TMi SERIES

MULTI TURN ACTUATOR

Ever Reliable

enertork
(ex-MORGAN KOREA)

TMi SERIES

MULTI TURN ACTUATOR

TMi is an upgraded version of conventional TM actuators, adding the cutting-edge technologies such as Fieldbus control, data logging etc to meet with the customer's demand.

TMi Smart, which derived from TMi, features non - intrusive position & torque setting.
Setting and configuration are available to IrDA remote control kit and push button respectively.

II Enhanced function

- Easy setting of potentiometer by adoption of mechanical slip device
- Non-penetrating push button switches
- prevention of recurrent torque switch chattering caused by the outside signal
- LCD display as option
- Fieldbus control as option
- Fire retarding
  - FR coating
  - Tested on the basis of UL 1709:2005
  - Certified by Lioyd's Register of Shipping
- Non-intrusive position & torque setting

DOUBLE SEALED - IP68 & EXPLOSION PROOF - ENVIRONMENT FREE USE

All the compartments of TMi series are double sealed with a pair of V shape ring & O ring and have enough flame path according to IEC standard to ensure complete protection from dust, moisture (submersible to a depth of 8 meters for 72hours) and flame.

MULTI - UNIT CONFIGURATION

All the compartments are independent of each other, but simple to assemble or disassemble, thus the expansion of function is easy.

INDEPENDENT HANDWHEEL SHAFT ALL SIDE MOUNTED

All TMi series actuators have independent handwheel shaft engaged with the worm through an intermediate spur gear to prevent the manual drive parts from the damages that often occur in the manual drive parts during the manual operation of the actuators of which handwheel shaft directly drive the worm. Also, the side mounted handwheel on all TMi series ensures easier manual operation than the top mounted.

TM*i* SERIES ACTUATOR

❶ HIGH TORQUE / LOW INERTIA MOTOR rapidly reaches peak torque after starting and stops with little overrun when switched off. the embedded thermostat ensures accurate temperature sensing to keep the motor's thermal capacity maximum.

❷-1 BASIC COVER is used for the TM actuator which does not need local control function.

❷-2 INTEGRAL CONTROL UNIT

- Non-intrusive push buttons are integrated with the actuator.
- The inner circuit is isolated from the remote signal by the opto-isolator to withstand the surge.
- Once the torque switch triggers, the actuator responds to no other command signals until the reset button is pushed.
- LED lamps for full open / full close / fault

❷-3 LCD DISPLAY available as option.

❸ TERMINAL UNIT is separately double sealed with a series of V shape ring and O ring to ensure the integrity of the components inside at the time the cover is removed for site wiring

❹ SWITCH UNIT consists of limit switch assembly, torque switch assembly and position indicator.

- LIMIT SWITCH is driven by a counter gear train to ensure high setting accuracy and reliability at any predetermined position. Set easily and fast by screwdriver.

- TORQUE SWITCH automatically stops the motor when the torque bigger than set value is applied to the output shaft of actuator. Originally measured and set at the time of delivery and adjustable at site by repositioning the dial.

