SmartFlo™ System Sizing Pocket Guide

Curves and sizing information for all SmartFlo systems

be
think
innovate

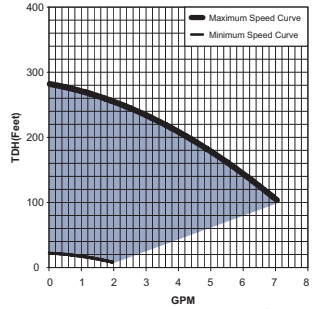
GRUNDFOS

Contents

SQE Curves - 3,000 rpm to 10,700 rpm

Sections

SQE SmartFlo™ System Curves



SQE

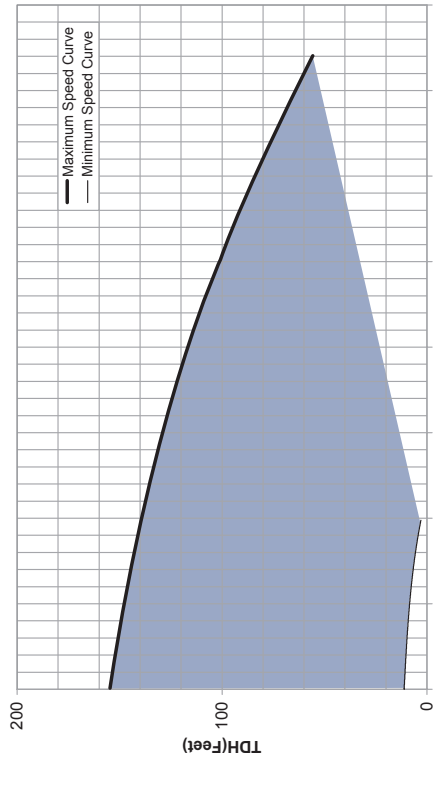
Pressure Tank (2 gal.)

CU 301

Pressure Sensor

SQE Performance Curve

5SQE

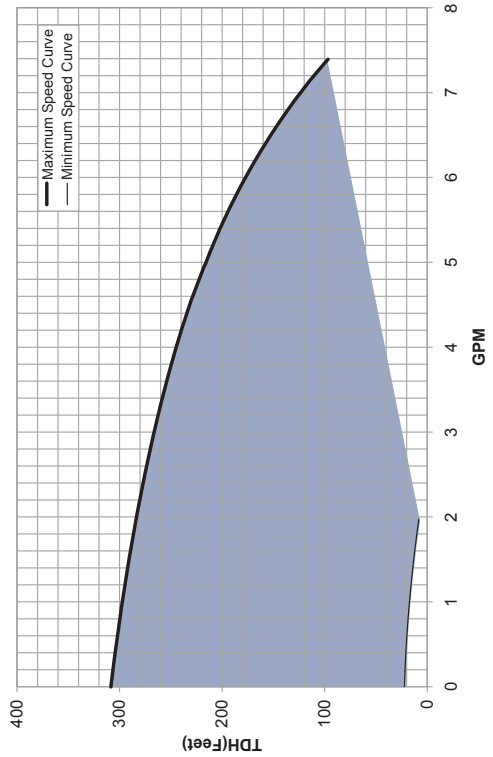


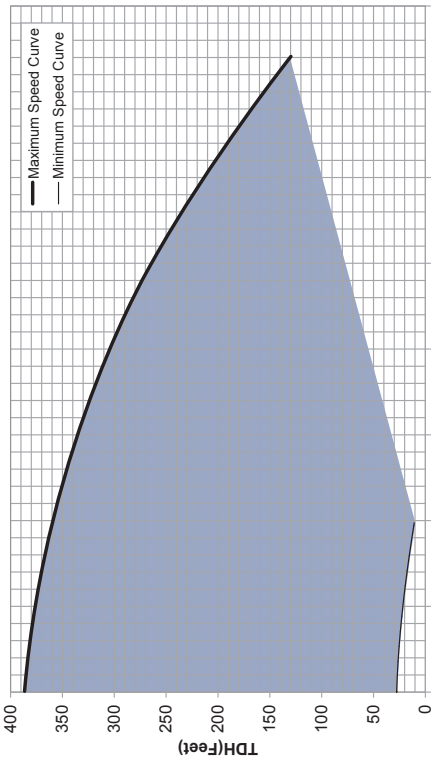
5SQE05-140

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
300
200
100
0
0
1
2
3
4
5
6
7
8
GPM

SQE Performance Curve

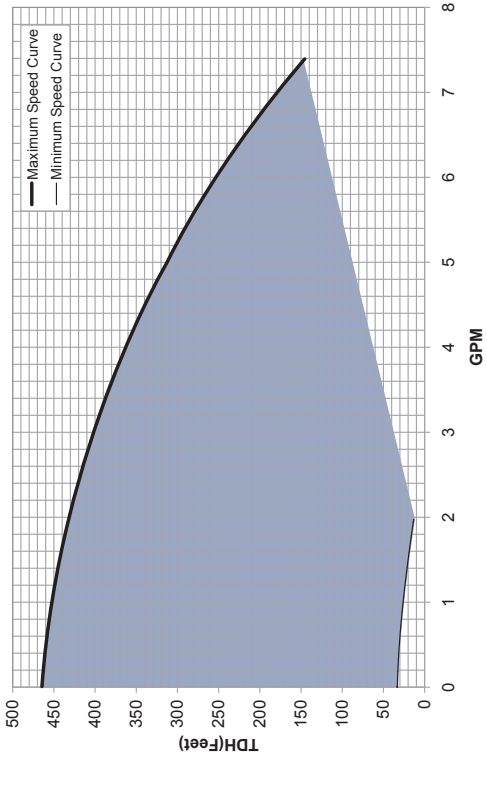
5SQE




Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
400
350
300
250
200
150
100
50
0
GPM
0
1
2
3
4
5
6
7
8

SQE Performance Curve

5SQE

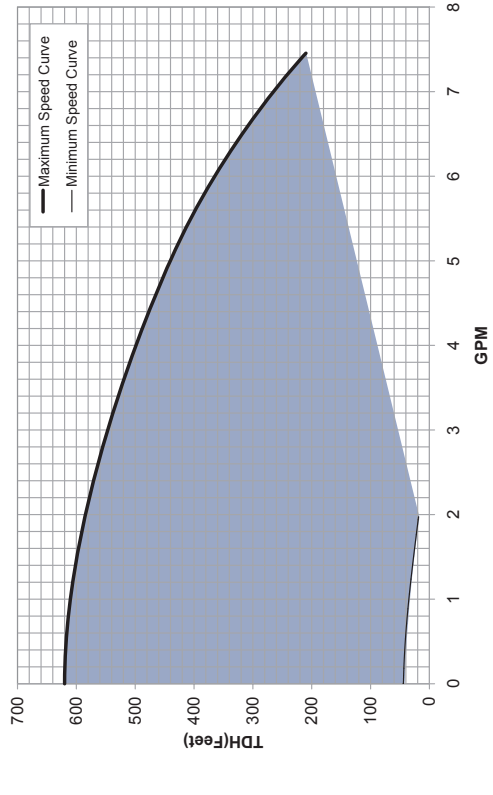


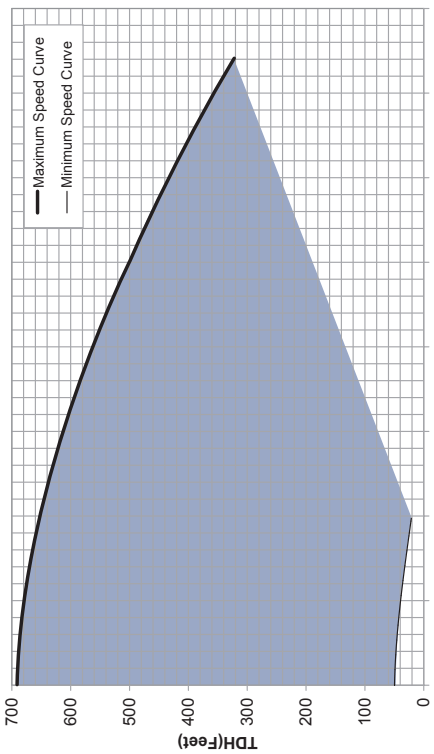
5SQE07-320

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
600
500
400
300
200
100
0
GPM
0
1
2
3
4
5
6
7
8

SQE Performance Curve

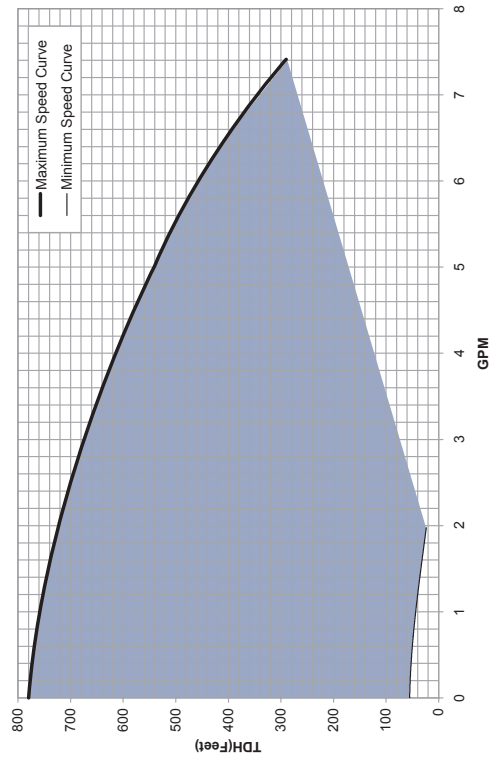
5SQE

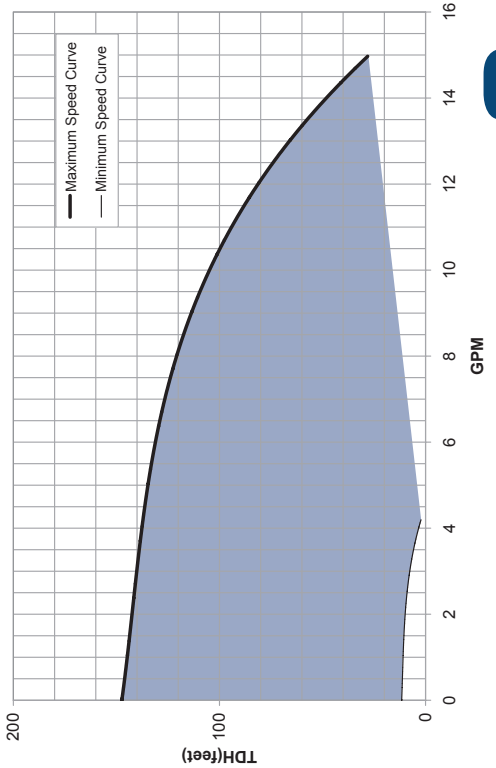



Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
0
100
200
300
400
500
600
700
GPM
0
1
2
3
4
5
6
7
8

