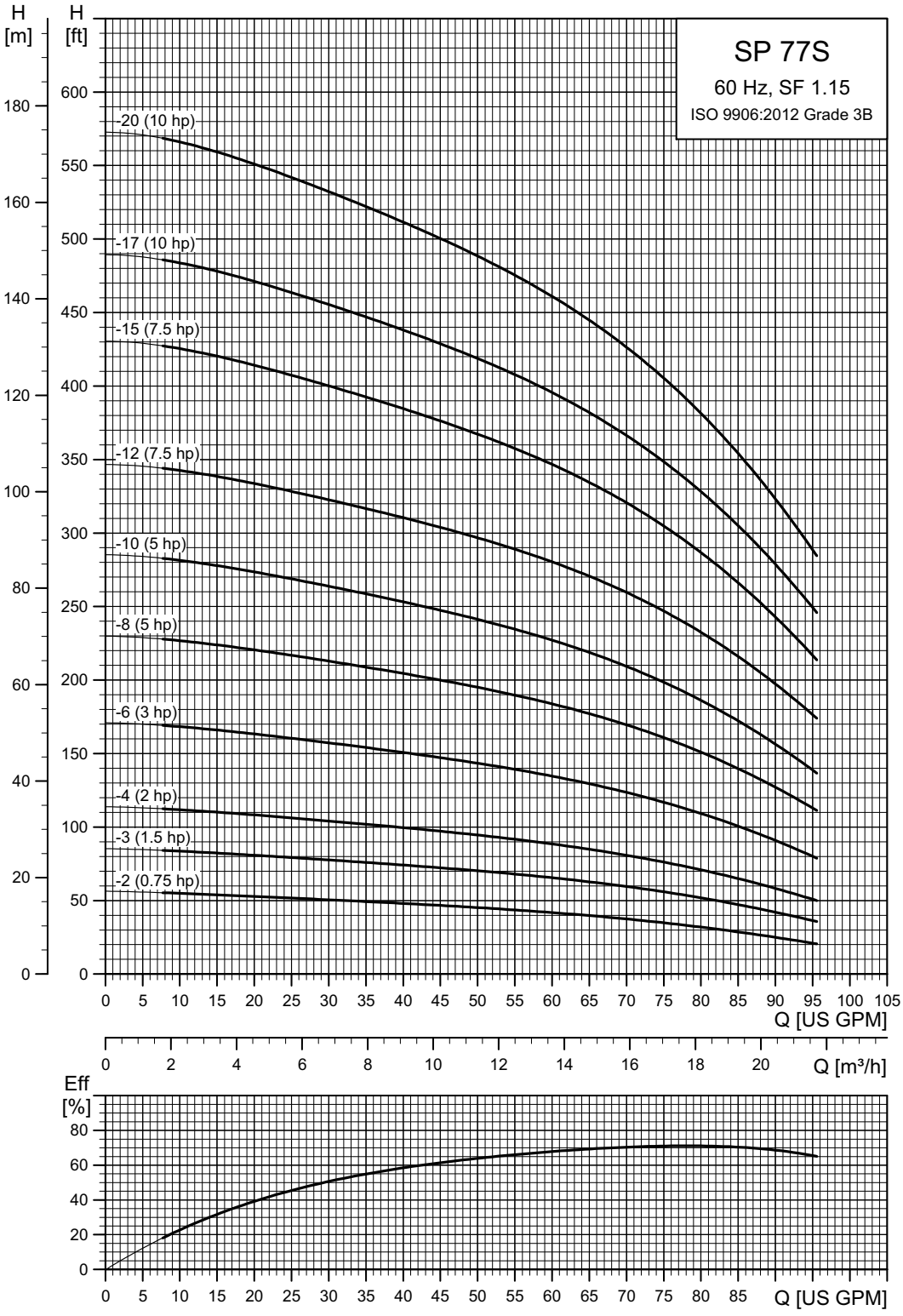
E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

▲ MS 6000C motor.

4" and larger wells - continued

SP 77S (77 gpm)



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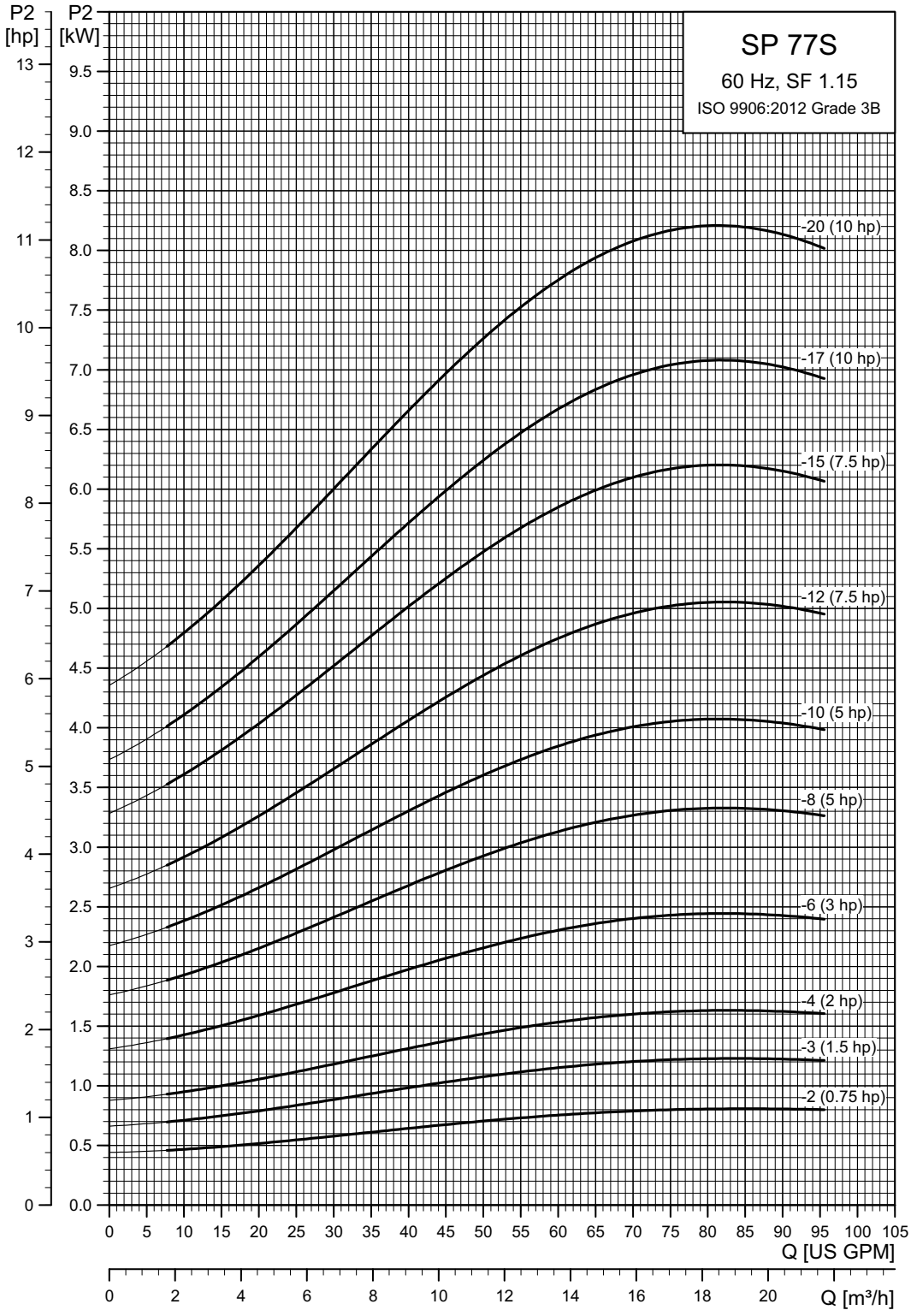
4" and larger pumps - continued

SP 77S (77 gpm) pump power requirement (P2)



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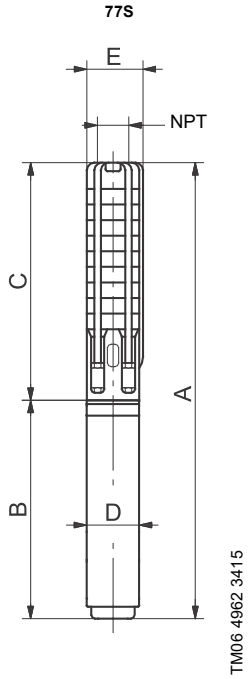
4" and larger wells - continued

SP 77S (77 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
77S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 77 gpm (2" NPT)												
77S07-2	37	1	230	.75	■	3380	28.35 (720)	13.08 (332)	15.28 (388)	3.75 (95)	3.98 (101)	29.7
	38	3	230	.75	■	3401	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
	38	3	460	.75	■	3401	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
	37	3	575	.75	■	3393	26.97 (685)	11.70 (297)	15.28 (388)	3.75 (95)	3.98 (101)	26.7
77S15-3	61	1	230	1	■	3457	33.47 (850)	15.24 (387)	18.23 (463)	3.75 (95)	3.98 (101)	36.8
	61	3	230	1.5	■	3463	31.89 (810)	13.67 (347)	18.23 (463)	3.75 (95)	3.98 (101)	33.3
	61	3	460	1.5	■	3463	31.89 (810)	13.67 (347)	18.23 (463)	3.75 (95)	3.98 (101)	33.3
	60	3	575	1.5	■	3440	31.89 (810)	13.67 (347)	18.23 (463)	3.75 (95)	3.98 (101)	33.0
77S20-4	77	1	230	2	•	3447	40.75 (1035)	19.57 (497)	21.19 (538)	3.75 (95)	3.98 (101)	54.2
	77	3	230	2	■	3445	36.42 (925)	15.24 (387)	21.19 (538)	3.75 (95)	3.98 (101)	38.8
	77	3	460	2	■	3445	36.42 (925)	15.24 (387)	21.19 (538)	3.75 (95)	3.98 (101)	39.0
	77	3	575	2	■	3441	36.42 (925)	15.24 (387)	21.19 (538)	3.75 (95)	3.98 (101)	38.8
77S30-6	113	1	230	3	•	3427	49.81 (1265)	22.72 (577)	27.09 (688)	3.75 (95)	3.98 (101)	66.5
	114	3	208	3	•	3437	45.08 (1145)	18.00 (457)	27.09 (688)	3.75 (95)	3.98 (101)	53.3
	114	3	230	3	•	3437	45.08 (1145)	18.00 (457)	27.09 (688)	3.75 (95)	3.98 (101)	53.3
	117	3	460	3	•	3466	45.08 (1145)	18.00 (457)	27.09 (688)	3.75 (95)	3.98 (101)	53.3
77S50-8	157	1	230	5	•	3484	59.65 (1515)	26.66 (677)	33.00 (838)	3.75 (95)	3.98 (101)	81.1
	159	3	208	5	•	3503	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	70.1
	159	3	230	5	•	3503	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	70.1
	159	3	460	5	•	3501	55.71 (1415)	22.72 (577)	33.00 (838)	3.75 (95)	3.98 (101)	70.1
77S50-10	192	1	230	5	•	3449	65.56 (1665)	26.66 (677)	38.90 (988)	3.75 (95)	3.98 (101)	84.6
	195	3	208	5	•	3476	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	73.6
	195	3	230	5	•	3476	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	73.6
	195	3	460	5	•	3473	61.62 (1565)	22.72 (577)	38.90 (988)	3.75 (95)	3.98 (101)	73.6
77S75-12	237	3	208	7.5	•	3493	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	88.1
	237	3	230	7.5	•	3493	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	88.1
	237	3	460	7.5	•	3493	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	88.1
	237	3	575	7.5	•	3493	71.46 (1815)	26.66 (677)	44.81 (1138)	3.75 (95)	3.98 (101)	88.1
77S75-15	293	3	208	7.5	•	3463	80.32 (2040)	26.66 (677)	53.67 (1363)	3.75 (95)	3.98 (101)	93.4
	293	3	230	7.5	•	3463	80.32 (2040)	26.66 (677)	53.67 (1363)	3.75 (95)	3.98 (101)	93.4
	293	3	460	7.5	•	3463	80.32 (2040)	26.66 (677)	53.67 (1363)	3.75 (95)	3.98 (101)	93.4
	293	3	575	7.5	•	3463	80.32 (2040)	26.66 (677)	53.67 (1363)	3.75 (95)	3.98 (101)	93.4
77S100-17	337	3	460	10	•	3484	90.16 (2290)	30.60 (777)	59.57 (1513)	3.75 (95)	3.98 (101)	105.7
	337	3	575	10	•	3484	90.16 (2290)	30.60 (777)	59.57 (1513)	3.75 (95)	3.98 (101)	105.7
77S100-20	392	3	460	10	•	3462	99.02 (2515)	30.60 (777)	68.43 (1738)	3.75 (95)	3.98 (101)	111.0
	392	3	575	10	•	3462	99.02 (2515)	30.60 (777)	68.43 (1738)	3.75 (95)	3.98 (101)	111.0



E = Maximum diameter of pump including cable guard and motor.

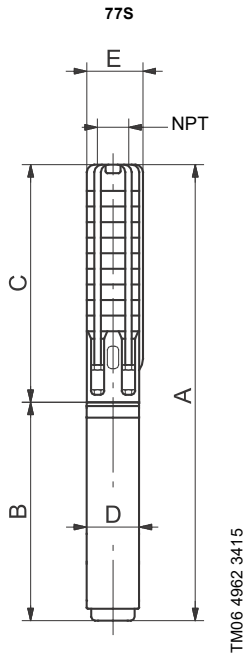
Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

- ■ MS 402 motor.
- • MS 4000 motor.

4" and larger wells - continued

SP 77S (77 gpm) pump with 6" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
77S - Motor diameter 6 inch, 60 Hz, rated flow rate 77 gpm (2" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
77S75-12	239	3	208	7.5	▲	3500	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	115.8
	239	3	230	7.5	▲	3500	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	115.8
	240	3	460	7.5	▲	3509	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	115.8
	240	3	575	7.5	▲	3508	70.79 (1798)	23.51 (597)	47.29 (1201)	5.50 (140)	5.50 (140)	115.8
77S75-15	295	3	208	7.5	▲	3472	79.65 (2023)	23.51 (597)	56.15 (1426)	5.50 (140)	5.50 (140)	121.1
	295	3	230	7.5	▲	3472	79.65 (2023)	23.51 (597)	56.15 (1426)	5.50 (140)	5.50 (140)	121.1
	297	3	460	7.5	▲	3484	79.65 (2023)	23.51 (597)	56.15 (1426)	5.50 (140)	5.50 (140)	121.1
	297	3	575	7.5	▲	3483	79.65 (2023)	23.51 (597)	56.15 (1426)	5.50 (140)	5.50 (140)	121.1
77S100-17	337	3	208	10	▲	3486	86.74 (2203)	24.69 (627)	62.05 (1576)	5.50 (140)	5.50 (140)	131.2
	337	3	230	10	▲	3486	86.74 (2203)	24.69 (627)	62.05 (1576)	5.50 (140)	5.50 (140)	131.2
	340	3	460	10	▲	3496	86.74 (2203)	24.69 (627)	62.05 (1576)	5.50 (140)	5.50 (140)	131.2
	340	3	575	10	▲	3496	86.74 (2203)	24.69 (627)	62.05 (1576)	5.50 (140)	5.50 (140)	131.2
77S100-20	393	3	208	10	▲	3462	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	393	3	230	10	▲	3476	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	396	3	460	10	▲	3476	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4
	396	3	575	10	▲	3475	95.60 (2428)	24.69 (627)	70.91 (1801)	5.50 (140)	5.50 (140)	136.4



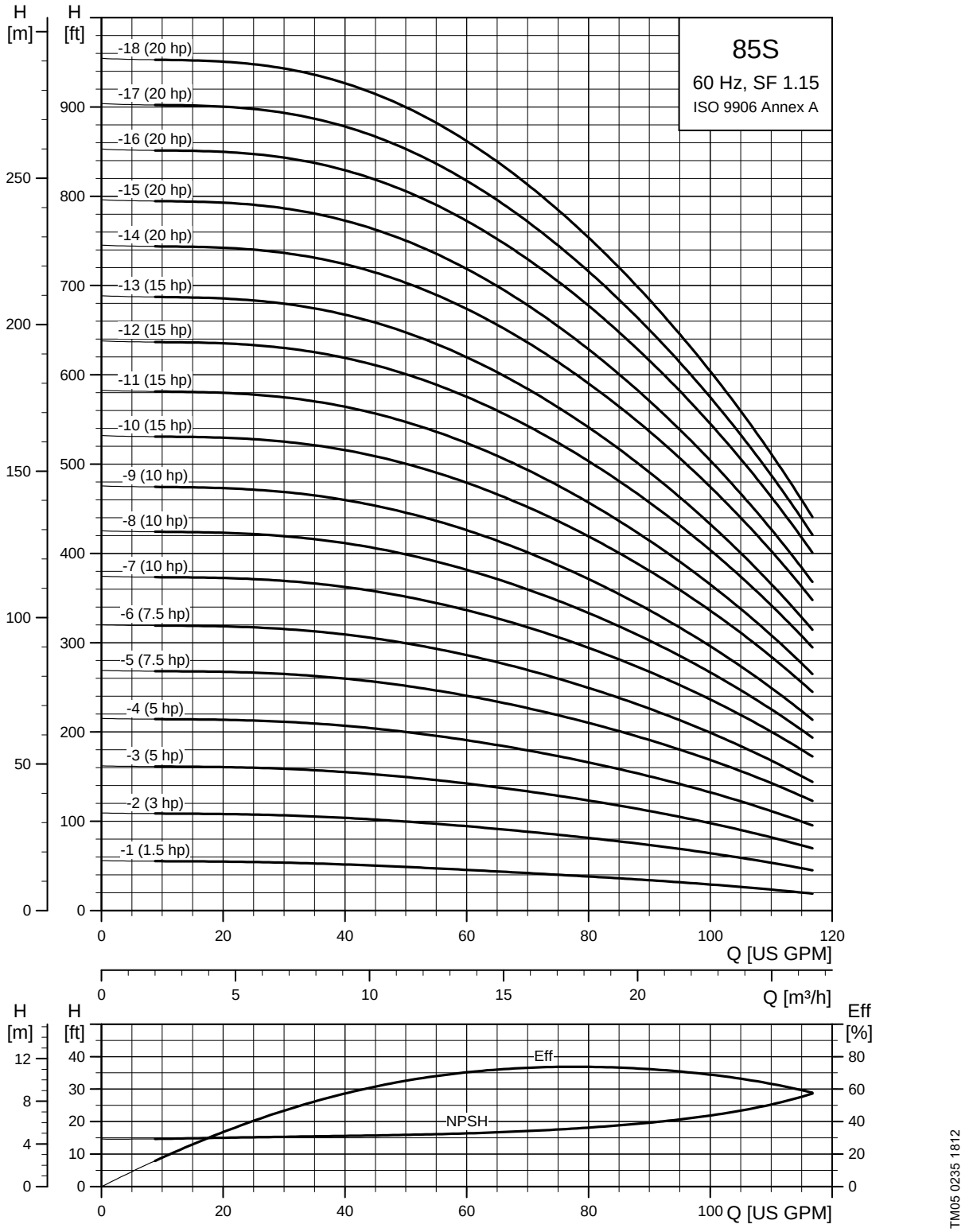
E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

▲ MS 6000C motor.

6" and larger wells

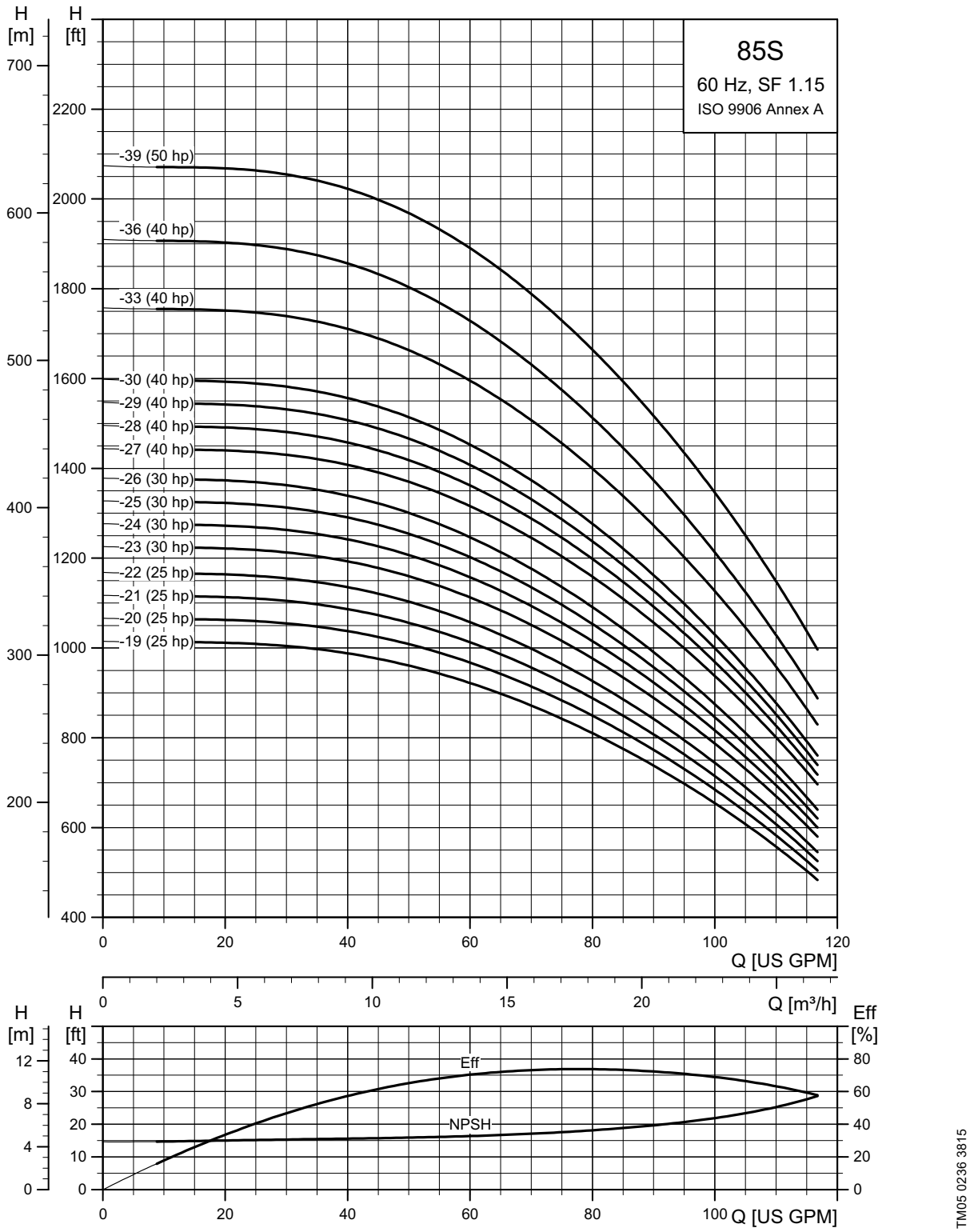
SP 85S (85 gpm)



TM05 0235 1812

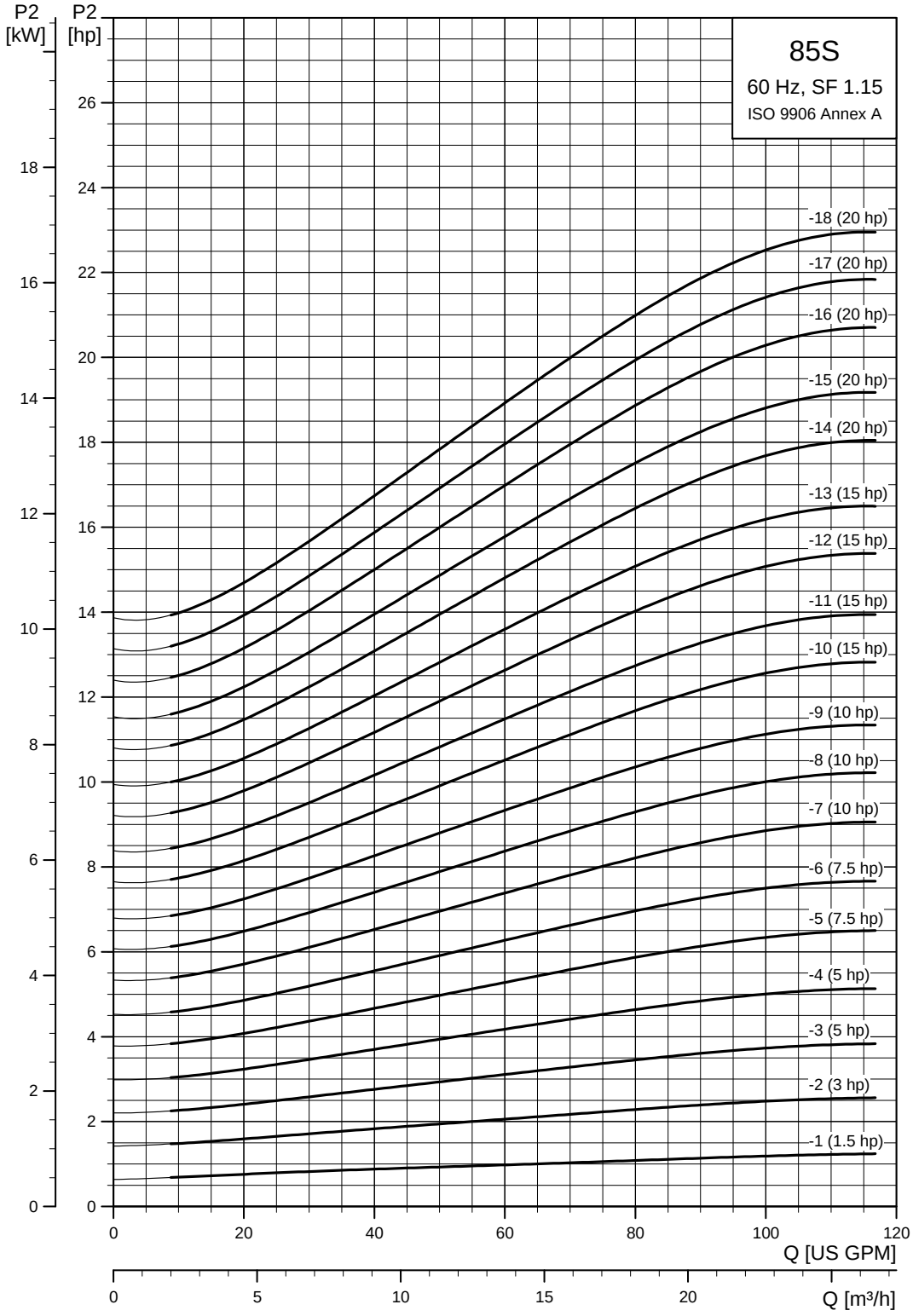
6" and larger wells - continued

SP 85S (85 gpm)



6" and larger wells - continued

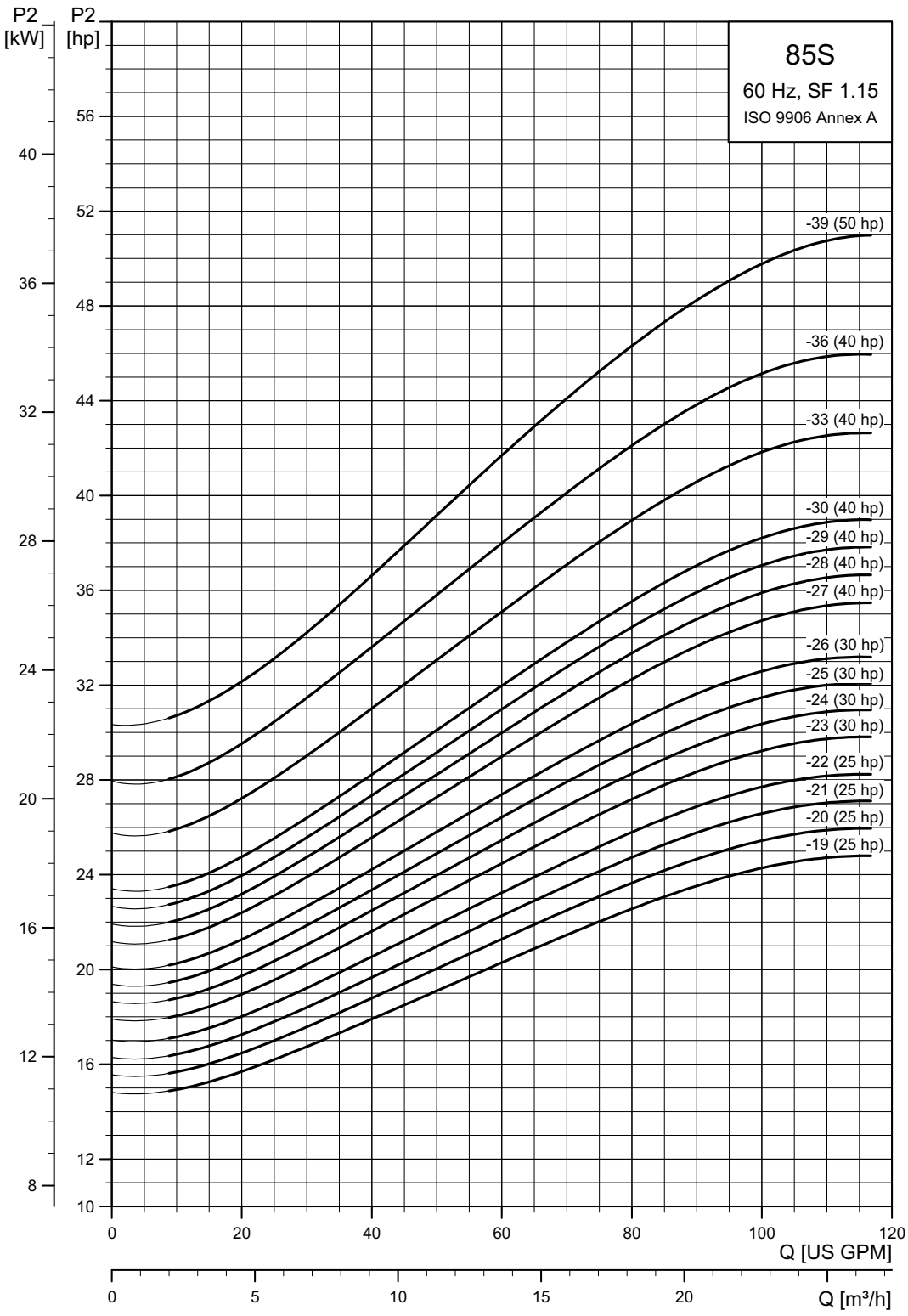
SP 85S (85 gpm) pump power requirement (P2)



TM05 0237 1812

6" and larger wells - continued

SP 85S (85 gpm) pump power requirement (P2)

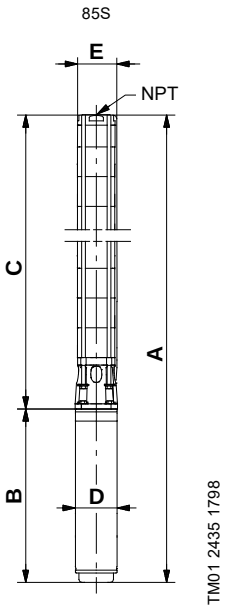


TM05 0238 3815

6" and larger wells - continued

SP 85S (85 gpm) pump with 4", 6" motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
85S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 85 gpm (3" NPT)												
85S15-1	42	1	230	1.5	■	3519	28.04 (712)	15.24 (387)	12.80 (325)	3.75 (95)	5.28 (134)	29.7
		3	230	1.5	■	3516	26.46 (672)	13.67 (347)	12.80 (325)	3.75 (95)	5.28 (134)	29.7
		3	460	1.5	■	3516	26.46 (672)	13.67 (347)	12.80 (325)	3.75 (95)	5.28 (134)	29.7
85S30-2	87	1	230	3	•	3500	37.88 (962)	22.72 (577)	15.16 (385)	3.75 (95)	5.28 (134)	55.8
	87	3	230	3	•	3491	33.12 (841)	17.96 (456)	15.16 (385)	3.75 (95)	5.28 (134)	47.7
	88	3	460	3	•	3517	33.12 (841)	17.96 (456)	15.16 (385)	3.75 (95)	5.28 (134)	47.7
85S50-3	135	1	230	5	•	3520	44.22 (1123)	26.66 (677)	17.56 (446)	3.75 (95)	5.28 (134)	67.5
	134	3	230	5	•	3531	40.24 (1022)	22.68 (576)	17.56 (446)	3.75 (95)	5.28 (134)	51.3
	135	3	460	5	•	3530	40.24 (1022)	22.68 (576)	17.56 (446)	3.75 (95)	5.28 (134)	51.3
85S50-4	170	1	230	5	•	3482	46.58 (1183)	26.66 (677)	19.93 (506)	3.75 (95)	5.28 (134)	69.3
	171	3	230	5	•	3502	42.60 (1082)	22.68 (576)	19.93 (506)	3.75 (95)	5.28 (134)	61.2
	171	3	460	5	•	3500	42.60 (1082)	22.68 (576)	19.93 (506)	3.75 (95)	5.28 (134)	61.2
85S75-5	215	3	230	7.5	•	3510	48.94 (1243)	26.62 (676)	22.33 (567)	3.75 (95)	5.28 (134)	73.8
	215	3	460	7.5	•	3510	48.94 (1243)	26.62 (676)	22.33 (567)	3.75 (95)	5.28 (134)	73.8
85S75-6	256	3	230	7.5	•	3490	51.30 (1303)	26.62 (676)	24.69 (627)	3.75 (95)	5.28 (134)	85.5
	256	3	460	7.5	•	3490	51.30 (1303)	26.62 (676)	24.69 (627)	3.75 (95)	5.28 (134)	76.5
85S100-7	301	3	460	10	•	3503	57.64 (1464)	30.56 (776)	27.09 (688)	3.75 (95)	5.28 (134)	136.8
85S100-8	342	3	460	10	•	3488	60.00 (1524)	30.56 (776)	29.45 (748)	3.75 (95)	5.28 (134)	138.6
85S100-9	382	3	460	10	•	3472	62.41 (1585)	30.56 (776)	31.86 (809)	3.75 (95)	5.28 (134)	140.4
85S - Motor diameter 6-inch, 3-wire motor, 60 Hz, rated flow rate 85 gpm (3" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
85S75-5	216	3	230	7.5	▲	3516	46.58 (1183)	23.51 (597)	23.08 (586)	5.52 (140)	5.52 (140)	98.1
	217	3	460	7.5	▲	3523	46.58 (1183)	23.51 (597)	23.08 (586)	5.52 (140)	5.52 (140)	98.1
85S75-6	257	3	230	7.5	▲	3498	48.94 (1243)	23.51 (597)	25.44 (646)	5.52 (140)	5.52 (140)	99.9
	258	3	460	7.5	▲	3507	48.94 (1243)	23.51 (597)	25.44 (646)	5.52 (140)	5.52 (140)	99.9
85S100-7	301	3	230	10	▲	3505	52.52 (1334)	24.69 (627)	27.84 (707)	5.52 (140)	5.52 (140)	103.5
	303	3	460	10	▲	3513	52.52 (1334)	24.69 (627)	27.84 (707)	5.52 (140)	5.52 (140)	103.5
85S100-8	342	3	230	10	▲	3490	54.89 (1394)	24.69 (627)	30.20 (767)	5.52 (140)	5.52 (140)	105.3
	344	3	460	10	▲	3500	54.89 (1394)	24.69 (627)	30.20 (767)	5.52 (140)	5.52 (140)	105.3
85S100-9	383	3	230	10	▲	3474	57.29 (1455)	24.69 (627)	32.60 (828)	5.52 (140)	5.52 (140)	108.0
	385	3	460	10	▲	3486	57.29 (1455)	24.69 (627)	32.60 (828)	5.52 (140)	5.52 (140)	108.0
85S150-10	432	3	230	15	▲	3509	62.01 (1575)	27.05 (687)	34.97 (888)	5.52 (140)	5.52 (140)	122.4
	433	3	460	15	▲	3513	62.01 (1575)	27.05 (687)	34.97 (888)	5.52 (140)	5.52 (140)	122.4
85S150-11	473	3	230	15	▲	3499	64.41 (1636)	27.05 (687)	37.37 (949)	5.52 (140)	5.52 (140)	126.0
	474	3	460	15	▲	3503	64.41 (1636)	27.05 (687)	37.37 (949)	5.52 (140)	5.52 (140)	126.0
85S150-12	513	3	230	15	▲	3489	66.78 (1696)	27.05 (687)	39.73 (1009)	5.52 (140)	5.52 (140)	133.2
	514	3	460	15	▲	3494	66.78 (1696)	27.05 (687)	39.73 (1009)	5.52 (140)	5.52 (140)	133.2
85S150-13	553	3	230	15	▲	3479	69.18 (1757)	27.05 (687)	42.13 (1070)	5.52 (140)	5.52 (140)	135.0
	554	3	460	15	▲	3484	69.18 (1757)	27.05 (687)	42.13 (1070)	5.52 (140)	5.52 (140)	135.0



E = Maximum diameter of pump including cable guard and motor.

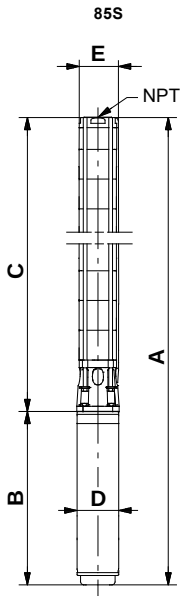
Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m)

- ■ MS 402 motor.
- • MS 4000 motor.
- ▲ MS 6000C motor.

6" and larger wells - continued

SP 85S (85 gpm) pump with 6", 8" motors

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
85S - Motor diameter 6 inch, 60 Hz, rated flow rate 85 gpm (3" NPT)											
85S200-14	604	3	230	20 ▲	3505	74.10 (1882)	29.61 (752)	44.49 (1130)	5.52 (140)	5.52 (140)	143.1
	607	3	460	20 ▲	3513	74.10 (1882)	29.61 (752)	44.49 (1130)	5.52 (140)	5.52 (140)	143.1
85S200-15	644	3	230	20 ▲	3497	76.50 (1943)	29.61 (752)	46.89 (1191)	5.52 (140)	5.52 (140)	147.6
	648	3	460	20 ▲	3507	76.50 (1943)	29.61 (752)	46.89 (1191)	5.52 (140)	5.52 (140)	147.6
85S200-16	685	3	230	20 ▲	3490	78.86 (2003)	29.61 (752)	49.26 (1251)	5.52 (140)	5.52 (140)	157.5
	689	3	460	20 ▲	3500	78.86 (2003)	29.61 (752)	49.26 (1251)	5.52 (140)	5.52 (140)	157.5
85S200-17	724	3	230	20 ▲	3482	81.26 (2064)	29.61 (752)	51.66 (1312)	5.52 (140)	5.52 (140)	160.2
	729	3	460	20 ▲	3493	81.26 (2064)	29.61 (752)	51.66 (1312)	5.52 (140)	5.52 (140)	160.2
85S200-18	764	3	230	20 ▲	3474	83.63 (2124)	29.61 (752)	54.02 (1372)	5.52 (140)	5.52 (140)	161.1
	769	3	460	20 ▲	3486	83.63 (2124)	29.61 (752)	54.02 (1372)	5.52 (140)	5.52 (140)	179.0
85S250-19	817	3	230	25 ▲	3497	88.19 (2240)	31.78 (807)	56.42 (1433)	5.52 (140)	5.52 (140)	191.7
	821	3	460	25 ▲	3506	88.19 (2240)	31.78 (807)	56.42 (1433)	5.52 (140)	5.52 (140)	191.7
85S250-20	857	3	230	25 ▲	3491	90.56 (2300)	31.78 (807)	58.78 (1493)	5.52 (140)	5.52 (140)	195.3
	862	3	460	25 ▲	3501	90.56 (2300)	31.78 (807)	58.78 (1493)	5.52 (140)	5.52 (140)	195.3
85S250-21	897	3	230	25 ▲	3485	92.96 (2361)	31.78 (807)	61.19 (1554)	5.52 (140)	5.52 (140)	198.0
	902	3	460	25 ▲	3496	92.96 (2361)	31.78 (807)	61.19 (1554)	5.52 (140)	5.52 (140)	198.0
85S250-22	936	3	230	25 ▲	3479	95.32 (2421)	31.78 (807)	63.55 (1614)	5.52 (140)	5.52 (140)	199.8
	942	3	460	25 ▲	3490	95.32 (2421)	31.78 (807)	63.55 (1614)	5.52 (140)	5.52 (140)	199.8
85S300-23	984	3	230	30 ▲	3487	100.08 (2542)	34.14 (867)	65.95 (1675)	5.52 (140)	5.52 (140)	199.8
	989	3	460	30 ▲	3498	100.08 (2542)	34.14 (867)	65.95 (1675)	5.52 (140)	5.52 (140)	199.8
85S300-24	1023	3	230	30 ▲	3482	102.45 (2602)	34.14 (867)	68.31 (1735)	5.52 (140)	5.52 (140)	216.0
	1030	3	460	30 ▲	3493	102.45 (2602)	34.14 (867)	68.31 (1735)	5.52 (140)	5.52 (140)	216.0
85S300-25	1063	3	230	30 ▲	3476	104.85 (2663)	34.14 (867)	70.71 (1796)	5.52 (140)	5.52 (140)	219.6
	1070	3	460	30 ▲	3488	104.85 (2663)	34.14 (867)	70.71 (1796)	5.52 (140)	5.52 (140)	219.6
85S300-26	1102	3	230	30 ▲	3471	107.21 (2723)	34.14 (867)	73.08 (1856)	5.52 (140)	5.52 (140)	221.4
	1110	3	460	30 ▲	3483	107.21 (2723)	34.14 (867)	73.08 (1856)	5.52 (140)	5.52 (140)	221.4
85S400-27	1171	3	460	40 ▲	3512	109.61 (2784)	34.14 (867)	75.48 (1917)	5.52 (140)	5.52 (140)	234.9
85S400-28	1212	3	460	40 ▲	3508	117.09 (2974)	39.26 (997)	77.84 (1977)	5.52 (140)	5.52 (140)	246.6
85S400-29	1253	3	460	40 ▲	3505	119.49 (3035)	39.26 (997)	80.24 (2038)	5.52 (140)	5.52 (140)	248.4
85S400-30	1294	3	460	40 ▲	3501	121.86 (3095)	39.26 (997)	82.60 (2098)	5.52 (140)	5.52 (140)	270.0
85S400-33DS	1416	3	460	40 ▲	3490	142.88 (3629)	39.26 (997)	103.63 (2632)	5.52 (140)	6.89 (175)	515.5
85S400-36DS	1535	3	460	40 ▲	3479	150.00 (3810)	39.26 (997)	110.75 (2813)	5.52 (140)	6.89 (175)	454.8
85S500-39DS	1670	3	460	50 ☼	3487	173.94 (4418)	56.03 (1423)	117.92 (2995)	5.63 (143)	6.89 (175)	469.0
85S - Motor diameter 8 inch, 60 Hz, rated flow rate 85 gpm (3" NPT)											
85S400-33DS	1427	3	460	40 *	3505	145.12 (3686)	43.71 (1110)	101.42 (2576)	7.56 (192)	7.56 (192)	652.7
85S400-36DS	1549	3	460	40 *	3496	152.25 (3867)	43.71 (1110)	108.55 (2757)	7.56 (192)	7.56 (192)	592.0
85S400-39DS	1690	3	460	50 *	3508	159.41 (4049)	43.71 (1110)	115.71 (2939)	7.56 (192)	7.56 (192)	537.2



TM01 2435 1798

E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 3" NPT, 8" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

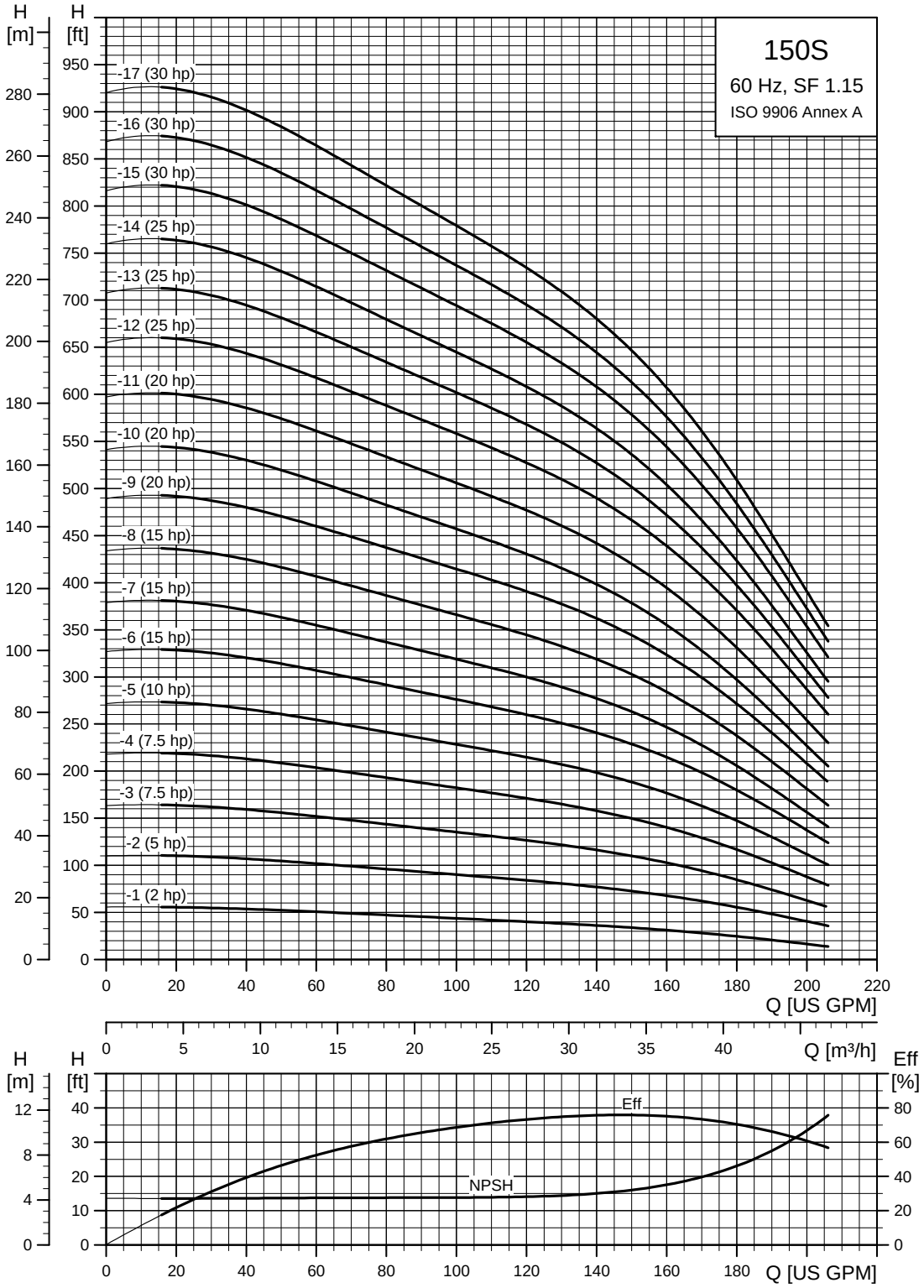
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

