Noah®

MA-SERIES MANUAL

http://www.emico.co.kr

EMICO

EUNHA MACHINERY INDUSTRIAL CO.,LTD

1. Caution

Turn off ALL Power before opening the terminal cover of the actuator.

Before use, verify the nameplate information to make sure the actuator has all the correct contents. (model number, torque, power voltage)

Please be sure to completely read and review the actuator manual prior to operation.

After assembling the actuator to the valve, make sure to do a final limit switch setting adjustment. Incorrect adjustment may cause the actuator to fail.

If the power supply is 1–phase, there must be one power line/wire source for each actuator to avoid possible motor burn–out or malfunction.

Use the grounding lugs provided inside and outside the actuator to properly ground the actuator.

Explosion–proof products must be only used under the appropriate temperature and environment.

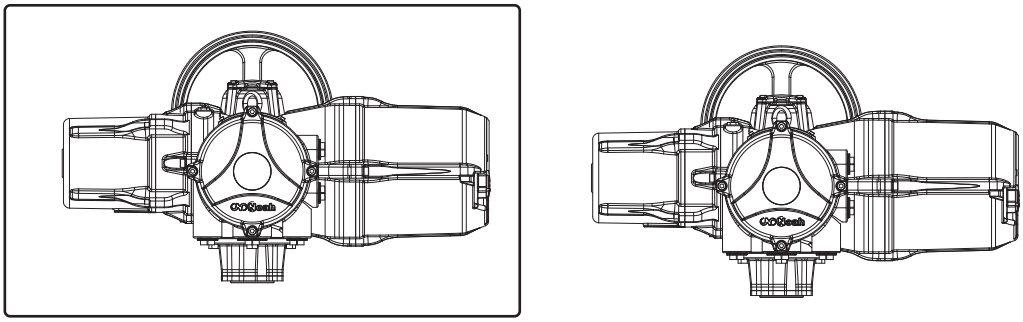
Ex d IIC T4 –20℃~ +55℃

When installing the wiring for explosion–proof actuators, the cable gland must also have the explosion–proof certification. The manufacturer is not responsible for any damages caused by incorrect installation or the use of any unapproved (non explosion–proof) products.

2. Storage

If the actuator cannot be immediately installed, it must be stored in a clean, dry and temperature controlled area. If stored in an area with high humidity, use the internal heater every 2 weeks to prevent condensation. Also, do not remove the blocking device plug for the cable entries until the actuator is ready to be installed correctly on site.

	Indoors
	18℃ ± 5℃



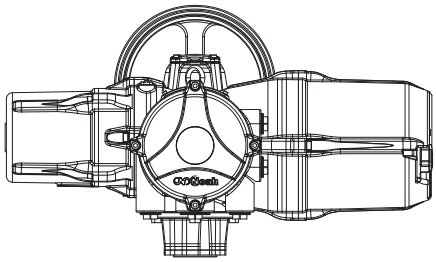
Improper storage of the actuator will void warranty.

3. Actuator Uses

3–1 The MA series actuator is designed for multi–turn automation requiring at least one full rotation. It is available in different torque outputs from 1kg·m (10N·m) ~ 180kg·m (1800N·m). MA series is also suitable for linear operation gate valve and globe valve as well as quarter–turn operation butterfly and ball valve.

3–2 Environment and Temperature

※ Standard Enclosure

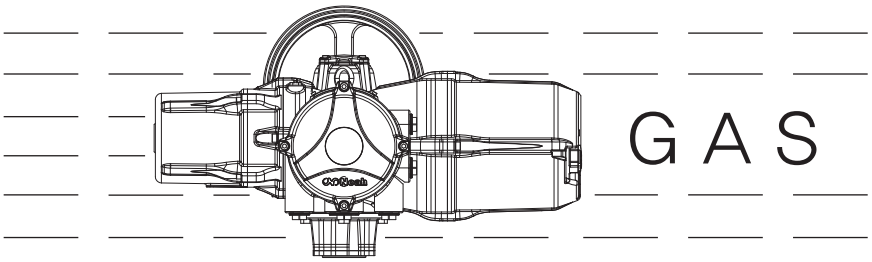


Temperature Range	–20℃ ~ +70℃
Sealing Protection	IP68

– The actuator enclosure is made from an anodized aluminum alloy coated for outdoor uses to help protect from erosion and oxidation.

– Depending on the environment, the type of sealing protection (IP) needed for the actuator will be different. Please contact us for detailed information and specification.

※ Ex Explosion–proof



Explosion Proof	Ex d IIC T4
Temperature Range	–20℃ ~ +55℃

4. Standard Specification

Enclosure	Watertight Ingress Protection 68 Nema 4 and 6
Ambient Temperature	−20℃ to +70℃
Power Supply	3PH 220 / 380 / 400 / 415 / 440 / 460 / 480 VAC 50/60Hz
Stall Protection	Built − in Thermal Protection
Manual Override	Manual /electric operating device
Limit Switch	Absolute Encorder
Torque Switch	Torque Sensor
Handle	MA01,02: Bevel Gear, MA03,04: Worm Gear
Duty Cycle	S2 30min
Base	ISO5210
Self Locking	Provided by means of Worm Gearing
Lubrication	Shell Gadus S2 V220 00
Material	Aluminium
Surface Treatment	Anodizing
External Coating	Polyester(TGIC−Free)

5. Optional Specification

E X P	Explosion Proof / Ex d IIC T4 (−20℃ to +55℃)
P C U	Proportional Control Unit (Input : DC 4−20mA, DC 0~10V / Output: DC 4−20mA)
C P T	Current Position Transmitter (Output: DC 4−20mA)
Field−Bus	Profi−Bus, Mod−Bus, Can−Bus

Manual Override

Use the hand lever for manual operation. After manual override when the motor turns on, the actuator will automatically reset to the previous setting.

Self Locking

2nd level worm gear system prevents any actuator from back−driving causing reverse valve rotation.

Heater

The internal heater helps to minimize and protect the actuator from condensation due to temperature and humidity.

Motor

The actuator motor has thermal protection (TP) designed to protect the motor from over heating (TP at 130℃)

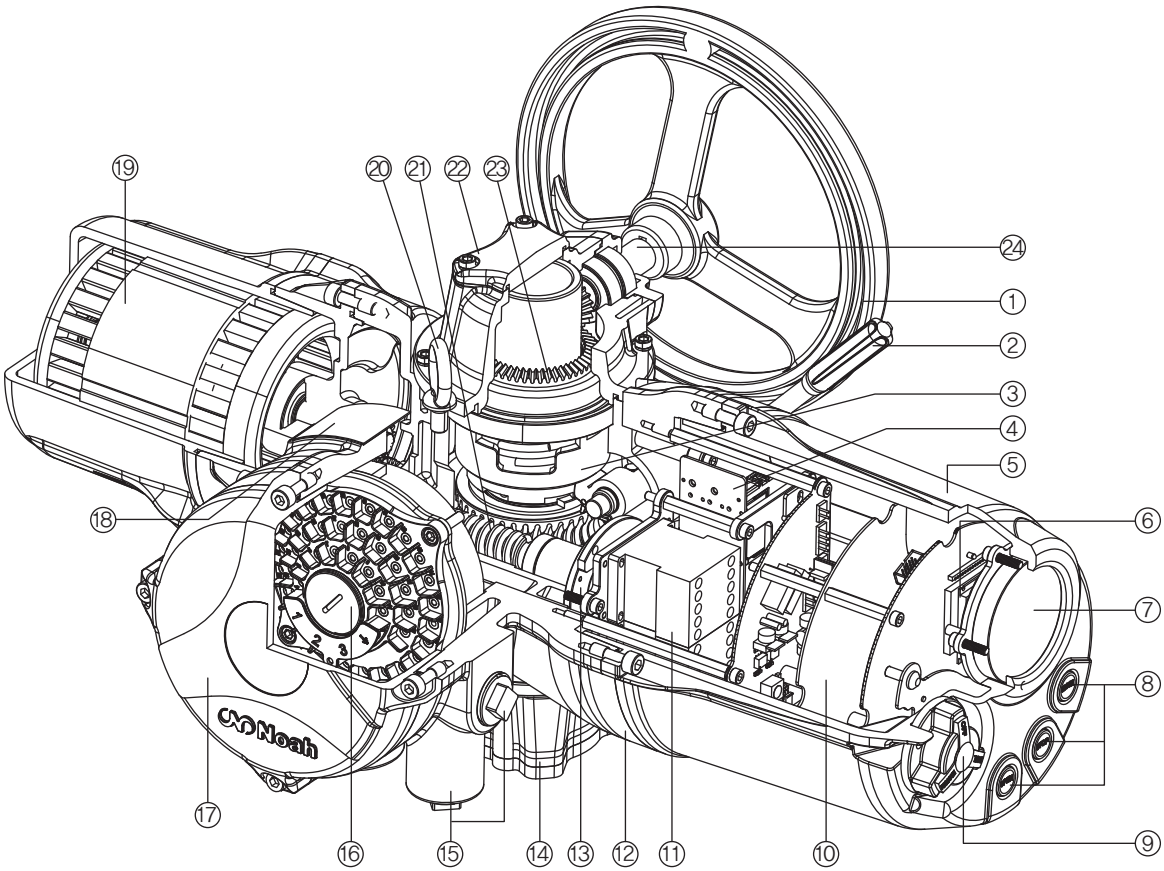
6. Speed–torque table

Max toruqe: N·m Ft-lbf

Model	Hz	50	60	50	60	50	60	50	60	50	60	50	60	50	60
	rpm	15.5	18.6	20.0	24.0	28.7	34.4	35.4	42.5	43.7	52.2	62.4	74.9	80.7	97.0
MA01	0.2	82		64		46		37		29		21		-	
		(60)		(47)		(34)		(27)		(21)		(15)		-	
	0.4	138		127		92		73		58		42		32	
		(102)		(94)		(68)		(54)		(43)		(31)		(24)	
	0.75	138		138		138		127		101		73		56	
		(102)		(102)		(102)		(94)		(74)		(54)		(41)	
MA02	0.75	302		246		169		-		-		-		-	
		(223)		(181)		(125)		-		-		-		-	
	1.5	415		415		340		270		214		155		120	
		(306)		(306)		(251)		(199)		(158)		(114)		(89)	
	2.2	415		415		415		372		295		214		165	
		(306)		(306)		(306)		(274)		(218)		(158)		(122)	
MA03	2.2	793		613		444		-		-		-		-	
		(585)		(452)		(327)		-		-		-		-	
	3.7	845		845		720		572		454		328		254	
		(623)		(623)		(531)		(422)		(335)		(242)		(187)	
	5.5	-		845		845		826		655		474		367	
		-		(623)		(623)		(609)		(483)		(350)		(271)	
MA04	5.5	1774		1436		1040		-		-		-		-	
		(1308)		(1059)		(767)		-		-		-		-	
	7.5	1774		1774		1340		1064		844		611		473	
		(1308)		(1308)		(988)		(785)		(623)		(451)		(349)	
	11	1774		1774		1774		1445		1147		830		642	
		(1308)		(1308)		(1308)		(1066)		(846)		(612)		(474)	

7. Interior Parts Idantification

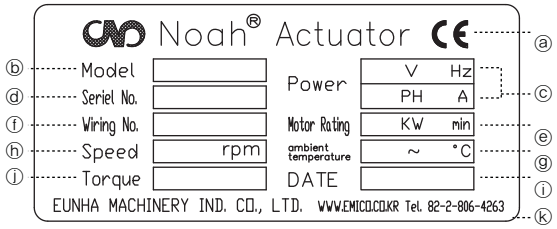
7-1. MA01, MA02, MA03, MA04



No.	Name	No.	Name	No.	Name
1	Handle	9	Selector Switch	17	Terminal Cover
2	Manual Lever	10	Board	18	Nameplate
3	Manual Override	11	Magnetic Contact	19	Motor
4	Position Controller	12	Body	20	Eye bolts
5	LCU Cover	13	Torque sensor	21	Worm Gear
6	LCD Display	14	Base	22	Stem Cover
7	Window	15	Cable entries	23	Bevel Gear Clutch
8	Local Control Switch	16	Terminal	24	Handle Shaft

8. Actuator Nameplate Information

Before use, please verify the nameplate information to insure that the actuator is the correct model.



