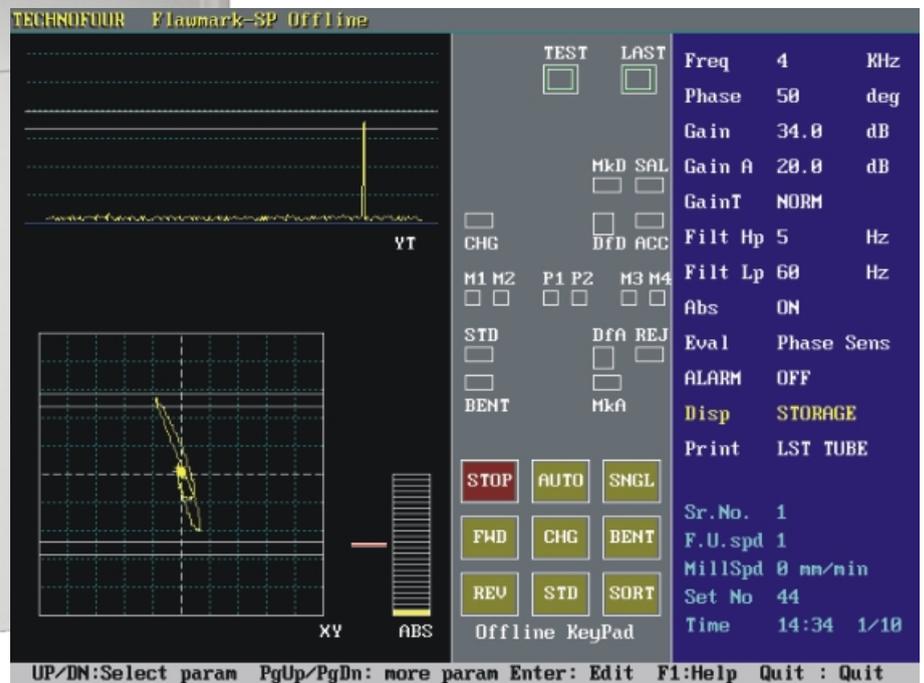


# Flawmark-SP



Advanced Differential and Absolute Eddy Current Test System For Non-destructive Inspection of metal Tubes and Wires



## Flawmark-SP

Flawmark-SP is a versatile Eddy Current Test System with an amazing set of features and specifications. The system is specially crafted for non-destructive inspection of tubes and wires made of ferro-magnetic, austenitic and non-ferrous metals. Defects such as cracks, pin holes, open welds, voids, inclusions, concentrated porosity, weld defects, mechanical damage, slivers, opened up skin laminations and deep pittings are reliably detected and marked by the system. The system is meant for detection of predominantly transverse defects on tubes, wires and wire rods.

The versatility of the system allows it to be employed in several configurations. It can be used in *online* (before cropping the tubes), *inline* (right after cropping the tube), *offline* (stand-alone with a separate handling system) as well as in *continuous* (coiler- decoiler) site modes. The system supports both encircling as well as segment test heads. Inspection can be carried out as per API, ASTM, BS, DIN, ETTC, JIS, IS or other relevant standards.

Flawmark-SP comes with a differential channel as standard. An absolute channel can be added as an option. A modern Graphical User Interface with color monitor and keyboard makes operation of the system very easy and intuitive. The system can also stream data over an RS-232C serial link. The system can be supplied in a floor-mount full height cabinet or a table-mount half height cabinet.

Mechanical handling systems and automatic sorting systems are also available.



A swivelling and balancing mechanism houses a magnetic yoke and segment test head for inspection of weld line for a steel pipe.

## SPECIAL FEATURES

### Digital Control

All test parameters are set and controlled digitally. There are no potentiometers or dials to twiddle. Settings, being digital, are precisely reproducible.

### Data Entry

As the settings and parameters are entered through the keyboard, the processor watches out for, and prevents, possible errors such as value of the upper threshold attempted to be set lower than the lower threshold.

### Data Communication

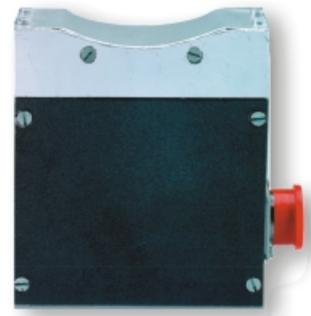
The system can communicate with an external computer via an RS-232C serial link. Test results can be sent to the computer in real time. The computer can query the system for any or all parameters. The system can be operated completely remotely if so configured.

