

Technical article

Save Costs and Boost Productivity

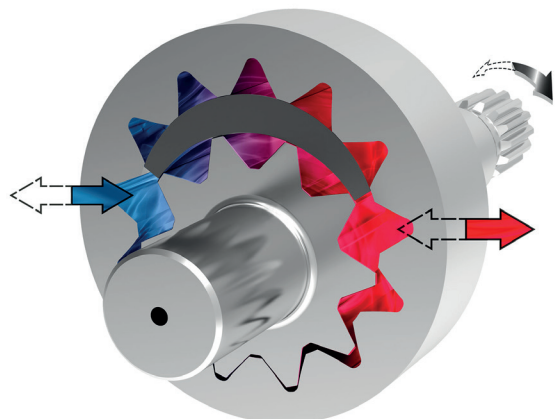
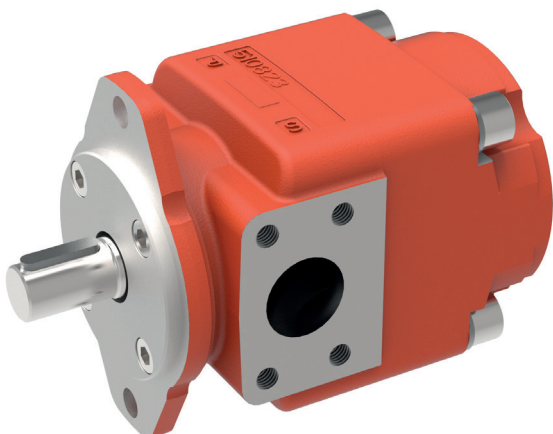
New QXEHX internal gear pump from Bucher Hydraulics supports successful downsizing

With a focus on lowering Total Cost of Ownership, hydraulic applications are experiencing growing demand for pumps with higher speeds: the goal is to make the power train more cost- and energy-efficient. The newly developed QXEHX series of pumps from Bucher Hydraulics helps to reduce drive torques by offering increased speeds in the power train. The optimised design of the internal gear units has enabled noise levels and size to be reduced still further, thus increasing operational safety and productivity. Applications that particularly benefit are those using highly dynamic open circuits, such as injection moulding and die casting machines as well as metal forming presses.

“Less is more” is becoming increasingly important in hydraulics. The aspiration to downsize and the scaling down of technical parameters while maintaining the same performance are aimed primarily at cost- and energy-savings. In the power train, the pump, motor and inverter are interdependent, which means that changes to the pump have a direct influence on the other components. If the pump has a larger speed range, users can employ smaller electric motors and inverters. With this objective in mind, the specialists from Bucher Hydraulics have developed the new QXEHX series of internal gear pumps. Compared with the existing QXEH, it offers approximately 20 percent higher maximum speeds, and it rounds off the portfolio of QX internal gear units.

The new QXEHX series of internal gear pumps from Bucher Hydraulics offers winning features such as reduced operating noise, 20 percent higher speeds and a long service life. This facilitates downsizing the power train and using smaller servo- or reluctance-motors and inverters, again saving costs and energy.

The main feature of the non-compensated QXEHX is its smooth pressure build-up along the crescent, thanks to a very long pressure build-up region. The pinion-shaft technology with free-running gears in precisely manufactured chambers, as well as the completely symmetrical suction and pressure zones, are the foundations of its low noise levels.



Early recognition of the increasing requirements in the market, as well as extensive application know-how with the QXEH, led to its systematic further development. The need for higher speeds had previously been met by connecting an optional second suction port. The underlying principle of flooding the ring gear from both sides was retained, but has now been implemented with a new technical solution within the pump body. For this purpose, the cast contours of the internal suction and pressure galleries were improved and optimised. This alone meant that the speed range of the new internal gear pump could be significantly increased as standard without fitting an additional suction connection. The result is maximum speeds that are approx. 20 percent higher compared with the QXEH. This gives users an opportunity for successful downsizing, with lower acquisition costs and reduced energy consumption.

