System of monitoring, managing and operating submersible pumps and deep-water intakes
LEVELS OF SOFTWARE AND INSTRUMENTATION

Software:

- **SoftSPM**
  - **SoftSPM\_BASIC** sets of several or a dozen wells,
  - **SoftSPM\_STANDARD** sets of tens of wells,
  - **SoftSPM\_ENTERPRISE** sets of several hundreds of wells corporations,
  - **SoftSPM\_TEST** trial stations of submersible pump units.

Each software level is made using the latest computer science technologies.

Instrumentation and metering of wells:

- **SPM\_MIN** minimal scope of metering,
- **SPM\_BASE** most commonly scope of metering,
- **SPM\_OPT** expanded scope of metering,
- **SPM\_TEST** instrumentation of a trial station.
A STRUCTURE DIAGRAM OF THE SOFTWARE

[Diagram of software structure with labeled components and flow paths.]

- soft SPM basic
- STOCK
- WELLS
  - TANKS or PIEZOMETERS
  - WELLS
- FIXED PARAMETERS
  - L, Dm, L, l, L, D, Dm, H(Q), η(Q), Q, Qm, Qmax
- MEASUREMENTS
  - T
  - MANU
  - N
- EVALUATION
  - SPM min, SPM base, SPM opt
  - L, H, pp, H, H, p
- OPERATION
- METERING
- MANUFACTURERS
- PUMPS
- ENGINES
- CABLES
- PIPING and FITTINGS
A STRUCTURE DIAGRAM OF THE SOFTWARE
THE CONTROL CONSOLE SOFTWARE
ARCHITECTURE AND STRUCTURE OF THE SOFTWARE
CLOUD COMPUTING

- The software at your fingertips.
- Available from anywhere in the world.
- Safe and stable.
- There are no direct costs.
- Always the latest version.
The integrated pressure measurement probe SGP-21 (Patent UP RP)
SCHEMATIC REPRESENTATION OF THE MEASURING SYSTEM VERSION "MINIMUM"

Automation cabinet **SAZ.1.1.11 SPM**
Controller **SZ-21** mit GSM Modem
The integrated pressure measurement probe **SGP-21**
Pressure Transmitter **PC-21**
Electronic diagnostic device **DSP-21** (option)
SCHEMATIC REPRESENTATION OF THE MEASURING SYSTEM - "THE BASIS VERSION"

Automation cabinet SAZ.1.1.11 SPM
Controller SZ-21 mit GSM Modem
Electromagnetic Flowmeters PEM -1000
The integrated pressure measurement probe SGP-21
Pressure Transmitter PC-21
Converter - electrical measurements P-41
Electronic diagnostic device DSP-21 (option)
SCHEMATIC REPRESENTATION OF THE MEASURING SYSTEM - "OPTIMAL VERSION"

Automation cabinet **SAZ.1.1.11 SPM**
Controller **SIMATIC S7 1200** mit GSM Modem
Electromagnetic Flowmeters **MAG 5100**
The integrated pressure measurement probe **SGP-21**
Pressure Transmitter **PC-21**
Converter - electrical measurements **PAC 3000**
Electronic diagnostic device **DSP-21** (option)
Fluid conductivity meter **ZS** (option)
Engine temperature gauge **PT-100** (option)
TEST STATION SUBMERSIBLE PUMPS - EXAMPLE
Assess the performance of submersible pumps pumping system by mathematical models of software SoftSPM.
Analysis and visualization of the current position of the submersible pump operating point with respect to the flow characteristic $H = f(Q)$ measured on the test station (Patent RP)

Assessment of the extent of the deformation characteristic $H = f(Q)$ and the visualization of the position of the pump duty point in relation to the range of its applicability
Panel control the submersible pump and remote control for example. Throttle valve, engine speed, etc.
THE DATA AND OPERATING PARAMETERS OF WELLS AND PUMPING SYSTEM
OPERATING STATUS OF THE TANK AND ITS RELATION WITH WORK WELL IN A SYSTEM
VISUALIZATION OF THE POSITION AND STATUS IN THE SYSTEM FILL PIESOMETER
THE OPERATING POSITION OF THE SYSTEM - CORPORATIONS
The full configuration of SPM\textsubscript{SYSTEM}, regardless of which levels of the SoftSPM software are applied or what the metering or instrumentation version of the SPM well is, provides the user with the following benefits:

**Economic:**

- the optimisation of energy consuming during the operation of well pumping systems – reduction the electricity fee,
- the increase of reliability of the pumping units used,
- the possibility of any financially planned configuration of the scope of the SoftSPM software level as well as the choice of compatible SPM metering and instrumentation versions,
- the possibility to use the service of the SoftSPM Cloud Computing (Clouds) in the SaaS model,
- the possibility to use the special lease system of the implemented and working SPM metering and instrumentation with its purchase after 36 months,

**Installation and motion:**

- simple, modular construction of the SPM well metering and instrumentation,
- the freely programmed measuring ranges of pressure transducers and depth finders - the HART system,
- the high operating accuracy and reliability of measuring devices and controllers.