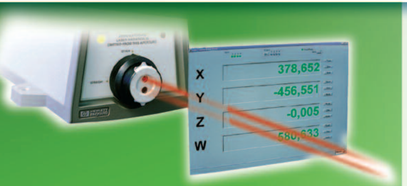
With FAGOR feedback that sets them apart



Feedback is crucial to precision

The range of FAGOR linear encoders guarantees the most reliable way to achieve the best system precision

Attending to the new challenges the machine manufacturers must face (high speed machining with greater vibrations, higher accuracy, immunity to temperature changes, etc.) FAGOR has developed a range of products that may be perfectly adapted to any need.

Top features

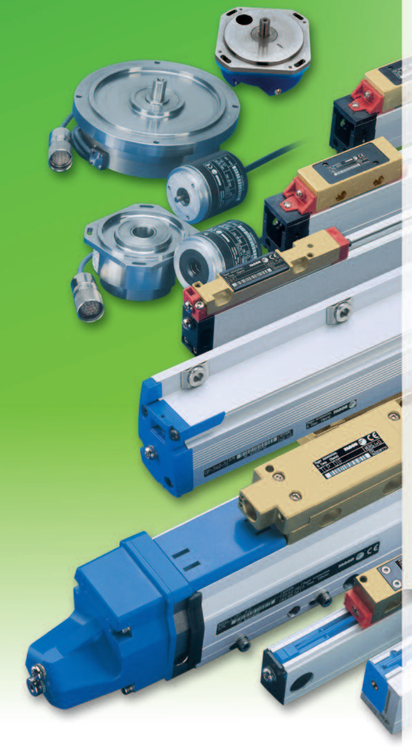
- Accuracy of up to ±3µm/m
- Resolution of up to 0.1 µm
- Repeatability better than 1 µm

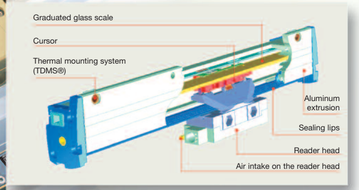
Great reliability

- **Immunity to temperature changes**
  Measuring errors due to temperature changes are drastically reduced using the patented mounting method Thermal Determined Mounting System (TDMS®)
- **Constant pressure on the bearings for longer life span**
  Using flexible bearings (each mounted on a spring) ensures constant contact all along the travel of the linear encoder even under high vibration guaranteeing the system's long life span.

Greater efficiency

- **Reference marks**
  FAGOR linear encoders have incremental reference marks (I_0) that may be selected by the user and distance-coded ones (that provide the absolute position value).





State of the art

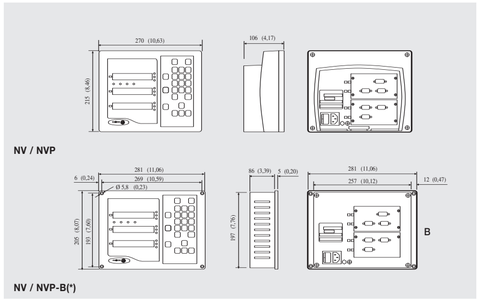
- **SMD technology = Maximum reliability**
  FAGOR uses SMD technology in all its products to achieve maximum reduction of size and quantity of electronic components thus minimizing the risk of breakdowns. On the other hand, using FAGOR specific components guarantees maximum reliability.

FAGOR linear and rotary feedback system

Technical characteristics

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% • For models ending in 1: Sinusoidal differential 0-5V (1 Vpp + 20% - 40% with 120 Ohm load) • Other types of signals through an adapter (consult)
Maximum feedback signal frequency	250 KHz

Dimensions in mm (inches)



(*) B: built-in option

Distributed by:

Fagor Automation S.Coop.
Bº San Andrés, 19, Apdo. 144
E-20500 Arrasate-Mondragón, Spain
Tel. 34-943 71 92 00 / 34-943 03 98 00
Fax 34-943 79 17 12
www.fagorautomation.com
E-mail: info@fagorautomation.es

