ELECTRONIC CONTROL ACTUATOR

Nucom-Z

(Rotary type)

Operation manual

Koei Industry Co., Ltd

FOR YOUR SAFETY

In order for better and safety use of the product for a long period, please observe this " WARNING and CAUTION " carefully.
Here are the specification and operation manual for the product to prevent suffering injury or loss by accidents.
The contents are divided into "WARNING" and "CAUTION" for different degree of risks.
Please strictly observe them, as both of them are very important for your safety.

⚠ WARNING: Improper handling of the product disregarding the notes under this mark may cause injury or death to a man.

⚠ CAUTION: Improper handling of the product disregarding the notes under this mark may cause injury or material loss.

⚠ WARNING

* This product is not of explosion-proof.
  Do not use it in the environment with flammable gas (gasoline etc.) or corrosive gas.
* Do not dismantle the actuator from the valve during power operation.
* Do not make wiring work when power is being supplied.

⚠ CAUTION

* Do not drop the product or give a shock to the product, for it may cause defects to the product.
* Do not get on the actuator, or it may cause defects or an accident.
* Do not make wiring work in the rain or in splashing water.

CONTENTS

1. GENERAL

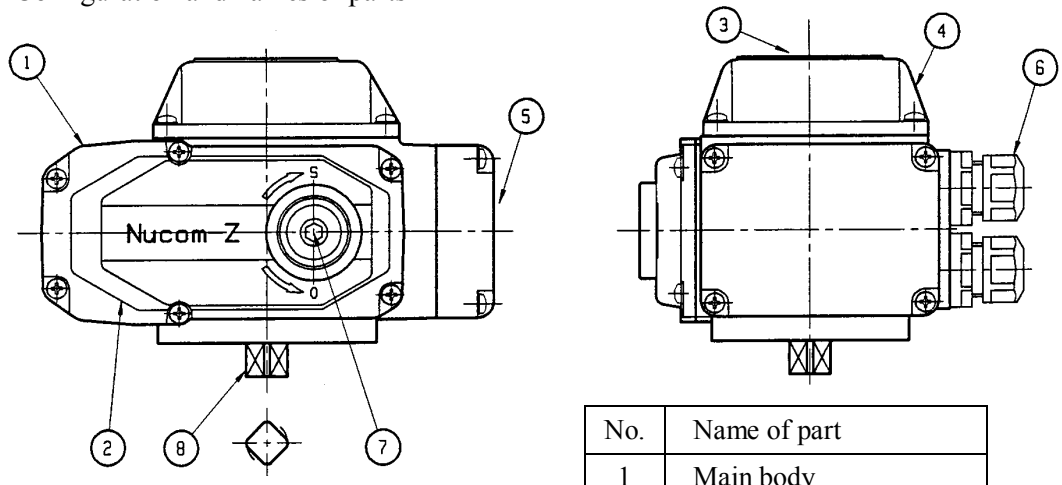
This system is a rotary type electronic actuator operated with 4-20mA control signals.
The system can position valve opening continuously without stopping.
The precision (control resolution:1/250) is far higher than traditional pneumatic actuators.
The system is developed for saving equipment and labor costs, maintenance free.
It is also significantly compact and light.

[FEATURES]

* Compact and light
* High control resolution (more than 1/250)
* Direction is reversible with mode switch.
* A mode during signal failure is selectable among close/open/stop.
* Servo control pack is perfectly resin-molded for water and vibration proof.
* Simplifies process flow and installation work.
* Process running cost declines one over dozens compared with pneumatic systems.
* Thermal protector protects motor from burnout.
* Water tightness : NEMA-4,4X (IP-66)
* Manual override (a crank handle is included as standard accessory)

