

Variable Speed Pump Comparison

Option A

Enter Curve Data from Published Curve

(1 to 3 equal size pumps)

Enter Pump Description: **MS Pump C (Grundfos CR45-2)**

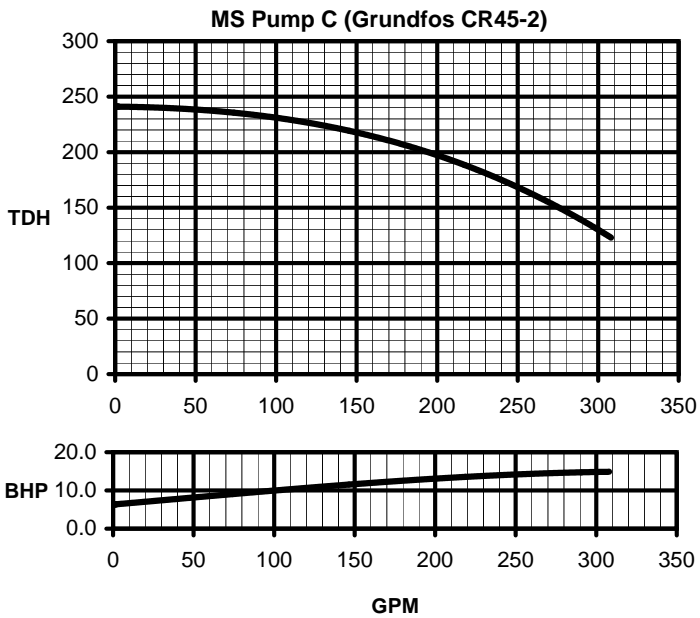
Enter Head at zero flow		241	FEET		
Enter End of curve pump performance:	308 GPM at	123	FEET at	64.3	%
Enter Head and Pump Efficiency at	77 GPM:	235	FEET	50.0	%
Enter Head and Pump Efficiency at	154 GPM:	216	FEET	71.5	%
Enter Head and Pump Efficiency at	231 GPM:	180	FEET	76.2	%

Enter Impeller Diameter for curve data above (if applicable): in.
 Enter Impeller Trim (if applicable): in.

Motor Information

HP	Nominal RPM	Eff [%] @ 100%	Eff [%] @ 75%	Eff [%] @ 50%	Eff [%] @ 25%
15.0	3,500	89.6	90.2	89.8	85.7

VFD Data Enter Full Load VFD Efficiency: %



Pump Sequencing

Enter Desired Max. Flow per Pump GPM

Variable Speed System Type

Enter "1" if all pumps are variable speed
 Enter "2" if only 1 pump is variable speed (additional or "lag" pumps are fixed speed).

Variable Speed Pump Comparison

Option B

Enter Curve Data from Published Curve

(1 to 3 equal size pumps)

Enter Pump Description: **MS Pump S (Grundfos model 230S200-5)**

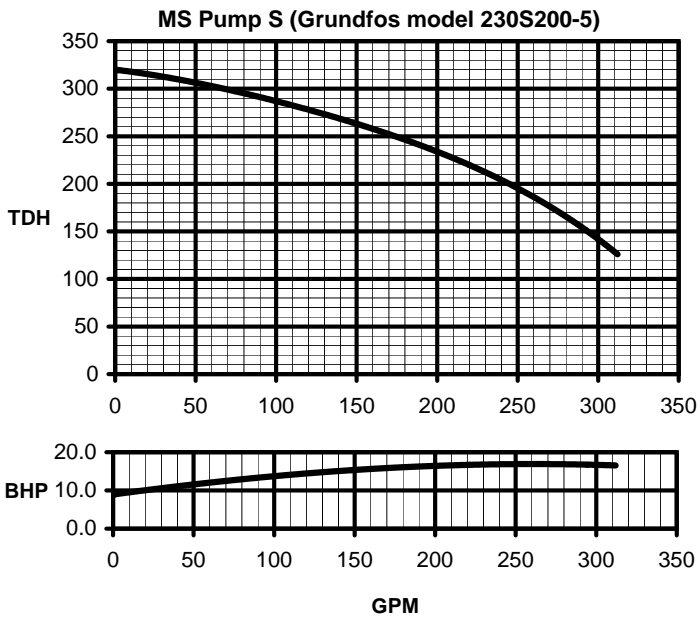
Enter Head at zero flow		320	FEET		
Enter End of curve pump performance:	312 GPM at	126	FEET at	60.1	%
Enter Head and Pump Efficiency at	78 GPM:	296	FEET	45.1	%
Enter Head and Pump Efficiency at	156 GPM:	260	FEET	66.6	%
Enter Head and Pump Efficiency at	234 GPM:	209	FEET	73.1	%

