

ECON ELECTRIC ACTUATOR

Fig. 7907, type ELA60

Fig. 7907 ELA60
IP67 (optionally IP68)



Fig. 7907 ELA60-Ex
II 2G Ex db IIB T4 Gb



- Small & Compact** quarter turn actuator
- Mechanical position indicator**
- High output torque**
- Multi mounting base**
- Manual override**



Scan for manual

Operating and Instruction Manual for actuator: ELA60

Contents

1. INTRODUCTION	3
1.1. Purpose	3
1.2. Safety Notices	3
2. PRODUCT IDENTIFICATION	4
2.1. Product Identification	4
2.1.1. Marking	4
2.1.2. Applied Standards	4
2.1.3. Certification	4
2.2. Initial Inspection	5
2.3. Storage	5
3. GENERAL INFORMATION AND FEATURES	5
3.1. General Information	5
3.1.1. Standard Technical Data	5
3.1.2. Additional Technical Data	6
3.1.3. Options	6
3.1.4. Duty Cycle	6
3.1.5. Heater	6
3.1.6. Manual Override	6
3.1.7. Lubrication	7
3.2. External Parts for Standard Models	7
3.3. Internal Parts for Standard Models	7
4. INSTALLATION	8
4.1. Pre-installation	8
4.1.1. Use in general service	8
4.1.2. Use in potentially explosive atmosphere	8
4.2. Actuator Mounting	8
4.2.1. Actuator Mounting Base Details	9
4.3. Limit Switch Setting	10
4.4. Setting Potentiometer (Optional)	11
4.5. Current Position Transmitter – CPT (Optional)	11
4.5.1. Standard Features	11
4.5.2. Calibration of Zero and Span – CPT	12
4.6. Proportional Control Units – PCU (Optional)	13
4.6.1. PCU-A Proportional Control Unit Alternating Current	13
4.6.2. PCU-D Proportional Control Unit Direct Current	14
4.6.3. LED Signal Indication	15
4.6.4. Setting PCU Functions	15
4.6.5. PCU-EB – Proportional Control Unit Alternating Current (2020 VERSION)	20
4.7. AC/DC Multi-Board (Optional)	28
5. FIELDBUS COMMUNICATION PROTOCOL (Optional)	29
5.1. ModBus Controller	29
5.2. Specification	29
6. OPERATION	30
6.1. Electrical Connections and Preliminary Test	30
7. MAINTENANCE	31
7.1. Maintenance	31
7.2. Tools	31

8. TROUBLE SHOOTING	32
8.1. The actuator does not respond	32
8.2. The actuator is supplied with power but does not operate	32
8.3. Actuator runs erratically	32
8.4. Optional Equipment	33
9. DIMENSIONS	34
9.1. ELA60 On/Off Type	34
9.2. ELA60 PCU Type	35
9.3. ELA60-Ex-version On/Off type	36
10. WIRING DIAGRAMS	37

1 INTRODUCTION

1.1 Purpose

The purpose of this manual is to introduce and explain the installation, operation and maintenance of ELA60 electric actuators.

1.2 Safety Notices

This manual contains safety notices and precautions the user must take to reduce the risk of personal injury and damage to the equipment. The user(s) must read these instructions before the installation, operation or maintenance of ELA60 electric actuators.



DANGER: Refers to personal safety and alerts the user for danger and/or injury .
Hazardous or unsafe practice may result in severe injury or death.



WARNING: Refers to personal safety. Alerts the user for potential danger.
Not following warning notices could result in personal injury or death.



CAUTION: Directs the user's attention to general precautions that, if not followed, could result in personal injury and/or equipment damage.

Note: Information in this manual is critical to the user's understanding of the actuator's installation and operation.

2 PRODUCT IDENTIFICATION

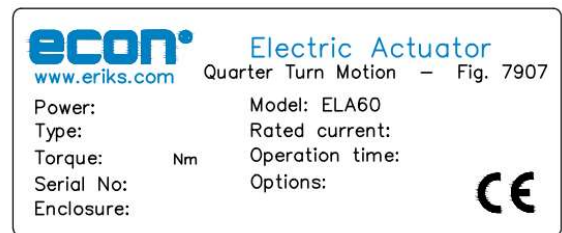
2.1 Product Identification

The actuator name plate is located on the opposite side of the conduit entry. The name plate contains the following:

2.1.1 Marking

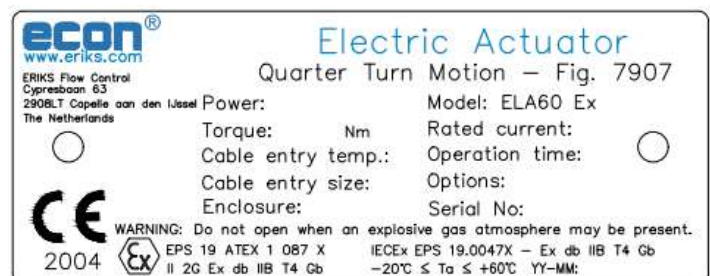
A) General

- ECON logo (trade mark)
- Model
- Electrical power supply
- Torque
- Operating time (seconds)
- Type
- Rated current
- Options
- Serial No.



B) Explosion proof

- ECON logo (trade mark)
- CE ATEX mark and IECEx mark
- Electrical power supply
- Model
- Torque
- Cable entry temperature limitation
- Cable entry size
- Enclosure
- Rated current
- Operating time (seconds)
- Options
- Serial No.



2.1.2 Applied Standards

- IEC60079-0: 2011, EN60079-0: 2012
- IEC60079-1: 2014-06, EN60079-1: 2014

2.1.3 Certification

- ATEX : EPS 19 ATEX 1 087 X - II 2G Ex db IIB T4 Gb
- IECEx : EPS 19.0047X - Ex db IIB T4 Gb

2.2 Initial Inspection

Upon on the receipt of the actuator, the user should inspect the condition of the product and ensure that product specification stated on the name plate matches with the order sheet.

- Remove the packing wrap or wooden box carefully. Inspect the product for any physical damage that may have occurred during shipment.
- Check the product specification of the received product. If a wrong product has been shipped, please immediately report this to the distributing company.

2.3 Storage

Actuators must be stored in a clean, cool and dry area. The unit should be stored with the cover installed and the conduit openings sealed. Storage must be off the floor, covered with a sealed dust protector.

3 GENERAL INFORMATION AND FEATURES

3.1 General Information

ECON ELA60 electric actuators are designed to provide reliable and efficient operation of 90 degree quarter turn valves, such as Ball and Butterfly valves, etc.

3.1.1 Standard Technical Data

Enclosure Rated	Weatherproof IP67, NEMA 4, 4x and 6
Enclosure	High grade aluminum alloy, corrosion coated
Power Supply	115 / 230VAC 1 Ph 50/60Hz, 24 VDC or 24VAC
Duty Type	S4-50% (IEC 60034)
Motor	AC reversible motor
Limit Switches	2 x open/close SPDT, 250V AC 10A rating
Auxiliary Limit Switches	2 x open/close SPDT, 250V AC 10A rating
Torque Switches	N/A
Stall Protection	Built-in thermal protection
Indicator	Continuous position indicator
Manual Override	Manual handle
Space Heater	2W
Conduit Entries	2 x PG13.5 or 2x 1/2" NPT (North American versions) Flame proof versions: 2x 3/4" NPT, M20 or M25
Lubrication	Grease moly EP
Ambient Temperature	-20°C (-4°F) up to +60°C (140°F)
External Coating	Dry powder polyester

3.1.2 ELA60 performance

Fig. 7907	Maximum torque in	Operating time in s/90°	Operating time in s/90°	Duty cycle according to IEC 60034-1 S4	Valve top flange connection according to ISO 5211		115VAC Rated current in A	230VAC Rated current in A	24VDC 24VAC Rated current in A	Weight
					Standard	Ex-version				
Type	Nm (lb-in)	50/60Hz	24V				50/60Hz	50/60Hz		kg (lbs)
ELA60	58 (521)	14/12	15*	50%	F03-F05-F07, DS14	F04-F05-F07, DS14	0,35/0,35	0,18/0,17	0,8	3 (6.6)

*The exact operating time for 24VDC actuators depends on the effective load.

3.1.3 Options

EXA	Explosion proof enclosure (Ex db II B T4 Gb)
WTA	Watertight Enclosure IP68 (10m/24hr) / Nema 6P
PIU	Potentiometer Unit (0~1KΩ)
PCU	Proportional Control Unit (input, output 0~10V DC, 4~20mA DC)
CPT	Current Position Transmitter (output 4~20mA DC)

3.1.4 Duty Cycle ¹⁾

Duty cycle rated IEC60034 – S4 50%

Exceeding the actuator's rated duty cycle may cause thermal overload.

Note: ¹⁾ *Type of duty according to VDE 0530 / IEC 60034-1*

Intermittent duty S4
The duty is a sequence of identical cycles which consist of starting time, operation time with constant load and rest period. The rest period allows the machine to cool down so that thermal equilibrium is not reached. The relative on-time at S4-25% or S4-50% is limited to 25% and 50% respectively.

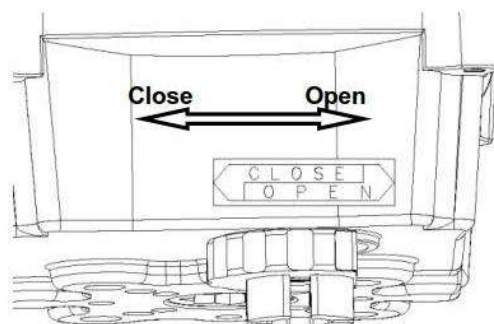
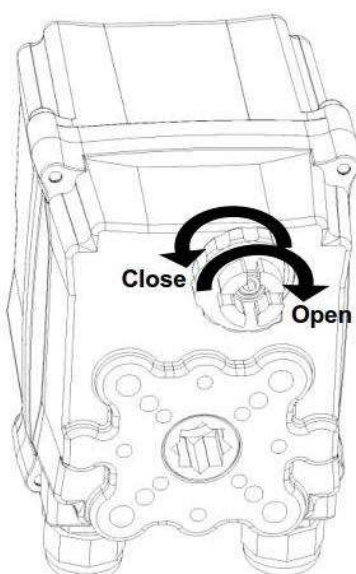
3.1.5 Heater

Condensation in the actuator is possible due to wide fluctuation of the ambient temperature. The heater integrated in the control unit prevents this in general.

3.1.6 Manual Override

ELA60 actuators are provided with a manual override system. The standard ELA60 actuators are equipped with a manual override nut. This nut is located on the bottom of the unit and can be easily operated with a 5mm screwdriver. Turn the manual override nut until the valve reaches the required position (turn clockwise to fully open and counter-clockwise to fully close).

The manual override system of the ELA60-Ex d actuators can be operated by using a 4mm Allen key only. Turn the manual override (Allen key) until the valve reaches the required position (turn clockwise to fully open and counter-clockwise to fully close).

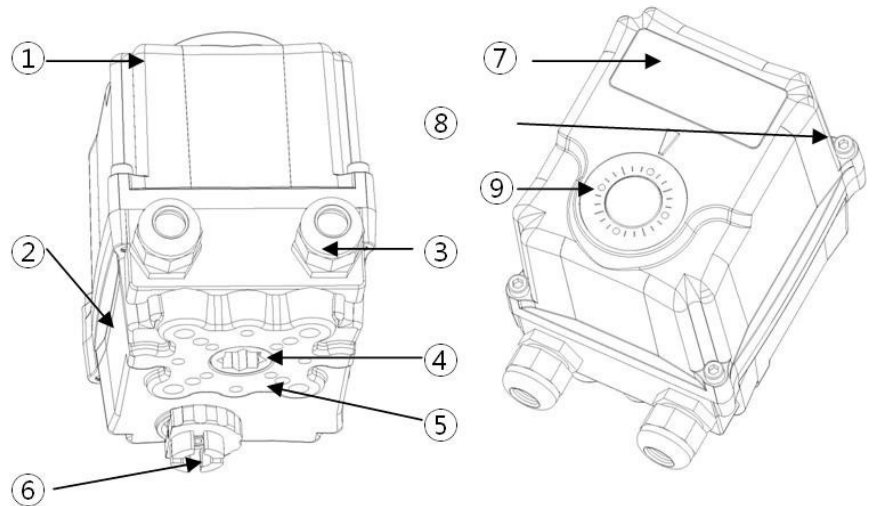


3.1.7 Lubrication

ELA60 electric actuator is a totally enclosed unit with a permanent lubricated gear train (Moly EP Grease). Once installed, lubricating the actuator should not be required. However, periodic preventative maintenance will extend the operating lifetime of the actuator.

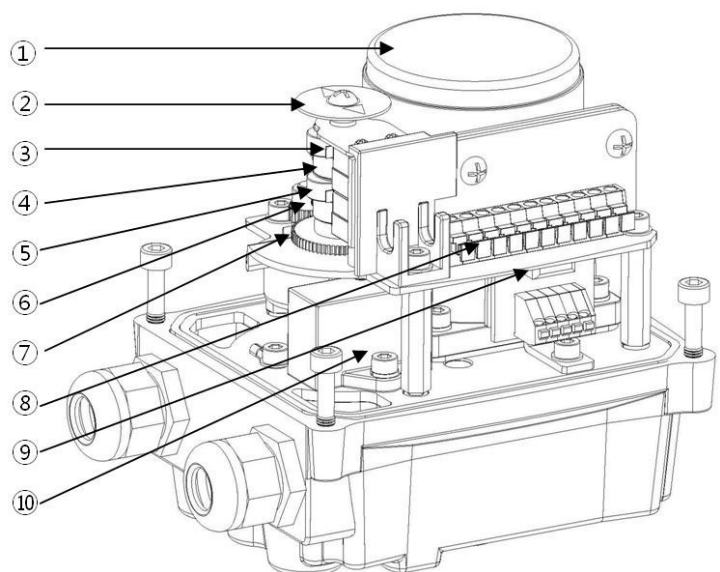
3.2 External Parts for Standard Models

External Parts	
ELA60	
1	Top Cover
2	Body
3	Cable Entry 2x PG 13.5 or 2x ½"NPT (North American versions)
4	Drive Shaft (Double Square 14mm)
5	Mounting Base: F03, F05, F07 and F04, F05, F07 for Ex-version
6	Hand Wheel
7	Name Plate
8	Cover Bolt
9	Indicator



3.3 Internal Parts for Standard Models

Internal Parts	
ELA60	
1	Motor
2	Indicator
3	Open Limit Switch
4	Close Limit Switch
5	Additional Open Limit Switch
6	Additional Close Limit Switch
7	Potentiometer Unit (Optional)
8	Terminal
9	Heater
10	Capacitor



4 INSTALLATION

4.1 Pre-installation

- Please check if the electric power supply corresponds with your specification and the information on the actuator type plate.
- Make sure the power supply has been switched off before you start wiring the actuator.

4.1.1 Use in general service

Verify the actuator's nameplate to ensure that model number, torque output, operating speed, voltage and enclosure type are correct before installation or use.

It is important to verify that the torque output of the actuator is appropriate for the torque requirements of the valve and that the duty cycle of the actuator is appropriate for the intended application.

Make sure the power supply has been switched Off before you start wiring the actuator.

4.1.2 Use in potentially explosive atmosphere

Model	ELA60 Ex
Type of Enclosure	ATEX II 2G Ex db IIB T4, IECEx Ex db IIB T4
Ambient Temperature	-20°C (-4°F) up to +60°C (140°F)



WARNING:

Read this installation, operation and maintenance manual carefully and completely before attempting to install, operate, or troubleshoot the ELA actuator.

For cable gland or conduit entries that are not used, user or installer shall close those entries by certified blanking elements in order to maintain the enclosure protection. Extra attention is required for selecting the correct "Ex db IIB" or "Ex db IIC" blanking elements.



CAUTION:

Installation, commissioning, maintenance, repairs and modification work may only be performed by qualified personnel with extensive knowledge on how to work on explosion-proof electrical equipment.

