DIGITAL READOUTS

1, 2 and 3 axes

FAGOR AUTOMATION

Open to your world

FAGOR AUTOMATION

in permanent evolution

Fagor Automation has been manufacturing digital readouts for over 40 years and has always kept ahead launching innovative products adapted to the actual machining requirements of conventional machines.

General specifications of all Fagor Automation DRO's

- **Preset function**
  For the operator to enter values into the DRO and save them in its memory and recall them when needed.
- **Axis coupling**
  Parallel axes may be combined so a single axis display shows the addition/subtraction of both axes.
- **Easy setup**
  The DRO detects the characteristics of the feedback system to which it is connected and sets its internal parameters automatically.
- **Multi-point compensation**
  Its 40 compensation points provide maximum efficiency and guarantee absolute precision. This point-to-point compensation minimizes possible machine errors.
- **Display of maximum, minimum coordinates and the difference between them**
- **Fine or coarse resolution, as needed**
- **Connection to linear and angular axes**
- **Software travel limits**
  These limits do not cancel the ones already set by the travel limits of the machine, but offer the operator the chance to add other limits between the main ones.

WITH SOLUTIONS FOR EACH MACHINE

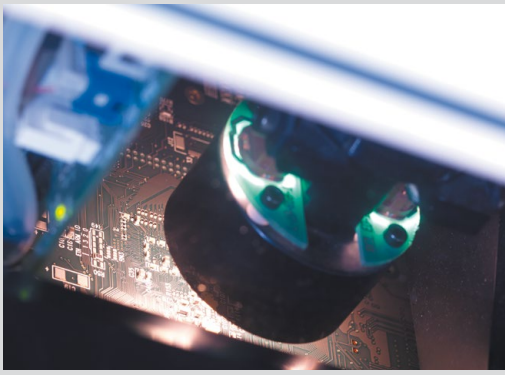
Innova series FAGOR DRO's carry components created, developed and patented by Fagor Automation. Highly reliable products that adapt to the customers' particular needs in order to improve the productivity of milling machines, boring mills, lathes, grinders, EDM and general purpose applications among other machines.

- **For milling machines and boring mills** — **M series**
- **For lathes** — **T series**
- **For EDM and grinders** — **E series**
- **For general purpose applications** — **General series**

WITH STATE-OF-THE-ART TECHNOLOGY

The DRO offers the user features that make his job easier, but what sets it apart in terms of machining accuracy is the feedback installed on the axes of the machine.

Fagor Automation uses high quality, highly reliable optic technology to manufacture their linear and rotary encoders.



Linear and rotary encoders ideal for conventional machines

Linear	Measuring lengths	Accuracy
F series	440 mm to 30 m	±5 µm/m
C/C2 series	220 mm to 3040 mm	±5 µm/m / ±10 µm/m
M/M2 series	40 mm to 1540 mm	±5 µm/m / ±10 µm/m
MM/MM2 series	40 mm to 520 mm	±5 µm/m / ±10 µm/m

Rotary	Pulses/turn	Accuracy
H, HP series	Up to 5,000	±1/10 of the pitch
S, SP series	Up to 5,000	±1/10 of the pitch
HA series	Up to 10,000	±1/10 of the pitch

Accuracy certificate

All FAGOR linear feedback systems are subjected a final accuracy test carried out on a computerized measuring bench equipped with a laser interferometer inside a climate-controlled chamber at a temperature of 20 ºC (68 ºF).

M series

MILLING MACHINES AND BORING MILLS

2 and 3 axes

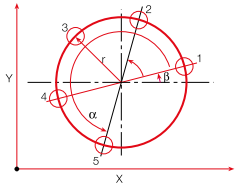
30i M model

20i M model

Common characteristics, M series

Bolt-hole drilling

The position of the holes is calculated automatically by entering the values requested by the DRO.

