When pumps age, running costs increase

As pumps get older, pump performance decreases. With lower efficiency, energy costs increase. This process is inevitable and relentless. Often, waterworks neither notice nor take account of this – if the groundwater flow meets demand, what's the problem?

The reality is that the cost benefits are tangible – and only apparent if the water utility has the correct data at their fingertips.

And it is not enough to check the pump nameplate or to assume the pump curves from the aging pump still apply.

Grundfos provides an online curve generator that lets you generate the current Q/H and efficiency curves for easy comparison with the pump curve at installation.

The GPC curve generator is available from Grundfos Product Center

If you cannot access the required measurements, your well-driller will help you.

Step 1: Note pump information and generate the original pump curve from GPC

Step 2: Measure flow (Q), discharge pressure (H), water level and power (P1) at maximum pump speed (if using a VFD), in the following order:

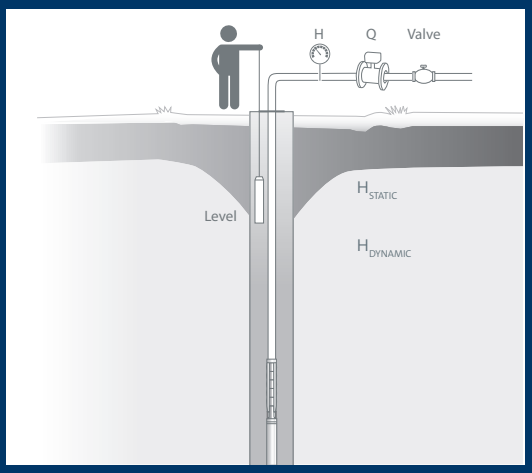
a. With the valve closed (static water level)
   Please note the pump should not be allowed to run for more than 30 seconds at zero flow
   The water level at zero flow should be measured without the pump running
b. Measure and repeat with a few more points with different flows (use valve to change flow)
   Always allow settling time for the new, dynamic water level
   The more points entered, the higher the accuracy
c. With the valve fully open (dynamic water level)

Step 3: From the data, a second curve is generated for comparison with the original pump curve

A PDF report is generated showing efficiency-fall-off and potential savings.

- Often, when looking at pumps from 5 to 10 years and older, the cost savings will be of a magnitude that makes it worthwhile to draw the pump and see why efficiency has fallen off.
- If the cause is clogging, or pressure loss due to leakage or mechanical failure, then a simple repair or cleaning could bring efficiency up to optimal levels again.
- If the pump's age and the extent of the duty point fall-off mean that extra costs are unavoidable, investment in a new, replacement pump is required. **The pay-back time is often surprisingly reasonable.**
- If you do not currently own a Grundfos pump, you can use the **Grundfos Pump Audit** to identify energy consumption and potential energy savings, and to get recommendations for achieving these energy savings.

Talk to your well-driller or to your Grundfos representative to understand more about the benefits of keeping pump efficiency high



Q = Flow

H = Pressure

(use the level sensor to measure H_{STATIC} and $H_{DYNAMIC}$)

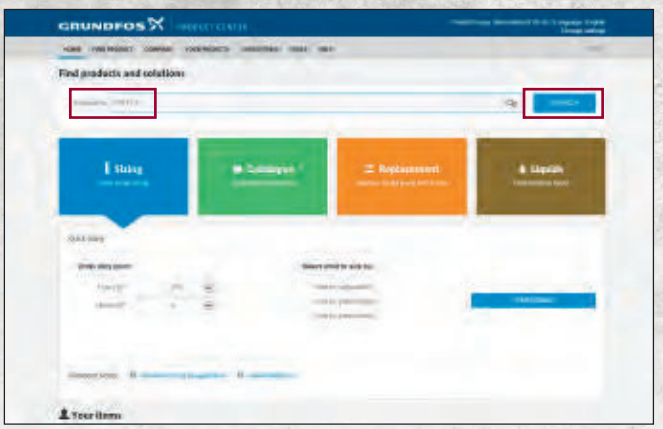
$H_{DIFFERENCE} = H_{DYNAMIC}* + H_{GUAGE} + H_{FRICTION}**$