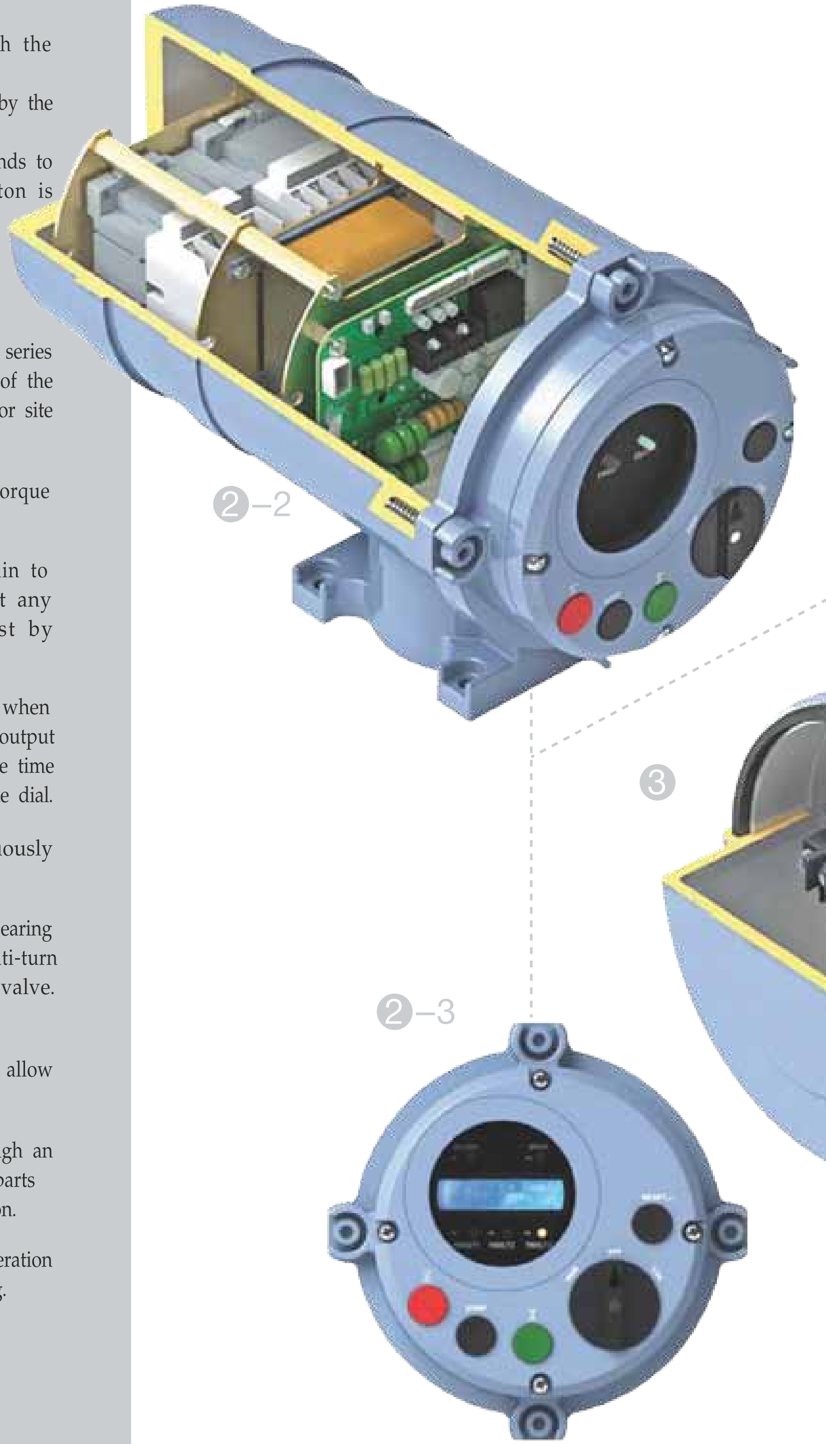
- POSITION INDICATOR of wide angle continuously shows the exact position of valve in percentage.

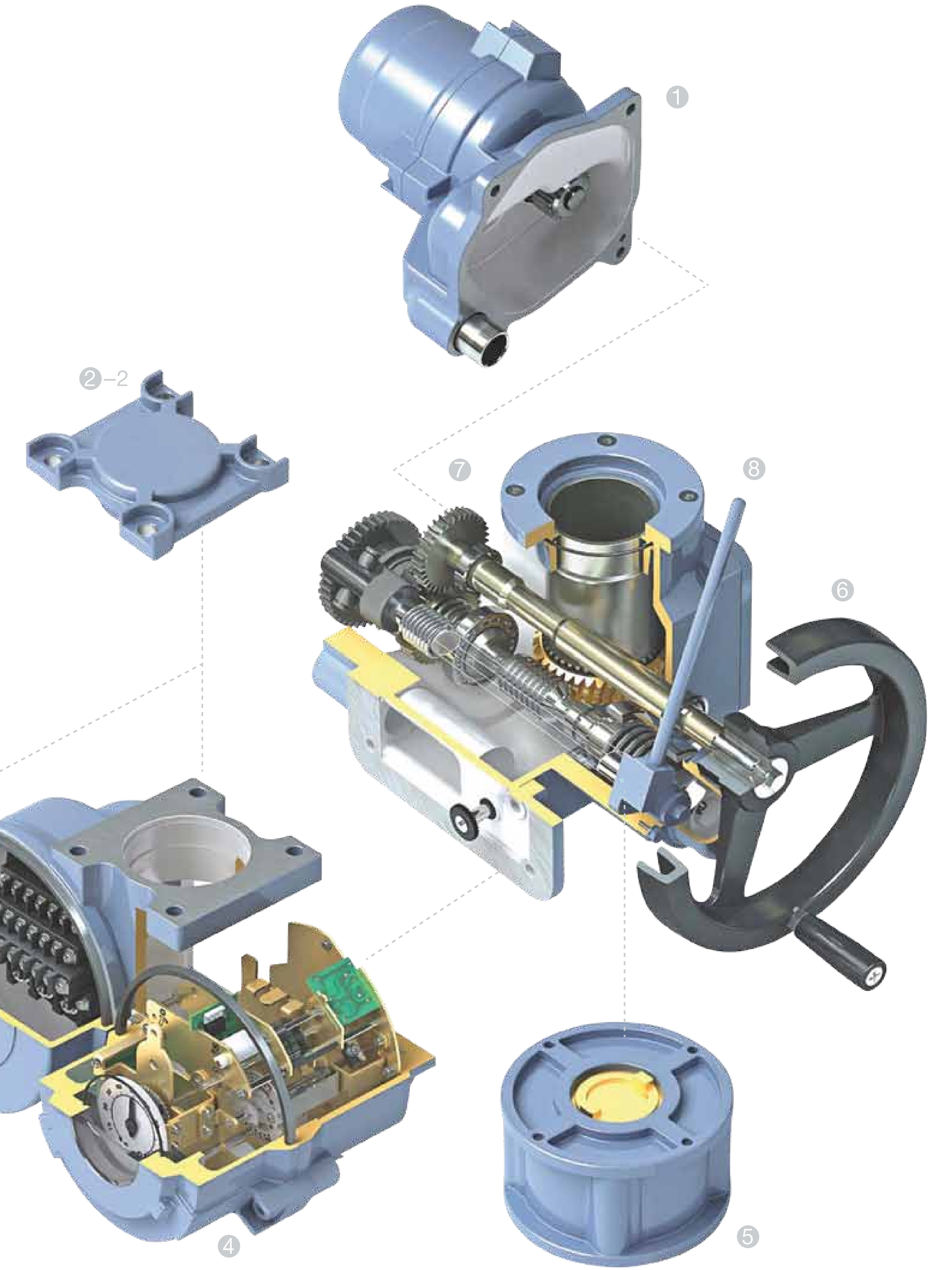
❺ THRUST UNIT of ductile cast iron consist of thrust bearing and 2 types of drive bush. Threacded bush for multi-turn valve and bore with key bush for quarter turn valve. Detachable to allow easy installation.

