

Date 18.12.2019

## BASIC SCOPE OF SUPPLY



**FORM X 400**

Validity: From 18.12.2019 to the next revision.

The printed document is not authentic.

Only data from TeamPortal are authentic.

Product      FORM X 400

## MACHINE DETAILS

GF Machining Solutions is pleased to propose the AgieCharmilles FORM X 400 die-sinking electrical discharge machining solution equipped with a personal computer (PC) numerical control, utilizing micro-processors that allow the automatic machining of ribs and cavities, from roughing to finishing. Thanks to the AC FORM human-machine interface (HMI) the automatic step-by-step execution of elementary machining operations, machining cycles, part programs and any other necessary operations between programs (e.g., as tool changing, filling up the work tank) are managed. The plus of this machine's generator is that the generator has been upgraded in order to allow you to achieve perfect and accurate part during micromachining.

- Space saving compact design.
- The Z axis is able to reach a maximum speed of 15 m/min (49.2 ft/min), with an acceleration speed of 10 m/s<sup>2</sup> (32.8 ft/s<sup>2</sup>)
- Travers for X,Y and Z travel of 6 m/min (19.7 ft/min) for fast tool changing and measuring time.
- X, Y and Z are cooled with thermo-stabilized dielectric allowing a constant temperature environment
- Z axis assembly benefits from a special thermo-stabilized network to avoid thermal expansion according to the environment temperature.
- Collision protection on all axes
- The symmetrical design concept of every single component ensures a predictive behavior of the machine geometry.
- Additionally, with its fully automatic thermos-compensating system, each machine axis is individually optimized to guarantee the highest accuracy in the workshop environment.
- GF Machining Solutions' Intelligent Speed Generator (ISPG) for best performances and results:
  - 80 ampere (standard)
  - 140 ampere (option)
- iQ module for graphite: reduction of wear to a minimum with almost all types of graphite
- iQ module for copper: reduction of wear to a minimum with copper electrodes

The machine can be equipped (variant) with an integrated C axis.

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## INCLUDED FEATURES

### MACHINE

**995001171 FORM X 400**



#### Design

- Machine dimensions:
- 1410 x 2460 x 2660 mm
- 55.5 x 96.8 x 104.7 in
- Short, cast-iron C frame to ensure static and dynamic rigidity of the mechanical structure
- X, Y and Z axes are laid out above the main column
- This arrangement guarantee optimum accessibility and accuracy
- Machine equipped with a Z axis

#### Regulation

- Machinery directive 89/392/EEC
- EMC directive 89/336/EEC (EN 55011/Emission and EN 50082-2/Immunity)
- Low voltage directive 73/23/EEC

NB: For the machines sent outside Europe the regulation will not fully comply with the EMC norms but fully complies with safety regulation.

#### X, Y, Z axes

- Travel:
- 400 x 300 x 350 mm
- 15.7 x 11.8 x 13.8 in
- Maximum manual displacement speed (X, Y):
- 6 m/min
- 19.7 ft/min
- Maximum displacement speed (Z):
- 15 m/min
- 49.21 ft/min
- Maximum machining acceleration (X, Y):
- 4 m/sec<sup>2</sup>
- 13.12 ft/sec<sup>2</sup>

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- Maximum machining acceleration (Z):
  - 10 m/sec<sup>2</sup>
  - 32.8 ft/sec<sup>2</sup>
- Axes equipped with precision linear rolling guide way increasing the movement accuracy and machining accuracy
- X, Y and Z equipped with loop servo control (Positioning control with glass scales and encoder) ensure pitch accuracy
- Linear displacement of all axes are inspected and software corrected using laser interferometer equipment according to the ISO 230-1 (geometric accuracy of machines) and ISO 230-2 (test code for machine tools - Determination of accuracy and repeatability).
- Automatic system provide optimum and permanent lubrication of the machine's vital components (PMC controlled)
- Spindle designed to receive a C axis, various chucks of EROWA, System 3R, HIRSCHMANN and MECATool
- 4 flushing systems, with pressure gauge, allowing the following possibility:
  - 2 laterals flushing
  - 1 workpiece injection flushing
  - 1 electrode injection flushing
  - 1 dielectric suction
- Continuous high-pressure injection, adjustable from 0 to 1.5 bars, lateral or through the workpiece
- Pulsed flushing injection synchronized with retraction of the electrode when pulsating

#### **Machine table**

- Fix table (50 mm hole pattern)
- The three sides drop tank allow easy access to the machining zone
- Dielectric level is programmable as well as the drop tank position
- Double check system stops the machine if the level of dielectric falls below the pre-set level or if there is an excessive rise in the temperature of the dielectric

#### **Front protection**

Front protection can be slid up and down with the button located next to the remote control.

#### **Dielectric unit**

This includes:

- Filtration of dielectric
  - Flushing
  - Filling of dielectric
  - Maintaining the dielectric level
  - Cooling the dielectric level
- 4 integrated paper cartridge filter

Closed loop heat exchanger allows connection to separate cooling system to maintain dielectric temperature.

Dielectric cooling circuit using heat exchangers built in to the reservoir; automatic regulation of outside cooling fluid flow done by an accurate temperature sensor.

#### **Electrical cabinet and power supply**

The electrical cabinet incorporates:

- Pulse spark generator
- Numerical control windows

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- All the power of the machining center

Standard voltages available:

- 380 V
- 400 V

Voltage variation: +/- 10%

Micro breaks less than 4 ms (permitted)

Integrated battery back-up system guarantees memory retention for 100 hours without external power.

For other voltage supplies an autotransformer is necessary.

