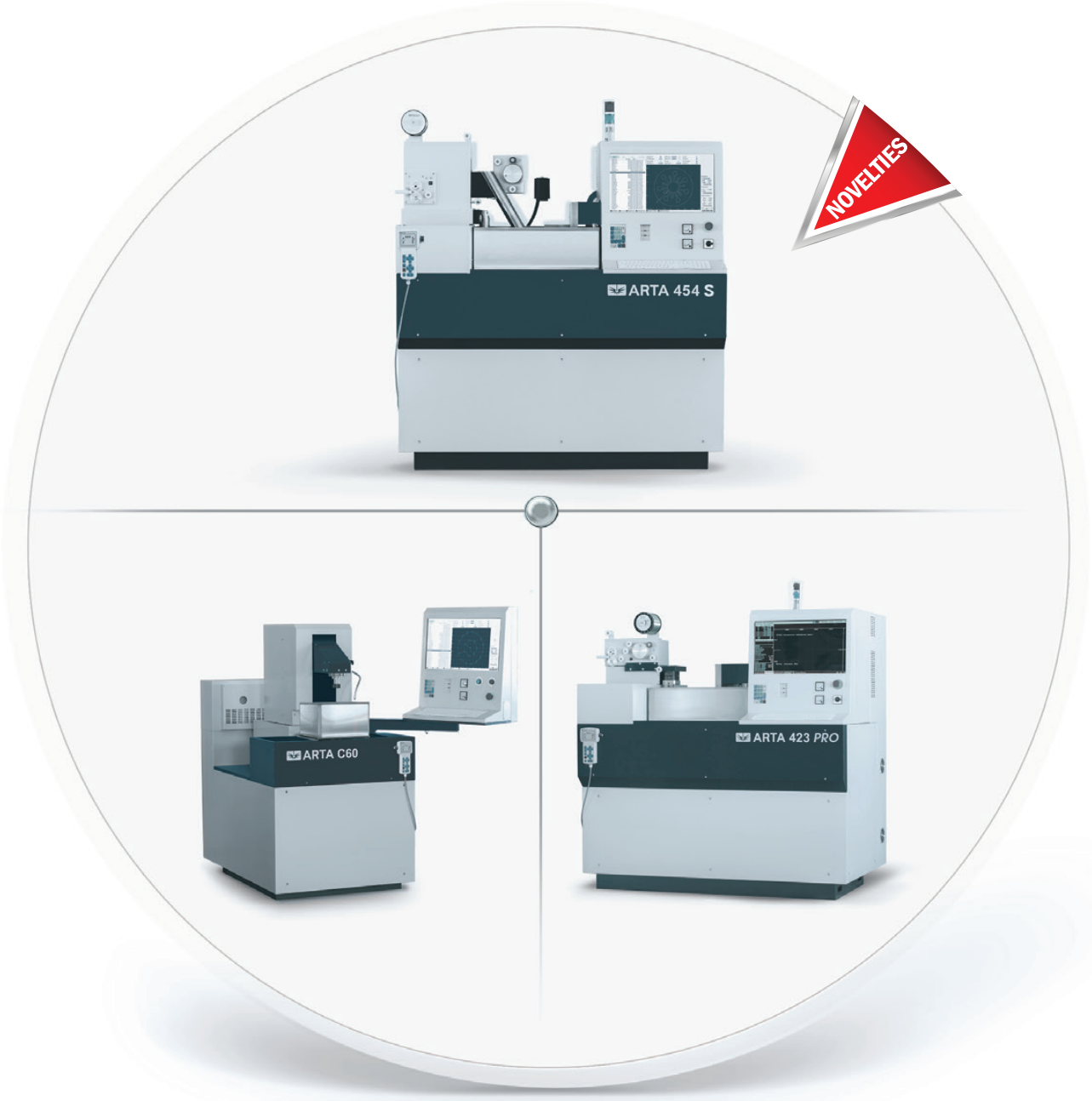
Scientific Industrial Corporation

DELTA - TEST

GENERAL CATALOG



ARTA®

ELECTRO-EROSION TECHNOLOGIES

We are pleased to introduce You the new catalog of main products and services, our latest achievements in the field of development of equipment and technol–ogies for electrical discharge machining (EDM).
More than a quarter century the team of SIC "Del-ta-Test" creates and improves complex precision equipment for solving tasks in various fields of industry and science. During this period we have passed a courage path, which was launched in 1991. At that time a group of like–minded professionals participated in the program of creation of new gener–ation TVs. We developed a special technology, equip–ment and software for production of micro–parts (cathodes) by means method four coordinate electri–cal discharge machining with special wire–electrodes diameter of 20 microns. In consequence we have focused in the field of CNC systems, technological current generators and precision mechanics. Due to the dedication effort and scientific potential of the team, flexible to work on domestic and foreign markets during this period, the company managed to occupy a leading position among Russian producers of EDM machines.
The optimal ratio of price and quality is our strong side. Due to clear understanding of Customer needs in a reliable, precision and efficient equipment, we use the most advanced solutions and com–ponents in various fields (mechanics, electronics, hydraulics, etc.) in our original developments. **All the models of ARTA machine tools 100% manufactured at the SIC "Delta-Test" factory in Russia** (Fryazino) – from machining of beds and parts to assembly, configuration, and testing of released equipment.
Distinctive features the ARTA (registered trademark) EDM machines are:

- Efficient and flexible application of equipment for a wide range of purposes: from typical tasks (dies, molds, tools) to specific (production of various special parts, precision microero–sion machining)
- The possibility of using ultrathin electrodes in diameter from 0.01 mm (10 microns)
- Cutting non–standard and difficult to machine materials (magnet, graphite, pyrolytic carbon «uglesitall», PCD, hard alloy, semiconductor and others)