6" and larger wells - continued

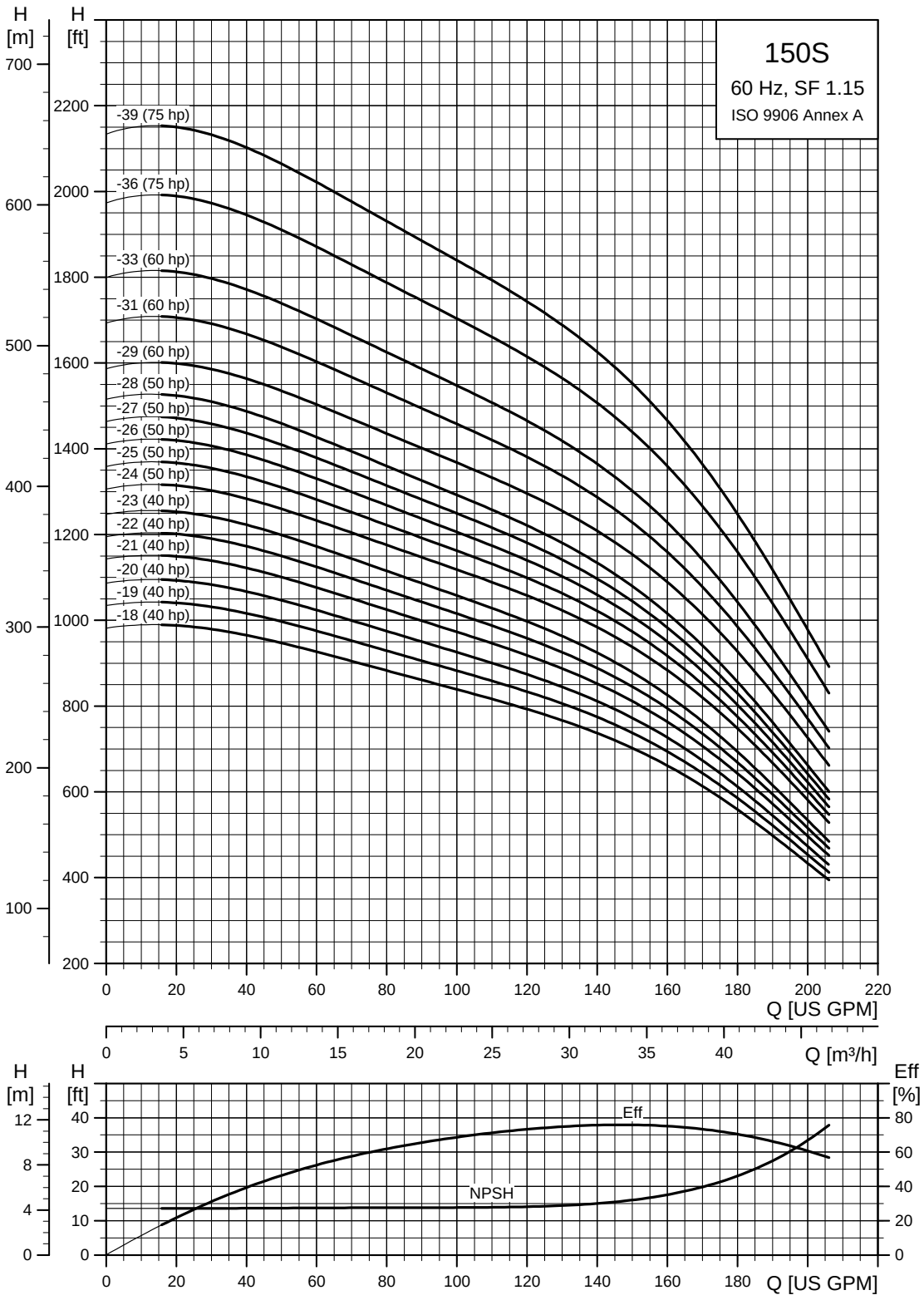
SP 150S (150 gpm)



TM05 0239 1812

6" and larger wells - continued

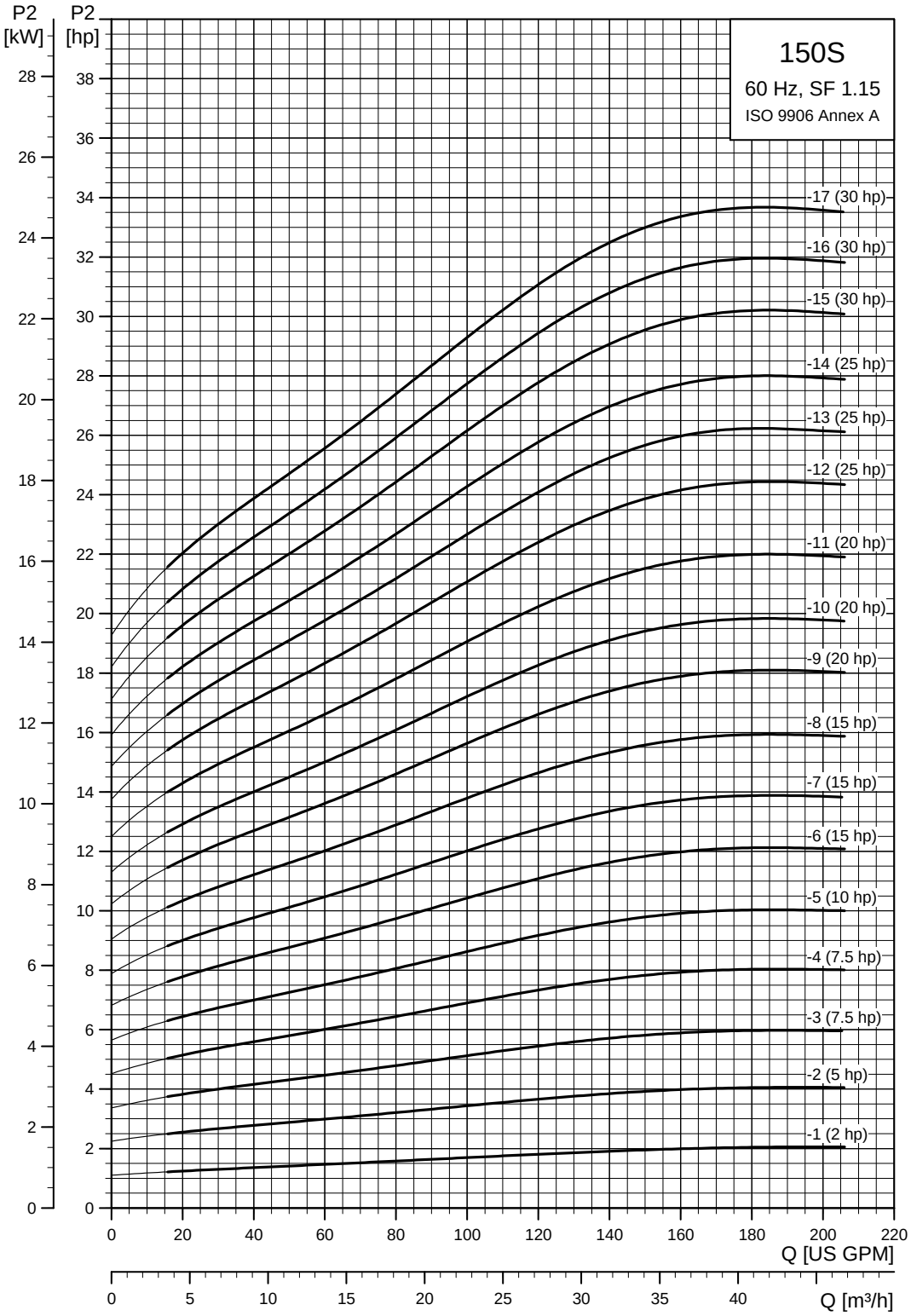
SP 150S (150 gpm)



TM05 0240 1812

6" and larger wells - continued

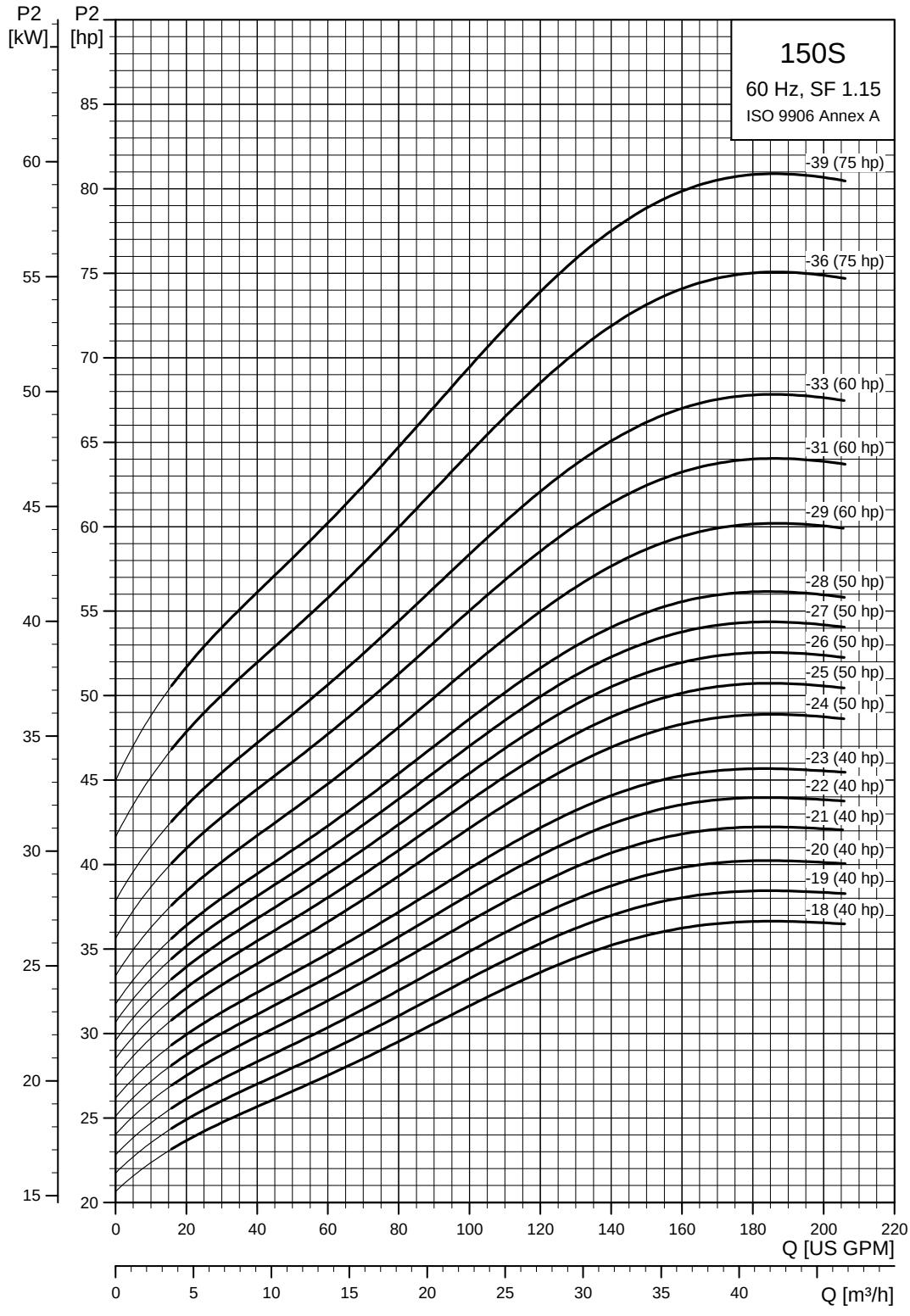
SP 150S (150 gpm) pump power requirement (P2)



TM05 0241 1812

6" and larger wells - continued

SP 150S (150 gpm) pump power requirement (P2)

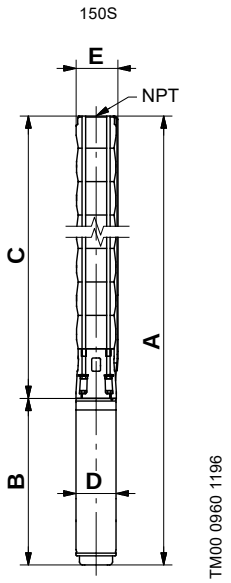


TM05 0242 1812

6" and larger wells - continued

SP 150S (150 gpm) pump with 4" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
150S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 150 gpm (3" NPT)												
150S20-1	39	1	230	2	•	3477	33.67 (855)	19.57 (497)	14.10 (358)	3.75 (95)	5.28 (134)	49.5
	39	3	230	2	■	3474	29.34 (745)	15.24 (387)	14.10 (358)	3.75 (95)	5.28 (134)	45.0
	39	3	460	2	■	3474	29.34 (745)	15.24 (387)	14.10 (358)	3.75 (95)	5.28 (134)	45.0
150S50-2	78	1	230	5	•	3502	44.53 (1131)	26.66 (677)	17.88 (454)	3.75 (95)	5.28 (134)	67.5
	79	3	230	5	•	3517	40.56 (1030)	22.68 (576)	17.88 (454)	3.75 (95)	5.28 (134)	42.3
	79	3	460	5	•	3516	40.56 (1030)	22.68 (576)	17.88 (454)	3.75 (95)	5.28 (134)	42.3
150S75-3	118	3	230	7.5	•	3508	48.27 (1226)	26.62 (676)	21.66 (550)	3.75 (95)	5.28 (134)	51.3
	118	3	460	7.5	•	3508	48.27 (1226)	26.62 (676)	21.66 (550)	3.75 (95)	5.28 (134)	82.8
150S75-4	154	3	230	7.5	•	3473	52.05 (1322)	26.62 (676)	25.44 (646)	3.75 (95)	5.28 (134)	85.5
	154	3	460	7.5	•	3473	52.05 (1322)	26.62 (676)	25.44 (646)	3.75 (95)	5.28 (134)	85.5
150S100-5	195	3	460	10	•	3481	59.77 (1518)	30.56 (776)	29.22 (742)	3.75 (95)	5.28 (134)	135.9
150S - Motor diameter 6 inch, 60 Hz, rated flow rate 150 gpm (3" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
150S75-4	155	3	230	7.5	▲	3482	49.69 (1262)	23.51 (597)	26.19 (665)	5.52 (140)	5.52 (140)	99.9
	156	3	460	7.5	▲	3493	49.69 (1262)	23.51 (597)	26.19 (665)	5.52 (140)	5.52 (140)	99.9
150S100-5	195	3	230	10	▲	3482	54.65 (1388)	24.69 (627)	29.97 (761)	5.52 (140)	5.52 (140)	73.8
	196	3	460	10	▲	3493	54.65 (1388)	24.69 (627)	29.97 (761)	5.52 (140)	5.52 (140)	73.8
150S150-6	238	3	230	15	▲	3508	60.79 (1544)	27.05 (687)	33.75 (857)	5.52 (140)	5.52 (140)	119.7
	239	3	460	15	▲	3511	60.79 (1544)	27.05 (687)	33.75 (857)	5.52 (140)	5.52 (140)	119.7
150S150-7	276	3	230	15	▲	3492	64.57 (1640)	27.05 (687)	37.52 (953)	5.52 (140)	5.52 (140)	127.8
	277	3	460	15	▲	3496	64.57 (1640)	27.05 (687)	37.52 (953)	5.52 (140)	5.52 (140)	127.8
150S150-8	313	3	230	15	▲	3474	68.35 (1736)	27.05 (687)	41.30 (1049)	5.52 (140)	5.52 (140)	137.7
	314	3	460	15	▲	3480	68.35 (1736)	27.05 (687)	41.30 (1049)	5.52 (140)	5.52 (140)	137.7
150S200-9	357	3	230	20	▲	3496	74.69 (1897)	29.61 (752)	45.08 (1145)	5.52 (140)	5.52 (140)	141.3
	359	3	460	20	▲	3506	74.69 (1897)	29.61 (752)	45.08 (1145)	5.52 (140)	5.52 (140)	141.3
150S200-10	395	3	230	20	▲	3484	78.47 (1993)	29.61 (752)	48.86 (1241)	5.52 (140)	5.52 (140)	151.2
	397	3	460	20	▲	3495	78.47 (1993)	29.61 (752)	48.86 (1241)	5.52 (140)	5.52 (140)	151.2
150S200-11	431	3	230	20	▲	3471	82.25 (2089)	29.61 (752)	52.64 (1337)	5.52 (140)	5.52 (140)	166.5
	435	3	460	20	▲	3483	82.25 (2089)	29.61 (752)	52.64 (1337)	5.52 (140)	5.52 (140)	166.5
150S250-12	477	3	230	25	▲	3490	88.19 (2240)	31.78 (807)	56.42 (1433)	5.52 (140)	5.52 (140)	188.1
	479	3	460	25	▲	3500	88.19 (2240)	31.78 (807)	56.42 (1433)	5.52 (140)	5.52 (140)	188.1
150S250-13	514	3	230	25	▲	3480	91.97 (2336)	31.78 (807)	60.20 (1529)	5.52 (140)	5.52 (140)	201.6
	517	3	460	25	▲	3492	91.97 (2336)	31.78 (807)	60.20 (1529)	5.52 (140)	5.52 (140)	201.6
150S250-14	550	3	230	25	▲	3470	95.75 (2432)	31.78 (807)	63.98 (1625)	5.52 (140)	5.52 (140)	206.1
	554	3	460	25	▲	3482	95.75 (2432)	31.78 (807)	63.98 (1625)	5.52 (140)	5.52 (140)	206.1



E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

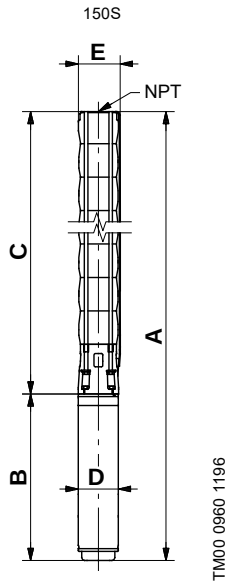
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

- ■ MS 402 motor.
- • MS 4000 motor.
- ▲ MS 6000C motor.

6" and larger wells - continued

SP 150S (150 gpm) pump with 6", 8" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
150S - Motor diameter 6 inch, 60 Hz, rated flow rate 150 gpm (3" NPT)											
150S300-15	592	3	230	30	▲ 3476	101.89 (2588)	34.14 (867)	67.76 (1721)	5.52 (140)	5.52 (140)	209.7
	596	3	460	30	▲ 3488	101.89 (2588)	34.14 (867)	67.76 (1721)	5.52 (140)	5.52 (140)	209.7
150S300-16	628	3	230	30	▲ 3466	105.67 (2684)	34.14 (867)	71.54 (1817)	5.52 (140)	5.52 (140)	211.5
	633	3	460	30	▲ 3479	105.67 (2684)	34.14 (867)	71.54 (1817)	5.52 (140)	5.52 (140)	211.5
150S300-17	664	3	230	30	▲ 3456	109.45 (2780)	34.14 (867)	75.32 (1913)	5.52 (140)	5.52 (140)	216.0
	670	3	460	30	▲ 3471	109.45 (2780)	34.14 (867)	75.32 (1913)	5.52 (140)	5.52 (140)	246.6
150S400-18	721	3	460	40	▲ 3501	118.35 (3006)	39.26 (997)	79.10 (2009)	5.52 (140)	5.52 (140)	246.6
150S400-19	759	3	460	40	▲ 3495	122.13 (3102)	39.26 (997)	82.88 (2105)	5.52 (140)	5.52 (140)	248.4
150S400-20	797	3	460	40	▲ 3489	125.91 (3198)	39.26 (997)	86.66 (2201)	5.52 (140)	5.52 (140)	291.0
150S400-21	834	3	460	40	▲ 3483	129.69 (3294)	39.26 (997)	90.44 (2297)	5.52 (140)	5.52 (140)	271.8
150S400-22	871	3	460	40	▲ 3476	133.47 (3390)	39.26 (997)	94.22 (2393)	5.52 (140)	5.52 (140)	305.9
150S400-23	907	3	460	40	▲ 3470	137.25 (3486)	39.26 (997)	98.00 (2489)	5.52 (140)	5.52 (140)	277.2
150S500-24	954	3	460	50	☼ 3483	157.88 (4010)	56.11 (1425)	101.78 (2585)	5.67 (144)	5.67 (144)	411.8
150S500-25	991	3	460	50	☼ 3478	161.66 (4106)	56.11 (1425)	105.56 (2681)	5.67 (144)	5.67 (144)	419.0
150S500-26	1028	3	460	50	☼ 3473	165.44 (4202)	56.11 (1425)	109.34 (2777)	5.67 (144)	5.67 (144)	426.2
150S500-27	1064	3	460	50	☼ 3467	169.22 (4298)	56.11 (1425)	113.12 (2873)	5.67 (144)	5.67 (144)	433.4
150S500-28	1100	3	460	50	☼ 3462	173.00 (4394)	56.11 (1425)	116.89 (2969)	5.67 (144)	5.67 (144)	440.6
150S600-29DS	1131	3	460	60	☼ 3465	190.64 (4842)	56.11 (1425)	134.53 (3417)	5.67 (144)	6.89 (175)	605.0
150S600-31DS	1209	3	460	60	☼ 3455	198.20 (5034)	56.11 (1425)	142.09 (3609)	5.67 (144)	6.89 (175)	617.0
150S600-33DS	1288	3	460	60	☼ 3446	205.76 (5226)	56.11 (1425)	149.65 (3801)	5.67 (144)	6.89 (175)	629.0
150S - Motor diameter 8 inch, 60 Hz, rated flow rate 150 gpm (3" NPT)											
150S500-24	966	3	460	50	* 3505	162.45 (4126)	45.67 (1160)	116.78 (2966)	7.56 (192)	7.56 (192)	484.5
150S500-25	1004	3	460	50	* 3501	166.23 (4222)	45.67 (1160)	120.56 (3062)	7.56 (192)	7.56 (192)	491.7
150S500-26	1042	3	460	50	* 3497	170.00 (4318)	45.67 (1160)	124.34 (3158)	7.56 (192)	7.56 (192)	498.9
150S500-27	1080	3	460	50	* 3493	173.78 (4414)	45.67 (1160)	128.12 (3254)	7.56 (192)	7.56 (192)	506.1
150S500-28	1117	3	460	50	* 3489	177.56 (4510)	45.67 (1160)	131.89 (3350)	7.56 (192)	7.56 (192)	513.3
150S600-29DS	1177	3	460	60	* 3519	182.33 (4631)	50.00 (1270)	132.33 (3361)	7.56 (192)	7.56 (192)	612.7
150S600-31DS	1255	3	460	60	* 3513	189.89 (4823)	50.00 (1270)	139.89 (3553)	7.56 (192)	7.56 (192)	623.7
150S600-33DS	1332	3	460	60	* 3508	197.45 (5015)	50.00 (1270)	147.45 (3745)	7.56 (192)	7.56 (192)	639.1
150S750-36DS	1467	3	460	75	* 3524	211.93 (5383)	53.15 (1350)	158.78 (4033)	7.56 (192)	7.56 (192)	689.2
150S750-39DS	1584	3	460	75	* 3518	223.27 (5671)	53.15 (1350)	170.12 (4321)	7.56 (192)	7.56 (192)	704.6



E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 3" NPT, 8" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 5 ft (1.5 m).

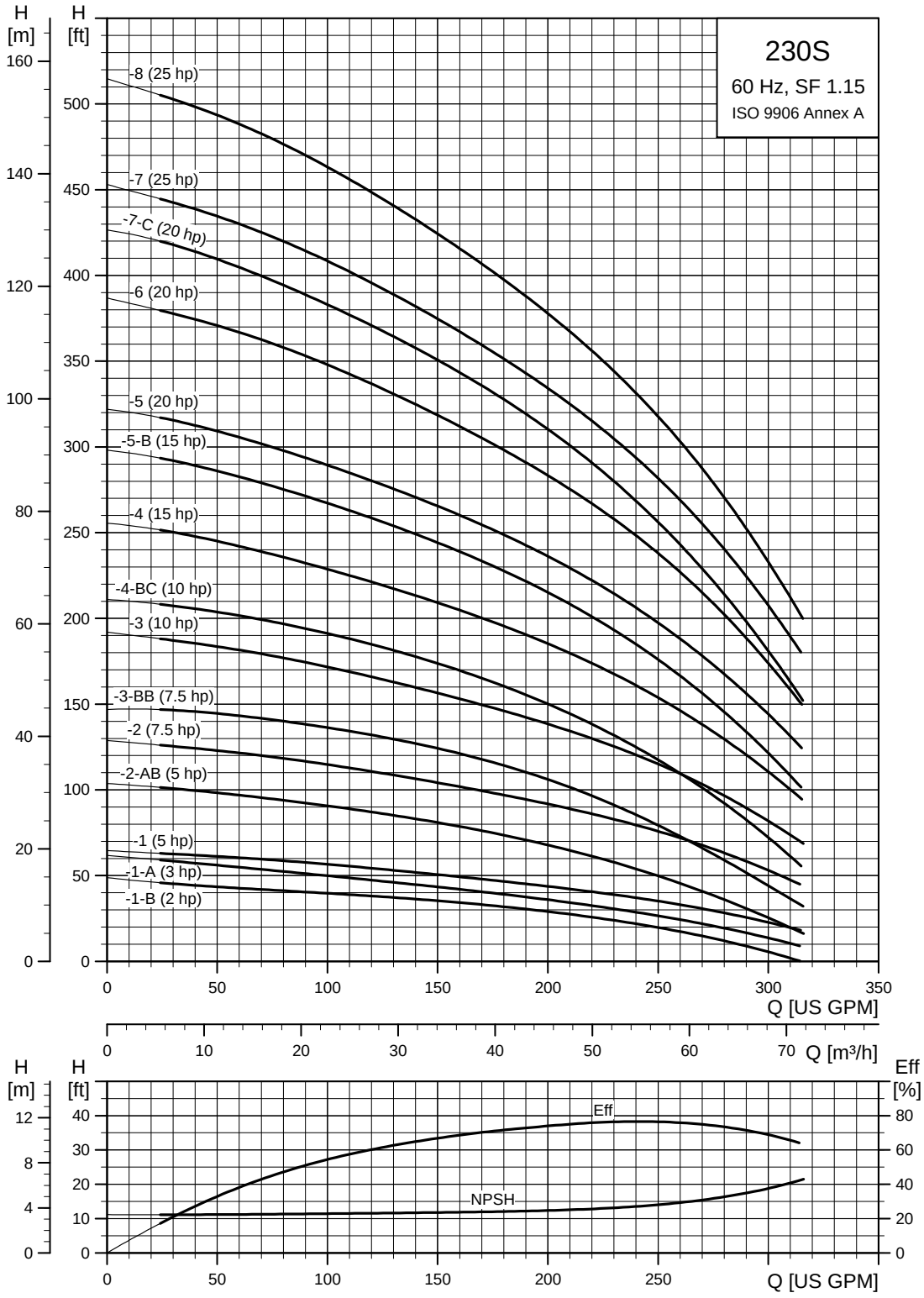
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

6" and larger wells - continued

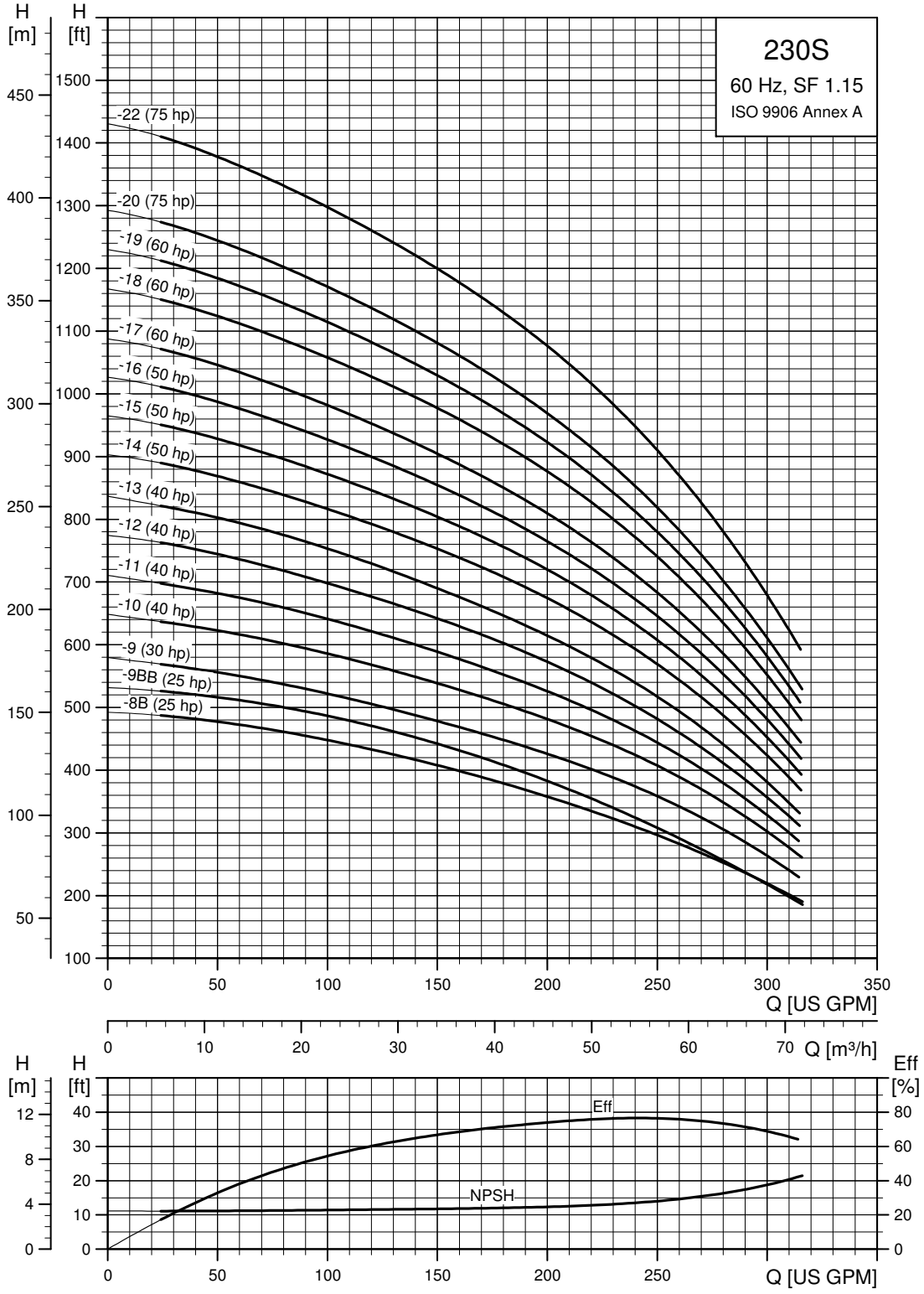
SP 230S (230 gpm)



TM05 0243 1812

6" and larger wells - continued

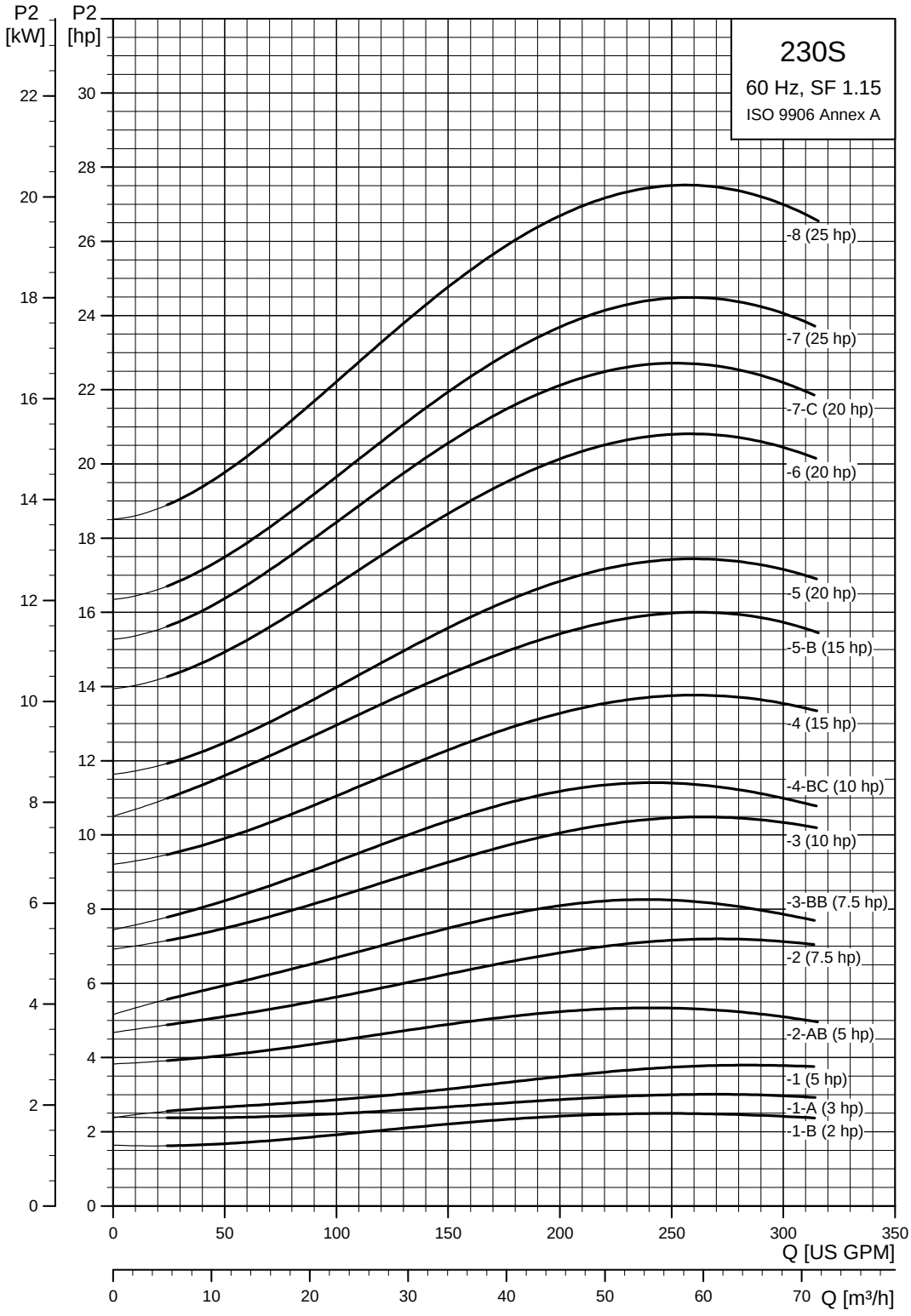
SP 230S (230 gpm)



TM05 0244 5014

6" and larger wells - continued

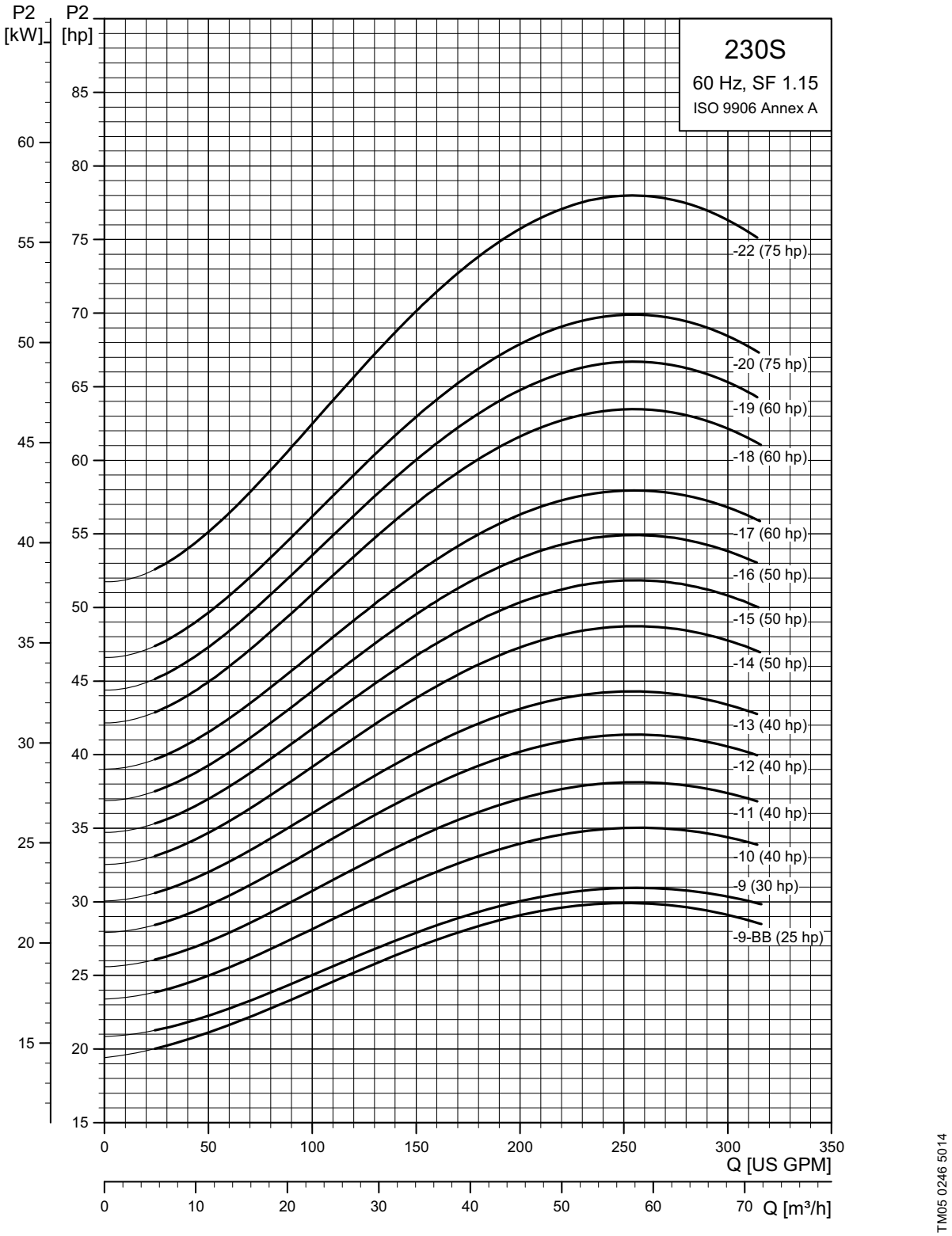
SP 230S (230 gpm) pump power requirement (P2)



TM05 0245 1812

6" and larger wells - continued

SP 230S (230 gpm) pump power requirement (P2)



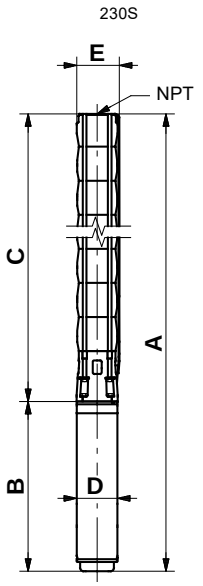
TM05 0246 5014

6" and larger wells - continued

SP 230S (230 gpm) pump with 4", 6" motor

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
230S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 230 gpm (3" NPT)												
230S20-1B	32	1	230	2	•	3434	34.45 (875)	19.57 (497)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	32	3	230	2	■	3432	30.12 (765)	15.24 (387)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	32	3	460	2	■	3432	30.12 (765)	15.24 (387)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S30-1A	38	1	230	3	•	3459	37.60 (955)	22.72 (577)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	38	3	230	3	•	3460	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	39	3	460	3	•	3489	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S50-1	46	1	230	5	•	3516	41.54 (1055)	26.66 (677)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	46	3	230	5	•	3528	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	46	3	460	5	•	3527	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S50-2AB	71	1	230	5	•	3459	45.99 (1168)	26.66 (677)	19.34 (491)	3.75 (95)	5.75 (146)	49.5
	71	3	230	5	•	3487	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
	71	3	460	5	•	3484	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
230S75-2	86	3	230	7.5	•	3488	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
	86	3	460	7.5	•	3488	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
230S75-3BB	110	3	230	7.5	•	3468	50.40 (1280)	26.62 (676)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
	110	3	460	7.5	•	3468	50.40 (1280)	26.62 (676)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
230S100-3	129	3	460	10	•	3472	54.34 (1380)	30.56 (776)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
230S100-4BC	141	3	460	10	•	3456	58.78 (1493)	30.56 (776)	28.23 (717)	3.75 (95)	5.75 (146)	144.9

230S - Motor diameter 6 inch, 60 Hz, rated flow rate 230 gpm (3" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
230S75-2	87	3	230	7.5	▲	3496	43.47 (1104)	23.51 (597)	19.97 (507)	5.52 (140)	5.79 (147)	111.6
	87	3	460	7.5	▲	3505	43.47 (1104)	23.51 (597)	19.97 (507)	5.52 (140)	5.79 (147)	111.6
230S75-3BB	111	3	230	7.5	▲	3477	47.92 (1217)	23.51 (597)	24.41 (620)	5.52 (140)	5.79 (147)	131.4
	111	3	460	7.5	▲	3488	47.92 (1217)	23.51 (597)	24.41 (620)	5.52 (140)	5.79 (147)	131.4
230S100-3	129	3	230	10	▲	3474	49.10 (1247)	24.69 (627)	24.41 (620)	5.52 (140)	5.79 (147)	126.0
	130	3	460	10	▲	3486	49.10 (1247)	24.69 (627)	24.41 (620)	5.52 (140)	5.79 (147)	126.0
230S100-4BC	141	3	230	10	▲	3457	53.55 (1360)	24.69 (627)	28.86 (733)	5.52 (140)	5.79 (147)	144.9
	143	3	460	10	▲	3472	53.55 (1360)	24.69 (627)	28.86 (733)	5.52 (140)	5.79 (147)	144.9
230S150-4	176	3	230	15	▲	3491	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	144.9
	176	3	460	15	▲	3495	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	144.9
230S150-5B	202	3	230	15	▲	3470	60.36 (1533)	27.05 (687)	33.31 (846)	5.52 (140)	5.79 (147)	161.1
	202	3	460	15	▲	3476	60.36 (1533)	27.05 (687)	33.31 (846)	5.52 (140)	5.79 (147)	161.1
230S200-5	222	3	230	20	▲	3499	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	161.1
	224	3	460	20	▲	3508	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	161.1
230S200-6	248	3	230	20	▲	3476	67.37 (1711)	29.61 (752)	37.76 (959)	5.52 (140)	5.79 (147)	167.4
	252	3	460	20	▲	3488	67.37 (1711)	29.61 (752)	37.76 (959)	5.52 (140)	5.79 (147)	167.4
230S200-7C	288	3	230	20	▲	3462	71.82 (1824)	29.61 (752)	42.21 (1072)	5.52 (140)	5.79 (147)	181.8
	291	3	460	20	▲	3475	71.82 (1824)	29.61 (752)	42.21 (1072)	5.52 (140)	5.79 (147)	181.8



E = Maximum diameter of pump including cable guard and motor.

Notes:

Control box is required for 3-wire, single-phase applications. Data does not include control box.

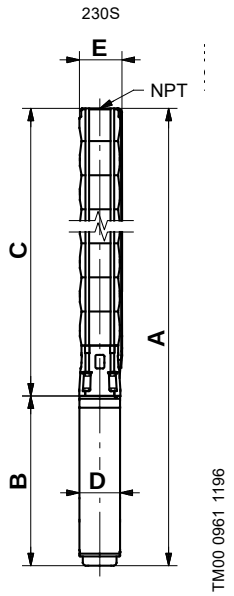
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 8 ft (2.4 m).

- ■ MS 402 motor.
- • MS 4000 motor.
- ▲ MS 6000C motor.

6" and larger wells - continued

SP 230S (230 gpm) pump with 6", 8" motor

Pump model	Nom. head [ft]	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
230S - Motor diameter 6 inch, 60 Hz, rated flow rate 230 gpm (3" NPT)											
230S250-7	291	3	230	25	▲ 3487	73.98 (1879)	31.78 (807)	42.21 (1072)	5.52 (140)	5.79 (147)	149.9
	294	3	460	25	▲ 3497	73.98 (1879)	31.78 (807)	42.21 (1072)	5.52 (140)	5.79 (147)	181.8
230S250-8B	315	3	230	25	▲ 3476	78.43 (1992)	31.78 (807)	46.66 (1185)	5.52 (140)	5.79 (147)	188.1
	316	3	460	25	▲ 3487	78.43 (1992)	31.78 (807)	46.66 (1185)	5.52 (140)	5.79 (147)	188.1
230S250-8	329	3	230	25	▲ 3469	78.43 (1992)	31.78 (807)	46.66 (1185)	5.52 (140)	5.79 (147)	188.1
	332	3	460	25	▲ 3482	78.43 (1992)	31.78 (807)	46.66 (1185)	5.52 (140)	5.79 (147)	188.1
230S250-9BB	363	3	230	25	▲ 3463	82.88 (2105)	31.78 (807)	51.11 (1298)	5.52 (140)	5.79 (147)	205.2
	366	3	460	25	▲ 3476	82.88 (2105)	31.78 (807)	51.11 (1298)	5.52 (140)	5.79 (147)	205.2
230S300-9	368	3	230	30	▲ 3468	85.24 (2165)	34.14 (867)	51.11 (1298)	5.52 (140)	5.79 (147)	205.2
	374	3	460	30	▲ 3481	85.24 (2165)	34.14 (867)	51.11 (1298)	5.52 (140)	5.79 (147)	205.2
230S400-10	414	3	460	40	▲ 3476	94.81 (2408)	39.26 (997)	55.56 (1411)	5.52 (140)	5.79 (147)	241.2
230S400-11	457	3	460	40	▲ 3493	99.26 (2521)	39.26 (997)	60.00 (1524)	5.52 (140)	5.79 (147)	245.7
230S400-12	495	3	460	40	▲ 3482	103.71 (2634)	39.26 (997)	64.45 (1637)	5.52 (140)	5.79 (147)	251.1
230S400-13	533	3	460	40	▲ 3472	108.15 (2747)	39.26 (997)	68.90 (1750)	5.52 (140)	5.79 (147)	255.6
230S500-14	577	3	460	50	☼ 3481	129.45 (3288)	56.11 (1425)	73.35 (1863)	5.67 (144)	5.79 (147)	356.0
230S500-15	615	3	460	50	☼ 3471	133.90 (3401)	56.11 (1425)	77.80 (1976)	5.67 (144)	5.79 (147)	360.5
230S500-16	653	3	460	50	☼ 3462	138.35 (3514)	56.11 (1425)	82.25 (2089)	5.67 (144)	5.79 (147)	365.0
230S600-17	700	3	460	60	☼ 3460	142.81 (1447)	56.11 (1425)	86.70 (2202)	5.67 (144)	5.79 (147)	381.0
230S600-18	742	3	460	60	☼ 3452	147.26 (3740)	56.11 (1425)	91.15 (2315)	5.67 (144)	5.79 (147)	386.0
230S600-19	783	3	460	60	☼ 3444	151.71 (38.53)	56.11 (1425)	95.60 (2428)	5.67 (144)	5.79 (147)	391.0
230S - Motor diameter 8 inch, 60 Hz, rated flow rate 230 gpm (3" NPT)											
230S600-17	700	3	460	60	* 3460	138.47 (3517)	50.00 (1270)	88.47 (2247)	7.56 (192)	7.56 (192)	546.0
230S600-18	741	3	460	60	* 3452	142.92 (3630)	50.00 (1270)	92.92 (2360)	7.56 (192)	7.56 (192)	568.5
230S600-19	783	3	460	60	* 3444	147.37 (3743)	50.00 (1270)	97.37 (2473)	7.56 (192)	7.56 (192)	591.0
230S750-20DS	850	3	460	75	* 3526	164.69 (4183)	53.15 (1350)	111.54 (2833)	7.56 (192)	7.56 (192)	549.9
230S750-22DS	931	3	460	75	* 3519	173.59 (4409)	53.15 (1350)	120.44 (3059)	7.56 (192)	7.56 (192)	620.4



E = Maximum diameter of pump including cable guard and motor.

Notes:
Control box is required for 3-wire, single-phase applications. Data does not include control box.
DS designation = Built into sleeve, 3" NPT, 8" minimum well diameter.
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 8 ft (2.4 m).