❻ HANDWHEEL is side-mounted for all TMi series to allow easy manual operation.

❼ HANDWHEEL SHAFT engaged with the worm through an intermediate spur gear to prevent the manual drive parts from the damages may occur during manual operation.

❽ CHANGE LEVER operation easily shift the power operation to manual operation even when the motor is running.




1
2-2
7
8
6
4
5

TMi SERIES
MULTI TURN ACTUATOR

Standard

Main power	50/60Hz, 3PH, 220/380/440/460V
Motor	Class F without brake. thermostat embedded and workable within ±10% of the rated voltage. Standard rating : 15minutes
Limit switch	Counter gear driven, open:1abX1, close:1abX1, AC250V, 2A/DC125, 0.4A (Inductive load)
Torque switch	Adjustable at site. open:1abX1, close:1abX1, AC250V, 2A/DC125, 0.4A (Inductive load)
Indicator	Gear driven and shows the valve position in percentage
Terminal	In double sealed compartment. All connection to control printed circuit board via pins & sockets. Control : 34 points with M4 screws, rating AC250V / 5A Power : 3 points with M6 screws, rating AC660V / 63A
Enclosure	IP-68(Water depth 8 meters 72hrs), IEC 60529, 1989,
Space heater	Thermistor type(PTC-5) embedded inside the switch unit. Capacity : 5W, 100 to 240V, 0.3 to 1.8kΩ
Ambient temp	-25°c~70°c
Manual/power shifting	Automatic return when motor re-energized
Conduit entry	1XPF $1\frac{1}{2}$ ” and 2XPF 1” for power and control
Standard coat	Polyester Powder coating after anodizing (Munsell No. 2.5PB5/2)
Design life	Min.10,000 cycles of 0-100% travel provided regular maintenance performed as per the manual
Thrust unit	Refer to the particulars of flange on page 9
Protection Features	Prevention of recurrent torque switch chattering Delayed over-torque detection for 5 sec in case of valve jam Dedicated ESD control (full open/full close/stay)

