

**TM-Series**  
Multi-turn 0.2kW-37kW



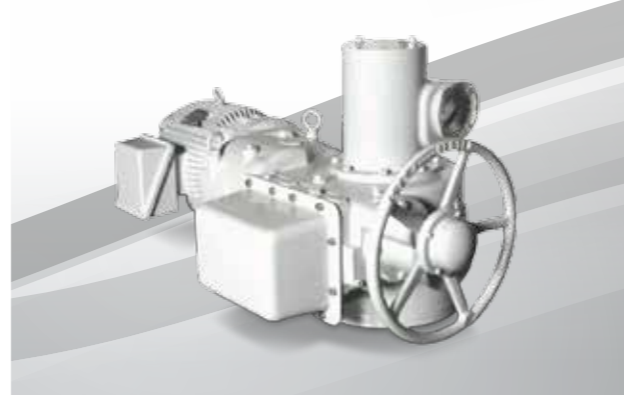
**TQ Series**  
Quarter-turn actuator 15~180W



**MW Series**  
Gear reducer-Worm, Bevel 51~30,600kgf.m



**LTMD-Q Series**  
Multi-turn actuator 0.2~37kW (For nuclear power plant)



# TX SERIES ACTUATOR



Intelligent Actuator  
Non-intrusive  
Intelligent Multi-Turn  
Actuator



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The design of our product is subject to change without notice for improvement. Publication No. CAT-18-001

The specification of actuator is subject to change without prior notice for on-going product improvement. Publication No. CAT-18-001



# Ever Reliable enertork



## Ever-Reliable, Enertork

Enertork has been specializing in manufacturing electric actuators and related products for industrial valves since 1987.

Enertork have focused on R&D, Manufacture, Test, Sales and Service for electric actuators and accessories, offering friendly support to our customers.

We manufacture products applicable to all kinds of industrial fields such as energy, power, water, oil&gas as well as factory automation.

Enertork has 3Q Policy to meet the needs of customers.

### Quick Delivery

We meet the delivery date with customers and propose the fastest delivery date possible.

### Quick Service

We operate a service organization and system so that we can act as quickly as possible when problems arise with our products.

### Quick Response

We express our belief that we are a trustworthy company by responding promptly to customers' requests.

## HISTORY

- ISO-9001 Quality Management System certified
- Listed in Korea Stock Market (KOSDAQ)
- CE Marking acquired
- Occupational Health and Safety Management System certified

We strive for being the company that only produces products which are essential for various industries.

### Establishment

- '87 Established as 'Morgan Korea'

### Technology acquisition

- '91 Selected as Korea Electric Power Corporation (KEPCO) supplier
- '91 Technical License Agreement with Seibu Electric & Machinery Co. Ltd., Japan
- '97 Acquired ISO-9001 Quality Management System certificate by DNV/ RVA (QSC-6758)
- '98 Launched a new actuator (co-developed with SEIBU Electric Japan)

### Domestic market share as No. 1

- '02 Registered as a qualified supplier for Korea's top 5 power generation facilities
- '03 Acquired 'Class 1E' 1E actuator at National Technical Systems Inc. in U.S.A.
- '06 Listed in Korea Stock Market (KOSDAQ)
- '08 Acquired CE marking for actuators from EVPU

### Set overseas expansion

- '10 Acquired Occupational Health and Safety Management System certification (OSHAS/ KOSHA 18001) from DNV
- '11 Newly changed company name and Logo to "ENERTORK LTD." (from Morgan Korea)
- '13 Acquired explosion proof approval for FM/ATEX/CSA
- '16 Acquired Functional Safety (SIL) certification from SGS-TUV.
- '16 Acquired Environmental Management(ISO-14001) from DNV.
- '17 Launched new TX-SERIES actuator

1987

1991

2006

2010

# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

TX series is for multi-turn valves such as gate, globe, penstock and used for large-sized quarter-turn valves such as butterfly and ball by adopting a reducer.

TX series is intelligent actuators based on accumulated technology and various field experience of Enertork Ltd., equipped with advanced functions such as 2-wire communication, data logging, and command using remote controller, and it is a model which can satisfy various needs of customers.

