

TX SERIES

Non-penetration type, intelligent multi-turn electric valve actuator

The TX series is a next-generation intelligent actuator that can be used for gate valves, globe valves, floodgate, etc. The TX Smart series can be applied to butterfly, ball valve, etc., by combination with a reducer.

The TX series is an intelligent actuator manufactured based on the accumulated technology and divers field experience of Enertork. The TX Series can satisfy the diverse requirements of customers using built-in advanced functions such as 2-wire communication, data logging, starting by remote control, etc.

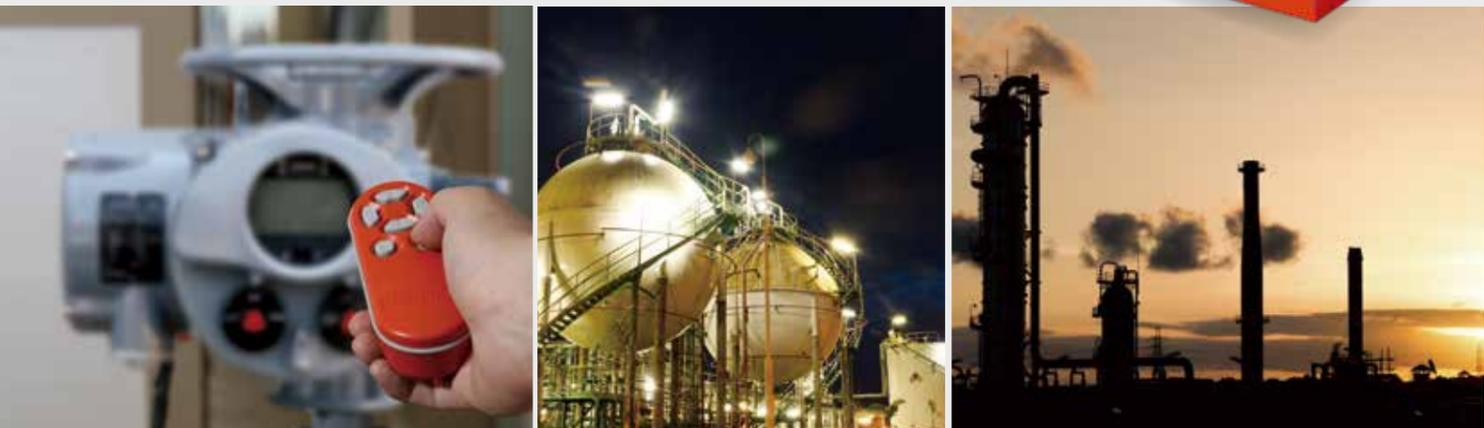


Main specifications of TX series

- Large-size graphic LCD
- Non-intrusive setting
- Portable devices can be set wirelessly by remote control or Bluetooth
- Waterproof function complying with IP68 (8m, 72 hours)
- 2-wire communication function (Profibus, Modbus, Foundation Fieldbus, HART, etc.)
- Ex d IIB, IIC explosion-proof
- LCD window and error signal maintained even in event of power failure
- Saves operation history of torque and limits
- Advance notification function for maintenance and repair
- Data logging and diagnostics

Advantages and differentiated features of TX series

- High recognition rate and various information provided by large-size LCD window
- Actuator can be set without opening the cover (non-penetration type setting) by remote control or wireless device (smartphone, etc.)
- Status of various actuators can be checked, with data logging



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Non-intrusive Intelligent Multi Turn Actuator

1 Motor

Designed as low-inertia high-power motor; Class F insulation grade; Built-in thermostat for protecting motor from overload