- Relatively low energy and resource consumption, the ability to machining in ordinary water (without de–ionization), the affordable price of consumables and wearing parts and materi–als, minimum cost of manufacture parts of small and medium overall class
- Prompt and affordable service, which enables clients to obtain current technical and tech–nological advice at any level of complexity from the experts–developers of equipment, availability of all major spare parts on stock and quick dispatch

Scientific Industrial Corporation "Delta–Test" assumes the **whole complex of accompanying works and services**, including:

- Commissioning and installation work
- Customer Training
- Quality warranty service
- Supply of consumables, wearing and spare parts

Basic range of wire cut EDM ARTA (page 6–10 of the catalog) represented by six models which are divided into two dimensional groups:

- Series for small–sized machining: **ARTA 123 PRO** (2 axis), **ARTA 153 PRO** (5 axis)
- **ARTA 423 PRO** (2 axis), **ARTA 453 PRO** (5 axis) – the most popular and multipurpose series of machines ARTA, optimal solution for machining small and medium size parts.

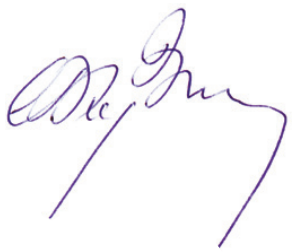
In addition to the basic range in the catalog briefly introduced **special complexes for high-precision wire-cut and microerosion sinker electrical discharge machining (ARTA 454 S, ARTA 122 NANO, ARTA C60, ARTA 1040).** General technical data of these models are given in the relevant sections of catalog (page 11–14).

Scientific Industrial Corporation "Delta–Test" also implements projects for development of equipment based on technical tasks of Customers (R&D) for various special purposes, including:

- Special high–precision (EDM) machines, microerosion technology
- Equipment for working in unusual conditions (nuclear industry, etc.)
- Equipment for electric–spark alloying of metals
- Special software and electronic/ microprocessor control systems of technological equipment and processes.

In any case this catalog is hard enough to present a full description and specifications for each model of our equipment, as well as reveal the full range of additional services. Therefore, in case of interest please send Your requests to us in order to obtaining the detailed revised proposal and other information of interest.

