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CHROMATEC JSC SDO, 2018
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Any information and technical specifications presented in this document may be changed unilaterally without notice.

**CRYSTAL 9000 GC
RESULT ATTACHED**



FROM THE HOMELAND
OF CHROMATOGRAPHY



OUR MISSION

More and more, the world we live in and humanity are dynamically evolving; in the past few decades, we have grown accustomed to use the whole panoply of chemical materials compounds, digital technologies and communication tools.

As modern technologies bring new opportunities that help us to improve our society, and raise our standards of living, we (at the same time) witness the emergence of new risks like environmental damages, food contamination, and the risks of accidents and manmade disasters... And however industrial production's technologies and control methods are growing (more and more) closely related, that they foster mutual growth while evolving independently.

Gas chromatography is a mass analytics method applied in all domains of human activities – from ecology, healthcare, and agriculture... to petro-chemistry and nuclear energy, as well as many modern scientific applications. And thanks to its high sensitivity and the ability to tailor analysis for specific compounds, gas chromatography occupies a special place among the other instrumental analysis methods.

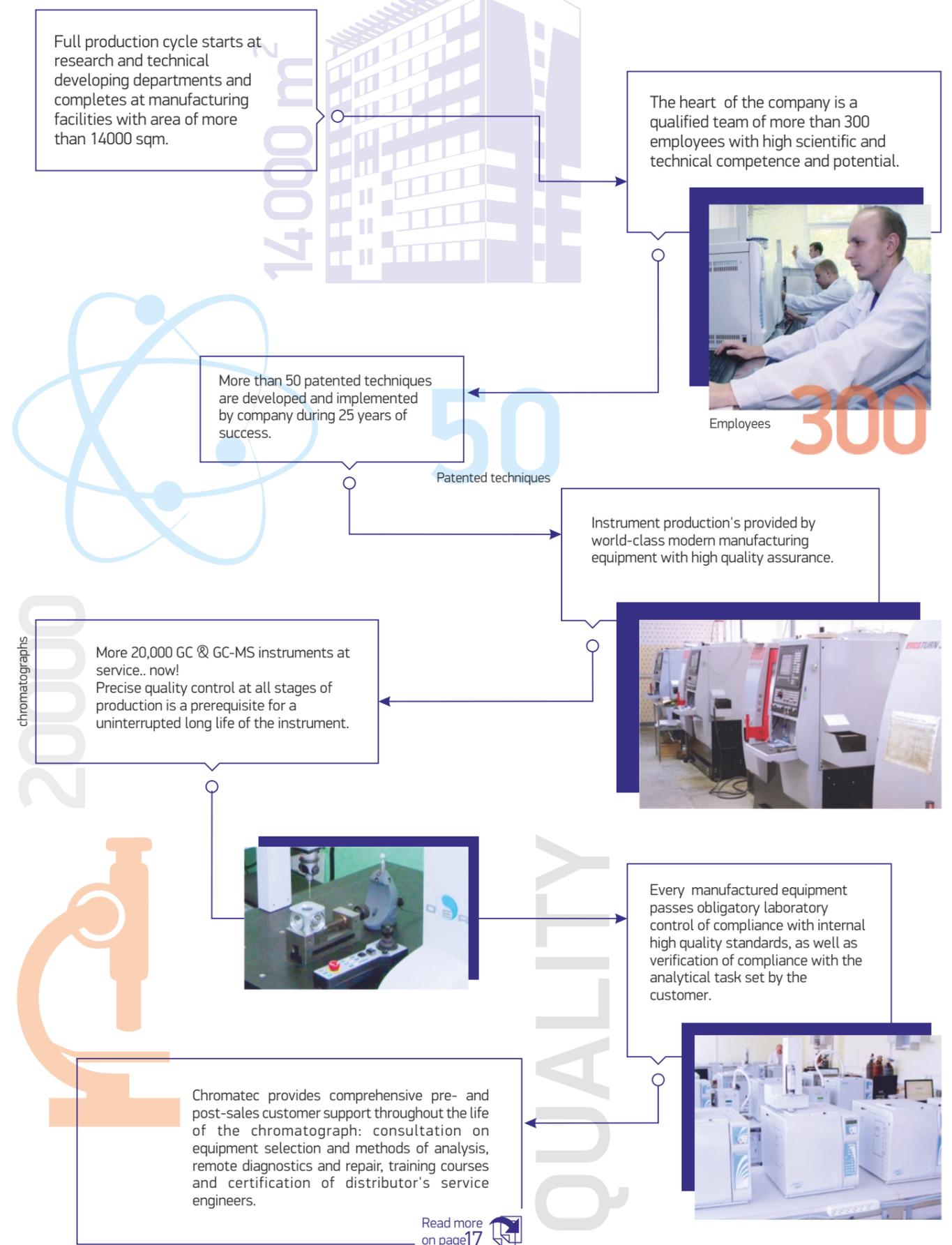
Today, analytical monitoring for contaminants to ensure they do not exceed health and safety limits, as well as food quality control, toxicological diagnostics, process control in production facilities, and material quality control... are unimaginable without gas chromatography.

Our mission is to ensure availability of analytical control tools and to give small and medium-sized enterprises the opportunity to use state-of-the-art chromatography instruments and achieve significant analytical results!

The Chromatec team, Russia



CHROMATEC TODAY



GC series Chromatec Crystal – best choice for every lab

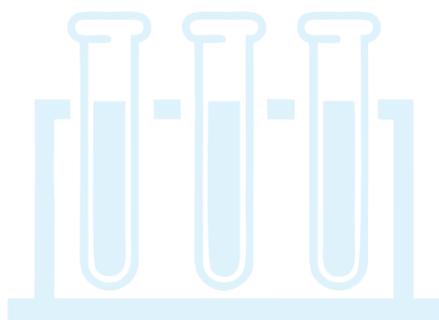
Matches all requirements

Chromatec Crystal 9000 is a modern gas chromatography system with a hi-end analytical capability. Also it is a fully automated, flexible and versatile tool with a wide range of detectors, sample introduction devices and external automatic samplers.