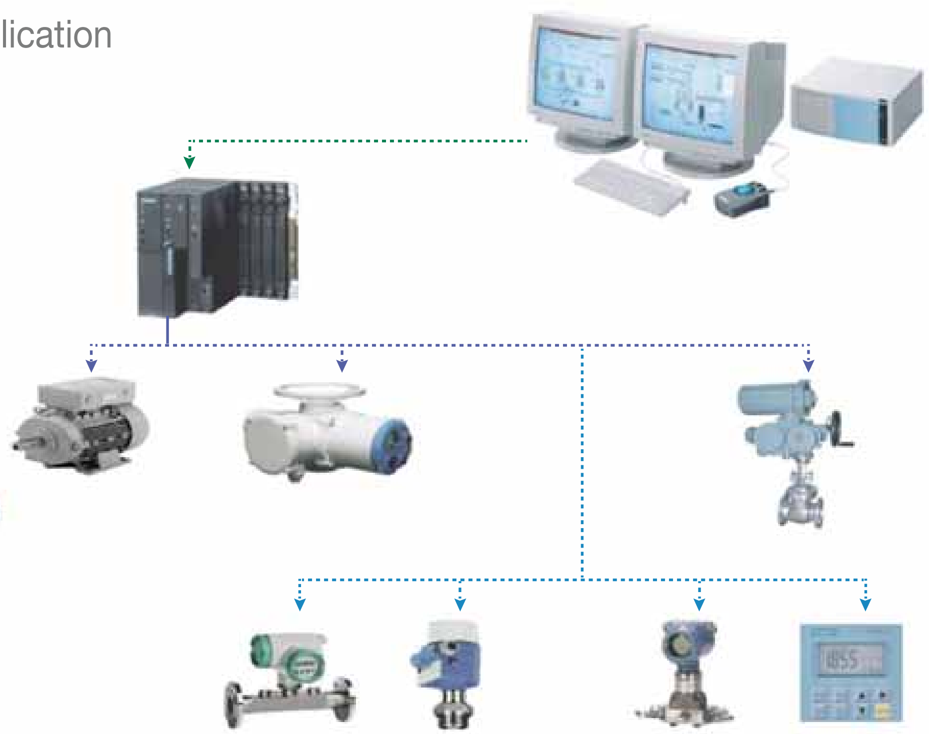
Limit, torque switch indicator ass'y

Terminal

Option

<table>
<tr><td>Main power</td><td colspan="3">50/60Hz, 1PH, 220V</td></tr>
<tr><td>Motor</td><td colspan="3">For other class except F. reter to us</td></tr>
<tr><td rowspan="4">Integral control unit</td><td>Type</td><td>LED</td><td>LCD</td></tr>
<tr><td>Common</td><td colspan="2">Non-penetrating push buttons (Open/Stop/Close/Reset). Local/Off/Remote Selector.
Open/Fault/Close LED Lamp, Reversing Contactor. Phase Discriminator. Monitor Relay</td></tr>
<tr><td>Self diagnosis</td><td></td><td>Running time/cycle,
Numbers of operation of limit / torque switch and thermostat</td></tr>
<tr><td>Fieldbus control</td><td></td><td>Profibus-DP, Modbus-RTU, FF-H1, HART</td></tr>
<tr><td>Potentiometer</td><td colspan="3">Standard 1KΩ, available Max. input voltage : 25V. Linearity : 0.5%. Rated power consumption : 0.8W</td></tr>
<tr><td>Transmitter</td><td colspan="3">Input AC110/220V ±10%, output 4~20mA DC, Accuracy ±0.5% FS, Adjusting range : ±20%, span ±20%,</td></tr>
<tr><td>Modulation</td><td colspan="3">Input/Output 4~20mA DC</td></tr>
<tr><td>Terminal</td><td colspan="3">47 points</td></tr>
<tr><td>Ambient temp</td><td colspan="3">For other temperature range, refer to us</td></tr>
<tr><td>Explosion proof</td><td colspan="3">Exd IIBT4</td></tr>
<tr><td>Aux. limit switch</td><td colspan="3">Max, 16contact</td></tr>
<tr><td>Optional coat</td><td colspan="3">For the special coat, refer to us</td></tr>
<tr><td>Fire retarding</td><td colspan="3">60minutes to UL 1709 Time-temperature curve</td></tr>
<tr><td>Non-Intrusive Position & Torque Setting</td><td colspan="3">- Smart, easy setting and configuration by IrDA remote control kit
- High resolution absolute encoder on magnetic hall sensor
- Non-contact Torque sensing on optical contactless resolver
- Data logging
- self-diagnosis</td></tr>
</table>