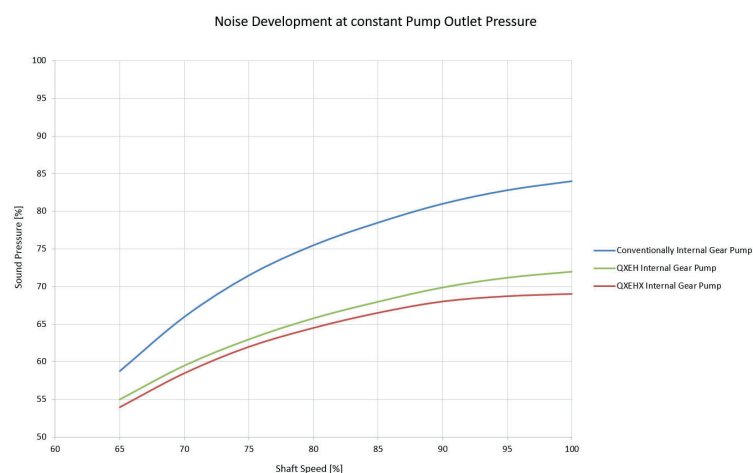
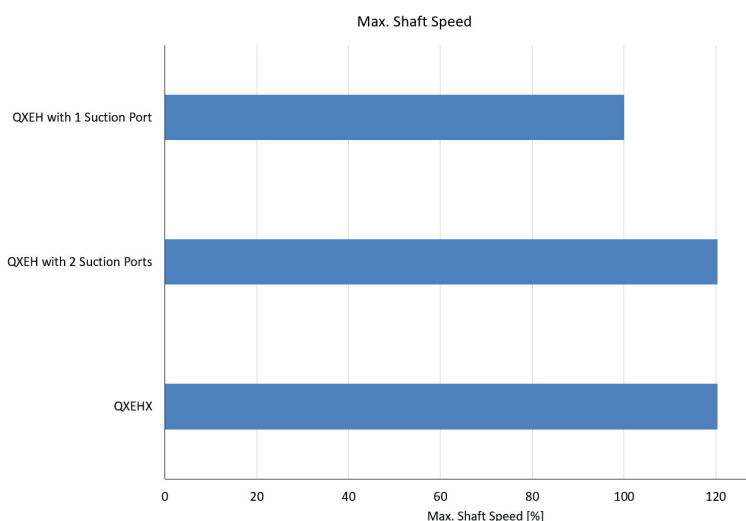
Higher speed, lower noise level

The speed and outlet pressure of a pump usually influence how loud it is. If the speed rises, the noise level also rises. Drawing on many years of experience with the previous series, the developers at Bucher Hydraulics overcame this issue by reworking the contours of the suction and pressure galleries. Optimising the flow galleries reduces the flow resistance, one result being that the noise level has been reduced by an average of 3 dB(A) compared with the QXEH. On top of that, the noise level in the upper speed range remains almost constant. The application therefore needs fewer sound-insulation measures, which saves costs for both machine manufacturers and end users.

The QXEHX's high degree of operational reliability is assured by its basic non-compensated design, which allows for a very long pressure build-up region over the entire symmetrically arranged crescent. Using the 'pinion shaft' design, the pinion and shaft are manufactured in one piece. In addition, the pump does not require any additional sealing or compensating elements for internal sealing of the pressure zone

The maximum speed of the QXEHX internal gear pump has been increased by approx. 20 percent compared with the QXEH. This increase has been made possible by optimised suction- and pressure-galleries within the pump body. What is standard today could previously only be achieved by using an optional second suction connection, which also involved more assembly work.

Compared with the low-noise QXEH, the noise level has been reduced by another 3 dB(A) on average. On top of that, the noise level in the upper speed range remains almost constant. Measurements have shown that the new QXEHX internal gear pump runs up to 15 percent more quietly than conventional internal gear pumps.



