

PX1

M E T A L

WILDEN[®]
A DOVER COMPANY



PRO-FLO[™]
PROGRESSIVE PUMP TECHNOLOGY

PX1 PERFORMANCE



Pro-Flo X™ Operating Principal

The Pro-Flo X™ air distribution system with the revolutionary Efficiency Management System (EMS) offers flexibility never before seen in the world of AODD pumps. The patent-pending EMS is simple and easy to use. With the turn of an integrated

control dial, the operator can select the optimal balance of flow and efficiency that best meets the application needs. Pro-Flo X™ provides higher performance, lower operational costs and flexibility that exceeds previous industry standards.



<p>Turning the dial changes the relationship between air inlet and exhaust porting.</p>	<p>Each dial setting represents an entirely different flow curve</p>	<p>Pro-Flo X™ pumps are shipped from the factory on setting 4, which is the highest flow rate setting possible</p>	<p>Moving the dial from setting 4 causes a decrease in flow and an even greater decrease in air consumption.</p>	<p>When the air consumption decreases more than the flow rate, efficiency is improved and operating costs are reduced.</p>

Example 1

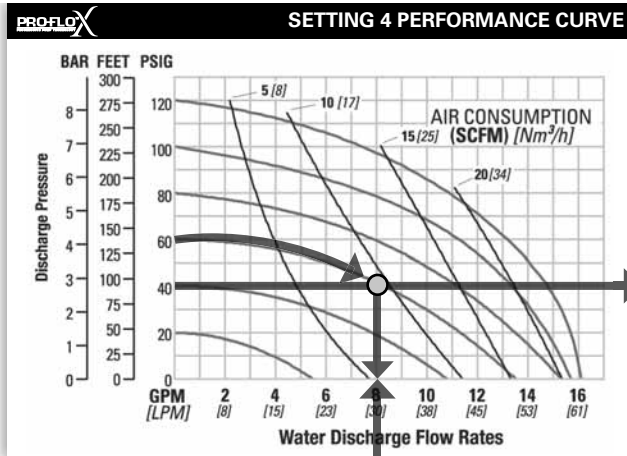


Figure 1

Example data point = **8.2** GPM

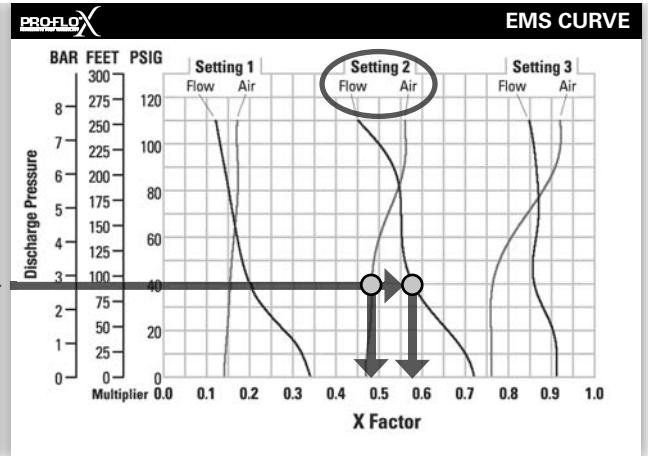


Figure 2

Example data point = **0.58** flow multiplier
0.48 air multiplier

This is an example showing how to determine flow rate and air consumption for your Pro-Flo X™ pump using the Efficiency Management System (EMS) curve and the performance curve. For this example we will be using 4.1 bar (60 psig) inlet air pressure and 2.8 bar (40 psig) discharge pressure and EMS setting 2.

Step 1: Identifying performance at setting 4. Locate the curve that represents the flow rate of the pump with 4.1 bar (60 psig) air inlet pressure. Mark the point where this curve crosses the horizontal line representing 2.8 bar (40 psig) discharge pressure. (Figure 1). After locating your performance point on the flow curve, draw a vertical line downward until reaching the bottom scale on the chart. Identify the flow rate (in this case, 8.2 gpm). Observe location of performance point relative to air consumption curves and approximate air consumption value (in this case, 9.8 scfm).

