FAGOR **8070** CNC

High features
High speed
Multi-channel
Flexible

FAGOR

The Ultimate Solution for your Machine Tool

With over 25 years of experience in providing solutions for shop floor automation **FAGOR AUTOMATION** introduces the all new 8070 CNC with revolutionary new hardware and host of new features to meet your current and future machining requirements.

The **operating and programming ease** of FAGOR CNC's results in considerable time savings in training, as well as daily programming and machining. At each operating mode of the 8070 CNC, it is possible to select the most relevant data screen and even customize a new one with only the most relevant data.

A part-program may be simulated graphically and executed while executing another part-program. It offers **cycles for tool calibration**, part measuring, milling operations (pre-emptied pockets, irregular pockets with islands, etc.) and turning operations (C axis, Y axis, et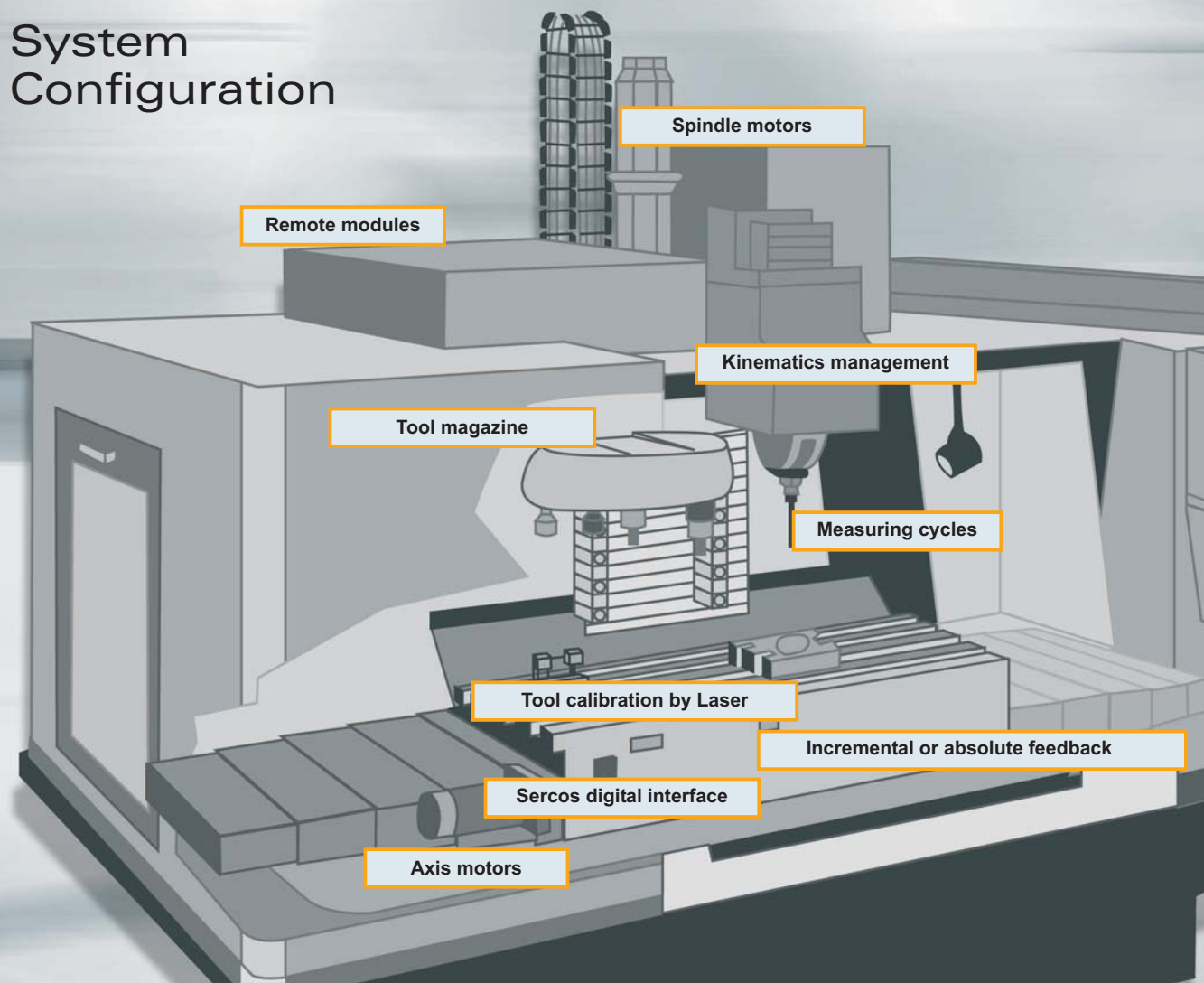c.). Its open architecture makes it easier for the users to integrate their own programming cycles and application software.

The control of position, velocity, accelerations and collisions prevents undesired machining and help achieve **unmatched part-finish and maximum performance** from the machine without compromising the speed thanks to the various smart algorithms and very fast block processing time.

Features like **tool calibration and block search** help the operator check and replace the tool after interrupting a program or after an execution error.

The **FAGOR 8070 CNC** simulator permits editing and simulating the program away from the noise and distractions of the manufacturing plant and later send that program to the CNC for execution using High speed Ethernet Interface.

System Configuration

Spindle motors

Remote modules

Kinematics management

Tool magazine

Measuring cycles

Tool calibration by Laser

Incremental or absolute feedback

Sercos digital interface

Axis motors

State-of-the-art CNC

The FAGOR 8070 is a state-of-the-art CNC that offers high tech features with maximum operating versatility. This powerful CNC has been designed by combining FAGOR's experience and technology with worldwide Industrial PC standards.
It can control up to 28 axes (interpolated simultaneously), 4 spindles, 4 tool magazines and 4 execution channels.

Monitor
Monitor with either a 10.4" or a 15" TFT screen.

Keyboard
It has keys with easy-to-understand symbols (icons), hotkeys for quick access to work modes and freely customizable keys to configure them according to the requirements of the machine.
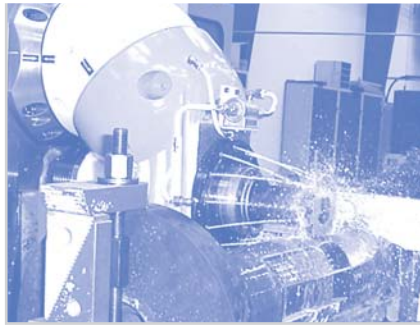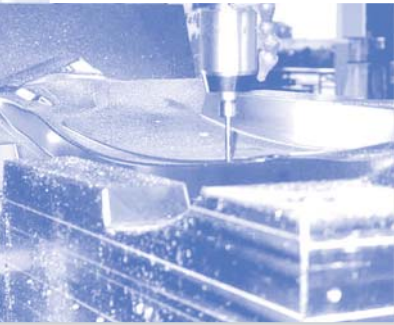
CNC

Handwheels

Ethernet

Simulator on PC

Hotkeys

AUTO	Automatic mode.
MANUAL	Jog mode.
EDIT	MDI mode.
MDI	Editing - simulation mode.
TABLES	User defined tables as well as offset and fixture tables.
TOOLS	Tool table and tool magazine table.
UTILITIES	Utility mode.
CUSTOM	Access to applications.

