

Technical means complex for energy resources estimating systems

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Within last 12 years Tomsk Electronic Company has been developing and manufacturing measuring and estimating systems, meters and controllers, including gas detectors, quantity and quality estimating systems for oil, oil products and natural gas, meters and batchers for liquids.

Among our Customers there are oil companies "UKOS", "LUKoil", JSC "Sibneft", JSC "Slavneft", JSC "TransGaz", JSC "Transneft", JSC "Sibur", petrochemical enterprises, including Tomsk Petrochemical Plant, Pervouralsk Silica Plant, Aksuysk Ferroalloy Plant, Chelyabinsk Metallurgical Complex, Nizhny Tagil Steel and Iron Plant and other manufacturing enterprises in Russia.

The most part of our developments has been made and implemented from 2000 and up to the present moment. For example, gas detector GSM-03, estimating and measuring system MicroTEC, Module C40 (HART-modem), MicroTEC-08, which indicates new solutions and their big potential.

ПРЕДЛАГАЕТ

Разработку и производство приборов контроля, учета и управления, в том числе газосигнализаторов, систем измерения количества и качества нефти, нефтепродуктов, природного газа и других жидких и газообразных материальных и продуктовых потоков.

Проведение НИиОКР по разработке новых изделий данной тематики по исходным требованиям заказчика.

Проектирование, изготовление и комплектную поставку узлов учета и технологических линий.

Выполнение проектов «под ключ» с техническим сопровождением, шеф-монтажом, ПНР, гарантийным и послугарантийным обслуживанием, проведением обучения эксплуатирующего персонала на этапе ввода в эксплуатацию.

НАШИ РЕШЕНИЯ ПОМОГУТ ВАМ

Решить практически все задачи в подведении баланса, оперативного и коммерческого учета энергоресурсов.

Обеспечить пожаровзрывобезопасность на опасных производственных объектах с прогнозированием аварийных ситуаций и своевременным принятием мер по их предотвращению.

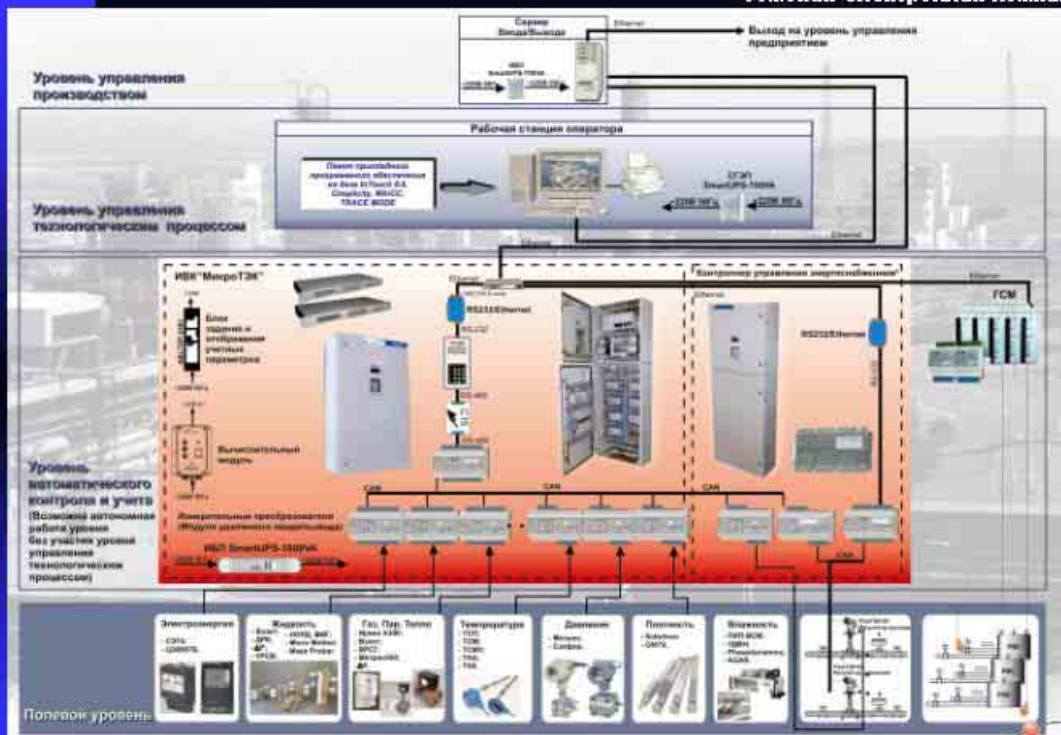
Автоматически управлять исполнительными механизмами, пробоотборниками, вентиляцией, сигнализацией, электроприводами, в том числе ПИД-регулированием.

Успешно сочетать приборы контроля, измерения, учета и управления, включая электроприводы, в единую АСУ ТП, что открывает новые возможности в решении Ваших задач.

<http://npptec.ru>



Tomsk Electronic Company develops on the basis of Research and Advanced Development, taking into consideration all the requirements of the Customer and standard technical documentation. We also undertake product certification, including safety and registration of measuring devices, obtaining of permission to apply them at hazardous manufacturing facilities in Russia. It should be noted that cost of Research and Advanced Development for the Customer includes only costs of certification. At the present time it amounts to 100-200 thousand rubles.



<http://npptec.ru>



We call your attention to the fact that Tomsk Electronic Company is ready to carry out Research and Advanced Development. The period of the product development, including prototyping, is 3-4 months. The Customer needs to make a request and to appoint person responsible in order to handle operational matters. Then our specialists prepare initial data or technical specification and adjust it with the Customer.

According to the same procedure in 2002 Tomsk Electronic Company developed the measuring and estimating system “MicroTEC” on the basis of the Research and Advanced Development of the oil company UKOS.



