

ModuDrive™

IIoT Ethernet Actuators

Real time data means more time at the face.





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The Actuator Challenge

Pneumatic and hydraulic actuators have been used to automate gates, regulators and dampers but still offer significant challenges in underground mines.

Pneumatic actuators require reliable and dry compressed air. All atmospheric air contains a certain amount of water vapor which is mixed with other gases making up the air. This water vapor is drawn into the compressor with the incoming air. The act of compression generates large amounts of heat which allows this water to remain in a vapor state. As the air/water mixture cools, either in a receiver, dryer, or in the system piping, the vapor condenses to liquid, and falls out of the air stream. Significant moisture buildup results in rust in pipes and early failure of water traps and cylinders resulting in higher OPEX and reduced system uptime.

Hydraulic actuators eliminate most of the operating maintenance but require significantly higher CAPEX often to the point of reducing automation in many underground applications. Hydraulic actuators require auxiliary components to provide pressure, such as motors, pumps, filtration, hoses, and couplings.

Pressurized systems also tend to have higher long-term maintenance costs due to the need to contain the integrity of the system for seals, leaks, or other issues that may arise. Hydraulic oil, a serious contaminant, can leak causing additional clean up activities as well as regulatory reporting.

ModuDrive™ IIoT linear actuators are used for rotary or linear control and positioning

Ventilation regulators and louver controls

Flap and chute automation

Ventilation damper controls

Door interlock control automation

Gate automation for traffic control and area protection controls

Paste fill/back fill automatic switching valves

Why Choose ModuDrive™

Why do automation and mine engineers choose
ModuDrive™ IIoT linear actuators?

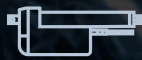
1



Reduce capital.

Eliminate expensive hydraulic or pneumatic systems and reduce 50% of your capital spend.

2



Eliminate complexity.

Connect and operate with a 120/240 VAC power source and RJ45 network connection without any auxiliary components.

3



Reduce maintenance.

Eliminate 100% of the auxiliary components that fail and require maintenance.

4



Improve controls.

Three modes of operational control to ensure all methods of movement and tight-smooth control.

5



Improve safety.

Fail-safe design on loss of power that assures a fail-in-place position with a built-in manual override and optional backup power supply to operate locally.

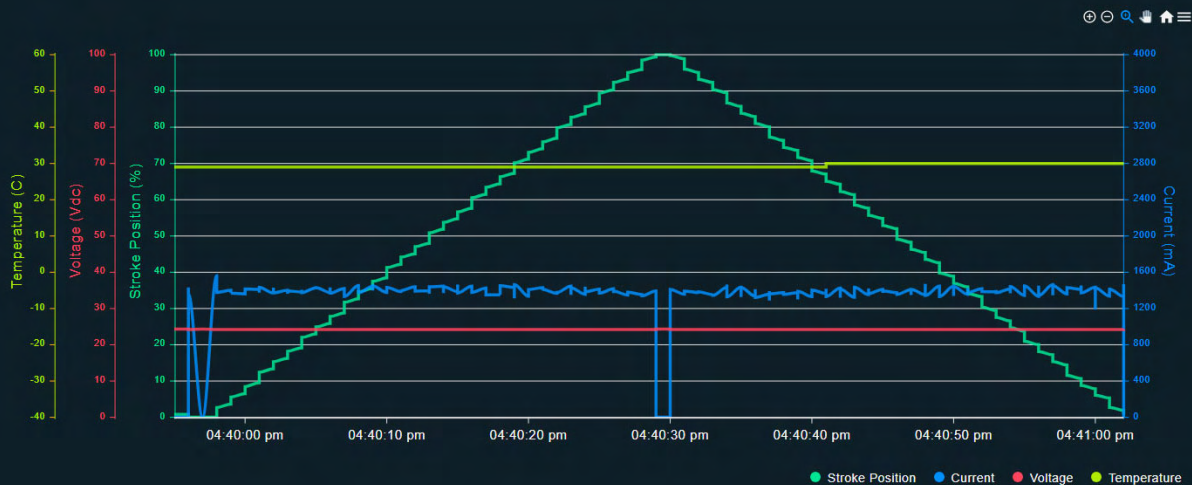
The ModuDrive™ Advantage

The ModuDrive™ IIoT linear actuators are 100% electric operated, reliable and simple to apply. The system consists of a remote electronics controller and fully electric linear cylinder providing real-time diagnostics allowing troubleshooting from surface through built-in pages.

Installation signatures can be captured comparing the operation of a new application over time thereby providing early detection of potential failure points.

Smart IIoT actuators provide service counters for starts/stops/total run time, over/under voltage, power failures and min/max internal temperatures providing maximum up-time and worker safety.