8070 M CNC

## For Milling Machines and Machining Centers

The FAGOR 8070 CNC is ideal for controlling all kinds of milling machines and machining centers both horizontal and vertical.

It is especially designed for machining high precision contours with a block processing time lower than 1 ms. Its acceleration and jerk control smoothes the tool path changes and reduces mechanical stress on the components of the machine thus making them more durable.

It offers filters that eliminate oscillations due to the machine's own frequencies and preventing them from negatively affecting the machining operations and reducing the mechanical stress on the system.

By utilizing an advance tool path analysis feature, it makes it possible to optimize the feed rate as well as a smoother and continuous movement of machine axes.
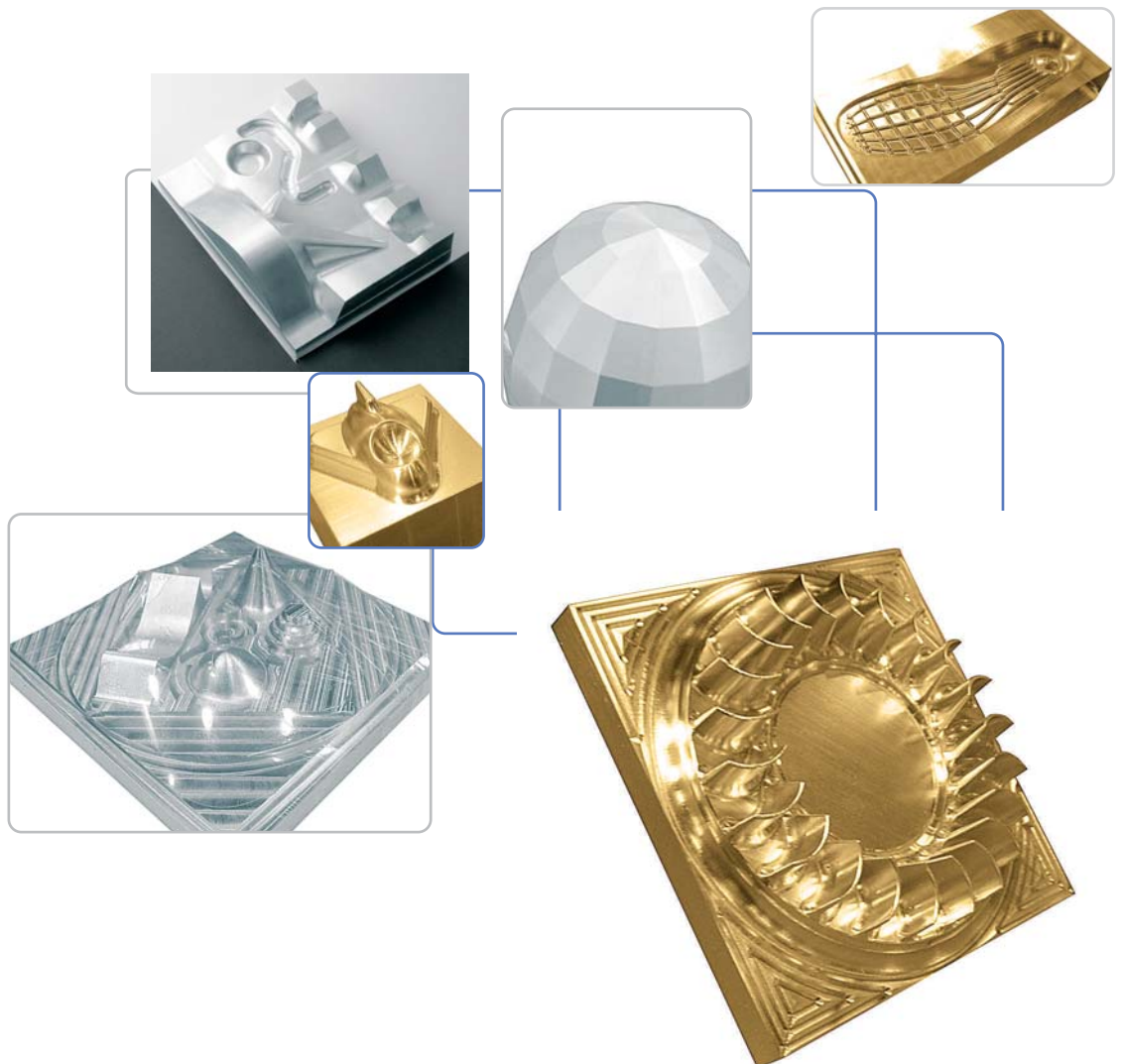
High speed machining

The high speed algorithms optimize machining by obtaining higher cutting speed, smoother contours, better part surface finish, greater accuracy and better reproduction of the programmed surface.

By combining splines and polynomial transitions, it uses straight paths to adapt the programmed contour to a curve that goes through all the programmed points.

The CNC works with nano-metric resolution: In order to obtain the best part finish, the CAD-CAM coordinates should be defined with the maximum resolution possible.

Improved Production Process

The Ethernet connection helps improve the production process by transmitting part-programs, previously created in the Programming Office, to the CNC for their execution.
It is also possible to monitor the machining time for statistical calculation, dead time, usage of each tool, etc.

Backwards compatibility

It is possible to edit new programs, or modify existing ones, in ISO format or in FAGOR's high level language with the help of a profile editor, a canned-cycle editor and Teach-in programming.
It allows execution of programs created with FAGOR 8040, 8050 or 8055 CNC, thus not being necessary to program the same parts again for the 8070 CNC. Those programs can also be modified at the 8070 CNC maintaining the same original format and may be used on other machines of the shop that are equipped with FAGOR 8040, 8050 and 8055 CNC's.

Working with CAD-CAM

For those who use CAD-CAM programming, the 8070 CNC converts and executes tool-path files and profiles generated in DXF format.

