
PROCESS ANALYZERS

BUSINESS UNIT

# SOCRATE—COMPANY OVERVIEW

For over 30 years, our focus is on the Italian and Mediterranean Oil and Gas Market offering Process Instrumentation Products, System and turnkey solutions for process analysis, Metering and Fire and Gas Safety Solutions.

Socrate provides to their valued customers the highest quality products & services, using engineering experience gained over many years of designing, implementing and commissioning hundreds of systems for numerous project applications.

# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: APPLICATIONS

The Process Analyzers Business Unit handles different kinds of analysis applications. Here are the examples:

- Sulphur Recovery Unit
- H2 monitoring
- Natural gas
- Moisture analysis
- H2S & total Sulphur
- Calorimeters
- Gascromatographs
- Combustion efficiency
- Mass spec application
- ASTM on-line analysers
- Blending & FTIR appl.
- Tunable Laser Diode analysers

# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: SULPHUR RECOVERY UNIT

**Sulfur recovery units (S.R.U.) are essential since the discharge of sulphur compounds to the atmosphere is severely restricted by environmental regulations. Typical hydrocracking brings a lot of sulphur compounds in the outlet sour gas. These gases are processed by amine plants providing acid gas (AG) and sour water stripping gas (SWS), very rich of H2S (up to 90%) and NH3 (up to 50%). Sulphur in this dangerous gases must and can be recovered for environmental purposes and interesting profitable solid sulphur reselling activity.**

## ANALYZERS FOR ACID GAS AND SOUR WATER STRIPPING GAS & ANALYZERS FOR QUENCH

**Ametek Model 931/932**

H2S,
NH3,
H2


**Ametek Model IPS 4**

H2S,
NH3,
CO2

## ANALYZERS FOR TAIL GAS

**Ametek Model 930**

H2S,
SO2,
COS,
CS2


**Ametek Model 880**

H2S,
SO2

# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: SULPHUR RECOVERY UNIT

## ANALYZERS FOR SULFUR PIT

**Ametek**
**Model 900**

H2S,
SO2,



**Ametek**
**Model 881**

H2S,
SO2

## ANALYZERS FOR ABSORBER/REGENERATOR

**Ametek**
**Model 931**

H2S,
H2


**H2SCAN**
**Model HY-OPTIMA 2740**

H2

## ANALYZERS FOR STACK

**Ametek**
**Model 920**

Nox, SO2 high range, SO2 low range



**Ametek**
**WDG Series**

O2

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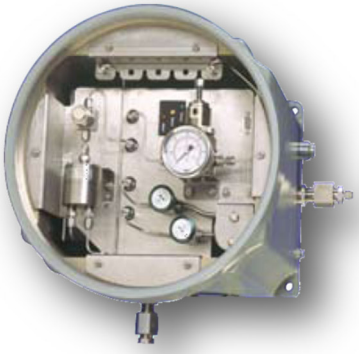
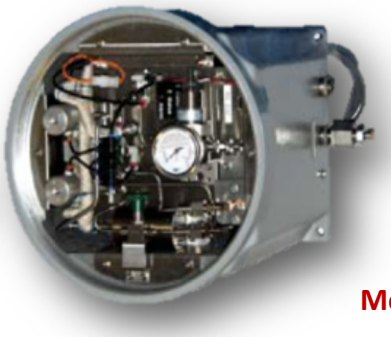
# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: MOISTURE ANALYSIS

Various applications require continuous and reliable measurement of ppmv moisture in gases and vapors. Our analyzers gives to the customer a direct measurement of moisture concentration. Furthermore, they provide a degree of accuracy and confidence that other analyzers can't offer.

Ametek
Model 3050 OLV





Ametek
Model 3050 SLR

In addiction we can provide water dewpoint analyzerws providing high performance with attractive "value for money".

# HYDROCARBONS AND WATER DEW POINT

Vympel
Cong Prima 2M

Phymetrix
ExMa

# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: CALORIMETRY

Control system philosophy of fired heaters varies depends on the requirements and design of the heater or boiler. However, in all cases the thermal load of the furnace and the air/fuel ratio are two critical parameters that must be monitored and controlled.

Depending on the control system design the Wobbe Index, the heating value and gas density may be required as input(s).