2 Torque sensing

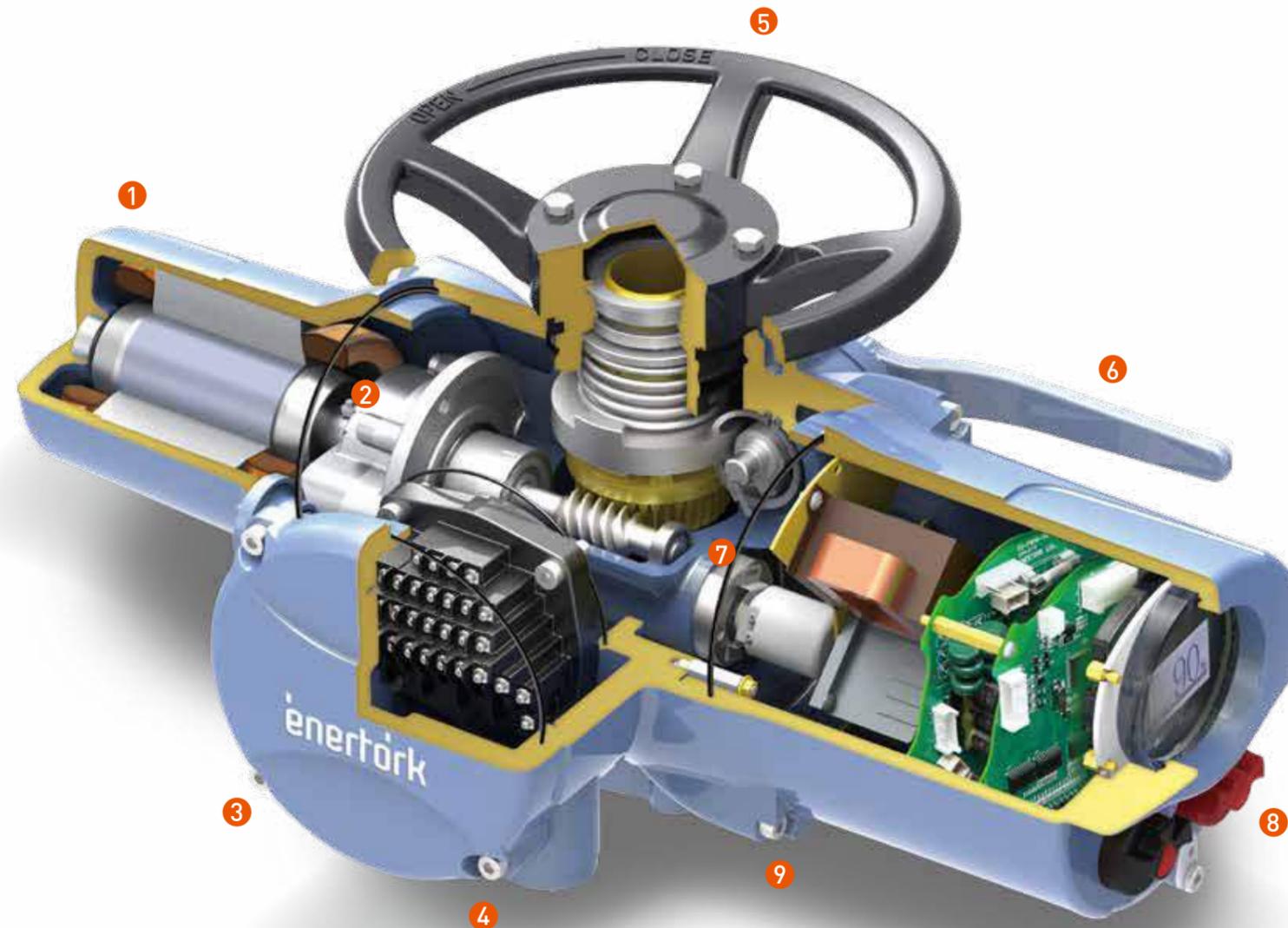
Improved accuracy by measuring torque when opening and closing using two independent torque sensing devices; Measured torque monitored in range of 40-100%

3 Terminal block

Each terminal of the device is of separate bolting type and sealed in a double-sealed enclosure for easy on-site wiring

4 Cable entry

1 x PF/NPT 1-1/2" for main power and 3 x PF/NPT 1" for control use



5 Manual handle

Equipped with manual operation handle for emergency such as power failure (top handle and side handle can be selected for small model; Only side handle is available for TX-05 or higher)

6 Manual switch lever

Motor can be conveniently switched from electric to manual using the switch lever; Automatic return type is standard for returning from manual to electric

7 Position sensing - absolute encoder

Locations can be sensed reliably by the absolute magnetic encoder; Location information is remembered even if power is down with no battery

8 Control unit

Various information provided with large-size graphic LCD window; Easy to maintain, as inside is made of PCB with simple structure

9 Thrust unit

Thrust bearings and various types of driving bushings can be selected for the inside of the unit made of ductile materials.