Possibility of production estimate

The simulation permits checking programs by graphically showing its execution. It also makes an estimate of the total execution time and of the machining time for each tool.
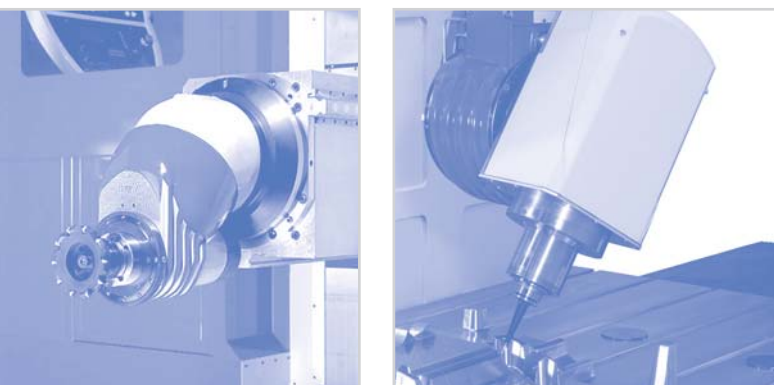
Background editing / simulation

A program may be edited and simulated even while executing another one, thus eliminating delays between parts. A canned cycle can also be simulated before inserting it into the program.
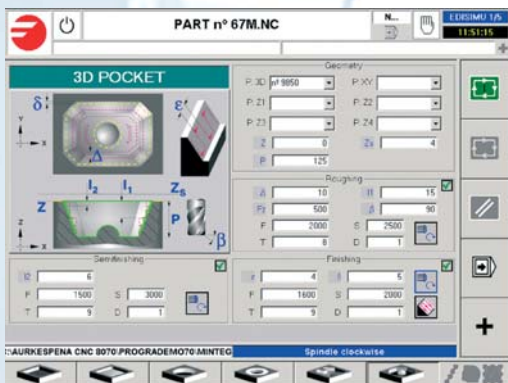
8070 M CNC
For Milling Machines and Machining Centers

Kinematics management

Several kinematics may be defined to better adapt to the requirements of the machine.

It admits parallel kinematics; spherical, orthogonal and angular spindles; rotary tables and the combination of swinging spindles and rotary tables.

Incline plane machining

It is possible to machine in incline planes without having to loosen and wedge the part. Once the tool has been manually or automatically oriented, it is enough to define the incline plane and carry out all kinds of machining operations; pockets, rotations, etc.

From that moment on, the machining is programmed according to the new incline plane (X,Y) and the tool along the axis (Z) perpendicular to it.

5-axis machining (RTCP)

The RTCP (Rotation Tool Center Point) function improves part finish by making the tool tip follow the programmed profile regardless of the length and orientation of the tool.

When working with RTCP and changing the orientation of the tool, the CNC moves the X, Y, Z axes to maintain the position of the tool tip on the part.

Using RTCP, a profile may be machined maintaining the tool perpendicular to the tool path at all times.

Tool magazine management

Any type of tool magazine may be managed: Turret type, synchronous with or without changer arm (1 or 2 claws) and asynchronous. Depending on how the tools are stored in the magazine, it can control magazines where the tool may occupy any position (random magazine) or always the same position (non random magazine).

It is up to the tool manager to change the tool, it knows which tool occupies each magazine position and each claw of the changer arm.

It can also manage milling machines and machining centers with up to 4 tool magazines.

Tool calibration and measuring cycles

The tool calibration cycle helps the operator to calibrate tools more easily both manually and automatically using tabletop probes.

By using probes placed on the tool holder spindle, the part measuring and aligning cycles help adapt easily and automatically the work coordinates to the actual part position (hole centering, corner and angle measuring, etc.).
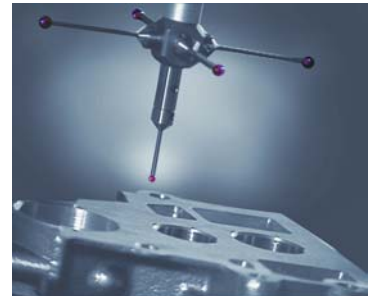
Tandem and Gantry axes

A tandem axis uses two servo drive systems coupled to each other mechanically. Each servo drive system is governed by a motor and the CNC keeps both motors coupled to each other in velocity and torque.

The Tandem axes compensate for backlash and are used to move the axes on large machines using rack and pinion systems. 2-axis Gantry machines with 4 motors are one of the applications using tandem axis control.

