The Clarus 590 & 690: Better GC

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For the Better

Clarus 590 & 690 Overview

New features that enable better performance and stability

- Wide-Range FID (Flame Ionization Detector) with 10^7 Linear Dynamic Range (no attenuation changes needed)
- Capillary Injector - new high performance design with decreased reactivity allowing lower reporting limits
- TurboMatrix MultiPrep Autosampler family – with multiple options for liquid injection, headspace and SPME applications

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Clarus 590 & 690 Overview

Reliable, high performance existing platform features

- Autosampler robustness and ability to access two injector ports
- Fully featured with a variety of convenient options, such as:
  - Wide range of injectors and detectors to meet customer needs
  - Multi-language, touch screen operation
  - Swafer flow-control capabilities
  - Arnel custom-engineered for petrochemical applications
  -
- Fastest available heat-up and cool-down conventional GC oven (690)

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Clarus 590 & 690 – New, High-Performance Features

New Capillary Inlet
Focus on inertness & analyte transfer to the column

Auto-Range FID
7 orders of linearity

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New Capillary Injection Port

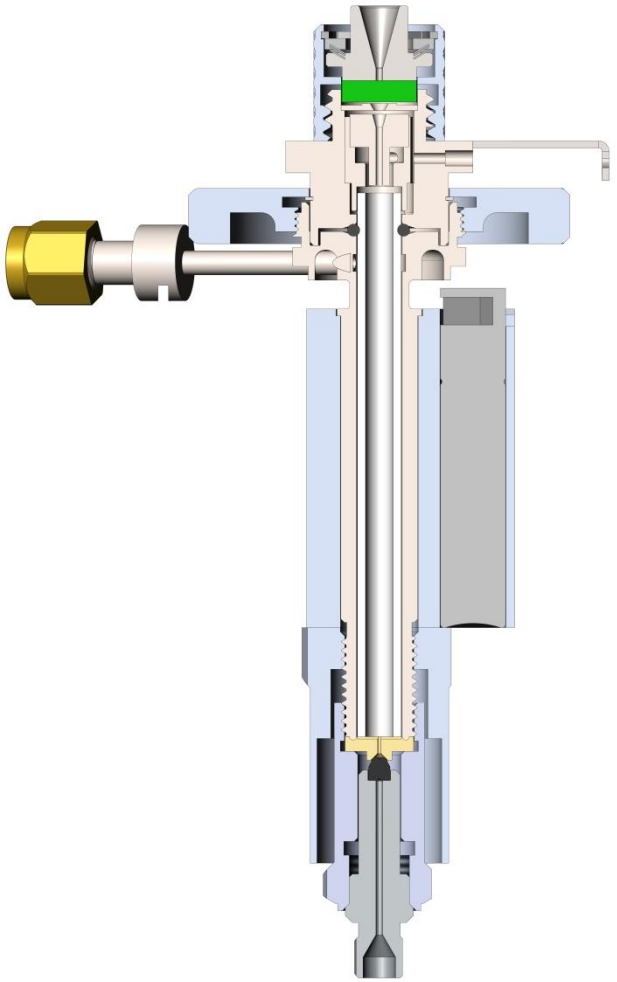
Features of the new injection port

Quantitative transfer

- New geometries to increase restriction and prevent sample from exiting the liner
- Improvements in heating and insulation
- Refinement of flow paths
- Implementation of an easy liner access system

Standardization of consumables:

- Standard dimension liner (same as Agilent)
- Addition of a replaceable inlet seal (similar to Agilent)



