For General Purpose and Grinding applications

For Lathes

For Milling Machines and Boring Mills

FAGOR DRO's

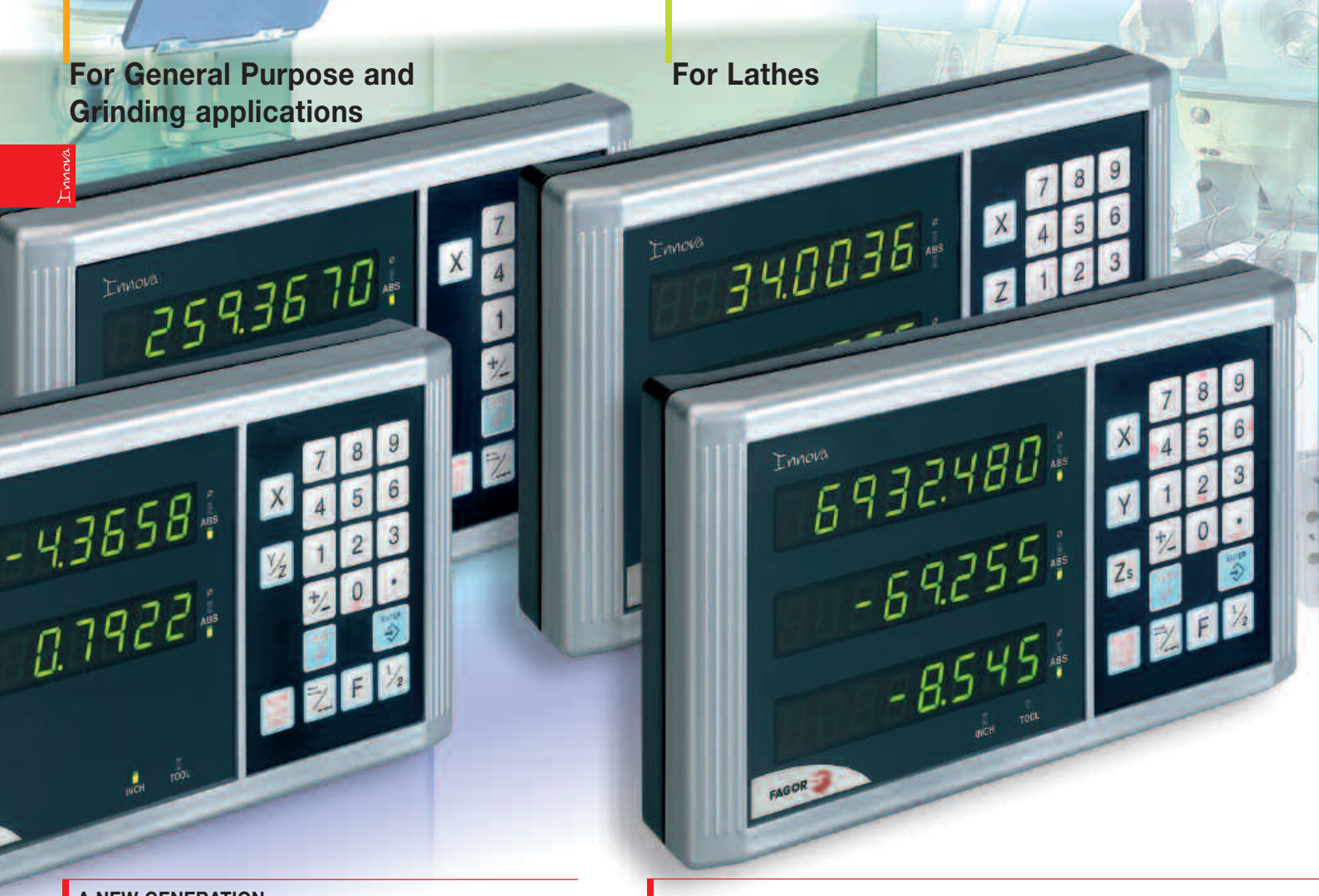
Intelligent Innovation

By Features, Experience and Technology

FAGOR

For General Purpose and Grinding applications

For Lathes



A NEW GENERATION OF DRO'S

The new Innova series FAGOR DRO's represents a new technological advance in measuring and control systems for the machine tool.