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Standard specifications

Main power	1PH, 220V, 50/60Hz 3PH, 200/380/400/415/460/480V, 50Hz 3PH, 220/380/440/460/480V, 60Hz
Motor	Insulation class F, built-in thermostat, operable within ±10% voltage fluctuation, Standard rating: S2, 15 minutes
Integrated operation panel	Non-penetration selection switch (Open/Close, Remote/Off/Local) / Motor forward / reverse actuator (magnetic contactor) / Large-size graphic LCD and status display LED / Reverse-phase protection function / Monitor relay / Save history of operation incl. operating time, usage times, torque and limit, etc. / Data logging and diagnosis function / Non-intrusive setting using remote control and wireless device without opening the cover
Position sensor	Absolute encoder with high-resolution magnetic hall sensor applied Position information stored even if power is lost and with no battery
Torque sensor	Pressure sensor (piezo sensor) Setting range: 40-100%
Output contact (position limit/torque switch)	Power Fail Relay (1 point, Rating : 8A 250VAC / 8A 30VDC) Configurable latch relay (6 points, Rating : 5A 250VAC / 5A 30VDC)
Gate positioner	0-100% is displayed on the LCD window.
Enclosure (waterproof grade)	IP-68 (72 hours duration at depth of 8 meters)
Space heater	Thermostat type (PTC-5) / 5W / 100-240VAC
Manual/electric switch	Automatic return; manually switch from electrical to manual using manual lever
Cable entry	1 x PF/NPT 1-1/2" for main power and 3 x PF/NPT 1" for control use
Operating ambient temperature	-25°C~+70°C
Vibration/Shock	Vibration: 1g rms within frequency range of 10-100Hz Shock: Up to 5g Earthquake: 2g in frequency range of 1-50Hz
Coating	Anodizing + polyester (powder) Carbon steel: Double-coated epoxy paint Finish color: Munsell No. 2.5PB 5/2

Optional

Motor	Insulation class H
Temperature range	-40°C~+50°C
Adding output contacts (position limit/torque switch)	Configurable latch relay (10 points, Rating : 5A 250VAC/5A 30VDC)
Cable entry	NPT, G, etc.
Transmitter (position value)	DC 4-20mA
Transmitter (torque value)	DC 4-20mA
Proportional control	Input : DC 4-20mA / Output : DC 4-20mA
Explosion-proof	Exd IIB T4 / Exd IIC T4
Fieldbus control (2-wire control)	Profibus-DP(Single/Redundancy) / Modbus-RTU / Foundation Fieldbus-H1 / HART / Wireless
Motor forward / reverse actuator	SSR (Solid State Relay) *Recommended when performing proportional control
Others	Surge protector, arrester

Waterproof grade

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 grade

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 G Ex db IIC T4 Gb	IEC-60079-0/1
	Korea	Exd IIC T4	IEC-6009-0
Remote Control Kit	Korea	Exia II B T4	IEC-6009-0/11

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Fieldbus Communication

PROFIBUS		<ul style="list-style-type: none"> - Fieldbus is a communication protocol that is the most reliable and commonly used in industrial sites that process discrete data such as water treatment for power generation at home and abroad. This product was certified by Profibus International according to EN 50170. - Supports Profibus DP V0, Profibus DP V1, and Profibus REDCOM redundancy.
MODBUS		<ul style="list-style-type: none"> - This product faithfully complies with the Modbus communication protocol of Modicon, as the communication protocol that can be most universally and easily applicable to industrial sites. This product can be applied on site more cheaply and quickly than other communication protocols. - Modbus-RTU products are currently supplied, and customers can select other options such as Modbus-ASCII and Modbus-TCP.
F/F		<ul style="list-style-type: none"> - A communication protocol used in the field of process control such as oil and gas; This product was certified by the Fieldbus Foundation in compliance with IEC-61158.
HART		<ul style="list-style-type: none"> - The HART (Highway Address Remote Transducer) communication protocol performs control by adding digital data on 4-20mA transmission signals. As it is designed to use OSI Layer 1, 2, and 7, the user's communication efficiency can be increased. - This product has been registered in the HCF (HART Communication Foundation).

Actuator installation environment

Temperature condition (Ambient temperature)	<ul style="list-style-type: none"> ▶ -25 ~ 70°C ▶ Options for low temperature (-40 - 50°C) can be selected * Sunshade installation recommended if actuator is exposed to direct sunlight in high-temperature area 														
Response to vibration and shock	<table border="1"> <thead> <tr> <th>type</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td>Vibration</td> <td>Total 1g rms in frequency range of 10-100Hz</td> </tr> <tr> <td>Shock</td> <td>Up to 5g</td> </tr> <tr> <td>Earthquake</td> <td>2g acceleration in frequency range of 1-50Hz</td> </tr> <tr> <td>Noise</td> <td>Below 70db at 1m</td> </tr> </tbody> </table> <p>* Recommended to install model that can separate the operation unit when installing in an area with vibrations</p>	type	Level	Vibration	Total 1g rms in frequency range of 10-100Hz	Shock	Up to 5g	Earthquake	2g acceleration in frequency range of 1-50Hz	Noise	Below 70db at 1m				
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Function for protecting actuator and securing operational stability

