

AgieCharmilles

FORM P 350

FORM P 600

FORM P 900



GF Machining Solutions: all about you

When all you need is everything, it's good to know that there is one company that you can count on to deliver complete solutions and services. From world-class electrical discharge machines (EDM), Laser texturing and Additive Manufacturing through to first-class Milling and Spindles, Tooling, Automation and software systems — all backed by unrivalled customer service and support — we, through our AgieCharmilles, Microlution, Mikron Mill, Liechti, Step-Tec and System 3R technologies, help you raise your game and increase your competitive edge.



Passion for Precision

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Perfect results at your fingertips

The ergonomics of GF Machining Solutions' new AC FORM human-machine interface (HMI) put customers in the driver's seat by making die-sinking EDM an intuitive, easy-to-learn and easy-to-use process. That means greater autonomy over your processes, higher efficiency, improved process reliability and accelerated performance. The standardized working environment created by the AC FORM HMI makes it easy to achieve perfect machining results.



Highlights

**Boost your
running time
with efficiency**

+ Optimize your production

The AgieCharmilles FORM P series includes a whole family of choices: Achieve your production objectives and meet your customers' expectations, with three different sizes of machines delivering the control of accuracy you need, thanks to rigid mechanics and high-resolution glass scales. Moreover, the AgieCharmilles FORM P series' available Accura C-axis and its high-torque capability help you execute complex cavities.

- + Compact and rigid mechanical concept
- + Accura C-axis, the best high-performance axis on the market
- + Linear glass scales: lifetime accuracy
- + Thermostabilization

+ Drive speed and quality

The AgieCharmilles FORM P series leads to high running time without manual intervention thanks to multiple available Automation solutions. Profit from a pallet/electrode changer (linear, rotary, robot) as well as smart features like Part Express and Job List management.

- + The ultimate in ergonomics
- + Intelligent Speed Power Generator based on legendary EDM expertise
- + Fastest graphite technology
- + Fast polishing of deep 3D shapes

+ Shorten your delivery time

GF Machining Solutions' die-sinking EDM know-how is fully embedded in the FORM P series through its EDM process management. Our Intelligent Speed Power Generator (ISPG), in association with innovative feature iGap, maximizes the material removal ratio by generating the best EDM spark settings in keeping a perfect surface finish accuracy.

- + High autonomy and reduction in dead time
- + Boost your competitiveness
- + Increased autonomy without manual intervention
- + Aim: 7,000 hours of EDM machining per year



Optimize your production

Meet customers' expectations

Compact and rigid mechanical concept

A short C-frame construction and the oversized casting guarantee mechanical stability and precision throughout the life of the machine. In addition, the robustness of the machine absorbs all the machining forces to maintain a precise gap between the part and the electrode.

Linear glass scales: lifetime accuracy

To obtain reliable positioning accuracy, only linear glass scales are effective. They eliminate all the classic errors, such as backlash, expansion and wear effects. The axis servo control system developed by GF Machining Solutions is a closed loop measurement solution designed to provide infallible accuracy, whatever the travel.





Accura C axis, the best high-performance axis on the market

It is not unusual to be confronted by machining where the electrodes are incorrectly located, even by such a distance that maintaining their position or stability during machining becomes problematic. Pulsation-induced movements in a liquid (dielectric) medium generate lateral forces (flexural or rotational) on the electrode, which must be resisted by the C axis. Thanks to its very robust design, the Accura C axis allows very high moments of inertia to be absorbed, up to 5000 kgcm².

Thermostabilization

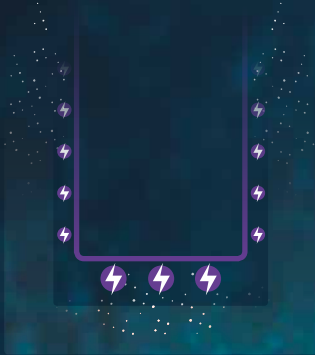
Only available on the AgieCharmilles FORM P 600 as a variant, the thermostabilization provides perfect and accurate machining every time and whatever the temperature conditions.

Higher accessibility

The AgieCharmilles FORM P machines, available in three sizes, are equipped with an automatic drop tank. This allows you optimum access to the work zone.

Drive speed and quality

Flexibility and power guarantee reliable results



Fastest graphite technology
Our dynamic iGAP feature maximizes the material removal rate while maintaining the accuracy of details and consistent surface finish.

The ultimate in ergonomics

Optimal machining strategies are at your fingertip with our AC FORM HMI's clear choices for each application. The operator introduces—on a single screen—machining parameters such as surface state, depth, machining cycle, and type of application to extract the best generator performance.

Strict minimum of electrode use at higher speed thanks to the wear partitioning

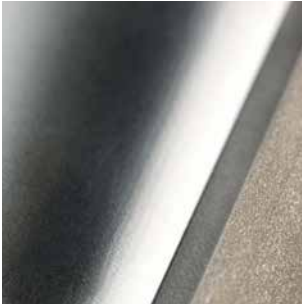
Outstanding productivity on irregular surfaces



Machining time < 4h
AC-K900 graphite electrode x1

Intelligent Speed Power Generator based on our EDM legacy

With our high-end generator, the EDM process is continuously optimized with every pulse, reducing electrode wear on even the finest finishes. Process control takes a fraction of second and produces an extremely homogeneous surface finish.

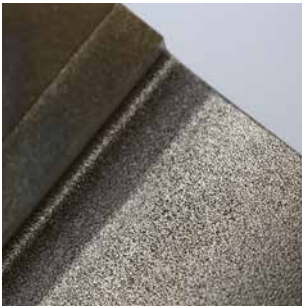


Fast polishing of deep 3D shapes

Reach the finest surface quality inside a deep, full material cavities, significantly reducing polishing time. With our mix-materials function start fast with graphite and finish with copper for high quality.



