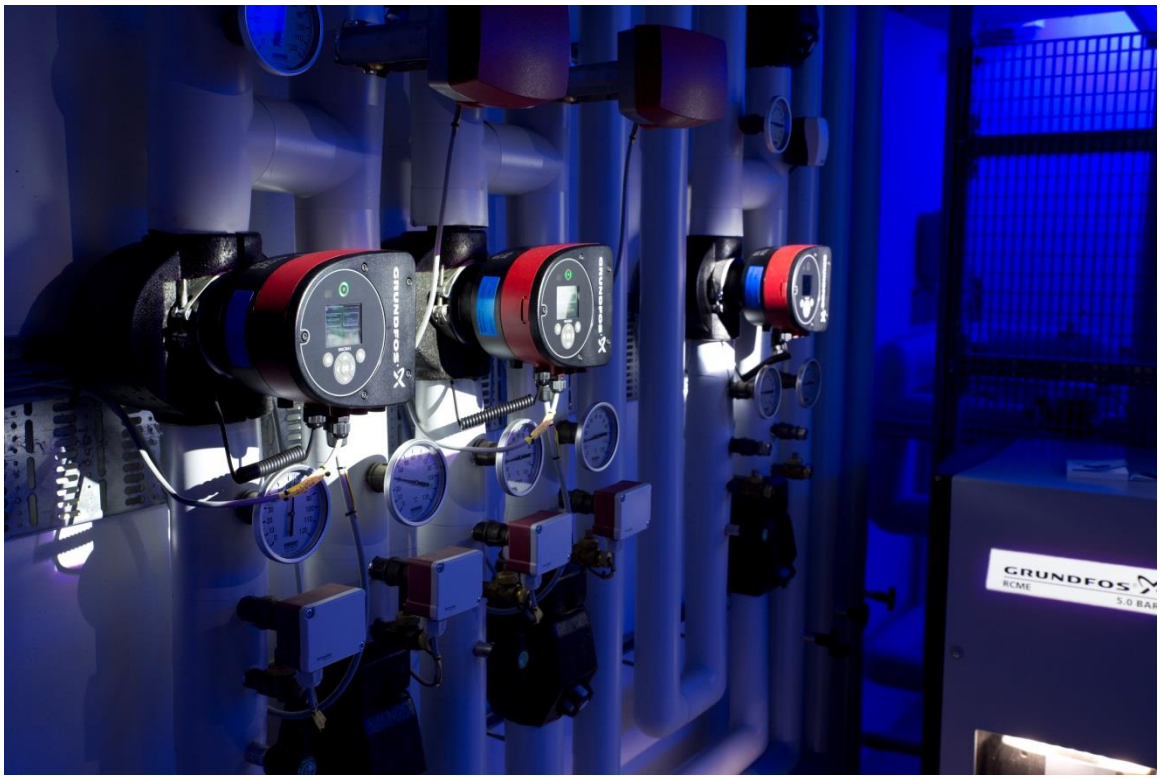
MAGNA3 with FLOWLIMIT avoids balancing problems in HVAC systems

The MAGNA3 and FLOW*LIMIT* technology brings intelligence to HVAC systems

Installing the Grundfos MAGNA3 means more efficiency in HVAC systems and means that balancing systems has never been easier. Avoiding the need for pump throttling valves, they promote the precise adjustment of flow levels and much greater efficiency.



You have a building with a maze of intricate pipes, and you need to install a HVAC system. There are lots of factors to consider, from friction loss in the pipes themselves to pressure loss in longer pipe sections. Even the size and power of the pump itself needs to be considered.

At the REHVA World Congress Clima 2013, it was claimed that around two-thirds of pumps run at full capacity all the time when this is needed only 5% of the time, demonstrating how hard it is to balance HVAC systems.

The MAGNA3 pump will change this. It brings in a number of innovations. In addition to a motor that uses permanent magnet technology to reduce friction loss within the pump and a sensor that measures exactly how much flow is moving through the pump, the MAGNA3 has FLOWLIMIT technology that allows the user to precisely control the output of the pump itself.

Using the MAGNA3 and FLOWLIMIT to define maximum flow
"Take a look at the flow graphs for other pumps," explains Anders Nielsen, project lead on the MAGNA3. "They just keep going, potentially forever. Now we can add a vertical line to the x axis of those graphs as we say to our pump that a particular flow level is its maximum (see figure 1). They can go that far and pump so much water, but go no further."