STATE-OF-THE-ART TECHNOLOGY

FAGOR has human and technical resources for researching, developing and innovating their products using the most advanced technology. Highly reliable technology used, for example, to minimize the size and quantity of the electronic components drastically reducing the chances of any breakdowns.
Thanks to this innovation and experience, it is possible to offer high quality and top features at very competitive prices.

TAILORED SOLUTIONS

Innova series FAGOR DRO's carry specific components developed and patented by FAGOR. Most reliable products that offer a great deal of standard features and perfectly adaptable to the specific needs of our customers to improve productivity on milling machines, boring mills, lathes, grinders and general purpose applications among others.

WITH MANY FEATURES

BASIC

- **Axis zero setting**
- **Preset**
  To enter values into the DRO and save them in its memory so they can be recalled when necessary.
- **Direct mm/inch conversion via keyboard**
- **Absolute, incremental and home reference signals**
- **Resolution of up to 0.1 microns**
- **Movement and feedrate alarms**
- **Axis coupling**
  Parallel axes may be coupled in order to display their combined movement on a single axis display.
- **Hysteresis factor**
  To prevent the displayed values from flickering due machine vibrations when working with high feedback resolutions.
- **Scaling factor**
  To enter a scaling factor to enlarge/reduce the blueprint values.
- **Linear axis compensation**
  The error caused by the axis sag on a machine may be compensated by parameter.

For Milling Machines and Boring Mills

All the features of the Innova series FAGOR DRO's are standard and common to all the models.

SPECIAL

- **Calculator function**
  To perform mathematical and trigonometric operations and preset any axis with the result of the calculation or use the feedback reading (position values) to carry out mathematical calculations.
  It is also possible to toggle between Recall and Preset modes:
  - Recall, to request the axis position and enter it in the calculator.
  - Preset, to preset the selected axis with the result of the calculation.

- **Software travel limits**
  These limits do not cancel the hardware limits set by the limit switches on the machine, but they give the operator the choice to set other travel limits between the main ones.

- **Multi-point compensation**
  A multi-point error is an interpretation of an error between two points of the travel; that error may be compensated with the DRO. Up to 40 points along the travel.

FAGOR EXCLUSIVE

- **Up to 20 references**
  For parts and/or tools

- **Feedback signal monitoring**
  The DRO checks the quantity and quality of the signals received from the feedback device and issues a warning in case of error.

- **Easy Setup and Diagnosis**
  The DRO detects the characteristics of the feedback system to which it is connected and adapts (sets) its internal parameters automatically.

- **Energy saving mode**
  The DRO turns off automatically after being idle for 30 minutes.

- **PC communication through USB adapter**
  For future feature updates

DRO's With the Best Quality and Reliability

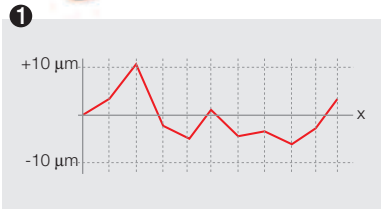
ERGONOMIC, RELIABLE AND EASY TO USE

The characteristics of Innova series FAGOR DRO's offer a number of features and advantages that help improve the precision of the work considerably with great savings in time and labor minimizing the risk of costly human errors.

