

Phasor CV/DM

Giving Greater Confidence in Corrosion Inspection Data



Phasor CV/DM combines a phased array imaging device and a conventional flaw detector into one instrument, with a phased array probe which allows significantly increased confidence in corrosion inspection data.

Compared with traditional thickness gauge and flaw detector inspection, it offers much better probability of detection of corrosion pits and faster, more reliable scanning.



GE imagination at work

Corrosion Detection Is a Problem – Phasor CV/DM Offers a Sophisticated Manual Inspection Solution

Featuring Phased Array Imaging and Pitting Identification

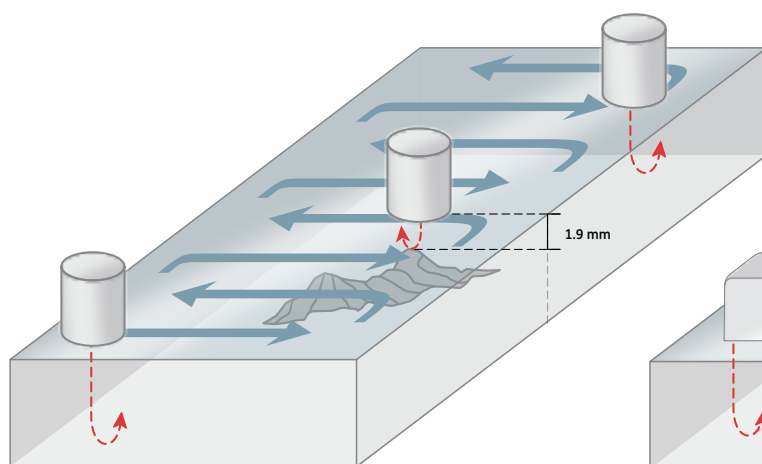
Corrosion costs industry throughout the world billions of dollars. These costs are split into the costs of corrosion protection, the costs of corrosion detection and the costs of repairing the results of corrosion.

However, corrosion does not necessarily occur evenly. It often can manifest itself in pitting and isolated corrosion spots, dependent on the type and manner of corrosive attack.

Corrosion Detection With Traditional Thickness Gauges

Traditionally, manual corrosion monitoring has been carried out with a thickness gauge or a portable flaw detector, measuring the wall thickness of the pipe or vessel at a series of single points, or in a series of coarse scans. This is fine if the corrosion is demonstrated by simple, general wall thickness loss.

However, this single point measurement technique can easily miss isolated corrosion spots or pits, even when a single point probe is applied intensively over a large area.



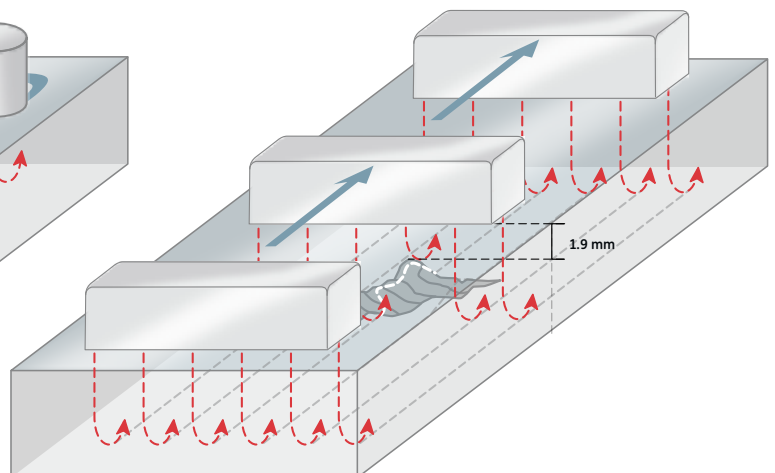
With traditional thickness gauges finding a pit is just as difficult as finding a needle in a haystack

Corrosion Detection, Imaging and Digital Measurement with Phasor CV/DM

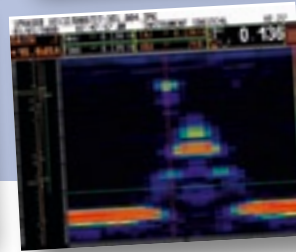
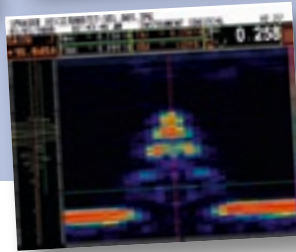
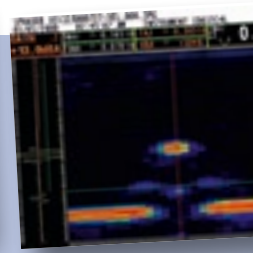
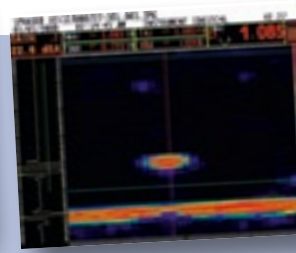
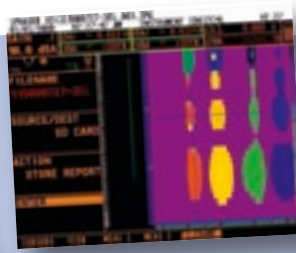
Phasor CV/DM provides a simple and elegant method for reliably monitoring corrosion, identifying corrosion pits, displaying meaningful images, and providing digital measurements.