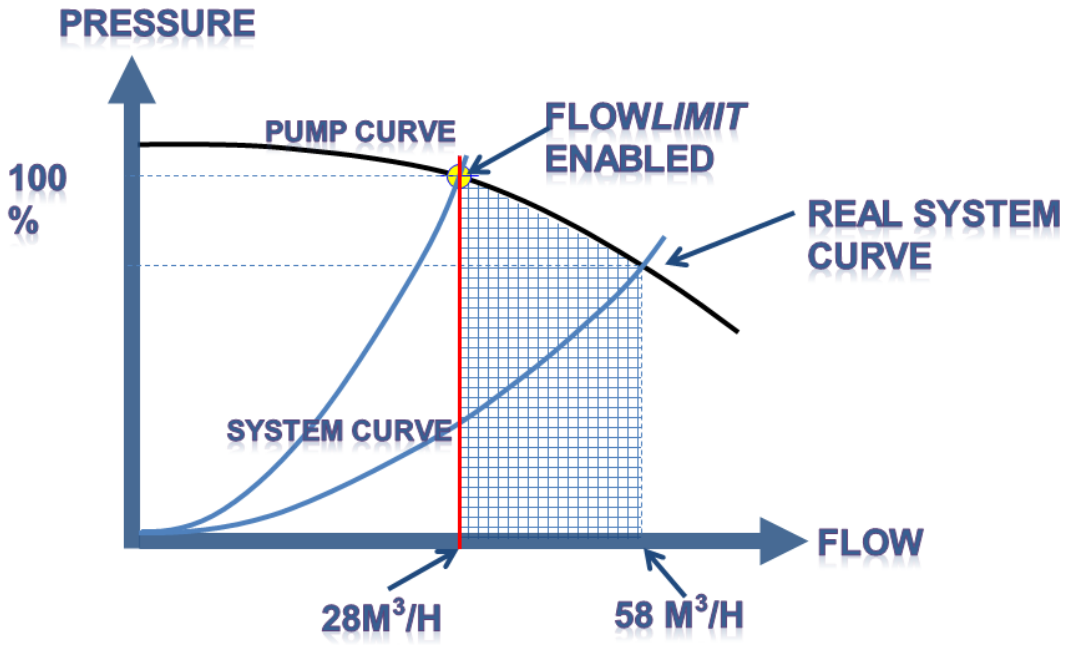


Figure 1: MAGNA3, with Flowlimit enabled, reduces the risk of system overflow by setting the max limit and maintains pressure in the system, thus reducing overall energy consumption.

Previously, this work was done by using throttling valves that had no direct relationship with the pump itself and were unable to alter its flow. "It's like fuelling a car to do 100 km an hour, but because you only want it to do 60 km an hour, using the brake to hold it back to that speed," Anders Nielsen says. "That's an inefficient way to drive a car or to run a pump. It's also very wasteful."

As flow can now be controlled through the pump, it makes balancing the system much easier and with much larger margins for error. If a system is designed to deliver 100 cubic metres per hour and does so, then the person who designed it could be said to have succeeded. But there are many other variables at work. When friction loss is much less than was originally factored into the design, the pump will continue to work in a hugely inefficient way. For example, if a window is left open without shutting off the radiator, the pump will continue to pump an increasing amount to keep pace, thus leading to energy waste.

The MAGNA3 as the ultimate balancing tool
While balancing is one of the most difficult aspects of HVAC systems, the MAGNA3 and FLOWLIMIT help take a large part of the guesswork out of it.

"You can help balance parts of the system with the MAGNA3," Anders Nielsen argues. "When connected to a specific branch in the system, and regardless of pipe diameter and therefore the amount of potential friction loss, the MAGNA3 pump will circulate the exact amount of water that it has been told to circulate."

In addition, the Grundfos GO smart device controller further enables FLOWLIMIT function by giving the system operator complete control, which can also be done directly on the pump itself. Where balancing the system using throttling valves can be quite a task, the MAGNA3 allows

operators to use a handheld controller, or their iOS or Android devices to talk directly to the pump. Reports on the pump's activity can be shared electronically and users can control a range of variables, including temperature, allowing them to make quick corrective changes.

Grundfos GO smart device for remote pump set-up, control and monitoring. It works with all Grundfos e-pumps and communicates both via radio and infra-red technology. It provides data such as duty point monitoring, power consumption, media temperature, water flow and running hours. The app is available for Apple iOS and Android devices.

A sample installation

So what kind of systems would suit the MAGNA3? Anders Nielsen cites the example of a building with four facades. The present understanding of pump technology is such that a system would have a throttling valve on each branch. With a MAGNA3, the system becomes much simpler. The throttling valve can all be dispensed with, in favour of four MAGNA3 pumps (see figures 2-3).

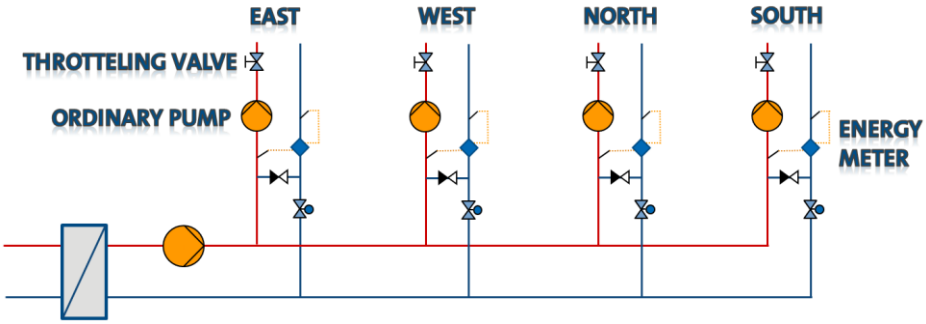


Figure 2: Schematic of a traditional HVAC system. There are mixing loops with throttling valves after each pump. Separate energy meters are applied to keep track of energy flows in the buildings in east, west, north and south wings of the building.

