tork
valve & automation

TREA 0150 / 0200 ELECTRIC ACTUATOR

USER'S MANUAL

JANUARY 2022

PLEASE READ THE INSTRUCTIONS BEFORE USE!

2354

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Read the operating instructions first.

- Follow the safety instructions.
- These operating instructions are part of the product.
- Retaing the operating instructions for life of the product.
- Forward instructions to future users or owners of the product.

Target Group:

This document contains information for installation, commissioning and maintenance personnel.

INDEX

1. SAFETY INSTRUCTIONS

1.1. Security Basics

• Our products are designed and manufactured in accordance with accepted standards.

• End user and contractor must comply with requirements such as legal requirements, directives, installation guidelines, regulations and recommendations, electrical connection, commissioning, operation and installation.

• In order to prevent personal injury and possible damage to the product, all personnel working with this device must comply with the safety and warnings specified in the safety instructions.

• Installation, electrical connection, commissioning, operation and maintenance must be performed by suitably qualified personnel authorized by the end user or contractor.

• Personnel must fully read and understand the instructions before working on this product.

• These instructions are given to know and abide by the officially recognized rules.

• Work in potentially explosive atmospheres is subject to special regulations.

• Before commissioning, it is important to check to make sure all settings are correct.

• Incorrect settings or connections may pose a danger to the application and may damage the valve or installation.

• The manufacturer cannot be held responsible for any consequential damages. This risk is entirely with the user.

• Care should be taken in cases such as transportation, proper storage, assembly and installation.

• Operate the device in accordance with the instructions.

• End user or contractor are responsible for implementing the necessary protective measures, providing and procuring enclosures, barriers or personal protective safety equipment for personnel.

• Maintenance and service operations should only be performed by trained and authorized personnel.

• During maintenance intervention on the faulty unit, it must be worked in accordance with the operating instructions.

• Any device changes require the manufacturer's prior written approval.

• Relevant explanation on opening the covers or loosening the screws is available in the operating instructions.

1.2. Warnings and precautions

The following warnings draw particular attention to safety-related procedures on these devices.

DANGER	WARNING	CAUTION	NOTE
Indicates an imminent dangerous situation with a high level of risk. Ignoring this warning will result in death or serious injury	Indicates a potentially hazardous situation with moderate risk. Ignoring this warning could result in death or serious injury.	Indicates a potentially dangerous situation with a low level of risk. It may cause property damage, minor or moderate injury. This warning should be heeded.	Potentially dangerous situation. Ignoring this warning does not apply to property damage and personal injury.

1.3. References and symbols

References and symbols used in this instruction and on electronic cards
Table 1: Defined in the Symbols table.

SIGNS /SYMBOLS	DEFINITIONS
L	Live end port on AC voltage supplies
N	Neutral end port on AC voltage supplies
24V	+24V port on DC voltage supplies
GND	0V port on DC voltage supplies
+IN	In proportional controls, the positive (+) voltage or current terminal port to be controlled
-IN	In proportional controls, negative (-) voltage or current terminal port to be controlled
+OUT	Positive (+) voltage or current port from which position information will be received in proportional controls
-OUT	Negative (-) voltage or current port where position information will be received in proportional controls
COM	The common ports of the voltage desired to be taken from the contacts of the micro-switches
NO	Port that gives Normally Open information of microswitches
NC	Port that gives the Normally Closed information of micro-switches
Grounding Symbol	The port where the grounding connection of the device will be made.

Table 1: Symbols

1.4. Handwheel safety instructions

CAUTION The handwheel works freely when the device is operating in automatic or manual mode. In cases that require intervention to the device, it should be worked carefully with the handwheel after the device is put into manual mode. After it is put into manual mode, external control signals coming from the outside will be blocked, thus preventing possible damage to the product and ensuring safe operation of the user. The handwheel should not be used in situations that do not require intervention.

