Complex solutions for oil estimation on the basis of measuring and estimating system “MicroTEC”

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The article presents complex solutions for current and commercial oil estimation on the basis of measuring and estimating system “MicroTEC”, implemented at facilities JSC “Tomskneft” East Oil Company “UKOS”. It shows structure charts of field equipment hook-up to the measuring and estimating system “MicroTEC”.

SME “Tomsk Electronic Company” Ltd. has been developing and manufacturing measuring and power equipment for oil, gas and metallurgic complex for more than 10 years. The company was established on the basis of Tomsk general engineering research studies institute. The main directions of “SME TEC” are development and production of electric drives and complete electric automatic equipment, measuring and estimating systems, meters and controllers, weighing and metering systems and devices, and also constructional design of APCS on the basis of equipment, manufactured in our company and abroad.

The company has developed measuring and estimating system “MicroTEC”, applied at current and commercial metering stations and providing estimation of oil and gas volume and mass with or without densitometer.

Measuring and estimating system “MicroTEC” is a module design-configured system, the amount of modules (measuring channels) depends on the amount of test lines, flow sensors, pressure, temperature and density. Measuring and estimating system “MicroTEC” provides field equipment hook-up according to the Fig. 1.

Measuring and estimating system “MicroTEC consists of measuring transducers, computing core and parameter displaying and setting device.

Measuring transducers (modules C7, C9) meter impulse signals frequency, amount of impulses, current signal 4-20 mA and thermoresistance temperature by four –wire communication line. All the transducers are united by digital communication on the computing core – the module of processor MPR-08, which provides computing and storing of accounting parameters, regulating of comparison and setting modes. The displaying and setting parameters device (BZP-08) displays current data, averages and accumulated data on the character device monitor, sets modes with the help of the keyboard. BZP-08 transfers accounting parameters to the telecontrol system via interfaces RS-232/485, via protocol ModBUS or other interfaces if there are other transducers.