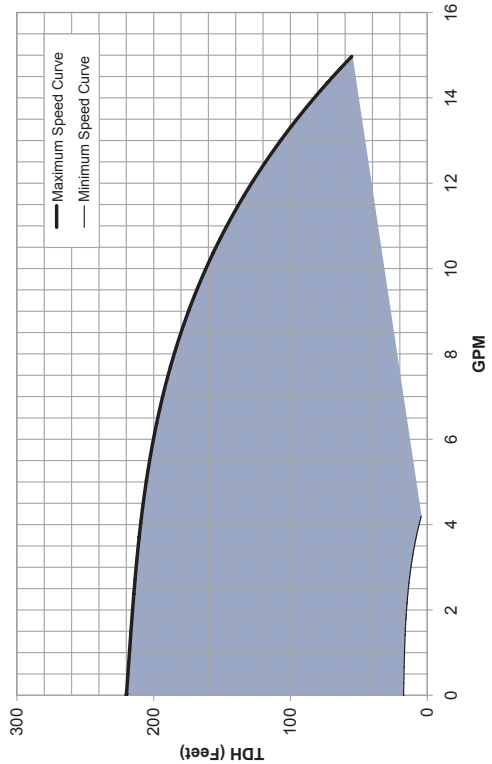
SQE Performance Curve

5SQE




Maximum Speed Curve
Minimum Speed Curve
TDH(feet)
200
100
0
GPM
0
2
4
6
8
10
12
14
16

SQE Performance Curve



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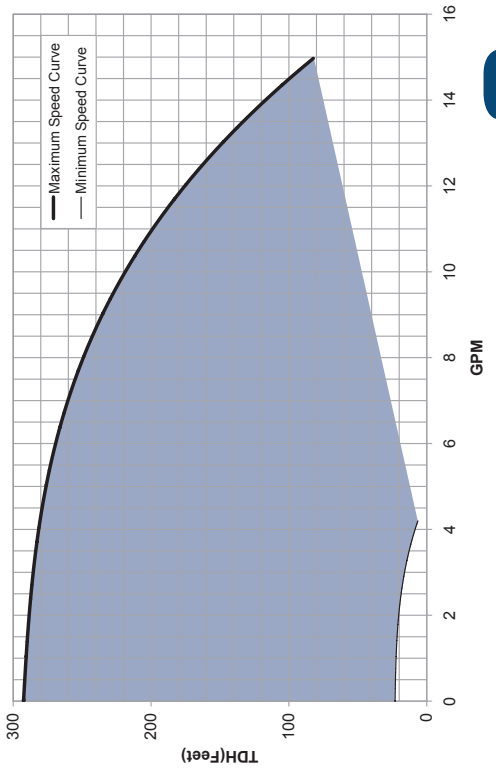
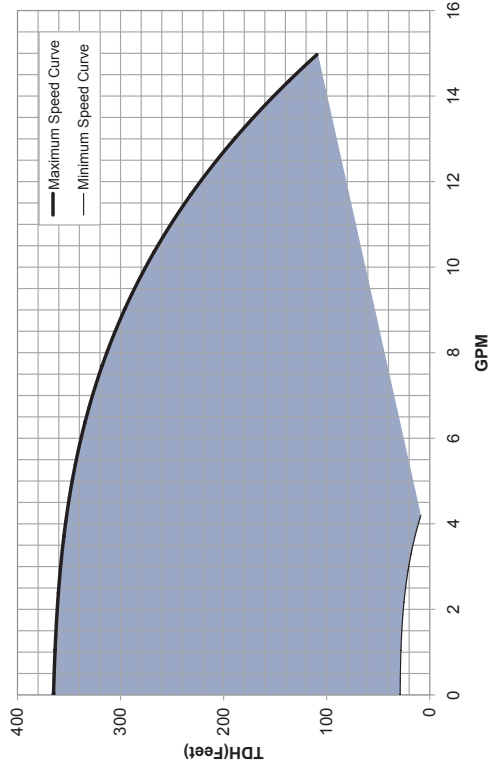
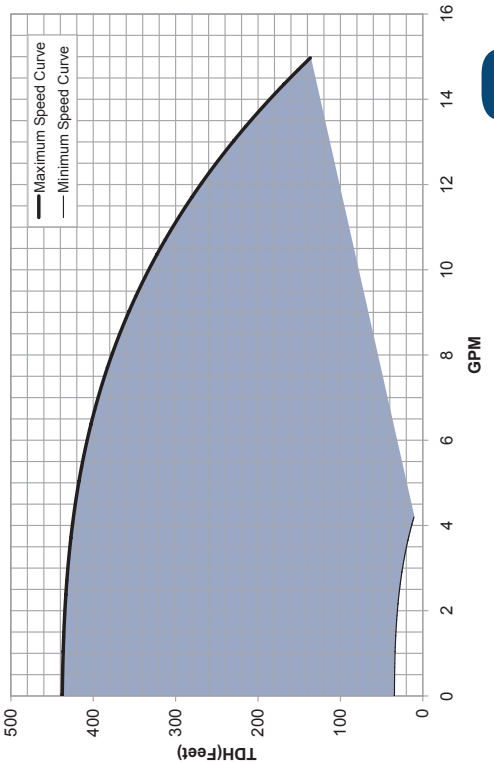

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
300
200
100
0
0
2
4
6
8
10
12
14
16
GPM

SQE Performance Curve

10SQE

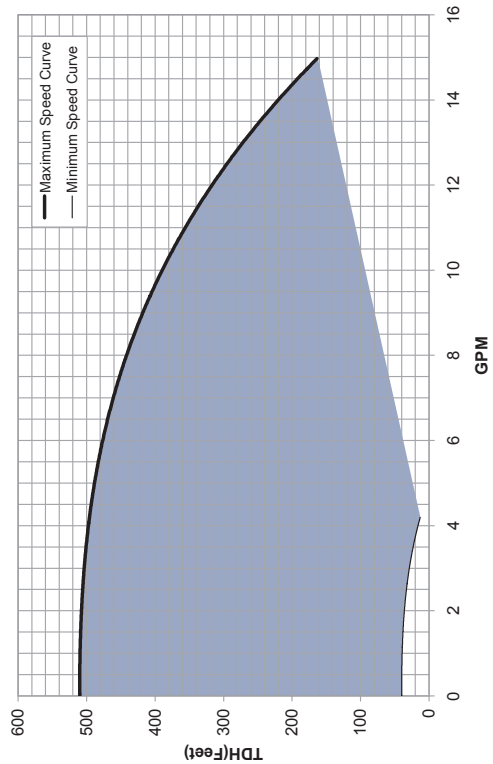


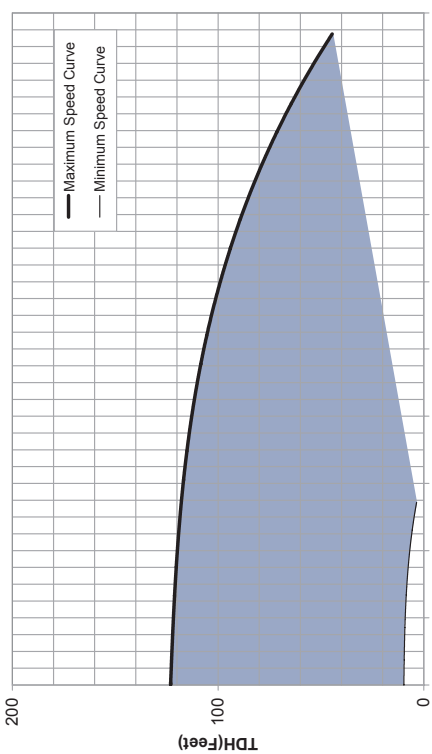
10SQE10-290


Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
0
100
200
300
400
500
GPM
0
2
4
6
8
10
12
14
16

