

AUTOMATIC ANALYZER OF RESIDUAL SOLVENTS Field Instrument

(Fast-Head Space-Gaschromatography)



**PROCESS
VERSION**

NEPTUNE 801

Quality control may no longer be a hindrance to production increase today.

In modern industry, the just-in-time production demands should no longer depend on laboratory analysis times.

The new techniques in fact allow shorter and shorter production times, and continual work shifts.

So far, the response times of the analysis laboratory, despite computer information support and the high instrumental automation, have been constant during the years and are no longer compatible with the production times.

The laboratory, for its own nature and for economical reasons, works single shift as offices do, and so doesn't provide a full time analytic support to production.

In addition to what described above, laboratory instruments :

- Are designed to operate in clean environments, are not so easily adapted to dusty and/or solvent polluted production lines and departments.
- Are based on the technique of sample transfer to the gas chromatograph via splitting. This technique requires frequent calibration checks.
- Require frequent and costly maintenance, owing to the mechanical complexity of Head Space sampling systems.
- Use complicated calculation integrators or expensive peripheral units.
- Need skilled and expert personnel because of their complexity.

Under these views and exploiting our multi-decade experience in solvent laden air monitoring on printing presses, we developed the **NEPTUNE 801**, an instrument based on the new FAST-HS-GC analytical technique, with all operating functions simplified, and applying it as on-line quality control of printing processes. This allows machine operators

of all work shifts to check every step of the printing process, quickly and in real time. This response rapidity enables easy and prompt decision making on the on-going production process, thus assuring the highest ratio of good finished product versus waste.

The just-in-time concept applied to quality control is now feasible, with the analytic responses matching the standards. (UNI U59.OB.162.O)

PERFORMANCE

- Direct analysis when starting the printing process will reduce machine start-up time considerably.
- Residual solvent analysis time is compatible with a high printing speed; this will reduce product waste or re-process.
- Direct analysis during the printing process will allow determining whether line speed may be increased or should be decreased.
- Routine analysis is transferred from laboratory to press room, with the advantage of reducing analysis costs and increasing productivity.

OPERATING METHOD

NEPTUNE 801 is capable of extracting and analyzing directly the solvents retained in a film or laminate (in general from an area of 100 cm²).

Handling is very easy, as follows :

1. Cut a 100 cm² sample, and put into the sample tray.
2. Plug in the sample tray into the chamber located on the instrument front.
3. Press a button to start the analytic cycle and the resulting data printout.

The chromatogram and the results, direct in mg/m², are displayed and printed in 2 min.

Every operator can thus be made autonomous and capable of achieving dependable results as far as solvent retention is concerned.

A new Windows interface enables easy access to the operating parameters and a possible data transfer.

OPERATING PRINCIPLE

NEPTUNE 801 is based on the new Fast-Head Space-Gaschromatography technology.

The sample receptacle into which a piece of film has been introduced, is put into the de-absorption cell, and the time programmable de-absorption phase starts: 5 min. for a film, 10 min. for a laminate.

When heating is completed, automatically the valve will air purge and pick a sample of exactly 20 µl of gas developed in the cell; the carrier-gas brings the sample extract into the column, where separation occurs, and to the FID detector for quantification.

The so obtained chromatogram is displayed on the monitor, together with all analytic data and production references: Date, Job Order No., Machine No., Reel No.

NEPTUNE 801 doesn't require costly and complicated external processing softwares.

ADVANTAGES

The advantages of using **NEPTUNE** are definite :

It can be put alongside the printing press.

It can operate in a solvent polluted environment.

It doesn't require skilled personnel.

Easy handling of web material sample; closing vials with special pliers is no longer needed.