Step 2: Determining flow and air X Factors. Locate your discharge pressure (40 psig) on the vertical axis of the EMS curve (Figure 2). Follow along the 2.8 bar (40 psig) horizontal line until intersecting both flow and air curves for your desired EMS setting (in this case, setting 2). Mark the points where the EMS curves intersect the horizontal discharge pressure line. After locating your EMS points on the EMS

curve, draw vertical lines downward until reaching the bottom scale on the chart. This identifies the flow X Factor (in this case, 0.58) and air X Factor (in this case, 0.48).

Step 3: Calculating performance for specific EMS setting. Multiply the flow rate (8.2 gpm) obtained in Step 1 by the flow X Factor multiplier (0.58) in Step 2 to determine the flow rate at EMS setting 2. Multiply the air consumption (9.8 scfm) obtained in Step 1 by the air X Factor multiplier (0.48) in Step 2 to determine the air consumption at EMS setting 2 (Figure 3).

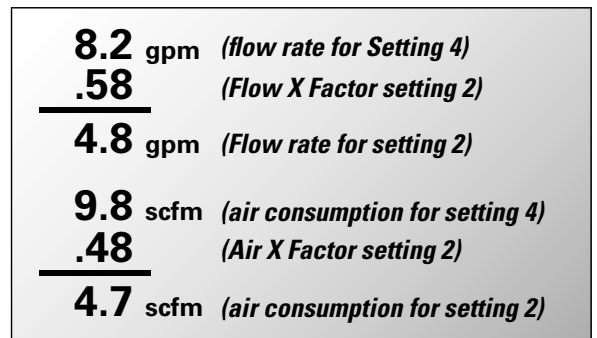


Figure 3

The flow rate and air consumption at Setting 2 are found to be 18.2 lpm (4.8 gpm) and 7.9 Nm³/h (4.7 scfm) respectively.

Example 2.1

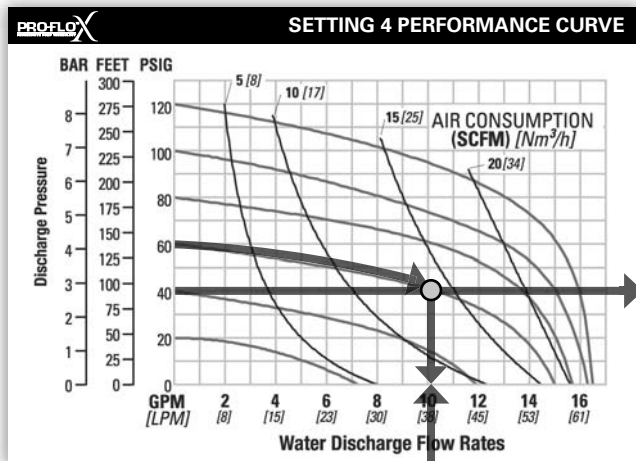


Figure 4

Example data point = **10.2** gpm

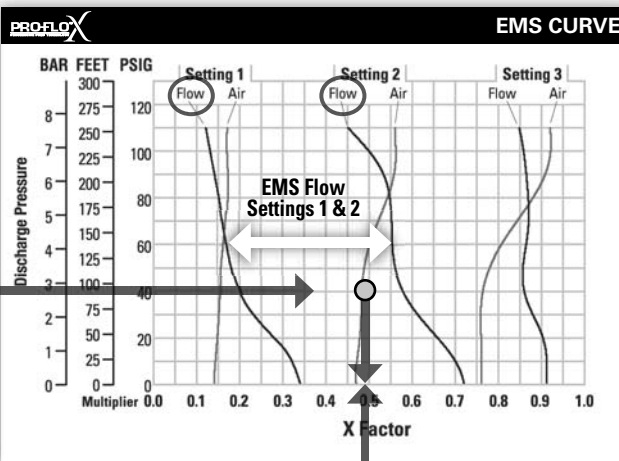


Figure 5

0.49 flow multiplier

This is an example showing how to determine the inlet air pressure and the EMS setting for your Pro-Flo X™ pump to optimize the pump for a specific application. For this example we will be using an application requirement of 18.9 lpm (5 gpm) flow rate against 2.8 bar (40 psig) discharge pressure. This example will illustrate how to calculate the air consumption that could be expected at this operational point.

DETERMINE EMS SETTING

Step 1: Establish inlet air pressure. Higher air pressures will typically allow the pump to run more efficiently, however, available plant air pressure can vary greatly. If an operating pressure of 6.9 bar (100 psig) is chosen when plant air frequently dips to 6.2 bar (90 psig) pump performance will vary. Choose an operating pressure that is within your compressed air systems capabilities. For this example we will choose 4.1 bar (60 psig).

