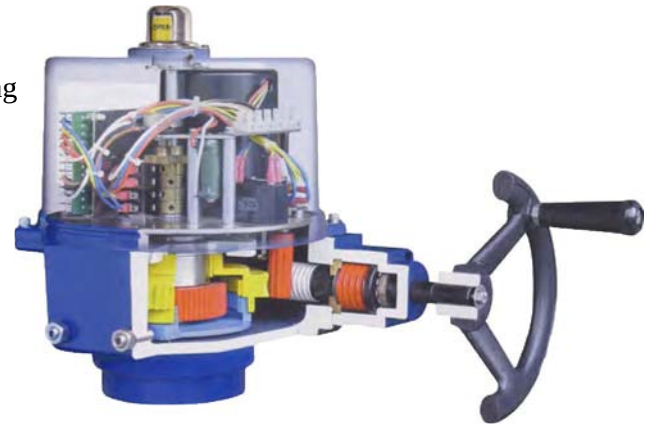
ELECTRIC ACTUATOR

SPECIFICATION

Enclosure : Weather proof enclosure IP67
Main Power Supply : 110/220V AC 1Ph, 380/440V AC 3Ph 50/60Hz, ± 10%
Control power supply : 110/220V AC 1Ph 50/60Hz, ± 10%
Moter : Squirrel caged induction motor
Limit switches : OPEN/CLOSE, SPDT, 250V AC 10A Rating
Torque switches : OPEN/CLOSE, SPDT, 250V AC 10A Rating
Stall protection (Temp.) : Built in thermal protection
Travel angle : 90° ±5° (0° ~ 100°)
Position indicator : Plate with indication arrow
Manual override : De - clutchable
Self locking : Provided by double worm gearing
Mechanical stopper : 1 each for each travel end (OPEN and CLOSE), external adjustable
Heater : Anti - condensation
Current position transmitter : 4 - 20 mA
Lubrication : EP Type grease
Ambient temperature : -30 °C~+ 65 °C (Except for optional electronic board)
Ambient humidity : 30% ~ 95% (Non-condensate)
External coating : Dry powder (Polyester)



OPTION REQUIREMENT

- Space heater.
- Additional limit switches (2 units).
- Potentiometer unit (1K ohm or 5K Ohm).
- Local control unit(local/remote, on/off).
- Conduit entrance(1/2" PS, 3/4" PF, 1/2" NPT).
- Torque switches (2 units).
- Current position transmitter(output 4-20mA).
- Modulating controller.
- Various voltages.
- Nylon enclosure material.

PERFORMANCE

Model No.	Power (Watts)	Max Torque (Nm)	Speed (Sec/90)	Weight (kg)	Manual Override	Mounting Flange (ISO 5211)
BM-2	40W	120	8	4.5	N/A	F07
OM-A	10W	50	20	3.0	N/A	F07
OM-A-M	10W	50	20	3.0	Lever	F07
OM-1	10W	35	12	2.0	Lever	F05/F03
OM-2	40W	90	15	11.0	Hand-wheel	F07
OM-3	40W	150	22	11.0	Hand-wheel	F07
OM-4	120W	400	16	22.0	Hand-wheel	F10
OM-5	120W	500	22	22.0	Hand-wheel	F10
OM-6	120W	650	28	22.0	Hand-wheel	F10
OM-7	180W	1000	46	36.0	Hand-wheel	F14/F12
OM-8	220W	1500	46	36.0	Hand-wheel	F14/F12
OM-9	180W	2000	58	56.0	Hand-wheel	F16
OM-10	220W	2500	58	56.0	Hand-wheel	F16
OM-11	250W	3000	58	56.0	Hand-wheel	F16
OM-12	300W	3500	58	56.0	Hand-wheel	F16

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ELECTRIC ACTUATOR

FEATURES & STRUCTURE

General

ARITA series actuator is designed for the 90 degree turn application such as damper, ball, plug, butterfly valve and other equipment.

Wide range of touque

Min. 120Nm to Max 3500Nm. In between there are 15 models and cater for various touque depending on application.

Material

Material is hard-anodized AL alloy and external coating of epoxy powder is suitable for the severe condition especially against the corrosion. Housing is designed in accordance with standard of ex-proof and IP67.

Sealing

Sealing provided by double O-ring system

Enclosure:

IP 67: Waterproof and dust-proof enclosures.
NEMA 4X: Waterproof and dust-proof enclosures.
Material: Dry powder coating aluminum alloy.

Position Indicator:

All models have continuous mechanism position indicator on the top of actuator cover.

Potentiometer (optional)

Is available on request, is to provide & tranmit remote indication of valve position.

Terminal Connection & Wiring

Terminal connection are of "WAGO" push on type, making wiring connection very easy & without fuss. Electrical wiring circuit is standardised for single & three phase voltage. Addition termination is available on request.

Visual Position Indicator

The visual position indicator is direcly mounted onto the centre drive columm, to provide true visual position of the valve.

Motor

Standard extended duty cycle induction motor. H insulation class for OM-1 and OM-A; F class for BM-2, and OM-2 to OM-12.
Built-in thermal protection (135 ℃) prevents motor burning out.
Squirrel cage motor is of encapsulated type. on high stall torque and low inherent force for seating & unseating of valves. All motors are integrated with build-in thermal protection.