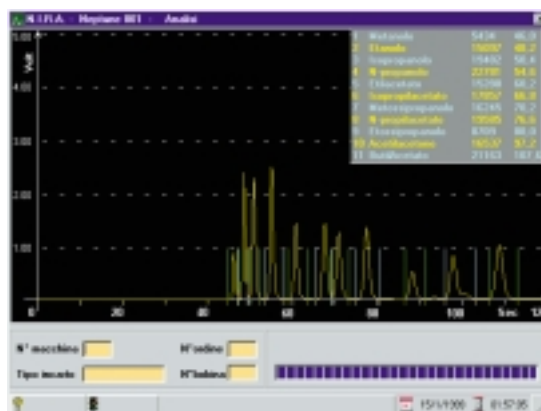
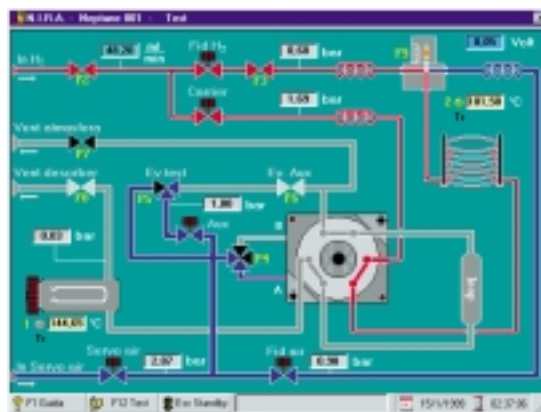
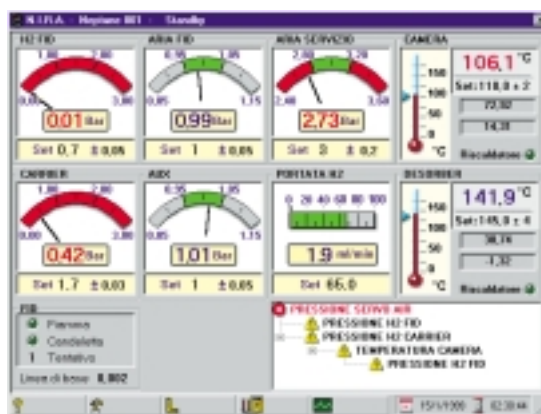
Thanks to its quick analysis, an instrument may control more printing machines.

Elimination of any sample preparation and transfer.

Drastic reduction of analysis time.

Considerable reduction of investment costs in peripheral units.

It can analyse films, laminates, solvents and inks.



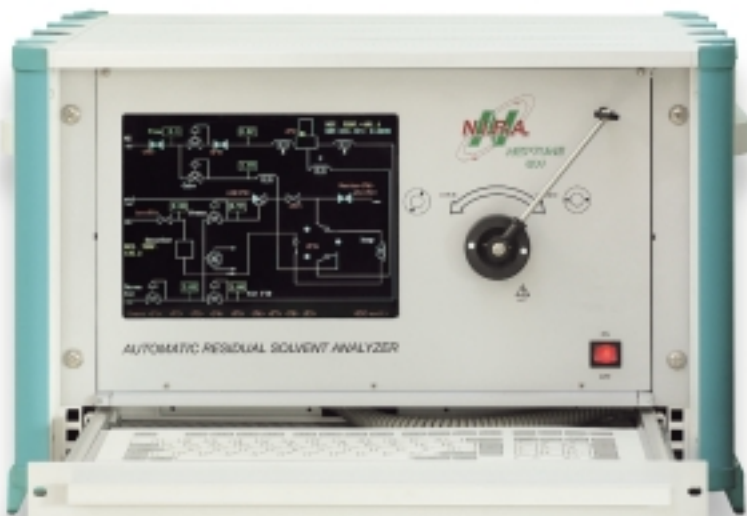


TABLE TOP VERSION

CHARACTERISTICS

De-absorption cell located on the instrument front, so allowing a quick inspection. Sample receptacle and chamber are designed to achieve an internal volume of 20 cc. The closing ferrule is absolutely airtight, and no tools are needed for opening or closing. The standard calibration mixture can be introduced directly via a gaschromatography syringe.

Digital pressure measurement and monitoring in the warm-up cell.

This parameter is important for validating the results obtained, and it gives an indication of the solvent contained in the sample.

On substrates like paper, the absorbed humidity affects the sample dilution; pressure measurement allows correcting this dilution.

The de-absorption cycles are not influenced by

the substrates, thus analyses are exactly repeatable.

High accuracy of temperatures both in the de-absorption cell and in the analysis chamber are assured by the internal processor and displayed on the monitor.

Patented automatic washing of the cell via internal overpressure. This system clears any memory effect. It also allows installing the analyser in direct vicinity of the printing press, as the result is absolutely not influenced by any solvent in the press room environment air. The system may work unaffected in solvent-laden air.

Automatic sampling valve, to introduce a known and reproducible sample volume into the capillary column without splitting. It improves response stability, proportionality and sensitivity. The frequency of calibrations is dramatically reduced.