Full feedback data on the stroke position, current draw and internal temperature provides early warning of bearing or blade damage on regulators, stuck or broken safety gates or duct blade damage on dampers to allow scheduled maintenance.



Pneumatic actuators require compressed air. Compressors are costly.

The Ontario Mining Association (OMA), representing all of the underground mining companies in Ontario, Canada conducted research and found that over 30% percent of the compressed air is ultimately wasted resulting in high operating costs and on-going operational maintenance.

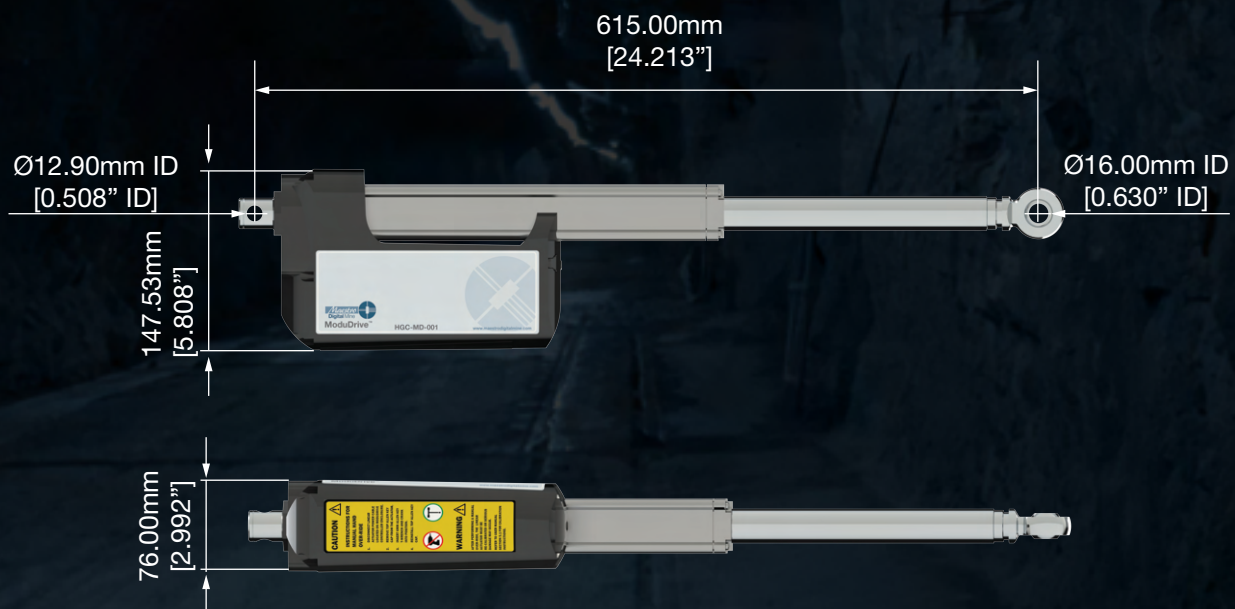
Similar studies from South Africa estimated energy waste exceeding 30%. Also in Canada, New Gold's New Afton Mine studied their compressed air delivery system and found electrical operating costs alone in the \$400,000.00/annum range noting high maintenance and inefficient compressors.

Optimize safety and energy savings

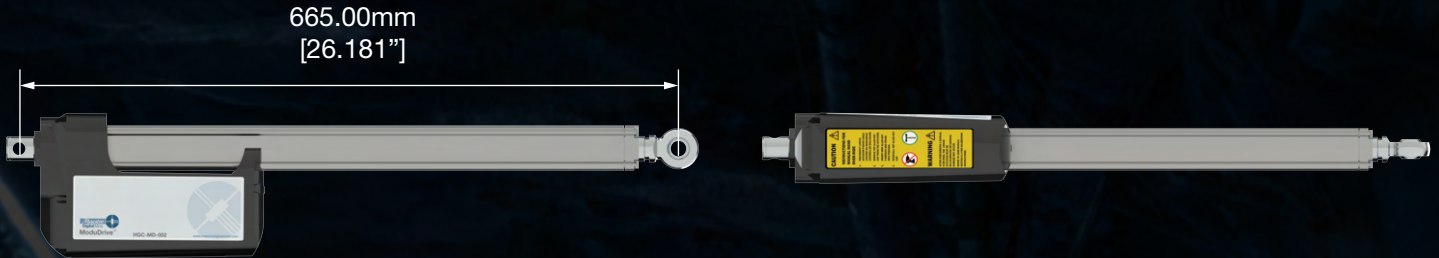
Retracted view (200mm)