Measuring and estimating systems, meters and controllers

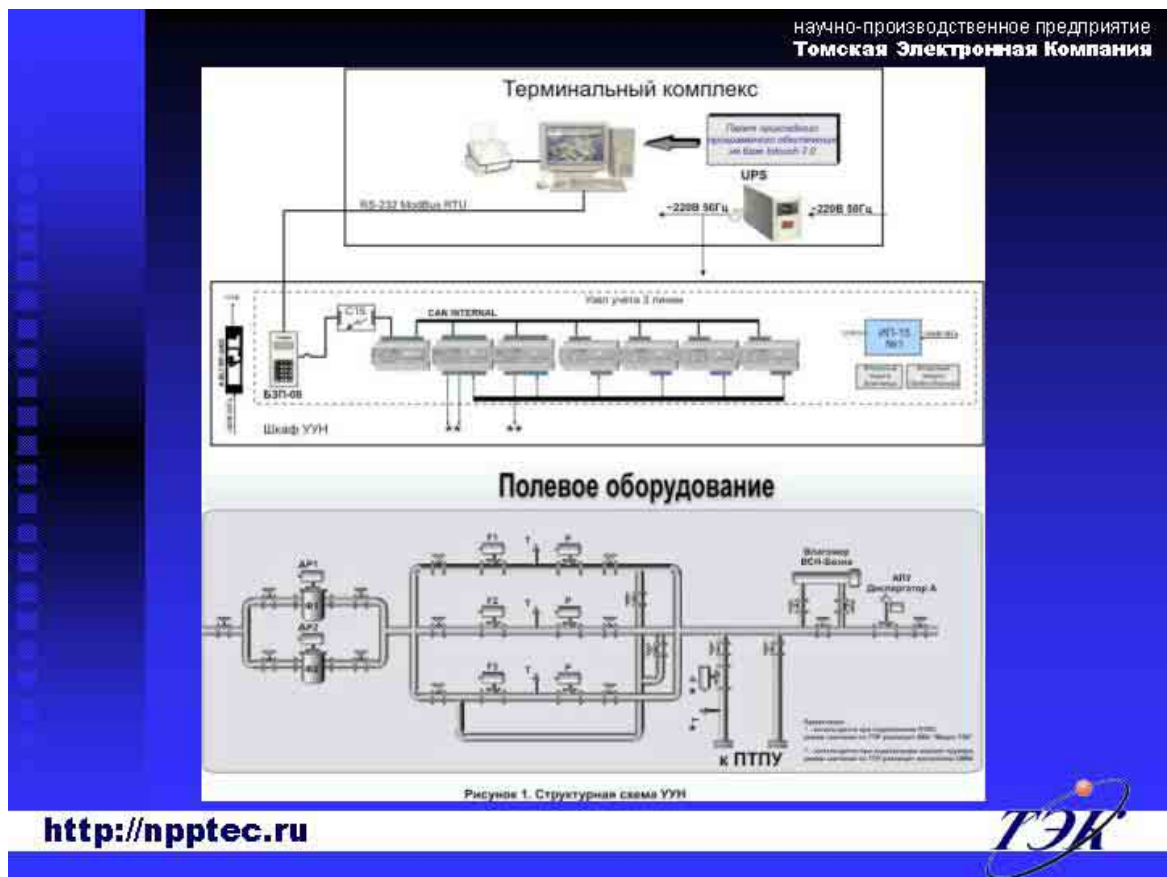
We processed and analyzed specification documents concerning the subject. Then we developed estimating procedures and operating modes of MicroTEC. From the beginning the aim of the system was to carry out current accounting, in terms of system costs and scalability. However, the development implied solutions, which, in terms of measuring accuracy and estimating procedure, enabled to apply it in commercial estimating systems.

“MicroTEC” is a module configured system, its cost is in linear dependence with the amount of the measuring channels.

The major MicroTEC distinctions from other controllers are:

- scalability;
- high accuracy of measuring channels;
- absence of complementary error;
- no need to apply secondary equipment of field sensors;

MicroTEC is a system of measuring channels, the amount of which depends on the object and can be increased without stop of estimating process, and also counting core and parameter displaying and setting device, which sets operating modes of oil quantity and quality measuring.



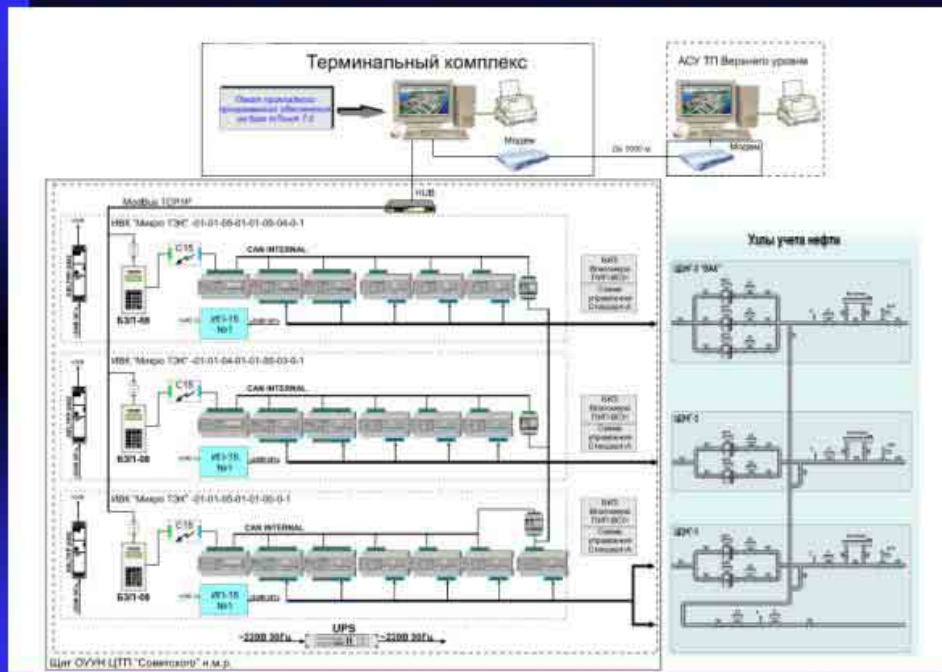
Structure chart of the system (JSC Samarneftegaz)

In terms of safety, the MicroTEC measuring and estimating system is provided with spark-proof circuits with explosion protection “spark-proof electric circuit ia”.

MicroTEC fulfills almost all tasks of current and commercial estimating:

- natural gas volume and mass measurement and automatic estimation with commercial accuracy in a broad range of temperatures;
- transmit estimating parameters to telemetry system;
- metrological characteristics monitor mode of turbine flow transducer by comparing with the mainline;
- turbine flow transducer testing mode by comparing with the piston prover;
- control automatic sampler.