Fagor Automation, Catalunya, Spain
Tel. 34-93 474 43 75 - Fax 34-93 474 43 27
Fagor Automation GmbH, Germany
Tel. 49-716115685-0 - Fax 49-71611568579
Fagor Italia S.R.L., Italy
Tel. 39-0295301290 - Fax 39-0295301298
Fagor Automation Ltda. (Sucursal Portuguesa), Portugal
Tel. 351-22-9968865 - Fax 351-22-9960719
Fagor Automation UK Limited, United Kingdom
Tel. 44-1327 300067 - Fax 44-1327 300880
Fagor Automation France Sàrl, France
Tel. 33-473277916 - Fax 33-473150289
Fagor Automation (Asia) Ltd., Hong Kong
Tel. 852-23891663 - Fax 852-23895086
Fagor Automation Taiwan Co. Ltd., Taiwan
Tel. 886-4-2-3271282 - Fax 886-4-2-3271283
Fagor Automation (S) Pte. Ltd., Singapore
Tel 65-68417345/6 - 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. Office and Service Centre, China
Tel. 86-10-84505858 - Fax 86-10-84505860
Beijing Fagor Automation Equipment Ltd. Nanjing Office., China
Tel. 86-25-83328259 - Fax: 86-25-83328260
Beijing Fagor Automation Equipment Co. Ltd. Guangzhou Rep. Office., China
Tel. 86-20-86553124 - Fax: 86-20-86553125
Beijing Fagor Automation Equipment Co. Ltd. Shanghai Rep. Office., China
Tel. 86-21-63539007 - Fax: 86-21-63538840
Fagor Automation Korea, Ltd., Korea
Tel. 82-2-21130341/2 - Fax 82-2-21130343
Fagor Automation do Brasil Com.Imp.Exp.Ltda., Brazil
Tel. 55-11-56940822 - Fax 55-11-56816271
Fagor Automation Corp., USA
Tel. 1-847-9811500 - Fax 1-847-9811311
Fagor Automation West Coast, USA
Tel. 1-714-9579885 - Fax 1-714-9579891
Fagor Automation East Coast (New Jersey-USA)
Tel. 1-973-7733525 - Fax 1-973-7733526
Fagor Automation South East, USA
Tel. 1-813-6544599 - Fax 1-813-6543387
Fagor Automation Ohio, USA
Tel. 1-614-855-5720 - Fax 1-614-855-5928
Fagor Automation Ontario, Canada
Tel. 1-905-6707448 - Fax 1-905-6707449
Fagor Automation Quebec, Canada
Tel. 1-450-2270588 - Fax 1-450-2276132
Fagor Automation Windsor, Canada
Tel. 1-519944-5674 - Fax 1-519944-2369

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

MONDRAGON CORPORACION COOPERATIVA

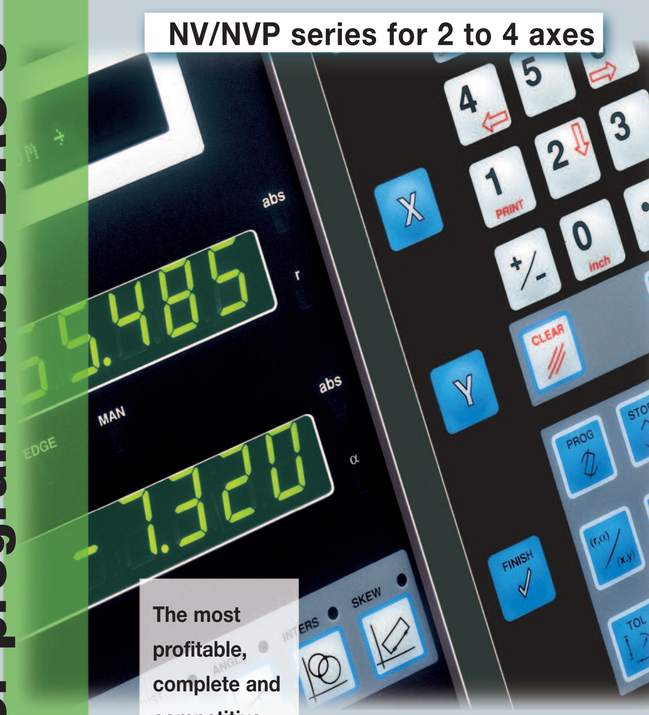
FAGOR

Worldwide reliability

602 NV - EN - A.G. Elkar D.L. BI-420-06

Fagor programmable DRO's

NV/NVP series for 2 to 4 axes



The most profitable, complete and competitive investment in measuring and control systems

FAGOR

FAGOR NV/NVP DRO's

Best quality and reliability in DRO

From 2 to 4 axes

Fagor programmable DRO's are the outstanding result of combining current technology and our over-30-year experience in manufacturing and selling measuring and control systems for the machine tool.