8-1 **ⓐ Noah ACTUATOR**

Noah ACTUATOR

8-2 **ⓑ Model**

Model Number

8-3 **ⓒ Power**

Main Power supply voltage

8-4 **ⓓ Ser.No.**

Unique serial number is issued for each and every actuator

8-5 **ⓔ Motor Rating**

Indicates the motor capacity and rated time

8-6 **ⓕ Wiring No.**

The number of the actuator's wiring diagram. The diagram is located inside the top cover.
Contact the supplier if the diagram is missing or the wiring number is different from the nameplate.

8-7 **ⓖ Ambient Temperature**

Temperature of the actuator

8-8 **ⓗ Speed**

Actuator Speed

8-9 **ⓘ Date**

Product Year. Month. Day.

8-10 **ⓙ Torque**

Actuator Torque

8-11 **ⓚ Company manufacturer information**

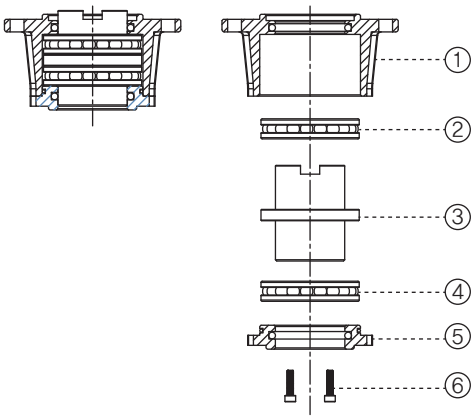
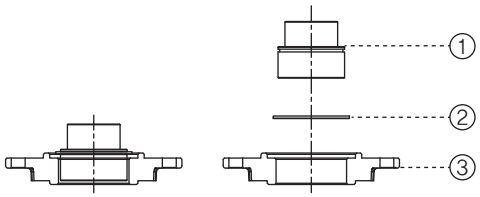
EUNHA MACHINERY INDUSTRIAL CO.,LTD(EMICO)
Tel: 02-806-4263 / Web Site: www.emico.co.kr

8-12 Flameproof / Explosion Proof ACTUATOR Enclosure

If the actuator is explosion-proof, confirm that the nameplate has the explosion-proof symbol or certification number. If there is no symbol or certification number, contact your supplier because the actuator is not manufactured with explosion-proof option.

9. Base & Buching Specification

MA Series base size is manufactured according to ISO5210 standards. If the actuator base and the bushing does not mount directly to the valve, a separate coupling adapter must be used.

Thrust Type	Non-Thrust Type
	

No.	Name	No.	Name
1	Base Body	4	Thrust Bearing
2	Thrust Bearing	5	Base
3	Bushing	6	Bolts

No.	Name
1	Bushing
2	Snapring
3	Base

9-2 Drive Bushing MAX Machined Bore Size

(mm)

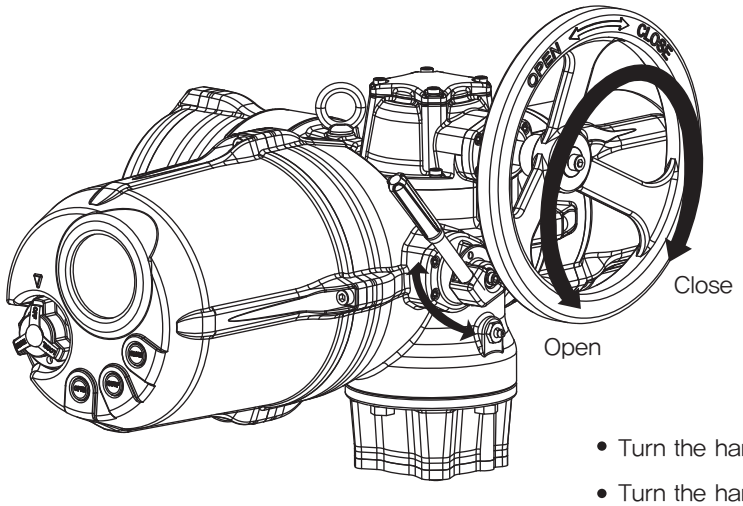
Model	Flange (ISO5210)	P.C.D	Tap	Max Size	
				Screw	Key
MA01	F10	Ø102	4-M10	40	Φ30
MA02	F14	Ø140	4-M16	58	Φ46
MA03	F16	Ø165	4-M20	72	Φ58
MA04	F25	Ø254	8-M16	97	Φ82

※ When requested, the drive bushing can be separately manufactured to directly fit the valve stem if the valve drawings and specs are provided to the manufacturer.

10. Manual Operation

10–1
The lever and the handwheel is provided for manual operation. To engage in manual operation, push the lever down and turn the handwheel.

10–2
If the lever does not move correctly, slowly turn the handwheel clockwise and pull the lever in the opposite direction.



- Turn the handwheel clockwise to close
- Turn the handwheel counter–clockwise to open

10–3
After manual operation, when the power is on, the actuator will automatically return to motor drive operation without using the lever.

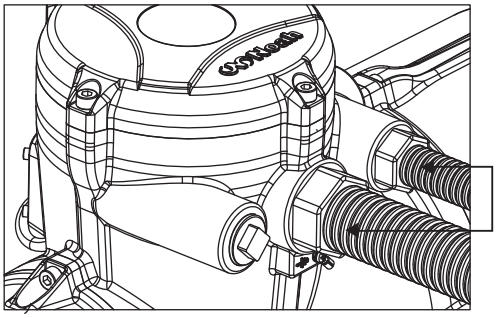
10–4
If a problem occurs during operation and the lever does not move for manual override, it may be due to jamming.

What is Jamming?

Jamming is when the worm gear is stuck so the lever and the handwheel does not move at this state.
Please refer to page 32 of the manual for solution when jamming occurs.

11. Wire Connection

The two cable entries on the MA Series is 2 x PF 1" and 1 x PF 1.5". Since the actuator is sold world-wide, there may be difference in the cable entry specification and thread pitch standards so please make sure to check.



Cable Grand Spec. (Standard)	Cable Grand Spec. (Option)
2 x PF1" 1 x PF1 1/2"	4 x PF1" 1 x PF1 1/2"
2 x M25 Pitch1.5 1 x M40 Pitch1.5	4 x M25 Pitch1.5 1 x M40 Pitch1.5
2 x NPT1" 1 x NPT1 1/2"	4 x NPT1" 1 x NPT1 1/2"

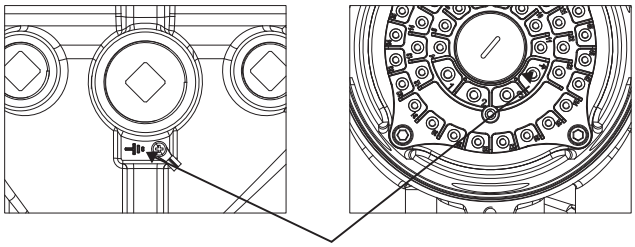
12. Electrical Wiring

12-1
Use a wrench to loosen 4 cover bolts and separate the top cover of the actuator. The actuator is double-sealed for double protection from dust and water. It is completely watertight and dust-proof so protection is maintained during site installation of electrical wiring connection.

12-2
Verify that the wiring diagram located in the actuator match the wiring number on the nameplate.

12-3
Verify that the main power voltage matches the power voltage on the nameplate.

12-4
Be sure to connect protective earth conductors inside and outside the terminal.



12-5
After the wiring is complete, use wire ties to clean and arrange the wires together inside the actuator.
Be sure that the wires are secured from any moving parts and remove any loose debris to prevent any interference when the actuator is in operation.

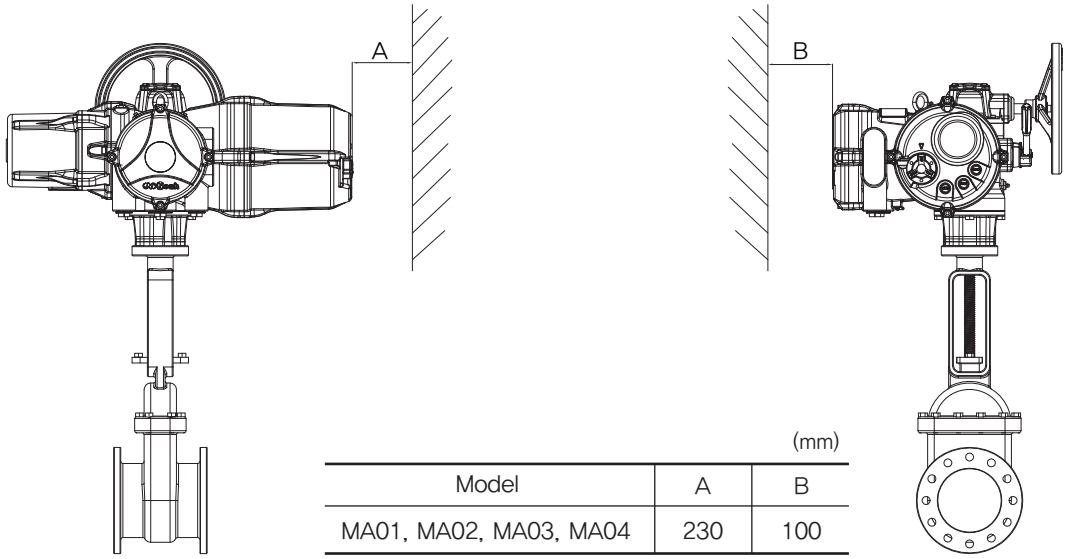
12-6
When all set up and electrical connection is complete, place the top cover back on the actuator and secure it by using the 4 cover bolts.

12-7
Turn on the power and do a final check to make sure the actuator is operating properly.

Main power must only be turned on after the top cover has been re-installed on the actuator.
If the main power is on while wiring the actuator, stop immediately and turn the power off first before proceeding.

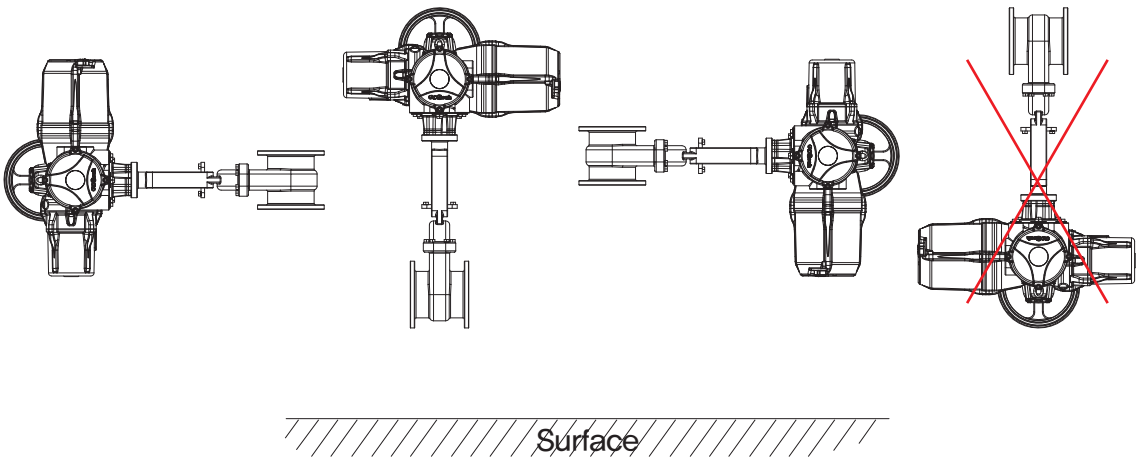
13. Actuator Installation

When installing the actuator, proper and accessible space is required around the actuator to ensure that there is enough room for maintenance check.



(mm)

Model	A	B
MA01, MA02, MA03, MA04	230	100

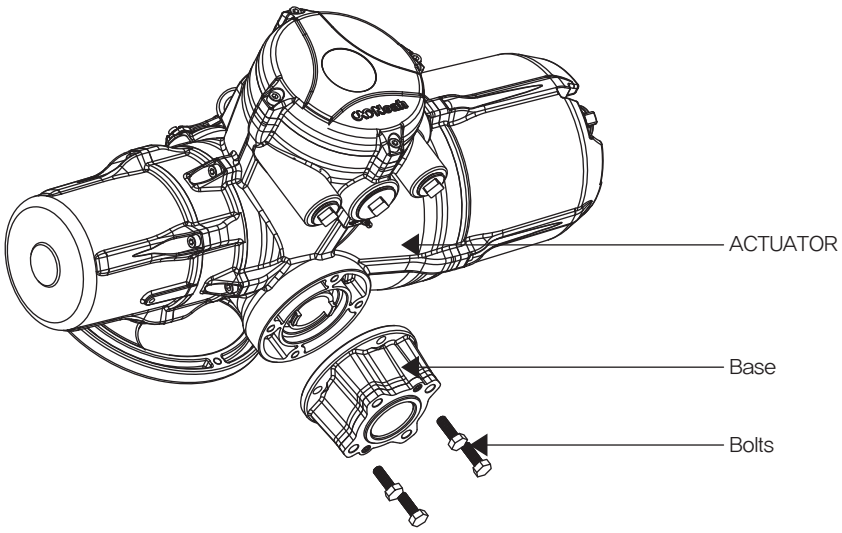


14. Actuator and Valve Aseembly

The manufacturer can directly assemble the actuator and the valve with the limit switch settings calibrated before delivery.

