N.I.R.A.

SAGITTARIUS 2001 L.E.L.

Multi-line monitoring system with automatic adjustment for the reutilization of exhaust air in the rotogravure process printing

The increasing of energy costs and more sensitivity beyond the ambient pollution pushed many rotogravure process operators to adopt automatic systems of drying and re-circulation of air together with regulation and control systems reaching three objectives:

- The reduction of air quantity shoots by production lines which allows energy saving for the air heating in function of the re-circulation percentage.
- The abatement of waste streams can reduce the size of the plant, lowering the purchase and running costs.
- The air flow rate into drying room always warrants a solvents concentration lower than L.E.L. (Lower Explosion Limit).

SAGITTARIUS 2001 L.E.L., warrants the continuous control of the solvent concentrations from of the drying chamber and allows the automatic lock regulation, of the controlled air re-circulation into the printer element.

• What are the savings coming from re-circulation?

The Sagittarius 2001 L.E.L. controlled re-circulation in a rotogravure with an air rate of total 90.000 Nm^3/h, reduces air ejection up to about 25.000 Nm^3/h, leaving the solvent extraction capacity unaltered.
The energetic regenerations is more than 60% of the heat normally used.

• What are the re-circulation advantages?

In the most part of printing cases for example flexible packaging printing for food, Etylacetate is used, whose L.E.L. value is 78,5 g/Nm^3.
The air ejection normally shows solvent concentration values included between 1 and 10 g/m^3, it depends to the hiding power.
Considering that Etylacetate at 30 C° saturation concentration value in the air is 517 g/m^3 it is possible to reuse recirculated air staying between the a/m values, without modifing the drying capacity, is do not raise the residual solvent in printing film, which should not exceed $10mg/m^3$.
Operating with recirculation controlled and governed by an analysis system, it is possible peaking, in drying room, up to 20-25 g/m^3 value, working in security anyway, considering that average temperature in drying chamber is between 50°C and 120°C.
Furthermore, the re-use of exhaust air with solvent, dramatically decreases the film effect (taking up solvent value between 3-4 mg/m^2).
Lowering working time and improving printing quality.

• And what about environment?

Managing the re-circulation value of the air, the drying chambers of each printing element are kept in depression **avoiding the solvent contamination in the working environment.**
Furthermore the pollution emission, can be monitored.

To archieve this result, it is necessary to check and govern the drying chamber with an air recirculation system piloted by NIRA Sagittarius 2001 L.E.L. Automatic Analyser.

• How is re-cirulation calculated?