### **Remote control**

2 types:

- With buttons (standard)
- With hand wheel (option)

Main functions are:

- Start and stop
- Axes controlled (movement, direction and speed)

Touch screen with same function on console

### **Generator/Technology**

- Intelligent Speed Power Generator (ISPG): 80 A (standard) and 140 A (option)
- Constant optimization of the orbiting movements for high efficiency planetary erosion with PLS (Predictive Learning System)
- Automatic optimization and maximum security of the EDM process with ACC/ACO
- Automatic selection and adaptation of the technology based on machining objectives and electrode data for a maximal removal rate and minimum electrode wear with TECFORM
- Upgraded generator that allow you accurate micromachining for very thin parts

### **SPAC**

- Allows eliminating any short circuit by applying a specific discharge during a fraction of a second.
- Can be activated according a configuration whatever the current value except during pulsation using capacitors

Multi-task Numerical Control / Human Machine Interface (HMI)

- GF MS Homemade CNC unit is a high performance multiprocessor Pentium with 2 Gigabytes of RAM which provides fast processing with a high level of reliability.
- AC FORM HMI offers 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.
- Allows multi-tasking allowing the operator preparing the next job to regain control of the machining by changing a page with a simple pressure on the screen icon or menu.
- Programs and data files are stored into 64 Gigabytes hard drive.
- The control is equipped in standard with
  - Ethernet Board
  - Port RJ 45

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- 2 USB ports
- Communication protocols available are:
  - TCP/IP
  - IPX
  - NetBEUI

All the following steps are available during machining:

- JOB: create new job or re-using an existing one or use job model
- TOOLS: describe the number of electrode, the under-sizes, and the offset
- PARTS: information about the workpiece such as, quantity, references, workpiece high
- CAVITIES: information about the location of a single or multi-cavity (definition can be done by using pre-defined patterns)
- EDM: All information regarding the machining is summarized on a single screen to generate automatically the machining strategy
- SEQUENCE: define in an easy way the complete machining process, which electrode will be used and for which cavities. Also, the graphic simulation is available to check a job before executing the program
- ISO: Based on all the above information, the CNC will generate the complete ISO program including generator setting, tool change, positioning of the cavity...

Large choice of additional functionalities

Measuring cycles for tooling:

- REFERENCE BALL: This cycle is used to define one reference point in the space that will be used to measure the tools offsets
- TOOL ALIGNEMENT 1: This cycle gives the possibility to find out the angle of the electrode by measuring on one surface. This offset will be taken into account on each motion of the C axis
- TOOL ALIGNEMENT 2: This cycle gives the possibility to find out the angle of the electrode by measuring on Z and one surface. This offset will be taken into account on each motion of the Z and C axis
- TOOL OFFSET 1: This cycle is used to define the tool offset in X, Y, Z. All these offsets will be automatically loaded into the offset table
- TOOL OFFSET 2: Same as above cycle, except that this cycle is used for dissymmetric electrode that needs more travel on one axis as on the other one

Measuring cycles for the work piece:

- EDGE: Measuring one edge of the work piece in Z, X or Y-axes or 3D measuring vectors
- CENTERING: Used to define the centre of a hole or a cavity on 1 or 2 axes(X, Y)
- EXTERNAL CENT. 1: This cycle is used to find the centre of a work piece by measuring on the external surface
- EXTERNAL CENT. 2: Same as the above cycle, except that in this case, a cavity is already located on the surface and need to offset the first probe (i.e. X, Y or Z)
- CORNER: Used to define the corner of a work piece
- PART ALIGNEMENT 1: This cycle gives the possibility to find out the angle of work piece by measuring on one surface. This value will be taken into account for all motions of the axes X, Y, Z and C
- PART ALIGNEMENT 2: This cycle gives the possibility to find out the angle of work piece by measuring on Z and one surface. This value will be taken into account for all motions of the axes X, Y, Z and C. 2
- HOLES ALIGNEMENT: This measuring cycle offers the possibility to define the angle of the work piece by measuring inside two holes

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- 3 POINTS INT. CENT: Measuring the internal centre of a hole by probing on 3 points
- 3 POINTS EXT. CENT: Measuring the external centre of a work piece by probing on 3 points

Machining cycles:

All these cycles have a specific ISO code which is completely transparent for the operator during the programming.

- DOWN: Plunge cut machining on one, two or three axes simultaneously
- ORB: This cycle combines the plunge and the orbital translation on a 45° cone
- EXPAN: This cycle plunge and a plane orbital translation
- ISOGAP: Equidistant gap machining along X, Y, Z
- CYLINDER: Combine plane orbital translation and plunge
- CONE: Conical machining opening upwards or downwards under an angle between 0-90° and around X, Y or Z-axis
- DIAG: This cycle enables the machining in the diagonal of a cavity. The operator can choose the number of diagonal as well as the angle of the translation
- HELIC: Helical machining with C-axis (option)
- TRAJECTORY: This cycle allows to define a trajectory of a profile by defining each segment (X, Y, Z, C) or (X, Y, Z, contouring mode)

N.B.: All the above machining cycles (except Helic) are index able in any direction in the space (3D)

### Execution

This module is dedicated for operation's linked to the sparking of cavity:

- CONFIGURATION: Operator can configure the way to execute a program and make a simulation.
- GAP: Where all the sparking parameters are located (M, C, V, P, A, VPULS, T, B, R, U, SV). The operator has the possibility to modify these parameters of the current program. Also information of the sparking conditions is displayed as well as a graph of the removal rate.
- FOLLOW-UP: Overview of the ISO program in progress as well as generator settings. Visual graphic during machining.
- SEAUENCES FOLLOW: Displays the machining sequence (actual + coming sequences)
- HISTORY: Each generator setting executed will be stored in table with some indications about execution time, sequence references, machining cycle, machining time, etc.
- JOB LIST: Organize Job sequence according to manufacturing priorities
- PART EXPRESS: Allow interrupting the operation in progress in order to insert a more urgent Job.

### Execution - Additional functionalities

- Dielectric management: Operator can set manually the flushing during machining
- Manual movement (X, Y, Z and C axes): move manually axes individually or simultaneously.
- Other: spindle on/off, retract the electrode from the cavity or contour and electrical touch on/off.

NB: Jobs described or executed are listed on a file. The operator can visualize the description of the file, modify or execute a Job. Operator can also use a Job as model and the explorer gives you the opportunity to copy, delete and rename the file.

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## VARIANTS

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### **EDMX.01 Special colors for the complete machine**



Colors have to be specified using RAL or NCS standards.