Step 2: Determine performance point at setting 4. For this example an inlet air pressure of 4.1 bar (60 psig) inlet air pressure has been chosen. Locate the curve that represents the performance of the pump with 4.1 bar (60 psig) inlet air pressure. Mark the point where this curve crosses the horizontal line representing 2.8 bar (40 psig) discharge pressure. After locating this point on the flow curve, draw a vertical line downward until reaching the bottom scale on the chart and identify the flow rate.

In our example it is 38.6 lpm (10.2 gpm). This is the setting 4 flow rate. Observe the location of the performance point relative to air consumption curves and approximate air consumption value. In our example setting 4 air consumption is 24 Nm³/h (14 scfm). See figure 4.

Step 3: Determine flow X Factor. Divide the required flow rate 18.9 lpm (5 gpm) by the setting 4 flow rate 38.6 lpm (10.2 gpm) to determine the flow X Factor for the application.

$$5 \text{ gpm} / 10.2 \text{ gpm} = 0.49 \text{ (flow X Factor)}$$

Step 4: Determine EMS setting from the flow X Factor. Plot the point representing the flow X Factor (0.49) and the application discharge pressure 2.8 bar (40 psig) on the EMS curve. This is done by following the horizontal 2.8 bar (40 psig) psig discharge pressure line until it crosses the vertical 0.49 X Factor line. Typically, this point lies between two flow EMS setting curves (in this case, the point lies between the flow curves for EMS setting 1 and 2). Observe the location of the point relative to the two curves it lies between and approximate the EMS setting (figure 5). For more precise results you can mathematically interpolate between the two curves to determine the optimal EMS setting.

For this example the EMS setting is 1.8.

Example 2.2

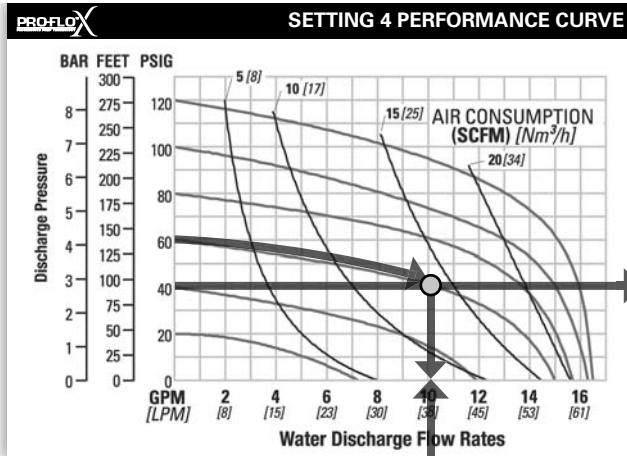


Figure 6

Example data point = **10.2** gpm

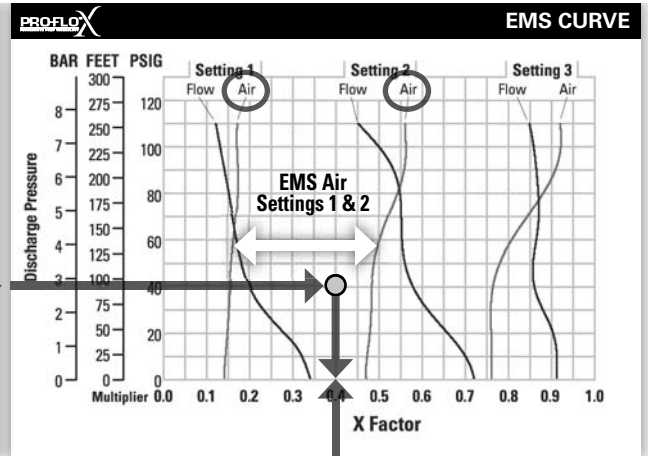


Figure 7

Example data point = **0.40** air multiplier

Determine air consumption at a specific EMS setting.

Step 1: Determine air X Factor. In order to determine the air X Factor, identify the two air EMS setting curves closest to the EMS setting established in example 2.1 (in this case, the point lies between the air curves for EMS setting 1 and 2). The point representing your EMS setting (1.8) must be approximated and plotted on the EMS curve along the horizontal line representing your discharge pressure (in this case, 40 psig). This air point is different than the flow point plotted in example 2.1. After estimating (or interpolating) this point on the curve, draw a vertical line downward until reaching the bottom scale on the chart and identify the air X Factor (figure 7).