Heater

For prevention of condensation due to weather & temperature changes, and also keeps internal components clean & dry, a 20 watt space heater is provided inside all the electric actuators.

Enclosure

Standard enclosure to water jet proof & water tight proof IP 67, NEMA 4 & 6. Explosion proof version is available on request.

Handwheel

Correct size of handwheel on the electric actuator ensure adequate strength for safe and efficient emergency operation.

Manual Over - Ride

Engage by pulling the lever & turning the handwheel. Lever is auto declutch when power supply is switch on, and handwheel does not trun as extra safety feature.

Mounting & Adaptation

Non-clutch design, the manual operation can be operated without any lever, clutch or brake upon power outage.
When electric motor is operating, manual hand-wheel won't rotate for person safe purpose.
Bottom flange mounting dimension conform to ISO 5211. A adaptor drive bushing is provided for every electric actuator, is removable and for machining to suite valve stem size.

Self Locking Mechanism

Because of the worm gear design system, all the electric actuators are self locking.

Limit Switches

A pair of limit switches is activated by means of simple, reliable & adjustable cam plates, mounted directly onto, and driven by centre column. The unique cam.

Torque Switches

Electric actuators on 100 Nm and above, are installed with torque switches for over-load protection.

Gear Train:

High alloy steel gear trains provide self-locking function to avoid valve back drive.
Gear trains have been already lubricated sufficiently with anti-high temperature lubricant at the factory.

Working Conditions:

Ambient temperature:-30 ℃ ~ +65 ℃.
The humidity: 30% ~ 95%.

Certificates:

ISO 9001., CE., CSA. (Conforming to the test standard of outdoor usage.)

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ELECTRIC ACTUATOR

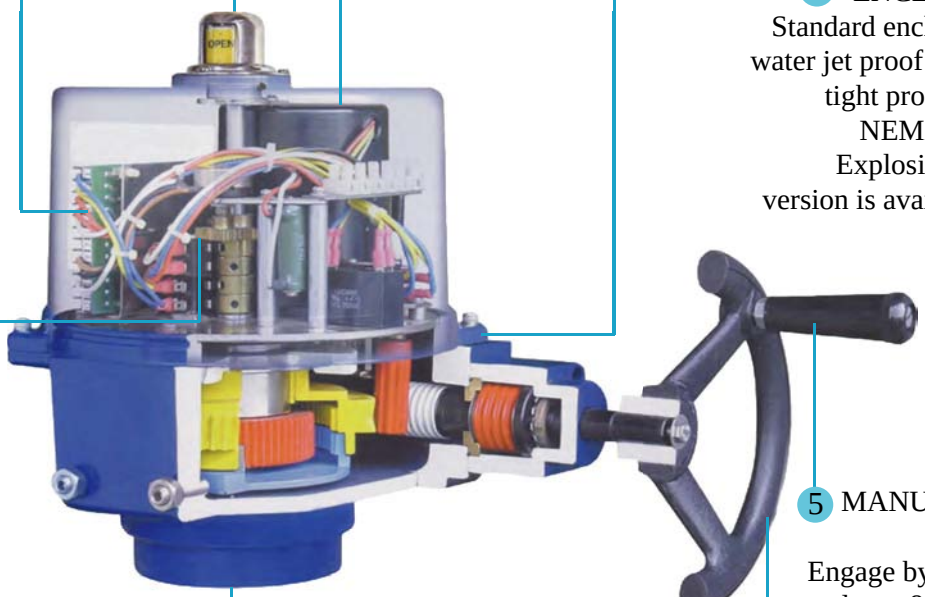
RECOMMEND

1 TERMINAL CONNECTION & WIRING
Terminal connection are of "WAGO" push on type, making wiring connection very easy & without fuss. Electrical wiring circuit is standardised for single & three phase voltage. Addition termination is available on request.

2 VISUAL POSITION INDICATOR
The visual position indicator is direcly mounted onto the centre drive columm, to provide true visual position of the valve

3 MOTOR
Squirrel cage motor is of encapsulated type. on high stall torque and low inherent force for seating & unseating of valves. All motors are integrated with build-in thermal protection

4 ENCLOSURE
Standard enclosure to water jet proof & water tight proof IP 67, NEMA 4 & 6. Explosion proof version is available on request



5 MANUAL OVER-RIDE
Engage by pulling the lever & turning the handwheel. Lever is auto declutch when power supply is switch on, and handwheel does not trun as extra safety feature.

6 HANDWHEEL
Correct size of handwheel on the electric actuator ensure adequate strength for safe and efficient emergency operation.

7 MOUNTING & ADAPTATION
Bottom flange mounting dimension conform to ISO 5211. A adaptor drive bushing is provided for every electric actuator, is removable and for machining to suite valve stem size.