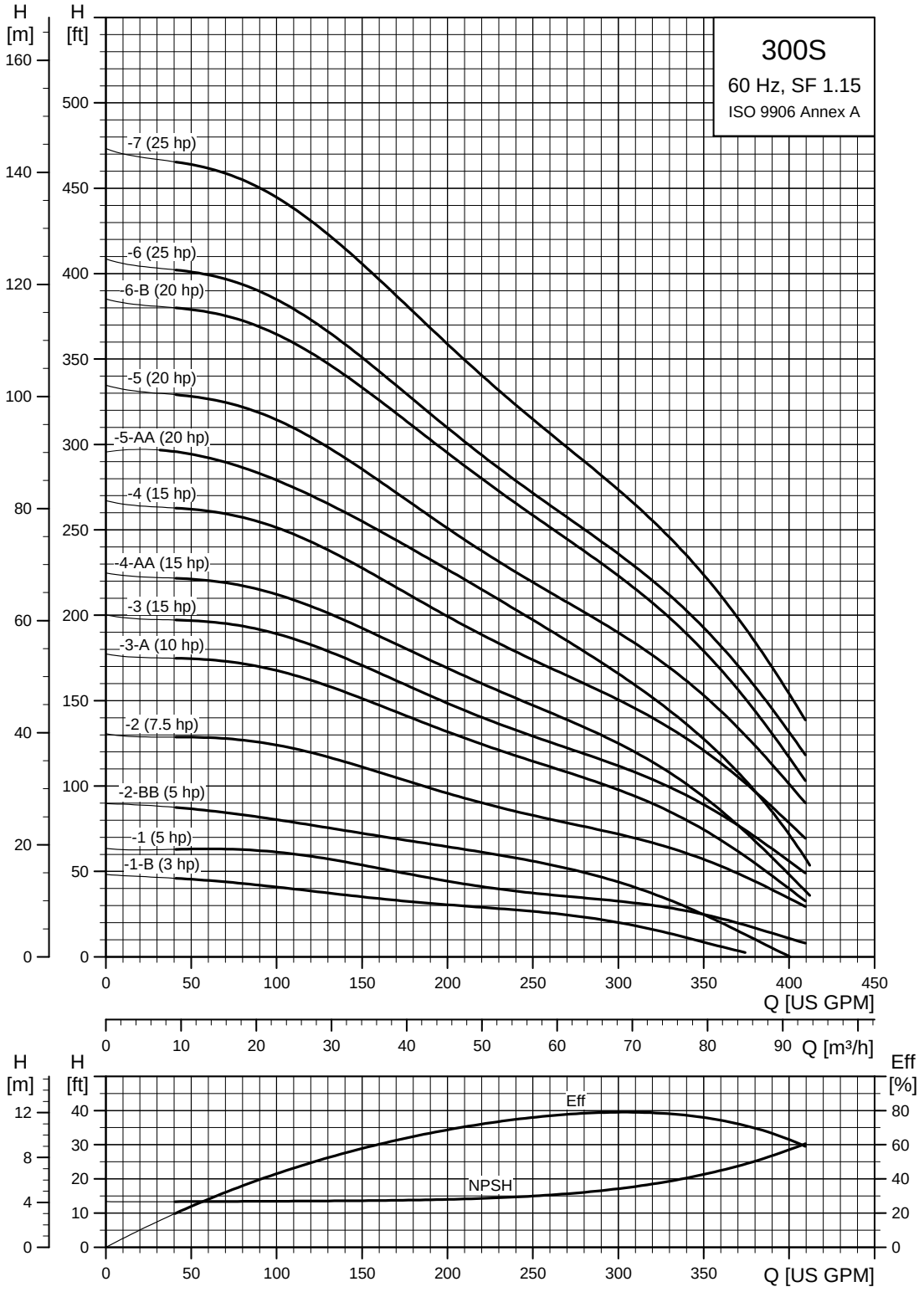
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

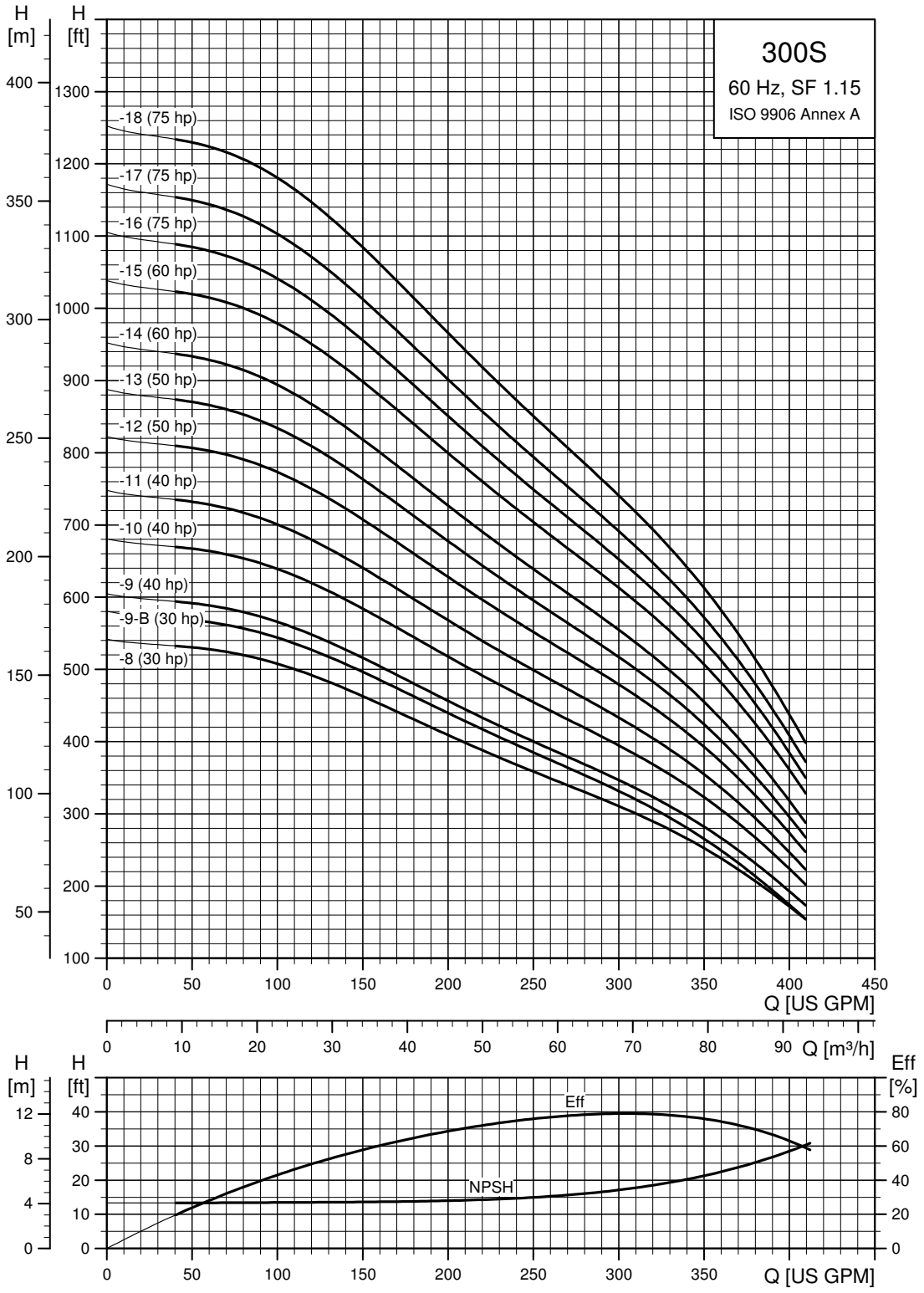
6" and larger wells - continued

SP 300S (300 gpm)



6" and larger wells - continued

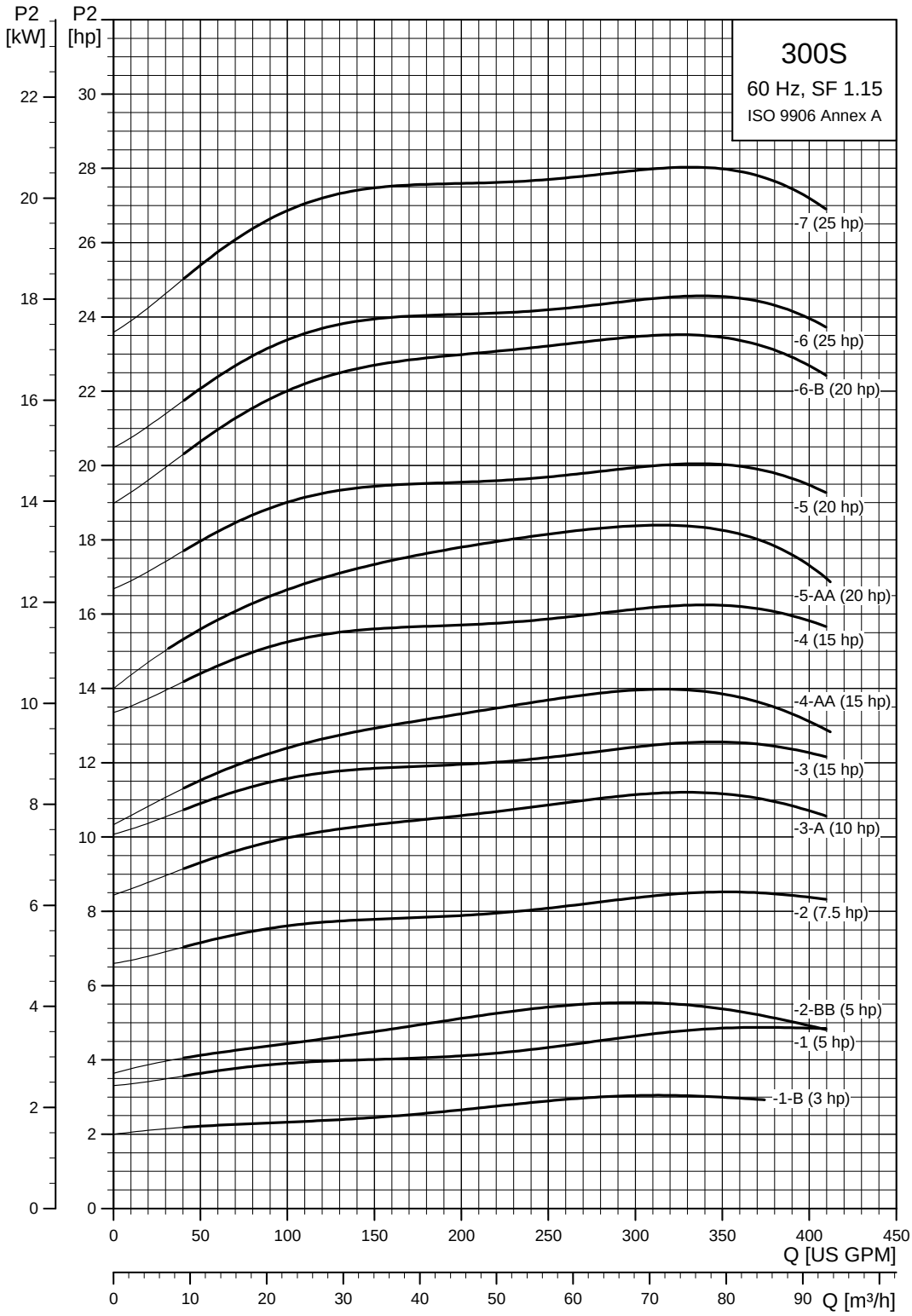
SP 300S (300 gpm)



TM05 0248 5014

6" and larger wells - continued

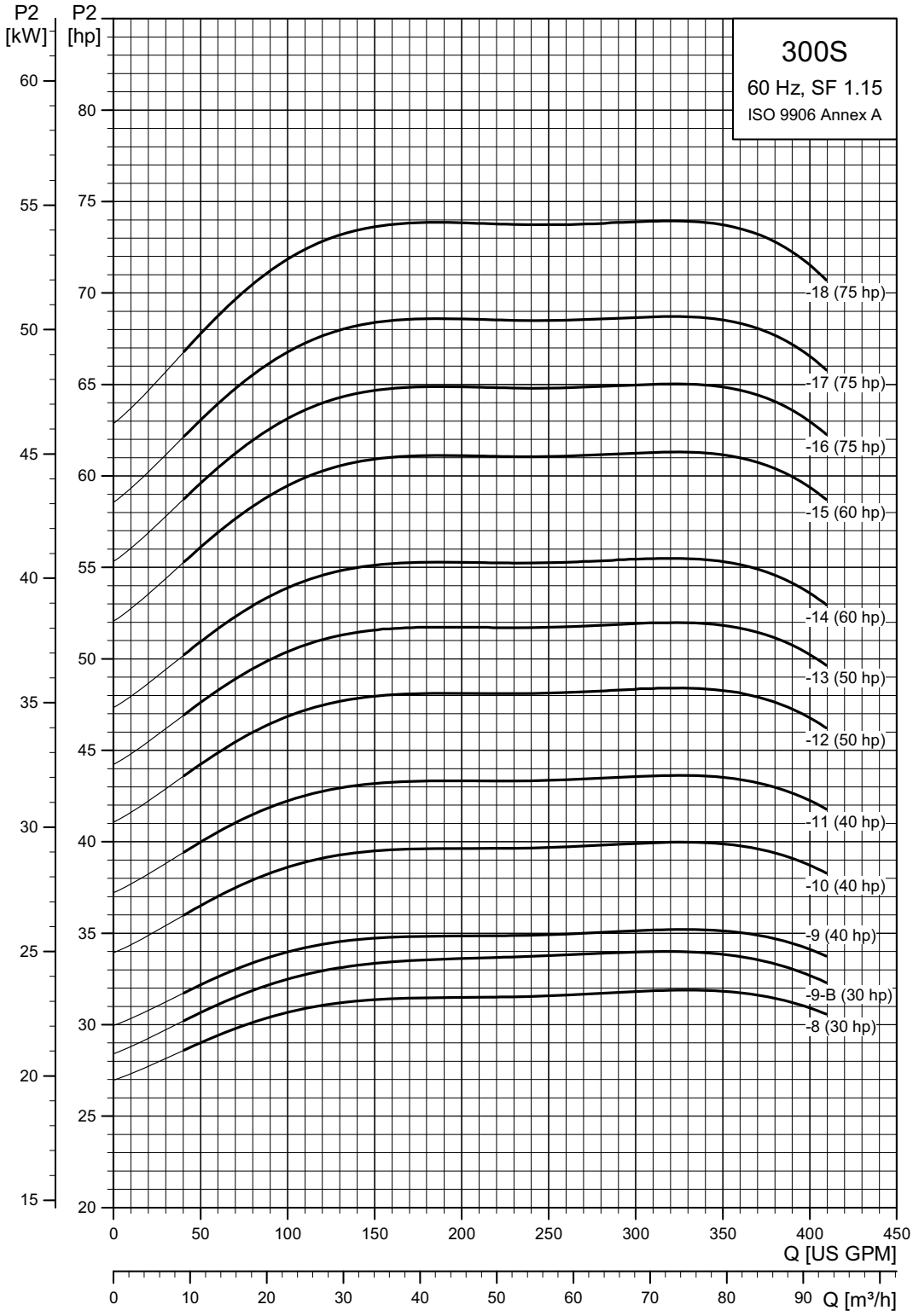
SP 300S (300 gpm) pump power requirement (P2)



TM05 0249 1812

6" and larger wells - continued

SP 300S (300 gpm) pump power requirement (P2)

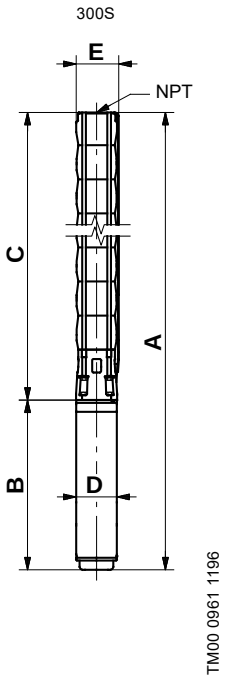


TM05 0250 5014

6" and larger wells - continued

SP 300S (300 gpm) pump with 4", 6" motor

Pump model	Nom. head [ft]	Ph	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
			Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
300S - Motor diameter 4-inch, 3-wire motor, 60 Hz, rated flow rate 300 gpm (3" NPT)												
300S30-1B	29	1	230	3	•	3470	37.60 (955)	22.72 (577)	14.89 (378)	3.75 (95)	5.75 (146)	72.0
	30	3	230	3	•	3466	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	72.0
	30	3	460	3	•	3494	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	72.0
300S50-1	38	1	230	5	•	3490	41.54 (1055)	26.66 (677)	14.89 (378)	3.75 (95)	5.75 (146)	74.7
	38	3	230	5	•	3508	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	74.7
	38	3	460	5	•	3506	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	74.7
300S50-2BB	57	1	230	5	•	3443	45.99 (1168)	26.66 (677)	19.34 (491)	3.75 (95)	5.75 (146)	135.0
	57	3	230	5	•	3480	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	135.0
	57	3	460	5	•	3477	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	135.0
300S75-2	77	3	230	7.5	•	3463	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	101.7
	77	3	460	7.5	•	3463	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	101.7
300S100-3A	107	3	460	10	•	3461	54.34 (1380)	30.56 (776)	23.78 (604)	3.75 (95)	5.75 (146)	145.8
300S - Motor diameter 6 inch, 60 Hz, rated flow rate 300 gpm (3" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
300S75-2	77	3	230	7.5	▲	3472	43.47 (1104)	23.51 (597)	19.97 (507)	5.52 (140)	5.79 (147)	167.4
	78	3	460	7.5	▲	3484	43.47 (1104)	23.51 (597)	19.97 (507)	5.52 (140)	5.79 (147)	167.4
300S100-3A	107	3	230	10	▲	3461	49.10 (1247)	24.69 (627)	24.41 (620)	5.52 (140)	5.79 (147)	216.0
	107	3	460	10	▲	3475	49.10 (1247)	24.69 (627)	24.41 (620)	5.52 (140)	5.79 (147)	216.0
300S150-3	119	3	230	15	▲	3503	51.46 (1307)	27.05 (687)	24.41 (620)	5.52 (140)	5.79 (147)	216.0
	119	3	460	15	▲	3506	51.46 (1307)	27.05 (687)	24.41 (620)	5.52 (140)	5.79 (147)	216.0
300S150-4AA	138	3	230	15	▲	3488	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	222.3
	139	3	460	15	▲	3492	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	222.3
300S150-4	157	3	230	15	▲	3469	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	222.3
	158	3	460	15	▲	3474	55.91 (1420)	27.05 (687)	28.86 (733)	5.52 (140)	5.79 (147)	222.3
300S200-5AA	179	3	230	20	▲	3493	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	194.4
	180	3	460	20	▲	3503	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	194.4
300S200-5	200	3	230	20	▲	3479	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	194.4
	201	3	460	20	▲	3491	62.92 (1598)	29.61 (752)	33.31 (846)	5.52 (140)	5.79 (147)	194.4
300S200-6B	222	3	230	20	▲	3462	67.37 (1711)	29.61 (752)	37.76 (959)	5.52 (140)	5.79 (147)	198.0
	224	3	460	20	▲	3476	67.37 (1711)	29.61 (752)	37.76 (959)	5.52 (140)	5.79 (147)	198.0
300S250-6	243	3	230	25	▲	3487	69.53 (1766)	31.78 (807)	37.76 (959)	5.52 (140)	5.79 (147)	198.0
	244	3	460	25	▲	3497	69.53 (1766)	31.78 (807)	37.76 (959)	5.52 (140)	5.79 (147)	198.0



E = Maximum diameter of pump including cable guard and motor.

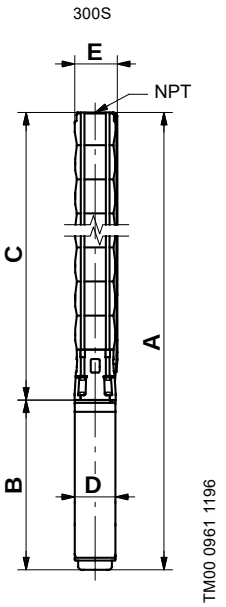
Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 8 ft (2.4 m).

- • MS 4000 motor.
- ▲ MS 6000C motor.

6" and larger wells - continued

SP 300S (300 gpm) pump with 6", 8" motor

Pump model	Nom. head [ft]	Ph	Motor			Dimensions [in (mm)]					Net weight (complete) [lb]
			Volts [V]	[Hp]	[rpm]	A	B	C	D	E	
300S - Motor diameter 6 inch, 60 Hz, rated flow rate 300 gpm (4" NPT)											
300S250-7AA	260	3	230	25 ▲	3478	73.98 (1879)	31.78 (807)	42.21 (1072)	5.52 (140)	5.79 (147)	217.8
	262	3	460	25 ▲	3489	73.98 (1879)	31.78 (807)	42.21 (1072)	5.52 (140)	5.79 (147)	217.8
300S300-7	283	3	230	30 ▲	3482	76.34 (1939)	34.14 (867)	42.21 (1072)	5.52 (140)	5.79 (147)	217.8
	285	3	460	30 ▲	3493	76.34 (1939)	34.14 (867)	42.21 (1072)	5.52 (140)	5.79 (147)	217.8
300S300-8	321	3	230	30 ▲	3463	80.79 (2052)	34.14 (867)	46.66 (1185)	5.52 (140)	5.79 (147)	224.1
	324	3	460	30 ▲	3477	80.79 (2052)	34.14 (867)	46.66 (1185)	5.52 (140)	5.79 (147)	224.1
300S300-9B	343	3	230	30 ▲	3450	85.24 (2165)	34.14 (867)	51.11 (1298)	5.52 (140)	5.79 (147)	261.0
	346	3	460	30 ▲	3466	85.24 (2165)	34.14 (867)	51.11 (1298)	5.52 (140)	5.79 (147)	261.0
300S400-9	370	3	460	40 ▲	3499	90.36 (2295)	39.26 (997)	51.11 (1298)	5.52 (140)	5.79 (147)	296.0
300S400-10	409	3	460	40 ▲	3487	94.81 (2408)	39.26 (997)	55.56 (1411)	5.52 (140)	5.79 (147)	300.5
300S400-11	442	3	460	40 ☼	3443	99.26 (2521)	39.26 (997)	60.00 (1524)	5.52 (140)	5.79 (147)	352.0
300S500-12	491	3	460	50 ☼	3482	120.56 (3062)	56.11 (1425)	64.45 (1637)	5.67 (144)	5.79 (147)	348.8
300S500-13	529	3	460	50 ☼	3471	125.00 (3175)	56.11 (1425)	68.90 (1750)	5.67 (144)	5.79 (147)	355.1
300S600-14	594	3	460	60 ☼	3456	129.46 (3288)	56.11 (1425)	73.35 (1863)	5.67 (144)	5.79 (147)	371.0
300S600-15	606	3	460	60 ☼	3458	133.91 (3401)	56.11 (1425)	77.80 (1976)	5.67 (144)	5.79 (147)	378.0
SP 300S - Motor diameter 8 inch, 60 Hz, rated flow rate 230 gpm (4" NPT)											
300S600-14	594	3	460	60 *	3456	125.12 (3178)	50.00 (1270)	75.12 (1908)	7.56 (192)	7.56 (192)	479.4
300S600-15	629	3	460	60 *	3515	129.57 (3291)	50.00 (1270)	79.57 (2021)	7.56 (192)	7.56 (192)	519.4
300S750-16	678	3	460	75 *	3532	137.17 (3484)	53.15 (1350)	84.02 (2134)	7.56 (192)	7.56 (192)	569.1
300S750-17	719	3	460	75 *	3528	141.62 (3597)	53.15 (1350)	88.47 (2247)	7.56 (192)	7.56 (192)	575.4
300S750-18	760	3	460	75 *	3523	146.07 (3710)	53.15 (1350)	92.92 (2360)	7.56 (192)	7.56 (192)	581.7



E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906 Annex A. Minimum submergence is 8 ft (2.4 m).

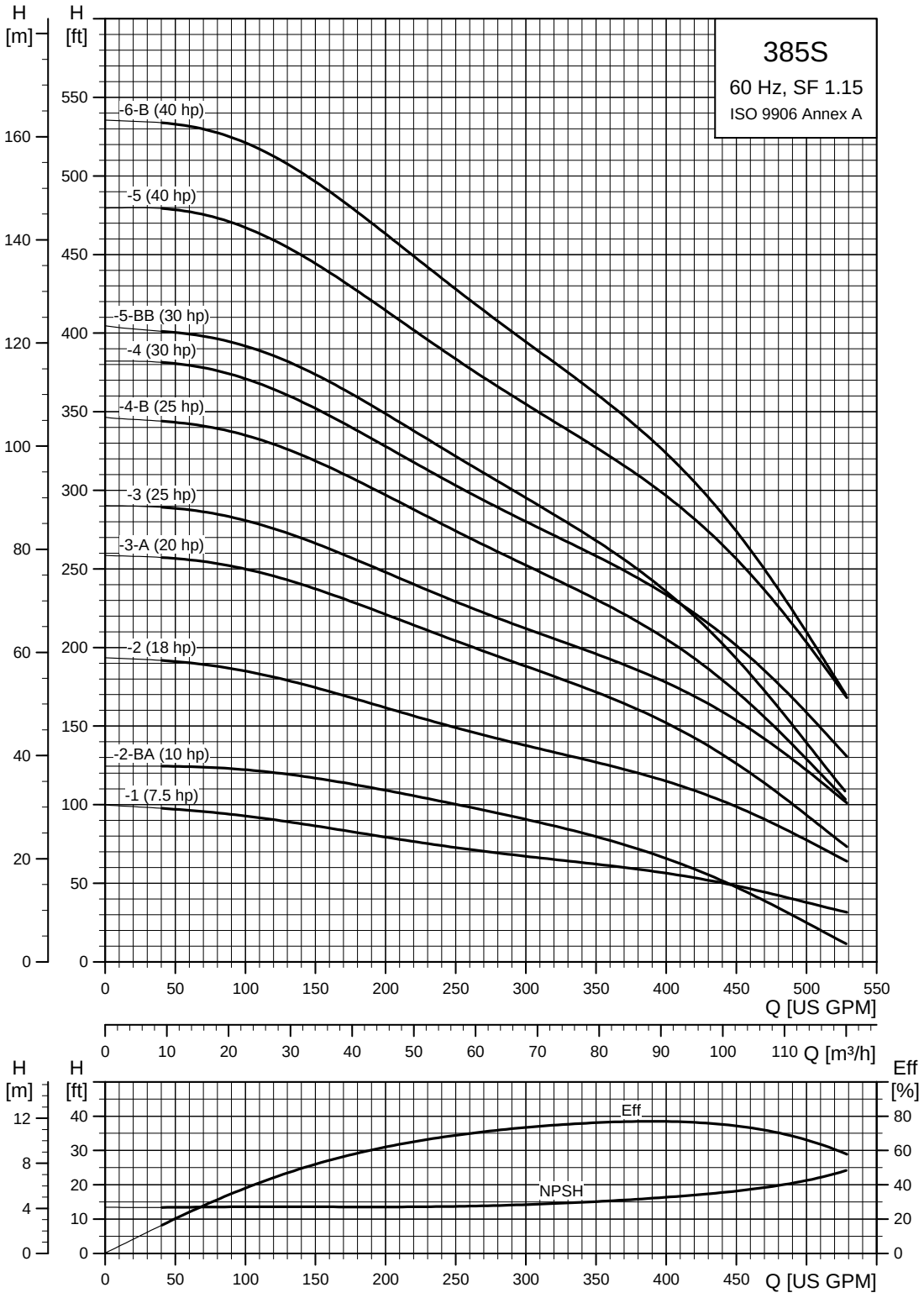
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

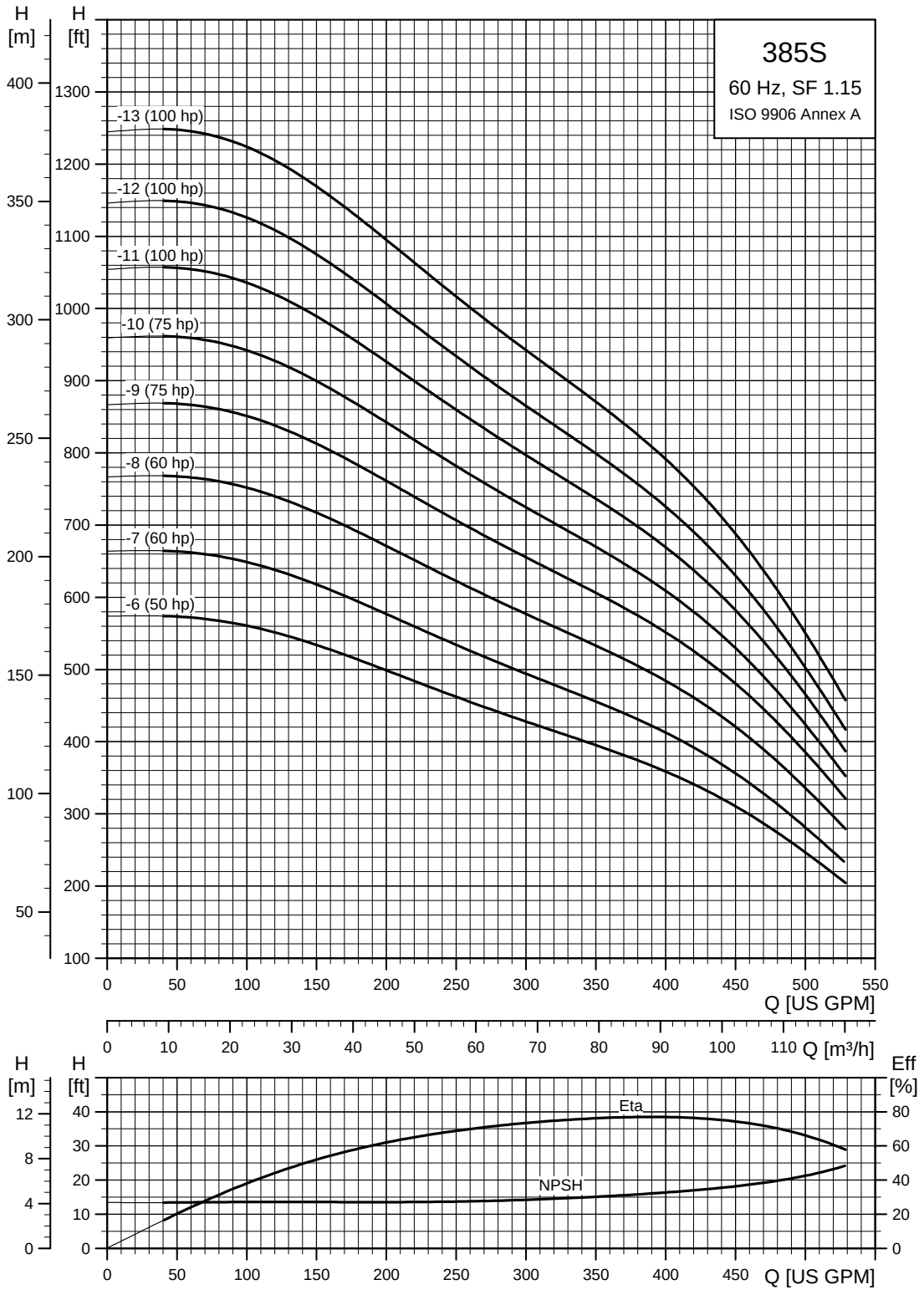
8" and larger wells

SP 385S (385 gpm)



8" and larger wells - continued

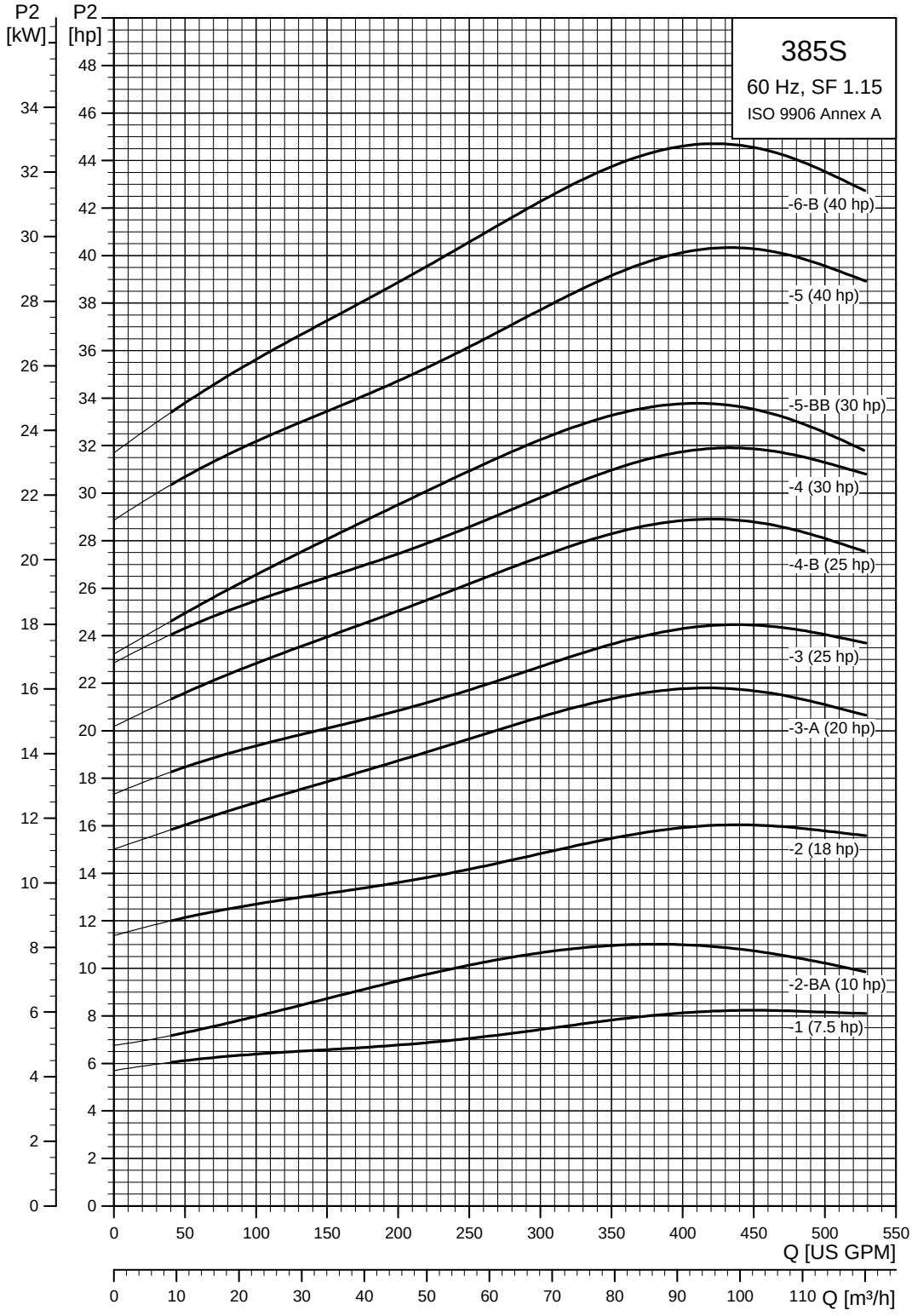
SP 385S (385 gpm)



TM05 0252 1812

8" and larger wells - continued

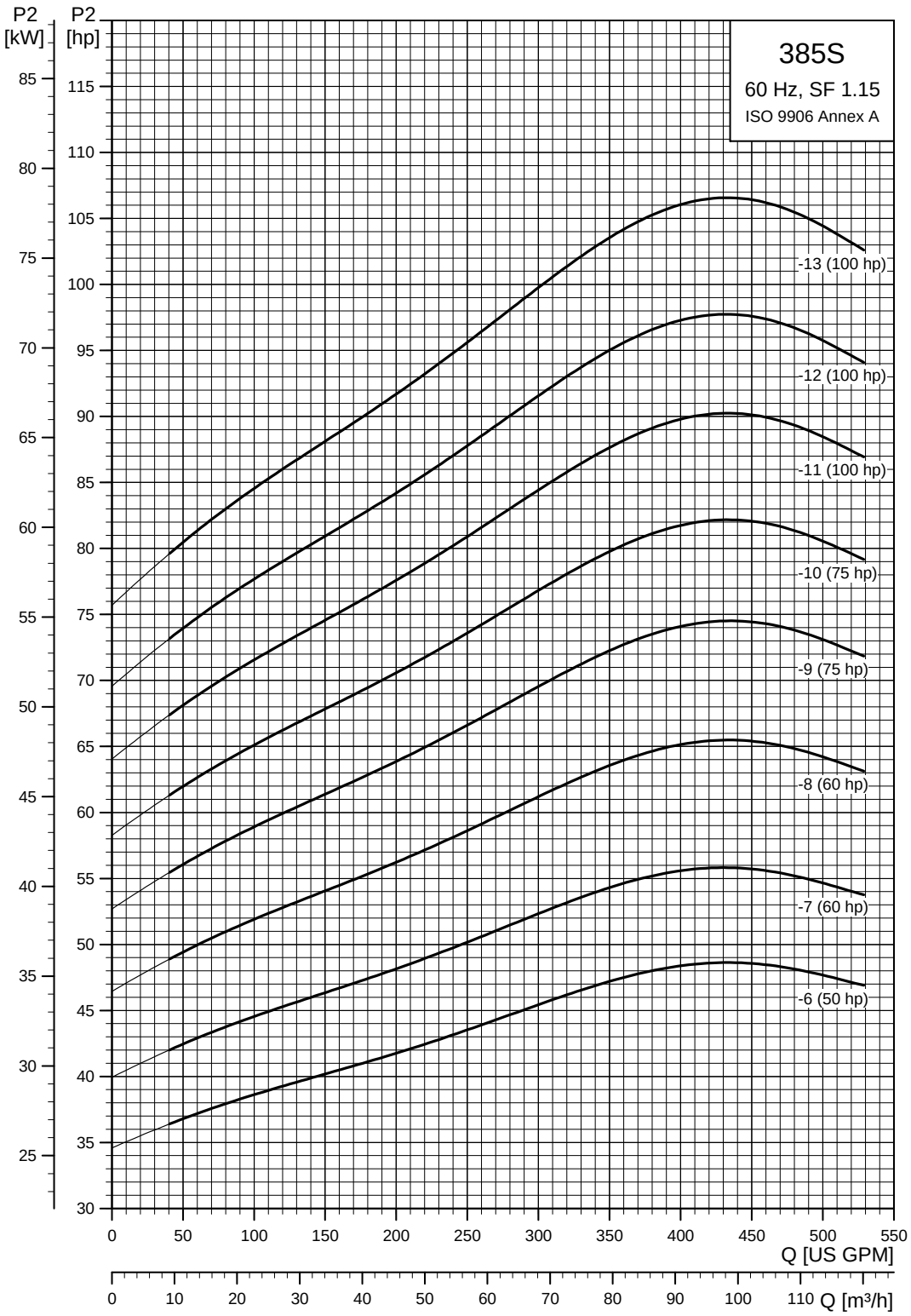
SP 385S (385 gpm) pump power requirement (P2)



TM05 0253 1812

8" and larger wells - continued

SP 385S (385 gpm) pump power requirement (P2)



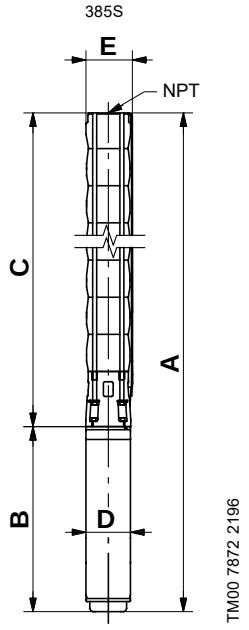
TM05 0254 1812

8" and larger wells - continued

SP 385S (385 gpm) pump with 6", 8", 10" motor

Pump model	Nom. head [ft]	Ph	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
			Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
385S - Motor diameter 6 inch, 60 Hz, rated flow rate 385 gpm (4" NPT)												
-	-	3	208	5	▲	3480	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	3510	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	3500	-	23.51 (597)	-	5.50 (139.5)	-	80.0
385S75-1	60	3	230	7.5	▲	3478	46.58 (1183)	22.25 (565)	24.34 (618)	5.63 (143)	7.01 (178)	135.9
	61	3	460	7.5	▲	3489	46.58 (1183)	22.25 (565)	24.34 (618)	5.63 (143)	7.01 (178)	135.9
385S100-2AB	87	3	230	10	▲	3467	52.6 (1336)	23.23 (590)	29.38 (746)	5.63 (143)	7.01 (178)	169.2
	87	3	460	10	▲	3482	52.6 (1336)	23.23 (590)	29.38 (746)	5.63 (143)	7.01 (178)	169.2
385S150-2	123	3	230	15	▲	3472	57.25 (1454)	27.88 (708)	29.38 (746)	5.63 (143)	7.01 (178)	169.2
	123	3	460	15	▲	3477	57.25 (1454)	27.88 (708)	29.38 (746)	5.63 (143)	7.01 (178)	169.2
385S200-3A	163	3	230	20	▲	3469	65.24 (1657)	30.83 (783)	34.41 (874)	5.63 (143)	7.01 (178)	188.1
	165	3	460	20	▲	3482	65.24 (1657)	30.83 (783)	34.41 (874)	5.63 (143)	7.01 (178)	188.1
385S250-3	187	3	230	25	▲	3489	67.41 (1712)	33.00 (838)	34.41 (874)	5.63 (143)	7.01 (178)	188.1
	189	3	460	25	▲	3499	67.41 (1712)	33.00 (838)	34.41 (874)	5.63 (143)	7.01 (178)	188.1
385S250-4B	220	3	230	25	▲	3461	72.45 (1840)	33.00 (838)	39.45 (1002)	5.63 (143)	7.01 (178)	239.4
	222	3	460	25	▲	3475	72.45 (1840)	33.00 (838)	39.45 (1002)	5.63 (143)	7.01 (178)	239.4
385S300-4	234	3	230	30	▲	3463	75.00 (1905)	35.56 (903)	39.45 (1002)	5.63 (143)	7.01 (178)	239.4
	249	3	460	30	▲	3478	75.00 (1905)	35.56 (903)	39.45 (1002)	5.63 (143)	7.01 (178)	239.4
385S300-5BB	254	3	230	30	▲	3452	80.04 (2033)	35.56 (903)	44.49 (1130)	5.63 (143)	7.01 (178)	247.5
	257	3	460	30	▲	3467	80.04 (2033)	35.56 (903)	44.49 (1130)	5.63 (143)	7.01 (178)	247.5
385S400-5	314	3	460	40	▲	3488	84.77 (2153)	40.28 (1023)	44.49 (1130)	5.63 (143)	7.01 (178)	247.5
385S400-6B	347	3	460	40	▲	3471	89.81 (2281)	40.28 (1023)	49.53 (1258)	5.63 (143)	7.01 (178)	252.0
385S500-6	375	3	460	50	☼	3447	110.99 (2825)	56.11 (1425)	54.88 (1394)	5.67 (144)	7.88 (200)	376.0
385S500-7A	414	3	460	50	☼	3467	110.99 (2825)	56.11 (1425)	54.88 (1394)	5.67 (144)	7.88 (200)	407.0
385S600-7	449	3	460	60	☼	3414	111.23 (2825)	56.11 (1425)	55.12 (1400)	5.67 (144)	7.88 (200)	385.0
385S600-8	494	3	460	60	☼	3449	111.23 (2825)	56.11 (1425)	55.12 (1400)	5.67 (144)	7.88 (200)	385.0

385S - Motor diameter 8 inch, 60 Hz, rated flow rate 385 gpm (4" NPT)												
385S400-6B	351	3	460	40	*	3490	93.78 (2382)	43.71 (1110)	50.08 (1272)	7.56 (192)	7.88 (200)	428.3
385S500-6	375	3	460	50	*	3481	95.75 (2432)	45.67 (1160)	50.08 (1272)	7.56 (192)	7.88 (200)	451.2
385S500-7A	420	3	460	50	*	3492	100.79 (2560)	45.67 (1160)	55.12 (1400)	7.56 (192)	7.88 (200)	461.1
385S600-7	449	3	460	60	*	3459	105.12 (2670)	50.00 (1270)	55.12 (1400)	7.56 (192)	7.88 (200)	507.3
385S600-8	511	3	460	60	*	3510	110.16 (2798)	50.00 (1270)	60.16 (1528)	7.56 (192)	7.88 (200)	517.2
385S750-9	582	3	460	75	*	3508	118.35 (3006)	53.15 (1350)	65.2 (1656)	7.56 (192)	7.88 (200)	558.7
385S750-10	643	3	460	75	*	3498	123.39 (3134)	53.15 (1350)	70.24 (1784)	7.56 (192)	7.88 (200)	568.6
385S1000-11	711	3	460	100	*	3512	137.88 (3502)	62.60 (1590)	75.28 (1912)	7.56 (192)	7.88 (200)	677.5
385S1000-12	771	3	460	100	*	3505	142.92 (3630)	62.60 (1590)	80.32 (2040)	7.56 (192)	7.88 (200)	687.4
385S1000-13	831	3	460	100	*	3497	147.96 (3758)	62.60 (1590)	85.36 (2168)	7.56 (192)	7.88 (200)	697.3



E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906 Annex A. Minimum submergence is 8 ft (2.4 m).