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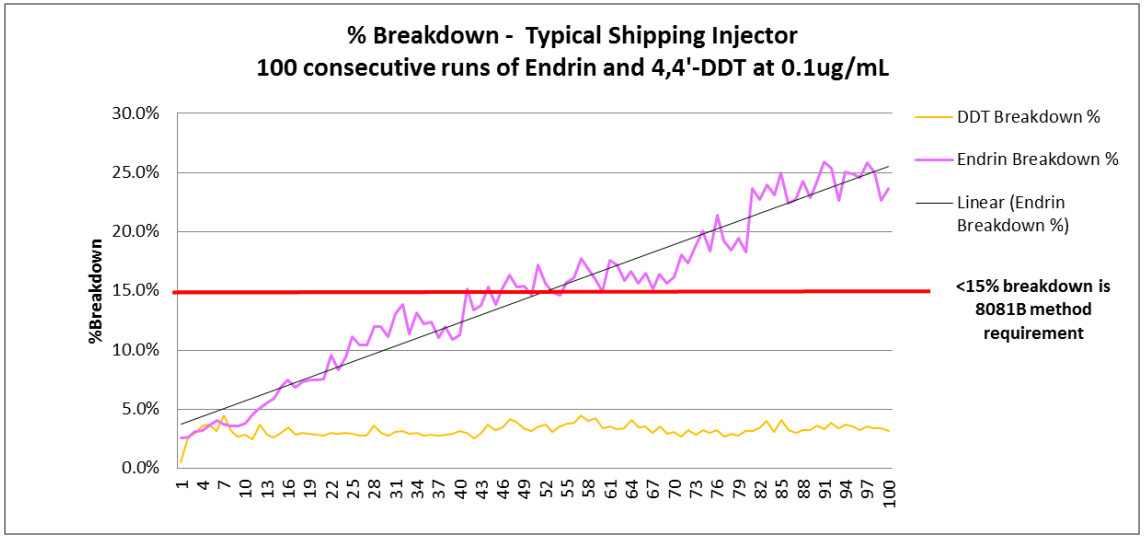
Key Benefits of the New Capillary Injector

- Improved Inertness
  - Reduced decomposition of sensitive compounds
    - US EPA Endrin and 4,4’-DDT decomposition test
- Improved Reproducibility & Carryover
  - Optimized design to minimize blow-back of sample into pneumatics
- Improved Ease-of-Use
  - No tools to change septum and liner
  - “Industry standard” injection port liners, gold seal
  - Maximum flexibility/availability

Old Breakdown Performance

Current Shipping injector

Cannot meet 8081B method criteria ~40 injection of clean standard



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Old v. New Breakdown Performance

Current Shipping injector

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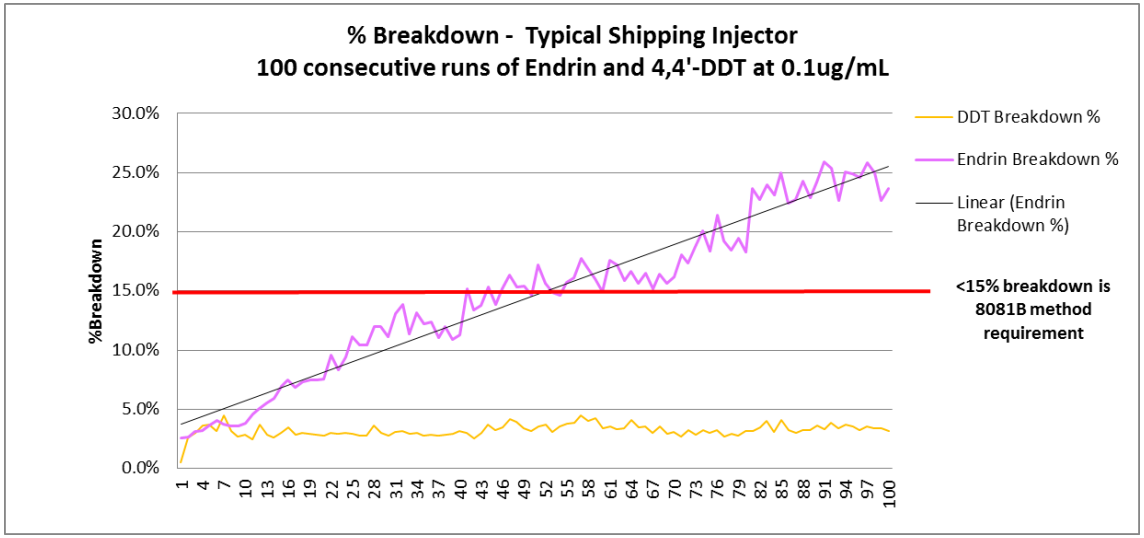
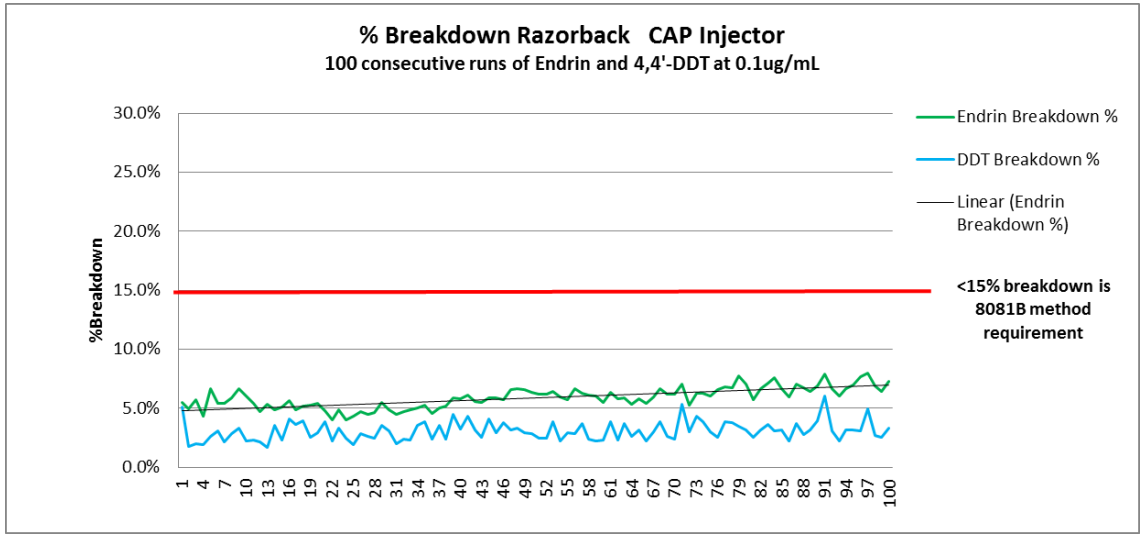


