ELECTRIC ACTUATOR

“ Unic Series “

ROTARY TYPE

Unic – Z,05

Unic – 10

Unic – 20,40

Unic – 60,100,150,200

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

"Unic Series" is a super high quality quarter-turn rotary type electric valve actuator for on/off and intermediate position service.

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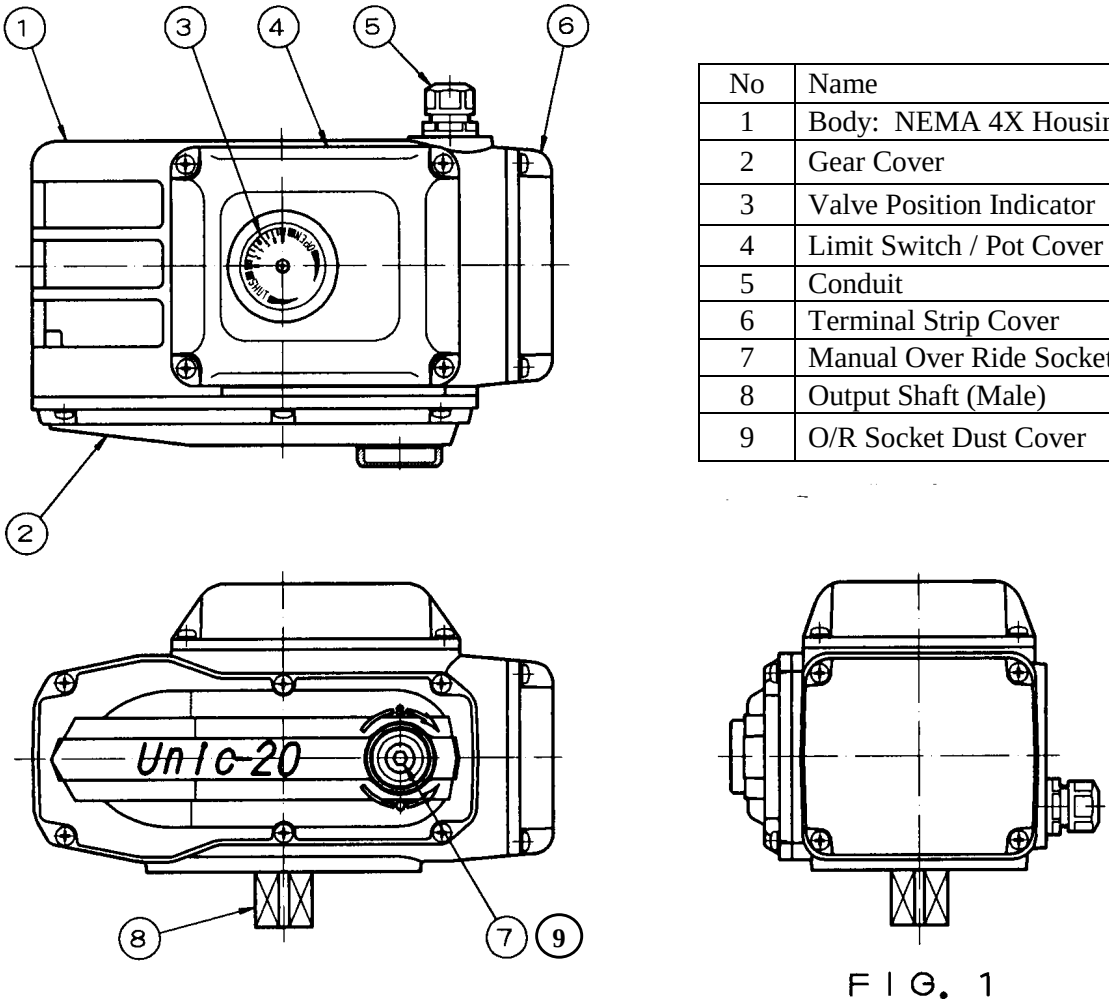
⧖ FEATURES

- ✧ Compact and light
- ✧ Easy of installation and maintenance
- ✧ Simple structure with fewest trouble
- ✧ Manual operation by crank handle
- ✧ Thermal protection from motor burn-out
- ✧ Terminal block for simple wiring
- ✧ Water tightness to NEMA-4X (to IP-66)

2. CONFIGURATION

2-1 Configuration and names of parts



No	Name
1	Body: NEMA 4X Housing
2	Gear Cover
3	Valve Position Indicator
4	Limit Switch / Pot Cover
5	Conduit
6	Terminal Strip Cover
7	Manual Over Ride Socket
8	Output Shaft (Male)
9	O/R Socket Dust Cover