Chromatec Crystal 9000 is always at the service of science and technology, providing the highest sensitivity and efficiency in analytical problems solving of

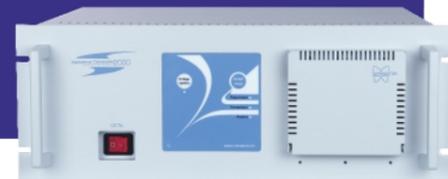


Chromatec's MSD offers both unsurpassed sensitivity and unparalleled stability for a wide range of applications in any laboratory. The system can deliver high-performance, throughput and stability.



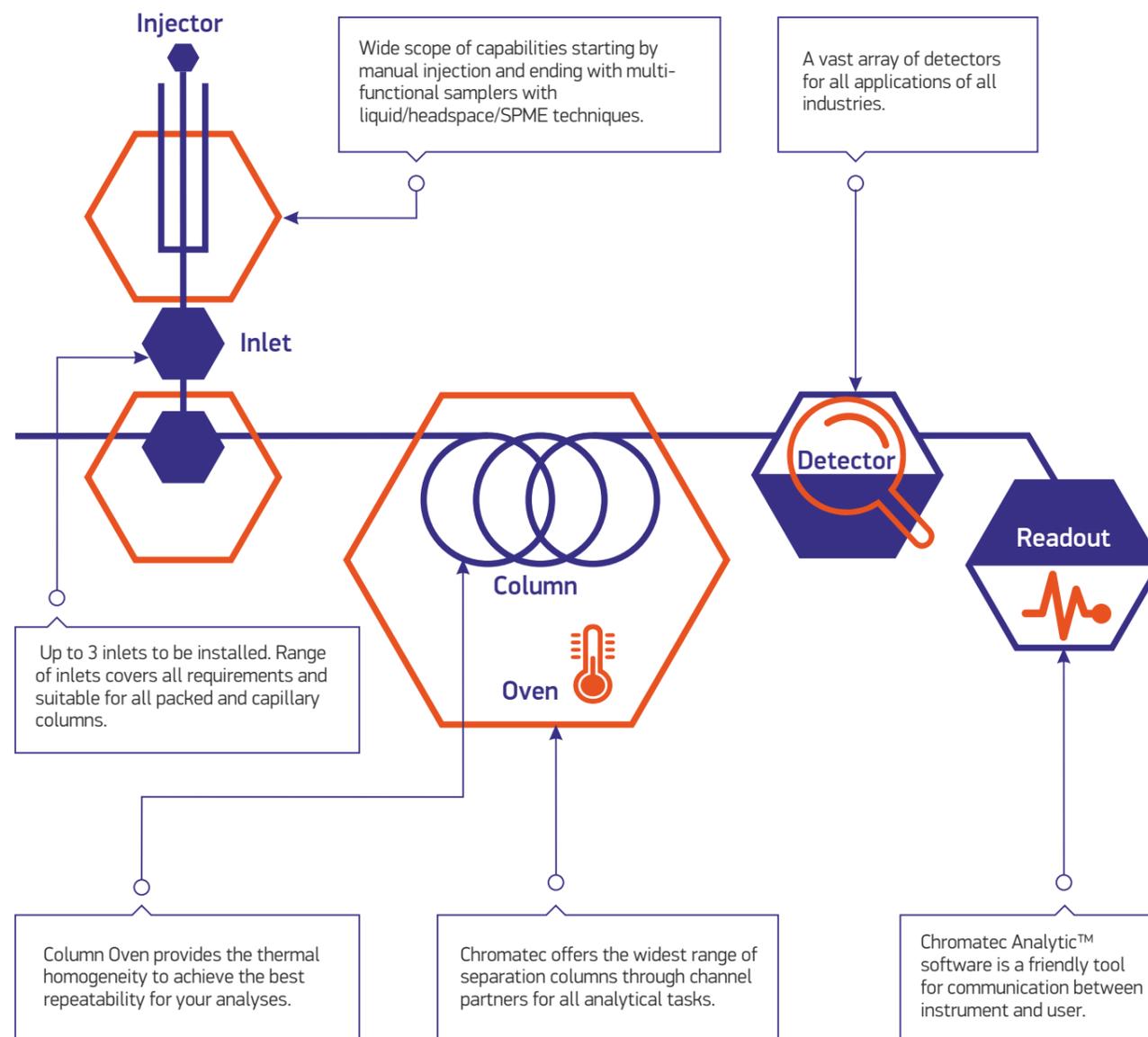
Portable Chromatec Gazochrom 2000 GC is a compact instrument for routine analysis, and it is successfully used in both stationary and mobile laboratories.

Chromatec Gazochrom 2000 is a special model in 19" framework for using at standard instrument rack.



For more information please refer Chromatec Crystal GC web page at

<http://chromatec-instruments.com/products/instruments/gas-chromatographs/>



▶▶ All ways to resolve complex samples
Chromatec provides all solutions to resolve multiple components in complex samples: Dean's switches, GCxGC, backflush, flow splitters and many others.

Eco-Friendly Operation
Chromatec is guided by the objectives of improving operational efficiencies in energy and gas consumption.
Chromatec Crystal GCs have all the functions to reduce the power and gas consumption between analyses and during other periods of inactivity.

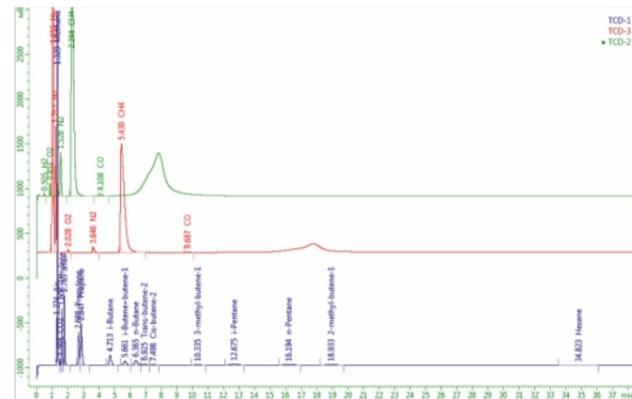


25 years of experience in gas chromatography and mass-spectrometry launched us toward the future, to develop solutions that achieves the maximum performance, robustness and cost efficiency for all requirements and budgets of all customers in all fields.