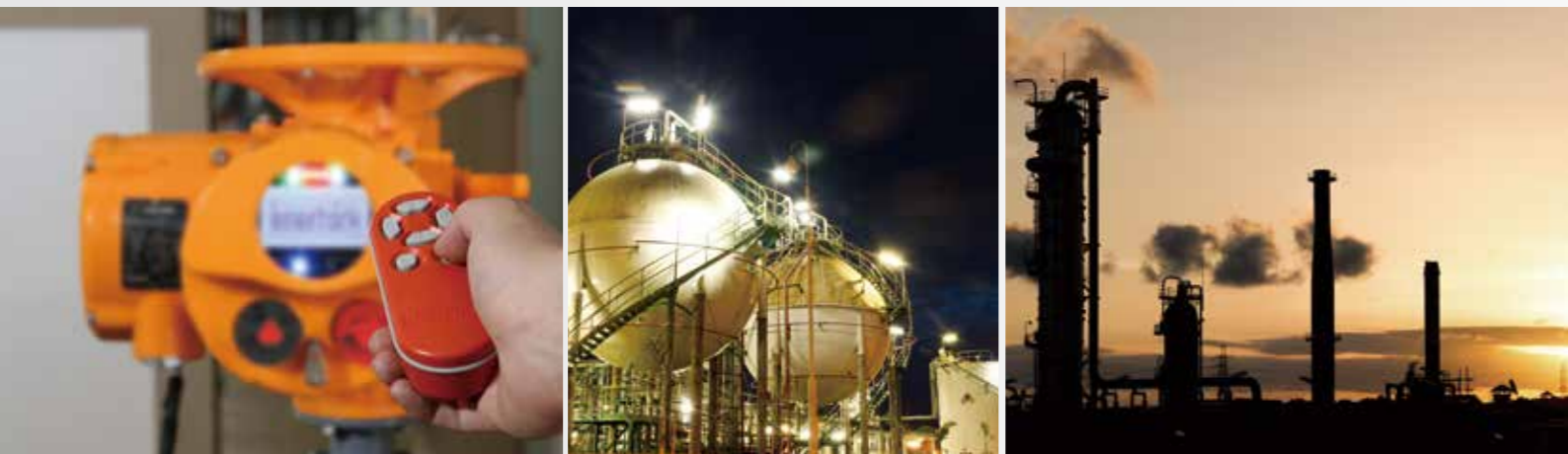


### Main specifications of TX series

- Large graphic LCD
- Non-intrusive setting
- Wireless setting via remote controller or Bluetooth
- IP68 waterproof  
(under water, depth of 8m for 72 hours long)
- 2-wire fieldbus communication  
(Profibus, Modbus, F/F, HART)
- Ex d IIC T4 explosion-proof (optional)
- LCD window and error signal maintained even during power failure
- Operating history of torque and limit tracked
- Advance notification function for maintenance and repair
- Data logging and Diagnostics

### Highlighted features

- Large LCD screen provides high recognition rate and variety in information displayed
- Setting function via local control switch, remote controller or wireless device(i.e. via Smartphone, without opening the cover - Non-intrusive setting)
- Data logging and various status check of actuator
- High resolution absolute encoder for position sensing
- Two(2) torque sensors, i.e. One for open and one for close independently



# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

### 1. Motor

High torque/low inertia motor in NEMA design D and class F insulation has the embedded thermostat, which ensures temperature sensing to protect the motor from damage.

### 2. Torque sensing devices

2 independent torque sensing devices for open and close direction - simple, accurate and reliable. Torque setting adjustable 40-100% rated torque.

### 3. Terminal unit

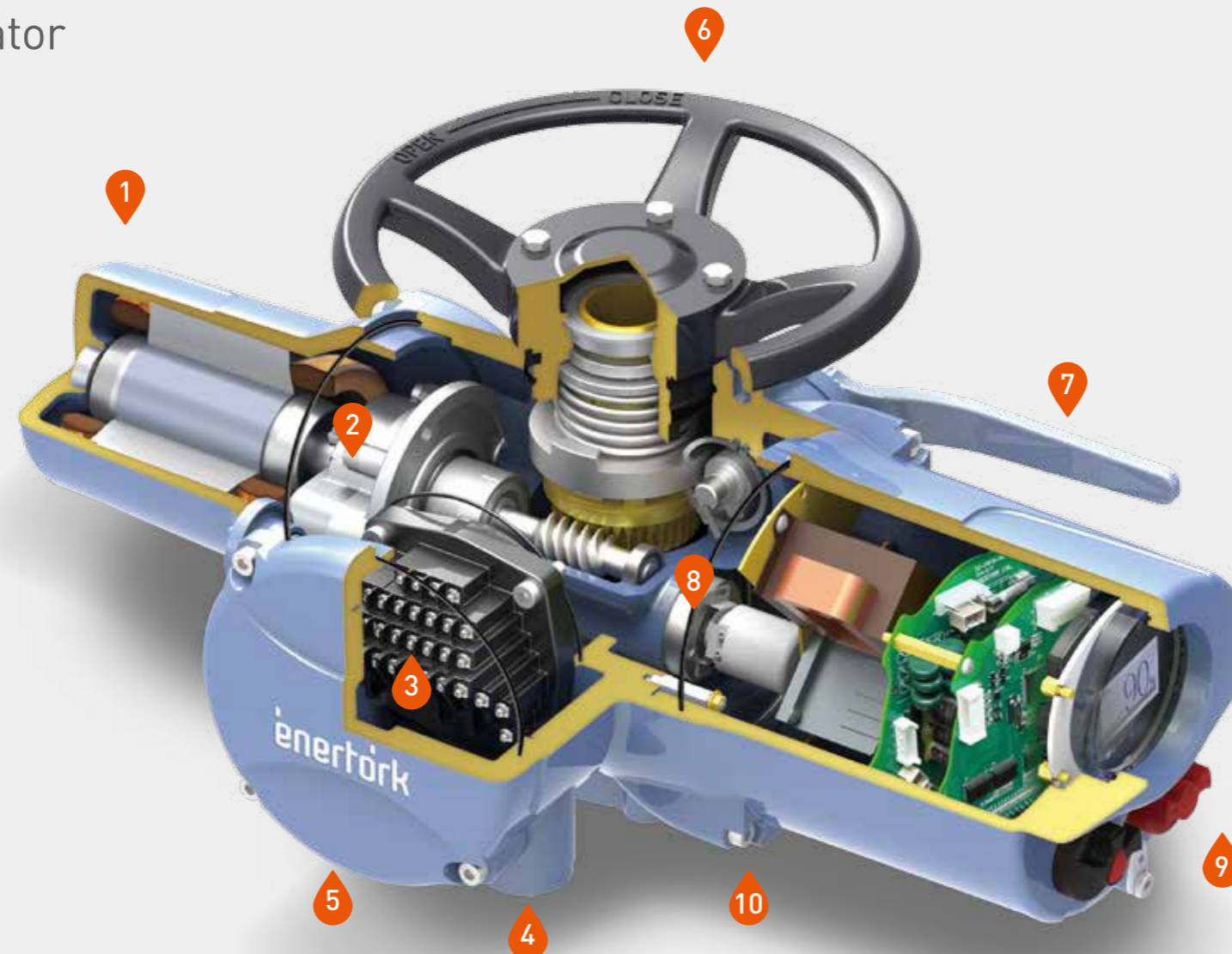
Double sealed with O rings to ensure the integrity of components inside when the cover is removed for site wiring. Step structure with barriers for easy and safe connection of wires.