FIG. 1

2-2 Unic-Z, 05 Configuration

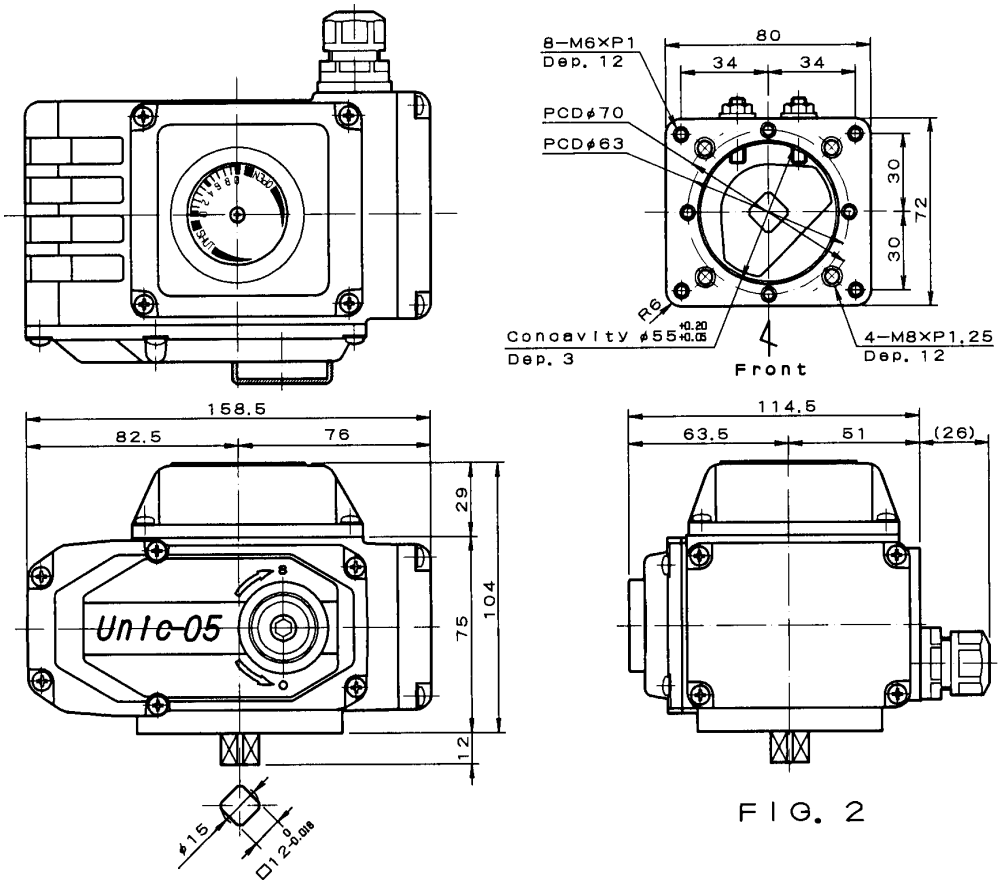


FIG. 2

2-3 Unic-10 Configuration

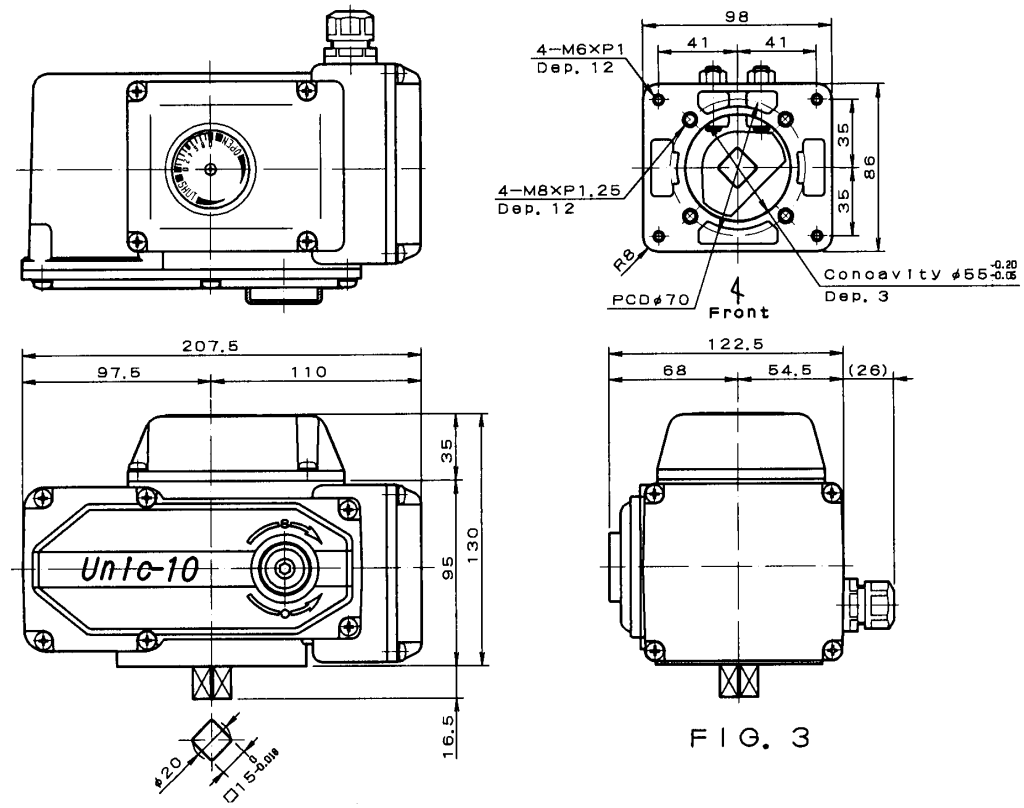


FIG. 3

2-4 Unic-20, 40 Configuration

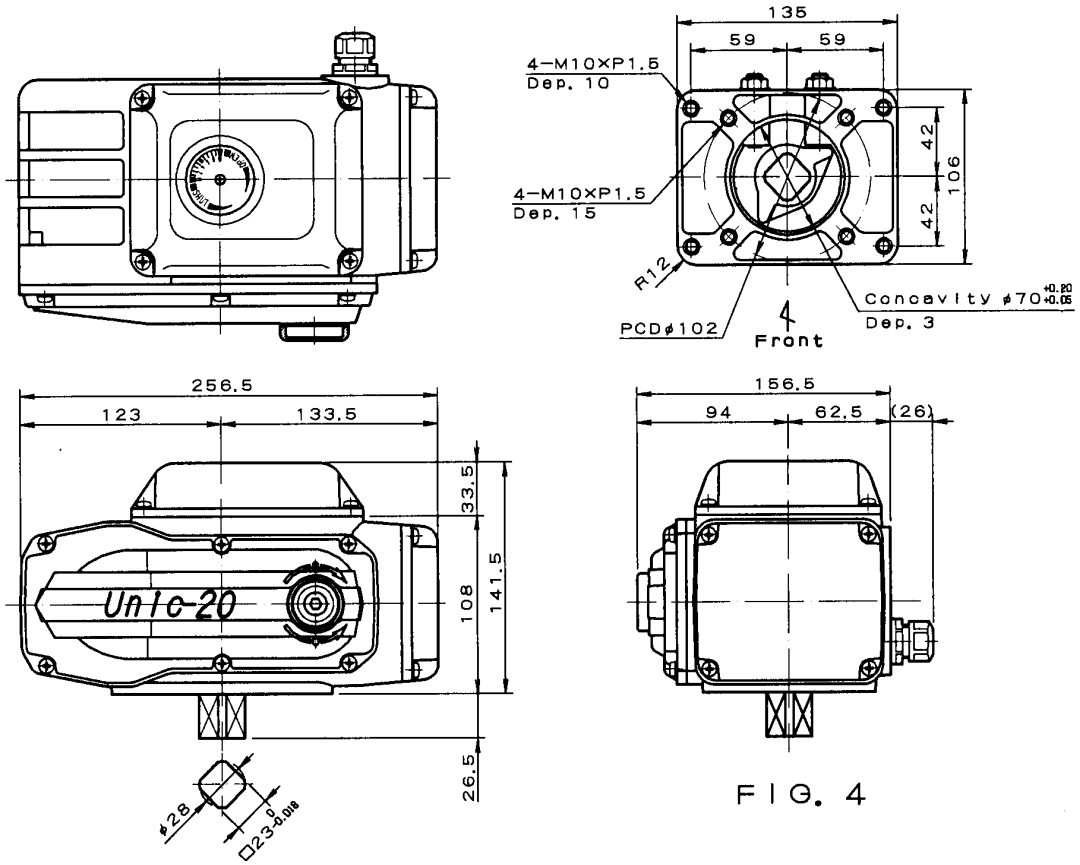
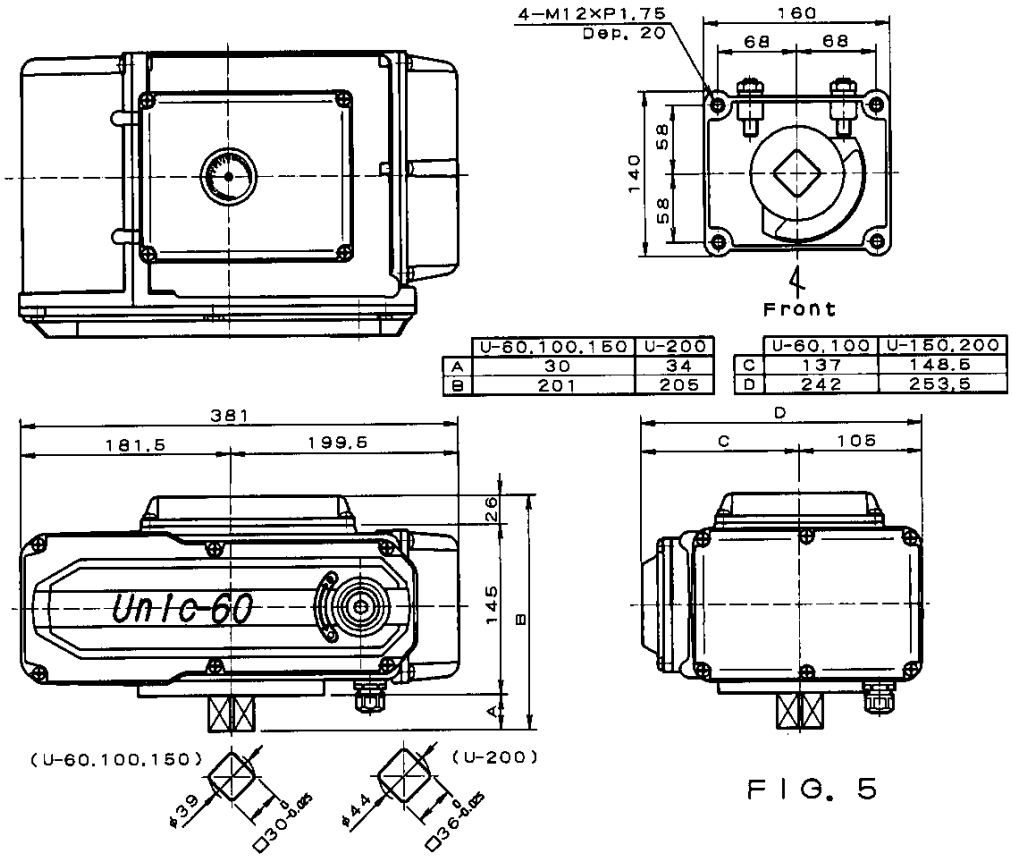


FIG. 4

2-5 Unic-60, 100, 150 ,200 Configuration



	U-60.100.150	U-200
A	30	34
B	201	205

	U-60.100	U-150.200
C	137	148.5
D	242	253.5

FIG. 5

3. FUNCTIONAL SPECIFICATION

ITEM \ MODEL		Unic-Z	Unic-05	Unic-10	Unic-20	Unic-40
RATED VOLTAGE		AC100/110V±10% (50/60 Hz) AC115/120V±10% (50/60 Hz) AC200/220V±10% (50/60 Hz) AC230/240V±10% (50/60 Hz)				
RATED CURRENT	AC100/110V	0.7/0.9A		0.65/0.70A	1.1/1.2A	1.8/2.0A
	AC115/120V	0.6/0.7A		0.60/0.65A	1.0/1.1A	1.6/1.8A
	AC200/220V	0.4/0.5A		0.35/0.40A	0.55/0.60A	0.9/1.0A
	AC230/240V	0.25/0.30A		0.30/0.35A	0.50/0.55A	0.7/0.9A
OUTPUT SHAFT TORQUE		9.8N・m (1kgf・m)	39N・m (4kgf・m)	98N・m (10kgf・m)	196N・m (20kgf・m)	392N・m (40kgf・m)
OPERATION SPEED		4/3.3sec (50/60Hz)	15/12.5sec (50/60Hz)	30/25sec (50/60Hz)		
MOTOR		8W E-class		20W E-class	30W E-class	90W E-class
OPERATION ANGLE		0～90 °				
PROTECTOR		Thermal protector				
AMBIENT TEMPERATURE		Ambient temperature within : -25～55℃				
INSULATION RESISTANCE		100MΩ/500DC				
WITHSTAND VOLTAGE		1500V AC/1minute				
MANUAL OPERATION		Crank handle attached				
STOP		Mechanical type(OPEN/CLOSE)				
ENCLOSURE PROTECTION		Water tightness NEMA-4X(to IP-65)				
MOUNTING ANGLE		From vertical to horizontal angles				
POSITION DETECTION		OPEN/CLOSE limit switches				
BODY MATERIAL		Die cast Aluminum				
COATING COLOR		Silver gray N-6				
CONDUIT ENTRANCE		P1/2×1 with resin connector				
WEIGHT		2.3kg		4.5kg	7.8kg	8.5kg

ITEM \ MODEL		Unic-60	Unic-100	Unic-150	Unic-200
RATED VOLTAGE		AC110/110V±10% (50/60 Hz) AC115/120V±10% (50/60 Hz) AC200/220V±10% (50/60 Hz) AC230/240V±10% (50/60 Hz)			
RATED CURRENT	AC100/110V	1.8/2.0A	2.9/3.0A	3.4/3.5A	3.4/3.5A
	AC115/120V	1.7/1.9A	2.6/2.8A	3.2/3.4A	3.2/3.4A
	AC200/220V	1.0/1.1A	1.5/1.6A	1.8/1.9A	1.8/1.9A
	AC230/240V	0.9/1.0A	1.3/1.4A	1.6/1.7A	1.6/1.7A
OUTPUT SHAFT TORQUE		588N・m (60kgf・m)	981N・m (100kgf・m)	1471N・m (150kgf・m)	1961N・m (200kgf・m)
OPERATION SPEED		30/25sec (50/60Hz)		45/38sec (50/60Hz)	60/50sec (50/60Hz)
MOTOR		90W E-class	100W E-class		
OPERATION ANGLE		0～90 °			
PROTECTOR		Thermal protector			
AMBIENT TEMPERATURE		Ambient temperature within : -25～55℃			
INSULATION RESISTANCE		100MΩ/500DC			
WITHSTAND VOLTAGE		1500V AC/1minute			
MANUAL OPERATION		Crank handle attached			
STOP		Mechanical type(OPEN/CLOSE)			
ENCLOSURE PROTECTION		Water tightness NEMA-4X(to IP-65)			
MOUNTING ANGLE		From vertical to horizontal angles			
POSITION DETECTION		OPEN/CLOSE limit switches			
BODY MATERIAL		Die cast Aluminum			
COATING COLOR		Silver gray N-6			
CONDUIT ENTRANCE		P1/2×1 with resin connector			
WEIGHT		20kg	21kg	22kg	

⚠ CAUTION ON ENVIRONMENTAL INSTALLATION CONDITIONS

4.INSTALLATION

4-1 Installation

⧖ Caution on indoor installation

* The actuators are not of explosion-proof type. Do not install in a hazardous place.
* Cover whole the unit, if it is installed at a place where water or materials are splashing.
* Reserve a space for manual maintenance work.

⧖ Caution on outdoor installation

* Shade the unit from direct sunlight, that may cause overheat and defect to the unit.
* Reserve a space for manual maintenance work.

Materials and treatment of the unit surface

MODEL / PART	Unic-Z/05	Unic-10	Unic-20/40	Unic-60/100/150/200
BODY BASE	Diecast Aluminum Chromate treatment Electrostatic coating			
DRIVING UNIT COVER	Diecast Aluminum Chromate treatment Electrostatic coating			
ELECTRIC UNIT COVER	Diecast Aluminum Chromate treatment Electrostatic coating			
CONTROL UNIT COVER	Diecast Aluminum Chromate treatment Electrostatic coating			
OUTPUT SHAFT	SUS 303			

4-2 AMBIENT TEMPERATURE / FLUID TEMPERATURE

⧖ Ambient temperature

* Environmental temperature range for use : –25℃～55℃.
* For use in minus temperature, in-fit space-heater is available at option.
* For use in temperature beyond the specified range, refer to our Sales Dept.

⧖ Fluid temperature

It is occasional that if the actuator is applied to a high temperature fluid line, the unit may overheat by transmission of line heat. In such a case, use radiation type bracket and couplings. (available at option)

* Standard bracket and couplings : Fluid temperature max. 65℃
* Radiation type bracket and couplings : Fluid temperature over 65℃

⚠ CAUTION ON ASSEMBLY WITH A VALVE

5. ASSEMBLY WITH A VALVE

⧖ Names of parts

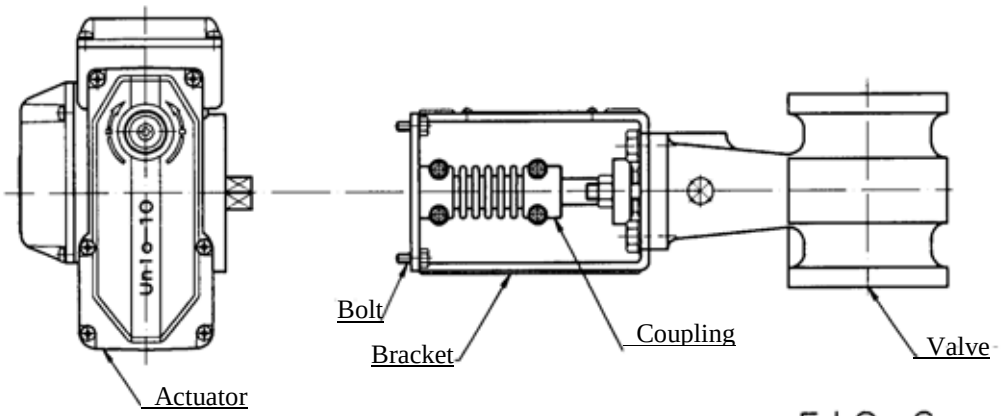


FIG. 6

⧖ Assembly procedure

1. Be sure that power is off before making manual operation.
2. Confirm that a valve is smoothly turnable by hands without eccentricity, then position it at full close.
   Note : There are some valves designed in reverse direction of open/close.
3. Bolt a bracket on the valve.
4. Tentatively mount an actuator on the bracket with loose bolts.
5. Position the actuator at 0 (close), joint the output shaft and the valve stem with couplings.
6. Screw up the bolts.
7. Check with the attached crank handle if the valve is turnable smoothly without eccentricity.

⚠ CAUTION ON WIRING WORK

6. WIRING

6-1 Power and input signals

Use a cable of φ9~11mm for the standard connector. (See FIG.7)
If a customer connector is used, select a cable of proper diameter, preventing water ingress to the unit.