2. IDENTITY

2.1. Intended use of the product

TREA series electric actuators are the most used control elements in valve control. Duties can be summarized as opening/closing the valve, keeping the valve at the desired opening, realizing local and remote control and monitoring possibilities.

TREA series electric actuators are produced in different models as On/Off or proportional. Electric actuators are used in the control of many valves such as ball valves, butterfly valves and plug valves. It has a wide range of uses in many fields such as the industrial sector, the energy sector, the fluid sector, the oil and gas sector.

2.2. Reasons for use

- Working with mains voltage
- Obtaining high torque with low energy consumption
- Local control, remote control possibility with its modular, integrated design structure
- Comprehensive control, easy adjustment and flexible operation
- Torque and position control
- Supporting English and Turkish languages (when used with LCU unit)
- High quality aluminum alloy body, robust and light structure
- High corrosion resistance, long life
- Proportional and On/Off operation
- Informing the user with visual warnings and alarms, locally or remotely.
- Precise proportional control possibility
- High protection class
- Visual and easy use with TFT LCD screen (when used with LCU unit)
- Possibility of control by mobile phone (when used with LCU unit)

2.3. Purpose of the document

This document has been prepared to provide information on assembly, installation, use and maintenance of TORK brand TREA series electric actuators.

2.4. Coding system

The product coding system is described in Figure 1: Coding System table.
It helps the user to choose the product that suits user's product range and needs.

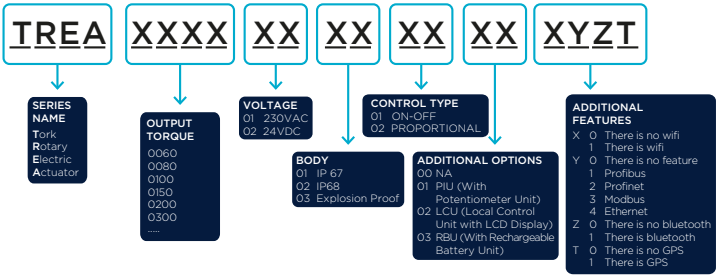


Figure 1: Coding System

2.5. Label information

The label information of the product is given in the table named Figure 2: Product Label, and the basic technical information about the product is given in the table named Table 2: Product Information.

NOTE If necessary, provide detailed information from the user manual, technical support team or sales team.

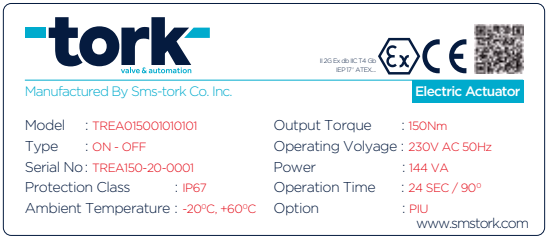


Figure 2: Product Label

Product Code	Maximum Output Torque	On-Off Time		Working Current			Electrical Power		Protection Class	Working Temperature	Weight
		24 VDC	110/230 VAC 50/60Hz	24 VDC	230 VAC 50/60Hz	110 VAC 50/60Hz	24 VDC	110/230 VAC 50/60Hz			
TREA0150	150 Nm	22 sn	24 sn	4.0 A	0.63 A	1.26 A	96 W	144 VA, pf 0.95	IP67	-20°C - +60 °C	15.3 kg
TREA0200	200 Nm	22 sn	24 sn	4.3 A	0.66 A	1.32 A	103 W	150 VA, pf 0.95	IP67	-20°C - +60 °C	15.3 kg