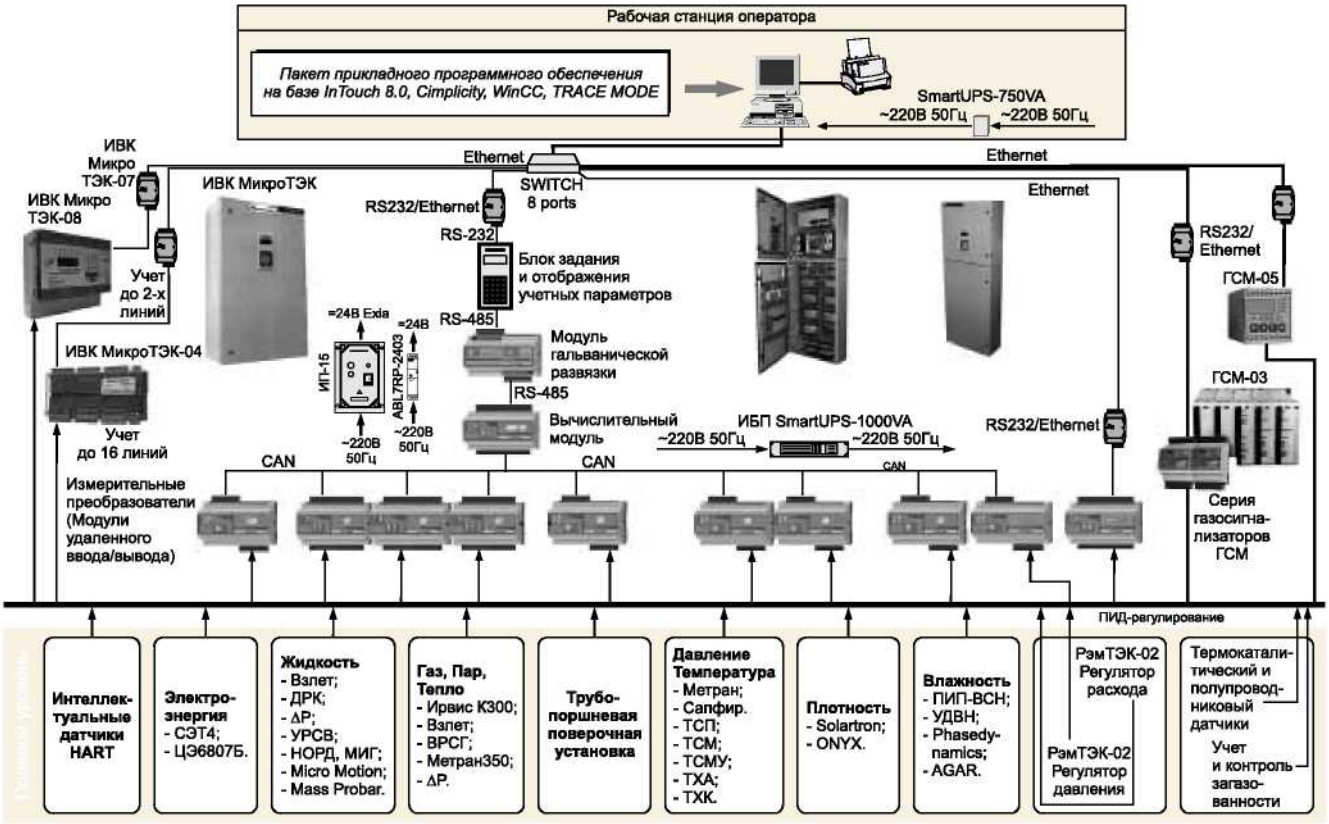

Fig. 1 Diagram connection of the field equipment for the measuring and computing complex “MicroTEC”