4.2 Actuator Mounting

Note:

- 1. Prior to mounting, the part-turn actuator must be checked for any damage**
- 2. Damaged parts must be replaced by genuine spare parts**

Mounting is most easily done with the valve shaft pointing vertically upwards. But mounting is also possible in any other position.

The ELA60 series actuators are supplied with a female double square drive. The ISO5211 bolt patterns are provided for actuator mounting. The actuator drive bushing can be replaced or removed for machining easily.

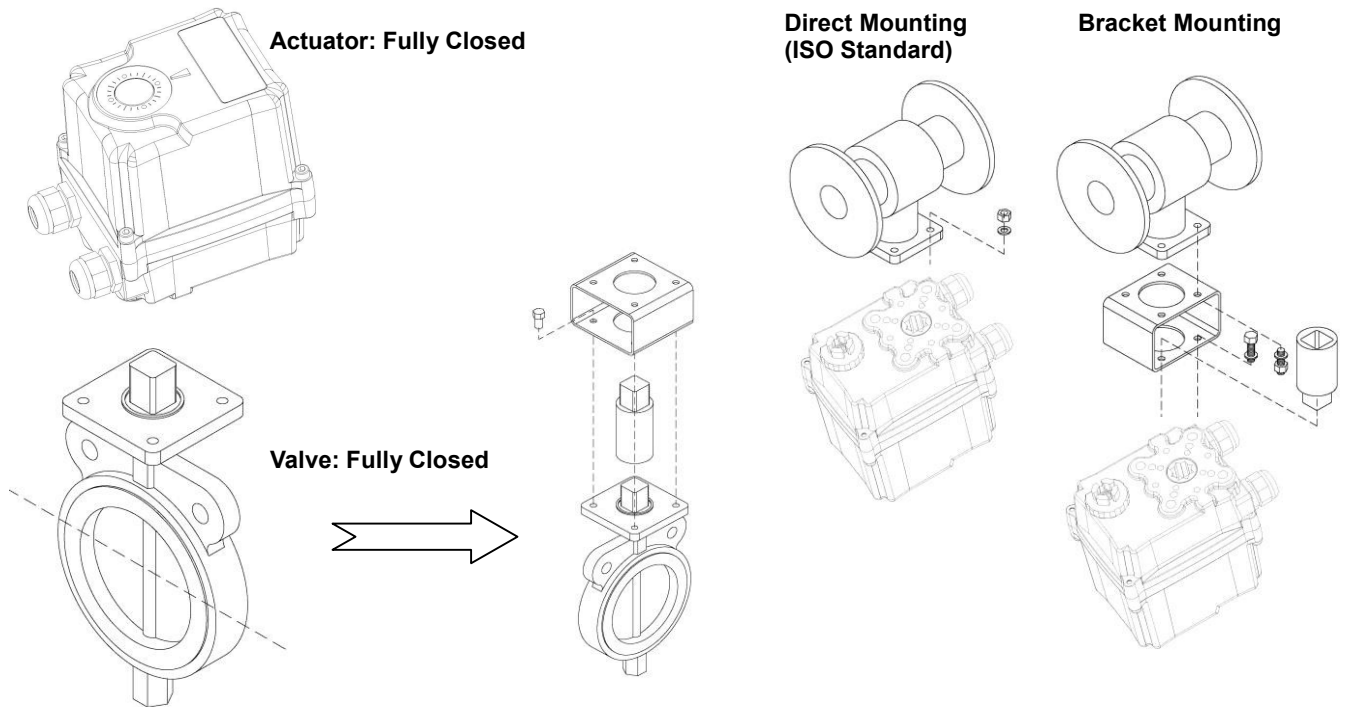


CAUTION:

Do not attempt to work on your ECON actuator without first shutting off the power supply.

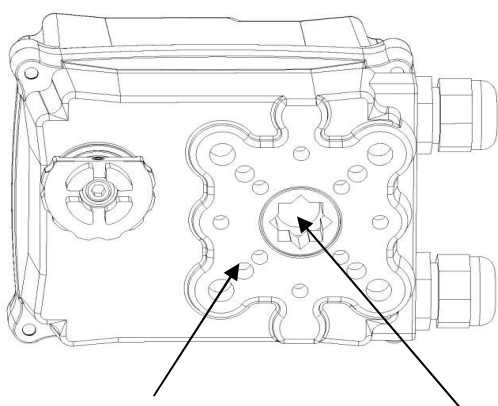
Do not attach ropes for lifting purposes to the manual override device.

4.2.1 Actuator Mounting Base Details



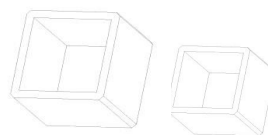
Note: Make sure both the actuator and valve are fully closed.

Actuator Mounting Base



F03*, F05, F07
*F04 for Ex-version

Double Square 14mm



Square reducer:

- 14mm to 11mm
- 11mm to 9mm



Double Square reducer:

- 14mm to 11mm
- 11mm to 9mm



DANGER:

HAZARDOUS VOLTAGE. Make sure all incoming power is disconnected before mounting the actuator on the valve.

4.3 Limit Switch Setting

- Rotate the hand wheel of the actuator manually to the fully closed position
- Use an Allen key to, loosen the set screw of the CLOSE limit switch cam
- Rotate the CLOSE cam CW until the limit switch ‘clicks’ (see Figure 1 below)
- Tighten the set screw with the Allen key
- Manually rotate the hand wheel of the actuator to the open position of the valve.
- Loosen the set screw of the OPEN limit switch cam
- Rotate the OPEN cam CCW until the limit switch ‘clicks’ (see Figure 2 below)
- Tighten the set screw with the Allen key



DANGER:

HAZARDOUS VOLTAGE. Make sure all incoming power is disconnected before setting the limit switches

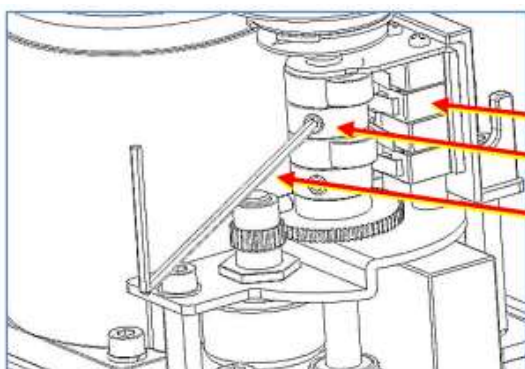


Figure 1: Close Cam Setting

- Close Limit Switch
- Close Limit Switch Cam (Clockwise)
- 2mm Hexagon Socket Screw Key

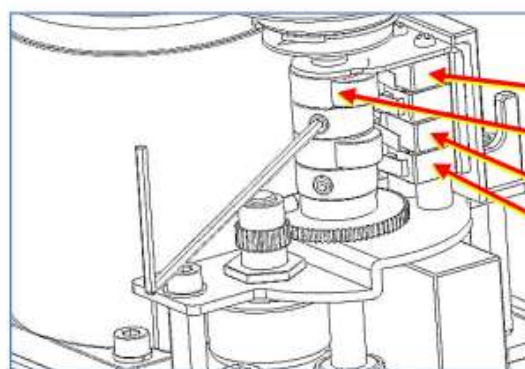


Figure 2: Open Cam Setting

- Open Limit Switch
- Open Limit Switch Cam (Counterclockwise)
- Auxiliary Open Limit Switch
- Auxiliary Close Limit Switch

4.4 Setting Potentiometer (Optional)

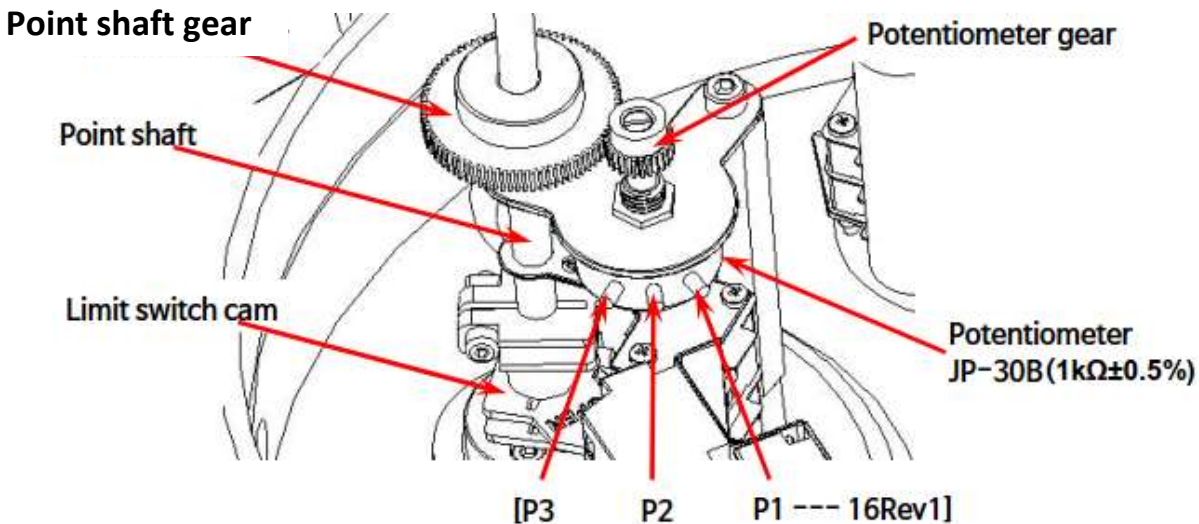
The potentiometer has been calibrated at the factory. However, if re-calibration is required, proceed as follows:

- Manually rotate the hand wheel of the actuator to the fully closed position.
- Loosen the locking bolts of the potentiometer gear by using an Allen key.
- While measuring the resistance between P1 (orange) and P2 (grey), gently rotate the Potentiometer Gear until it reaches between 80 - 120Ω (100Ω preferred), by using a flat head screw driver.
- Engage the Potentiometer Gear into the Point Shaft Gear and use an Allen key to tighten the locking bolts.



DANGER:

HAZARDOUS VOLTAGE. Make sure all incoming power is disconnected before setting the potentiometer

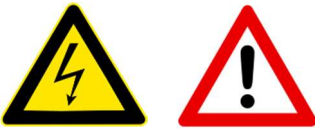


4.5 Current Position Transmitter – CPT (Optional)

The potentiometer is used for the actuator signal feedback. It reads a resistance value which corresponds with the current position of the actuator and transfers it to the CPT card. The CPT indicates the current position of the actuator throughout the complete stroke by a 4 – 20mA output signal.

4.5.1 Standard Features

Model	CPT
Power	230 or 115VAC, 50/60Hz 2VA Max
Output Signal	4~20mA DC
Output Impedance	750Ω Max
Resolution	Min 1/1000
Position Conversion Accuracy	±0,5 ~±1,5%
Ambient Temperature	-20°C (-4°F) to 60°C (140°F)
Ambient Humidity	90% RH Max (Non-condensing condition)
Dielectric Strength	1500V AC 1 Min (Input to output to power ground)
Insulation Resistance	Above 500V DC 30MΩ
Vibration	10g, 0~34Hz

**DANGER:**

HAZARDOUS VOLTAGE. Make sure the power supply is disconnected before setting the actuator

4.5.2 Calibration of Zero and Span - CPT

The settings of Zero and Span have been calibrated at the factory. However, if re-calibration is required, proceed as follows:

- Use the manual override to put the actuator into the half open position.
- Apply power (or use the manual override) to move the actuator to its fully closed position (clockwise rotation).
- When the actuator is in the fully closed position, adjust the ZERO close setting on the CPT board until an output value of 4mA is achieved.
- Apply power (or use the manual override) to move the actuator to its fully open position (counter-clockwise rotation).
- When the actuator is in the fully open position, adjust the SPAN open setting on the CPT board until a reading of 20mA is achieved.



Anti-vibration type (OKM)



General use

4.6 Proportional Control Unit – PCU (Optional)

Modulating actuators are equipped with a PCU-PCB (Printed Circuit Board). The circuit board has its own housing and is mounted on the actuator. This option can only be ordered directly from the factory and cannot be retrofitted. See paragraph 8.2 for a drawing.

Note: *Please be aware that since the year 2020 a second version PCU (VAC) became available. This PCU can be recognized by the “PCU-EB” marking on the PCB. This PCB has a slightly different setting instruction, which can be found in paragraph 4.6.5..*

4.6.1 PCU-A 1P - Proportional Control Unit Alternating Current



PCU (1 Phase) High Performance Modulation Controller, which is using a 10 bit A/D converter and 8 bit microprocessor technology

PCU-A 1P Features	
Model	PCU-A (1 Phase)
Power	85 ~ 260 VAC Free Voltage \pm 10%, 50/60Hz 4 VA Max
Input Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~5V DC, 0~10V DC
Input Impedance	250 Ω
Output Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~5V DC, 0~10V DC
Output Impedance	250 Ω Max
Output Contact	1 (Fault monitor)
Dead Time Adjustment	0.05~7.5 seconds
Deadband Adjustment	0.12mA DC Max
Resolution Adjustment	0.0625~1mA (0.0625mA + step no. x 0.0625mA, 15 steps total)
Ambient Temperature	-10°C (14°F) to 70°C (158°F)
Ambient Humidity	90% RH Max (non-condensation)

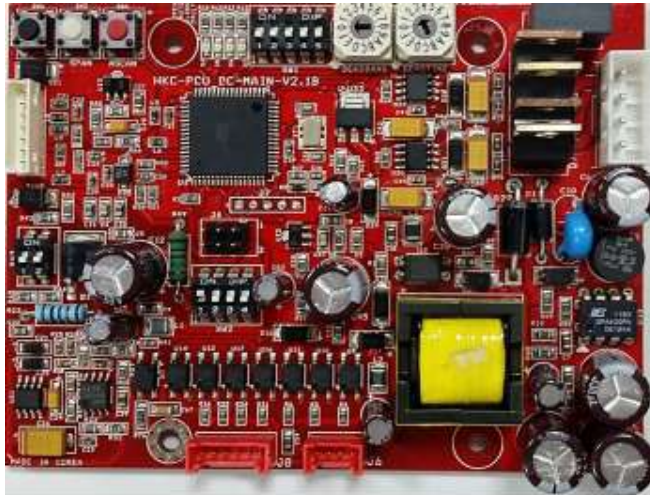
The factory settings of the PCU card are normally set according to the customer requirements at the time of order. However, we strongly recommend that input power, signal input selection and dip switches are to be verified prior to the actuator start up.

Settings the PCU functions are shown in paragraph 4.6.3 and 4.6.4.



CAUTION:
HAZARDOUS VOLTAGE. Turn off all power before setting the actuator.

4.6.2 PCU-D - Proportional Control Unit Direct Current



PCU-D High Performance Controller, using a 10 bit A/D converter and 8 bit microprocessor technology.

PCU-D Features	
Model	PCU-D
Power	24V DC Voltage ± 15% (36V DC Max)
Input Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~5V DC, 0~10V DC
Input Impedance	250Ω
Output Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~5V DC, 0~10V DC
Output Impedance	250Ω Max
Output Contact	1 (Fault monitor)
Dead Time Adjustment	0.05 ~ 7.5 seconds
Deadband Adjustment	0.12mA DC Max
Resolution Adjustment	0.0625~1mA (0.0625mA + step no. x 0.0625mA, 15 steps total)
Ambient Temperature	-10°C (14°F) to 70°C (158°F)
Ambient Humidity	90% RH Max (non-condensation)

The factory settings of the PCU card are normally set according to the customer requirements at the time of order. However, we strongly recommend that input power, signal input selection and dip switches are to be verified prior to the actuator start up.

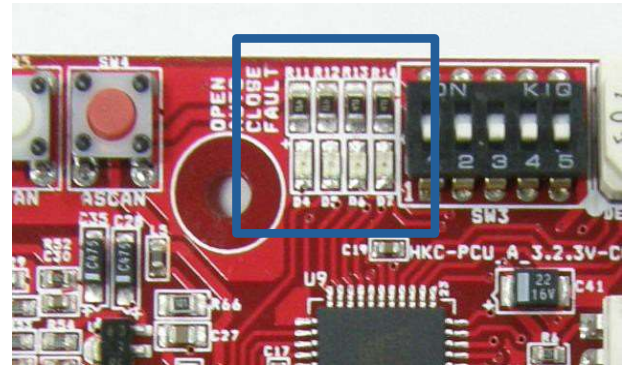
Settings the PCU functions are shown in paragraph 4.6.3 and 4.6.4.