Their extraordinary characteristics and really competitive price make these DRO's the most profitable choice to increase the productivity of your machine, new or used, and reducing scrap.

On the other hand, not only do they stand out for their ergonomic design or operating ease, but also for being:

- Leaders in reliability; thanks to their universal power supply and robust aluminum body.
- Leaders in features.
- Leaders in technology: because we use the same components in our DRO's as in our CNC's (including state-of-the-art microprocessors with ASIC integrated circuits).
- Leaders in service with 23 branch offices and over 40 service centers worldwide.

Applications

FAGOR programmable DRO's cover a wide range of applications requiring up to 4 axes such as milling machines and boring mills, lathes and turning centers, EDM and profile projectors.

Features

All FAGOR programmable DRO's offer a number of standard features such as:

- Axis zero setting
- Axis preset
- Reference mark (I0)
- "Display off" mode
- Absolute and incremental operation modes
- Direct mm/inch conversion
- Feedrate and feedback alarms
- Auxiliary LCD screen
- Messages in 6 languages (plus a configurable one)
- Multi-point machine error compensation
- Digital inputs and outputs
- Standard program cycles
- Program cycles that may be configured by the manufacturer

For Milling Machines and Boring Mills

For Milling Machines and Boring Mills

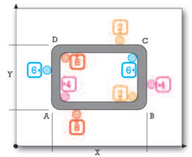
NVP 200/201 MRS (2 axes)
NVP 300/301 MRS (3 axes)
NVP 400/401 MRS (4 axes)

For milling applications the following features deserve a special mention:

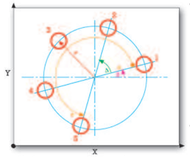
- Tool radius compensation
- Part centering
- Axis coupling
- Shrink factor (for mold work)
- Bolt-hole drilling calculation

And...

- RS232 and probe
- Angular feedback reading
- Library of 10 tools
- Teach-in
- Tool calibration
- Part skew (coordinate rotation)
- Program cycles:
  - -Positioning
  - -Linear, grid and parallelogram pattern drilling calculation
  - -Pocket milling
  - -Corner rounding
  - -Scaling factor / mirror image
- Up to 10 zero offsets



Tool radius compensation



Bolt-hole drilling calculation

For EDM

For EDM

NV 300/301 E (3 axes)

Besides having the standard characteristics of the FAGOR DRO's for milling machines and boring mills, these DRO's offer the following features:

- 6 digital outputs:
  To control up to 6 penetration levels in the EDM process and 10 in BCD mode.
- 3 digital inputs
  Used as emergency input and to set the axes to zero.
- Possibility to modify any activation coordinate and the length of the electrode while executing the program.
- Hysteresis factor.
- Electrode length compensation

For Lathes

For Lathes

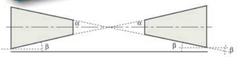
NVP 300/301TRS (2/3 axes)
NVP 300/301TS RS

For lathe applications we point out:

- Coupling (combination) of Z1 and Z2 axes
- Library of up to 9 tools
- Tool calibration
- Taper calculation by simply touching two points of the part
- Hold function for tool change
- Direct radius/diameter reading

And...

- Storage for up to 16 tools
- Teach-in
- Program cycles:
  - -Positioning
  - -Corner rounding
  - -Turning/facing/taper facing



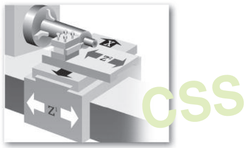
Taper angle calculation by simply touching two points of the part.

NVP 300/301TS RS with spindle control

The NVP 300/301 TS RS DRO model offers:

- Constant Surface Speed (CSS)
- Spindle orientation, by entering the desired angle directly
- Override (50% to 150%) of the programmed rpm without interrupting the machining operation.
- Control of the spindle rpm by an external potentiometer

This DRO calculates and varies the spindle speed automatically depending on the X axis radius while machining, thus obtaining optimum part finish, machining time savings between 20% and 30% and longer tool life.



Coupling (combination) of the Z1 and Z2 axes

For Profile projectors

For Profile projectors

NVP 200/201QC (2 axes)

The NVP 200/201 QC can turn a simple profile projector or microscope into a powerful measuring machine and can calculate in two dimensions.

This DRO includes excellent features such as tolerance control, statistical control of various measurements taken as well as the optional fiber optic connection.