Elmo's Gold Line

Our Best Ever Motion Solutions

The Gold Duo

Highly Compact Dual Axis Networking Servo Drive

Up to 1.6 kW (3.2 kW Peak) of Qualitative Power Per Drive

Elmo

Motion Control

Motion Control Solutions Made Small, Smart & Simple

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Offering You Top Servo Solutions

The Gold Duo – one of Elmo's newest Gold Line intelligent servo drives – operates from DC power of up to 48 VDC, 60 VDC or 100 VDC depending on the model. It meets the highest level of motion control application requirements, providing a highly compact dual axis package, top servo performance, advanced networking, built-in safety and high power density, combined with a fully featured motion controller and local intelligence.

It's Easy to Implement Challenging Applications

In conjunction with Elmo's Gold Maestro, the ultimate distributed network motion controller, and the other members of Elmo's Gold Line of intelligent servo drives, state-of-the-art solutions for the most challenging multi-axis motion applications can be easily implemented, with a short development cycle while maintaining high performance.

The Gold Duo

- A highly compact dual-axis panel-mounted package with up to 1.6 kW of qualitative power.
- Ideal for any high performance application that requires rapid yet highly accurate movement of an electrical motor.
- Very high density of power and intelligence.

Intelligence at the Axis Level

The Gold Line of servo drives incorporates Elmo's highly efficient and compact power density design together with the rich feature set of Elmo's proprietary, core motion control technology. The Gold Line solutions enhance servo performance with very high speed intelligent vector control, extremely wide bandwidth, advanced filtering, proprietary power switching technology, cogging and BEMF compensations.

Ideal, Cost Effective Solutions for your Machinery

The combination of the Gold Line servo drives' unique characteristics, programming flexibility, a wide variety of feedbacks for closed loop operation, and EtherCAT and CANopen distributed networking, makes it an ideal, cost effective solution. The Gold Duo also meets stringent industrial environmental conditions.
A smart built-in power supply allows the Gold Duo to operate with or without "supply back-up" functionality.

Feedback Sensors

- Incremental Quadrature Encoder (with or without commutation halls) up to 60×10^6 counts per second (15 MHz on A/B)
- Digital Halls.
  - Up to 3 kHz commutation frequency.
  - "5V logic"
  - Input voltage up to 15 VDC.
- Incremental Encoder + Digital Halls
- Analog Encoders
  - 1 V PTP Sine/Cosine.
  - Sin-Cos Frequency: up to 500 kHz.
  - Internal Interpolation: up to ×8192.
  - Automatic correction of amplitude mismatch, phase mismatch, signal offset.
- Analog Halls (commutation & position)
  - One feedback electrical cycle = one motor's electrical cycle.
  - 1 V PTP Sine/Cosine.
  - Sin-Cos Frequency: up to 500 kHz.
  - Internal Interpolation: up to ×8192.
  - Automatic correction of amplitude mismatch, phase mismatch, signal offset.
- Absolute Serial (communication) Encoders:
  - NRZ (Panasonic, Tamagawa, Mitutoyo, etc.)
  - EnDAT 2.2
  - BiSS/SSI
  - Hiperface
- Resolver up to 512 rps with 14-bit resolution.
- Tachometer (available on request)
- Potentiometer (available on request)
- The Gold Duo provides 5 V supply voltage (5 V, 400 mA max) for the encoders' supplies

Protection

Built-in Protection & Diagnostics:

- Software error handling
- Abort
- Extensive status reporting
- Protection against:
  - Shorts between motor power outputs and power return
  - Over temperature
  - Over/under voltage
  - Loss of feedback
  - Motor current
  - Current limits
  - Following errors
  - $i^2 \times t$ motor current