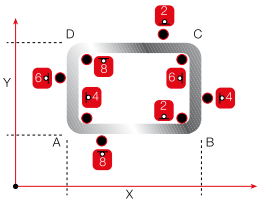


Linear drilling calculation

Calculates, memorizes the position and guides through the execution of linear drilling operations at any angle with respect to the axes.

Tool radius compensation

The tool radius is added to or subtracted from the position value when milling with a round tool depending on the machining direction.

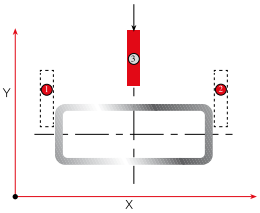


Corner rounding/machining of arcs

To be used in simple corner rounding or curved surfaces in a plane defined by two linear axes.

Part centering

Simply touching two points of the part with the tool or with a probe and pressing a key, the DRO calculates the center of the part.

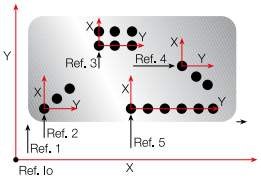


Part alignment

For measuring angles avoiding part misalignment and correct its inclination until the right position is obtained.

Multiple part-zeros (datum points)

It makes working with several origin points easier and may be used to save tool data and to position holes.



T series
LATHES

2 and 3 axes

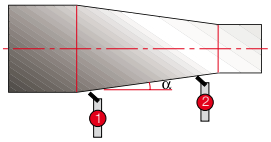
30i T model

20i T model

Common characteristics, T series

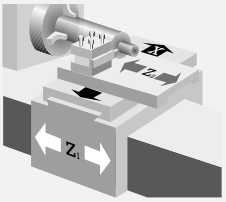
Taper calculation

The taper of a part may be calculated by entering the value of two points of the travel at the DRO.



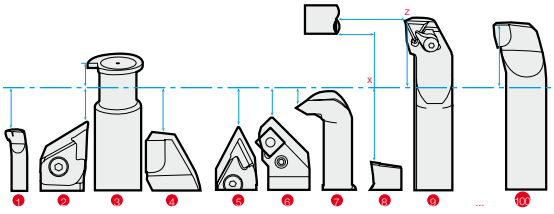
Z axis coupling

A parallel axis may be coupled with its pair at the same DRO display axis showing the combination of both on the Z axis display.



Up to 20 tool references

When using more than one tool, each one will have a different origin (offset), these origins may be saved and recalled every time a new tool is changed. At every tool change, it saves a different origin (offset) that may be recalled by the operator.



Preset in HOLD mode

It is possible to preset on the axis the actual diameter value of the machined part (measured with a caliper or a micrometer).

E series
EDM AND GRINDERS

1, 2 and 3 axes

30i E model

The 30i E model includes the following features:

- Bolt-hole drilling
- Linear drilling
- Hold

20i E model

Common characteristics, E series

EDM mode: to set the activation level of the EDM program.
Any level may be changed even during the EDM process.

6 digital outputs

To control up to 6 penetration levels.

4 digital inputs

For axis zero setting and emergency input.

Electrode length compensation

The outputs may be disabled during the EDM operation for measuring or replacing the electrode.

General series
GENERAL PURPOSE APPLICATIONS

20i model

10i model

Common characteristics, Gereral series

These models provide multi-purpose solutions, because they may be adapted to applications as different as auxiliary axes, metrology, woodworking machines, etc.