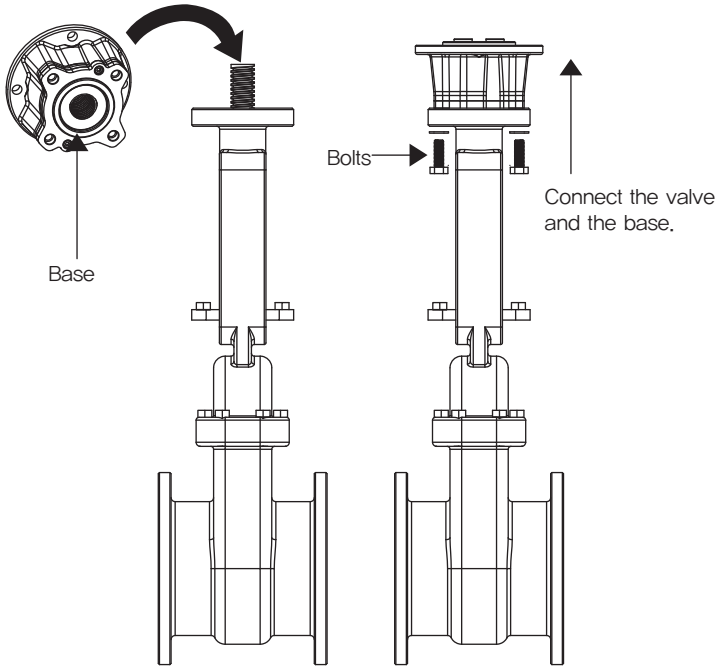
14-1 Bushing Assembly

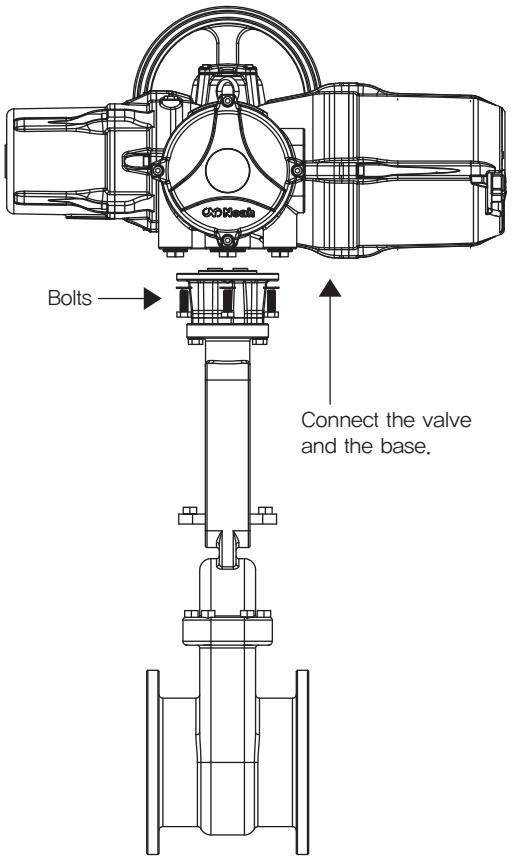
14-1-1
Separate the base and the actuator as shown in the picture below.



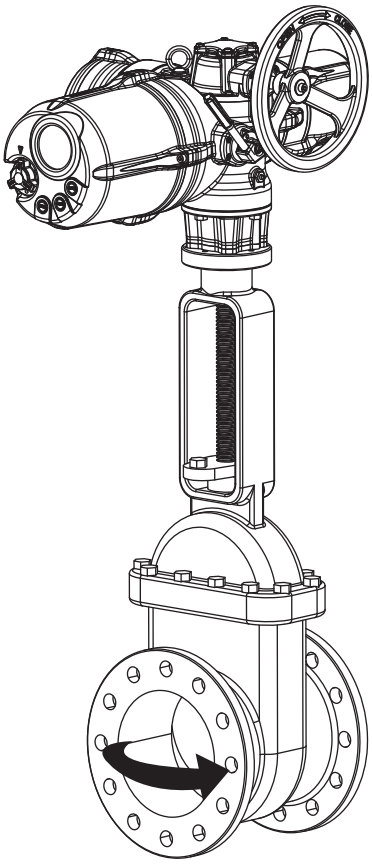
14-1-2
Check to see if the actuator base and the mounting flanges of the valve fit together.

※ Make sure to apply a good amount of grease to the input shaft and drive bushing.





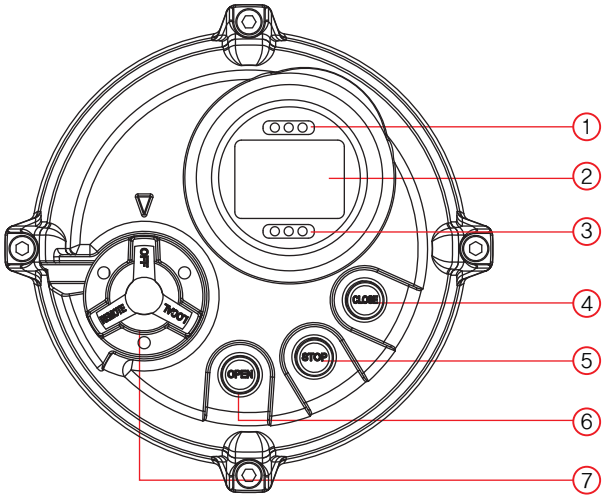
14–1–3
Assemble the actuator and the valve.



14–1–4
Use the lever and put the actuator in manual operation and confirm if the valve moves when turning the handwheel.

14–1–5
Set the actuator limit switch settings.

15. Board SPEC.

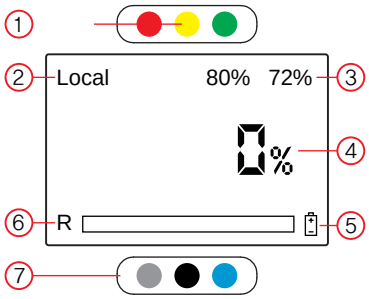


15-1 L.C.U Configure

No.	Name
1	LED Lamp
2	LCD Display
3	LED Lamp / IR Receiver
4	Close Push Button
5	Stop Push Button
6	Open Push Button
7	Remote/Local/Off Select Switch

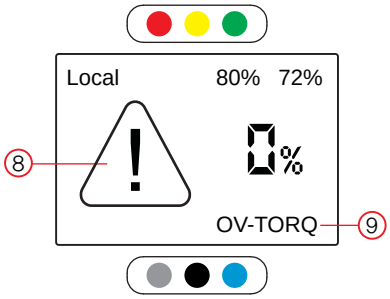
15-2 Display configuration

15-2-1 Basic screen

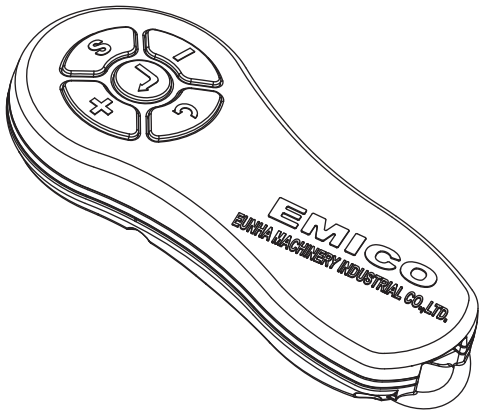


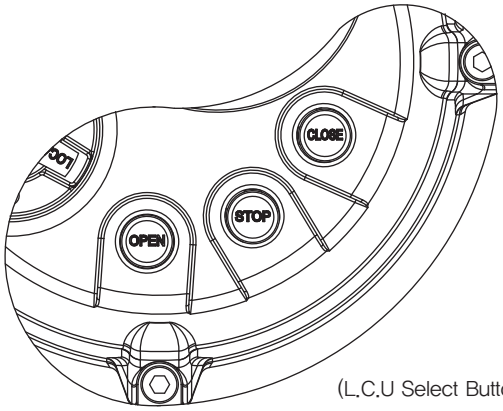
No.	Name
1	LED Lamp (Red:Open, Yellow:Error, Green:Close)
2	ACTUATOR Mode Display – REMOTE : ACTUATOR Remote control – LOCAL : ACTUATOR Local control – OFF : ACTUATOR OFF (Enter the menu) – ESD : ACTUATOR Emergency display
3	TORQUE display
4	Actuator from 0 to 100% display
5	Battery icon (Flashes when battery is low)
6	Reverse operation display
7	LED Lamp (White: Local, IR Receiver, Blue: Remote)
8	Error icon
9	Error message display

15-2-2 Error screen



15-3 Push Button & How to use setting tool





(L.C.U Select Button)

How to use setting puch button	Setting tool	How to use setting tool
OPEN	+	Scroll down and increase value in OFF mode. Open running in LOCAL mode.
CLOSE	−	Scroll up and decrease value in OFF mode. Close running in LOCAL mode.
OPEN CLOSE Push for at least 1 second	S	Enter the setting menu in OFF mode.
STOP Push for at least 1 second	↵	Display down menu or select the menu.
STOP	↩	Back to previous menu in OFF mode. Stop actuator in LOCAL mode.

16. Key Feature Details

16-1 ESD (=Emergency Shutdown)

In case of emergency, the ESD action has priority over any existing or applied local or remote control signals. ESD setting can be configured to user preference to open, close, stop, or middle position.
There is N.O (Normal Open) and N.C (Normal Close) option in ESD. Choose either N.O or N.C to activate the ESD signal. Moreover, ESD allows for override action if there is a problem in the actuator, with 5 different options that can be set to have priority (local, motor temperature, interlock, speed control, torque)

16-2 INTERLOCK

Interlock provides a way to "lock" and prevent changing setting while in local mode or remote mode.
So if interlock is set for remote, even if a push button is pressed in local, it will ignore that signal and only allow the signal from the remote control.

16-3 BRAKE

Brake is used to increase accuracy and precision when controlling the valve. Brake is used to protect the motor from hunting. However, because it will increase the chances of a burn-out in the motor when using brake, it is often not recommended.

16-4 TORQUE CONTORL

This setting is to use the torque to stop, open, close instead of the limit switch setting. The maximum rated torque is at 100% and the torque may be set in the range between 30%~100%.

16-5 DEAD BAND

Dead band is to set positioning accuracy. The dead band range is from 0.5%~10%. A smaller deadband increases accuracy, however it can cause unnecessary hunting which can easily burn-out the motor.

16-6 RESET

To reset all the user settings due to the valve breaking or change in user. However, it won't reset all the factory settings of over-torque settings and valve limit setting.

16-7 PASSWORD

Setting password to restrict and protect from anyone entering the setting menu.

16-8 SPEED CONTROL

The user can set the valve to move in different speed. Speed control for open and close can each be configured to different speed.