Hobré
Model WIM COMPAS

# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: COMBUSTION EFFICIENCY

Combustion efficiency is a measurement of how well the fuel that is being burned is being utilized in the combustion process. This is different from the efficiency number produced on the analyzer, which is reflective of the total amount of heat available from the fuel minus the losses from the gasses going up the stack. The combustion efficiency calculation considers both the stack temperature and the net heat and moisture losses.

Ametek
Model WDG Insitu
Cenelec

Ametek
Model WDG
1200/1210


Ametek
Model WDG V-C


Ametek
Model WDG IV-C

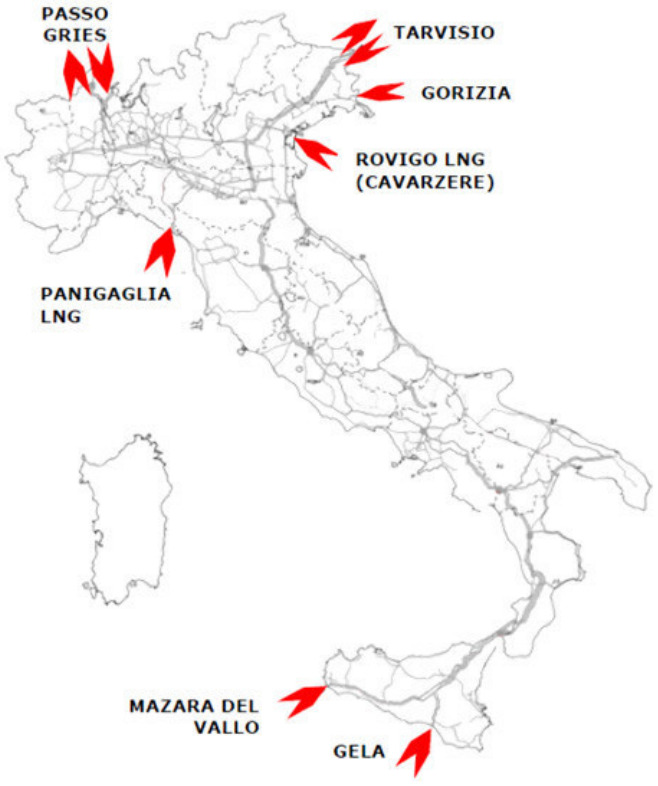
# SOCRATE – PROCESS ANALYZERS BUSINESS UNIT: NATURAL GAS

**The most common measure to be applied on Natural gas is flow, achievable by means of orifice fittings, turbines or ultrasonic meters. But SOCRATE applies also other measures that for different reasons can be interesting for quality determination:**

- **Calorific Value**
- **Water Dew Point**
- **Hydrocarbon Dew Point**
- **Hydrogen Sulfide (H2S)**
- **Total Sulphur**
- **Specific Gravity**

## NATURAL GAS IN ITALY

**Natural gas network configuration in Italy is a good testing area for Natural Gas analytical application since it is fed by many different gas sources, with different gas quality and with a very capillary distribution network like nowhere in the world. Thanks to the peculiarity of this gas network SOCRATE has gained very important experience in the field of natural gas analysis**




- **Russia**
- **Norway**
- **Algeria**
- **Libya**
- **LNG**
- **Internal production (wells)**
- **Storage (natural caves/ empty wells)**

# PROCESS ANALYZERS BUSINESS UNIT: CALORIFIC VALUE

Calorific value is the amount of heat produced by the complete combustion of a material or fuel measured in units of energy per amount of material (Kj/Sm3). Combining this data with the volumetric flow we can obtain the actual flow of energy.

Azbil Model HGC 303

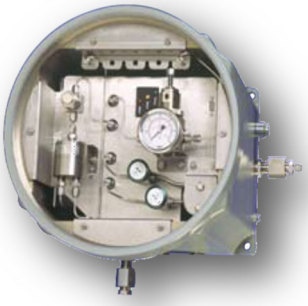
GasPT 2


Azbil Model GasCVD

# PROCESS ANALYZERS BUSINESS UNIT: WATER DEW POINT

The water dew point is the temperature below which the water vapor in a volume of humid air at a given constant barometric pressure will condense into liquid water at the same rate at which it evaporates.

Condensed water is called dew when it forms on a solid surface.



Ametek
Model 3050 OLV

Vympel
Cong Prima 2M

Phymetrix
ExMa

# PROCESS ANALYZERS BUSINESS UNIT: HYDROCARBONS DEW POINT

The hydrocarbon dew point is the temperature (at a given pressure) at which the hydrocarbon components of any hydrocarbon-rich gas mixture, such as natural gas, will start to condense out of the gaseous phase. The hydrocarbon dew point is a function of the gas composition as well as the pressure.