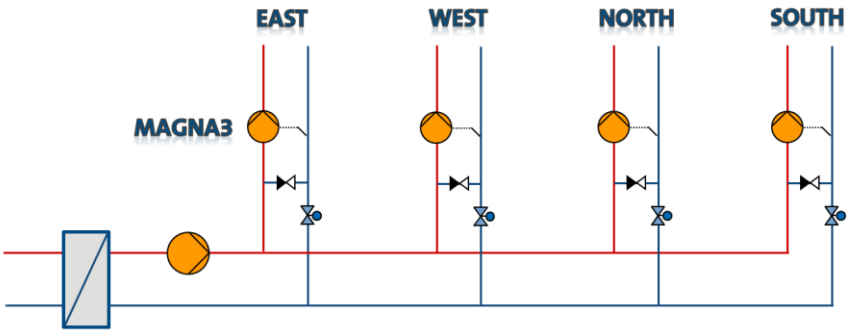


Figure 3: The same system with the MAGNA3 pump installed along with FLOWLIMIT. There is no need for separate energy meters and pump throttling valves.

This makes the system much cleaner as the surplus elements can be removed, saving on installation and maintenance costs as the MAGNA3 performs all three functions itself. As well as acting as a pump, it provides accurate energy output readings and negates the need for dedicated throttling valves. If this network was installed where there was no previous

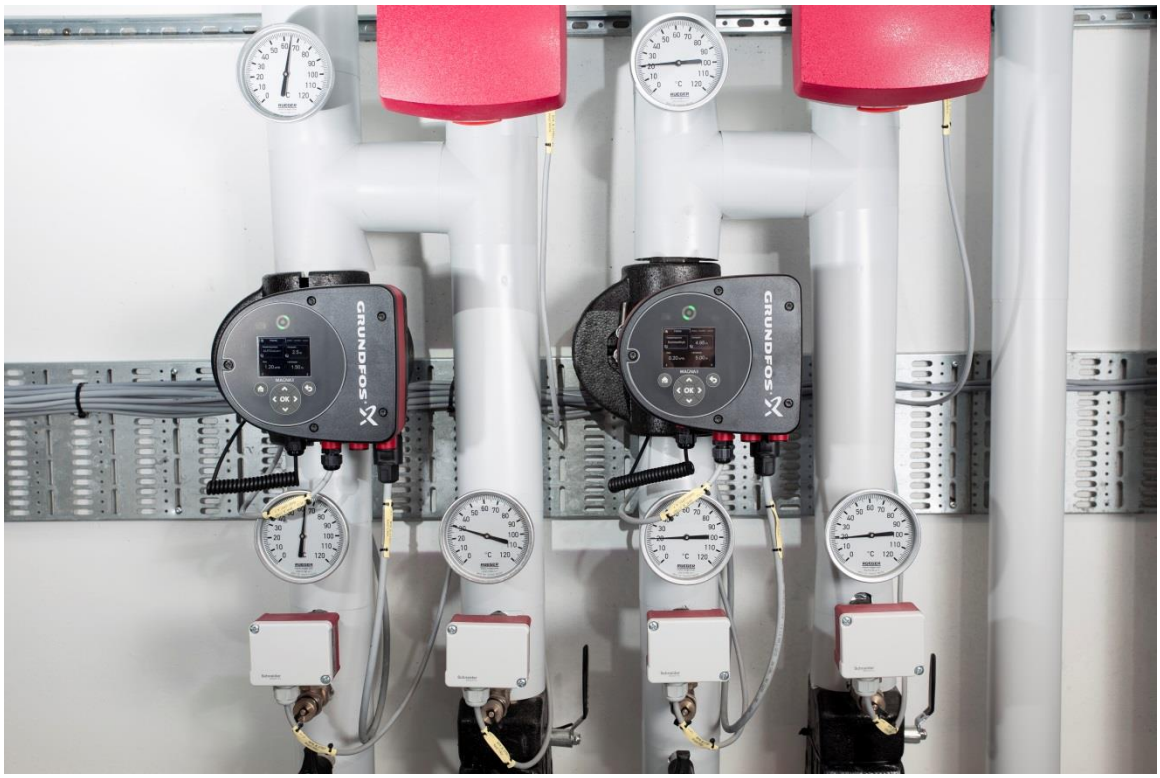


Image: MAGNA3 pumps eliminate the need for throttling valves in a heating or cooling system.

HVAC system, commissioning costs would also be reduced which would mean that, over a protracted period, the MAGNA3 pump paid for itself.

According to Anders Nielsen, one of the participants at the Grundfos workshop at the REHVA World Congress Clima 2013 noted simply: “If I don’t have to buy a throttling valve and an additional energy meter, I save initial costs. And the first step to increased performance is knowledge about how the system performs which we can get from the energy metering and ability to make a log from the live online results.”

Click here for more information on the MAGNA3.