CAUTION:
HAZARDOUS VOLTAGE. Turn off all power before setting the actuator.

4.6.3 LED Signal Indication

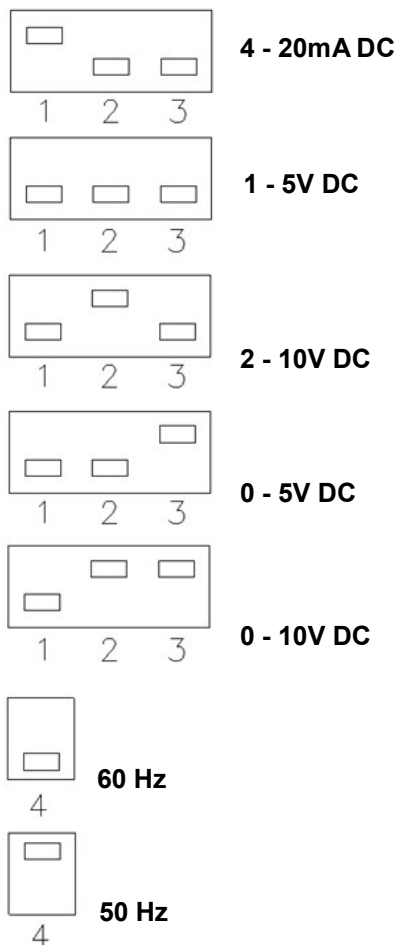
LED	State	Indication
Blue	On	Power on (auto)
	Flickering	Auto calibrating
Green	On	Fully closed
	Flickering	Closing
Red	On	Fully open
	Flickering	Opening
Yellow	On	Manual mode
	Flickering	Fault indication, either: - no input signal - wrong input wiring - wrong PIU setting



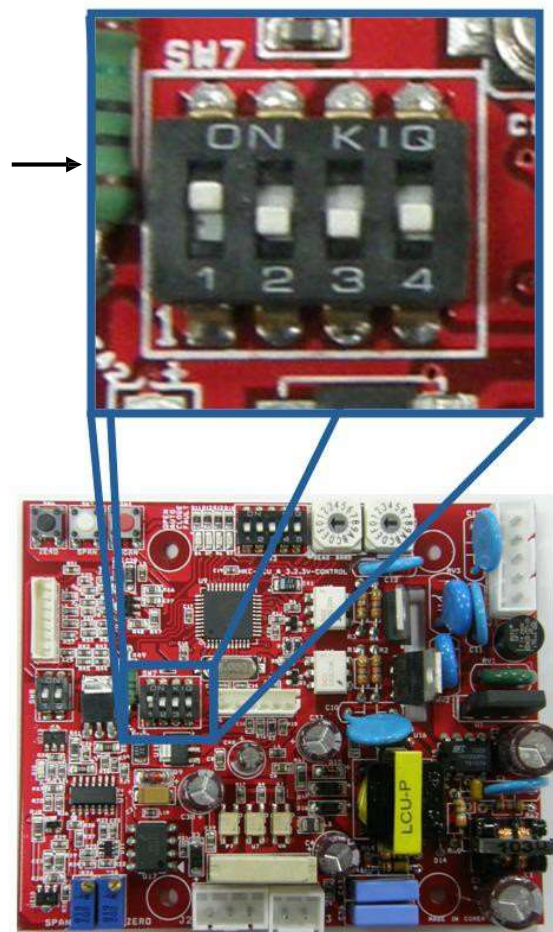
4.6.4 Setting PCU Functions

A) Selecting Input Signal (SW7 on PCU-A or SW2 on PCU-D)

User can select different types of input signal by adjusting the DIP switches as follows:



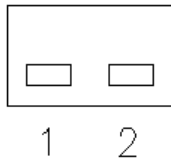
Input Signal Switch



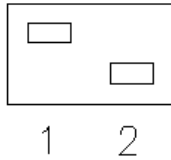
Note: If not specified, the factory setting of the input signal is 4 - 20mA.

B) Selecting Output Signal (SW8 on PCU-A or SW3 on PCU-D)

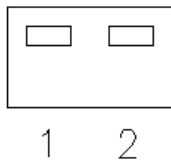
User can select different types of output signal by adjusting the DIP switch as follows:



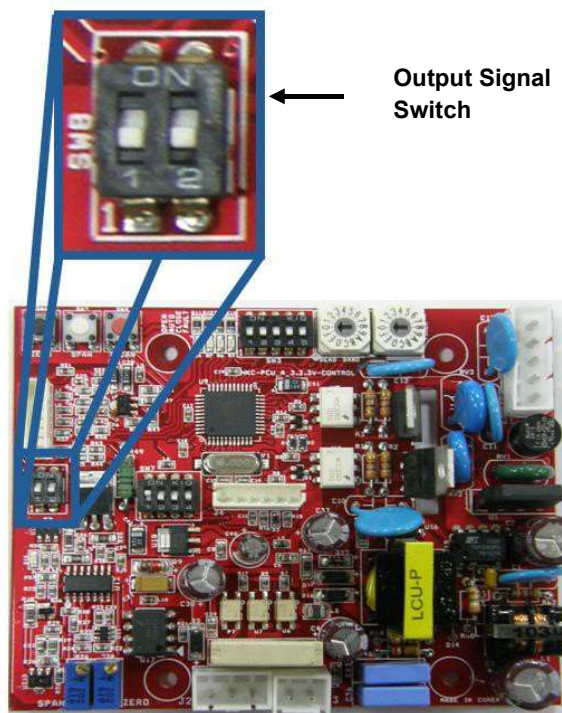
4 - 20mA DC



SW8-1 "ON" , SW8-2 "OFF" & SW7-3 "ON"	0 – 10V DC
SW8-1 "ON" , SW8-2 "OFF" & SW7-3 "OFF"	2 – 10V DC



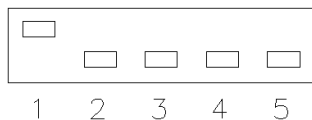
SW8-1 "ON" , SW8-1 "ON" & SW7-3 "ON"	0 – 5V DC
SW8-1 "ON" , SW8-1 "ON" & SW7-3 "OFF"	1 – 5V DC



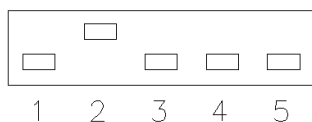
Note: *If not specified, the factory setting of the output signal is 4 - 20mA.*

C) Fail Position Setting

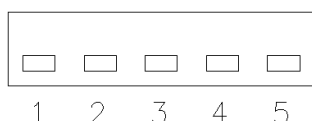
User can select the fail position of the actuator in case of control signal failure by adjusting the DIP switches as follows:



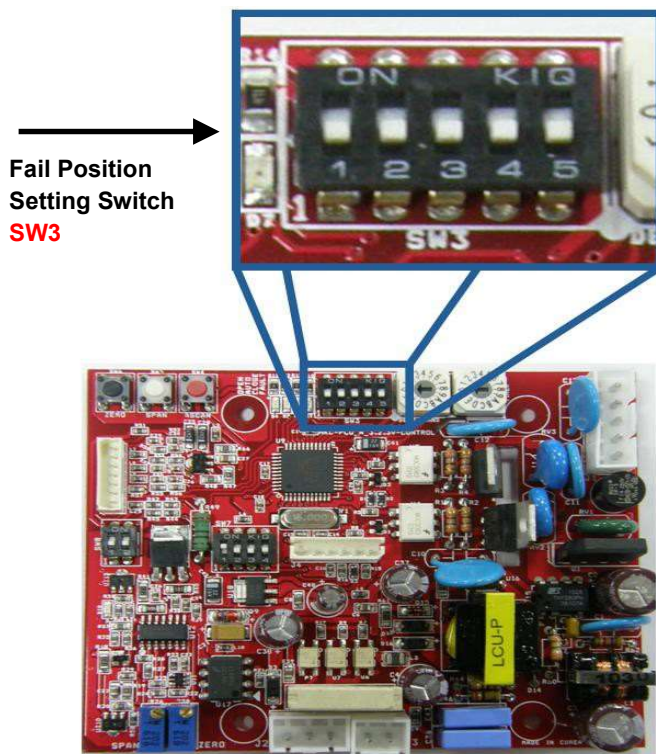
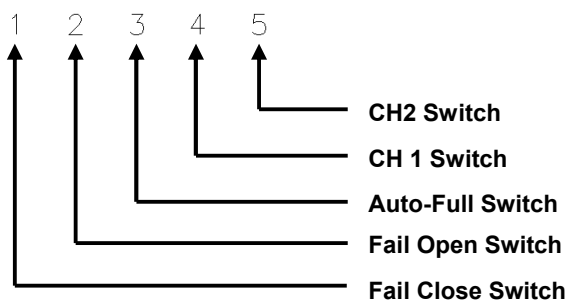
Fail Close



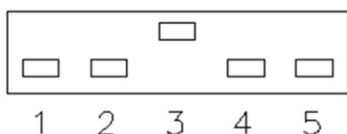
Fail Open



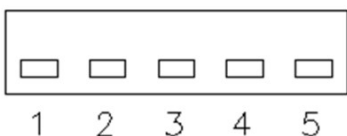
Fail Last Position



D) Special Signal Setting for Fully Open and Fully Closed



Auto-Full Switch (Switch 3) On (up)	Signal: 4.3~4.0mA	Fully Closed
	Signal: 19.7~20.0mA	Fully Open

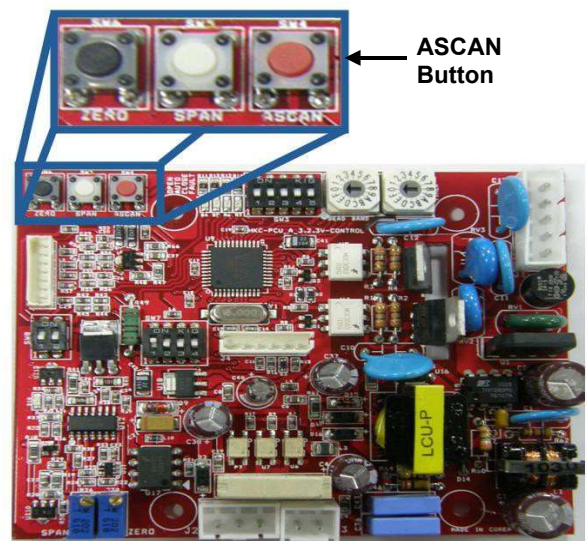


Auto-Full Switch (Switch 3) Off (down)	Signal: 4mA	Fully Closed
	Signal: 20mA	Fully Open

E) Auto Setting

- This function is used for automatic setting of the PCU card to the predefined limits.
- First make sure that the actuator has been mounted correctly on the valve. Press the ASCAN button once. Regardless the position of the actuator, the actuator will now perform the Auto Setting motion:

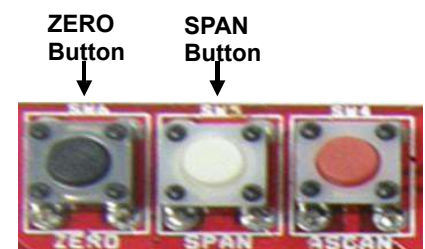
- 1) The blue LED starts flickering
- 2) The red LED starts flickering, indicating that the actuator is moving to the open position for 5 seconds
- 3) Pause for 2 seconds
- 4) The green LED starts flickering, indicating that the actuator is moving to the fully closed position
- 5) Pause (the green LED on) for 3 seconds
- 6) The red LED starts flickering, indicating that the actuator is moving to the fully open position
- 7) Pause (the red LED on) for 3 seconds
- 8) Moving back to the previous position



Note: *Since the actuator is already set at the factory, no further settings are required unless the user has made adjustments to the Limit Switch or Potentiometer settings.*

F) Manual Operation

- This function allows the user to manually operate the actuator.
- To access this function, press the ZERO (black) and SPAN (white) buttons simultaneously for 2 seconds and the yellow LED will be lit to indicate that the actuator is in Manual Operation mode
- Pressing the ZERO button will move the actuator to the closed position and pressing the SPAN button will move the actuator to the open position.
- If no operation occurs within 5 seconds, the PCU automatically terminates the Manual Operation Mode or alternatively press the ZERO and SPAN buttons simultaneously for 2 seconds. In both cases, the yellow LED will be lit off to indicate the termination of the Manual Operation Mode.

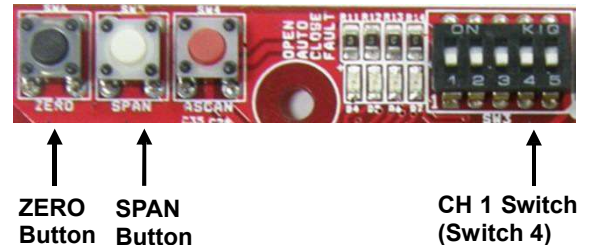


Note: *During the Manual Operation mode, the input signal is ignored.*

G) Customizing Set-points (CH 1 Switch)

- This function is used when the user wants to set different set-points for fully open and fully closed positions.
- For example, if the user wants to assign the 5mA as the set-point for the fully closed position, first of all switch- on (move up) the CH1 switch (switch 4). Supply a 5mA signal and push the ZERO button once. Hereafter, the actuator will acknowledge the 5mA signal as the set-point for the fully closed position and transmits a 4mA feedback signal. Similarly, for setting the set-point for the fully open position, supply the desired signal (for example, 19mA) and push the SPAN button once. Switch-off (move down) the CH1 switch to complete the setting.

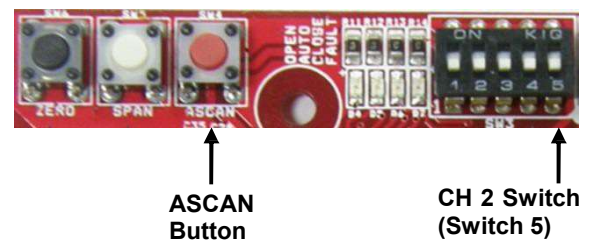
Set-points	Adjustable Range
Fully Closed	3 – 8mA DC
Fully Open	16 – 21mA DC



H) Reversal Acting (CH 2 Switch)

- This function allows the user to reverse the input and output signals for the operation of the actuator.
- For standard operation (CH 2 switch down), the input signal of 4mA operates the actuator to the fully closed position and the actuator transmits the output signal of 4mA. However, if the CH 2 switch is on (moved up) the input signal of 4mA operates the actuator to the fully open position and still transmits a 4mA output signal.
- Manually move the actuator to half-open position and push the ASCAN button once to execute the Auto Setting (see 4.7.2 E). Supply signal and check the operation.

CH 2 Switch (Switch 5) "On" (up)	4mA DC	Fully Open
	20mA DC	Fully Closed
CH 2 Switch (Switch 5) "Off" (down)	4mA DC	Fully Closed
	20mA DC	Fully Open

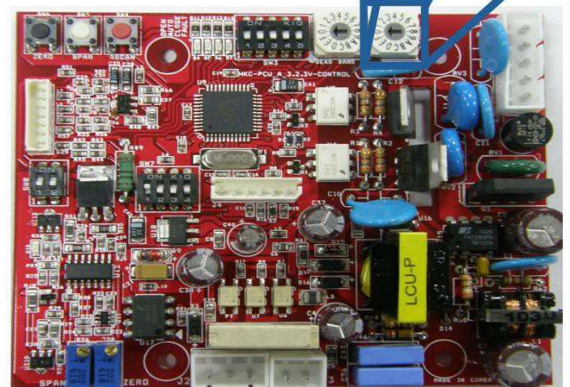
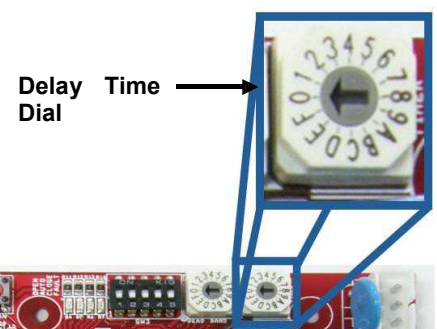


I) Delay Time

- The actuator will only start to move if the change of the input signal value, is greater than the resolution set value (see 4.8.2 J) and when the signal value is maintained for the duration of the delay time.
- This prevents malfunction of the actuator caused by unwanted signals in the input signal such as noise and interferences.
- Turning the Delay Time Dial in clockwise direction will increase the delay time (Range 0.05 to 7.5 seconds).