Table 2: Product Information

2.6. Technicial Features

TECHNICAL FEATURES	
Operation time	22 - 24 sn. / 90°
Body protection class	IP67, IP68 (on request)
Body material	Aluminum injection
Body trim	Electrostatic powder paint
Supply voltage	110 VAC, 230 VAC, 24VDC
Control signal	0/4-20 mA, 0/2-10 mA, 0/2-10V DC, 0/1-5V DC
Output (feedback) signal	0/4-20 mA, 0/2-10 mA, 0/2-10V DC, 0/1-5V DC
Reversible control signal	Adjustments can be made with switches on the control card
Reversible output signal	Adjustments can be made with switches on the control card
Automatic calibration	Adjustments can be made with switches on the control card
Error positions (at loss of control signal)	Stay in current position, Open valve, Close valve
Adjustable special working angle	Adjustable special working angle from 0° to X°
Protection measures	PST (Partial stroke test) Voltage protection, Valve jammed detection, Over and under temperature protection, Humidity protection, Delay time protection against sudden reverse operation
Motor	AC (Reversible) motor, DC brushed motor
Motor body class	S4 %70, 1000 start/hour
Atex protection class	Ex II 2G Ex IIC T4 Gb (for Atex models)
Limit switches	2x On/Off SPDT, max. 250VAC 10A
Auxiliary limit switches	2x On/Off SPDT, max. 250VAC 10A
Position indicator	ON/OFF location
Manual control	With handwheel, With buttons via electronic card
Interior heater	5W
Cable gland size	G3/4"
Thread oil	Gres
Ambient temperature	-20°C - +60 °C
Protection insurance	6A B type automat insurance
Clutch system	Manual control, automatic exit from manual control
Supply voltage cable	Tin-plated copper braided, core, shielded, 1 mm2 cable

Table 3: Technical Features

OPTIONAL FEATURES
IP68 Protection Class (Can work underwater up to 72 hours at a depth of 10 meters)
ATEX Certified Electric Actuator (Ex II 2G Ex IIC T4 Gb)
LCU: Local Control Unit (with LCD Display)

Table 4: Optional Features

3. TRANSPORT, STORAGE, PACKAGING, WARRANTY AND PROTECTION MEASURES

3.1. Transport

When transporting TREA series electric actuators, consider all kinds of variable transportation conditions such as impact, vibration, falling, rain, transportation that may damage it. Pack it well so that it reaches the installation site securely.

CAUTION **A dangerous situation due to improper transport.**

- Check the packaging.
- Pay attention to the total weight of the product.
- Do not stand under a suspended load.
- Ask for support if manpower will be used.

3.2. Storage

NOTE **Risk of corrosion due to improper storage.**

- Store in a well-ventilated dry place (maximum humidity 70%).
- Cover to protect against dust and dirt.
- Protect against ground moisture by storing on a shelf or on a wooden pallet.
- Apply a suitable corrosion inhibitor to unprotected surfaces.

NOTE **Risk of damage due to excessively low temperatures.**

- Actuator controls can only be stored permanently down to –30 °C.
- Actuator controls may require short-term storage conditions in special cases or at temperatures as low as –60 °C.

NOTE **Pay attention to the following warnings to ensure long-term (more than 6 months) storage conditions.**

- Protect uncoated surfaces (for long-term protection of the output drive parts and surface mount) with a corrosion inhibitor prior to storage.
- In a storage condition of approximately 6 months, check for corrosion to the stored place. Apply new corrosion inhibitor if the first signs of corrosion appear.

3.3. Packaging

Our products are protected by special packaging for transportation when leaving the factory. The packaging materials used are environmentally friendly that can be easily cleaned. It should be separated and recycled.

Packaging materials such as wood, cardboard, paper, PE foil are used. TORK recommends recycling and collection centers for the disposal of packaging materials.

3.4. Warranty

• The warranty period starts from the delivery date of the product and the warranty period is 2 years.
• The entire product, including all its parts (against failures that may arise from our production and assembly errors and/or defective parts), is within the scope of our company's warranty.

• If the product fails within the scope of warranty;

The time spent in repair is added to the warranty period. The repair period of the product is maximum 20 business days.

• The warranty starts from the date of notification of the product defect to the TORK authorized service, or in the absence of an authorized service station, to the seller, dealer, agency, representative, importer or manufacturer of the product. The consumer can make the failure notification via telephone, fax, e-mail, registered letter with return receipt or similar, but in case of conflict, the burden of proof rests with the consumer.