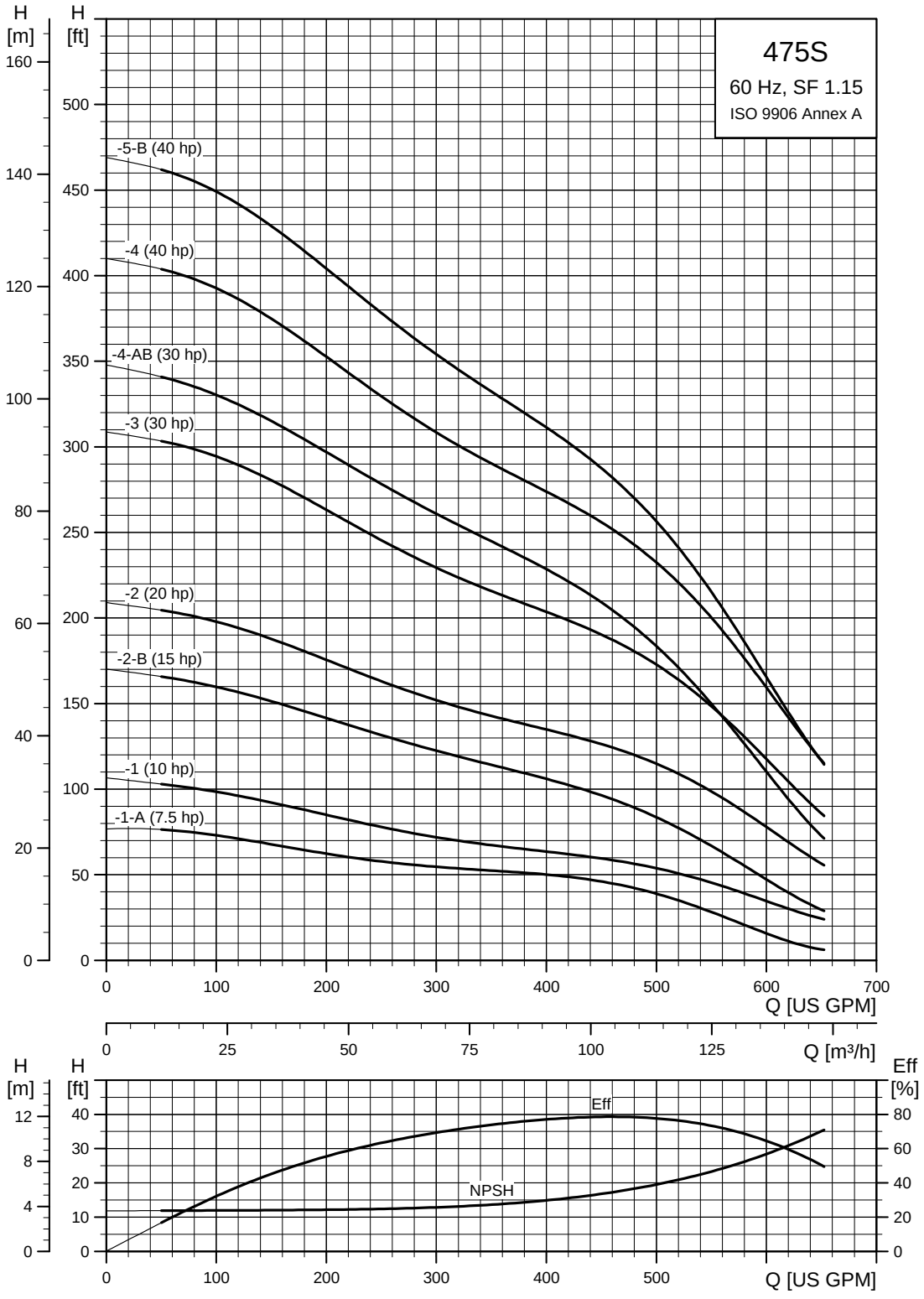
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

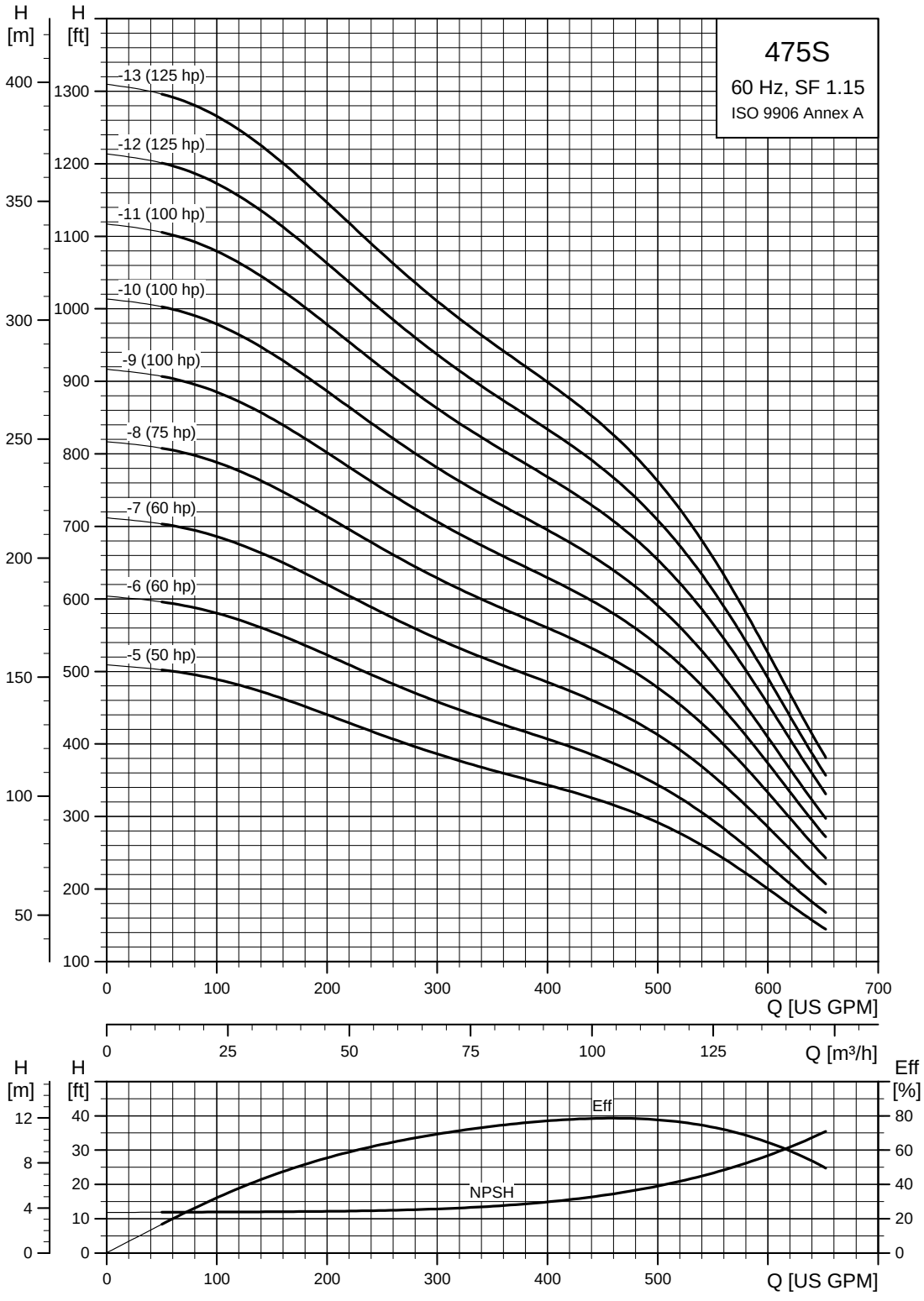
8" and larger wells - continued

SP 475S (475 gpm)



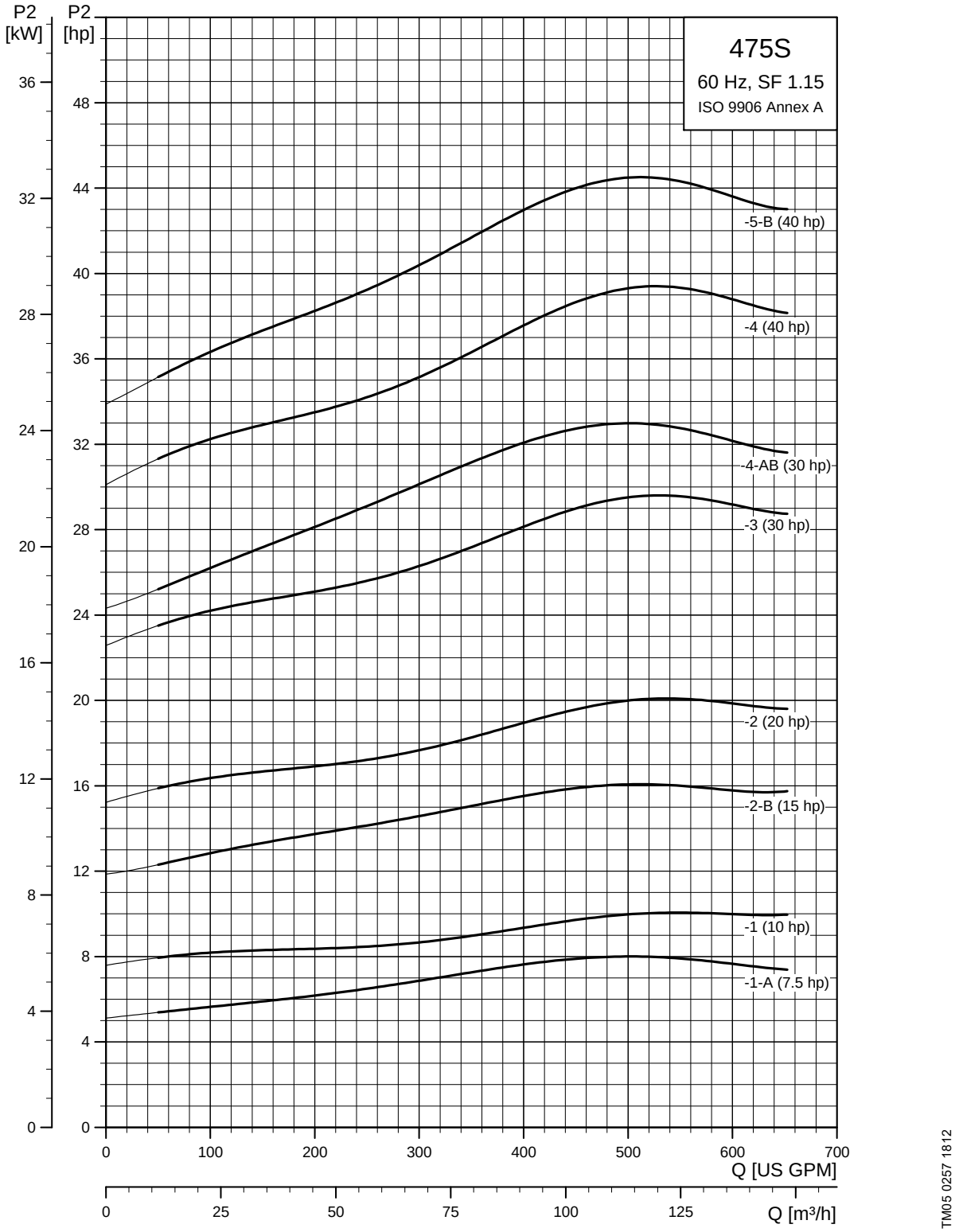
8" and larger wells - continued

SP 475S (475 gpm)



8" and larger wells - continued

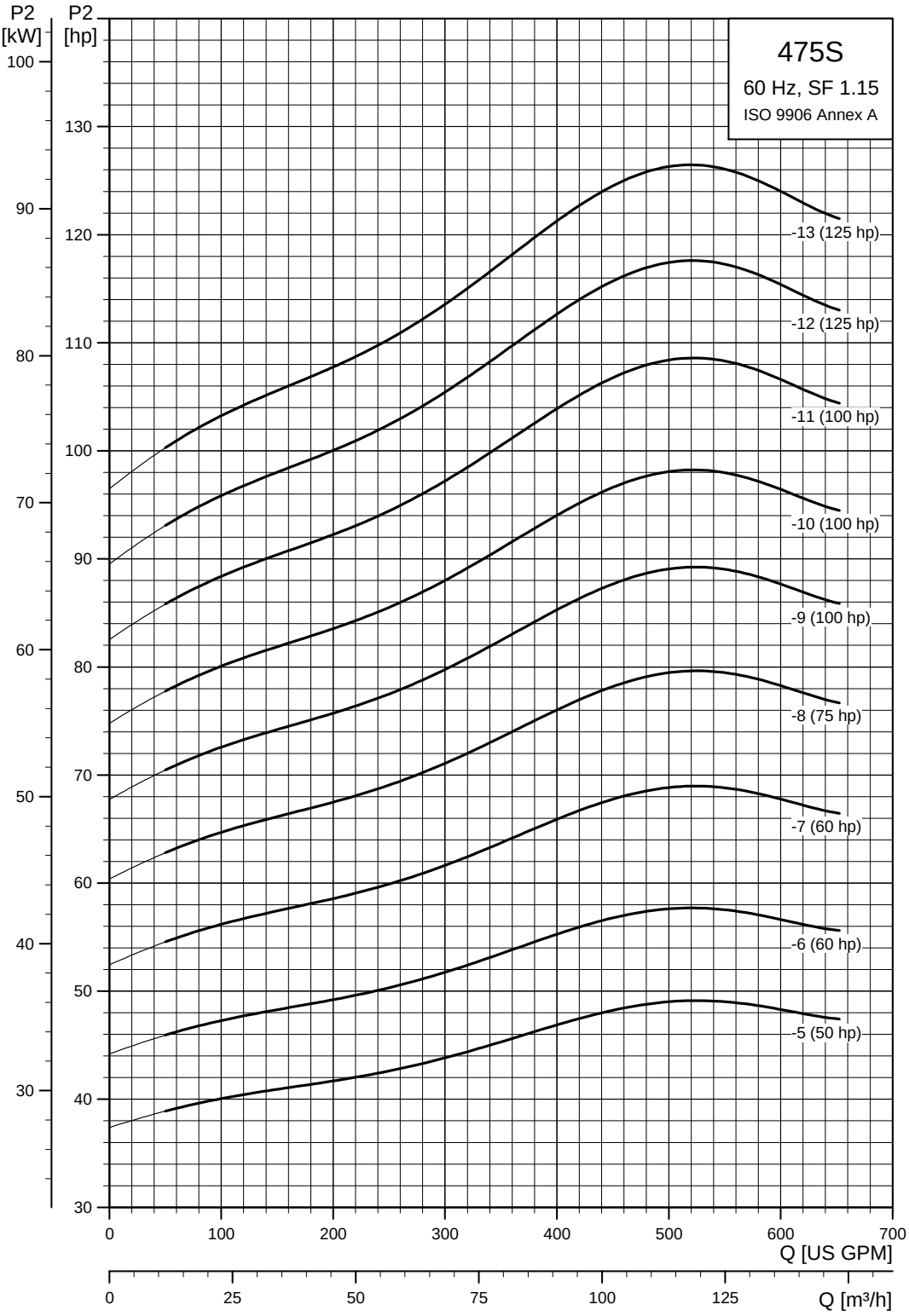
SP 475S (475 gpm) pump power requirement (P2)



TM05 0257 1812

8" and larger wells - continued

SP 475S (475 gpm) pump power requirement (P2)



TM05 0258 1812

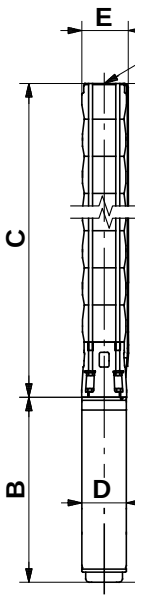
8" and larger wells - continued

SP 475S (475 gpm) pump with 6", 8" motors

Pump model	Nom. head [ft]	Ph	Motor				Dimensions [in (mm)]					Net weight (complete) [lb]
			Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
475S - Motor diameter 6 inch, 60 Hz, rated flow rate 475 gpm (6" NPT)												
-	-	3	208	5	▲	-	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			230	5	▲	-	-	23.51 (597)	-	5.50 (139.5)	-	80.0
			460	5	▲	-	-	23.51 (597)	-	5.50 (139.5)	-	80.0
475S75-1A	51	3	230	7.5	▲	3484	46.58 (1183)	22.25 (565)	24.34 (618)	5.63 (143)	7.05 (179)	132.3
	51	3	460	7.5	▲	3495	46.58 (1183)	22.25 (565)	24.34 (618)	5.63 (143)	7.05 (179)	132.3
475S100-1	61	3	230	10	▲	3478	47.56 (1208)	23.23 (590)	24.34 (618)	5.63 (143)	7.05 (179)	132.3
	61	3	460	10	▲	3490	47.56 (1208)	23.23 (590)	24.34 (618)	5.63 (143)	7.05 (179)	132.3
475S150-2B	108	3	230	15	▲	3474	57.25 (1454)	27.88 (708)	29.38 (746)	5.63 (143)	7.05 (179)	170.1
	108	3	460	15	▲	3480	57.25 (1454)	27.88 (708)	29.38 (746)	5.63 (143)	7.05 (179)	170.1
475S200-2	124	3	230	20	▲	3484	60.20 (1529)	30.83 (783)	29.38 (746)	5.63 (143)	7.05 (179)	198.7
	124	3	460	20	▲	3494	60.20 (1529)	30.83 (783)	29.38 (746)	5.63 (143)	7.05 (179)	198.7
475S250-3A	172	3	230	25	▲	3471	67.41 (1712)	33.00 (838)	34.41 (874)	5.63 (143)	7.05 (179)	218.2
	173	3	460	25	▲	3484	67.41 (1712)	33.00 (838)	34.41 (874)	5.63 (143)	7.05 (179)	218.2
475S300-3	186	3	230	30	▲	3477	69.97 (1777)	35.56 (903)	34.41 (874)	5.63 (143)	7.05 (179)	233.6
	187	3	460	30	▲	3489	69.97 (1777)	35.56 (903)	34.41 (874)	5.63 (143)	7.05 (179)	233.6
475S300-4AB	210	3	230	30	▲	3457	75.00 (1905)	35.56 (903)	39.45 (1002)	5.63 (143)	7.05 (179)	239.9
	212	3	460	30	▲	3472	75.00 (1905)	35.56 (903)	39.45 (1002)	5.63 (143)	7.05 (179)	239.9
475S400-4	251	3	460	40	▲	3491	79.73 (2025)	40.28 (1023)	39.45 (1002)	5.63 (143)	7.05 (179)	268.5
475S400-5B	284	3	460	40	▲	3460	84.77 (2153)	40.28 (1023)	44.49 (1130)	5.63 (143)	7.05 (179)	356.0
475S500-5	313	3	460	50	☼	3460	100.6 (2555)	56.11 (1425)	44.49 (1130)	5.67 (144)	7.05 (179)	384.0
475S500-6A	357	3	460	50	☼	3460	105.63 (2683)	56.11 (1425)	49.53 (1258)	5.67 (144)	7.05 (179)	385.0
475S600-6	375	3	460	60	☼	3456	106.19 (2697)	56.11 (1425)	50.08 (1272)	5.67 (144)	7.05 (179)	436.0
475S600-7	449	3	460	60	☼	3433	111.23 (2825)	56.11 (1425)	55.12 (1400)	5.67 (144)	7.05 (179)	446.0

475S - Motor diameter 8 inch, 60 Hz, rated flow rate 475 gpm (6" NPT)												
475S400-4	245	3	460	40	*	3462	83.71 (2126)	43.71 (1110)	40.00 (1016)	7.56 (192)	8.08 (205)	406.5
475S400-5B	284	3	460	40	*	3441	88.75 (2254)	43.71 (1110)	45.04 (1144)	7.56 (192)	8.08 (205)	444.0
475S500-5	317	3	460	50	*	3480	90.71 (2304)	45.67 (1160)	45.04 (1144)	7.56 (192)	8.08 (205)	420.4
475S500-6A	363	3	460	50	*	3480	95.75 (2432)	45.67 (1160)	50.08 (1272)	7.56 (192)	8.08 (205)	422.0
475S600-6	375	3	460	60	*	3519	100.08 (2542)	50.00 (1270)	50.08 (1272)	7.56 (192)	8.08 (205)	476.0
475S600-7	449	3	460	60	*	3505	105.12 (2670)	50.00 (1270)	55.12 (1400)	7.56 (192)	8.08 (205)	482.6
475S750-8	513	3	460	75	*	3518	113.31 (2878)	53.15 (1350)	60.16 (1528)	7.56 (192)	8.08 (205)	524.4
475S1000-9	582	3	460	100	*	3529	127.8 (3246)	62.60 (1590)	65.20 (1656)	7.56 (192)	8.08 (205)	631.0
475S1000-10	643	3	460	100	*	3512	132.84 (3374)	62.60 (1590)	70.24 (1784)	7.56 (192)	8.08 (205)	637.6
475S1000-11	711	3	460	100	*	3512	137.88 (3502)	62.60 (1590)	75.28 (1912)	7.56 (192)	8.08 (205)	644.3
475S1250-12	771	3	460	125	*	3505	152.37 (3870)	72.05 (1830)	80.32 (2040)	7.56 (192)	8.08 (205)	754.1
475S1250-13	831	3	460	125	*	3497	157.41 (3998)	72.05 (1830)	85.36 (2168)	7.56 (192)	8.08 (205)	760.7

475S



TM00 7872 2196

E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 8 ft (2.4 m).

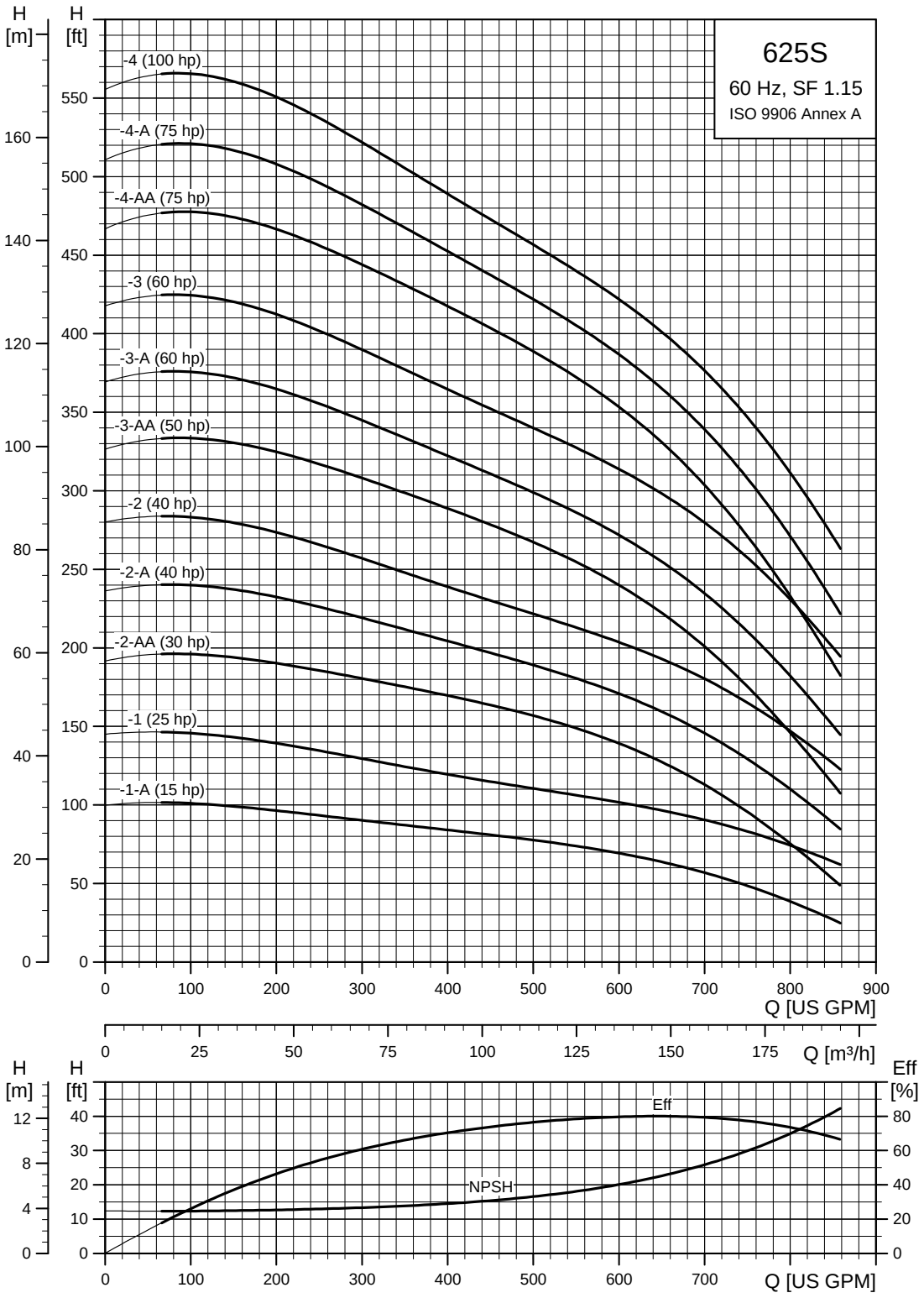
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

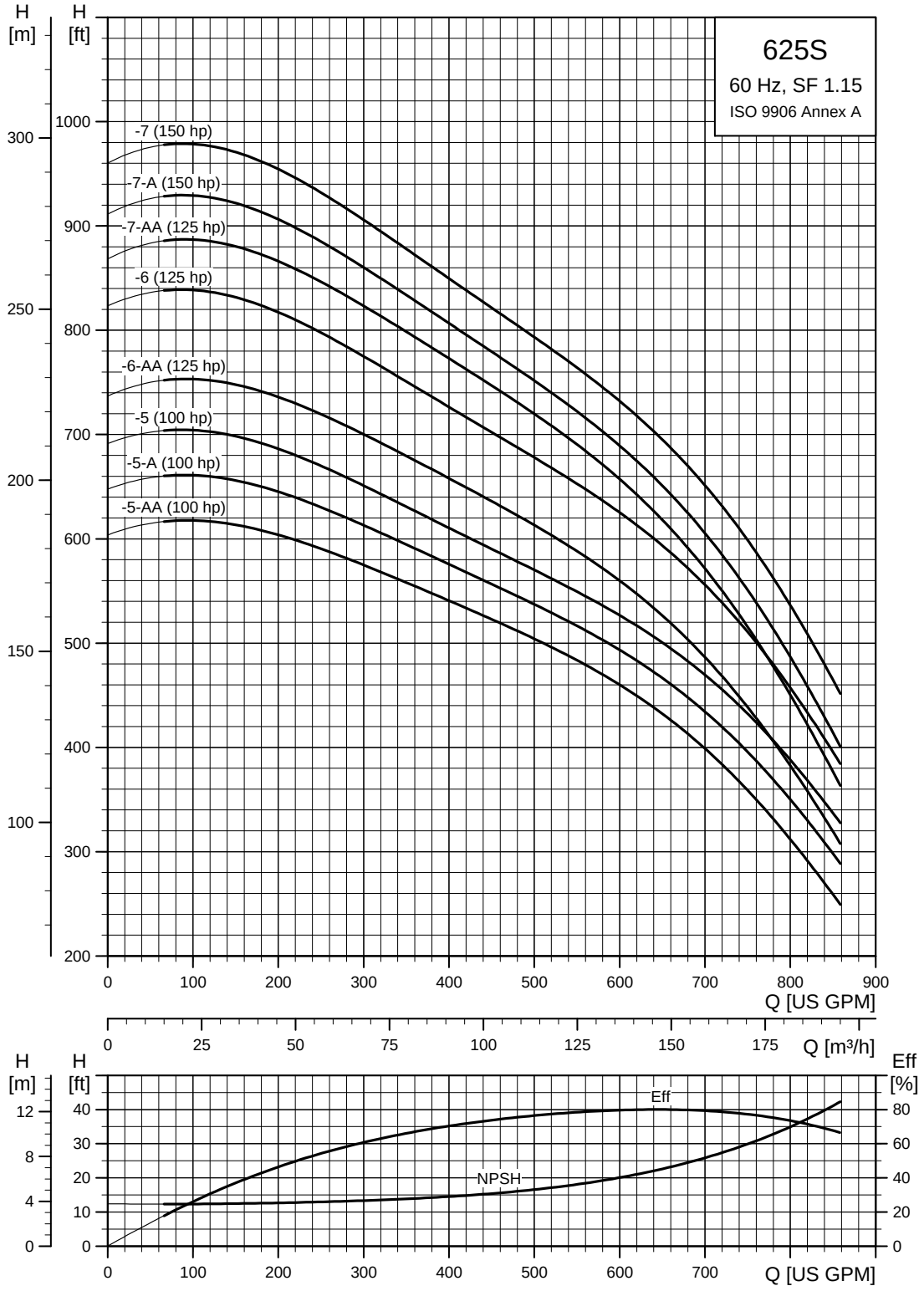
10" and larger wells

SP 625S (625 gpm)



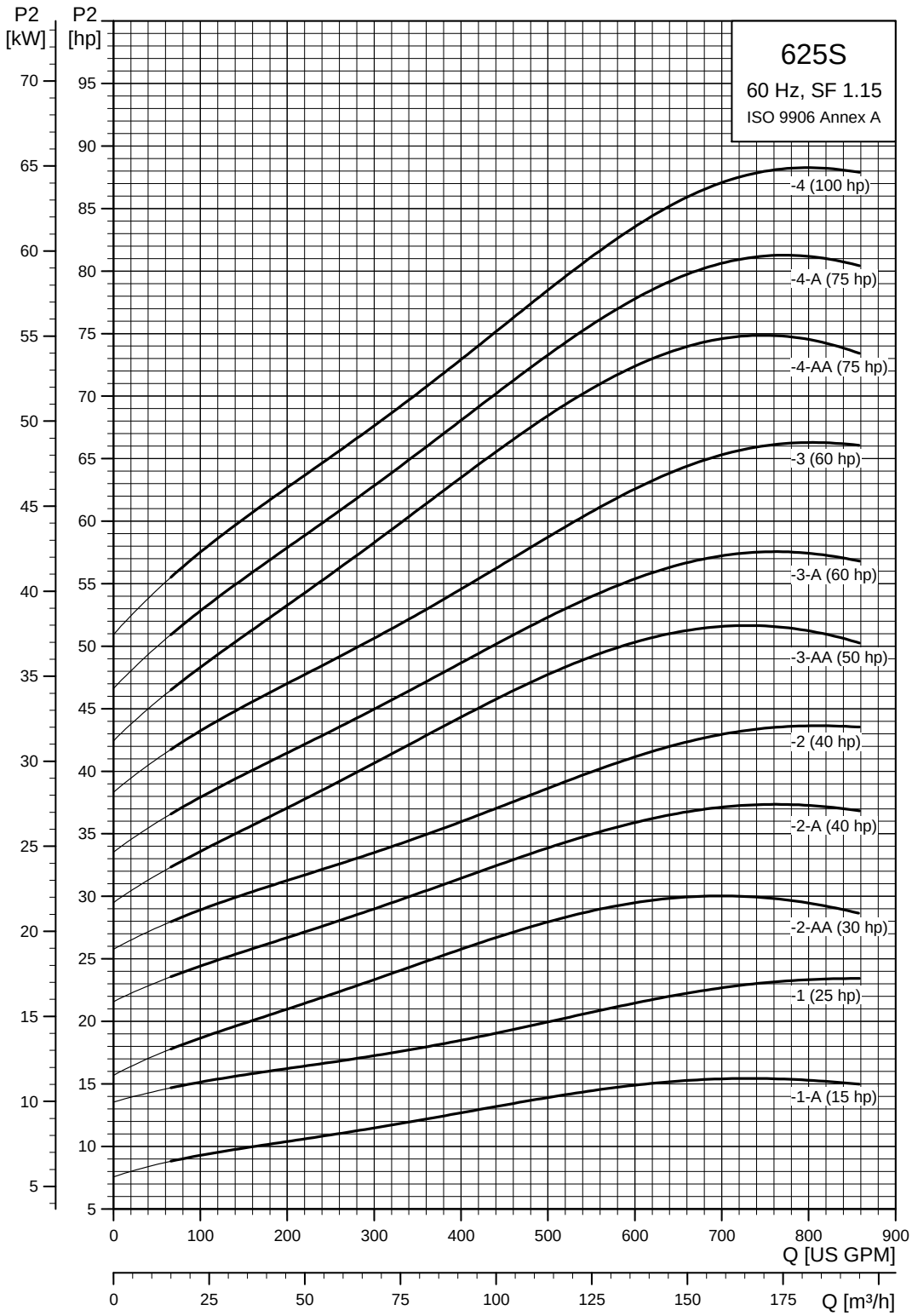
10" and larger wells - continued

SP 625S (625 gpm)



10" and larger wells - continued

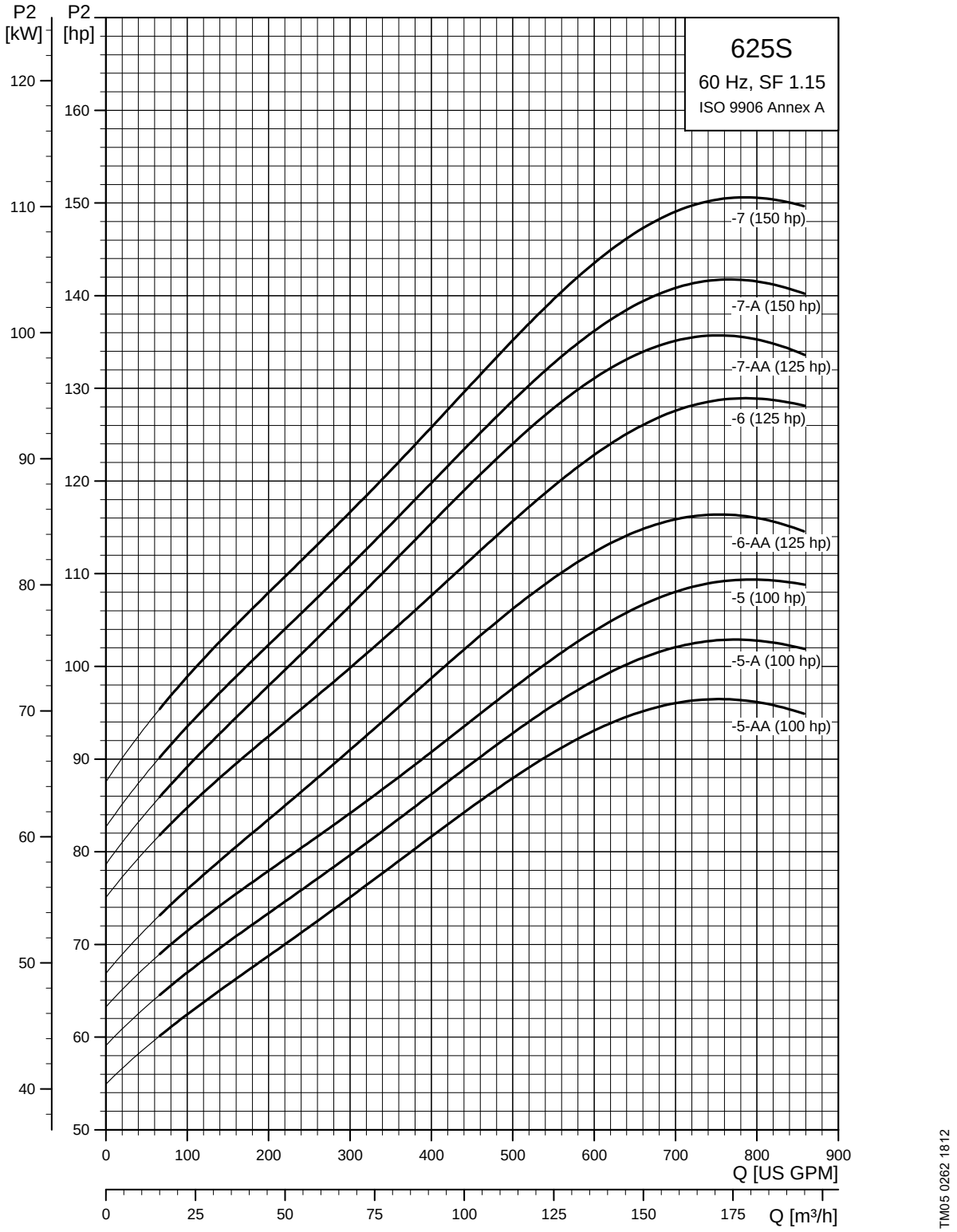
SP 625S (625 gpm) pump power requirement (P2)



TM05 0261 1812

10" and larger wells - continued

SP 625S (625 gpm) pump power requirement (P2)

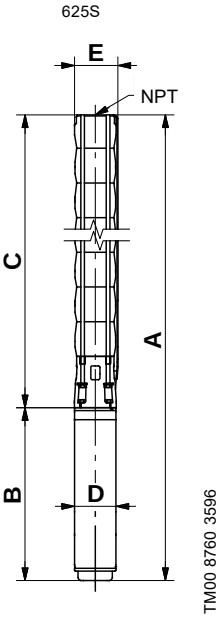


TM05 0262 1812

10" and larger wells - continued

SP 625S (625 gpm) pump with 6", 8" motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
625S - Motor diameter 6 inch, 60 Hz, rated flow rate 625 gpm (6" NPT)												
625S150-1A	76	3	230	15	▲	3486	53.51 (1359)	27.88 (708)	25.63 (651)	5.63 (143)	8.31 (211)	193.0
		3	460	15	▲	3491	53.51 (1359)	27.88 (708)	25.63 (651)	5.63 (143)	8.31 (211)	193.0
625S250-1	101	3	230	25	▲	3502	58.63 (1489)	33.00 (838)	25.63 (651)	5.63 (143)	8.31 (211)	189.9
		3	460	25	▲	3511	58.63 (1489)	33.00 (838)	25.63 (651)	5.63 (143)	8.31 (211)	198.9
625S300-2AA	143	3	230	30	▲	3476	67.33 (1710)	35.56 (903)	31.78 (807)	5.63 (143)	8.31 (211)	213.0
	144	3	460	30	▲	3488	67.33 (1710)	35.56 (903)	31.78 (807)	5.63 (143)	8.31 (211)	222.3
625S400-2A	171	3	460	40	▲	3499	72.05 (1830)	40.28 (1023)	31.78 (807)	5.63 (143)	8.31 (211)	333.8
625S400-2	203	3	460	40	▲	3482	72.05 (1830)	40.28 (1023)	31.78 (807)	5.63 (143)	8.31 (211)	333.8
625S500-3AA	240	3	460	50	☼	3475	94.02 (2388)	56.11 (1425)	37.94 (963)	5.63 (143)	8.31 (211)	376.4
625S600-3A	267	3	460	60	☼	3467	94.03 (2388)	56.11 (1425)	37.92 (963)	5.63 (143)	8.31 (211)	382.0
625S600-3	301	3	460	60	☼	3453	94.03 (2388)	56.11 (1425)	37.92 (963)	5.63 (143)	8.31 (211)	382.0
625S - Motor diameter 8 inch, 60 Hz, rated flow rate 625 gpm (6" NPT)												
625S400-2	205	3	460	40	*	3498	76.03 (1931)	43.71 (1110)	32.33 (821)	7.56 (192)	8.39 (213)	409.4
625S500-3AA	243	3	460	50	*	3498	83.59 (2123)	45.67 (1160)	37.92 (963)	7.56 (192)	8.39 (213)	444.6
625S600-3A	278	3	460	60	*	3520	87.92 (2233)	50.00 (1270)	37.92 (963)	7.56 (192)	8.39 (213)	490.8
625S600-3	299	3	460	60	*	3510	87.92 (2233)	50.00 (1270)	37.92 (963)	7.56 (192)	8.39 (213)	490.8
625S750-4AA	350	3	460	75	*	3524	97.21 (2469)	53.15 (1350)	44.06 (1119)	7.56 (192)	8.39 (213)	534.8
625S750-4A	384	3	460	75	*	3518	97.21 (2469)	53.15 (1350)	44.06 (1119)	7.56 (192)	8.39 (213)	534.8
625S1000-4	402	3	460	100	*	3529	106.66 (2709)	62.60 (1590)	44.06 (1119)	7.56 (192)	8.39 (213)	633.8
625S1000-5AA	460	3	460	100	*	3524	112.76 (2864)	62.60 (1590)	50.16 (1274)	7.56 (192)	8.39 (213)	649.3
625S1000-5A	490	3	460	100	*	3519	112.76 (2864)	62.60 (1590)	50.16 (1274)	7.56 (192)	8.39 (213)	649.3
625S1000-5	500	3	460	100	*	3513	112.76 (2864)	62.60 (1590)	50.16 (1274)	7.56 (192)	8.39 (213)	649.3
625S1250-6AA	557	3	460	125	*	3507	128.31 (3259)	72.05 (1830)	56.26 (1429)	7.56 (192)	8.39 (213)	761.5
625S1250-6	590	3	460	125	*	3495	128.31 (3259)	72.05 (1830)	56.26 (1429)	7.56 (192)	8.39 (213)	761.5
625S1250-7AA	655	3	460	125	*	3490	134.45 (3415)	72.05 (1830)	62.41 (1585)	7.56 (192)	8.39 (213)	774.7
625S1500-7A	696	3	460	150	*	3505	143.51 (3645)	81.11 (2060)	62.41 (1585)	7.56 (192)	8.39 (213)	884.7
625S1500-7	690	3	460	150	*	3499	143.51 (3645)	81.11 (2060)	62.41 (1585)	7.56 (192)	8.39 (213)	884.7



E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 10 ft (3 m).

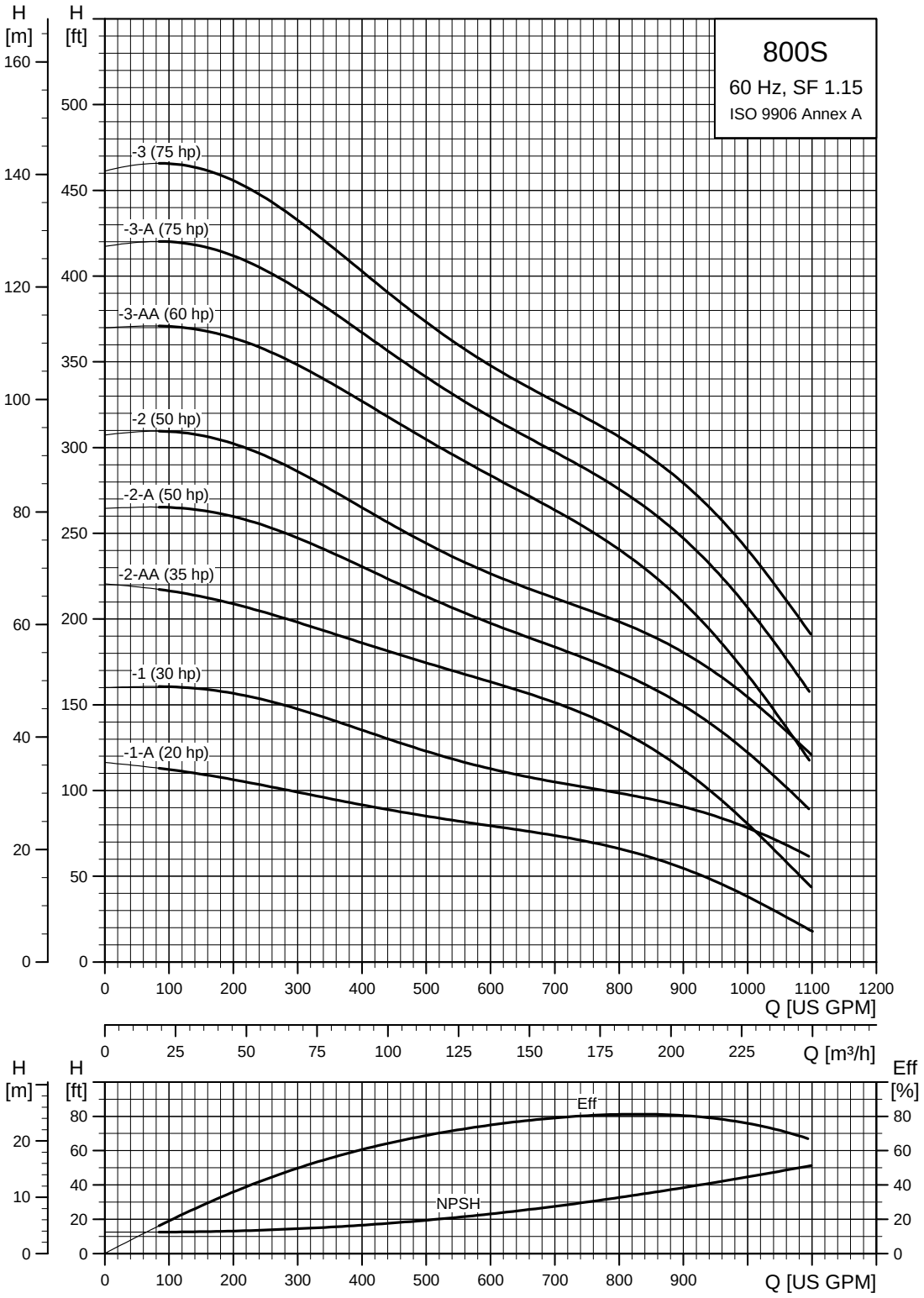
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

10" and larger wells - continued

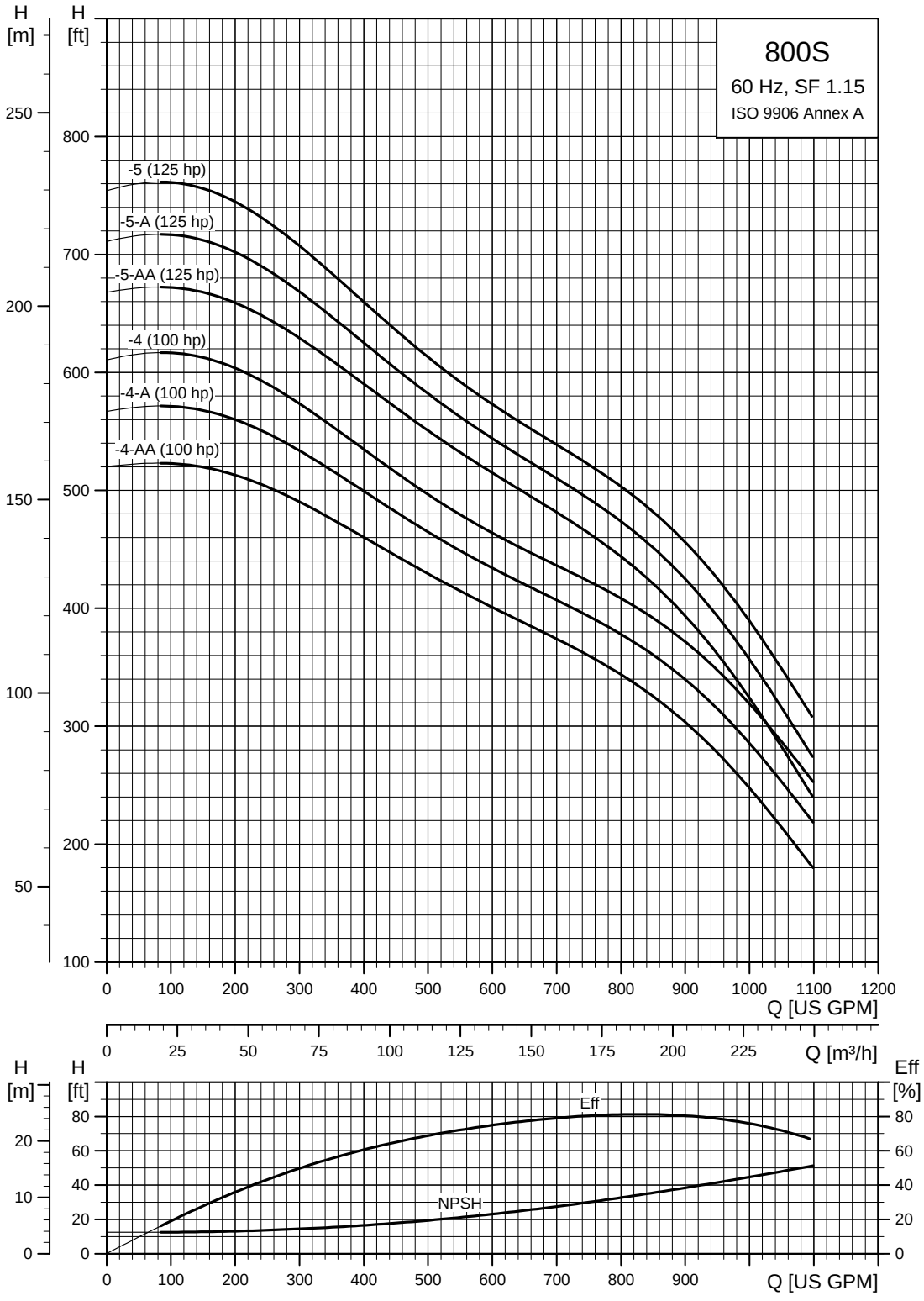
SP 800S (800 gpm)



TM05 0263 1812

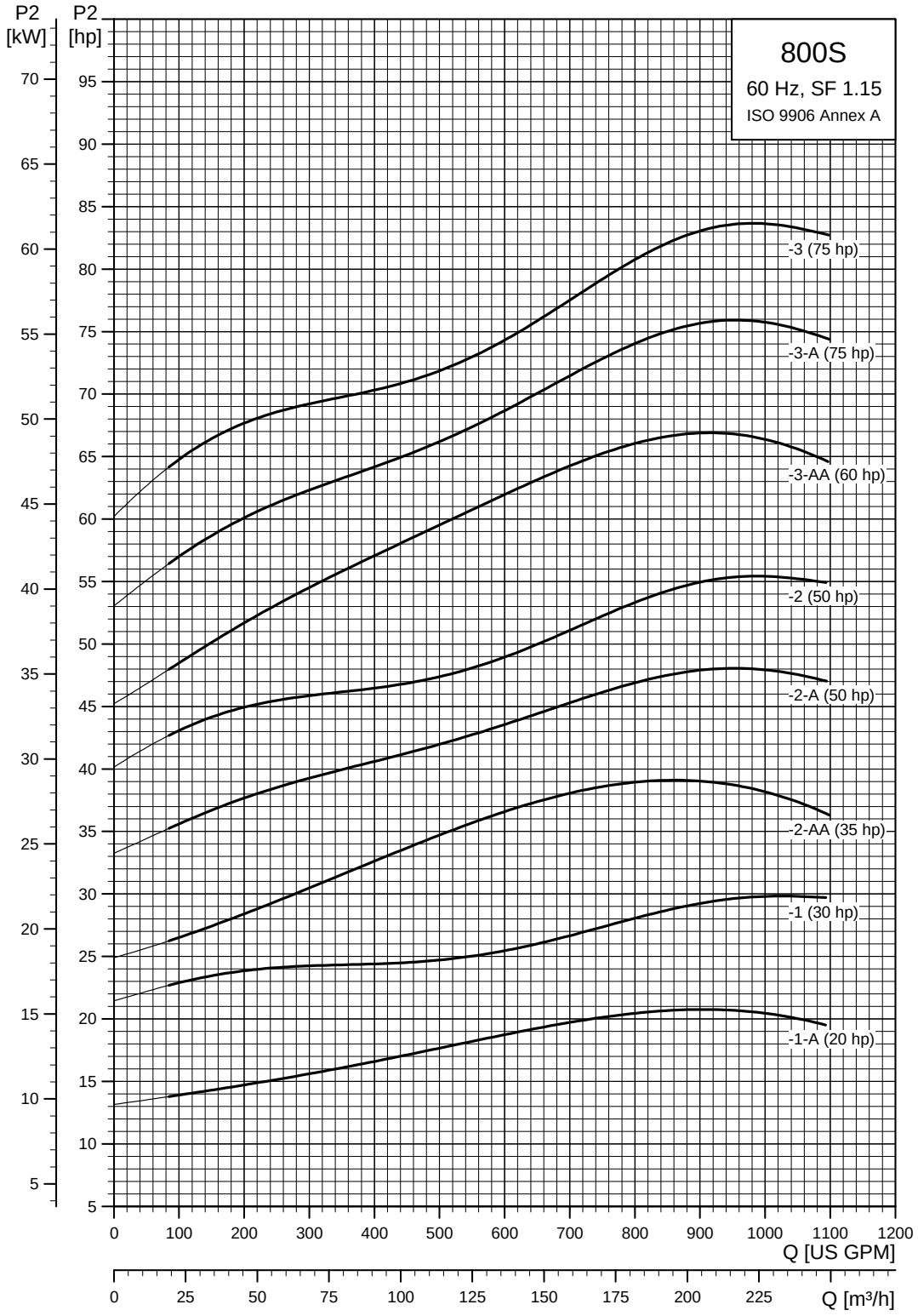
10" and larger wells - continued

SP 800S (800 gpm)