Fieldbus application



Speed-torque table

Model	rpm										
	60Hz	13.5	17.6	23.1	30.4	40.5	52.8	69.3	91.2	(150)	(196)
	50Hz	11.3	14.6	19.3	25.3	33.9	43.8	57.9	75.9	(125)	(164)
	Motor(kW)	Max. torque : kgf · m Nm									
TM-01i	0.2	13.6	10.5	7.9	6.0	5.3	4.1	3.1			
		133.3	103.9	77.4	58.8	51.9	40.2	30.4			
	0.4	15.0	15.0	15.0	12.1	10.6	8.1	6.2	4.7		
		147.0	147.0	147.0	118.6	103.9	79.4	60.8	46.1		
	0.75		15.0	15.0	15.0		14.3	10.9	8.3	(8.2)	(6.3)
			147.0	147.0	147.0		140.1	106.8	81.3	(80.3)	(61.7)
	1.5									(11.2)	(8.8)
										(109.7)	(86.2)
TM-04i	0.4	31.7	24.3	18.6	14.1	12.1	9.3	7.0	5.3		
		310.7	238.1	182.3	138.2	118.6	91.1	68.6	51.9		
	0.75	55.9	42.9	32.6	24.8	21.3	16.3	12.4	9.5		
		547.8	420.4	319.5	243.0	208.7	159.7	121.5	93.1		
	1.5		56.0	56.0	50.9		33.5	25.4	19.4		
			548.8	548.8	498.8		328.3	248.9	190.1		
	2.2		56.0	56.0	56.0		48.3	36.6	27.9	(21.1)	(16.2)
			548.8	548.8	548.8		473.3	358.7	273.4	(206.7)	(158.7)
	3.7									(38.6)	(29.4)
										(378.2)	(288.1)
TM-07i	1.5	86.0	86.0	66.8	50.9	43.6	33.5	25.4	19.4		
		842.8	842.8	654.6	498.8	423.3	328.3	248.9	190.1		
	2.2	86.0	86.0	86.0	73.3	62.8	48.3	36.6	27.9		
		842.8	842.8	842.8	718.3	615.4	473.3	358.7	273.4		
	3.7		86.0	86.0	86.0		68.0	51.5	39.3		
			842.8	842.8	842.8		666.0	504.7	385.1		
	5.5		86.0	86.0	86.0		86.0	86.0	70.0	(60.8)	(46.5)
			842.8	842.8	842.8		842.8	842.8	686.0	(595.8)	(455.7)
	7.5									(71.2)	(54.5)
										(697.6)	(534.1)
TM-1i	2.2	164.9	126.7	96.2	73.3	62.8	48.3	36.4	27.9		
		1616.0	1241.7	942.8	718.3	615.4	473.3	356.7	273.4		
	3.7	184.0	178.8	135.8	103.5	88.6	68.1	51.7	39.4		
		1803.2	1752.1	1331.3	1014.3	868.3	667.4	506.7	386.1		
	5.5		184.0	184.0	183.4		120.8	91.7	70.0		
			1803.2	1803.2	1797.3		1183.8	898.7	686.0		
	7.5		184.0	184.0	184.0		164.6	125.0	95.2	(71.6)	(54.8)
			1803.2	1803.2	1803.2		1613.1	1225.0	933.0	(701.6)	(537.0)
	11.0			184.0	184.0			176.0	135.6	(83.8)	(63.9)
				1803.2	1803.2			1724.8	1328.9	(821.2)	(626.2)

* Main power AC 380V 3PH 60Hz standard. For other main power, refer to US * ( ) is 2pole motor spec

Mechanical data

Allowable torque		Allowable thrust		Allowable stem dia. mm		Handwheel ratio/dia. mm	Flange dia. ISO No. Tap PCD/size Pilot dia. mm	Weight motor included control unit excluded ( ) : 2pole motor Kg
kgf · m	Nm	ton	kN	key	threaded			
15.0	147.0	7.0	68.6	34	40	up to 30.4rpm 16.8:1/225 over 40.5rpm 5.6:1/225	125 F10 102/4xM10 70	34 35 39(39) (44)
56.0	548.8	13.0	127.4	50	58	up to 30.4rpm 40:1/245 over 40.5rpm 13.3:1/245	175 F14 140/4xM16 100	54 58 64 67(67) 73
86.0	842.8	16.0	156.8	60	72	up to 30.4rpm 45.9:1/330 over 40.5rpm 13.3:1/330	210 F16 165/4xM20 130	91 95 110 114(115) (122)
184.0	1803.2	27.0	264.6	80	95	up to 30.4rpm 71.1:1/450 over 40.5rpm 23.7:1/450	300 F25 254/8xM16 200	132 146 150 162(158) (181)