### **EDMX.02 Console on pedestal**



### **EDMX.08 Console on rotative support (Attached to the machine frame)**

### **EDMX.16 Remote control (with hand wheel)**





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**EDMX.06 Remote control (with button)**



**EDMX.10 3R Macro chuck**



- Mounted ex works
- Required air pressure => 7 bar

**EDM.001 Quill equipment 3R-Macro/Combi mounted ex works**



- Mounted ex works
- Required air pressure => 7 bar

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**EDM.034 3R Macro Nano**

**EDM.058 3R Macro HP chuck**

- Mounted ex works
- Required air pressure => 7 bar

**EDMX.13 Erowa ITS chuck**

- ER-010591 1 pcs Uniholder
- 1 pcs Chucking spigot
- 1 set of 5 pcs insert plates



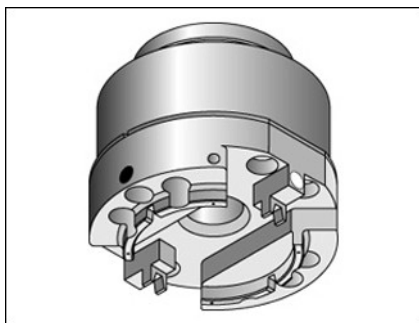
**EDMX.14 Erowa ITS-Compact chuck**

- Mounted ex works
- Required air pressure => 7 bar



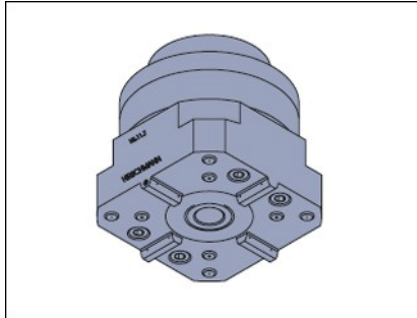
**EDM.002 Quill equipment Mecatool GPS 70 mounted ex works**

- Mounted ex works
- Required air pressure => 7 bar



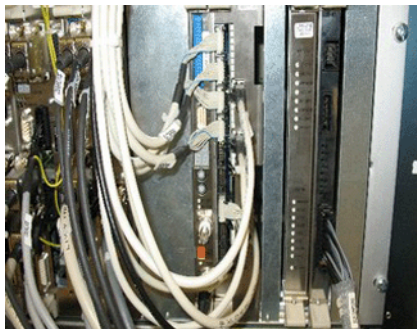
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**EDMX.15 Hirschmann System H8.11.7 chuck**



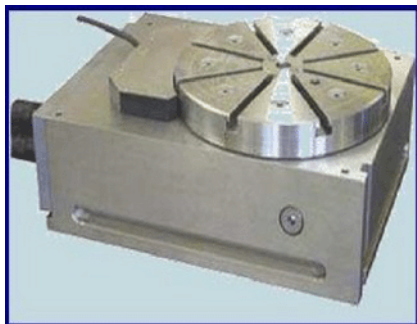
- Only in combination with quill equipment

**D08.013 Hardware and software kit to control one rotary axis**



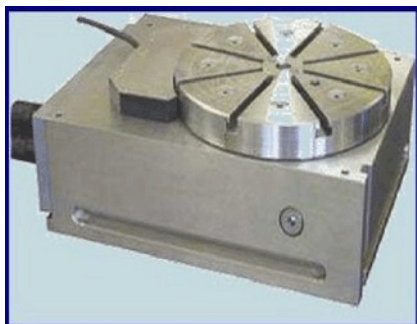
Kit for additional axis

**D08.014 Additional Axis JS R-10226D--115 steel**



Additional Axis JS R-10226D--115 steel

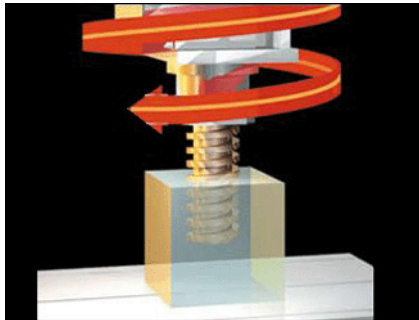
**D08.015 Additional Axis JS R-10340D--175 steel**



Additional Axis JS R-10340D--175 steel

Product FORM X 400

**D08.003 Standard C-axis**



L'asse C (senza mandrino) è incorporato nella testa dell'asse Z ed è compatibile con il sistema EROWA, System 3R, MECATOOL e HIRSCHMANN. Il sistema di utensili deve essere specificato all'atto dell'ordine.

Ha tre funzioni principali:

- Rotazione di un elettrodo con velocità permanente, selezionata tra 1-100 giri/min
- Indicizzazione dell'elettrodo su un determinato angolo programmato nell'NC
- Asse di lavorazione controllato, solitamente funziona insieme con uno o più assi lineari (controllo simultaneo), ad esempio per la lavorazione della forma di un mandrino (modalità di lavorazione HELIC).

Predisposizione per il lavaggio del dielettrico centrale.

Il bloccaggio dell'elettrodo è fatto da pneumatico e può essere attivato manualmente o automaticamente

Specifiche tecniche:

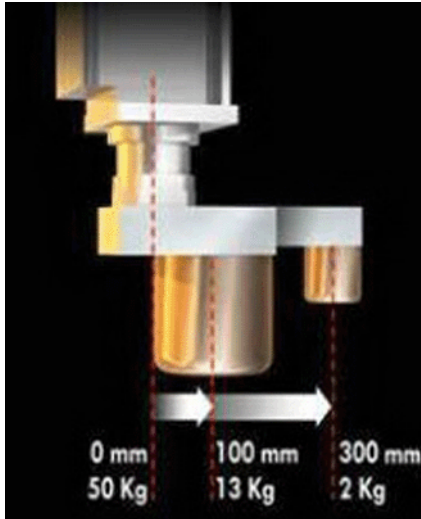
Peso massimo dell'elettrodo con l'asse C: fino a 50 kg (dipende dal mandrino)

Per uso sia statico che dinamico:

Inerzia massima dell'elettrodo	2000
kg/cm <sup>2</sup>	
Risoluzione di misurazione	0.1 mdeg
Gamma di velocità di rotazione	da 0.2 a
100 giri/min	
Coppia massima	8 Nm
Risoluzione indicizzazione	0.001°
Corrente massima di lavorazione (statica e rotante)	140 A

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**D08.004 Accura C-axis with high inertia**



The « ACCURA-C » is a high performing C-axis which is compatible with EROWA, System 3R, MECATOOL and HIRSCHMANN tooling systems. The tooling system must be specified with the order.

Fully integrated in the Z-axis working head, the “ACCURA-C” is a direct driven axis, which allows high accuracy in positioning and a high inertia.

Mainly dedicated for applications requiring a high level of precision (i.e. Gears) and/or when using electrode having an inertia up to 5000 kg/cm<sup>2</sup>.

ACCURA-C has three main functions:

- Rotating an electrode with a permanent speed, selected from 1-100 rpm.
- Indexing the electrode to a certain angle programmed in the NC.
- Controlled machining axis, usually operating together with one or more linear axis (simultaneous control), e.g. for machining a spindle shape (machining mode HELIC).

Provision for central dielectric flushing.

Electrode clamping is made by pneumatic and can be activated manually or automatically.