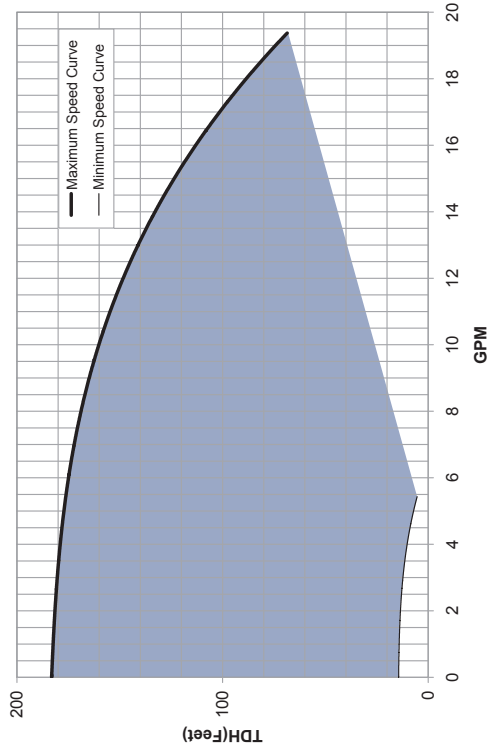
SQE Performance Curve

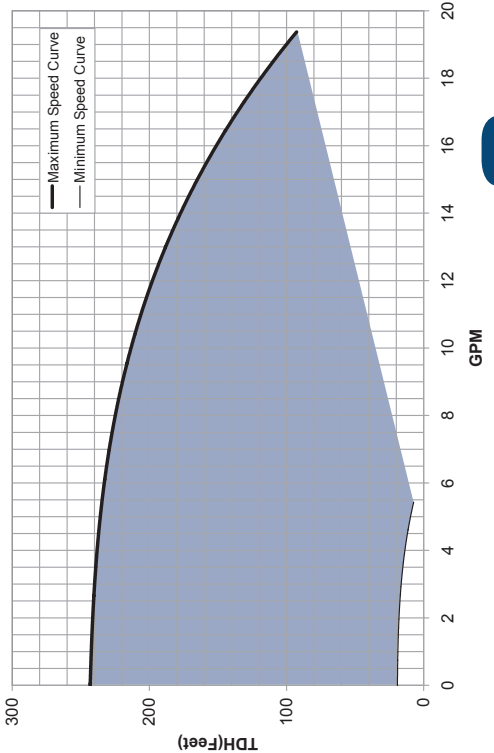
10SQE



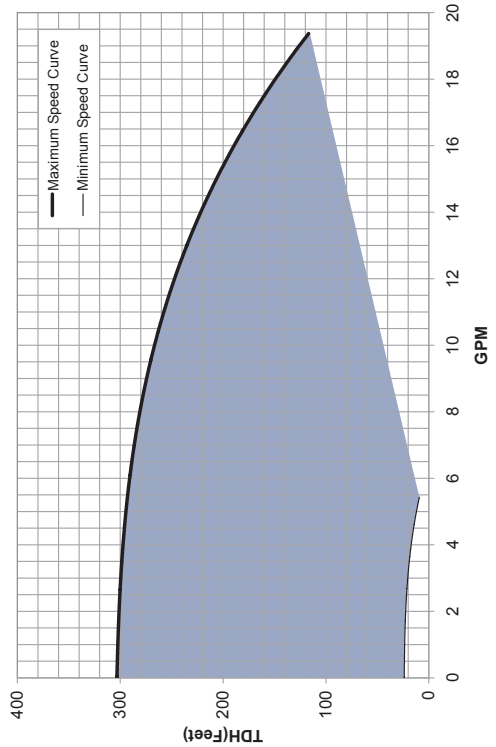

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
200
100
0
0
2
4
6
8
10
12
14
16
18
20
GPM

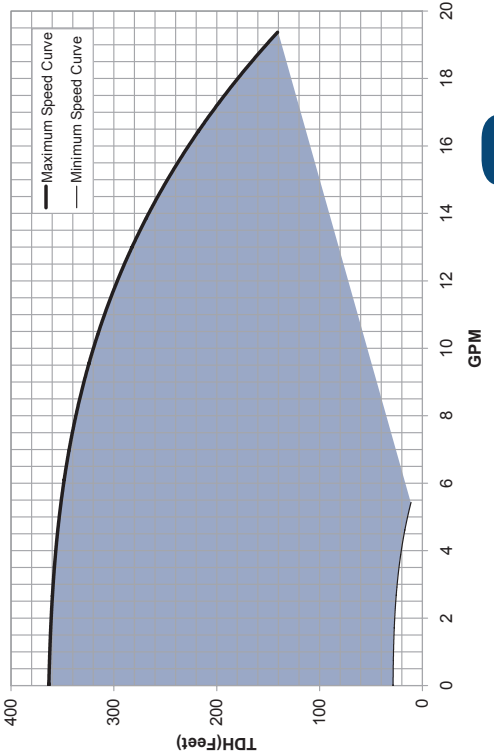
SQE Performance Curve



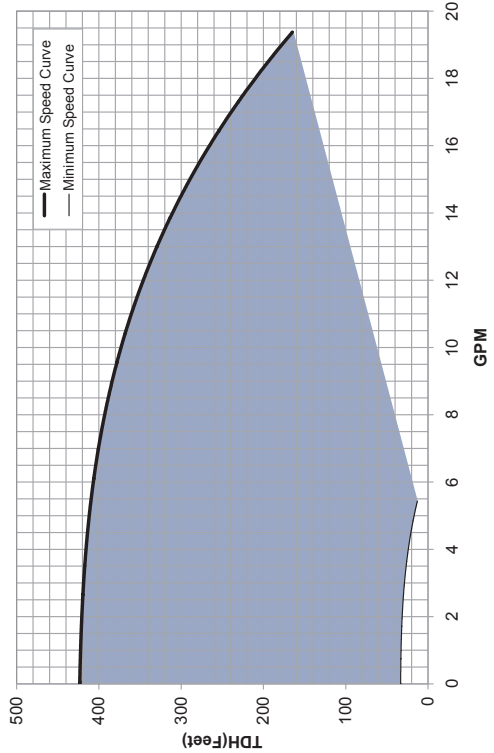

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
300
200
100
0
0
2
4
6
8
10
12
14
16
18
20
GPM

SQE Performance Curve

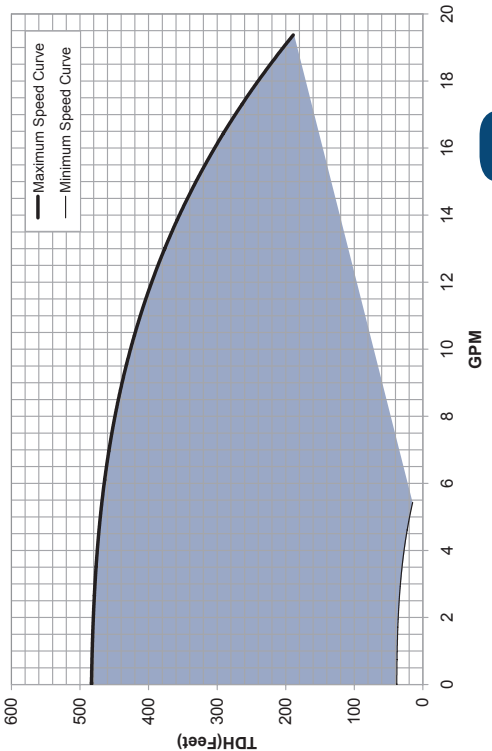



Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
400
300
200
100
0
0
2
4
6
8
10
12
14
16
18
20
GPM

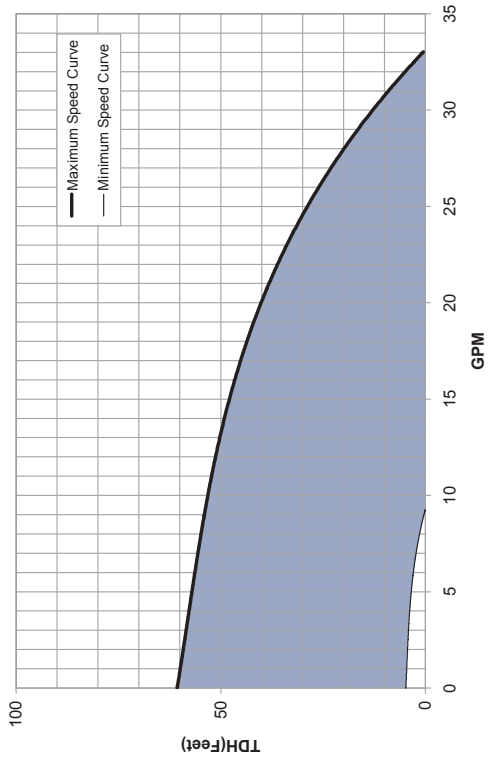
SQE Performance Curve

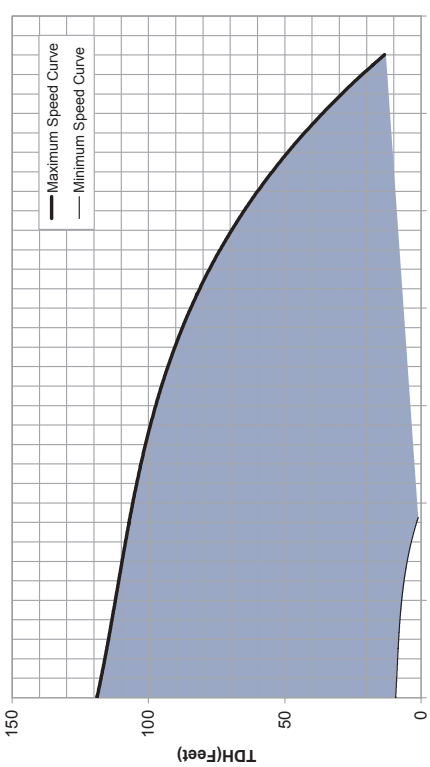


15SQE15-290


Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
600
500
400
300
200
100
0
GPM
0
2
4
6
8
10
12
14
16
18
20