Reverse mode guaranteed

This design, typical for the entire QX series, has proven itself in numerous applications over many years and is the basis for higher productivity, from which the users benefit. This is particularly true when combined with highly dynamic servo- and reluctance-motors. In injection moulding machines, the QXEHX can easily be operated in full reverse mode several times per work cycle to relieve pressure in the system.

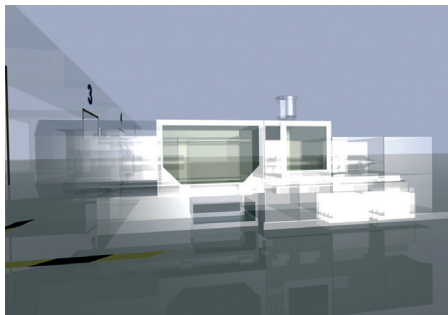
This is where the design features of the QXEHX internal gear pump come into their own. The pump does not require a defined preload pressure at the pump outlet, so that it works absolutely reliably even when reversed with very low pressures at the outlet. The result: its first-rate overall reliability. Other types of pumps need auxiliary valves to protect them against failure, but users can now save the costs of acquiring these valves as well as powering them. The design also offers the ideal conditions for maintaining a perfect lubricating oil film in the bearing areas and gear parts.

More displacement in a smaller size

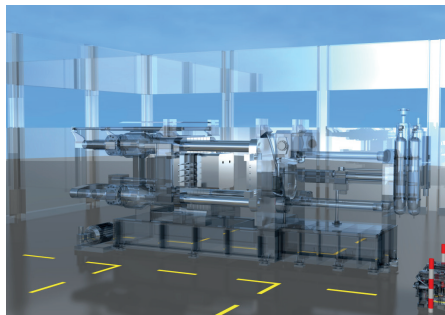
Anticipating customer requests for the smallest possible, compact components, Bucher Hydraulics offers the new internal gear pump with a wider range of displacements. Whereas only three displacements per frame size were available previously, users of the QXEHX can now benefit from larger displacements in smaller and also lighter frame sizes. As an example, for applications requiring a pump with a displacement of 40 cm³/rev at a continuous operating pressure of 210 bar at the pump outlet, customers can now select a size 4 unit instead of the size 5 that would have been necessary before. This saves about 30 percent of the weight of the pump and reduces costs. The “higher speed/lower displacement” concept also contributes to downsizing the power train.

Bucher Hydraulics offers overlapping displacements for the new sizes 4 and 5 (20 to 80 cm³/rev). Both frame sizes cover almost all typical applications that feature a highly dynamic open circuit, such as injection moulding and die casting machines as well as metal forming presses. Sizes 3 and 6 of the QXEHX will follow at a later date.

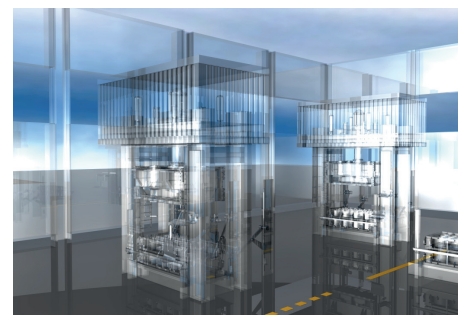
The innovative concept of the QXEHX internal gear pump from Bucher Hydraulics raises the efficiency of injection moulding machines. To relieve pressure in the system, the pump can easily be operated in full reverse mode several times per work cycle.



Pressure die casting machines place great demands on the hydraulic components that are used, for example, to accurately move punches and slides in the moulds. Servo drives are normally used to individually adjust the flow rate to the load cycle. Thanks to the higher maximum speeds of the QXEHX internal gear pumps from Bucher Hydraulics, pumps with smaller displacements can now be specified.



Efficient hydraulic concepts for metal forming – in deep-drawing presses, for example – must always be individually adapted to the specific application. With an extended range of displacements and sizes for the new QXEHX internal gear pump, Bucher Hydraulics offers users a wider choice.



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