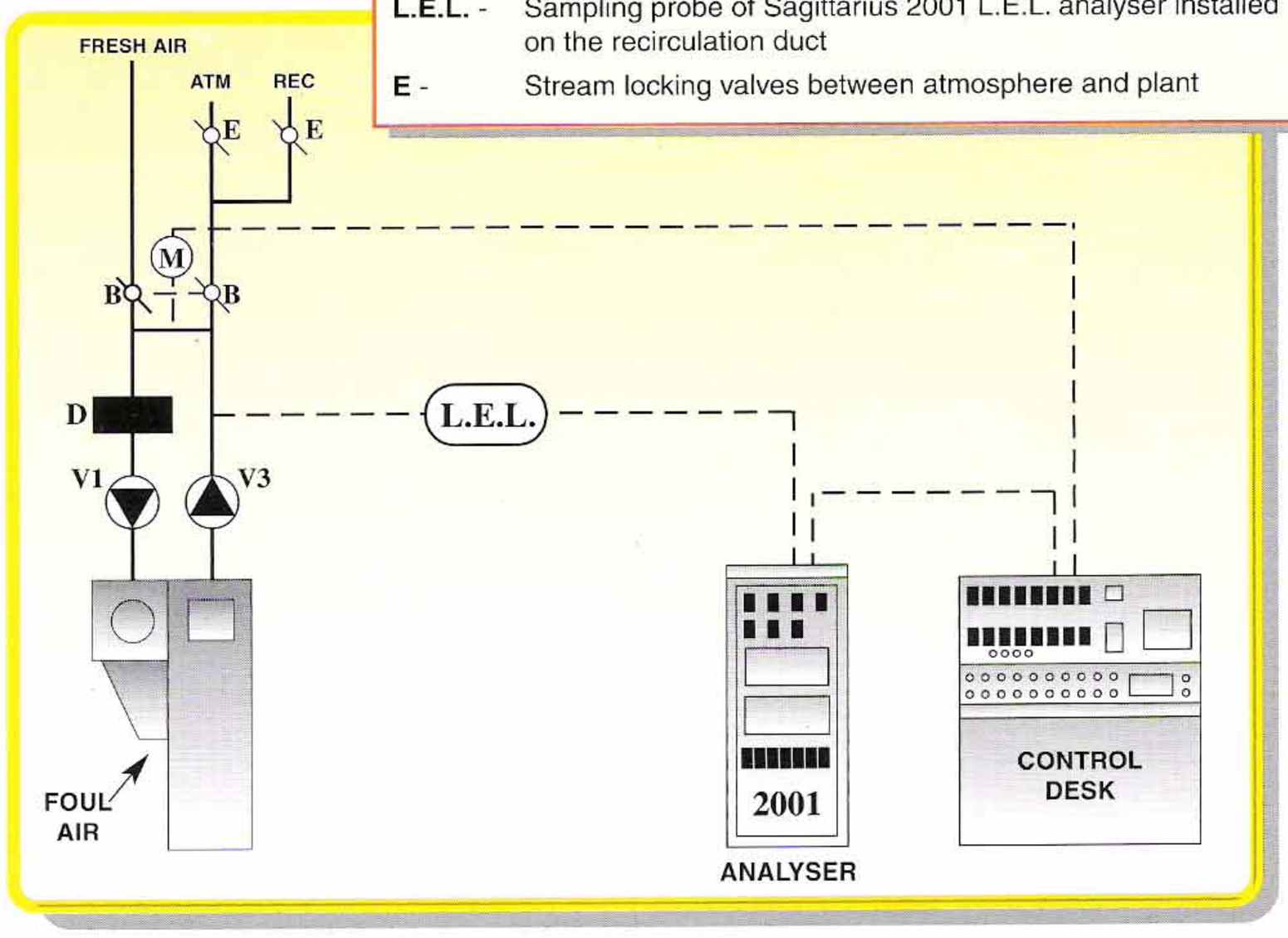
The rotogravure machinery is settled by different printing elements, to allow the carrying out on line of different working phases.
The recirculation system insertion in each printing element, equipped with different fan systems, requires the study of the existing fanning and the production technical data.

Through the examination above mentioned data, it is possible to establish the solvent concentration in the air ejected by a printing element, so to correctly tune the air recirculation system.

MONITOR AND CONTROL CABINET WITH SYNOPTICAL

CONTROLLED RECIRCULATION PLANT

V1 -	Fan drying chamber inlet
V3 -	Suction fan of drying chamber usually with a capacity of 10% above the inlet fan to keep the element in depression
D -	Heat exchanger
B -	Motorized recirculation locking valves
L.E.L. -	Sampling probe of Sagittarius 2001 L.E.L. analyser installed on the recirculation duct
E -	Stream locking valves between atmosphere and plant



- max printing light
- max. printing speed
- max. printing covering
- wet ink used quantity
- ink dry bottom
- working temperature
- used solvent type or possible mixture
- **Operating principle**

The system, through a membrane sampling valve, draws a significant aliquot of sample from each analyses line, which intake by an injector situated at the valve bottom, is sent to an unique analytical system. The flame ionisation detectors (FID) directly reads the existing hydrocarbons concentration, comparing them to a standard continuously .

- **Advantages of Sagittarius 2001 L.E.L. System**

- NIRA system is free from catalyst poisoning phenomena.
- The membrane valve warrant years of maintenance free work.
- The using of one FID detector requires unique automatic calibration.
- FID is a carbons atoms counter, so that its measurement is independent from the solvent type used.
- FID doesn't give wrong answers depending to the solvents moistures.
- It doesn't require difficult sample moisture elimination systems.
- The direct analyse on the sample without middling condense locks, always gives true data.
- Every function and data are continuously controlled by PC.

The FID sensitivity, accuracy and reproducibility, is definitely higher than other detectors.

