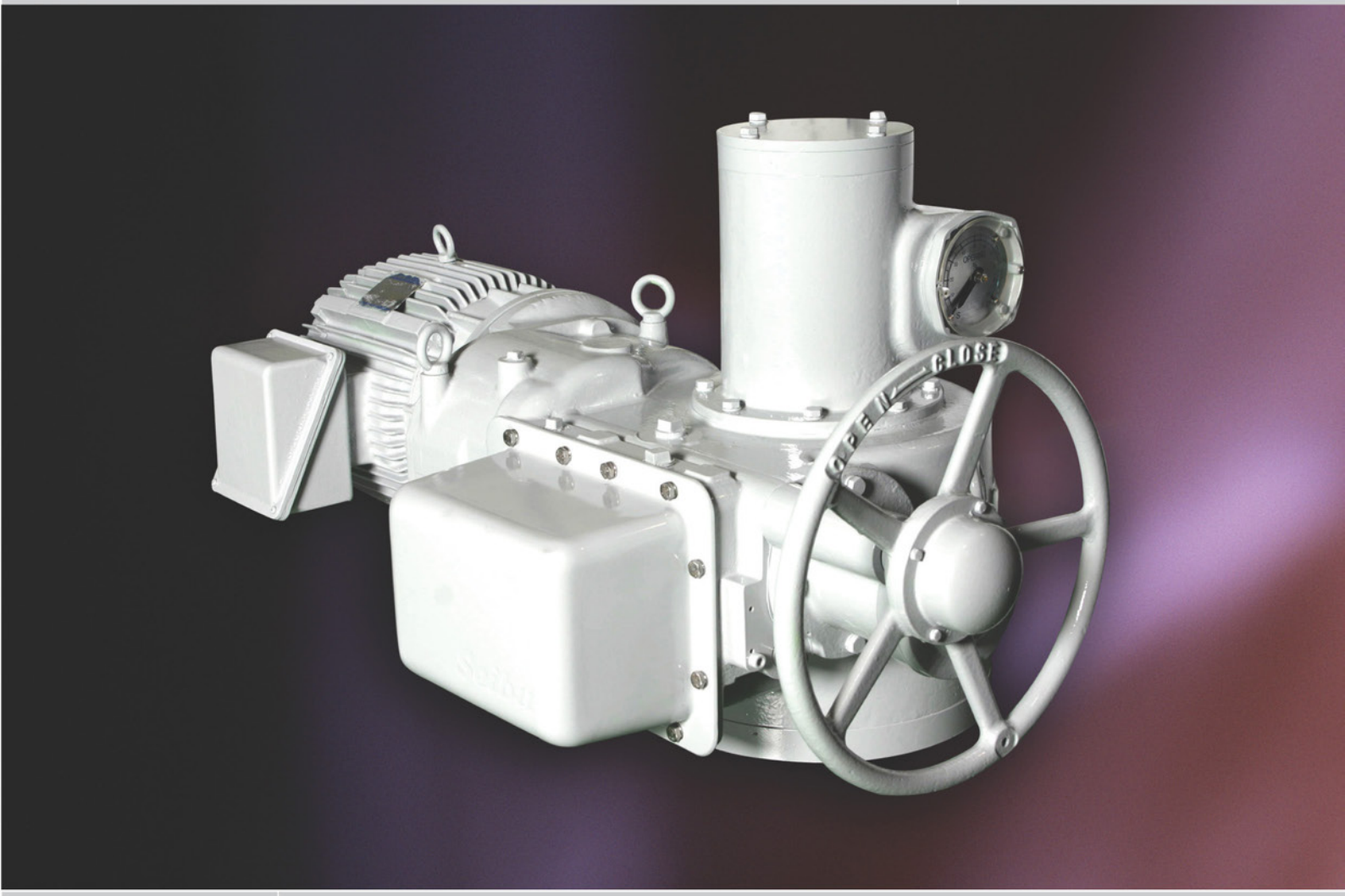
LTMD-Q SERIES

MULTI TURN ACTUATOR FOR NUCLEAR USE

Once Use, Ever Use



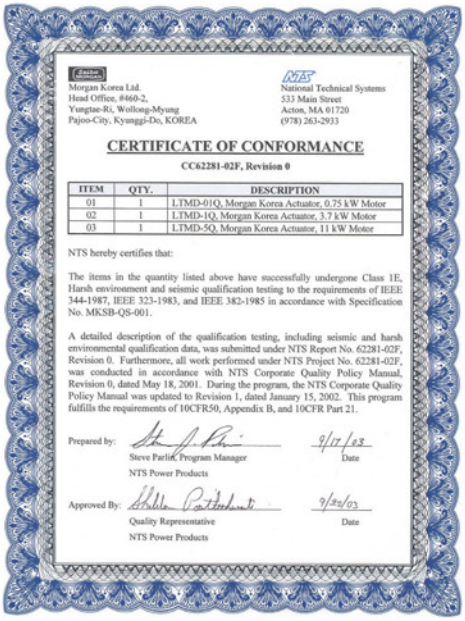
enertork
(ex-MORGAN KOREA)