Machining time including polishing :
10 h 50 min
AC-K900 graphite electrode x2
Copper electrode x1
Surface finish : Ra 0.12 µm

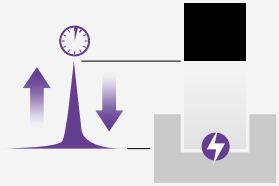


3DS technology perfects your surfaces

The 3DS technology minimizes residue accumulation on molds and reduces friction and ejection forces in the plastic injection process. That means higher productivity and flexibility, greater end- product quality, more repeatability in your mold making process, and homogeneity of granularity.



Machining time including polishing :
6 h 30 min
AC-K800 graphite electrode x2
Copper electrode x1
Surface finish : Ra 1.5 µm



High Velocity Pulsation (HVP)

- Efficient cavity cleaning by rapid retraction
- Good flushing conditions
- Optimum erosion results



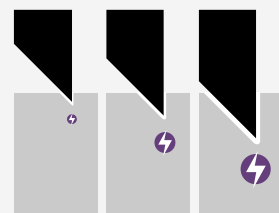
Predict Learning System (PLS)

- Orbital movements are recorded and analyzed.
- Deviation is optimized one step after the other.
- Cavities are made quickly and accurately.



Mastery of spark generator

- Higher removal rate thanks to the ISPG
- Optimize each spark generated by the generator.
- Reduce electrode wear



Controlled process

- Adaptive Current Control (ACC)
- Adaptive Current Optimization (ACO)
- Increase productivity with perfect algorithms.

Ensure positioning precision

To ensure positioning precision, an optical transmission probe can be managed by the AgieCharmilles FORM P 350/600/900. Measurement allows dimensional inspection of machined cavities as well as the taking of references of the part without having to remove it, thus saving a considerable amount of time. Furthermore, a measurement report is automatically generated by AC FORM HMI to accommodate rigorous checking and monitoring.



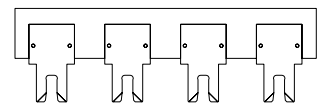
Shorten your delivery time

Unattended machining

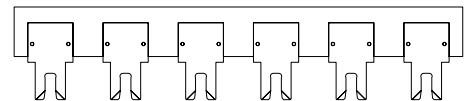
High autonomy and reduction in dead time

The AgieCharmilles FORM P 350/600/900 can be equipped with integrated tool changers, allowing them to work for long periods without human intervention. These linear changers allow satisfactory autonomy for work requiring a smaller number of tools. For the FORM P 900, this integrated tool changer can be installed on the left, on the right or on both sides at the same time keeping machine dimensions to a strict minimum.

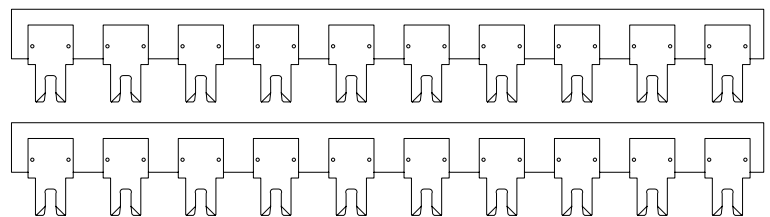
FORM P 350: four positions



FORM P 600: six positions



FORM P 900: ten positions x2



Increased autonomy without manual intervention

Manufacturing a mold often requires a large number of electrodes whose spark erosion time can vary noticeably from one cavity to another. The AgieCharmilles FORM P 350/600 machines have a new rotary changer which offers large storage capacity for up to 160 electrodes. A double gripper clamp reduces unnecessary movements, notably speeding up the loading process.

Aim: 7,000 hours of EDM machining per year

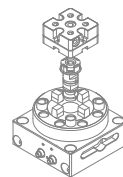
Autonomous cell management maximizes machining time from 2,500 hours on average, to close to 7,000 hours per year. Thanks to the AC FORM HMI, tool changer cycles are optimized and operators can import CAD/CAM data during machining allowing continuous production.



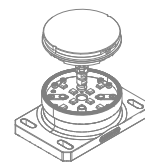
Tooling

Boost your competitiveness

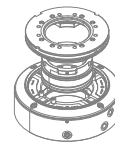
Automation keeps production going whatever the time of day or day of the week. Your results are shorter lead times, higher productivity and quicker payback of capital invested in machines. With automated operations, production can continue running round the clock, seven days a week. The possibilities are endless.