- **Features of Sagittarius 2001 L.E.L.**

- PC running of control points
- Flame Ionisation Detection (FID)
- Hydrogen automatic interception
- Automatic flame re-lighting
- Detector temperature control
- Detector temperature alarm
- Gas pressures digital control
- Hydrogen pressure and air alarm
- Sampling valve pneumatic control
- Sample line depression alarm
- No. 3 threshold of concentration alarm for each point
- Digital view of concentrations
- Auto-calibration range with standard gas
- Calibration automatic control
- Calibration alarm
- Zero alarm
- Included auto-diagnostic
- Signals digital integration
- Colour TFT graphic screen
- Measurement rend introduction
- Historical registration of alarm and possible irregularities
- Synoptic view

- **Alarms common to each control and regulation places:**

- 1° Flame off
- 2° Servo air pressure
- 3° Halt by operator
- 4° Wait for temperature
- 5° Sampling valve blockage

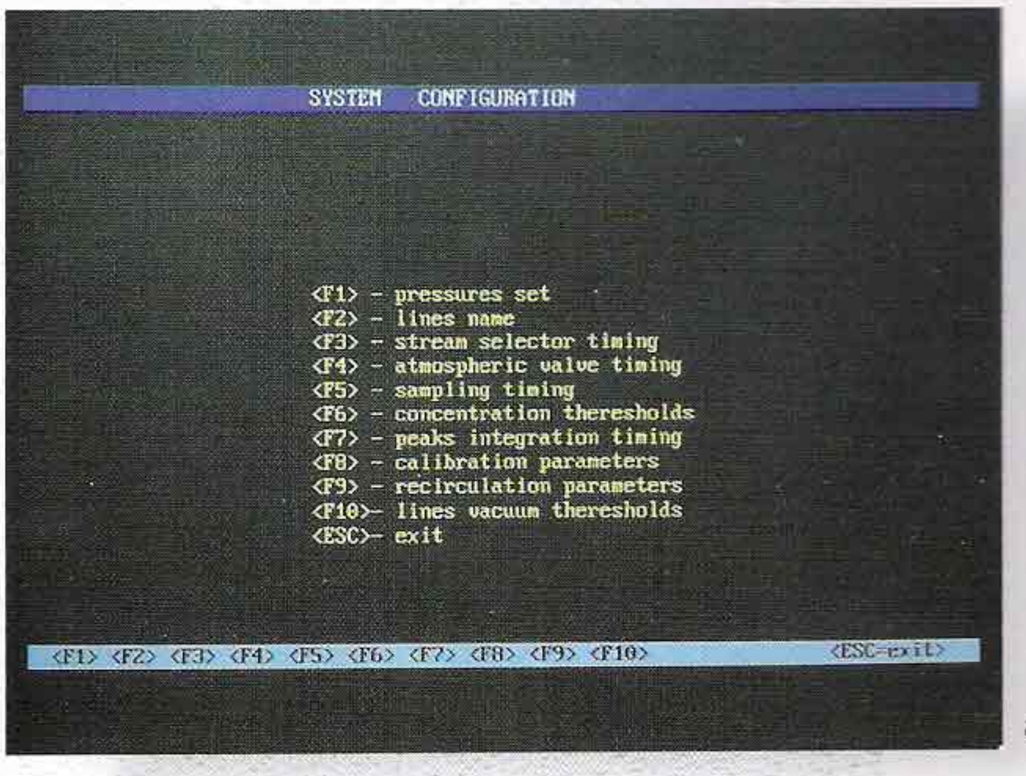
- **Alarm for single element:**

- 1° Sample flow rate
- 2° Sample line depression
- 3° Concentration pre-alarm
- Max. concentration alarm
- Hydrogen pressure pre-alarm
- Contact system in

SAGITTARIUS 2001 L.E.L. analyser run by "PC-embedded" doesn't require any further connection or peripheral devices.

• WORKING

The analyser automatically performs the calibration of each parameter.
The different phases measurement cycle, are managed by “PC-embedded” which controls and shows the menus on the screen.