LTMD-Q SERIES

Through knowledge and experience accumulated
in the valve actuation for over 20 years, we developed LTMD series
which are applicable to Class-1E of the nuclear power plants.

Features

- 60 years of long lifespan
- Class - 1E certified, reliable products
- Rigid structure made of cast-iron
- Simple and easy maintenance



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National Technical Systems
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Acton, MA 01720
(978) 263-2933

CERTIFICATE OF CONFORMANCE

CC62281-02F, Revision 0

ITEM	QTY.	DESCRIPTION
01	1	LTMD-01Q, Morgan Korea Actuator, 0.75 kW Motor
02	1	LTMD-1Q, Morgan Korea Actuator, 3.7 kW Motor
03	1	LTMD-5Q, Morgan Korea Actuator, 11 kW Motor

NTS hereby certifies that:

The items in the quantity listed above have successfully undergone Class 1E, Harsh environment and seismic qualification testing to the requirements of IEEE 344-1987, IEEE 323-1983, and IEEE 382-1985 in accordance with Specification No. MKSB-QS-001.

A detailed description of the qualification testing, including seismic and harsh environmental qualification data, was submitted under NTS Report No. 62281-02F, Revision 0. Furthermore, all work performed under NTS Project No. 62281-02F, was conducted in accordance with NTS Corporate Quality Policy Manual, Revision 0, dated May 18, 2001. During the program, the NTS Corporate Quality Policy Manual was updated to Revision 1, dated January 15, 2002. This program fulfills the requirements of 10CFR50, Appendix B, and 10CFR Part 21.

Prepared by: Steve Parlin, Program Manager, NTS Power Products — 9/17/03 Date

Approved By: Quality Representative, NTS Power Products — 9/20/03 Date

LTMD-Q SERIES

MULTI TURN ACTUATOR FOR NUCLEAR USE

Introduction of Class 1E (Q-Class)

IEEE-382		KEPIC(Korea Electric Power Industry Code & Standard)		KHNP(Korea Hydro & Nuclear Power Co., Ltd.)	
Class	Description	Class	Description	Class	Description
Class 1E	Safety related Class	Class 1E	Safety related Class	Q	Safety related Class for Nuclear Power Plant
Non-Class 1E	Non Safety related Class	Non-Class 1E	Non Safety related Class	T	Safety Impacted Class
				R	Reliable Class
				S	Non Class

※ Products to be applied to Class 1E(or Q-Class) area are to be qualified in accordance with the international standards and requirements for the environmental and seismic qualification.

Specifications for Class 1E

Our electric actuators for Class 1E fully meet the strict technical specifications of IEEE-323, 344, 382, ASME Sec. III NCA, KEPIC ENA and KEPIC END-3700.

Main technical specifications and requirements for certification are as following.

Applied Specification(Code) :

- IEEE-323 Qualifying Class 1E Equipment
- IEEE-344 Seismic Qualification of Class 1E
- IEEE-382 Qualification of Actuator
- MKSB-QS-001 Qualification Specification of Morgan Korea

■ Main requirements for certification

- Life span : 60 years
- Normal Dose Radiation Exposure

  TID : 1×10^7 Gamma Rads.

  Dose Rate $\leq 1 \times 10^6$ rads/hr
- Thermal Aging

  Service Temperature : 50 ~ 120 °F(10 ~ 49℃)

  Ambient Pressure : Atmosphere

  Relative Humidity : 5 ~ 90 %, continuous

  Test Spec.