BASIC | SPECIAL | FAGOR EXCLUSIVE

		10*i*	20*i*	20*i*-M	30*i*-M	20*i*-T	30*i*-T
FEEDBACK	Connection to TTL encoders	1	2	2	3	2	3
	Linear axes	•	•	•	•	•	•
	Angular axes	•	•	•	•		
	Incremental and distance-coded Io's	•	•	•	•	•	•
	Linear compensation	•	•	•	•	•	•
	Multi-point compensation (40 points per axis) for linear or angular axes ❶	•	•	•	•	•	•
	Scaling factor	•	•	•	•	•	•
	Feedrate alarm	•	•	•	•	•	•
	Travel limit alarm	•	•	•	•	•	•
	Feedback pulse monitoring	•	•	•	•	•	•
DISPLAY	Number of axes	1	2	2	3	2	3
	Radius or diameter display	•	•	•	•	•	•
	Mm / inch conversion	•	•	•	•	•	•
	Fine / coarse resolution	•	•	•	•	•	•
	Absolute / Incremental / Io ❷	•	•	•	•	•	•
	Display-off mode	•	•	•	•	•	•
	References with indicator display			20	20	20	20
FUNCTIONS	Axis zero setting	•	•	•	•	•	•
	Buzzer			•	•	•	•
	Number of references			20	20		
	Number of tools					20	20
	Axis preset	•	•	•	•	•	•
	Tool compensation			•	•	•	•
	Axis feedrate display						•
	Display of maximum, minimum position and difference	•					
	Software limits ❹	•	•	•	•	•	•
	Hysteresis factor ❸	•	•	•	•	•	
	Machining axis rotation			•	•		
	Calculator			•	•	•	•
	Easy setup and diagnosis	•	•	•	•	•	•
CYCLES	Part centering	•	•	•	•		
	Taper calculation (on lathes)					•	•
	Bolt-hole drilling (with most recent data saved in memory)			•	•		
	Linear drilling cycle			•	•		
	Arc machining cycle			•	•		
OTHERS	PC communication via USB adapter	•	•	•	•	•	•
	Auto shut-off after 30 minutes	•	•	•	•	•	•

❶



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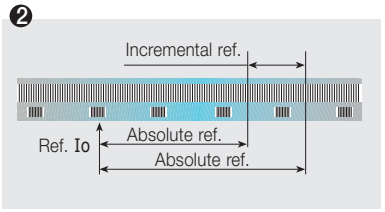

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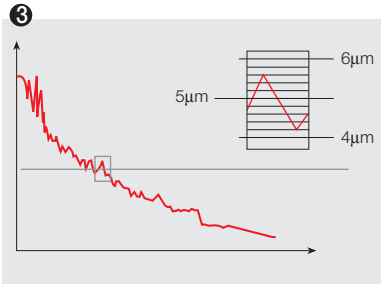

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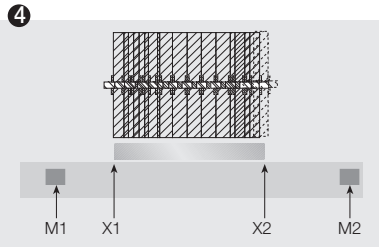


With FAGOR Feedback Systems that always set them apart

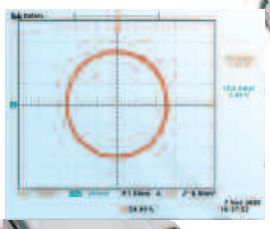
FEEDBACK IS CRUCIAL TO THE PRECISION OF THE SYSTEM

Fagor Automation uses high-quality, highly reliable optic technology to manufacture its linear and rotary encoders.
From its birth, in 1975, Fagor have dedicated a great part of their technical and human resources to the research, development and design of encoders. That is why their quality is unquestionable as asserted by the exigency tests carried out by our customers.

WITH THE MOST RELIABLE TECHNOLOGY

OPTICAL DESIGN

Fagor use both optical transmission and reflection in their range of encoders as well as patented components and scanning techniques to achieve high quality signals.

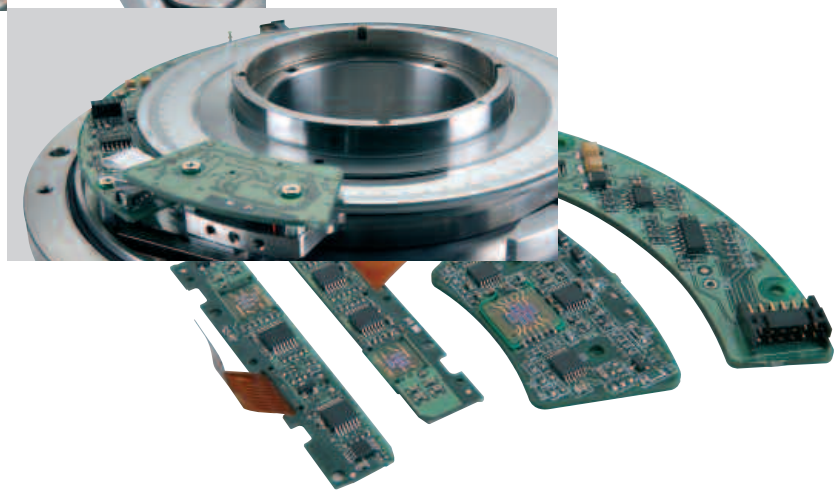


MECHANICAL DESIGN

FAGOR's mechanical developments over the past 30 years have resulted in some of the most innovative and effective methods for minimizing the effects of harsh operating environments often encountered in machine tool applications.