Technical specifications:

- Maximum electrode weight with Accurca C-axis: up to 50kg (depends on the spindle chuck)

For both static and dynamic use:

- Maximum electrodes inertia:
  - 5000 kg x cm<sup>2</sup>
- Measuring resolution:
  - 0.1 mdeg
- Rotation speed range:
  - 0.2 to 100 rpm
- Maximum torque:
  - 28 Nm
- Indexing resolution:
  - 0.001°
- Maximum machining current (Rotating and static):
  - 140 A

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## D08.007 Multi Flushing



Multi-Flushing with 6 additional programmable outlets  
Additional multi cavities flushing system provided with 6 outlets for programmable pressure flushing.

## D08.005 Preparation for Fire extinguisher

Total Walther.  
Drop shutter 12V for the smoke extraction opening included,  
CO2 bottle and release unit not included.

## EDM.048 3 Dimension Structure

Set of strategies & technologies for texturing mold machining.  
This option releases the access to dedicated EDM process algorithm and machining strategies for burning mold cavities in modulating the surface finish state.

Thanks to a specific generation of machining strategies and technologies, the aspect of the surface (texturing) has been improved. This allows customers to improve the mold aspect and quality, and to increase the productivity during injection process.

### 3 Dimension Structure in Copper-Steel:

- FORM E: Not available
- FORM P: Available on FORM P 350 (1)
- FORM X: Available on FORM X 400/600 (1)

### 3 Dimension Structure in Graphite-Steel:

- FORM E: Not available
- FORM P: Available FORM P 350 / 600 / 900 (2)
- FORM X: Available on FORM X 400/600 (2)

(1) "IC" Application

(2) "Surface 2" Application

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## TOOL CHANGER

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### **D08.019      Automation kit for external robot (left)**

This kit is needed when willing to connect and external robot to the machine. It includes cables, connectors and software handling the communication between the machine and the robot.

Robot is to be located on the left side of the machine (when looking at the machine from the front).

### **D08.020      Automation kit for external robot (right)**

This kit is needed when willing to connect and external robot to the machine. It includes cables, connectors and software handling the communication between the machine and the robot.

Robot is to be located on the right side of the machine (when looking at the machine from the front), and the console will be installed on the left side, on pedestal.

### **D08.021      Automation kit for System 3R (left)**

This kit is needed when willing to connect and external robot from System 3R (like WPT1+) to the machine. It includes cables, connectors and software handling the communication between the machine and the robot.

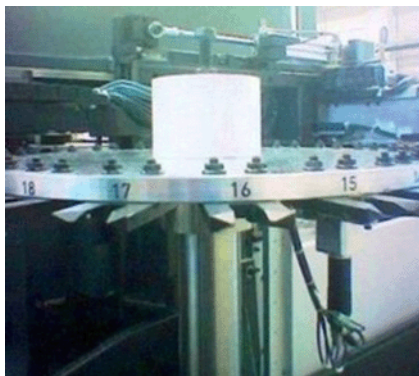
Robot is to be located on the left side of the machine (when looking at the machine from the front).

### **D08.022      Automation kit for System 3R (right)**

This kit is needed when willing to connect and external robot from System 3R (like WPT1+) to the machine. It includes cables, connectors and software handling the communication between the machine and the robot.

Robot is to be located on the right side of the machine (when looking at the machine from the front), and the console will be installed on the left side, on pedestal.

### **D08.010      1-1 disc 3R/ITS/Hirschmann 20**



Tool changeur Capa 1 with 1 disc 3R/ITS50/ITSCompact/Hirsch. 20 Pos. (GPS 70: 10 Pos.)



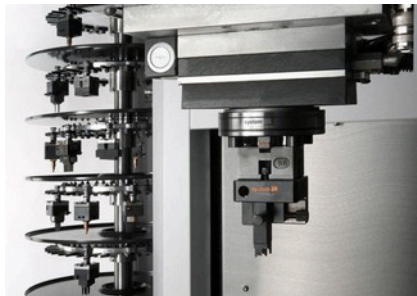
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**D08.011            2-2 discs 3R/ITS/Hirschmann 40**



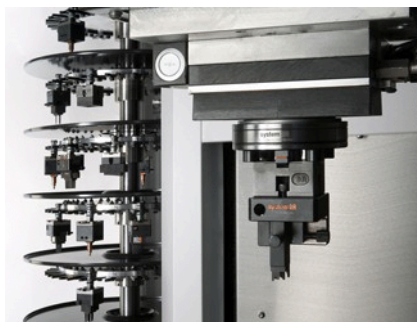
Tool changeur Capa 2 with 2 discs 3R/ ITS50/ITSCompact /Hirsch. 40 Pos.  
(GPS 70: 20 Pos.)

**D08.012            3-3 discs 3R/ITS/Hirschmann 60**



Tool changeur Capa 3 with 3 discs 3R/ ITS50/ITSCompact /Hirsch. 60 Pos.  
(GPS 70: 30 Pos.)

**DDX3.14            3-4 discs 3R/ITS/Hirschmann 80**

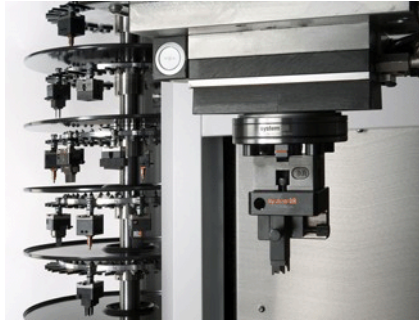


Tool changeur Capa 3 with 4 discs 3R/ ITS50/ITSCompact /Hirsch. 80 Pos.  
(GPS 70 : 40 Pos.)



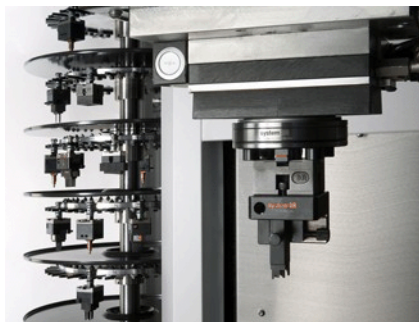
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**DDX3.15 3-5 discs 3R/ITS/Hirschmann 100**



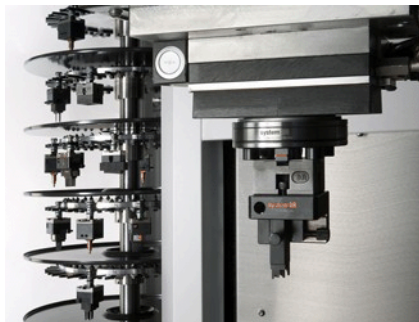
Tool changeur Capa 3 with 5 discs 3R/ ITS50/ITSCompact /Hirsch.100 Pos. (GPS 70: 50 Pos.)