СТРУКТУРНАЯ СХЕМА СОИ ИВК МикроТЭК ЦТП СОВЕТСКОЕ ОАО «ТН» ВНК



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Structure chart of oil estimation JSC Tomskneft East Oil Company Sovietskoe oil-field

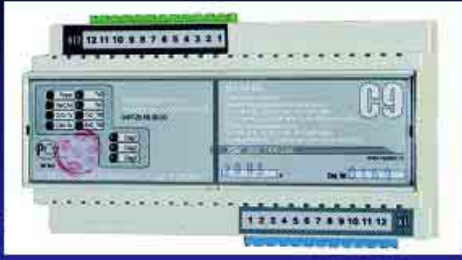
In addition to the described tasks, this year MicroTEC is going to fulfill a new function (at the request of Uganskneftegaz) – to support smart sensors HART. For this purpose Module C40 has been developed (HART-modem), which will be primarily included in MicroTEC. It will have the same construct, as the measurement modules in the system.

научно-производственное предприятие
Томская Электронная Компания

БЛОК С9

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ:
Температура окружающей среды, С
Основная относительная погрешность измерения тока, %
Абсолютная погрешность измерения температуры, С
Мощность, потребляемая по сети питания, Вт
Относительная влажность воздуха, %

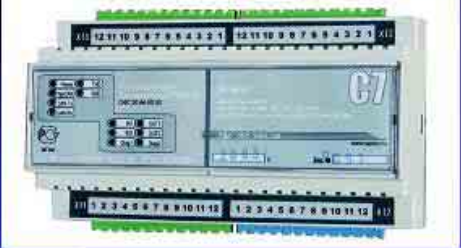
от -40 до +50
0,05
0,1
не более 3
95, при 35 С и
более низких
температурах
без конденсации
влаги



БЛОК С7

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ:
Температура окружающей среды, С
Основная относительная погрешность измерения частоты, %
Относительная погрешность по импульсному каналу, %
Мощность, потребляемая по сети питания, Вт
Относительная влажность воздуха, %

от -40 до +50
0,05
0,05
не более 3
95, при 35 С и
более низких
температурах
без конденсации
влаги



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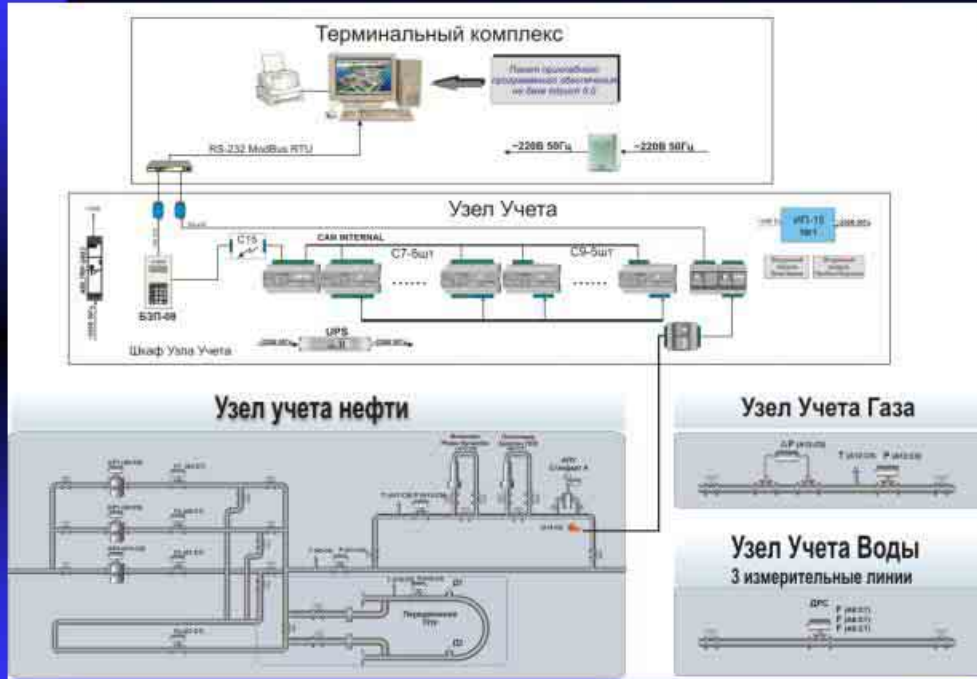
Modules C7, C9

Special software, applied in metering and estimating system MicroTEC, reduces the flow estimating inaccuracy, i.e.:

- automatically adjust flow to the current temperature, pressure, moisture, compactness, viscosity;
- automatically adjust conversion coefficient of turbine flow transducer from frequency;
- measure operating time of flow meters;
- automatically adjust compression and expansion coefficients to the measured temperature and oil compactness;
- control regularly metrological characteristics of turbine flow transducer;
- control range of flow measurement;
- automatically adjust by comparing with flow and pressure;

Estimating the natural gas flow, MicroTEC measures and estimates volume in standard conditions and mass of the natural gas by variable pressure drop and calculation of compression coefficient using Nx19 method, GERG 91 equation of state, AGA 92 DC equation of state and equation of state developed by the All-Russia Research and Development Center for Standardizing Information and Raw Materials, Work Materials and Substances Certification.