8 LIMIT SWITCHES
A pair of limit switches is activated by means of simple, reliable & adjustable cam plates, mounted directly onto, and driven by centre column. The unique cam

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ELECTRIC ACTUATOR

PERFORMANCE

(12V/24V)

Model No.	Max Torque (Nm)	Speed (90°)	Motor Power	Motor Speed		12V DC/AC			24V DC/AC		
				12V	24V	Run	Start	Lock	Run	Start	Lock
OM-A	50	20 s	10W	3600/min	3600/min	0.5A	3.0A	3.0A	0.7A	0.8A	1.4A
OM-1	35	15 s	10W	3600/min	3600/min	0.5A	3.0A	3.0A	0.6A	0.8A	1.4A
OM-2	90	15 s	70W	1800/min	1800/min	3.4A	5.0A	8.5A	3.0A	5.0A	13.0A
OM-3	150	22 s	70W	1800/min	1800/min	3.4A	5.0A	8.5A	3.0A	5.0A	13.0A
OM-4	400	16 s	180W	1800/min	1800/min	12.0A	8.5A	30.0A	6.0A	8.0A	30.0A
OM-5	500	22 s	180W	1800/min	1800/min	13.0A	8.5A	30.0A	6.5A	8.0A	30.0A
OM-6	650	28 s	180W	1800/min	1800/min	14.0A	8.5A	30.0A	7.5A	8.0A	30.0A
OM-7	1000	46 s	220W		1800/min				7.0A	8.0A	30.0A
OM-8	1500	46 s	220W		1800/min				7.5A	8.0A	30.0A
OM-9	2000	58 s	220W		1800/min				7.0A	8.0A	30.0A
OM-10	2500	58 s	220W		1800/min				7.5A	8.0A	30.0A
OM-11	3000	58 s	250W		1800/min				10.0A	10.0A	26.0A
OM-12	3500	58 s	300W		1800/min				15.0A	15.0A	26.0A

* Please note BM-2 can't install 12V / 24V.
* Run-operating : START-start to operate : LOCK-When you input the power supply to the actuator, the actuator can't operate.

(Three-Phase)

Model No.	Max Torque (Nm)	Speed (90°)		Motor Power	Motor Speed		220V Current			380V Current			440V Current		
		60Hz.	50Hz.		60Hz.	50Hz.	Run	Start	Lock	Run	Start	Lock	Run	Start	Lock
BM-2	120	8 s	10 s	40W	1720/min	1450/min	0.6A	1.8A	1.1A	0.3A	1.0A	0.7A	0.4A	1.3A	0.7A
OM-2	90	15 s	17 s	40W	1720/min	1450/min	0.6A	1.8A	1.1A	0.3A	1.0A	0.7A	0.4A	1.3A	0.7A
OM-3	150	22 s	26 s	40W	1720/min	1450/min	0.6A	1.8A	1.1A	0.3A	1.0A	0.7A	0.4A	1.3A	0.7A
OM-4	400	16 s	18 s	120W	1720/min	1450/min	1.0A	3.0A	3.5A	0.7A	2.2A	2.0A	0.8A	2.5A	2.0A
OM-5	500	22 s	25 s	120W	1720/min	1450/min	1.0A	3.0A	3.5A	0.7A	2.2A	2.0A	0.8A	2.5A	2.0A
OM-6	650	28 s	31 s	120W	1720/min	1450/min	1.0A	3.0A	3.5A	0.7A	2.2A	2.0A	0.8A	2.5A	2.0A
OM-7	1000	46 s	55 s	180W	1720/min	1450/min	0.6A	0.8A	1.8A	0.4A	0.6A	1.0A	0.4A	0.6A	1.0A
OM-8	1500	46 s	55 s	220W	1720/min	1450/min	0.8A	1.0A	2.8A	0.6A	0.8A	1.6A	0.6A	0.8A	1.2A
OM-9	2000	58 s	70 s	180W	1720/min	1450/min	0.4A	0.6A	2.0A	0.4A	0.6A	1.0A	0.4A	0.6A	1.0A
OM-10	2500	58 s	70 s	220W	1720/min	1450/min	0.8A	1.0A	1.5A	0.4A	0.6A	1.0A	0.4A	0.6A	1.0A
OM-11	3000	58 s	70 s	250W	1720/min	1450/min	1.2A	1.2A	3.0A	0.6A	0.8A	1.5A	0.6A	0.8A	1.5A
OM-12	3500	58 s	70 s	300W	1720/min	1450/min	1.2A	1.4A	2.5A	0.6A	0.8A	1.5A	0.6A	0.8A	1.5A

* Please note OM-A & OM-1 can't install three-phase.

(Single-Phase)

Model No.	Max Torque (Nm)	Speed (90°)		Motor Power	Motor Speed		110V Current			220V-240V Current		
		60Hz.	50Hz.		60Hz.	50Hz.	Run	Start	Lock	Run	Start	Lock
BM-2	120	8 s	10 s	40W	1720/min	1450/min	1.3A	3.0A	1.8A	0.5A	1.5A	0.9A
OM-A	50	20 s	24 s	10W	3600/min	3000/min	0.5A	1.5A	0.6A	0.3A	1.0A	0.5A
OM-1	35	15 s	13 s	10W	3600/min	3000/min	0.5A	1.5A	0.6A	0.3A	1.0A	0.5A
OM-2	90	15 s	17 s	40W	1720/min	1450/min	1.0A	3.0A	1.8A	0.5A	1.5A	0.9A
OM-3	150	22 s	26 s	40W	1720/min	1450/min	1.0A	3.0A	1.8A	0.5A	1.5A	0.9A
OM-4	400	16 s	18 s	120W	1720/min	1420/min	1.3A	3.1A	3.6A	0.6A	1.5A	1.8A
OM-5	500	22 s	25 s	120W	1720/min	1450/min	1.5A	3.0A	3.6A	0.7A	1.5A	1.8A
OM-6	650	28 s	31 s	120W	1720/min	1450/min	1.8A	3.0A	3.6A	0.8A	1.5A	1.8A
OM-7	1000	46 s	55 s	180W	1720/min	1450/min	3.2A	12.0A	10.0A	1.6A	4.0A	4.0A
OM-8	1500	46 s	55 s	220W	1720/min	1450/min	4.0A	14.0A	10.0A	2.0A	3.6A	5.0A
OM-9	2000	58 s	70 s	180W	1720/min	1450/min	3.2A	12.0A	6.0A	1.6A	5.0A	4.0A
OM-10	2500	58 s	70 s	220W	1720/min	1450/min	4.0A	12.0A	6.0A	2.0A	4.0A	3.0A
OM-11	3000	58 s	70 s	250W	1720/min	1450/min	3.0A	10.0A	5.0A	1.6A	4.0A	3.0A
OM-12	3500	58 s	70 s	300W	1720/min	1420/min	4.0A	14.0A	5.0A	2.2A	4.0A	3.0A