New Injector

Clearly meets 8081B method breakdown criteria over 100 injections



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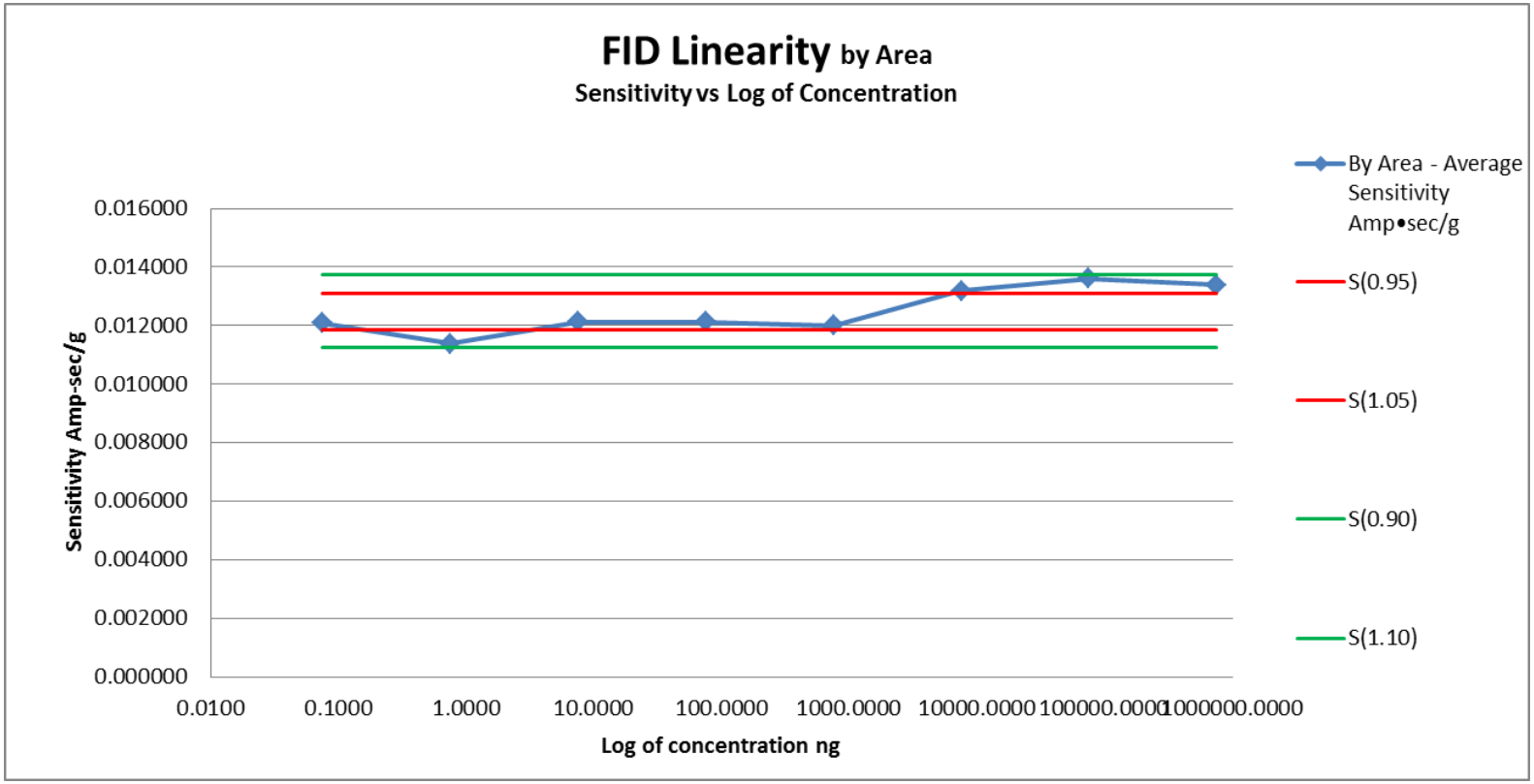
New Wide-Range Flame Ionization Detector (FID)