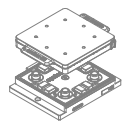
Macro



MacroMagnum



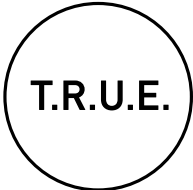
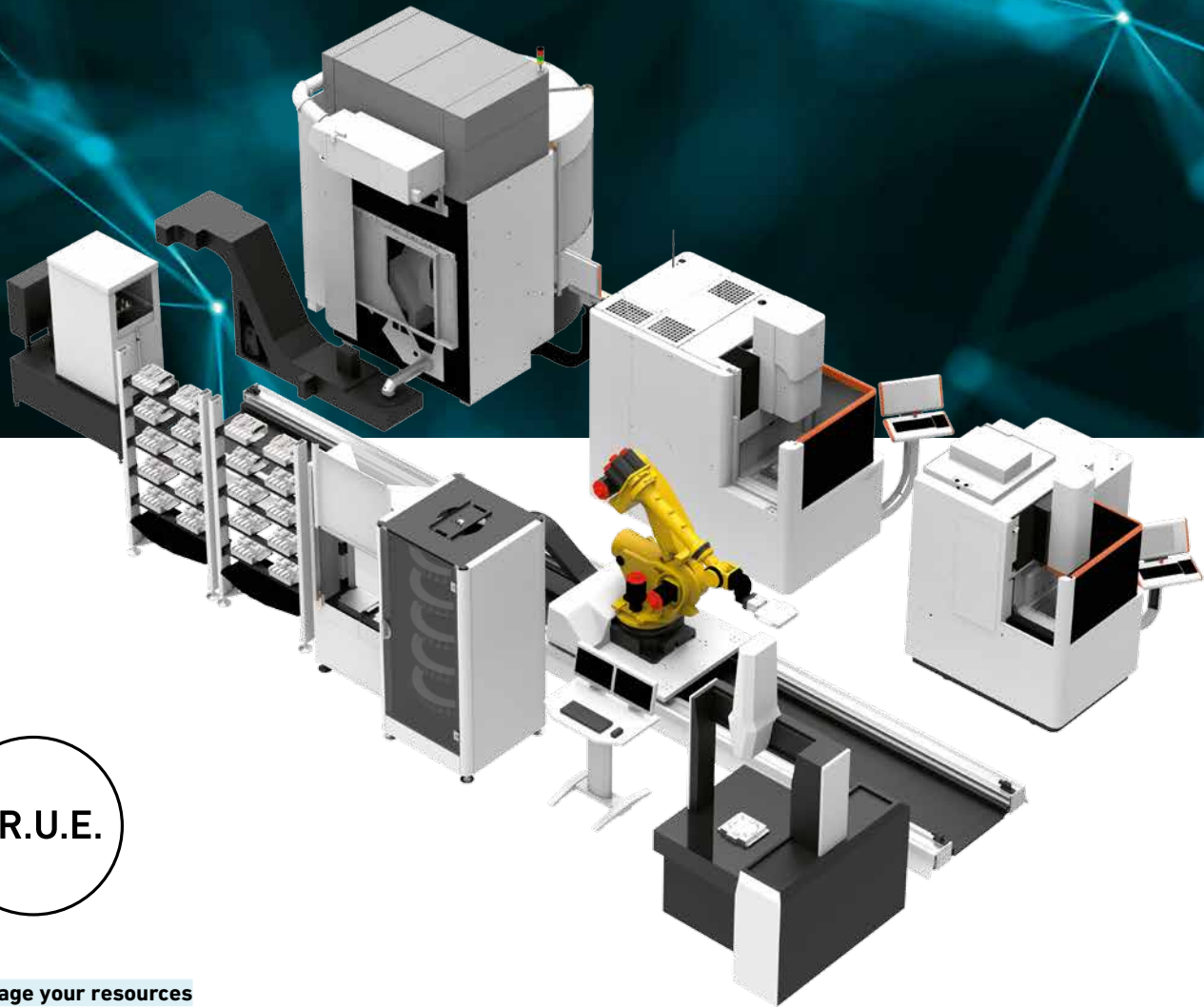
Matrix



Dynafix

Availability is key for your business

Connecting you to the future



Manage your resources

T.R.U.E. (True Response to User Expectation) PRECISION is an innovative manufacturing solution for optimizing the die-sinking electrical discharge machining (EDM) process based on the true geometry of the electrode. This software is used in Automation cells between AgieCharmilles die sinking EDM and Mikron Mill machines through an uninterrupted workflow in order to compare whether the electrodes produced by the Milling machine match with the CAD/CAM data. The aim is to ensure the highest accuracy and consistency on the electrodes produced.

Aligned with Industry 4.0

Aligned with Industry 4.0's vision of the smart factory of the future, T.R.U.E. PRECISION intelligently addresses real-world manufacturing challenges including the growing complexity of parts and molds. Meeting the needs of a mass production intensive market, our Automation cell connecting AgieCharmilles die-sinking EDM machines and Mikron Mill machines for the production of electrodes, manual operator intervention is significantly reduced. T.R.U.E. PRECISION lays the foundation for achieving higher accuracy and tighter tolerances, greater productivity, faster time to market, full predictability, and the cost reductions needed for die-sinking machining.



Industry 4.0

GF Machining Solutions' die-sinking EDM is completely aligned with Industry 4.0 and your need to optimize production processes with intelligent information use. We understand that machines are part of a larger puzzle consisting of creation, simulation and post-processing stages. That's why we collaborate with multiple partners to connect all stages and make them complementary.



rConnect

Secure highest availability with rConnect

rConnect brings smart manufacturing to your workshop. Our innovative applications make machine intelligence always available to ensure that your workshop operates to its full potential at all times.

Your benefits with rConnect

- Detailed information about your machine with your cockpit per machine
- More uptime for your machinery
- Direct and interactive access to our service specialists
- Faster identification of potential problems
- Secure connection based on the latest technology—certified by TÜVIT
- A significant step toward smart services to increase your efficiency



rConnect Live Remote Assistance

With rConnect Live Remote Assistance, rely on our expert engineers to rapidly respond to your service requests. Our solution connects you to our experts for remote assistance in real time.



rConnect Messenger

rConnect Messenger delivers machine data to your mobile device. You gain insight into the efficiency of your workshop by continuously monitoring your machines.

Reduce energy consumption

Manage your resources

Econowatt Smart module: Take action to save energy

For several years, the cost of energy has been spiraling out of control. For this reason, controlling production costs and saving energy have become priorities for all workshops. The Econowatt Smart module makes GF Machining Solutions the industry leader in energy saving and environmental protection.