10" and larger wells - continued

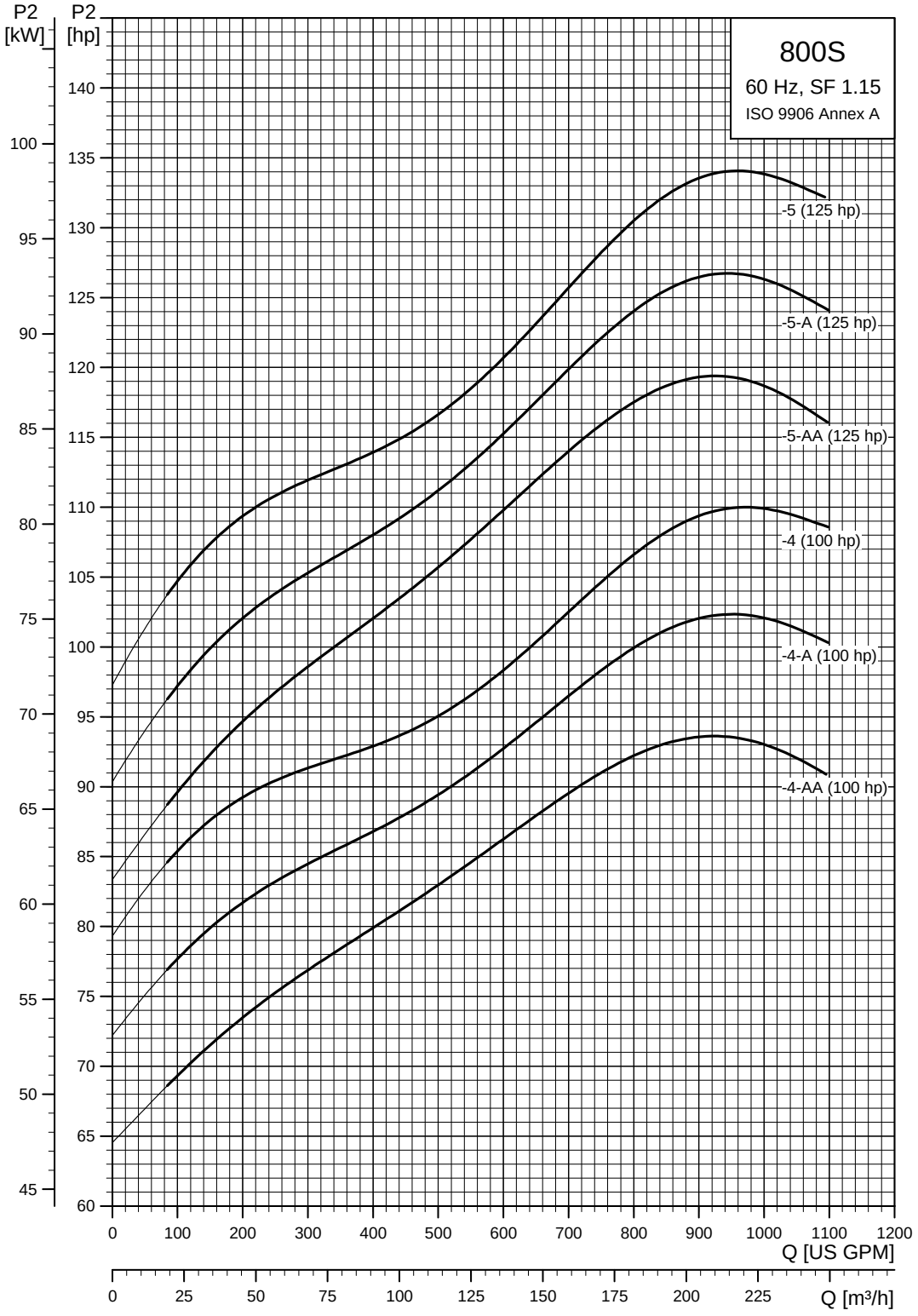
SP 800S (800 gpm) pump power requirement (P2)



TM05 0265 1812

10" and larger wells - continued

SP 800S (800 gpm) pump power requirement (P2)

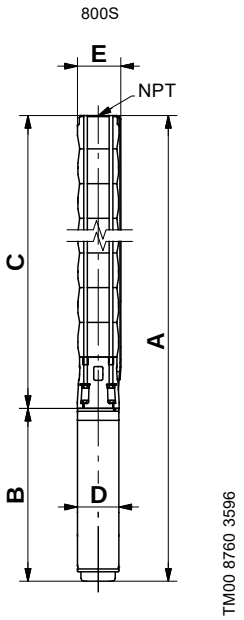


TM05 0266 1812

10" and larger wells - continued

SP 800S (800 gpm) pump with 6", 8" motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
800S - Motor diameter 6 inch, 60 Hz, rated flow rate 800 gpm (6" NPT)												
800S200-1A	72	3	230	20	▲	3481	56.50 (1435)	30.83 (783)	25.67 (652)	5.63 (143)	8.31 (211)	180.0
	72	3	460	20	▲	3492	56.50 (1435)	30.83 (783)	25.67 (652)	5.63 (143)	8.31 (211)	180.0
800S300-1	95	3	230	30	▲	3479	61.23 (1555)	35.56 (903)	25.67 (652)	5.63 (143)	8.31 (211)	202.5
	96	3	460	30	▲	3491	61.23 (1555)	35.56 (903)	25.67 (652)	5.63 (143)	8.31 (211)	202.5
800S400-2AA	143	3	460	40	▲	3490	72.05 (1830)	40.28 (1023)	31.78 (807)	5.63 (143)	8.31 (211)	257.4
800S500-2A	172	3	460	50	☼	3486	88.00 (2235)	56.11 (1425)	31.87 (810)	5.63 (143)	8.39 (213)	363.2
800S500-2	189	3	460	50	☼	3463	88.00 (2235)	56.11 (1425)	31.87 (810)	5.63 (143)	8.39 (213)	363.2
800S600-3AA	239	3	460	60	☼	3446	94.03 (2388)	56.11 (1425)	37.92 (963)	5.63 (143)	8.39 (213)	381.4
800S - Motor diameter 8 inch, 60 Hz, rated flow rate 800 gpm (6" NPT)												
800S400-2AA	141	3	460	40	*	3462	75.48 (1917)	43.71 (1110)	31.78 (807)	7.56 (192)	8.39 (213)	409.4
800S500-2A	174	3	460	50	*	3507	77.45 (1967)	45.67 (1160)	31.78 (807)	7.56 (192)	8.39 (213)	431.4
800S500-2	192	3	460	50	*	3489	77.45 (1967)	45.67 (1160)	31.78 (807)	7.56 (192)	8.39 (213)	438.0
800S600-3AA	247	3	460	60	*	3508	87.92 (2233)	50.00 (1270)	37.92 (963)	7.56 (192)	8.39 (213)	490.8
800S750-3A	281	3	460	75	*	3523	91.07 (2313)	53.15 (1350)	37.92 (963)	7.56 (192)	8.39 (213)	523.8
800S750-3	293	3	460	75	*	3514	91.07 (2313)	53.15 (1350)	37.92 (963)	7.56 (192)	8.39 (213)	523.8
800S1000-4AA	354	3	460	100	*	3524	106.62 (2708)	62.60 (1590)	44.02 (1118)	7.56 (192)	8.39 (213)	633.8
800S1000-4A	385	3	460	100	*	3519	106.62 (2708)	62.60 (1590)	44.02 (1118)	7.56 (192)	8.39 (213)	633.8
800S1000-4	390	3	460	100	*	3511	106.62 (2708)	62.60 (1590)	44.02 (1118)	7.56 (192)	8.39 (213)	633.8
800S1250-5AA	454	3	460	125	*	3503	122.21 (3104)	72.05 (1830)	50.16 (1274)	7.56 (192)	8.39 (213)	748.3
800S1250-5A	457	3	460	125	*	3496	122.21 (3104)	72.05 (1830)	50.16 (1274)	7.56 (192)	8.39 (213)	748.3
800S1250-5	479	3	460	125	*	3489	122.21 (3104)	72.05 (1830)	50.16 (1274)	7.56 (192)	8.39 (213)	746.6



E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 25 ft (7.6 m).

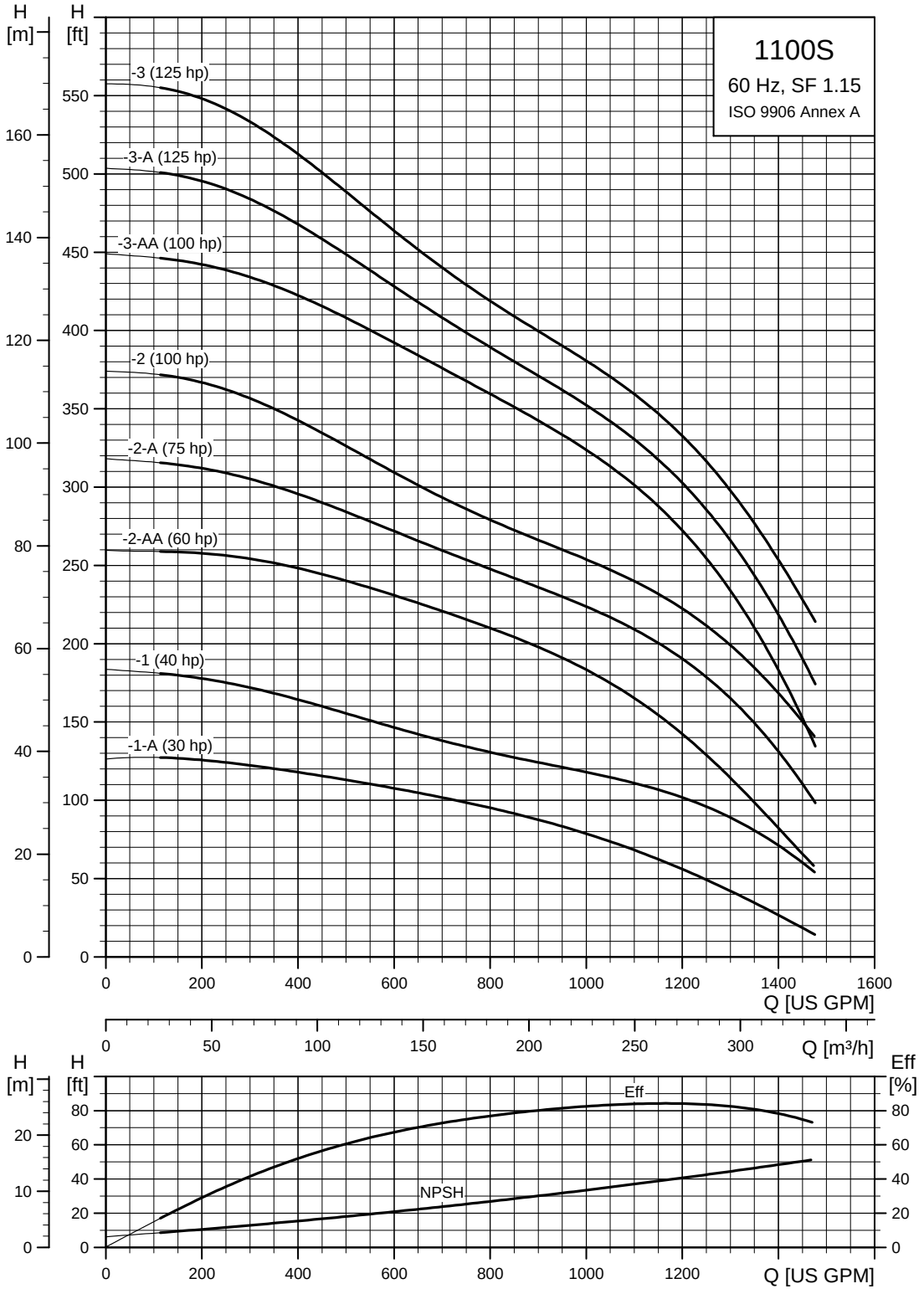
▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

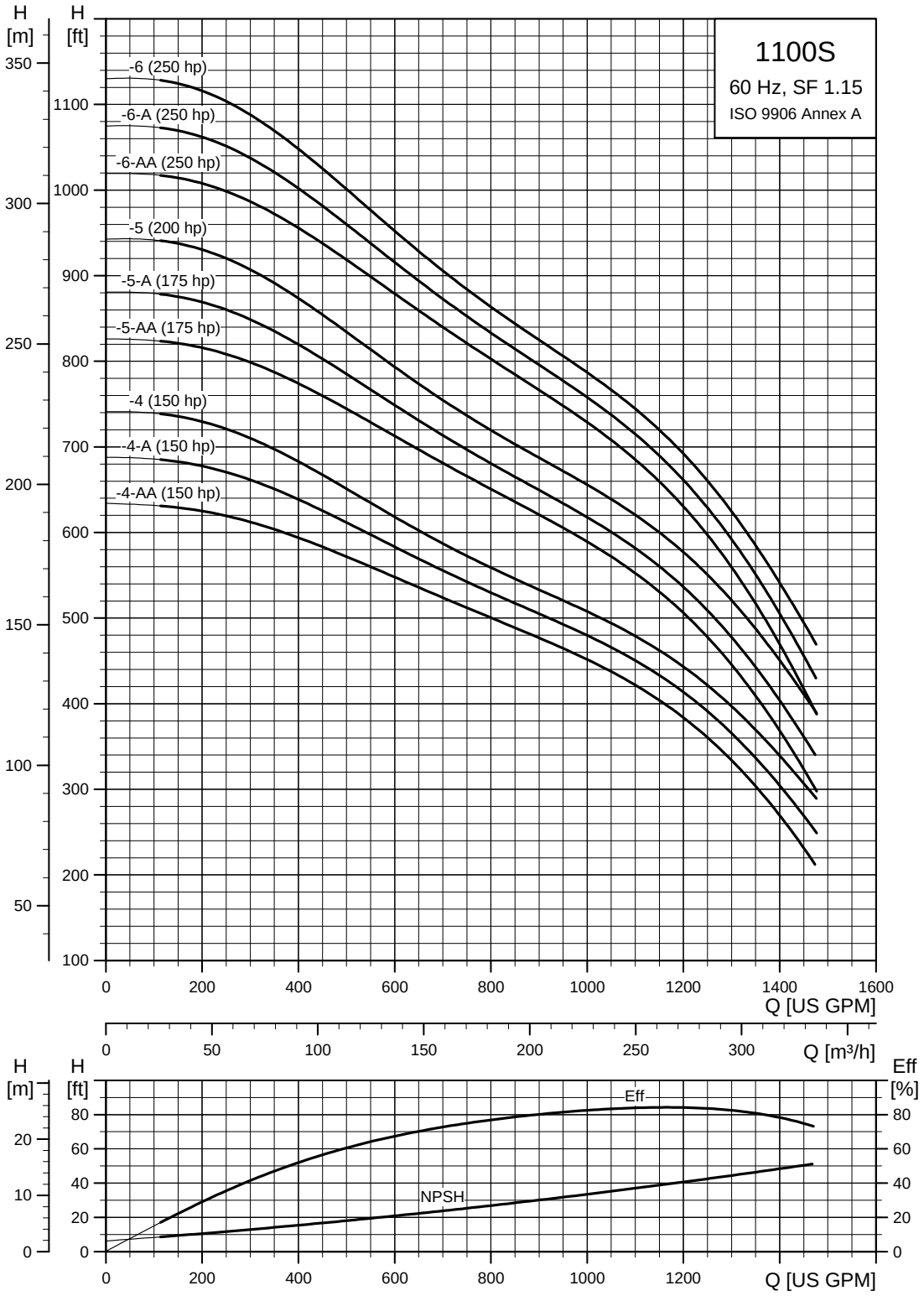
10" and larger wells - continued

SP 1100S (1100 gpm)



10" and larger wells - continued

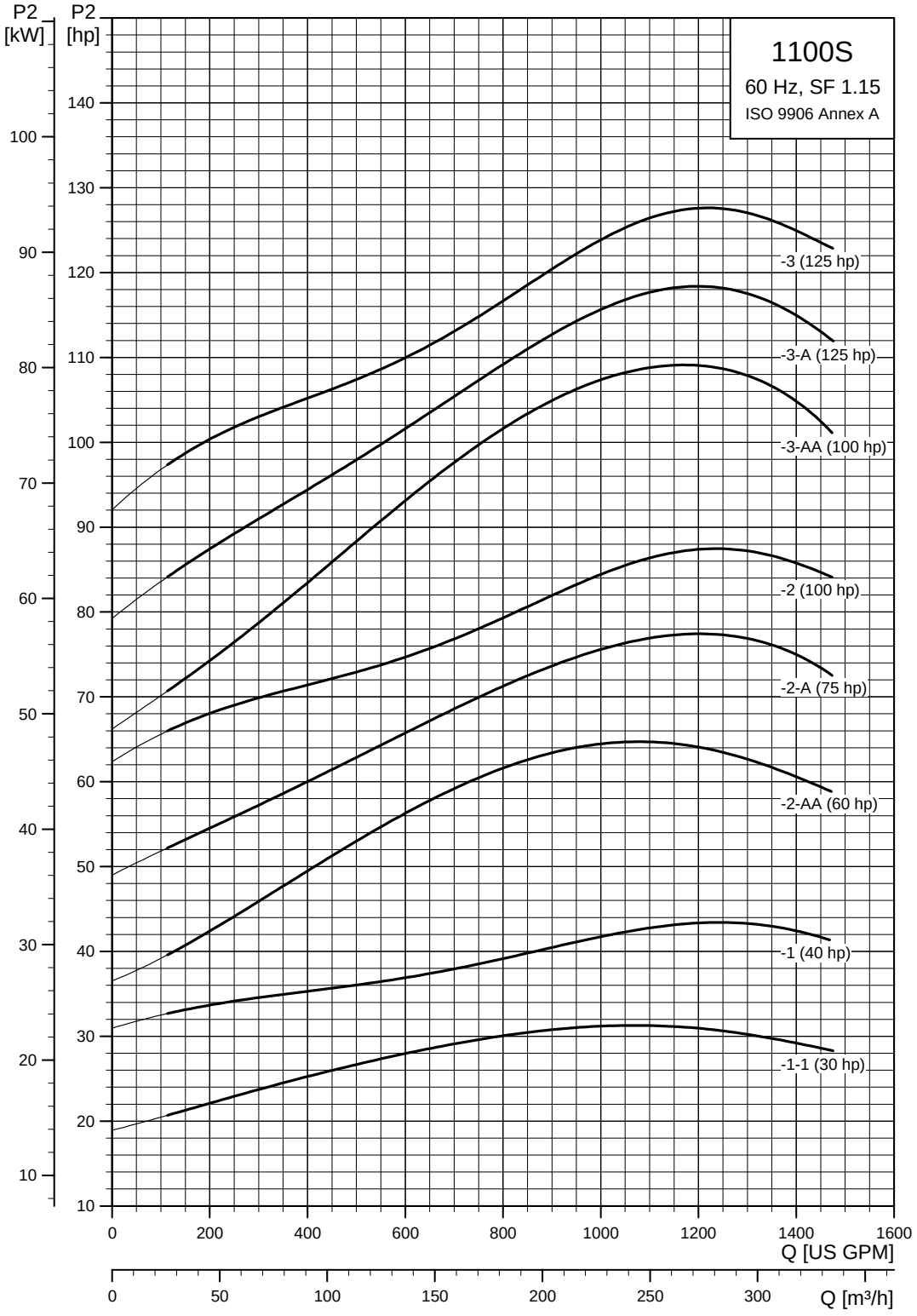
SP 1100S (1100 gpm)



TM05 0268 1812

10" and larger wells - continued

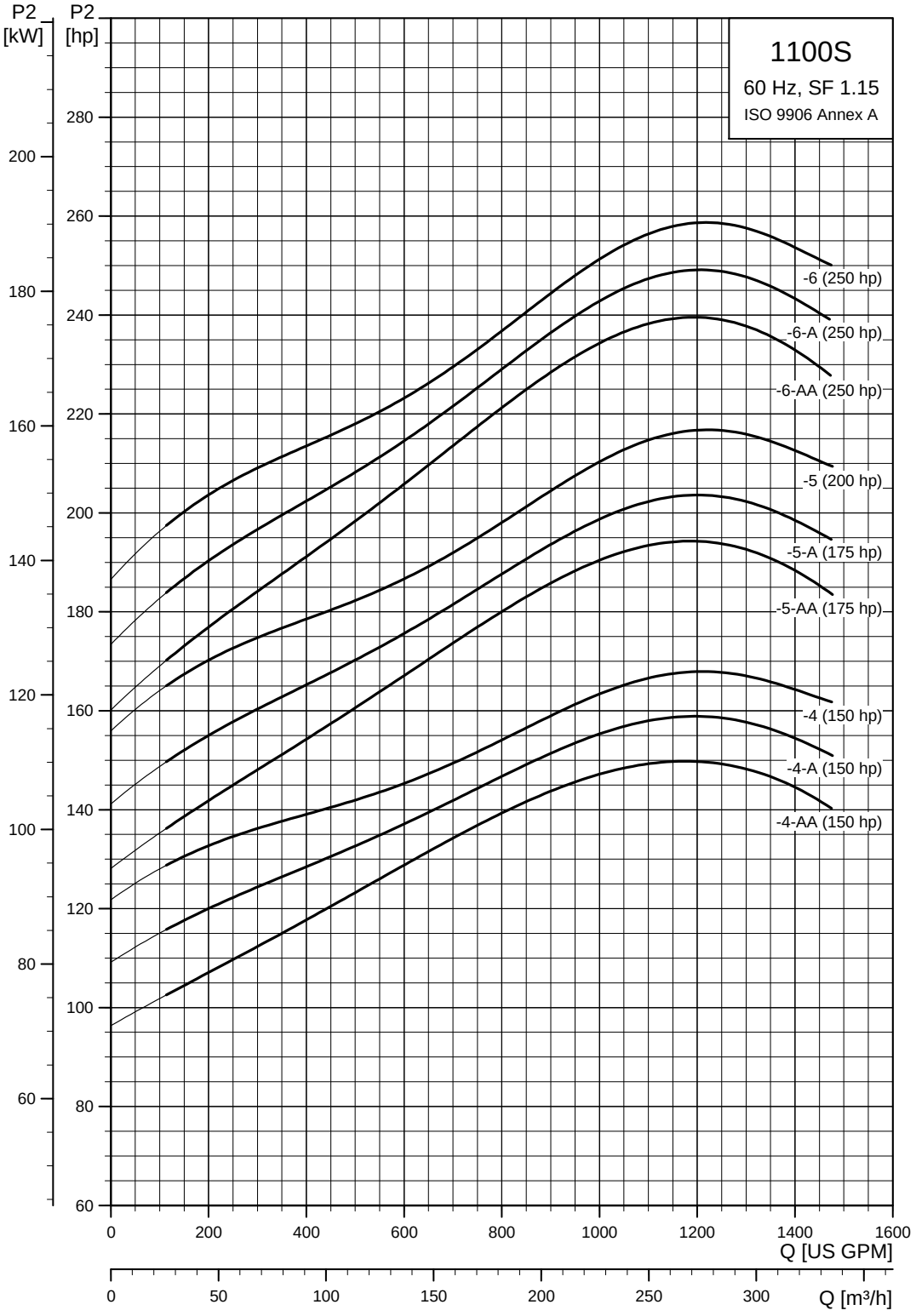
SP 1100S (1100 gpm) pump power requirement (P2)



TM05 0269 1812

10" and larger wells - continued

SP 1100S (1100 gpm) pump power requirement (P2)

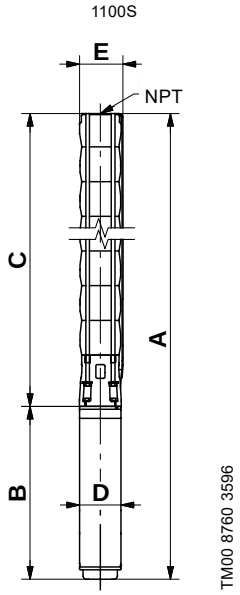


TM05 0270 1812

10" and larger wells - continued

SP 1100S (1100 gpm) pump with 6", 8", 10" motors

Pump model	Nom. head [ft]	Motor					Dimensions [in (mm)]					Net weight (complete) [lb]
		Ph	Volts [V]	[Hp]		[rpm]	A	B	C	D	E	
1100S - Motor diameter 6 inch, 60 Hz, rated flow rate 1100 gpm (6" NPT)												
1100S300-1A	77	3	230	30	▲	3449	66.66 (1693)	35.56 (903)	31.11 (790)	5.63 (143)	9.30 (236)	261.0
	89	3	460	30	▲	3481	66.66 (1693)	35.56 (903)	31.11 (790)	5.63 (143)	9.30 (236)	261.0
1100S400-1	109	3	460	40	▲	3476	71.38 (1813)	40.28 (1023)	31.11 (790)	5.63 (143)	9.30 (236)	290.6
1100S600-2AA	178	3	460	60	☼	3455	94.15 (2391)	56.11 (1425)	38.04 (966)	5.63 (143)	9.30 (236)	389.8
1100S - Motor diameter 8 inch, 60 Hz, rated flow rate 1100 gpm (6" NPT)												
1100S400-1	110	3	460	40	*	3493	74.81 (1900)	43.71 (1110)	31.11 (790)	7.56 (192)	9.41 (239)	407.2
1100S600-2AA	180	3	460	60	*	3510	88.04 (2236)	50.00 (1270)	38.04 (966)	7.56 (192)	9.41 (239)	501.8
1100S750-2A	217	3	460	75	*	3521	91.19 (2316)	53.15 (1350)	38.04 (966)	7.56 (192)	9.41 (239)	534.8
1100S1000-2	230	3	460	100	*	3529	100.63 (2556)	62.60 (1590)	38.04 (966)	7.56 (192)	9.41 (239)	633.8
1100S1000-3AA	314	3	460	100	*	3511	107.56 (2732)	62.60 (1590)	44.97 (1142)	7.56 (192)	9.41 (239)	655.9
1100S1250-3A	319	3	460	125	*	3503	117.01 (2972)	72.05 (1830)	44.97 (1142)	7.56 (192)	9.41 (239)	757.1
1100S1250-3	340	3	460	125	*	3495	117.01 (2972)	72.05 (1830)	44.97 (1142)	7.56 (192)	9.41 (239)	757.1
1100S1500-4AA	411	3	460	150	*	3498	133.00 (3378)	81.11 (2060)	51.89 (1318)	7.56 (192)	9.41 (239)	889.1
1100S1500-4A	431	3	460	150	*	3485	133.00 (3378)	81.11 (2060)	51.89 (1318)	7.56 (192)	9.41 (239)	889.1
1100S1500-4	450	3	460	150	*	3491	133.00 (3378)	81.11 (2060)	51.89 (1318)	7.56 (192)	9.41 (239)	889.1
1100S - Motor diameter 10 inch, 60 Hz, rated flow rate 1100 gpm (6" NPT)												
1100S1750-5AA	524	3	460	175	†	3510	132.45 (3364)	73.63 (1870)	58.82 (1494)	9.34 (237)	9.85 (250)	1142.2
1100S1750-5A	559	3	460	175	†	3446	132.45 (3364)	73.63 (1870)	58.82 (1494)	9.34 (237)	9.85 (250)	1137.0
1100S2000-5	577	3	460	200	†	3522	140.32 (3564)	81.5 (2070)	58.82 (1494)	9.34 (237)	9.85 (250)	1285.2
1100S2600-6AA	658	3	460	250	†	3520	160.24 (4070)	94.49 (2400)	65.75 (1670)	9.34 (237)	9.85 (250)	1478.0
1100S2600-6A	673	3	460	250	†	3520	160.24 (4070)	94.49 (2400)	65.75 (1670)	9.34 (237)	9.85 (250)	1483.2
1100S2600-6	703	3	460	250	†	3520	160.24 (4070)	94.49 (2400)	65.75 (1670)	9.34 (237)	9.85 (250)	1483.2



E = Maximum diameter of pump including cable guard and motor.

Notes:
Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 30 ft (9.1 m).

▲ MS 6000C motor.

☼ Takes MMS 6 motor; not available as complete.

* Takes MMS 8000 motor; not available as complete.

† Takes MMS 10000 motor; not available as complete.

18. Electrical data

Motor type	Hp	kW	Volt [V]	Service factor	Full load				Service factor (max. load)				Locked rotor	KVA code	Max. thrust	RPM
					[A]	[W]*	Power factor	Eff. [%]	[A]	[W]*	Power factor	Eff. [%]	[A]**			
4" 2-wire single phase motors - control box not required																
MS402	.5	0.37	115	1.60	9.5	675	0.67	55.0	12.0	1076	0.78	62	82.8	R	900	3450
	.5	0.37	230	1.60	4.5	646	0.63	57.7	6.0	1049	0.76	62	37.2	R	900	3450
	.75	0.55	230	1.50	6.9	994	0.63	56.3	8.4	1449	0.75	62	51.2	N	900	3450
	1	0.75	230	1.40	8.8	1260	0.67	59.7	9.8	1848	0.82	63	55.9	M	900	3450
	1.5	1.10	230	1.30	11.6	1760	0.70	62.7	13.1	2561	0.85	64	81.2	L	900	3450
4" 3-wire single phase motors - control box required																
MS402	.5	0.37	115	1.60	10.0	992	0.74	37.6	12.0	1049	0.73	61	44.4	L	900	3450
	.5	0.37	230	1.60	5.6	968	0.75	38.2	6.0	1049	0.76	62	24.6	L	900	3450
	.75	0.55	230	1.50	8.4	1410	0.76	39.7	8.4	1449	0.75	62	34.4	L	900	3450
	1	0.75	230	1.40	9.0	1662	0.81	44.9	9.8	1848	0.82	63	42.1	K	900	3450
	1.5	1.10	230	1.30	10.7	2169	0.89	51.6	11.6	2375	0.89	69	58.0	H	900	3450
MS4000	2	1.50	230	1.25	13.1	2582	0.86	57.8	13.2	2611	0.86	72	55.4	G	1500	3450
	3	2.20	230	1.15	16.8	3601	0.93	62.1	17.0	3636	0.93	74	103.7	F	1500	3450
	5	3.70	230	1.15	25.7	5645	0.96	66.0	27.5	5819	0.92	77	110.0	F	1500	3450
4" three phase 60 Hz motors																
MS402	.5	0.37	208	1.60	3.3	623	0.53	59.4	3.5	908	0.72	67	16.1	N	900	3450
			230	1.60	3.0	625	0.53	59.2	3.2	904	0.72	67	14.5	N	900	3450
			460	1.60	1.5	625	0.53	59.2	1.6	918	0.72	67	7.4	N	900	3450
			575	1.60	1.2	618	0.53	59.5	1.3	896	0.72	67	5.8	N	900	3450
	.75	0.55	208	1.50	4.6	878	0.53	62.7	5.1	1286	0.70	69	23.5	N	900	3450
			230	1.50	4.2	883	0.53	62.3	4.6	1283	0.70	69	21.2	N	900	3450
			460	1.50	2.1	878	0.53	62.6	2.3	1283	0.70	69	10.6	N	900	3450
			575	1.50	1.7	881	0.53	62.4	1.9	1290	0.70	69	8.5	N	900	3450
	1	0.75	208	1.40	4.9	1105	0.63	67.4	6.0	1578	0.73	70	28.8	M	900	3450
			230	1.40	4.6	1129	0.62	66.3	5.4	1570	0.73	70	25.9	M	900	3450
			460	1.40	2.3	1131	0.62	66.3	2.7	1570	0.73	70	13.0	M	900	3450
			575	1.40	1.8	1130	0.62	66.3	2.2	1563	0.73	70	10.3	M	900	3450
	1.5	1.10	208	1.30	6.6	1581	0.67	70.1	8.1	2101	0.72	75	40.5	M	900	3450
			230	1.30	5.8	1571	0.68	70.8	7.3	2094	0.72	75	37.2	M	900	3450
			460	1.30	2.9	1559	0.67	71.0	3.7	2094	0.72	75	18.6	M	900	3450
			575	1.30	2.3	1560	0.69	70.7	2.9	2080	0.72	75	14.5	M	900	3450
	2	1.50	208	1.25	8.1	2043	0.70	73.2	9.6	2594	0.75	76	51.8	L	900	3450
			230	1.25	7.5	2062	0.69	72.8	8.7	2599	0.75	76	47.0	L	900	3450
			460	1.25	3.7	2056	0.69	72.7	4.4	2599	0.75	76	23.5	L	900	3450
			575	1.25	3.1	2071	0.68	72.7	3.5	2614	0.75	76	19.3	L	900	3450
MS4000	3	2.20	208	1.15	9.9	2996	0.84	72.6	11.9	3644	0.85	73	61.9	J	1500	3415
			230	1.15	10.4	3054	0.74	71.6	11.6	3466	0.75	73	60.3	J	1500	3460
			440	1.15	5.0	3010	0.79	73.6	5.7	3531	0.82	73	28.8	J	1500	3440
			460	1.15	5.2	3042	0.74	72.7	5.8	3604	0.78	73	30.7	J	1500	3460
			575	1.15	3.9	3014	0.77	73.5	4.7	3520	0.76	73	24.2	J	1500	3470
	5	3.70	208	1.15	15.7	4864	0.86	76.0	18.6	5830	0.87	77	106.0	K	1500	3425
			230	1.15	15.0	4840	0.81	76.7	17.4	5407	0.78	77	102.7	K	1500	3470
			440	1.15	7.5	4820	0.84	76.5	8.7	5472	0.83	77	47.6	J	1500	3460
			460	1.15	7.5	4814	0.81	76.6	8.7	5513	0.80	77	51.0	J	1500	3470
			575	1.15	6.1	4617	0.76	80.5	6.9	5498	0.80	77	40.7	J	1500	3470
	7.5	5.50	208	1.15	22.8	7146	0.87	76.8	27.0	8657	0.89	81	137.7	I	1500	3415
			230	1.15	21.5	7023	0.82	78.0	25.0	8167	0.82	81	155.0	I	1500	3460
			440	1.15	10.8	6996	0.85	78.0	12.8	8487	0.87	81	73.0	I	1500	3440
			460	1.15	10.6	6925	0.82	78.3	12.6	8232	0.82	81	78.1	I	1500	3460
			575	1.15	8.7	6876	0.79	81.4	10.0	8167	0.82	81	62.0	I	1500	3460
	10	7.50	440	1.15	15.1	9667	0.84	78.0	18.0	11386	0.83	81	108.0	J	1500	3420
			460	1.15	15.0	9561	0.80	78.0	18.6	11856	0.80	81	119.0	J	1500	3460
			575	1.15	12.5	9212	0.74	81.0	14.4	11330	0.79	81	90.7	J	1500	3440

Motor type	Hp	kW	Volt [V]	Service factor	Full load				Service factor (max. load)				Locked rotor	KVA code	Max. thrust	RPM
					[A]	[W]*	Power factor	Eff. [%]	[A]	[W]*	Power factor	Eff. [%]	[A]**			
6" three phase 60 Hz motors																
MS 6000C	5	3.70	208	1.15	16.9	4932	0.81	79.3	19.0	5681	0.83	79.3	95.0	H	6070	3480
			230	1.15	16.2	4969	0.77	79.2	17.8	5673	0.80	79.9	105.0	H	6070	3510
			460	1.15	8.0	4908	0.77	79.4	8.8	5609	0.80	80.2	51.3	H	6070	3500
	7.5	5.50	208	1.15	24.2	7149	0.82	80.2	27.5	8223	0.83	79.4	114.0	H	6070	3450
			230	1.15	23.4	7178	0.77	80.6	26.0	8286	0.80	80.8	130.0	H	6070	3480
			440	1.15	11.6	7161	0.81	80.6	13.2	8249	0.82	80.4	61.0	J	6070	3470
			460	1.15	11.6	7117	0.77	80.6	13.0	8286	0.80	80.8	64.5	J	6070	3480
			480	1.15	12.0	7283	0.73	80.2	13.0	8322	0.77	80.7	68.0	J	6070	3490
			575	1.15	9.3	7186	0.78	80.6	10.2	8228	0.81	80.8	51.0	H	6070	3480
	10	7.50	208	1.15	32.0	9684	0.84	80.5	37.5	11483	0.85	79.2	126.0	G	6070	3420
			230	1.15	30.0	9680	0.81	81.7	33.5	11077	0.83	81.5	142.0	G	6070	3470
			440	1.15	15.2	9615	0.83	81.5	17.4	11139	0.84	0.81	67.5	G	6070	3450
			460	1.15	15.0	9680	0.81	81.8	16.8	11110	0.83	81.7	71.0	G	6070	3470
			480	1.15	15.0	9602	0.77	81.8	16.6	11041	0.80	82.0	75.0	G	6070	3480
			575	1.15	12.0	9680	0.81	81.4	13.4	11077	0.83	81.2	56.5	G	6070	3470
	15	11.00	208	1.15	46.5	14072	0.84	82.1	53.5	16383	0.85	81.1	198.0	G	6070	3430
			230	1.15	44.5	14005	0.79	83.0	49.5	16170	0.82	82.9	224.0	G	6070	3470
			440	1.15	22.0	13916	0.83	82.8	25.0	16004	0.84	82.1	100.0	H	6070	3450
			460	1.15	21.6	13940	0.81	83.1	24.4	16136	0.83	82.8	106.0	H	6070	3470
			480	1.15	21.6	13828	0.77	83.1	24.0	15963	0.80	83.2	112.0	H	6070	3480
			575	1.15	17.2	13875	0.81	83.0	19.4	16036	0.83	82.7	84.0	G	6070	3460
	20	15.00	208	1.15	61.5	19054	0.86	82.7	71.5	22153	0.86	81.5	310.0	H	6070	3430
			230	1.15	57.5	18783	0.82	84.0	65.0	21751	0.84	83.7	350.0	H	6070	3470
			440	1.15	29.0	18565	0.84	83.7	33.5	21701	0.85	82.9	166.0	J	6070	3450
			460	1.15	29.0	18947	0.82	84.0	32.5	21751	0.84	83.7	176.0	J	6070	3470
			480	1.15	29.0	18806	0.78	83.9	32.0	21549	0.81	83.9	186.0	J	6070	3480
			575	1.15	23.4	18877	0.81	83.8	26.0	21492	0.83	83.5	144.0	J	6070	3480
	25	18.50	208	1.15	75.0	23237	0.86	83.4	87.0	26955	0.86	82.3	395.0	J	6070	3430
			230	1.15	71.0	22910	0.81	84.6	80.0	26452	0.83	84.3	445.0	J	6070	3480
			440	1.15	36.0	23046	0.84	84.3	41.0	26559	0.85	83.6	212.0	J	6070	3460
			460	1.15	35.5	22910	0.81	84.6	40.0	26452	0.83	84.3	224.0	J	6070	3480
			480	1.15	36.0	23046	0.77	84.3	39.5	26272	0.80	84.4	236.0	J	6070	3490
			575	1.15	28.5	23275	0.82	84.0	32.0	26452	0.83	83.7	180.0	J	6070	3480
	30	22.00	208	1.15	88.0	27582	0.87	83.3	104.0	32597	0.87	81.8	445.0	H	6070	3420
			230	1.15	81.0	27105	0.84	85.1	92.0	31153	0.85	84.4	500.0	H	6070	3470
			440	1.15	41.5	27199	0.86	84.5	48.0	31825	0.87	83.5	238.0	J	6070	3450
			460	1.15	40.5	27105	0.84	85.1	46.0	31153	0.85	84.4	250.0	J	6070	3470
			480	1.15	40.0	26937	0.81	85.2	45.0	31052	0.83	85.0	265.0	J	6070	3480
			575	1.15	32.0	27089	0.85	84.8	37.0	31690	0.86	84.0	194.0	H	6070	3460
	40	30.00	440	1.15	56.0	37130	0.87	84.7	65.0	43592	0.88	83.6	290.0	H	6070	3440
			460	1.15	54.5	36909	0.85	85.2	62.0	42482	0.86	84.7	310.0	H	6070	3460
			480	1.15	54.5	37155	0.82	85.3	61.0	42600	0.84	85.1	330.0	H	6070	3480
			575	1.15	43.5	36824	0.85	85.2	49.5	42890	0.87	84.7	250.0	G	6070	3470
6" three phase 60 Hz motors																
MMS 6	50	37.00	460	1.15	73.0	47111	0.81	83.2	82.0	54226	0.83	82.6	405	H	6000	3450
MMS 6	60	45.00	460	1.15	86.3	57070	0.83	85.0	97.0	66464	0.86	86.0	525	G	6000	3455
8" three phase 60 Hz motors																
MMS 8000	40	30.00	460	1.15	53.3	36096	0.85	82.5	64.0	43853	0.86	83.0	371	K	13000	3490
	50	37.00	460	1.15	65.6	44426	0.85	83.7	78.0	53446	0.86	84.0	429	J	13000	3480
	60	45.00	460	1.15	77.5	52485	0.85	85.4	92.5	64118	0.87	86.0	592	K	13000	3500
	75	55.00	460	1.15	101.0	65182	0.81	85.8	112.0	77635	0.87	86.0	650	J	13000	3500
	100	75.00	460	1.15	126.0	86335	0.86	86.6	150.0	105170	0.88	87.0	855	J	13000	3500
	125	92.00	460	1.15	155.5	107787	0.87	86.9	184.0	129009	0.88	87.0	1104	J	13000	3480
	150	110.00	460	1.15	186.2	129068	0.87	86.6	220.0	154250	0.88	86.0	1276	J	13000	3480
	40	30.0	575	1.15	43.3	37086	0.86	81.0	49.0	42456	0.87	85.0	202	J	13000	3500
	50	37.0	575	1.15	55.5	46983	0.85	79.0	62.2	53274	0.86	84.0	257	G	13000	3500
	60	45.0	575	1.15	62.0	53720	0.87	84.0	71.0	62226	0.88	85.0	465	J	13000	3500
	75	55.0	575	1.15	79.1	67749	0.86	81.0	89.4	78352	0.88	85.0	586	L	13000	3485
	100	75.0	575	1.15	104.0	91147	0.88	82.0	118.0	104592	0.89	86.0	786	N	13000	3470
	125	92.0	575	1.15	118.4	104947	0.89	88.0	144.0	127638	0.89	86.0	1007	R	13000	3470
	150	110.0	575	1.15	156.0	127399	0.82	86.0	176.0	147238	0.84	89.0	1230	H	13000	3470
10" three phase 60 Hz motors																
MMS 10000	175	132.00	460	1.15	226.2	151388	0.84	86.5	265.0	181578	0.86	88.0	1511	J	13000	3510
	200	147.00	460	1.15	266.4	171924	0.81	86.6	305.0	204126	0.84	87.0	1891	K	13000	3520
	250	190.00	460	1.15	339.8	213879	0.79	86.7	405.0	264598	0.82	87.0	2471	K	13000	3520

* Calculated value (voltage x current x Cos F)
** Calculated value (full load current x locked rotor current %)

19. Approvals

Product	Approval		
SP 4"		C US	
SP 4" pump end (5S - 77S)		CLASSIFIED C UL US **WATER QUALITY** **Drinking Water System Component** **NSF/ANSI 61** **MH26400** **NSF/ANSI 372**	
MS 6000C motor		CLASSIFIED C UL US **Submersible Motor** **NSF/ANSI 372** **MH26400**	
MS 4000 motor		IAPMO File 6591 0.25 % lead	
MS 402 motor			IAPMO File 6591 0.25 % lead

Grundfos SP pumps are certified when driven by a certified motor provided with suitable overheating protection.

20. Accessories

Grundfos RSI (Renewable Solar Inverter)

Grundfos RSI is an off-grid solar inverter that converts the DC power output from a solar panel to AC power supply for pump operation.

RSI is designed for continuous as well as intermittent operation. The system is suitable for various water supply systems including irrigation.

The RSI can be used in existing systems with submersible pumps or dry-installed pumps, thus providing a very wide range of applications allowing you to leverage renewable energy sources with the ability to back up the system with grid or generator power.

RSI features:

- Weatherproof (enclosure class IP66).
- Setup wizard.
- Can operate without the detachable, magnetic control panel.
- AC/DC* compatibility for connecting to the grid or use as a generator as back-up power during solar panel disruptions.
- Maximum power point tracking (MPPT) optimizes available solar irradiation and environmental conditions.
- Overvoltage and undervoltage protection.
- Overload protection.
- Overcurrent protection.
- Overtemperature protection**.
- No-load protection.
- Operating history memory.

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Fig. 19 Grundfos RSI

System components

An RSI system consists of a three-phase Grundfos motor, an RSI solar inverter, and other components such as:

- circuit breaker, AC (optional)
- circuit breaker, DC
- surge protection, DC
- solar panel
- dry-running switch
- level switch (optional)
- sine-wave filter (optional)
- combiner box (junction box).

Pump requirements:

- 50 or 60 Hz
- 3 x 380-440 VAC or 3 x 220 VAC.

As standard, Grundfos three-phase pumps can only be operated via an AC voltage supply. Therefore, the solar panels must not be connected directly to the pump but must be connected via an RSI.

* Solar power (DC) and AC power must never under any circumstances be connected at the same time.

** The inverter does not detect motor temperature or protect the motor against overtemperature.

Technical data

Voltage			3 x 208-240 V	3 x 380-440 V
Installation environment	Minimum ambient temperature	[°F (°C)]	14 (-10)	14 (-10)
	Maximum ambient temperature	[°F (°C)]	140 (60)	140 (60)
	Maximum relative humidity	[%]	100	100
Electrical data	DC minimum MPP voltage	[VDC]	230	400
	DC recommended MPP voltage	[VDC]	290-336	530-615
	DC maximum input voltage	[VDC]	380	800
	AC input voltage	[VAC]	208-240	380-460
	AC rated output voltage	[VAC]	220	380-440
	Minimum frequency	[Hz]	5	5
	Maximum frequency	[Hz]	60	60
	Phases		3	3
	Enclosure class		IP66	IP66

Low voltage range (3 x 208-240 V)

Power [kW]	Product number	Electrical data			Frame size
		Max. P2 [Hp]	Max. P2 [kW]	Rated output current [Amps]	
1.5	99090622	2	1.5	8	A
2.2	99090633	3	2.2	11	A
3	99090634	4	3.0	12.5	A
4	99090635	5	4.0	18	B
5.5	99090636	7.5	5.5	24.2	B
7.5	99090637	10	7.5	31	B
11	99090638	15	11	48	C
15	99090639	20	15	62	C

High voltage range (3 x 380-440 V)

Power [kW]	Product number	Electrical data			Frame size
		Max. P2 [Hp]	Max. P2 [kW]	Rated output current [Amps]	
2.2	99044348	3	2.2	5.6	A
3.0	99044349	4	3.0	8	A
4.0	99044350	5	4.0	9.6	A
5.5	99044351	7.5	5.5	12	A
7.5	99044352	10	7.5	16	B
11	99044363	15	11	23	B
15	99044364	20	15	31	B
18.5	99044365	25	18.5	38	C
22	99044366	30	22	46	C
30	99044367	40	30	61	C
37	99044368	50	37	72	C

CU331SP variable frequency drive

Description	Product number
Combiner box (junction box) components kit, DC	98298572
Circuit breaker, DC	98341686
Surge protection, DC	98341687

CU331SP constant pressure drive kits (with sensor)

Enclosure type	NEMA	Hp	Input Ph	Input volts	Product number	Approximate ship wt. [lb]
Indoor	Type 12	2	1	200 - 240	98370277	60
		3	1	200 - 240	98370280	60
		5	1	200 - 240	98370304	60
Outdoor	Type 4X	2	1	200 - 240	98370279	60
		3	1	200 - 240	98370301	60
		5	1	200 - 240	98370305	60

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Fig. 20 CU331SP variable frequency drive and sensor

Features

User interface

The user interface offers these possibilities:

- Local operation via a operating panel with graphic display where the menu structure is based on the well-known system from Grundfos E-pumps.
- Monitoring of operating status via indicator lights and signal relays.
- Display of alarm or warning and logging of the last five alarms and warnings.

