

Submersible Electric Actuator Series



Here at Indelac Controls, we strive towards innovation and encourage new ideas so we can continue to offer reliable actuator products to fit the electric actuator needs of our customers and the market. In this effort, Indelac has designed a submersible enclosure option compatible with our popular M Series and SNS4-15 Series Electric Actuators. The M Series electric actuator is ideal for valve automation with a standard ISO mounting configuration, output torque options up to 1500in-lbs, 5 motor voltage options, open/closed or modulating control options,

and an optional integrated battery backup system for fail-safe operation (*SNS-Series Only*).

The project began when one of ICI's customer's (a large US automotive manufacturer) wanted to reduce their impact on the environment by incorporating green/eco-friendly designs into their facilities. One of their building projects set out to utilize rainwater collection to satisfy a factory's non-potable water requirements by using the rainwater collected from the factory roof to accomplish tasks like flushing toilets. When the auto manufacturer approached Indelac, they were looking for a way to automate the flow of water for their rainwater collection and storage system for their manufacturing facility with a submersible electric actuator.

At that time Indelac did not have a submersible actuator solution but had NEMA 4 & 4X enclosures that could be easily modified for the job. The Indelac team went to work! After reviewing the application requirements and specifications with our client ICI agreed to take on the challenge. Our design engineers set out to develop and test a submersible enclosure to help our client achieve their green initiatives using Indelac electric actuators. Keep reading below for a summary of the test performed here at Indelac Controls.

Electric Actuator Submerged in a 6-foot Column of Water.

Testing started in August of 2013 at ICI's production facility. A sample electric actuator constructed inside the newly developed enclosure designed to meet NEMA 6P specifications was immersed in a 2-meter column of water made of 2 steel drum barrels welded together.

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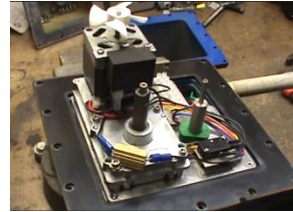
The actuator was equipped with a timer to automatically actuate the submersible electric actuator every 90 seconds, 24 hours a day, 7 days a week. After several months under water, the column of water even began to freeze and thaw over the winter! No problem for the Indelac electric actuator. Under the ice and water, in below freezing temperatures the actuator was functioning normally, reaching an outstanding 100,001 cycles in December 2013.

Breaking the Ice & Inspection of the Actuator

Once 100,000+ cycles were reached it was time to break through the ice and evaluate the electric actuator, as can be seen on this next picture below:



The electric actuator was disconnected from the power and taken inside the factory where the cover was removed. Upon cover removal and inspection there were no signs of water ingress or corrosion present.



Next, the technician reconnected the power supply to the electric actuator at the bench. Once connected, the power was turned back on, and the unit was cycled open and close successfully.

After several months immersed under 6 feet of water, the actuator didn't miss a beat and functioned perfectly, was corrosion free with exception of the rust from the inside of the steel drums on the exterior of the enclosure.

Each submersible electric actuator is equipped with a heater as standard equipment, however, the heater inside the actuator was not wired during this experiment.

Click Below to Watch: Submersible Electric Actuator Test



[CLICK TO WATCH - NEMA 6P Electric Actuator Test Video](#)

Additional Resources:

NEMA 6/6P & IP68 Enclosure Ratings

Below are some tables detailing the level of protection that NEMA 6/6P offers compare to other NEMA ratings. As can be seen, a NEMA 6P electric actuator can be used not only under water for a prolonged submersion. The NEMA 6/6P rating can also be used in an environment with corrosive agents. As one of the most versatile electric actuator enclosure options NEMA 6P is built for extreme conditions for both indoor and outdoor applications offering a high degree of protection for the electronics inside.

Please see the following diagrams:

Comparison of Specific Applications of Enclosures for Outdoor Nonhazardous Locations [From NEMA 250-2003]

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	3	3X	3R*	3RX*	3S	3SX	4	4X	6	6P
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of water (Rain, snow, and sleet **)	X	X	X	X	X	X	X	X	X	X
Sleet ***	...	...	...	...	X	X	...	...	...	...
Ingress of solid foreign objects (Windblown dust, lint, fibers, and flyings)	X	X	...	...	X	X	X	X	X	X
Ingress of water (Hosedown)	...	...	...	...	...	...	X	X	X	X
Corrosive agents	...	X	...	X	...	X	...	X	...	X
Ingress of water (Occasional temporary submersion)	...	...	...	...	...	...	...	...	X	X
Ingress of water (Occasional prolonged submersion)	...	...	...	...	...	...	...	...	...	X

* These enclosures may be ventilated.

** External operating mechanisms are not required to be operable when the enclosure is ice covered.

*** External operating mechanisms are operable when the enclosure is ice covered.

Comparison of Specific Applications of Enclosures for Indoor Nonhazardous Locations [From NEMA 250-2003]

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	1*	2*	4	4X	5	6	6P	12	12K	13
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (falling dirt)	X	X	X	X	X	X	X	X	X	X
Ingress of water (Dripping and light splashing)	...	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (Circulating dust, lint, fibers, and flyings **)	X	X	...	X	X	X	X	X
Ingress of solid foreign objects (Settling airborne dust, lint, fibers, and flyings **)	X	X	X	X	X	X	X	X
Ingress of water (Hosedown and splashing water)	X	X	...	X	X	...	...	...
Oil and coolant seepage	X	X	X	X
Oil or coolant spraying and splashing	X
Corrosive agents	X	...	...	X	...	...	...
Ingress of water (Occasional temporary submersion)	X	X	...	...	...
Ingress of water (Occasional prolonged submersion)	X	...	...	...

* These enclosures may be ventilated.

** These fibers and flyings are nonhazardous materials and are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or combustible flyings see the National Electrical Code, Article 500.

Comparison of NEMA 6P Enclosure Standards and IP68 Enclosure Standards.

IP First Character	NEMA Enclosure Type										IP Second Character
	1	2	3, 3X, 3S, 3SX	3R, 3RX	4, 4X	5	6	6P	12, 12K, 13		
IP_0	1	2	3, 3X, 3S, 3SX	3R, 3RX	4, 4X	5	6	6P	12, 12K, 13	IP_0	
IP_1										IP_1	
IP_2										IP_2	
IP_3										IP_3	
IP_4										IP_4	
IP_5										IP_5	
IP_6										IP_6	
	A	B	A	B	A	B	A	B	A	B	

(Cannot be used to convert IEC Classification Designations to NEMA Type Ratings)

CONTACT INDELAC CONTROLS FOR MORE INFORMATION ABOUT OUR LINE OF SUBMERSIBLE ELECTRIC ACTUATORS.