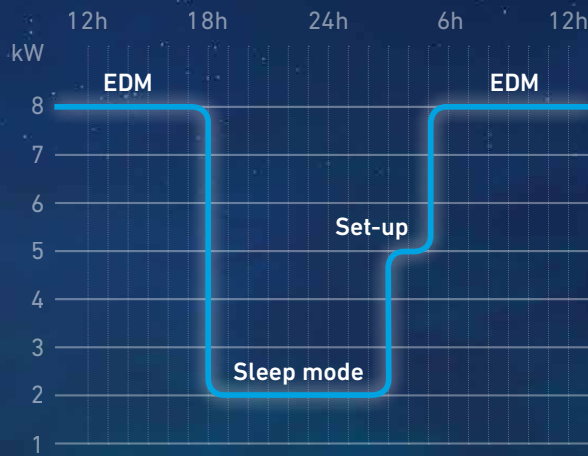
Improve competitiveness

- An automatic wake up can be programmed in a weekly calendar
- Before the scheduled time for restarting work, the machine automatically restarts to enable thermostabilization of the dielectric.
- Each morning the equipment is found in perfect working order, ready to perform precision work.





With the Econowatt Smart module you can save, per machine, enough energy to run two houses for a year.



Accelerate your production to new levels of success

Experience the highest performance of your equipment with GF Machining Solutions Customer Services providing you with unbeatable life cycle support.



Keep pace in a changing environment

As your business evolves, so does its needs, and you can count on GF Machining Solutions for the individually tailored solutions to enhance your operational excellence. We help you keep pace with the continuously changing business and market environments and outperform your competitors.



Operations Support: solutions to boost your applications

Your single source provider of a vast selection of certified consumables including electrodes and filters to achieve optimum level of performance.



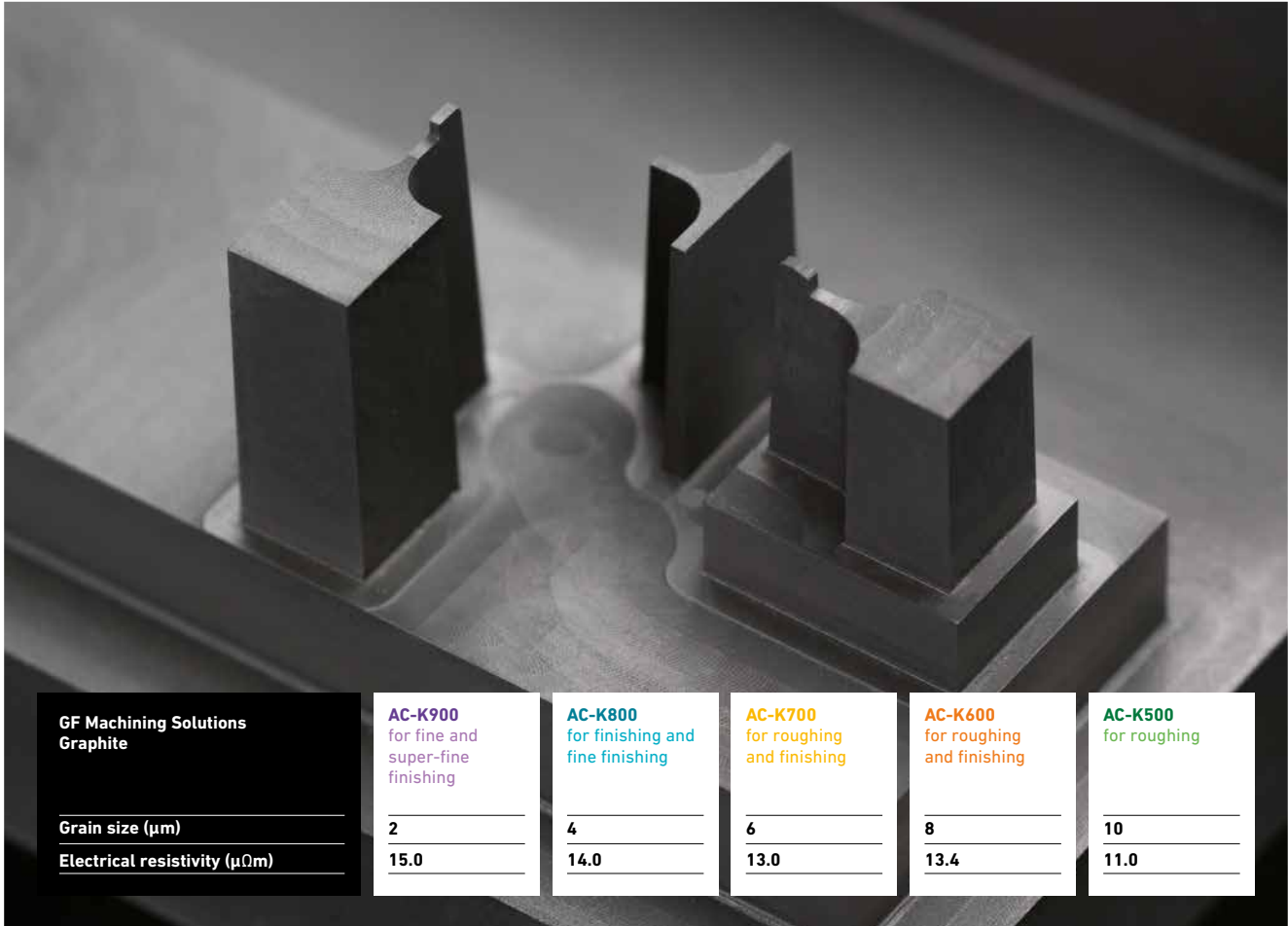
Machine support: securing your sustainable machining success

Preventive maintenance as well as advanced preventive services such as circularity tests with ball bar or laser calibration will optimize your uptime.



Business support: realize the full potential of your equipment

Advanced support and consulting—including training, upgrades and dedicated Automation solutions—to improve your performance, productivity and competitive edge.