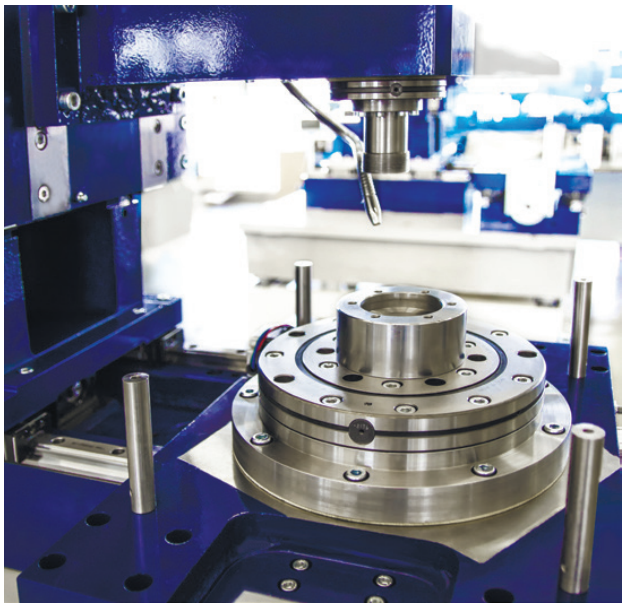
Ivan Kuznetsov
President SIC «Delta–Test»



EDM WIRE CUT AND SINKER MACHINES ARTA

GENERAL CHARACTERISTICS, TECHNOLOGICAL CAPABILITIES, DESIGN

High reliability of the ARTA equipment guaranties long life even in round the clock work. Design all major machine components, architecture and software of CNC systems, generators of technological current - own original development SIC "Delta-Test" - in which we use only approved components in the industrial performance. The whole cycle of production equipment ARTA fully focused on our factory in the Fryazino city (Moscow region), which ensures 100% quality control and comprehensive testing of each unit of production.



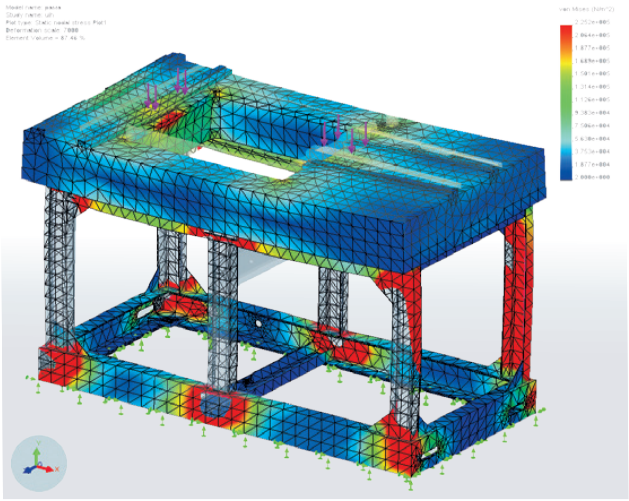
Digital microprocessor control of all subsystems of the machine (generator technology current, winding/tension wire, hydraulic components, worktank

with lifting mechanism). Guarantee of punctuality of provided values, wide adjustment range of each characteristic, performance and high accuracy.
High precision control system, drivers, mechanisms. Due to interpolation (step) working displacement of coordinate axes of the machine with discreteness of 0.01...0.1 μm achieved a perfect uniformity of the machining process. Linear scale feedback control with the use of a contactless optical linear encoders on the axes with an accuracy of 0.1 micron.

The directflow generator ARTA-5MC2 that implements the optimal shape of extremely short pulses with large amplitude to provide enhanced productivity and surface finish of machined parts.

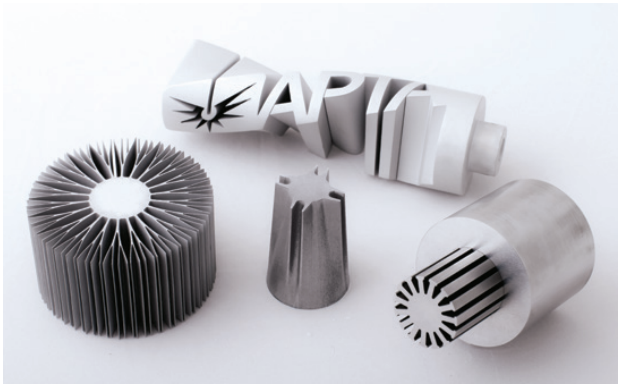
The rigid construction of the bed and major mechanical components. At the design stage the machine and its elements are analyzed by the finite

element method to identify problem areas (subject to elevated stresses and deformations).



Coordinate axes on the basis of zero-backlash ballscrew transmission and linear precision class guideways – a guarantee of high accuracy, reliability and durability.

All ARTA EDM wire cut machines are **submerged type** that creates the conditions for the maximum technological capabilities of the scope, including machining of pipes, hollow parts, batch-sheet cutting. Worktank ("bath") with **a lifting mechanism** on the basis of reliable noiseless actuator and the rigid guides solution that provides the convenience of operator's work and minimizing the time spent on preparatory and intermediate operations.