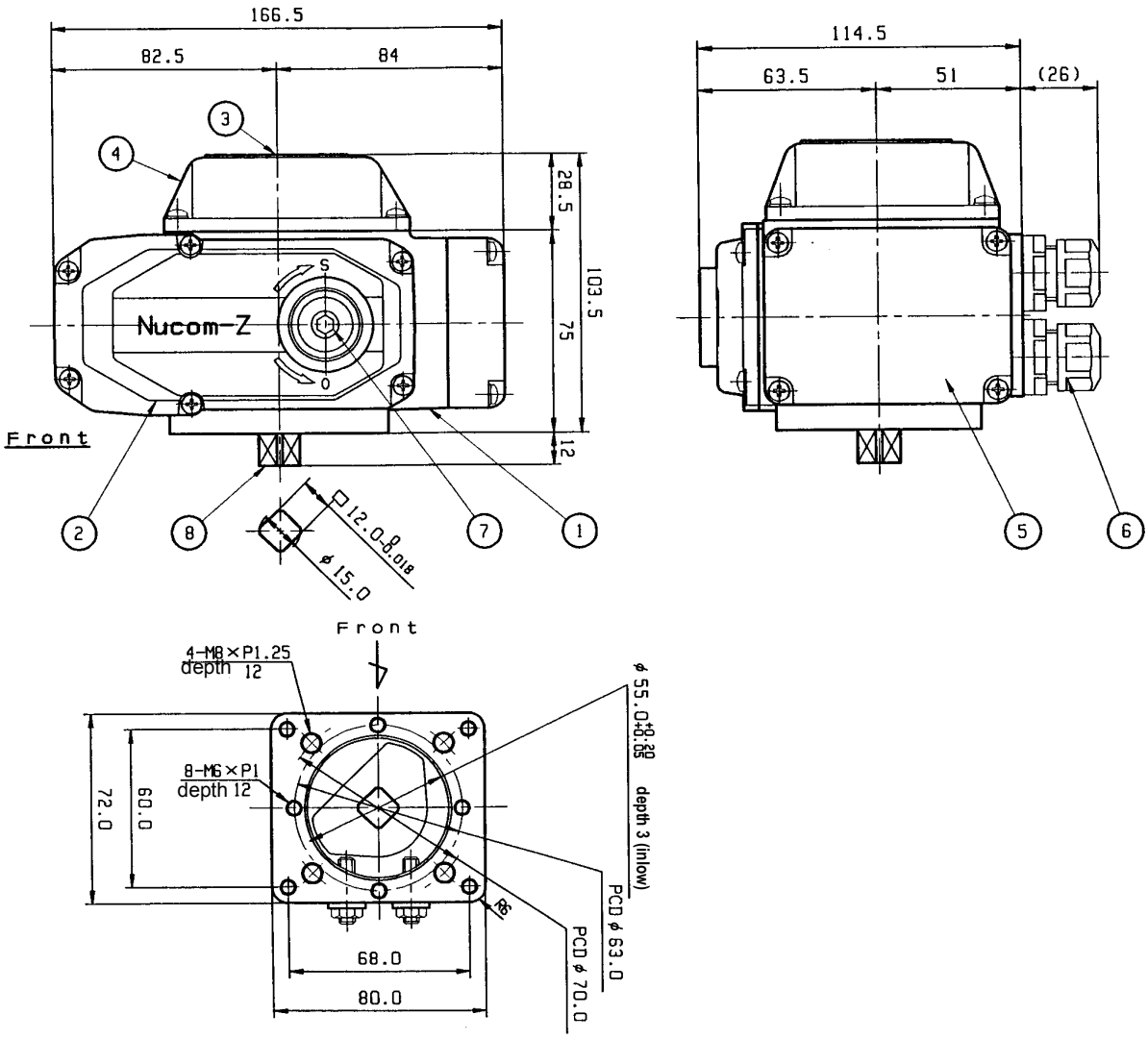
2. CONFIGURATION

2-1 Configuration and names of parts



No.	Name of part
1	Main body
2	Driving unit cover
3	Valve position indicator
4	Electric unit cover
5	Terminal unit cover
6	Conduit
7	Manual override shaft
8	Output shaft

2-2 Configuration



No.	Name of part	Material
1	Main body	ADC12
2	Driving unit cover	ADC12
3	Indicator window	Tempered glass
4	Electric unit cover	ADC12
5	Terminal unit cover	ADC12
6	Conduit	Nylon66
7	Manual override hole	S45C
8	Output shaft	SUS304

3. FUNCTIONAL SPECIFICATION

ITEM \ MODEL	Nucom-Z
	Standard specification
RATED VOLTAGE (50/60Hz)	AC100V±10% (50/60 Hz) AC110V±10% (50/60 Hz) AC115V±10% (50/60 Hz) AC120V±10% (50/60 Hz) AC200V±10% (50/60 Hz) AC220V±10% (50/60 Hz) AC230V±10% (50/60 Hz) AC240V±10% (50/60 Hz)
INPUT SIGNAL	4-20mA DC (Std.) 4-12/12-20mA DC (Option)
OUTPUT SHAFT TORQUE	19.6N·m (2kgf·m)
OPERATION SPEED	15sec (50HZ) 12.5sec(60Hz)
OPERATION ANGLE	0-90 degrees
CONTROL RESOLUTION	Over 1/250
DEAD ZONE	Less than 0.5% F.S.
LINEARITY	Within 0.5% F.S.
MODE WHEN SIGNAL OFF	Close / Open / Stop selectable
PROTECTION	Thermal protector (120 ˚C) Open / Close limit switches (Std.) Open / Close mechanical stopper (Std.) Full open / Full close torque limiter (Option)
RATED CURRENT	0.32A (100V) 0.28A (110V) 0.29A (115V) 0.26A (120V) 0.18A (200V) 0.16A (220V) 0.14A (230V) 0.15A (240V)
RATED DUTY CYCLE	Continuous operation
MOTOR	8W E class (JIS C4004)
POSITION DETECTOR	Potentiometer
OUTPUT SIGNAL	1~5V DC (Std.) Open / Close no-voltage contact output (Option)
INSULATION RESISTANCE	Terminal ~ enclosure : More than 500V DC / 100MΩ
WITHSTAND VOLTAGE	Terminal ~ enclosure : More than 1500V AC / minute
CONNECTION TERMINAL	6 pin terminal block (Control pack)
CONDITIONS FOR USE	Temperature -25°C ~ 55˚C Humidity 10% ~ 90% RH Vibration 2G 5 ~100Hz (should be no resonance) Shock 30G / 11ms
MANUAL OVERRIDE	Crank handle (Std. Accessory)
WIRE INLET	G 1/2 ×2 (Water proof conduit)
WATER TIGHTNESS	NEMA 4,4X (IP-66)
EXPLOSION PROOF	Non explosion proof
MOUNTING ANGLE	360˚
BODY MATERIAL	Die cast aluminum
COATING	Grey (Munsell N-6) Electrostatic coating
WEIGHT	2.6kg

4. ACTION PRINCIPLE

As 4~20mA signals are input, the system drives the motor in direction to balance input signals and position signals detected by the potentiometer.