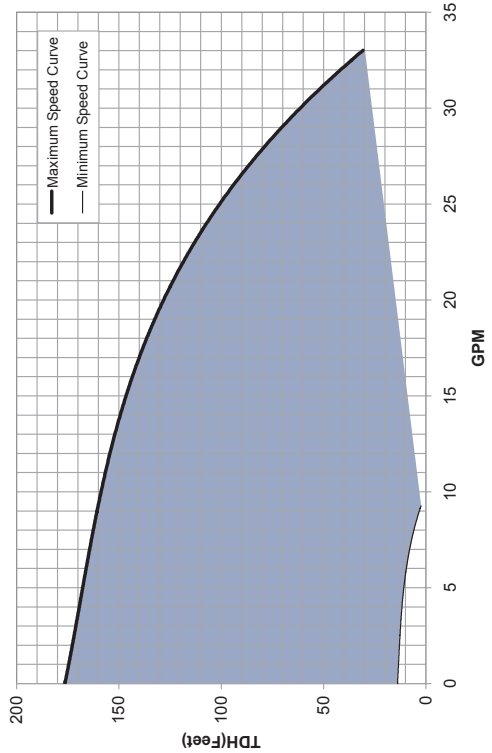
SQE Performance Curve



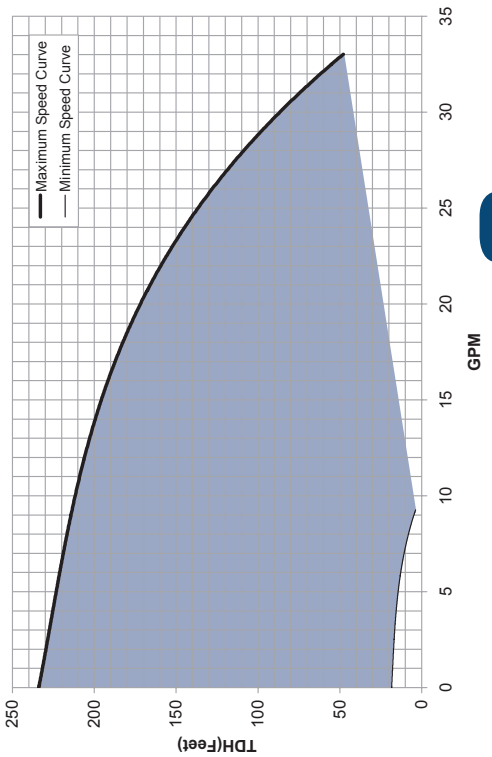

Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
150
100
50
0
0
5
10
15
20
25
30
35
GPM

22SQE

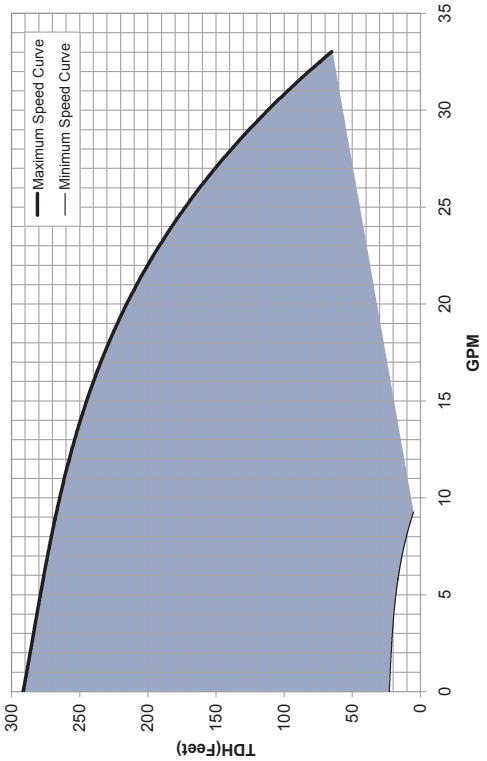
SQE Performance Curve



22SQE07-160


Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
250
200
150
100
50
0
0
5
10
15
20
25
30
35
GPM

SQE Performance Curve



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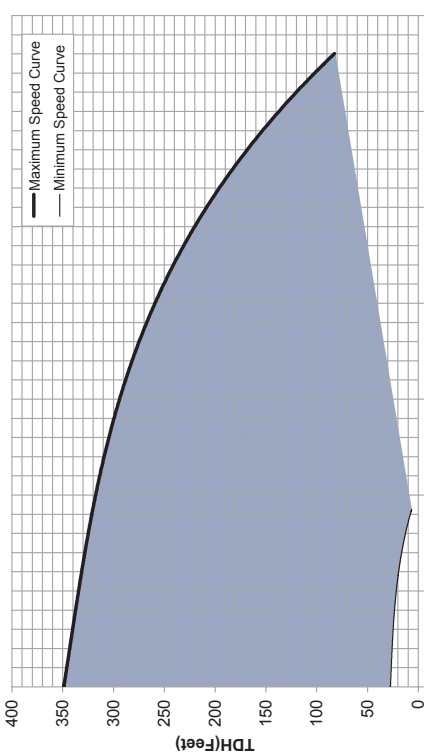
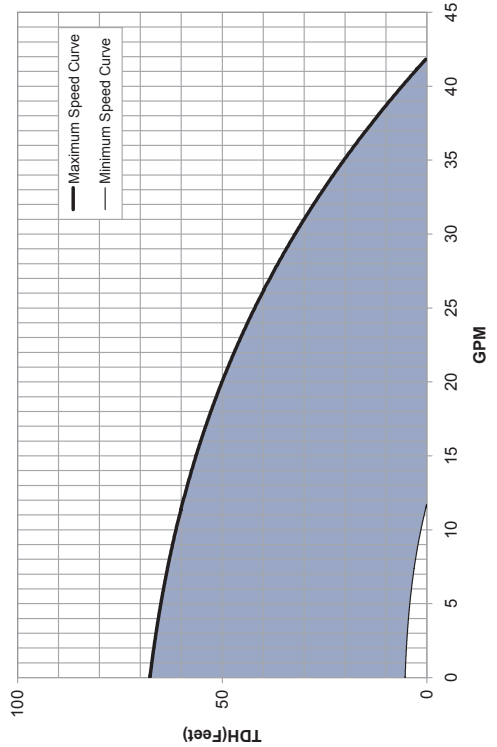
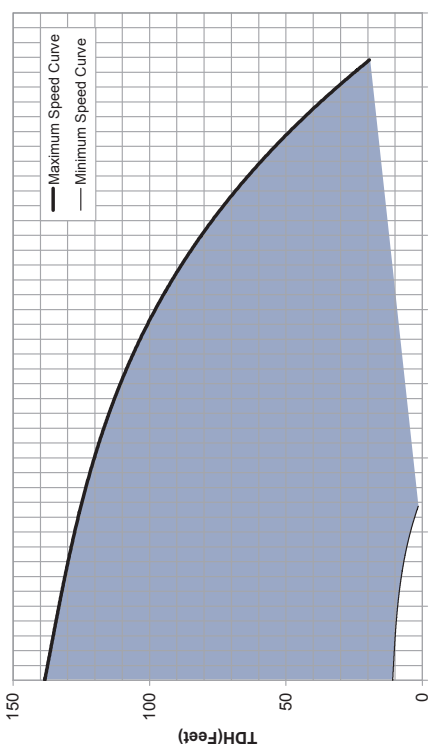


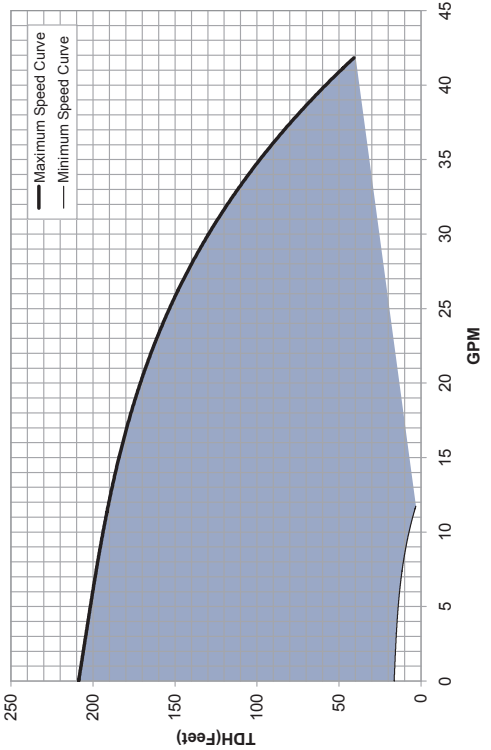
22SQE

SQE Performance Curve




Maximum Speed Curve
Minimum Speed Curve
TDH(Feet)
150
100
50
0
0
5
10
15
20
25
30
35
40
45
GPM

SQE Performance Curve



SQE SmartFlo™ System Sizing

Follow these 2 steps.

STEP 1

Calculate maximum head requirements at rated flow conditions:

Hmax (required) = dynamic head + system pressure (in feet) + friction loss + above grade elevation.

STEP 2

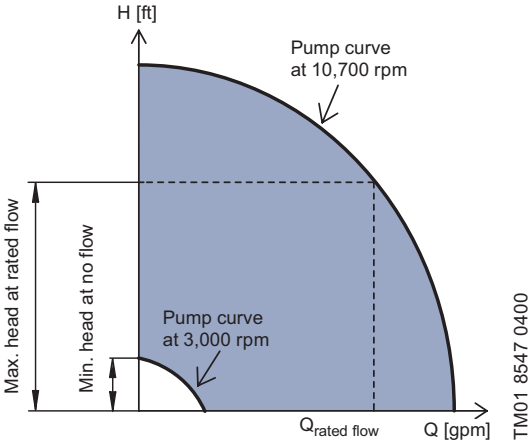
Select pump from the chart on the following page:

- Choose model family based on desired flow rate i.e. 15SQE for a flow rate of 15 gpm.