New rotary table for submerged machining controlled by the CNC system (6th axis) own development and production. Waterproof precision mechanism to implement contours of complex geometry.

Wire guides (dies) of a natural diamond can confidently handle forming inclined **up to 45 degrees**. In addition, maximum durability, accuracy and repeatability over many years of operation of the machine.

Certain Models ARTA machines can be equipped with additional elements for machining a **special thin wires (diameter from 0.01 mm = 10 microns)**, which allows the fabrication of micro-parts with a groove width less than 20 microns.

WIRE CUT EDM ARTA

TECHNICAL PARAMETERS, STANDARD DELIVERY SPECIFICATION

(for models ARTA 123 PRO, 153 PRO, 423 PRO, 453 PRO)

MACHINE MODEL	ARTA 123 PRO / 153 PRO, ARTA 423 PRO / 453 PRO
Type of machining	Submerged Type (Worktank with Lifting Mechanism) Wire cut machining
Dielectric	- Standart (Tap) Water - Deionized water (for Better Cutting Results) - requires optional equipment with the Hydraulic Unit

PRECISION MECHANISM OF AXIS MOVEMENTS	
Main components (X, Y, U, V, Z axes)	Linear Guideways Precision Class, Precision Ballscrew (THK, Japan); service life not less than 10 years (with a guarantee of safety precision characteristics)
X, Y Axis Repeatable Positioning, +/- µm	1
X, Y Axis Working Step, µm	0,1

NUMERICAL CONTROL SYSTEM	model: ARTA-X.9
Standard Functions	- Complete Measuring Cycles for Workpiece and Wire-Electrode Setup - Complete Information on Job in Progress including Graphics - Programming during Machining Process - Automatic Storing of All Settings in Case of Power Failure (including Emergency) with Automatic Recovery of Interrupted Tasks - Built-in Help and Technology Library
Digital Numerical Control of All Machine Subsystems	- Wire Circuit; - Pulse Generator; - Filtration / Dielectric System; - Worktank Lifting Mechanism
Display	24" TFT
NC Programming	- Built-in editor - CAD-CAM System (including FriCAD / to be installed on a workplace programmer)
NC Program Input	- External USB Flash-Drive - On-board USB Flash-Disk - Ethernet
System Components	Industrial Computers and Controllers (Service Life Of Not Less Than 10 Years)

SMART PULSE GENERATOR	model: ARTA-5MC2
Element Base, Architecture	MOS Transistors Based Power Modules with Spark Gap Direct Switching System (Microprocessor Control of All Parameters with 32-bit Microcontroller)
Maximum Cutting Speed (Steel), mm2/min	160
Roughness Ra, µm: - First Cut (no less) - Maximum Achievable	1,5 0,6
Basic Features	- Machining is possible in ordinary water (without deionization) - Wide range of adjustment of parameters of technological pulses (including provides machining of special materials (magnets, graphite, PCD and others) and applying of very thin wires diameter from 10 µm) - Fast adaptive protection system of wire breakages on the basis of microprocessor control - Digital setting pulses from functional keyboard CNC system and through technological control program commands

WINDING / TENSION WIRE MECHANISM	
Wire Material	brass / copper / tungsten / molybdenum
Available Wire Diameters	0,10 - 0,30 mm (0,02 – 0,30 optional)
Spool Type (weight)	DIN125 (4 kg) / P5 (5 kg)
Wire Guides	Natural Diamond Guides *Typical Diameters, mm: 0,10/ 0,15/ 0,20/ 0,25/ 0,30;* *Set of Spare Parts Includes 1 (one) Spool Wire (4kg) under the Diameter of the Customer*
Winding / Tension Wire Mechanism	On the Basis of the Powder Brake Clutch, Gear Motor; microprocessor Control of All Parameters by CNC System

TANK LIFTING MECHANISM	On the Basis of Actuator with low noise and Linear Bearing Guides

Spare parts, Documentation	Spare Parts Kit (Set of Consumables for an Initial Period, Spare Parts, Tools and Others), Documentation Kit; Quality Certificate
The Basic Cost of the Machine Includes	- Additional Remote Control - CAM System FriCAD (for AutoCAD) or other - Transport Packaging is Basic and Additional Sets - Customer Training - Warranty for 24 months