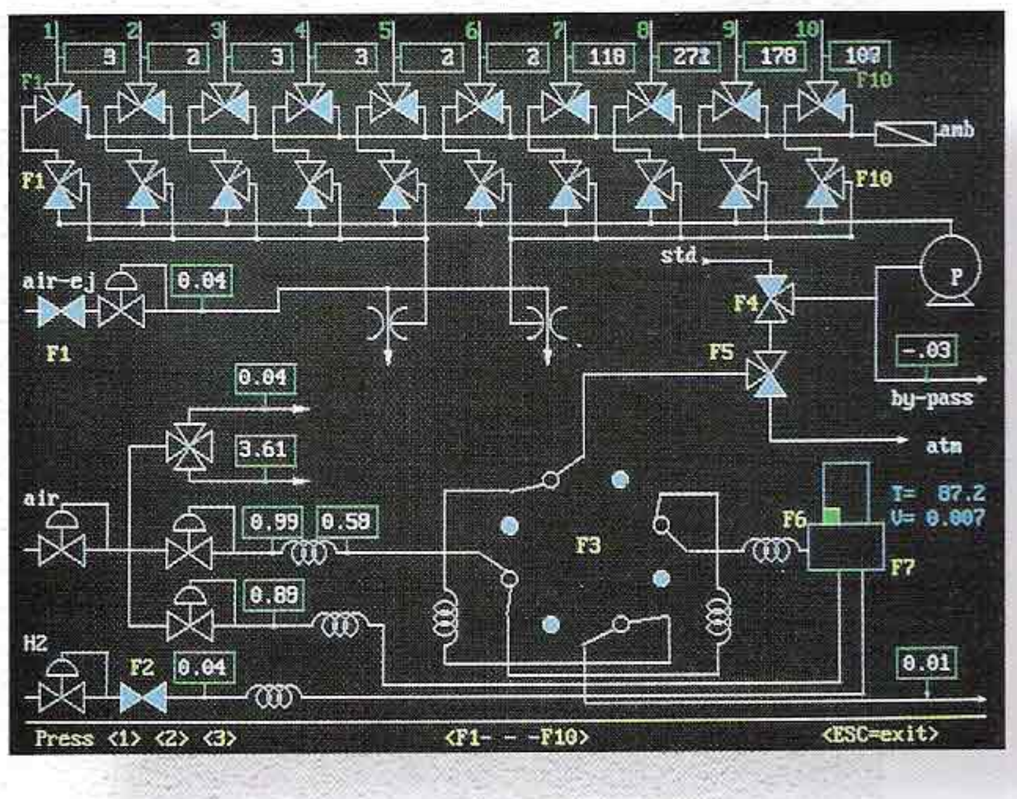


a)

b)

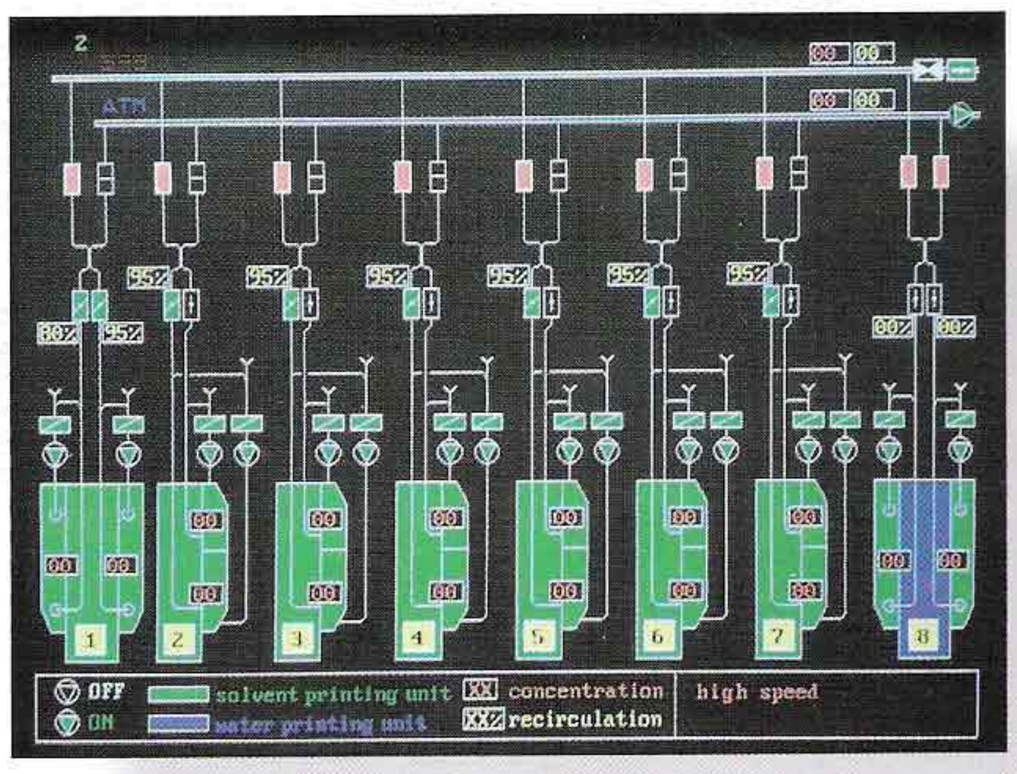
a) Set-up configuration system.