ELECTRONIC DESIGN

State of the art electronics create a perfect relationship between the reader head and scale and automatic gain control further ensures constant signal characteristics allowing high resolutions to be obtained.



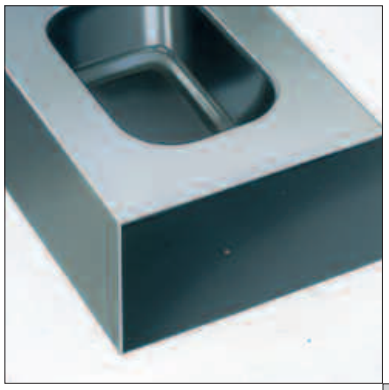
ACCURACY CERTIFICATE

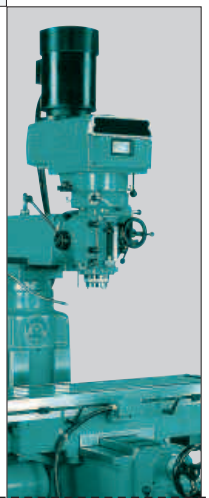
Every single FAGOR linear encoder and angular encoder product is subjected to a final accuracy test conducted in a computer controlled measuring test bench.

For Milling Machines and Boring Mills

FOR MILLING MACHINES AND BORING MILLS

With a product range of optimum performance, designed to simplify as much as possible the specific operations of milling machines and boring mills while increasing their productivity and ensuring top quality in each process.



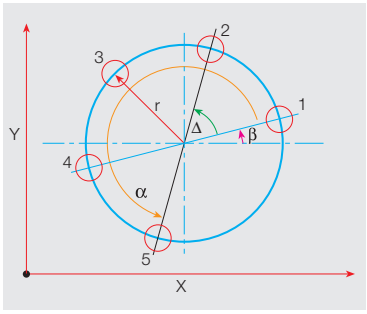


MAIN FEATURES

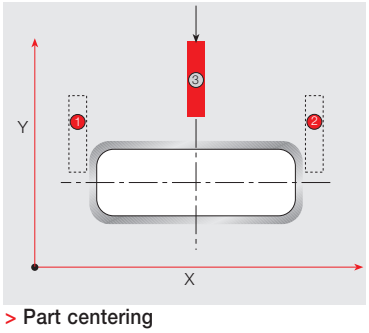
- **Bolt-hole drilling**
  The DRO automatically calculates the position of the holes as the operator enters the data requested by it.
- **Linear drilling calculation**
  It calculates, memorizes the position and guides the operator when executing linear drilling operations at any angle with respect to the axes with a fixed gap between holes.
- **Tool radius compensation**
  In a milling operation with a rounded tool, its radius must be taken into account and it must be added to or subtracted from the position value depending on the machining direction. Once the tool value is entered, it is saved in the DRO's memory.
- **Part centering**
  By touching two points of the part with the tool or with a probe, the DRO can calculate the center of the part by simply pressing a key.
- **Up to 20 part zeros (datum points)**
  This feature makes it easier to work with several part zeros and may be used to save tool data and hole positions. The DRO offers greater flexibility to the operator.
- **Part angle**
  This feature offers the possibility to measure angles in order to avoid part alignment errors. Thus, the inclination of the part may be corrected to obtain the right position.
- **Corner rounding / machining of arcs**
  To be used in simple corner rounding or surfaces in arc in a plane defined by two linear axes.