Dial	0	1	2	3	4	5	6	7
Sec	0.05	0.2	0.4	0.6	0.8	2.5	3.0	3.5

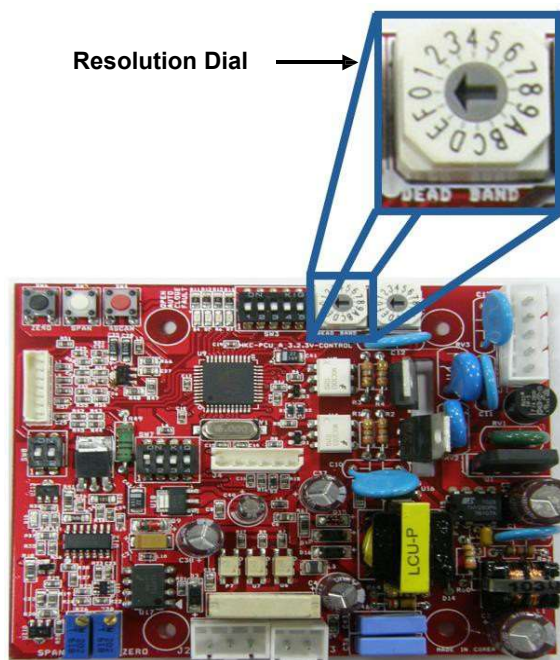
Dial	8	9	A	B	C	D	E	F
Sec	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5



J) Resolution

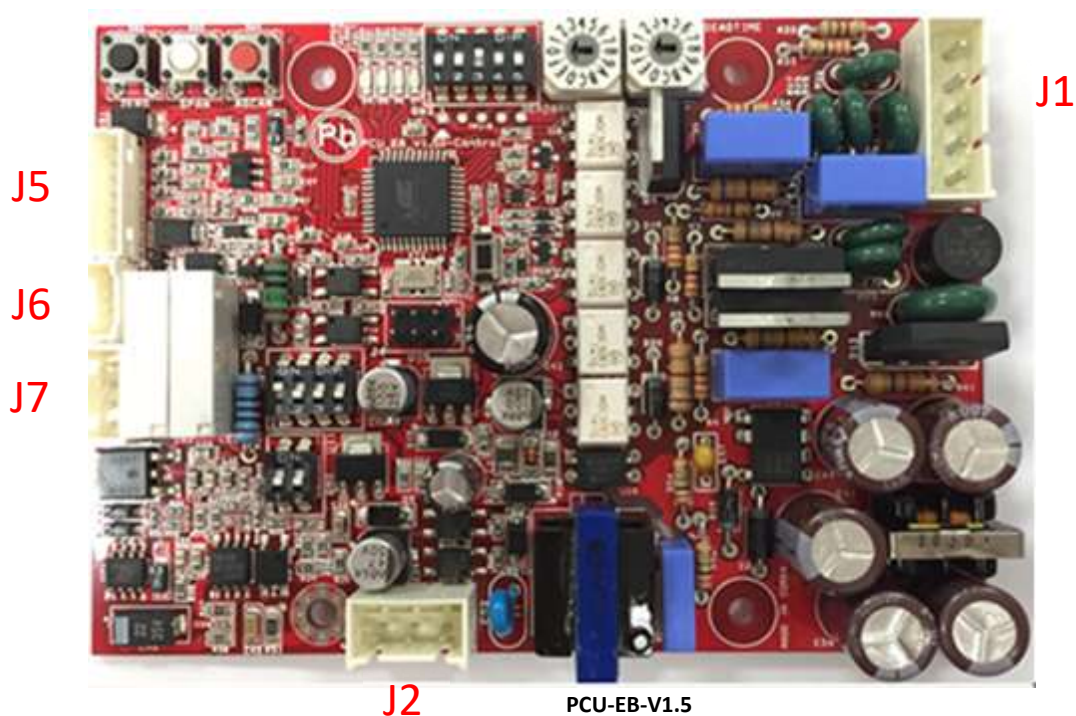
- The deadband adjusts the limits of the valve's deviation between an actual position and a target position. The deadband is set to 0.12mA DC Max.
- Resolution indicates the extent of the reaction on the input signal.
- Low resolution setting may cause the actuator to hunt or to unnecessarily respond to a fluctuating input signal. If so, the resolution must be increased.
- Turning the Resolution Dial in clockwise direction will increase the resolution (Range 0.0625mA to 1mA).

Dial mA DC	0	1	2	3
Dial mA DC	0.0625	0.125	0.1875	0.25
Dial mA DC	4	5	6	7
Dial mA DC	0.3125	0.375	0.4375	0.5
Dial mA DC	8	9	A	B
Dial mA DC	0.5625	0.625	0.6875	0.75
Dial mA DC	C	D	E	F
Dial mA DC	0.8125	0.875	0.9375	1



4.6.5 PCU-EB – Proportional Control Unit Alternating Current (2020 VERSION)

Note: Please be noted that two PCU Alternating Current PCB's are available. Check the markings on the PCB before you start working on the settings. The instructions below are only applicable to the PCU-EB PCB.



Connector	Purpose
J1 (5-Pin)	Power connection for PCU and motor
J1 (5-Pin)	LCU connection terminal
J1 (5-Pin)	Command and feedback signal, Potentiometer connector
J1 (5-Pin)	Closed (1, 2) & Open (3, 4) Limit Switch connection terminal
J1 (5-Pin)	Closed (1, 2) & Open (3, 4) Relay contact output terminal

PCU-EB Features	
Model	PCU-EB-V1.5 (1 Phase)
Power	115/230 VAC \pm 10%, 50/60Hz, Max. 4 VA
Input Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~20mA DC, 0~5V DC, 0~10V DC
Input Impedance	250 Ω
Position Impedance	100~10k Ω
Output Signal	4~20mA DC, 1~5V DC, 2~10V DC, 0~20mA DC, 0~5V DC, 0~10V DC
Output Impedance (load)	500 Ω Max
Deadtime Adjustment	0.2~7.5 seconds (to be set in 16 steps)
Deadband Adjustment	0.3~7.5% (to be set in 16 steps)
Ambient Temperature	-25°C (-13°F) up to +80°C (176°F)
Ambient Humidity	90% RH Max (non-condensation)
Fault Mode	Fail close, fail open and fail stop
Position Conversion Accuracy	\pm (0.2~5)% (depending on conditions)
Dielectric Strength	1500V AC 1 minute
Insulation Resistance	500V DC, 50M Ω
Vibration and Shock	X, Y & Z, 10g (6g based on RMF), Frequency: 0.2~34Hz, Time: 30 minutes

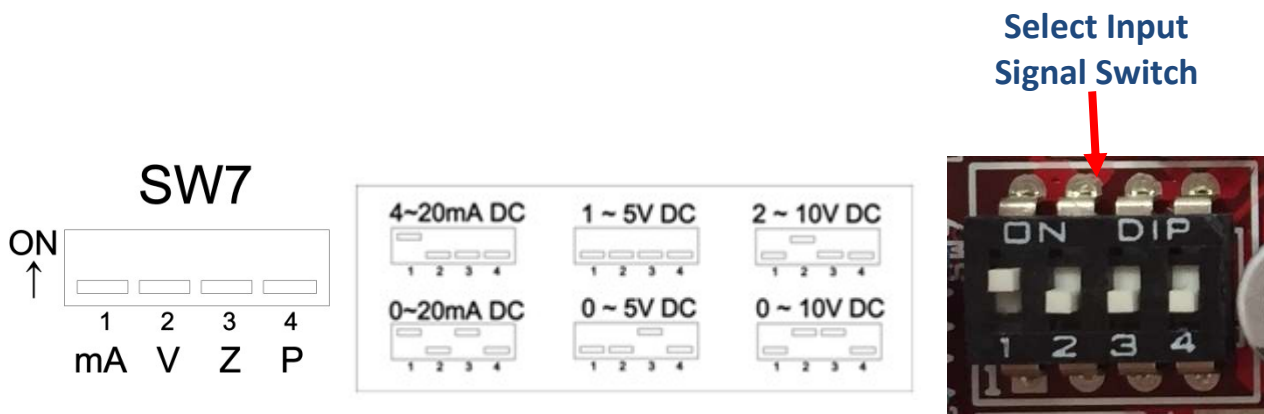
A) LED Signal Indication

LED	Signal
Red	Open
Blue	Power or Auto
Green	Close
Yellow	Manual or Fault



B) Selecting Input Signal

Depending on the system environment a suitable input signal can be selected by adjusting the SW7 DIP-switches as follows:

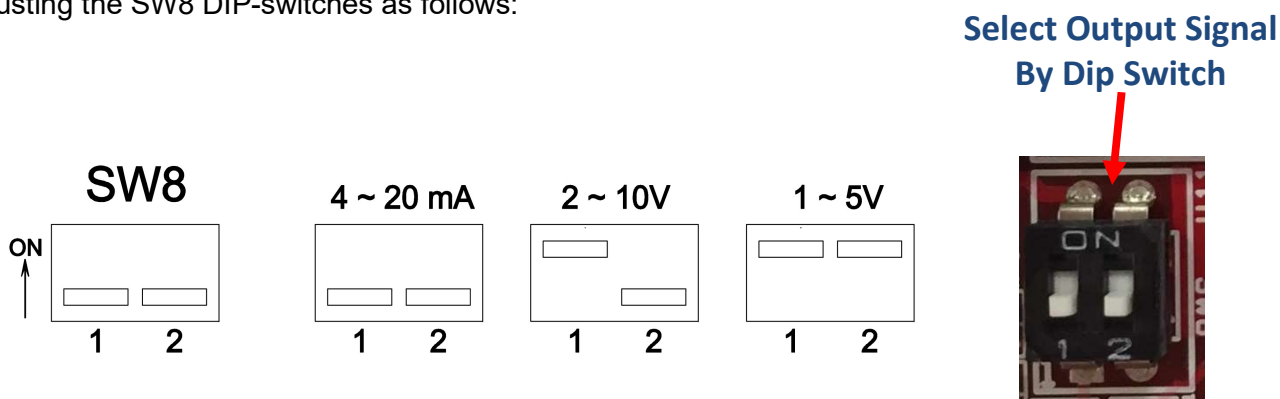


Notes:

- 4-20mA is the standard factory setting for the input signal of this PCU.
- ZERO SWITCH (SW7.3). Same application of input and output signals.

C) Selecting Output Signal

Depending the system environment a suitable output (feedback) signal can be selected by adjusting the SW8 DIP-switches as follows:



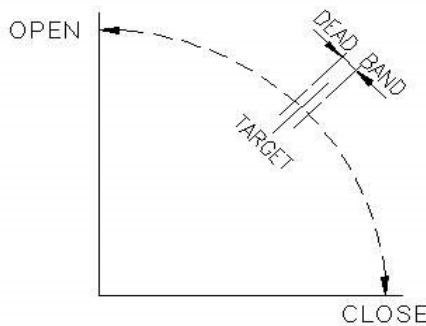
Note: 4-20mA is the standard factory setting for the output signal of this PCU.



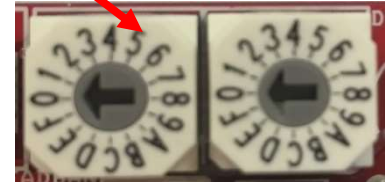
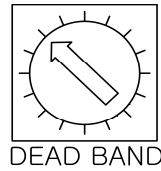
CAUTION: "(1) Selection of input signal" ZERO SWITCH (SW7.3) Usage Notes

D) Deadband Setting

- Max. allowable value of actuator position error by input command signal.
- Min. variation range of the input command signal to start operating the actuator.



DeadBand Rotary DIP Switch



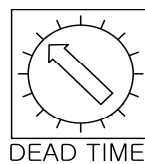
- Range of DEAD BAND setting: 0.3 ~ 7.5% (setting in 16 steps)
 - ① Step 0 : 0.1% increase per step (0.3% ~ 0.7%)
 - ② Step 1 ~ 4 : 0.2% increase per step (1.0% ~ 1.8%)
 - ③ Step 5 ~ 15 : 0.5% increase per step (5.0% ~ 7.5%)
 - ④ Factory setting : "2"
- In case the DEADBAND is set too narrow, the actuator may run back and forward repeatedly not finding the target position. This is called as HUNTING.
- DEADBAND should be properly adjusted in order to prevent HUNTING.



CAUTION: *Continuous HUNTING will cause damage to the motor, PCU-card or potentiometer.*

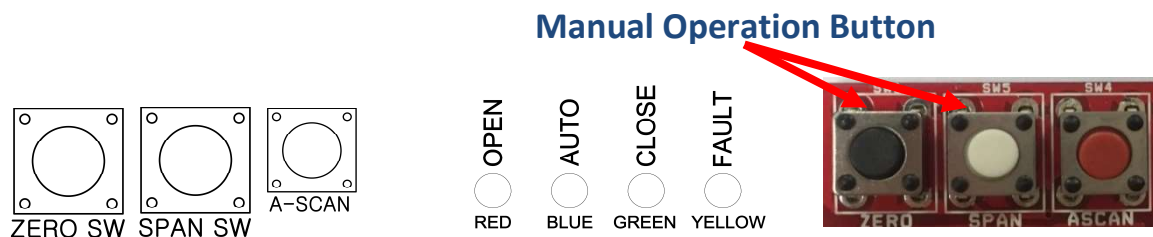
E) Deadtime Setting

DeadTime Rotary DIP Switch



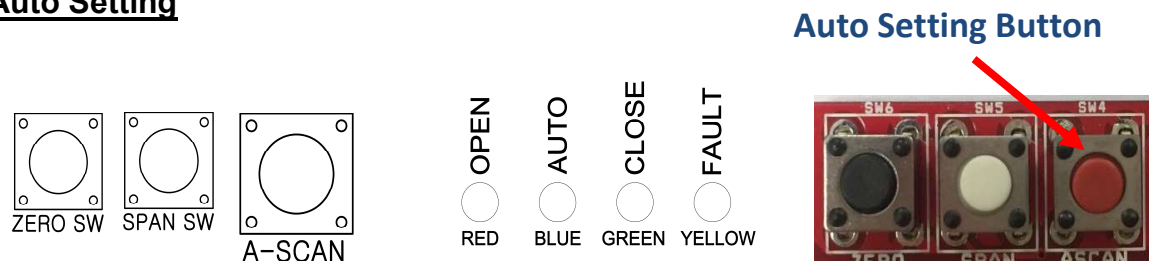
- DEAD TIME setting is to secure the reliability of the command signal.
- Minimum duration time of the input command signal satisfying DEAD BAND.
- Actuator is operated by recognizing input signals satisfying DEAD TIME as command signals.
- Range of DEAD TIME Setting : 0.2 ~ 7.5 seconds (setting in 16 steps)
 - ① Step 0 : 0.2s (the minimum value)
 - ② Step 1 ~ 4 : 0.25s increase per step (0.25 ~ 1 sec)
 - ③ Step 5 ~ 15 : 0.50s increase per step (2.5 ~ 7.5 sec)
 - ④ Factory setting : "2"

F) Manual Mode



- This is for operating the actuator manually.
- Press the “ZERO” button and “SPAN” button simultaneously for more than one second until the YELLOW LED turns on. The manual mode is now activated.
- ZERO BUTTON (black): For operating the actuator to the CLOSED direction.
- SPAN BUTTON(white) : For operating the actuator to the OPEN direction.
- The MANUAL MODE will be released automatically when there is no new command signal within 10 seconds by using the manual buttons. Or press the ZERO SW (black) and SPAN SW (white) button simultaneously for more than one second. The YELLOW LED will turn off, indicating that the MANUAL MODE is released.