b) Parameters readout and monitoring



c)

c) Animated graphic showing of analytical process.



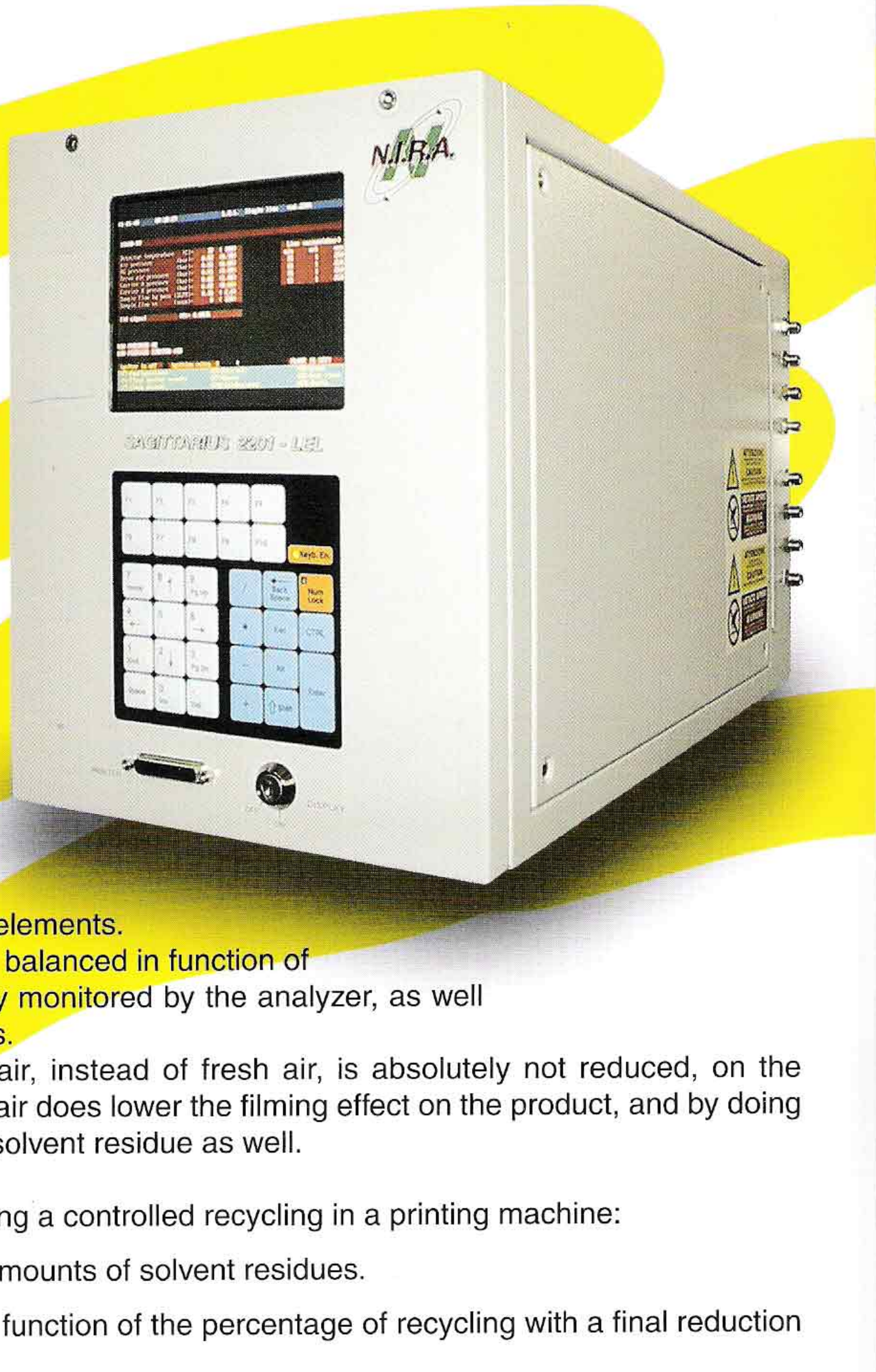
d)