Power rating of each drive

Feature	Units	15/48	20/48	1/60	2.5/60	5/60	10/60	15/60	20/60	1/100	2.5/100	5/100	10/100	15/100	20/100
Minimum supply voltage	VDC	6		7.5						12					
Nominal supply voltage	VDC	42		50						85					
Maximum supply voltage	VDC	48		59						95					
Maximum continuous power output	W	600	800	50	120	240	480	720	960	80	200	400	800	1200	1600
Efficiency at rated power (at nominal conditions)	%	> 99													
Maximum output voltage		> 95% of DC bus voltage													
Auxiliary power supply	VDC	11 – 95 VDC (up to 2.5 VA inc. 5 V/200 mA for encoder)													
Amplitude sinusoidal/ DC continuous current	A	15	20	1	2.5	5	10	15	20	1	2.5	5	10	15	20
Sinusoidal continuous RMS current limit (Ic)	A	10.6	14.1	0.7	1.8	3.5	7	10.6	14.1	0.7	1.8	3.5	7	10.6	14.1
Peak current limit	A	2 x Ic													
Weight	g (oz)	450 g (15.9 oz)													
Dimensions	mm (in)	105 x 150 x 25.4 mm (4.13" x 5.91" x 1")													
Digital in/ Digital out/ Analog in		6/4/1													
Mounting method		Panel Mount													

Dual Loop Options

		Port A				
		Incremental Encoder + Digital Halls	Incremental Encoder	Digital Halls	Absolute Serial Encoder	Absolute Serial Encoder + Digital Halls
Port B	Incremental Encoder	Yes	Yes	Yes	Yes	Yes
	Analog Encoder	Yes	Yes	Yes	Yes	Yes
	Analog Halls	Yes	Yes	Yes	Yes	Yes
	Resolver	Yes	Yes	Yes	Yes	N/A

Gold Line Servo Drive Highlights

Servo Control

- Advanced and extremely fast vector control algorithm (Current loop bandwidth: 4 kHz).
- Current/Torque sampling rate: up to 25 kHz (40 µs)
- Velocity sampling rate: up to 12.5 kHz (80 µs)
- Position sampling rate: up to 12.5 kHz (80 µs)
- Up to 3 kHz electrical commutation frequency.
- Current close loop bandwidth exceeds 4 kHz.
- Position/Velocity/Acceleration command range – full 32 bit.
- Position over velocity, with full Dual Loop Support.
- Current gain scheduling to compensate for the motor's non-linear characteristics.
- Advanced filtering: Low pass, Notch, General B-Quad.
- Current loop gain scheduling to compensate for bus voltage variations.
- Velocity gain scheduling for ultimate velocity loop performance.
- Gains & filter scheduling vs position for mechanical coupling optimization, speed and position tracking errors.
- High order filters gain scheduling vs speed and position.
- S-curve Profile Smoothing
- Cogging, BEMF and $\omega \times L$ compensation.
- Dual Loop Operation supported by Auto Tuning.
- Fast, easy and efficient advanced Auto Tuning.
- Incremental Encoder frequency of up to 60×10^6 counts/sec.
- Motion profiler numeric range:
  - Position up to $\pm 2 \times 10^9$ counts
  - Velocity up to 2×10^9 counts/sec
  - Acceleration up to 2×10^9 counts/sec^2
- Large selection of feedback sensors.

Motion Control

- Motion control programming environment
- Motion modes: PTP, PT, PVT, ECAM, Follower.
- Full DS-402 motion mode support, in both the CANopen and Can Over EtherCAT protocols, including Cyclic Position/Velocity modes. Fast (Hardware) event capturing inputs, supporting < 1 µs latch latency.
- Fast (hardware) Output Compare, with < 1 µsec latency.
- Output compare repetition rate:
  - Fixed Gap: Unlimited.
  - Table based: 4 kHz.
- Motion Commands: Analog, PWM, SW, Pulse and Direction.
- Distributed Motion Control.
- EAS (Elmo Application Studio): An efficient and user-friendly Auto Tuner

Communications

- Fast and efficient EtherCAT and CANopen networking.
- EtherCAT Slave:
  - CoE (CAN over EtherCAT)
  - EoE (Ethernet over EtherCAT)
  - FoE (File over EtherCAT) for firmware download
  - Supports Distributed Clock
  - EtherCAT cyclic modes supported down to a cycle time of 250 µs.
  - Dynamic Objects Mapping (future option)
- CANopen (DS-301, DS-305, DS-402)
- Ethernet TCP/IP
  - UDP
  - Telnet
- USB 2.0