### 4. Cable conduit

Total 4ea of cable conduits (1/2" × 1ea, 1" × 3ea) as standard (PF, NPT type selectable).

### 5. Terminal Cover

5-1 Basic type terminal cover  
5-2 Special type terminal cover with 4-additional cable entries for interfacing Profibus communication



### 6. Manual operation

Handwheel provided for emergency operation - Top mounted for TX-01 and TX-03(side mounting also available as option), whereas side mounted for TX-05 and TX-1.

### 7. Change lever and change-over

Change lever easily switches over from electric mode to manual mode then back to electric mode. The change-over to electric mode will be returned automatically by energizing the motor.

### 8. Position sensing - Absolute encoder

Position is measured and retained even in power failure and in absence of backup battery. High resolution type absolute encoder based on magnetic technology senses the position with high accuracy. It can measure and memorize the position without electric power and battery.

### 9. Control unit

Various information displayed through a large graphic LCD screen. Internal structure is composed of simple PCB for easy maintenance.

**Components** : Reversing magnetic contactor, transformer, control boards, operation switches, etc.

### 10. Thrust unit

Thrust unit of ductile cast iron consists of thrust bearing and two types of drive bush - A threaded bush for multi-turn valves and a bore with key bush for quarter-turn valves. Both are detachable for easy installation.



TX series are applicable to multi-turn valves such as globe, gate valves, and penstock. This series are also used for large-sized quarter-turn valves such as butterfly and ball valves, accompanied by worm gearboxes.

TX series is created from 20 years of accumulated technological and field experiences of Enertork. TX series have cutting-edge technologies such as fieldbus control and data logging, as well as the reliability and durability of the TM series in order to meet the demands of our customers.

- Non-intrusive setting for position and torque.
- IP-68 water proof (8m, 72 hours)
- Ex d IIC T4 explosion proof (optional)
- Fieldbus communications (Profibus, FF, Hart, Modbus)
- Operating history of position and torque tracked

- Wide and high resolution graphic LCD screen
- LCD and remote contacts are maintained in case of power failure
- Advance notification function for maintenance and repair
- Data logging and diagnostics
- Wireless setting and control (Remote controller, Bluetooth)

# TX SERIES

Non-intrusive Intelligent Multi-Turn Actuator

## LCD features/function

Displays information on position and status, position and torque, position and demand value(graphic), position in decimal points and status.



### 1 Position information and the status

The valve position display as an integer from 0%~100%  
The letter sizing is large and clear, and is easy to see from distance.



### 2 Position information and torque

Valve position value display with digital-bars and an integer during the actuator operation, and the torque value display as 40~100%.



### 3 Position information and demand value(GRAPHIC)

Valve position value display as an integer from 0% to 100% and the remote signal analyzed to convert the demanded valve position values display with a valve-shaped image.



### 4 Decimal point position information and status

The valve position display from 0% to 100% to the first decimal place.

## SETUP Menu



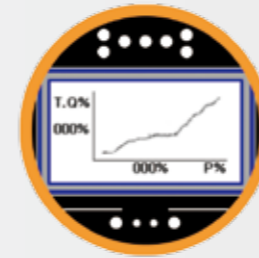
### 1 Tree structure menu

Tree structure menu allows easy setup configuration and user-friendly exploring.



### 2 Set-up mode

The user can check various parameters of setting values of the actuator.



### 3 Graphical analysis of torque data

The user can check real-time torque value according to opening and closing operation of the actuator in a simple graph format.






### 4 LOG-DATA analysis

The user can access Service and Alarm Log for any abnormal operation of the actuator and the cause of the error.

# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

### Main Component

<b>Motor</b>	<ul style="list-style-type: none"> <li>▶ Three or single phase squirrel-cage induction type</li> <li>▶ F-class insulation and B-class temperature rising</li> <li>▶ Totally Enclosed Non Ventilated(TENV)</li> <li>▶ Designed base on IEC-60034-1 and NEMA MG-1</li> <li>▶ S2-15min or S4 30% load of rated torque</li> <li>▶ Two(2) thermostats embedded in coils.</li> </ul>
<b>Position sensing</b>	<ul style="list-style-type: none"> <li>▶ Position detection with reliable absolute magnetic encoder.</li> <li>▶ Position recognition maintained in the absence of main power and battery</li> <li>▶ Number of turns for sensing                             <ul style="list-style-type: none"> <li>- TX-01 : 4096 turns - TX-03 : 3640 turns</li> <li>- TX-05 : 4096 turns - TX-1 : 2048 turns</li> </ul> </li> </ul> 
<b>Torque sensing</b>	<ul style="list-style-type: none"> <li>▶ Torque is measured using two pressure sensor(piezometer), one for open and one for close</li> <li>▶ Calibrated to 1% sensor accuracy</li> <li>▶ Indication of torque value at desired position is expressed numerically</li> </ul> 
<b>Wireless Setting Tool</b>	<ul style="list-style-type: none"> <li>▶ IrDA type remote control kit</li> <li>▶ Available with portable devices (mobile phone) with Bluetooth communication after installing Enertork's valve operation application software.</li> </ul> 