Comparison table

	30i M	20i M	30i T	20i T	30i E	20i E	10i E	20i	10i
	M SERIES milling machines and boring mills		**T SERIES** lathes		**E SERIES** EDM and grinders			**General series** general purpose applications	
feedback									
Connection to TTL encoders	3	3	3	2	3	2	1	2	1
Linear axes	•	•	•	•	•	•	•	•	•
Angular encoders	•	•			•	•	•	•	•
Incremental and distance-coded reference marks	•	•	•	•	•	•	•	•	•
Linear axis sag compensation	•	•	•	•	•	•	•	•	•
Multi-point compensation (points per axis)	40	40	40	40	40	40	40	40	40
Travel limit alarm	•	•	•	•	•	•	•	•	•
display									
LED display	•	•	•	•	•	•	•	•	•
Number of axes	3	2	3	2	3	2	1	2	1
Radius or diameter display	•	•	•	•				•	•
Mm/inch conversion	•	•	•	•	•	•	•	•	•
Fine/coarse resolution	•	•	•	•	•	•	•	•	•
Absolute/incremental feedback	•	•	•	•	•	•	•	•	•
“Display off” mode	•	•	•	•	•	•	•	•	•
Axis coupling	•	•	•	•	•	•		•	
functions									
Zero setting of the axes	•	•	•	•	•	•	•	•	•
Buzzer function	•	•	•	•	•				
Number of references - part zeros	20	20			20	20	20		
Number of tools			20	20					
Axis preset	•	•	•	•	•	•	•	•	•
Tool compensation	•	•			•	•	•		
Axis feedrate display			•						
Calculator	•	•	•	•	•				
Easy setup	•	•	•	•	•	•	•	•	•
Electrode length compensation					•	•	•		
Hysteresis factor	•	•	•	•	•	•	•	•	•
cycles									
Part centering cycles	•	•			•	•	•	•	•
Bolt hole drilling (with the most recent data saved in memory)	•	•			•				
Linear drilling	•	•			•				
Modo EDM mode					•	•	•		
Corner rounding/machining of arcs	•	•			•				
Angle measuring	•	•			•				
Taper calculation			•	•					
otros									
Auto shut-off after 30-minute idle	•	•	•	•	•	•	•	•	•
Digital inputs/outputs					4/6	4/6	4/6		

ACCESSORIES

Support arm

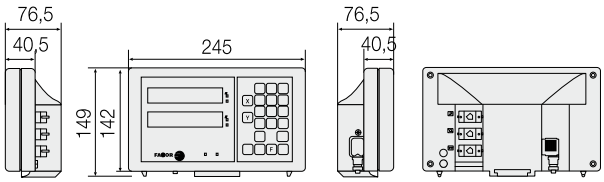
- **For mill**
  ARM 300 model, 300 mm long
  ARM 500 model, 500 mm long

- **For lathe**
  ARM-V-500 model
  500 mm long

Adapter plate

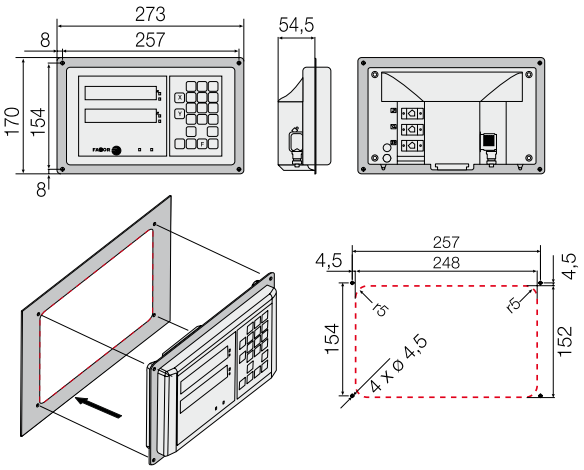
- **For built-in model**

Tabletop models



Dimensions in mm

Built-in models



(*) Built-in option: Add “B” to the model (for example: 20i-B)

Operating conditions

Power supply protected against AC mains outage
universal power supply with an input range between 85 VAC and 264 VAC.
Frequency from 45 Hz to 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 % without condensation at 45 ºC (113 ºF)

Sealing
front panel IP54 and rear panel IP4X (DIN 40050)

Product in compliance with safety and electromagnetic compatibility regulations
EN 60204-1: 2018; EN 61010-2-201:2018; EN 61000-6-2:2005; EN 61000-6-4:2007+A1:2011 and EC directives 2014/30/UE, 2014/35/UE and 2011/64/UE

Type of feedback signals
TTL and differential TTL (EIA422)

Maximum feedback frequency
250 kHz

Other languages are available in the Downloads section from Fagor Automation's website.