PRECISION WIRE CUT EDM ARTA 123 *PRO*/ARTA 153 *PRO*

General technical specifications

MACHINE MODEL		ARTA 123 *PRO*	ARTA 153 *PRO*
Type of machining		Submerged Type (Worktank with Lifting Mechanism) Wire cut machining	
Number of Axis		2 (3 optional)	5 (6 optional)
Maximum Workpiece Dimensions (W x D x H), mm		250 x 160 x 80	
Axis Travel, mm	X x Y	125 x 200	
	U x V		60 x 60
	Z (H)	80 (manually install)	80 (automatically install)
Available Wire Diameters, mm		0,10 - 0,30 (0,02 – 0,30 optional)	
X, Y Axis Repeatable Positioning, mm		+/- 0,001	
The Maximum Angle of Wire Inclination (depending on the thickness of the workpiece), degree			21...30 (45 optional)
Maximum Cutting Speed (Steel, mm2/min)		140	
Dimensions of the Machine (W x D x H), mm		1230 x 920 x 1600	
Total Weight of Equipment (without Filtration and Dielectric system), kg		730	900
Input Voltage		220 V	
Maximum Energy Consumption (without Filtration and Dielectric system), kVA		5,0	

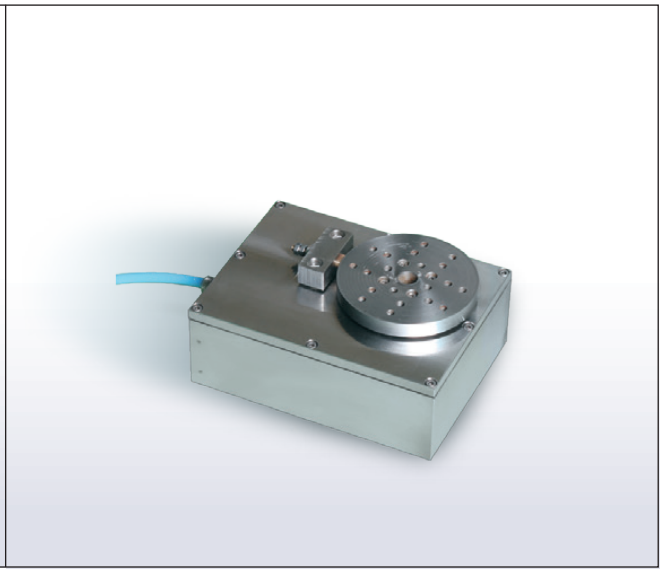
PRECISION WIRE CUT EDM ARTA 423 *PRO*/ARTA 453 *PRO*

General technical specifications

MACHINE MODEL		ARTA 423 *PRO*	ARTA 453 *PRO*
Type of machining		Submerged Type (Worktank with Lifting Mechanism) Wire cut machining	
Number of Axis		2 (3 optional)	5 (6 optional)
Maximum Workpiece Dimensions (W x D x H), mm		420 x 300 x 120 (optional height up to 150 for ARTA 423 PRO)	
Axis Travel, mm	X x Y	200 x 320	
	U x V		60 x 60
	Z (H)	120 (manually install)	120 (automatically install)
Available Wire Diameters, mm		0,10 - 0,30 (0,02 – 0,30 optional)	0,10 - 0,30
X, Y Axis Repeatable Positioning, mm		+/- 0,001	
The Maximum Angle of Wire Inclination (depending on the thickness of the workpiece), degre			14...30 (45 optional)
Maximum Cutting Speed (Steel, mm2/min)		160	
Dimensions of the Machine (W x D x H), mm		1950 x 1100 x 1850	
Total Weight of Equipment (without Filtration and Dielectric system), kg		1500	1600
Input Voltage		220 V	
Maximum Energy Consumption (without Filtration and Dielectric system), kVA		5,0	

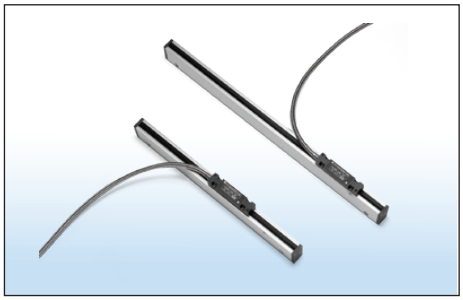
OPTIONAL EQUIPMENT AND ACCESSORIES

(*for models* ARTA 123/153 *PRO*, ARTA 423/453 *PRO*)