Ametek
Model 241 CE II

Vympel
Cong Prima 2M

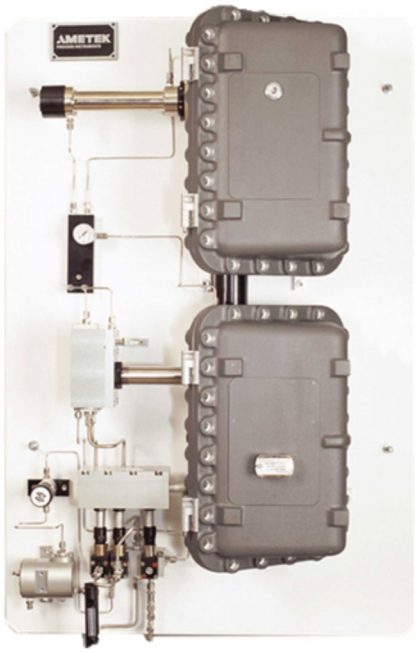
# PROCESS ANALYZERS BUSINESS UNIT: HYDROGEN SULFIDE

Sulphur can be present in Natural gas at different concentration and in different ways, but the most important in terms of quantity and care is Hydrogen Sulfide (H2S)

H2S is toxic and becomes harmful above 20ppm.

Hydrogen sulfide reacts with metal ions to form metal sulfides.

It is highly recommended to use process analyzers to measure H2S concentration. Monitoring done in laboratory is dangerous for the operator, is not continuous, (high concentration events could be not seen); Sulphur concentration in the grab bottle can decrease or change due to reaction with internal walls (metal surface) and due to condensation of heaviest components.




Ametek
Model 933

# PROCESS ANALYZERS BUSINESS UNIT: SPECIFIC GRAVITY

Specific gravity is the ratio of the density of a substance compared to the density (mass of the same unit volume) of a reference substance. Temperature and pressure must be specified for both the sample and the reference

THERMO
Model SARASOTA SG 900

# PROCESS ANALYZERS BUSINESS UNIT: TOTAL SULFUR

Even if elemental sulfur is non-toxic its compounds such as carbon disulfide, hydrogen sulfide and sulfur dioxide are toxic. The sulfur contamination of a gas or a liquid has to be measured in order to determine the sulfur compounds that will be produced as the effect of the process. A sulfur online analyzer determines the total sulfur content of liquid or gas phase samples to ensure process optimization and maximum uptime. It replaces labor-intensive laboratory grab samples with online analysis for rapid determination of sulfur contamination.

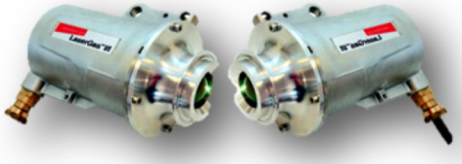

THERMO
Model SOLA II

# PROCESS ANALYZERS BUSINESS UNIT: TUNABLE LASER DIODE ANALYZERS

Tunable laser diode analyzers are used for continuous emission monitoring and process control across a wide range of industrial applications e.g. in steel, aluminium and other non-ferrous metal, chemical, petroleum and cement production, power generation and waste incineration.

NEO MONITORS
Model LASERGAS II SP

NEO MONITORS
Model LASERGAS II OP



NEO MONITORS
Model LASERGAS III

NEO MONITORS
Model LASERGAS

NEO MONITORS
Model LASERDUST

# PROCESS ANALYZERS BUSINESS UNIT: GASCHROMATOGRAPHS

AIT Model FXI

Gas chromatography is a type of chromatography used in analytical chemistry in order to separate and analyze compounds that can be vaporized without decomposition. Its typical uses include testing the purity of a particular substance, or separating the different components of a mixture (the relative amounts of such components can also be determined). In some situations gas chromatography may help in identifying a compound.

Azbil Model HGC 303

# PROCESS ANALYZERS BUSINESS UNIT: MASS SPECTROMETERS


Thermo Prima

Mass spectrometry is an analytical chemistry technique that helps identify the amount and type of chemicals present in
a sample by measuring the mass-to-charge ratio and abundance of gas-phase ions. Mass spectrometry works by ionizing chemical compounds to generate charged molecules or molecule fragments and measuring their mass-to-charge ratios.

