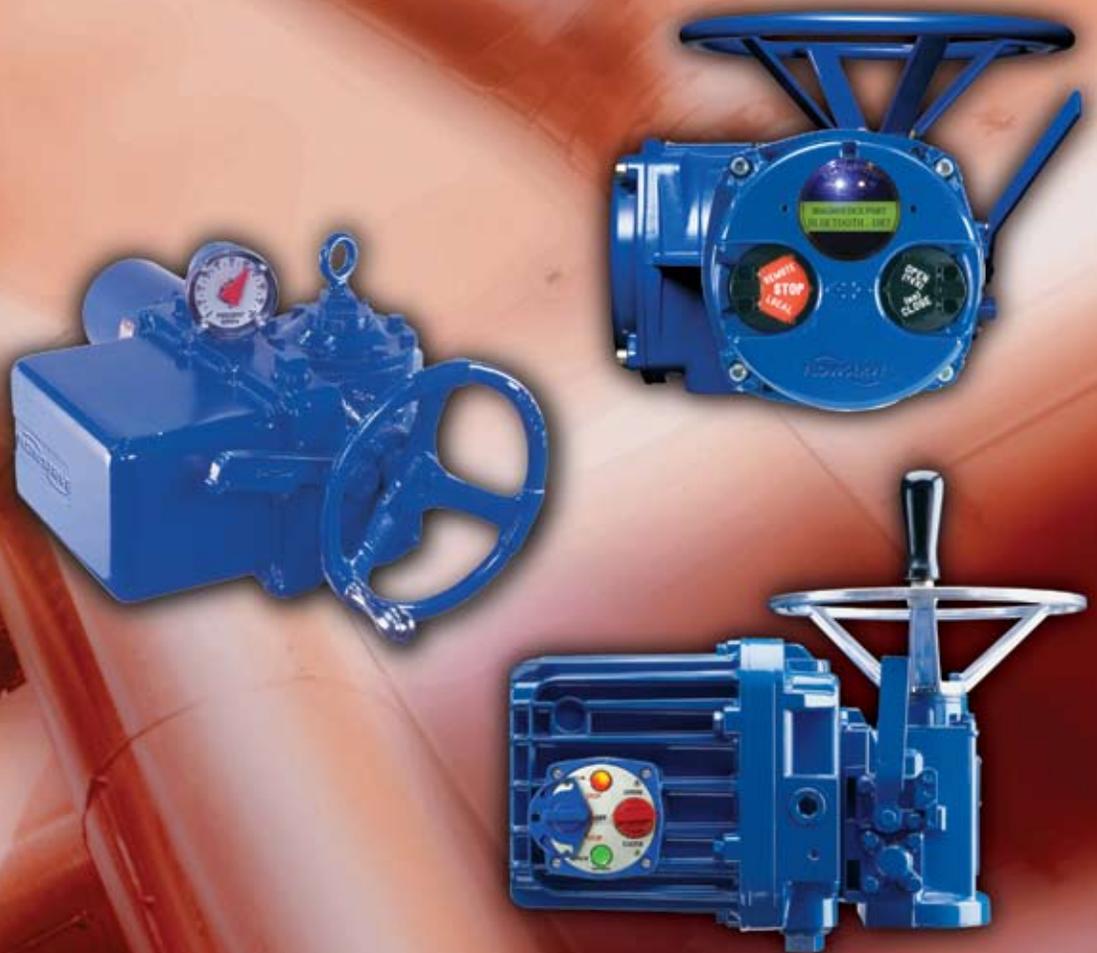




Limitorque Actuation Systems

Valve Actuators and Control Systems



Experience In Motion



Flowserve Limitorque Products

Flowserve Limitorque products help make valve control easier in ways as diverse as the applications in which they are used. Whether you need an actuator with the strength to handle a half-million pounds of thrust, or a sophisticated control network to precisely orchestrate hundreds of valves, you will find that Limitorque products make the task easier. After nearly three-quarters of a century of experience in the field of valve control, Flowserve Limitorque understands the particular needs of customers in every major facet of industry. Limitorque actuators are at work in more than 100,000 sites around the world, reliably automating valves in some of the harshest conditions imaginable: from scorching desert sands to frozen tundra, from rainforest humidity to the stormy salt spray of offshore oil rigs. Automating industrial valves can help increase safety, raise productivity, and reduce operating costs. You can rely on Flowserve Limitorque for extraordinary valve control.

