

# DECENTRALISED PUMP SYSTEM "GENIAX" START INTO A NEW ERA OF HEATING SYSTEMS

*Olaf Strubelt*

According to the manufacturer, "GeniAx" is a real technical revolution in heating technology. Instead of temperature control valves, it relies on several miniature pumps at the heating surfaces or the heating circuits. The conventional "supply-oriented heating" with a central heating pump will thus be replaced by a "demand-oriented heating". Pumping will only take place if heat is required.

In this context the engineers at Wilo recognised that the right way to achieve more energy efficiency in pump technology is to optimise the heating system construction itself. A few years ago this was the starting point for the pioneering idea of a decentralised pump system. Since then the company has been working on this concept with very ambitious research effort and in close co-operation with scientific institutes to make the system ready for the market.

## The innovative overall system

Dr. Thorsten Kettner, the project manager responsible for the development and the market introduction of the new system gave a detailed technical description of the new decentralised pump system. Wilo relies on the power-saving EC motor technology for the miniature pumps which is known from the high-efficiency pumps. He underlines that the new development of pumps for the living space was a special challenge because they did not only have to be of small construction size and be very sturdy, but they also had to be as quiet as possible. He carried on explaining that in the



*The "GeniAx" pumps are so quiet that they can be operated in living and sleeping rooms. All requirements regarding sound insulation are met. The sound level is clearly below the limit value of 25dB(A), determined in the most strict stage III of the VDI guideline 4100 "Sound insulation in buildings". For this reason Wilo made extensive measurements in the sound chamber of its research laboratory.*



*A very important leap in technology during the development of "GeniAx" was the development of very small, but still powerful and, above all, reliable miniature pumps which are not bigger than a conventional thermostatic valve.*

raw installation phase only the pump adapters are installed; those are optionally available in the versions inline, H-block inline or H-block angle. The pumps themselves are only mounted as the final step of installation. The heating installation must not be drained. The third component is the pump electronics installed near the pumps which controls them via a cable connection. Design housings are available for pumps and pump electronics for a modern integration into the living or office ambience.

Furthermore, Dr. Kettner introduced the appropriate room user interfaces with different functions for single-family houses, multi-family houses and commercial properties. The user can set the temperature individually for each room and can program different setback periods in the daily and weekly routine in order to save even

more energy. Moreover, a central user interface is provided.

## Central intelligence in the heating system

Another decisive component of the decentralised pump system is – besides the miniature pumps and their pump electronics – a central management unit with an interface to the heat generator, Dr. Kettner emphasised. The task of the “GeniAx” server is the management of all components in the entire heating system in coordination with the heat requirement in the individual rooms and the specifications from the room user interface. The server sends control signals to the pump electronics which then regulate the pump’s speed, the pump’s mass flow and the heating power variably and accordingly to what is actually needed. Furthermore, the server controls the indications of the room user interfaces, it monitors all connected components, collects data for diagnosis and controls the heat generator via the 0-10 V interface. In addition, the system is open for the integration into building automation systems.

Regarding the hydraulic planning Dr. Kettner underlined that “GeniAx” does not differ from conventional systems. Planning can also be done in accordance with the established rules of laying and according to the known state of technology. Wilo provides a system set-up software for the building-specific configuration of the system by a HVAC craftsman company. The installation does not require special knowledge either. The pump adapters are installed just like the lower part of the thermostatic valve, e.g. in the raw installation phase. The pumps can be installed by means of a service adapter without any tools even when the heating system is filled. Upon commissioning, the decentralised pump system leads the installer step by step. Programming onsite is not necessary.

## Extensive scientific support

One of the most important co-operation partners of the Dortmund-based pump expert in the development of the decentralised pump system, but also in the extensive field tests, is Technical University (TU) Dresden. Prof. Dr.-Ing. habil. Wolfgang Richter, professor for heating and ambient

air technology at the local Institute of Power Engineering.

The focus of his institute’s research was the development and the testing of control strategies, comparative measurements with conventional control and to prove the achievable energy savings and improvements of comfort. For this, the decentralised pump system was subject to extensive field tests for several years.

“The energy-saving potential of the new systems is based on a clear reduction of heat losses in heat generation, heat distribution and in heat transfer”, dr. Richter emphasised. One of the reasons is a feed temperature which is controlled according to the demand, which also involves the reduction of the average system temperatures and therewith a considerably improved use of the calorific value compared to the conventional solution with differential

system uses an automatic hydraulic balancing to make even higher energy savings possible. A system is hydraulically ideal when every heating surface is provided with the precisely required water quantity. Energy losses caused by hydraulic deficits can be avoided effectively.