СТРУКТУРНАЯ СХЕМА СОИ ИВК МикроТЭК ОАО «СИБНЕФТЬ»



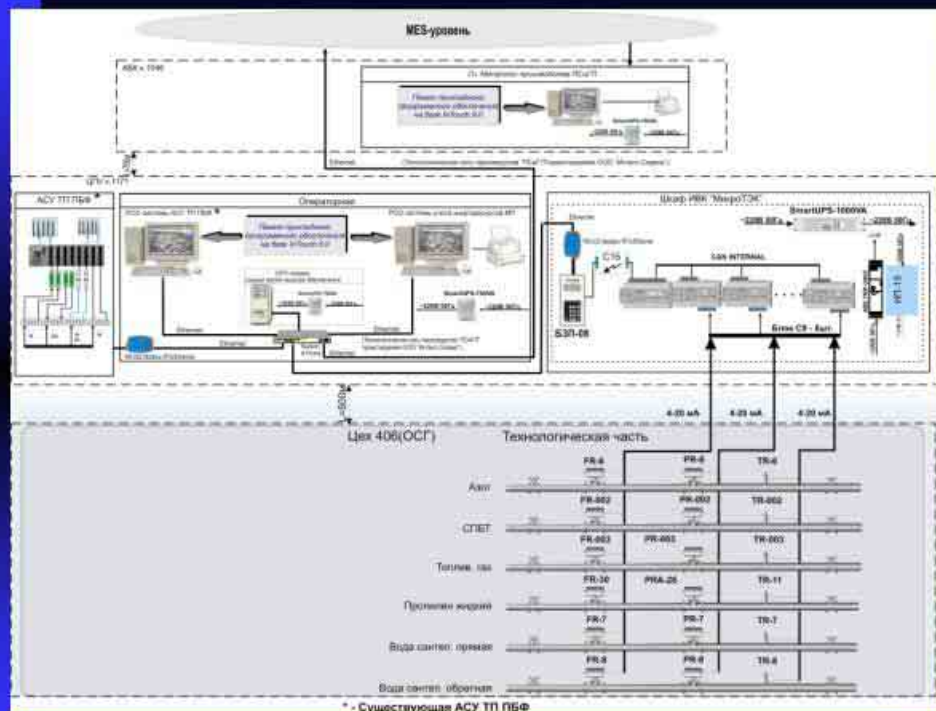
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Structure scheme of oil and gas estimation JSC Sibneft -NNG

There are 8 main modifications of measuring and estimating system “MicroTEC”:

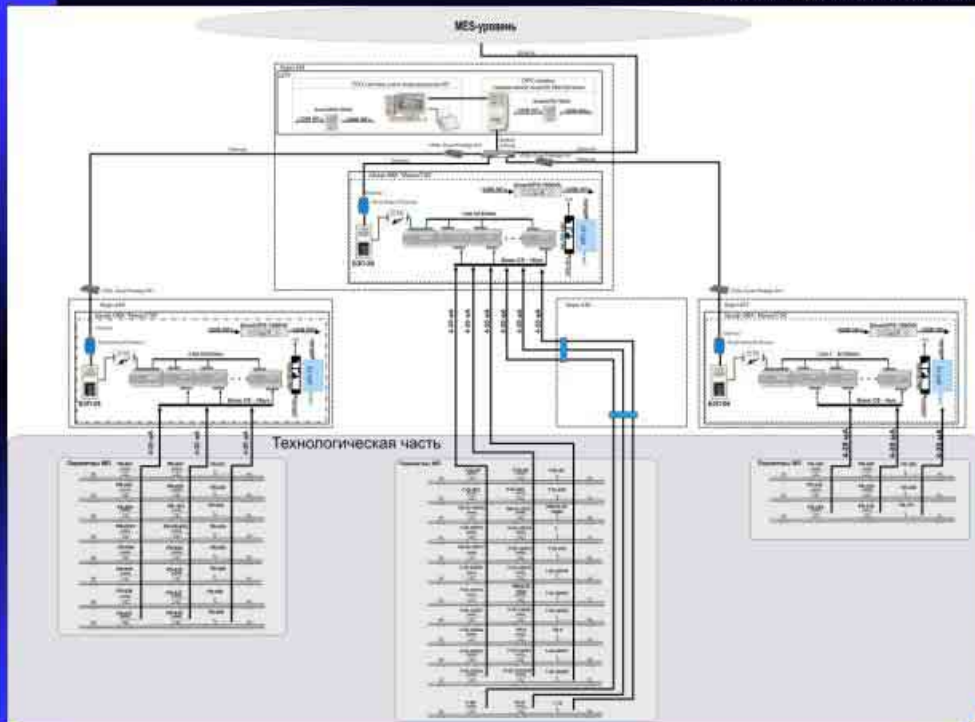
- 1) system, providing oil estimation up to 8 test lines;
- 2) system, providing summary oil, gas and water estimation up to 8 test lines;
- 3) system, providing estimation of material flows;



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Structure chart of Automated material flow control system, Tomsk Petrochemical Plant (enterprise, preparing raw materials and manufacturing end product)



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Structure chart of Automated material flow control system for high-pressure polyethylene production, Tomsk Petrochemical Plant

- 4) system, providing estimation of electric power and water;