Functions

Control mode: Constant pressure

CU331SP has only one control mode, Constant pressure. The pressure is kept constant, independently of the flow rate.

Startup guide

CU331SP has a startup guide, which is launched at the first power up. Parameters are set manually on the basis of the installation. The startup guide can be repeated, if necessary.

Thanks to the startup guide, the installer can quickly set a few parameters and put CU331SP into operation.

Direction of rotation test

During startup, CU331SP automatically tests and sets the correct direction of rotation without changing the cable connections. The direction of rotation test can be performed manually if it fails for any reason.

Dry-running protection

To protect the pump, CU331SP will automatically set up dry-running protection so that water shortage can be detected. The dry-running alarm will automatically reset 30 minutes after the alarm is declared.

Low-flow stop function

The low-flow stop function is used for changing between on/off operation at low flow rate and continuous operation at high flow rate.

The low-flow stop function protects the pump and saves energy.

Applications

For 4" or larger wells. Main applications:

- Domestic and light commercial water supply
- irrigation
- livestock watering
- water transfer.

System components

- Compact, efficient, and reliable variable frequency drive
- rugged stainless steel pump end and proven, reliable, three-phase motor
- pressure sensor
- diaphragm tank (sold separately).

CU331SP identification

Nameplate

CU331SP can be identified by means of the nameplate. An example is shown below.

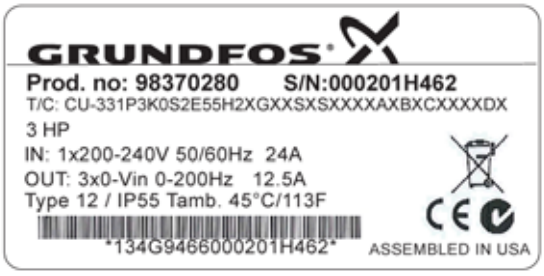

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Fig. 21 Example of nameplate

Key	
Text	**Description**
T/C:	CU-331 (product name)
Prod. no:	Product number (98370280)
S/N:	Serial number (000201H462) The last four digits indicate the production date. In this case, 46 is the week, and 2 is the year 2012.
3.0 hp	Typical shaft power on the motor
IN:	Supply voltage, frequency and maximum input current.
OUT:	Motor voltage, frequency and maximum output current. The maximum output frequency usually depends on the pump type.
Type 12 / IP55	Enclosure class
Tamb.	Maximum ambient temperature

CU331SP sizing

Step 1

Calculate maximum head requirements at rated flow rate conditions:

H_{max}=dynamic head + system psi (in feet) + friction loss + above grade elevation.

Step 2

Select pump from performance curves as follows:

Select a model in which the calculated value of H_{max} is within the maximum performance curve of the pump. Refer to section *CU331SP curve charts* on page 180.

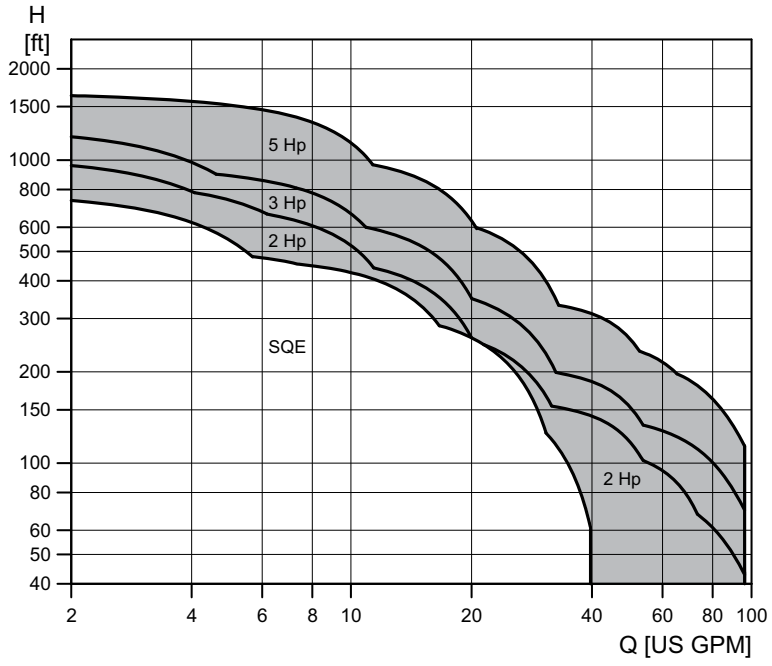
Step 3

Select the CU331SP that corresponds to the correct motor Hp and enclosure type.

CU331SP product range

Enclosure type	NEMA	Hp	Input Ph	Input volts
Indoor	Type 12	2	1	200 - 240
		3	1	200 - 240
		5	1	200 - 240
Outdoor	Type 4X	2	1	200 - 240
		3	1	200 - 240
		5	1	200 - 240

CU331SP performance range



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CU331SP operation

Menu structure

CU331SP has a startup guide, which is launched at the first power up. After the startup guide, CU331SP has a menu structure divided into four main menus:

0. **GENERAL** gives access to the startup guide for the general setting of CU331SP.
1. **OPERATION** enables the setting of setpoint and resetting of alarms. It is also possible to see the latest five warnings and alarms.
2. **STATUS** shows the status of CU331SP and the pump. It is not possible to change or set values.
3. **INSTALLATION** gives access to available parameters.

CU331SP menu overview

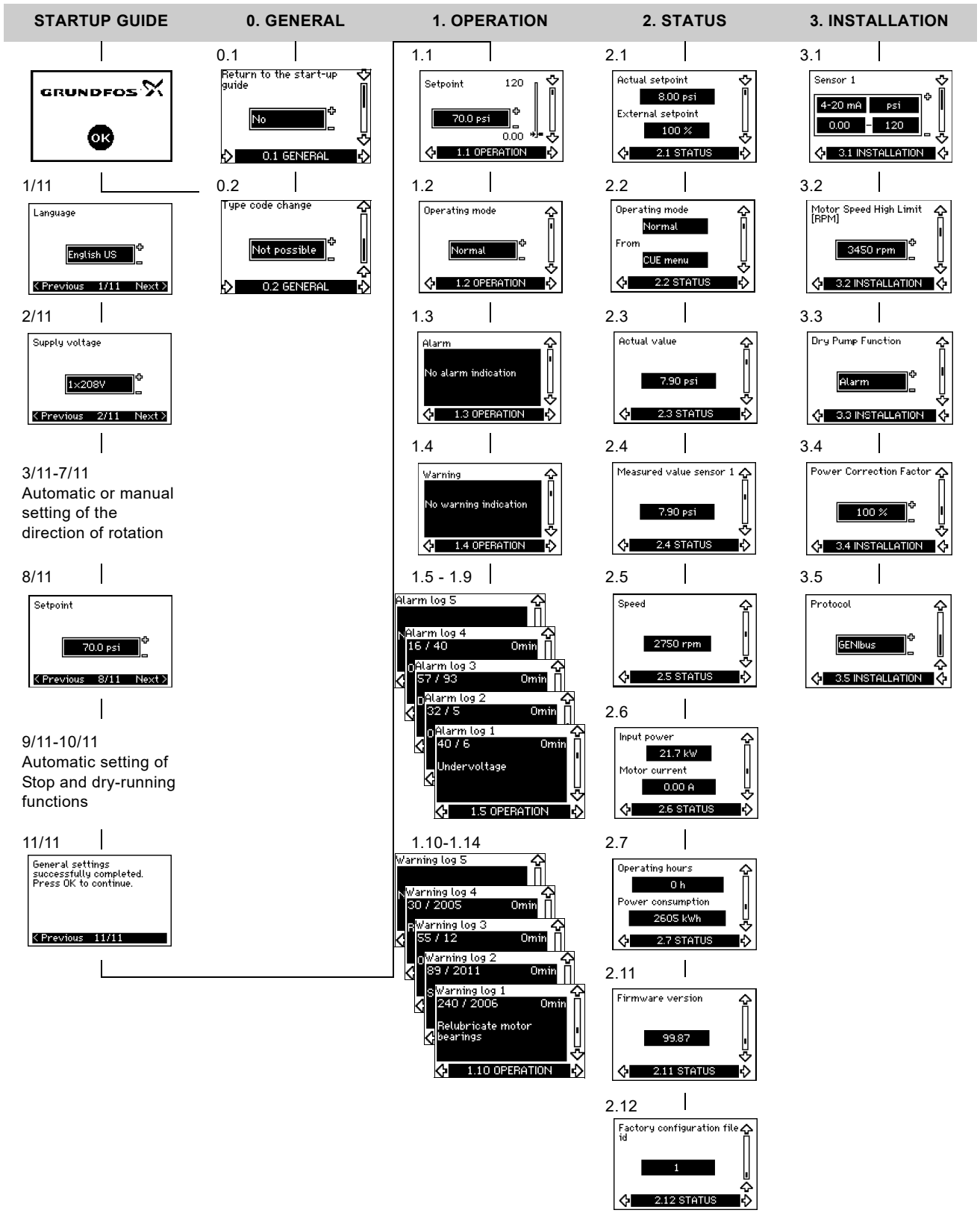

Fig. 22 Menu overview

Operating modes

These operating modes can be selected with CU331SP:

- Normal
- Stop
- Minimum
- Maximum

You can set the operating modes without changing the setpoint setting.

Normal

The pump operates in constant pressure mode.

Stop

The pump has been stopped by user.

Minimum curve

The pump is running at a set minimum speed value. See fig. 23.

For instance, this operating mode can be used during periods with a very small flow requirement.

Maximum curve

The pump is running at a set maximum speed value.

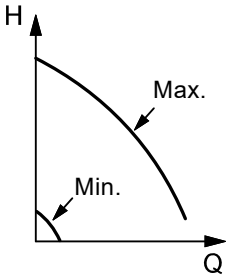

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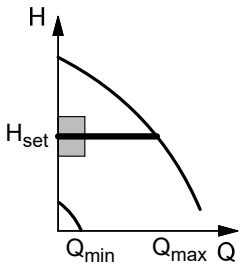
Fig. 23 Minimum and maximum curves

Control mode

CU331SP has been developed specifically to operate submersible pumps in constant pressure mode. This closed-loop control mode uses an analog pressure transducer to provide pressure feedback to the drive.

Constant pressure with stop function

The outlet pressure is kept constant at high flow rate (Q > Qmin). On/off operation at low flow rate. See fig. 24.



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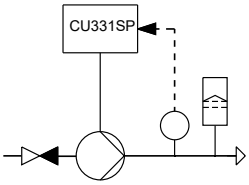

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Fig. 24 Constant pressure with stop function

The pump is controlled according to a constant pressure measured after the pump. This means that the pump offers a constant pressure in the Q-range of Q_{min} to Q_{max}, represented by the horizontal line in the QH diagram.

Setting the setpoint by means of the "OPERATION" menu

The setpoint can be set or changed during operation using the setpoint display in the "OPERATION" menu shown below. It is not necessary to run the startup guide to change the setpoint.

Low flow and stop functions

The pump will check the flow regularly by reducing the speed for a short time. If there is no or only a small change in pressure, this means that there is low flow.

The speed will be increased until the stop pressure (actual setpoint + 0.5 x ΔH) is reached and the pump will stop after a few moments. The pump will restart at the latest when the pressure has fallen to the start pressure (actual setpoint - 0.5 x ΔH).

Operating conditions for the stop function

It is only possible to use the stop function if the system incorporates a pressure sensor, a check valve and a diaphragm tank.

The check valve must always be installed before the pressure sensor.

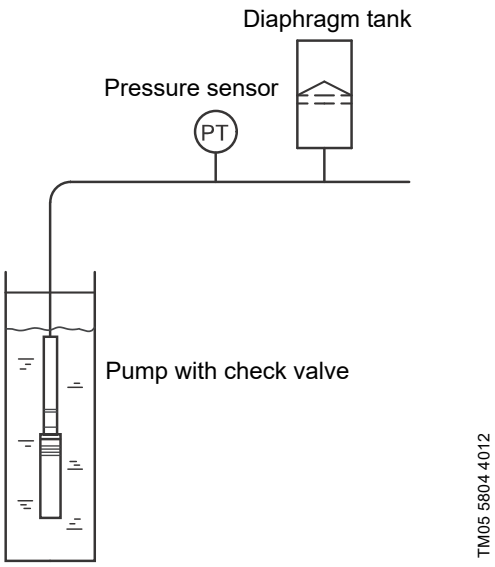


Fig. 25 Position of the pressure sensor and diaphragm tank

Diaphragm tank

The stop function requires a diaphragm tank of a certain minimum size. The tank must be installed as close as possible after the pump and the precharge pressure must be 0.7 x actual setpoint.

Recommended diaphragm tank size:

Rated flow rate of pump [gpm (m^3/h)]	Minimum diaphragm tank size [gal (l)]
0-26 (0-6)	2 (8)
27-105 (7-24)	4.4 (18)
106-176 (25-40)	14 (50)
177-308 (41-70)	34 (120)
309-440 (71-100)	62 (180)

If a diaphragm tank of the above size is installed in the system, the factory setting of ΔH is the correct setting.

If the tank installed is too small, the pump will start and stop too often.

Setting the direction of rotation

The startup guide is started the first time CU331SP is connected to supply voltage. Then while going through the startup guide, CU331SP tests and sets the correct direction of rotation without changing the cable connections to the motor.

The correct direction of rotation can be set in these ways:

- automatic setting.
- manual setting when the direction of rotation is not visible.

Automatic setting

CU331SP automatically tests and sets the correct direction of rotation without changing the cable connections.

Automatic setting requires a sensor.

This test is not suitable for all pump types and will in certain cases not be able to determine for certainty the correct direction of rotation. In these cases, CU331SP changes over to manual setting where the direction of rotation is determined on the basis of the installer's observations.

Manual setting when the direction of rotation is not visible

The correct direction of rotation is set manually without changing the cable connections. This requires that it is possible to observe the head or flow rate.

Status functions

CU331SP shows the following data:

- power consumption
- operating hours
- measured value
- speed
- input power
- motor current.

The status information can be shown in the display.

Power consumption

The value of the power consumption is an accumulated value calculated from the pump's startup date and cannot be reset. No additional sensor is required.

Operating hours

The value of operating hours is an accumulated value calculated from the pump's startup date and cannot be reset. No additional sensor is required.

Measured value

The sensor display will show the actual pressure as received from the pressure transducer.

Speed

The display will show the motor speed in RPM's (calculated).

Input power

The display will show the power consumption in kW.

Motor current

The display will show the actual motor current being used.

Logging functions

Alarm and warning log

The latest five alarms and five warnings are logged with a timestamp corresponding to the power-on time after the fault has occurred. The alarm and warning log can be shown directly on the display.

See section *Warning and alarm list*.

Signal relays

The table shows the function of the signal relays.

Type	Function
Relay 1	• *Pump running*
Relay 2	• *Alarm*

See also fig. 26.

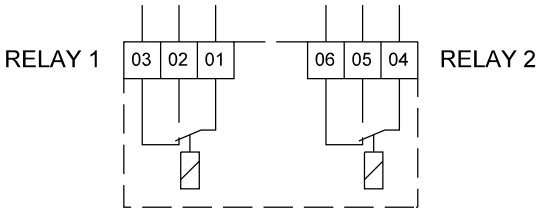


Fig. 26 Terminals for signal relays (normal state, not activated)

Terminal		Function
C1	C2	Common
NO 1	NO 2	Normally open contact
NC1	NC2	Normally closed contact

CU331SP installation

Mechanical installation

The individual CU331SP cabinet sizes are characterized by their enclosures. The table in section *CU331SP technical data* shows the relationship of enclosure class and enclosure type.

Reception and storage

Check on receipt that the packaging is intact, and the unit is complete. In case of damage during transport, contact the transport company to file a claim.

Note that CU331SP is delivered in a packaging which is not suitable for outdoor storage.

Transportation and unpacking

CU331SP must only be unpacked at the installation site to prevent damage during the transport to the site.

The packaging contains accessory bag(s), documentation and the unit itself. See fig. 27.

Fig. 27 CU331SP packaging

Space requirements and air circulation

CU331SP units can be mounted side by side, but as a sufficient air circulation is required for cooling these requirements must be met:

- Sufficient free space above and below CU331SP
- Ambient temperature up to 122°F (50 °C)
- Hang CU331SP directly on the wall, or fit it with a back plate. See fig. 28.

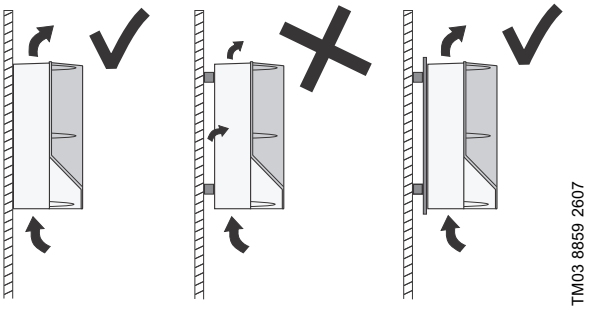


Fig. 28 CU331SP hung directly on the wall or fitted with a back plate

Required free space above and below CU331SP:

Enclosure	Space [in (mm)]
B1	7.9 (200)

For information about enclosure, see section *Enclosure*.

Mounting

CU331SP must be mounted securely on a firm surface. Ensure that screws are sized appropriately for the weight of CU331SP (approximately 60 lbs) and anchored securely to the mounting surface.

1. Mark and drill holes. See fig. 29; also see section *Main dimensions and weight*.
2. Fit the screws, but leave loose. Mount CU331SP, and tighten the four screws.

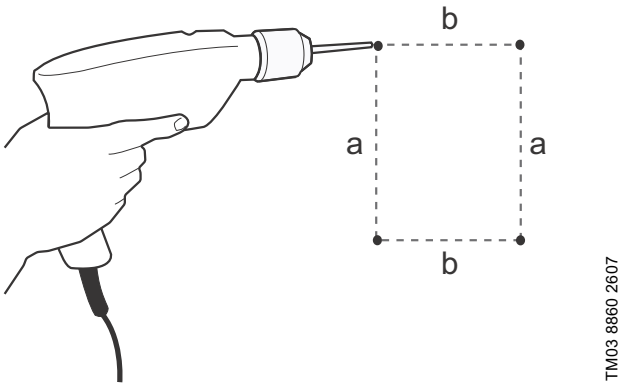


Fig. 29 Drilling holes for mounting

CU331SP electrical connection

Ensure the correct grounding and protection procedures are used for the installation. Before the electrical installation, ensure that the power supply and other voltage inputs are switched off.

Electrical protection

Protection against electric shock, indirect contact

The leakage current to ground exceeds 3.5 mA, and a reinforced ground connection is required.

Protective conductors must always have a yellow and green (PE) or yellow and green and blue (PEN) color marking.

Instructions according to EN IEC 61800-5-1:

- CU331SP must be stationary, installed permanently and connected permanently to the mains supply.
- The ground connection must be carried out with duplicate protective conductors or with a single reinforced protective conductor with a cross-section of minimum AWG 7 (10 mm^2).

Protection against short-circuit, fuses

CU331SP and the supply system must be protected against short-circuit.

Grundfos requires that the backup fuses are used for protection against short-circuit.

CU331SP offers complete short-circuit protection in case of a short-circuit on the motor output.

Additional protection

The leakage current to ground exceeds 3.5 mA.

We recommend to connect CU331SP to an electrical installation where a Ground Fault Circuit Interrupter (GFCI) type B is used as additional protection. The total leakage current of all the electrical equipment in the installation must be taken into account.

During startup and in asymmetrical supply systems, the leakage current can be higher than normal and may cause the GFCI to trip.

Motor protection

The motor requires no external motor protection. CU331SP protects the motor against thermal overloading and blocking.

Protection against overcurrent

CU331SP has an internal overcurrent protection for overload protection on the motor output.

Protection against mains voltage transients

CU331SP is protected against mains voltage transients.

Mains and motor connection

The supply voltage and frequency are marked on the CU331SP nameplate. Make sure that CU331SP is suitable for the power supply of the installation site.

The maximum output voltage of CU331SP is equal to the input.

Example: if the supply voltage is rated at 208V choose a 208V motor for operation.

Main switch

A main switch can be installed before CU331SP according to local regulations. See fig. 30.

Wiring diagram

The wires in the terminal box must be as short as possible. Excepted from this is the ground wire, which must be so long that it is the last one to be disconnected in case the cable is inadvertently pulled out of the cable entry.

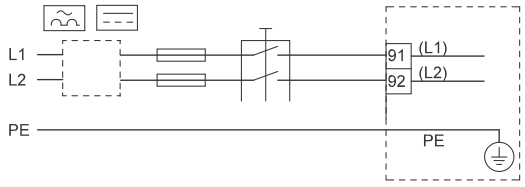


Fig. 30 CU331SP wiring diagram

Terminal		Function
91	(L1)	Single-phase supply
92	(L2)	
95/99	(PE)	Ground connection

For single-phase connection, use L1 and L2.

Mains connection

Check that mains voltage and frequency correspond to the values on the nameplate of CU331SP and the motor.

1. Connect the ground wire to terminal 95 (PE). See fig. 31.
2. Connect the power leads to the terminals 91 (L1), 92 (L2).
3. Fix the mains cable with a cable clamp.

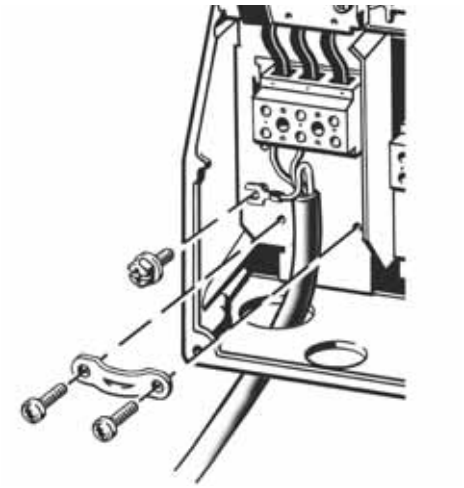


Fig. 31 Mains connection

CU331SP drive is usable with three-phase input power by connecting leads to 91 (L1), 92 (L2), and 93 (L3).

Motor connection

The motor cable must be screened for CU331SP to meet EMC requirements.

1. Connect the ground wire to terminal 99 (PE). See fig. 32.
2. Connect the motor leads to the terminals 96 (U), 97 (V), 98 (W).
3. Fix the screened cable with a cable clamp.

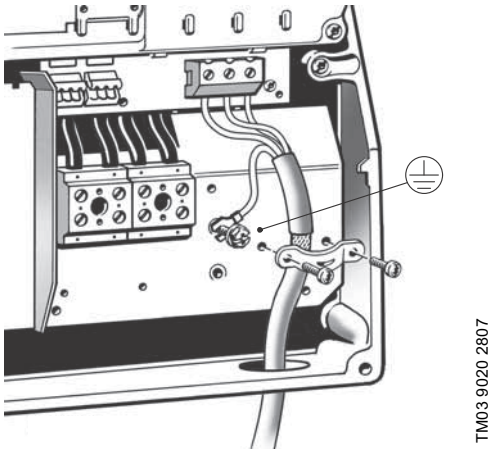


Fig. 32 Motor connection

The cable screen must be exposed and in physical contact with the mounting plate and clamp

20.1 Connecting the signal terminals

As a precaution, signal cables must be separated from other groups by reinforced insulation in their entire lengths.

If no external on/off switch is connected, short-circuit terminals 18 and 20 using a short wire.

Connect the signal cables according to the guidelines for good practice to ensure EMC-correct installation. See section *EMC-correct installation*.

- Use screened signal cables with a conductor cross-section of minimum AWG 20 (0.5 mm^2) and maximum AWG 16 (1.5 mm^2).
- Use a 3-conductor screened bus cable in new systems.

Minimum connection, signal terminal

Operation is only possible when the terminals 18 and 20 are connected, for instance by means of an external on/off switch or a short wire.

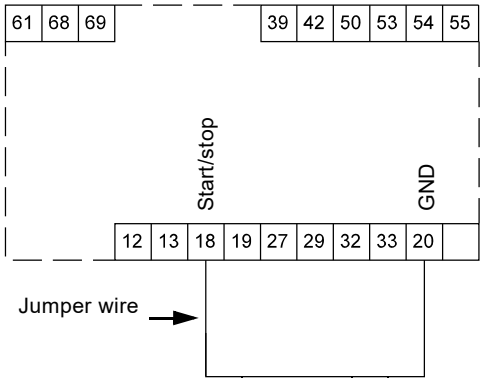


Fig. 33 Required minimum connection, signal terminal

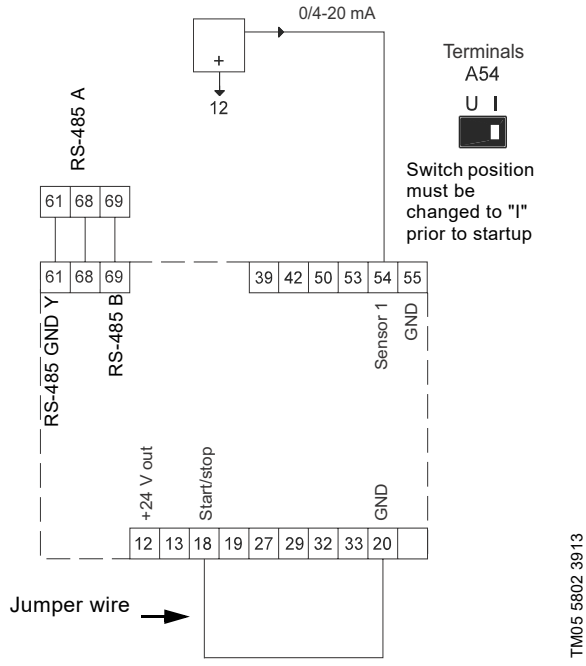


Fig. 34 Wiring diagram for CU331SP

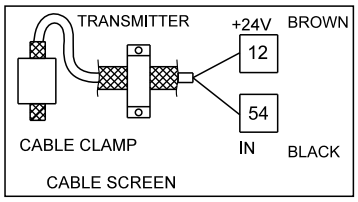


Fig. 35 Sensor wiring diagram

Setting the analog input 54

The contact A54 is positioned behind the control panel and is used for setting the signal type of the analog input.

The factory setting of the inputs is voltage signal "U". This setting must be changed to "I" prior to starting CU331SP. Be sure the power supply is switched off.

Remove the control panel to set the contact. See fig. 36.

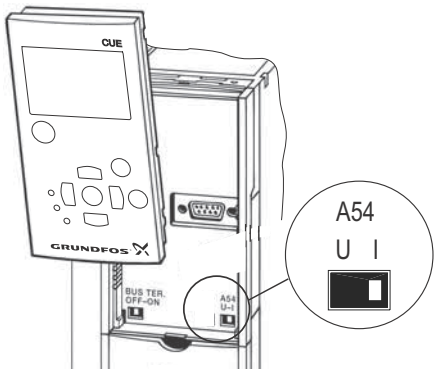


Fig. 36 Setting contact A54 to current signal "I"

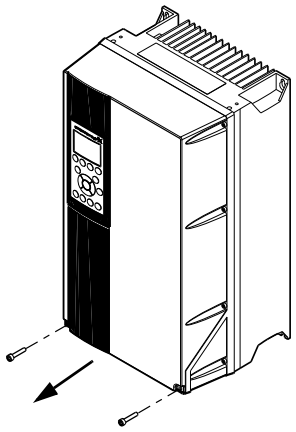
Terminal key

Terminal	Type	Function
12	+24 V out	Supply to sensor
18	DI 1	Digital input, start/stop
20	GND	Common frame for digital inputs
55	GND	Common frame for analog inputs
54	AI 2	Sensor input, sensor 1, 0/4-20 mA
61	RS-485 GND Y	GENIbus, frame
68	RS-485 A	GENIbus, signal A (+)
69	RS-485 B	GENIbus, signal B (-)

The RS-485 screen must be connected to frame.

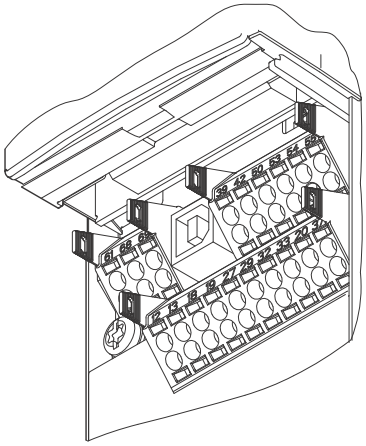
Access to signal terminals

All signal terminals are behind the terminal cover of CU331SP front. Remove the terminal cover as shown in fig. 37.



TM03 9004 2807

Fig. 37 Access to signal terminals

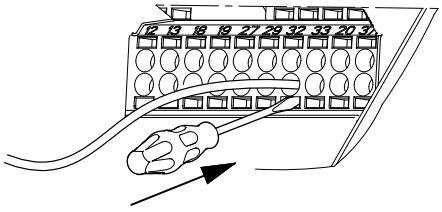


TM03 9025 2807

Fig. 38 Signal terminals

Fitting the conductor

1. Remove the insulation at a length of 0.35 to 0.40 inches (9 to 10 mm).
2. Insert a screwdriver with a tip of maximum 0.015 X 0.1 in (0.4 X 2.5 mm) into the square hole.
3. Insert the conductor into the corresponding round hole. Remove the screwdriver. The conductor is now fixed in the terminal.

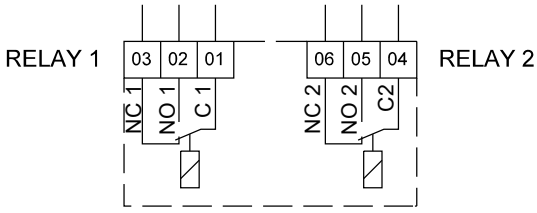


TM03 9026 2807

Fig. 39 Fitting the conductor into the signal terminal

Connecting the signal relays

As a precaution, signal cables must be separated from other groups by reinforced insulation in their entire lengths.



TM03 8801 2507

Fig. 40 Terminals for signal relays (normal state, not activated)

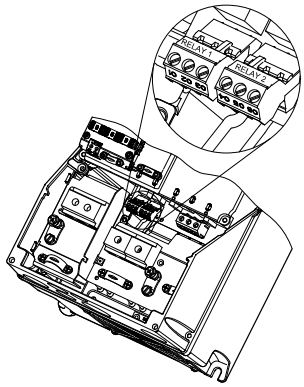
Terminal		Function
C 1	C 2	Common
NO 1	NO 2	Normally open contact
NC 1	NC 2	Normally closed contact

Signal relay

The signal relays on CU331SP are predefined as follows:

Relay 1: Pump running

Relay 2: Alarm



TM03 9008 2807

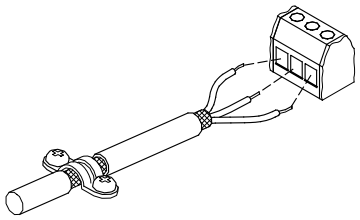
Fig. 41 Terminals for relay connection

EMC-correct installation

This section gives guidelines for good practice when installing CU331SP. Follow these guidelines to meet EN 61800-3, first environment.

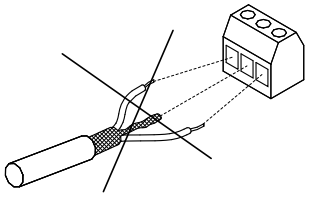
- Use only motor and signal cables with a braided metal screen in applications without output filter.
- There are no special requirements to supply cables, apart from local requirements.
- Leave the screen as close to the connecting terminals as possible. See fig. 42.
- Avoid terminating the screen by twisting the ends. See fig. 43. Use cable clamps or EMC screwed cable entries instead.
- Connect the screen to frame at both ends for both motor and signal cables. If the controller has no cable clamps, connect only the screen to CU331SP.
- Avoid unscreened motor and signal cables in electrical cabinets with variable frequency drives.
- Make the motor cable as short as possible in applications without output filter to limit the noise level and minimize leakage currents.
- Screws for frame connections must always be tightened whether a cable is connected or not.
- Keep main cables, motor cables and signal cables separated in the installation, if possible.

Other installation methods may give similar EMC results if the above guidelines for good practice are followed.



TM02 1325 0901

Fig. 42 Example of stripped cable with screen



TM03 8812 2507

Fig. 43 Do not twist the screen ends

Line disturbance and transient protection

To protect itself from AC line voltage disturbances, CU331SP monitors the input power supply and interrupts drive operation in the event of phase loss or imbalance. Transients on the AC line are suppressed by MOVs as well as zener diodes for extreme transients. CU331SP meets VDE 0160 (European standard - 2.3 x line voltage for 1.3 msec) for transient protection.

RFI filters

To meet the EMC requirements, CU331SP comes with the following types of built-in radio frequency interference filter (RFI).

Voltage	Typical shaft power P2	RFI filter type
1 x 200-240 V *	1.5 - 10 hp	C1

* Single-phase input - three-phase output.

Description of RFI filter types

C1: For use in domestic areas.

RFI filter types are according to EN61800-3.

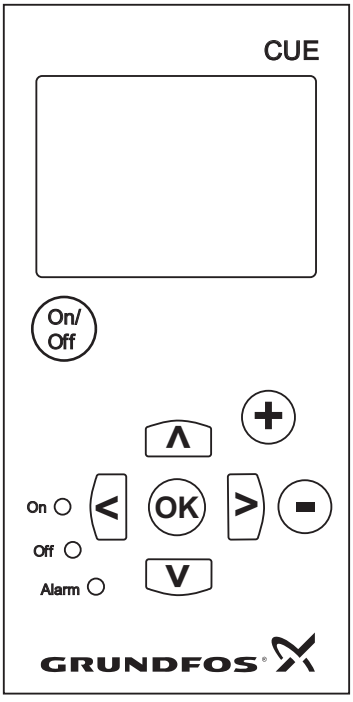
Control panel

The on/off button on the control panel does not disconnect CU331SP from the power supply and must therefore not be used as a safety switch.

On/ Off

The On/Off button has the highest priority. In "Off" condition, pump operation is not possible.

The control panel is used for local setting of CU331SP. The functions available are preset in CU331SP.



TM03 8719 2507

Fig. 44 Control panel of CU331SP

Editing buttons

Button	Function
On/ Off	With this button you can start and stop the pump and ake it ready for operation.
OK	With this button you can save changed values, resets alarms and expands the value field.
+ −	These buttons change values in the value field.

Navigating buttons

Button	Function
< >	With these buttons you can navigate from one menu to another. When the menu is changed, the display shown will always be the top display of the new menu.
∧ ∨	With these buttons you can navigate up and down in the individual menu.

Adjusting the display contrast

Press OK and + for darker display.

Press OK and - for brighter display.

Button lock

To lock the buttons on the panel press and hold the up and down arrows simultaneously.

Indicator lights

The operating condition of the pump is indicated by the indicator lights on the front of the control panel. See fig. 44.

The table shows the function of the indicator lights.

Indicator light	Function
On (green)	The pump is running or has been stopped by a stop function.
	If flashing, the pump has been stopped by the user (CU331SP menu), external start/stop or bus.
Off (orange)	The pump has been stopped with the on/off button.
Alarm (red)	Indicates an alarm or a warning.

Displays, general terms

Figures 45 and 46 show the general terms of the display.

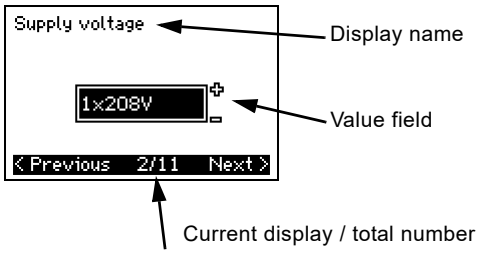


Fig. 45 Example of display in the startup guide

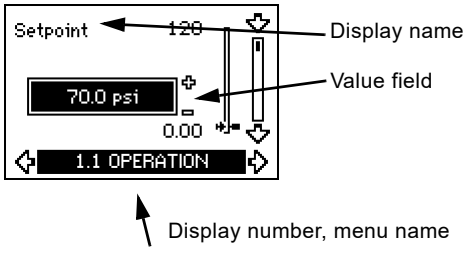


Fig. 46 Example of display in the user menu

Warning and alarm list

	Code and display text	Status: Warning	Status: Alarm	Status: Locked alarm	Operating mode	Resetting
1	Too high leakage current			•	Stop	Man.
2	Mains phase failure		•		Stop	Aut.
3	External fault		•		Stop	Man.
16	Other fault		•		Stop	Aut.
				•	Stop	Man.
32	Overvoltage	•			-	Aut.
			•		Stop	Aut.
40	Undervoltage	•			-	Aut.
			•		Stop	Aut.
48	Overload		•		Stop	Aut.
				•	Stop	Man.
49	Overload		•		Stop	Aut.
55	Overload	•			-	Aut.
			•		Stop	Aut.
57	Dry running		•		Stop	Aut.
64	Too high CU331SP temperature		•		Stop	Aut.
89	Sensor 1 outside range		•		[1]	Aut.
96	Setpoint signal outside range		•		[1]	Aut.
155	Inrush fault		•		Stop	Aut.
241	Motor phase failure	•			-	Aut.
			•		Stop	Aut.

[1] In case of an alarm, CU331SP will change the operating mode depending on the pump type. Warning is reset in display 3.20.

CU331SP technical data

Enclosure

All CU331SP enclosures are size B1.

The enclosure rating can be either IP 55 / TYPE 12 or IP 66 / TYPE 4X.

Main dimensions and weight

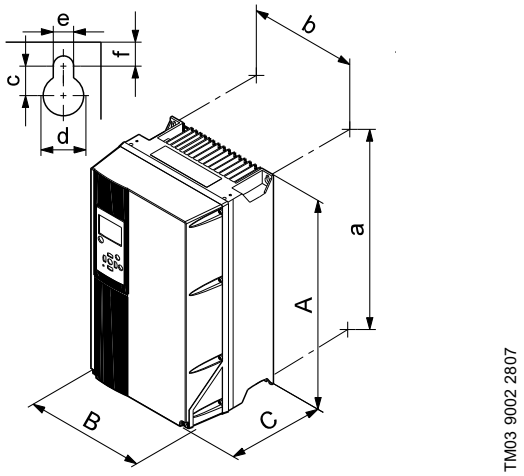


Fig. 47 Enclosure B1

Note: The dimensions shown for CU331SP enclosures are maximum height, width and depth.

Enclosure	Height [in]		Width [in]		Depth [in]
	A	a	B	b	C
B1	18.9	17.9	9.5	8.3	10.2

Enclosure	Screw holes [in]				Weight [lbs]
	c	d	e	f	
B1	0.47	0.75	0.35	0.35	50.7

Surroundings

Relative humidity	5-95 % RH
Ambient temperature	Max. 122 °F (50 °C)
Average ambient temperature over 24 hours	Max. 113 °F (45 °C)
Minimum ambient temperature at full operation	32 °F (0 °C)
Minimum ambient temperature at reduced operation	14 °F (-10 °C)
Temperature during storage and transportation	-13 to 150 °F (-25 to 65 °C)
Storage duration	Max. 6 months
Maximum altitude above sea level without performance reduction	3280 ft (1000 m)
Maximum altitude above sea level with performance reduction	9840 ft (3000 m)

CU331SP comes in a packaging which is not suitable for outdoor storage.

Terminal tightening torques

Enclosure	Tightening torque [ft-lb]			
	Mains	Motor	Earth	Relay
B1	1.3	1.3	2.2	0.4

Cable length

Maximum length, screened motor cable	500 ft (152 m)
Maximum length, unscreened motor cable	1000 ft (305 m)
Maximum length, signal cable	1000 ft (305 m)

Fuses and cable cross-section

Always comply with national and local regulations as to cable cross-sections.

Cable cross-section to signal terminals

Maximum cable cross-section to signal terminals, rigid conductor	AWG 14
Maximum cable cross-section to signal terminals, flexible conductor	AWG 18
Minimum cable cross-section to signal terminals	AWG 20

Non-UL fuses and conductor cross-section to mains and motor

Typical shaft power P2 [Hp]	Maximum fuse size [A]	Fuse type	Maximum conductor cross section[1]	
			[AWG]	[mm^2]
2	40	gG	7	10
3	40	gG	7	10
5	80	gG	7	10

1) Screened motor cable, unscreened supply cable.

UL fuses and conductor cross-section to mains and motor

Typical shaft power P2 [Hp]	Maximum fuse size [A]	Bussmann RK1	Maximum conductor cross section[1] [AWG}
2	40	KTN-R40	7
3	40	KTN-R40	7
5	80	KTN-R80	7

1) Screened motor cable, unscreened supply cable.

Inputs and outputs

Mains supply (L1, L2)

Supply voltage	200-240 V ± 10 %
Supply frequency	60 Hz
Maximum temporary imbalance between phases	3 % of rated value
Leakage current to earth	> 3.5 mA
Number of cut-ins	Max. 1 time/min.

Do not use the power supply for switching CU331SP on and off.

Motor output (U, V, W)

Output voltage	0-100 % [1]
Output frequency	0-60 Hz
Switching on output	Not recommended

[1] Output voltage in % of supply voltage.

RS-485 GENIbus connection

Terminal number	68 (A), 69 (B), 61 GND (Y)

The RS-485 circuit is functionally separated from other central circuits and galvanically separated from the supply voltage (PELV).

Digital inputs

Terminal number	18
Voltage level	0-24 VDC
Voltage level, open contact	> 19 VDC
Voltage level, closed contact	< 14 VDC
Maximum voltage on input	28 VDC
Input resistance, R_i	Approx. 4 kΩ

All digital inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

Signal relays

Relay 01, terminal number	1 (C), 2 (NO), 3 (NC)
Relay 02, terminal number	4 (C), 5 (NO), 6 (NC)
Maximum terminal load (AC-1) [1]	240 VAC, 2 A
Maximum terminal load (AC-15) [1]	240 VAC, 0.2 A
Maximum terminal load (DC-1) [1]	50 VDC, 1 A
Minimum terminal load	24 V DC 10 mA 24 V AC 20 mA

[1] IEC 60947, parts 4 and 5.

C Common
NO Normally open
NC Normally closed

The relay contacts are galvanically separated from other circuits by reinforced insulation (PELV).

Analog input

Terminal number	54
Current signal	A54 = "I" [1]
Current range	0-20, 4-20 mA
Input resistance, R_i	Approx. 200 Ω
Maximum current	30 mA
Maximum fault, terminals 53, 54	0.5 % of full scale

[1] The factory setting is voltage signal "U".

All analog inputs are galvanically separated from the supply voltage (PELV) and other high-voltage terminals.

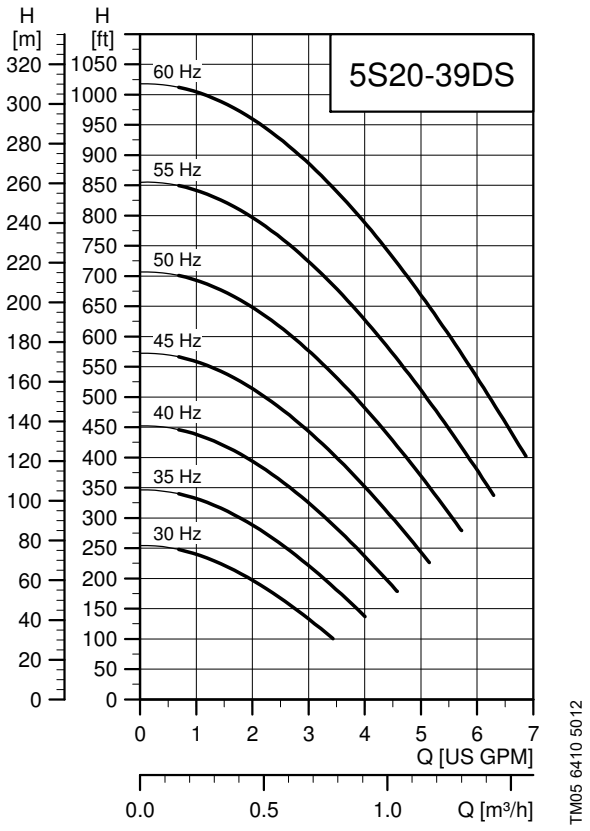
Sound pressure level

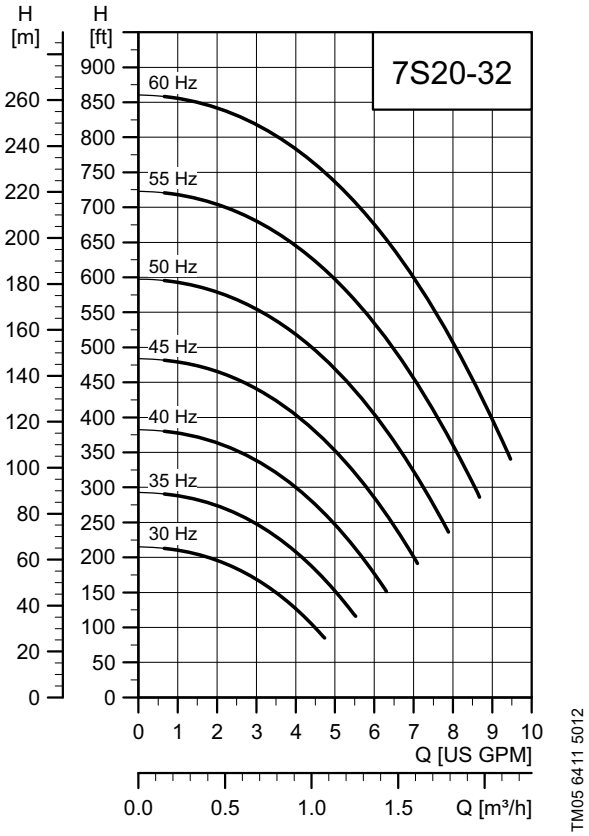
The sound pressure of CU331SP is maximum 70 dB(A).

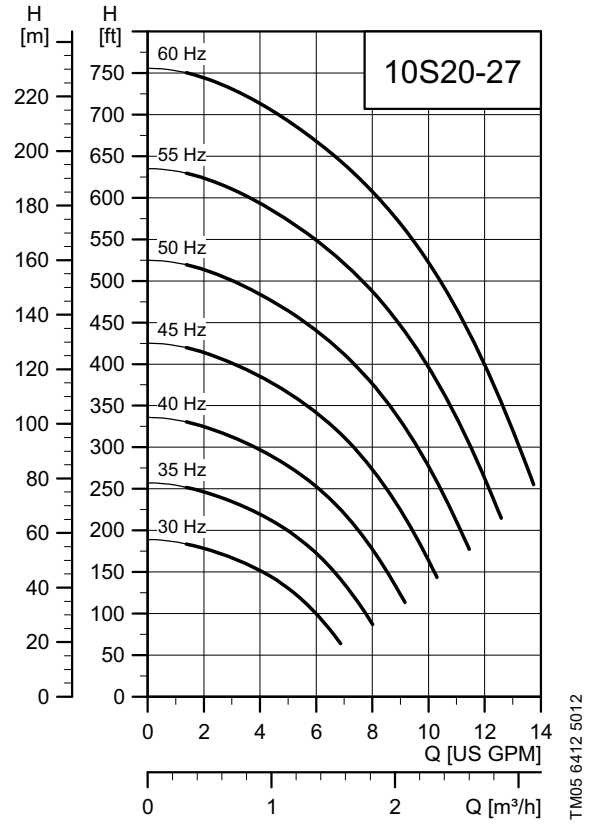
The sound pressure level of a motor controlled by a variable frequency drive may be higher than that of a corresponding motor which is not controlled by a variable frequency drive.