For this example the air X Factor is **0.40**

Step 2: Determine air consumption. Multiply your setting 4 air consumption (14 scfm) value by the air X Factor obtained above (0.40) to determine your actual air consumption.

$$14 \text{ scfm} \times 0.40 = 5.6 \text{ SCFM}$$

In summary, for an application requiring 18.9 lpm (5 gpm) against 2.8 bar (40 psig) discharge pressure, the pump inlet air pressure should be set to 4.1 bar (60 psig) and the EMS dial should be set to 1.8. The pump would then consume 9.5 Nm³/h (5.6 scfm) of compressed air.

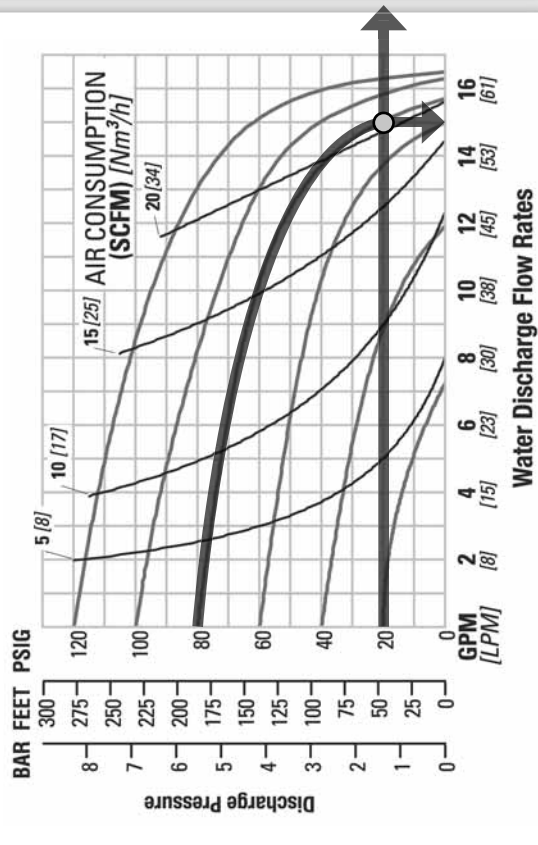
PX1 METAL RUBBER-FITTED



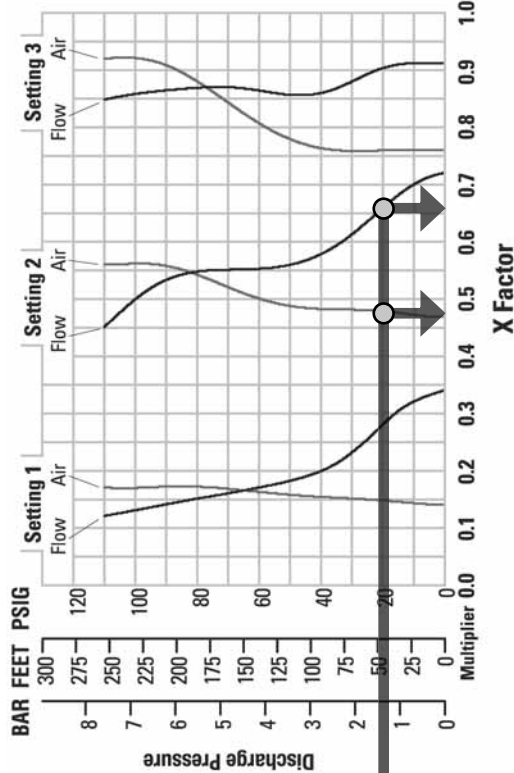
PERFORMANCE



SETTING 4 PERFORMANCE CURVE



EMS CURVE



TECHNICAL DATA

Height	..... 224 mm (8.8")
Width	..... 208 mm (8.2")
Depth	..... 287 mm (11.3")
Ship Weight	..... Aluminum 6 kg (13 lbs.)
	..... 316 Stainless Steel 9 kg (20 lbs.)
Air Inlet	..... 13 mm (1/2")
Inlet	..... 13 mm (1/2")
Outlet	..... 13 mm (1/2")
Suction Lift	..... 5.9 m Dry (19.3')
	..... 8.0 m Wet (26.1')
Disp. Per Stroke	..... 0.09 l (0.023 gal.)
Max. Flow Rate	..... 62.5 lpm (16.5 gpm)
Max. Size Solids	..... 1.6 mm (1/16")

*Displacement per stroke was calculated at 4.8 bar (70 psig) air inlet pressure against a 2 bar (30 psig) head pressure.