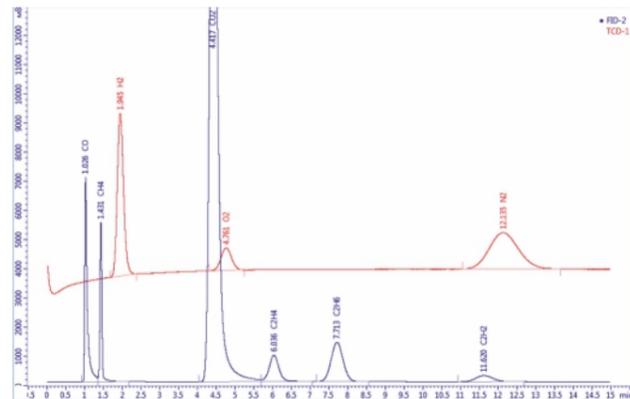
Oil & Gas

Flexibility in solutions against all challenges. Dedicated and pre-configured analyzers for most demand applications for natural, refinery & liquefied gas, and crude oil & petroleum products.



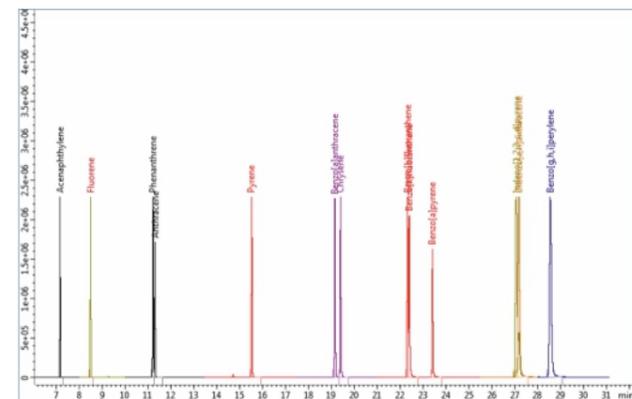
Industrial

The fast growth of our industrial world requires huge development in technology. Chromatec Crystal 9000 GC is a powerful tool to exam the products and raw materials for all needs of petrochemical, chemical, biotechnology and mining industries.



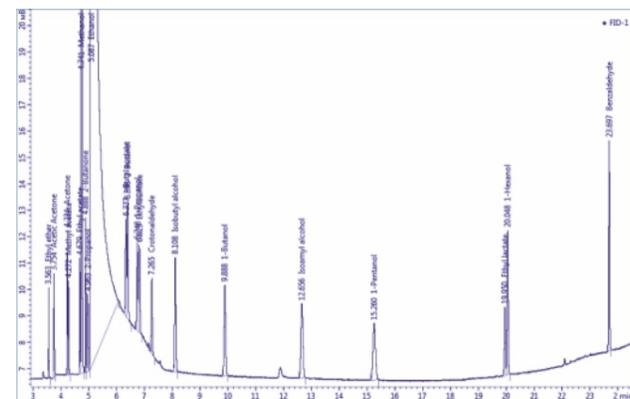
Environment

Chromatec instruments obliged to high environment monitoring standards and protecting. Crystal 9000 GC & GC-MSD obtain high limit of detection for determination of harmful pollutants such as pesticides, herbicides and chemical contamination to guarantee Air Quality & Safe Nature.



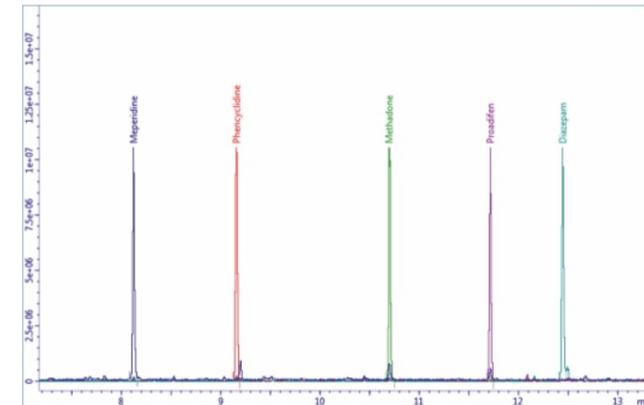
Food & Beverages

Although, the vast variation of food & beverages presents a huge volume of test parameters for quality insurance, Chromatec Crystal 9000 GC is for the challenge! Its variations in accessories are designed to meet the different needs of customers in all laboratories: with low or high sample throughput.



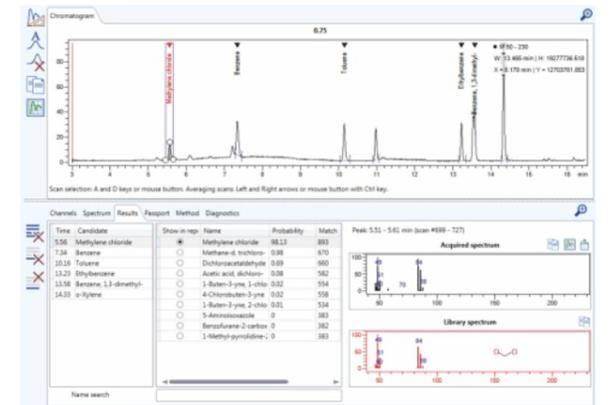
Forensic

Crystal 9000 GC & GC-MSD are accurate and precise tools to detect and specify drugs of abuse, toxics and explosive materials. These instruments are successfully served in many criminalistics laboratories.



Pharmaceutical

Accuracy and validity are key factors in pharmaceutical industry. Crystal 9000 GC has been designed to meet these requirements in the highest performance. For all phases of validation Chromatec provides IQ/OQ/PQ protocols to establish a documented evidence of high assurance.



Chromatec develops customized chromatographic analyzers for a large number of applications in various industries. However, customer's requirements often go beyond the scope of such solutions. Chromatec Crystal 9000 GC has unsurpassed configuration flexibility, which, together with the vast experience of experts allows creating a unique chromatographic system that perfectly meets the customer's requirements with minimum cost.



Chromatec solutions covers vast range of industries and applications integrated with international standards: ASTM, CEC, DIN, EN, ENV, GPA, IP, ISO, UOP, EPA, GOST, USP and many others.

Thanks to the wide range of the auxiliary devices and the unmatched level of integration of hardware and software, Chromatec Crystal 9000 GC makes it easy to solve even the most complex analytical problems.