Continues on next page ›

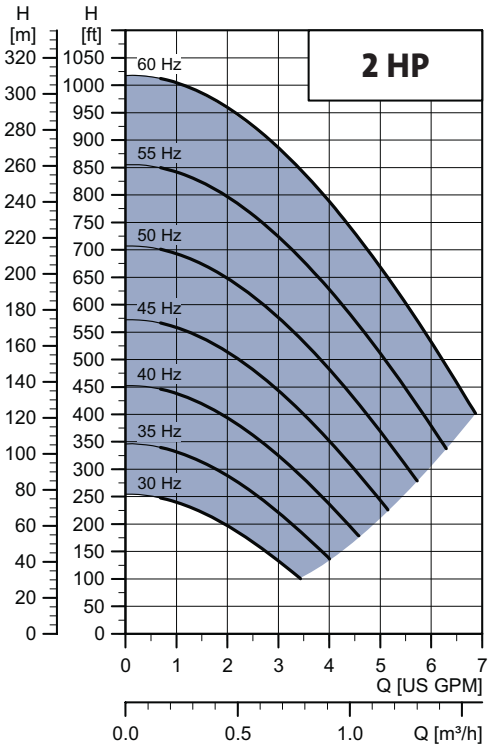
- Select the first model with a value in Column 2 that is greater than the Hmax calculated in Step 1.

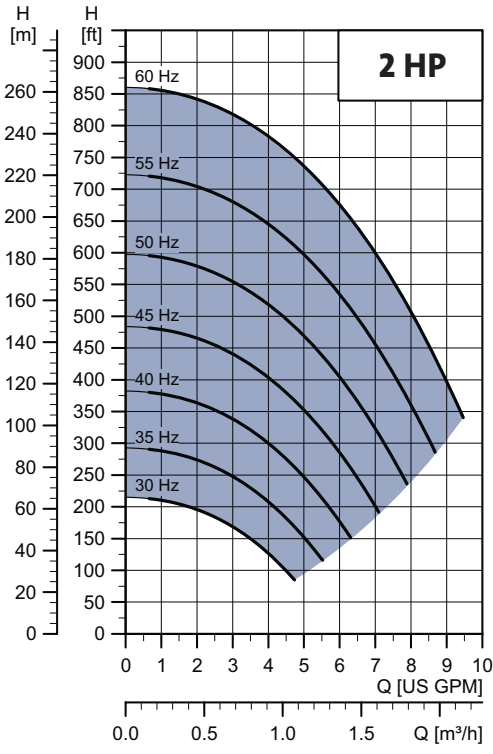
- For example: the choice for a 22 gpm model with an Hmax of 140' would be the 22SQE-160. Double check your selection in the performance curve found in the front of this book.



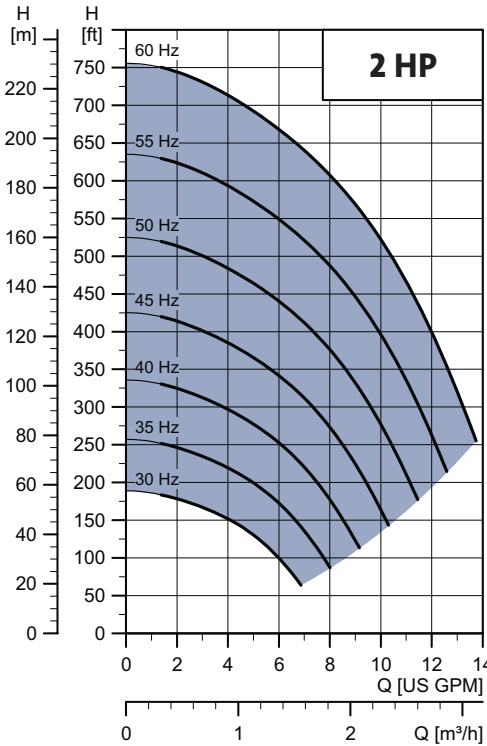
	Col. 1	Col. 2
System Sizing Matrix		
Pump Type Model B	Shutoff Head (0 GPM) @ 3000 RPM Min. Speed	Head @ Rated GPM @ 10700 RPM Max. Speed
	TDH(Feet)	TDH(Feet)
5SQE-90	12	104
5SQE-140	18	161
5SQE-180	24	218
5SQE-230	31	275
5SQE-270	37	332
5SQE-320	43	389
5SQE-360	49	446
5SQE-410	55	503
5SQE-450	61	560
10SQE-110	12	102
10SQE-160	17	158
10SQE-200	23	214
10SQE-240	29	270
10SQE-290	34	326
10SQE-330	40	382
15SQE-70	10	80
15SQE-110	14	121
15SQE-150	19	161
15SQE-180	24	202
15SQE-220	29	242
15SQE-250	33	283
15SQE-290	38	323
22SQE-40	5	35
22SQE-80	9	75
22SQE-120	14	115
22SQE-160	18	155
22SQE-190	23	195
22SQE-220	27	235
30SQE-40	5	31
30SQE-90	11	78
30SQE-130	16	125