**DDX3.16 3-6 discs 3R/ITS/Hirschmann 120**



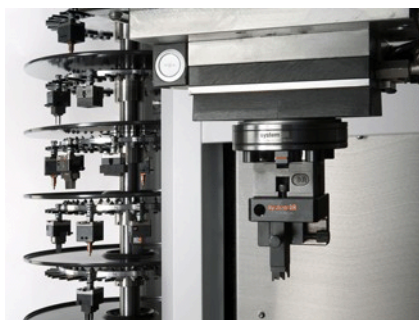
Tool changeur Capa 3 with 6 discs 3R/ ITS50/ITSCompact /Hirsch.120 Pos. (GPS 70: 60 Pos.)

**DDX3.17 3-7 discs 3R/ITS/Hirschmann 140**



Tool changeur Capa 3 with 7 discs 3R/ ITS50/ITSCompact /Hirsch.140 Pos. (GPS 70: 70 Pos.)

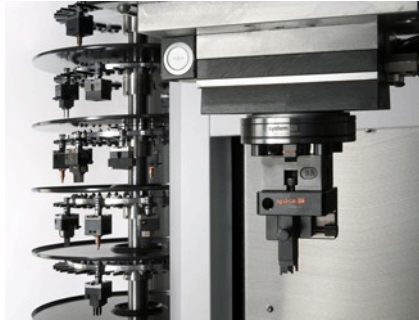
**DDX3.21 1-1 disc 3R Combi - 30 Positions**



Tool changeur Capa 1 with 1 disc 3R Combi - 30 Pos.

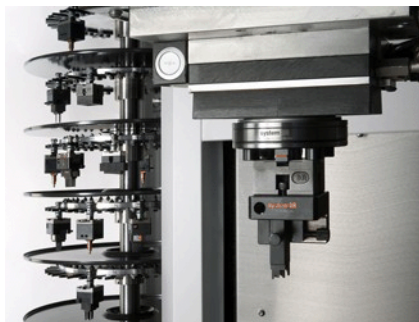
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**DDX3.22      2-2 discs 3R Combi - 60 Positions**



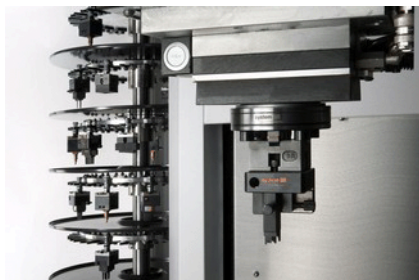
Tool changeur Capa 2 with 2 discs 3R Combi - 60 Pos.

**DDX3.23      3-3 discs 3R Combi - 90 Positions**



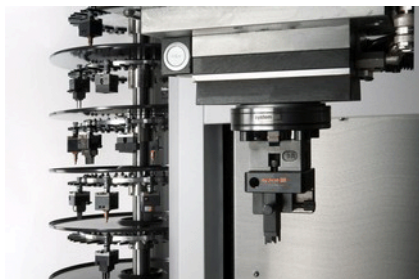
Tool changeur Capa 3 with 3 discs 3R Combi - 90 Pos.

**DDX3.24      3-4 discs 3R Combi - 120 Positions**



Tool changeur Capa 3 with 4 discs 3R Combi - 120 Pos.

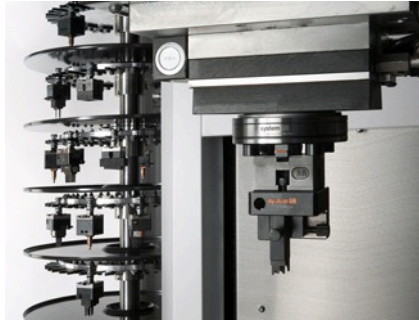
**DDX3.25      3-5 discs 3R Combi - 150 Positions**



Tool changeur Capa 3 with 5 discs 3R Combi - 150 Pos.

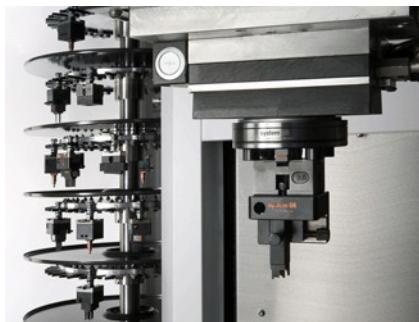
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**DDX3.26            3-6 discs 3R Combi - 180 Positions**



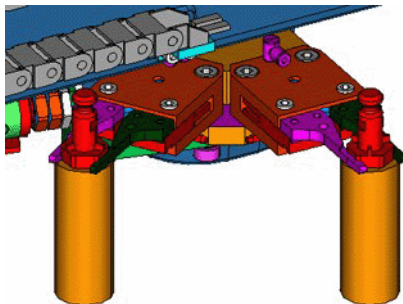
Tool changeur Capa 3 with 6 discs 3R Combi - 180 Pos.

**DDX3.27            3-7 discs 3R Combi - 210 Positions**



Tool changeur Capa 3 with 7 discs 3R Combi - 210 Pos.

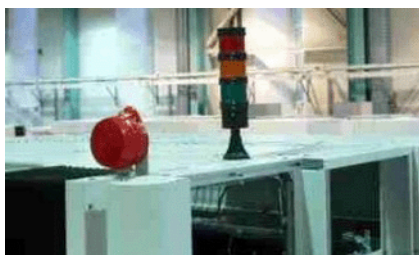
**DDX3.40            Double gripper**



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OPTIONS

**EDMX.17            Warning light**



Stacklamp for the visualisation of the equipment status

- Three-light unit stack light (green, yellow, red)
- Mounting material

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## EDMX.33 Additional power module 60A

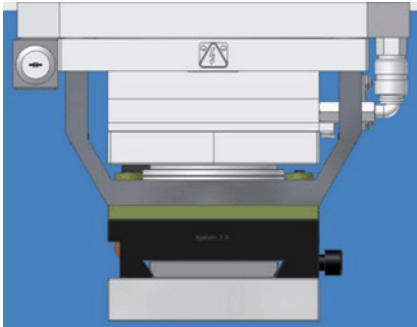


This option allows increased material removal rate

### Specifications:

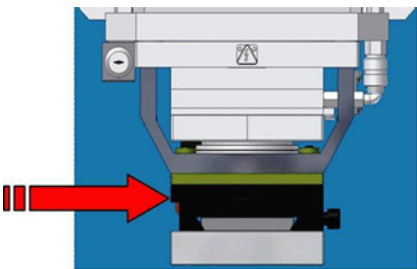
- Type of generator: ISPG
- Machining current: 60 A