Variety of automatic and manual devices for sample introduction

- Single- or multi-channel liquid autosampler
- Headspace samplers
- Single- or dual-stage thermal desorber (with optional automatic loader)

Read more on pages 13-14

Mass-spectrometry detector

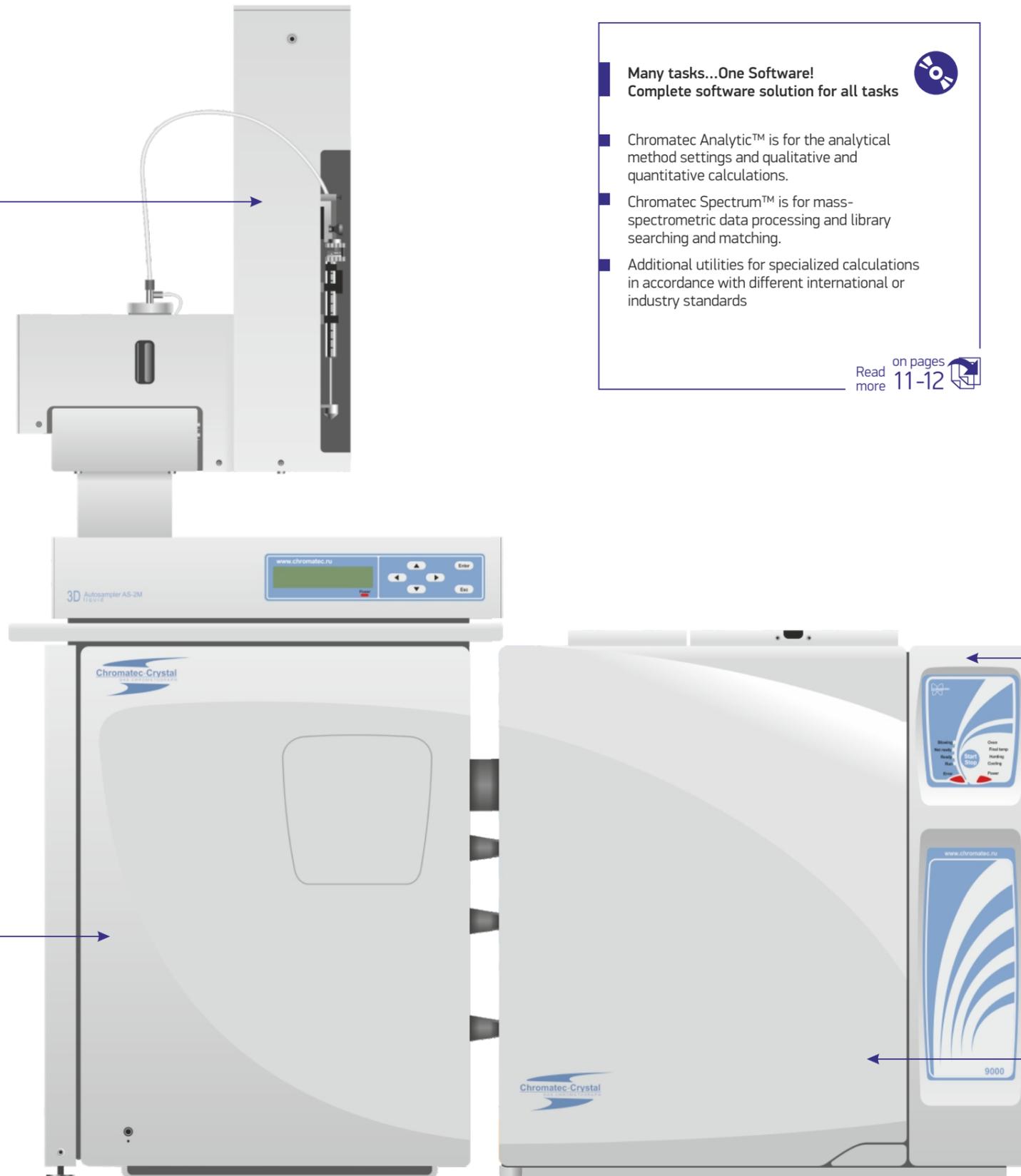
GC-MSD Crystal 9000 is an indispensable tool for any analytical laboratory, due to its unique features: the insured compounds' identification and its high selectivity and sensitivity.

- El source (standard) and CI source (optional)
- Direct probe system (optional)
- Ion source is made of inert metal with minimal adsorption
- Mass-filter with unlimited lifetime
- High sensitivity detection system with off-axis dynode and long life electron multiplier
- Operation modes: Scan, SIM, simultaneous Scan & SIM
- Auto and manual tune modes
- Integrated leak test
- Start Delay feature for increasing filaments life
- Glass window for observing filament operation
- Dual reagent gas for CI
- Single software for GC and MSD
- NIST™, Wiley™ and many other libraries*

*available through Chromatec channel partners

For more information please refer Chromatec Crystal GC-MSD web page at

<http://chromatec-instruments.com/products/instruments/gas-chromatographs-mass-spectrometers/>



Many tasks...One Software! Complete software solution for all tasks

- Chromatec Analytic™ is for the analytical method settings and qualitative and quantitative calculations.
- Chromatec Spectrum™ is for mass-spectrometric data processing and library searching and matching.
- Additional utilities for specialized calculations in accordance with different international or industry standards

Read more on pages 11-12

A unique opportunity to control the operation of the system by full-featured mobile application.



Full digital control

- The built-in controller makes GC operation independent from the PC
- Optional wide full-color touch screen interface

More analytical performance using cooling devices to extend the temperature range of column oven.

- Oven cooling unit allows to reach -10°C without using of any cryogenic agents (like LN2 or CO2)
- Oven ventilation unit allows to speed up the cooling to save time between runs.

The individually placement of all analytical units on a single platform provides easy access to operate and maintain, and also allows simple upgrading or replacement.

Pneumatic system

Pneumatic system of Chromatec Crystal 9000 GC is a basic and universal platform for the construction of gas circuits of any complexity with maximum efficiency.

Ease of maintenance

Flow path is free from adjacent devices, making diagnostics and system service more efficient.

Unitary design

Each gas channel has its own Unitary Electronic Pneumatic Control (UEPC) with independent flow measurement system that ensures effective monitoring of leaks and system performance.