SUPPLIED VOLTAGE : 24V DC/AC, 110/220V AC 1-PH.
WORKING TEMPERATURE : 10°C ~ +60°C.
THE PROCEDURE FOR ADJUSTING VR1 & VR2.

When you need to adjust the signal of modulation board, please adjust the VR1 & VR2 :
VR2 adjusts 4mA, 2V, 1V (Fully-closed).
VR1 adjusts 20mA, 10V 5V (Fully-open).

1. Please turn the VR2 to the end by clockwise direction and input 4mA to modulation board. Then please slightly turn the VR2 by counter-clockwise direction about 3~6 times until the RED light keep ON.
2. Please turn the VR1 to the end by counter-clock wise dercetion and input 20mA to modulating board. Then please slightly turn the VR1 by clockwise direction about 3~6 times until the GREEN light keeps ON.

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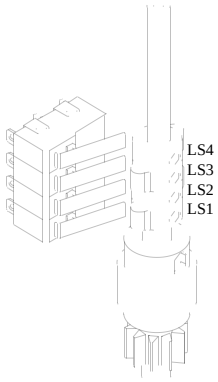
TRAVEL CAM & LIMIT SWITCHES ADJUSTMENT

The travel cams are set to control the open and closed position of the valve. The position is set to stop the travel of the actuator when the travel cams activate the limit switch.

Standard is two limit switches, one for open, one for closed. The bottom limit switch is normally the open position (full CCW); the top limit switch is normally the closed position (full CW). 2-Auxiliary switches are available and are set independent of the two primary control limit switches.

The travel cams can be adjusted by 2.5 mm Hex. Spanner.

Adjust Travel Cam (OM-A)



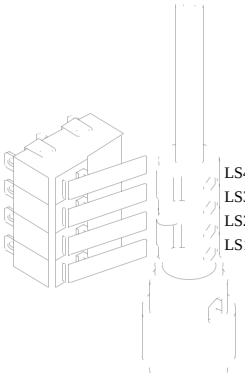
LS4 "LS4" Synchronous turn with LS2(Option)

LS3 "LS3" Synchronous turn with LS1(Option)

LS2 "CLOSE"
- Clockwise: increase closed degree to fully close.
- Counter-clockwise: decrease closed degree.

LS1 "OPEN"
- Clockwise: decrease opening degree.
- Counter-clockwise: increase opening degree to fully open.

Adjust Travel Cam (OM-1)



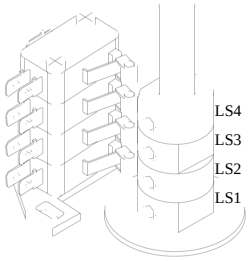
LS4 "LS4" Synchronous turn with LS2(Option)

LS3 "LS3" Synchronous turn with LS1(Option)

LS2 "CLOSE"
- Clockwise: decrease closed degree.
- Counter-clockwise: increase closed degree to fully close.

LS1 "OPEN"
- Clockwise: increase opening degree to fully open
- Counter-clockwise: decrease opening degree.

Adjust Travel Cam (BM-2) (OM-2~12)



LS4 "LS4" Synchronous turn with LS2(Option)

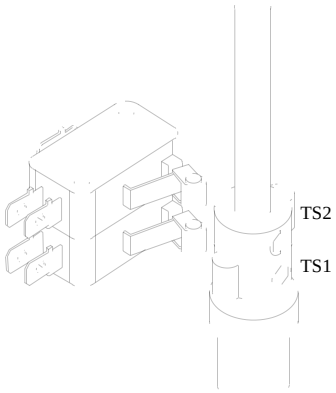
LS3 "LS3" Synchronous turn with LS1(Option)

LS2 "CLOSE"
- Clockwise: decrease closed degree.
- Counter-clockwise: increase closed degree to fully close.

LS1 "OPEN"
- Clockwise: increase opening degree to fully open
- Counter-clockwise: decrease opening degree.

TRAVEL CAM & TORQUE SWITCHES ADJUSTMENT

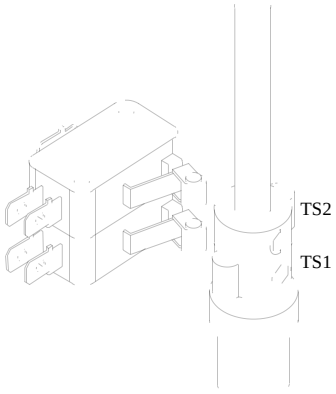
Adjust Travel Cam (OM-2~OM-8)



TS2 "CLOSE"
- Counter-clockwise: Decrease the degree of torque setting.
- Clockwise: Increase the degree of torque setting.