MX Multi-turn Actuator

Flowserve Limitorque introduced the MX electric actuator in 1997 as the first smart actuator providing uncompromised reliability and performance in an easy to use design.

The MX for 2006 improves on its market-first innovations – patented absolute encoder that does not require battery back-up – patented Limigard technology – easy to use menus in six languages – the use of Hall-effect devices to eliminate potentially troublesome reed switches – providing the user with predictable, reliable, and safe operation in the most extreme applications.

Enhancements to the MX include a patented absolute encoder with increased span, improved diagnostics capability, and built-in self-test (BIST), which verifies and validates the integrity of its components. Another new MX feature is MX Quik™, an uninterrupted power transfer option during main power losses, strengthening the Flowserve Limitorque commitment that the MX be the only smart actuator with “no batteries required.”

DeviceNet is added to the MX’s communication options to complement Modbus, Foundation Fieldbus H1, PROFIBUS DP_V1, and PROFIBUS PA and support is added for four new languages — Mandarin, Russian, Bahasa Indonesia, and Katakana.

These features, along with improved display options and optional Bluetooth wireless connectivity, truly make the MX the next generation in smart actuation.

Torque		Thrust		Output Speed
ft-lb	N m	lb.	kN	RPM
34-1,700	46-2,307	8,000-75,000	35-330	15-200





L120 Multi-turn Actuator

The L120 is a proven choice for any valve requiring either rotary or linear power. Whether gate or globe valves, sluice gates or penstocks, the L120 performs reliably in any situation demanding positive, dependable actuation.

It can be used without modification with any rising or non-rising stem for linear action valves. When combined with a Limitorque PT or HBC series worm gear operator, the L120 can be used to control butterfly, ball, and plug valves, as well as damper drives, flop gates, or similar devices. L120 actuators can also be coupled with other gearheads such as Limitorque B320 or MT bevel gear operators for motorized operation of valves requiring increased torque and/or thrust.

The L120 is factory-lubricated and weatherproofed for service in temperatures ranging from -50°F to 150°F (-45°C to 65°C). Submersible and explosionproof versions are available. Weatherproof enclosures meet NEMA 4 and 4X standards, as well as NEMA 6 and IP67. Integral controls with printed board circuitry and plug-in modules are also available.



Torque		Thrust		Output Speed
ft-lb	N m	lb.	kN	RPM
50-60,000	68-81,600	10,000-500,000	44-2,224	12-250



SMB Multi-turn Actuator

The eight models in the SMB series range offer rugged dependability from the smaller SMB-000 through the industry's largest electric valve actuator, the SMB-5. An extensive selection of motors is available to suit various speed and voltage requirements. Optional controls include an integral reversing starter and control voltage transformer, a control station with Open/Stop/Close selector switch, position indicating lights, and Local/Off/Remote selector switch.

The SMB is well suited to applications involving gate and globe valves, sluice gates, and other applications where long-term, uncompromised, reliable operation is critical. Fully qualified for use in nuclear power plants, the SMB is the recognized veteran of the nuclear power industry. The SB, a high-speed, high-temperature version of the SMB, is also available. In 2004, Flowserve Limatorque introduced the industry's first 10 year warranty for SMB electric actuators in commercial service.

L75 Electric Actuator

The L75 series of electric actuators add a new dimension of operational dependability and flexibility to the remote control of quarter-turn valves and other rotary devices. A multi-function capability enables the L75 actuator to be used throughout the process for on/off, throttling, variable-cycle and any analog or digital control. One of the most reliable electric actuators on the market, the L75 Series is lightweight, compact and powerful. Its split phase capacitor AC reversing motor or DC motor drives a valve through a sealed, permanently lubricated gear train, which offers virtually lifetime maintenance-free dependable operation. The L75 series produces torques up to 3000 in-lb and is available in eight sizes and a variety of housings.