AIT MGA

# PROCESS ANALYZERS BUSINESS UNIT: RAMAN SPECTROMETERS

Raman spectroscopy is a spectroscopic technique used to observe vibrational, rotational, and other low-frequency modes in a system.
Our solution provides rapid, accurate and stable monitoring of physical properties and chemical composition of liquids, emulsions, slurries and solids.

AIT RPM

# PROCESS ANALYZERS BUSINESS UNIT: ASTM ON-LINE ANALYZERS

ASTM standards are those developed in cooperation with ASTM (American Society for Testing and Materials) International.

ASTM International has no role in requiring or enforcing compliance with its standards. The standards, however, may become mandatory when referenced by an external contract, corporation, or government.

ICON SCIENTIFIC

- Flash point (ASTM D92, 93, IP34, 170)
- Freeze point (ASTM D8326)
- Cloud point (ASTM D2500, 5771, 5772, 5773)
- Cold Filter Plugging Point (ASTM D6371)
- Vapor Pressure Analyzer (ASTM D6377, 6378, 6897)
- Color analyzer (ASTM D156, 1209, 1500, 1544,…)
- Opacity analyzer ASTM D1209 – ISO 6271)
- Distillation analyzer (ASTM D86)
- Viscosity analyzer (ASTM D445

# PROCESS ANALYZERS BUSINESS UNIT: BLENDING AND FTIR APPLICATIONS

The product properties are monitored in real time at the mixer during the blending, but this require an analyzer with the following characteristics:

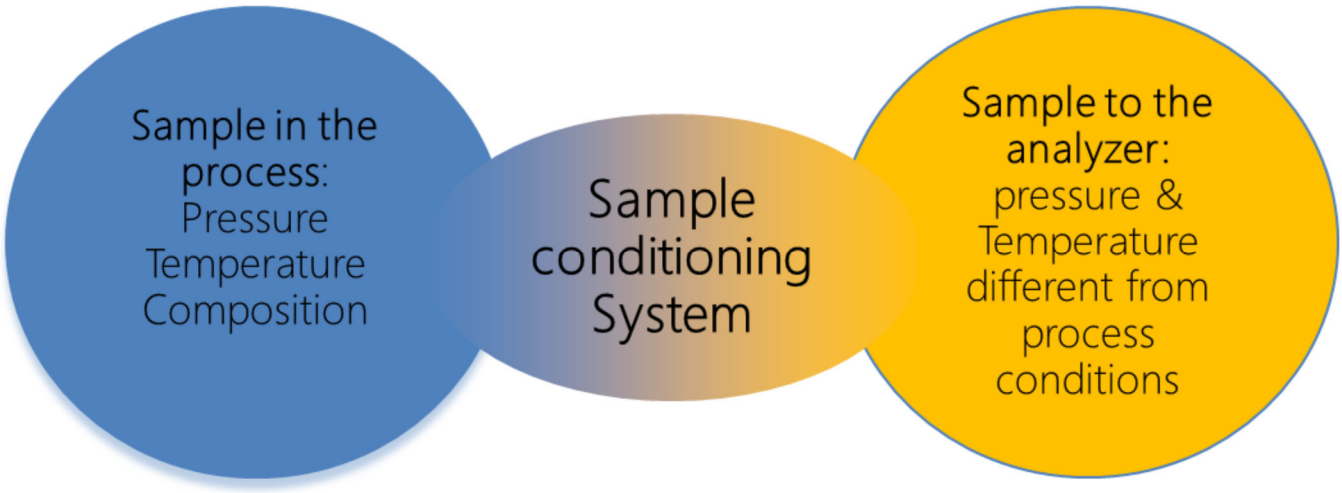
- The analyzer shall guarantee that the gasoline will meet specificific requirements in terms of quality and physical properties with high accuracy.
- The on line analyzer shall provide analysis in real time to allow eventual on line recipies correction.
- The online analyzer shall meet at least the ASTM requirements for accuracy and auto validation.