ИЗМЕРИТЕЛЬНО-ВЫЧИСЛИТЕЛЬНЫЙ КОМПЛЕКС МикроТЭК-04



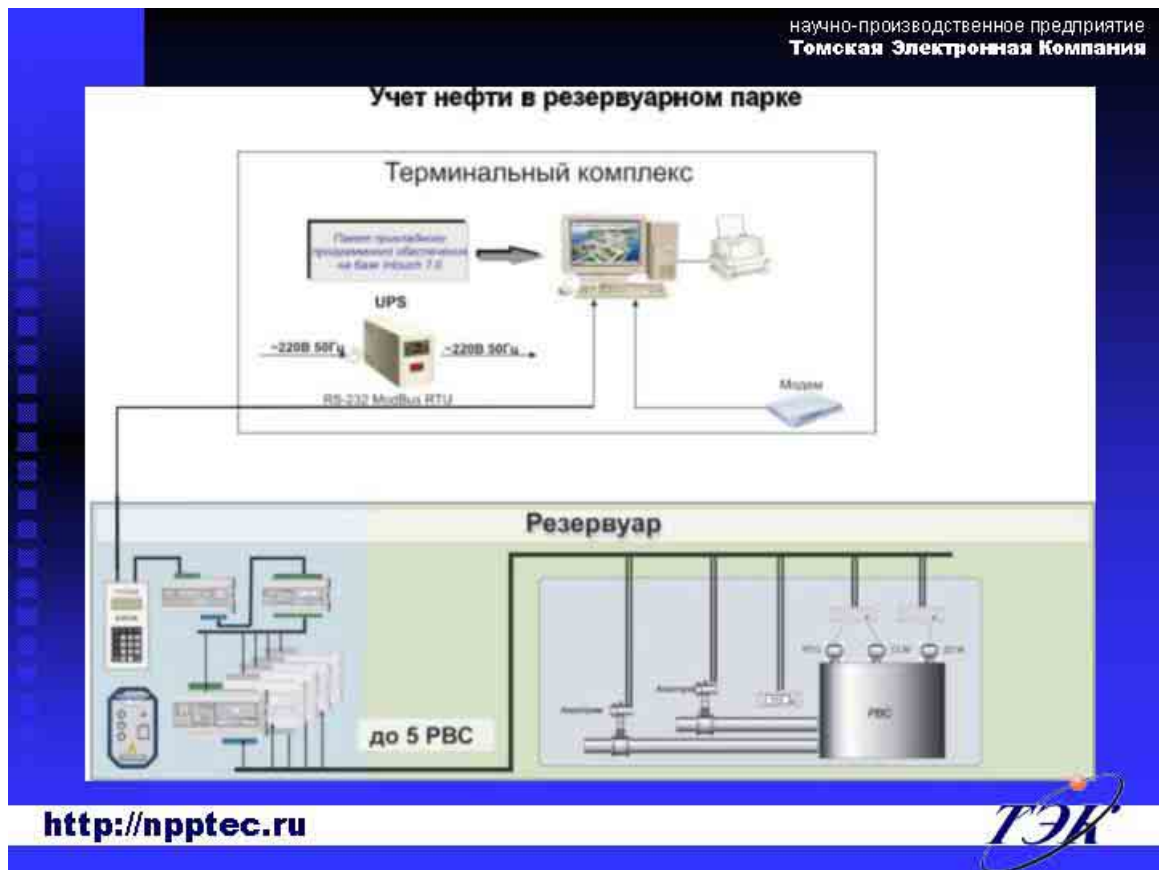
ИВК МикроТЭК-04 предназначен для применения на объектах нефтяной и газовой промышленности для учета воды и электроэнергии на БКНС, других отраслей промышленности для хозяйственного учета материальных потоков.

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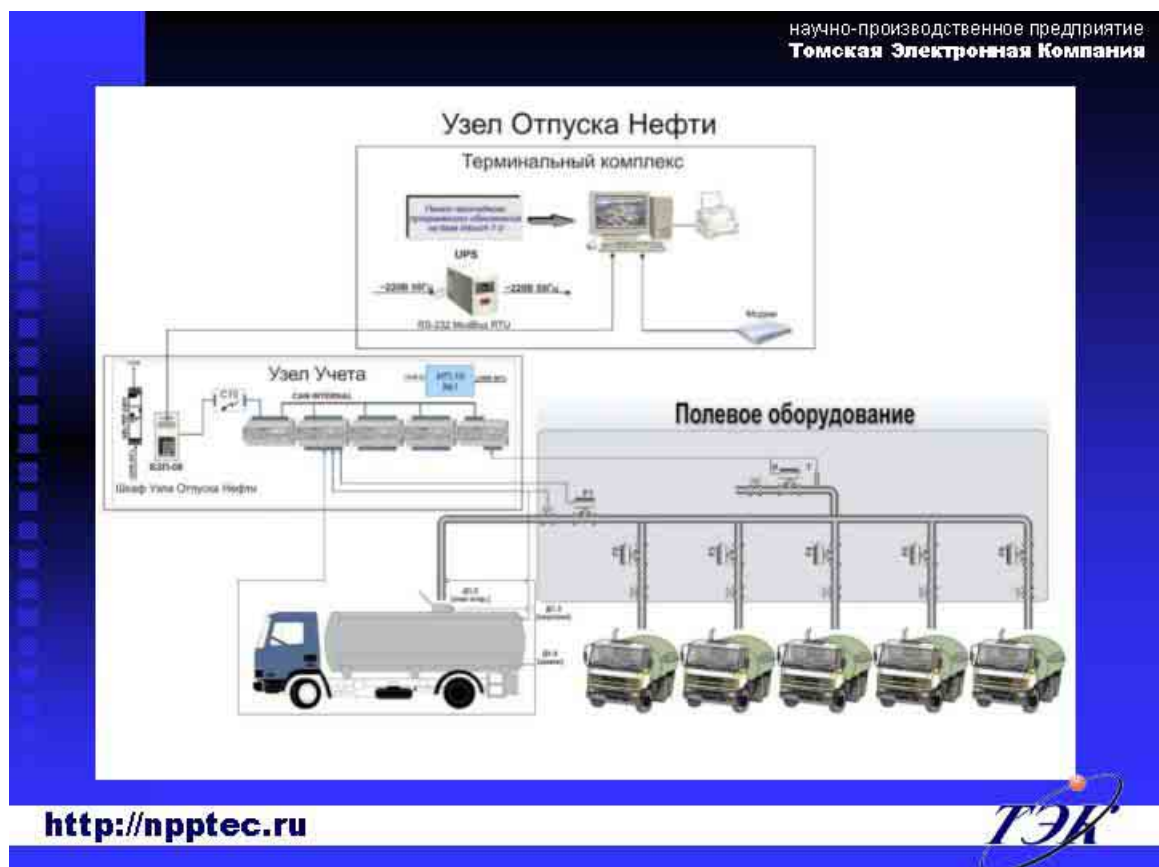
MicroTEC – 04

- 5) system, providing oil estimation per tanks, up to 5 temporary storage tanks;



Structure chart of estimation in tank battery

- 6) system, providing measuring and metering of oil and other products into automobile, railway and water transport;



Structure chart of metering into automobile transport;

- 7) system, providing oil estimation up to 2 lines;
- 8) system, providing natural gas estimation up to 2 lines;

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Томская Электронная Компания

**ИЗМЕРИТЕЛЬНО-ВЫЧИСЛИТЕЛЬНЫЕ КОМПЛЕКСЫ МикроТЭК-07
МикроТЭК-08**

ИВК «МикроТЭК» - 07, 08 предназначены для применения на объектах нефтяной и газовой промышленности, а также химической, нефтехимической, нефтеперерабатывающей и других отраслей промышленности.

ИВК «МикроТЭК» - 07, 08 обеспечивают учет нефти и природного газа до 2-х измерительных линий.