EDM graphite

Increase your productivity, optimize your costs and time

GF Machining Solutions offers various grades of graphite with a wide range of performance characteristics. Each grade can be dedicated to a specific range of applications.

Easy and quick machining, no deburring

Excellent machinability result in high cutting speed rate and time savings in electrode production. In contrast to copper electrodes, graphite electrodes require no additional deburring operation.

Higher removal rate and high resistance to wear compared to copper

Optimal erosion time and minimal electrode wear results in both cost and time savings.

High thermal stability and high resistant to thermal shock

Electrode dimensions remain stable during the erosion process and high current densities are maintained. Graphite's light weight makes it easier to manage and handle large electrodes and optimize electrode costs.

Saw-cut service

- We can cut your graphite block to the size you need and in the grade that best fits your application.
- Contact your local partner to discuss your desired dimensions and graphite grade.

Technical specifications



FORM P 350



FORM P 600



FORM P 900

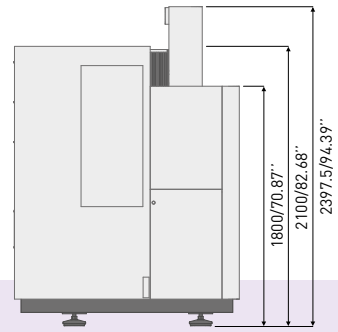
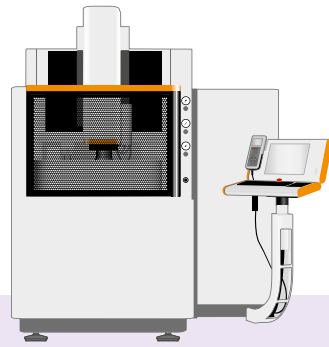
		FORM P 350	FORM P 600	FORM P 900
Machine				
Architecture		C-frame/Fixed table/Drop tank		
Dimensions (*)	mm (in)	1900 x 1690 x 2398 (74.80 x 66.53 x 94.4)	2265 x 2110 x 2780 (89.17 x 83.07 x 109.45)	2970 x 3100 x 3320 (116.93 x 122.05 x 130.71)
Total weight (without dielectric)	kg (lbs)	2800 (6173)	4500 (9920)	7000 (15432)
Floor space (**)	mm (in)	1900 x 1690 (74.80 x 66.53)	3040 x 2830 (119.68 x 111.42)	2970 x 3100 (116.93 x 122.05)
Complies with "Machines, Safety and Health" directive		89/392/CEE	89/392/CEE	89/392/CEE
Complies with "Electromagnetic Compatibility" directive		89/336/CEE	89/336/CEE	89/336/CEE
X, Y, Z axes				
X, Y, Z travel (*)	mm (in)	350 x 250 x 300 (13.78 x 9.84 x 11.81)	600 x 400 x 450 (23.62 x 15.75 x 17.72)	900 x 700 x 500 (35.43 x 27.56 x 19.68)
X, Y, axes speed	m/min (ft/min)	6 (19.7)	6 (19.7)	6 (19.7)
Z axis speed	m/min (ft/min)	15 (49.2)	10 (32.8)	7.5 (24.6)
Positioning resolution X, Y, Z	µm (in)	0.05 (0.000002)	0.05 (0.000002)	0.05 (0.000002)
Work area				
Worktank size (*)	mm (in)	790 x 530 x 350 (31.1 x 20.87 x 13.78)	1220 x 870 x 470 (48.03 x 34.25 x 18.50)	1814 x 1215 x 700 (71.42 x 47.83 x 27.56) Extendable in X
Worktable size (**)	mm (in)	500 x 400 (19.68 x 15.75)	750 x 600 (29.53 x 23.62)	1100 x 900 (43.31 x 35.43)
Distance floor to clamping level	mm (in)	1000 (39.37)	1000 (39.37)	1100 (43.31)
Min./Max. distance between table and chuck	mm (in)	150/450 (5.91/17.72)	150/600 (5.91/23.62)	322/822 (12.68/32.36)
Workpiece and electrode				
Max. electrode weight	kg (lbs)	50 (110.23)	50 (110.23)	50 (110.23)
Max. workpiece weight	kg (lbs)	500 (1102.31)	1600 (3527.40)	3000 (6613.86)
Max. workpiece dimensions (*)	mm (in)	790 x 530 x 275 (31.1 x 20.87 x 10.83)	1220 x 870 x 470 (48.03 x 34.25 x 18.50)	1814 x 1215 x 600 (71.42 x 47.83 x 23.62)
Bath level (programmable)	mm (in)	100 - 325 (3.94 - 12.8)	100 - 430 (3.94 - 16.93)	100 - 630 (3.94 - 24.80)