The Efficiency Management System (EMS) can be used to optimize the performance of your Wilden pump for specific applications. The pump is delivered with the EMS adjusted to setting 4, which allows maximum flow.

EXAMPLE

A PX1 metal, Rubber-fitted pump operating at EMS setting 4, achieved a flow rate of 56.8 lpm (15.0 gpm) using 35.7 Nm³/h (21.0 scfm) of air when run at 5.5 bar (80 psig) air inlet pressure and 1.4 bar (20 psig) discharge pressure (See dot on flow chart).

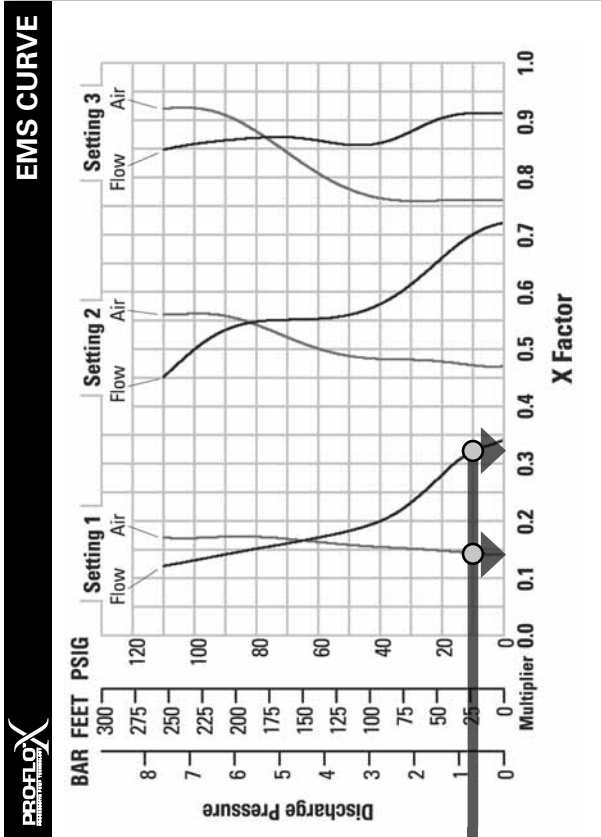
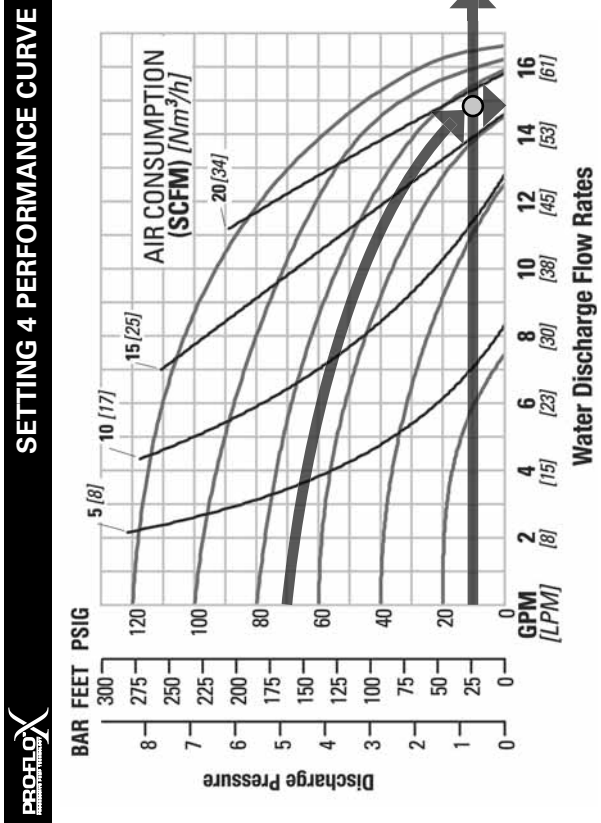
The end user did not require that much flow and wanted to reduce air consumption at his facility. He determined that EMS setting 2 would meet his needs. At 1.4 bar (20 psig) discharge pressure and EMS setting 2, the flow "X factor" is .66 and the air "X factor" is .48.