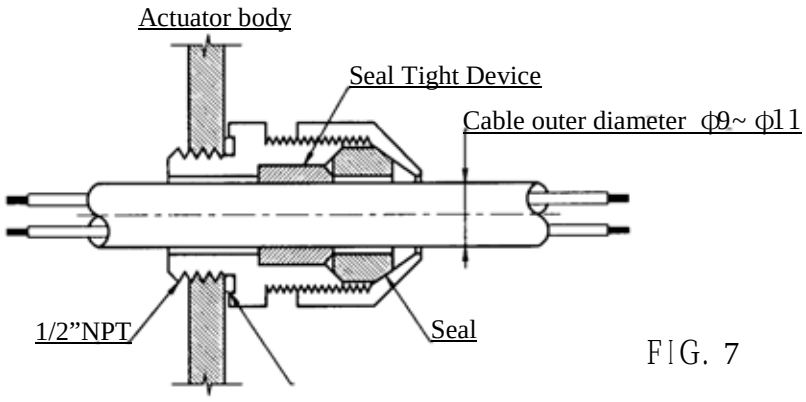


FIG. 7

6-2 Wiring work

Use sufficiently sealed tubes or conduit to prevent water ingress.

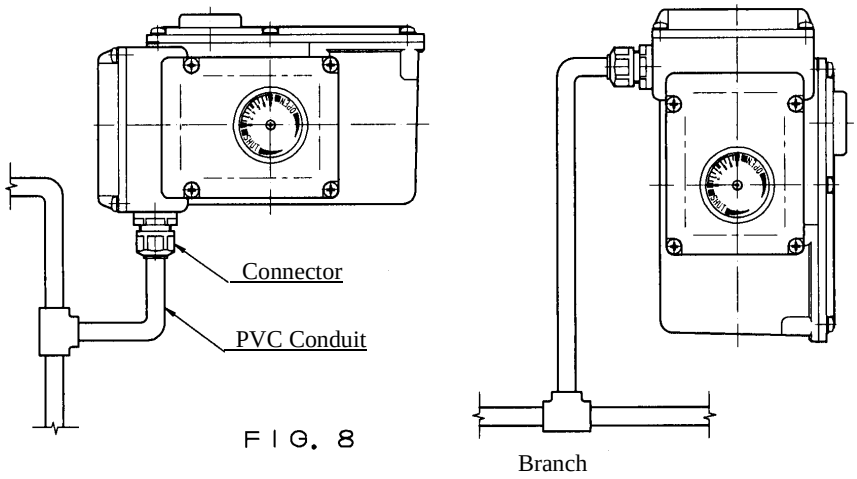


FIG. 8

⚠ CAUTION ON USE

7. POWER SOURCE AND CIRCUITS

7-1 Power source

Standard supply: Single Phase AC Power Supply

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

For different supply from the above, refer to our Sales Dept.

7-2 Recommendable fuse and braker

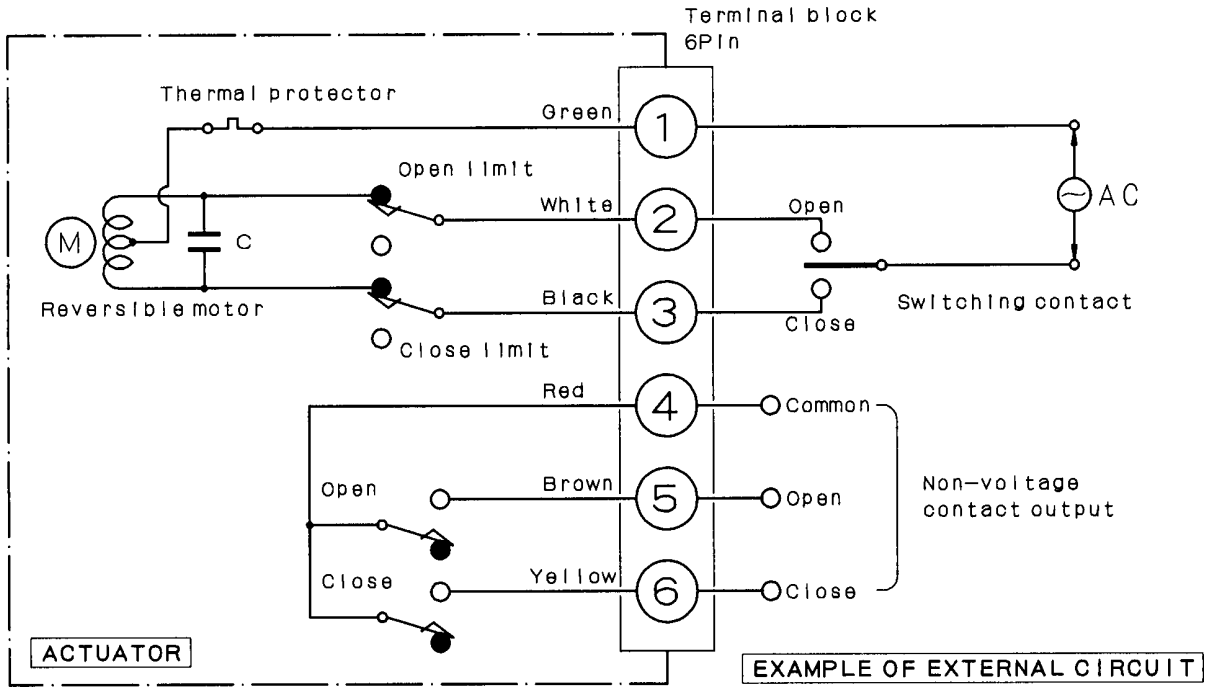
Install a fuse or braker for protection according to the following table.

Model	Capacity of fuse/braker	Motor capacity
Unic-Z, 05	5A	8W
Unic-10	5A	20W
Unic-20	5A	30W
Unic-40	7A	90W
Unic-60	7A	90W
Unic-100,150, 200	10A	100W

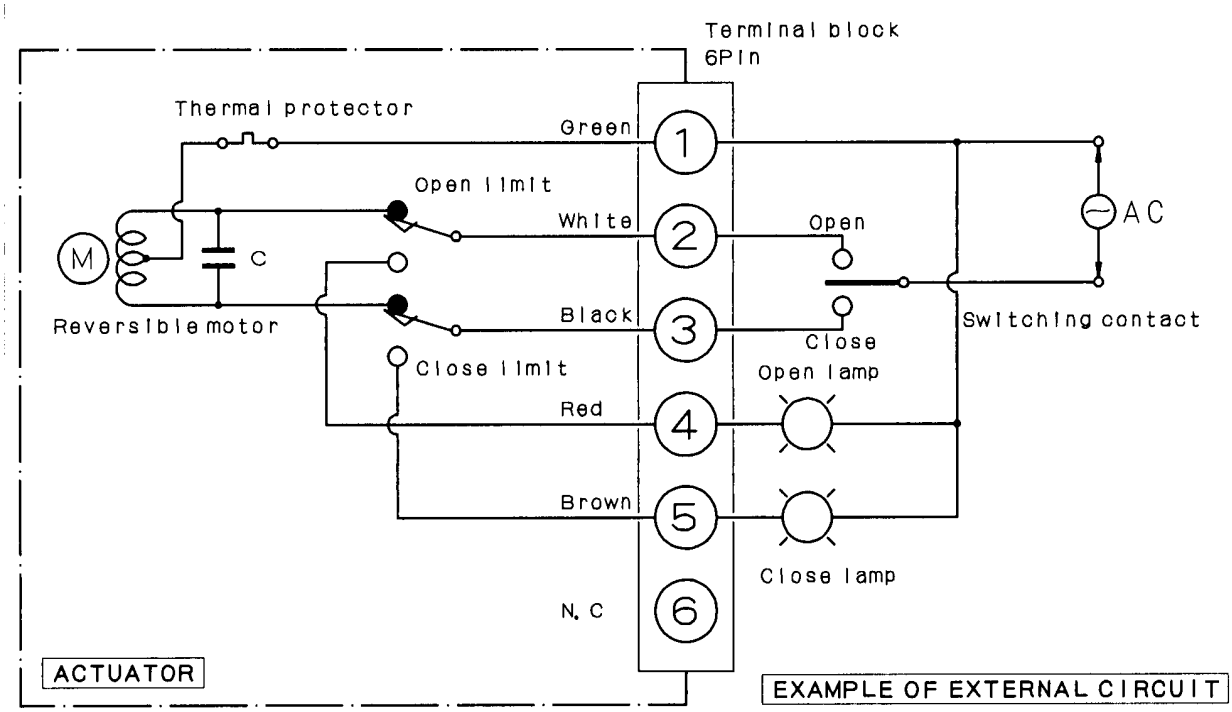
Note: Wiring should be made properly to avoid noise disturbance etc.

7-3 Circuit diagram

[Unic-Z, 05, Standard circuit]



[Unic-10,20, 40, 60, 100, 150, 200 Standard circuit]



⚠ Do not make parallel operation with multiple actuators.
If they are operated at the same time through one open-close switch or relay, the actuators may draw abnormal feed-back current into the units, causing chattering, then disturbance to normal operation. If it goes as is for a long time, actuators may become defective.
Always use individual switch / relay for each actuator.

⚠ Confirm that power is OFF before making manual operation

8. ADJUSTMENT

8-1 Adjustment of limit switches and position indicator

(1) Unic-Z, 05

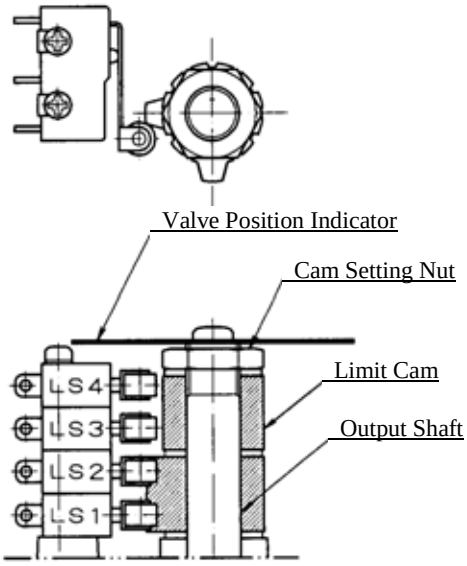


FIG. 9

LS1: Open travel limit switch
LS2: Open Aux. contact output switch
LS3: Close travel limit switch
LS4: Close Aux. contact output switch

1. Fully open the valve by manual handle.
   Loosen and turn the lower limit cam and confirm that the limit switch is effective (click sound).
2. For close side, fully close the valve, turn the upper limit cam, and confirm that the switch is effective.

* Make sure that the mechanical stop at each travel end does not intervene the motion.
  When mechanical stop restricts motion, retiring the stopper bolt, and adjust the bolt position so as to hit the stopper after 1/4 – 1/2 handle turn from the electrical travel limit.

*The Aux. contact output positions are shifting together with travel limit positions at constant angle.

3. Tighten up the cam nut. Adjust the valve position indicator, and check the motion.

(2) Unic-10

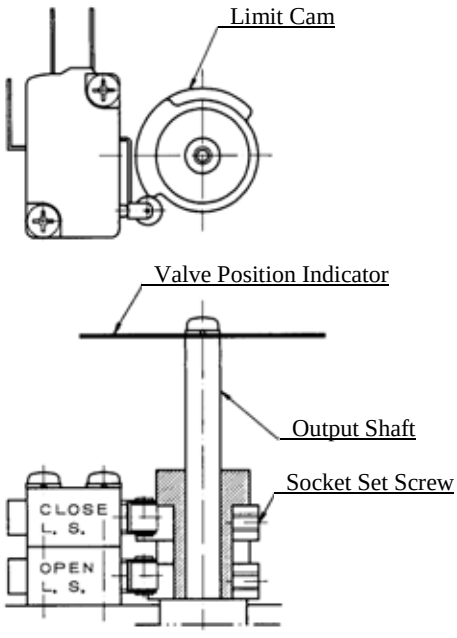


FIG. 10

The upper limit switch is for close, lower one is for open direction. 2 extra limit switches (contact output) are available at option.

1. Open the valve fully by manual handle.
   Loosen and turn the lower cam. Confirm that the switch is effective (making click sound).
   Then secure the cam by set screw.