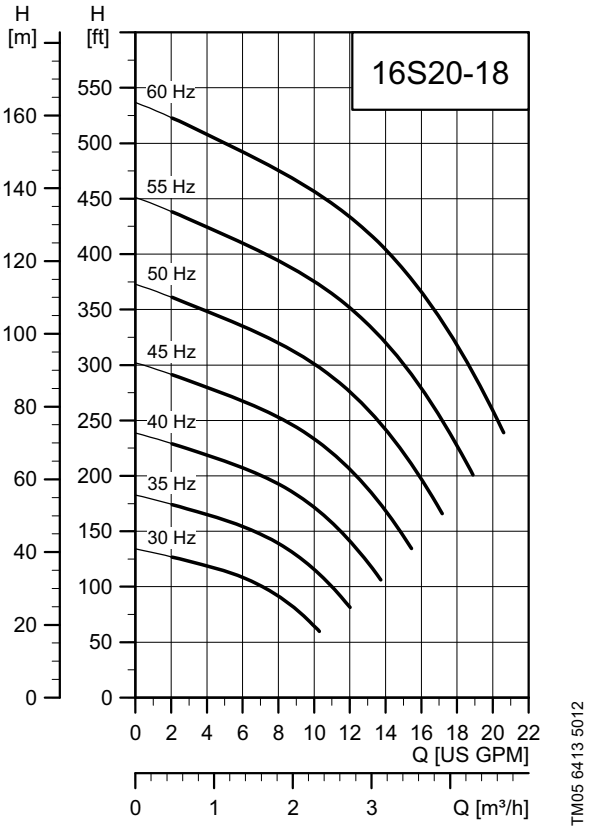
CU331SP curve charts

CU331SP, 2 Hp

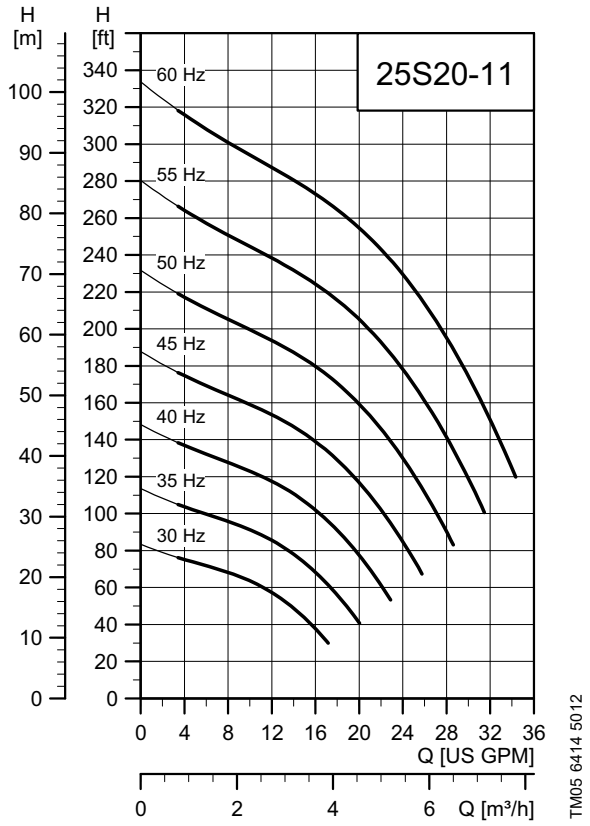


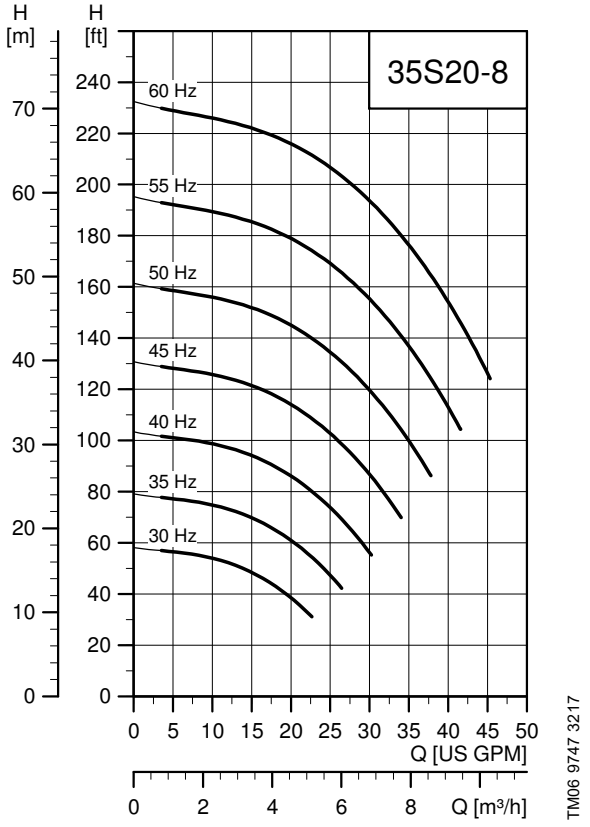


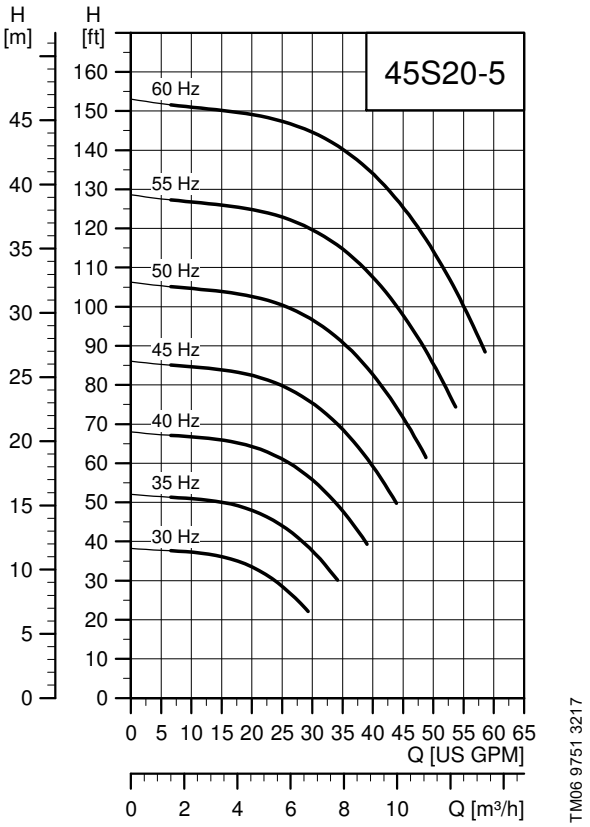


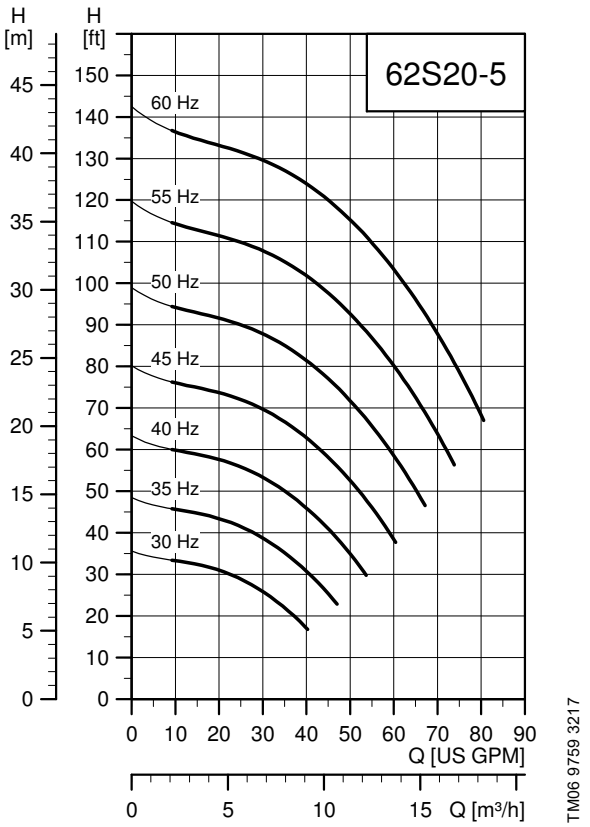


CU331SP, 2 Hp, continued

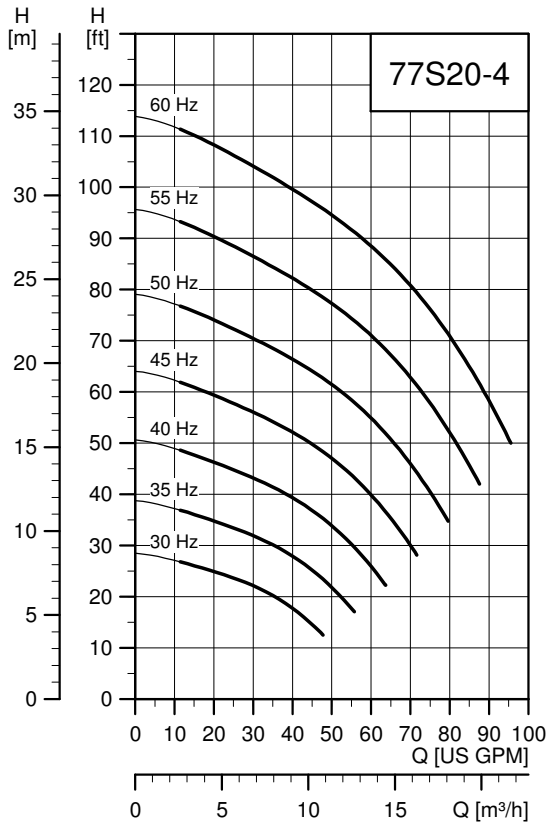




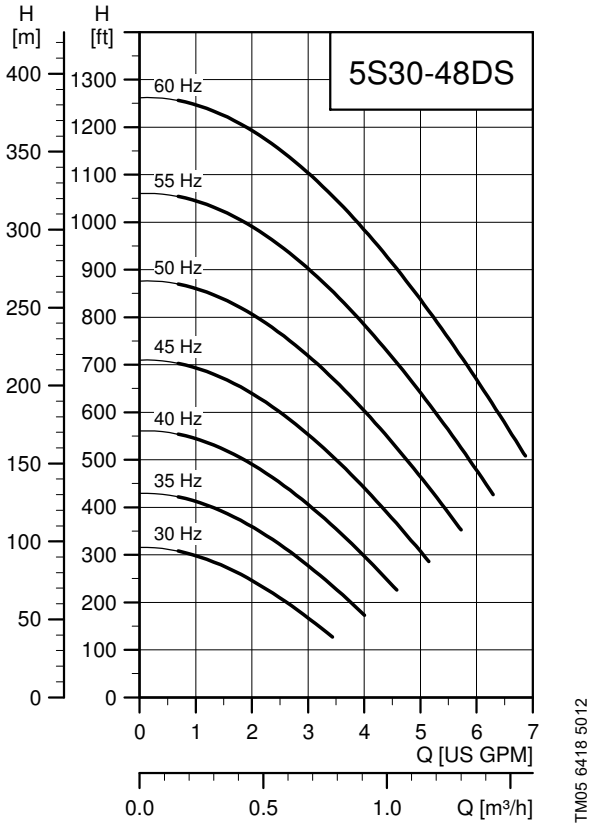


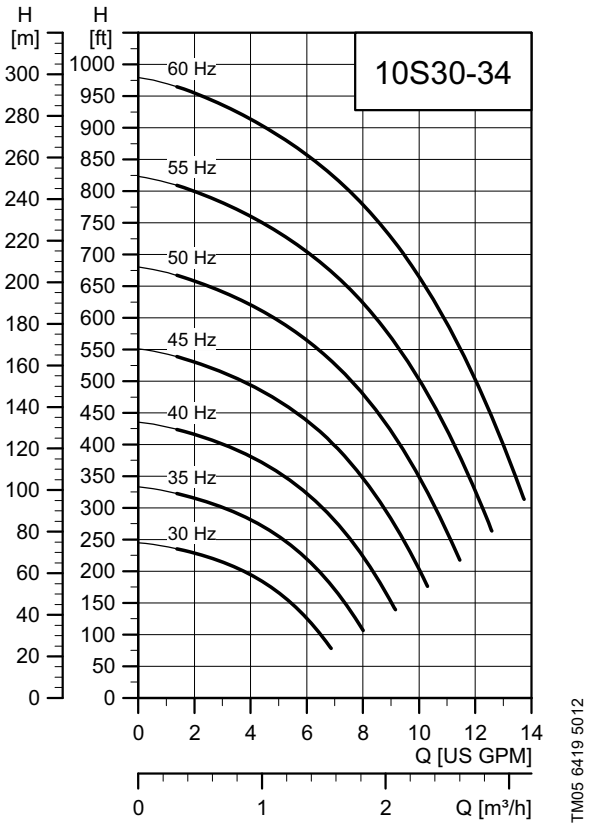


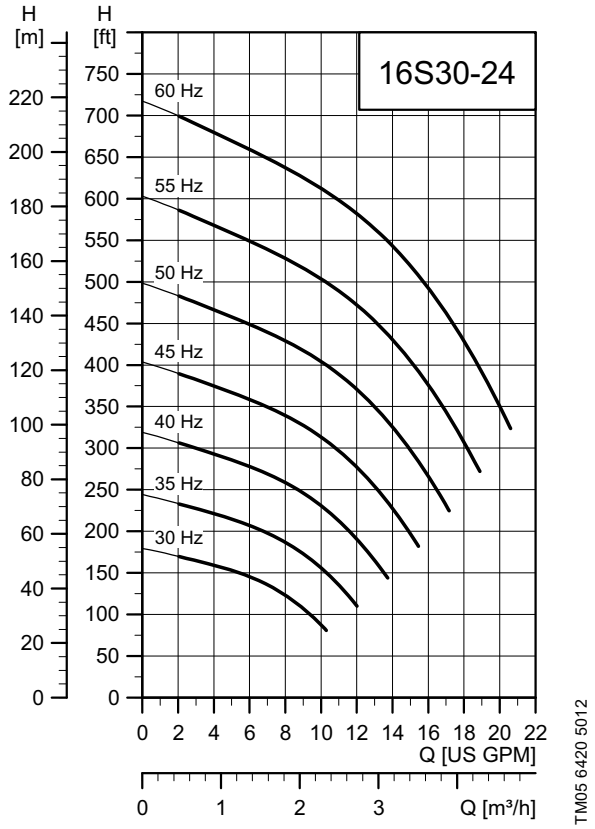
CU331SP, 2 Hp, continued

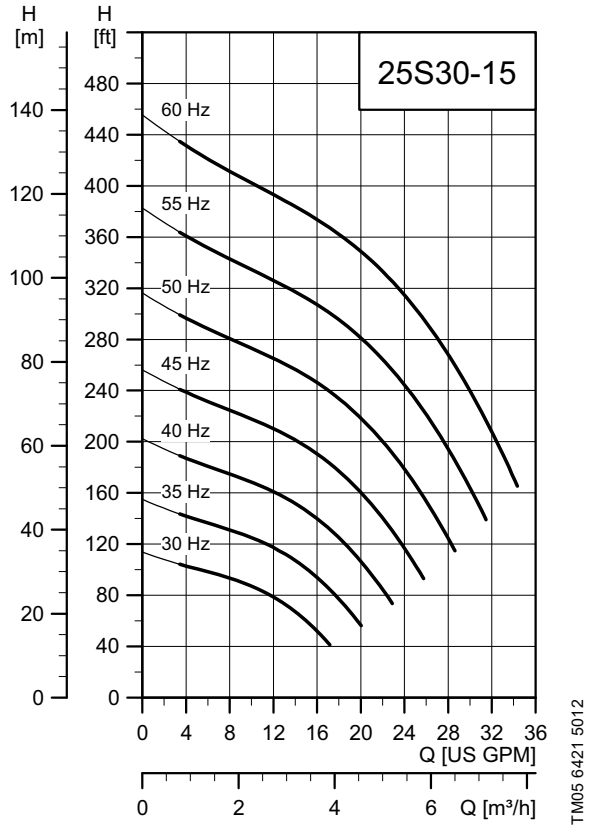


CU331SP, 3 Hp

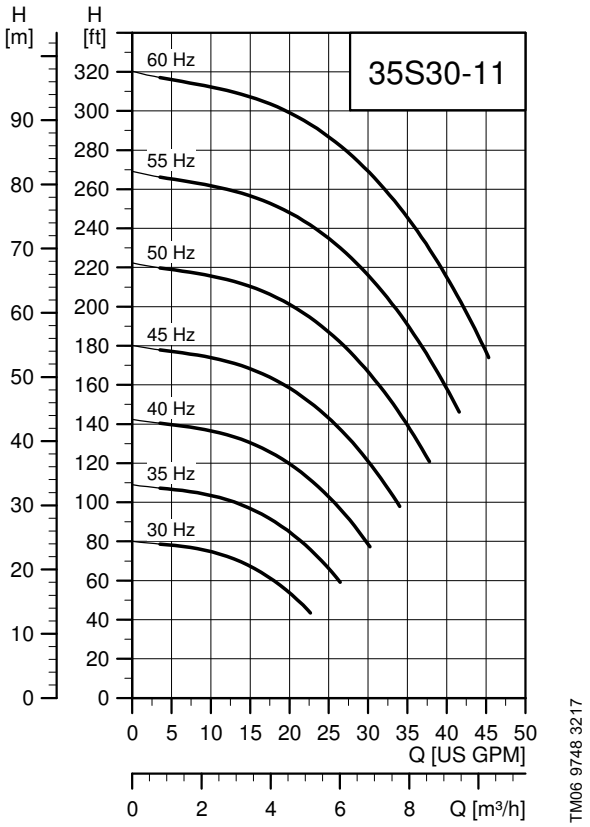

5S30-48DS
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6418 5012

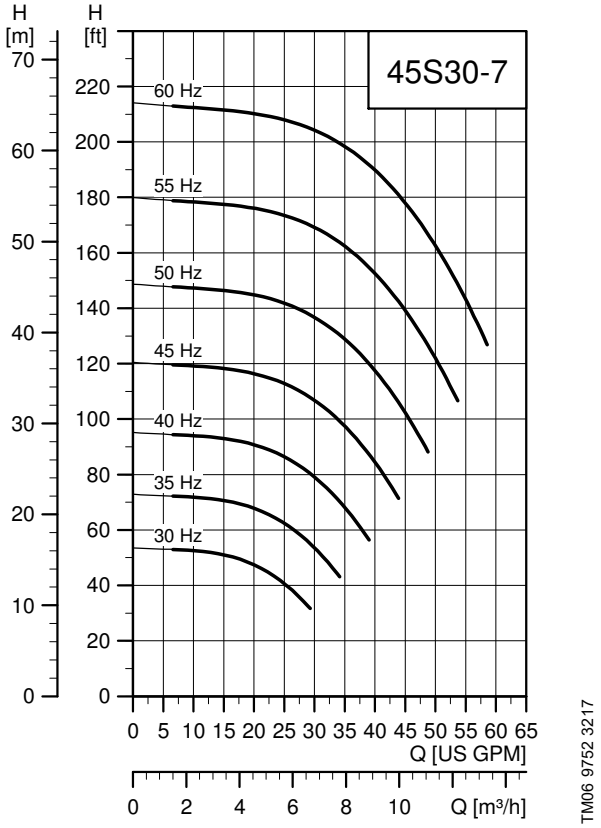

10S30-34
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6419 5012

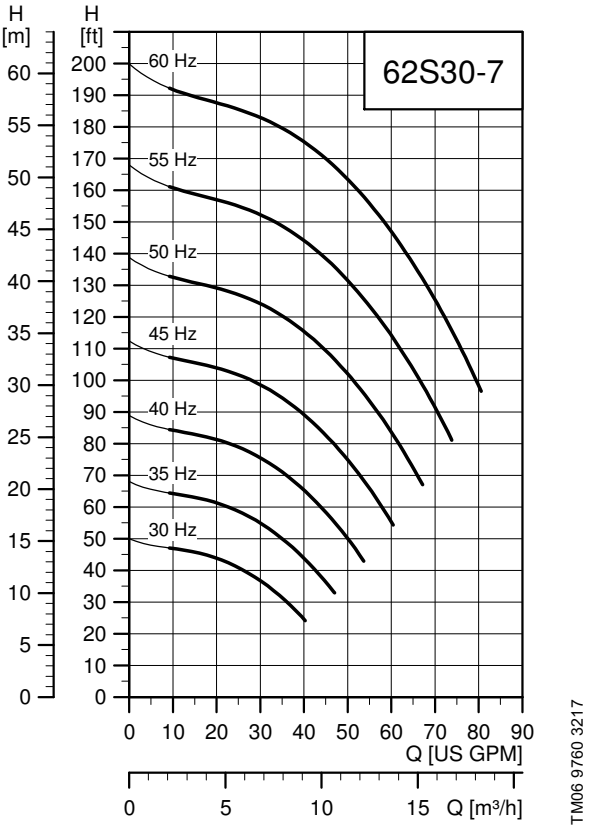

16S30-24
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6420 5012

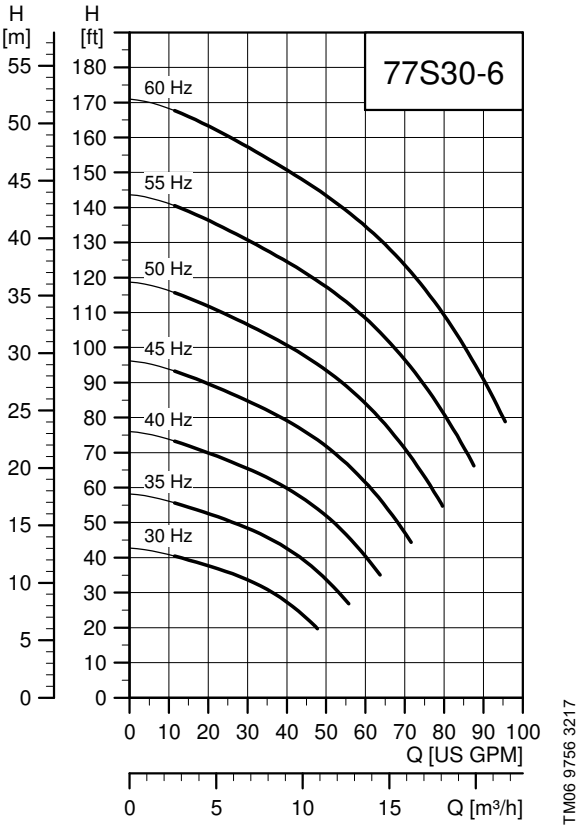

25S30-15
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6421 5012

CU331SP, 3 Hp, continued

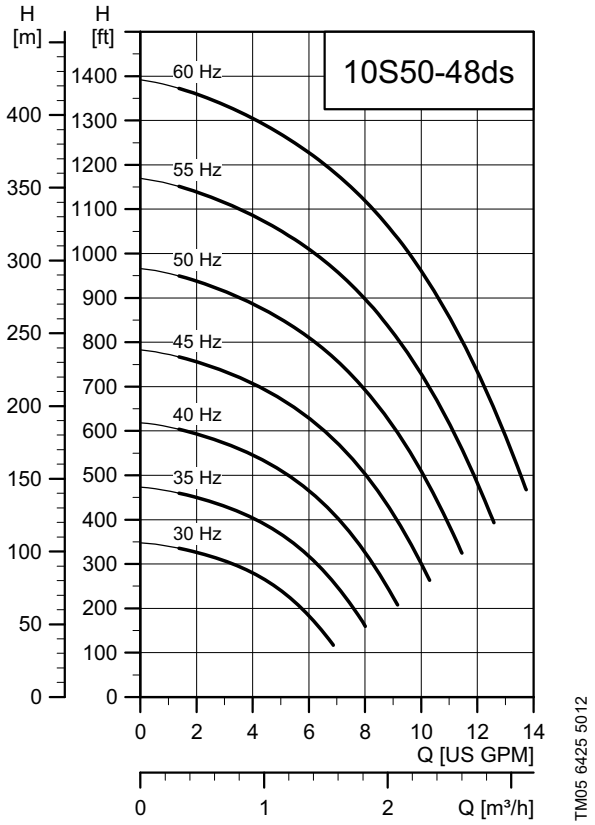


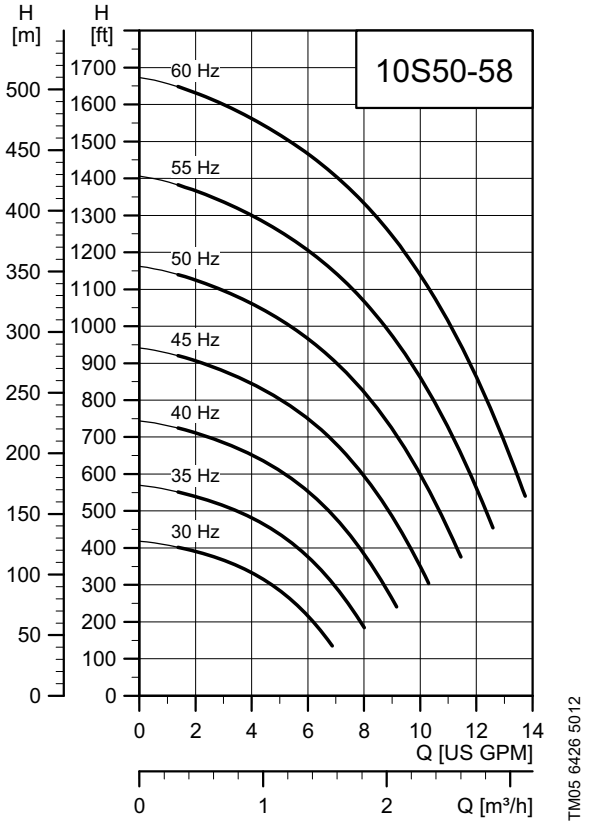


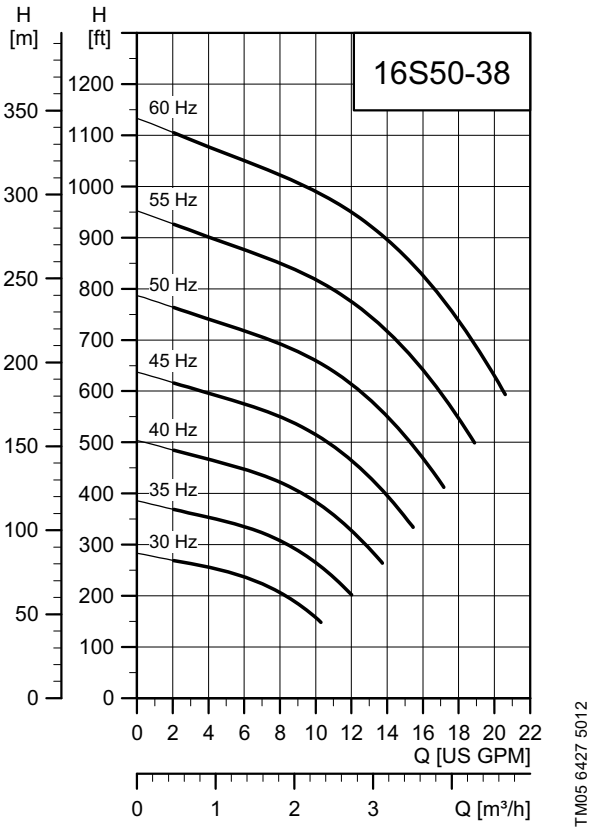


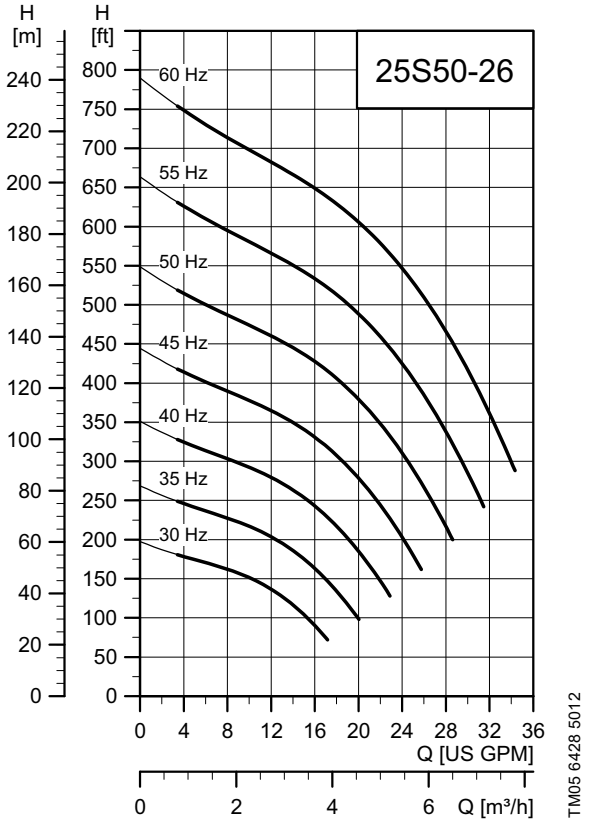


CU331SP, 5 Hp

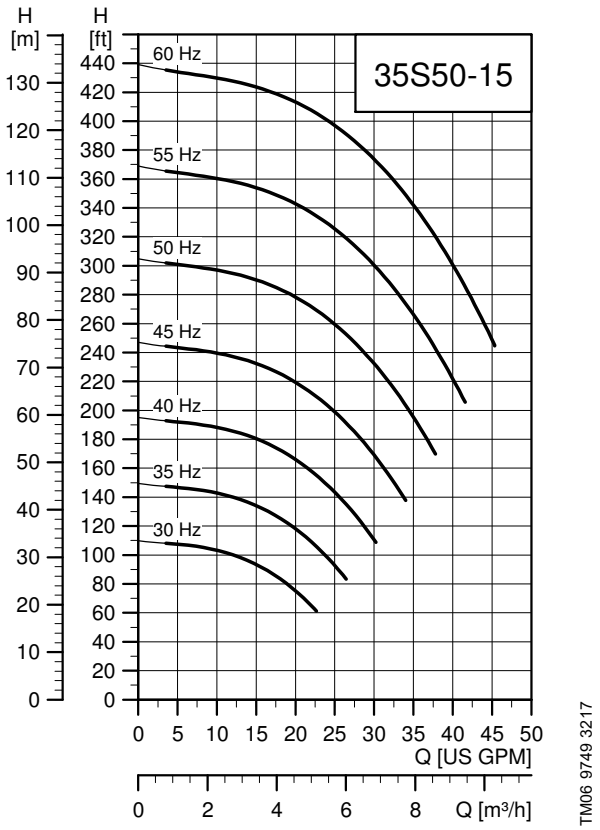

10S50-48ds
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6425 5012


10S50-58
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6426 5012

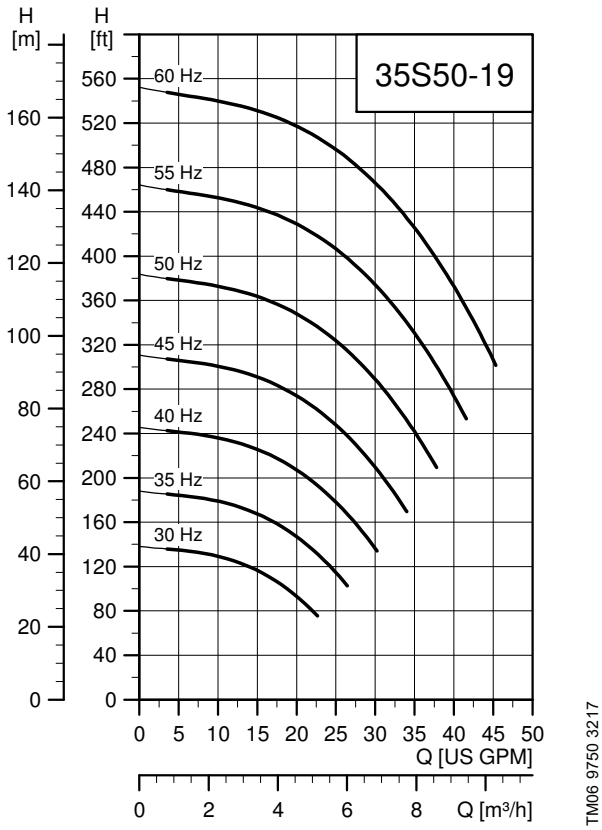

16S50-38
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6427 5012


25S50-26
H [m]
H [ft]
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6428 5012

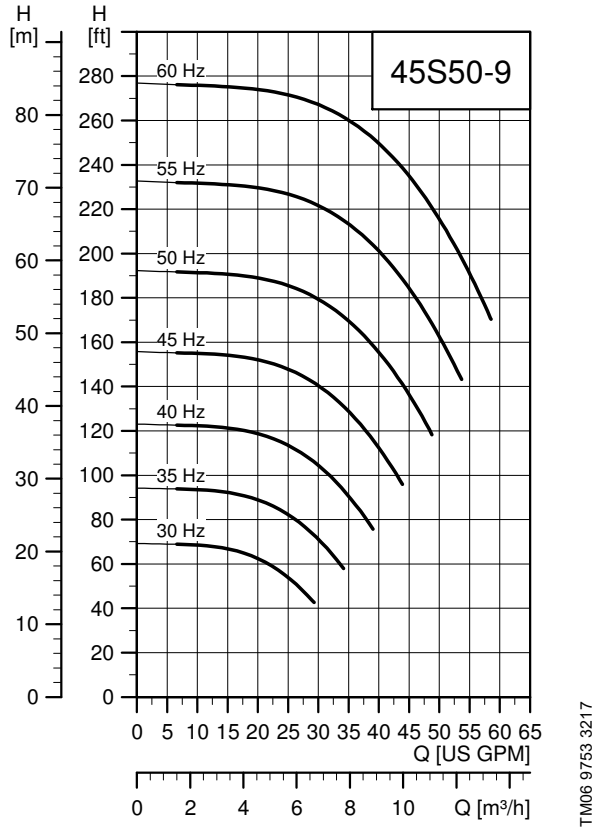
CU331SP, 5 Hp, continued



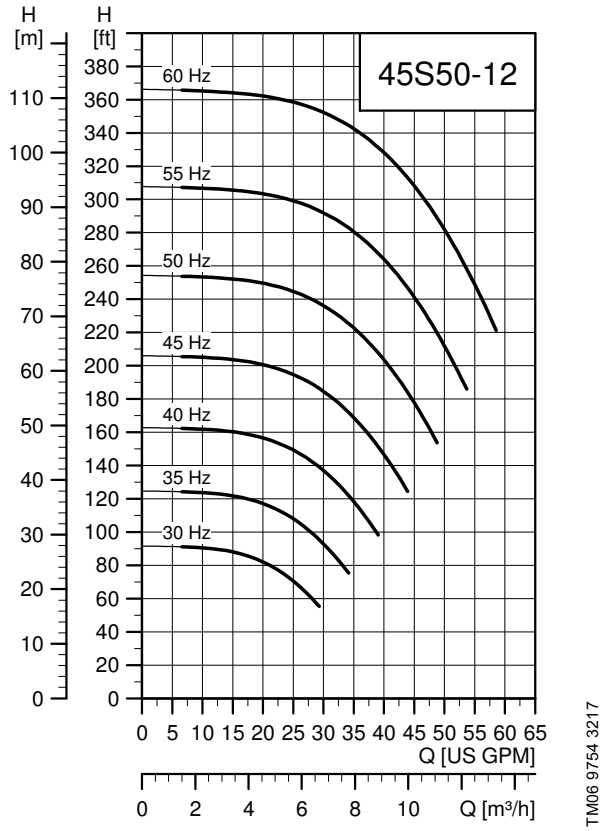
TM06 9749 3217



TM06 9750 3217

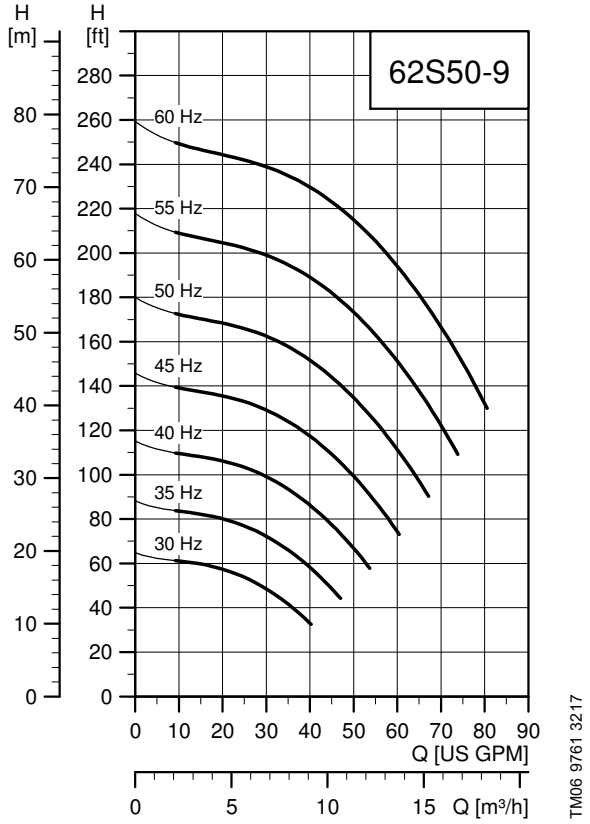


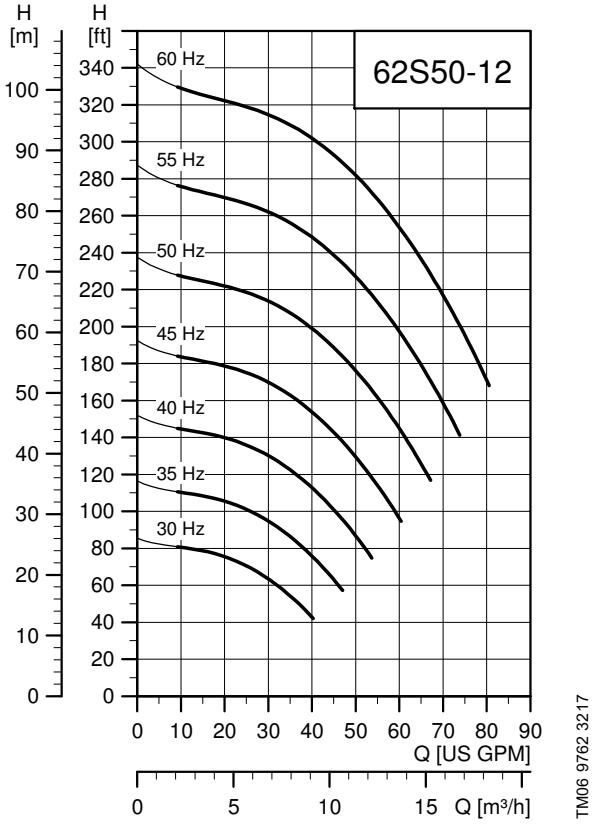
TM06 9753 3217

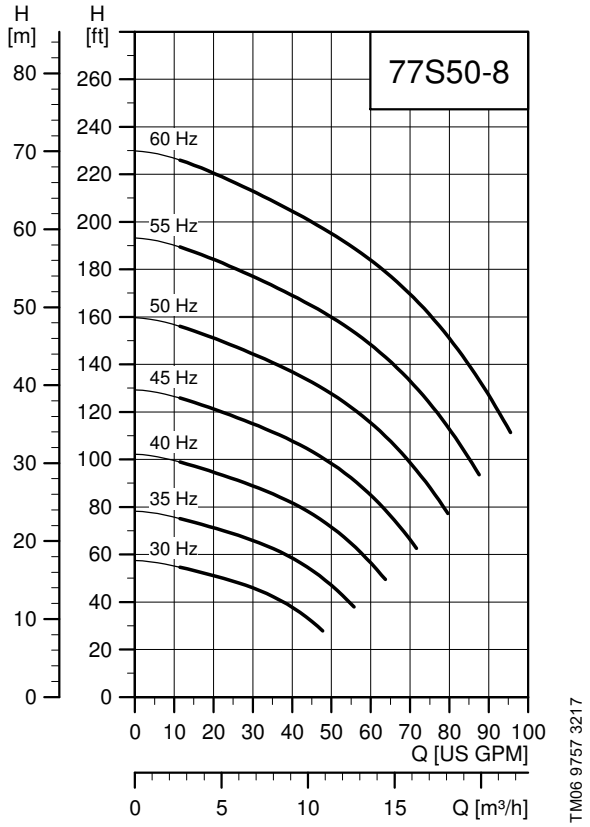


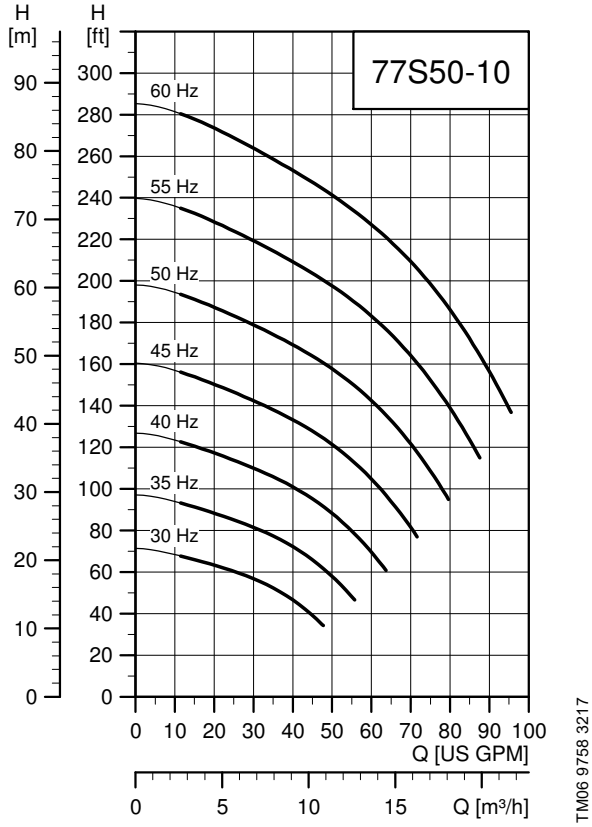
TM06 9754 3217

CU331SP, 5 Hp, continued









CUE variable frequency drive

GrSS 316404 3407

Fig. 48 The CUE range

Grundfos CUE is a series of external variable frequency drive designed for speed control of a wide range of Grundfos pumps.

CUE offers quick and easy setup and commissioning compared to a standard variable frequency drive because of the startup guide. Simply key in application-specific variables such as motor data, pump family, control function (for example constant pressure), sensor type and setpoint, and CUE will automatically set all necessary parameters.

CUE enables gentle pumping and thereby protects the water reservoir and the rest of the distribution system, as water hammer can be avoided by adjusting ramp times up and down.

When a CUE is installed, the motor requires no further overload protection. Pt100/1000 together with the MCB 114 provides overheat protection of the motor windings, if needed.

Note: If the motor has a built-in Tempcon sensor, this sensor will be disconnected when it is exposed to the variable frequency drive. An internal fuse in the motor blows and it cannot be replaced. The motor will work without the sensor, but it is not possible to restore the functionality of the Tempcon sensor.

CUE is available in two enclosure classes:

- Nema 1 (IP20/21)
- Nema 12 (IP54/55).

RFI filters

To meet the EMC requirements, CUE comes with the following types of built-in radio frequency interference filter (RFI).

Functions

CUE has a wide range of pump-specific functions, such as:

- constant pressure
- constant level
- constant flow rate
- constant temperature
- constant curve.

Features

- Startup guide
  CUE incorporates an innovative startup guide for the general setting of CUE including the setting of the correct direction of rotation.
  The startup guide is started the first time CUE is connected to the power supply.
- Check of direction of rotation.
- Duty/standby operation.
- Dry-running protection.
- Low-flow stop function.

Accessories

Grundfos offers various accessories for CUE.

MCB 114 sensor input module

MCB 114 offers additional analog inputs for CUE:

- 1 analog input, 0/4-20 mA
- 2 inputs for Pt100/Pt1000 temperature sensors.

Output filters

Output filters are used primarily to protect the motor against overvoltage and increased operating temperature. However, output filters can also be used to reduce acoustic noise from the motor.

Grundfos offers sine-wave filters as an CUE accessory.

Sensors

The following sensors can be used in connection with CUE. All sensors are with 4-20 mA output signal.

- pressure sensors, up to 362 psi (25 bar)
- temperature sensors
- differential-pressure sensors
- differential-temperature sensors
- flowmeters
- potentiometer box for external setpoint setting.

Installation

Use of output filters

The table below shows in which cases an output filter is required and which type to use.

The selection depends on these factors:

- pump type
- motor cable length
- the required reduction of acoustic noise from the motor.

Pump type	Typical shaft power, P2	Sine-wave filter
SP with 380 V motor and up	All sizes	0-984 ft (0-300 m)

The lengths stated apply to the motor cable.

Cables used in CUE installations

Note: When CUE is installed in connection with SP pumps, we distinguish between two types of installation:

- installation in EMC-insensitive sites. See fig. 49.
- installation in EMC-sensitive sites. See fig. 50.

The two types of installation are different when it comes to the use of screened cable.

Note: Drop cables are always unscreened.

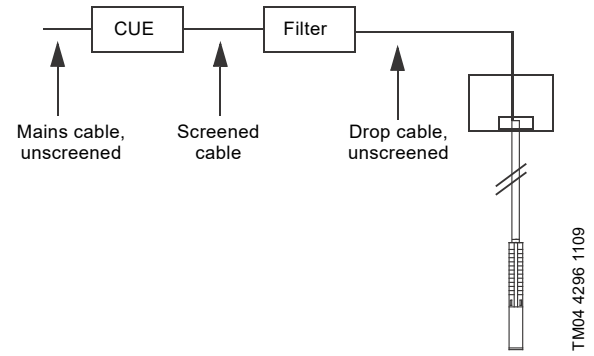


Fig. 49 Example of installation in EMC-insensitive sites

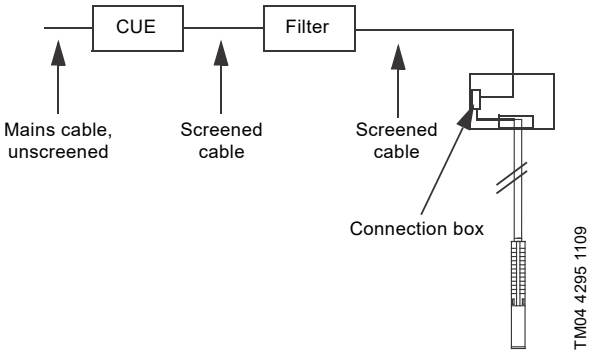


Fig. 50 Example of installation in EMC-sensitive sites

Screened cables are required in those parts of the installation where the surroundings must be protected against EMC.

CUE is the right choice of variable frequency drive in SP installations as it meets all basic issues.

CUE has a pre-installed startup guide which takes the installer through all the necessary settings.

For more information about the CUE variable frequency drive, see the CUE Data booklet, part number 9886424 or visit Grundfos Product Center at www.grundfos.us.

MP 204

MP 204 is an electronic motor protector, designed for the protection of an asynchronous motor or a pump.

The motor protector consists of:

- a cabinet incorporating transformers and electronics
- a control panel with operating buttons and display for reading of data.

MP 204 operates with two sets of limits:

- a set of warning limits and
- a set of trip limits.

If one or more of the warning limits are exceeded, the motor continues to run, but the warnings will appear in the MP 204 display.

Some values only have a warning limit.

The warning can also be read out by means of Grundfos GO.

If one of the trip limits is exceeded, the trip relay will stop the motor. At the same time, the signal relay is operating to indicate that the limit has been exceeded.

Applications

MP 204 can be used as a stand-alone motor protector.

MP 204 can be monitored via a Grundfos GENIbus.

The power supply to MP 204 is in parallel with the supply to the motor. Motor currents up to 120 A are passed directly through MP 204. MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement. MP 204 disconnects the contactor if, for example, the current exceeds the preset value.

Secondarily, the motor is protected via temperature measuring by a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

MP 204 is designed for single- and three-phase motors. In single-phase motors, the starting and run capacitors are also measured. Cos φ is measured in both single- and three-phase systems.

Benefits

MP 204 offers these benefits:

- Suitable for both single- and three-phase motors
- Dry-running protection
- Overload protection
- Very high accuracy
- Made for submersible pumps.