Double-sealed enclosure	▶ Protects actuator from moisture and dust
Non-intrusive setting	▶ Actuator can be set without opening the cover
Non-penetrative switch	▶ Switch structure using magnetic force to completely isolate inside and outside to improve secure sealing
Torque bypass function	▶ Over-torque can be set so as not to be activated for 5 seconds when opened after full closing to prevent valve jamming.
Reverse-phase detection and automatic phase conversion	▶ Prevents incorrect wiring by generating an error or automatically converting the phase to prevent problems that can occur when the 3-phase power supply is wired incorrectly.
Prevention of lightning damage	▶ Protects internal circuits from external signals or lightning using an opto-isolator
Motor thermostat	▶ By default, two thermostats are installed to prevent damage due to motor overload (3 thermostats can be installed optionally for a 3-phase motor)

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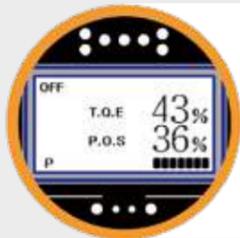
LCD functions/description

Displays position information and status; position information and torque; position information and request value (graphic); decimal point position information and status



1 Position information and status

Displays valve position as integer in range of 0-100%.



2 Position information and torque

Displays valve position value as opening degree bar and integer, and displays torque value as 40-100% when actuator is running



3 Position information and request value (graphic)

Displays opening degree as integer in range of 0-100% and analyzes remote signals to display requested valve position value with valve-shaped image



4 Decimal point position information and status

Displays valve position to first decimal place in range of 0-100%



Setup menu



1 Tree-type menu structure

Users can view the setup menu conveniently with the tree type menu structure.



2 View mode initial setting

Users can check various parameter set values of the actuator.



3 Graphical torque data analysis

Users can check the real-time torque value according to the actuator opening degree in a graph format that is easy to understand.



4 LOG-DATA analysis

Users can check service and alarm logs. When an error occurs on site, users can check for normal operation of the actuator to identify the exact cause of the incident.



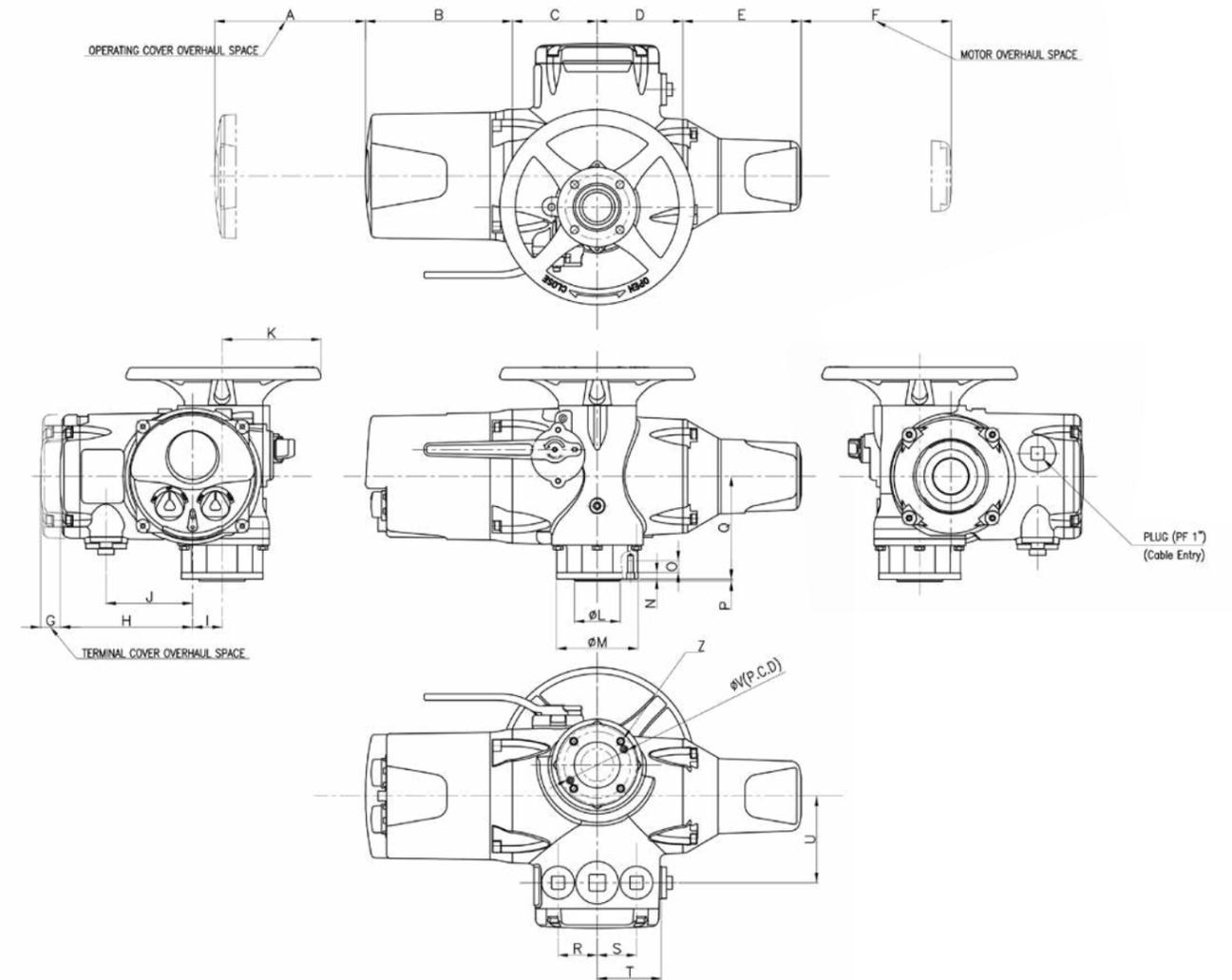
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Torque Table