Flexibility

- Unlimited number of steps for flow/pressure settings
- Minimum pressure setpoint of 0.01 kPa (0,001 psi)

The continuous flame control and the integrity of inlets give confident reliability in all results, and guarantee safe operation.

Installing additional independent UEPCs makes it easy to modify the GC's gas pneumatic circuit.

- Maximum flow of 1250 ml / min for all carrier gases
- Stability under any changing of ambient conditions
- Function of carrier gas saving

Valves

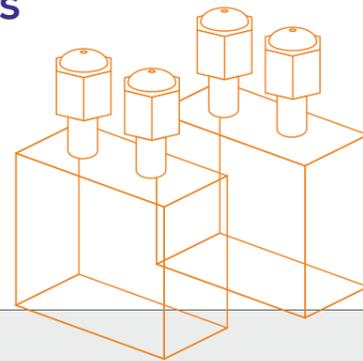
The platform allows placing several manual or automatic valves simultaneously, temperature-controlled or unheated, either Chromatec's or from other manufacturers.

Chromatec Crystal 9000 GC supports installing up to 6 valves, and even more in some configurations.

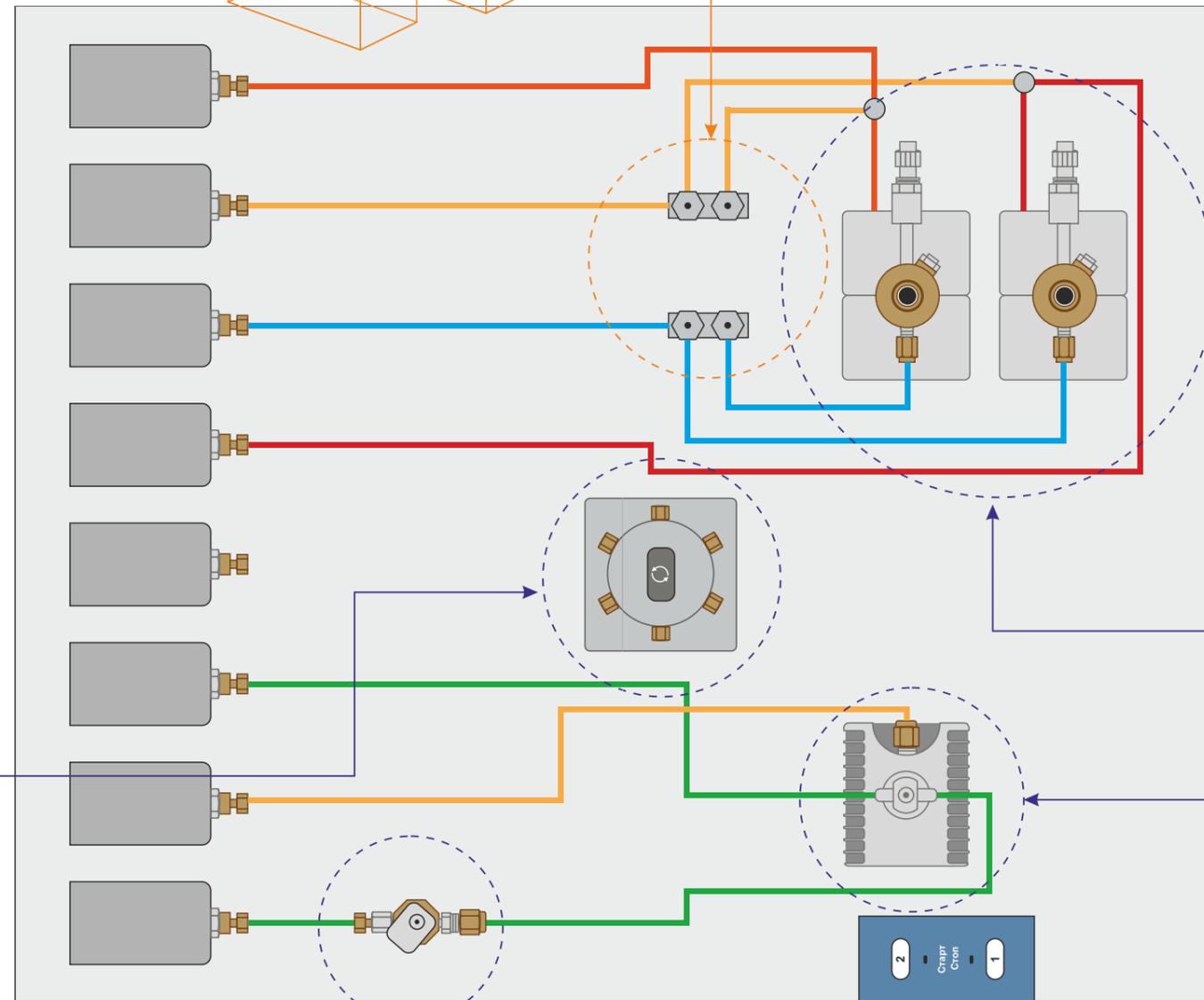


Automatic and manual external sample introduction devices
Chromatec supplies a wide variety of external devices for routine introduction to GC of a large number of liquid samples, and for headspace analysis, thermal desorption, pyrolysis, SPME.

on pages
Read more 13-14



Flow Dividers easily and efficiently divide a stream 50/50, which allows supplying two identical detectors from one pneumatic unit (UEPC) to reduce the cost ultimately.



Solenoid valve allows blocking off vent line to make the GC being faster ready in Splitless mode.

Sample introduction

GC Chromatec Crystal 9000 offers a variety of embedded devices providing reliable sample introduction over a wide range of boiling points.

- Packed inlet
- Capillary inlet (operating modes: split/splitless, pulsed split, pulsed splitless)
- Liquefied gas valve for injection of sample under pressure up to 30 atm

Detectors

Chromatec offers a vast range of chromatography detectors with a variety of universal and selective types:

FID (flame ionization detector) – universal high sensitivity detector for analysis of organic compounds. FID equipped with automatic ignition/re-ignition function.

TCD & μ-TCD (thermal conductivity detector) – universal detector for organic compounds and gases. Commonly used for analysis of permanent gases. TCD is available in several modifications with different types of filaments and chamber volume.