8070 T CNC

For Lathes and Turning Centers
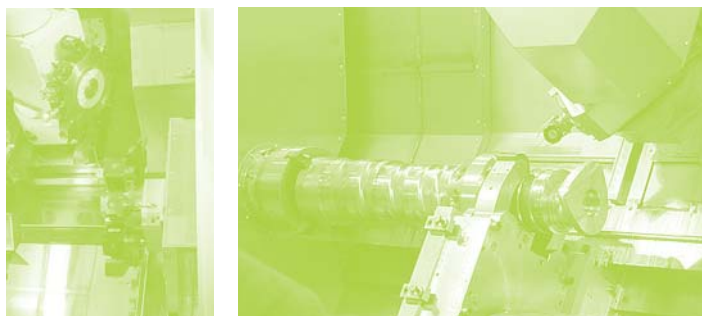
The FAGOR 8070 CNC can control high production turning centers, vertical lathes, lathes with an incline bed and parallel lathes.
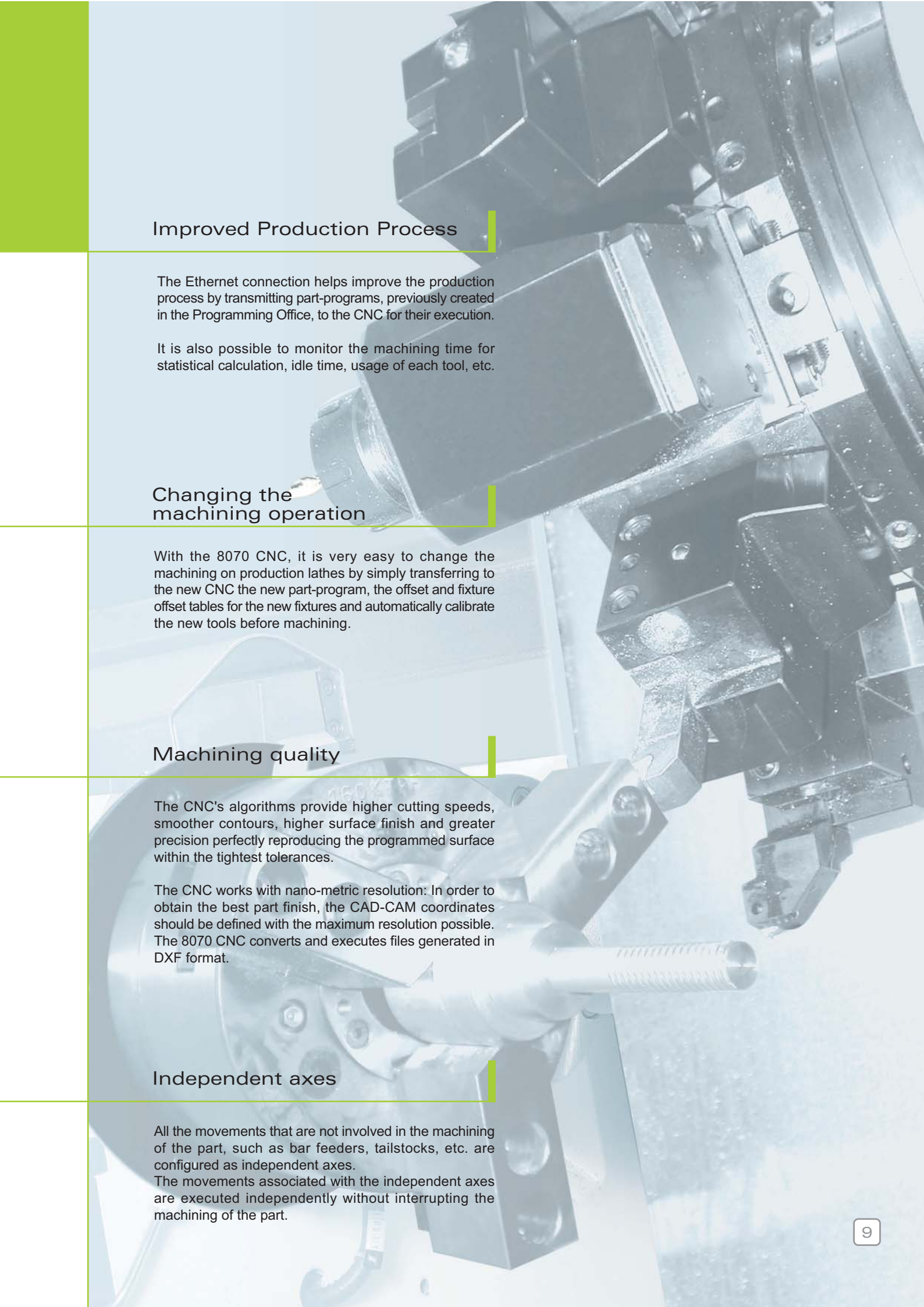
Thanks to its high configuration versatility, it can be easily adapted to the machines governing several turrets, spindles, execution channels, etc.

Depending on the type of machine, it can control up to 4 spindles and 28 axes; the "C", "Y" and "B" axes among others and perform milling operations in the planes formed by all of them.

It offers a variety of filters that eliminate oscillations due to the machine's own frequencies and preventing them from negatively affecting the machining operations and reducing the mechanical stress on the system.

Its acceleration and jerk control smoothes the tool path changes and reduces mechanical stress on the components of the machine thus making them more durable.

Improved Production Process

The Ethernet connection helps improve the production process by transmitting part-programs, previously created in the Programming Office, to the CNC for their execution.

It is also possible to monitor the machining time for statistical calculation, idle time, usage of each tool, etc.

Changing the machining operation

With the 8070 CNC, it is very easy to change the machining on production lathes by simply transferring to the new CNC the new part-program, the offset and fixture offset tables for the new fixtures and automatically calibrate the new tools before machining.

Machining quality

The CNC's algorithms provide higher cutting speeds, smoother contours, higher surface finish and greater precision perfectly reproducing the programmed surface within the tightest tolerances.

The CNC works with nano-metric resolution: In order to obtain the best part finish, the CAD-CAM coordinates should be defined with the maximum resolution possible. The 8070 CNC converts and executes files generated in DXF format.

Independent axes

All the movements that are not involved in the machining of the part, such as bar feeders, tailstocks, etc. are configured as independent axes.
The movements associated with the independent axes are executed independently without interrupting the machining of the part.

8070 T CNC
For Lathes and Turning Centers

Home search

After powering up the machine, there is no need to move the axes to the reference point (home). Using FAGOR distance-coded feedback systems, the CNC assumes the new position by simply moving the axes 50 mm. There is no need to move the axes when using FAGOR absolute feedback systems.

Programming and operating flexibility

With the help from the profile editor and canned-cycle editor, it is possible to edit new programs and modify existing ones as well as those created at a FAGOR 8040, 8050 and 8055 CNC in ISO or FAGOR's high level language.

When parts of the workpiece must be retouched, the block search function restores the program history making it possible to resume the machining operation from a particular block with the same machining conditions as if the program were executed from the beginning.

The user can also customize the interface modifying each screen so they only show the information desired at each moment.

Tool calibration and measuring cycles

The tool calibration cycle helps the operator calibrate the tool easily both manually and automatically.

By using probes placed in the tool holder, the part measuring cycles help measure parts or compensate for tool wear easily and automatically.

Automatic tool calibration (cycles integrated into the part-program) provides better machining time by eliminating idle time and manual calibration.
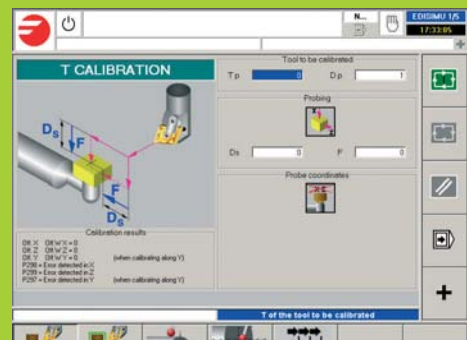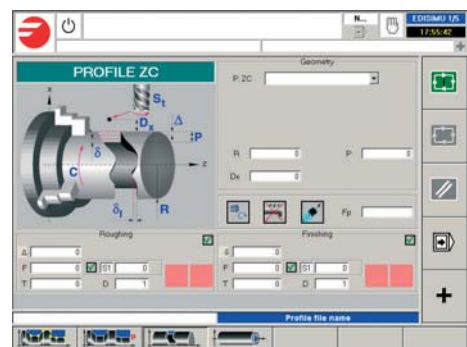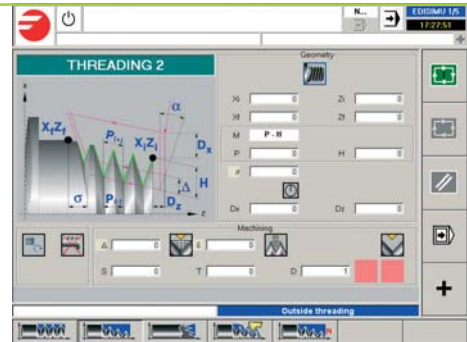
Thread cutting operations

All kinds of threading are possible besides the typical turning operations (turning, grooving, facing, etc.). Standard, longitudinal, taper, on the face, with variable pitch, etc. It is also possible to define the thread entry and exit as well as blending 2 or more consecutive threads. The thread repair function is ideal for re-machining worn out threads.