HYDRAULIC (DIELECTRIC) UNIT		
MODEL	**ARTA-SV31M** (working volume 320 l) for EDM Machines APTA 1XX	**ARTA-SV40M** (working volume 430 l) for EDM Machines APTA 4XX
The Use with the EDM Machine Provides	- Improved Performance - Higher Stability (Repeatability) of the Machining Results - Improved Surface Quality (Roughness Ra) - Ecological Compliance Equipment Operation	
Basic Features	- On the basis of reliable noiseless circulation and high pressure pumps (GRUNDFOS) - 3 outline: cleaned through the filter cartridge, high pressure water supply, the deionization circuit - Automatic control by CNC system	
Type of Filters	Paper	
Dimensions (W x D x H), mm	1050 x 950 x 1270	1000 x 1100 x 1300
Weight (without water), kg	140	180
Input Voltage Maximum Energy Consumption	220 V 1,0 kVA	

- **The performance of the machine on the basis of the universal Winding / Tension Wire Mechanism** with precision destacker for waste wire and additional set of special brackets with V–shaped type Guides (provides additional technological **possibility of using wire electrodes with small diameters from d = 0.02 mm);** option available for all models except series ARTA 453
- **Additional rotary table controlled by CNC system** (3rd/ 6th axes of the machine)
- **Linear glass scales** X, Y axes
- **Thermo-chiller** (Cooler) for the working fluid (thermostabilization circuit)



ULTRAPRECISION WIRE CUT EDM ARTA 454 S

EDM Machines ARTA 454 S features high precision mechanisms, drives and control systems, structural rigidity and thermostability for use in the most demanding fields of electrical discharge machining materials.

The complex is in the basic configuration includes a CNC system of the latest generation, high–performance energy–efficient generator with energy recuperation, hydraulic unit with refrigerator–thermostat, precision linear scale system of the axes.

General features of the ARTA 454S:

- CNC ARTA–X.10 on the basis of the two–level architecture, providing a completely new degree of performance, ease of operation and technological capabilities
- Large touch screen with a diagonal of 24" for easy and rapid data entry
- Directflow generator with microprocessor control and an extended range of parameters of technological current to achieve high–quality surfaces, the use of miniature electrodes
- Perfect positioning in the X, Y based on the linear guides, the ballscrews ultraprecision class
- Optical non–contact linear position sensors on the axes with an accuracy of 0.1 micron
- The stability of the system is ensured by the inclusion of a set of hydraulic unit with precision refrigerator–thermostat of the working fluid (in basic configuration)
- The technological capability of precision micromachining of thin wires with a diameter of 50 microns (basic configuration)

MACHINE MODEL		ARTA 454 S
Type of machining		Submerged Type (Worktank with Lifting Mechanism) Wire cut machining
Number of Axes		5 (6 optional)
Maximum Workpiece Dimensions (W x D x H), mm		420 x 300 x 120
Axes Travel, mm	X x Y	200 x 320
	U x V	60 x 60
	Z (H)	120
The Maximum Angle of Wire Inclination (depending on the thickness of the workpiece), degree		14...30 (45 optional)
Available Wire Diameters, mm		0,05 - 0,30
Achievable machining accuracy, +/- micron		2,5
Interelectrode liquid		water deionized
Floor space (machine with accessories) WxD, mm		2050 x 1950
Total weight, kg		1 850
Power supply		220 V, 50 Hz
Maximum Energy Consumption, kVA		6,0
Additional (optional) equipment for ARTA 454 S		
Precision rotary table controlled by a CNC system (6th axis)		

ULTRAPRECISION WIRE CUT EDM ARTA 122/152 NANO

Developed specially for solving problems of ultra-precise machining using as standard (diameter 0.1-0.3 mm), and a special "thin" wires (diameter from 0.01 mm = 10 microns). Provides a minimum width of cut groove at least 20 microns. Applied in the manufacture of microdetail of microwave technology, elements of the devices of nanotechnology, products of high precision.

Discrete positioning (specified in the control program): 100 nanometers.

The interpolation increment (step movement): 10 nanometers.