CU331SP Performance Curve

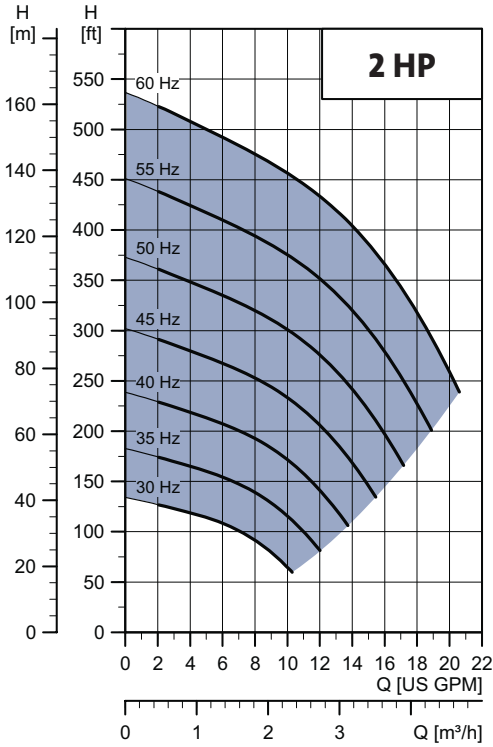



H [m]
H [ft]
2 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6411 5012

CU331SP Performance Curve

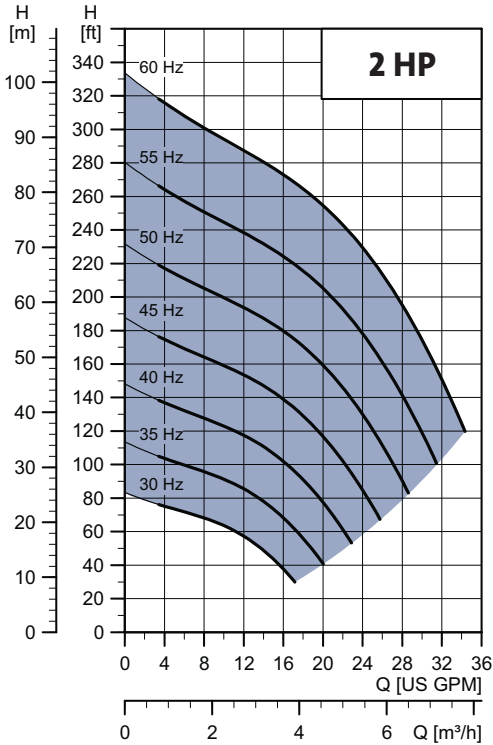


TM05 6412 5012

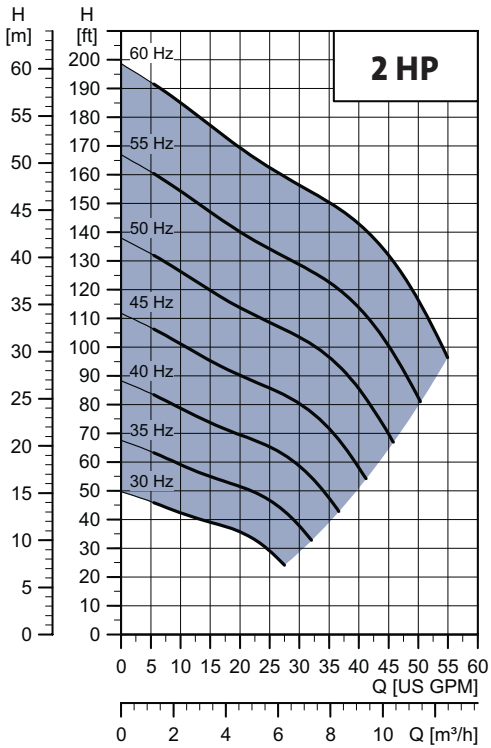


TM05 6413 5012

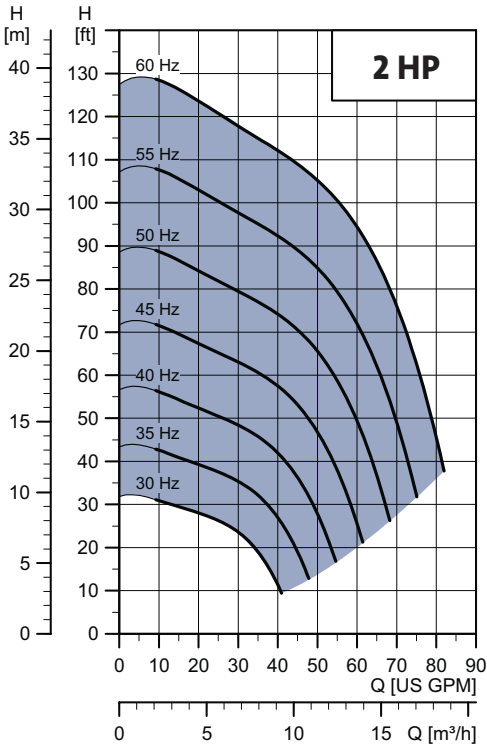
CU331SP Performance Curve



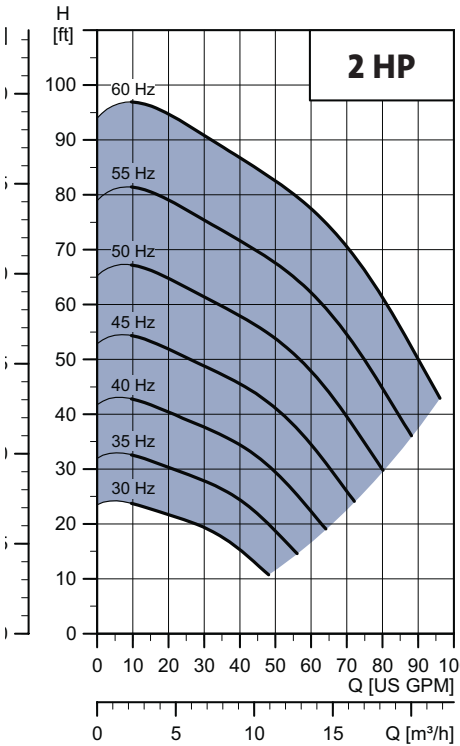
TM05 6414 5012


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

CU331SP Performance Curve



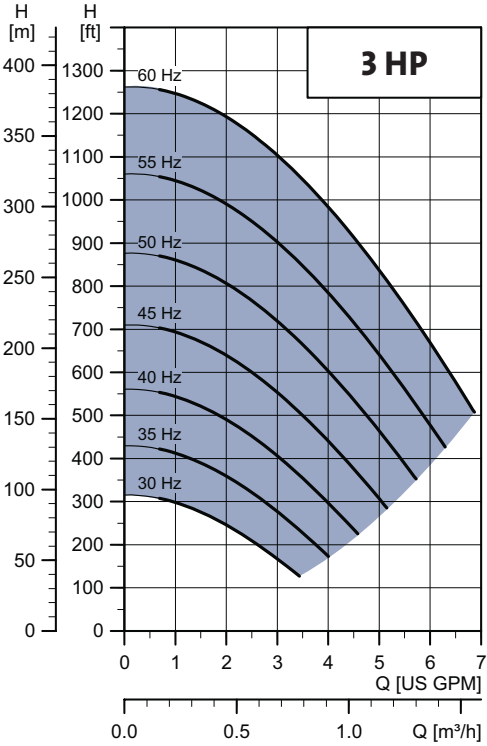
TM05 6416 5012



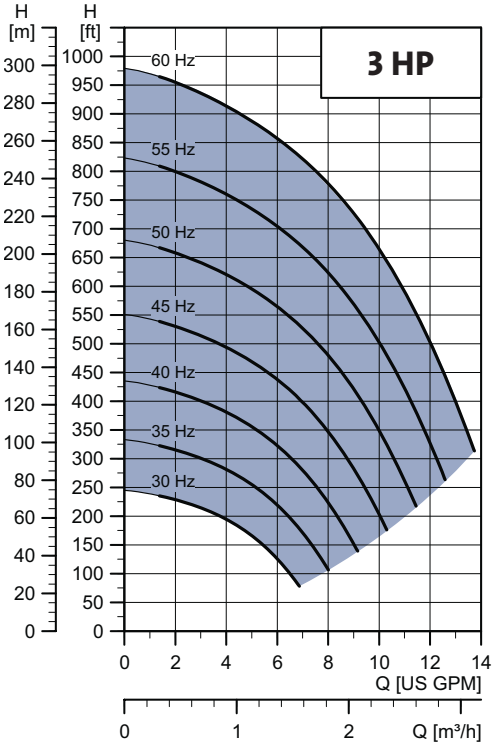
TM05 6417 5012

2

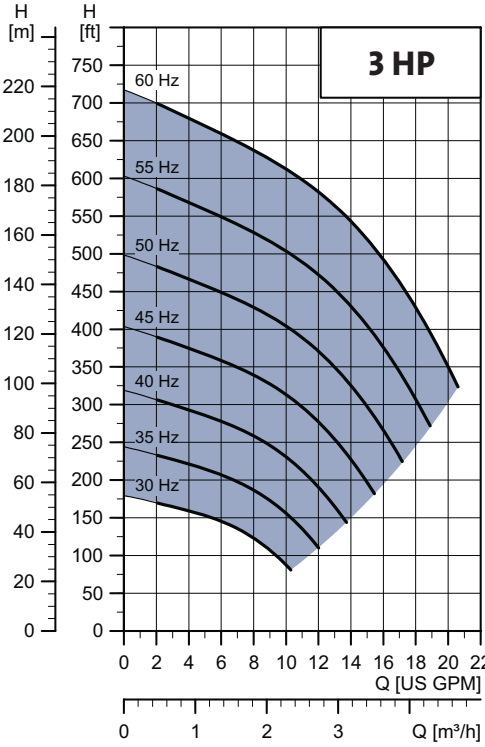
CU331SP Performance Curve



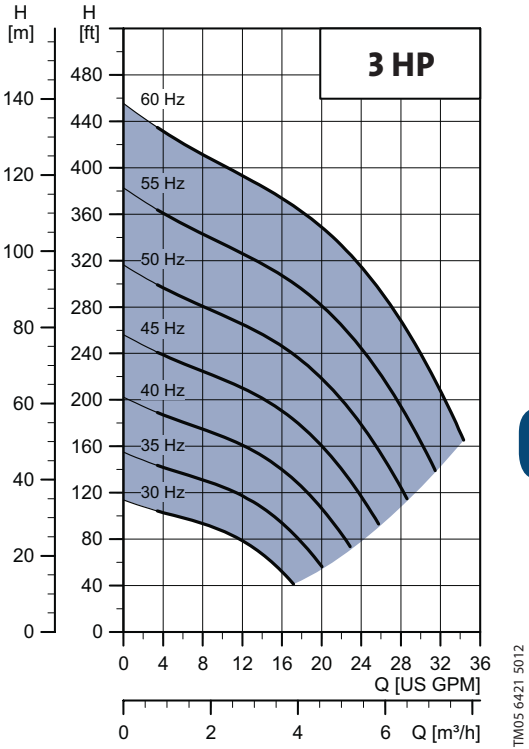
TM05 6418 5012


H [m]
H [ft]
3 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
Q [US GPM]
Q [m³/h]
TM05 6419 5012

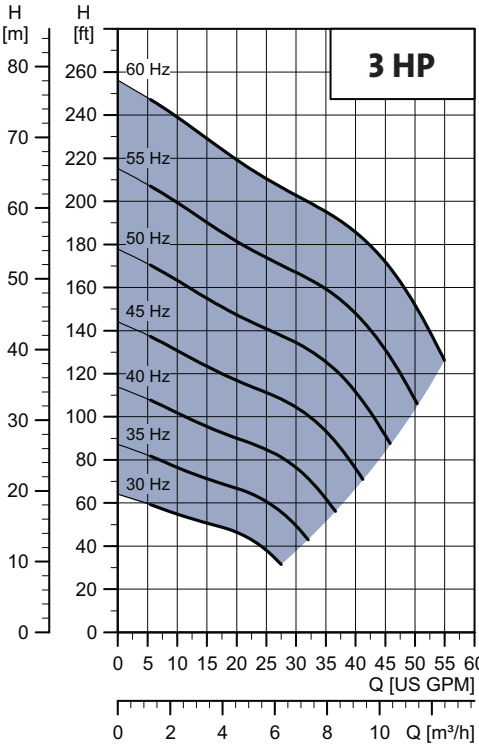
CU331SP Performance Curve



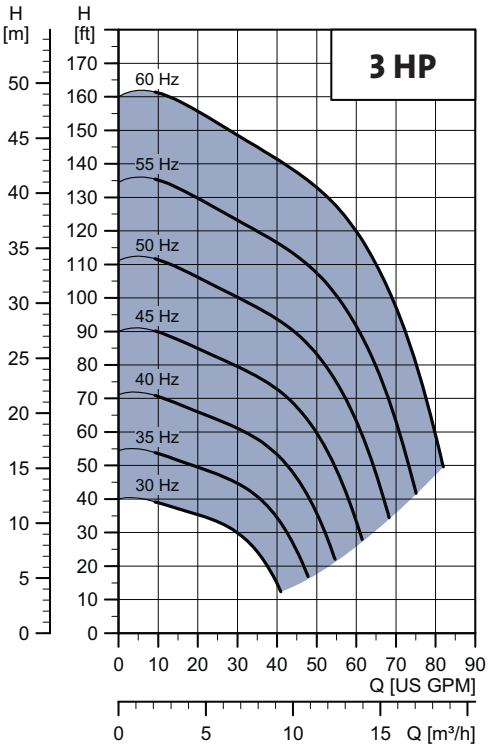
TM05 6420 5012


H [m]
H [ft]
3 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0 20 40 60 80 100 120 140
0 40 80 120 160 200 240 280 320 360 400 440 480
0 4 8 12 16 20 24 28 32 36
Q [US GPM]
0 2 4 6 Q [m³/h]
TM05 6421 5012