When the signal deviation becomes zero, the electrical brake circuits work and instantaneously stop the motor.

The motor rotation is transmitted through spur gears A-B-C to the worm shaft, worm wheel and drives the output shaft.

As the motor turns direct or reverse, the output shaft turns as well.

The potentiometer detects the output shaft position, and feedback it to the control pack.

Along with such actions, the system continuously makes proportional control to input signals

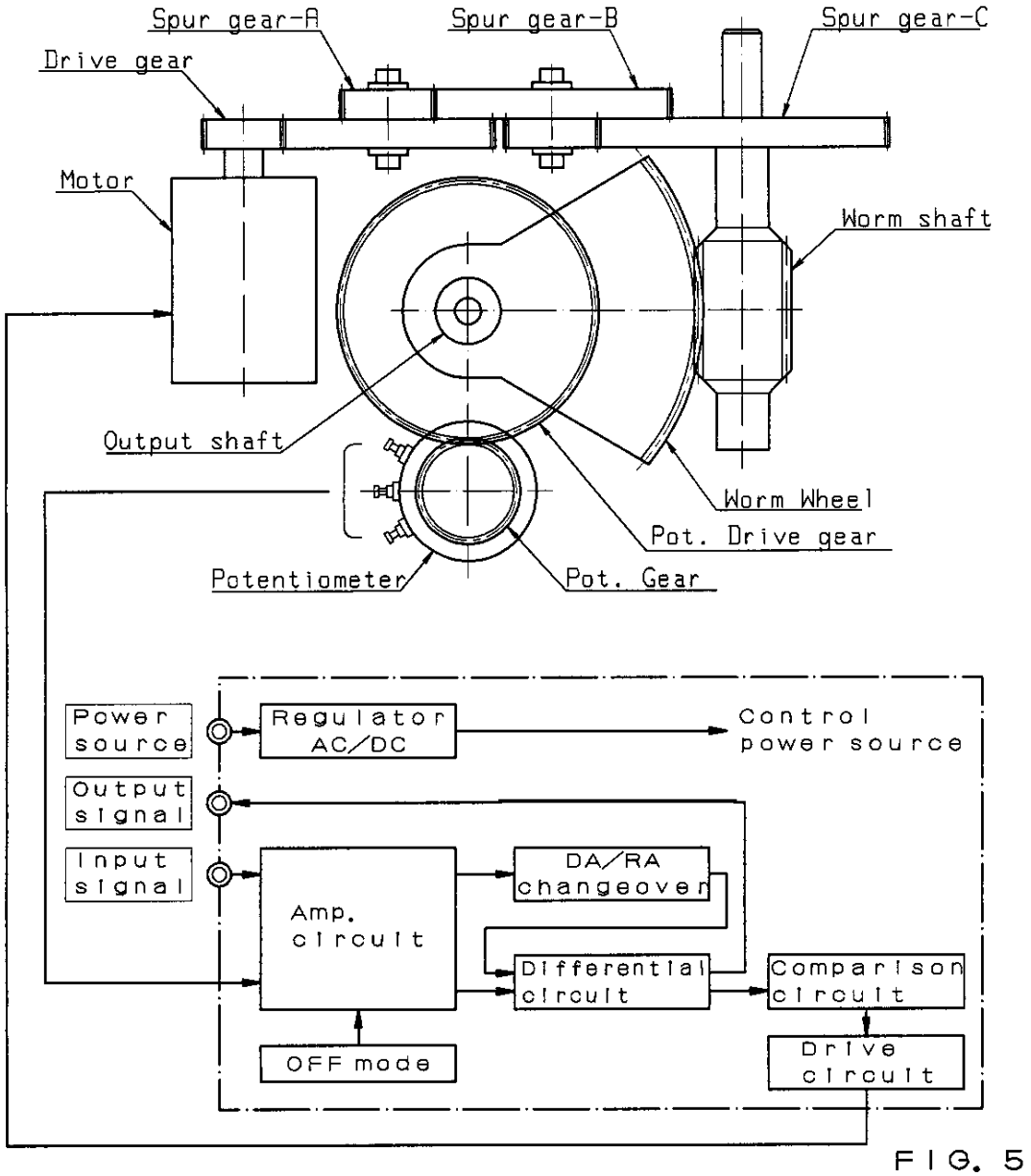
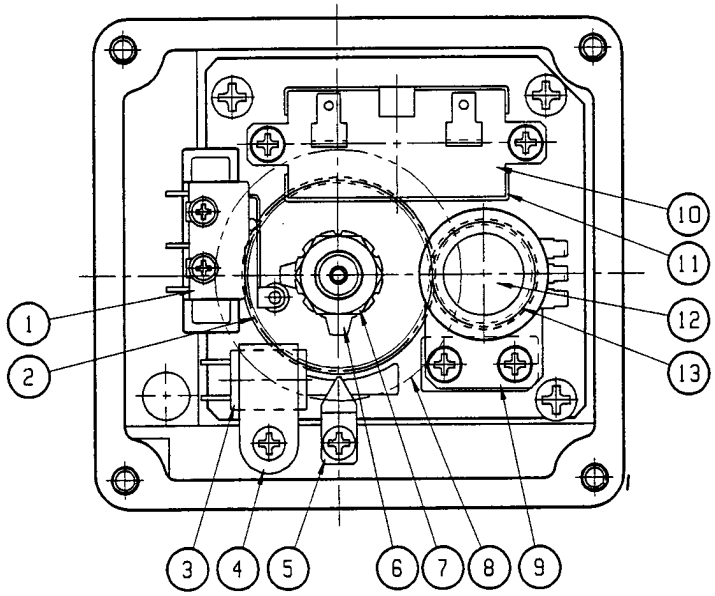