G) Auto Setting



- Please check the actuator wiring connections and input and output signals, after the actuator has been mounted on the valve.
- If all wiring connections have been made correctly, press the “ASCAN” button one time.
- The PCU card will start the actuator SETTING automatically. During the AUTO SETING mode the blue LED is blinking.

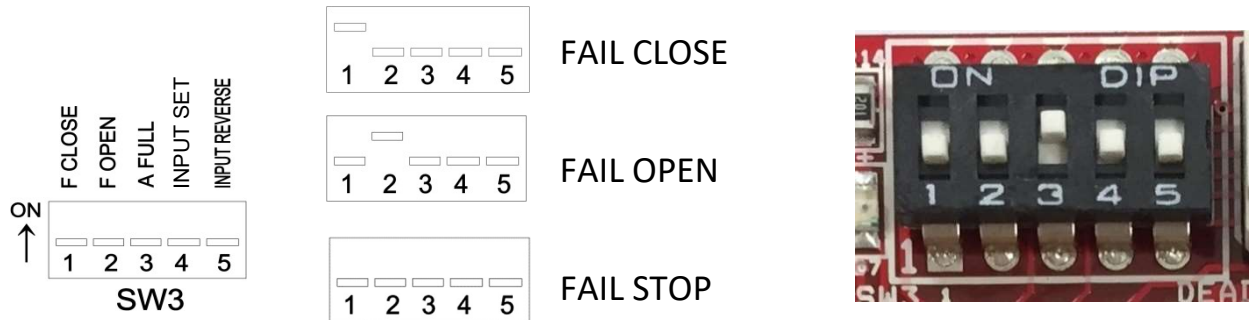
Setting Procedure:

- 1) The BLUE LED blinks continuously.
- 2) The actuator is moving to the closed position (GREEN LED blinking) → The actuator is fully closed (GREEN LED turns ON). If the actuator is already in the closed position, the closing process will be skipped!
- 3) The actuator is moving to the open position (RED LED is blinking) → The actuator is fully open (RED LED light turns ON)
- 4) When the AUTO SETTING has been completed (BLUE LED turns ON) → The actuator will move to the new position given by the input signal.

Note: *The Auto Setting command is cancelled automatically when any button (Zero, Span or A-scan) is pressed during the Auto Setting mode.*

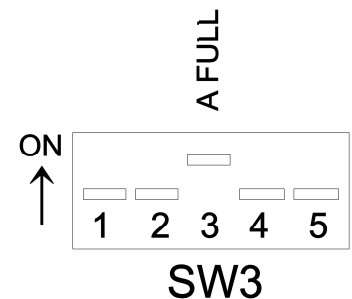
H) Fail Close, Fail Open and Fail Stop Setting

The PCU card will recognize input signals such as no signal or wrong signal as faults, it will make the actuator automatically move to fully OPEN or fully CLOSE position, or the actuator will STOP immediately in the current position.



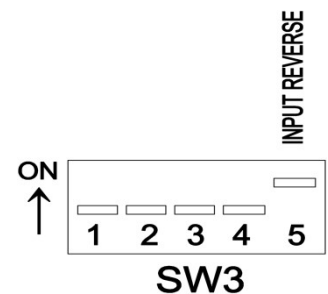
I) Auto Full Action (A FULL)

Dip switch No. 3 (A_FULL) is in the ON position as shown above. This setting will make the actuator run to the fully closed position if the input signal is lower than 4.3mA. It will run to the fully open position if the input signal is higher than 19.7mA

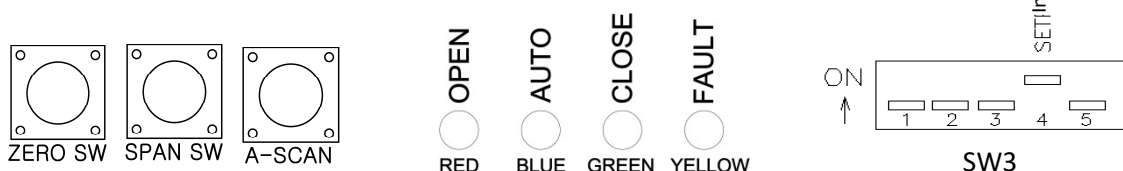


J) Reverse Mode

- When the Reverse Mode is set as shown on the picture on the right, the actuator is responding in reverse to the input signal. This means:
- When input (command) signal is 4mA, the actuator will run to the fully open position and will send out 4mA as output signal (feedback).
- When the input (command) signal is 20mA, the actuator will run to the fully closed position and will send out 20mA as output signal (feedback).



K) Setting the Optional Set Point



- ZERO (FULL CLOSE) Signal, SPAN (FULL OPEN) Signal for changing the Signal
- ZERO (FULL CLOSE) Signal SETTING Range: Generally 3 ~ 8 mA DC
- SPAN (FULL OPEN) Signal SETTING Range: Generally 16 ~ 21mA DC

Example

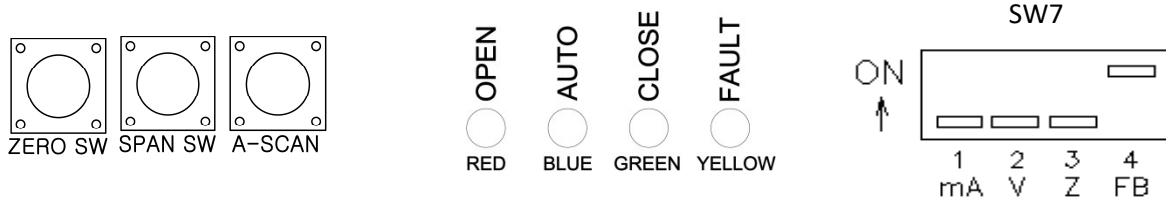
Please set full close (zero) to 5mA DC and set fully open (span) to 19mA DC

- ① Put dip switch No. 4 ON (SW3).
- ② RED & GREEN LED start blinking together.
- ③ After 1.5 Seconds, Only the GREEN LED blinks.
- ④ Put the 5mA input (command) signal on the input terminal, then push the black "ZERO" button.
- ⑤ If the setting has succeeded, the YELLOW LED will blink once.
- ⑥ Check if the GREEN LED is on and the RED LED is blinking.
- ⑦ Put the 19mA input (command) signal on the input terminal, then push the white "SPAN" button.
- ⑧ If the setting has succeeded, the YELLOW LED will blink once and the RED LED is on.
- ⑨ Check if the RED and GREEN LEDS are blinking together and wait until only the GREEN LED is blinking.
- ⑩ Put dip switch No. 4 back to OFF (SW3)

Notes:

- *The above setting procedure will be cancelled if dip switch No. 4 is being put in the OFF position during the setting procedure.*
- *If, during the above procedure, there is any input signal for longer than 2 minutes the setting procedure is being cancelled.*

L) Setting the feedback



- Setting the output signal as 4mA and 20mA.
- ZERO BUTTON (Black): To decrease the Output signal.
- SPAN BUTTON (white): To increase the output signal.

Example

ZERO: 4mA and SPAN: 20mA Setting

- ① Put dip switch No. 4 ON (SW7)
- ② The RED and GREEN LED will turn off. Wait until the GREEN LED starts blinking.
- ③ Push the "ZERO-SPAN" button in order to set the output signal to 4mA.
- ④ Check the 4mA output signal and push the "ASCAN" button.
- ⑤ Check if the YELLOW LED blinks once.
- ⑥ Check if the GREEN LED is on and the RED LED is blinking.
- ⑦ Push the "ZERO-SPAN" button in order to set the output signal to 20mA.
- ⑧ Check the 20mA output signal and push the "ASCAN" button.
- ⑨ Check if the YELLOW LED blinks once.
- ⑩ Check if the RED LED is on.
- ⑪ Check if the RED and GREEN LED are switched on together and wait until RED LED switches off.
- ⑫ Put dip switch No. 4 back to OFF (SW7).

Notes:

- *The above setting procedure will be cancelled if dip switch No. 4 is being put in the OFF position during the setting procedure.*
- *If, during the above procedure, there is any input signal for longer than 2 minutes the setting procedure is being cancelled.*

M) LED Display

LED	Color	Operation	Status
OPEN	RED	ON	FULLY OPEN
		OFF	OPENING
AUTO	BLUE	ON	POWER ON
		OFF	AUTO SETTING
CLOSE	GREEN	ON	FULLY CLOSED
		OFF	CLOSING
FAULT	YELLOW	ON	MANUAL MODE
		OF	MALFUNCTION

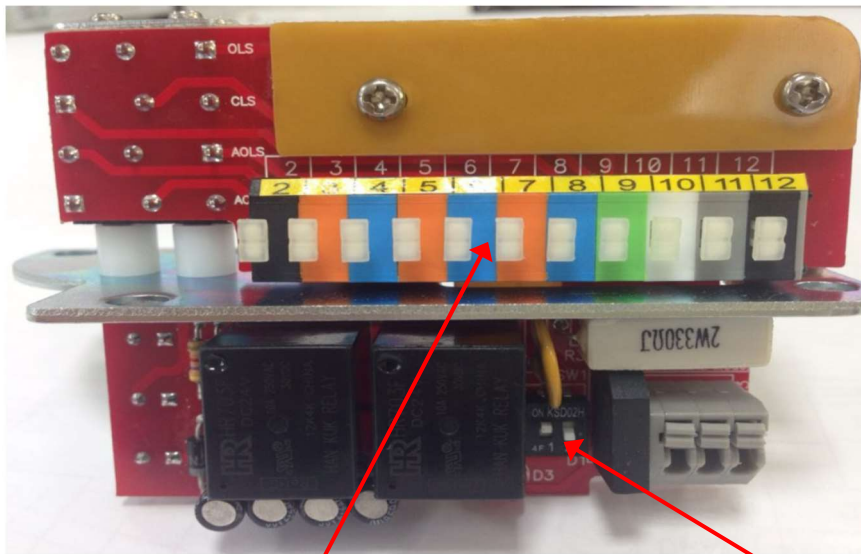
N) Error Display

PCU-card is in error condition (YELLOW LED is switched off)

By pushing the black "ZERO" button, the error condition can be checked with the LED status as shown in the below table.

No.	Type of Error	LED			
		RED	BLUE	GREEN	YELLOW
1	EEPROM Error	OFF	OFF	OFF	ON
2	Input signal initialization error	OFF	OFF	ON	OFF
3	Auto Setting initialization error	OFF	OFF	ON	ON
4	Input signal error	OFF	ON	OFF	OFF
5	Motor backlashing	OFF	ON	OFF	ON
6	Command signal select switch error	OFF	ON	ON	OFF
7	POTENTIOMETER	OFF	ON	ON	ON
8	Open position error	ON	OFF	OFF	OFF
9	Close position error	ON	OFF	OFF	ON
10	Limit switch error	ON	OFF	ON	OFF

4.7 AC/DC Multi-Board (Optional)



Terminal block

Power in-put switch

A) Terminal block connections

- 2 CLOSE LAMP
- 3 NONE
- 4 OPEN LAMP
- 5 NONE
- 6 LAMP COM
- 7 Power 24V AC/DC (DC + input terminal)
- 8 CLOSE signal
- 9 OPEN signal
- 10 NONE
- 11 NONE
- 12 Power 24V AC/DC (DC – input terminal)

B) Power in-put switch



For AC Mode, #1 switch turn "ON" and #2 switch turn "OFF"



For DC Mode, #1 switch turn "OFF" and #2 switch turn "ON"

Note: Don't operate both switches #1 and #2 at the same time. It may damage the board

5 FIELDBUS COMMUNICATION PROTOCOL (Optional)

5.1 ModBus Controller

- This clause explains the ModBus-RTU Slave Module (MBRSM). Positioned at level 7 of the OSI model, ModBus is an application layer messaging protocol that provides client/server communication between devices connected on different types of buses or networks.
- As a ModBus Serial Line protocol, ModBus-RTU (Remote Terminal Unit) is a Master-Slave protocol which takes place at level 2 (Data Link layer) of the OSI model. The master initiates the communication by transmitting the Function Code (a 'request') to the address of a slave and after receiving and processing the Function Code, the slave returns a message (a 'response').
- The slaves shall not communicate with each other without the request of the master. Since the MBRSM is based on the 2 wire (half-duplex) RS-485 communication, the network length limit or the number of station should follow the standards of the RS-485 communication. To extend the network, such as adding another segment, repeaters can be used. To ensure stability of the network system, the network redundancy can be configured to slave redundancy.
- ModBus manages the access of data simply and flexibly. ModBus supports two data types: A Boolean value and an unsigned 16-bit integer. Generally, it is common for field devices to have certain values defined as inputs while other values are outputs, such as current temperature or valve position.



ModBus PCB

5.2 Specification

- Communication Protocol: ModBus-RTU according to IEC 61158 and IEC 61784
- Topology: Line topology with termination
- Number of nodes: 32 nodes in each segment without repeater, with repeaters expandable to 247
- Number of repeaters: Max. 9 with signal refreshing
- Cable length: Max. 1.2 Km with Repeater 10 Km
- Transfer Mode: RS-485
- Transmission Medium: Twisted, shielded 2-Wire cable according to IEC 61158
- Bus Access: Polling between master and slaves (query response)
- Supported Baud Rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- Supported Parity Bit: Odd, Even, None
- Supported Stop Bit: 1, 2

For more detail information, please refer to separate ModBus operation manual.

6 OPERATION

6.1 Electrical Connections and Preliminary Test

WARNING:



Working in potentially explosive atmospheres implies, that European Standards must be observed: EN 60079-14 “Electrical Installation in Hazardous Areas” and EN 60079-17 “Inspection and Maintenance of Electrical Installations in Hazardous Areas”.

Work on electrical systems or equipment may only be carried out by skilled electricians or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

For cable gland or conduit entries that are not used, user or installer shall close those entries by certified blanking elements in order to maintain the enclosure protection. Extra attention is required for selecting the correct “Ex db IIB” or “Ex db IIC” blanking elements.

An explosion proof enclosure must be treated with care. Seals and sealing surfaces may not be damaged in any way. Do not jam during assembly.

- For testing purposes, loosen the bolts of the actuator cover and remove the cover.
- Make sure that the power supply voltage is in accordance with the information on the nameplate of the actuator.
- Put the cables through the cable glands: 2x PG13.5 or 2x ½”NPT (North American versions)
- Connect wires according to the enclosed wiring diagram (see Appendix I)
- Manually move the valve to the half-open position. Then electrically operate the actuator to the fully open position and check if the motor rotates in the correct direction. According to the applicable standards the actuator must be closing in counter-clockwise direction.
- Test the actuator and check whether the limit switches work correctly
- After testing, check if all cable glands are correctly tightened. Applicable cable glands must be selected to meet the application’s condition. It is recommended to use at least IP67 cable glands.
- Put the cover back to the actuator and tighten the bolts.
- See Appendix one for the wiring diagrams

DANGER:



HAZARDOUS VOLTAGE. *Electrical power must not be connected until all wiring and limit switch adjustments have been completed. Once the power is supplied to the unit, precautions must be taken if the cover is not mounted on the actuator.*

7 MAINTENANCE

7.1 Maintenance

**CAUTION:**

Turn off all power before performing maintenance on the actuator.

POTENTIALLY HIGH PRESSURE VESSEL. *Before removing or disassembling your actuator, ensure that the valve or other actuated device is isolated and not under pressure.*

Under normal conditions, maintenance should be carried out at six month intervals. But when the conditions are more severe, more frequent inspections may be advisable.

- Ensure that the actuator is properly aligned with the valve (stem) or other actuated device
- Ensure that all wires are insulated and connected properly
- Ensure that all screws are present and tightened
- Ensure that all internal electrical devices are clean (dry and free of dust)
- Ensure that conduit connections are properly installed and are dry
- Check the internal devices for any condensation
- Check the power supply of the internal heater
- Check the enclosure O-ring seals and verify that the O-rings are not pinched
- Check the declutch mechanism
- Visually inspect the open/close cycle
- Inspect the identification labels for wear and replace it if necessary

**WARNING:**

Treat cover with care. Seals and sealing surfaces may not be damaged or dirty in any way. Do not jam the cover during mounting.