SPEED-TORQUE TABLE											MECHANICAL DATA					
Model	rpm	60Hz	★ 21	★ 28	★ 42	★ 56	★ 84	112	168	224	Allowable thrust	Allowable stem dia. max. mm	Flange dia. ISO No. Tap PCD/size Pilot dia. mm	Weight (kg)		
		50Hz	★ 18	★ 24	★ 36	★ 49	★ 73	98	147	196						
		Motor (kW)	Max. torque : Nm									ton	kN	key	screw	
TX-01	0.2	Max. adjustable torque	85	75	55									40.5		
	0.4	Max. adjustable torque	150	145	110	80	60				7	68	34 40	125 F10 102/4xM10 70	41.5	
	0.75	Max. adjustable torque	200	200	200	150	115	100	70	55				44.5		
TX-03	0.75	Max. adjustable torque	300	300	220	170	120	105	75	55	10	98	40 48	175 F14 140/4xM16 100	55	
	1.5	Max. adjustable torque	400	400	400	300	240	205	145	105					60	
TX-05	1.5	Max. adjustable torque	600	600	445	335	240	205	140	105	13	124	50 58	175 F14 140/4xM16 100	77	
	2.2	Max. adjustable torque	600	600	600	490	350	295	205	155					80	
	3.7	Max. adjustable torque	600	600	600	600	575	500	350	250					84	
TX-1	2.2	Max. adjustable torque	1120	920	670	510	365	295	205	160	16	156	60 72	210 F16 165/4xM20 130	113	
	3.7	Max. adjustable torque	1200	1200	1130	850	610	495	345	265					115	
	5.5	Max. adjustable torque	1200	1200	1200	1200	905	740	515	390					117	

1. Above speed-torque table may vary according to actuator specifications.
 2. (★) Self-locking is possible with these RPM speeds