* Width x depth x height ** Width x depth

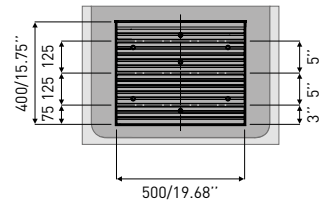
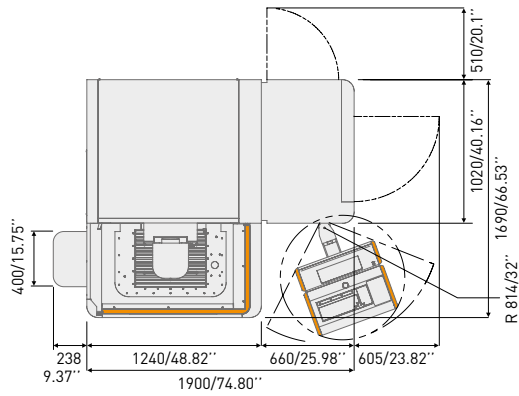
		FORM P 350	FORM P 600	FORM P 900
Dielectric unit				
Capacity	l (gal)	410 (108.65)	700 (184.8)	2500 (662.5)
Number of filter elements and type		4 Paper filter	6 Paper filter	8 Paper filter
Generator				
Generator type		ISPG	ISPG	ISPG
Max. machining current (option)	A	80 (140)	80 (140)	80 (140)
Best surface finish	µm Ra	0.08	0.08	0.1
Electrical supply standard				
Standard voltage		3 x 380V/400V ± 10%. 50/60Hz (50Hz standard)		
Cooling				
Heat exchanger dielectricum/water for the dielectricum		Integrated	Integrated	Integrated
Control Unit				
Operating system		Windows		
Data input		15" LCD screen, mouse or touch screen, keyboard and remote control		
User interface		AC FORM HMI		
Expert systems		TECFORM		
Console support		Movable on cabinet or on foot		
Modules				
Z axis (15 m/min)		Standard	—	Option
Linear tool changer (*)		4 (Std. tooling) 5 (Combi tooling)	6 (Std. tooling) 6 (Combi tooling)	10 (Std. tooling) Left 10 (Std. tooling) Right
Rotary tool changer (*)		16-80 pos. (Std. tooling) 32-160 pos. (Combi tooling)	16-80 pos. (Std. tooling) 32-160 pos. (Combi tooling)	— —
Flushing Injections		2 Laterals, 1 through the piece, 1 through the electrode, 1 suction		
Heat exchanger air/water for the cabinet		Option	Option	Option
Multicavity flushing 6 outputs		Option	Option	Option
3D probe measuring system for Erowa or System 3R		Option	Option	Option
iQ graphite and copper module for reduction of electrodes' wear		Standard	Standard	Standard
Standard C-Axis (*)				
Max. electrode weight on automatic chuck	kg (lbs)	25 (55.12)	25 (55.12)	25 (55.12)
Rotation speed	rpm	0-100	0-100	0-100
Max. inertia	kgcm ² (lbsin ²)	2000 (683)	2000 (683)	2000 (683)
Accura C-Axis (*)				
Max. electrode weight on automatic chuck	kg (lbs)	25 (55.12)	25 (55.12)	25 (55.12)
Rotation speed	rpm	0-100	0-100	0-100
Max. inertia	kgcm ² (lbsin ²)	5000 (1700)	5000 (1700)	5000 (1700)

* Option

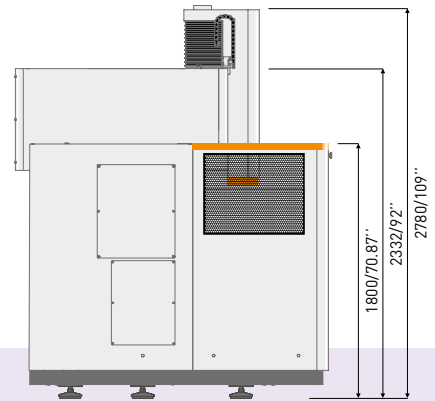
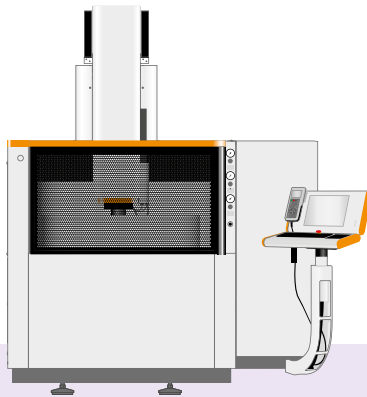
FORM P 350



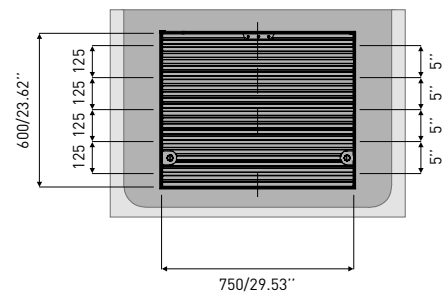
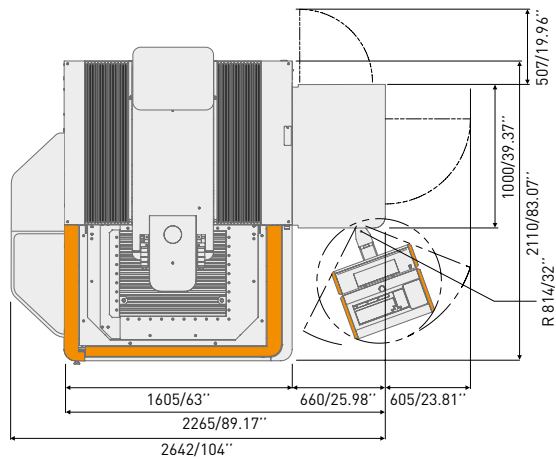
FORM P 350 + LTC