### Controls

<b>On-off and modulation control mode.</b>	<p>In general, on-off valves are either opened or closed which operated through the full stroke. The are controlled by means of command signals OPEN and CLOSE. This type of duty is classified as short-time duty(S2-15minutes). Modulating valves are used to set a desired variable positions and adjusted at short intervals, and can operated by 4~20mA signal. This type of duty is classified as modulating duty(S4, with 33% E1)and 40% of maximum allowable torque.</p>
<b>Setting in the end positions</b>	<p>For the valves operated in on-off duty and modulating duty, the actuator must automatically stop when reaching at the end position by one of two(2) kinds of following methods, depending on the type of valves</p> <ul style="list-style-type: none"> <li>▪ Position limit setting or Torque seating for globe valves : Please contact "ENERTORK"for applying torque seating.</li> </ul>
<b>Local control</b>	<p>Padlockable non-penetrating selectors are fitted on the actuator's operating case, also including a LCD window indicating valve position, status and alarm.</p> <ul style="list-style-type: none"> <li>- One(1) is for Local off and Remote selector switch.</li> <li>- One(1) is for Open and Close selector switch.</li> </ul> <p>Position and torque setting can be carried out by using the selector switches as described in the O&amp;M manual, and also by using remote control kit. Setting may be password protected. Remote control kits are provided on one-for-ten actuators basis. Standard data-logger provides valve torque, starts/stops, operational data, event log, etc. The operating case can be turned through 360° with 90° increments suitable for operator access.</p>

### Remote Control

TX series can be controlled remotely from central control room, and single relay outputs or "bus" network systems are used to meet the various demands for plant control systems. Six(6) configurable voltage free latching contacts are provided for indication of position, status and alarm. As an option, ten(10) configurable voltage free latching contacts can be provided for configuration by user.

### Fieldbus Communication

<b>Fieldbus control as options</b>	Tx series can be adopted with the following network interface modules for remote control and indication.				
	MODBUS-RTU	PROFIBUS-DP	PROFIBUS-DP-V1	FOUNDATION FIELDBUS	HART
TX-Series	0	0	0	0	0
<b>Profibus -DP</b>	 <p>For automating plants and machines, Profibus DP module is available that the actuator is to be integrated into a Profibus networks. The module complying with EN50170 on actuator allow the control and feed back of data through the network.</p> <ul style="list-style-type: none"> <li>- Supports Profibus DP-V0, DP-V1 and DP-V2</li> <li>- Max 126 units can be connected.</li> <li>- Redundant line topology as an option</li> <li>- Certified from Profibus International.</li> </ul>				
<b>Modbus -RTU</b>	 <p>Modbus is a simple and easily Applicable multi functional communication standard. Modbus module provides Fieldbus communication of actuator control functions and feedback data. RS485 data highway and Modbus-RTU protocol used for transmitting data.</p> <ul style="list-style-type: none"> <li>- Max 247 units can be connected.</li> <li>- Redundant line topology as an option.</li> <li>- Modbus ASCII and TCP/IP as an option.</li> </ul>				
<b>Foundation Fieldbus (FF-H1)</b>	 <p>The basic concept of Foundation Fieldbus is the master-slave system to distribute the tasks in the automation system. Foundation Fieldbus interface card complying with IEC-61158-2 will allow the actuator to the network systems. The scheduler controls for ensuring fieldbus communication. The actuators adopted Foundation Fieldbus can communicated directly between actuators without the need of host system.</p> <ul style="list-style-type: none"> <li>- Max 240 units can be connected.</li> </ul>				
<b>HART</b>	 <p>- HART (Highway Address Remote Transducer) communication standard is Process control communication standard that controls digital data over 4 ~ 20mA transmission signal. Its design is using OSI Layer 1, 2, 7 to enhance communication efficiency.</p> <ul style="list-style-type: none"> <li>- HCF (HART Communication Foundation) registration completed.</li> </ul>				

# TX SERIES

Non-intrusive Intelligent Multi-Turn Actuator

## SPEED-TORQUE TABLE

Model	RPM	60HZ	21	28	42	56	84	112	168	224*
		50HZ	18	24	36	49	73	98	147	196*
Motor (kW)		Max. torque : Nm lb-ft								
TX-01	0.2	70	70	60	60	40				
		52	52	44	44	30				
	0.4	150	150	110	110	90	50			
		111	111	81	81	66	37			
	0.75	150	150	150	150	150	100	75	75	
		111	111	111	111	111	74	55	55	
TX-03	0.4	150	150	110	110	90				
		111	111	81	81	66				
	0.75	300	300	240	240	200	90			
		221	221	177	177	148	66			
	1.5	300	300	300	300	200	200	130	100	
		221	221	221	221	148	148	96	74	
TX-05	1.5	600	600	500	400	300				
		443	443	369	295	221				
	2.2	600	600	600	500	350	300			
		443	443	443	369	258	221			
	3.7	600	600	600	500	400	400	300	150	
		443	443	443	369	295	295	221	111	
TX-1	2.2	1200	1000	700	500	350				
		885	738	516	369	258				
	3.7	1200	1200	1100	800	600	500			
		885	885	811	590	443	369			
	5.5	1200	1200	1200	1000	700	700	500	300	
		885	885	885	738	516	516	369	221	