FIG. 5

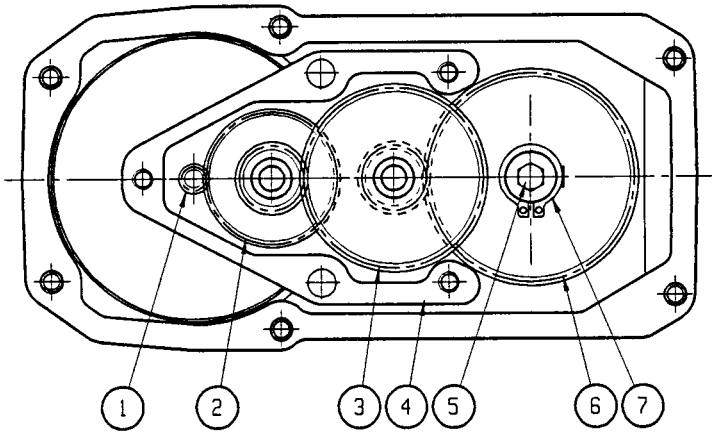
5.COMPONENTS

A,. Electric unit



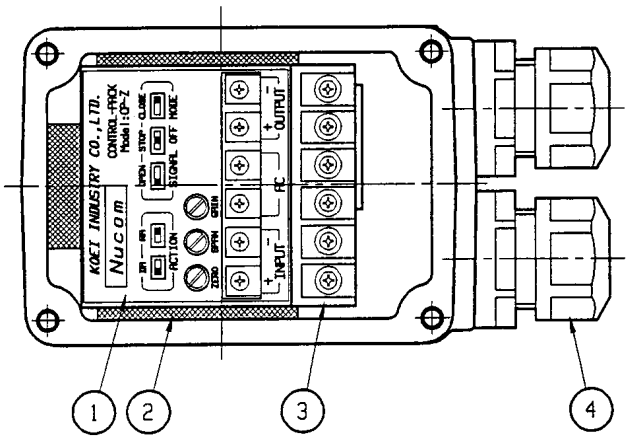
No.	Name of part
1	Limit switch
2	Opening gear
3	Choke coil
4	Choke fixing band
5	Pointer
6	Limit dog
7	Dog nut
8	Position indicator
9	POT plate
10	Condenser
11	Condenser plate
12	Potentiometer
13	Potentiogear

B. Driving unit



No.	Name of part
1	Motor pinion
2	2-speed gear A
3	2-speed gear B
4	Gear unit case
5	Worm shaft
6	Final gear
7	E ring

C. Terminal unit

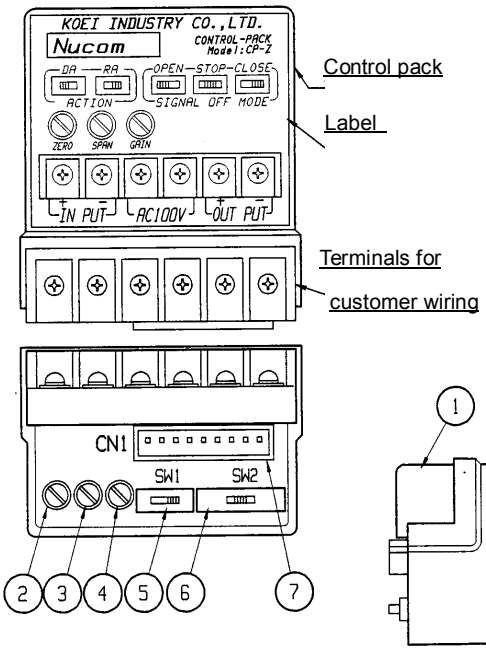


No.	Name of part
1	Control pack
2	Fixing seal
3	Terminal block
4	Conduit

⚠ CAUTION ON USE

6. CONTROL PACK (CP-Z)

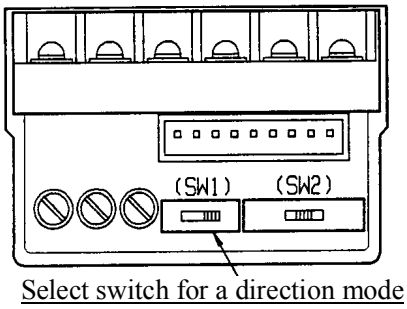
6 – 1 Names of parts



No	Name of part
1	Terminal block for customer wiring (J1-6P)
2	ZERO trimmer
3	SPAN trimmer
4	GAIN trimmer
5	Direction mode select switch
6	Select switch for signal failure
7	Connector for internal wiring (CN1-9pin)