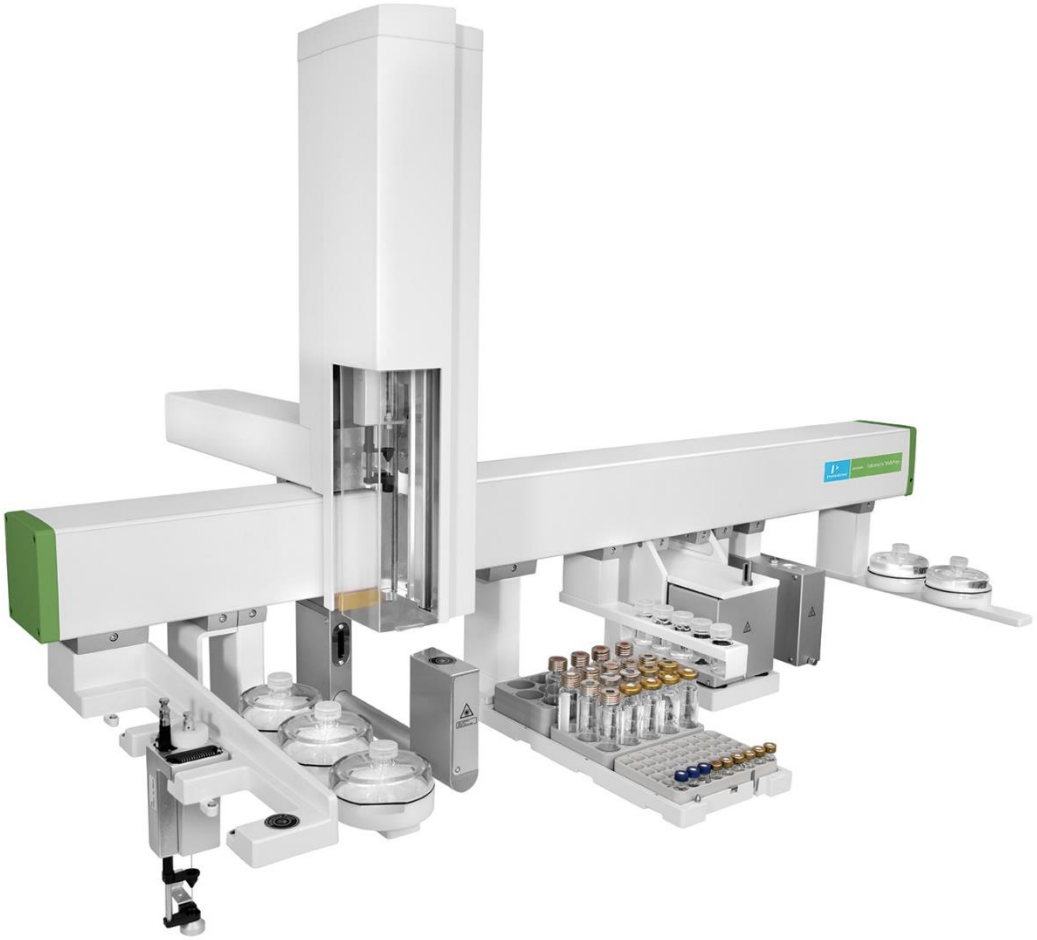
- Electrometer linear dynamic range improved to 10^7
  - No attenuation changes needed to keep ppb to percent peaks on-scale
  - USP <*467*>
- Hardware only not backwards compatible
  - Polarities reversed
  - Smaller jet tip
  - Saves hydrogen combustion gas with lower flow rate
  - 30 mL/min vs. 45 mL/min
- Able to upgrade Clarus x80
  - Detector, Electrometer board, Firmware