Torque		Thrust		Output Speed
ft-lb	N m	lb.	kN	RPM
91-60,000	122-81,350	8,000-500,000	36-2,224	12-108



Torque	
in-lb	N m
120-3,000	13.6-338.9

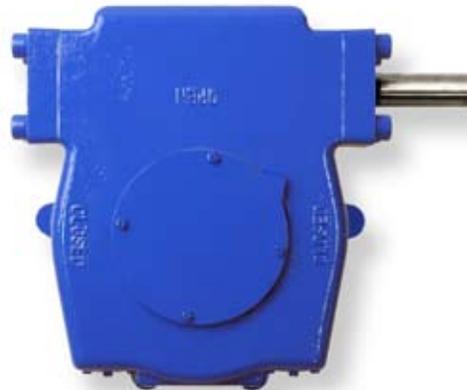




PT and PTD Worm Gear Operators

PT and PTD worm gear operators are the first such devices designed specifically for motorized operation. When combined with unexcelled Limatorque electric actuators such as the MX, L120, and SMB, the PT quarter-turn and PTD multi-turn operators provide the user with dependable, efficient, and economical solutions for valve and damper applications. The PT and PTD, developed to deliver extraordinary valve and damper control, are each available in a wide range of output torques and operational speeds.

Torque	
ft-lb	N m
880-135,000	1,193-183,060



B320 Bevel Gear Operator

The B320 series of bevel gear operators excel in specialized applications such as extended operating times for sluice and slide gates. Whether controlled manually or automatically with either L120, MX, or SMB actuators, B320 operators are ideal for any multi-turn application requiring accurate, reliable performance. They are used with gate valves, globe valves, and sluice gates in power plants, petrochemical installations, pipelines, and water and waste treatment facilities. All units are fully weatherproofed, with gearing crafted from high-strength alloy steel for dependable operation with minimum backlash. They are also permanently lubricated and fully supported on anti-friction bearings.

Torque		Thrust	
ft-lb	N m	lb.	kN
600-8,000	813-10,846	40,000-325,000	180-1,463





MT Bevel Gear Operator

The MT series is a superior combination of a bevel gear operator torque housing with a thrust base housing that is ideally suited for torque-seated valves and applications involving elevated process temperatures. Ductile iron bevel gear and thrust base housings and robust thrust bearing and drive sleeve/stem nut designs combine to offer the most rugged bevel gear operator available for handling the seating and unseating forces of high pressure gate and globe valves used in power plants world-wide.

The MT series provides high efficiency and strong design for every application. When motorized by Limitorque MX, SMB, or L120 series electric actuators, the MT offers flexibility for a wide range of valve opening and closing times.



Torque		Thrust	
ft-lb	N m	lb.	kN
600-4,500	815-6,100	40,000-150,000	178-668

HBC Worm Gear Operator

HBC worm gear operators have proven their rugged dependability in the nuclear power industry, large damper operations, and power plant flue gas desulphurization applications. Whether controlled manually or with L120, MX, or SMB actuators, HBCs are ideal for any quarter-turn application requiring accurate, reliable, uncompromised performance. They are commonly used with butterfly, ball, and plug valves in power plants, petrochemical installations, pipelines, and water and waste treatment facilities. HBCs are fully weatherproof, and built to meet AWWA requirements. Submersible and buried service constructions are also available.



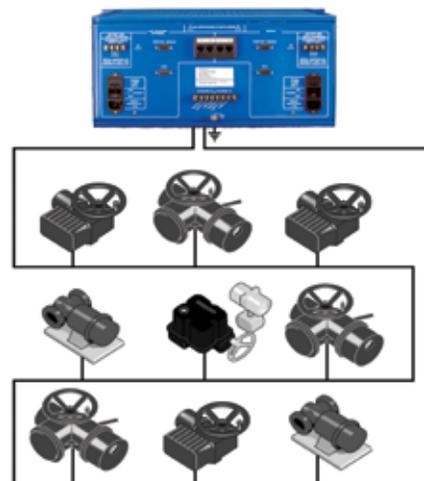
Torque	
ft-lb	N m
445-93,000	603-126,090



Master Station II

The next generation master station is designed and manufactured by Limitorque specifically for use with Limitorque's entire line of DDC field units: MX, L120, and L75. For power, petrochemical, oil and gas, water and waste water applications, it acts as a single-source controller for up to 250 actuators, providing real time status of field units through continuous cyclical polling.