Spindle synchronization

With this feature, a part may be machined in a single fixturing operation on a dual-spindle lathe. One side is machined in one of the spindles and then the part is switched over to the other spindle to finish machining the other side.

The switch is done by coupling both spindles in speed and synchronizing them in position; no home search is required.

Milling operations with the C and Y axes

Besides the cycles associated with the C axis which allows machining operations on the face and along the side of the part on Lathe-Mill type machines that have 4th axis (Y), the 8070 CNC also offers all the milling operations and cycles (surface milling, profiling, bosses, 2D and 3D pockets, etc.).
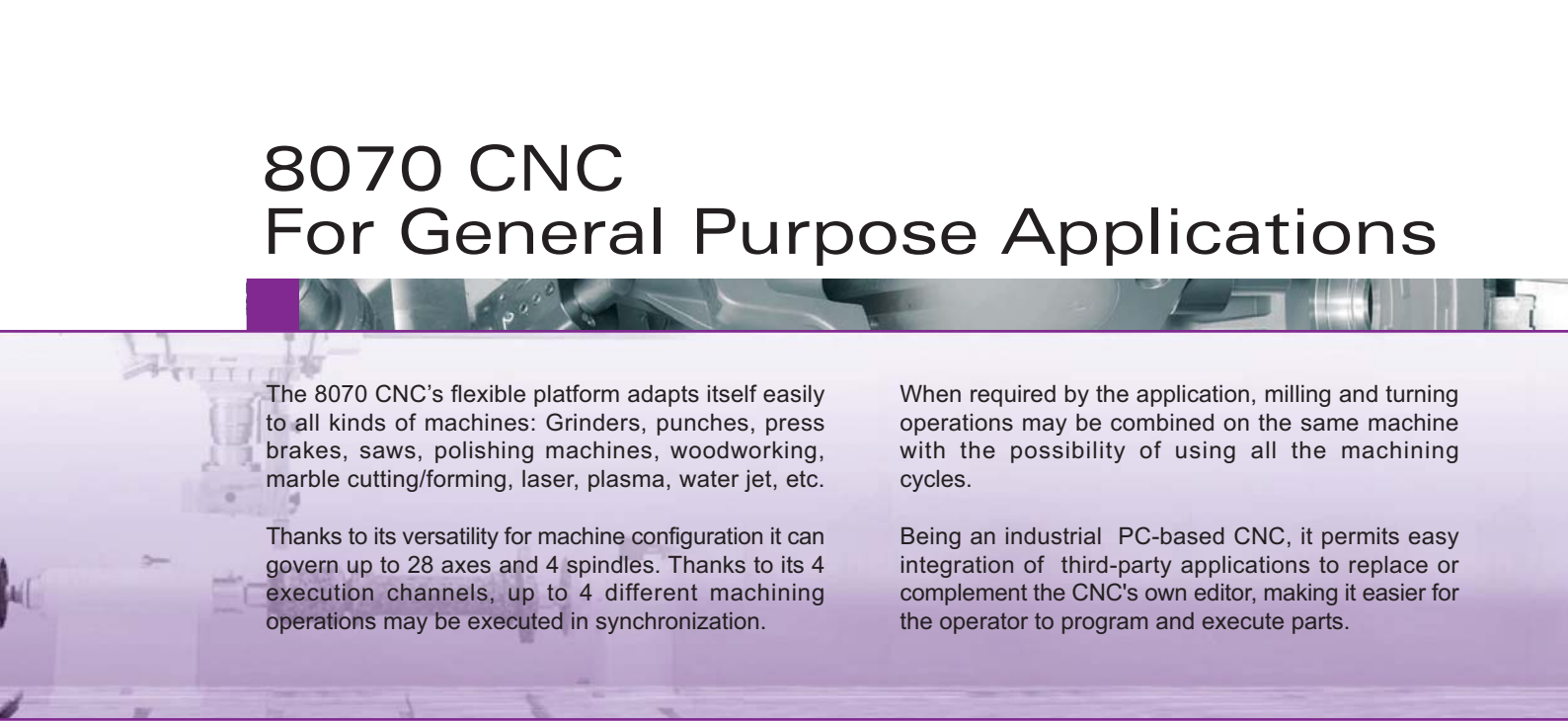
Kinematics management

Different kinematics may be set on a machine to adapt perfectly to the geometry of the machine in each case.

The kinematics for the "C", "Y" and "B" are already implemented, the latter is for turret types that may be used on milling operations even in inclined surfaces in any of the spindles.
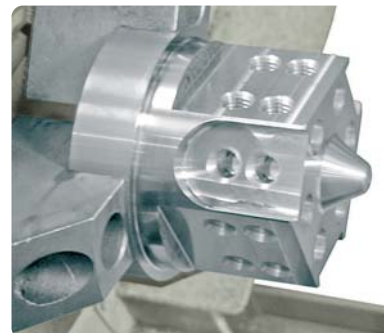
8070 CNC
For General Purpose Applications

The 8070 CNC's flexible platform adapts itself easily to all kinds of machines: Grinders, punches, press brakes, saws, polishing machines, woodworking, marble cutting/forming, laser, plasma, water jet, etc.

Thanks to its versatility for machine configuration it can govern up to 28 axes and 4 spindles. Thanks to its 4 execution channels, up to 4 different machining operations may be executed in synchronization.

When required by the application, milling and turning operations may be combined on the same machine with the possibility of using all the machining cycles.

Being an industrial PC-based CNC, it permits easy integration of third-party applications to replace or complement the CNC's own editor, making it easier for the operator to program and execute parts.

Up to 28 interpolated axes and 4 spindles

Up to 28 axes may be set so they all interpolate with each other or have some of them interpolate and others work independently.

Independent axes are those that are not directly involved in the machining of part, like handlers, part loaders and all those that carry out simple operations parallel to the machining operations.

It is very easy to set up and control machines that have several tools machining at the same time thanks to the four-spindle configuration.

4 execution channels

Several machining operations may be carried out at the same time using the various execution channels. Each channel may be assigned its own spindle, tool magazine and certain axes or several execution channels may share spindles and tool tables.

The 8070 CNC can easily adapt to any user interface by allowing you to modify or create new screens for editing, execution, graphics, simulation, etc. It is possible to create screens showing the information of several execution channels at the same time or create specific screens for each channel.