## MECHANICAL DATA

Allowable torque		Allowable thrust		Allowable stem dia. Mm		Flange dia. ISO No. Tap PCD/size Pilot dia. mm	Approximate weight	
Nm	lb-ft	ton	kN	key	threaded		Explosion proof (Exd IIB T4)	Explosion proof (Exd IIC T4)
150	111	7	68.6	34	40	125 F10 Φ102 / 4xM10 70	37	40.5
							38.5	41.5
							41.5	44.5
300	221	10	98.1	40	48	175 F14 140 / 4xM16 100	50.5	52
							53.5	55
							56	60
600	443	13	124.7	50	58	175 F14 140 / 4xM16 100	74	77
							77	80
							80	84
1200	885	16	156.8	60	72	210 F16 165 / 4xM20 130	108	113
							109	115
							116	117

\* We do not recommend these speeds for direct mounting on gate valve applications.  
 1. Above speed-torque table is based on AC 380V 3PH 60Hz main power supply standard. Please contact Enertork about speed-torque data for any other power supply range.  
 2. Stall torque is approximately 1.4 times the max. torque value.

# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

### Actuator installation environment

<b>Temperature condition (ambient temperature)</b>	<ul style="list-style-type: none"> <li>▶ Standard : -25°C ~ 70 °C</li> <li>▶ Option : Low temperature(-40°C~50°C)</li> <li>* Additional installation of sun shade recommended at the time of exposure to direct sunlight in high temperature areas.</li> </ul>											
<b>Vibration, shock, seismic and noise</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="width: 15%;">type</th> <th style="width: 85%;">Level</th> </tr> </thead> <tbody> <tr> <td>Vibration</td> <td>1g rms at 10~100 Hz frequency range</td> </tr> <tr> <td>Shock</td> <td>5g max. acceleration</td> </tr> <tr> <td>Seismic</td> <td>2g at 1~50 Hz frequency range</td> </tr> <tr> <td>Noise</td> <td>Lower than 75dB at 1m distance</td> </tr> </tbody> </table> <p>* It is recommended to install a wall-mounted or a self standing type control unit, If installing in an area with vibration</p>		type	Level	Vibration	1g rms at 10~100 Hz frequency range	Shock	5g max. acceleration	Seismic	2g at 1~50 Hz frequency range	Noise	Lower than 75dB at 1m distance
type	Level											
Vibration	1g rms at 10~100 Hz frequency range											
Shock	5g max. acceleration											
Seismic	2g at 1~50 Hz frequency range											
Noise	Lower than 75dB at 1m distance											
<b>Corrosion Protection</b>	<ul style="list-style-type: none"> <li>▶ Standard : Polyester dry powder coating after anodizing Color : Munsell No. 2.5 PB 5/2 (similar to RAL 7046)</li> <li>▶ Option : Special coatings available under requests according to ISO-12944(Contact ENERTORK Ltd. for more)</li> </ul>											
<b>Operating lifespan</b>	DUTY	Model										
	ON-OFF & inching	TX-01, TX-03, TX-05	100% of maximum adjustable torque operation at close position and 30% of maximum adjustable torque operation at intermediate position : 10,000 cycles. ※ 1 cycle : 25 turns of output for both direction									
		TX-1	100% of maximum adjustable torque operation at close position and 30% of maximum adjustable torque operation at intermediate position : 5,000 cycles. ※ 1 cycle : 25 turns of output for both direction									
	Modulating	TX-01, TX-03, TX-05	30% of maximum adjustable torque operation at intermediate position : 1,200,000 starts.									
		TX-1	30% of maximum adjustable torque operation at intermediate position : 500,000 starts.									

### Functions for actuator protection and Operational Safety

<b>Terminal Unit Double Sealing</b>	▶ One O-ring for terminal unit and one O-ring for terminal cover protect actuator from ingress of water or dust.
<b>Non-intrusive setting/control</b>	▶ Without opening a cover, actuator setting for position and torque is easy as by using remote control kit or rotary switches.
<b>Non-penetrative Switch</b>	▶ The switches composed of magnet and sensor completely isolates the inside and the outside of actuator, improving the tightness.
<b>Valve Obstruction</b>	▶ Independently set torque switch for open and close direction will trip the actuator at the set torque.
<b>Valve Jamming</b>	▶ Torque switch will trip the actuator when the preset value is reached, to prevent the damage to valve.
<b>Torque Bypass</b>	▶ The torque switches set to automatically bypass during 5 seconds of operating Open from Full Close to prevent the valve from jamming.
<b>Torque Switch Hammering</b>	▶ Once torque trips, the actuator cannot operate to the same direction, even if the remote and local control signals are available.
<b>Reverse phase detection and automatic phase rotation correction</b>	▶ Automatic phase rotation correction allows the actuator to run in the correct direction when the 3-phase power is wired incorrectly.
<b>Lost Phase</b>	▶ The circuit is checked for three phase power supply, and when lost phase is detected, the circuit prevents the motor from running.
<b>Instantaneous Reverse Operation</b>	▶ A time delay of 200ms is automatic between the reverse operations to protect the motor.
<b>Surge protection</b>	▶ Protects internal circuits from external command signals or surge by using Opto-isolator.
<b>Motor thermostat</b>	▶ To protect motor from overheating, two thermostats are installed in coils as standard. (option of up to three thermostats are available for 3-phase motors) Thermostats open the circuit when the temperature reaches at 30°C ±5°C, resulting the motor to stop.
<b>Emergency Shutdown(ESD)</b>	▶ The ESD signal has priority over any existing local or remote control signals. ESD operation set to open, close or stay-put depending on the process requirements.



# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

### Standard Specifications

<b>Main Power</b>	60 Hz, 3PH, 220/380/440/460/480VAC 50 Hz, 3PH, 200/380/400/415/460/480VAC	Voltage tolerance : ± 10% Frequency tolerance : ± 5% Max.starting voltage drops : -15%
<b>Motor</b>	Class F insulation without brake. Thermostat built-in and functionable within ±10% of the rated voltage. Standard rating : S2 15 minutes for On-Off and Inching operation. S4 at 33% ED and 30% load of max. torque for modulating.	
<b>Position Sensor</b>	Absolute encoder based on magnetic hall sensor(Resolution 13 bits, No need of battery)	
<b>Torque Sensor</b>	Double pressure sensor (Piezometer) Setting range : 40~100%	
<b>Contact Output</b>	Configurable latch relays(6 points, Rating : 5A 250VAC / 5A 30 VDC).	
<b>Terminal Unit</b>	Located in double-sealed compartment. All connection to the control printed circuit board use pins & sockets. © Control : 59 pins with M4 screws, rating : 250VAC / 5A © Main power : 3 pins with M6 screws, rating 660VAC / 64A © Earth : 1 pin with M6 screws	
<b>Enclosure</b>	IP68(underwater depth of 8 meter for 72 hours long) and IP66	
<b>Space Heater</b>	Thermistor type(PTC-5) installed inside the operating case	
<b>Manual/electric switchover</b>	Automatic return when motor starts up.	
<b>Conduit Entry</b>	1 x PF 1½ for main power and 3 x PF 1 for control use 1 x PF 1 can be provided as an option	
<b>Standard Coating</b>	Polyester dry powder coating after anodizing(Munsell No. 2.5 PB5/2), in accordance with ISO regulations.	
<b>Thrust Unit</b>	Detachable type with ductile cast iron case High strength bronze stem bush for thrust type, and mild steel for non-thrust type. Flange size : ISO-5210	

### Optional Specifications

<b>Main Power</b>	50/60 Hz, 1Ph, 220 VAC
<b>Motor</b>	H-Class, Space heater
<b>Modulation</b>	4 - 20mA modulating control.
<b>Explosion-proof</b>	Ex d IIC-T4
<b>Aux. Contact Out</b>	Maximum additional 10 contacts
<b>Conduit Entry</b>	NPT, G, etc.
<b>Data Logging HMI</b>	Monitoring actuator's operation status, Trend analysis, Setting & maintenance.
<b>Bluetooth Control</b>	Normal operation, Configuration, Diagnostics via smart devices (PDA, Smart phone, PC as such)
<b>Ambient Temperature</b>	For special temperature range, refer to Enertork.
<b>Special coating</b>	For special coatings, refer to Enertork.
<b>Linear drive unit</b>	For converting rotating motion to linear motion - Available for TX-01, 03, 05
<b>Thrust unit for High temperature and high speed</b>	Specially designed and spring-loaded thrust unit can compensate the dynamical axial forces at high speed and reduce the stress due to thermal expansion to ensure safe operation without damaging valves and actuators.
<b>Fire-proofing</b>	30 minutes availability in fire temperature up to 1,093°C as per fire curve of uc1709, by FR coating of CHARIEK-7(min.15mm).

### Watertight enclosure

ENERTORK actuators are designed with improved protection as IP-68(8m water depth for 72 hours) in accordance with IEC-60529. For guarantee of the enclosure protection IP68, suitable cable glands must be used. Cable glands are available from ENERTORK upon customer request.

### Explosion-proof

For installation of actuators in hazardous or explosive areas, explosion-proof actuators must be installed. TX-Series are tested and certified by concerning authorities in accordance with IEC-60079-0/1 standards and related regulation

Classification of explosion proof			
Products	Authorities	Classification	Regulation
TX-Series	FM(USA)	Class I , Division 1, Groups C, D; T4 Class II , III, Division 1, Groups E, F, G; T4	FM 3600/3615
	ATEX	II 2 Gc Exdb II c T4	IEC-60079-0/1
	Korea	Exd IIC T4	IEC-6009-0
Remote Control Kit	Korea	Exia IIB T4	IEC-6009-0/11

# TX SERIES

## Non-intrusive Intelligent Multi-Turn Actuator

### Functional Safety (SIL)

TX-Series actuators tested with risk analysis and assessment in compliance with IEC-61508 and certified as SIL level 2 from SGS-TUV.

### 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, economic feasibility is another crucial element for sizing properly. We are ready to assist customers with torque/thrust calculation, method of mounting, selection of options, and other inquiries at all times for achieving proper sizing.

#### SUPLING SPARES

We respond promptly to any inquiries regarding individual spare parts and modules.