As a final result, TU Dresden was able to detect heating energy saving potentials between 17 % (multi-family house, old building ) and 24 % (administration building, new building), depending on the type and the age of the building.

## From optimised hydraulics to energy savings

Prof. Dr.-Ing. Rainer Hirschberg, professor for technical development and resource-friendly construction at the faculty of architecture of the University of Applied Sciences Aachen and member of the executive committee of



*The “GeniAx” pumps are installed in the return line. The pump electronics is installed near the pumps and controls them via a cable connection. The pumps and pump electronics have a design housing for modern integration into living or office ambience.*

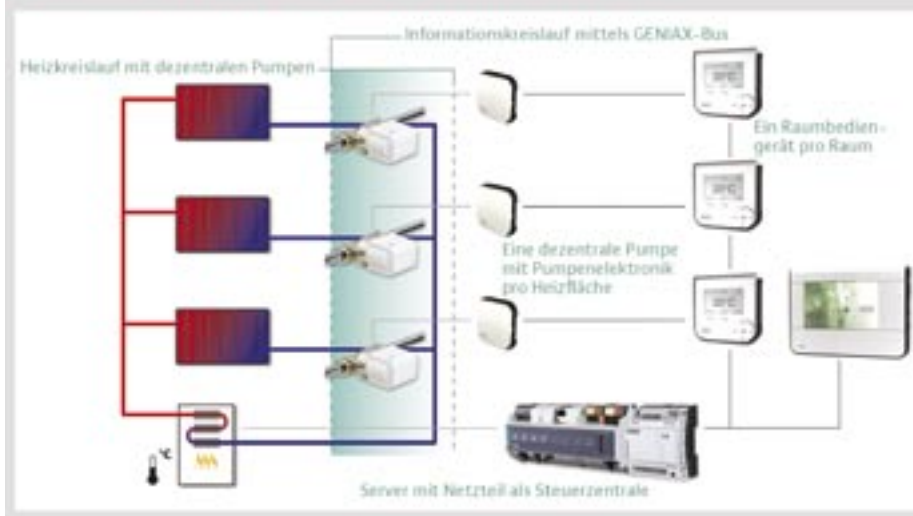
pressure valves. In contrast to the control according to atmospheric conditions, the decentralised pump system also considers that in many cases a lower feed temperature is sufficient for covering the heat load because there are always solar gains and inner loads, too. “This is how also the heat losses in the heat generator and the piping network are reduced”, he said.

Furthermore, the decentralised pump

VDI until December 2008, described the new decentralised pump system as the “revolutionary idea for optimum system hydraulics, maximum heating comfort and reduced consumption of heating energy”.

He underlined the most important hydraulic differences between the standard system where the heating water is provided from one central place, and the new decentralised pump

## Heiz- und Informationskreislauf des Dezentralen Pumpensystems GENIAX



*The chart shows the hydraulic part of the heating installation and the information circuit between the components of the “GeniAx” system.*

system where the heating water is only provided when it is actually needed. Whereas in conventional system constructions the mass flow is controlled by means of throttle valves – involving energy losses –, the decentralised pump system works exclusively via the speed control according to actual demands of the individual radiator. There is also a decisive difference when it comes to the pump’s running times. Whereas the

central pump must run for every single room, regardless of the heat required in these rooms, the miniature pumps of the decentralised pump system only run as long as the respective radiator requires heat.

### Manual hydraulic balancing omitted

Prof. Hirschberg also mentioned the manual hydraulic balancing to be a

central key to more heating comfort and energy efficiency – because this will not be necessary anymore: „Conventional heating systems are often not hydraulically balanced. Hydraulic deficits in heating installations, however, means, especially in multi-storey buildings, an uneven heat distribution which plays a role in 70 % of the legal disputes between lessor and lessee”, the expert says. In practice, it is often tried to compensate this unbalance by installing overdimensioned pumps or by increasing the feed temperature. However, both methods involve excess energy consumption.

In the case of the decentralised pump system, the hydraulic balancing is already done with the planning of the heating installation. Just like in the conventional system, a heat requirement calculation determines the mass flow for the heating surfaces and the pressure losses. On this basis the appropriate and sufficient speed is determined so that the system always runs at a hydraulically ideal stage. These specifications are then automatically realised by the system. Thus every heating surface is provided precisely and energy-efficiently with the required water quantity for optimum comfort. <<



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