TS1 "OPEN"
- Counter-clockwise: Decrease the degree of torque setting.
- Clockwise: Increase the degree of torque setting

Adjust Travel Cam (OM-9~OM-12)

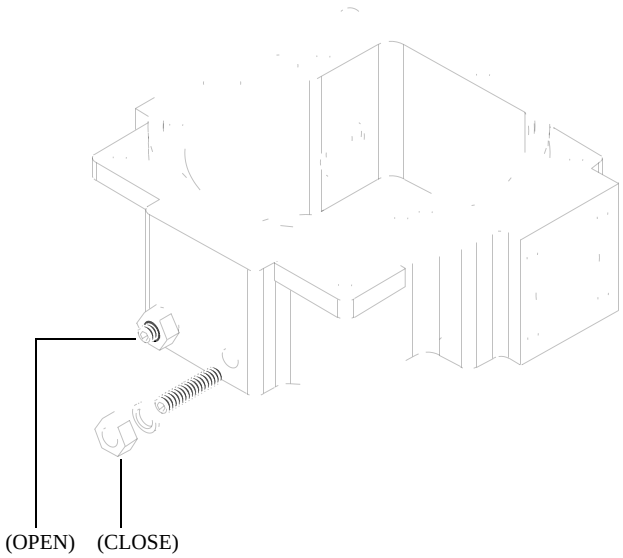


TS2 "CLOSE"
- Counter-clockwise: Increase the degree of torque setting.
- Clockwise: Decrease the degree of torque setting.

TS1 "OPEN"
- Clockwise: Increase the degree of torque setting.
- Counter-clockwise: Decrease the degree of torque setting

(1) For Electric Operation
Please refer to "Travel Cam & Limit Switches Adjustment".

(2) For Manual Operation
1. To loosen the screws.
2. To adjust limit switches & travel cams.
3. To adjust the screws.



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ELECTRIC ACTUATOR

POTENTIOMETER

Potentiometers turn with transmission shafts, and can provide a feedback signal for position indication.

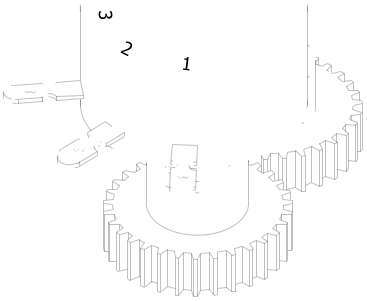
Potentiometer points 1,2,3 are wired to terminal blocks 5,6,7.

When a valve is closed: 5,6 → 1K Ohm.
6,7 → 0K Ohm.
When a valve is opened: 5,6 → 0K Ohm.
6,7 → 1K Ohm.

For modulating controllers, potentiometer points 1,2,3 are wired to terminal blocks 8,9,10.

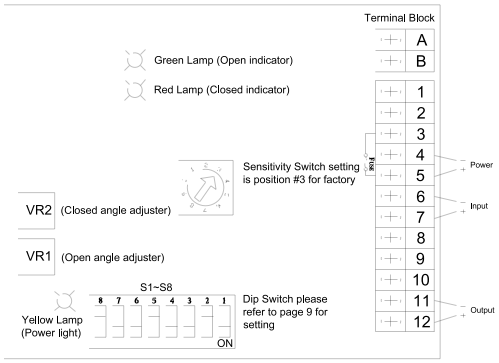
When a valve is closed: 8,9 → 5K Ohm.
9,10 → 0K Ohm.
When a valve is opened: 8,9 → 0K Ohm.
9,10 → 5K Ohm.

* Remark: OM-A is opposite. (i.e. 1,2,3 wired to 7,6,5: 1,2,3 wired to 10,9,8)