CU331SP Performance Curve

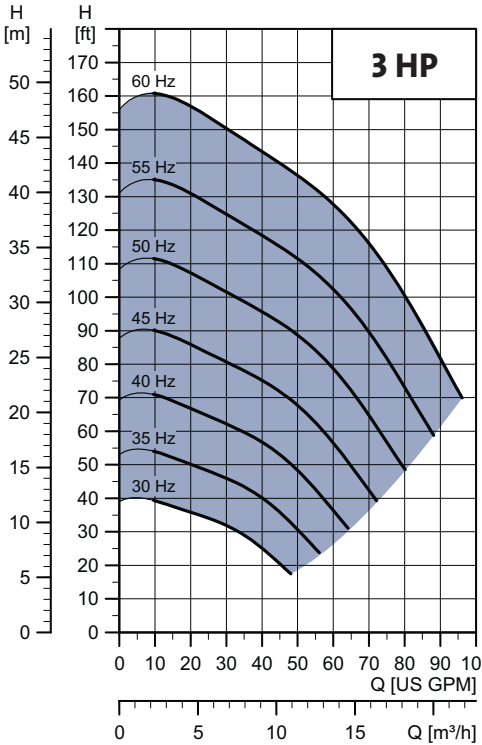


TM05 6422 5012

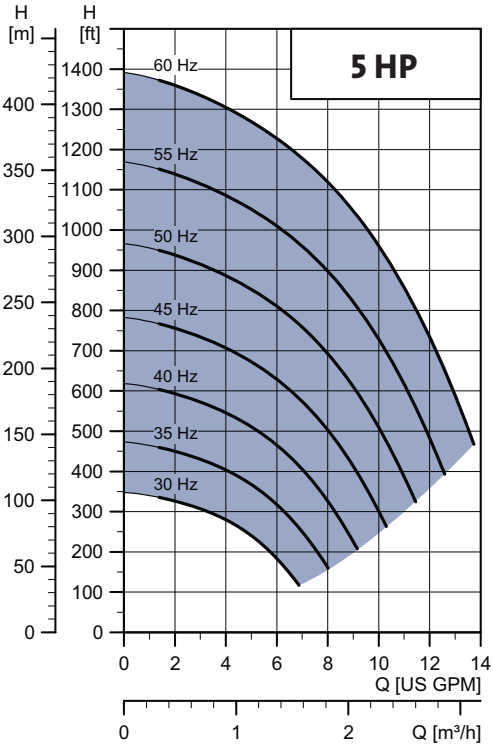


TM05 6423 5012

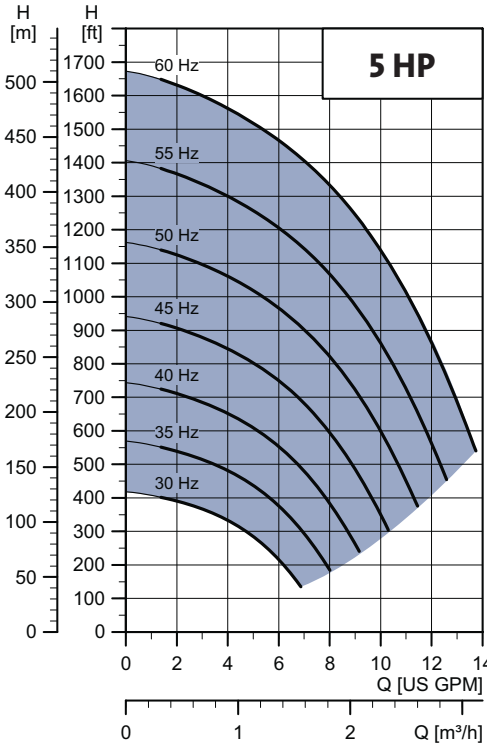
CU331SP Performance Curve



TM05 6424 5012


H [m]
H [ft]
5 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0
50
100
150
200
250
300
350
400
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
0
2
4
6
8
10
12
14
Q [US GPM]
0
1
2
Q [m³/h]
TM05 6425 5012

CU331SP Performance Curve



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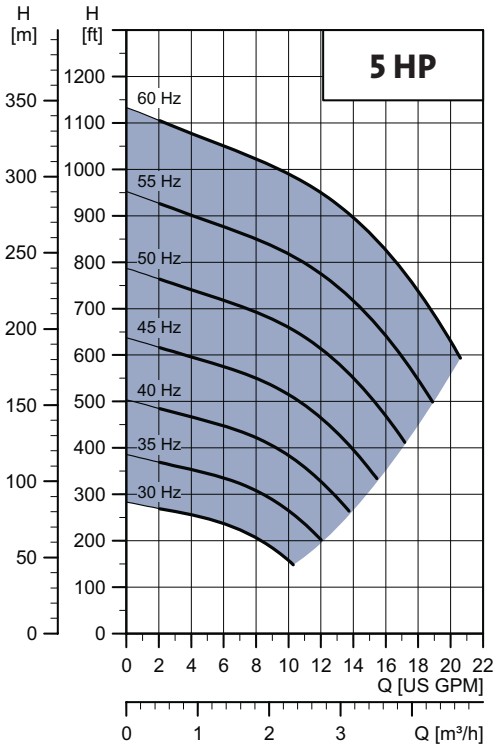
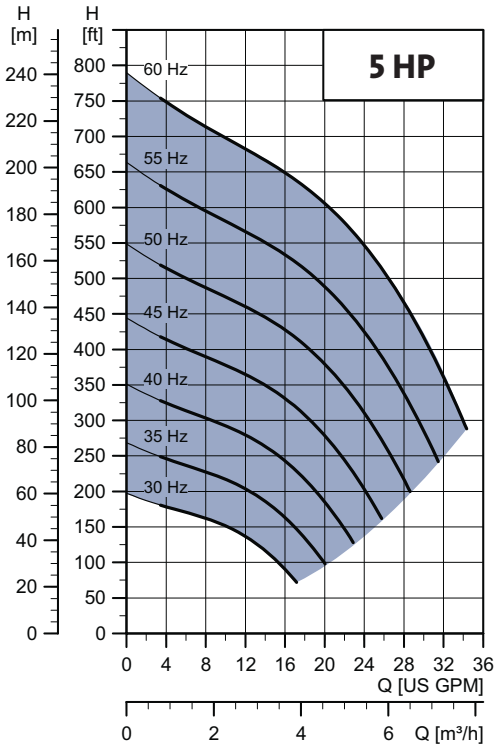
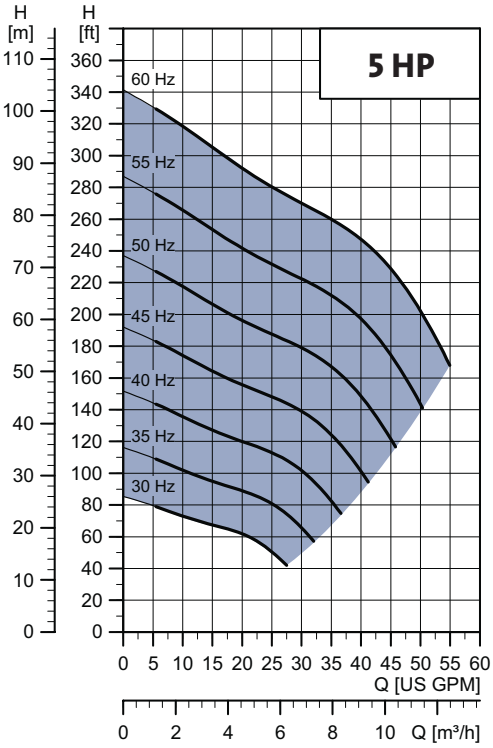

H [m]
H [ft]
5 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0 2 4 6 8 10 12 14 16 18 20 22
Q [US GPM]
0 1 2 3
Q [m³/h]
TM05 6427 5012

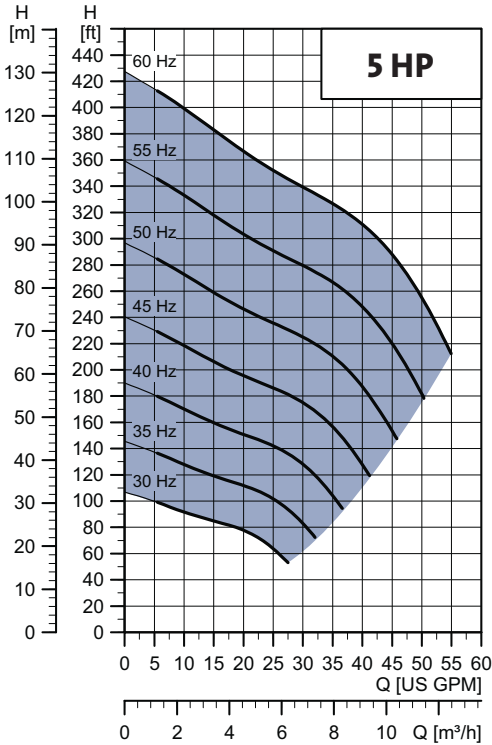
CU331SP Performance Curve

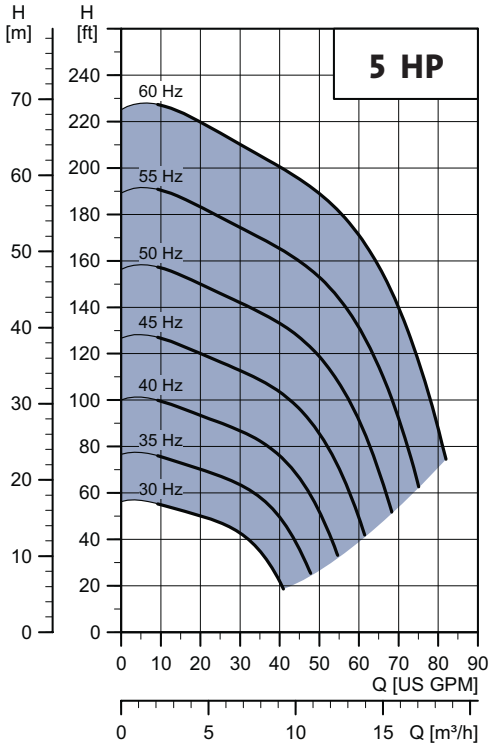


TM05 6428 5012

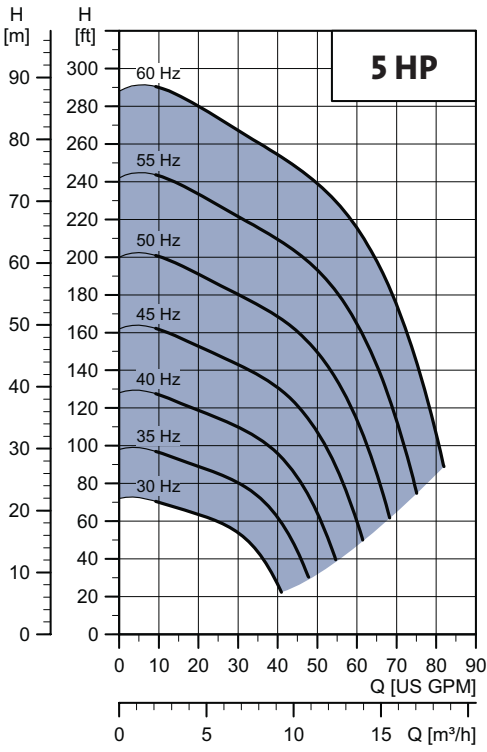

H [m]
H [ft]
5 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0 5 10 15 20 25 30 35 40 45 50 55 60
Q [US GPM]
0 2 4 6 8 10 Q [m³/h]
TM05 6429 5012