The 8070 CNC offers various functions for easily synchronizing the various operations to be carried out in different execution channels.
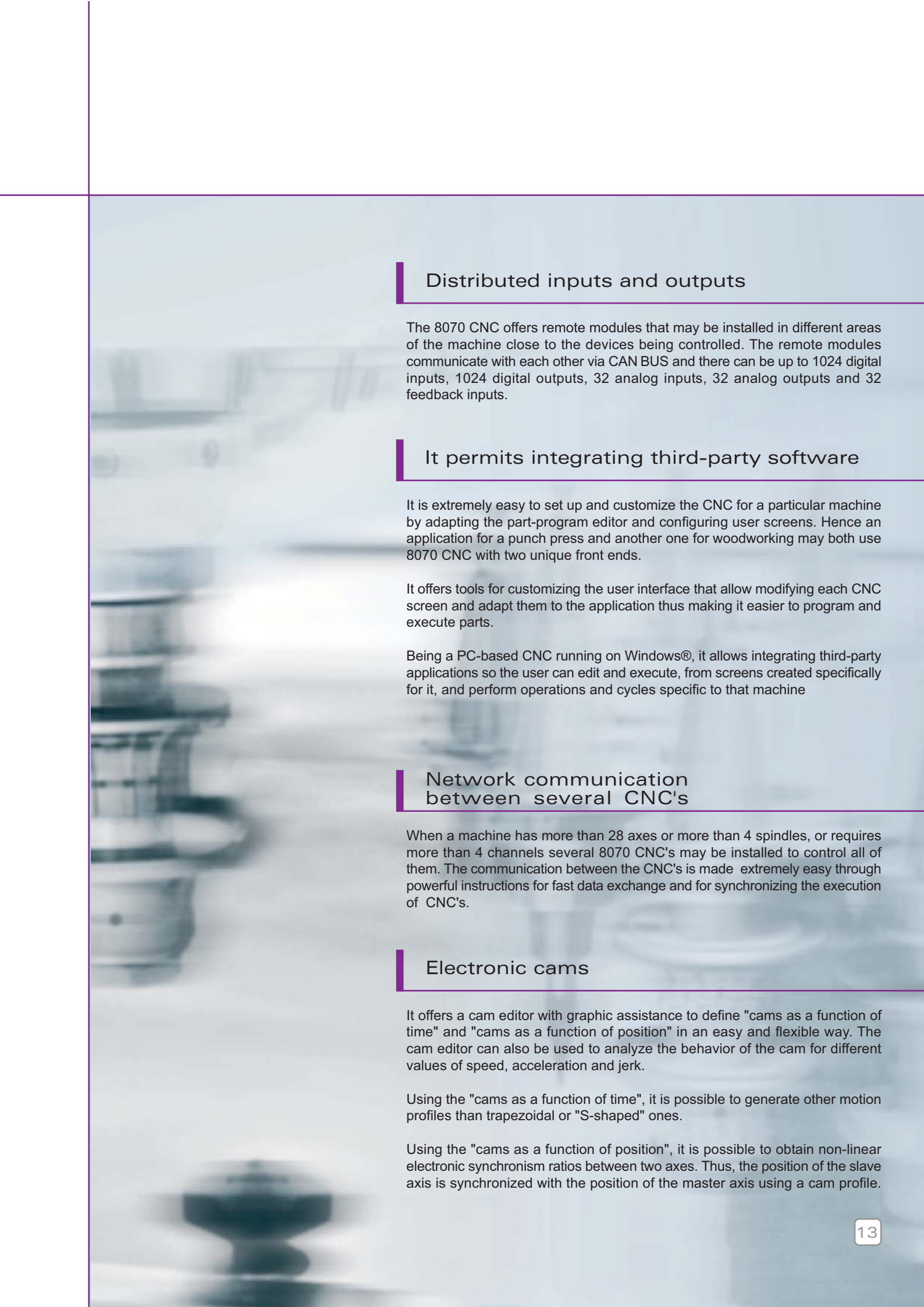
Fast and flexible PLC

The PLC program has a modular structure and can combine C language files with files edited in mnemonics and using contacts (ladder diagram). It is executed in synchronization with the CNC, by executing a full PLC scan within the CNC's loop thus ensuring a fast PLC execution simultaneously with the CNC.

PLC monitoring permits a quick diagnostics of the machine status. No great knowledge is required because the PLC program may be monitored both using mnemonics or contacts, regardless of how the program has been edited. It is also possible to monitor the status of the PLC resources and variables.

From the PLC, besides controlling the machine accessories using inputs and outputs, it is also possible to exchange information with the CNC and to generate periodic velocity commands to execute specific periodic applications. It is also possible to monitor certain conditions of the machine to execute actions parallel to the machining of the part when the actions are completed.

Distributed inputs and outputs

The 8070 CNC offers remote modules that may be installed in different areas of the machine close to the devices being controlled. The remote modules communicate with each other via CAN BUS and there can be up to 1024 digital inputs, 1024 digital outputs, 32 analog inputs, 32 analog outputs and 32 feedback inputs.

It permits integrating third-party software

It is extremely easy to set up and customize the CNC for a particular machine by adapting the part-program editor and configuring user screens. Hence an application for a punch press and another one for woodworking may both use 8070 CNC with two unique front ends.

It offers tools for customizing the user interface that allow modifying each CNC screen and adapt them to the application thus making it easier to program and execute parts.

Being a PC-based CNC running on Windows®, it allows integrating third-party applications so the user can edit and execute, from screens created specifically for it, and perform operations and cycles specific to that machine

Network communication between several CNC's

When a machine has more than 28 axes or more than 4 spindles, or requires more than 4 channels several 8070 CNC's may be installed to control all of them. The communication between the CNC's is made extremely easy through powerful instructions for fast data exchange and for synchronizing the execution of CNC's.

Electronic cams

It offers a cam editor with graphic assistance to define "cams as a function of time" and "cams as a function of position" in an easy and flexible way. The cam editor can also be used to analyze the behavior of the cam for different values of speed, acceleration and jerk.

Using the "cams as a function of time", it is possible to generate other motion profiles than trapezoidal or "S-shaped" ones.

Using the "cams as a function of position", it is possible to obtain non-linear electronic synchronism ratios between two axes. Thus, the position of the slave axis is synchronized with the position of the master axis using a cam profile.

