It is another object of the present invention to provide a turning off method, that spares the conduit and non-return valves.

It is another object of the present invention to provide a turning off method, that entail decreased energy consumption during the turning off.

Brief description of the Invention

According to the invention at least the basic object is attained by means of the initially defined method and pump station arrangement, having the features defined in the independent claims. Preferred embodiments of the present invention are further defined in the dependent claims.

According to a first aspect of the present invention it is provided a method for turning off a pump configured for pumping liquid via a conduit, the pump before being turned off being driven at an operational frequency (F_N) by means of a control unit, the method characterized by the steps of by means of the control unit ramping down the frequency of the pump due to a turn off instruction, the terminal frequency of the ramping down being equal to the operational frequency of the pump minus at least 10Hz and the ramping down time being at least a reflection time for the conduit in question, and the terminal frequency of the ramping down not being less than 10Hz, and by means of the control unit stopping the pump after said ramping down which include disengagement of the pump by means of the control unit in order to let the impeller of the pump to freewheel until it stop.

According to a second aspect of the present invention it is provided a pump station arrangement, comprising a pump, a control unit and a conduit connected to the outlet of the pump.

The pump station arrangement is characterized in that the control unit due to a turn off instruction is configured to ramp down the frequency of the pump from an operational frequency, the terminal frequency of the ramping down being equal to the operational frequency F_N of the pump minus at least 10Hz and the ramping down time being at least a reflection time T_R for the conduit in question, and the

terminal frequency of the ramping down not being less than 10Hz, furthermore the control unit is configured to stop the pump after the ramping down by disengagement of the pump in order to let the impeller of the pump freewheel until it stop.

Thus the present invention is based on the understanding to use the positive effects at the beginning of a ramping down and avoiding the negative effects at the end of a ramping down.

According to a preferred embodiment of the present invention, the step of stopping the pump after the ramping down, include disengagement of the pump by means of the control unit in order to let the impeller of the pump to freewheel until it stop. In this way it is ensured that the pump does not preform work that is not useful output.

According to an alternative embodiment of the present invention, the step of stopping the pump after the ramping down includes performing a second ramping down of the frequency of the pump by means of the control unit in such a way that the torque the motor of the pump is subject to from the pumped liquid is controlled towards being equal to zero. In this way an impeller freewheeling until it stop is imitated, and thereby it is ensured that the pump does not perform work that is not useful output.

According to a preferred embodiment the terminal frequency of the ramping down is less than or equal to 35Hz, and thereto bigger than or equal to 25Hz. In this way enough ramping down is performed in order to substantially reduce the water hammer effects without having the pump performing work that is not useful output.

Other advantages with and features of the invention are evident from the other dependent claims as well as from the following detailed description of preferred embodiments.

Brief description of the drawings

A more complete understanding of the above mentioned and other features and advantages of the present invention