2. Adjust the close side in the same manner.

* Make sure that the mechanical stop at each travel end does not intervene the motion.
  When mechanical stop restricts motion, retiring the stopper bolt, and adjust the bolt position so as to hit the stopper after 1/2 handle turn from the electrical travel limit.

3. Adjust the valve position indicator, and check the motion.

* The limit switch is normally at “A” contact.

(2) Unic-20, 40

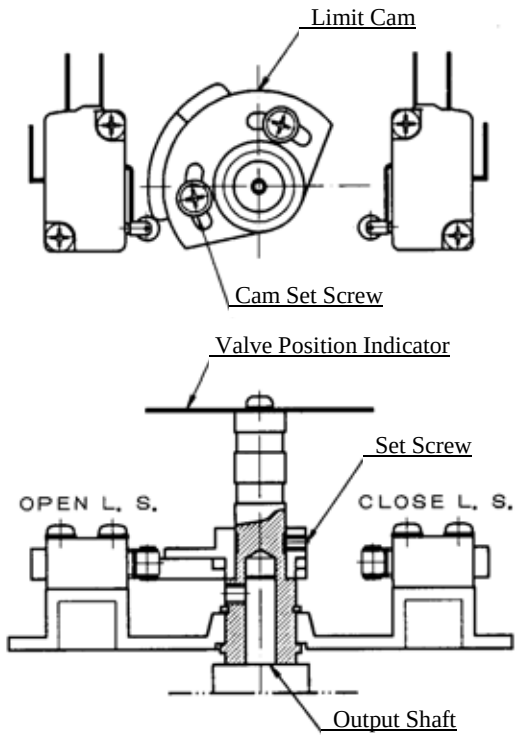


FIG. 11

The limit switch at right is for close, left one is for open direction.

1. Open the valve fully by manual handle.
2. Remove the position indicator.
3. Loosen and turn the limit cam.
   * By working on Philips screws, the cam angle can be adjusted for open / close sides.
   * By working on Set screw on side, shifting the whole cam.
4. Confirm that the limit switch is effective at travel end (making click sound).
   Then secure the cam by Philips screws /set screw.
5. Adjust the close side in the same manner.

* Make sure that the mechanical stop at each travel end does not intervene the motion.
  When mechanical stop restricts motion, retiring the stopper bolt, and adjust the bolt position so as to hit the stopper after 1/2 handle turn from the electrical travel limit.
6. Adjust the valve position indicator, and check the motion.

* The limit switches are normally at “B” contact.

(2) Unic-60, 100, 150, 200

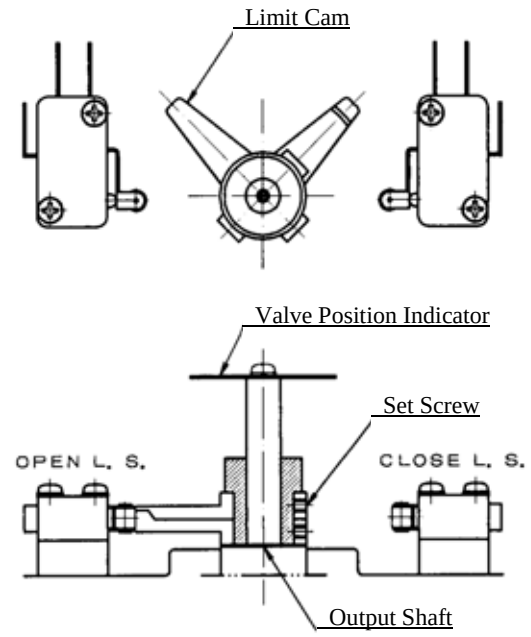


FIG. 12

The limit switch at right is for close, left one is for open direction.

1. Open the valve fully by manual handle.
2. Loosen, then set the position indicator at full open.
3. Loosen, and turn the lower limit cam.
   Confirm that the limit switch is effective (making click sound). Then secure the cam by set screw.
4. Adjust close side in the same manner.

* Make sure that the mechanical stop at each travel end does not intervene the motion.
  When mechanical stop restricts motion, retiring the stopper bolt, and adjust the bolt position so as to hit the stopper after 1/2 handle turn from the electrical travel limit.

5. Adjust the valve position indicator, and check the motion.

* The limit switches are normally at “B” contact.

8-2 Open/Close Non-Voltage Aux. Limit Switch (option)

The following diagram shows Unic-10 case as an example.

* For Unic-20,40, 60 and larger, the additional set of cam/switches are added on the top of existing travel limit switches for each open/close side. (Top switch is for Aux. contact, Bottom for travel limit.)

1. After setting the actuator output shaft at a desired position, adjust LS-1 cam to a position where the limit switch makes click sound.
2. Set LS-2 in the same manner.

* Refer to Fig.13 for wiring diagram.

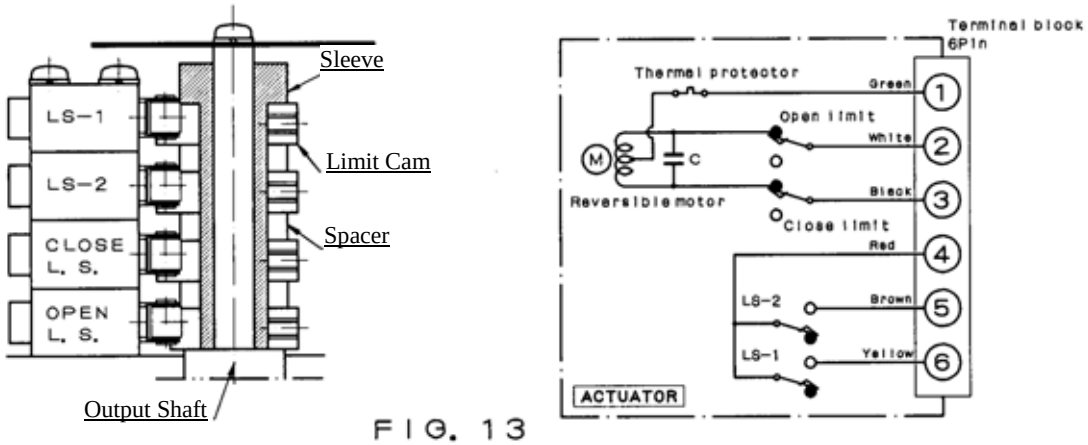


FIG. 13

8-3 Potentiometer (option)

Standard resistance for your choice:

135, 500,1000 Ω

1. Open the valve fully by manual handle.
2. Loosen opening-meter gear.
3. Applying a tester between 4-5 terminals on the terminal block, set the opening-meter at a point where the resistance rate becomes below 5Ω , then screw it up.

* Refer to Fig.14 for wiring diagram.

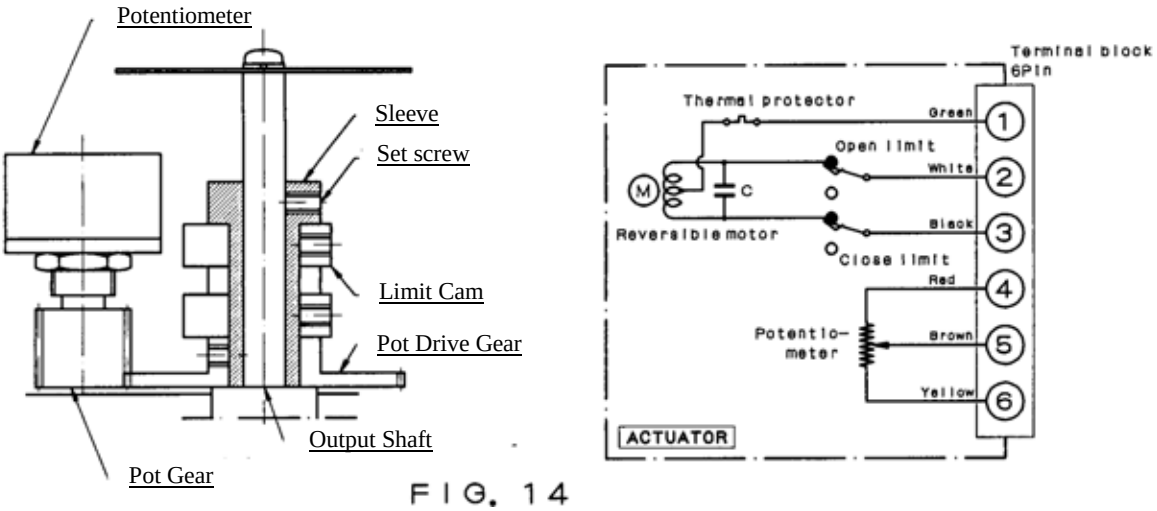


FIG. 14

8-4 Mechanical stop

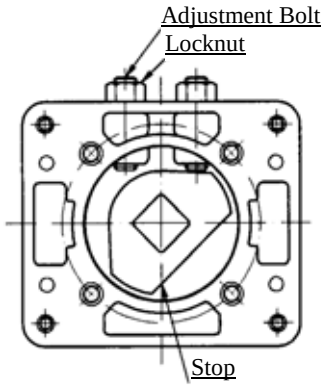


FIG. 15

1. Open the valve fully by manual handle.
2. Loosen, and return the stop by 1/2 turn with the adjuster bolt.
3. Tighten the locknut.
4. Adjust close side in the same manner.

* Make sure the electric motion is not constrained by the mechanical stop.
Travel limit switches must make contact before the stopper hits mechanical stop bolt.

9. TEST OPERATION

9-1 Manual operation

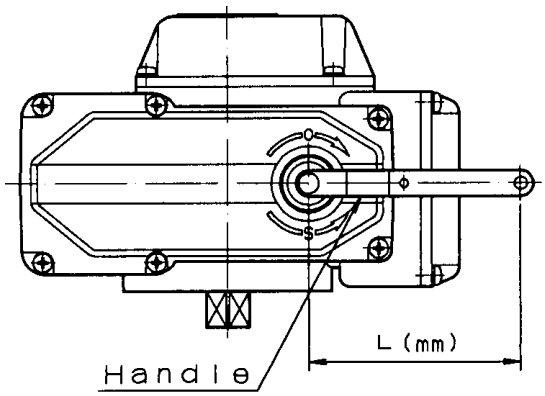


FIG. 16

1. Cut power off before making manual operation.
2. Insert the manual handle into the hexagonal hole underneath the rubber cap.
3. Turn the handle clockwise for close, counter clockwise for open.

Note: The limit switches become effective at open/close of position indicator. The mechanical stops are set at around 1/2 handle-turn beyond those electrical travel limits. Do not apply excessive force to the handle, for it might damage the unit.

<SIZE OF MANUAL HANDLE>

Item \ Model	Unic-Z/05	Unic-10	Unic-20,40	Unic-60,100,150,200
Opposite of hexagon	5mm	5mm	6mm	10mm
Number of handle turns	7-1/2	15	15	15
Length	100mm	100mm	120mm	230mm

⚠ CAUTION

When making manual operation,
be sure that power is off.
If power is on while manual operation,
the handle will suddenly return!

9-2 Power operation

✡ Before making power operation:

- Confirm that the indication on the position meter and the valve opening are matching each other.
- Confirm that the circuits are properly wired, also that the unit operates in correct direction with external switches.

10. MAINTENANCE, INSPECTION

✡ Lubrication

As the major parts of the products are lubricated with long life di-sulphate molibdenem grease (MoS_2) before shipment, re-lubrication is in principle not required.

✡ Inspection

When re-starting operation after a long period of rest, make the following confirmation.

- Cut power off, confirm by manual operation that valve moves smoothly without eccentricity.
- Open body cover and check if there is no condensation inside the unit, also no problem on wiring.

Note: After checking, secure the cover to prevent water ingress.