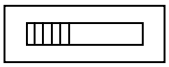
6 – 2 SETTING OF DIRECTION MODE

[Input signal and setting of the direction mode]



Select switch for a direction mode

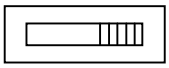
SW1



DIRECT ACTION

Input signal	20mA	Full close position
	4mA	Full open position

SW1

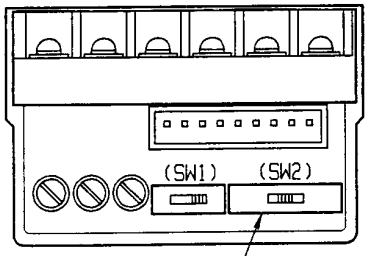


REVERSE ACTION

Input signal	4mA	Full close position
	20mA	Full open position

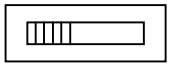
[Mode selection for signal failure]

When signal fails or declines below 2mA during operation, the system judges the status as signal is “Off”, and stops operation at the position preset with the select switch.

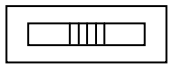


Select switch for signal failure

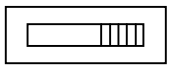
SW2



Stops at full open position (OPEN)



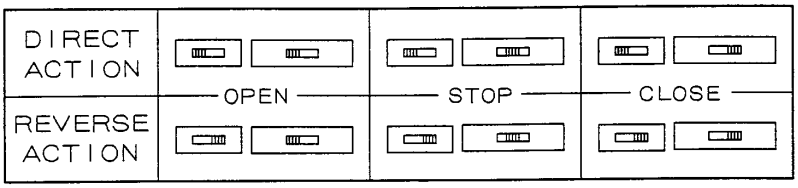
Stops at the position before signal fails (STOP)



Stops at full close position (CLOSE)

(Note) Confirm that the unit is isolated before making mode setting.

Modes for direct/reverse and for signal failure are available in the following 6 combinations:



Unless otherwise instructed, the modes are set in the following combination before shipment.

Direction	Reverse action (RA)
Signal failure	Stop (STOP)

(Note) Make accurate adjustment of 4-20mA signals (Full close/ full open position signals) with customer controller or computer. Otherwise when signals decline below 2mA, the "abnormal signal" circuit will work and drive the unit as in the mode of "signal failure".

6 – 3 Sensitivity volume and ZERO/SPAN adjustment

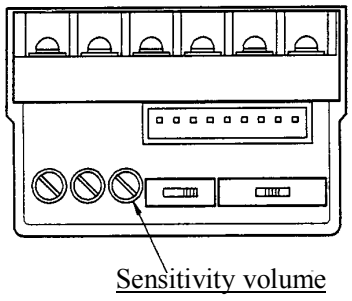
<Sensitivity volume adjustment>

Control resolution is set at 1/250 (0.4%) before shipment.

When there is noise disturbance, it is occasional that the system repeats unnecessary action besides normal action, causing much shorter life to the unit.

In such a case, user may lower sensitivity volume so that unnecessary action is controlled.

(Make such an adjustment within the extent not to affect process operation.)