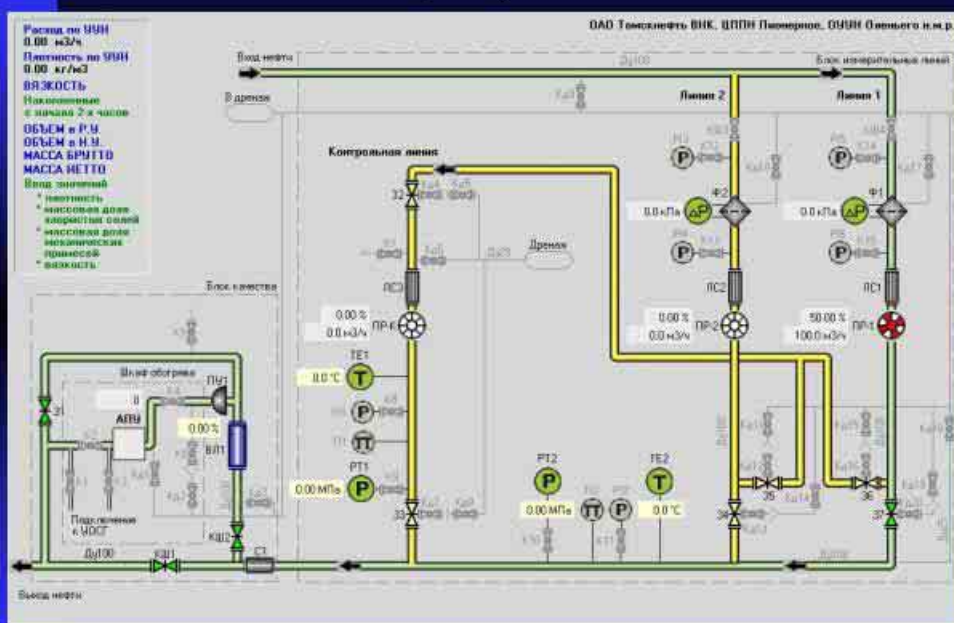
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Measuring and estimating system MicroTEC-07,08

Measuring and estimating system “MicroTEC” has in-built control and setting panel. The system can be additionally equipped with terminal complex, fulfilling the WKS operator functions. We are also developing a solution with more sophisticated control and setting panel, in-built in the cabinet. There will be a graphic display, displaying trend lines.

ВИЗУАЛИЗАЦИЯ ЦППН ПИОНЕРНОЕ

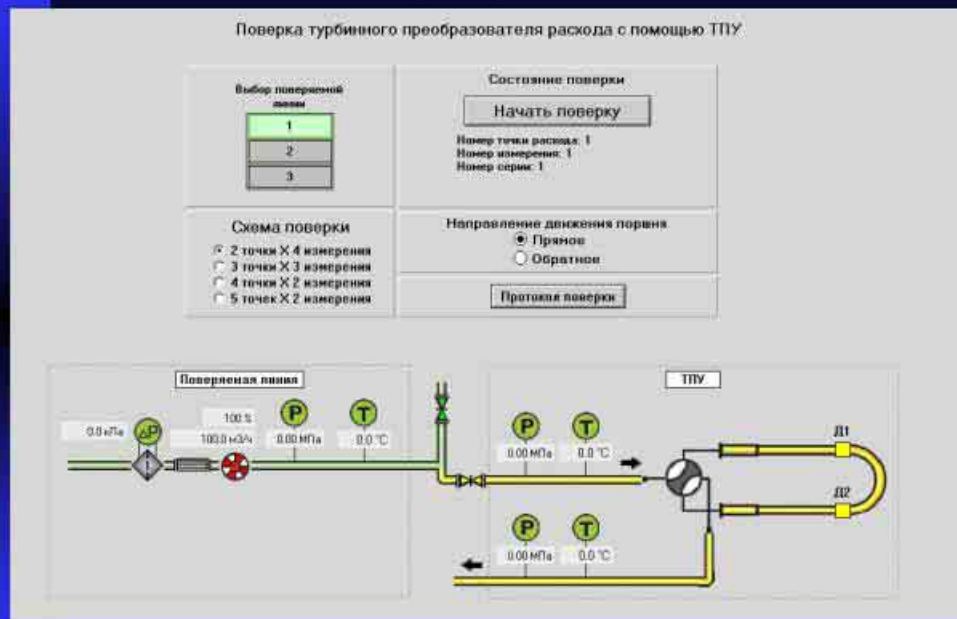


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Visualization of oil processing and pumping shop Pionernoe oil-field Tomskneft East Oil Company, (Flow sheet)

ВИЗУАЛИЗАЦИЯ ЦППН ПИОНЕРНОЕ



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Visualization of oil processing and pumping shop Pionernoe oil-field Tomskneft East Oil Company, (piston prover)

Measuring and estimating system “MicroTEC” has several designs:

- module in-built in the consumer panels;
- cabinet wall-mounted;
- cabinet ground-type.

Consequently:

- the abovementioned options of measuring and estimating system “MicroTEC” allow to apply the system to estimate oil and gas with required accuracy, according to specification documents, provide full and reliable transmitting of information of oil and gas extracting to all levels, which is important to strike a balance;
- Measuring and estimating system “MicroTEC” is a provided metrological system, with calibrating test, applying basic reference standards and certified technique of measuring process.

At the present time SME Tomsk Electronic Company is developing Research and Advanced Development on vibrating oil density meter RoTEC. We have carried out first engineering tests of brassboard and achieved 0,5 % fractional error of density measurement, which is sufficient to apply it at current accounting facilities. Its cost does not exceed 70 % of the world-famous Solartron.

Additionally, to provide prevention of gas explosions at fire and explosion dangerous facilities, we can offer gas concentration control system on the basis of gas detector GSM-03.

GSM-03 is also a module system, one gas detector provides up to 20 sensors.

Gas detector is a certified measuring device; it has permission of Federal Oversight Agency for Mining and Industry, certificate of conformance GOST R.

If the facility has ventilation and alarm systems, GSM-03 can regulate them via its two independent quantized outputs, which operating threshold is preset by software.

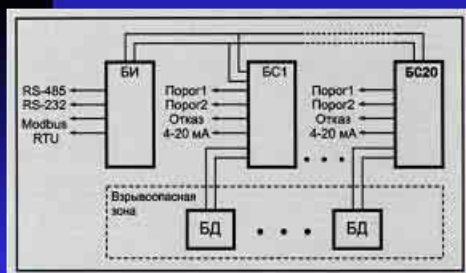
GSM-03 includes the same sensor as the famous STM-10. This is the reason why GSM-03 can be implemented cost-effectively at hazardous facilities.