Multiplying the original setting 4 values by the "X factors" provides the setting 2 flow rate of 37.5 lpm (9.9 gpm) and an air consumption of 17.2 Nm³/h (10.1 scfm). The flow rate was reduced by 34% while the air consumption was reduced by 52%, thus providing increased efficiency.

For a detailed example for how to set your EMS, see beginning of performance curve section.

Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.

PX1 METAL TPE-FITTED



SETTING 4 PERFORMANCE CURVE

EMS CURVE

TECHNICAL DATA

Height	224 mm (8.8")
Width	208 mm (8.2")
Depth	287 mm (11.3")
Ship Weight	Aluminum 6 kg (13 lbs.)
	316 Stainless Steel 9 kg (20 lbs.)
Air Inlet	13 mm (1/2")
Inlet	13 mm (1/2")
Outlet	13 mm (1/2")
Suction Lift	5.7 m Dry (18.7') 9.3 m Wet (30.6')
Disp. Per Stroke	0.11 l (0.029 gal.)
Max. Flow Rate	62.8 lpm (16.6 gpm)
Max. Size Solids	1.6 mm (1/16")

*Displacement per stroke was calculated at 4.8 bar (70 psig) air inlet pressure against a 2 bar (30 psig) head pressure.

The Efficiency Management System (EMS) can be used to optimize the performance of your Wilden pump for specific applications. The pump is delivered with the EMS adjusted to setting 4, which allows maximum flow.

The EMS curve allows the pump user to determine flow and air consumption at each EMS setting. For any EMS setting and discharge pressure, the "X factor" is used as a multiplier with the original values from the setting 4 performance curve to calculate the actual flow and air consumption values for that specific EMS setting. Note: you can interpolate between the setting curves for operation at intermediate EMS settings.

The Efficiency Management System (EMS) can be used to optimize the performance of your Wilden pump for specific applications. The pump is delivered with the EMS adjusted to setting 4, which allows maximum flow.

EXAMPLE

A PX1 metal, TPE-fitted pump operating at EMS setting 4, achieved a flow rate of 56.0 lpm (14.8 gpm) using 29.7 Nm³/h (17.5 scfm) of air when run at 4.8 bar (70 psig) air inlet pressure and 0.7 bar (10 psig) discharge pressure (See dot on flow chart).

The end user did not require that much flow and wanted to reduce air consumption at his facility. He determined that EMS setting 1 would meet his needs. At 0.7 bar (10 psig) discharge pressure and EMS setting 1, the flow "X factor" is .32 and the air "X factor" is .14.

Multiplying the original setting 4 values by the "X factors" provides the setting 1 flow rate of 17.8 lpm (4.7 gpm) and an air consumption of 4.2 Nm³/h (2.5 scfm). The flow rate was reduced by 68% while the air consumption was reduced by 86%, thus providing increased efficiency.

For a detailed example for how to set your EMS, see beginning of performance curve section.

Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.