<Sensitivity volume>

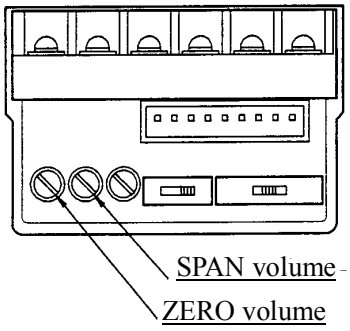
CW for higher sensitivity

CCW for lower sensitivity

Resolution: about 1/300 at maximum sensitivity

Resolution: about 1/100 at minimum sensitivity

<ZERO/SPAN Adjustment>



<ZERO volume>

CW for open

Adjustable range: -25%~25%

<SPAN volume>

CW for wider opening

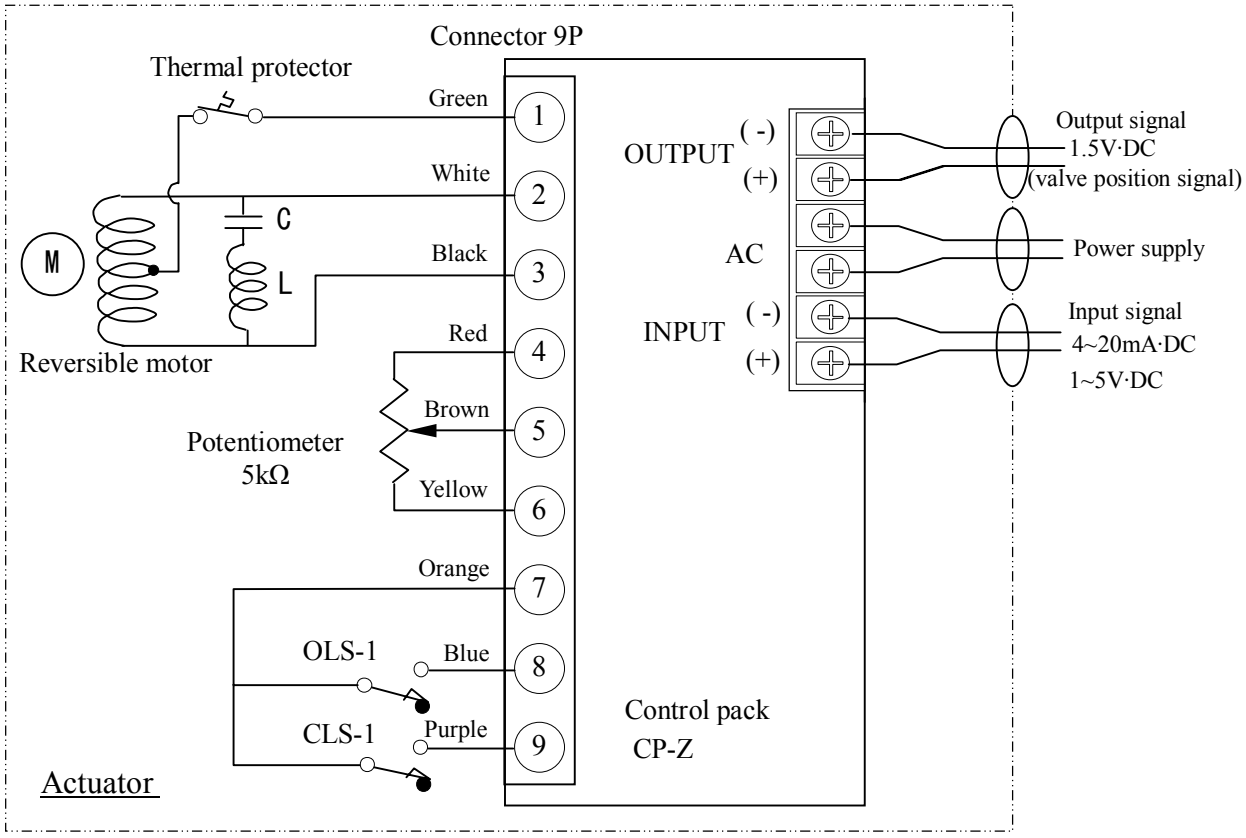
Adjustable range: 75%~125%

(Note) First adjust ZERO, then adjust SPAN.

ZERO/SPAN adjustment is properly made before shipment. Do not adjust it unless particularly required.

Use a trimming driver for re-adjustment within the torque of 300g/cm. (Excessive force may cause troubles to the unit)

7. WIRING DIAGRAM



OLS-1: Open position limit switch

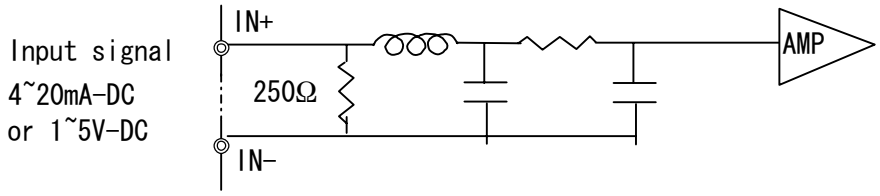
CLS-1: Close position limit switch

8. WIRING (POWER AND INPUT/OUTPUT)

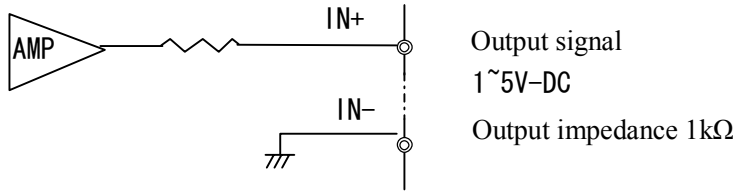
a . Power supply .. Supply clean power without noise

Install isolation transformer, power filter etc., when there are high frequency noises from power source.

b. Input circuit



c. Output circuit



⚠ CAUTION ON INSTALLATION ENVIRONMENT

9. INSTALLATION

9 – 1 Installation place

<Indoor installation>

* Avoid hazardous environment as the unit is not explosion proof
* Cover whole the unit when the unit is installed in a place always with splash of water or materials.
* Reserve a maintenance space allowing manual override and wiring work.

<Outdoor installation>

* Shade whole the unit from direct sunlight and rainfall.
  (Prevent inside the unit being heated by direct sunlight and degradation of seals by rainwater)
* Reserve maintenance space allowing wiring and manual override.

< Actuator surface materials and treatment >

Model / Part	***Nucom-Z***
Main body	Die cast aluminum Chromate treatment Electrostatic coating
Driving unit cover	Die cast aluminum Chromate treatment Electrostatic coating
Electric unit cover	Die cast aluminum Chromate treatment Electrostatic coating
Terminal unit cover	Die cast aluminum Chromate treatment Electrostatic coating
Output shaft	SUS304

9 – 2 AMBIENT TEMPERATURE / FLUID TEMPERATURE

< Ambient temperature >

Ambient temperature for use: -25 degree C ~ 55 degree C.