16-9 MODULATION

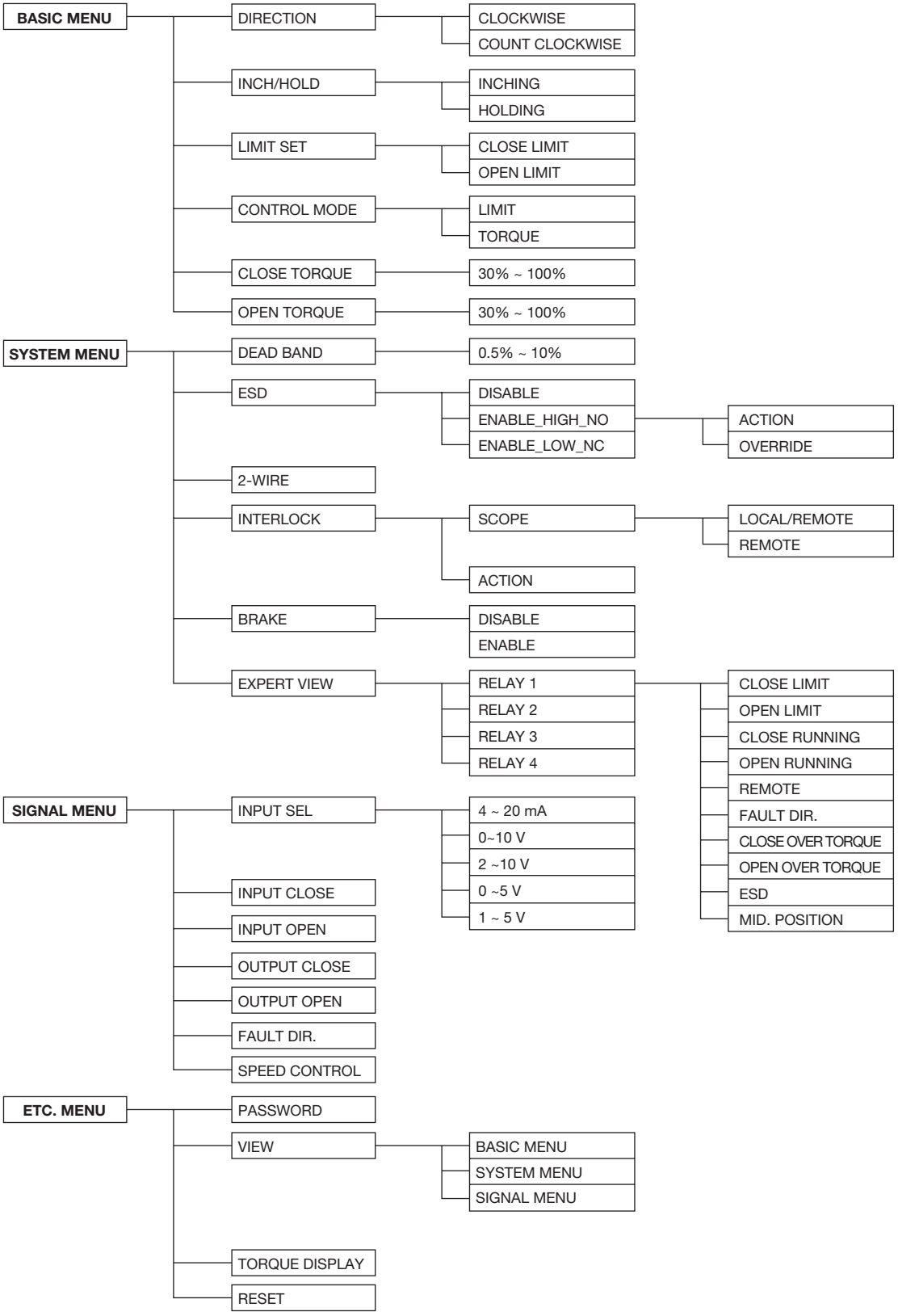
There are 5 different signal settings from 4-20mA to 0-10V, 2-10V, 0-5V, 1-5V. The most standard signal is 4-20mA. The user can set the input signal and output signal. If the signal is disconnected, the actuator can be auto-set to open, close, stop, or in middle position.

16-10 BATTERY

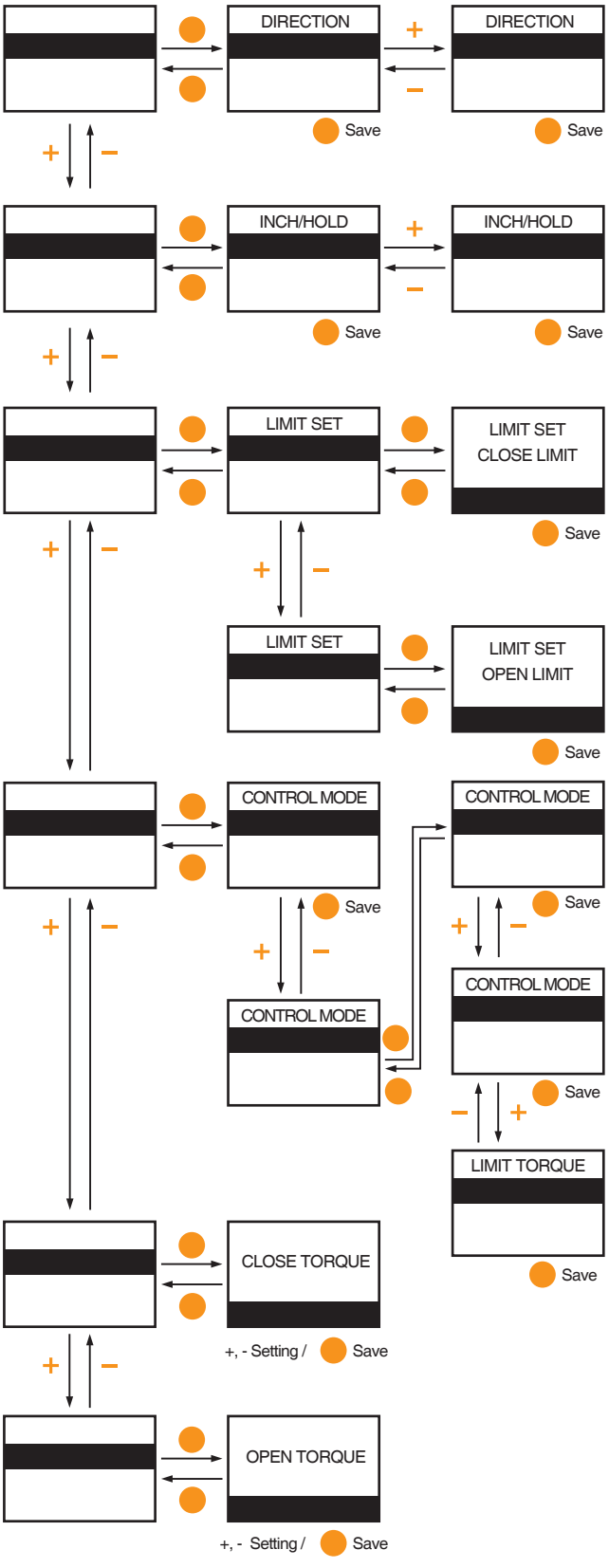
Even if the main power turns off, the current battery life (0-100%) is indicated on the LCD screen. However, the battery must be replaced when it runs out.

Manufacturer and Model Name	XENOENERGY / XL-100F	Power voltage	3.6V	Capacity	3500mAh	UL Number	MH28122

17. Board Menu Configuration



17-1. Basic Menu Setting



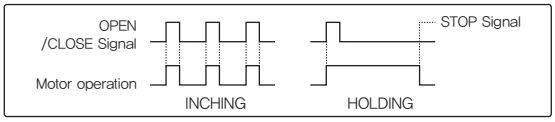
17-1-1 DIRECTION

[DEFAULT : CLOCKWISE]
Select the direction of motor rotation.
- CLOCKWISE : Clockwise is close running.
- COUNT CLOCKWISE : Count clockwise is close running.

* When count clock wise is selected, R is seen on the display.

17-1-2 INCH / HOLD

[DEFAULT : HOLDING]
Signal types in local mode.
- HOLDING : To keep moving according to the command till the stop command is given.
- INCHING : To start a motor with short jabs of power



17-1-3 LIMIT SET

Set the range of full open(0%) and full close(100%).

1	Enter CLOSE LIMIT Setting
2	Operate the actuator to close position using CLOSE or − button.
3	Stop the actuator using STOP or ↻ button.
4	Set the full close position by handwheel.
5	Push the STOP or ↵ button for a second.
6	Enter Close Limit Setting
7	Operate the actuator to close position using OPEN or + button.
8	Stop the actuator using STOP or ↻ button.
9	Put the actuator in full open position by manual handwheel.
10	Hold STOP or ↵ button for a second
11	Save the setting

17-1-4 CONTROL MODE

[DEFAULT : LIMIT]
How to stop the actuator in FULL OPEN or FULL CLOSE position can be selected.
- LIMIT : The actuator can stop at the position set in the LIMIT SET menu by encoder position
- TORQUE : The actuator can be stop at the position according to the set up torque in both close and open direction.

※ OPEN, CLOSE CONTROL MODE

MODE Setting	CLOSE	OPEN	CLOSE&OPEN
OPEN	LIMIT	TORQUE	TORQUE
CLOSE	TORQUE	LIMIT	TORQUE

17-1-5 CLOSE TORQUE

[DEFAULT : 100%]
The torque can be set in close direction from 30% to 100% by 0.1%.
Maximum torque can be displayed 100% converted into percentage.
E.G.) If the maximum torque is 50kg·m, 50% means 25kg·m.

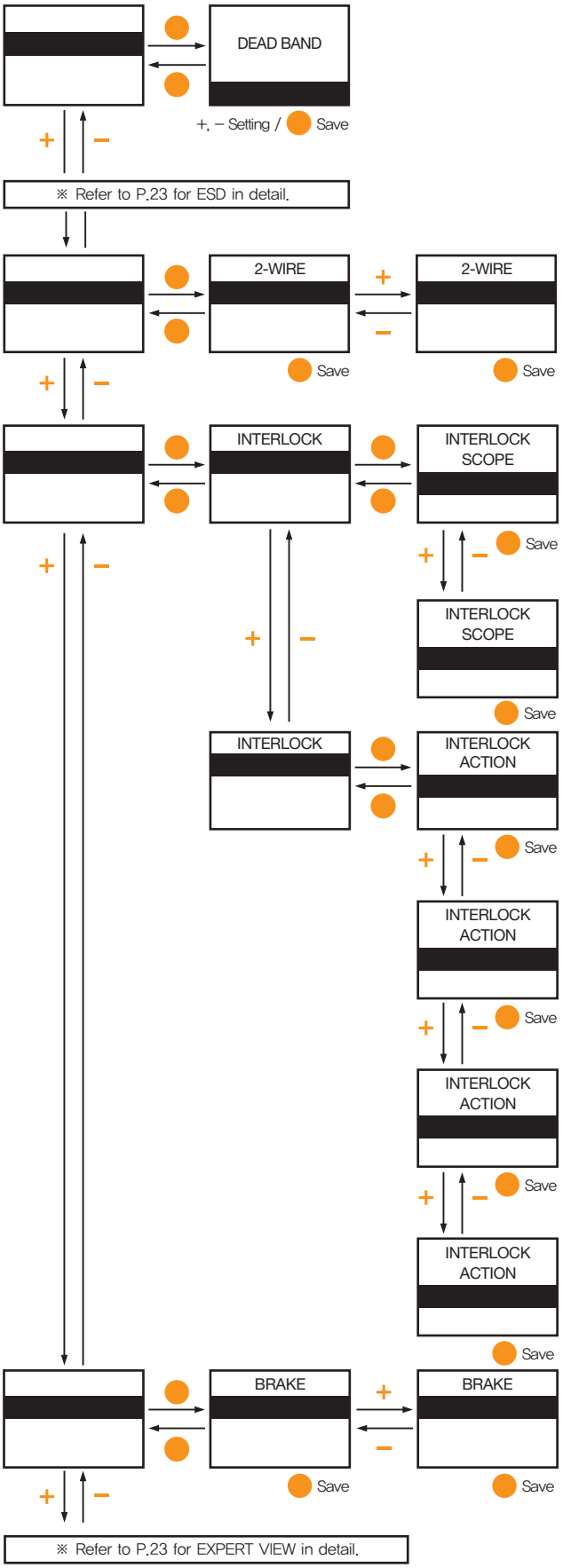
※ CONTROL MODE – TORQUE – CLOSE Setting
1) If the actuator stops at 0% but actually it exceeds the torque in the full close position, an error message is not displayed as it is normal operation.
2) If the actuator stops exceeding the torque between 1% and 99%, CL–TORQ is displayed.

17-1-6 OPEN TORQUE

[DEFAULT : 100%]
The torque can be set in open direction from 30% to 100% by 0.1%.
Maximum torque can be displayed 100% converted into percentage.
e.g.) If the maximum torque is 50kg·m, 50% means 25kg·m.

※ CONTROL MODE – TORQUE – OPEN Setting
1) If the actuator stops at 100% but actually it exceeds the torque in the full open position, an error message is not displayed as it is normal operation.
2) When the actuator stops exceeding the torque, OP–TORQ is displayed.

17–2. System Menu Setting



17–2–1 DEAD BAND

[DEFAULT : 1.2%]
To prevent the actuator's hunting, set the range not responding to the input signal and set up the precision. The range is from 0.5% to 10% by 0.1%.