• The product;

• In the event that it breaks down at least four times within a year or six times within the warranty period determined by the manufacturer and/or importer, provided that it remains within the warranty period, from the date it is delivered to the consumer, and if the user is not able to benefit from this product due to these faults,

• In case of exceeding the maximum time required for repair,

• If it is determined that the repair of the malfunction is not possible with a report prepared by the seller, dealer, agency, representative or one of our company's officials, respectively, if the service station is not available, the product will be replaced free of charge.

• The warranty period of the product that has been changed during the warranty period, the purchased product, TORK Industrial Automation Products San. Trade Ltd. St. limited to the remaining warranty period provided by
• Free repair and product replacement obligations are eliminated in the following cases.
• Failure of the product due to use contrary to the methods or conditions specified in the user manual,
• The product and the warranty labels on its contents are damaged/torn,
• If it is determined or noticed that the product has been opened/repaired before, other than TORK Authorized Service personnel,
• In case the outer surfaces of the product and its components are broken within the customer's responsibility,

• Incorrect handling (bump, drop, impact), inadequate maintenance, abuse, use contrary to the environmental characteristics specified in the user manual, use of the product in excessively humid, dusty or hot environments, use in environments that are damaging to electronic circuits and corrosive, failures caused by accidents, impacts, electricity (voltage changes), natural disasters,

• Malfunctions or damages during transportation that are not under the responsibility of SMS Sanayi Malzemeleri Üretim ve Satası A.S.,

• In case the defective part is replaced with parts other than TORK Authorized technical services and/or parts without SMSTORK warranty

• If it is determined by a report to be issued by the TORK authorized service, whether the malfunctions occur as a result of usage error or not.

• If the device fails after the warranty period, if you have a service agreement with TORK, request the type of service available in this agreement. If you do not have a service agreement, you can get service by contacting the TORK dealer or customer service center.

• Use original packaging materials whenever possible. The responsibility of the damages that may occur during shipment due to improper packaging belongs to the customer.

• Regarding the Warranty Certificate; For problems that may arise, an application can be made to the Ministry of Customs and Trade, General Directorate of Consumer Protection and Market Surveillance.

3.5. Protection measures

TREA series proportional electric actuators have safety protections such as high current protection, high voltage protection, power board protection, over temperature protection and delay time protection against sudden reverse operation.

If any of these protections are encountered in the product, the reasons causing the protection must be determined before restarting and necessary measures must be taken to prevent these situations from occurring again.

4. ASSEMBLY

4.1. Actuator operation

When the supply voltage (230VAC or 24VDC) is applied to the electric actuator, the motor and gears inside produce a rotational force. This force allows the valve shaft to move in the direction of on/off.

While the position of the valve is monitored with the mechanical position indicator in On/Off type actuators, it can be monitored or controlled with both mechanical position indicator and analog control input-output signals in proportional type actuators. Position information is also obtained by adding a PIU unit to On/Off type actuators.
TREA series electric actuators with 150Nm and 200Nm output torque are given in Table 5: Product types.

Torque N.m	Control Type	Supply Voltage
150	ON / OFF	230 V AC
150	Proportional	230 V AC
150	PIU	230 V AC
150	ON / OFF	24 V DC
150	Proportional	24V DC
150	PIU	24V DC
200	ON / OFF	230 V AC
200	Proportional	230 V AC
200	PIU	230 V AC
200	ON / OFF	24 V DC
200	Proportional	24V DC
200	PIU	24V DC

Table 5: Product Types.

4.2. General structure of the actuator

Details of the mechanical and electrical/electronic components of the TREA series electric actuator are given below.