## EDMX.34 Support for heavy electrodes



Maximum 100 kg without a chuck

## EDMX.35 3R Manual chuck for support for heavy electrodes



Dove tail fixturing system

## EDMX.09 I/O interface to command peripheral devices (8 Inputs/8 Outputs)

Product FORM X 400

**EDMX.20 Mecatool table chuck GPS 240 complete**



Consisting of:

- Palette receiver C219110 with 6 mm air connector
- Fastening screws

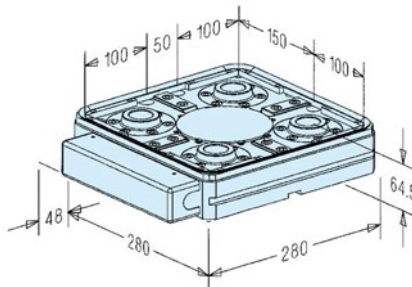
**EDMX.21 3R Dynafix table chuck complete**

Consisting of:

- Automatic chuck 3R-770.1 with 6 mm air connector
- Adapter plate
- Fastening screws

Adapting plate 30 mm, Nr.716.207 necessary for AT 2,  
NOT necessary for FORM P 350 / FORM S 350 / FORM X 400

**EDMX.22 Erowa UPC table chuck complete**



Consisting of:

- UPC table chuck ER-016093
- Clamping brackets ER-009499
- Reduction for pneumatic connection
- Hose
- Hose adapter

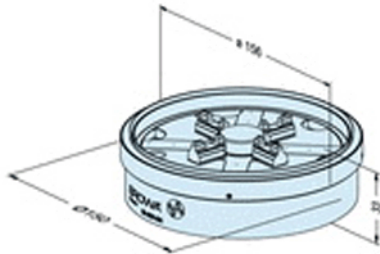
**EDMX.23 3R MacroMagnum table chuck complete**

Consisting of:

- Automatic chuck 3R-680.10-2 with 6 mm air connector
- Fastening screws

Product FORM X 400

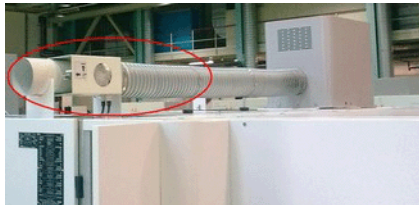
**EDMX.24 Erowa ITS 148 table chuck complete**



Consisting of:

- ITS 148 table chuck ER-007623
- Adapter plate (hole pattern)
- Pneumatic connectors
- Air hose diam. 6 mm x 2 m

**DDX3.80 Drop shutter for the smoke extraction duct and piping**



Drop shutter for the smoke extraction duct and piping for FORM X

**EDM.032 eConnectivity**

This option allows the user to connect the machine to the local network of a workshop in order to:

- Control it by a remote software
- Load, start or suspend a job execution as well as send a job execution report
- Refresh tools or parts offsets and magazine position
- Send information on its status and on all events happening on the machine such as job execution start and end, new tool or part load, machine power failed, emergency Stop On,Off

These data are used to track the machining process, performance and running time.

Please note: It contains also e-Connect, e-Control, e-Supervision and MT Connect



Product      FORM X 400

**EDM.042            e-Connectivity for S3R**

These data are used to track the machining process, performances, and running time. This function supports the MT Connect protocol (a software designed for monitoring and traceability of machining of parts).

It allows to the machine to be connected to the local network of a workshop in order to:

- Track the machine, tools and consumable status
- Enable job execution management
- Control by remote software
- Send the information to a supervisor

Please note: This option is included as standard with a System 3R robot.

**DFX3.02            FORM X 400 - Additional year parts warranty**

This is an extension of the first year warranty. The contract is on the same legal basis as applicable to the first year warranty for the parts only. Consumable and wear parts are excluded. This option must be purchased when the machine is ordered.

**DDX3.77            Light for work area**



This lamp use LED technology

**DDX3.78            Set of 4 grip bolts short for handling of EROWA UPC pallet**

Set of 4 grip bolts short for handling of EROWA UPC pallet

Product FORM X 400

**DDX3.79 Set of 4 grip bolts long for handling of EROWA UPC pallet**

Set of 4 grip bolts long for handling of EROWA UPC pallet

**EDM.049 Optical Measuring System (System 3R)**

The Optical Measuring System (OMS) is composed with:

- One optical device with a fixed focal
- A 15" portable monitor

The optical device is clamped into machine chuck for the measures, and then removed during machining. The OMS device is equipped with a System3R Macro Chuck, so if the customer is using another kind of machine chuck then a specific adapter is necessary.

The 15" portable monitor installed next to the machine displays the video images provided by the optical device.

The magnification factor is X 280.

The working distance, from the work-piece to the optical device is 62mm (focal distance).

Five crosshairs are available. Diameter up to 0.7mm can be directly and precisely measured on the portable monitor.

NB:

- Since this Optical Measuring System device is mobile, it can be used for several machines.
- The Software option "OMS Toolbox" (EDM.050) must be ordered on each machine using this Optical Measuring System in order to make to measurements calculation.

**EDM.050 OMS Toolbox**

This Software option is dedicated to measurement calculation in storing a certain number of points in the working area.

Four measuring cycles are available on the CNC screen:

- Pick up the coordinate of one point
- Get the angle of a work-piece face (rotation angle)
- Get a diameter of an arc or a circle with 3 points. Get the coordinate of the center
- Pick up the coordinate of a corner

All the picked up points are stored in the CNC and can be directly used in a program.

NB: This option is required for a machine with which the Optical Measuring System (EDM.049) is going to be used.



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**EDM.065            Seal Slot Package**

This package is focusing on Seal Slot manufacturing with machining monitoring and traceability.

It includes a Seal Slot specific application, and eTracking Software process.

1- SEAL SLOT application

Technology specifically tuned for seal slot cavity machining with graphite electrodes

2- ETRACKING PROCESS software

It allows monitoring machining and afterwards ensuring machining traceability.

The monitored machining or maintenance data will be compared with reference value in real time and if these data are out of tolerance an associated action (display a message, send an Email, machine suspension...) will be taken.

The monitored machining or maintenance data will be stored in database; it can be extracted as a report (csv file) for machining traceability.