11. TROUBLE SHOOTING

TROUBLE AND PROBABLE CAUSE	SOLUTION
✡MOTOR DOES NOT START UP	
Power is off	Supply power
Circuits or terminal are open	Renew cables or re-connect terminal
Supply voltage is improper or too low	Check terminal voltage with a tester
Trouble on thermal protector (Ambient Temperature is too low or valve is constrained)	Lower ambient temperature or check valve movement by manual operation
Limit switch is faulty	Renew a limit switch
Motor is defective or lead wire is broken	Renew an actuator
Over capacity for motor advancer	Replace an advancer (condenser)
Limit cam is not correctly adjusted	Re-adjust limit cam
✡LAMP(open/close) DOES NOT LIGHT UP	
Lamp is broken	Replace a lamp
Limit switch is faulty	Renew a limit switch
Stop is not correctly adjusted	Re-adjust a stop

⚠ Do not make parallel operation with multiple actuators.
If they are operated at the same time through one open-close switch or relay, the actuators may draw abnormal feed-back current into the units, causing chattering, then disturbance to normal operation.
If it goes as is for a long time, actuators may become defective.
Always use individual switch / relay for each actuator.

* For other situation of troubles than the above, please refer to our Sales Dept.

12. OPTIONAL EXTRAS

* Open/Close Non-voltage Aux. Limit Switches
* Potentiometer : 135/500/1000 Ω
* R/I Converter : 4 ～ 20 mA DC Position Feedback Signals
* Torque Limiters
* Speed Controller
* Space Heater

For any special version, contact our Sales Dept.

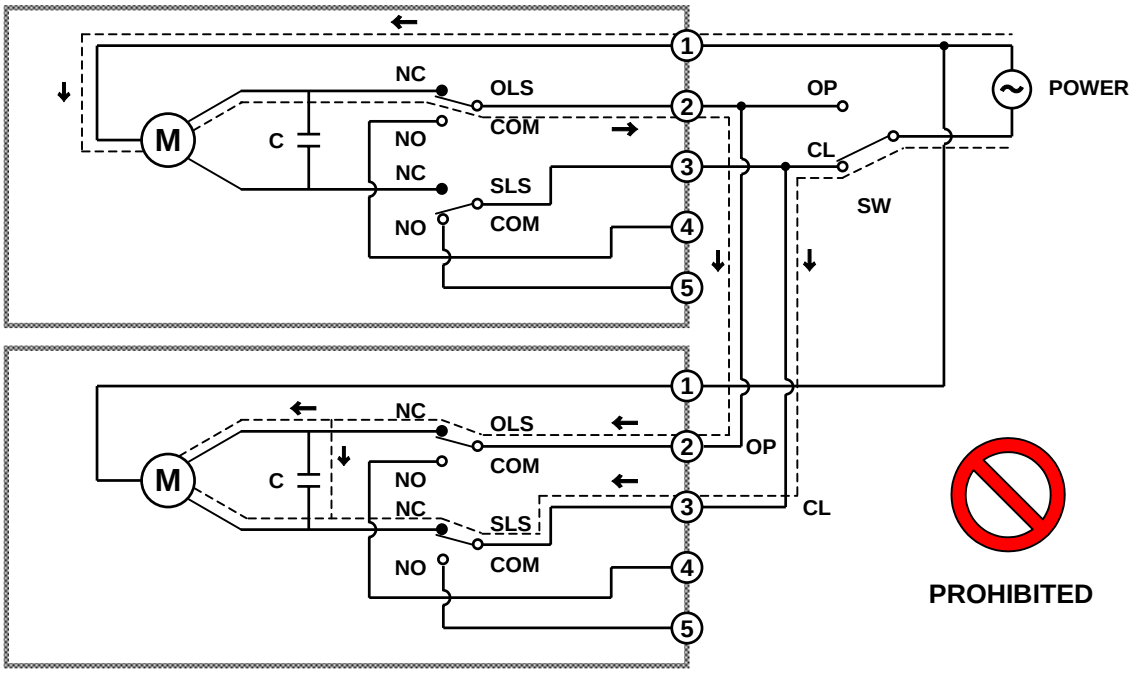
CAUTION ON USE

● Do not make parallel operation

[Parallel operation]

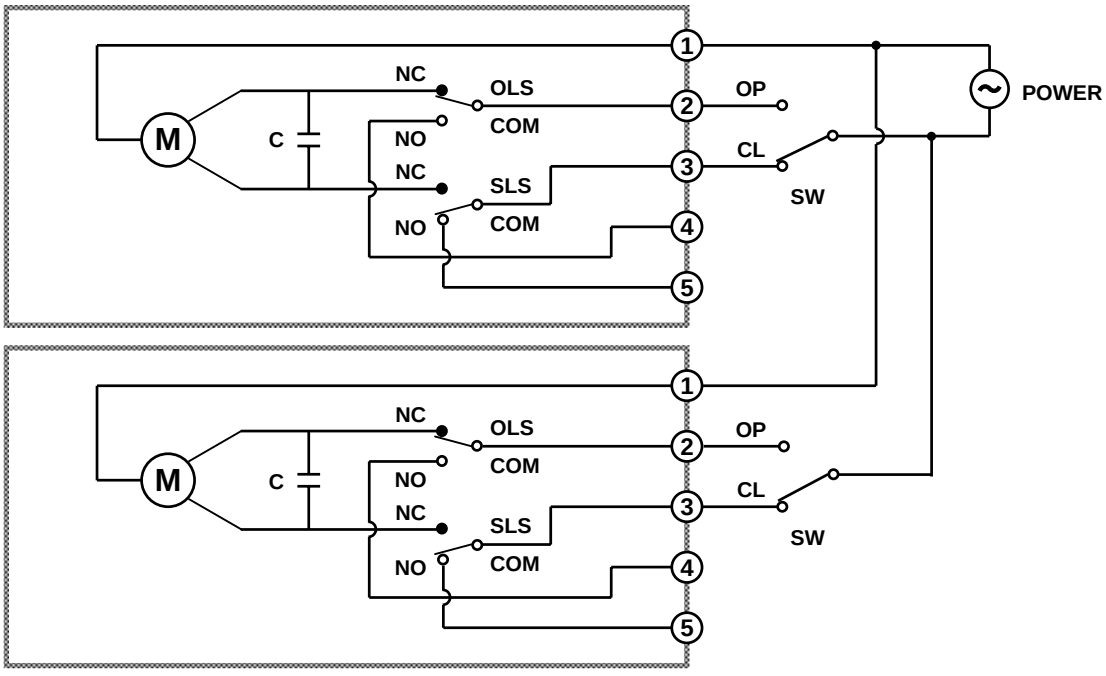
Parallel operation means operating plural units at the same time with one open-close switch.
Trouble by parallel operation:
As shown in Fig. 6, an abnormal current flow will occur along with the dotted line, causing chattering to the actuators, then disturbance to normal operation.
If it goes as is for a long time, the actuators may be defective.

Fig. 6



[Solution]

Apply an open-close switch to each actuator, or apply relays.



Unic Engineering Information

(Rotary Models: *Unic*-Z to 200)

1. General

Unic series rotary models are Quarter-turn On-Off (2-position control) electric actuators.
Introduced as sister model of 4-20mA modulating actuator *Nucom* series in the mid 80's, they have been applied extensively to various valve / damper applications around the world.
They are assembled with, for example, ball valves 1/4" – 10", butterfly valves 1-1/2" – 24", and dampers 2" – 48", and supplied to industrial mills & factories of pulp & paper, food, steel, chemical and pharmaceutical, also commercial HVAC, power plants, municipal water/wastewater plants, shipbuilding (including Naval ships), and other manufacturing such as water filtration.

As named after "for serving Unique applications", *Unic* series have various factory options.
From simple basic model to full option model, customers can choose factory options and customize own spec. model to attain the best process controls design.

5 Body Sizes & 9 Models:

Z - Body: Unic-Z & 05
S - Body: Unic-10
M- Body: Unic-20 & 40
L - Body: Unic-60 & 100
LB-Body: Unic-150 & 200

Model (AC Power)	Unic-Z	Unic-05	Unic-10	Unic-20	Unic-40	Unic-60	Unic-100	Unic-150	Unic-200
Torque in-lb (ft-lb)	87 (7)	347 (29)	868 (72)	1,736 (145)	3,472 (289)	5,208 (434)	8,680 (723)	13,020 (1,085)	17,360 (1,447)
Speed(sec./90deg)	3	13	25	25	25	25	25	38	50
Length (inch)	6.2	6.2	8.2	10.1	10.1	15.0	15.0	15.0	15.0
Width (inch)	4.5	4.5	4.8	6.2	6.2	9.5	9.5	9.9	9.9
Height (inch)	4.1	4.1	5.1	5.6	5.6	6.7	6.7	6.7	6.7
Weight (lbs)	4.4	4.4	8.8	15.2	17.2	43.3	45.1	48.4	50.6

2. Features

Industrial Heavy Duty / Maintenance Free Design

Torque Range: 87 in-lb to 17,360 in-lb

Supply Voltage: 24-240VAC / 1-ph. & 24VDC

Aluminum Die-cast Body / 360 deg. All Angle Mountable

Low Profile, Compact & Light Weight

Nema-4/4X Housing Approved by UL

International Approval: CSA/UL & CE

All Metal Gearings / Permanently Lubricated

Final Reduction: Worm Gear / No Motor Brake Required

Built-in Motor Construction / Efficient Motor Heat Dissipation

Opening Angle Indicator

Manual Override: Crank Handle, Standard Accessory

Side Entry Wiring / Terminal Block Compartment

Variety of Options for Custom Spec.

3. Body Design

Compactness & lightness is one of the main features of *Koei* actuators. The basic product design concept is set for easy installation and minimum impact on existing facilities design:

- Low Profile – to fit into spaces of pneumatic cylinders, and to save spaces all the way along piping to make whole plant be compact
- Compact – to fit within ball valve flange to flange distance
- Light Weight – to be hand-carried and installed by one man

Besides, the output shaft is located at the center of actuator body, contributing to functional and integral beauty of valve/damper assembly packages.
It is important for *Koei* to keep the basic design concepts and features consistently through all product lines from the largest *Unic*-200 (17,360 in-lb) to the smallest class *Unic*-Z and 05 (87 & 347 in-lb).

Unic-05 + 2 inch Ball Valve

Attaining compactness without sacrificing functions and features – it is *Koei*'s product design heritage. Low profile, aluminum die-cast Nema-4/4X housing, worm gear, manual override, opening indicator, side entry wiring, and built-in motor – you can find all of these features on any *Koei* actuators.

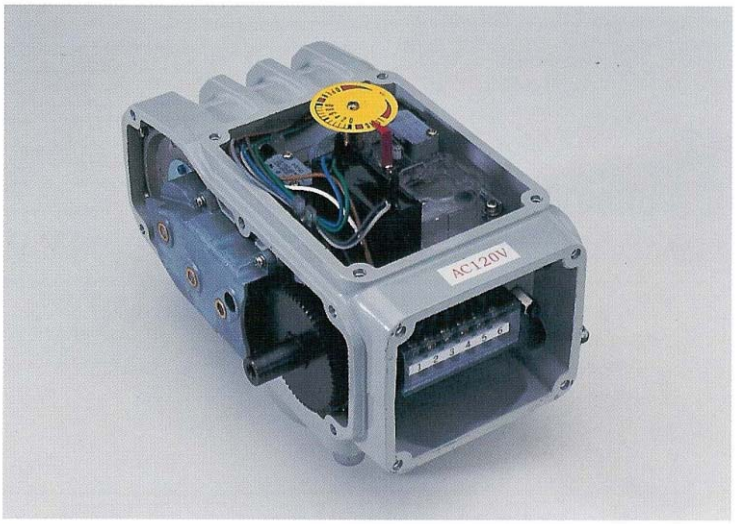
<Butterfly Valve Assembly Examples>
From Left: 18"+ Unic-200 class (Nucom-10NL-200),
12" + Unic-20, 2" + Unic-Z, and 1-1/2" sanitary + Unic-05

Unic guarantees the rated torque at its output shaft, with no secondary reduction gearbox required. The largest class *Unic*-100 to 200 (8,680 in-lb to 17,360in-lb) are only L15" x W10" x H7", 50 lbs – said to be the world smallest and lightest electric actuators in the class of over 8000 in-lb torque.