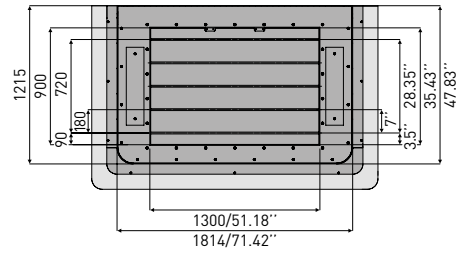
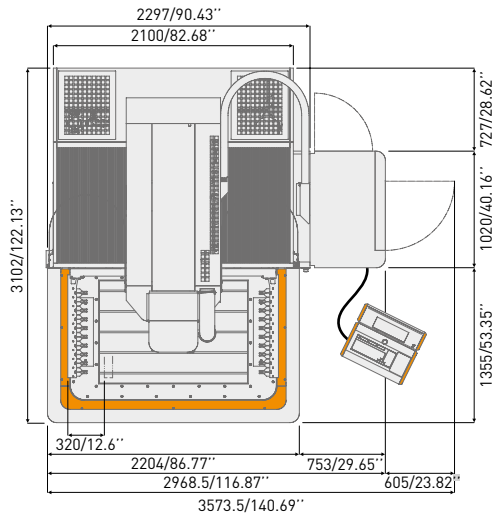
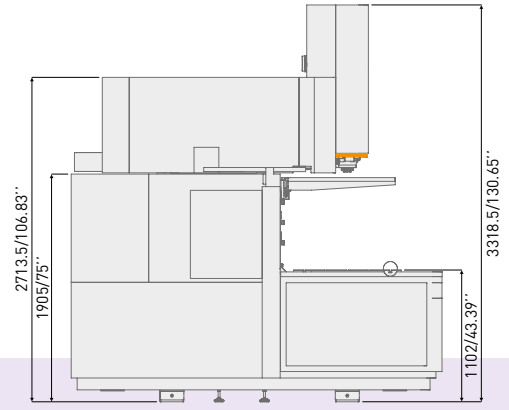
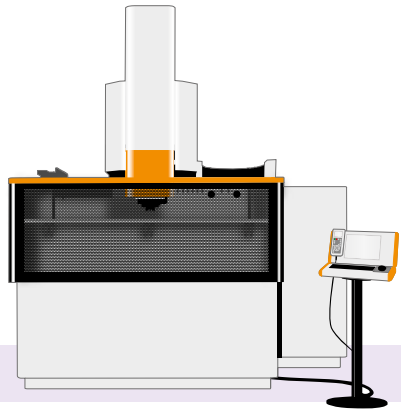
FORM P 600



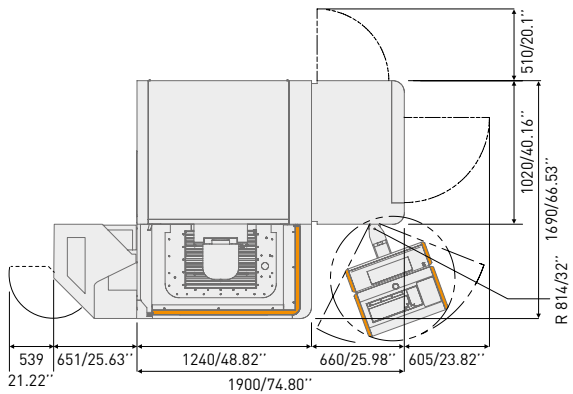
FORM P 600 + LTC



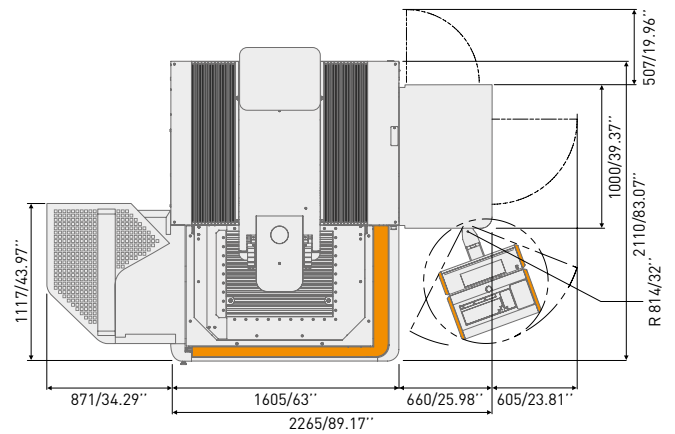
FORM P 900



FORM P 350/600 + Rotary tool changer (RTC)



FORM P 350 + RTC



FORM P 600 + RTC

GF Machining Solutions



EDM (electrical discharge machining)

AgieCharmilles wire-cutting, die-sinking and hole-drilling machines

For over 60 years we have been at the forefront of every EDM development: designing and refining the EDM process and building machine tools that deliver peerless part accuracies, surface finishes, cutting speeds and process reliability. Today, our AgieCharmilles wire-cutting, die-sinking and hole-drilling machines are recognized throughout the world as the best in the business. Our continuous research and development in digital generator technology, control systems and integrated Automation systems are evidence of our commitment to keeping your EDM operations on the leading edge of technology.



Laser

AgieCharmilles Laser texturing machines

Laser texturing is a fully-digitized surface engineering process that has huge potential. The technology enables precise 2D and 3D textures or engravings to be machined accurately and directly onto complex parts or molds to improve and alter their aesthetic appeal, functionality and performance. The process is infinitely repeatable and offers many distinct environmental and economic advantages over conventional texturing processes.

Laser Additive Manufacturing (AM)

GF Machining Solutions has partnered with EOS, the global leader for high-end AM solutions, to integrate this innovative technology and further develop it into its current solutions to fully benefit the mold industry, by focusing on injection efficiency: optimized cooling design to reduce cycle time, lower energy consumption, higher quality of plastic parts.



Tooling and Automation

System 3R Tooling, Automation and software

Productivity is the key to manufacturing success, and automating a manufacturing process is a proven method of increasing its efficiency, effectiveness, quality and reliability. System 3R's integrated Tooling, Automation and software solutions ranging from simple workpiece pallet and electrode changers through to flexible manufacturing and robot handling systems are guaranteed to help you increase their competitive advantage.



Milling

Mikron MILL S (high-speed Milling), Mikron MILL P (high-performance Milling) and Mikron MILL E (high-efficiency Milling)

Customers operating in the mold, tool and die and precision component manufacturing sectors stake their reputations on being able to quickly and cost-competitively meet their customers' demands. That's why they invest in GF Mikron machines. Incorporating the latest and most advanced technologies and premium-performance components, Mikron MILL S, Mikron MILL P and Mikron MILL E machines help you increase your production capabilities and improve your productivity. Designed and built for speed, accuracy and reliability, the machines, like you, are proven performers.