7.2 Tools

- Metric Allen key (Hex Wrench) x 1
- Screw driver x 1
- Metric Spanner x 1
- Wrench 200mm x 1
- Wrench 300 mm x 1
- Wire stripper Long Nose x 1
- Multi-meter (AC, DC, Resistance) x 1
- PCU Board option: DC Signal Generator (4 – 20mA DC) x 1
- PCU & CTU Board Option: 1mA Ammeter (0 – 25mA)

8 TROUBLE SHOOTING

The following instructions are listed in the order of the most common difficulties encountered during the installation and start-up.

Symptom	Probable Cause	Corrective Action
Motor will not run	Open in control circuit	Consult the appropriate wiring diagram and check for continuity
	Insulation resistance breakdown in motor	Perform megger Test
No power available to the actuator	Tripped circuit breaker	Reset circuit breaker
Manual Override Nut hard to turn	Valve stem improperly lubricated	Lubricate with grease
	Actuator lubrication has broken down	Clean out old grease and replace with recommended lubricant
	Valve packing gland too tight	Loosen packing gland nuts as far as necessary and possible
	Jammed valve	Refer to valve maintenance manual
Valve only opens or closes partially with motor	Limit switch improperly set	Check setting and reset if necessary
Manual Override Nut does not operate valve	Stripped gearing	Replace as necessary
	Broken hand wheel shaft	Replace as necessary
	Broken valve stem	Repair or replace as necessary
Motor runs but will not operate valve	Stripped gearing	Replace as necessary

8.1 The actuator does not respond

- Visually inspect the actuator and check if no damage has occurred during shipping and handling of the actuator.
- Verify the line voltage supplied to the actuator; it must match with the rating on the actuator's nameplate
- Compare the internal wiring with the supplied wiring diagram of the actuator
- Check the limit switch cams

8.2 The actuator is supplied with power but does not operate

- Verify the line voltage supplied to the actuator. It must match with the rating on the actuator's nameplate.
- Check if the actuator torque is greater than the valve torque
- Check the limit switch cams
- Check if the torque switches have not been tripped
- Check the mechanical travel stop adjustment
- Check if the rotating direction matches with the rotating direction of the valve.
- Check for any corrosion and condensation. Electrical or mechanical devices may have been affected.
- Verify that coupler/bracket is correctly installed and may not block the actuator rotation.

8.3 Actuator runs erratically

- Check the ambient temperature
- Verify that the duty cycle has not been exceeded
- Check the position of manual override lever

8.4 Optional Equipment

1) Potentiometer Current Position Transmitter

- Check the resistance value
- Check the potentiometer gear for jamming
- Check the ZERO and SPAN calibration
- Check the board for any damage

2) Current Position Transmitter

- Verify the input signal
- Check the configuration of the dip switches
- Check the board for any damage

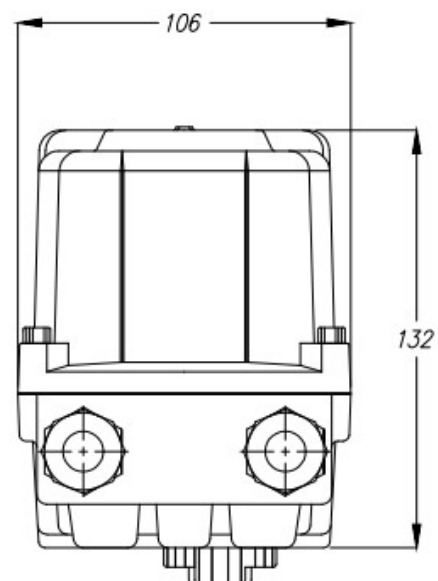
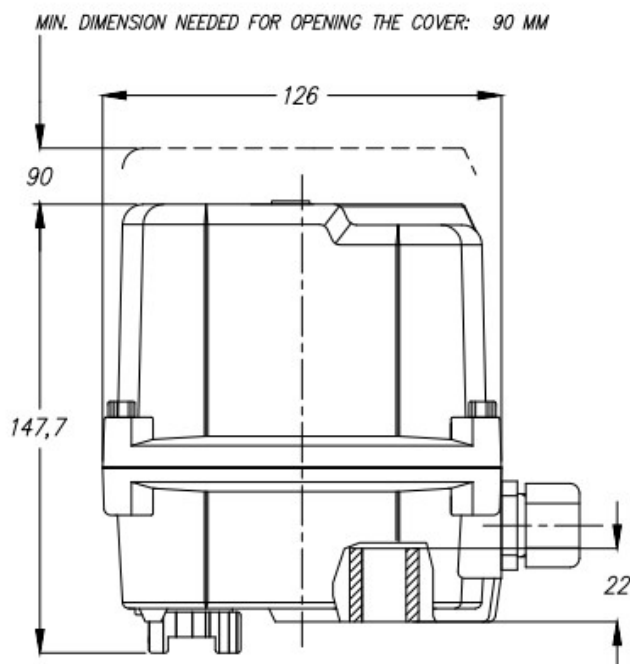
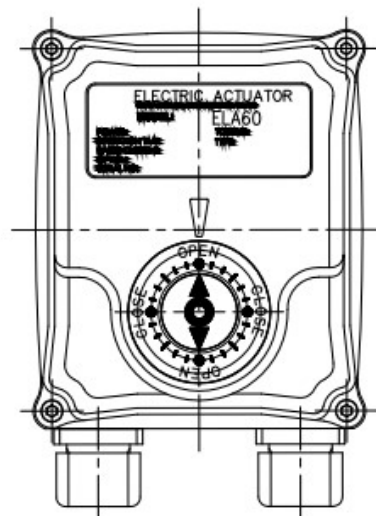
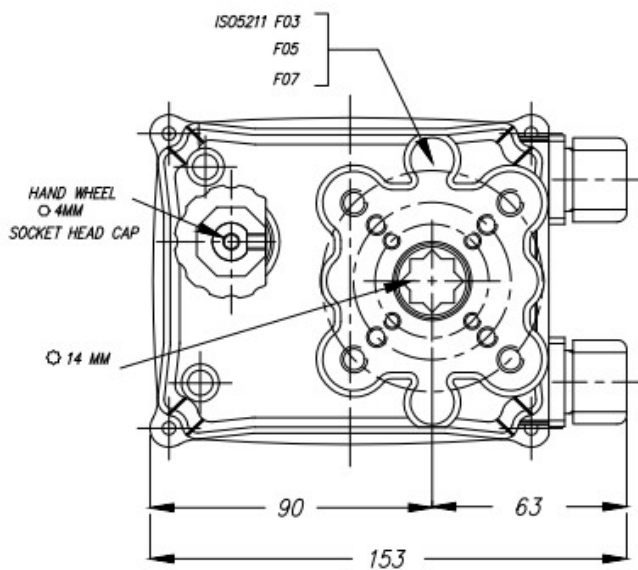
9 DIMENSIONS

9.1 ELA60 On/Off Type

ELECTRIC ACTUATOR ELA60 WITH DRIVE BUSHING

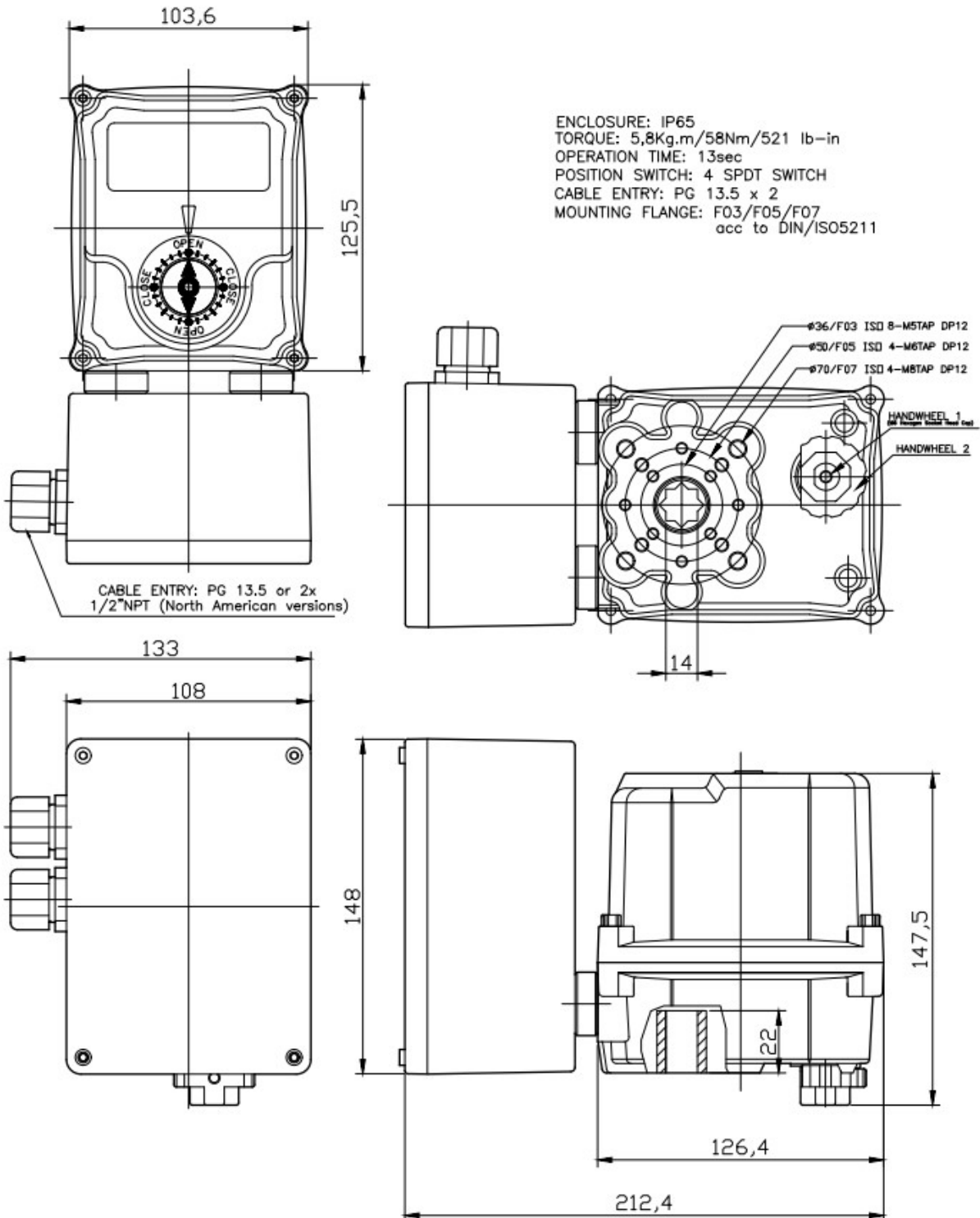
DOUBLE SQUARE INSERT DS14

ENCLOSURE: IP67
 TORQUE: 5,8Kg.m/58Nm/521 lb-in
 OPERATION TIME: 12sec
 POSITION SWITCH: 4 SPDT SWITCH
 CABLE ENTRY: PG11
 MOUNTING FLANGE: F03/F05/F07
 acc. to DIN/ISO5211



9.2 ELA60 PCU Type (Optional)

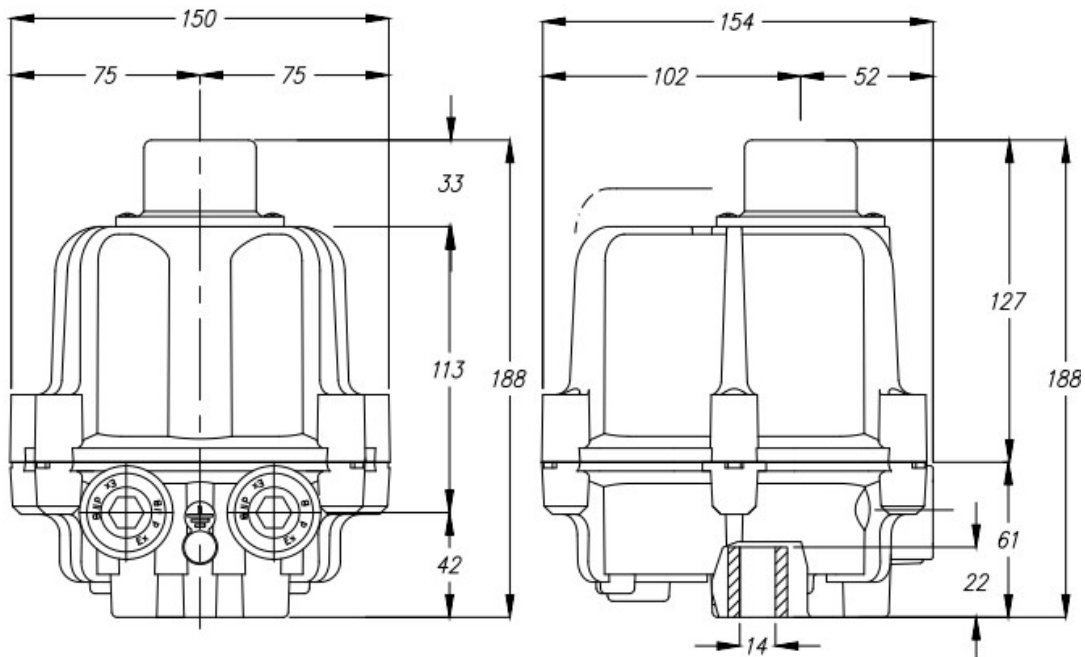
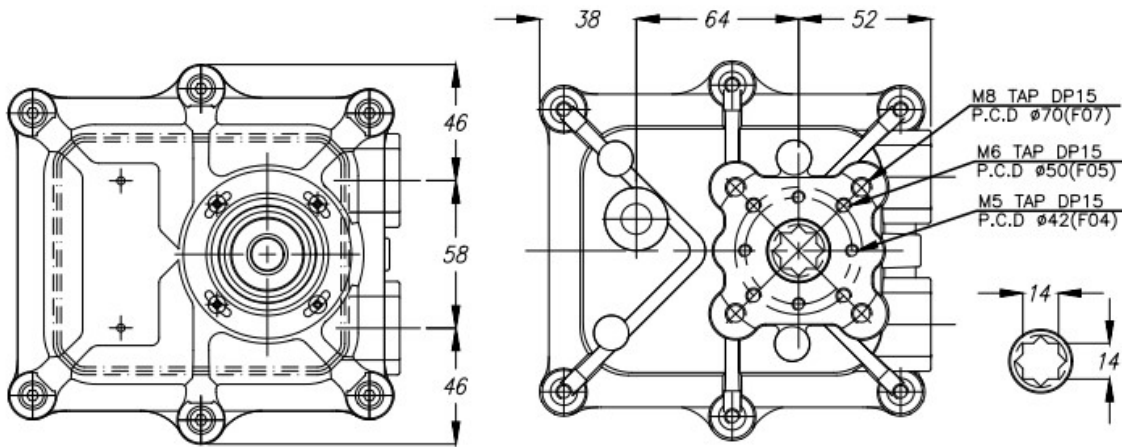
ELECTRIC ACTUATOR ELA60 WITH PCU
DOUBLE SQUARE INSERT DS14



