BAUGH & WEEDON NDE

TELEDICTOR 4618

SEGREGATOR FOR QUALITY CONTROL

Ideal for monitoring variations in:

- Ferrous & Non-Ferrous Metals.
- Chemical Composition.
- Metallurgical Structure.
- Heat Treatment.
- Case Hardening.
- Dimensions.

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Principal of Operation

Segregators operate by comparing the electromagnetic properties of a test sample with those of a known component (the standard). A pair of coils is used, into which the components are placed. Each coil has primary and secondary windings and the primaries are energized by an alternating current at the appropriate test frequency.

When a product is introduced into one of these coils, current is induced in its secondary windings, modified in phase and amplitude in relation to its primary current. The amount of phase and amplitude change will depend on the electromagnetic properties of the materials and this change is displayed on the instrument display.

“State of balance” is achieved when a product having the same properties as the “standard” is introduced into the second coil. However if the product introduced into the second coil has different electromagnetic properties to that of the standard the display will show an “out of balance” condition and this can be monitored.

Test Parameters

Physical Changes

Segregators are comparator instruments, designed to compare pieces of similar dimension and form within the area of influence of the test coils.

Chemical Changes

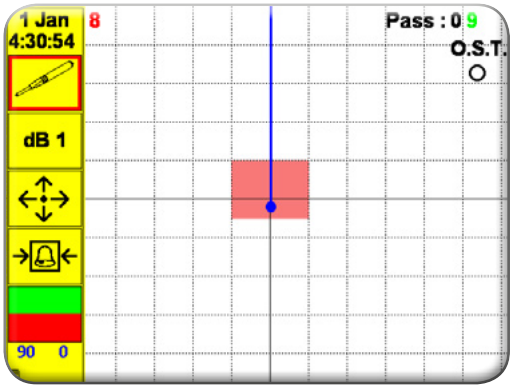
Most changes in chemical composition will affect the permeability and/or conductivity of a material. For example, very small changes in carbon content will substantially affect the magnetic properties of steel. Similarly alloying such elements such as zinc or tin in brass and bronze, magnesium in aluminium alloys and complex ratios of alloying elements in high nickel, cobalt and titanium materials will cause significant changes in signal display. Unwanted tramp elements e.g. oxygen and phosphorus in copper seriously affect the conductivity and can be detected using the Teledictor 4618.

Teledictor Segregators

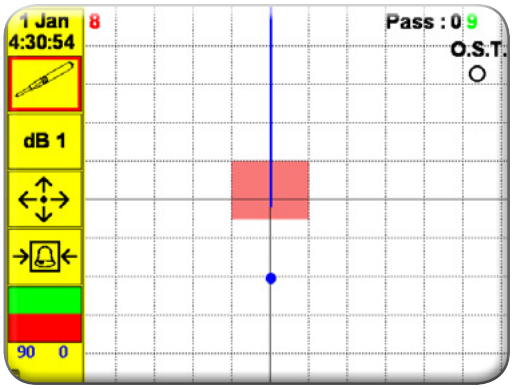
The Teledictor 4618 is designed for bench top use, and for integration into new or legacy process control systems. The Teledictor can be interfaced to automatic test systems, feed conveyors and sorting gates.

The instrument display provides familiar impedance plane plot, and allows for independent X and Y gain and detection gate configuration. High speed digital outputs may be interfaced to a PLC or directly to a mechanical segregator.

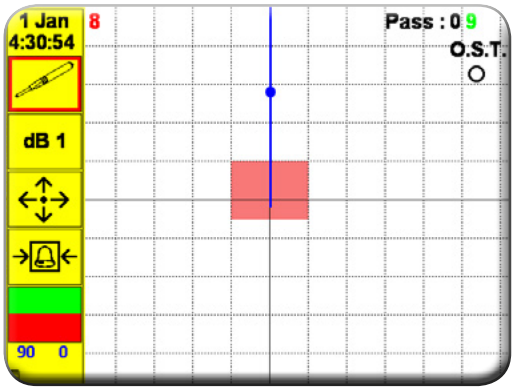
The Teledictor is a single frequency instrument, which is capable of operation in the range 10Hz to 500kHz, although for ferrous product testing low frequencies are typically used.



Part Accepted – with range of correct heat treatment



Reject result– part too hard



Reject result– part too soft

Typical Applications

Sorting Mixed Materials:
Segregators can be used for separating most qualities of ferrous and non-ferrous metals at stages of raw material, semi-finished and finished components condition.

Cast segregation in steel:
The Teledictor 4618 is ideal for this application as carbon variations of as little as 0.01% can be detected.

Heat Treated Conditions:
Differences between normalised, hardened and tempered, annealed conditions in steel and solutionised, precipitation and age hardened conditions in non-ferrous metals are detectable.

Structure
Subtle changes in metallurgical structure caused by cooling rate, re-treatment and prolonged thermal treatment can be identified.

Hardness
Under controlled conditions rapid sorting according to hardness is possible without preparation.

Case Depth
Depth of induction hardening and in some cases carburising, carbo-nitriding and nitriding can be monitored using the Teledictor.