#### MOV SUPPLY

We can supply MOV including valves, dampers, and water gates along with our actuators under our quality guarantees, upon special customer requests.

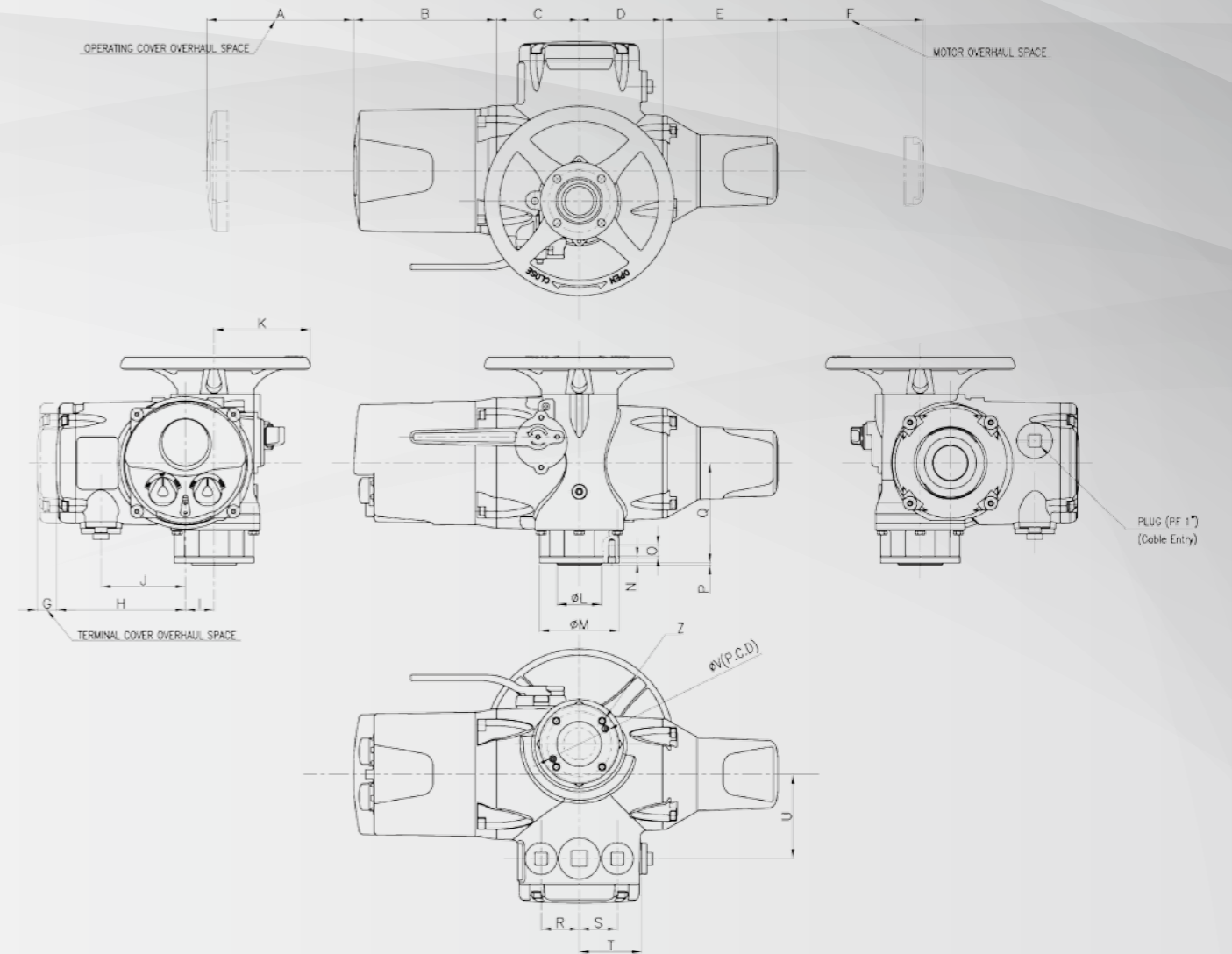
#### RETROFIT/ATTACHMENT SUPPLY

In case of retrofitting or site installation of actuators, customers often need various attachments in relation with actuator such as mounting flanges, iron stands, levers, rods, metal fittings, and many others. We are ready to attend and help out from designing stages to supplying the product, until the customers satisfaction is reached.

### Quality / Safety and health / Environmental Management

All processes from designing through to the delivering of actuators including pre-inspection of individual parts or modules. proceeds with strict accordance with the Quality Management system complying with ISO-9001 certified by DNV. Before delivery, each actuator is tested and a Final test report is issued. Customized torque valves, sleeve rotational speed, motor current, voltage, performance of position limit and torque limit switches, and manual/automatic switch-over are checked at the specifically developed test console and test report is generated. Safety and Health Management system complying with ISO-18001 and Environmental Management system complying with ISO-14001 certified by DNV are controlled the manufacturing process.