TMi SERIES
MULTI TURN ACTUATOR

Speed-torque table

Model	rpm	13.5	17.6	23.1	30.4	40.5	52.8	69.3	91.2	(150)	(196)
	60Hz	13.5	17.6	23.1	30.4	40.5	52.8	69.3	91.2	(150)	(196)
	50Hz	11.3	14.6	19.3	25.3	33.9	43.8	57.9	75.9	(125)	(164)
	Motor(kW)	Max. torque : kgf · m N · m									
TM-3i	5.5	296	228	173	132	167	128	98	74		
		2905	2232	1694	1290	1640	1259	956	729		
	7.5	400	310	236	179	228	175	133	101		
		3923	3043	2310	1760	2236	1717	1304	994		
	11		400	346	264		257	195	149		
			3923	3392	2585		2522	1916	1460		
	15		400	400	339		330	251	191	(123)	(94)
			3923	3923	3320		3240	2460	1875	1209	921
	18.5						400	309	236	(152)	(116)
							3923	3034	2312	1490	1135
TM-6i	11	593	456	346	264	335	257	195	149		
		5819	4470	3392	2585	3284	2522	1916	1460		
	15	762	585	444	339	430	330	251	191		
		7475	5741	4357	3320	4219	3240	2460	1875		
	18.5		722	548	417		407	309	236	(152)	(116)
			7080	5373	4094		3995	3034	2312	1490	1135
	22		800	652	497		485	368	281	(181)	(138)
			7845	6395	4872		4755	3611	2752	1774	1352
TM-12i	18.5	940	722	548	417	530	407	309	236		
		9218	7080	5373	4094	5202	3995	3034	2312		
	22	1119	859	652	497	631	485	368	281		
		10970	8426	6395	4872	6191	4755	3611	2752		
	30	1524	1171	889	677	860	661	502	382	(247)	(188)
		14949	11482	8714	6639	8437	6480	4921	3750	2419	1844
	37		1464	1111	846		826	627	478	(308)	(235)
			14356	10896	8301		8101	6153	4689	3024	2304

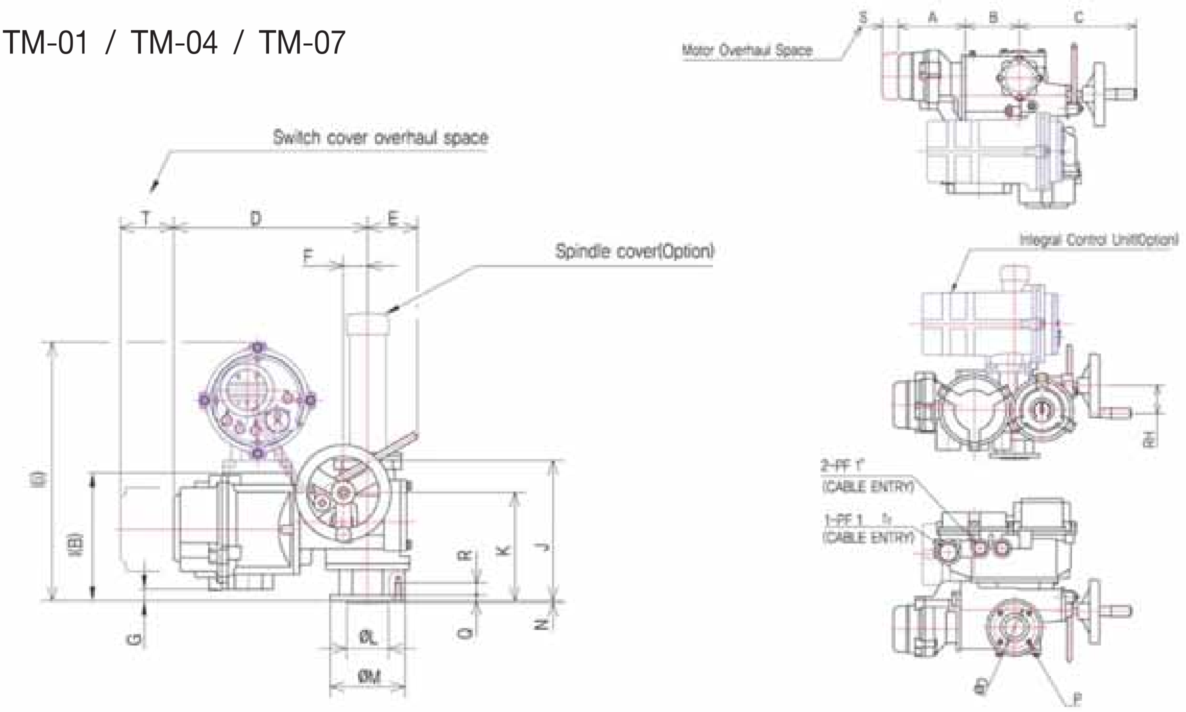
※ Main power AC 380V 3PH 60Hz standard. For other main power, refer to US * ( ) is 2pole motor spec