It does this by using a specially developed phased array compression transducer, which provides 28 adjacent and discrete inspection probes to allow extensive linear coverage. This ensures that even the smallest corrosion pit is identified and evaluated.

The corrosion software specially developed for the Phasor CV/DM displays results in an understandable and useful way, both in terms of digital data and imagery. A positional encoder provides precise linear location information for each scan



Phasor CV/DM makes finding the needle possible



Phasor CV/DM – A New Phased Array Probe, New Corrosion Software and the Proven Phasor Instrument Platform



- Wide Coverage Corrosion Array - (GEIT Global PN 1314599)
- 5 Mhz, 48 mm (1.890") active length with selectable 3 or 5 element apertures
 - 28 or 30 virtual probes covering up to 44 mm (1.73")
 - Benefits: Wide coverage with great near surface resolution and flat acoustic response



- Medium Coverage Corrosion Array (GEIT Global PN 1314600)
- 5 Mhz, 24 mm (0.945") active length with selectable 6 or 10 element apertures
 - 23 or 27 virtual probes covering up to 20mm (0.79")
 - Benefits: Medium coverage with great near surface resolution and very flat acoustic response
 - Small footprint improves coupling on curved surfaces and increases lateral resolution

New phased array probes

The unique phased array probes developed for corrosion monitoring are multi-element arrays which provide comprehensive linear coverage AND excellent near surface resolution. This revolutionary combination is ideal for quickly detecting and measuring corrosion. Two array models are available which both offer:

- Amazing near surface resolution: 1.9 mm (0.075") on a #4 flat bottomed hole (1.5 mm/0.062" diameter)
- Optimum test range 1.9 mm (.075") to 25.4 mm (1") in steel
- Adjustable wear bars
- Right angle 2 meter cables with Phasor connectors

New Corrosion Software

Software has been specially developed for the new Phasor CV/DM to allow the instrument to make maximum use of the measurement and imaging power of phased array technology.

This provides:

- The ability to select and display:
 - thickness measurement in each beam
 - minimum thickness in a current view
 - minimum thickness recorded during a current scan, since the last re-set.
- The ability to freeze a Top View
- The availability of a conventional A-scan to confirm readings

All information can be downloaded by means of a removable SD card and stored in jpeg format for subsequent hard copy print-off. The instrument's on-board memory is sufficient to capture the data of a metre scan.

Proven Phasor Instrument Platform

The Phasor instrument offers many of the familiar features of GE portable flaw detectors such as thumbwheel controls and function buttons. It is sealed to IP65 for operation in the most hostile of environments and weighs less than 10 lbs (4.4kg) for ease of carrying. Its long-life battery can be re-charged on board and its large display screen allows superior image viewability in all conditions.

Technical Specifications - Phasor CV/DM

Phasor: Conventional Operation	
Range (Steel)	6.75 mm - 13700 mm (0.266" - 540")
Display Delay	-15.0 to 3500 μ sec
Probe Delay	0 to 1000 μ sec
Sound Velocity Custom	250 to 16,000 m/s (0.0098 - 0.6299"/ μ sec)
Material Velocity Table	65 fixed entries and custom
Damping	50 and 1000 Ω
Pulse Repetition Frequency	15 to 2000, Auto/Manual
Pulser Type	Spike 250 V, Hi Lo select
Bandwidth/Amplifier Bandpass	0.3 to 15 MHz @ -3 dB
Filter Selection	1.0, 2.0, 2.25, 4.0, 5.0, 10 and 13 MHz + BB
Dual and Single	Standard
Gain	0 to 110 dB
dB Change Steps	0.2-0.6-1.0-2.0-6 and user defined (0.2 to 60.0)
Auto CAL Feature	Standard
Reject	0 to 80%
Rectification	(+)/(-)/Full + RF
DAC	Amplitude curves (DAC) with a maximum of 15 reference echoes, 4 other curves or lines can be displayed with variable dB intervals. Point editor.
TCG	60 dB to 12 dB/ μ sec
DGS	Standard
Multicurve JIS/ASME	Standard
Custom Offset Curve	Standard
AWS D1.1	Standard
Measurement to Curve	Standard
Monitor Gates	Two independent gates
One Touch Gate Magnify	Standard
One Touch Report Store	Standard
Measurement Resolution	0.01 up to 99.999 mm (0.001"t up to 99.999")
Alarm	LED, TTL out
Sound Path Measurement	Digital display of sound path (projection distance, depth) between initial pulse and the first echo in the gate with the echo flank echo peak or +JFLANK
Color Leg	Standard
Echo Evaluation	Sound, Distance horizontal, Distance vertical, Distance amplitude, dB difference
Zoom	Standard
A-scan Freeze	Off/On
Memory Capacity	128 KB internal, external SD card
Dataset	Internal memory or SD card
Alphanumeric Report	SD card
Input/Output	JPEG out on SD card
Power	Battery or AC adaptor
Battery	Li-Ion, Charging in or out of unit
Battery Operation	6 hours
Voltage	International
IP Sealing	54
Language Support	English, German, French, Italian, Romanian, Polish, Czech, Russian, Chinese and Japanese
EN 12668	Yes
Temperature Operation	0; +55°C
Weight	3.4 kg (7.6 lb)
Screen Type	LCD
Screen Size	640 x 480 (6.5")
Display Color Choice	Match the light, A-scan, background, grid
VGA Output connection	Standard
Size (LxWxH)	282 x 150 x 159 mm (11.1" x 6.0" x 6.2")