Liechti dedicated aerospace and energy machining centers

Aerospace and power generation turbine manufacturers increasingly turn to Liechti dedicated five- and six-axis machining centers to machine complex, high-precision airfoils on blades, disks, blisks, blisks/IBRs and impellers. It's easy to see why because these machines, with their specific profile machining technology, specialized CAD/CAM software and engineering competence for ultra-dynamic machining in titanium, Inconel, nimonic, titanium-aluminide and high-alloy steels, yield productivity gains as much as 30 percent, thanks to reduced machining times. In the globally competitive aerospace and power generation manufacturing sector, that's definitely worth shouting about.

Step-Tec Spindles

At the heart of every GF Mikron machining center is high-performance Step-Tec Spindle. Step-Tec Spindles are essential core components of our machining centers. Highly accurate and thermally stable Step-Tec Spindles ensure that our machines can handle everything from heavy-duty roughing to fine-finishing operations.



Customer Services

Operations Support, Machine Support and Business Support

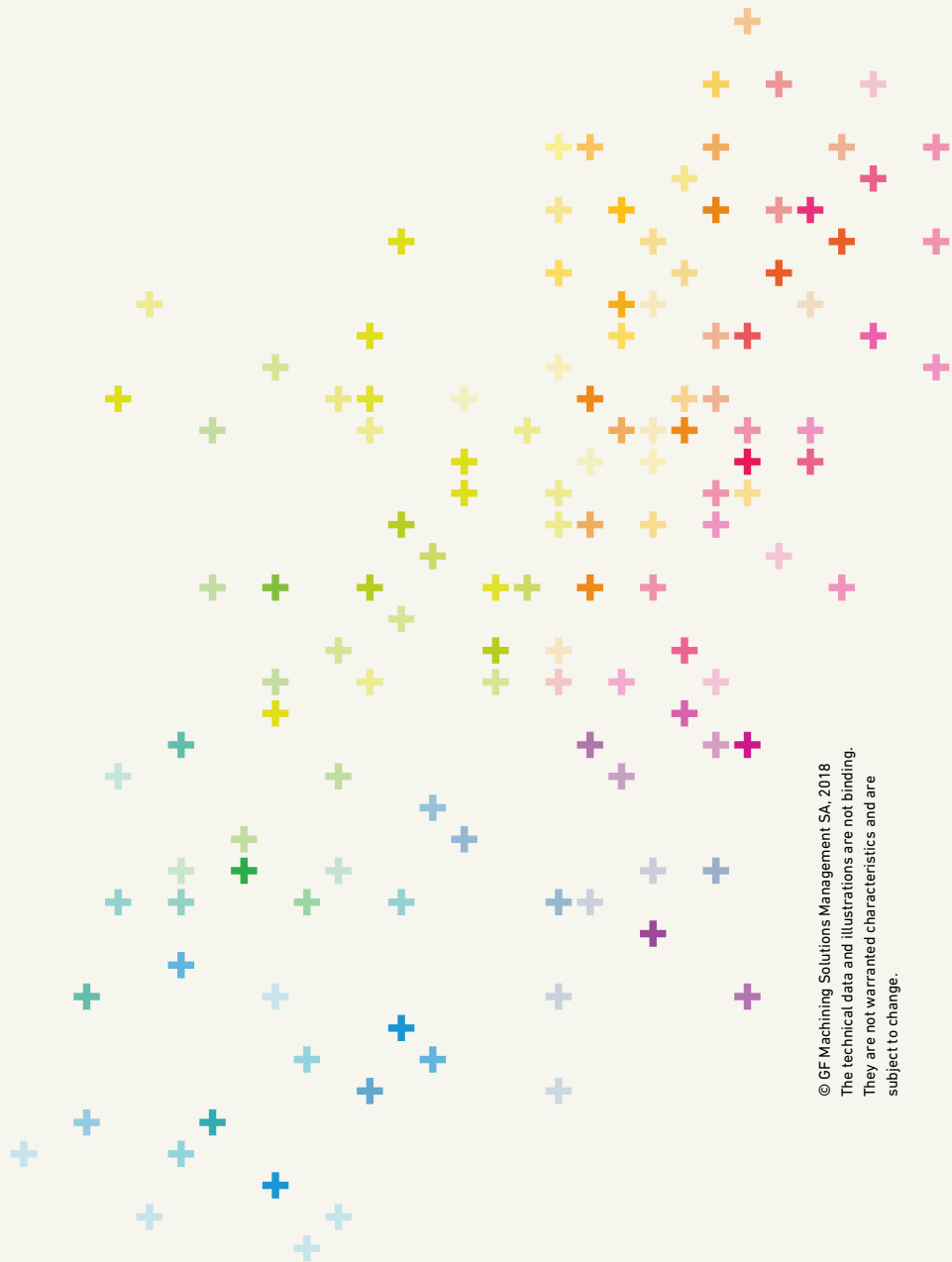
To help you get the most and the best from your machine tools and equipment, we offer three levels of support. Operations Support covers our range of original wear parts and certified consumables (EDM wires, filters, resins, electrodes etc.) to ensure that your machines are performing at the highest levels. Machine Support maximizes, through our best-in-class technical support, preventive services and quality spare parts, your machine tool uptime. Business Support is designed to help you make a real step-change in your productivity and performance with solutions tailored to your specific needs.



At a glance

We enable our customers to run their businesses efficiently and effectively by offering innovative Milling, EDM, Laser, Additive Manufacturing, Spindle, Tooling and Automation solutions. A comprehensive package of Customer Services completes our proposition.

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