E.G.) When the dead band is 2% and input is 50% (12mA), the actuator can stop between 48% to 52% (50±2%). The signal should be over 52% or under 48% to operate the actuator again.

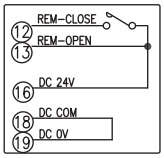
17–2–2 2–WIRE

[DEFAULT : CLOSE]
When there are signals in the terminal 12 (close) and the terminal 13(open) at once, a signal can be prioritized.

– CLOSE : Close is prioritized.
– OPEN : Open is prioritized.

※ CLOSE SETTING IN 2–WIRE

INTERNAL POWERED

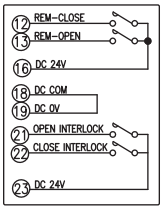


SWITCH	BOARD	OPERATION
SWITCH ON	12(CLOSE):HIGH 13(OPEN):HIGH	CLOSE
SWITCH OFF	12(CLOSE):LOW 13(OPEN):HIGH	OPEN

17–2–3 INTERLOCK

[DEFAULT : SCOPE – LOCAL/REMOTE , ACTION – DISABLE]
When the control system is accessible by anyone, INTEROCK can be used to prevent the operation by unauthorized persons.
Actuator can operate to open or close position only if there are additional signals in terminal no.21(open interlock) or terminal no.2w(close interlock).

- SCOPE — Setting the range of application.
  - LOCAL &REMOTE — The motor can't operate without interlock signal in LOCAL and REMOTE mode. (It's not applicable when action is in disable.)
  - REMOTE — The motor can't operate without interlock signal in REMOTE mode. (It's not applicable when action is in disable.)
- ACTION — Setting the restriction on direction.
  - DISABLE — Unuse interlock. The motor can operate to open or close position without INTERLOCK signal.
  - OPEN — The motor can not operate to OPEN without INTERLOCK signal.
  - CLOSE — The motor can't operate without INTERLOCK signal.
  - OPEN &CLOSE — The motor can't operate to OPEN and CLOSE direction without INTERLOCK signal.



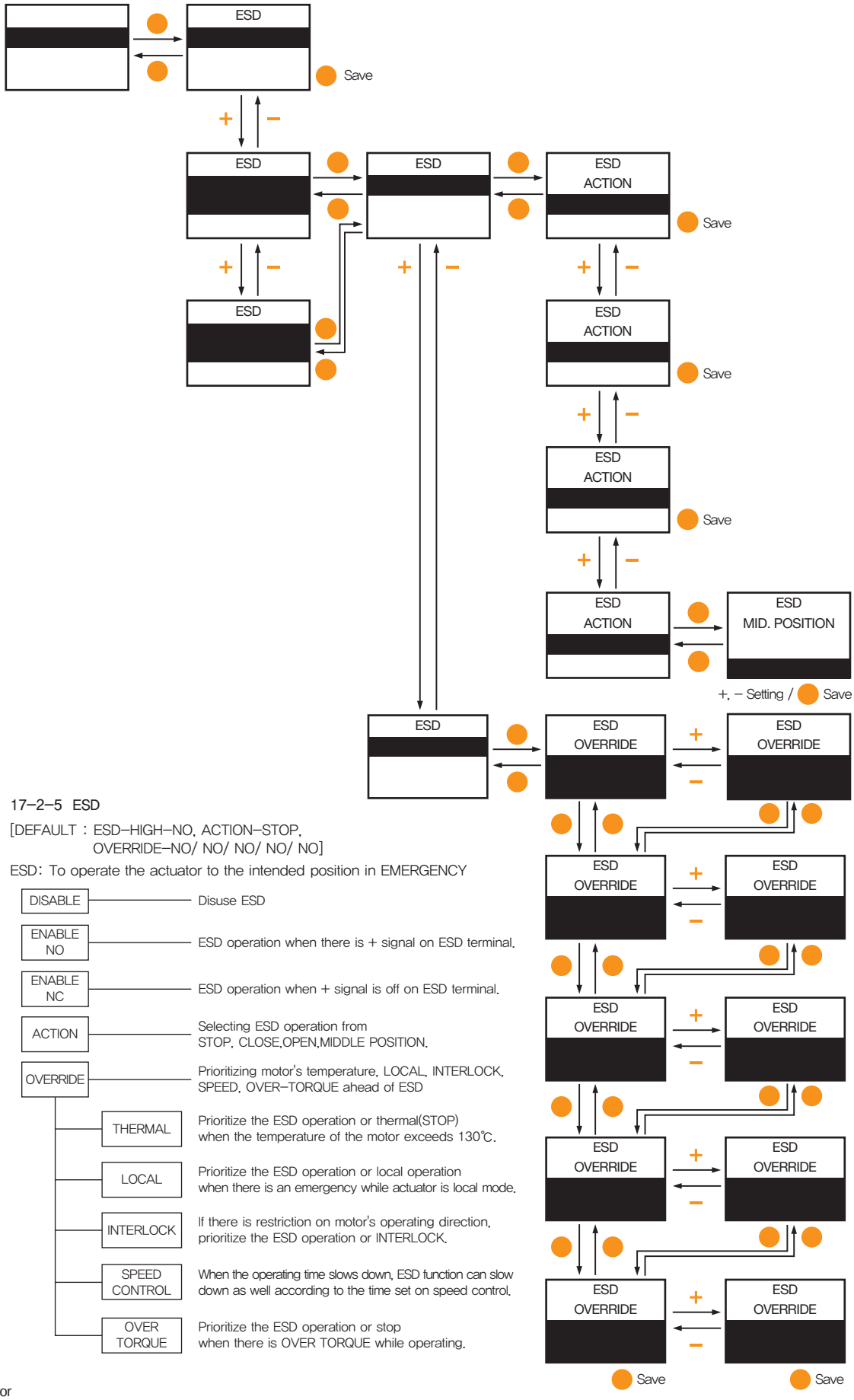
※ INTERLOCK, ACTION OPEN&CLOSE Setting

CLOSE	22	12
NO RUNNING	HIGH LOW LOW	LOW HIGH LOW
RUNNING	HIGH	HIGH

OPEN	21	13
NO RUNNING	HIGH LOW LOW	LOW HIGH LOW
RUNNING	HIGH	HIGH

17–2–4 BRAKE

[DEFAULT : DISABLE]
To control the actuator more accurately than the control range set already. When the distance between open and close is short or the load on the valve is little, there could be hunting. It could be controlled by brake. However, it could lead fatigue on the actuator so frequent use is not recommended.

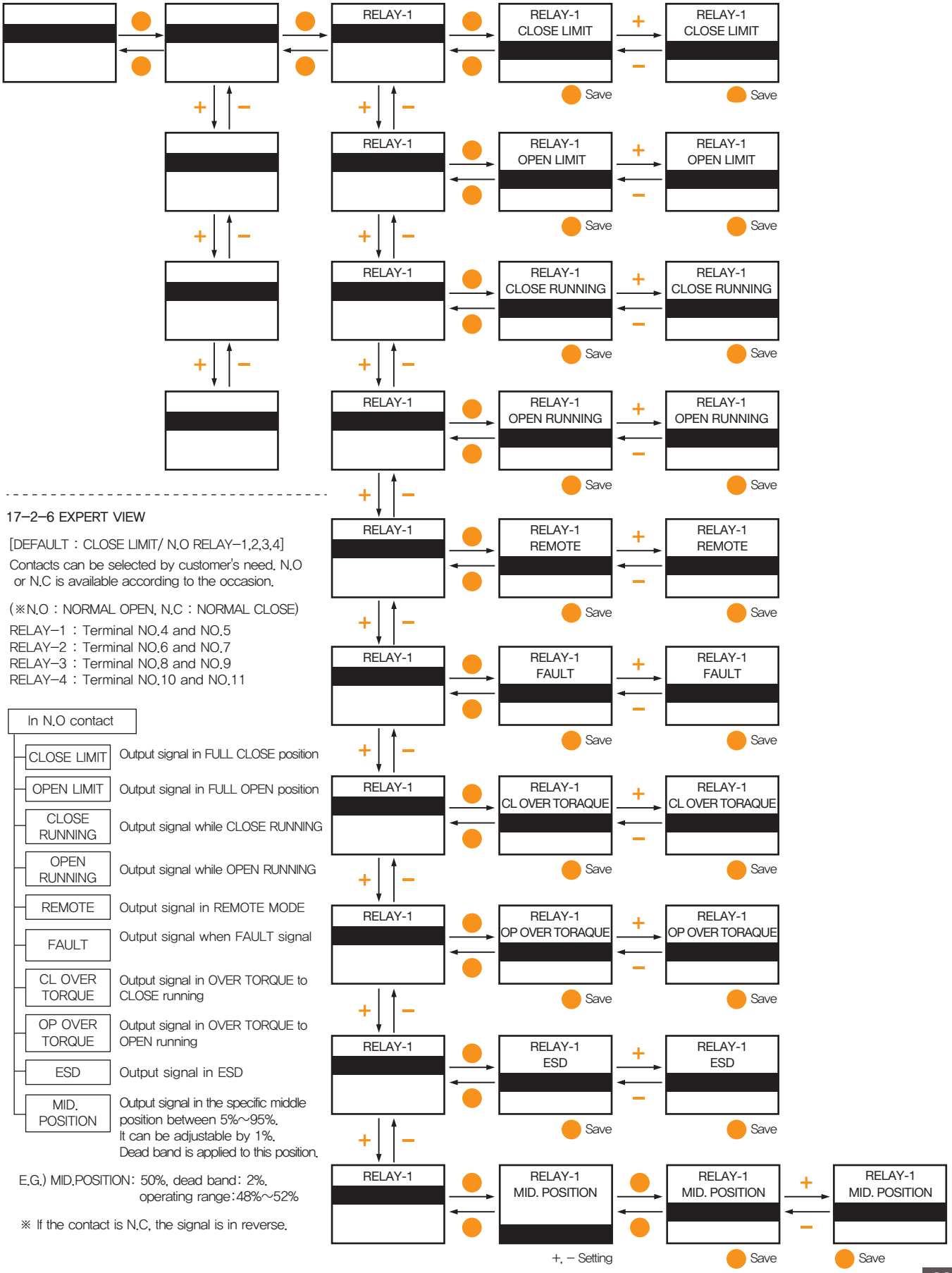


17-2-5 ESD

[DEFAULT : ESD-HIGH-NO, ACTION-STOP,
OVERRIDE-NO/ NO/ NO/ NO/ NO]

ESD: To operate the actuator to the intended position in EMERGENCY

- DISABLE — Disuse ESD
- ENABLE NO — ESD operation when there is + signal on ESD terminal.
- ENABLE NC — ESD operation when + signal is off on ESD terminal.
- ACTION — Selecting ESD operation from STOP, CLOSE,OPEN,MIDDLE POSITION.
- OVERRIDE — Prioritizing motor's temperature, LOCAL, INTERLOCK, SPEED, OVER-TORQUE ahead of ESD
  - THERMAL — Prioritize the ESD operation or thermal(STOP) when the temperature of the motor exceeds 130℃.
  - LOCAL — Prioritize the ESD operation or local operation when there is an emergency while actuator is local mode.
  - INTERLOCK — If there is restriction on motor's operating direction, prioritize the ESD operation or INTERLOCK.
  - SPEED CONTROL — When the operating time slows down, ESD function can slow down as well according to the time set on speed control.
  - OVER TORQUE — Prioritize the ESD operation or stop when there is OVER TORQUE while operating.



17-2-6 EXPERT VIEW

[DEFAULT : CLOSE LIMIT/ N.O RELAY-1,2,3,4]

Contacts can be selected by customer's need. N.O or N.C is available according to the occasion.