> 20*i*-M

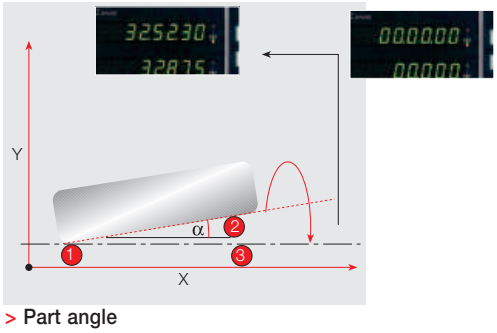
> 30*i*-M



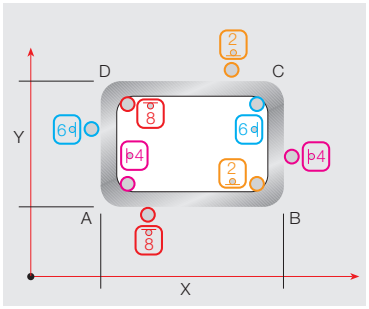
> Bolt-hole drilling calculation



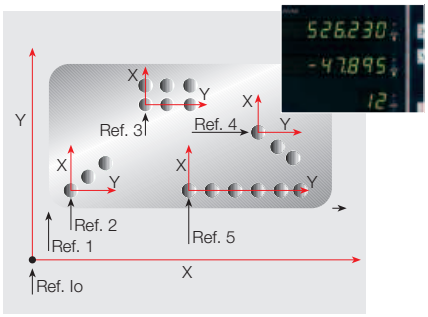
> Part centering



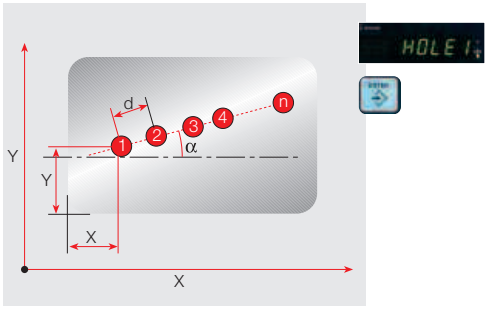
> Part angle



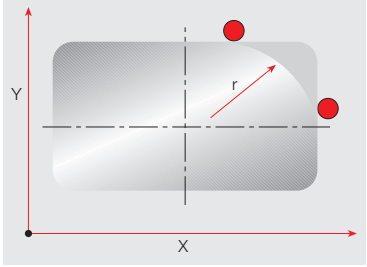
> Tool radius compensation



> Up to 20 part zeros



> Linear drilling calculation



> Corner rounding/ machining of arcs

For Lathes

FOR LATHES

With specific functions for turning operations that require increased time savings for optimum productivity and reliability.

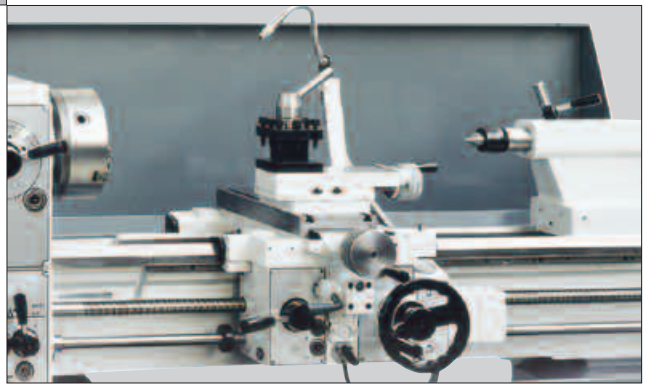
MAIN FEATURES

- **Taper calculation**
  The DRO calculates the part taper by entering the values of two points of the part.

- **Up to 20 tool references**
  When using several tools, each will have a different origin point; these origin points may be stored and recalled every time a tool is changed. In each tool change, it stores a different origin point that may recalled at any time.

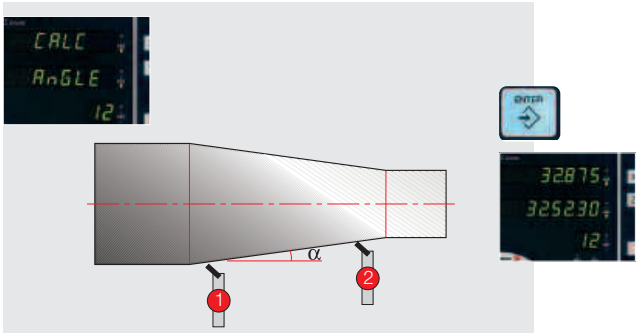
- **Z axis coupling**
  Two parallel axes may be coupled with each other so the Z axis display shows their combined movement.