*: With no flow, $H_{DYNAMIC}$ is the same as H_{STATIC}

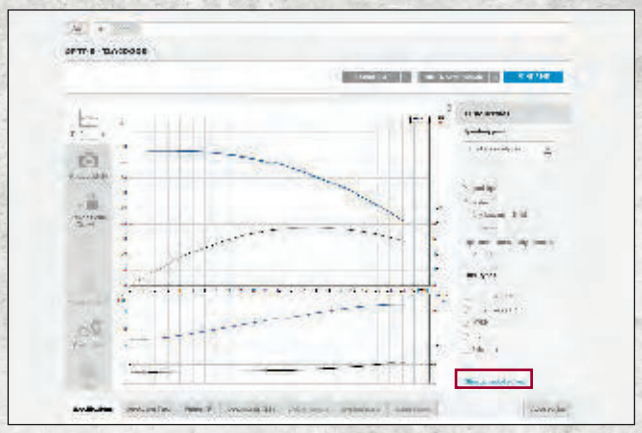
**: The customer decides whether to calculate $H_{FRICTION}$
($H_{FRICTION}$ is the friction loss in the pipes from the pump to the pressure gauge.
Use the 'Pipe friction loss calculator' in GPC under 'Tools')

Step-by-step guide to calculating efficiency fall-off

1 *From Grundfos Product Center (product-selection.grundfos.com), find your existing SP pump by filling in the full pump name directly in the* **'SEARCH'** *field:*



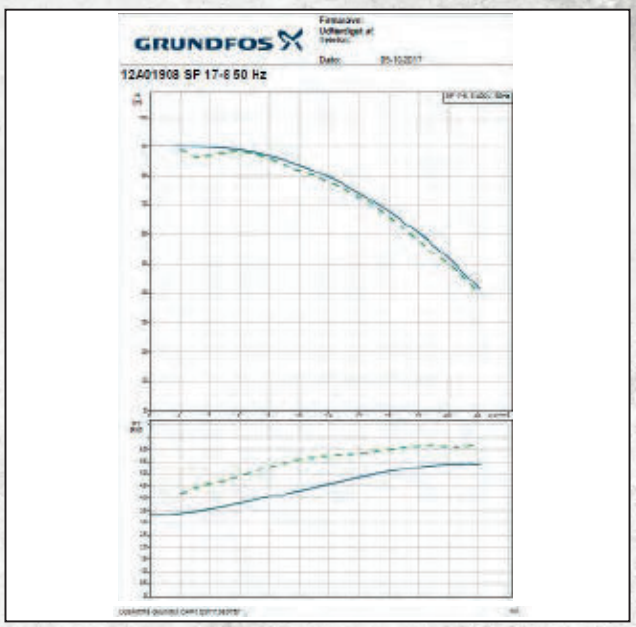
2 *Once you have your existing pump information on-screen, click* **'show advanced options',** *and then* **'other curves'** *followed by* **'insert your own curve'**:



3 *The following screen then appears, and you need to enter measurements for* **Q, H** *and* **P1**:

Input	Q		H		P1	
1*	2	m³/h	89	m	4.2	kW
2*	4	m³/h	87	m	4.6	kW
3*	8	m³/h	86	m	5.3	kW
4	11	m³/h	80	m	5.7	kW
5	15	m³/h	70	m	5.9	kW
6	17.5	m³/h	60	m	6.1	kW
7	20	m³/h	50	m	6.1	kW
8	22	m³/h	40	m	6.2	kW

4 *When you have entered measurements for Q, H and P1 and clicked* **'generate pdf'**, *you get the following report. The dashed line shows performance fall-off and changed power consumption:*



Conclusion: The curve shows that to maintain a flow of 17m³, power consumption has increased by 1 kW.
With a pumping requirement of 9 hours per day, that equates to **3,285 kWh over a year,** or a **16 % increase** in energy use.

Acknowledgement to Brøker well-drillers – a company focused on keeping efficiency high

Some well-drilling companies specialise in helping their customers optimise their groundwater pumping. Danish well-drilling company *Brøndbøringsfirmaet Brøker* in Holbæk, Denmark, approached Grundfos to hear if we could develop a curve generator that simplifies the process with data collection onsite. This is now available on Grundfos Product Center (GPC).

Read about Brøker well-drillers and how Grundfos supports them to optimise groundwater pump efficiency at their customers. **[Grundfos.com/cases]**

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