

Claims

1. A method for stopping a submersible pump when the pump is snoring, wherein the pump is operatively connected to a control unit, the method being **characterized** by the steps of:
- 5 - regulating, by means of the control unit, the operational speed of the pump in order to direct an average power of the pump towards a predetermined set level,
- determining whether the instantaneous power of the pump is outside a predetermined range, by monitoring at least one
- 10 of the parameters: power [P], current [I] and power factor [cosφ],
- determining whether the operational speed of the pump is increasing, and
- stopping the pump due to snoring, by means of the control
- 15 unit, when the instantaneous power of the pump is determined as being outside the predetermined range at the same time the operational speed of the pump is determined as increasing.
- 20 2. The method according to claim 1, wherein the step of determining whether the operational speed of the pump is increasing, is performed after an affirmative determination that the instantaneous power of the pump is outside the predetermined range.
- 25 3. The method according to claim 1 or 2, wherein the step of determining whether the operational speed of the pump is increasing, is performed by monitoring a trend of change of the operational speed of the pump.
- 30 4. The method according to claim 3, wherein the monitoring of the trend of change of the operational speed of the pump is performed by the steps of:
- measuring a plurality of instantaneous operational speeds
- 35 [n1, n2, n3, n4,...] of the pump during a predetermined period of time [t],
- comparing the mutual relationship of each pair of adjacent instantaneous operational speeds [n1;n2, n2;n3, n3;n4,...],

- monitoring the number of times [m] a latter instantaneous operational speed [n2] of a pair of adjacent instantaneous operational speeds [n1;n2]) is greater than a former instantaneous operational speed [n1] of the pair of adjacent instantaneous operational speeds [n1;n2], and
- confirming that the operational speed of the pump is increasing when the number of times [m] the latter instantaneous operational speed [n2] is greater than the former instantaneous operational speed [n1] is greater than a predetermined threshold, during the predetermined period of time [t].

5. Method according to claim 4, wherein the plurality of instantaneous pump speeds [n1, n2, n3, n4,...] is equal to or greater than ten.

6. Method according to claim 4 or 5, wherein the predetermined threshold of the monitored number of times [m] the latter instantaneous operational speed [n2] is greater than the former instantaneous operational speed [n1], is equal to or greater than four.

7. The method according to any of claims 4-6, wherein the predetermined period of time [t] is equal to or greater than two seconds, and equal to or less than five seconds.

8. The method according to claim 1 or 2, wherein the step of determining whether the operational speed of the pump is increasing, is performed by monitoring when the instantaneous operational speed of the pump is greater than a predetermined threshold.

9. The method according to any preceding claim, wherein the upper limit of the predetermined range of the instantaneous power of the pump is equal to or greater than a factor 1,02 times the predetermined set level of the average power of the pump.

10. The method according to any preceding claim, wherein the lower limit of the predetermined range of the instantaneous power of the pump is equal to or less than a factor 0,98
5 times the predetermined set level of the average power of the pump.

11. The method according to any preceding claim, wherein the pump, after it has been stopped due to snoring, is kept
10 inactive a predetermined pause time.

12. The method according to any of claims 1-11, wherein the pump, after it has been stopped due to snoring, is kept inactive until the control unit obtains a start-signal from a
15 level sensor.

13. The method according to any preceding claim, wherein the control unit is constituted by a variable frequency drive [VFD].