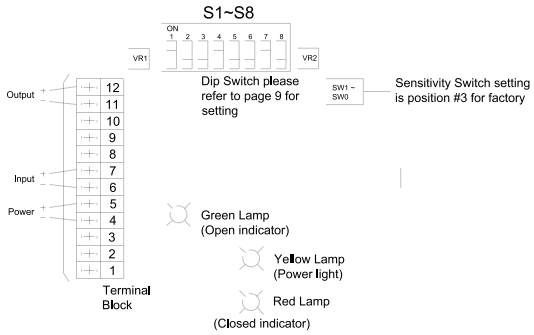


MODULATING CONTROL BOARD : Interface

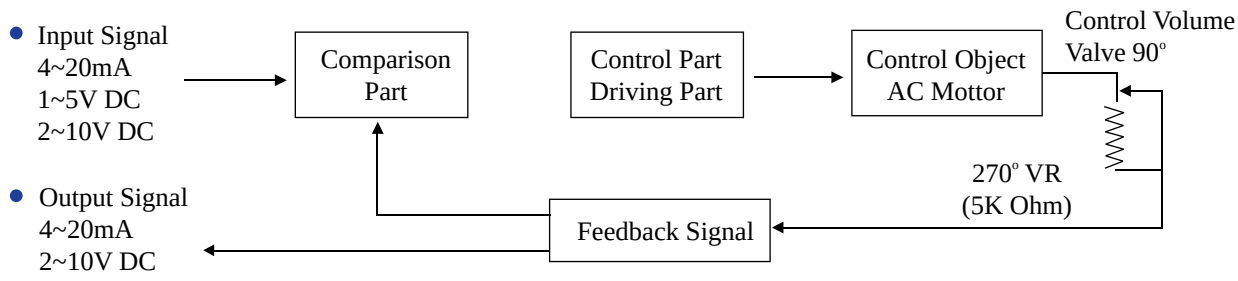
Modulating Control Board for



Modulating Control Board for



MODULATING CONTROL BOARD



Attention: TURN POWER OFF BEFORE CHANGING THE FOLLOWING SETTINGS:

S1,2: INPUT SIGNAL SELECT "4~20mA" set 1-ON/2-OFF.
"1~5V" set 1-OFF/2-OFF.
"2~10V" set 1-OFF/2-ON.

S3,4,5: OUTPUT SIGNAL SELECT "2~10V" set 3-ON/4-OFF/5-ON.
"4~20mA" set 3-OFF/4-ON/5-OFF.

S6: Valve is fully-open when the input signal is 4mA, 2V or 1V and valve is fully-closed when the input signal is 20mA, 10V or 5V, set 6-ON.

S7,8: POSITION SELECT (When the feedback signal fails) 'valve fully-closed' set 7-ON/8-OFF 'valve fully-open' set 7-OFF/8-ON : "valve stops" set 7-ON/8-ON.

SW1~0: Sensitivity switch:-

When switch to '10' : Highest Gensitive and the 0~9 degree can be divided up to around 80 time movement.
When switch to '0' : Lowest Sensitive and the 0~9 degree can be divided up to around 17 times movement.
The sensitivity decreases 7 times movement by sectors from SW1 to SW2 to SW3 to SW4 andt so on

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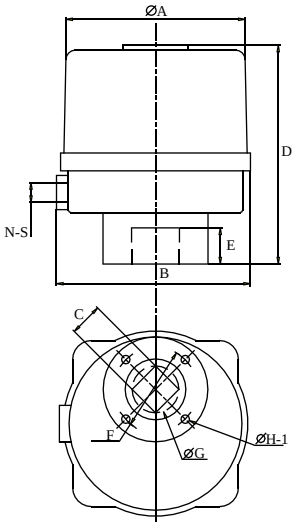
DIMENSIONS

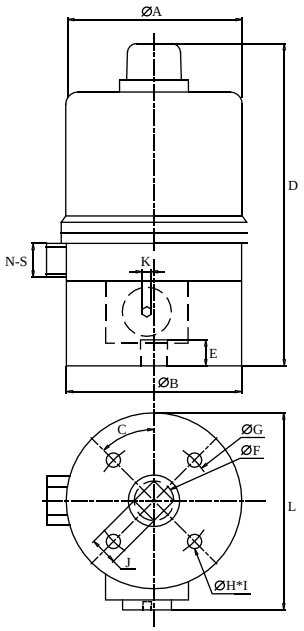
Quarter-turn Electric Actuator



- Plastic cover. No manual overide.
  No mechanical stops. No certificates.

Unit:mm

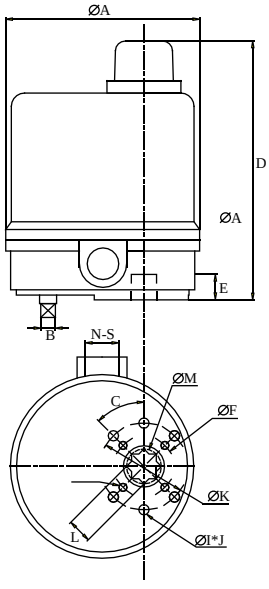
Dimension Model No.	A	B	C max	D	E	F	G	H	I	N	S	Flange Type
BM-2	154	160	22	192	30	70	30.1	m8	4	1	1/2 PS	F07



- With modulating card D=233

Unit:mm

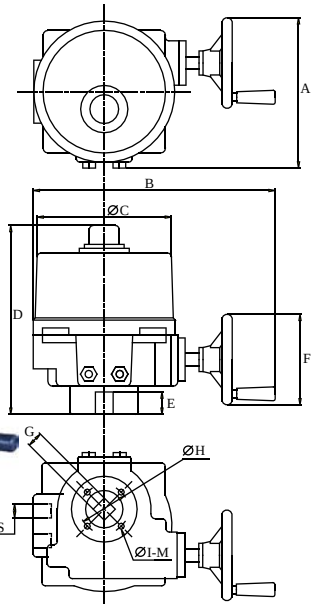
Dimension Model No.	A	B	C	D	E	F	G	H	I	J max	K	L	N	S	Flange Type
OM-A	114	106	45°	203	16	24	70	m8	4	17			1	1/2 PS	F07
OM-A-M	114	106	45°	203	16	24	70	m8	4	17	5	121	1	1/2 PS	F07



- Option: (1)L=11,M=15 (2)L=9,M=12
- With modulating card D=185
- No mechanical stops.