(※N.O : NORMAL OPEN, N.C : NORMAL CLOSE)

RELAY-1 : Terminal NO.4 and NO.5
RELAY-2 : Terminal NO.6 and NO.7
RELAY-3 : Terminal NO.8 and NO.9
RELAY-4 : Terminal NO.10 and NO.11

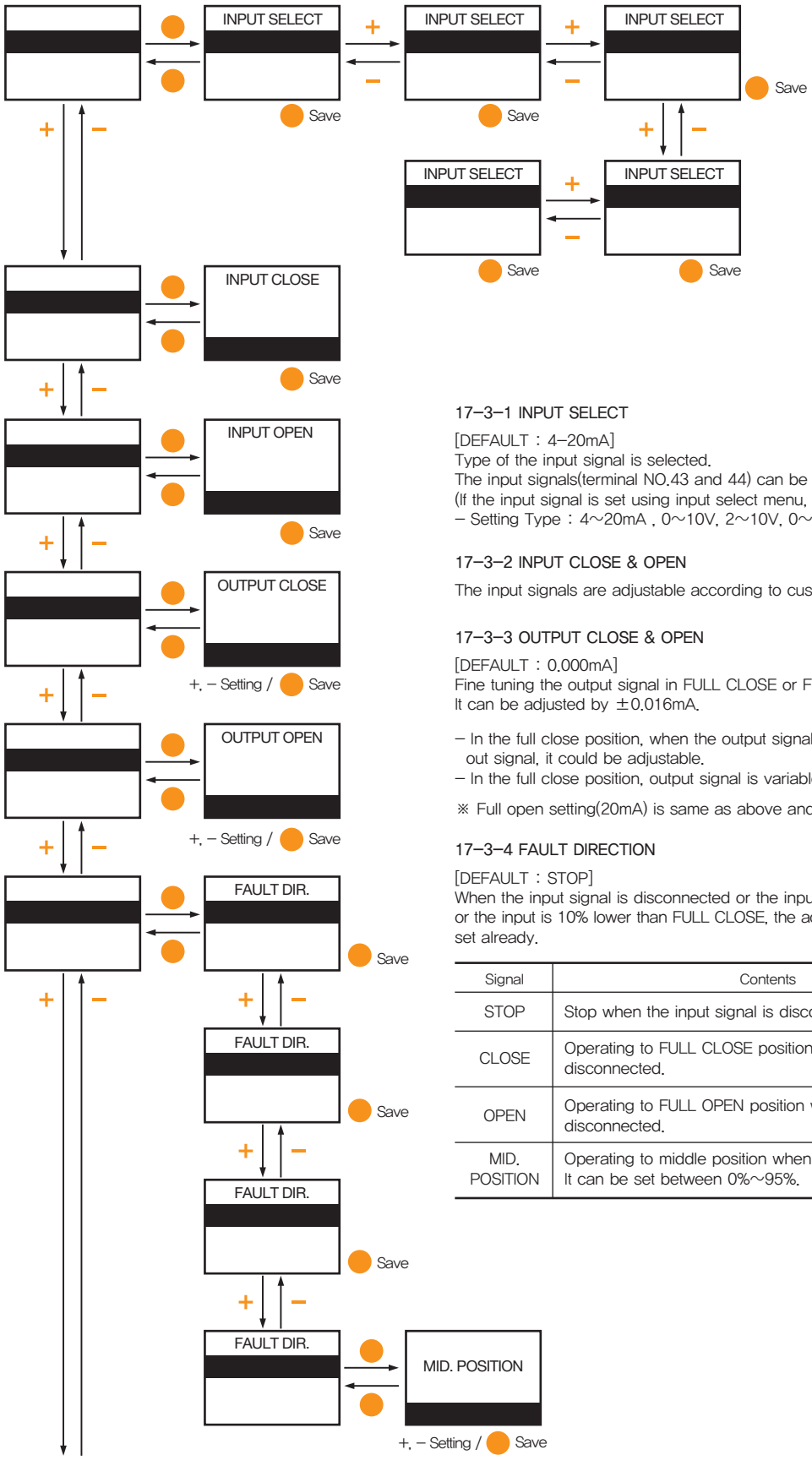
In N.O contact

CLOSE LIMIT	Output signal in FULL CLOSE position
OPEN LIMIT	Output signal in FULL OPEN position
CLOSE RUNNING	Output signal while CLOSE RUNNING
OPEN RUNNING	Output signal while OPEN RUNNING
REMOTE	Output signal in REMOTE MODE
FAULT	Output signal when FAULT signal
CL OVER TORQUE	Output signal in OVER TORQUE to CLOSE running
OP OVER TORQUE	Output signal in OVER TORQUE to OPEN running
ESD	Output signal in ESD
MID. POSITION	Output signal in the specific middle position between 5%~95%. It can be adjustable by 1%. Dead band is applied to this position.

E.G.) MID.POSITION: 50%, dead band: 2%.
operating range:48%~52%

※ If the contact is N.C, the signal is in reverse.

17–3. Signal Menu Setting



17–3–1 INPUT SELECT

[DEFAULT : 4–20mA]
Type of the input signal is selected.
The input signals(terminal NO.43 and 44) can be variable.
(If the input signal is set using input select menu, additional setting is not required.)
– Setting Type : 4~20mA , 0~10V, 2~10V, 0~5V, 1~5V

17–3–2 INPUT CLOSE & OPEN

The input signals are adjustable according to customer's need and it is displayed.

17–3–3 OUTPUT CLOSE & OPEN

[DEFAULT : 0.000mA]
Fine tuning the output signal in FULL CLOSE or FULL OPEN position.
It can be adjusted by ±0.016mA.

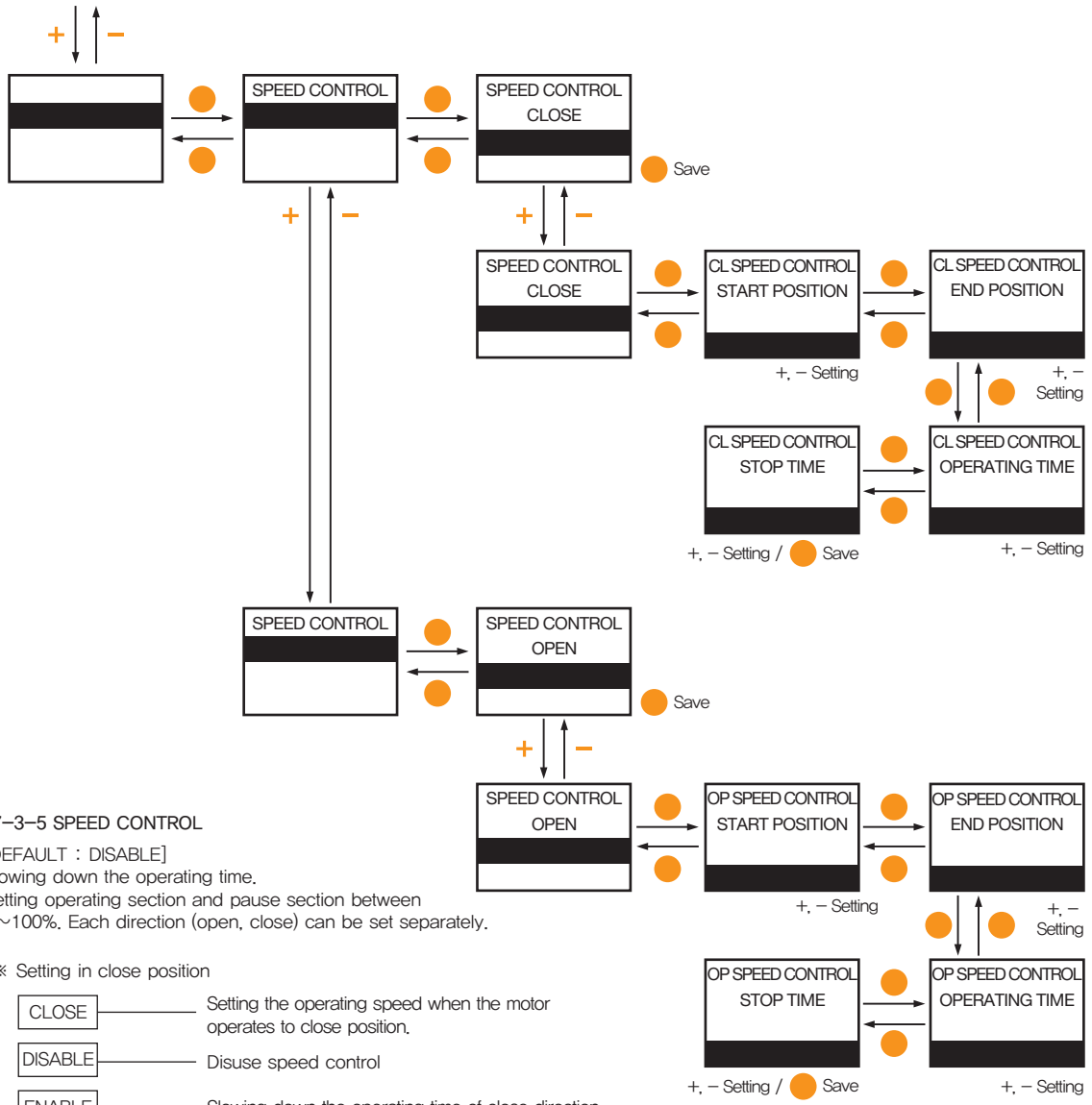
– In the full close position, when the output signal is different with the actuator's out signal, it could be adjustable.
– In the full close position, output signal is variable depending on the occasion.

※ Full open setting(20mA) is same as above and it's adjusted by +, – buttons.

17–3–4 FAULT DIRECTION

[DEFAULT : STOP]
When the input signal is disconnected or the input is 10% higher than FULL OPEN or the input is 10% lower than FULL CLOSE, the actuator can operate to the position set already.

Signal	Contents
STOP	Stop when the input signal is disconnected.
CLOSE	Operating to FULL CLOSE position when the input signal is disconnected.
OPEN	Operating to FULL OPEN position when the input signal is disconnected.
MID. POSITION	Operating to middle position when the input signal is disconnected. It can be set between 0%~95%.



17–3–5 SPEED CONTROL

[DEFAULT : DISABLE]
Slowing down the operating time.
Setting operating section and pause section between 0~100%. Each direction (open, close) can be set separately.

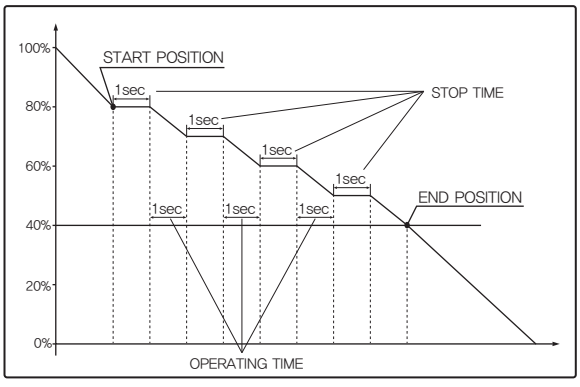
※ Setting in close position

- CLOSE — Setting the operating speed when the motor operates to close position.
- DISABLE — Disuse speed control
- ENABLE — Slowing down the operating time of close direction
  - START POSITION — Setting the start position of speed control (0~100sec)
  - END POSITION — Setting the end position of speed control (0~100sec)
  - OPERATING TIME — Setting operating time in speed control section (0~100sec)
  - STOP TIME — Setting pause in speed control section (0~100sec)

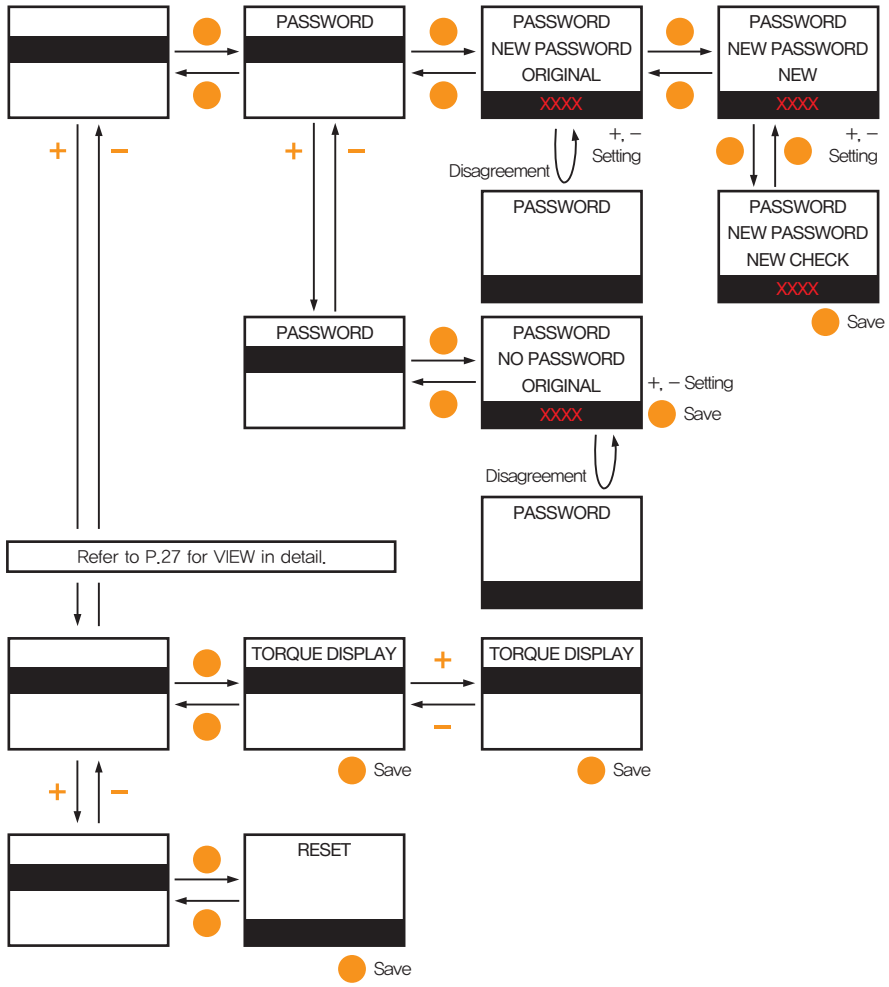
※ Open setting is same as above. (Direction:0%→100%)

※ Refer to the graph on the right for reference.