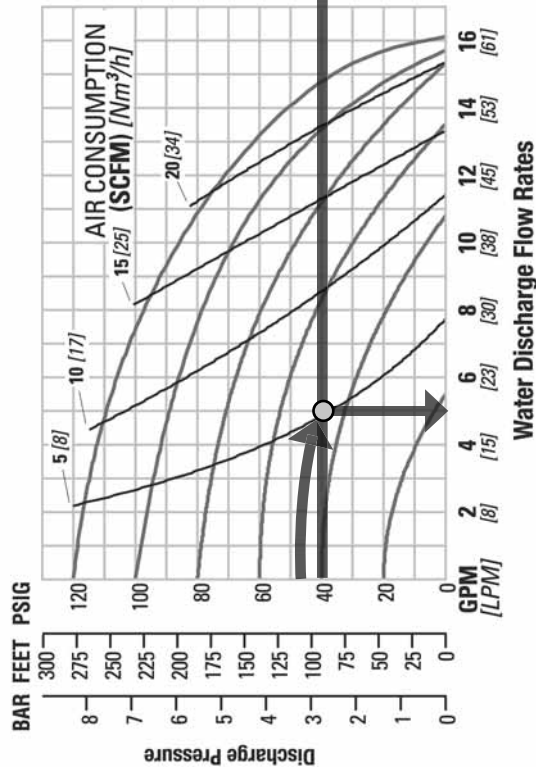
PX1 METAL PTFE-FITTED



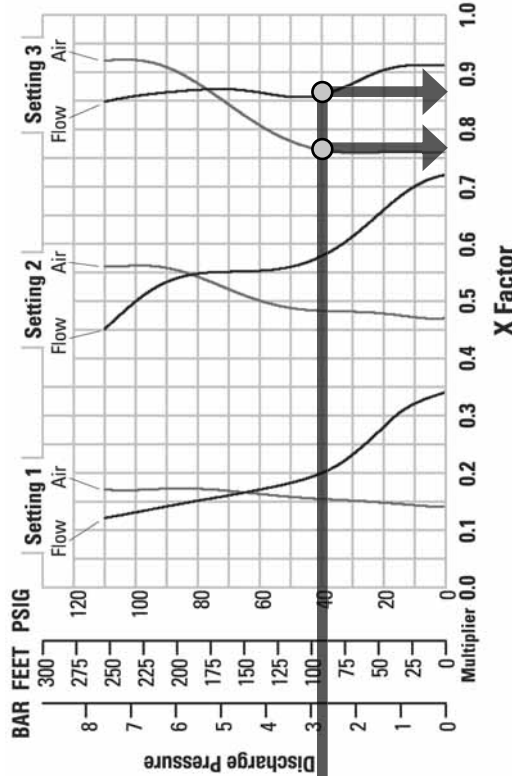
PERFORMANCE



SETTING 4 PERFORMANCE CURVE



EMS CURVE



TECHNICAL DATA

Height	.....	.224 mm (8.8")
Width	.....	.208 mm (8.2")
Depth	.....	.287 mm (11.3")
Ship Weight	.....	Aluminum 6 kg (13 lbs.)
	.....	316 Stainless Steel 9 kg (20 lbs.)
Air Inlet	.....	13 mm (1/2")
Inlet	.....	13 mm (1/2")
Outlet	.....	13 mm (1/2")
Suction Lift	.....	4.7 m Dry (15.3') 8.0 m Wet (26.1')
Disp. Per Stroke	.....	0.09 l (0.024 gal.) ¹
Max. Flow Rate	.....	60.9 lpm (16.1 gpm)
Max. Size Solids	.....	1.6 mm (1/16")

¹ Displacement per stroke was calculated at 4.8 bar (70 psig) air inlet pressure against a 2 bar (30 psig) head pressure.

The Efficiency Management System (EMS) can be used to optimize the performance of your Wilden pump for specific applications. The pump is delivered with the EMS adjusted to setting 4, which allows maximum flow.

The Efficiency Management System (EMS) can be used to optimize the performance of your Wilden pump for specific applications. The pump is delivered with the EMS adjusted to setting 4, which allows maximum flow.

The EMS curve allows the pump user to determine flow and air consumption at each EMS setting. For any EMS setting and discharge pressure, the "X factor" is used as a multiplier with the original values from the setting 4 performance curve to calculate the actual flow and air consumption values for that specific EMS setting. Note: you can interpolate between the setting curves for operation at intermediate EMS settings.

EXAMPLE

A PX1 metal, PTFE-fitted pump operating at EMS setting 4, achieved a flow rate of 18.9 lpm (5 gpm) using 8.83 Nm³/h (5.2 SCFM) of air when run at 3.2 bar (47 psig) air inlet pressure and 2.8 bar (40 psig) discharge pressure (See dot on flow chart).

The end user did not require that much flow and wanted to reduce air consumption at his facility. He determined that EMS setting 3 would meet his needs. At 2.8 bar (40 psig) discharge pressure and EMS setting 3, the flow "X factor" is .86 and the air "X factor" is .76.

Multiplying the original setting 4 values by the "X factors" provides the setting 3 flow rate of 16.3 lpm (4.3 gpm) and an air consumption of 6.8 Nm³/h (4.0 scfm). The flow rate was reduced by 14% while the air consumption was reduced by 24%, thus providing increased efficiency.

For a detailed example for how to set your EMS, see beginning of performance curve section.

Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.

THE RULES HAVE CHANGED.

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Take control of your process today with

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PROGRESSIVE PUMP TECHNOLOGY X

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