Dimensions
Variations in diameter, length and shape of products can be identified but the degree of influence is dependant on the overall dimensions of the product.

Test Frequency

Many issues with ferrous metals can be tested at low frequencies, such as 50Hz. For some special application in testing ferrous pieces e.g. examining core structure in case of hardened or heavily decarburised work pieces, a lower test frequency may be required.

Similarly higher frequencies may be advantageous when testing smaller parts. The Teledictor 4618 is supplied with a frequency of 10Hz to 500kHz. This allows the standard Teledictor 4618 to be used for standard and special sorting applications. In non-ferrous metals the optimum test frequency can be determined from the formula:

$$F=52.3p/d^2$$

Where F = optimum frequency
P= resistivity in micro ohm cm
d= diameter in cm

From the range of frequencies available the 4618 will provide testing parameters to suit most sorting applications.

Features

Adjustable Thresholds

On-screen monitoring is a feature of the Teledictor 4618. Vertical and horizontal thresholds are displayed as an alarm box on the screen. The edges of the box can be adjusted, so that spot deflection from the acceptable products will fall inside the box whilst those from the rejects will be indicated outside the box.

The display incorporates a pass/fail indicator to highlight the condition of each product passing through the test coil. The indicator will illuminate ‘Green’ to indicate acceptable products and rejects will illuminate ‘Red’.

The Teledictor display indicates the number of parts that have failed and passed testing. The counters may be reset by the user. Test alarms can be configured with user defined time persistence.

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Opto-isolated outputs are enabled for each measurement, indicating the status of the test result.

The relevant information is available via solid state outputs for operating sorting mechanisms and two counters register the number of accepted and rejected components.

Automatic Sorting Systems

As a product is passed through the test coil, the instrument compares the signal given with the pre set monitor levels and retains the information on the condition of the product. This information is used to set the sorting gates of automatic systems to the correct positions.

The opto-isloated outputs of the Teledictor may be interfaced directly to a mechanical component segregator or to a PLC depending on the requirements and complexity of the system.

Teledictor 4618 Specification		
Connectors	Sensor Coils	2 off - 6 way Amphenol
	I/0 (output)	1 off - 4 way Amphenol
Frequency	Frequency Range	10Hz - 500kHz
Gain	Overall	-18 to +104dB
	Main Gain	-18 to +82dB. 0.1, 1 and 6 dB steps
	Input (Pre-Amp)	0dB or 12 dB
	Max X/Y ratio	-18dB to +82dB independent
Phase	Range	0.0 - 359.9°, 0.1° steps
Filters	Normal High Pass	DC to 2kHz or Low Pass Filter, whichever is the lower in 1 Hz steps. Plus variable adaptive balance drift compensation 0.01 - 0.5 Hz (6 steps)
	Normal Low Pass	1Hz to 2kHz or a quarter of the lowest test frequency whichever is lower in 1Hz steps.
Alarm Gates	Box	4 zones.
Display	Type	145mm (5.7”), 18 bit colour, daylight readable
	Viewable Area	115.2mm (4.5”) (h) x 86.4mm (3.4”) (v)
	Resolution	640 x 480 pixels
	Colour Schemes	User configurable Dark, Bright and Black & White.
Removable Data Storage	Set-up Storage	Micro SD up to 32GB, holding over 10,000 settings
	Stored Screen Shots	Micro SD up to 32GB, holding over 10,000 screen shots
	Recorded Data	Micro SD up to 32GB, holding over 500 2.5 minute long data recordings.
	Guides	Micro SD up to 32GB, holding over 10,000 slides
Advanced Features	Guides	Create a slide show containing instructions, tutorials & procedures using MS PowerPoint.
	Attachments	Screenshots and Data Recordings are saved in a folder with the name of the Settings.
Inputs/Outputs	PC Connectivity	Mini USB (Full PC remote control plus Real Time data)
	VGA	Full 15 way VGA output
	Sorter Control	4 off Opto-isolated Outputs, 1 off Opto-isolated Input
Languages	-	English, French
Power on Self-Test	-	The system performs a self-test on start-up of external RAM, SD RAM, accelerometer, Micro SD card, LCD screen buffer
Power	External	Nominal 24V (18-36V DC), 2.5A – 30 Watts
Physical	Weight	3.3kg (7.25lbs)
	Size	(wxhxd) 250 x 153 x 250 mm / 9.9 x 6.0 x 9.9 inches
	Operating temp	-20°C to +60°C (-4°F to 140°F)
	Storage temp	Storage for up to 12 months -20 to +35 °C (-4°F to 95°F). Nominal +20 °C (68°F)

Teledictor 4618 Segregator Interface	
Output Type	Opto-isolators
Maximum Switching Current	100mA DC
Minimum Response Time	24ms
Compatible Output Devices	B&W sorting bridge, PLC

B&W Mechanical Segregator Specification	
Input Logic Low	0v
Input Logic High	24v
Input Ports	1
Output Ports	3
Actuation Type	Double acting rotary pneumatic (>6 Bar)
Maximum Component size	30mm diameter
Maximum Sorting rate	2/sec

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