OEM special compact model Unic-ZZ (front) is only half size of Unic-Z/05 (3" x 2" x 2"), generates 43 in-lb & 7 sec. with 24V DC power supply. This tiny model also has common features with larger sister models - worm gear, indicator, manual override, mechanical stop, and open/close aux. feedback contact outputs.

4. Housing and Motor

Aluminum die-cast (ADC12) Nema-4/4X UL approved housings (UL50 Type-4, 4X), with Chromate treatment and Electrostatic Coating applied on surface. All covers are secured with stainless steel captive screws.



Terminal strip, gearing, limit switch compartment.

ADC material contributes not only to light weight but also to excellent radiation of motor heat.

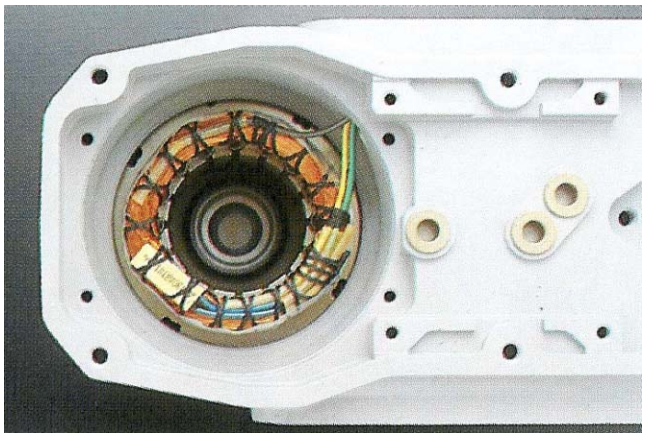
One of unique features of *Unic* is its "Built-in Motor Design", by which the stator of motor is directly inserted into the ADC body housing.

That is, the body of *Unic* is the motor housing itself and works as heat sink, efficiently radiating motor heat to atmosphere.

Therefore, *Unic* can attain much higher frequency of start-stop motion than other conventional electric actuators without getting overheated.

All *Unic* series AC power supply models have reversible motor with E class rating, equipped with a Thermal Protector embedded on the stator windings (white rectangle piece).

When temperature reaches 248 deg. F. at the stator, power supply to the motor is automatically cut off.

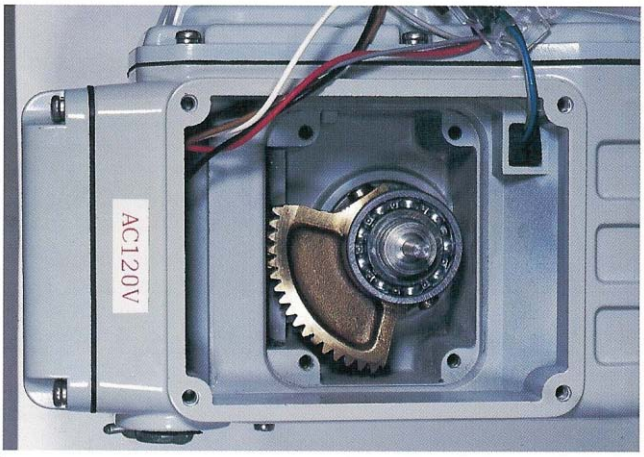


5. Power Train

All gears are made of carefully selected metal materials and are sustained by heavy-duty bearings. Industrial high-grade MOS2 grease is applied on to the surface of each gear and no periodical lubrication required.

The final reduction is worm gear, so as to hold its braking torque, i.e., never to be turned by the force from valve/damper side, at any opening angle under stand-by / power-off status.

Therefore, all *Unic* series can be fitted to any type of rotary valves/dampers including butterfly valves, and no need to add internal motor brake.



Final output sector gear and heavy duty bearings.

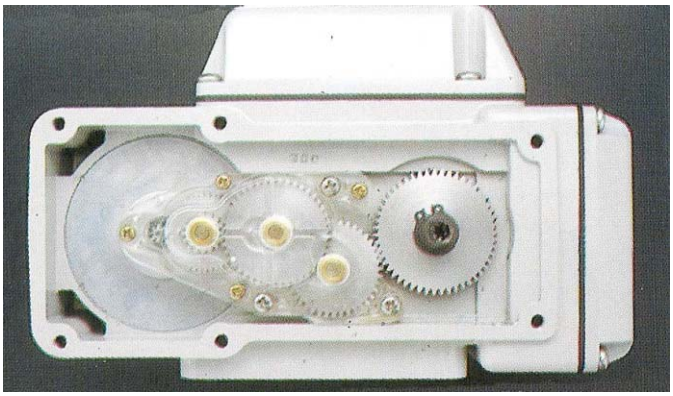
- Worm shaft
  Made by rolling process, instead of machine cut, and special coating applied to its surface, resulting in highly efficient power transmission.

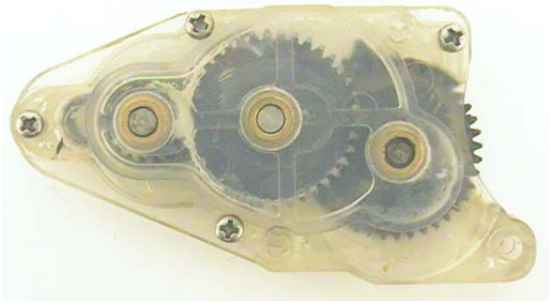
- Worm wheel
  ALBC-3rd grade (Aluminum Bronze), forged.
  This very hard material withstands continuous operation for a long period of use.
  Specially designed sector shape contributes to reduce the size of body housing.

- Medium spur gearings:
  - Sintered metal
    (Unic-Z, 05, 10, 20)
  - Carbon steel (Unic-40)
  - Oil-less Chain drive (Unic-60 and larger)

- Final spur gear: Carbon Steel (all models)

- Output shaft: SUS303 Stainless Steel





- Gear Cassette (Unic-Z, 05 & 10)
  In smaller models (such as in *Unic*-10, 868 in-lb above picture), spur gears are contained in clear ABS plastic case for easy service in case of replacement.
  Uniformity in sintered metal spur gears contributes to silent motion.

6. Operational Interface

The following features are standard to all models from *Unic*-Z (picture) to *Unic*-200:

- Manual Operation by Detachable Crank handle
  (Direct Worm Shaft Drive, Rubber Cap on Handle Hole)
- Position Indicator – Dial Type on Top
- Mechanical Stopper & Stopper Bolts – Adjustable at the Bottom
- Side Entry Wiring Terminal – Terminal Block in Side Compartment (square cover),
  and NPT1/2 Conduit Entry at Side (*Unic*-Z to 40) or at Bottom (*Unic*-60 and larger)

Crank handle rotation and tip size:		
Unic-Z, 05 (picture):	7.5 turns for 90 deg. (1 turn = 12 deg.)	5mm Hex.
Unic-10:	15 turns for 90 deg. (1 turn = 6 deg.)	5mm Hex.
Unic-20, 40 :	15 turns for 90 deg. (1 turn = 6 deg.)	6mm Hex.
Unic-60, 100, 150, 200:	15 turns for 90 deg. (1 turn = 6 deg.)	10mm Hex.

7. Options

- Power Supply Spec. for Various Regions /Applications around the World:
  100/110, 115/120, 200/220, 230/240V AC / 50 & 60Hz,1-phase – available for all models
  24VAC & 24VDC available for *Unic*-05, 10 and 20

- Regional Electrical Approvals & Markings:
  CE Marking – For European Markets
  CSA Marking – For Canadian Market

- Space Heater (SH) available for all models.

- Open/Close Non-Voltage Auxiliary
  Signal Limit Switches (L)
  available for all models.

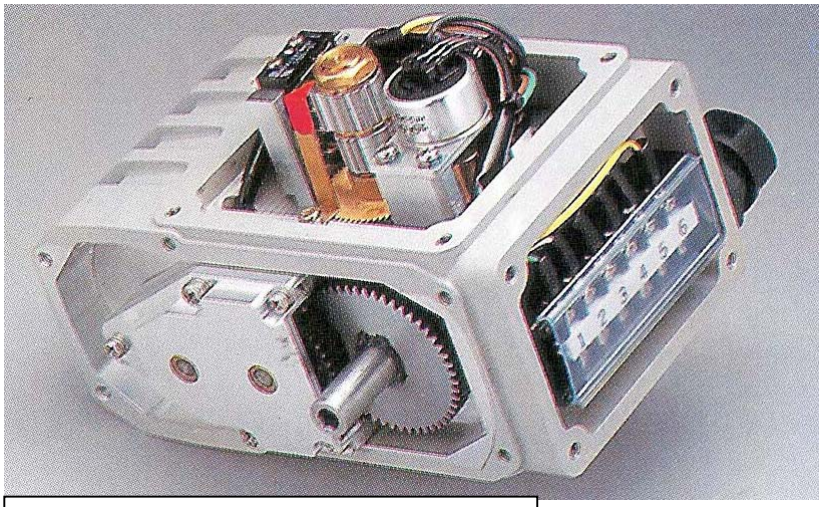
- Potentiometer (P1 / P5 / P1K)
  135 ohms, 500 ohms, and 1000(1K)
  ohms available for all models.

- R/I Converter (R/I)
  4-20mA DC signal feedback.
  Not available for *Unic*-Z and 05.

- Torque Limiter (T1 / T2)
  Close side only torque limiter (T1) available for all models.
  Open & Close both directions torque limiter (T2) is not available for *Unic*-Z and 05.

- Speed Controller Unit (SC)
  Slowing open/close operation speed up to 180 sec. by “on” and “off” pulse motion.
  Opening and closing speed individually adjustable. Not available for *Unic*-Z and 05.

<Mechanical Type Torque Limiter>
- Featuring Belleville washer-type springs to worm shaft, and slight thrust movement of worm shaft is detected by limit switch when overload occurs at output shaft.
- When the device senses torque increase above the torque set point during travel regardless of position, it automatically cuts off internal motor power line to protect actuator & valve/damper.
- Accurate and robust mechanism against power supply voltage fluctuation, and assures consistent torque limiting.



Unic-Z/05 model with potentiometer option

- Battery Back-up
  / Electric Fail Safe (ESD)
  A separate product line of *Unic-ESD-BB* series is available for self-contain battery back-up for emergency operations under power interruption.
  Please ask *Koei* representatives for details.

* For combination of multiple options, please consult with your local *Koei* representatives.