Monitoring and recording contents for FORM E / P / S / X series (with AC FORM HMI) :

- Record operator badge
- Record part name
- Record part serial number
- Record current power setting
- Monitor machining time with this power setting (vs. tolerance)
- Monitor machining parameters
- Record machine alarm
- Record the user maintenance reset

One license (English or French) of eTracking Process is monitoring one machine.

Minimum requirements for the PC where eTracking Process will be installed :

- Minimum Windows XP SP2 or Windows 7
- 32 bits platform or 64 bits platform
- PC Pentium 4, 2.3 GHz
- Minimum 1 GB RAM
- 500 MB space available on Hard Disk
- VGA color screen and driver, resolution 1280 x 1024 minimum

On machine side, AC FORM HMI Software version 1.7 (minimum) is

Product FORM X 400

needed.

## ACCESSORIES.

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### **EDMX.07 Voltage stabilizer 12 kVA E334n/12**



- Input power 3 x 400 Volt +/- 15%
- Output power 3 x 400 Volt +/- 2%

### **EDMX.25 Transformer 12 kVA TP-E415 / 190 - 230 V**



- Input power 3 x 190, 200, 208, 220, 230 Volt
- Output power 3 x 400 Volt 50/60 Hz

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**EDMX.26 Transformer 12 kVA TP-E416 / 340 - 440 V**



- Input power 3 x 340, 360, 380, 400, 415, 440 Volt
- Output power 3 x 400 Volt 50/60 Hz

**EDMX.27 ER-008638 Measuring sensor with ball 5 mm ITS-50**

This option allows to measure directly and automatically the offsets X, Y, Z of the parts on the machine.

**EDMX.28 H5.50.7 Measuring sensor with ball 5 mm H 5000**

This option allows to measure directly and automatically the offsets X, Y, Z of the parts on the machine.

**EDMX.29 3R-656.31-5P Macro 52 measuring sensor 5 mm**

This option allows to measure directly and automatically the offsets X, Y, Z of the parts on the machine.

**EDMX.38 Electronic line conditioner 12 kVA TST 12**



- Input power 3 x 400 Volt +/- 15%
- Output power 3 x 400 Volt +/- 3%
- Frequency adaptable 50 or 60 Hz

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**EDMX.39 Reference ball - 15 mm**



The option reference balls allows to measure directly and automatically the offsets X, Y, Z of the electrodes on the machine.

SERVICES.

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**EDM.036 Standard erosion test in plant**

- Machine and workpiece installation in acceptance test area in GF MS Losone.
- Standard erosion test defined by GF MS plant.
- Valuation with customer's attendance.
- Two days with customer.

**EDM.037 Geometrical inspection including laser measurement**



- Machine and measurement devices installation in acceptance test area at GF MS Losone.
- Standard geometrical check defined by GF MS plant.
- Laser measurement included.
- Valuation with customer's attendance.
- Two days with customer.

**EDM.038 Test according to customer's request**

- Acceptance test defined by customer, two days in GF MS Losone.
- Preparation and set-up in the acceptance test area.
- Acceptance execution and valuation with customer's attendance.
- Additional days on request.

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**EDM.040 Test according to customer's request by GF MS sales co**

- Acceptance test defined by customer, two days in GF MS Losone.
- The test is done by technician from GF MS sales co.
- Machine set-up in the acceptance test area.
- Technical support.
- Cleaning and dismounting of machine.

**EDM.041 Test of handling devices in GF MS Losone**

- Acceptance test of handling devices, two days in GF MS Losone.
- Preparation of machine.
- Functioning test.
- Dismounting of the machine.

**EDM.039 Laser measurement at customer site**



- Laser measurement at customer site by GF MS technician.
- Included in the price:
  - Material rental, shipment cost of material.
  - Labour (service engineer).
  - Travel (flight and hotel costs).
- Same measurement procedure applied in the plant according to the norm ISO 230-2.

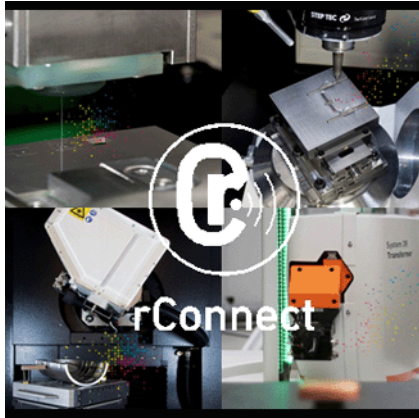
**EDM.051 Laser measurement and geometrical control at customer's site**



- Laser measurement and geometrical control at customer site by GF MS technician.
- Included in the price:
  - Material rental, shipment cost of material.
  - Labour (service engineer).
  - Travel (flight and hotel costs).
- Same measurement procedure applied in the plant according to the norm ISO 230-2.

Product      FORM X 400

**200010158      rConnect Live Remote Assistance, first year**



Live Remote Assistance: efficient service through secured remote support. (First year of warranty)

Connect your machine with our Customer Services via the rConnect platform. Connection is established on demand by your staff, providing a service control center for multiple networked machines. With Live Remote Assistance (LRA), you increase the efficiency of your equipment, your organization and your operators. When incidents occur, the causes are quickly diagnosed and errors are investigated directly.

Combined with LRA, the customer cockpit is an indispensable tool for daily business activities and connects you closely with our Customer Services.

Our remote service product is certified with the TÜViT Trusted Product Certificate.

**Your benefits:**

- Increased machine availability
- Optimized downtime
- Fewer service calls
- Less waiting time
- Increased work product quality
- Maximum return on your machine investment

Fast support is essential in a service request. Start your service request conveniently via PC or tablet. Within seconds, our Helpline receives a service ticket and starts working to resolve the issue.

To use the remote support system, you need an internet connection with outgoing port 443. When connected to your local network, your operating and maintenance personnel can access the service functions of the individual machines through the customer cockpit.

**200010159      rConnect Live Remote Assistance, extended**



One additional year in case of extended warranty.

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**200010283      rConnect Messenger six months trial**



You and your machine park are always connected. Messenger delivers machine data to your mobile device. You receive notifications on your smartphone about machines status, messages and jobs. When incidents occur, you can send a service request to get a fast and effective diagnosis.

Combined with Live Remote Assistance (LRA), Messenger is an indispensable app for daily business activities and connects you closely with your workshop.

Peace of mind through Messenger:

- One app for all GF Machining Solutions technologies
- Always stay informed, wherever you are.
- Monitor machining progress from your smartphone.
- Send a support request from anywhere, anytime.