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

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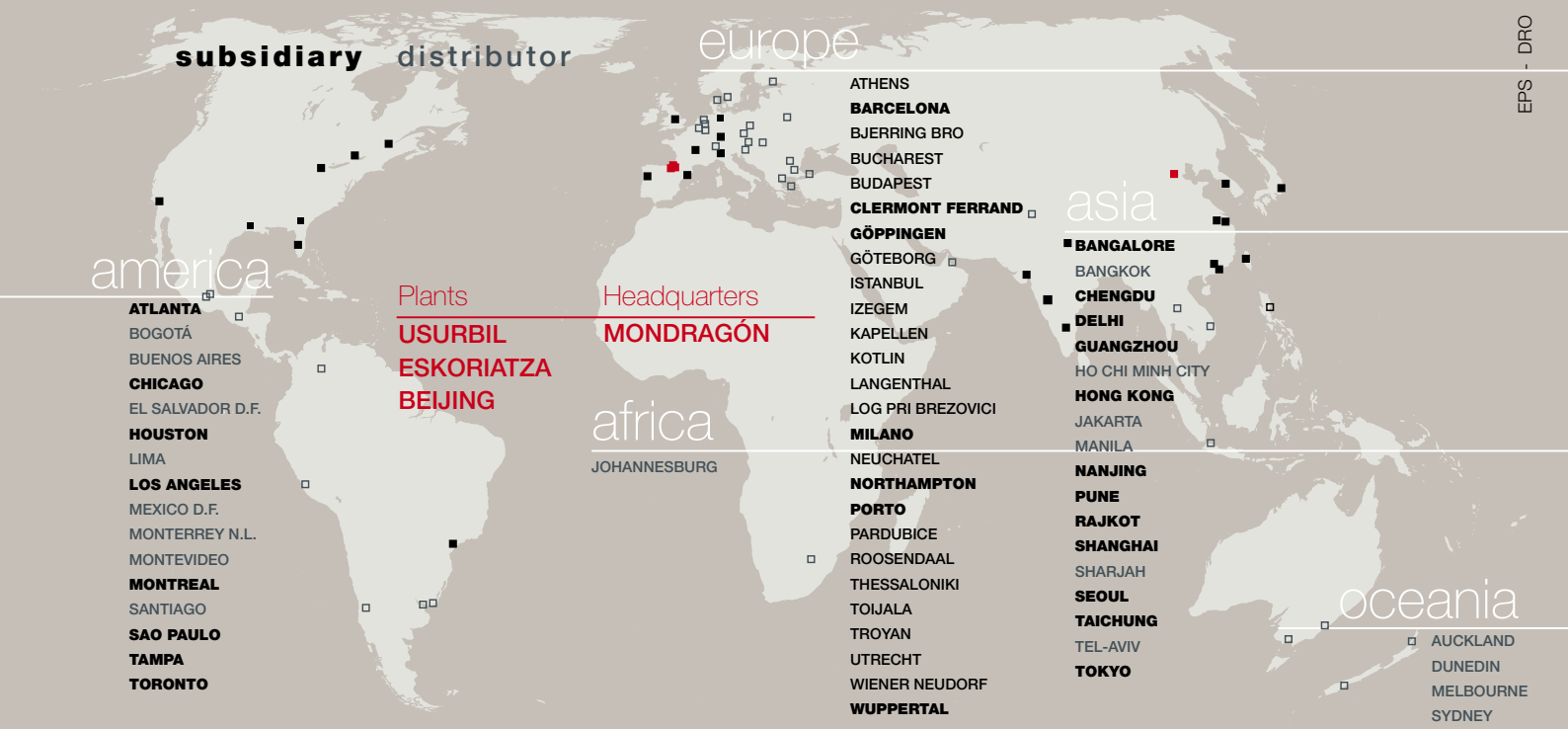

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