Mechanical data

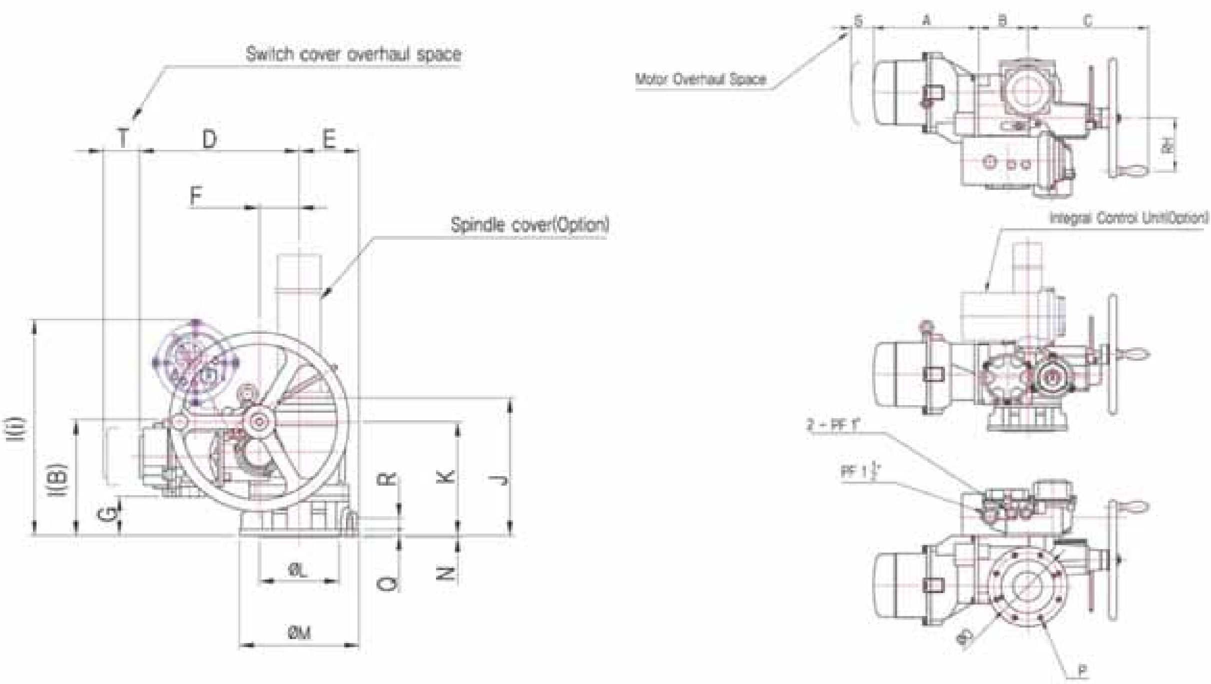
Allowable torque		Allowable thrust		Allowable stem dia. mm		Handwheel ratio/dia. mm	Flange dia. ISO No. Tap PCD/size Pilot dia. mm	Weight motor included control unit excluded thrust unitexcluded Kg
kgf · m	Nm	ton	kN	key	threaded			
400	3920	40	392	100	115	up to 30.4rpm 299.2:1/450 over 40.5rpm 148.8:1/450	350 F30 298/8xM20 230	290 305 320 365 (365)
800	7840	68	665	140	160	up to 30.4rpm 394:1/550 over 40.5rpm 201.2:1/550	415 F35 356/8xM30 260	500 510 550 550
1600	15680	122	1195	155	180	up to 30.4rpm 478.8:1/650 over 40.5rpm 338.:8:1/650	475 F40 406/8xM36 300	950 950 990 990