Functions and Features

|	
General characteristics	Industrial PC-based open system. Windows® XP operating system. Block processing time < 1 ms. PLC execution time < 1 ms/K. 256 Mb RAM memory. 2Gb compact flash and optional 20 Gb hard disk.
Configuration	15" or 10.4" color LCD monitor. Up to 28 axes (interpolated simultaneously) and 3 handwheels. Up to 4 spindles. Up to 4 execution channels. Axes and spindles may be distributed at will between the channels. Up to 4 tool magazines. Digital and analog interface. Sercos® and CAN® field bus. Ethernet 10/100Mhz base T.
Programming language	ISO code programming. High level programming language. Cycle editor.
Connectivity	USB. Telediagnosis. 56Kb modem/Fax .
Coordinate system	Coordinates in mm and inches. Absolute and incremental coordinates. Radius or diameter programming. Cartesian and Polar coordinate programming. Leadscrew error compensation, cross compensation, etc.
Tool compensation	Tool radius compensation in the work plane and tool length compensation. Collision detection up to 200 blocks in advance.
Part zero setting	Coordinate preset. Absolute and incremental zero offsets. Clamps and fixtures. Polar origin preset. Programming with respect to machine zero or to part zero.
Machining feedrate	Feedrate in millimeters(inches)/minute or millimeters(inches)/revolution. Setting machining time in seconds. Feedrate adaptation at the beginning of the block. Constant feedrate of the tool center. Constant surface speed (feedrate at the cutting point). Control of acceleration, Jerk, feed-forward and AC-forward.
Spindle	Constant turning speed. Constant surface speed. Turning speed limitation.
Path control	Rapid positioning. Linear and circular interpolation (programming the center and the radius). Arc tangent to previous path. Arc defined with 3 points. Helical interpolation. Electronic threading with constant pitch. Rigid tapping. Manual intervention during execution. Additive manual intervention.
Geometry assistance	Square corner. Controlled round corner (5 ways). Corner rounding and chamfering. Tangential entry and output. Mirror image. Coordinate system rotation. Scaling factor.
Milling canned cycles	Center punching. Drilling with variable peck and deep hole drilling with constant peck. Tapping with a clutch and rigid tapping (without a clutch). Reaming, Boring. Rectangular, circular and pre-emptied pocket. 2D and 3D pockets. Rectangular and circular boss. Surface milling, Slot milling. Profile milling.
Turning canned cycles	Turning, facing, taper, rounding, grooving. Drilling (along the side and on the face). Multiple drilling. Threading (along the side, on the face, taper and thread repair). Tapping. Rigid tapping. Multiple threading. Standard threads. Slot milling (along the side and on the face). Multiple slot milling. Profile (ZX, ZC and XC).

|	
Multiple machining (Milling)	In a straight line. In an arc or in a circle. In a parallelogram pattern. In a grid pattern. Random points.
Probing canned cycles	Tool radius and length calibration. Probe calibration. Canned cycle for measuring the surface, the outside corner, the inside corner. Canned cycle for measuring the angle, the outside corner and angle. Hole measuring cycle. Boss measuring cycle.
Subroutines	Local and global subroutines. Modal subroutines. Define Macros.
Operation with axes and spindles	Gantry axes (14 pairs). Tandem axes (14 pairs). Hirth axes. Independent axes. Electronic coupling of axes and spindles. Synchronization of axes and spindles. Park axes and spindles.
Operation with channels	Axis swapping. Spindle swapping. Communication and synchronization between channels.
C axis	Machining on the face of the part. Machining on the side of the part.
High speed machining	Spline interpolation. Polynomial interpolation. Anti-resonance post-interpolation filters.
Flow control instructions	Block skip ($GOTO). Conditional execution ($IF) and ($SWITCH). Block repetition (#RPT) and ($FOR). Conditional block repetition ($WHILE) and ($DO).
Coordinate transformation	Kinematics, up to 6 different ones on a machine. Incline plane movement. Tool perpendicular to the plane. Working with RTCP (Rotating Tool Center Point). Tool length and radius compensation.
Programming assistance	Calculator. Graphic assistance for cycle programming. Block comments. Context dependent integrated manual. Expandable windows for defining instructions and variables.
Editing Simulation	DXF file import. Profile editor. Teach-in editing. Cycle editor in conversational mode. Simulation with graphics while executing another program. Simulation of a canned cycle before inserting it into the program.
Time estimate	Estimate of the total program execution time and of the machining time with each tool. Program time estimate in simulation.
Execution	Tool inspection while executing the program. Block search restoring the program history. MDI/MDA mode.
Graphics	Top view, projection in 3 planes, 3D and solid. Change of the graphics "point of view" to show it from another angle. ZOOM function without interrupting the program. Measurement of the distance between two points.
Jog mode	Movement using a handwheel or JOG keys. Move an axis to a coordinate after selecting the target point. Tool calibration. Zero offset loading. Spindle control. MDI/MDA mode.
Tables	Zero offset table (up to 20 different zero offsets). Fixture table. Table of global and local parameters per channel. Table of common parameters for communication between channels. Tool table and tool magazine table.
Setup assistance	Tuning. Oscilloscope function. Bode diagram. Circularity (roundness) test.
Fully customizable	Tool for display configuration FGUIM. Visual Basic®, Visual C++®, etc. OPC server.
Integrated PLC	Up to 1024 digital inputs and 1024 digital outputs. Up to 8192 marks and 1024 registers. Up to 256 timers and 256 counters. Unlimited symbols. PLC programming languages: Equations, contacts and C language. Monitoring of CNC resources and variables. Logic analyzer.
Remote modules	Up to 1024 digital inputs and 1024 digital outputs. Up to 32 analog inputs and 32 analog outputs. Up to 32 feedback inputs.

Dimensions in mm (inches)

15" 8070 CNC
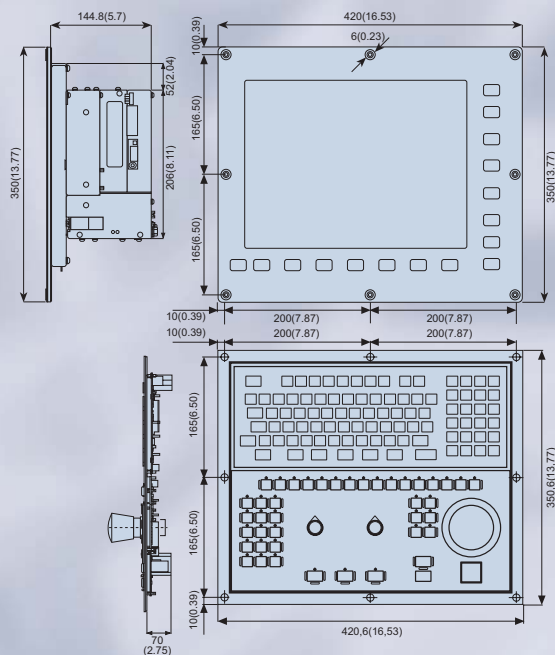
10.4" modular 8070 CNC
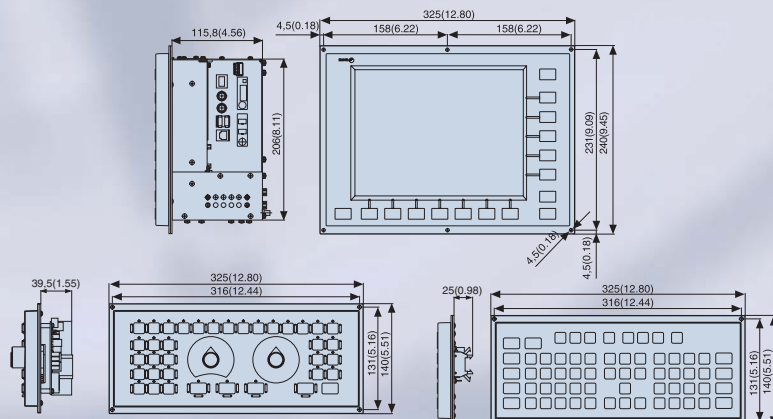
10.4" compact 8070 CNC