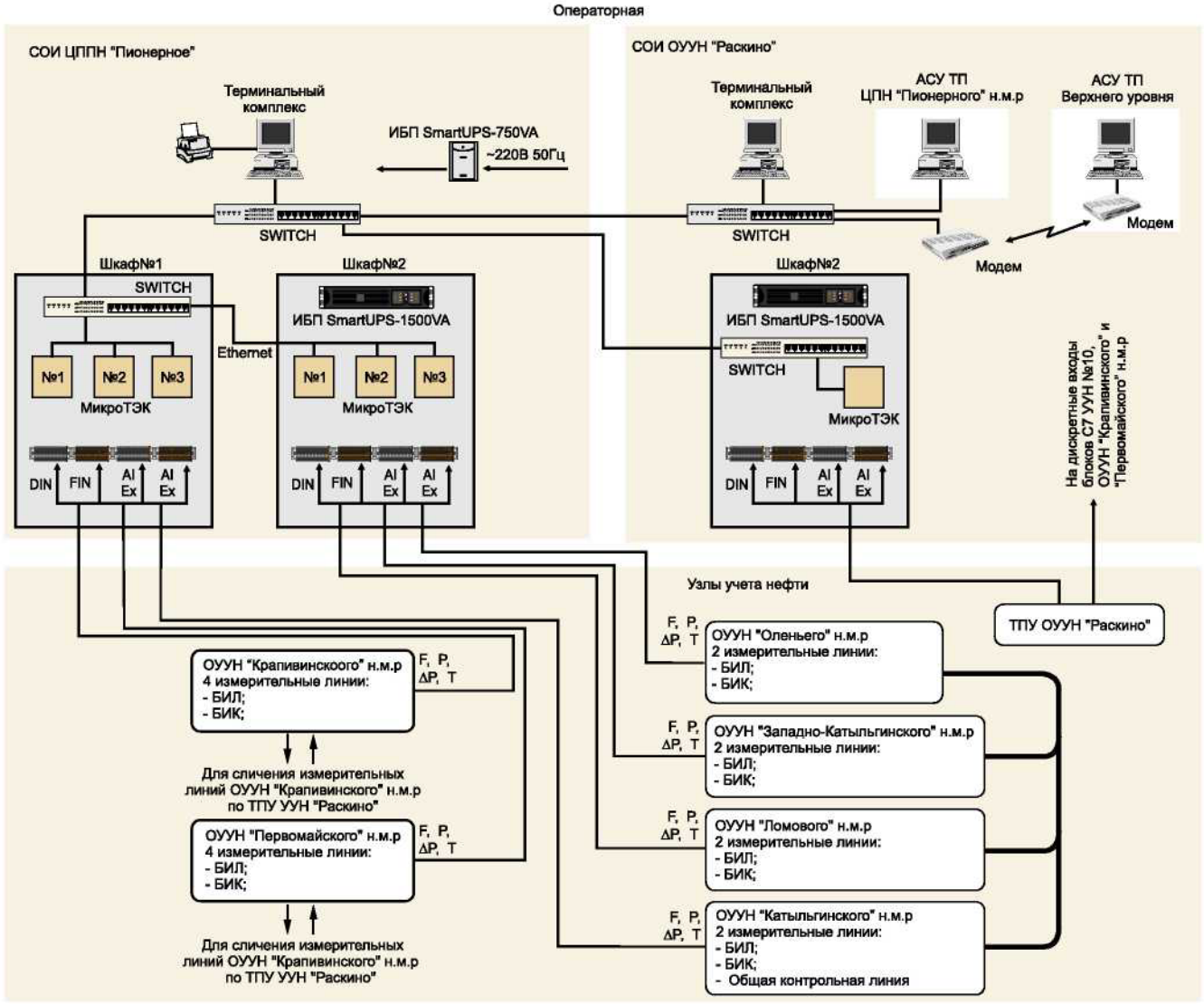

Fig.2 Operational unit of oil estimation OPPS “Pionernoe”

Owing to the flexible structure and generalized measuring channels, the measuring and estimating system “MicroTEC” can be applied for almost every task. For example, in 2004 information processing system (IPS) was designed end installed on the system of seven sets “MicroTEC” at the oil processing and pumping shop (OPPS) Pionernoe oil-field JSC “Tomskneft” East Oil Company “UKOS”. Six current metering stations (Krapivinskoe, Pervomaiskoe, Olenie, Katylginskoe, Zapadno-Katylginskoe, Lomovoe oil-fields) and one intracompany metering station (Raskino) are situated on one process pad. Cubicles with measuring and estimating system “MicroTEC” and operator workstation (WKS) are installed in one operator's room, situated at the distance 200 m from the process pad. WKS is designed to display accounting, processing and emergency parameters. The structure of estimation for six current metering stations is shown in the Fig. 2 and 3.

As the Fig. 2 shows, there is a common control line, with which any test line of four metering stations can be compared. The operator can control metrological performance of the turbine flow transducer (TFT) with the help of WKS, save, read and print the control chart.

The structure scheme of metering stations at OPPS “Pionernoe” shows two metering stations, each of which has its own control line. There are also connections with piston prover, installed at the Raskino metering station (station №10). IPS measures temperature and pressure of TFT and calibrated piston provers of Pervomaiskoe, Krapivinskoe and Raskino (station №10).

IPS OPPS Pionernoe oil-field carries out calibrating test of Pervomaiskoe and Krapivinskoe TFT by piston prover, installed at Raskino station. The control charts are stored at WKS with reading and printing options. The Fig.4 shows visualization of TFT calibration by comparing with piston prover. The visualization of TFT calibration can set the calibrating line number, backward or forward motion of piston and calibration chart depending on flow points amount and amount of measurements in the flow point.