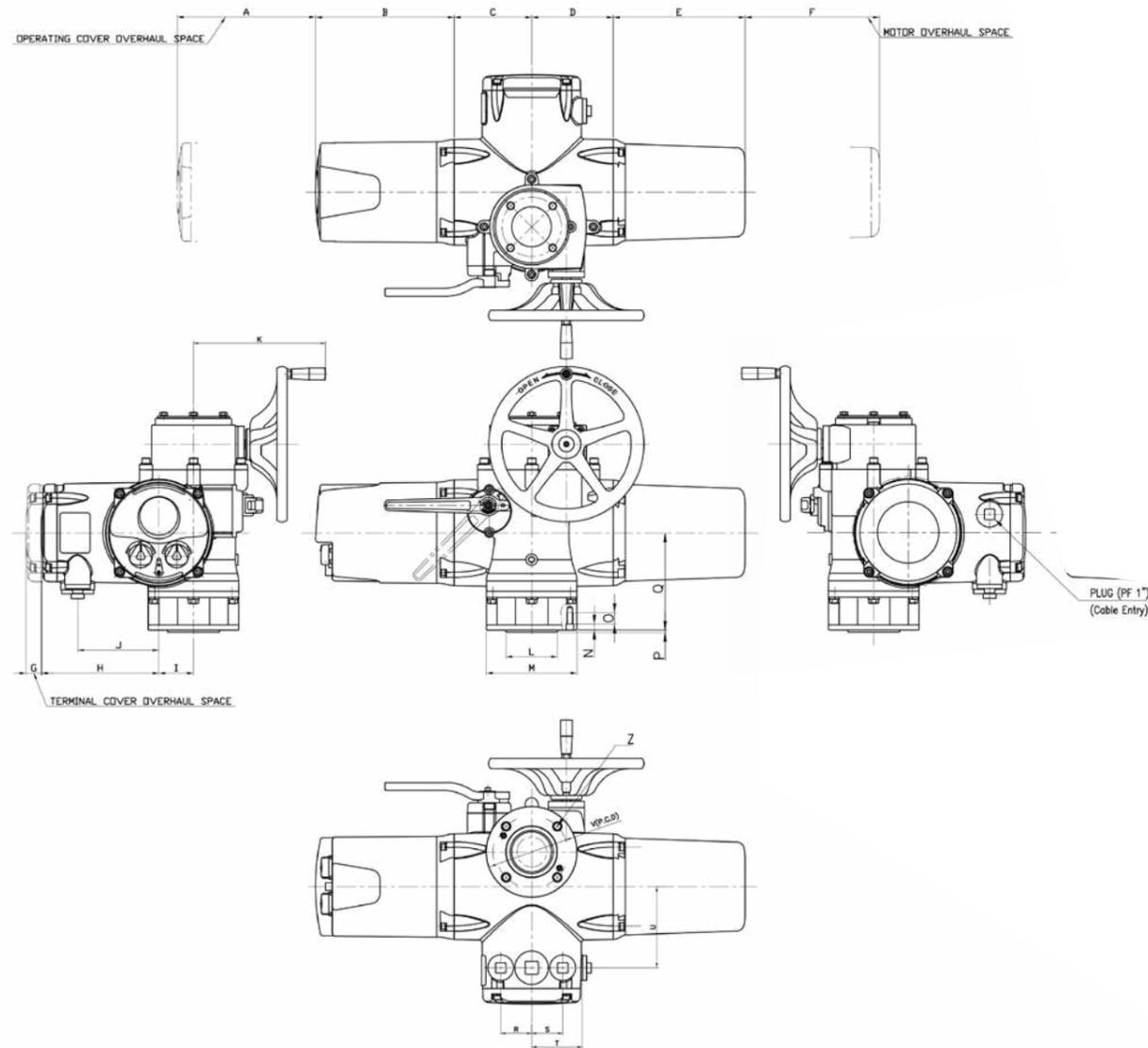
Outside view of TX-01 and 03



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

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Outside view of TX-05 and 1



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 ² 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 Kg·m	
9	Running Torque	N·m or Kg·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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Special Option

■ Separated Integral Type

- If it is dangerous or uncomfortable for the operator to use the integrated type operation panel, it can be relocated.
- If piping vibrates severely, the integrated operation panel can be relocated to protect electronic devices.

There are two types of the integrated operation panel - the **standing type** that is secured to the floor, and the **wall bracket type** that can be attached to the wall.



Special Option

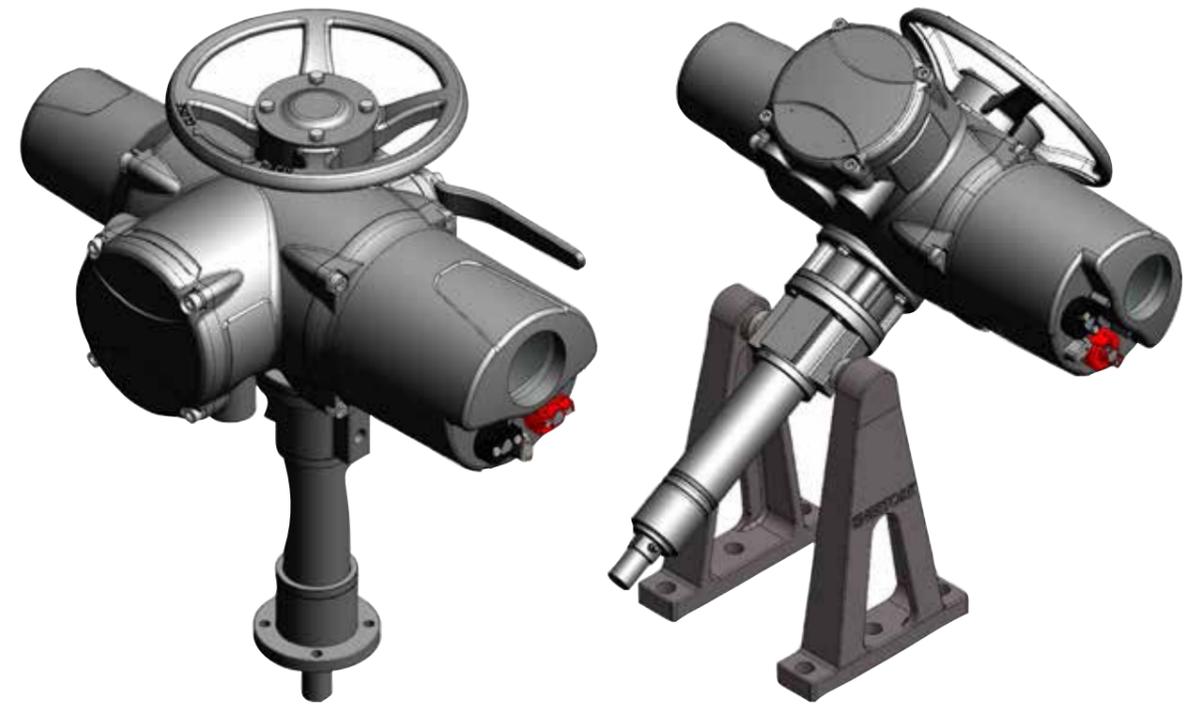
■ ML TYPE (Linear Thrust Unit)