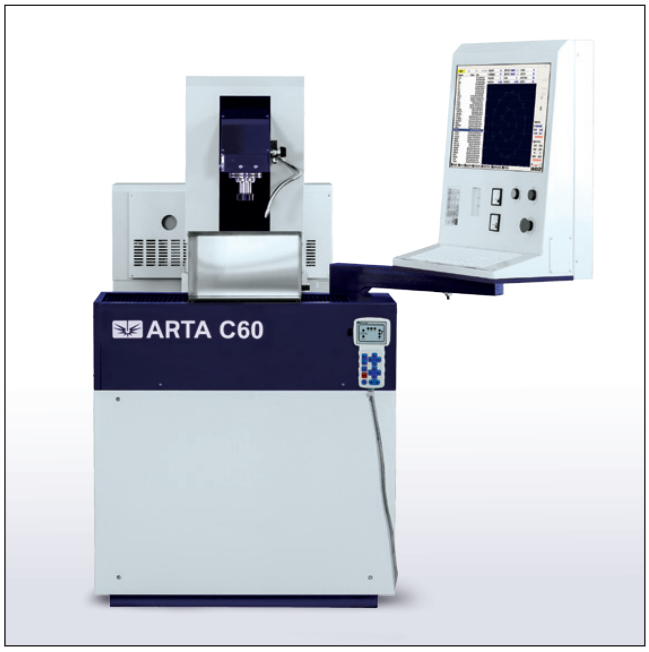
Technical features:

- Axes X,Y: linear guide, ball screw transmission ultraprecision class (THK)
- Linear scale tracking system (X,Y) on the basis of high speed optical encoders, with precision the posi–tion of 0.1 microns (Renishaw)
- Generator with microprocessor control and tracking of single pulses (provides a current pulse duration of 0.1 s and – frequency up to 200 kHz)
- Special uni with the use of high–precision destacker waste wire and unigue brake clutch
- Refrigerator–thermostat for automatic maintenance of the set temperature of the working fluid

MACHINE MODEL		ARTA 122 NANO	ARTA 152 NANO
Type of machining		Submerged Type (Worktank with Lifting Mechanism) Wire cut machining	
Number of Axes		2 (3 optional)	5 (6 optional)
Maximum Workpiece Dimensions (W x D x H), mm		250 x 160 x 80	
Axes Travel, mm	X x Y, mm	125 x 200	
	Z, mm		60 x 60
	A, B, W, degree	80	
The Maximum Angle of Wire Inclination (depending on the thickness of the workpiece), degree			21...30 (45 optional)
Available Wire Diameters, mm		0,01 – 0,30	
Achievable machining accuracy, +/- micron		1,5	
Interelectrode liquid		water deionized	
Floor space (machine with accessories) WxD, mm		2600 x 1700	
Total weight, kg		1300	1450
Power supply		220 V, 50 Hz	
Maximum Energy Consumption, kVA		5,0	

PRECISION SINKER EDM ARTA C60

ARTA C60 developed specially to solve complex problems multi-axes (6 axes) microerosion machining in the radio-electronic, aerospace, engine building, medical and other industries. Mechanical and control parts of the machine include all the latest developments and achieve–ments of SIC "Delta–Test" to meet the most demanding requirements in the field of micro–machining.



General features of the ARTA C60:

- 6–th axes (3 linear + 3 rotary)
- Highest accuracy on all axes field position due to the stiffness of the symmetrical design cast bed, the X carriage (subject table) based on precision guide rails with stretch (relative to maximum displacement), regardless of the installed Y–column
- CNC ARTA–X.10 of the latest generation on the basis of two–level architecture, ARTA–5MC2K gen–erator with microprocessor control for accurate high–speed adaptive control of parameters of tech–nological current supply electrode
- Nano–interpolation of displacement along the linear axes X, Y with feedback on the basis of high–precision noncontact optical linear encoder with resolution 0.1 micron
- Angular optical position sensor rotary B–axis resolution of 0.0001 degrees
- Optical visual system, alignment and electrode–based micro–tools
- Equipping all the necessary functions, a broad set of technologies spanning almost all types micro–erosion works