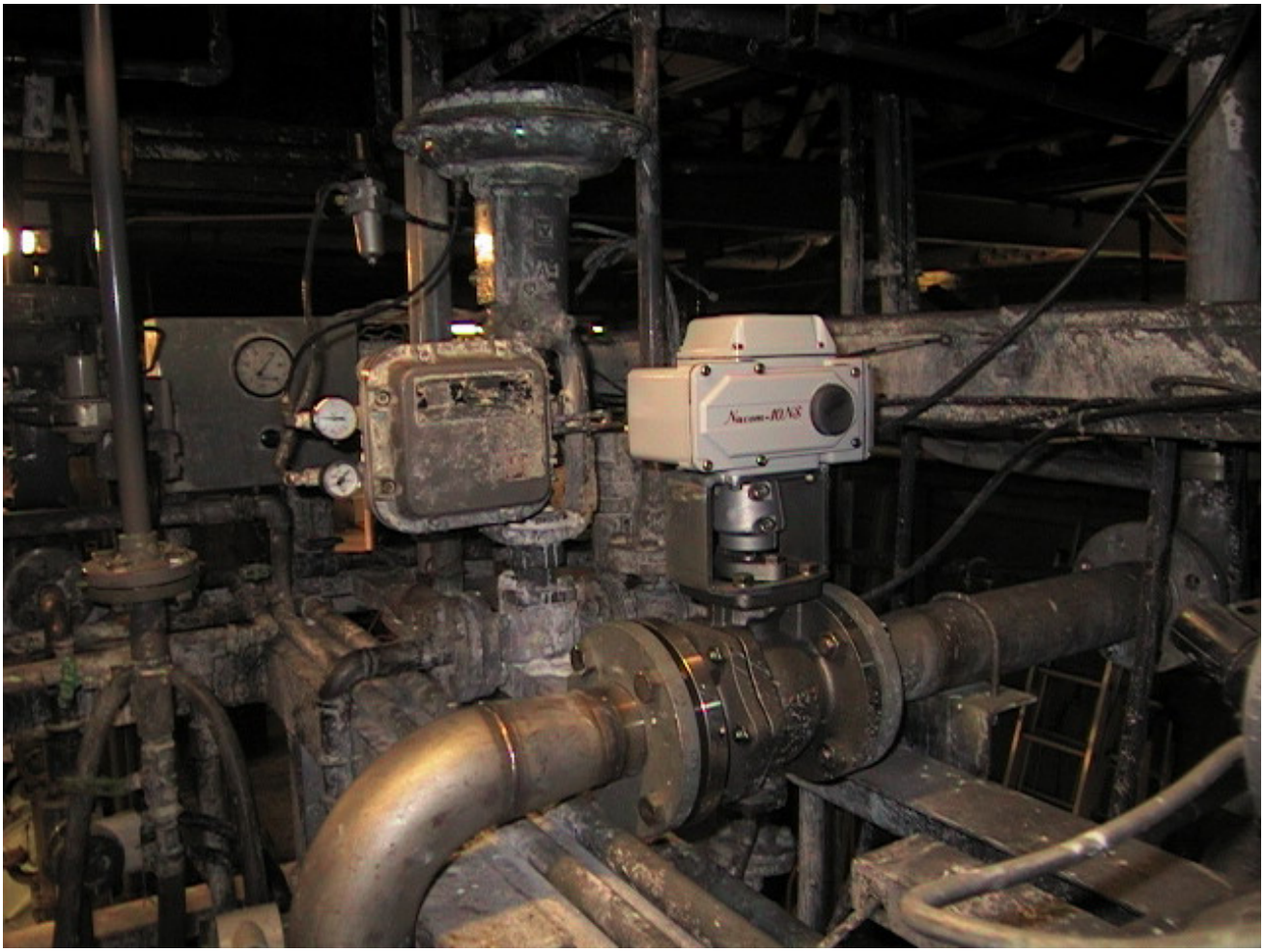
Nucom to *Unic*: Inherited Advantages in Basic Design & Structure

On-Off actuators are generally put under much less duty than Modulating actuators in continuous process applications. For example, *Unic* would be operated only 10 cycles a day, or merely standing by 99% of time, while *Nucom* would make stepping motions every several seconds on 24-7, 100% continuous control duty.

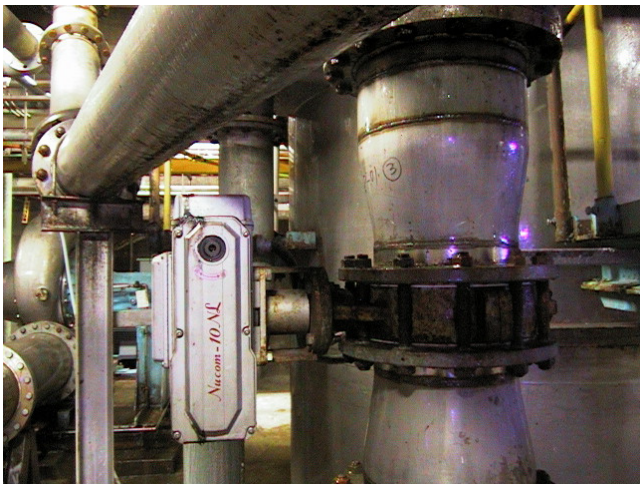
Most small / medium range actuator products found in the market primarily target at On-Off applications, and thus the parts and constructions are selected and designed so as to meet such light duty operations.

Koei took different path than those ordinary approach - set own standards for attaining most efficient process controls, and developed high-resolution / heavy-duty 4-20mA input signal modulating *Nucom* series first in the early '80s.

Aside from those precision control specifications, basic requirements for *Nucom* were to withstand rather severe industrial process requirements of such as pulp & paper mills, under moisture, heat, and high-pitch vibrations from pumping through 24-7 operations, and to remain maintenance free for years to come – to provide our customers most benefits out of all electric valve control network. Several mills have over 1,000 control loops with *Nucom*.

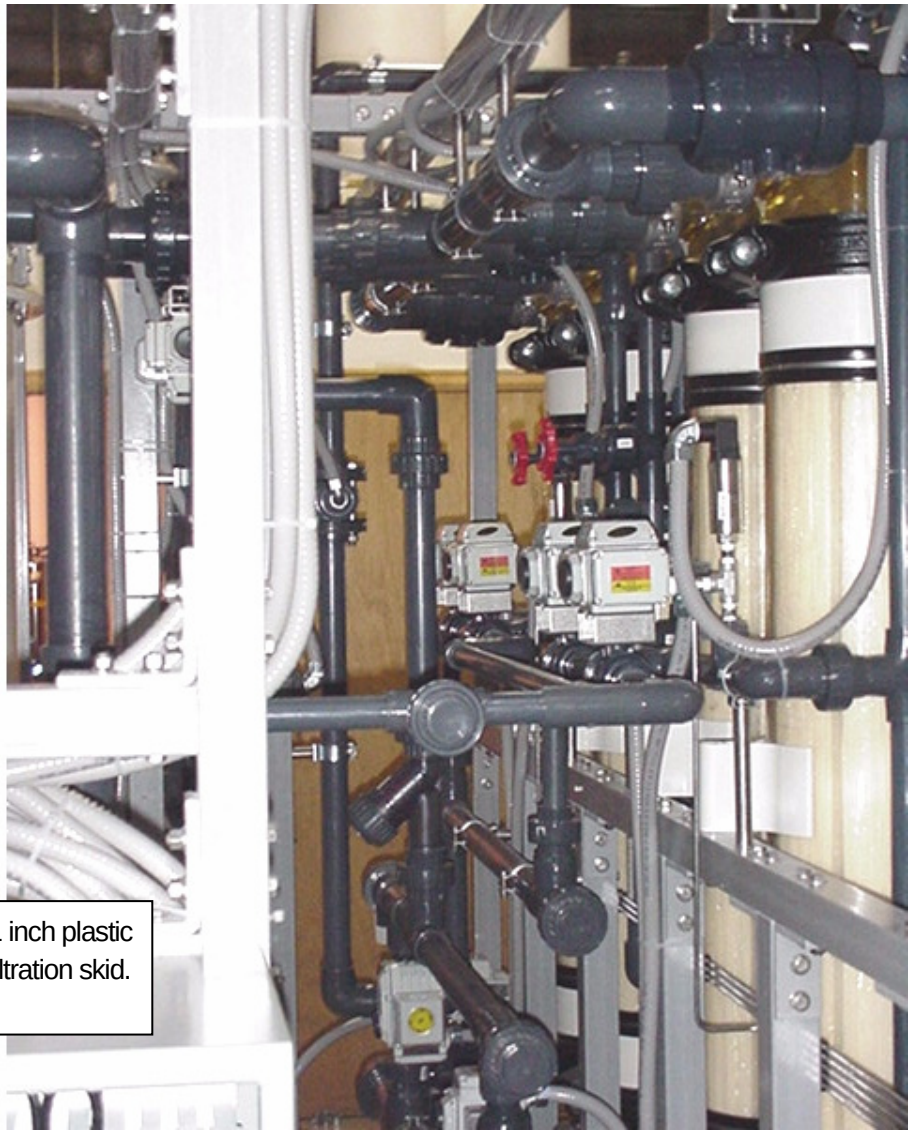


2 inch V-ball valve with Unic-10 class (Nucom-10NS) in paper mill replaces globe pneumatic control valve.



10 inch metal seated butterfly valve with Unic-60 class (Nucom-10NL) in paper mill – where moisture, heat and vibration are common, and fitting in to the tight space between tanks and pipes is often prerequisite.

Industrial PID Modulating origin On-Off actuators – this is the key to understand the real advantage of this simple valve / damper operating device. Even the *Unic* actuators are doing only several cycles per day, *Koei* applies the best parts designed for continuous heavy-duty applications – it sounds “overkill” for some people in this industry, however, from our R&D and production point of view, it is natural to share main body, power train, motor, and electronic parts with other product lines – adopting the field-proven design, construction and parts of *Nucom* series modulating actuators is simply an advantage of *Unic* series, providing high competitiveness in the market without making any compromise in quality nor performance. Best of all, we are proudly offering our best On-Off actuators at reasonable cost, yet with extra high performance and durability margin against “everything could happen” process control environment.



Unic-05 actuators are mounted on 1 inch plastic ball valves inside an industrial R/O filtration skid. 8 units can be seen from this angle.

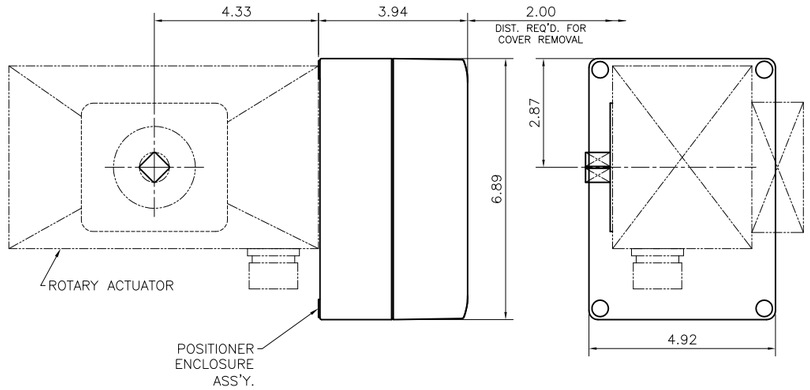
Every *Koei* actuators are made to achieve minimum weight and size in each torque / speed class in the market while maintaining rugged construction for withstanding heavy duty conditions, simply because we believe Light Weight & Low Profile / Compact Design contributes to flexibility in plant design, and provides over all economy to the users.

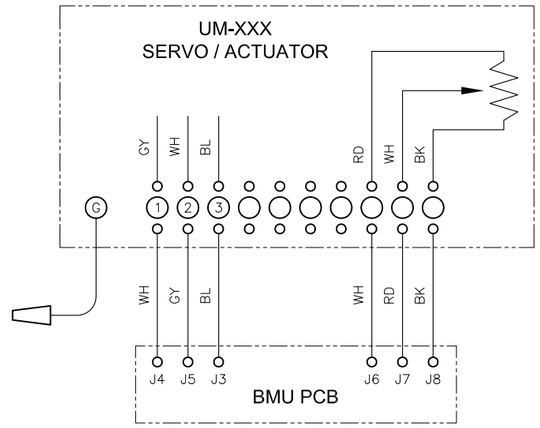
Low profile / Compact / Narrow Body design and 360 deg. mountable structure enables installation in minimum space in between pipes and tanks – customers can have wider choice of valve types and can choose better installation point along the pipeline. In some cases, compact actuators can eliminate high cost of re-routing piping.
Distance between pipe to pipe, as well as distance between piping to wall, can be minimized by compact / 360 degree mountable actuators, which can lead engineers to construct whole system / plant in much less space / area by minimizing dead spaces along the pipeline.

Not only lighter weight, but also lower height assembly design gives less stress to piping and valve connections under vibration. Industrial quality actuators tend to have larger mass, and need extra supports for mounting. *Koei* products can eliminate such installation nightmare.
There are many kinds of small - medium size actuators in the market place, however, most of those small ones are for lighter duty and cleaner ambient conditions.
Compact, yet Industrial Quality Actuator – that is what we are presenting to our customers, for enhancing their production quality and performance.