- START POSITION: 80%
- END POSITION: 40%
- OPERATING TIME: 1SEC
- STOP TIME: 1SEC



17-4. PASSWORD & VIEW Menu Setting



17-4-1 PASSWORD

[DEFAULT : NO PASSWORD]
Setting-up the password is available after the settings. When the actuator is locked, the only PASSWORD and VIEW menu are accessible and the other functions are available after entering password.

	NO PASSWORD
SYSTEM MENU SIGNAL MENU ETC. MENU	Unlock is available.

(* Display when the actuator is unlocked with a password.)

	NEW PASSWORD
VIEW	Set up the new password after providing the current password. Factory setting password: 0000

(* Display when the actuator is locked with a password.)

17-4-2 VIEW

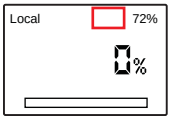
To view all settings of the actuator via this function.
View menu is useful and recommended to prevent unintended operation while viewing the settings and to see the all settings conveniently.

Even if the actuator is locked with the password, view menu is accessible.

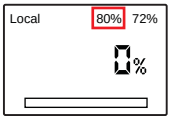
- Activated menu: BASIC, SYSTEM, SIGNAL MENU, BATTERY
- BATTERY menu: Battery status can be checked.
- The battery level is under 10% of its capacity, BATTERY is shown on the display. When it is displayed it should be replaced with the correct battery type.

17-4-3 TORQUE DISPLAY

[DEFAULT : DISABLE]
Torque on the actuator can be displayed in real time.



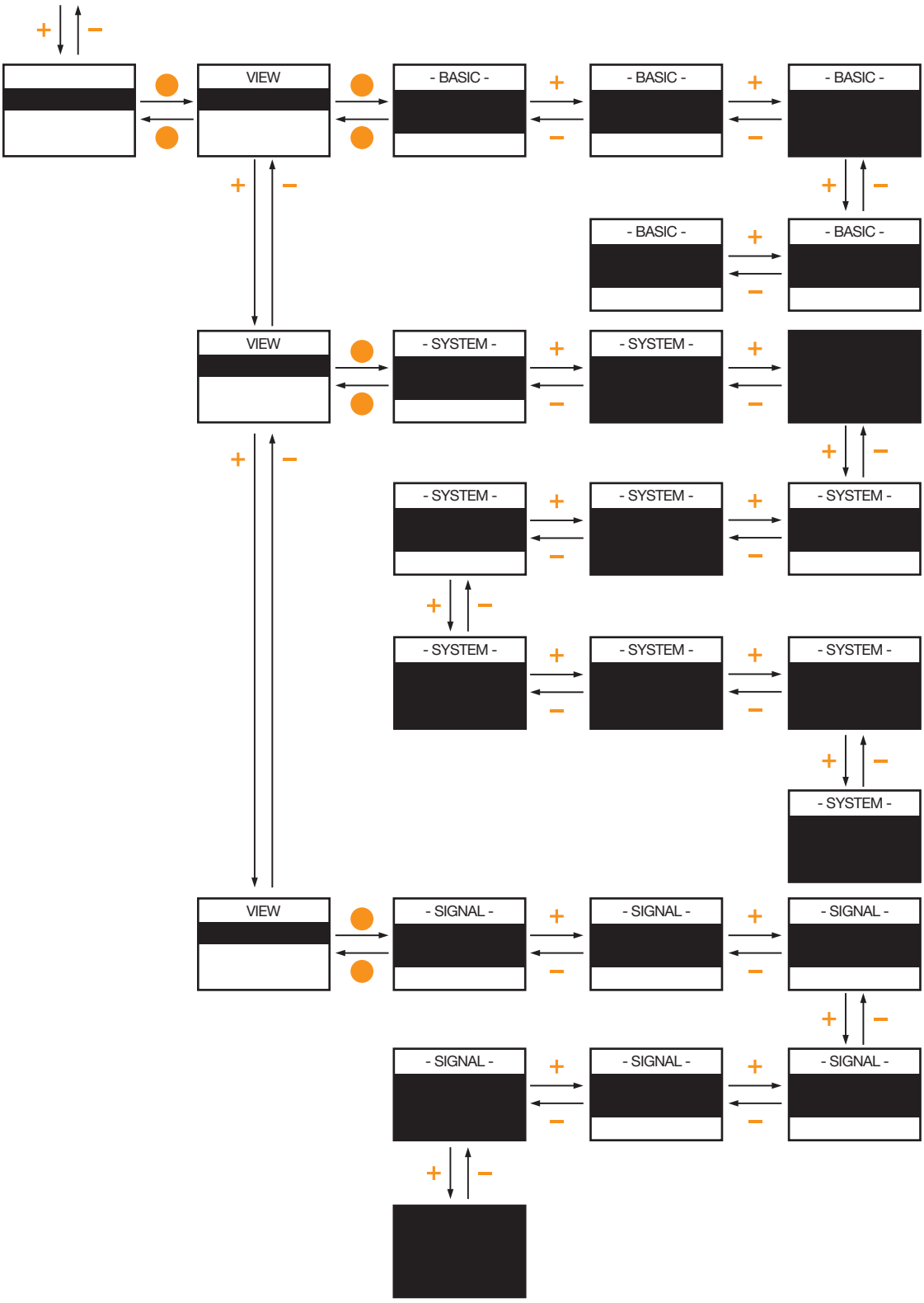
(ENABLE Display)



(DISABLE Display)

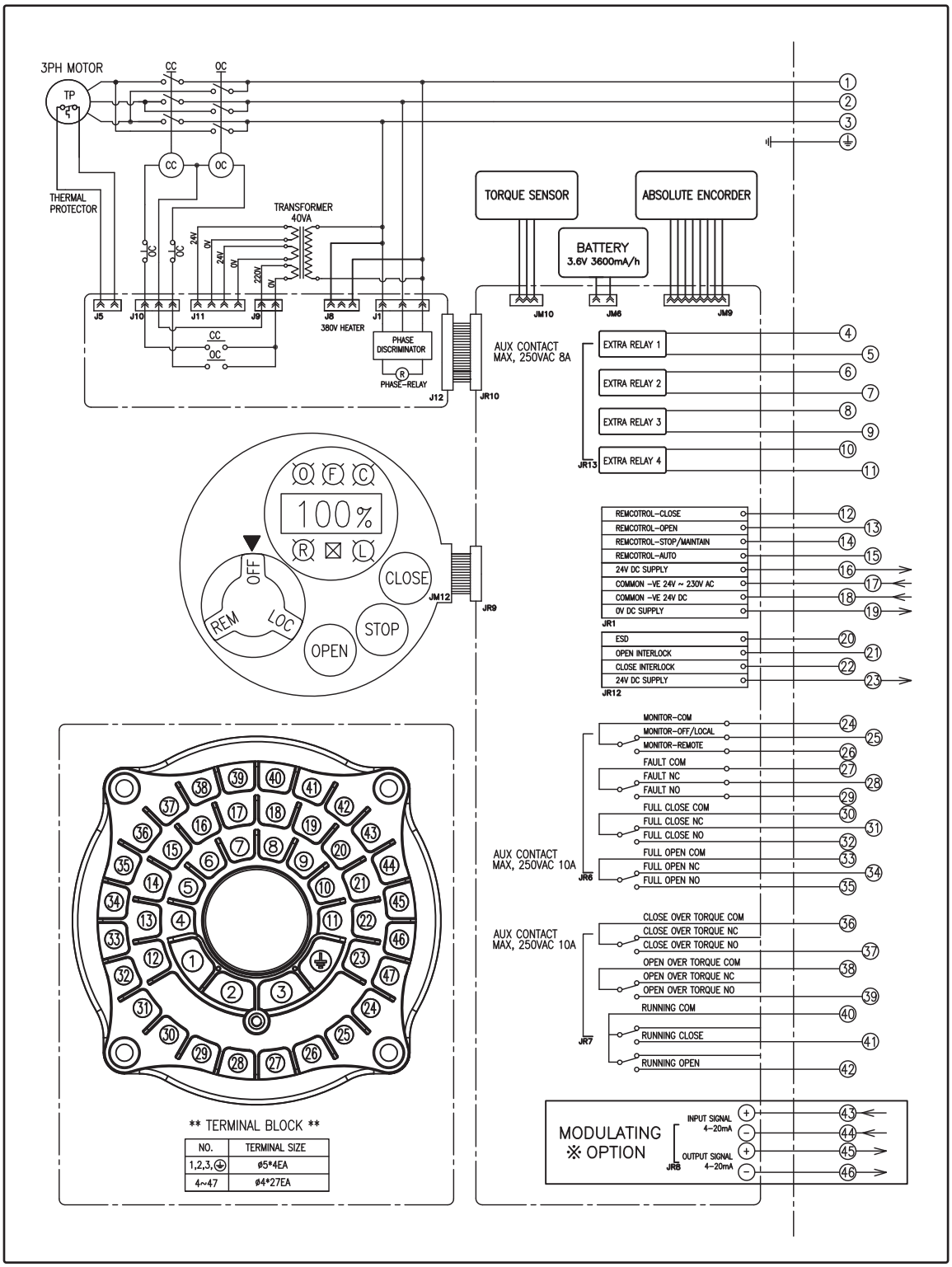
17-4-4 RESET

It is to initialize every settings.

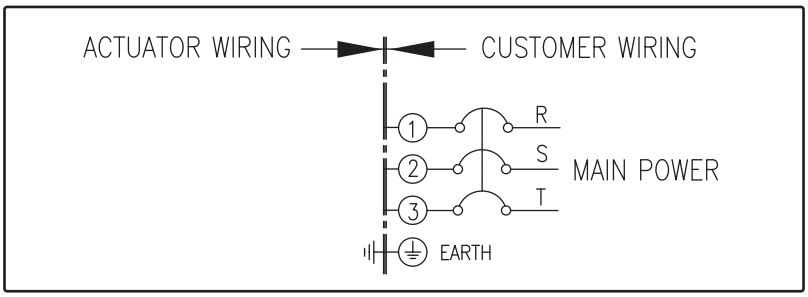

VIEW
- BASIC -
- BASIC -
- BASIC -
- BASIC -
- BASIC -
VIEW
- SYSTEM -
- SYSTEM -
- SYSTEM -
- SYSTEM -
- SYSTEM -
- SYSTEM -
- SYSTEM -
- SYSTEM -
VIEW
- SIGNAL -
- SIGNAL -
- SIGNAL -
- SIGNAL -
- SIGNAL -
- SIGNAL -