Our remote service product is certified with the TÜVIT Trusted Product Certificate.

Please contact your GF Machining Solutions office to check machine compatibility and options needed to activate Messenger. Functionality depends on machine software version. The office will organize the remote installation and get your private log in information. The app is available for iOS and Android smartphones. Simply download the app from Apple's App Store or the Google Play store. Then, enter your private information.

**200010284      rConnect Messenger 1 year license**



One-year license for rConnect Messenger.



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**EDM.100            eConnectivity rConnect services**

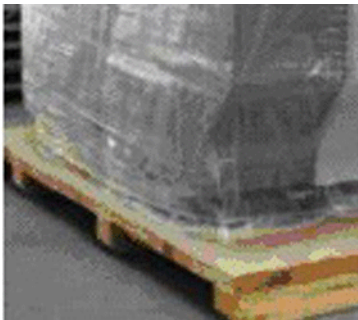
This option enables machine communication and allows publication of internal machine information and status to rConnect digital services.

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PACKING & DOCUMENTATION

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**DEX3.03            FORM X 400 packing with pallet**



The machine is fixed on a wooden transport pallet and packed in PE sheet and VCI corrosion protection.  
Used for Western Europe only.

**DEX3.04            FORM X 400 packing with wooden crate**



The machine is fixed on a wooden transport platform in a wooden crate with bug free treatment and packed in PE sheet and VCI corrosion protection.  
Packing with wooden crate is mandatory for delivery overseas by ship or air.

**D08.016            Small accessories box**

**DBX3.01            Additional documentation complete version on paper**

Operating and maintenance  
(Chapters: C1 - C12)



Product      FORM X 400

## SPECIFICATIONS

Equipment		Unite
Dimensions of complete equipment	1410 x 2460 x 2660	mm
Total weight (without dielectric)	3830	kg
<b>Machining area</b>		
Max. work piece Dimensions (W x D x H)	820 x 580 x 250	mm
Max. work piece Weight	800	kg
Dimension of work-table	600 x 400	mm
<b>XYZ axes</b>		
Axis travel (X, Y, Z)	400 x 300 x 350	mm
Max. manual displacement speed	2000	mm
Max. machining speed (XY)-(Z)	6 - 15	m/min
Max. machining acceleration (XY)-(Z)	4 - 10	m/s <sup>2</sup>
Lubrication	Centralized	
<b>C axis Option</b>		
Max. Rotation Speed	0 to 100	rpm
C axis Max. Electrode inertia	2000	kg/cm <sup>2</sup>
Max. Electrode Weigh	25	kg
Max. Electrode weight without C-axis	50	kg
Positioning resolution	0.001	°
<b>Accura C axis Option</b>		
Max. Rotation Speed	0 to 100	rpm
C axis Max. Electrode inertia	5000	kg/cm <sup>2</sup>
Max. Electrode Weigh	25	kg
Max. Electrode weight without C-axis	50	kg
Positioning resolution	0.001	°
<b>High speed generator</b>		
Generator	Intelligent Speed Power Generator (ISPG)	
Machining current standard/option	80/140	A
iQ module ( No Wear)	Standard	
Minimum surface finish	0.08	µm Ra
<b>Numerical control</b>		
Measurement Device (XYZ)	Linear scales	
Measurement resolution (XYZ)	0.05	µm
Operating System	AC FORM HMI	
Screen	15" LCD screen (touch screen)	
Communication ports	Ethernet RJ45, USB (x2)	
Programing system on PC	Standard	

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<b>Options</b>		
Tool and Part Changer	Different capacity and tooling	pos.
Autoscanning	YES	
Ready for automation	YES	
Connectivity	YES	
Multicavities flushing	6	Outputs

Product FORM X 400

## ENVIRONMENT AND SERVICE REQUIREMENTS

### Paint finish

Die-sinking EDM machine in 4 colours

- NCS S1000N white
- NCS S8500N dark-gray
- NCS S3500N light-gray
- NCS S0580Y60R orange  
(2 components, textured)

### Electric power supply

- 3 x 400 Volt, 50 or 60 Hz (permissible variations +/- 10%)  
Direct connection to nets type TT, TN C and TN S  
For other voltages a transformer for galvanic separation to be used also for IT nets is available (see options)
- In the event of a weak, unstable main voltage system we recommend a voltage stabilizer or a line conditioner (see options)

### Compressed air supply

- 6-8 bar pressure free from interruptions
- The air should be dried and filtered
- Air consumption: 100 +/- 10% m<sup>3</sup>/hr

### Environment

- Environment temperature: < 23 degrees
- Recommended temperature for highest accuracy  
in temperature stabilized environment: 20°C
- Temperature-fluctuations: < 0,5°C / h
- Maximal fluctuations: 2°C / 24 h
- Thermal radiation and air draught should be avoided
- Free from vibrations
- Air velocity in room: max. 0.5 m/s
- Relative humidity: not exceeding 80 %

### IMPORTANT (state when ordering)

- Available mains supply (voltage, frequency, phases)
- Language of documentation

### QUILL EQUIPMENT'S SCOPE OF DELIVERY

Quill equipment 3R-Macro composed of:

- 1 3R-600.84-30 Macro automatic chuck
- 1 3R-651.7-S Macro standard element

Product      FORM X 400

- 1 3R-658.4-S      Macro electrode holder
- 1 3R-605.1      Drawbar

or

Quill equipment 3RMacro/Combi composed of:

- 1 3R-460.83-2      Combi automatic chuck
- 1 3R-651.7-S      Macro standard element
- 1 3R-658.4-S      Macro electrode holder
- 1 3R-405.16 Drawbar

or

Quill equipment Mecatool GPS 70 composed of:

- 1 C188.040      GPS 70 automatic chuck
- 1 C526.010      Square holder
- 1 N901.700      Clamping spigot

or

Quill equipment EROWA ITS-50 composed of:

- 1 ER-007523 ITS-50 Automatic chuck
- 1 ER-010591 1 pcs Uniholder, 1 pcs Chucking spigot,  
1 set of 5 pcs insert plates

or

Quill equipment EROWA ITS-50/Compact composed of:

- 1 ER 020026 Compact automatic chuck
- 1 ER-025040 Chucking spigot with clip, insert plates, sealing  
ring, Compact electrode holder and ITS-50  
electrode holder

or

Quill equipment Hirschmann H5000 composed of:

- 1 H8.11.7 Automatic chuck
- 1 H5.611 Clamping journal
- 1 H5.611.1 Centering element
- 1 H5.50.25 V-holder