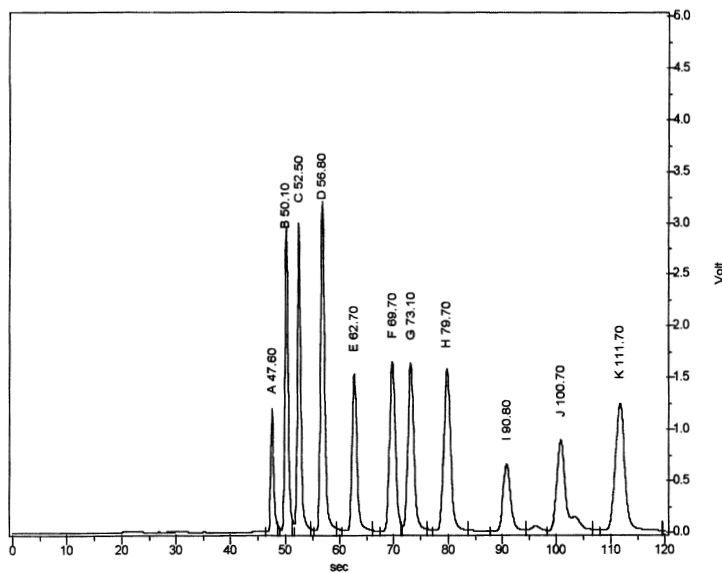
Automatic diaphragm valves for air purging, washing and sampling. They reduce maintenance operations.

Fast analysis: the use of hydrogen not as a fuel but also as a carrier allows complete separation of residual solvents between 7 to 10 times faster than with conventional laboratory systems.

The FID detector has been designed for using carrier hydrogen.

Calibration is executed by injecting directly a standard mixture.

The analyser stability in the course of time can be checked automatically using a quick reference method.



01-04-2000 23:05:44 100 inc.time = 5 min

CALIBRATION ANALYSIS										
	RT	W.ini	W.end	area	arearef	STD	STD	ST		
	(sec)	(sec)	(sec)			%vol	mg	mg/m2		
A	METHANOL	47.6	46.5	48.7	25046.1	25046.1	5.0	.19	19.75	
B	ETHANOL	50.1	49.1	51.3	67339.9	67339.9	10.0	.39	39.50	
C	ISOPROPANOL	52.5	51.7	54.7	77796.9	77796.9	10.0	.39	39.25	
D	1-PROPANOL	56.8	55.3	59.3	92987.7	92987.7	10.0	.40	40.20	
E	ETHYL ACETATE	62.7	60.5	66.1	53858.4	53858.4	10.0	.44	44.99	
F	ISOPROPYL ACETATE	69.7	67.5	71.3	68307.3	68307.3	10.0	.43	43.59	
G	METHOXY PROPANOL	73.1	71.5	76.3	70235.9	70235.9	10.0	.46	46.05	
H	N-PROPYL ACETATE	79.7	77.3	83.7	75662.5	75662.5	10.0	.44	44.40	
I	ETHOXY PROPANOL	90.8	87.7	94.5	36838.4	36838.4	5.0	.22	22.40	
J	2-4 PENTANDION	100.7	98.3	106.6	61210.8	61210.8	10.0	.48	48.80	
K	N-BUTYL ACETATE	111.7	108.0	119.6	88345.9	88345.9	10.0	.44	44.24	
TOTAL					717630.3					

MODELS & COMPOSITION

The instrument is proposed in two different versions.

NEPTUNE 801 Process Version

The instrument is housed in a free standing console, and is complete with :

- Air filter (compressed air of 4-5 bars, oil and humidity free, is required).
- Catalytic system of air oxydation.
- Blower or air purging (option).
- Anti explosion monitoring device.
- Ultimetall capillary column 50m x 0.53mm
- Printer
- Free standing console
- Kit of sample receptacles.
- Hydrogen generator (option).

This system may be installed alongside the machine, out of the explosion hazard area.

Machine production output may be monitored by the operators round the clock.

NEPTUNE 801 Table top Version

The instrument is assembled in a box that can be laid on a table or bench a few metres away from the printing machine (requires external utilities: power supply and compressed air).

Complete with:

- Ultimetall capillary column 50m x 0.53mm
- Printer
- Kit of sample receptacles.

ACCESSORIES

- Precision cutter for dependable picking of 100 cm² samples
- Additional kit of sample receptacles.
- Standard mixture for calibration
- 5 µl syringe for standard mixture

TECHNICAL SPECIFICATIONS

DETECTOR	FID
WARM-UP CHAMBER	accepts 20 ml sample receptacles
WARM-UP TEMPERATURE	50 to 200 °C, selectable
OPERATING TEMPERATURE	50 to 200 °C, selectable
ACCURACY	± 2% of calibration value
MINIMUM DETECTABLE QUANTITY	0.01 mg ethyl acetate
WARM-UP TIME	selectable
ANALYSIS TIME	selectable
GRAPHIC DISPLAY UNIT	10.5" colour VGA TFT resolution
GRAPHIC PRINTER	Centronix compatibile (option)
OUTPUTS	for printer, RS 232
NETWORK LINK	Ethernet interface (option)
DIMENSIONS	19" x 7U standard rack
WEIGHT	20 kg
ELECTRIC POWER SUPPLY	110/220 Vac, 50/60 Hz, 500VA

Note: the instrument needs:

- Air and hydrogen gas chromatographyc type



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