9.3 ELA60-Ex-version On/Off Type

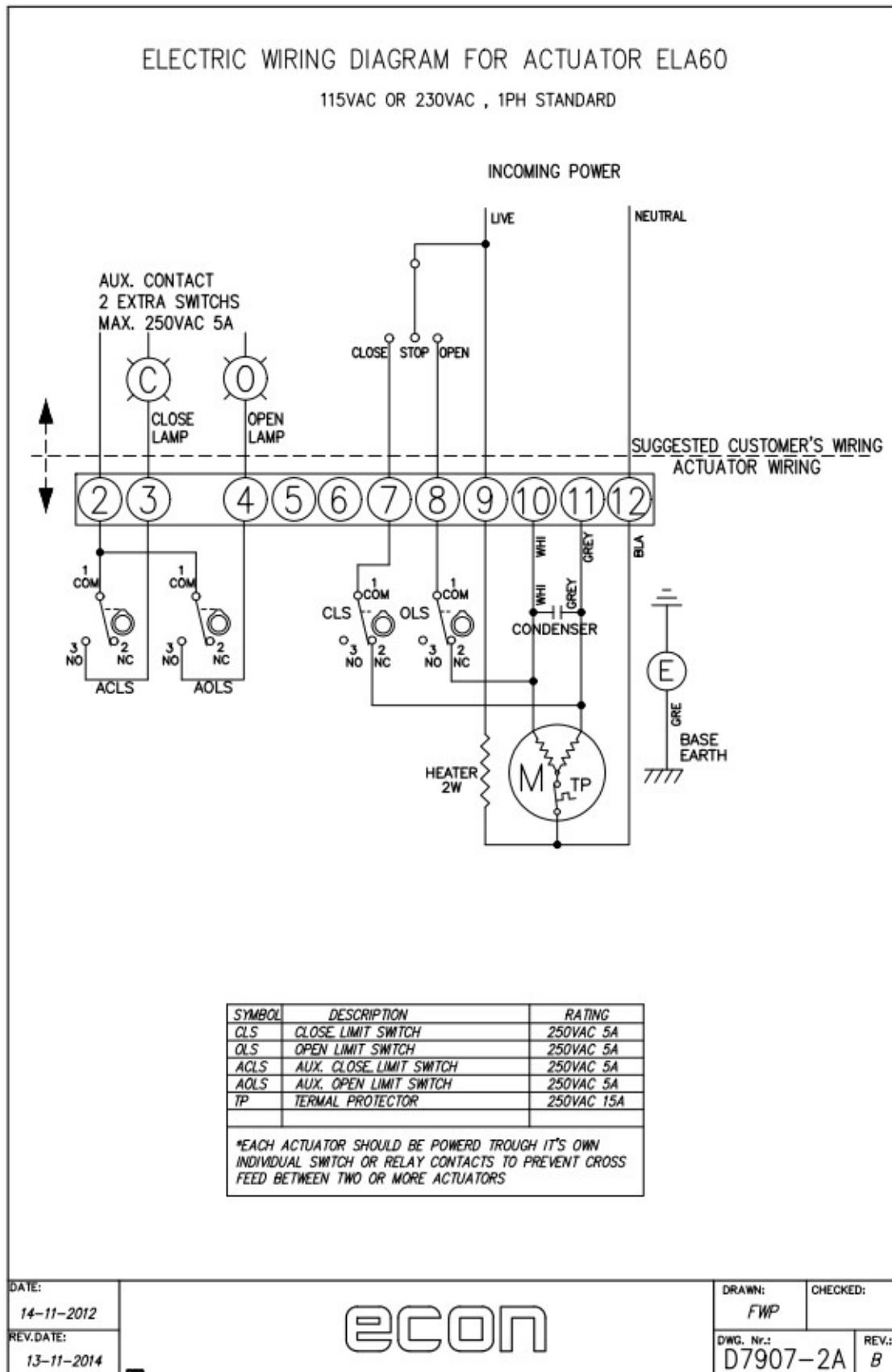
*ELECTRIC ACTUATOR ELA60EX WITH DRIVE BUSHING
DOUBLE SQUARE INSERT DS14*

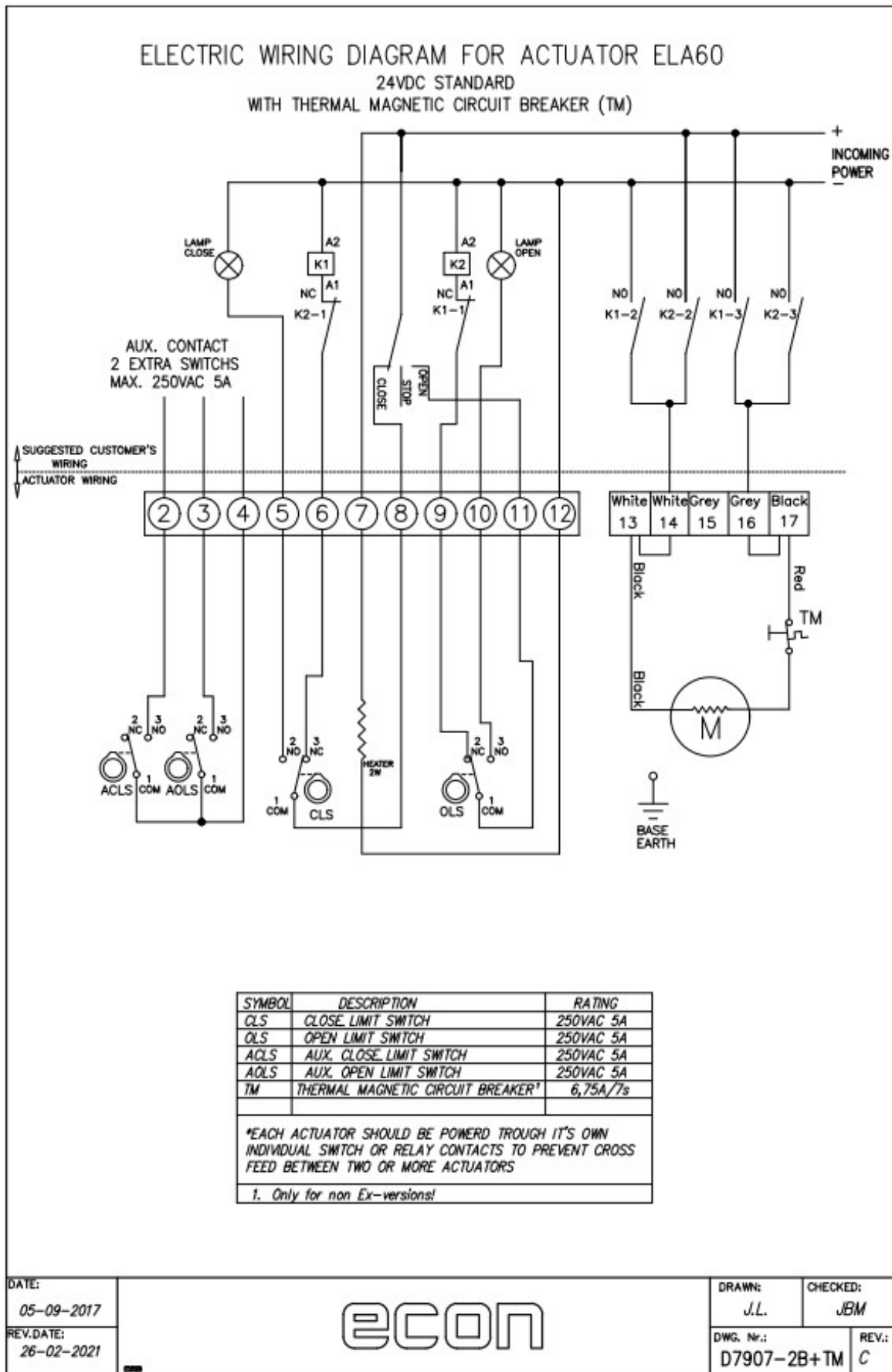
ENCLOSURE: IP67
 TORQUE: 5,8Kg.m/58Nm/521 lb-in
 OPERATION TIME: 1,3sec
 POSITION SWITCH: 4 SPDT SWITCH
 CABLE ENTRY: M20(1.5) x 2EA
 MOUNTING FLANGE: F04/F05/F07
 acc. to DIN/ISO5211

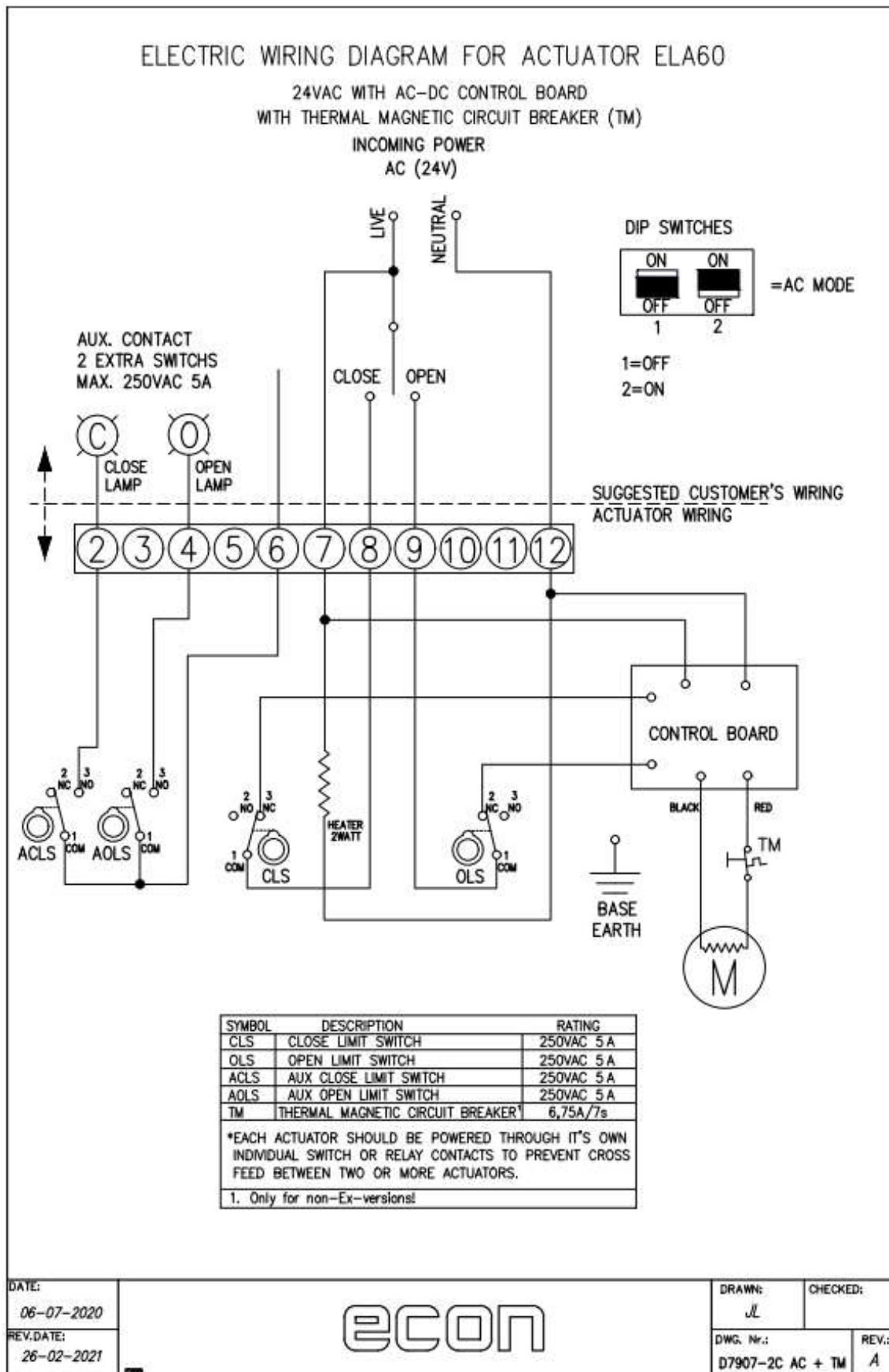


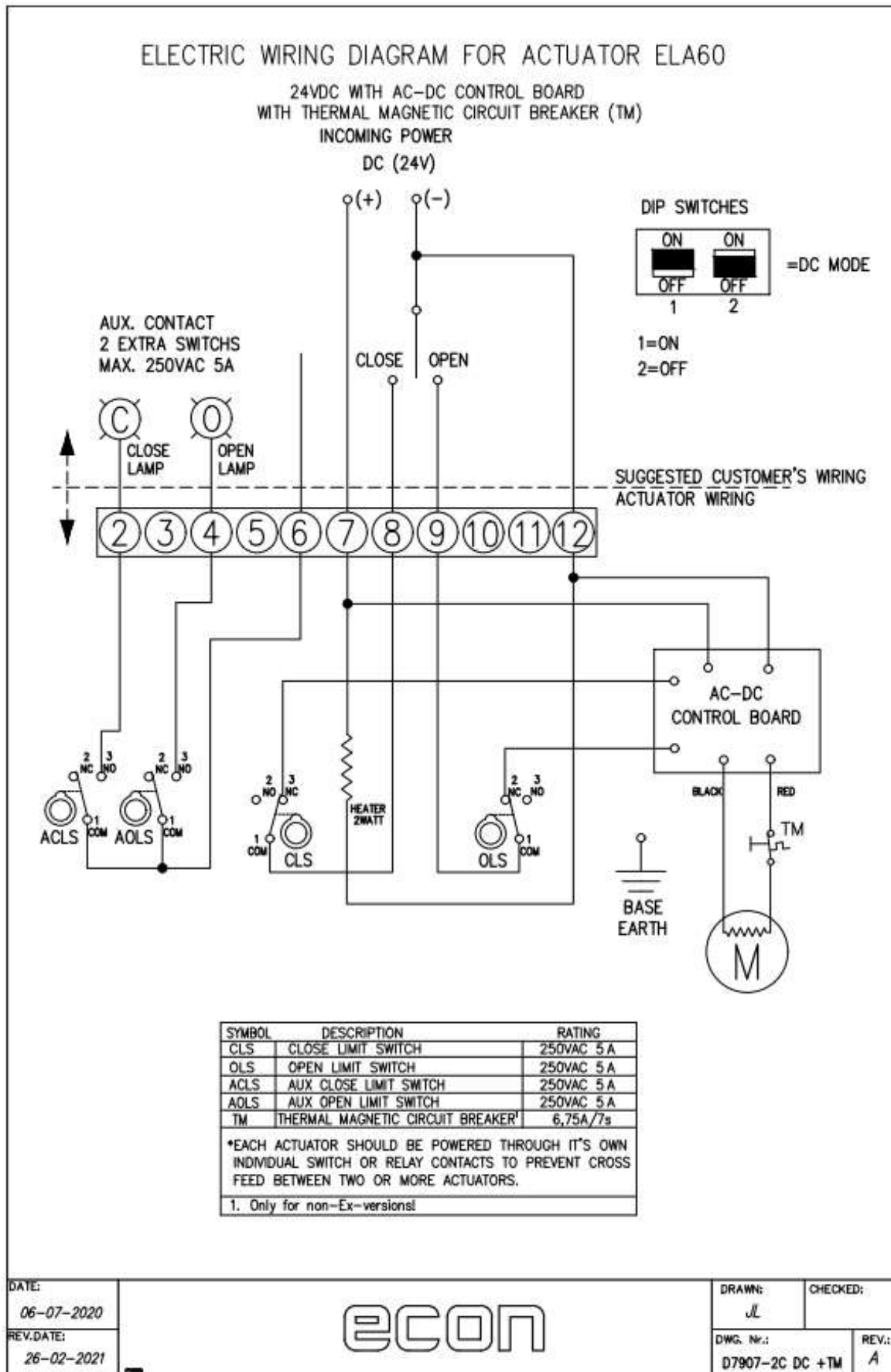
NOTE : For more information regarding this product, please contact your nearest supplier on www.eriks.com