  - Aging Temperature : 120℃
  - Aging Duration : 322.63 hr
  - Activation Energy : 0.98 eV
- Cycle Aging : Total 19,000 cycle (Open/Close)
- Vibration Aging : Sweeping from 5Hz ~ 100Hz with 0.75g (90min per axis)
- Seismic Test

  Operating Basis Earthquake(OBE) : 4.0g

  Safe Shutdown Earthquake(SSE) : 5.0g

  RIM & RRS TEST
- DBE Radiation Aging

  1.2×10^8 + 10%(margin) Gamma Rads.
- Pressurization Cycle Test : 66psig, 15 cycles (3min per cycle)
- Combined LOCA and MSLB Exposure

  Max. Pressure : 63psi

  Max. Temperature : 375°F

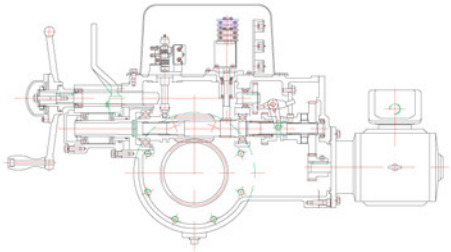
  Accident Duration : 1 year

LTMD-Q SERIES

MULTI TURN ACTUATOR FOR NUCLEAR USE

LTMD-Q series Actuators

Structure



LTMD-Q series actuators are structurally rigid and properly operated under even a severe environment. As main material of outside parts is cast-iron and inner structure is so simple, they are very suitable for Class-1E.

Characteristics

Motor	Starting torque is more than 250% of normal operating torque
Output Revolution	13 ~ 85rpm in 60Hz 11 ~ 71rpm in 50Hz
Thrust Unit	Gear case does not directly take thrust because thrust unit, made of robust ductile cast iron, absorbs it primarily.
Slip Mechanism	Gear reducer or valve is protected from overload when actuators are operated manually (available above LTMD-05Q)
Torque Switch	When the actual torque value goes over pre-set value of torque, its torque is transmitted to torque switch by torque shaft. Electric motor stops automatically with torque switch activated. Changable torque value by repositioning the adjustable scale at the site.
Limit Switch	Adopted the counter gear train to ensure high accuracy and reliability at any predetermined position. Set easily and fast by screwdriver.
Manual / Power Shifting	Simply converted to manual from motor-driven mode by just shifting the lever. By switching on motor, Motor powered driving is automatically returned.
Position Indicator	Continuously shows the exact position of valve in percentage.

Specifications

1. MOTOR	- Certified Class 1E for Nuclear Power Plant - Design Specification : NEMA MG1 - High starting torque and low inertia force , TENV - 400 / 440 / 460VAC 60Hz 3 Phase / 15min rating - Deviation of main electric power for normal operation Voltage : +10% ~ -25% / Frequency : ±5% - Insulation grade : H
2. WORM & WORM WHEEL	- Self-Locking design - Reliable long-term performance due to alloy steel & bronze - Hammer-blow effect for improvement of starting performance
3. LIMIT SWITCH	- Counter gear type & snap-action for reliability - Contact of DPST method and using silver alloy - Maximum 16 contacts (4 trains x 4 contacts) - Durability of over 100,000 cycle
4. TORQUE SWITCH	- Mechanism of cam driving - Available to contact for warning or alarming - Setting torque value by adjusting scale
5. ENCLOSURE	- IP 55 based on IEC 60529
6. OPTION	- Potentiometer and R/I Converter

Non metal materials for LTMD-Q

Classification	Materials	Application
PLASTIC group	PEEK	Limit Switch / Torque Switch
	Phenol	Terminal Block
RUBBER group	Viton	O Ring / Oil Seal / Gasket
	EPR	Wire (Class 1E certified)
LUBRICATION	Fluorocarbon Grease	Lubricant
PAINT	Epoxy / Polyamide Resin	Primer / Top Coat (Class 1E certified)

LTMD-Q SERIES

MULTI TURN ACTUATOR FOR NUCLEAR USE

SPEED vs TORQUE DATA (460V, 3φ, 60Hz)