d) Synoptic supervisory of recirculation system

FID 2201 L.E.L.

NEW GENERATION OF L.E.L. ANALYSER FROM N.I.R.A.

FID 2201-1 L.E.L. single line guarantees monitoring and recycling in according to rule EN 1539
FID 2201-2 L.E.L. two lines
FID 2201-3 L.E.L. three lines
FID 2201-4 L.E.L. four lines



Printing machines for the production of flexible packing reached a 200/300 meters per minute output speed, thanks to the distribution of hot air on the tape surface in the drying chamber.
The general trend in the past was choosing to have high inputs of air in the drying chamber, so that these were proportional to printing speed.
This choice was based on low costs of energy and lack of attention to environmental issues.
Lowering the quantity of air released by the production lines allows noticeably smaller sizes for the solvent recycling and the abatement devices, consequently reducing both the purchasing and managing costs.
N.I.R.A. 2201 LEL guarantees continuous control of output solvent from the drying chamber as much as of input air, allowing automatic regulation, by using a gate for the controlled recycling system in the printing elements.
The shares of recycled and discharged air are balanced in function of the solvents concentration, which is constantly monitored by the analyzer, as well as according to the chosen referral parameters.
The stripping power of the solvent charged air, instead of fresh air, is absolutely not reduced, on the contrary it seems that the already charged up air does lower the filming effect on the product, and by doing so it guarantees a smaller quantity of leftover solvent residue as well.

The following goals can be reached by operating a controlled recycling in a printing machine:

- Improvement of product quality, with lower amounts of solvent residues.
- Energy savings in the air heating system, in function of the percentage of recycling with a final reduction of discharged output
- After lowering the discharged output an abatement device can be installed

The system requires service gas:

- hydrogen for gaschromotography
- network air, oilless and dehumidified for ejectors (170 l/min)

Dimensions: w 27 x h 34 x d 54 cm.

The FID 2201 LEL analyzer can be set up from one to a maximum of four lines.

www.gripa.it

Technical specifications SAGITTARIUS 2001 L.E.L.

DETECTION SYSTEM		flame ionization
ANALYSIS LINES		10
ANALYSIS TIME FOR TEN LINES		30 sec.
MEASURING RANGES (others as option)		10-30-40-100 gr.
NOISE		0,001%
SENSITIVITY LIMIT		0,002%
ZERO DRIFT		automatic compensed
SPAN DRIFT		<1% on 24 h (max sensitivy)
ACCURACY		+/- 1% FS
LINEARITY		+/- 1% FS
REPEATIBILITY		+/- 1% FS
WORKING TEMPERATURE		10°-40°C
HYDROGEN	CONSUME	50 cc/min
	INLET PRESSURE	25-40 psi
AIR	CONSUME	500 cc/min
	INLET PRESSURE	50-60 psi
ALARMS		contacts n.c. L.D.P.
OUTLETS	ANALOG	0-10 V; 4-20 mA
	SERIAL (OTHERS AS OPTION)	485
READ-OUT		VGA (TFT color)
POWER		220 Vca; 500 VA

The system requires the following gases to operate:
- hydrogen used as detector flame feeder
- chromatographic air, used as detector flame feeder and for sample valve actuation
- servo air used for the ejectors, consume 40 l/min.

Directives CE 89/392

NEW INSTRUMENTS and RESEARCH for ANALYSIS s.r.l.
via Locatelli, 113 - 20046 Biassono (MI) Italy
tel.: +39 039.24.97.856 - fax +39 039.24.90.049

www.nirainstruments.it
sales@nirainstruments.it

Local distributor and service