The Master Station II is virtually maintenance free, requires no batteries, and is backed by Limitorque support and service. A plug and play solution offering Ethernet capability, the Master Station II provides complex control and diagnostics of Limitorque field units through a simple, user-friendly touch panel operator interface.





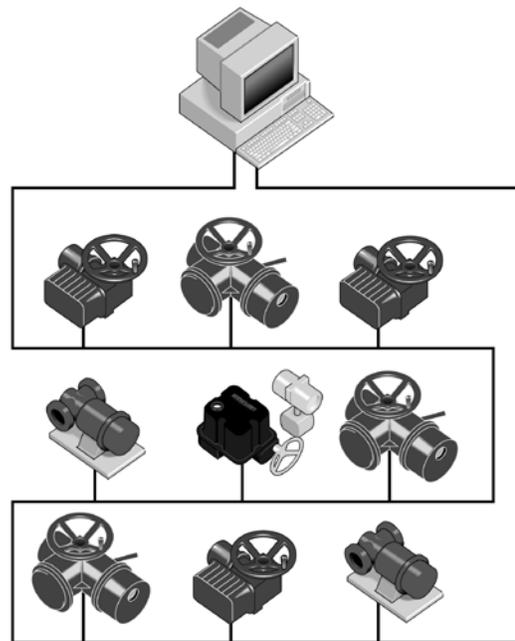
DDC Valve Control Network

The DDC valve control network efficiently connects as many as 250 valve actuators directly to an existing host system without adding hardware or new equipment. The network's design also reduces the costs of engineering, cable, and installation.

With a simple and reliable communications path between the host system and the network, actuators and other devices (such as pumps and solenoids) can be efficiently automated and monitored from a central control room.

The system's open architecture is compatible with affordable Modbus protocols and communication standards, and is easily expanded to include MX and DDC units. Limatorque's partnerships with host suppliers ensure that connection and programming can be smoothly accomplished with minimal equipment, effort, and cost.

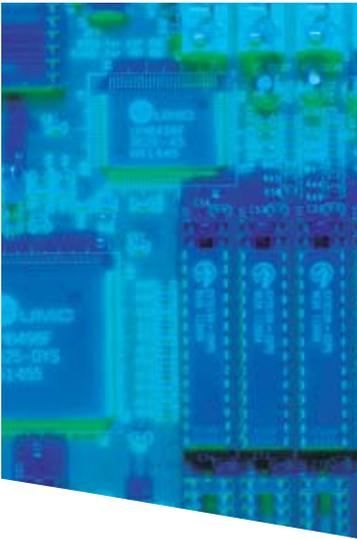
The "bottom line" is that the Limatorque DDC direct-to-host network simplifies valve operation, enhances control, and reduces costs.



DeviceNet

DeviceNet is a digital, trunk/drop network that connects and serves as a communication network between MX actuators. Up to 63 actuators can be connected by a single 5 strand, twisted-pair cable to form a DeviceNet network. DeviceNet follows the Open Systems Interconnection (OSI) model, an ISO standard for network communications. A new addition to the communication options of the MX, DeviceNet offers the user bit-strobe I/O messaging and a host of other benefits.