The ML series is a device that performs linear motion in combination with the TM series.

A-type is directly connected to TM series, and **B-type** operates lever arrangement by mounting of the hinge bracket.

FEATURES

1. Adopted the international flange standard of EN ISO 5211
2. Water tight as protection grade of IP67
3. Self-locking
4. Allowable temperature from -25°C to +80°C
5. Short -time duty S2 -15 min, max. 3 cycles (OPEN-CLOSE-OPEN) based on mean thrust and standard ambient temperature

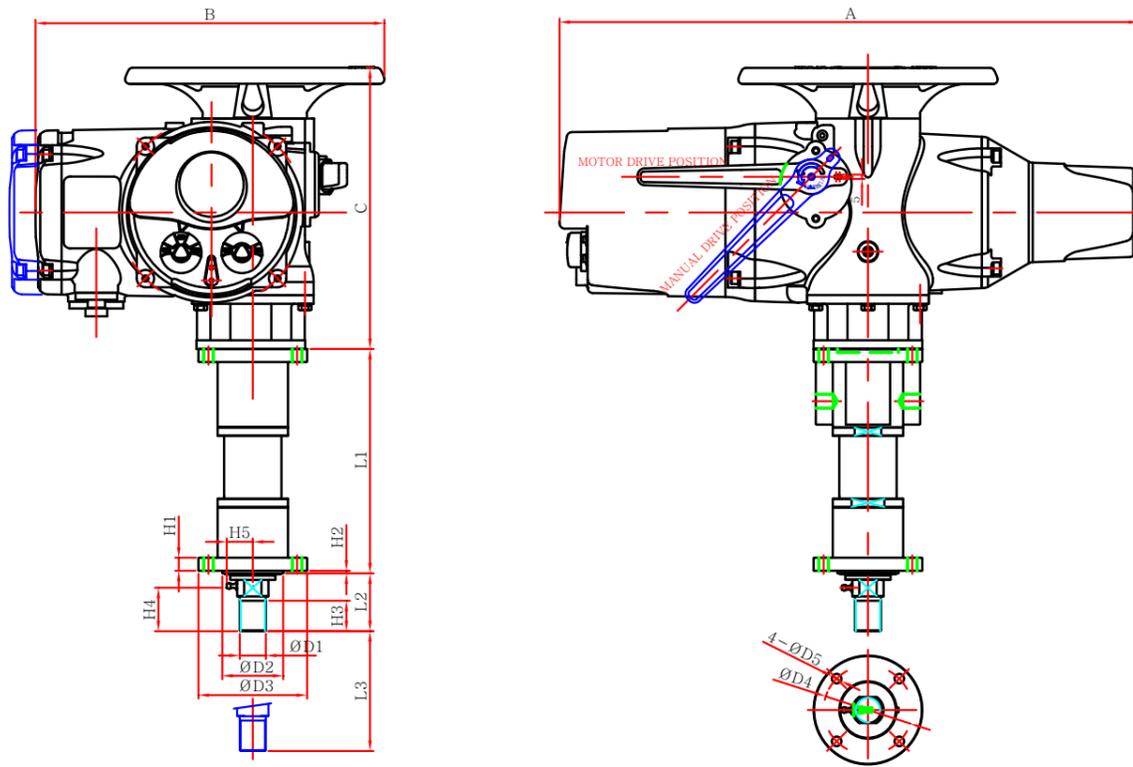


▲A-TYPE

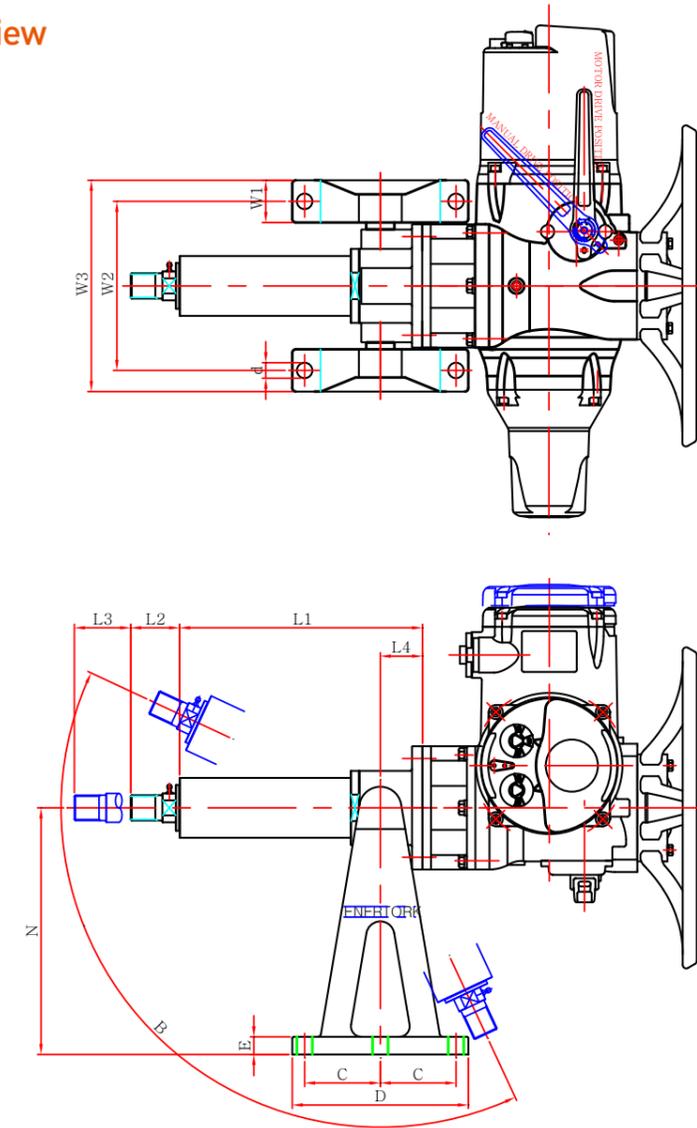
▲B-TYPE

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External view
A - TYPE



External view
B - TYPE



Model	A	B	C	L1	L2	L3	D1	D2	D3	D4	D5	H1	H2	H3	H4	H5
	(Max.)															
ML01-63-A	711	400	323	268	69.5	63	M30	70	125	102	11	15	3	35	52	30
ML01-125-A	711	400	323	330	69.5	125	M30	70	125	102	11	15	3	35	52	30
ML01-250-A	711	400	323	455	69.5	250	M30	70	125	102	11	15	3	35	52	30