The GSM-03 special feature is the extended useful life of the product by 1.5-2 times in comparison to STM-10 (owing to PMO which fulfill zero adjustment of measuring scale on operator command). It also transfers the current gas concentration values to computer. It creates new possibilities for development of gas concentration control systems for oil extracting sites. GSM-03 issues pre-emergency events, enables to predict events, enables the operator to monitor gas concentration and take necessary measures to prevent explosions.

At the present time SME TEC is developing a new gas concentration sensor with prolonged useful life.

ГАЗОСИГНАЛИЗАТОР МОДУЛЬНЫЙ ГСМ-03

Газосигнализатор ГСМ-03 предназначен для непрерывного контроля дозврывоопасных концентраций горючих газов, паров легко-воспламеняющихся жидкостей и их смесей во взрывоопасных зонах помещений всех классов, наружных установках и открытых пространствах термехимическим способом.



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Module gas detector GSM-03

Tomsk Electronic Company develops and manufactures not only measuring systems. We also produce electric drives.

For example, "Tomsk Electronic Company" manufactures explosion-proof electric drives for stop and control valves: RemTEC series.

БЛОКИ УПРАВЛЕНИЯ "ПОЛЕВОГО" ИСПОЛНЕНИЯ



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Electric drives

БЛОК ЭЛЕКТРОННОГО УПРАВЛЕНИЯ **ПБЭ-7М1**



Предназначен для управления асинхронными электродвигателями в составе электроприводов для запорной, запорно-регулирующей арматуры и шаровых кранов Ду 100...1200 Ру 1,6...10, эксплуатируемых в наружных установках во взрывоопасных зонах класса В-1г и в помещениях во взрывоопасных зонах класса В-1а, зонах класса 2 по ГОСТ Р 51330.13, в которых возможно образование паро- и газозооушных взрывоопасных смесей категории IIА, IIВ групп Т1, Т2, Т3 по классификации ГОСТ Р 51330.5, ГОСТ Р 51330.11.



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RemTEC-01

ЭЛЕКТРОПРИВОД РЕГУЛИРУЕМЫЙ АСИНХРОННЫЙ **ЭРА-10**



Предназначен для управления с заданными параметрами движения рабочих органов запорной и запорно-регулирующей арматуры нефте-, газопроводов, а также для нефтехимических, химических и других производств для эксплуатации в наружных установках во взрывоопасных зонах класса В-1г и в помещениях во взрывоопасных зонах класса В-1а.

ЭРА-10 представляет собой устройство, состоящее из электронного блока управления и трехфазного асинхронного электродвигателя.



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RemTEC-02

БЛОК УПРАВЛЕНИЯ РЕГУЛИРУЕМЫЙ БУР



Предназначен для управления электроприводами **РэмТЭК-03** для запорной, запорно-регулирующей арматуры: Ду 80...150, Ру 1,6...6,3 МПа и Ду 350...800, Ру 1,6...10,0 МПа, эксплуатируемой на объектах нефтяной и газовой промышленности, на магистральных трубопроводах, также в химической, нефтехимической, нефтеперерабатывающей и других отраслях промышленности. Во взрывоопасных зонах класса 2 по ГОСТ Р 51330.9, в которых возможно образование паров и газозвушных взрывоопасных смесей категорий IIA и IIB групп T1, T2, T3 по классификации ГОСТ Р 51330.11, ГОСТ Р 51330.5.



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RemTEC-03

РЕГУЛИРУЕМЫЙ МОМЕНТНЫЙ ЭЛЕКТРОПРИВОД РэмТЭК-04

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ РэмТЭК-04

Максимальный крутящий момент на выходном валу, Н·м	400
Максимальное усилие на выходном штоке линейного электропривода, Н	1800
Максимальная частота вращения вала электродвигателя, об/мин	200
Диапазон регулирования крутящего момента, %	10–100
Диапазон регулирования скорости движения, %	1–100
Точность останова вала электродвигателя, не более	±1 градус; ±0,1 мин
Погрешность определения нагрузки на выходном звене, % заданного значения	±10
Диапазон температур эксплуатации, °С	от –50 до +50
Маркировка взрывозащиты	1Exd IIBT4
Степень защиты оболочки	IP 54
Габариты (без редуктора), мм	370 в 330 в 260



взрывозащищенное
исполнение

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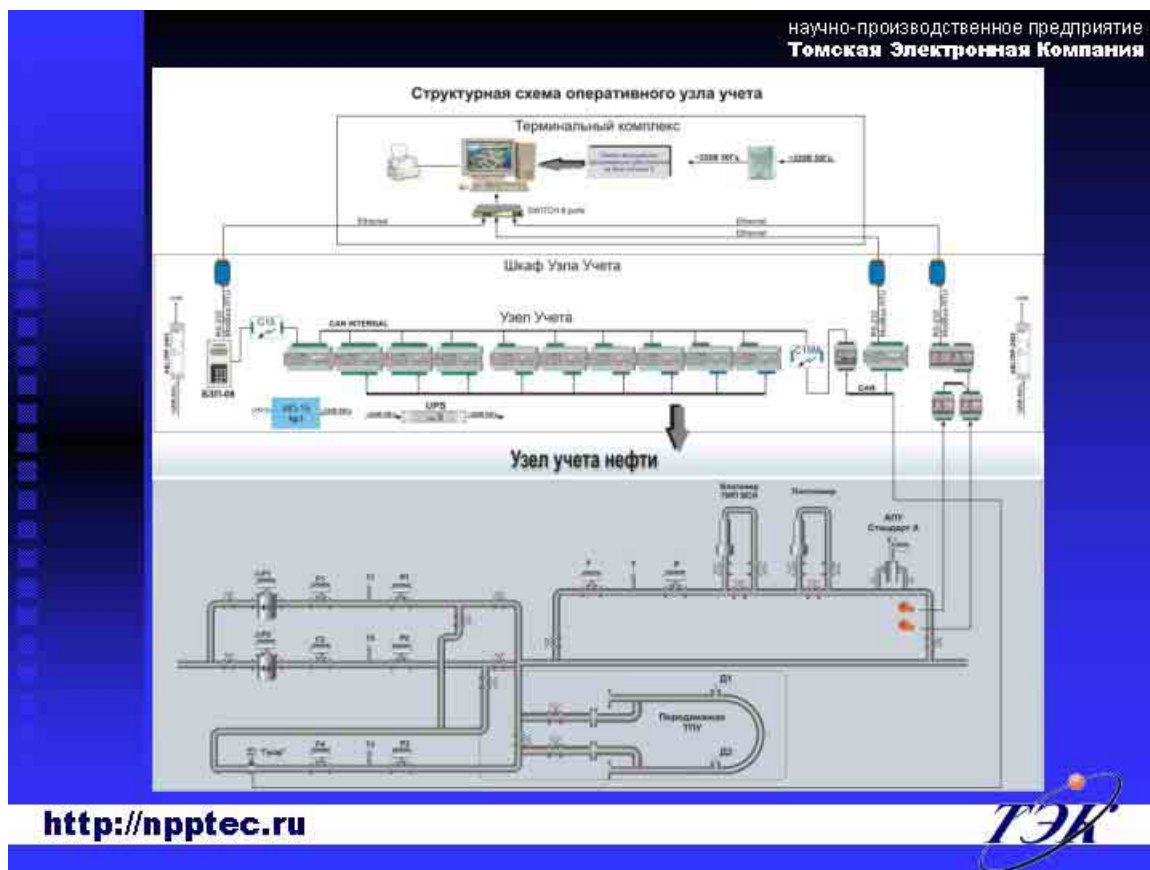