- **Preset in HOLD mode**
  It is possible to preset the actual diameter value of the machined part (measured with a caliper or micrometer).

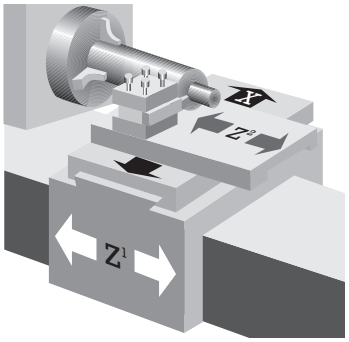


> 20*i*-T

> 30*i*-T

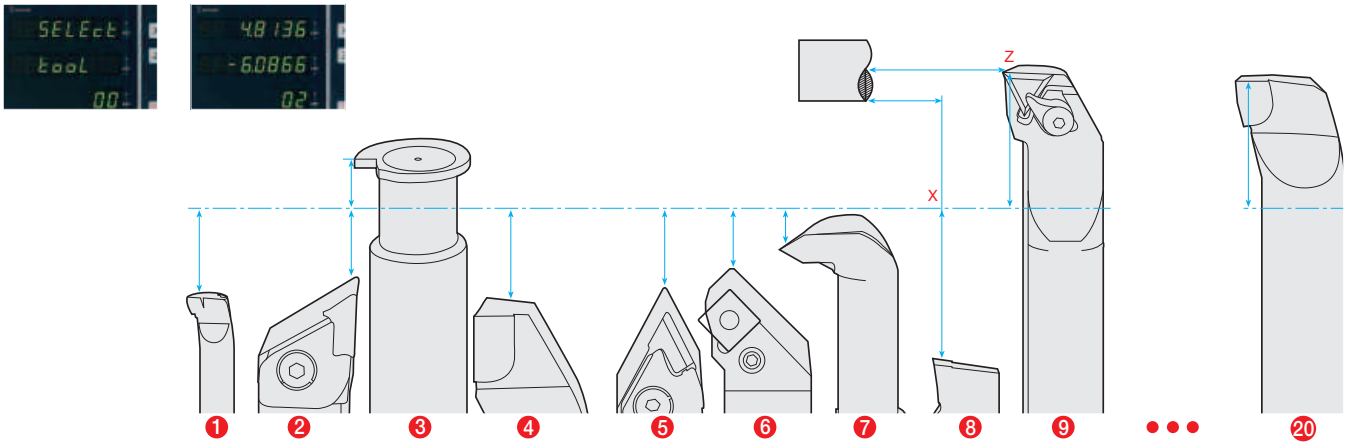


> Taper calculation



> Z axis coupling

> 20 tool references



For General Purpose and grinding applications

> 10ℓ

> 20ℓ

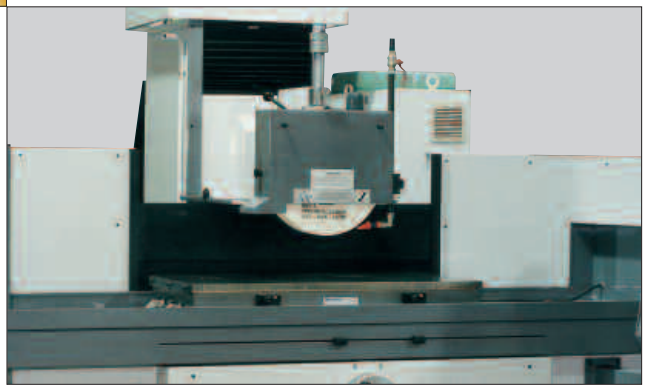
FOR GENERAL PURPOSE AND GRINDING APPLICATIONS

These models provide multi-purpose solutions because they can be adapted to very different types of applications such as grinders, auxiliary axes, metrology, woodworking machines, etc.

MAIN FEATURES

- **In grinding applications**
  Their 40 compensation points ensure maximum efficiency and absolute precision.
  This point-to-point compensation minimizes possible machine errors.