ACTUATOR MODEL			MAXIMUM SETTING TORQUE(N • m)										
LTMD -01Q	speed(r.p.m.)		15.9	22.3	28.5	34.0	38.1	42.7	44.6	57.0	68.0	76.2	85.4
	motor (KW)	0.2	140	100	79	66	59	52	–	–	–	–	–
		0.4	210	150	120	100	90	81	90	70	59	52	44
		0.75	–	250	230	190	170	150	170	130	110	100	91
LTMD – 02Q	speed(r.p.m.)		15.5	18.6	24.8	31.0	32.3	37.2	39.5	49.6	64.6	79.0	–
	motor (KW)	0.4	220	180	130	–	–	–	–	–	–	–	–
		0.75	420	350	270	240	–	200	–	150	–	–	–
		1.5	–	–	440	–	390	–	320	290	230	180	–
LTMD – 05Q	speed(r.p.m.)		–	27.7	–	35.8	–	42.7	–	54.8	–	71.6	84.5
	motor (KW)	0.75	–	240	–	180	–	–	–	–	–	–	–
		1.5	–	460	–	350	–	–	–	270	–	200	–
		2.2	–	730	–	560	–	–	–	430	–	330	–
		3.7	–	–	–	830	–	820	–	–	–	570	470
LTMD – 1Q	speed(r.p.m.)		13.0	21.6		35.5		43.3		51.3	60.5	78.6	
	motor (KW)	1.5	970	580	–	350	–	–	–	–	–	–	
		2.2	1550	930	–	570	–	540	–	450	–	–	
		3.7	–	1610	–	980	–	930	–	790	670	510	
		5.5	–	1720	–	1420	–	1350	–	1140	970	740	
LTMD – 3Q	speed(r.p.m.)		12.8	22.0		31.7		44.1		51.7	63.3	77.2	
	motor (KW)	3.7	2720	1580	–	1100	–	–	–	–	–	–	
		5.5	–	2290	–	1590	–	1330	–	1140	930	760	
		7.5	–	3330	–	2320	–	1940	–	1650	1350	1110	
		11	–	–	–	3920	–	3250	–	270	2260	1860	
LTMD – 5Q	speed(r.p.m.)		13.7	20.1	29.6	36.4		42.5		50.3	53.1		
	motor (KW)	5.5	3680	2510	–	–	–	–	–	–	–		
		7.5	5360	3660	–	–	–	–	–	–	–		
		11	–	6130	4160	3370	–	3370	–	2850	2700		
		15	–	6370	5040	4090	–	4090	–	3450	3270		
LTMD – 10Q	speed(r.p.m.)		12.7	19.1	25.0	32.1	37.7						
	motor (KW)	7.5	5780	3840	2940	2290	1940						
		11	9680	6440	4920	3830	3260						
		15	–	7810	5970	4650	3950						
		18.5	–	8940	6840	5320	4530						
		22	–	11760	8470	6590	5610						

※ Note : For the other voltages, Please contact our design department

Mechanical data

ALLOWABLE TORQUE N · m	ALLOWABLE THRUST KN	MOUNTING FLANGE SIZE(mm)	MAX.STEM DIA(mm)		WEIGHT kg Approx.
		PILOT DIA. TAP PCD TAP SIZE FLANGE O.D	BORE & KEY	SCREW	
250	45	100 125 4-M10 150	28	30	57 66 70
440	65	130 160 4-M12 190	40	42	81 84 91
830	103	130 180 8-M16 220	50	52	139 146 156 163
1720	196	200 250 8-M16 300	62	70	211 221 228 250
3920	310	250 300 8-M20 340	80	90	299 321 336 360
6370	490	310 360 8-M24 410	100	115	464 479 503 528
11760	1080	300 406 8-M36 475	115	135	692 716 741 781 801

LTMD-Q SERIES

MULTI TURN ACTUATOR FOR NUCLEAR USE

Customer Service

SIZING The performance of motor operated valve(MOV), water gate and damper depends on the proper sizing of actuator in terms of speed and torque. Also, economy is another must for proper sizing. We are ready to help customers with torque/thrust calculation, method of mounting, selection of optionals, etc. for proper sizing.

SPARES SUPPLY shall be performed, as an individual part and/or as modules, in speedy manner.

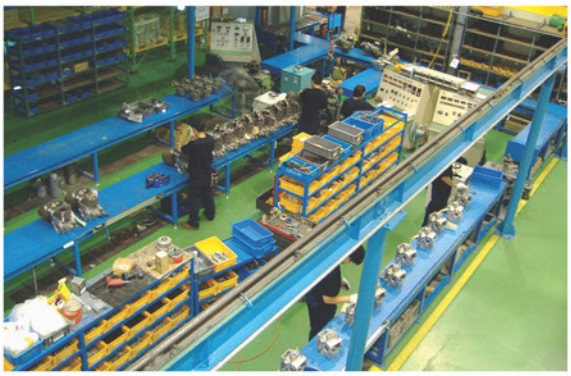
MOV SUPPLY Basically, we supply actuators to customers. But, when customer requires, we may supply valves, dampers and water gates with our actuators under our quality guarantee.

RETROFIT/ATTACHMENT SUPPLY In case of retrofit or site installation of actuators, customers often need to have various kinds of actuator related attachments - mounting flanges, iron stands, levers, rods, metal fittings, etc. We are ready to help, from design stage to supply, customers acquire the attachments properly.