RemTEC-04

Our production is successfully operating at enterprises of JSC “Transneft” and can “cover” the full range of electric drives and electrics of oil and gas extracting facilities.

All the devices and systems, manufactured by TEC, have certificates of RF GOST (national standard) and permission of RF Federal Committee for Mining and Industrial Supervision.

It should be noted, that all the measuring and estimating systems, meters and controllers, including electric drives and gate valve control modules can be effectively assembled to one APCS or telecontrol systems. On their basis we have developed a range of systems from APCS of commercial and operating metering stations to APCS of different oil treatment facilities (oil treatment facilities, compressed air treatment facilities, booster pipeline pumping station, central heating station etc.).



Structure chart of oil metering station UPSV-9

Apart from the products for oil and gas complex, Tomsk Electronic Company supplies weighing lines and material flow estimating lines to metallurgic enterprises.

The manufacturers of various industries have to produce in the dynamic market of material resources and raw materials with constantly increasing prices. This is the reason why they have to pay more attention to implementation of material resources and raw materials estimating systems, i.e. systems, which provide enterprise managers at all levels with latest information about raw material outgo and store and enable them to make effective solutions on regulating discharge process, forming manufacturing cost and planning production activity. Systems, which are sensitive and react flexibly to the market environment, use inner production reserves to minimize manufacturing cost.

Our company has acquired substantial experience in implementing such systems for mining and metallurgic industries on the basis of complex use of the processing weighing and metering equipment. Among our Customers there are such major plants: Aksusk Ferroalloy Plant, Aktyubinsk Ferroalloy Plant, Bratsk Aluminum Plant, Krasnoyarsk Aluminum Plant, Pervouralsk Silica Plant, Tomsk Petrochemical Plant, Chelyabinsk Electrometallurgic Plant, Nizhny Tagil Steel and Iron Plant, Yuzhno-Uralsky Nickel Plant etc.

First level of weight estimating and control system:

- Dynamic and static scales (conveyor, platform, automobile, railway, bunker, crane scales);
- Volume and weight batchers of continuous and discontinuous action (conveyor, bunker, liquid and gas batchers for loading from tanks);
- Monitoring and Control Systems: weighing controller KB – 03 is designed for all types of weighing and batching equipment, control systems SD – 01, 02, 03 to carry out continuous and discontinuous weighing, automation-equipped working places for weigh masters.

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Main weighing and metering systems

Second level of automatic control and estimating.

Control, regulation and detection equipment: controllers, manufactured by firms Emmerson Process, GE Fanuc, Jumo, Siemens, Schneider Electric (for Customer choice).

Third level of operating procedures control:

SCADA – systems: Software on the basis of InTouch (Wounderware), Software on the basis of Delta V;

Fourth level of production control.

Software on the basis of Plsystem (firm OSI soft)

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**АВТОМАТИЗАЦИЯ ВЕСОИЗМЕРЕНИЯ И ВЕСОДОЗИРОВАНИЯ.
ТЕХНОЛОГИЧЕСКИЕ ЛИНИИ И АСУ ТП.**

Уровень управления технологическим процессом
SCADA-системы:
ПП ПО на базе InTouch (Wonderware);
ПП ПО на базе Simplicity (GE Fanuc);
ПП ПО на базе WinCC (Siemens).

Уровень автоматического контроля
Аппаратно-программные средства:
- фирмы Modicon;
- фирмы GE Fanuc;
- фирмы Siemens.

Уровень автоматического контроля
Средства автоматизации производства
ООО "НПТЭК" и его поставщики для
весоизмерительного и весодозирующего
оборудования.

Полевой уровень
Дозаторы непрерывного
действия, порционные
дозаторы, питатели
крупнозернистого и другое
технологическое
оборудование
производства ЗАО
"Сибтехсортбор"
и его поставщиков.

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ТЭК

Automatization of weighing and metering in APCS

On the basis of these four levels we offer ready-to-operate solutions of complete weighing lines, bulk materials charging lines, different transport systems etc.

In order to solve complex estimating problem, one should develop and implement integrated information system of production control, i.e. system of group with already established name MES. Such system would provide a lot of managers with access to the functional estimating system.

The results of estimating procedures can be performed on the fly in different, but convenient for the Customer consumers record formats, including necessary for the consumer information.

The estimation results are integrated with information of all other production procedures and form integrated operating data, such as specific consumption of various materials, allocation of actual consumption per accounting period and their diversion from the intended one, deviation from consumption rate and their interconnection with actual technologic modes and many others.

At the present time the aim of all the developments and projects of our enterprise is to implement them in the structure of such systems.

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