Nitinol driver(actuator)----- muscle wires & nitinol spring

Nitinol driver(actuator) mainly consist of muscle wires and nitinol springs
The driving principle is different from that of ordinary bimetallic sheets and ordinary paraffin driver(actuator)s.

1 Advantage of Nitinol driver(actuator)

① power/mass ratio is higher, the output force per unit weight is greater, and the smaller the mass of the driver(actuator), the more obvious it is;
② The structure is simple, and the SMA driver(actuator) utilizes the SMA phase transition process to directly output force and displacement.
③ The direction of action is not restricted;
④ Act quickly at specific temperatures;
⑤ Not sensitive to the action environment;
⑥ No pollution and noise.

2 Features of Nitinol driver(actuator)

① Simple structure and small volume, capable of achieving structural miniaturization.
② Actions are not affected by environments or atmospheres other than temperature.
③ Nitinol can output significant stress, strain, and energy during temperature changes. Direct action, high recovery strain, and high work density.

3. Muscle Wires

Muscle wire is a Ti-rich Binary NiTi Alloy or NiTiCu Alloys.
We have four main types of muscle wires, with Active Af of **70 °C, 90 °C, 110 °C, and 130 ° C.**
When in use a muscle wire can be stretched up to 8 percent of its length and still recover.
However, this can only be done a few times until it breaks or stops returning to its original length.
Its life cycle can be extended dramatically if it is stretched to between 3 to 5 percent of its overall length.
Within this range it will go through the stretching and return cycle millions of times.

4. Nitinol Spring

The most of the components used are made of NiTi shape memory alloy into **spiral springs** to expand the action stroke.
Spiral springs can be effectively used as thermal sensitive and driving components, and are widely used in sensing and driving components of intelligent systems. Such as over-current and short circuit protection devices, robots and various temperature control devices for automotive thermostats, automotive fan clutches, automotive fog light protective covers, air conditioning unit wind direction adjustment mechanisms, constant temperature mixing valves, gas pipeline fire valves, sprinkler fire extinguishing devices, memory alloy driver(actuator)s driven by human heating, memory alloy driven robots, etc.
(1) Automotive field: widely used in thermostats and engine thermal clutches, automotive fog light protective covers, automotive fan clutches

(2) Electrical protection and monitoring: applied in overcurrent and short circuit protection devices, as well as temperature detection
(3) Fire protection, daily necessities: air conditioning unit wind direction adjustment mechanism, constant temperature mixing valve, gas pipeline fire damper, sprinkler fire extinguishing device, memory alloy driver(actuator) driven by human heating, memory alloy drive robot, various temperature control devices, and shape memory control mechanism of small structures.

Superelastic SE508 Nitinol Tension Spring

Spring Parameters:
Wire diameter: 0.75mm±0.01mm
Spring outside diameter: 6.75mm ±0.10mm
Total coil number: 25
Active coil number: 21 (with the extra loops)
Transformation temperature: Active Af=10°C

Shape Memory SM NTC(NiTiCu) Compression Spring

Spring Parameters
Wire Diameter: 2.0mm
Spring Outside diameter: 15 mm
Extension length of spring: 36 mm (high temperature)
Compressed length of spring: 20 mm (low temperature)
Active coil number: 8
Total coil number: 6
Transformation temperature: Active Af=62°[C]
Spring Force at 11 mm above 67°[C]: 6.0 Kgs