FPD (flame photometric detector) – selective detector for phosphorus and sulfur containing compounds. The inert jet excludes contact of sample with metal surfaces, thereby prevents sorption of labile components.

ECD & μ-ECD (electron capture detector) – is high sensitive and selective detector for halogenated organic compounds with wide linear range. Also available with smaller chamber.

NPD (nitrogen phosphorus detector) – selective detector for phosphorus and nitrogen containing compounds.

PID (photoionization detector) – detector with high sensitivity for aromatic compounds (more than 10 times over FID).

CCD (catalyst combustion detector) – is commonly used for determination of hydrogen and oxygen. The measuring principle is based on thermal effect of catalyst combustion of target compounds on the surface of platinum thread.

MSD (mass-spectrometric detector) – quadruple detector for determination of wide range of compounds with identification via mass-spectrum libraries.

Other detectors through Chromatec channel partners

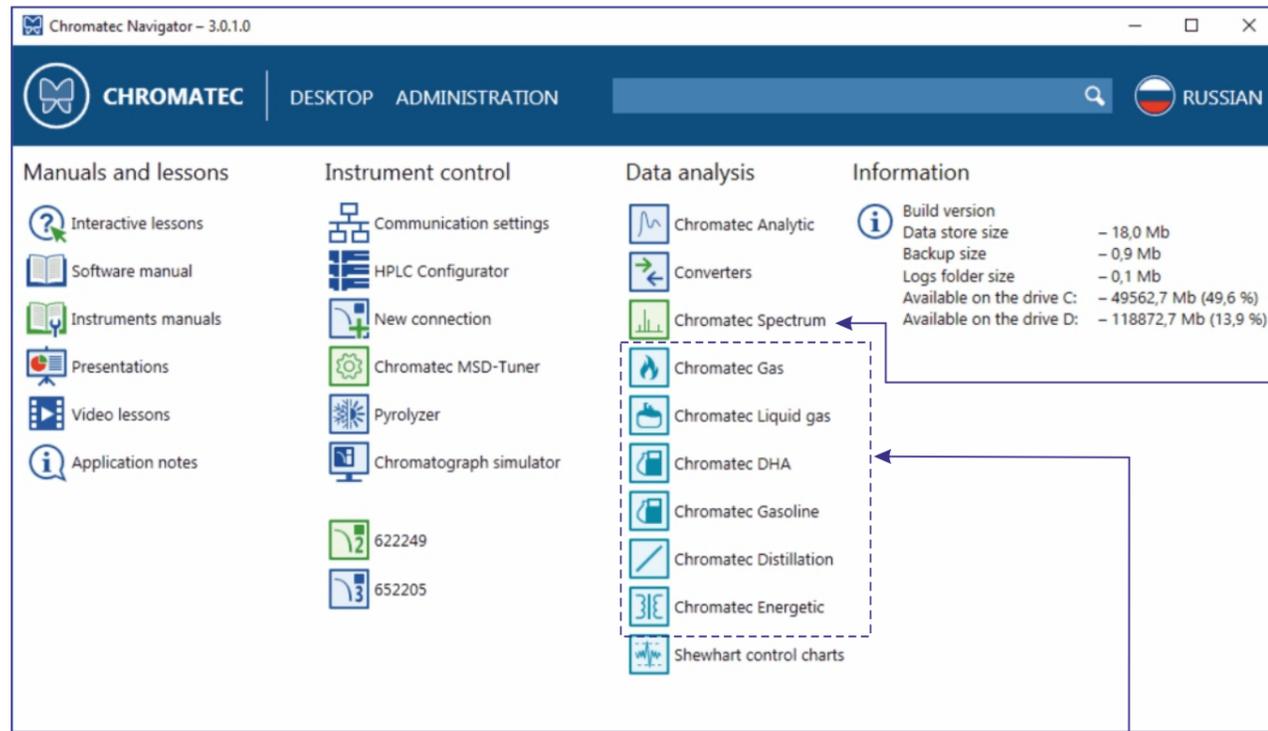
Chromatec Crystal 9000 GC supports installing of up to 5 detectors simultaneously.

Methanizer

Methanizer allows detecting very low concentrations of carbon monoxide and carbon dioxide. It consists of a FID preceded by a hydrogenating reactor which converts CO₂ and CO into CH₄ (methane).

Programmable inlet allows variation of working temperature and additionally has advanced operating modes: cool on-column and large volume injection.

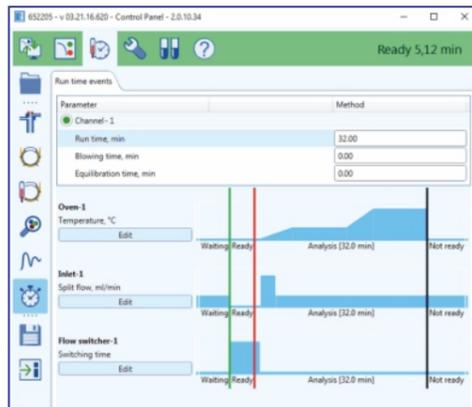
Syringeless injection of liquefied (or liquid) samples under pressure up to 100 atm and temperature up to 400 °C



Chromatec Analytic™ - a unified software solution for managing chromatographs and auxiliary equipment, processing of chromatographic and mass spectrometric data

Chromatec Spectrum™ allows

- Performing peak search on the chromatogram in automatic and manual mode
- Subtracting the noise signal from mass spectrum to improve the quality of identification.
- Matching the spectra obtained on any libraries from NIST™, Wiley™, and other general-purpose to highly specialized (drugs, pesticides, etc.)
- Processing of mass spectrometry data from other GC-MSD vendors, and to carry out the reverse conversion



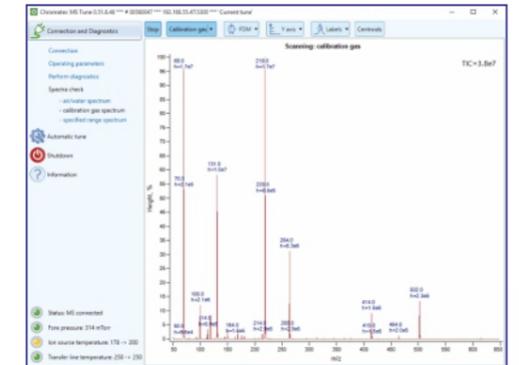
Control Panel provides full instrument control over all internal and external accessories

- Two simultaneous independently controlled analyses at one GC
- Flexible configuration and automation of analyses using the Task Manager
- Automatic applying of GC method while the PC boots up
- Chromatogram Backup on flash memory

Comply FDA 21 CFR part 11 according to GLP/GMP requirements.