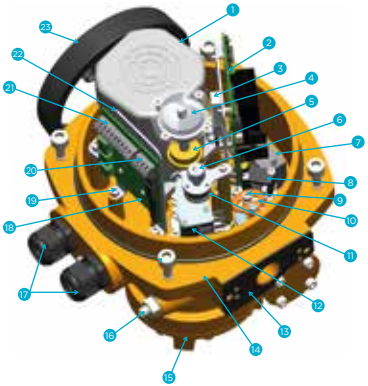


Figure 3: General Structure of the Product

DEFINITIONS

1. Motor
2. Proportional Control Card
3. Internal Heater
4. Mechanic Position Indicator
5. Position Adjustment Gear
6. Potentiometer Gear
7. AC Motor Capacitor
8. Torque Limit Switches
9. Torque Limit Adjustment Plate Screw
10. Torque Limit Adjustment Plate
11. Potentiometer
12. Position Switches
13. LCU Unit Connection Point
14. Body
15. Flange
16. Stopper (Adjustable Stop Screw)
17. Cable Input Gland
18. Terminal Board
19. Terminal Board Sheet Fixing Screw
20. User Analog Signal Connection Terminals
21. User Connection Terminals
22. Terminal Board Fixing Sheet
23. Handwheel

Here, it is aimed for the user to have knowledge about the mechanical and electrical/electronic components, and to make the correct and on-site intervention during assembly or in cases where emergency intervention is required.

Actuators are produced in two types as On/Off and Proportional. They have the same mechanical structure. They can be converted by adding or removing some parts when they want to be operated with AC mains voltage or DC Source voltage. These conversions must be carried out by the TORK manufacturer. It is strictly not recommended to convert by the user or other companies.

4.3. Mounting position of the actuator

The product described in these operating instructions can be operated in any mounting position. Determine the suitability of the mounting location according to the product structure and weight. Determine the horizontal, vertical or suitable position shape.

Note the direction of the manual handwheel and adjust it to a large, easily accessible area. If it will be used with the LCU unit, make sure that the LCU unit is in an easily readable and accessible position.

NOTE **Difficulty due to unsuitable position.**

Assemble the product in the appropriate position. Avoid all kinds of negativities that will prevent the user from working comfortably. The user is responsible for incorrect assembly or connections that may occur in the field.

4.4. Mounting of the actuator to the valve and flange dimensions

After the valve is connected, the user is responsible for taking precautions against malfunctions and vibrations that may occur in the product or user system over time.

⚠ CAUTION **Difficulty due to unsuitable product**

Check the product and its parts before assembly. If it is seen that there are damaged, incompatible or missing parts, the product should not be received. Check the label information on the box and the product, the compatibility of the line voltage and the supply voltage on the label on the product, and the compatibility with the system to be connected.

⚠ WARNING **Electrical dangerous situation before installation**

- Before installation, disconnect the product's supply cable from the mains. Perform the installation.
- When working in potentially explosive atmospheres, check for gas and electrical leakage before operating the product.
- Do not use tooling equipment that is not suitable for use in product assembly and disassembly.
- Electric actuators are manufactured to be mounted on valves according to ISO5211 standard.

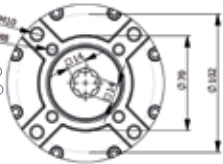
The following steps can be followed when connecting the valve to the flange.

- First of all, pay attention to the position (On-Off) of the actuator. It may be set in a different position as factory default. Move it to the required position using the manual handwheel.
- Check the compatibility of the valve shaft with the valve shaft connection point[4].
- Mount the actuator with flange[1] on the valve. Make sure that the screw holes of the flange connection[2], [3] with the valve are opposite each other and make sure that they are fully seated on the valve.
- Use appropriate valve mounting screws when installing valve mounting screws.