New FID Linearity

The new Wide-Range FID amplifier will allow a customer to quantitate more accurately, up to 7 orders of magnitude



Introducing the TurboMatrix™ MultiPrep



MultiPrep & MultiPrep+

Liquid, HS, & SPME
Short & Long Rail

A La Carte Add ons

Design a system for the specific customer need
Mixing, washing, bar code, solvent capabilities

Headspace Capability

Flexibility to automate switch between injection modes in a workflow

SPME

Adding SPME capability to the TurboMatrix family

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TurboMatrix MultiPrep Strengths

- Strengths
  - Multiple injection techniques
  - High sample capacity
  - Flexible autosampler based on CTC PAL3 technology
- Tiered offering
  - MultiPrep
  - MultiPrep +
- TurboMatrix HS gives better HS performance
  - Better Reproducibility
  - More inert (pressure balanced injection - no glass syringe)
  - Higher Temperature (210 ºC vs. 140 ºC)

MultiPrep Key Features

MultiPrep

- Liquid samples only
- Able to load over one thousand 2 mL vials
- 4 to 40 °C Peltier sample storage trays
- Functions
  - Internal standards addition
  - Sandwich liquid injection
  - Sample vial barcode validation
  - Heating and agitation
  - Vortexing

MultiPrep+

- All of MultiPrep features
- Also syringe headspace, SPME, sample prep
- Standard or long rail
- Long rail features
  - More samples
  - More modules

Summary of the New Clarus GC

New Clarus GC platform offers superior sensitivity, capacity and throughput – with greater flexibility

- New CAP injector
  - Improved inertness
  - Easy to access without tools
  - Flexibility/access most commonly used consumables
  -
- New Wide Range FID
  - 10^7 Quantifiable dynamic range
  - One analysis for high and low concentrations
  - Better characterization of samples with fewer reruns
- New MultiPrep and MultiPrep+
  - Greater flexibility and efficiency with 24 hr. walkaway operation
  - More vial capacity
  - Syringe Headspace, SPME, Sample Prep

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Better GC for the Most Critical Applications - Yours

Thank You

Additional Backup Information

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Clarus 590/690 GC Product Family

- Fastest heating and cooling of any conventional GC oven (690)
  - More samples per day
- Robust integrated autosampler with 108 vial tray
- Color touch-screen display
- TurboMatrix HS and HS/Trap for volatiles analysis
- TurboMatrix TD for air sampling and thermal desorption
- Clarus SQ 8 GC/MS for high sensitivity and identification
- Swafer flow-control technology
- Arnel engineered applications systems
- TG-MS, TG-GC/MS and TG-IR-GC/MS for advanced materials characterization

MultiPrep Syringe Headspace Injection

- Basic headspace
- Headspace with internal standards
- Pipelining architecture thermostats multiple samples in parallel
- Up to 270 20 mL vials

MultiPrep Solid Phase Microextraction (SPME)

- Headspace and Liquid sampling
- Ultra-high sensitivity
- On-fiber gas or liquid phase SPME on-fiber derivatization
- Pre-injection fiber washing to remove solids and salts
- Fiber Conditioning station
- Pipelining architecture thermostats multiple samples in parallel

MultiPrep Sample Manager Software Control

- New PerkinElmer software
- Customizable methods
- User-created Workflows combining methods and samples
- Supports Clarus GC and GC/MS