Unit:mm

Dimension Model No.	A	B	C	D	E	F	G	H	I	J	K	L max	M	N	S	Flange Type
OM-1	114	8	45°	155	15	36	m5	4	m6	6	50	14	19	1	1/2 PS	F03/ F05



- With DC motor D=289
  (apply to DC model or 75% duty cycle)

Unit:mm

Dimension Model No.	A	B	C	D	E	F	G max	H	I	M	N	S	Flange Type
OM-2~OM-3	203	326	180	255	30	123	22	70	m8	4	2	1/2 PS	F07

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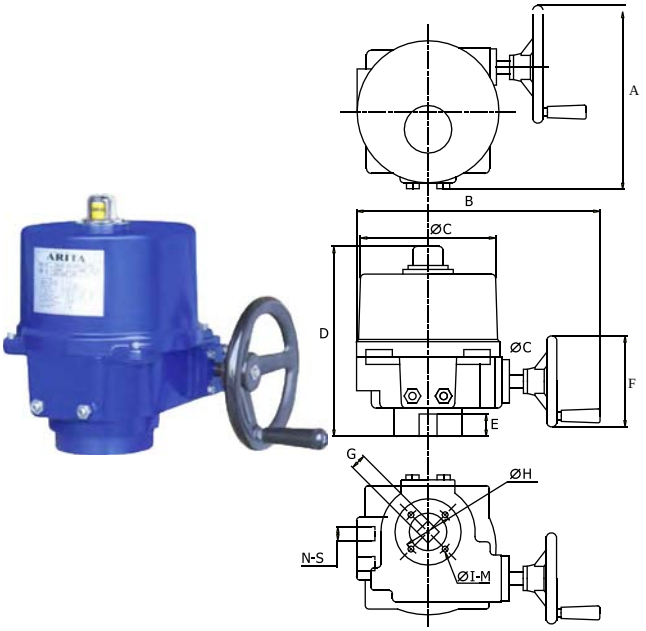
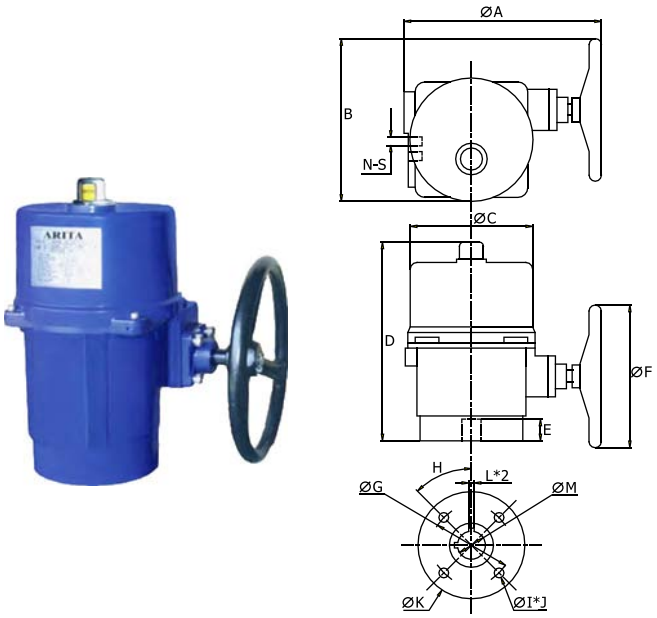
DIMENSIONS

Quarter-turn Electric Actuator





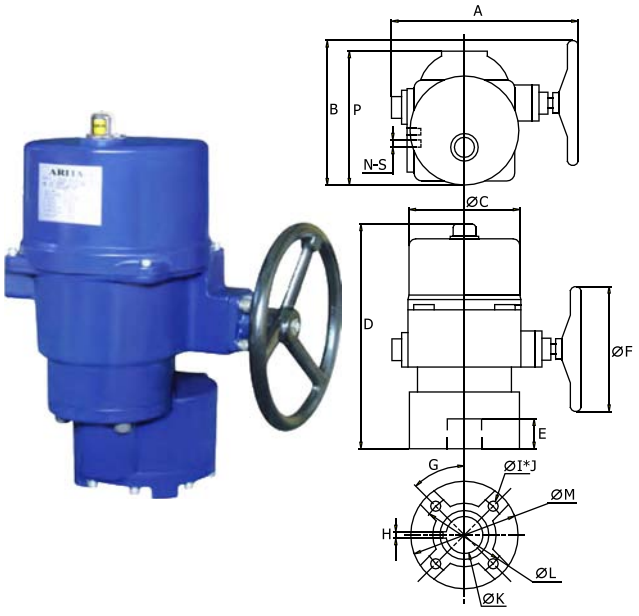
Unit:mm

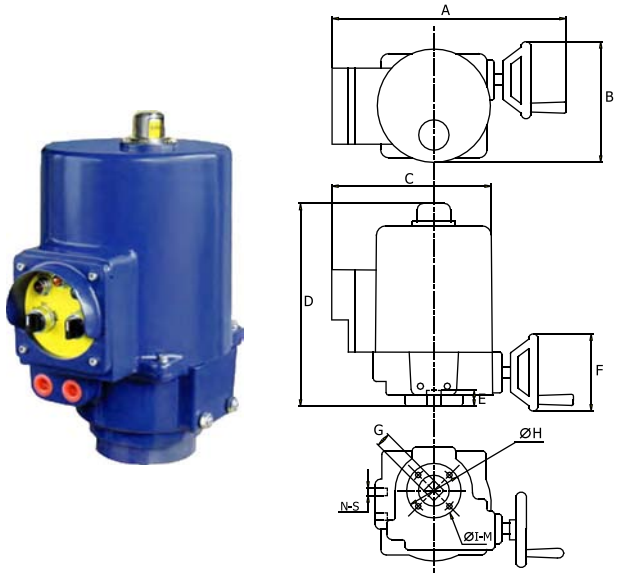
Dimension Model No.	A	B	C	D	E	F	G max	H	I	M	N	S	Flange Type
OM-4~OM-6	290	394	217	317	40	194	35	102	m10	4	2	1/2 PS	F10