### Data Reporting and logging

Test parameters and batch results can be printed on a PCL-3 compatible inkjet or laser printer attached to the parallel port. If a computer is connected to the serial link, data can be logged on the hard disk for further analysis.

### Visual Setup

Especially useful in online configurations, the differential gain and phase can be visually set on the basis of signals obtained due to standard defects. Just "show" where you want the signal.



Segment test heads are meant for inspection of the weld line area, usually in larger diameter pipes where an encircling coil is not sensitive enough.

## Automatic Tracking Filters

Eddy current response to defects in dynamic test systems such as Flawmark-SP is speed dependent. The same defect, passed at different speeds, might show a different signal amplitude and phase unless filters are dynamically adjusted to varying mill speeds that may occur in a typical tube mill. Flawmark series pioneered filters that track testing speed and automatically adjust themselves to optimum values.

## Three modes of Evaluation

Flawmark-SP supports three Evaluation modes: Phase sensitive (which has linear horizontal thresholds), amplitude (with circular thresholds) and sector (which is a combination of the above two, with sector-segment thresholds). Together, these allow you to choose the optimum evaluation mode for your tests.

## Paint Markers

Two thresholds are available in differential channel. They are simply called “Upper” and “Lower” thresholds. Two paint marker outputs are available corresponding to these thresholds. In systems with absolute channel, a third paint marker output is available.



Ferromagnetic tubes require magnetic saturation to reduce effects of permeability variation in tubes under test. Later tubes can be passed through a demagnetizer.

## Automatic sorting

Opto-isolated inputs and outputs are available for interfacing with encoders, proximity detectors and pneumatic solenoids etc. Thus, automation is very convenient in all configurations.

## Test coils and probes

Flawmark-SP supports encircling test heads for tube diameters up to 180mm. In case of welded pipes, only the weld zone can be tested using segment probes. Magnetic saturation and demagnetization systems are also available for testing ferromagnetic materials.

## Power-on and watchdog diagnostics

The system goes through self-checks each time it is powered on. In addition, it keeps looking out for error conditions during operation. This adds to the reliability and dependability of the system.

## On-line Help

Context sensitive hyper-text help is available. Moreover, the entire operation manual is also online. Thus, at any moment, help is just a key-press away.



Encircling test heads are available for inspection of the entire surface area of tubes up to 180mm dia. They either fit in a tube holder or in a saturation coil.

## FLAWMARK-SP SPECIFICATION

Test Configurations	Online, Inline, Offline or Continuous
Test Frequency	1 KHz to 1000 KHz Optional extended range up to 4 MHz.
Eddy Current Channels	One differential is standard An additional absolute channel is optional
Signal Gain	20 dB to 80 dB in 0.1 dB steps (differential) 20 dB to 60 dB in 0.5 dB steps (absolute)
Phase	0 to 359 in 1 steps (differential)
Evaluation modes	Amplitude, Phase-sensitive and Sector mode (Differential) Amplitude mode for absolute channel.
Thresholds	Two independent amplitude thresholds and Two independent sector thresholds (differential) One amplitude threshold for absolute
Filters	High-pass 1 Hz .. 250 Hz Low-pass 2 Hz .. 500 Hz Filters can auto-track in Online configuration.
Balance	Differential channel does not need balancing. Absolute channel has smart auto-balance.
Setup	Manual or visual at user-selected frequency
Parameter storage	Up to 100 sets can be stored and recalled
Alarms	Internal beeper. Outputs for external alarms. “Lamps” on screen. Paint Marker outputs (opto-isolated TTL).
Display	Real time vector display with thresholds as well as real time y-t (strip-chart) display (differential). “Bar-graph” display for absolute signals.
Printing	PCL-3 compatible inkjet/laser parallel port printer can be attached for printing parameter sets, statistics, stripchart signal and screen prints.
User interface	Graphical User Interface on VGA monitor with keyboard for input
Digital I/O	Opto-isolated logic-level Inputs/outputs required for sorting automation are provided
Serial link	RS-232C serial link with optional software for remote operation. Results can be sent via RS232C realtime.



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