For use under negative temperature, space heater to prevent condensation is available.

For use beyond the specified temperature range, refer to Sales Dept.

< Fluid temperature >

It is occasional that the temperature of the actuator body may raise by transmission of fluid temperature. For high temperature fluid application, radiation type yoke and coupling may be used.

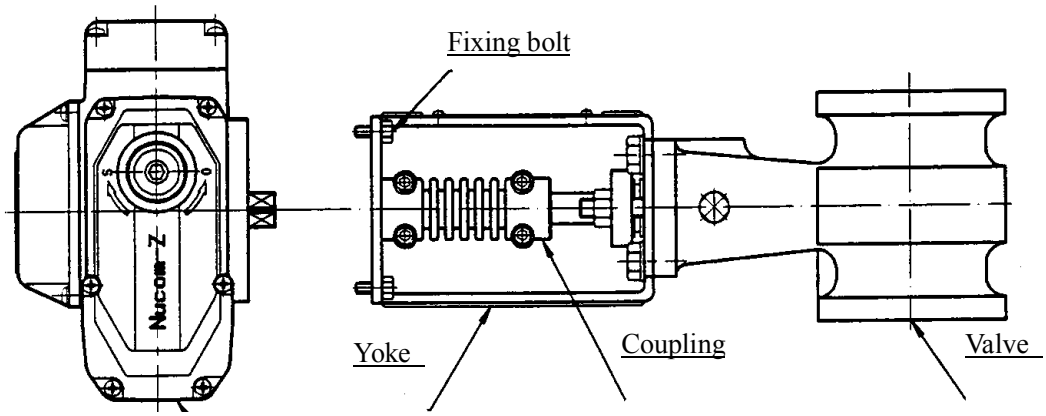
Standard yoke and coupling: for fluid temperature below 65 degree C.

High temperature yoke and coupling: for fluid temperature over 65 degree C.

⚠ CAUTION ON VALVE AUTOMATION

10. ASSEMBLY WITH A VALVE

As shown in the illustration, valve and actuator are separately constructed, and are easy of disassembly when trouble is occurred.



⚠ Confirm power is off before making manual operation

< Mounting procedures >

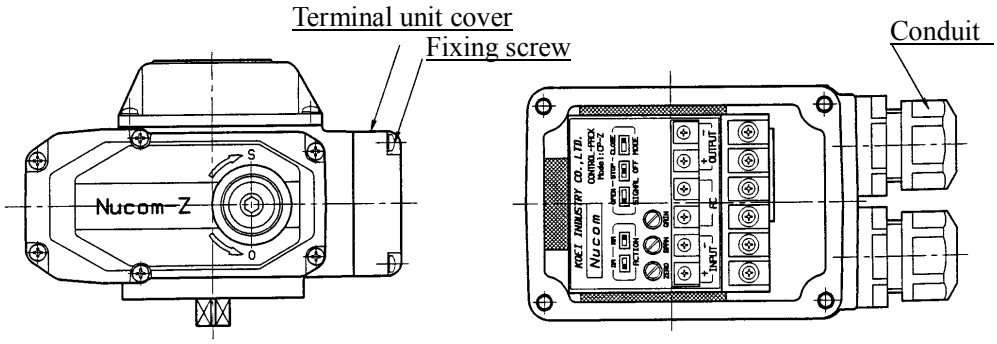
1. Confirm that power is off.
2. Manually drive a valve, and confirm that it is normal. Then, position it at full close
3. Tentatively bolt a yoke on valve, also an actuator on the yoke.
4. Manually set the valve at full close, then fix the output shaft and valve stem with coupling.
5. Secure up all the bolts.
6. Manually drive the actuator, and confirm that it moves smoothly without eccentricity

⚠ CAUTION ON VALVE WIRING

11. WIRING

11 – 1 Wiring with power and input signal

Remove terminal cover (side cover), and find 6-pin terminal block on the control pack.



< Caution on wiring work >

Wiring work should be made by a qualified person based on electrical equipment technical standard.

Refrain from wiring work in the rain, or under high humid conditions.

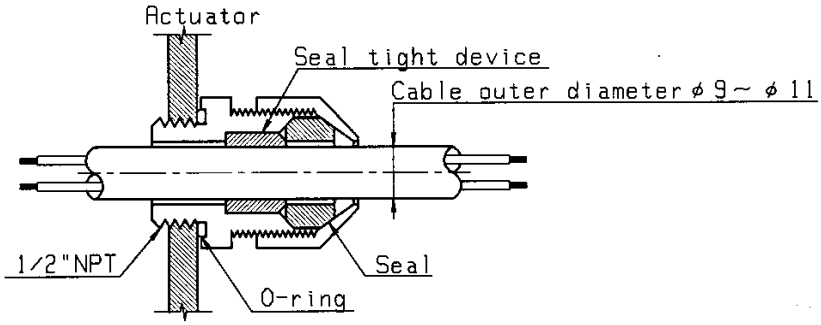
Make proper wiring to wiring diagram.

For all connections use fork crimped-on terminals.