Enter Impeller Diameter for curve data above (if applicable): in.
 Enter Impeller Trim (if applicable): in.

Motor Information

HP	Nominal RPM	Eff [%] @ 100%	Eff [%] @ 75%	Eff [%] @ 50%	Eff [%] @ 25%
20.0	3,500	83.5	83.3	80.2	69.7

VFD Data Enter Full Load VFD Efficiency: %



Pump Sequencing

Enter Desired Max. Flow per Pump GPM

Variable Speed System Type

Enter "1" if all pumps are variable speed
 Enter "2" if only 1 pump is variable speed (additional or "lag" pumps are fixed speed).

Variable Speed Pump Comparison

Part 3: Summary and Results

Enter Flow Profile - 5 Duty Points

Flow (GPM)	Required TDH, feet	Hours per Day	Hours per Yr
40.0	170	8.0	2,920
80.0	170	8.0	2,920
180.0	170	6.0	2,190
250.0	170	1.0	365
350.0	170	1.0	365
		24	8,760

Application Type: Domestic Water - Small Hospital

Enter Annual Operating Days: 365

Enter Electricity Cost [\$/kWh] 0.100

Water usage: 57,816,000 gal./year
158,400 gal./day

Option A Results

Pump Type(s) **MS Pump C (Grundfos CR45-2)**

Flow			Speed, RPM			BHP			Efficiency [%]			Input kW	Annual kWh
Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3		
40.0	0.0	0.0	2,954	0	0	4.8	0.0	0.0	35.4	0.0	0.0	4.2	12,243
80.0	0.0	0.0	2,994	0	0	6.1	0.0	0.0	56.4	0.0	0.0	5.3	15,413
180.0	0.0	0.0	3,231	0	0	10.2	0.0	0.0	75.9	0.0	0.0	8.8	19,236
125.0	125.0	0.0	3,076	3,076	0	7.7	7.7	0.0	69.4	69.4	0.0	13.3	4,869
175.0	175.0	0.0	3,214	3,214	0	9.9	9.9	0.0	75.6	75.6	0.0	17.1	6,252
Total													58,012

Option B Results

Pump Type(s) **MS Pump S (Grundfos model 230S200-5)**

Flow			Speed, RPM			BHP			Efficiency [%]			Input kW	Annual kWh
Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3	Pump 1	Pump 2	Pump 3		
40.0	0.0	0.0	2,613	0	0	5.0	0.0	0.0	34.7	0.0	0.0	5.5	16,136
80.0	0.0	0.0	2,701	0	0	6.4	0.0	0.0	53.9	0.0	0.0	6.2	18,006
180.0	0.0	0.0	3,023	0	0	10.7	0.0	0.0	72.7	0.0	0.0	9.9	21,766
125.0	125.0	0.0	2,827	2,827	0	8.1	8.1	0.0	66.4	66.4	0.0	15.7	5,724
175.0	175.0	0.0	3,001	3,001	0	10.4	10.4	0.0	72.4	72.4	0.0	19.3	7,059
Total													68,691

Operating Cost Summary

Option A Annual Operating Cost is	\$ 5,801
Option B Annual Operating Cost is	\$ 6,869
Annual Savings with Option A	\$ 1,068

Increase in operating costs for Option B **18.4%**

Option A

Average Pumping Efficiency: 55.6 %
Specific Energy: 1.00 kWh/1000 gal

Option B

Average Pumping Efficiency: 53.5 %
Specific Energy: 1.19 kWh/1000 gal

Application Notes