18. Wiring

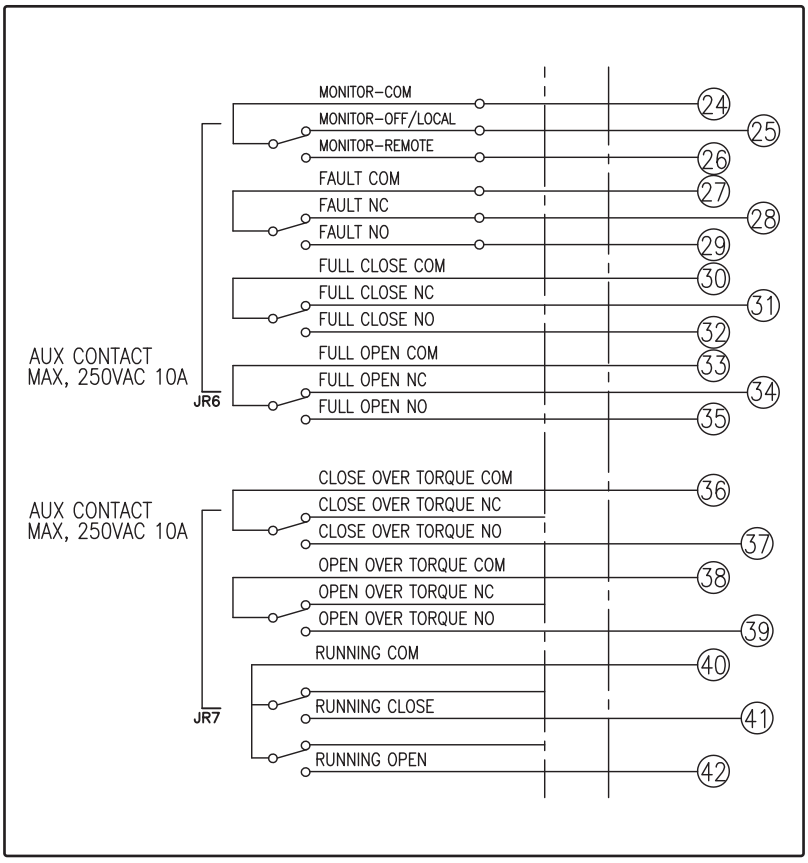
18–1 Wiring



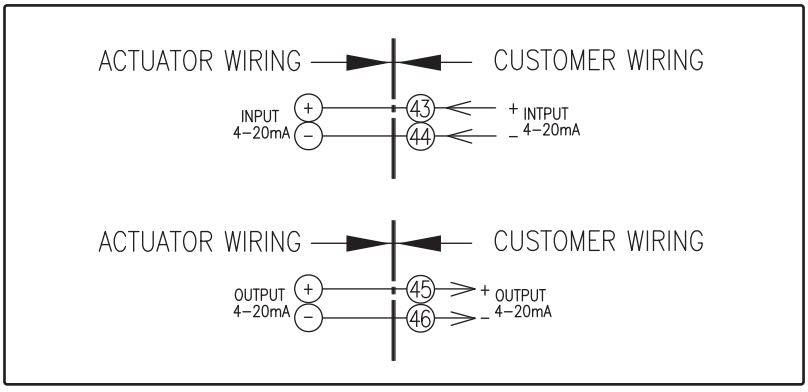
18–2
3PH Power Supply



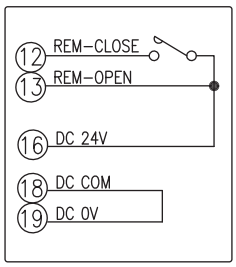
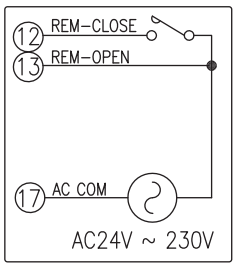
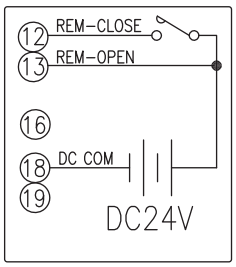
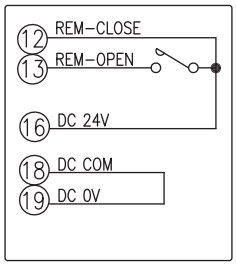
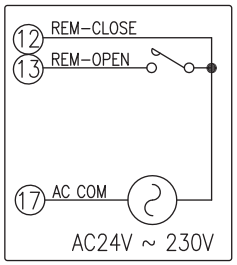
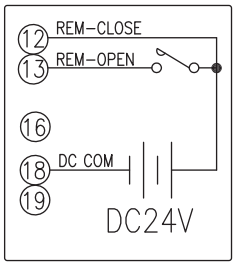
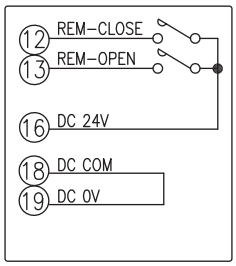
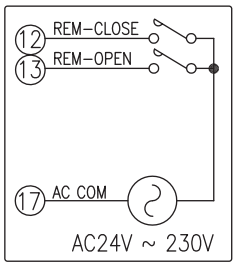
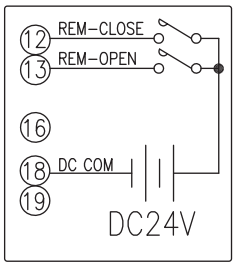
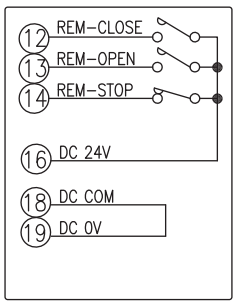
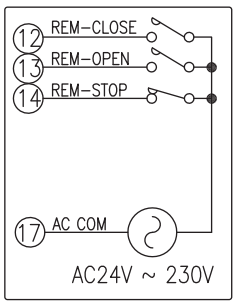
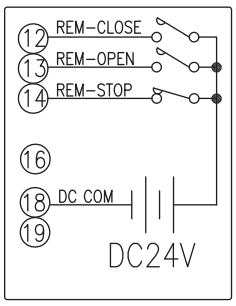
18–3
Dry Contact



18–4
4–20mA
In/ Out Control

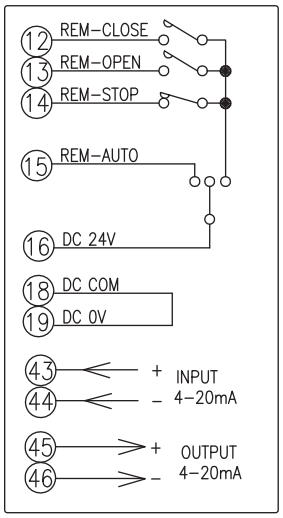


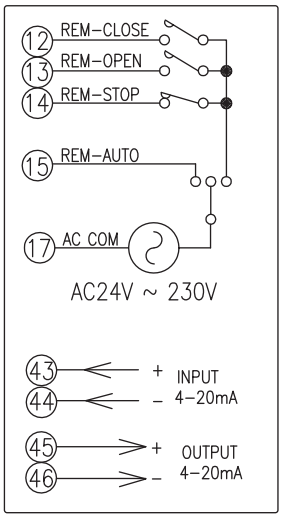
18–5 On/Off Remote Control

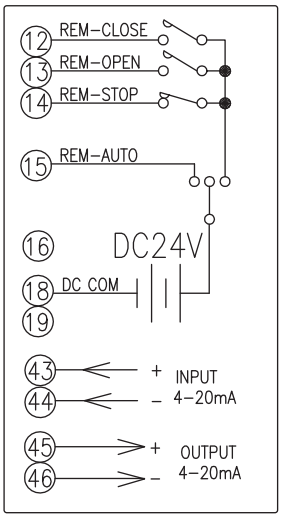
	INTERNAL POWERED	EXTERNAL AC POWERED	EXTERNAL DC POWERED
2–WIRE CONTROL FULL OPEN			
2–WIRE CONTROL FULL CLOSE			
3–WIRE CONTROL OPEN/CLOSE			
4–WIRE CONTROL OPEN/STOP/CLOSE			

18-6 PCU Remote Control (4-20mA In/ Out Control)

INTERNAL POWERED	EXTERNAL AC POWERED	EXTERNAL DC POWERED

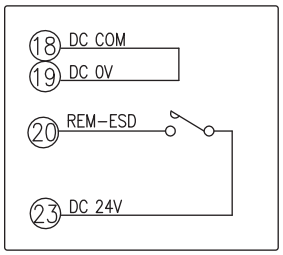


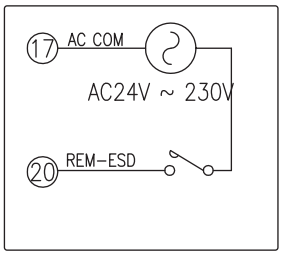


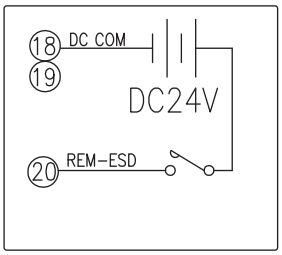


18-7 ESD Remote Control

INTERNAL POWERED	EXTERNAL AC POWERED	EXTERNAL DC POWERED

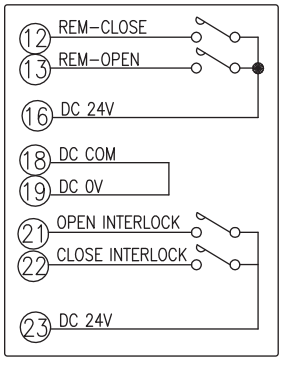


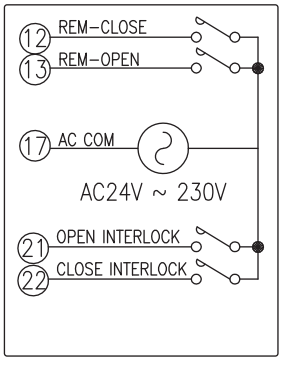


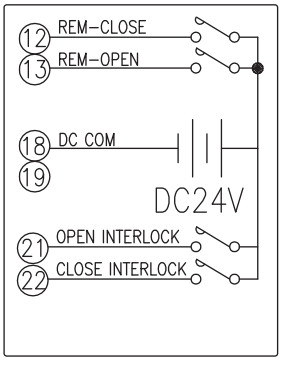


18-8 Interlock Control

INTERNAL POWERED	EXTERNAL AC POWERED	EXTERNAL DC POWERED







19. Troublshooting

If the ACTUATOR fails to function correctly, first check for any mechanical / alignment problems, then check for any electrical problems. See chart below for more information.

–Mechanical parts

Problem	Cause	Solution
When the manual handwheel does not move even when the lever is in manual mode.	The worm wheel and mechanucal limit stop is jammed	Loosen the mechanical limit stop and the valve mounting bolts. Correct the declutch and then secure the mounting bolts and limit stop
Actuator operates correctly but the valve does not move	Damage in the screws and bushing	Replace bushing
If the actuator does not operate	Power defect or magnetic damage	Check if the input power voltage connected to the actuator matches the power voltage written on the nameplate

–Electrical parts

Error message	Error information	Solution
LO–POW	Main power failure	Check main power
OP–TORQ	Open over torque	Operate counter–clockwise then back to clockwise ~~and if OVER TORQUE message is still on,~~ please contact the manufacturer
CL–TORQ	Close over torque	
TH–PRO	Thermal protector disconnection	Thermal Protector is on to protect the motor from overheating. Once the motor cools down, then began operation.
EN–DROP	Encoder disconnection	Position control line breaks or unable to enter the restricted area, please contact the manufacturer.
LI–HIGH	Open limit out of range	It went out of set close limit range. Use the manual handwheel or the close signal to operate the actuator.
LI–LOW	Close limit out of range	It went out of set open limit range. Use the manual handwheel or the open signal to operate the actuator.
IN–DROP	Input signal disconnection	Check the input signal connection
IN–HIGH	Input signal out of range	Input signal is being received over than 10% of its maximum value. Check the input signal and calibrate.
IN–LOW		Input signal is being received lower than 10% of its minimum value. Check the input signa and calibrate
LO–ROT	Idling motor	The motor operates according to the input signals but the position control sensor doesn't work. Please contact the manufacturer.
EM–SHUT	Emergency shut down	The actuator operates to the position set previously in emergencies.

20. Maintenance

20-1 Lubrication

MA Series uses Gadus S2 V220 00. Generally, since the actuator is already thoroughly lubricated with grease, no additional grease needs to be added during normal operation.

20-2 Regular Periodic Inspection

The actuator is recommended to be cycled and test operated every two weeks. Also, to prevent condensation in the actuator, always utilize the internal heater.

21. Warranty Information

The warranty will be void under the following conditions.

21-1 Failure or damage caused by misuse or abuse by the user.

21-2 Failure or damage caused by unauthorized modification or repairs done to the actuator.

21-3 Failure caused by unauthorized modification or change in wiring.

21-4 Failure caused by a reverse mis-wiring when using 3-phase power.

21-5 Failure caused by water leakage due to improper sealing of the actuator.

21-6 Failure caused by improper setting of the limit switches.

21-7 Failure or damage caused by fire, flood or other natural disasters.

21-8 Failure or damage caused after 1 year of the shipment date. Our warranty is valid for one year.