For standard conduit, use a Ø 9-11mm cable

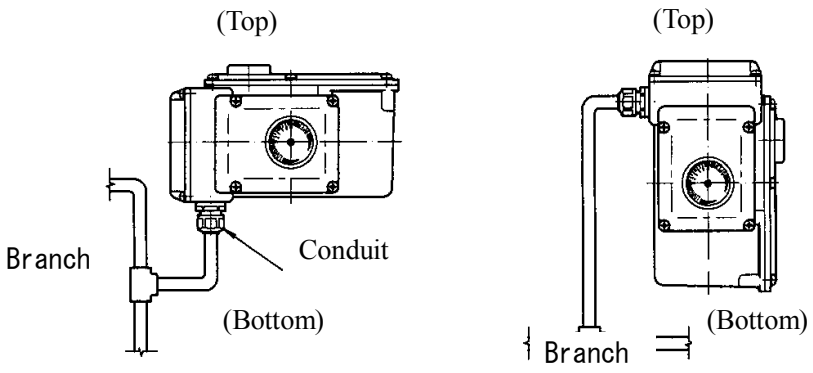
Use a proper size conduit to cable diameter, or it is possible that water ingress through the gap may cause troubles to the unit.

(Note) Screw up covers, conduit etc sufficiently after connection work is over, or it is possible that water ingress through the gap may cause troubles to the unit.



11 – 2 Conduit and tube

Make sufficient water prevention, when vinyl tubes or conduit tubes are used.



⚠ CAUTION ON USE

12. POWER SUPPLY AND INPUT SIGNAL

12 – 1 Power supply

Rated voltage

AC 100 / 110 / 115 / 120V±10%	50/60Hz
AC 200 / 220 / 230 / 240V±10%	50/60Hz

Confirm that the supply voltage is within +/- 10% of the specified voltage, or it may cause troubles.

12 – 2 Input signal

Standard	4~20mA·DC
Option	4~12mA·DC / 12~20mA·DC

Make proper wiring to prevent noise disturbance.

12 – 3 Fuse and breaker

Install a protection fuse or breaker on power source.

The table shows recommendable fuse or breaker capacity

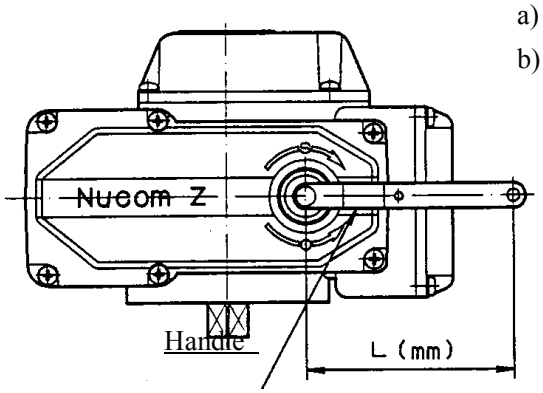
Model	Fuse or breaker	Motor wattage Capacity
Nucom-Z	3A	8W

12 – 4 Wiring diagram

See " 7. WIRING DIAGRAM" for standard wiring.

13. OPERATION

13 – 1 Manual operation



a) Remove the dust cover on the driving unit cover.

b) Insert the crank lever into the hexagon hole.
Turn CW for close, CCW for open.

Dimensions of manual handle

Item	Size
Opposite of hexagon(mm)	5
Number of turns (90 degrees)	7.5
Length (mm)	100
Material	SCS13

⚠ Caution

Confirm that the unit is isolated before making manual operation.
If not, the handle may suddenly return!

13 – 2 Power operation

1. Before making power operation, confirm with manual operation that valve opening and actuator opening are correctly matching each other.
   Check that shaft turns smoothly without eccentricity.
2. Confirm that wiring is properly made, also that the actuator moves normally with external control signals.
3. Start power operation after then.

14. MAINTENANCE AND INSPECTION

* Lubrication

The unit is lubricated with long life di-sulfate molybdenum grease (MoS_2) before shipment, and in principle it does not require re-lubrication after shipment.

* Inspection

When starting operation after a long period of rest, make the following confirmation:

a) Cut power off, manually drive the unit and confirm that it moves smoothly without eccentricity.

b) Remove the body covers, and check that there is no condensation inside, and wiring is proper.
   After inspection is over, screw up all the covers sufficiently.
   Insufficient screwing may cause water ingress and troubles.

15. TROUBLE SHOOTING

Trouble	Probable cause	Solution
Motor does not start up	Power is off	Supply power
	Signal is off	Input signals
	Cable is broken or terminal is open	Change cable or properly connect terminals.
	Voltage is out of range	Check terminal voltage with a tester
	Thermal protector worked. (Ambient temperature is too high, or valve is constrained.).	Lower ambient temperature or manually check valve movement
	Limit switch is not normal	Change limit switch
	Motor coil or lead wire is broken	Renew actuator.
	Over capacity to phase advancer	Change condenser
	Torque limiter worked at light load	Reset torque rate
Input signal and opening position do not match each other	ZERO/SPAN adjustment is not proper	Reset ZERO/SPAN
Motor is constrained	OP/CL limit switches are set out of range	Reset limit switches
	Close torque limiter set rate is too large	Reset torque rate
	Stopper bolt is not in position	Adjust bolt