- **In other applications**
  - Display of maximum, minimum position and difference between them (10ℓ)
  - Fine or coarse resolution as needed
  - Connection to linear and angular axes



Accessories

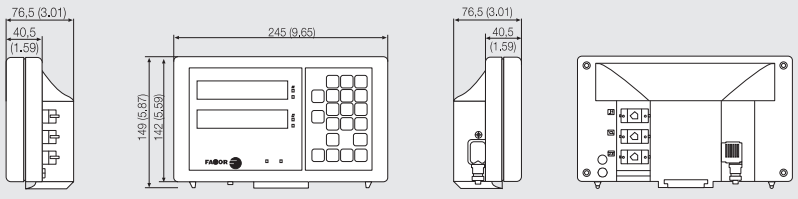
SUPPORT ARM

Operating conditions

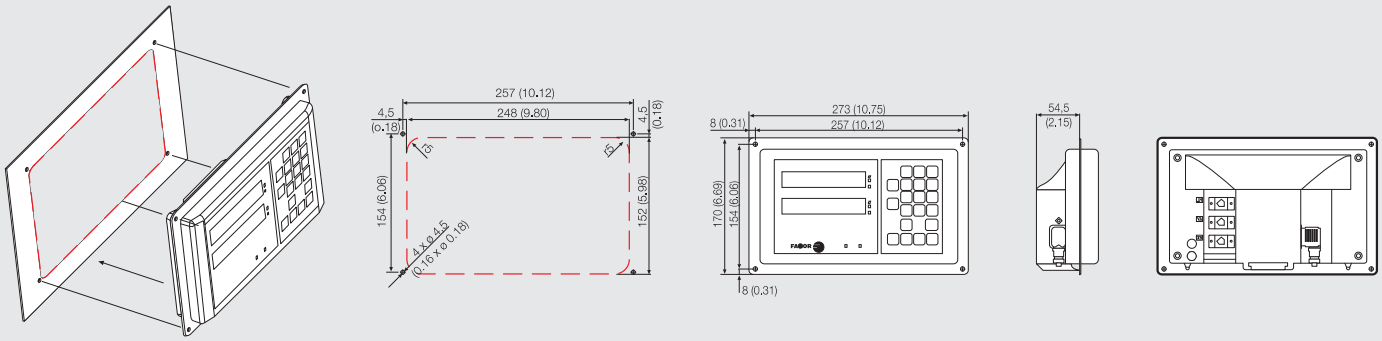
Power supply with protection against power outages	Universal power supply with an input range between 100 Vac and 264 Vac (±10%); frequency between 45 Hz and 400 Hz.
Operating temperature	From 5 ºC to 45 ºC (from 41 ºF to 113 ºF)
Storage temperature	From -25 ºC to 70 ºC (from -13 ºF to 158 ºF)
Relative humidity	Maximum 95% non-condensing at 45 ºC (113 ºF)
Sealing	Front panel IP54 and rear panel, IP4X (DIN 40050)
This product complies with the regulations on Safety and electromagnetic compatibility	EN-60204-1, EN-50081-2, EN-55011, EN-55022, EN-50082-2, EN-610004-2, 3, 4, 5, 6, 11, EN-V50140, EN-V50141, EN-V50204 and EU directives 73/23 ECC, 89/392/CEE, 89/336/ECC and 73/23EEC
Type of feedback signals	• TTL 0-5 VDC ±5% • Differential TTL 0-5 Vdc ±5% • Other types of signals through an adapter (consult)
Maximum feedback signal frequency	250 KHz

Dimensions in mm and inches

Tabletop models



Built-in models



(*) Built-in option: Add B to the model name (e.g. 20*i*-MB)

Backed by a worldwide leader group

FAGOR AUTOMATION is a company that as well as the DRO's shown in this catalog, develops, manufactures and sells complete CNC packages as well as linear and rotary encoders making it an essential reference for any automation application. All this with the guarantee of a great international group it belongs to: Mondragón Cooperative Corporation (MCC).

This corporation has over 70,000 employees and is divided into three groups: financial, industrial and distribution and has its own R&D and training centers.

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

MONDRAGON CORPORACION COOPERATIVA

FAGOR

Worldwide reliability

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