Optional add-ons for special calculations allow to obtain the required by industry standards quantitative information from the chromatographic data, without the help of third-party software products.

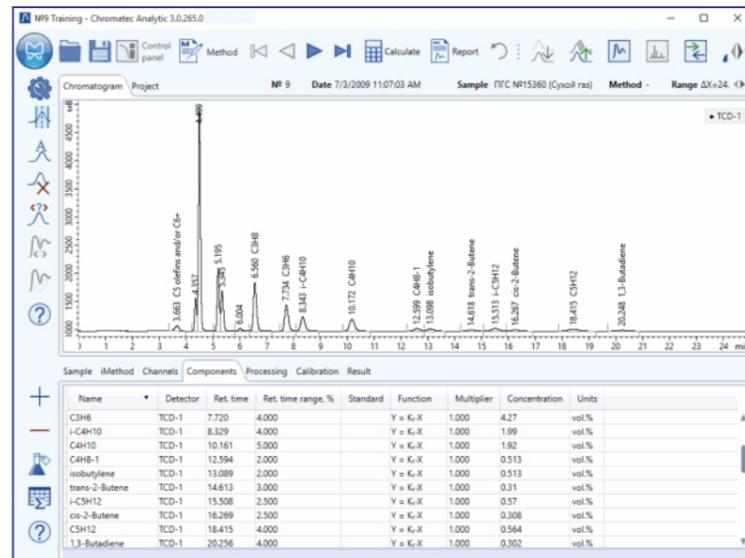
- Chromatec Gas - for the calculation of natural gas properties by its component composition
- Chromatec Liquefied Gas - for the calculation of liquefied gas properties and composition
- Chromatec DHA/Chromatec Gasoline - for detailed hydrocarbon analysis of gasoline
- Chromatec Distillation - for the calculation of fractional composition of petroleum products and other parameters
- Chromatec Energetic - for diagnosing of transformer defects by composition of gases dissolved in the oil (TOGA)



Chromatec MSD-Tuner provides tools to control and to manual or automatic adjust of the MSD parameters.

Chromatec Analytic - is a powerful tool for efficient and correct obtaining of qualitative and quantitative chromatographic data.

- Multiple ways to set up the calibration curve and data processing methods
- Set of tools to provide full automated or user selected integration of chromatogram
- Calculation of the chromatogram with one button
- Unique ability to adjust the calibration "on the fly"
- Customized report templates



Detailed Hydrocarbon Analysis

Summary report

Analyst: User 1
 Injection Date & Time: 11/25/2014 2:00:44 PM
 Data File Path: D:\Analytic 3\Projects\Gasoline\chromatograms\2014-25-11 14-00-14 0004.chrx
 Sample Name: Gasoline from 0°C
 Database: 6729(32507.B +Oxygenates)
 Hold time: 5.685
 Identified peaks: 348 from 348

Groups	Paraffins	Iso-paraffins	Aromatics	Olefins	Oxygenates	Naphthenes	Unidentified	Total
Mass, %	15,008	28,864	29,165	1,781	7,528	16,431	1,223	100,000
Volume, %	17,014	31,956	24,526	1,874	7,737	15,748	1,146	100,000
Molal, %	17,570	30,216	25,341	1,972	8,214	15,795	0,891	100,000

Oxygenates
 Total Mass, % 7,528
 Total Oxygen Content, % 1,404

Calculated Octane Number
 Research method 86,808
 Motor method 78,856

Average molecular mass, g/mol 98,344
 Relative density, g/cm³ 0,732
 Vapour pressure, kPa 57,502

Chromatec Analytic™ - one software for all tasks from instrument control to specific calculations and reporting.

All ways for sample introduction

- Allows to inject into any GC inlet port
- High tray capacity with positions for: 150 sample, 4 wash solvents and 2 waste vials
- Two syringe washing techniques to get maximum purity of analysis: top washing and vial washing
- Space above the Inlets are always free for manual injection
- Vial tray is isolated from GC heating zones

AS-2M 3D – multichannel autosampler



AS-2M – single-port autosampler

- Simple and reliable design, easy installation and operation
- Carousel capacity: 22 samples and washing vials
- Two syringe washing techniques to get maximum purity of analysis: top washing and vial washing



Chromatec's Headspace product line provides ability to measure VOC in water and biofluids, residual solvents in different matrixes like pharmaceuticals materials, monomer in polymers and many others.

DRP-4 Manual Headspace



- Low ownership cost
- Could be used with any existing GC
- Advanced design and excellent performance
- Manual gastight headspace syringe

AS 2M 3D Headspace Autosampler



- Static headspace autosampler with advanced features
- Upgradable by options for liquid sample injections and SPME.
- Possibility to Inject any GC inlet port

Chromatec's Thermal Desorber product line provides ability to measure volatile contaminants in indoor and outdoor air, plastic materials, building materials and food. Also it provides unique analyses for vapor emissions' testing applications, for example, in forensics and defense.

TDS-1 series:

Dual-stage

- Trap on the second focusing stage allows to reach much better sensitivity and components separation efficiency
- Ideally for GC-MSD applications



Single-stage

- Recommended to use with cryogenic trap
- Ideal for semi-VOC (e.g. phthalates) analysis thanks to short pathway

Dual-stage Automatic

- Automatic loader with 50 sample tubes
- High efficiency is guaranteed by complete inert internal gas flow path and high temperature transfer line



Chromatec offers full range of instruments for volatile contaminants analysis in air analysis. Sampling Pump PV-2 was designed specially to meet all requirements of environment monitoring laboratories such as sampling rate, battery capacity and operation convenience.