Dimensional Data

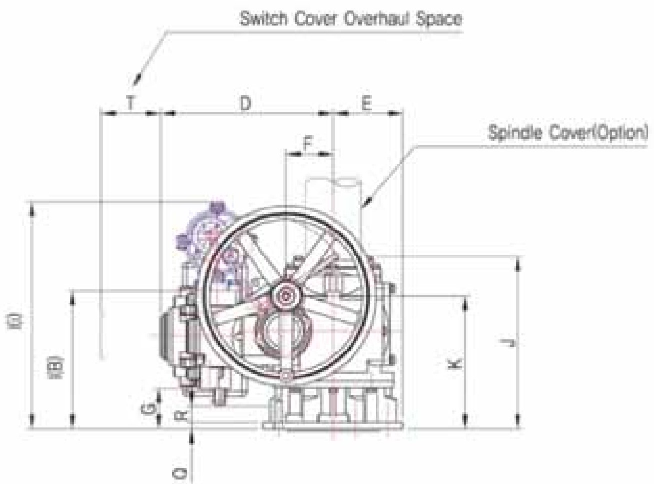
TM-01 / TM-04 / TM-07

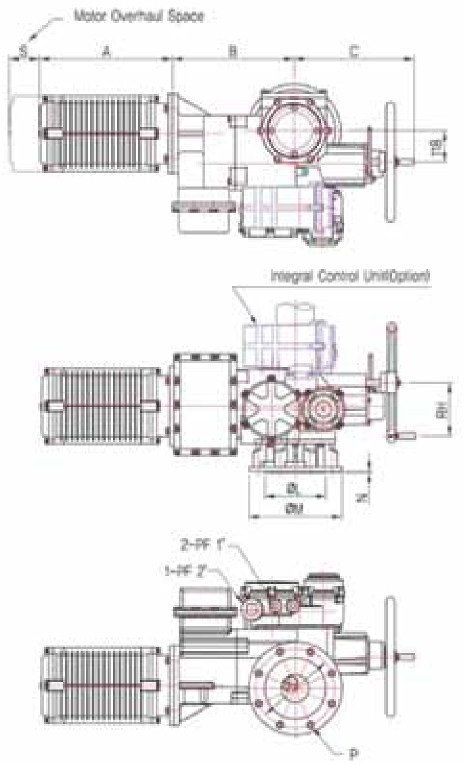


TM-1



TM-3 / TM-6 / TM-12





Unit : mm

Model	A	B	C	D	E	F	G	H	I(i)	I(B)	J	K
TM-01	232	135	290	324	83	41	19	70	433	235	235	181
TM-04	295	140	341	352	88	58	45	110	459	260	282	219
TM-07	322	155	396	380	125	69	73	157	511	288	330	258
TM-1	400	185	453	401	150	100	98	200	542	313	345	285
TM-3	500	456	452	432	175	118	104	200	572	373	422	333
TM-6	521	540	593	519	219	178	182	250	725	450	573	335
TM-12	521	645	594	611	265	228	260	315	765	528	723	577

※ Dimension “A” is Subject to Change

※ I(B) and I(i) mean Basic and Integral type

Model	L	M	N	O	P	Q	R	ISO NO.	S	T
TM-01	70	125	3	102	4-M10	10	20	F10	40	90
TM-04	100	175	4	140	4-M16	10	28	F14	75	90
TM-07	130	210	5	165	4-M20	15	30	F16	85	90
TM-1	200	300	5	254	8-M16	15	28	F25	85	90
TM-3	230	350	5	298	8-M20	17	40	F30	115	100
TM-6	260	415	5	356	8-M30	20	40	F35	115	100
TM-12	300	475	8	406	8-M36	24	46	F40	115	100

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, Integral case common case, terminal/switch cover	Al, alloy die casting	D6006/H5302	B-85
Trust unit	Ductile cast iron	D4302/G5502	A536
Stem bush	Copper alloy	D5101/H3250	B-133
Worm	Chromium molybdenum	D3711/G4105	A-148
Worm wheel	High strength Brass casting	D6007/H5102	B-584
Grease	Lithium grease	M2130/K2220	ISO, LXBCA (MULIS)

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 certfied 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.


DET NORSKE VERITAS
MANAGEMENT SYSTEM CERTIFICATE

Enertork Ltd.

Design and Manufacture of Electric Actuator

Automatic warehouse

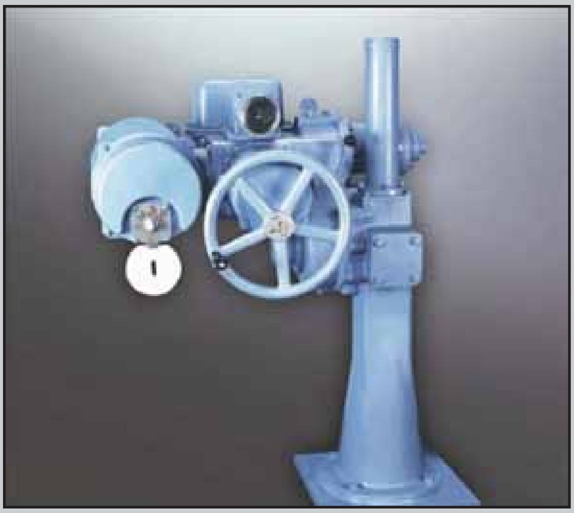
Final test

Quality Control

Machining

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

Gear Reducer
Worm, Bevel 51 ~ 30,600kgf · 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)

บริษัท ไฮ ควอลิตี้ อินดัสเทรียล โปรดักส์ จำกัด
HIGH QUALITY INDUSTRIAL PRODUCTS CO., LTD.
43/160-161, Soi lardphrao 80, lardphrao rd., Wangthonglang, Bangkok, 10310, Thailand.
Tel: 66-2-932-6975-6, 66-2-935-5078 Fax: 66-2-935-5079
Email: hqipcom@yahoo.co.th
www.hqip.net

The design of our product is subject to change without notice for improvement. Publication No. CAT-08-002 REV2. 2011.07