Safety

- IEC 61800-5-2, Safe Torque Off (STO)
- UL508c recognition
- UL60950 compliance
- CE EMC compliance

Outputs

- Four high voltage outputs (PLC compatible):
  - Conforms to IEC 61131-2
  - Up to 32 VDC
  - High side logic (Source)
  - Opto-isolated
  - Up to 250 mA
  - 500 mA for the brake
  - Short circuit protection
  - Thermal protection.
  - Reverse polarity protection
- Two fast outputs (5V logic)
  - Port C EIA-422 differential output line transmitters
  - Response time < 1µs
  - ± 15 mA output current
- The four outputs can be configured to "5V Logic" (available on request)

Inputs

- 2 STO (Safe Off Torque) inputs PLC level
- 6 Digital Inputs – conforms to PLC Standard.
  - The six inputs and two 2 STOs can be configured to "5V Logic" (available on request)
- 2 (out of the 6) PLC level fast digital capture data <5 µs
- 2 Analog inputs ± 10 V
- 2 very fast event capture inputs "5V logic"
  - Via Port A or B
  - EIA-422 Differential input line receiver
  - Response time < 1 µs

Feedbacks

Flexible configurable Port A and Port B feedback input ports.
Each port can be programmed to serve as:

- Commutation feedback and/or
- Velocity feedback and/or
- Position feedback

Port A supports any one of the following sensors:

- Incremental Encoder
- Increment Encoder + Digital Halls
- Absolute Serial Encoder.
- Absolute Serial Encoder + Digital Halls (for dual loop).

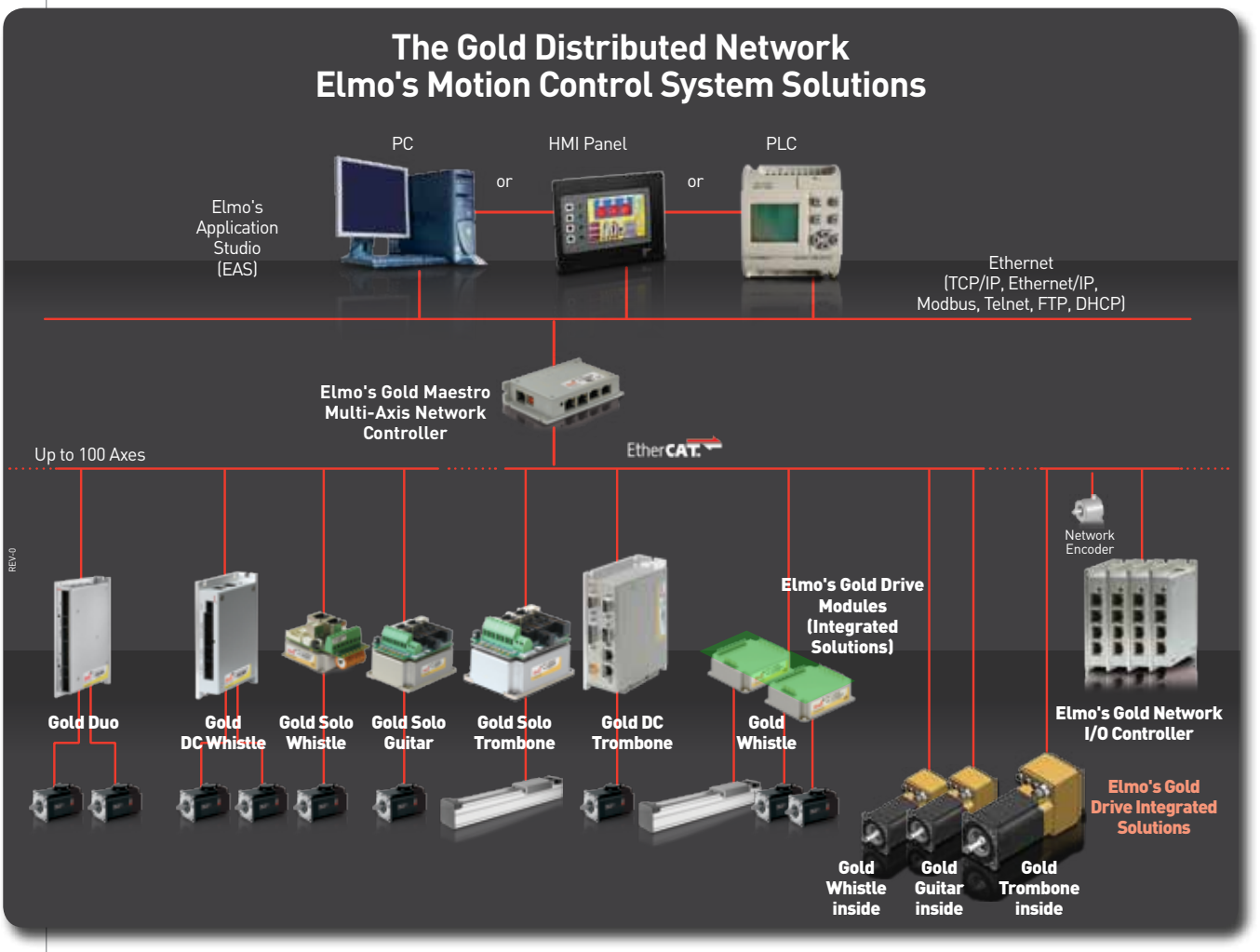
Port B supports any one of the following sensors:

- Incremental Encoder
- Analog Encoder
- Analog Halls
- Resolver

Port C: Flexible configurable feedback output port

- Encoder Emulation outputs of Port A or Port B or internal variables.
- Analog Inputs (± 10 V ptp). Can also be used for:
  - Velocity Feedback (Tachometer)
  - Position Feedback (Potentiometer).

The Gold Distributed Network
Elmo's Motion Control System Solutions



The Gold Duo Part Number

G-DUOR XX XX/YYY ER A X

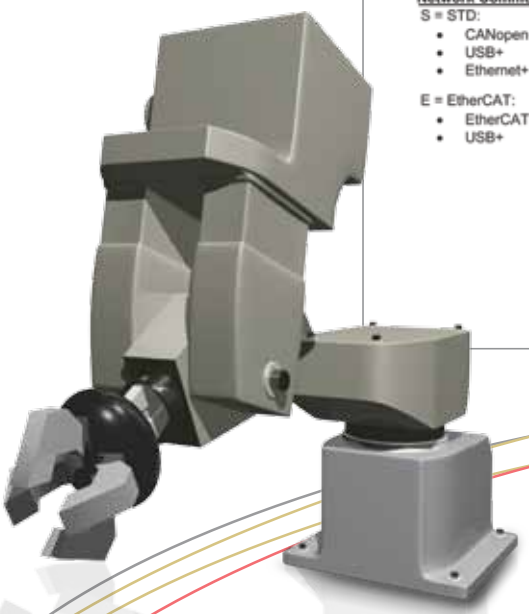
- Gold Line
- **Version:** Blank = Standard; R = RMS
- Continuous Current (Amps) Axis 1
- Continuous Current (Amps) Axis 2
- Maximum DC Operating Voltage
- **Network Communications:**
  - S = STD:
    - CANopen+
    - USB+
    - Ethernet+
  - E = EtherCAT:
    - EtherCAT+
    - USB+
- Options
- **Feedback (Axis 2):** See below
- **Feedback (Axis 1):**
  - **E = Port A:**
    - Incremental Encoder+
    - Digital Halls

    Port B:
    - Incremental Encoder+
    - Analog Encoder+
    - Analog Halls
  - **A = Port A:**
    - Absolute Serial Encoder

    Port B:
    - Incremental+
    - Analog Encoder+
    - Analog Halls
  - **R = Port A:**
    - Incremental Encoder+
    - Digital Halls

    Port B:
    - Resolver
  - **M = Port A:**
    - Absolute Serial Encoder

    Port B:
    - Resolver



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Studio Gold

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