Remote modules

EN 50022
EN 50022
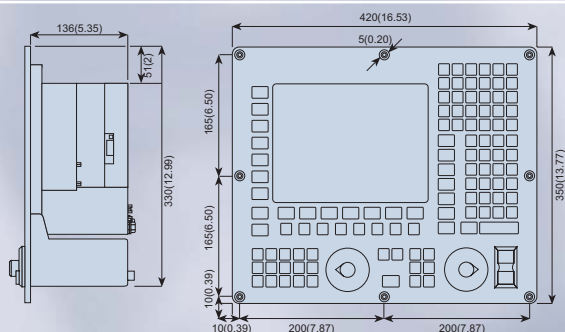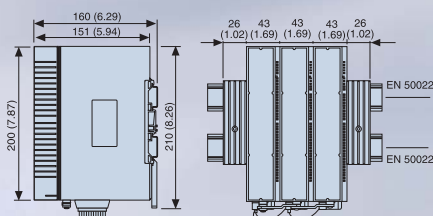
FAGOR AUTOMATION shall not be held responsible for any printing or transcribing errors in this catalog and reserves the right to make any changes to the characteristics of its products without prior notice.

Fagor Automation S. Coop. (Mondragón)
Bº San Andrés, 19 – P.O.Box 144
E-20500 Arrasate-Mondragón, Spain
Tel.   34 943 719 200
          34 943 039 800
Fax: 34 943 791 712
E-mail: info@fagorautomation.es
www.fagorautomation.com

Fagor Automation S. Coop. (Usurbil)
Bº San Esteban, s/n – Txoko Alde
E-20170 Usurbil, Spain
Tel. 34 943 000 690
Fax: 34 943 360 527
E-mail: usurbil@fagorautomation.es

AENOR
ER
Empresa Registrada

ER-073/1994
ER-0968/1999

IQNet

Fagor Automation Catalunya (Barcelona-Spain)
Tel. 34 934 744 375   Fax: 34 934 744 327

Fagor Automation GmbH (Göppingen-Germany)
Tel. 49 7161 15 6850   Fax: 49 7161 15 685 79

Fagor Italia S.R.L. (Milano-Italy)
Tel. 39 0295 301 290   Fax: 39 0295 301 298

Fagor Automation Ltda. (Leça da Palmeira-Portugal)
Tel. 351 229 968 865   Fax: 351 229 960 719

Fagor Automation UK Ltd. (West Midlands-United Kingdom)
Tel. 44 1327 300 067   Fax: 44 1327 300 880

Fagor Automation France S.à.r.l. (Clermont Ferrand-France)
Tel. 33 473 277 916   Fax: 33 473 150 289

Fagor Automation (Asia) Ltd., (Hong Kong)
Tel. 852 23 89 16 63   Fax: 852 23 89 50 86

Fagor Automation Taiwan Co. Ltd. (Taichung-Taiwan)
Tel. 886 4 2 385 1558   Fax: 886 4 2 385 1598

Fagor Automation (S) Pte. Ltd. (Singapore)
Tel. 65 68417345 / 68417346   Fax: 65 68417348

Fagor Automation (M) SDN.BHD. (Malaysia)
Tel. 60 3 8062 2858   Fax: 60 3 8062 3858

Beijing Fagor Automation Equipment Co., Ltd. (Beijing-China)
Tel. 86 10 84505858   Fax: 86 10 84505860

Beijing Fagor Automation Equipment Ltd. (Nanjing-China)
Tel. 86 25 83 32 82 59   Fax: 86 25 83 32 82 60

Beijing Fagor Automation Equipment Co., Ltd. (Guangzhou Rep.-China)
Tel. 86 20 86 55 31 24   Fax: 86 20 86 55 31 25

Beijing Fagor Automation Equipment Co., Ltd. (Shanghai-China)
Tel. 86 21 63 53 90 07   Fax: 86 21 63 53 88 40

Fagor Automation Korea, Ltd. (Seoul-Korea)
Tel. (82 2) 21130341 / 2113 0342 Fax: (82 2) 2113 0343

Fagor Automation do Brasil Com. Imp. Exp. Ltda. (São Paulo-Brasil)
Tel. 55 11 56 94 08 22   Fax: 55 11 56 81 62 71

Fagor Automation Corp. (Chicago-USA)
Tel. 1 847 98 11 500   Fax: 1 847 98 11 311

Fagor Automation West Coast (California-USA)
Tel. 1 714 957 98 85   Fax: 1 714 957 98 91

Fagor Automation East Coast (New Jersey-USA)
Tel. 1 973 773 35 25   Fax: 1 973 773 35 26

Fagor Automation Ohio Branch (USA)
Tel. 1 614 855 5720   Fax. 1 614 855 5928

Fagor Automation South East (Florida-USA)
Tel. 1 813 654 45 99   Fax: 1 813 654 3387

Fagor Automation Ontario (Mississauga-Canada)
Tel. 1 905 670 74 48   Fax: 1 905 670 74 49

Fagor Automation Quebec (Montreal-Canada)
Tel. 1 450 227 05 88   Fax: 1 450 227 61 32

Fagor Automation Windsor (Canada)
Tel. 1 519 944 56 74   Fax: 1 519 944 23 69

Fagor Automation holds the ISO 9001 Quality System Certificate and the CE Certificate for all its products.

MONDRAGON
CORPORACION COOPERATIVA

FAGOR

Worldwide reliability

agoranet   8070 - EN 0307- D.L. BI-659/07   SORALUCE S. COOP and PRUSSIANI ENGINEERING have provided some of the images in this catalog to us.