Pure gases for pure results



Hydrogen generators require deionized water with analytical quality grade, and that can be obtained using the Chromatec's Water Purification System. Device is easy to use and maintain thanks to its compact size, the possibility of connection to the domestic water supply, and easy replacement of any purification

Additional information about Chromatec devices for gas management please find at

<http://chromatec-instruments.com/products/>



Spare parts and accessories that make your work much efficient

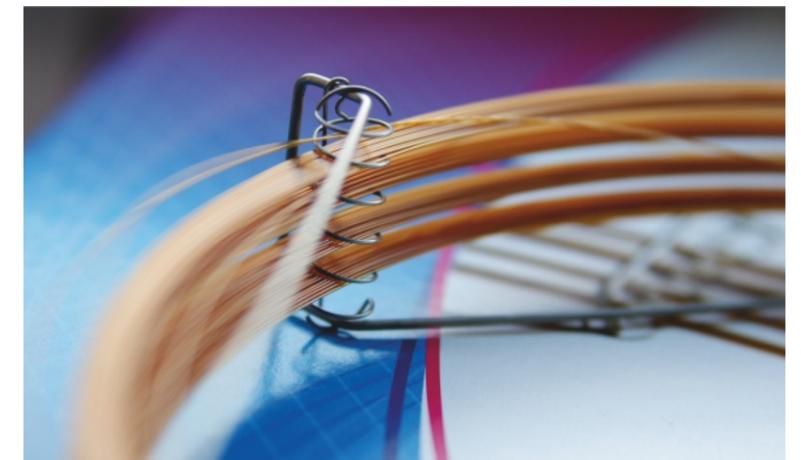


Chromatec support team happily consults the customer about appropriate reference materials, reagents and gas mixtures for calibration in accordance with the methods of analysis, and provides all information of spare parts' selecting and purchasing.

- Chromatec offers packed and capillary columns for gas chromatography from worldwide leading manufacturers.
- Packed metal and glass columns are manufactured and tested in Chromatec's laboratories in accordance with the analysis methods.

For more effective implementation of certain chromatographic analyzes Chromatec produces various dedicated accessories:

- Gas flow indicator
- Specialized devices for the analysis of transformer oil (TOGA): syringes for sampling, valves for filling the syringe by carrier gas, equilibration device
- Hydrogen leak sensor and others.



Open system is our policy

- Chromatec always designs its instruments with approach to provide the customers with full flexibility in choosing of spare parts' origins.
- As all main spare parts could be acquire either from Chromatec or any other worldwide chromatography parts supplier.

Full-time support

- Assist in the selection of the optimum configuration of equipment
- Maintenance and repair
- Installation and application support
- Consultations in the online mode
- Training courses for laboratory personnel and service engineers

Training courses in chromatography and mass spectrometry are held on a regular basis in specially equipped laboratories of Chromatec Training Center using the full spectrum of the equipment produced. During the training, users can acquire theoretical and practical skills in methods of analysis, working with chromatographic equipment, its set-up and maintenance, working with the software and its applications.



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For more information please refer Chromatec Support web page at <http://chromatec-instruments.com/service-support/>

Technical specialists always support the best choice of the instrument's configuration for analytical tasks based on reference methods. And they provide all needed consultations to upgrade the used systems.

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Technical service support of the instrument for the customers done by qualified and certified engineers is a major part of Chromatec's international network through worldwide partners.

Installations of all instruments and training services of the operators are provided by our qualified teams to insure uninterrupted and most efficient work from the first day.

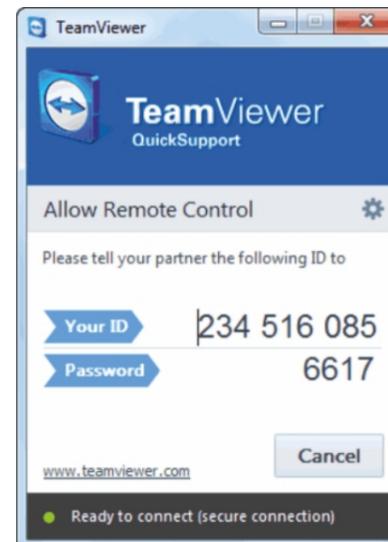
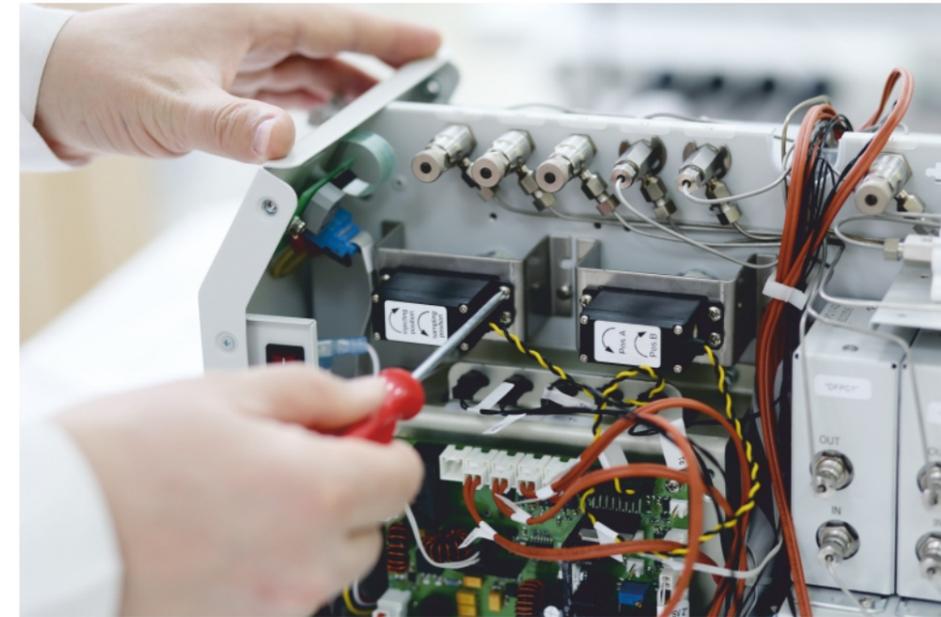


Warranty and post warranty services are provided along with metrological certification by Chromatec specialists or local representatives.

support@chromatec-instruments.com

Prompt consultations regarding the operation of instruments and software, and application support can be provided by Chromatec's experts via telephone and email.

Also remote diagnoses of technical conditions of instrument and software are available via TeamViewerQS built-in utility in Chromatec software standard package.



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