Standard bill of materials

Parts	Material	KS/JIS No.	ASTM No.
Gear case	Cast iron	D4301/G5501	A-48
Thrust unit	Ductile cast iron	D4302/G5502	A-536
Stem bush	Copper alloy	D5101/H3250	B-133
Worm	Chromium molybdenum	D3711/G4105	A-148
Worm wheel	High strength brass	D6007/H5102	B-584

Design



Assembling

Quality control

All the processes from design through the delivery of actuators, including preinspecting of individual parts or modules, are performed in strict accordance with the Quality Assurance Procedures certified by ISO9001. Every actuator is tested finally before delivery and a test report is issued. Designed torque values, sleeve rpm, motor current, voltage, functions of limit and torque switches, hand/auto function are checked at the specially developed test console and recorded on the test report.

Automatic warehouse

DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 0184-1997-AQ-SEO-RvA

This is to certify that the Quality Management System of

MORGAN KOREA LTD.

at

#64-6, Oga-Ri, Neungnae-Myun, Yeoju-Kun, Kyunggi-Do, Republic of Korea

has been found to conform to the Quality Management System Standard

ISO 9001:2000, KS A 9001:2001

This Certificate is valid for the following product or service ranges:

Design and Manufacture of Electric Actuator

Original Certification date
October 28th, 1997

This Certificate is valid until
October 28th, 2009

Compliance to the Standard in respect to the indicated scope is verified by the DNV approved registered Team Leader

Yu-Kyung Jeong
Lead Auditor

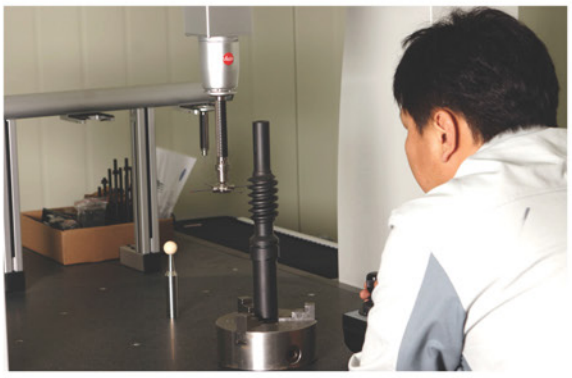
Place and date
Seoul, October 16th, 2006

for the Accredited Unit
DNV CERTIFICATION B.V., THE NETHERLANDS

Jin-Kyoon Ahn
Management Representative

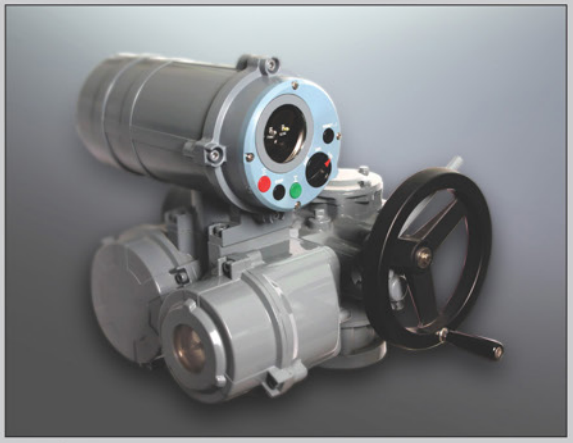
Lack of fulfillment of conditions as set out in the Appendix may render this Certificate invalid

Final test



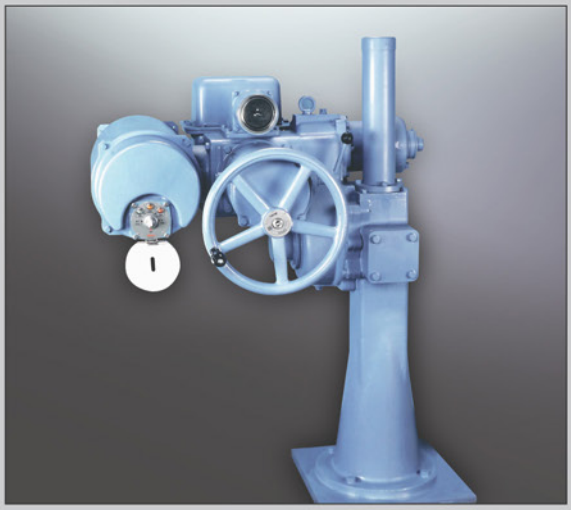
Quality Control

Machining



TMi Series
Multi-turn 0.2~7.5 Kw

Gear Reducer
Worm, Bevel 51 ~ 12,750kgf · m



LEC Series
Self-descending actuator (1 ~ 20 ton) 0.1 ~ 2.2kW

TQ Series
Quarter turn actuator 0.015 ~ 0.18kW

enertork (ex-MORGAN KOREA)

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Distributor

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