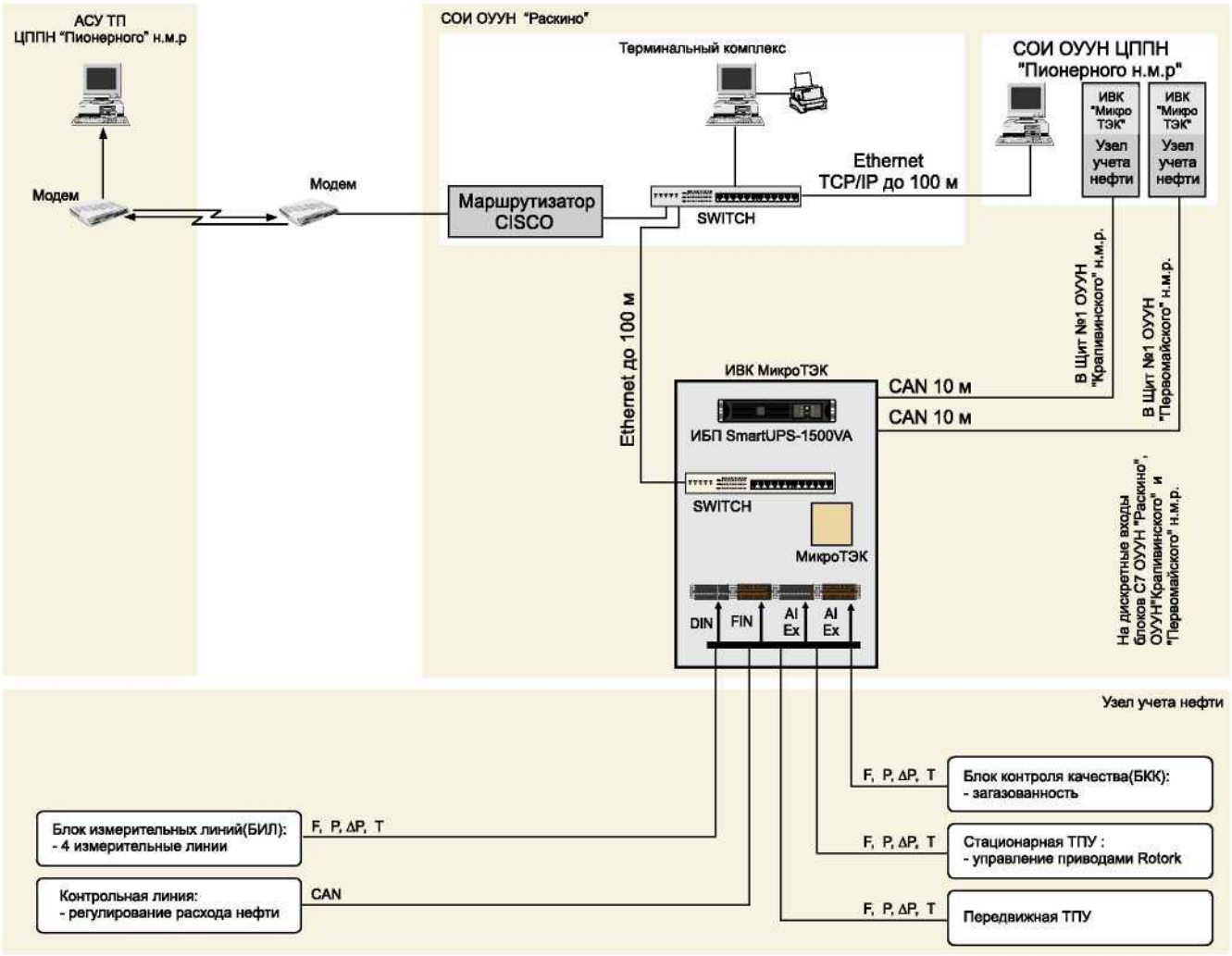

Fig.3. Operational unit of oil estimation “Raskino”

All the videograms are worked out with the help of InTouch 8.0 environment. However, the adaptation to TRACE MODE, WinCC, Simplicity, A-Studio or any other environments is also possible.

According to the present contract SME “TEC” manufactured, carried out erection supervision and start up of information processing system on the basis of MES “MicroTEC” at facilities of JSC “Tomskneft” East Oil Company “UKOS”. This design solution on oil estimating at OPPS on the basis of MES “MicroTEC” applies one piston prover for three metering stations and one control line for four metering stations, which reduces substantially the customer expenses for manufacturing and operation of such systems.

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The additional communication functions

The company “PLCSystems” is an official distributor of “AutiomationDirect” production. The company presents two new communication modules for micro-PLC of DL05/DL06 type. Module D0-DCM completes controller DirectLOGIC of DL05 or DL06 type with two sequential ports with the speed up to 115,2 Kbit/sec. Port 1 applies interface RS-232 and supports ModBus RTU, DirectNet and slave device protocol K-Sequence. The special feature of such module is the fact, that the port 2 can operate as leading module with busbar DirectNet or ModBus and uses interface RS-232/422/485. Module F0-CP128 CoProcessor has three sequential ports. They can be programmed with the help of Basic language, which support is incorporated in the computer. The module special features are high clock frequency 100 MHz, data interface RS-232 or RS-485, transmission speed up to 512 Kbit/sec. The module can be installed in the additional slot of the controller DL05 or any of four DL06 slots.

http://www.plcsystems.ru