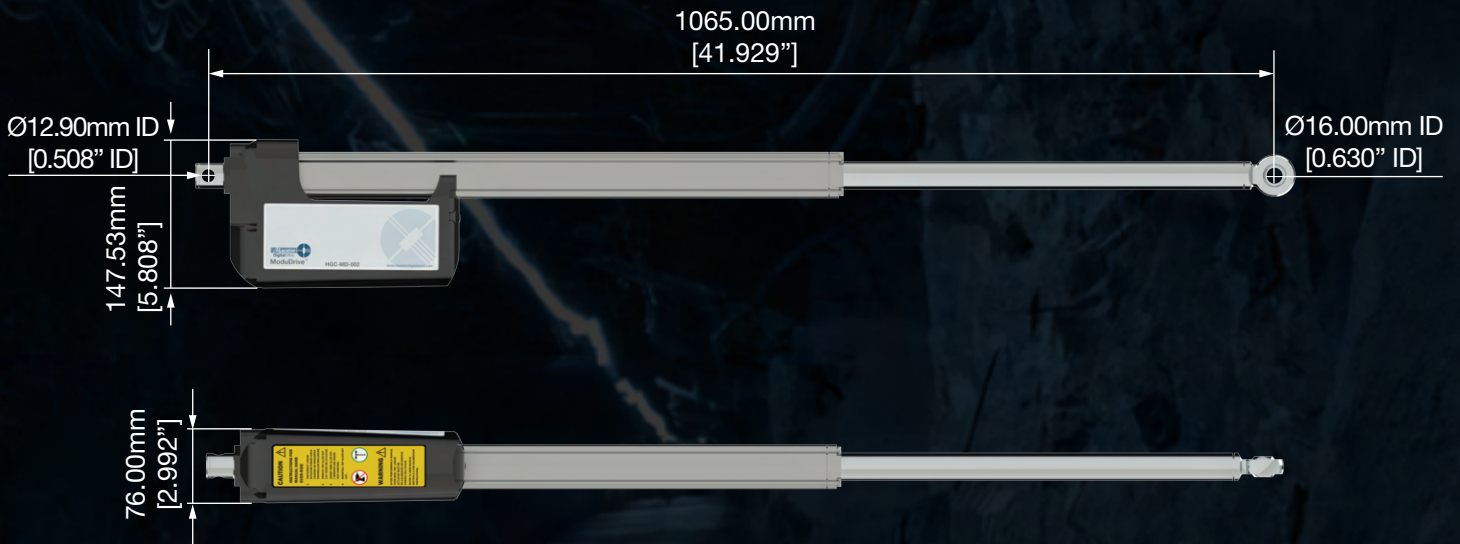
Extended view (200mm)



Retracted view (400mm)



Extended view (400mm)



*ID: Internal Dimensions

Maestro's Brand Promise - *We leave no one stranded*

Maestro Digital Mine applies its 20+ years of mining experience and globally recognized expertise in developing and enabling mine ventilation IIoT devices for underground mines and supplying regulators to the top global mining companies (Rio Tinto, Vale, Glencore, Newmont, etc.). The commitment to excellence is one of our core values and is evident in our technologies with our first regulators still in operations after 20 years of use in operating underground mines.

Technical Specifications

	<i>Model # HGC-MD-001</i>	<i>Model # HGC-MD-002</i>
Stroke length	200 mm (7.8 inches)	400 mm (15.7 inches)
Thrust	10,000 Newton force (2200 lbs force)	10,000 Newton force (2200 lbs force)
Temperature limitations	-30 to +65°C (-22 to +149°F)	-30 to +65°C (-22 to +149°F)
Housing	Ruggedized coated anodized aluminum	Ruggedized coated anodized aluminum
Enclosure rating	IP66 and wash down to IP69K	IP66 and wash down to IP69K
Piston rod	304 Stainless Steel	304 Stainless Steel
Connecting hardware and screws	304 Stainless Steel	304 Stainless Steel
ModuDrive™ power supply	100-240 VAC, 50-60 Hz, 6.3 Amp (typical 2 amp current draw at 120 VAC)	100-240 VAC, 50-60 Hz, 6.3 Amp (typical 2 amp current draw at 120 VAC)
ModuDrive™ remote electronics	Modbus TCP/IP communication protocol (EtherNet/IP™ communication protocol available 2025) RJ45 connection IP 65/ NEMA 4X	Modbus TCP/IP communication protocol (EtherNet/IP™ communication protocol available 2025) RJ45 connection IP 65/ NEMA 4X
Weight	5.5 kg (12 lb)	10 kg (22 lbs)

The Maestro Ecosystem



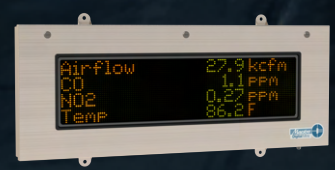
Vigilante AQS™
Air Quality Stations



DustMon PM™



Plexus PowerNet™



SuperBrite™
Marquee Display

For more information on the Maestro ecosystem visit maestrodigitalmine.com



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complex simple

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