DeviceNet[®]
CONFORMANCE TESTED



FOUNDATION Fieldbus H1

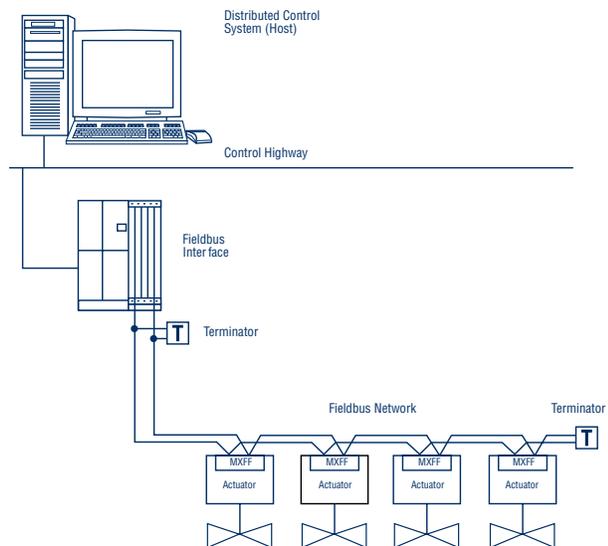
Limatorque's FOUNDATION Fieldbus H1 interface for MX actuators uses an all-digital, serial, two-way communications system to permit a truly field-distributed control system.

Standard Function Blocks for Analog Output (AO), Digital Output (DO), and Digital Input (DI) are used to easily integrate the MX actuator into the plant control system. These standard Function Blocks permit a seamless interface to control and monitor the MX actuator with other field instrumentation for increased visibility and control of the plant processes.

Other features of FOUNDATION Fieldbus:

- Increased visibility of MX actuator status
- Reduced wiring and wire terminations
- Ease of configuration
- Open standard, non-proprietary fieldbus protocol

The MX FF unit may command its actuator to open, stop, close, move to a set position, or perform an emergency shutdown operation. Commands to the unit come over the network from the host system, which may be a PC, distributed control system (DCS), programmable logic controller (PLC), or some other microprocessor-based device. Commands may also be generated in another network actuator or device and transmitted over fieldbus using peer-to-peer, publisher/subscriber communication.





PROFIBUS PB DPV1 / PA

The MX PROFIBUS (PB) field unit is another option for networking and communicating with MX actuators. The PROFIBUS communications system is a digital, serial, two-way open bus system that supports a variety of communication rates. The MX PB field unit allows the actuator to send multiple variables to the control system over a high-resolution and distortion-free digital communication network, providing control and self-test capabilities. This system allows a network host station such as a distributed control system (DCS) or a programmable logic controller (PLC) to control and monitor up to 250 MX actuators, including the acquisition of status and alarm data from each MX. The MX PB field unit supports two different communication board options: PROFIBUS DP, designed for communication between a master host station and distributed devices at the field level, and PROFIBUS PA, designed for high-speed and reliable communications, with the ability to link sensors and actuators to a common fieldbus line, even in potentially explosive areas.



Customers can receive individualized hands-on instruction at the Learning Resource Center, Flowserve's national training facility or at Flowserve Limatorque's Houston Training Center. Training includes how to select the proper equipment and how to install, commission, and maintain valve actuators and controls.

Online documentation (from <http://www.flowserve.com>) includes sales brochures, specification bulletins, and installation and operation manuals.



The latest valve control technology with full technical support

Flowserve Limatorque's determination to make valve control easier is reflected in a comprehensive customer support program.

Support begins before the sale, when customers turn to Flowserve's experts for technical assistance in selecting the proper equipment. After the sale, Limatorque customers are backed by 200 factory-trained service technicians, stationed around the globe, who are available to assist with installation, commissioning, and maintenance.

Limatorque customers find their needs met by factories, stocking distributors, parts/service centers and sales offices in more than 100 cities around the world. This global Flowserve network ensures that the end-user, engineer, contractor, or valve manufacturer can access parts and service through a local office.

Internet technology also plays a part in our customer service support program. Using Flowserve's web site, customers can access key information around the clock, including product specifications and local service contacts. Customers can also use Flowserve's web site for downloading sales and technical literature from Limatorque's ever-growing library of detailed documentation.

To make valve control as easy as possible for operations personnel, Flowserve offers extensive training options for all major Limatorque products. Programs can be tailored to fit a customer's particular needs.

Customers worldwide rely on Flowserve Limatorque's commitment to technical support.