10 WIRING DIAGRAMS



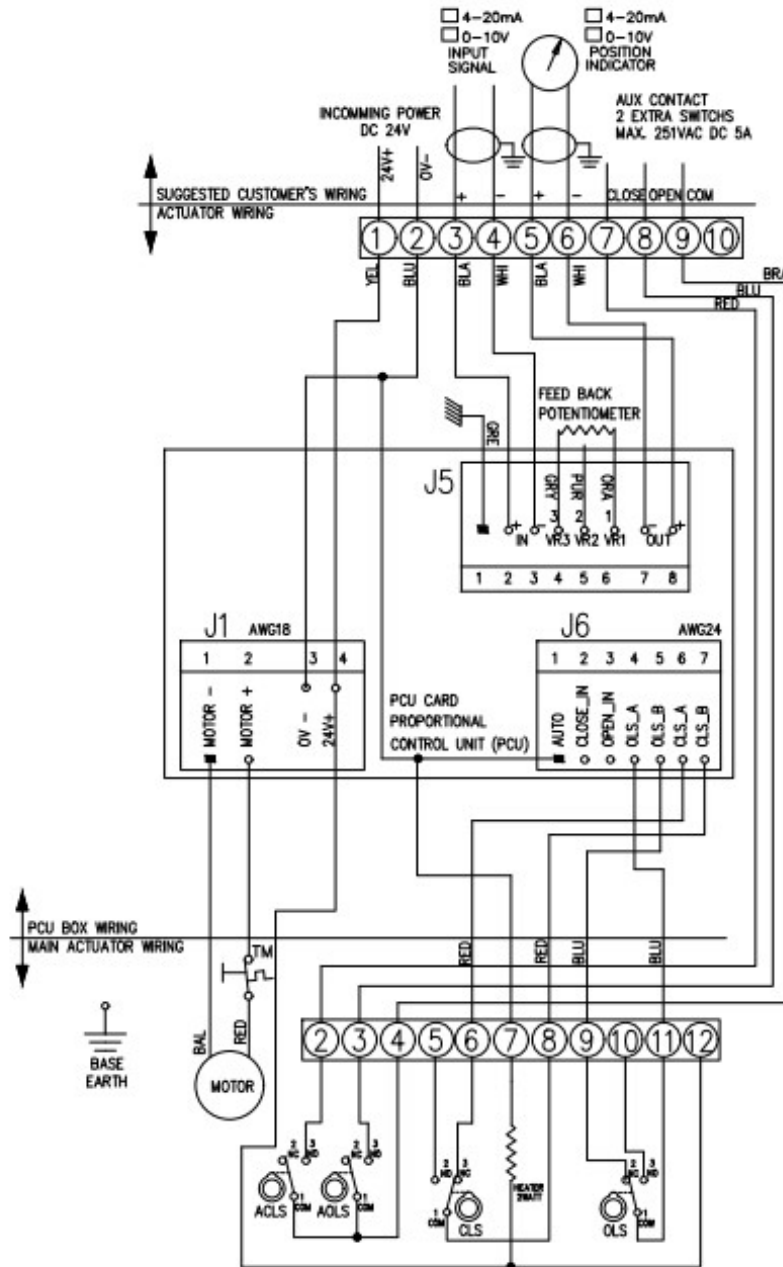






ELECTRIC WIRING DIAGRAM FOR ACTUATOR ELA60

24VDC PCU WITH THERMAL MAGNETIC CIRCUIT BREAKER (TM)



SYMBOL	DESCRIPTION	RATING
CLS	CLOSE LIMIT SWITCH	250VAC 5 A
OLS	OPEN LIMIT SWITCH	250VAC 5 A
ACLS	AUX CLOSE LIMIT SWITCH	250VAC 5 A
AOLS	AUX OPEN LIMIT SWITCH	250VAC 5 A
TM	THERMAL MAGNETIC CIRCUIT BREAKER ¹	6,75A/7s
■	FIRST PIN	

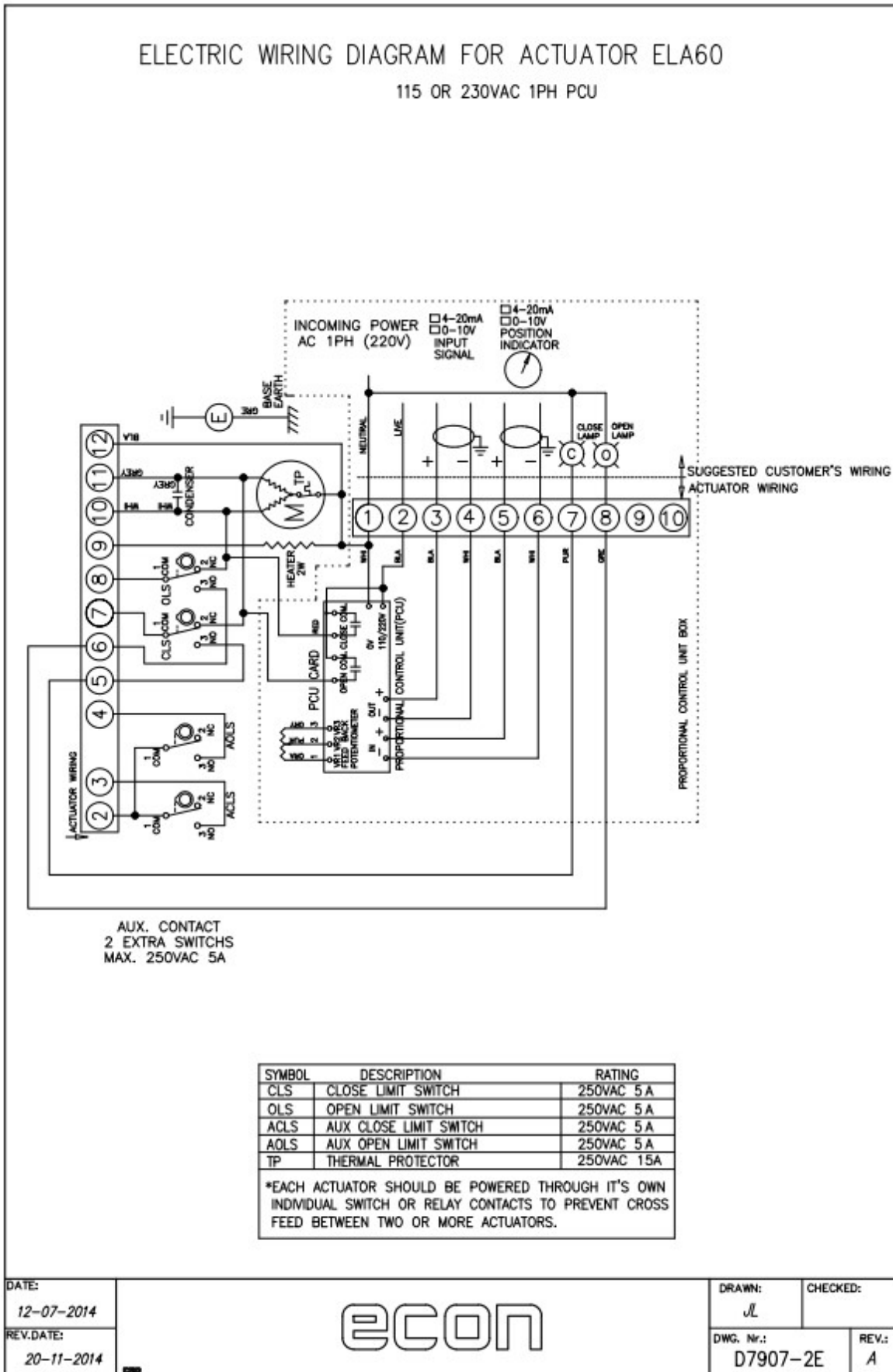
*EACH ACTUATOR SHOULD BE POWERED THROUGH IT'S OWN INDIVIDUAL SWITCH OR RELAY CONTACTS TO PREVENT CROSS FEED BETWEEN TWO OR MORE ACTUATORS.
1. Only for non-Ex-versions!

DATE:
01-08-2014
REV. DATE:
26-02-2021



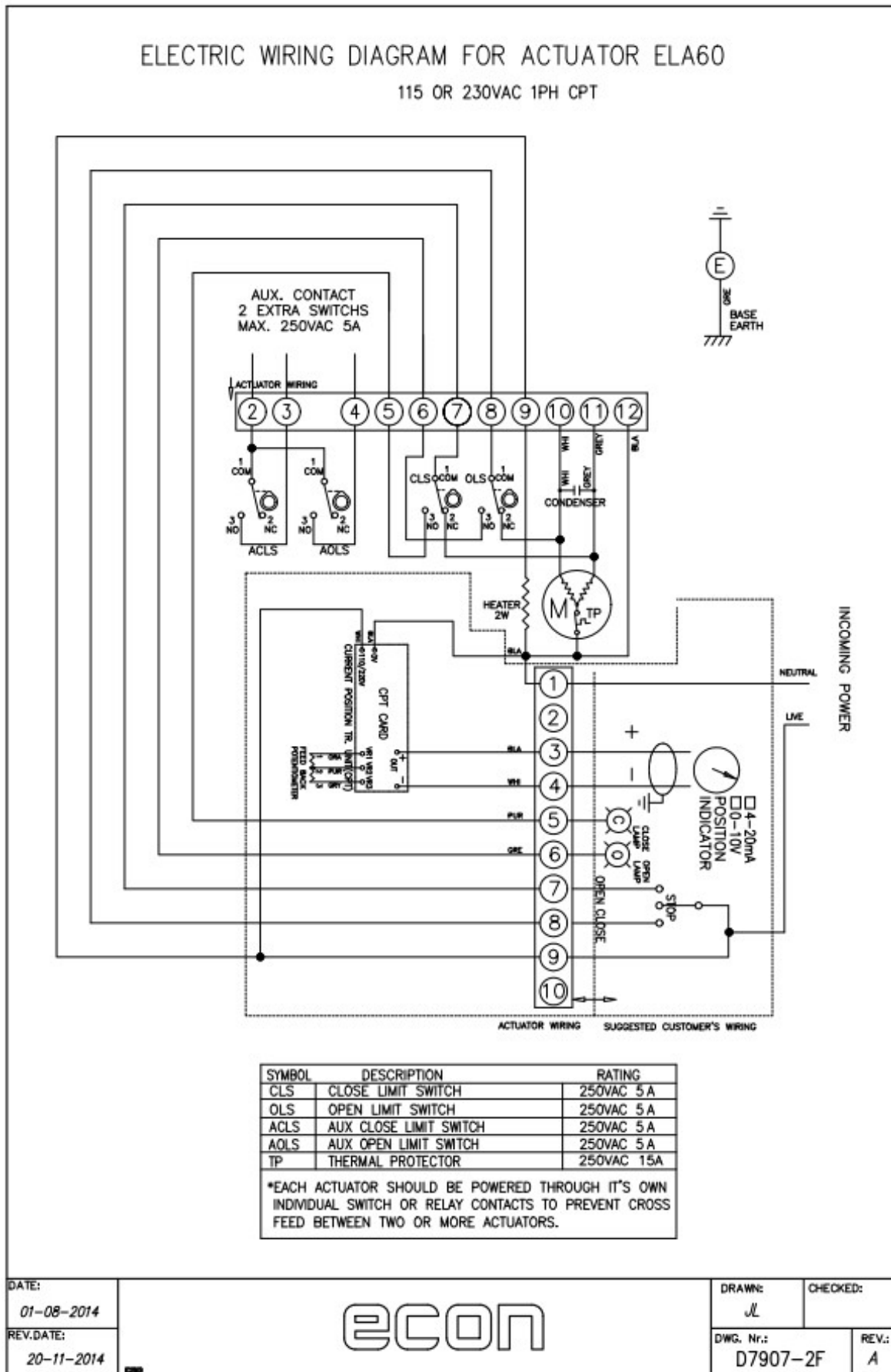
DRAWN: FWP
CHECKED:
DWG. Nr.: D7907-2D
REV.: C

ELECTRIC WIRING DIAGRAM FOR ACTUATOR ELA60
115 OR 230VAC 1PH PCU



ELECTRIC WIRING DIAGRAM FOR ACTUATOR ELA60

115 OR 230VAC 1PH CPT



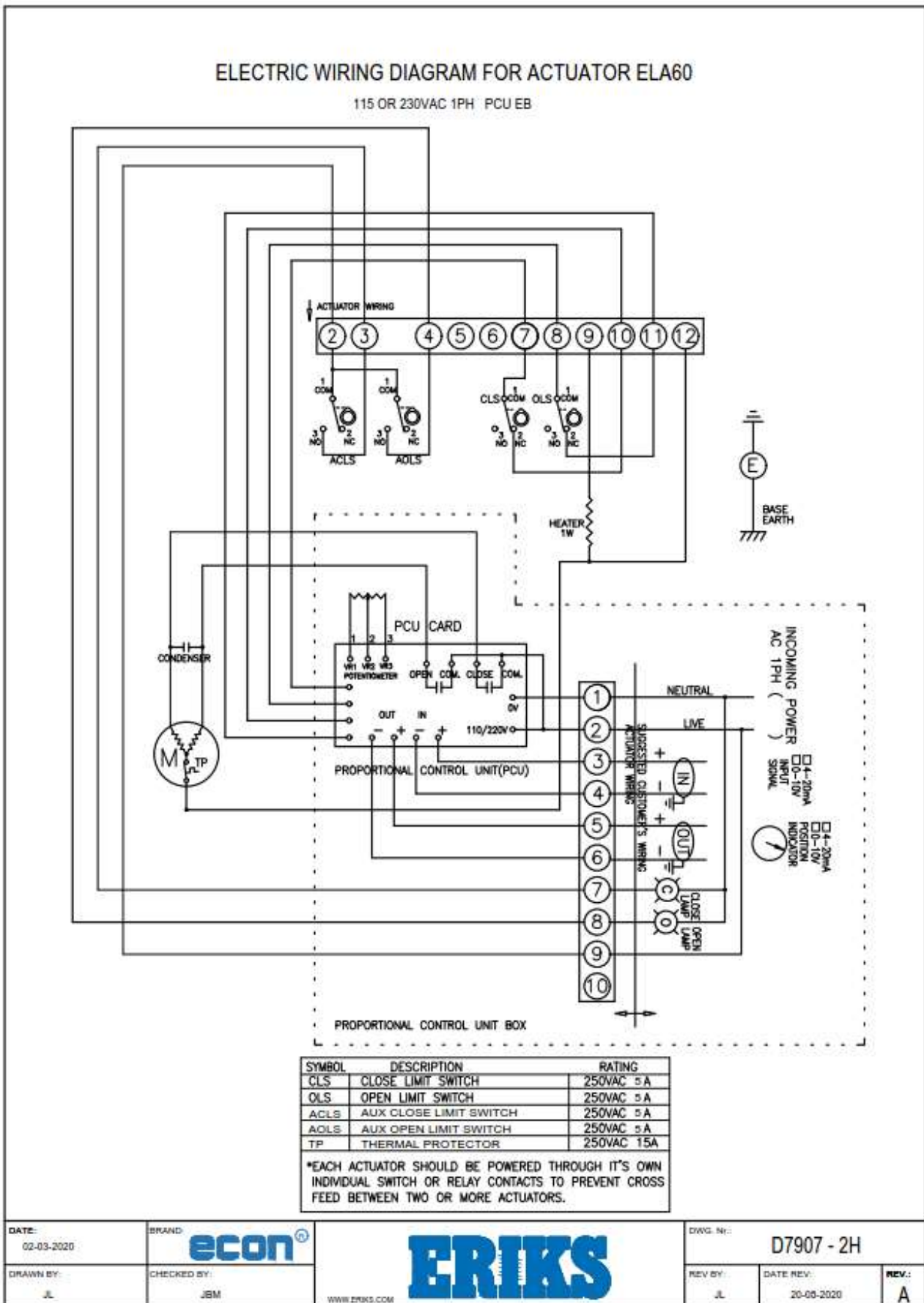
SYMBOL	DESCRIPTION	RATING
CLS	CLOSE LIMIT SWITCH	250VAC 5A
OLS	OPEN LIMIT SWITCH	250VAC 5A
ACLS	AUX CLOSE LIMIT SWITCH	250VAC 5A
AOLS	AUX OPEN LIMIT SWITCH	250VAC 5A
TP	THERMAL PROTECTOR	250VAC 15A

*EACH ACTUATOR SHOULD BE POWERED THROUGH IT'S OWN INDIVIDUAL SWITCH OR RELAY CONTACTS TO PREVENT CROSS FEED BETWEEN TWO OR MORE ACTUATORS.

DATE:
01-08-2014
REV.DATE:
20-11-2014



DRAWN: JL
CHECKED:
DWG. Nr.: D7907-2F
REV.: A



**DANGER:****HAZARDOUS VOLTAGE.**

Electrical power must not be connected until all wiring and limit switch adjustments have been completed. Once the power is supplied to the unit, precautions must be taken if the cover is not mounted on the actuator.

**If you have questions about this product,
Please contact the nearest ECON distributor.
You can find them on www.eriks.com**

ERIKS**ERIKS Flow Control**

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