The Phasor CV/DM is supported by GE's global service and training network.



Phasor CV/DM Option	
Pulser	Bi-Polar Square Wave
Pulser Repetition Freq.	15 to 7680 Hz
Pulser Voltage	50 V to 150 Volts 2V Steps
Pulser Rise Time	< 15 nsec
Mode of Operation	Custom T/R operating files only
Receiver Input Resistance	220 Ohms
Max Input Voltage	200 mV peak-to-peak
Bandwidth/Amplifier Bandpass	0.6 to 6.5 MHz @ -3 dB
Filter Selection	2.0, 3.0, 4.0, 5.0 MHz, Low Pass 4 MHz, High Pass 5 MHz and Broadband (0.6 to 6.5 MHz)
Rectification	Pos HW, Neg HW, FW and RF
Analog Gain	0 to 40 dB
Digital Gain	0 to 53.9 DB depending on APERTURE selection
Virtual Probe	1 to 16 elements
Pulser Width @ 1/2 Cycle	20 to 500 nsec
Pulser Delay	0 to 10.24 μ sec
Receiver Delay	0 to 10.24 μ sec
Acoustic Velocity	1000 to 16000 m/sec, 0.0393 to 0.5905"/ μ sec
Steel	Min Range Long: 0-7.6 mm (0.3"), Shear: 0-4.2 mm (0.17") Max range Long: 0-1073 mm (42"), Shear: 0-1073 mm (42")
Display Delay	1m (39.4")

DM T/R Option	
TCG	15 points @ 6 dB/ μ sec
Gates	A, B and IF
Gate Threshold	5 to 95%
Gate Start	0 mm - full range
Gate Width	1 mm - full range
Gate Logic	Off, Positive and Negative (Off, Coincidence and Anticoincidence)
TOF Modes	Flank/Peak
Available Views	ASCAN, BSCAN and TOP VIEW
Displayed Readings	Beam, Amplitude, Sound Path, Trig for displayed and for all beams
Measurement Resolution	5 nsec
Displayed Units	mm or inch (selectable)

DM Option Specifications SW 2.27 Corrosion	
Measuring modes	Zero to GATE crossing, Flank or Peak and Gate to Gate
Calibration	2 point Manual Probe zeroing and material CAL, probe wear compensation
Measuring	V-path correction
Thin Reading Capture modes	Per Beam minimum, Per Scan minimum, Accumulated minimum and TOPVIEW auto cursor location to minimum
Probe compatibility	Compatible Probes (as of October 09) Global PN 1314599 5Mhz 32element 1.5mm pitch Global PN 1314699 5Mhz 32 element .75mm pitch Temperature range -29°C (-20°F) to 57°C (135°F) * See instrument and probe documentation for important notes.
TOP VIEW	Timed, Time Continuous, and encoded

Environmental Test	
Per Mil-Std-810F	
Cold Storage	-20°C for 72 hrs, 502.4 Procedure I
Cold Operation	0°C for 16 hrs, 502.4 Procedure II
Heat Storage	+70°C for 48 hrs, 501.4 Procedure I
Heat Operation	+50°C for 16 hrs, 501.4 Procedure II
Damp Heat / Humidity (storage)	10 Cycles: 10 hrs at +65°C down to +30°C, 10 hrs at +30°C up to +65°C, transitions within 2 hrs, 507.4
Temperature Shock	3 Cycles: 4 hrs at -20°C up to +70°C, 4 hrs at +70°C, transitions within 5 min. 503.4 Procedure II
Vibration	514.5-5 Procedure I, Annex C, Figure 6, general exposure: 1 hr each axis
Shock	6 cycles each axis, 15 g, 11 ms half sine, 516.5 Procedure I
Loose Cargo	514.5 Procedure II
Transit Drop	(packaged for shipment) 516.5 Procedure IV, 26 drops
IP54 / IEC529 ... dust proof / dripping water proof as per IEC 529 specifications for IP54 classification	

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GEIT-20057EN(09/09)