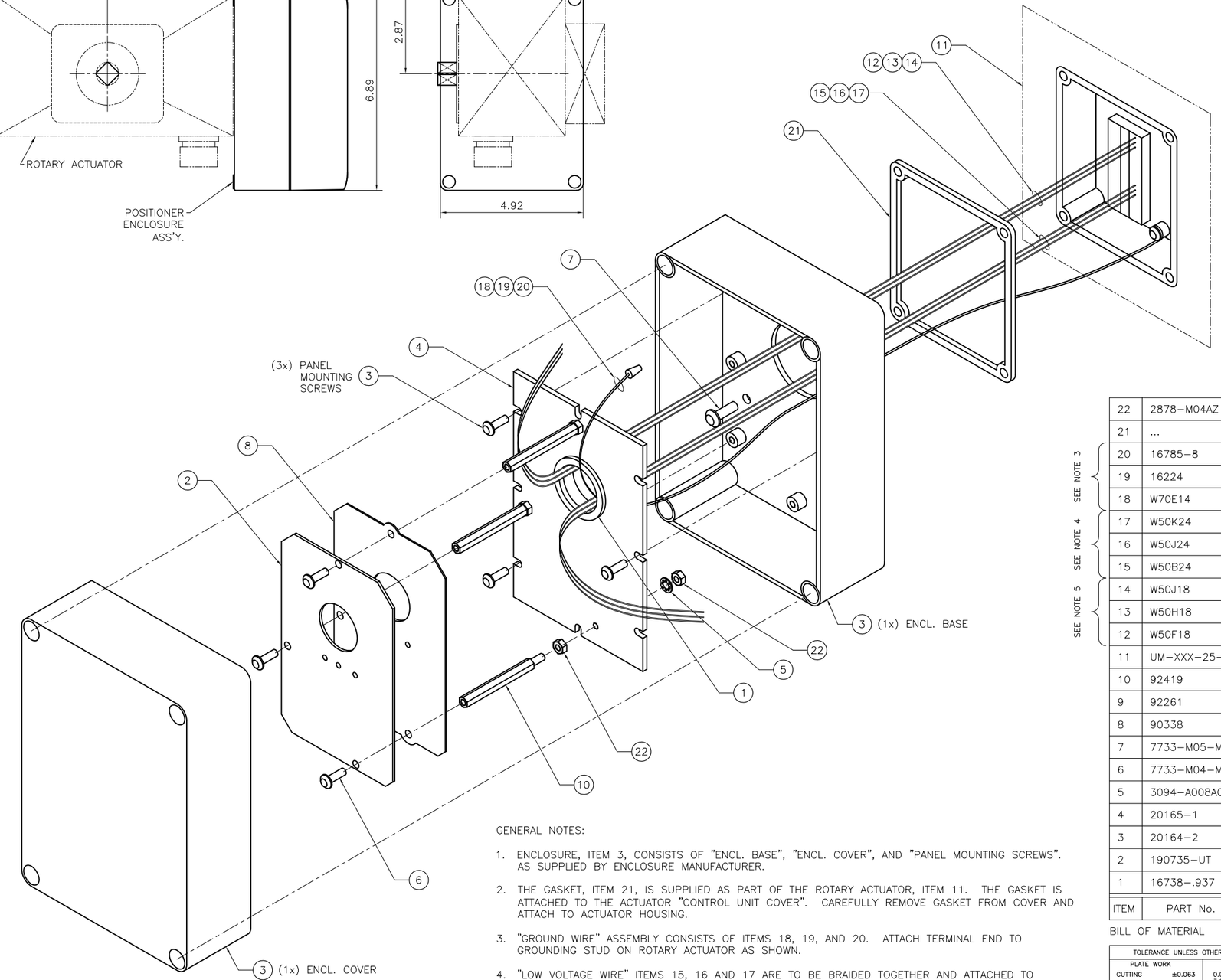
F:\GENERAL\PPC\Unic Actuator Mounting\Aux Box Assy.dwg, BMU-UM-140.280

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
...	A	ADDED ITEM 22; ITEM 5, QTY WAS 9.	1/23/09	PPC





TYPICAL WIRING BETWEEN
"BMU PCB" AND "ROTARY ACTUATOR"



	22	2878-M04AZ	6	HEX NUT M4 x 0.7 MM PITCH
	21	...	1	GASKET (SEE NOTE 2)
SEE NOTE 3	20	16785-8	1	TERMINAL, LOCKING FORK
	19	16224	1	WIRE-NUT WIRE CONN., BLUE, PRESSURE-TYPE
	18	W70E14	1	WIRE, 14 GA, GREEN
SEE NOTE 4	17	W50K24	1	WIRE, 24 GA, BLACK
	16	W50J24	1	WIRE, 24 GA, WHITE
	15	W50B24	1	WIRE, 24 GA, RED
SEE NOTE 5	14	W50J18	1	WIRE, 18 GA, WHITE
	13	W50H18	1	WIRE, 18 GA, GRAY
	12	W50F18	1	WIRE, 18 GA, BLUE
	11	UM-XXX-25-2-1K-E0-S2-M0	1	ROTARY ACTUATOR, 140 OR 280 FT-LB
	10	92419	3	STANDOFF, 6MM HEX, MALE-FEMALE, 52MM LG, M4-0.7 THR'D.
	9	92261	2	SHUNT (NOT SHOWN)
	8	90338	1	INSULATOR SHEET
	7	7733-M05-M12SS	4	METRIC PAN HD. SCREW, M5-0.8MM x 12MM LG.
	6	7733-M04-M12SS	3	METRIC PAN HD. SCREW, M4-0.7MM x 12MM LG.
	5	3094-A008AC	3	LOCK WASHER, #8, INT. SHK. PRF.
	4	20165-1	1	PANEL
	3	20164-2	1	ENCLOSURE (SEE NOTE 1)
	2	190735-UT	1	BMU ACTUATOR PCB, UNTESTED
	1	16738-.937	1	BUSHING, SNAP ON
	ITEM	PART No.	QTY	DESCRIPTION

BILL OF MATERIAL

GENERAL NOTES:

1. ENCLOSURE, ITEM 3, CONSISTS OF "ENCL. BASE", "ENCL. COVER", AND "PANEL MOUNTING SCREWS". AS SUPPLIED BY ENCLOSURE MANUFACTURER.
2. THE GASKET, ITEM 21, IS SUPPLIED AS PART OF THE ROTARY ACTUATOR, ITEM 11. THE GASKET IS ATTACHED TO THE ACTUATOR "CONTROL UNIT COVER". CAREFULLY REMOVE GASKET FROM COVER AND ATTACH TO ACTUATOR HOUSING.
3. "GROUND WIRE" ASSEMBLY CONSISTS OF ITEMS 18, 19, AND 20. ATTACH TERMINAL END TO GROUNDING STUD ON ROTARY ACTUATOR AS SHOWN.
4. "LOW VOLTAGE WIRE" ITEMS 15, 16 AND 17 ARE TO BE BRAIDED TOGETHER AND ATTACHED TO TERMINAL STRIP ON ROTARY ACTUATOR AS NOTED. PASS WIRING THROUGH COMPONENTS AS SHOWN AND SOLDERED TO BMU PCB CONTACT POINTS AS NOTED. SUFFICIANT LENGTH OF WIRE SHOULD BE PROVIDED TO ALLOW FOR REMOVAL OF ALL COMPONENTS.
5. "POWER WIRE" ITEMS 12, 13 AND 14 ARE TO BE BRAIDED TOGETHER AND ATTACHED TO TERMINAL STRIP ON ROTARY ACTUATOR AS NOTED. PASS WIRING THROUGH COMPONENTS AS SHOWN AND SOLDERED TO BMU PCB CONTACT POINTS AS NOTED. SUFFICIANT LENGTH OF WIRE SHOULD BE PROVIDED TO ALLOW FOR REMOVAL OF ALL COMPONENTS.

TOLERANCE UNLESS OTHERWISE SPECIFIED			
PLATE WORK		MACHINING	
CUTTING	±0.063	0.000-3.000	±0.016
ASSEMBLY:		3.001-24.00	±0.031
0"-36"	±0.063	24.00 & UP	±0.062
36" & UP	±0.125	ANGLES	±1°00'
ANGLES	±2'30'	HOLE DIA.	
HOLE DIA.		0.000-0.250	+0.003 -0.002
0.000-0.250	+0.006 -0.002	0.251-0.500	+0.005 -0.002
0.251-0.500	+0.008 -0.002	0.501 & UP	+0.010 -0.003
0.501 & UP	+0.010 -0.003	FINISH	125 RMS
BREAK ALL SHARP EDGES			

PREFERRED INSTRUMENTS
31-35 South Street, Danbury, CT. 06810 (203)743-6741
A Division of Preferred Utilities Manufacturing Corp.

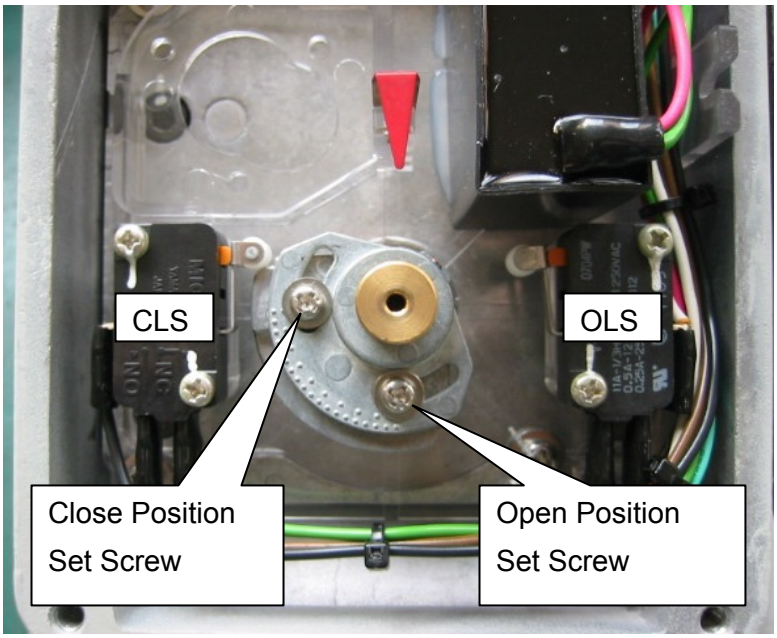
BMU-UM-140 OR -280
POSITIONER ENCLOSURE
ASSEMBLY

SIZE	JOB NO.	DWG NO.	REV
D	....	BMU-UM-140(PEA)	A

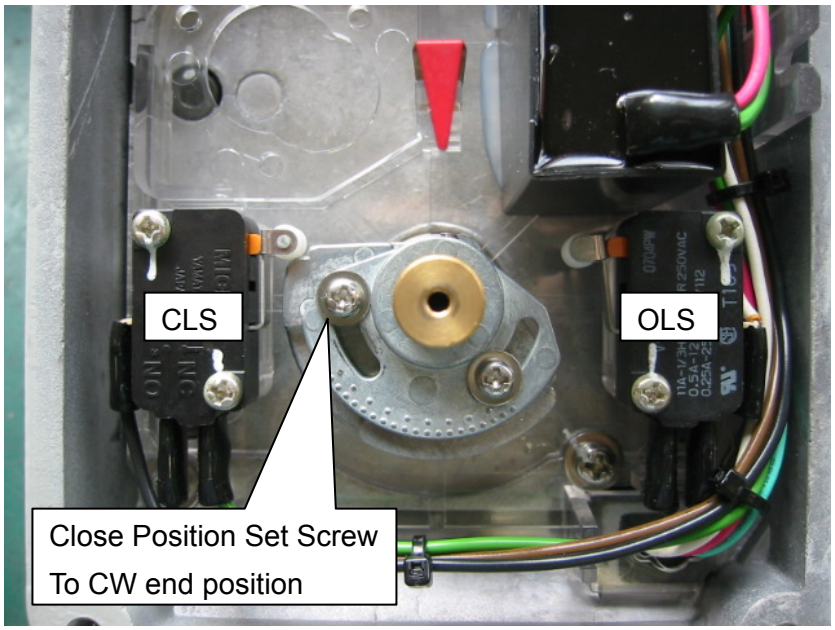
SCALE N.T.S. SHEET 1 of 1

Unic-20 / 40 – Close Side Limit Switch Adjustment

(Factory Default Position)
- Actuator electrical operation angle:
  0 – 90 deg.
- Picture at Close Position



(Close Cam Set at Widest Angle)
- Open Cam position unchanged
- Close Cam moved to the farthest position
- Actuator electrical operation angle:
  34 – 90 deg.
- Picture at Close Position



(Both Cams Set at Widest Angle)
- Both Open / Close Cam moved to the farthest position
- Entire Cam position readjusted
- Actuator electrical operation angle:
  69 – 90 deg.
- Picture at Open Position