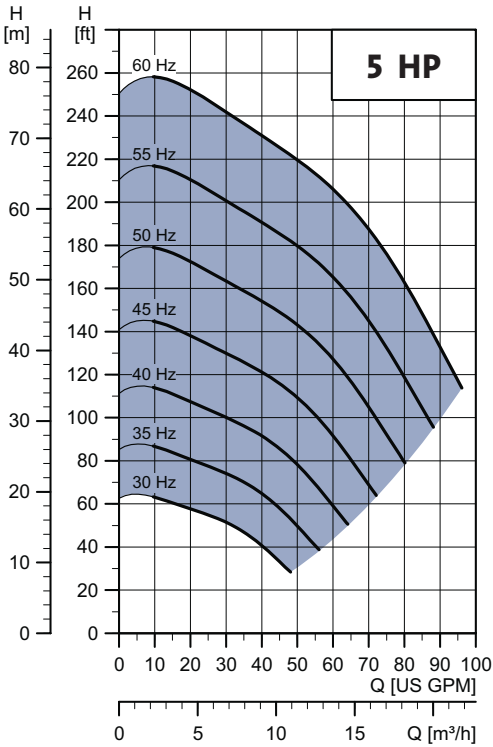
CU331SP Performance Curve




H [m]
H [ft]
5 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0 10 20 30 40 50 60 70 80 90
Q [US GPM]
0 5 10 15 Q [m³/h]
TM05 6431 5012

CU331SP Performance Curve




H [m]
H [ft]
5 HP
60 Hz
55 Hz
50 Hz
45 Hz
40 Hz
35 Hz
30 Hz
0 10 20 30 40 50 60 70 80 90 100
Q [US GPM]
0 5 10 15 Q [m³/h]
TM05 6433 5012

CU331SP SmartFlo™ System Sizing

Follow these 3 steps.

STEP 1

Calculate maximum head requirements at rated flow conditions:

2

Hmax = dynamic head + system psi (feet) + friction loss + above grade elevation.

		Dynamic head
+		System psi (feet)
+		Friction Loss
+		Above grade elevation
=		**Hmax**

STEP 2

Select pump from performance curves as follows:

Select a model in which the calculated value of **Hmax** is within the maximum performance curve of the pump.

STEP 3

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

CU331SP Variable Frequency Drive

IMPORTANT NOTE:
MUST BE USED WITH 3 PHASE MOTORS

PUMP TYPE	HP	VOLTAGE	FULL LOAD AMPS	
			230V	115V
5SQE05-90	1/2	230V/115V	2.1	4.2
5SQE05-140	1/2	230V/115V	2.9	6.0
5SQE05-180	1/2	230V/115V	3.7	7.7
5SQE07-230	3/4	230V	4.6	
5SQE07-270	3/4	230V	5.3	
5SQE07-320	3/4	230V	6.2	
5SQE10-360	1	230V	7.2	
5SQE10-410	1	230V	8.1	
5SQE15-450	1 1/2	230V	9.2	
10SQE05-110	1/2	230V/115V	2.9	6.1
10SQE05-160	1/2	230V/115V	4.1	8.6
10SQE07-200	3/4	230V	5.3	
10SQE7-240	3/4	230V	6.0	
10SQE10-290	1	230V	7.7	
10SQE15-330	1 1/2	230V	8.9	
15SQE05-70	1/2	230V/115V	2.9	6.0
15SQE05-110	1/2	230V/115V	4.0	8.3
15SQE07-150	3/4	230V	5.1	
15SQE07-180	3/4	230V	6.2	
15SQE10-220	1	230V	7.4	
15SQE10-250	1	230V	8.4	
15SQE15-290	1 1/2	230V	9.7	
22SQE05-40	1/2	230V/115V	1.9	3.9
22SQE05-80	1/2	230V/115V	3.4	7.2
22SQE07-120	3/4	230V	4.9	
22SQE07-160	3/4	230V	6.4	
22SQE10-190	1	230V	7.9	
22SQE15-220	1 1/2	230V	9.5	
30SQE05-40	1/2	230V/115V	2.8	5.7
30SQE07-90	3/4	230V	5.2	
30SQE10-130	1	230V	7.6	

OVERLOAD AMPS		MIN. WELL DIA.	DISCHARGE
230V	115V		
5	11	3”	1” NPT
5	11	3”	1” NPT
5	11	3”	1” NPT
8		3”	1” NPT
8		3”	1” NPT
8		3”	1” NPT
11		3”	1” NPT
11		3”	1” NPT
12		3”	1” NPT
5	11	3”	11/4” NPT
8	11	3”	11/4” NPT
8		3”	11/4” NPT
8		3”	11/4” NPT
11		3”	11/4” NPT
12		3”	11/4” NPT
5	11	3”	11/4” NPT
5	11	3”	11/4” NPT
8		3”	11/4” NPT
8		3”	11/4” NPT
11		3”	11/4” NPT
11		3”	11/4” NPT
12		3”	11/4” NPT
5	11	3”	11/2” NPT
5	11	3”	11/2” NPT
8		3”	11/2” NPT
8		3”	11/2” NPT
11		3”	11/2” NPT
12		3”	11/2” NPT
5	11	3”	11/2” NPT
8		3”	11/2” NPT
11		3”	11/2” NPT

Cable length selection tables

The following table (Fig. 7) lists the recommended copper cable sizes and various cable lengths for SQE motors. Proper wire size will ensure that adequate voltage will be supplied to the motor.

To assure adequate voltage, the maximum cable lengths are calculated for when the motor is running at maximum nameplate amps. Cable sizes larger than specified may always be used and will reduce power loss.

The use of cables smaller than the recommended sizes will void the warranty. Smaller cable sizes may cause under-voltage alarms.

SQ/SQE ONLY

Motor Rating		Copper Wire Size (AWG)							
Volts	HP	AMPS	14	12	10	8	6	4	2
115	1/2	12	140	220	360	550	880	1390	2260
230	1/2	5.2	640	1000	1660	2250	4060		
230	3/4	8.4	400	620	1030	1580	2510	3970	
230	1	11.2	300	460	770	1190	1890	2980	4850
230	1 1/2	12	280	430	720	1110	1760	2780	4530

Fig. 7

Cable length is in feet

Note: The calculations in the table are based on supply of 115V or 230V
Max recommended cable length between the CU300/301 and SQE = 200m (656 ft)

Friction Loss Table - SCH 40 Steel Pipe

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
		ID	ID	ID	ID	ID	ID	ID	ID	ID
GPM	GPH	0.622"	0.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
2	120	4.8								
3	180	10	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	4.5						
9	540	78.3	18.8	5.7						
10	600	95.9	23	6.9	1.8					
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				
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	23.5	10.8	3.1	1.3		
45	2,700				29.4	13.5	3.9	1.6		
50	3,000				36	16.4	4.7	1.9		
60	3,600				51	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	14.2	5.8	2	
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	17.5	5.8	1.5
200	12,000						66.3	27	8.9	2.3
260	15,600							45	14.8	3.7
300	18,000							59.6	19.5	4.9

Friction Loss Table - Valves and Fittings

(Friction Loss in Equivalent number of Feet of Straight Pipe)

TYPE OF FITTING AND APPLICATION	PIPE AND FITTING	NOMINAL SIZE OF FITTING AND PIPE 1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
		EQUIVALENT LENGTH OF 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

Friction Loss Table - SCH 40 PVC

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
		ID	ID	ID	ID	ID	ID	ID	ID	ID
GPM	GPH	0.622"	0.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
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	2.5						
7	420	41.5	10.6	3.3						
8	480	53	13.5	4.2						
9	540	66	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	11.8	3.1	1.4				
16	960		48.6	15.1	4	1.9				
20	1,200		60.5	22.8	6	2.8				
25	1,500			38.7	9.1	4.3	1.3			
30	1,800				12.7	6	1.8			
35	2,100				16.9	8	2.4			
40	2,400				21.6	10.2	3	1.1		
45	2,700				28	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	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	3	
140	8,400						30.6	10.5	4	1.1
160	9,600						39.3	13.4	5	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

NOTES:

Based on schedule 40 steel and plastic fittings.

Figures given are friction losses in terms of Equivalent Lengths of straight pipe.

1 Friction loss figures are for screwed valves and are based on equivalent lengths of steel pipe.

Notes

Notes

Notes

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