Many monitoring options

MP 204 monitors the following parameters:

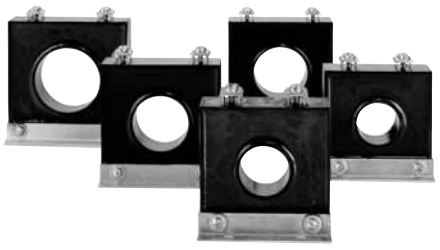
- Insulation resistance before startup
- Temperature (Tempcon, Pt sensor and PTC/thermal switch)
- Overload and underload
- Overvoltage and undervoltage
- Phase sequence
- Phase failure
- Power factor
- Power consumption
- Harmonic distortion
- Operating hours and number of starts.

TM03 1471 2205

Fig. 51 MP 204

Five sizes of single-turn transformers, 120-999 A.

Note: Monitoring of motor temperature with Tempcon sensor is not possible when single-turn transformers are used.



TM03 2033 3505

Fig. 52 Single-turn transformers

Product numbers

Product	Product number
MP 204	96079927
Single-turn transformers	
Current transformer ratio: 200:5, $I_{max.}$ = 120 A	96095274
Current transformer ratio: 300:5, $I_{max.}$ = 300 A	96095275
Current transformer ratio: 500:5, $I_{max.}$ = 500 A	96095276
Current transformer ratio: 750:5, $I_{max.}$ = 750 A	96095277
Current transformer ratio: 1000:5, $I_{max.}$ = 1000 A	96095278

Functions

- Phase-sequence monitoring
- Indication of current or temperature (user selection)
- Indication of temperature in °F or °C (user selection)
- 4-digit, 7-segment display
- Setting and status reading with Grundfos GO.
- Setting and status reading via GENIbus.

Tripping conditions

- Overload
- Underload (dry running)
- Temperature (Tempcon sensor, PTC/thermal switch and Pt sensor)
- Phase failure
- Phase sequence
- Overvoltage
- Undervoltage
- Power factor (cos φ)
- Current unbalance.

Warnings

- Overload
- Underload
- Temperature (Tempcon and Pt sensor)
- Overvoltage
- Undervoltage
- Power factor (cos φ)
  Note: In connection with single- and three-phase connection.
- 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.

External current transformers

When fitted with external current transformers, the MP 204 unit can handle currents from 120 to 999 A. Grundfos can supply approved current transformers from stock (200/5A, 300/5A, 500/5A, 750/5A, 1000/5A).

Grundfos GO

Grundfos GO allows for wireless infrared remote control of your MP 204 unit.

With Grundfos GO, you get access to a full range of options such as factory setting adjustment, service and fault finding.

Ready for bus communication

MP 204 allows for monitoring and communication via GENIbus, a Grundfos-designed bus for exchange of pump data, alarms, status information, and setpoints. This enables users to connect MP 204 to, for instance, SCADA systems.

Technical data - MP 204

Enclosure class	IP20
Ambient temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Relative humidity	99 %
Voltage range	100-480 VAC
Current range	3-999 A
Frequency	50 to 60 Hz
IEC trip class	1-45
Special Grundfos trip class	0.1 to 30 s
Voltage variation	- 25 %/+ 15 % of nominal voltage
Approvals	EN 60947, EN 60335, UL/CSA 508
Marking	CE, cUL, C-tick
Consumption	Maximum 5 W
Plastic type	Black PC / ABS

	Measuring range	Accuracy	Resolution
Current without external current transformers	3-120 A	± 1 %	0.1 A
Current with external current transformers	120-999 A	± 1 %	1 A
Phase-to-phase voltage	80-610 VAC	± 1 %	1 V
Frequency	47-63 Hz	± 1 %	0.5 Hz
Power	0-1 MW	± 2 %	1 W
Power factor	0 - 0.99	± 2 %	0.01
Energy consumption	0-4 x 10^9 kWh	± 5 %	1 kWh

Control functions

This table describes the protection provided by MP 204.

Control parameters	Function	Problem	Advantages
Temperature	**MS** The motor temperature is measured by means of the built-in Tempcon temperature transmitter and a signal is sent to MP 204 via the phase leads. In MP 204 the measured temperature is compared with the factory-set value of 167 °F (75 °C). **MMS** The motor temperature is measured by means of Pt100/Pt1000. The signal is sent to MP 204 where the measured temperature is compared with the factory-set value. Temperature protection requires a submersible motor with a Pt100/Pt1000. The motor temperature must be monitored during variable frequency drive operation.	Overload, frequent starts/stops, operation against blocked outlet pipe, insufficient flow velocity past the motor.	Longer motor life, safe operating conditions, service indication.
Overvoltage/undervoltage	If the set trip value is exceeded, the motor will stop.	The installation is close to a transformer. The mains do not absorb load variations.	Important installation parameter, possibility of improving operating conditions.
Overload	The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the factory-set value is exceeded, the motor will stop.	Incorrect sizing of pump/motor, voltage supply failure, defective cable, blocking, wear or corrosion.	Longer pump life, safe operating conditions, service indication.
Underload (dry running)	The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the average value is lower than the factory-set value, the motor will stop.	Pump exposed to dry running or underload, for example caused by wear.	Traditional dry-running protection is no longer necessary, no extra cables.
Current unbalance	The power input of the motor is measured on each of the three phases.	Mains load is uneven, incipient motor defect, phase voltages diverging.	Motor protection against overload, service indication.
Phase sequence	MP 204 and motor are installed so that the phase sequence corresponds to correct direction of rotation. MP 204 monitors changes in the phase sequence.	Two phases are wrongly connected.	Ensures correct pump performance.
Phase failure	MP 204 checks the phases connected, phase failure will cause an alarm.	Phase failure.	Indication of phase failure, and alarm.

Grundfos GO remote app and Grundfos GO CAPS

Grundfos GO is the mobile tool box for professional users on the go. The Grundfos GO app can be used to establish wireless connection to Grundfos products. Grundfos GO gives you intuitive handheld pump control, and full access to all the Grundfos Online tools on the go. Grundfos GO consists of two Apps: GO Remote and GO CAPS. It is available from Apple App Store and Google Play.

The Grundfos GO app must be used in conjunction with one of the following mobile interface devices:

Product	Description	Product number
MI 202	Dongle for iPhone 4/4s, iPad, or iPod touch (30 pin connector compatible)	98046376
MI 204	Dongle for iPhone, iPad, or iPod touch with Lightning connector	98424092
MI 301	Universal Bluetooth dongle for Android, iPhone or other iOS device	98046408
MI 204	MI204 Kit with MI204 dongle, Apple iPod, sleeve and cover	98612711

•

The mobile interfaces are modules with built-in IR and radio communication.

The Grundfos product must support either IR communication or radio communication.

Grundfos GO Remote

Grundfos GO Remote works with all our E-pumps and communicates both using both radio and infrared technology. It provides easy-to-follow tips and guidance as well as live pump data feeds.

To communicate with the pumps, special hardware (Mobile Interfaces) from Grundfos is required. The Grundfos GO Remote app can be downloaded for free for both Apple iOS and Android devices.

While connected to a Grundfos product, the following features are available:

- Product dashboard which gives the user a quick overview of the connected product
- Status data which monitor status data from the Grundfos product
- Alarms and warnings where you can see detailed alarm information with timestamps
- Configuration and commissioning
- Create installation report in pdf format
- Read and write profiles,and copy configuration from one product to another
- Available in 28 languages.

Grundfos GO CAPS

GO CAPS works online and supports all the basic CAPS functionalities. It is available for Apple iOS devices only, and is free to download. Features:

- Search product by: Number, Name or QR code
- Size a product (Heating, Air-conditioning, Pressure boosting & Wastewater)
- Catalog
- Replace product
- Compare products
- Product view
- Projects
- Favorites
- Supports 11 languages

MI 202 and MI 204

MI 202 and MI 204 are add-on modules for Apple devices. For Apple iPod touch 4 and iPhone 4 and 4S, use MI 202. For Apple products with Lightning connector, use MI 204.

Note: "Made for iPod, iPhone" means that an electronic accessory has been designed to connect specifically to iPod or iPhone and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod may affect wireless performance.

Fig. 53 MI 202 and MI 204

MI 301

MI 301 is a module that connects to an Android or iOS-based smart device via Bluetooth. MI 301 has a rechargeable Li-ion battery and must be charged separately.

Fig. 54 MI 301

Supported devices

The smart devices listed below have been tested and are supported by Grundfos GO.

Make	Model	MI 202	MI 204	MI 301
Apple	iPod touch 4G	•		•
	iPod touch 5G		•	•
	iPhone 4, 4S	•		•
	iPhone with Lightning connector		•	•
	iPad, iPad Mini		•	•
Asus	Nexus 7			•
	Transformer TF101, TF300			•
Google	Galaxy Nexus, Nexus 4, Nexus 10			•
HTC	Desire S, One S, Sensation			•
Motorola	Xoom2, Moto X (XT1053)			•
Samsung	Galaxy S II, Galaxy S III			•
	Galaxy tab 2 7.0			•
Sony	Xperia Arc, Arc S, Xperia Tipo, Xperia V			•

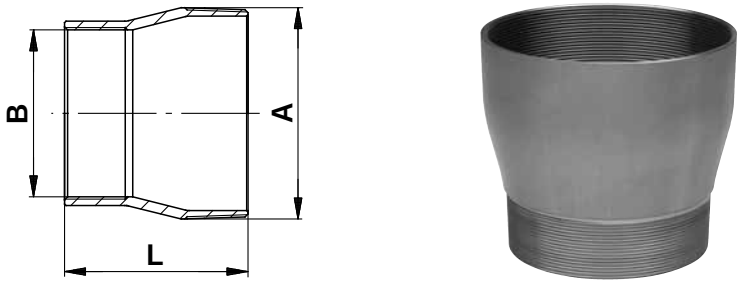
Note: Similar Android and iOS-based devices may work as well, but have not been tested by Grundfos.

For further details, features and screens, see Grundfos GO instructions part number 98133717, included with GO Remote product.

Connecting pieces

The tables below show the range of connecting pieces for connection of thread-to-flange and thread-to-thread.

Thread-to- thread



TM01 2397 1698 - GrA2555

Fig. 55 Dimensional sketch and photo of connecting piece thread-to-thread

Type	Connecting piece	Dimensions			Product number	
		Thread-to-thread		L [in (mm)]		
		A	B		304 stainless steel	316 stainless steel
385S 475S	NPT 5→ NPT 4	NPT 5	NPT 4	4.76 (121)	190064	190586
	NPT 5→ NPT 6	NPT 5	NPT 6	5.91 (150)	190070	190592
625S 800S 1100S	NPT 6→ NPT 5	NPT 6	NPT 5	5.91 (150)	200135	200645

Zinc anodes

Application

Cathodic protection by means of zinc can be used for corrosion protection of SP pumps in chloride-containing liquids such as brackish water and seawater.

Sacrificial anodes are placed on the outside of the pump and motor as protection against corrosion.

The number of anodes required depends on the pump and motor in question.

Please contact Grundfos for further details.

Liquid temperatures

- Seawater:
  Up to 95 °F (35 °C).
- Brackish water (minimum 1500 ppm (g/m^3) chloride):
  Up to 95 °F (35 °C).

Anode life

The zinc anodes have a life of one to four years, depending on operating conditions (temperature, flow rate and chloride content).

Product numbers of zinc anodes

Zinc anodes for pumps										
	Used for pump type									
Product number	SP 5S to 77S	85S	150S	230S	300S	385S	475S	625S	800S	1100S
99326959	●	-	-	-	-	-	-	-	-	-
97645875	-	●	●	●	●	-	-	-	-	-
97645914	-	-	-	-	-	●	●	-	-	-
97646116	-	-	-	-	-	-	-	●	●	-
97646118	-	-	-	-	-	-	-	-	-	●

Zinc anodes for motors				
4" motors	6" motors	8" motors	10" motors	12" motors
96856060	97645910	97646116	97646118	97646138

SA-SPM 6 control boxes

Application

SA-SPM 6 control boxes are used as starting units for single-phase, 3-wire motors ranging from 0.5 Hp to 5 Hp (.37 kW to 3.7 kW).

SA-SPM 6 from 1.5 Hp to 5 Hp (1.1 kW to 3.7 kW) is available in two versions, Standard (STD) and Deluxe (DLX).

The standard version incorporates a motor-protective circuit breaker and thus protects the motor against overload.

The deluxe version is identical to the standard version with the addition of a motor contactor for connection and disconnection of the power supply.

Technical data

Enclosure class: IP42.

Ambient temperature: -4 °F to +140 °F (-20 °C to +60 °C).

Relative humidity: Maximum 95 %, normal non-aggressive atmosphere.

TM03 8150 0607

Fig. 56 SA-SPM 6 control box

SA-SPM 6 control box part numbers

Control box for 4-inch, 3-wire, single phase motors						
Type	Hp	Volts	Approximate ship wt (lb)	Product number (Order in multiples of 1)	Product number (Order in multiples of 10)	Reference product number only**
STD	1/2*	115	2	-	98821580	98315240
STD	1/2*	230	2	-	98821631	98315251
STD	3/4*	230	2	-	98821632	98315252
STD	1*	230	2	-	98821633	98315253
STD	1-1/2	230	2	98315254	-	-
DLX	1-1/2	230	3	98315255	-	-
STD	2	230	6	98315256	-	-
DLX	2	230	6	98315257	-	-
STD	3	230	6	98315258	-	-
DLX	3	230	7	98315259	-	-
STD	5	230	7	98315260	-	-
DLX	5	230	8	98315261	-	-

* The 1/2 hp, 3/4 hp and 1 hp control boxes are now sold by Grundfos in multiple quantities (10-pack) only.

** Old control box material numbers that Grundfos sold in single units.

DLX (Deluxe Control Box,): Includes magnetic starter in addition to Standard Control Box (STD).

Pt100/Pt1000

The Pt100/Pt1000 sensor offers these features:

- Continuous monitoring of the motor temperature
- Protection against too high motor temperature.

Protecting the motor against too high motor temperature is the simplest and cheapest way of avoiding that motor lifetime is reduced. Pt100/Pt1000 ensures that the operating conditions are not exceeded and indicates when it is time for service of the motor.

Monitoring and protection by means of Pt100/Pt1000 require the following parts:

- Pt100/Pt1000 sensor
- Relay, type PR 5714
- Cable.

The PR 5714 relay is fitted with a Pt100/Pt1000 module. For both relays the following temperature limits are preset on delivery:

- 140 °F (60 °C) warning limit
- 167 °F (75 °C) stop limit.

Technical data

	Relay type
	PR 5714
Enclosure class	IP65 (mounted in a control panel)
Ambient temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Relative humidity	95 % (condensating)
Voltage variation	• 1 x 24-230 VAC ± 10 %, 50-60 Hz. • 24-250 VDC ± 20 %.
Approvals	UL, DNV
Mark	CE

PR 5714 relay	Voltage	Product number
	24-230 VAC, 50/60 Hz / 24-250 VDC	96621274

PR 5714 relay		Voltage	Product number
	GrA3186 0407	24-230 VAC, 50/60 Hz / 24-250 VDC	96913234

Pt100 sensor, including cable for standard-, N- and R-versions		Cable length [ft (m)]	
	GrA3190 0407	65.6 (20)	For product number, see Grundfos Price Book or call Grundfos.
		131.2 (40)	
		196.9 (60)	
		262.5 (80)	
		100 (328.1)	

Staybolt kits for Pt100 in MS 6000		Description	
	GrA3191 0407	Staybolt kit for Pt100/Pt1000. Material: AISI 316 (EN 1.4401).	For product number, see Grundfos Price Book or call Grundfos.
		Staybolt kit for Pt100. Material: AISI 904L (EN 1.4539).	

Insertion probe for MMS 10000		Description	
	TM04 3560 4508	Insertion probe for Pt100/Pt1000 in MMS 10000. Material: 316 (EN 1.4401) (N-version).	For product number, see Grundfos Price Book or call Grundfos.
		Insertion probe for Pt100/Pt1000 in MMS 10000. Material: AISI 904L (EN 1.4539) (R-version).	

Pt1000 sensor, including cable		Cable length [ft (m)]	
	TM04 3563 4508	65.6 (20)	For product number, see Grundfos Price Book or call Grundfos.
		131.2 (40)	
		196.9 (60)	
		262.5 (80)	
		100 (328.1)	

Staybolt kits for Pt1000 in MS 402 and MS 4000		Description	
	TM05 3694 1612	Staybolt kit for Pt1000. Material: AISI 316 (EN 1.4401).	For product number, see Grundfos Price Book or call Grundfos.
		Staybolt kit for Pt1000. Material: AISI 904 (EN 1.4539).	

21. Energy consumption

Energy consumption of submersible pumps

The percentage distribution of service life costs of a submersible pump for water supply is:

- 5 % initial costs (pump)
- 85 % operating energy costs
- 10 % maintenance costs.

It is obvious that the highest savings can be achieved within energy consumption!

The annual energy consumption, E, of a submersible pump can be calculated as follows:

E = c x h x P_1 (USD)

c = specific energy price (USD/kWh)

h = operating hours/year (hours)

P_1 = power input of the submersible pump (Hp).

Example: Calculation of the annual energy consumption of the submersible pump, type 625S-3.

625S-3 with MMS 8000, 60 Hp, 3 x 460 V, 60 Hz.

Duty point:

Flow rate:	Q = 528 gpm
Total head:	H = 335 ft
Specific energy price:	c = USD 0.15/kWh (consisting of day and night rate)
Operating hours/year:	h = 3200.

$$P_1 = \frac{Q \times H \times \rho}{367 \times \eta_{pump} \times \eta_{motor}} \text{ in kW}$$

Q	=	gpm
H	=	ft
Density ρ	=	lb/ft^3 (assumed 1)
367	=	conversion factor
η_{motor}	=	(example 84.5 %, in equation 0.845)
η_{pump}	=	(not to be confused with the stage efficiency curve).

By showing the P_2/Q curve we make it easier for you to calculate the energy consumption.

$$P_1 = \frac{P_2}{\eta_{motor}}$$

P_2 = 35 Hp (power requirement of 625S-3 pump at 88 gpm, from curve P_2/Q).

Calculation of motor efficiency at duty point

As standard the SP 625S-3 is equipped with a 60 Hp (45 kW for P1) MS 6000C motor.

At duty point (Q = 528 gpm) the pump requires 59 Hp (44 kW for P1), thus:

a motor load of 87 % (44 kw / 45 kw) and a power reserve of 2 %.

From the table on page 94 the motor efficiency can be read as:

84.6 % at a load of 75 %. ($\eta_{75\ \%}$)

85.6 % at a load of 100 %. ($\eta_{100\ \%}$)

The interpolated value in this example is

η_{motor} = 85.1 %, η_{motor} = 0.851.

$$P_1 = \frac{44}{0.851} = 51.7 \text{ kW}$$

E = 0.15 USD/kWh x 3200 h x 51.7 kW.

The annual energy costs amount to USD 24816.

The pay-off time, A, (months) is calculated as follows:

$$A = \frac{\text{Purchase price of energy - efficiency pump}}{\text{Energy savings / year}} \times 12$$

Cable sizing

In order to obtain an economical duty of the pump the voltage drop must be low.

Today large water works already size cables for a maximum voltage drop of 1 %.

The hydraulic resistance in the outlet pipe must be as low as possible.

22. Cables

Cable sizing charts

115 V and 230 V, 1 ph 60 Hz

Maximum submersible power cable length (maximum cable length in feet - starter to motor)

Motor rating	[Hp]	AWG copper wire size [ft (m)]													MCM copper wire size		
		14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350
115 V 1 ph 60 Hz	0.33	130 (40)	210 (64)	340 (104)	540 (165)	840 (256)	1300 (396)	1610 (491)	1960 (597)	2390 (728)	2910 (887)	3540 (1079)	4210 (1283)	5060 (1542)	5680 (1731)	6390 (1948)	7110 (2167)
	0.5	100 (30)	160 (49)	250 (76)	390 (119)	620 (189)	960 (293)	1190 (363)	1460 (445)	1780 (543)	2160 (658)	2630 (802)	3140 (957)	3770 (1149)	4240 (1292)	4770 (1454)	5320 (1622)
230 V 1 ph 60 Hz	0.33	550 (168)	880 (268)	1390 (424)	2190 (668)	3400 (1036)	5250 (1600)	6520 (1987)	7960 (2426)	9690 (2954)	11770 (3587)	14320 (4365)	17050 (5197)	20460 (6236)	22980 (7004)	25850 (7879)	28750 (8763)
	0.5	400 (122)	650 (198)	1020 (311)	1610 (491)	2510 (765)	3880 (1183)	4810 (1466)	5880 (1792)	7170 (2185)	8720 (2658)	10620 3237)	12660 (3859)	15210 (4636)	17100 (5212)	19260 (5870)	21440 (6535)
	0.75	300 (91)	480 (146)	760 (232)	1200 (366)	1870 (570)	2890 (881)	3580 (1091)	4370 (1332)	5330 (1625)	6470 (1972)	7870 (2399)	9380 (2859)	11250 (3429)	12640 (3853)	14220 (4334)	15810 (4819)
	1	250 (76)	400 (122)	630 (192)	990 (302)	1540 (469)	2380 (725)	2960 (902)	3610 (1100)	4410 (1344)	5360 (1634)	6520 (1987)	7780 (2371)	9350 (2850)	10510 (3203)	11840 (3609)	13180 (4017)
	1.5	190 (58)	310 (94)	480 (146)	770 (235)	1200 (366)	1870 (570)	2320 (707)	2850 (869)	3500 (1067)	4280 (1305)	5240 (1597)	6300 (1920)	7620 (2323)	8630 (2630)	9810 (2990)	10980 (3347)
	2	150 (46)	250 (76)	390 (119)	620 (189)	970 (296)	1530 (466)	1910 (582)	2360 (719)	2930 (893)	3620 (1103)	4480 (1366)	5470 (1667)	6700 (2042)	770 (235)	8890 (2710)	10080 (3072)
	3	120 (37)	190 (58)	300 (91)	470 (143)	750 (229)	1190 (363)	1490 (454)	1850 (564)	2320 (707)	2890 (881)	3610 (1100)	4470 (1362)	5550 (1692)	6450 (1966)	7580 (2310)	8690 (2649)
	5	-	110* (34*)	180 (55)	280 (85)	450 (137)	710 (216)	890 (271)	1110 (338)	1390 (424)	1740 (530)	2170 (661)	2680 (817)	3330 (1015)	3870 (1180)	4550 (1387)	5210 (1588)
	7.5	-	-	120* (37*)	200 (61)	310 (94)	490 (149)	610 (186)	750 (229)	930 (283)	1140 (347)	1410 (430)	1720 (524)	2100 (640)	2400 (732)	2790 (850)	3120 (951)
	10	-	-	-	160* (49*)	250 (76)	390 (119)	490 (149)	600 (183)	750 (229)	930 (283)	1160 (354)	1430 (436)	1760 (536)	2030 (619)	2370 (723)	2700 (823)
	15	-	-	-	-	170* (52*)	270 (82)	340 (104)	430 (131)	530 (162)	660 (201)	820 (250)	1020 (311)	1260 (384)	1460 (445)	1700 (518)	1940 (591)

NOTE:

* Indicates single conductor only (not jacketed).

No asterisk indicates both jacketed cable and single conductor cables.

1. The table is based on copper wire. If aluminum wire is used, multiply lengths by 0.5.
   The maximum permissible length of aluminum is considerably shorter than copper wire of same size.
2. Make sure that the portion of the total cable which is between the service entrance and a motor starter/controller does not exceed 25 % of the total maximum length to ensure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. The table is based on a maintaining motor terminal voltage at 95 % of service entrance voltage, running at maximum nameplate amperes. In general, a voltage drop must be maintained at 3 V / 100 ft or less.
4. 1 foot = 0.305 meter (1 meter = 3.28 feet).

200-208 V, 3 Ph 60 Hz

Maximum submersible power cable length (maximum cable length in feet - starter to motor)																	
Motor rating	[Hp]	AWG copper wire size [ft (m)]													MCM copper wire size		
		14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350
200-208 V 3 ph 60 Hz	.5	710 (216)	1140 (347)	1800 (549)	2840 (866)	4420 (1347)	-	-	-	-	-	-	-	-	-	-	-
	.75	510 (155)	810 (245)	1280 (390)	2030 (619)	3160 (963)	-	-	-	-	-	-	-	-	-	-	-
	1	430 (131)	690 (210)	1080 (329)	1710 (521)	2670 (814)	4140 (1262)	5140 (1567)	-	-	-	-	-	-	-	-	-
	1.5	310 (94)	500 (152)	790 (241)	1260 (384)	1960 (597)	3050 (930)	3780 (1152)	-	-	-	-	-	-	-	-	-
	2	240 (73)	390 (119)	610 (186)	970 (296)	1520 (463)	2360 (719)	2940 (896)	3610 (1100)	4430 (1350)	5420 (1652)	-	-	-	-	-	-
	3	180 (55)	290 (88)	470 (143)	740 (226)	1160 (354)	1810 (552)	2250 (686)	2760 (841)	3390 (1033)	4130 (1259)	-	-	-	-	-	-
	5	110* (34*)	170 (52)	280 (85)	440 (134)	690 (210)	1080 (329)	1350 (411)	1660 (506)	2040 (622)	2490 (759)	3050 (930)	3670 (1119)	4440 (1353)	5030 (1533)	-	-
	7.5	-	-	200 (61)	310 (94)	490 (149)	770 (235)	960 (293)	1180 (360)	1450 (442)	1770 (539)	2170 (661)	2600 (792)	3150 (960)	3560 (1085)	-	-
	10	-	-	-	230* (70*)	370 (113)	570 (174)	720 (219)	880 (268)	1090 (332)	1330 (405)	1640 (500)	1970 (600)	2390 (728)	2720 (829)	3100 (945)	3480 (1061)
	15	-	-	-	160* (49*)	250* (76*)	390 (119)	490 (149)	600 (183)	740 (226)	910 (277)	1110 (338)	1340 (408)	1630 (497)	1850 (564)	2100 (640)	2350 (716)
	20	-	-	-	-	190* (58*)	300* (91*)	380 (116)	460 (140)	570 (174)	700 (213)	860 (262)	1050 (320)	1270 (387)	1440 (439)	1650 (503)	1850 (564)
	25	-	-	-	-	-	240* (73*)	300* (91*)	370* (113*)	460 (140)	570 (174)	700 (213)	840 (256)	1030 (314)	1170 (357)	1330 (405)	1500 (457)
	30	-	-	-	-	-	-	250* (76*)	310* (94*)	380* (116*)	470 (143)	580 (177)	700 (213)	850 (259)	970 (296)	1110 (338)	1250 (381)

NOTE:

* Indicates single conductor only (not jacketed).

No asterisk indicates both jacketed cable and single conductor cables.

1. The table is based on copper wire. If aluminum wire is used, multiply lengths by 0.5.
   The maximum permissible length of aluminum is considerably shorter than copper wire of same size.
2. Make sure that the portion of the total cable which is between the service entrance and a motor starter/controller does not exceed 25 % of the total maximum length to ensure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. The table is based on a maintaining motor terminal voltage at 95 % of service entrance voltage, running at maximum nameplate amperes. In general, a voltage drop must be maintained at 3 V / 100 ft or less.
4. 1 foot = 0.305 meter (1 meter = 3.28 feet).

230 V, three-phase, 60 Hz

Maximum submersible power cable length (maximum cable length in feet, starter to motor)																		
Motor rating	**[Hp]**	**AWG copper wire size [ft (m)]**													**MCM copper wire size**			
		14	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1**	**0**	**00**	**000**	**0000**	**250**	**300**	**350**	**400**
230 V 3-ph 60 Hz	.5	930 (283)	1490 (454)	2350 (716)	3700 (1128)	5760 (1756)	8910 (2716)	-	-	-	-	-	-	-				
	.75	670 (204)	1080 (329)	1700 (518)	2580 (786)	4190 (1277)	6490 (1978)	8060 (2457)	9860 (3005)	-	-	-	-	-				
	1	560 (171)	910 (277)	1430 (436)	2260 (689)	3520 (1073)	5460 (1664)	6780 (2067)	8290 (2527)	-	-	-	-	-				
	1.5	420 (128)	670 (204)	1060 (323)	1670 (509)	2610 (796)	4050 (1234)	5030 (1533)	6160 (1878)	7530 (2295)	9170 (2795)	-	-	-				
	2	320 (98)	510 (155)	810 (247)	1280 (390)	2010 (613)	3130 (954)	3890 (1186)	4770 (1454)	5860 (1786)	7170 (2185)	8780 (2676)	-	-				
	3	240 (73)	390 (119)	620 (189)	990 (302)	1540 (469)	2400 (732)	2980 (908)	3660 (1116)	4480 (1366)	5470 (1667)	6690 (2039)	8020 (2444)	9680 (2950)				
	5	140* (43*)	230 (70)	370 (113)	590 (180)	920 (280)	1430 (436)	1790 (546)	2190 (668)	2690 (820)	3290 (1003)	4030 (1228)	4850 (1478)	5870 (1789)	6650 (2027)	7560 (2304)	8460 2579)	9220 (2810)
	7.5	-	160* (49*)	260 (79)	420 (128)	650 (198)	1020 (311)	1270 (387)	1560 (475)	1920 (585)	2340 (713)	2870 (875)	3440 (1049)	4160 (1268)	4710 (1436)	5340 (1628)	5970 (1820)	6500 (1981)
	10	-	-	190* (58*)	310 (94)	490 (149)	760 (232)	950 (290)	1170 (357)	1440 (439)	1760 (536)	2160 (658)	2610 (796)	3160 (963)	3590 (1094)	4100 (1250)	4600 (1402)	5020 (1530)
	15	-	-	-	210* (64*)	330 (101)	520 (158)	650 (198)	800 (244)	980 (299)	1200 (366)	1470 (448)	1780 (543)	2150 (655)	2440 (744)	2780 (847)	3110 (948)	3400 (1036)
	20	-	-	-	-	250* (76*)	400 (122)	500 (152)	610 (186)	760 (232)	930 (283)	1140 (347)	1380 (421)	1680 (512)	1910 (582)	2180 (664)	2450 (747)	2680 (817)
	25	-	-	-	-	-	320* (98*)	400 (122)	500 (152)	610 (186)	750 (229)	920 (280)	1120 (341)	1360 (415)	1540 (469)	1760 (536)	1980 (604)	2160 (658)
	30	-	-	-	-	-	260* (79*)	330* (101*)	410* (125*)	510 (155)	620 (189)	760 (232)	930 (283)	1130 (344)	1280 (390)	1470 (448)	1650 (503)	1800 (549)

Note:

* Indicates single conductor only (not jacketed).
No asterisk indicates both jacketed cable and single-conductor cables.

1. The table is based on copper wire. If aluminum wire is used, multiply lengths by 0.5.
   The maximum permissible length of aluminum is considerably shorter than copper wire of same size.
2. Make sure that the portion of the total cable which is between the service entrance and a motor starter/controller does not exceed 25 % of the total maximum length to ensure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. The table is based on maintaining motor terminal voltage at 95 % of service entrance voltage, running at maximum nameplate amperes. In general, a voltage drop must be maintained at 3 V / 100 ft or less.
4. 1 foot = 0.305 meter (1 meter = 3.28 feet).

460 V, 3 ph 60 Hz

Maximum submersible power cable length (maximum cable length in feet - starter to motor)																	
Motor rating	[Hp]	AWG copper wire size [ft (m)]													MCM copper wire size		
		14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350
460 V 3 ph 60 Hz	.5	3770 (1149)	6020 (1835)	9460 (2883)	-	-	-	-	-	-	-	-	-	-	-	-	-
	.75	2730 (832)	4350 (1326)	6850 (2088)	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	2300 (701)	3670 (1119)	5770 (1759)	9070 (2765)	-	-	-	-	-	-	-	-	-	-	-	-
	1.5	1700 (518)	2710 (826)	4270 (1301)	6730 (2051)	-	-	-	-	-	-	-	-	-	-	-	-
	2	1300 (396)	2070 (631)	3270 (997)	5150 (1570)	8050 (2454)	-	-	-	-	-	-	-	-	-	-	-
	3	1000 (305)	1600 (488)	2520 (768)	3970 (1210)	6200 (1890)	-	-	-	-	-	-	-	-	-	-	-
	5	590 (180)	950 (290)	1500 (457)	2360 (719)	3700 (1128)	5750 (1753)	-	-	-	-	-	-	-	-	-	-
	7.5	420 (128)	680 (207)	1070 (326)	1690 (515)	2640 (805)	4100 (1250)	5100 (1554)	6260 (1908)	7680 (2341)	-	-	-	-	-	-	-
	10	310 (94)	500 (152)	790 (241)	1250 (381)	1960 (597)	3050 (930)	3800 (1158)	4680 (1426)	5750 (1753)	7050 (2149)	-	-	-	-	-	-
	15	-	340* (104*)	540 (165)	850 (259)	1340 (408)	2090 (637)	2600 (792)	3200 (975)	3930 (1198)	4810 (1466)	5900 (1798)	7110 (2167)	-	-	-	-
	20	-	-	410 (125)	650 (198)	1030 (314)	1610 (491)	2000 (610)	2470 (753)	3040 (927)	3730 (1137)	4580 (1396)	5530 (1686)	-	-	-	-
	25	-	-	330* (101*)	530 (162)	830 (253)	1300 (396)	1620 (494)	1990 (607)	2450 (747)	3010 (917)	3700 (1128)	4470 (1362)	5430 (1655)	-	-	-
	30	-	-	270* (82*)	430 (131)	680 (207)	1070 (326)	1330 (405)	1640 (500)	2030 (619)	2490 (759)	3060 (933)	3700 (1128)	4500 (1372)	5130 (1564)	5860 (1786)	-
	40	-	-	-	320* (98*)	500* (152*)	790 (241)	980 (299)	1210 (369)	1490 (454)	1830 (558)	2250 (686)	2710 (826)	3290 (1003)	3730 (1137)	4250 (1295)	-
	50	-	-	-	-	410* (125*)	640 (195)	800 (244)	980 (299)	1210 (369)	1480 (451)	1810 (552)	2190 (668)	2650 (808)	3010 (917)	3420 (1042)	3830 (1167)
	60	-	-	-	-	-	540* (165*)	670* (204*)	830 (253)	1020 (311)	1250 (381)	1540 (469)	1850 (564)	2240 (683)	2540 (774)	2890 (881)	3240 (988)
	75	-	-	-	-	-	440* (134*)	550* (168*)	680* (207*)	840 (256)	1030 (314)	1260 (384)	1520 (463)	1850 (564)	2100 (640)	2400 (732)	2700 (823)
	100	-	-	-	-	-	-	-	500* (152*)	620 (189*)	760* (232*)	940 (287)	1130 (344)	1380 (421)	1560 (475)	1790 (546)	2010 (613)
	125	-	-	-	-	-	-	-	-	-	600* (183*)	740* (226*)	890* (271*)	1000 (305)	1220 (372)	1390 (424)	1560 (475)
	150	-	-	-	-	-	-	-	-	-	-	630* (192*)	760* (232*)	920* (280*)	1050 (320)	1190 (363)	1340 (408)
	175	-	-	-	-	-	-	-	-	-	-	-	670* (204*)	810* (247*)	930* (283*)	1060 (323)	1190 (363)
	200	-	-	-	-	-	-	-	-	-	-	-	590* (180*)	710* (216*)	810* (247*)	920* (280*)	1030 (314)

NOTE:

* Indicates single conductor only (not jacketed).

No asterisk indicates both jacketed cable and single-conductor cables.

1. The table is based on copper wire. If aluminum wire is used, multiply lengths by 0.5.
   The maximum permissible length of aluminum is considerably shorter than copper wire of same size.
2. Make sure that the portion of the total cable which is between the service entrance and a motor starter/controller does not exceed 25 % of the total maximum length to ensure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. The table is based on a maintaining motor terminal voltage at 95 % of service entrance voltage, running at maximum nameplate amperes. In general, a voltage drop must be maintained at 3 V / 100 ft or less.
4. 1 foot = 0.305 meter (1 meter = 3.28 feet).

575 V, 3 ph 60 Hz

Maximum submersible power cable length (maximum cable length in feet - starter to motor)																	
Motor rating	[Hp]	AWG copper wire size [ft (m)]													MCM copper wire size		
		14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350
575 V 3 ph 60 Hz	5	5900 (1798)	9410 (2868)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	.75	4270 (1301)	6810 (2076)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	3630 (1106)	5800 (1768)	9120 (2780)	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5	2620 (799)	4180 (1274)	6580 (2006)	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	2030 (619)	3250 (991)	5110 (1558)	8060 (2457)	-	-	-	-	-	-	-	-	-	-	-	-
	3	1580 (482)	2530 (771)	3980 (1213)	6270 (1911)	-	-	-	-	-	-	-	-	-	-	-	-
	5	920 (280)	1480 (451)	2330 (710)	3680 (1122)	5750 (1753)	-	-	-	-	-	-	-	-	-	-	-
	7.5	660 (201)	1060 (323)	1680 (512)	2650 (808)	4150 (1265)	-	-	-	-	-	-	-	-	-	-	-
	10	490 (149)	780 (238)	1240 (378)	1950 (594)	3060 (933)	4770 (1454)	5940 (1811)	-	-	-	-	-	-	-	-	-
	15	330* (101*)	530 (162)	850 (259)	1340 (408)	2090 (637)	3260 (994)	4060 (1237)	-	-	-	-	-	-	-	-	-
	20	-	410* (125*)	650 (198)	1030 (314)	1610 (491)	2520 (768)	3140 (957)	3860 (1177)	4760 (1451)	5830 (1777)	-	-	-	-	-	-
	25	-	-	520 (158)	830 (253)	1300 (396)	2030 (619)	2530 (771)	3110 (948)	3840 (1170)	4710 (1436)	-	-	-	-	-	-
	30	-	-	430* (131*)	680 (207)	1070 (326)	1670 (509)	2080 (634)	2560 (780)	3160 (963)	3880 (1183)	4770 (1454)	5780 (1762)	7030 (2143)	8000 (2438)	-	-
	40	-	-	-	500* (152*)	790 (241)	1240 (378)	1540 (469)	1900 (579)	2330 (710)	2860 (872)	3510 (1070)	4230 (1289)	5140 (1567)	5830 (1777)	-	-
	50	-	-	-	410* (125*)	640* (195*)	1000 (305)	1250 (381)	1540 (469)	1890 (576)	2310 (704)	2840 (866)	3420 (1042)	4140 (1262)	4700 (1433)	5340 (1628)	5990 (1826)
	60	-	-	-	-	540* (165*)	850 (259)	1060 (323)	1300 (396)	1600 (488)	1960 (597)	2400 (732)	2890 (881)	3500 (1067)	3970 (1210)	4520 (1378)	5070 (1545)
	75	-	-	-	-	-	690* (210*)	860 (262)	1060 (323)	1310 (399)	1600 (488)	1970 (600)	2380 (725)	2890 (881)	3290 (1003)	3750 (1143)	4220 (1286)
	100	-	-	-	-	-	-	640* (195*)	790* (241*)	970 (296)	1190 (363)	1460 (445)	1770 (539)	2150 (655)	2440 (744)	2790 (850)	3140 (957)
	125	-	-	-	-	-	-	-	630* (192*)	770* (235*)	950 (290)	1160 (354)	1400 (427)	1690 (515)	1920 (585)	2180 (664)	2440 (744)
	150	-	-	-	-	-	-	-		660* (202*)	800* (244*)	990* (302*)	1190 (363)	1440 (439)	1630 (497)	1860 (567)	2080 (634)
	175	-	-	-	-	-	-	-	-	-	700* (214*)	870* (265*)	1050* (320*)	1270 (387)	1450 (442)	1650 (503)	1860 (567)
	200	-	-	-	-	-	-	-	-	-	-	760* (232*)	920* (280*)	1110* (338*)	1260 (384)	1440 (439)	1620 (494)

NOTE:

* Indicates single conductor only (not jacketed).

No asterisk indicates both jacketed cable and single conductor cables.

1. The table is based on copper wire. If aluminum wire is used, multiply lengths by 0.5.
   The maximum permissible length of aluminum is considerably shorter than copper wire of same size.
2. Make sure that the portion of the total cable which is between the service entrance and a motor starter/controller does not exceed 25 % of the total maximum length to ensure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. The table is based on a maintaining motor terminal voltage at 95 % of service entrance voltage, running at maximum nameplate amperes. In general, a voltage drop must be maintained at 3 V / 100 ft or less.
4. 1 foot = 0.305 meter (1 meter = 3.28 feet).

23. Friction loss tables

Friction loss table - SCH 40 steel pipe										
[US gpm]	[US gph]	.5"	.75"	1"	1.25"	1.5"	2"	2.5"	3"	4"
		ID 0.622"	ID 0.824"	ID 1.049"	ID 1.380"	ID 1.610"	ID 2.067"	ID 2.469"	ID 3.068"	ID 4.026"
		Friction loss in feet of head per 100 feet of pipe								
2	120	4.8								
3	180	10.0	2.5							
4	240	17.1	4.2							
5	300	25.8	6.3	1.9						
6	360	36.5	8.9	2.7						
7	420	48.7	11.8	3.6						
8	480	62.7	15.0	4.5						
9	540	78.3	18.8	5.7						
10	600	95.9	23.0	6.9						
12	720		32.6	9.6	2.5	1.2				
14	840		43.5	12.8	3.3	1.5				
16	960		56.3	16.5	4.2	2.0				
20	1,200		86.1	25.1	6.3	2.9				
25	1,500			38.7	9.6	4.5	1.3			
30	1,800			54.6	13.6	6.3	1.8			
35	2,100			73.3	18.2	8.4	2.4			
40	2,400			95.0	23.5	10.8	3.1	1.3		
45	2,700				29.4	13.5	3.9	1.6		
50	3,000				36.0	16.4	4.7	1.9		
60	3,600				51.0	23.2	6.6	2.7		
70	4,200				68.8	31.3	8.9	3.6	1.2	
80	4,800				89.2	40.5	11.4	4.6	1.6	
90	5,400					51.0	14.2	5.8	2.0	
100	6,000					62.2	17.4	7.1	2.4	
120	7,200						24.7	10.1	3.4	
140	8,400						33.2	13.5	4.5	1.2
160	9,600						43.0	17.5	5.8	1.5
200	12,000						66.3	27.0	8.9	2.3
260	15,600							45.0	14.8	3.7
300	18,000							59.6	19.5	4.9

Friction loss table - SCH 40 PVC pipe										
[US gpm]	[US gph]	.5"	.75"	1"	1.25"	1.5"	2"	2.5"	3"	4"
		ID 0.622"	ID 0.824"	ID 1.049"	ID 1.380"	ID 1.610"	ID 2.067"	ID 2.469"	ID 3.068"	ID 4.026"
		Friction loss in feet of head per 100 feet of pipe								
2	120	4.1								
3	180	8.7	2.2							
4	240	14.8	3.7							
5	300	22.2	5.7	1.8						
6	360	31.2	8.0	2.5						
7	420	41.5	10.6	3.3						
8	480	53.0	13.5	4.2						
9	540	66.0	16.8	5.2						
10	600	80.5	20.4	6.3	1.7					
12	720		28.6	8.9	2.3	1.1				
14	840		38.0	11.8	3.1	1.4				
16	960		48.6	15.1	4.0	1.9				
20	1,200		60.5	22.8	6.0	2.8				
25	1,500			38.7	9.1	4.3	1.3			
30	1,800				12.7	6.0	1.8			
35	2,100				16.9	8.0	2.4			
40	2,400				21.6	10.2	3.0	1.1		
45	2,700				28.0	12.5	3.8	1.4		
50	3,000					15.4	4.6	1.7		
60	3,600					21.6	6.4	2.3		
70	4,200					28.7	8.5	3.0	1.2	
80	4,800					36.8	10.9	3.8	1.4	
90	5,400					45.7	13.6	4.8	1.8	
100	6,000					56.6	16.5	5.7	2.2	
120	7,200						23.1	8.0	3.0	
140	8,400						30.6	10.5	4.0	1.1
160	9,600						39.3	13.4	5.0	1.4
200	12,000						66.3	20.1	7.6	2.1
260	15,600							32.4	12.2	3.4
300	18,000							42.1	15.8	4.4

Type of fitting and application	Pipe and fitting	Nominal size of fitting and pipe						
		1/2"	3/4"	1"	1.25"	1.5"	2"	2.5"
		Friction loss in equivalent length of straight pipe in feet						
Insert coupling	Plastic	3	3	3	3	3	3	3
Threaded adapter (plastic to thread)	Plastic	3	3	3	3	3	3	3
90 ° standard elbow	Steel	2	2	3	4	4	5	6
	Plastic	2	2	3	4	4	5	6
Standard tee (flow through run)	Steel	1	2	2	3	3	4	4
	Plastic	1	2	2	3	3	4	4
Standard tee (flow through side)	Steel	4	5	6	7	8	11	13
	Plastic	4	5	6	7	8	11	13
Gate valve[1]	Steel	1	1	1	1	2	2	2
Swing check valve[1]	Steel	5	7	9	12	13	17	21

Notes:
Based on Schedule 40 steel and plastic fittings.
Friction loss figures are for screwed valves and are based on equivalent lengths of steel pipe.

24. Grundfos Product Center

Grundfos Product Center is an 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 lowest purchase price
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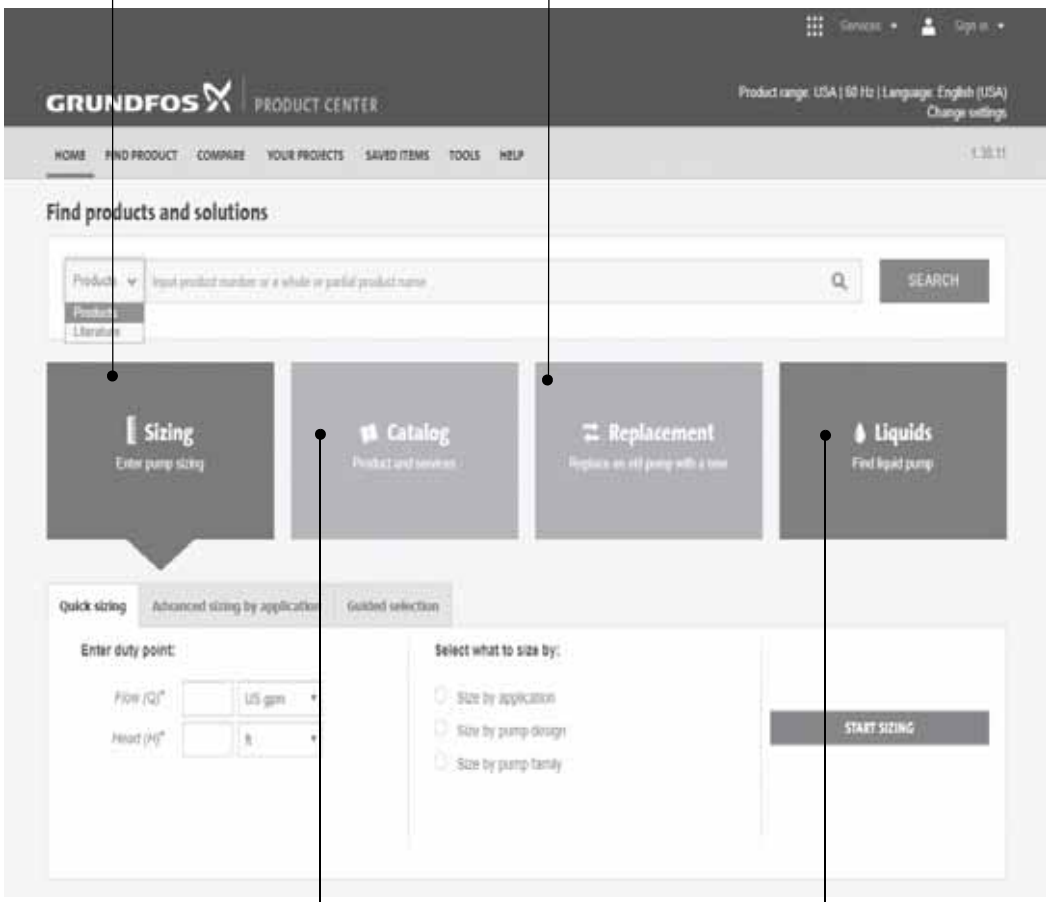

CATALOG gives you access to the Grundfos product catalog.

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