ML01-400-A	711	400	323	605	69.5	400	M30	70	125	102	11	15	3	35	52	30
ML04-63-A	742.5	515	389.5	322	75.5	63	M36	100	175	140	18	15	4	35	57	32.5
ML04-125-A	742.5	515	389.5	384	75.5	125	M36	100	175	140	18	15	4	35	57	32.5
ML04-250-A	742.5	515	389.5	509	75.5	250	M36	100	175	140	18	15	4	35	57	32.5
ML04-400-A	785	515	389.5	659	75.5	400	M36	100	175	140	18	15	4	35	57	32.5

Model	L1	L2	L3	L4	A	B	C	D	E	N	W1	W2	W3	d
					(Max.)	(Max.)								
ML01-63-B	272	65.5	63	60	25°	140°	107.5	250	25	350	60	200	260	22
ML01-125-B	324	65.5	125	60	25°	140°	107.5	250	25	350	60	200	260	22
ML01-250-B	459	65.5	250	60	25°	140°	107.5	250	25	350	60	200	260	22
ML01-400-B	609	65.5	400	60	25°	140°	107.5	250	25	350	60	200	260	22
ML04-63-B	328	69.5	63	60	25°	140°	M36	100	175	140	18	15	4	35
ML04-125-B	742.5	515	389.5	384	25°	140°	M36	100	175	140	18	15	4	35
ML04-250-B	742.5	515	389.5	509	25°	140°	M36	100	175	140	18	15	4	35
ML04-400-B	785	515	389.5	659	25°	140°	M36	100	175	140	18	15	4	35