MACHINE MODEL		ARTA C60
Type of machining		Microerosion Sinker Machining
Number of Axes		6
Axes Travel, mm	X x Y, mm	250 x 125
	Z, mm	200
	A, B, W, degree	360
The minimum diameter of the electrodes, mm		0,060
X, Y Axes Repeatable Positioning, micron		0,75
Accuracy of rotary axes, s		10
Achievable machining accuracy, +/- micron		2,5
Interelectrode liquid		water deionized / special liquids
Floor space (machine with accessories) WxD, mm		1500 x 1350
Total weight, kg		1650
Power supply		220 V, 50 Hz
Maximum Energy Consumption, kVA		4,5

EDM ARTA 1040 FOR PRECISION HOLES

ARTA 1040 EDM machine is designed for making high-precision (tangential) holes of nozzles (engines etc.) and other similar technical tasks. The complex is made on the basis of rigid frame of cast iron, includes hydraulic unit and worktank with lifting mechanism to ensure effective and convenient submersible type machining.

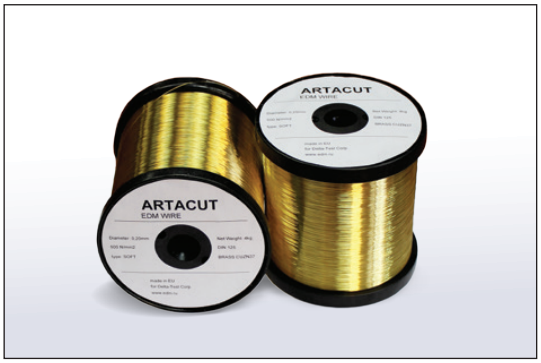
General features of the ARTA 1040:

- Technology for perfect holes with no modified layer and without deformation
- Complex accurate tangential holes, angle machining
- Precision rotary table controlled by a CNC system (4 axis)
- Linear scale tracking system (X,Y) on the basis of high speed optical encoders, with positioning accuracy 0,1 microns (Renishaw)
- Precision positioning system of die and supply electrode console made on the basis of original single rigid construction
- Operating with the rotation of the tool (electrode) and pumping of dielectric for maximum repeatability, perfor–mance, and minimal deviation from the roundness for the obtained holes

MACHINE MODEL		ARTA 1040
Type of machining		EDM Drilling Machining (Submerged Type)
Number of Axes		3 (4 optional)
Axes Travel	XxY, мм	200 x 320
	Z, мм	die installation – 200 mm electrode supply – 320 mm
Diameter of the electrodes, mm		from 0,1 to 3,0 with step 0,01
X, Y Axes Positioning Repeatability, +/- micron		1
Achievable machining accuracy, +/- micron		2,5
Interelectrode liquid		water deionized special liquids
Floor space (machine with accessories) WxD, mm		2000 x 1950
Total weight, kg		1700
Power supply		220 V, 50 Hz
Maximum Energy Consumption, kVA		4,5

EDM CONSUMABLES

SIC «Delta–Test» supplies **brass wire for EDM machines of its own brand ARTACUT**. Production is organized in our partner company in accordance with international quality standards. ARTACUT wire are able to be effectively used ARTA machines and other EDM equipment.



WIRE TYPE	MATERIAL	TENSILE STRENGTH	ALONGATION	TYPICAL DIAMETERS
ARTACUT *500*	Brass CuZn37	500 N/mm2	15%	0,20/0,25/0,30 мм
ARTACUT *1000*	Brass CuZn37	1000 N/mm2	<2%	0,20/0,25/0,30 мм

Besides SIC «Delta–Test» provides a complete range of related consumables and wearing parts, materials and supplies for EDM Machines ARTA:

- special purpose electrodes
- diamond and ceramic guides
- filters, resin
- nozzles, conductivity pieces, tools etc.

For full specifications price list of consumables and parts of EDM machines, please send your requests.

TECHNICAL CENTER, EDM MACHINING

Within the Headquarters organized a Technical center, showroom with samples of products. Seminars are held for all interested specialists. We Invite You and colleagues to introduce ARTA equipment and assess Its characteristics when performing a specific task. We are also ready to remotely complete a test and send to Your address a sample (detail after machining) with detailed report.

SIC "Delta–Test" renders services in manufacturing of parts by means of electrical discharge machining on our own equipment.

Also within the center are trained specialists of the enterprises–customers on maintenance programs and service equipment ARTA. Upon completion of training are issued certificates brand.

MADE

IN RUSSIA

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