Note: Without torque switch A=385

Unit:mm

Dimension Model No.	A	B	C	D	E	F	G	H	I	J	K	L*2	M max	N	S	Flange Type
OM-7~OM-8	450	340	234	420	60	295	140	45°	m12	4	180	10	35	2	1/2 PS	F12
OM-7~OM-8	450	340	234	420	60	295	140	45°	m12	4	180	10	35	2	1/2 PS	F14





Unit:mm

Dimension Model No.	A	B	C	D	E	F	G	H	I	J	K	L	P	M	N	S	Flange Type
OM-9~OM-12	470	350	260	590	100	395	45°	12	m20	4	75	165	221	360	2	1/2 PS	F16

Unit:mm

Dimension Model No.	A	B	C	D	E	F	G max	H	I	M	N	S	Flange Type
OM-2~OM-3	405	205	275	350	30	125	22	70	4	m8	2	1/2 PS	F07
OM-4~OM-6	455	305	310	410	40	195	35	102	4	m10	2	1/2 PS	F10

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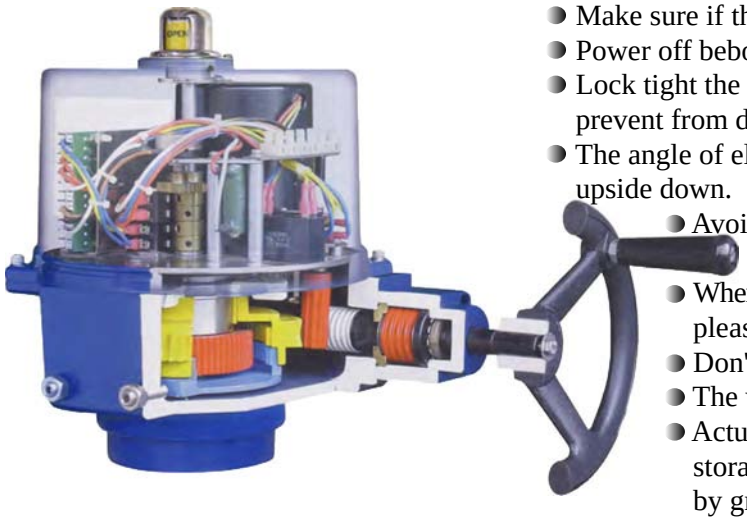
ELECTRIC ACTUATOR

IMPORTANT NOTICES & MAINTENANCE



- Make sure if the voltage is correct before wiring.
- Power off bebore distribution or for maintenance purpose.
- Lock tight the casting and conduit entrance after power distribution to prevent from dusting or water spoiling.
- The angle of electric actuators must not be below the horizon or stands upside down.
- Avoid the zone of gas or any chemical agent that might be explosive.
- When electric actuators need two sets of unit for simultaneously, please connect with the individual cable.
- Don't install in the complete vacuum space directly.
- The warranty period of our products is one year.
- Actuators should be placed at clean and dry place for storage, and protectedwith outer carton from being affected by great temperature difference or serious vibration.

TROUBLE SHOOTING

Conditions	Possibilities	Solutions
Motor does not operate	1. Is the supplied power and voltage corredt? 2. Any blisters on the capacitor? 3. Are the gear trains free?	1. Checking by meter. 2. If so replace. 3. Remove motor to check.
Motor stops running	1. Is power supply short circuited? 2. Any foreign objects in flow stream?	1. Check wiring. 2. Check for obstructions.
Unable to fully open/close	1. Loose/Misaligned cam? 2. Bent valve stem? 3. Mechanical stop adjustment incorrect?	1. Adjust/Tighten using spanner. 2. Replace valve stem. 3. Check position of stops.
Valve stops operating when motor is running.	1. Gear worn out? 2. Sleeve adapter worn out or broken? 3. Broken valve stem or actuator transmission shaft?	1. Replace gear. 2. Replace sleeve adapter. 3. Replace valve stem or actuator transmission shaft.
Abnormal control for operating two or more actuators simultaneously.	1. Controlling circuit connects in tandem or parallel?	1. Please refer to the wiring diagram.
Motor overheats.	1. Is the voltage correct? 2. Is valve too tight to operate? 3. High working frequency? 4. Is motor stem or bearing binding?	1. Checking by meter. 2. Replace valve. 3. Check duty cycle. 4. Replace the binding parts.
abnormal on/off angle on 3-phase voltage. Occasional on/off actuator failure. Vibration when valve is closed.	1. Wrong phase wiring? 1. Simultaneous input power on/off. 1. Motor brake spring fatigued or Teflon worn?	1. Change phase wiring. 1. Check if the selection switch is normal. 1. Replace spring or Teflon.

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