AIT FTIR HSS

# PROCESS ANALYZERS BUSINESS UNIT: INTEGRATION AND SAMPLING SYSTEM

**A good analyzer with a bad sampling system will result in a bad analysis system.**

**An analyzer shall operate in the correct ambient conditions.**

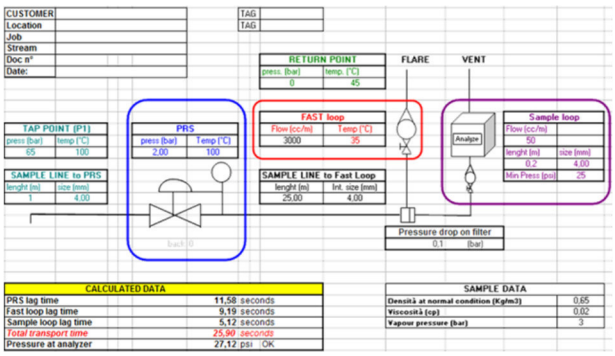



**A good sampling system matches process with analyzer keeping in consideration what needed to guarantee sample at the analyzer representative to the actual process**

**Sample composition, sample phase, process pressure and temperature, dewpoint, density, and more, are considered to evaluate the kind of sampling system to**

## FAST LOOP CALCULATION

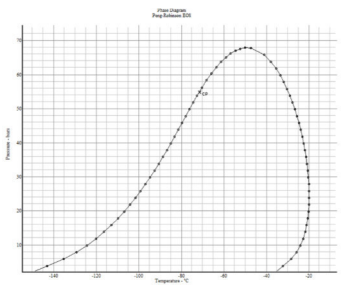
**Lag time must be calculated and minimized to guarantee representative sample to analyzer, considering pressure, temperature viscosity, density and distances, as well as sample flow to the fast loop.**




## PHASE CALCULATION

**To guarantee sample characteristics it is necessary calculate the phase curve depending on sample composition.**

**Avoiding liquid in sampling system is mandatory to guarantee a correct sampling condition.**



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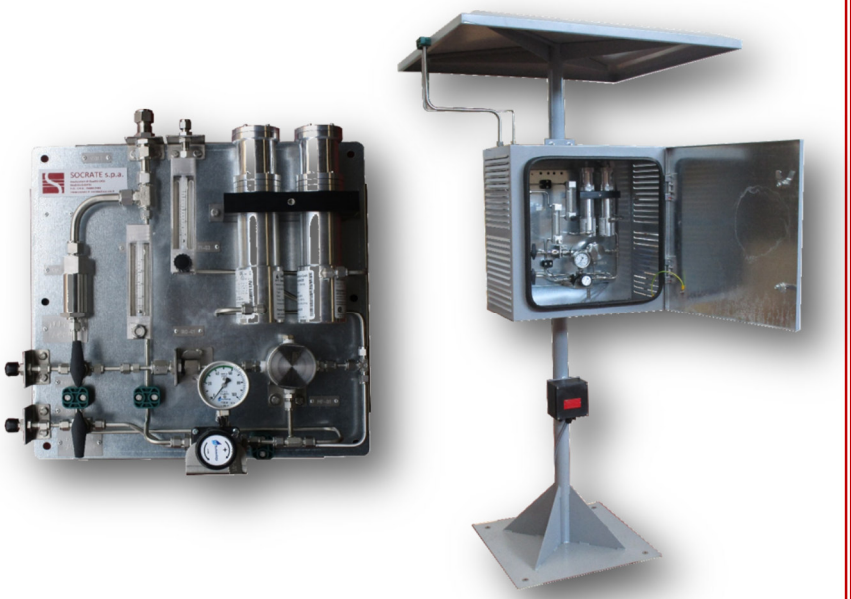
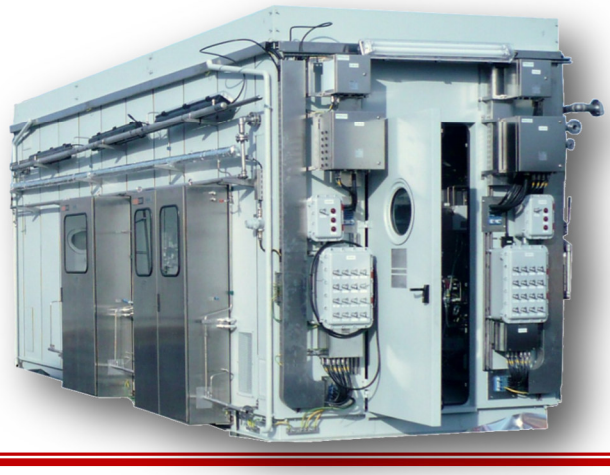
# EXAMPLES OF INTEGRATION



LOCAL PANEL

LOCAL CABINET



SHELTER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