### TX-01, 03 drawing

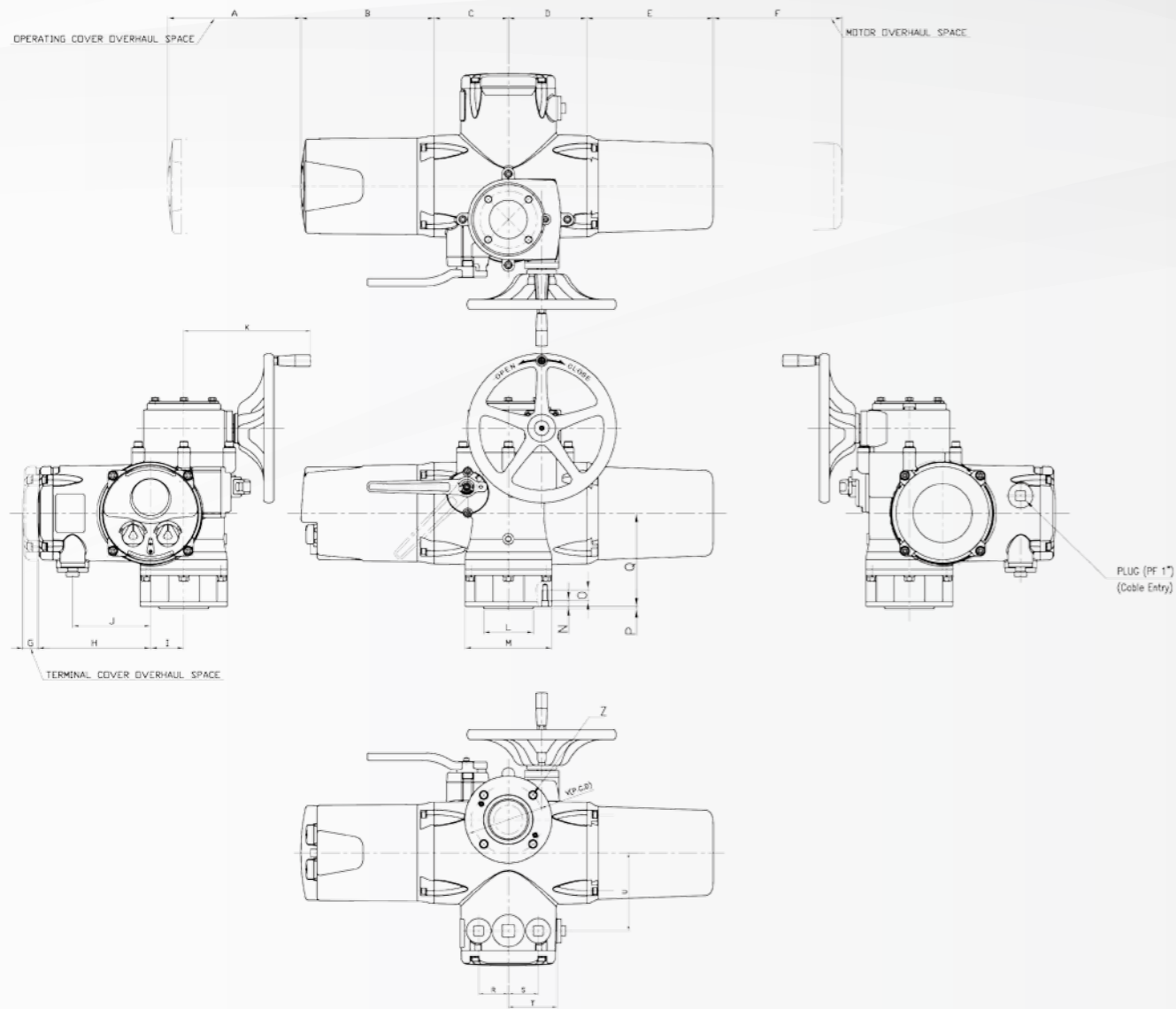


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	Z	ISO NO.
TX-01	230	225	130	131	225	230	30	203	46	133	150	70	125	10	20	3	157	60	60	98	132.5	102	4-M10	F10
TX-03	230	225	145	147.5	225	230	30	227	60	157	225	100	175	10	28	4	180	60	60	98	157	140	4-M16	F14

# TX SERIES

Non-intrusive Intelligent Multi-Turn Actuator

## TX-05, 1 drawing



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	Z	ISO NO.
TX-05	260	268	150	157.5	255	260	30	227	67	157	255	100	175	10	28	4	188	60	60	98	157	140	4-M16	F14
TX-1	260	268	177.5	197.5	270	285	30	262	85	177	276.5	130	210	15	30	5	217	60	60	98	177	165	4-M20	F16

## Selection Guide

The following basic information may be useful in finding solutions for motor operated valves.

No	Item	Description	Spec
1	Valve type & Size	Multi-turn	
		Quarter-turn	
2	Fluid of line	Fluid name	
3	Design/Operation pressure	kg/cm <sup>2</sup> or psi	
4	Design/Operation temperature	°C or °F	
5	Operating Duty	On-Off and inching	
		Modulating	
6	Main Power Supply	Volts, Hz, Phase	
7	Operating Time or Turns	Sec from full closed to full open	
		Turns from full closed to full open	
8	Required Seating Torque	N·m or Kgf·m	
9	Running Torque	N·m or Kgf·m if known	
10	Thrust	KN or Ton	
11	Enclosure	Ingress of water : IP68(8m water depth for 72 hours)	
		Explosion proof	
12	Local Indication	Standard display	
13	Remote Control	Contacts	
		Analogue : 4~20mA	
		Fieldbus-network : Type	
14	Remote Indication	Voltage free contacts	
		4~20mA position indication	
		Fieldbus network	
15	Environmental conditions for installation	High Temperature	
		Low Temperature	
		Vibration	



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