Flange Type (ISO5211)	Torque N.m	Flange Center Diameter(mm)	Supply Voltage	Number of Screws
F7	150-200	70	M8	4
F10	150-200	102	M10	4

DEFINITIONS

1. Flange
2. Valve Flange Connection (F12)
3. Valve Flange Connection (F10)
4. Valve Shaft Connection Point
5. Valve Shaft
6. Actuator Screw Mechanism



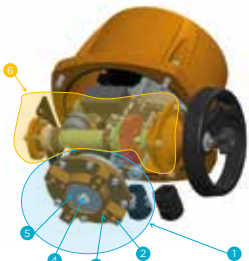


Figure 4: Flange Information

CAUTION **Flange and valve mismatch**

• When valve shaft and actuator flange movement shaft mismatch is detected, write down necessary information such as flange dimensions, valve shaft dimensions.
• Communicate with the sales team that supplied you with the product from the manufacturer and share the information you noted.
• Check the connecting bracket you have received and assemble it correctly.
• Actuators are shipped with or without mounting to the valve upon customer's request. Usually, customers can choose the valve and actuator, price, transportation, shipping, etc. they demand it as assembled within the framework of the conditions.
An example of mounting the actuator to the valve with and without brackets is shown in the picture below.

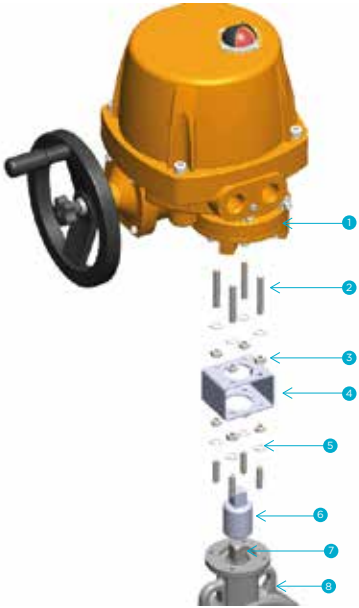


Figure 5: Mounting with Bracket

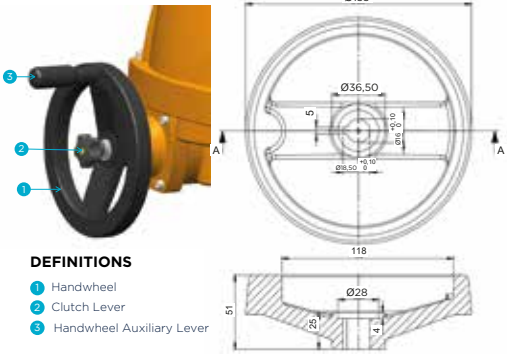
DEFINITIONS

1. Flange
2. Screw
3. Nut
4. Bracket
5. Stamp
6. Clutch
7. Valve shaft
8. Valve

Figure 6: Mounting without Bracket

4.5. Manual Control

To be able to operate the actuator manually during a power outage, to benefit from it in an emergency, and to efficiently use the advantages of its size and mechanical structure, follow the steps specified in the instruction.



DEFINITIONS

1. Handwheel
2. Clutch Lever
3. Handwheel Auxiliary Lever

Figure 6: Handwheel

Pull the manual clutch lever handle at the center of the handwheel towards you, allowing the actuator to switch from automatic control mode to manual control mode. To adjust the position of your valve, carefully turn the handwheel[1] in the opening or closing direction until it reaches the desired position. It opens or closes the valve after an average of 11 cycles. When you apply power to the actuator after manual adjustment, it automatically switches to automatic control mode.

CAUTION **Handwheel hardly turns when adjusting in manual control mode**

There may have been difficulties due to reasons such as jamming in the valve connected to the system to which the actuator is connected, or a malfunction may have occurred in the product. Check the system. If there is any jamming, remove it. If the problem still persists, contact TORK authorized service and ask for support.

4.6. Cam, torque switch and limit switch settings

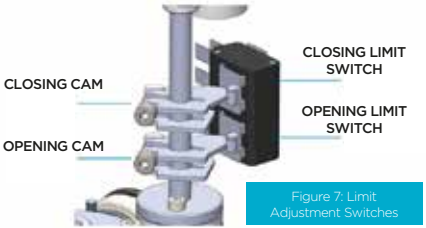


Figure 7: Limit Adjustment Switches

The cam and limit switches on the actuator are clearly shown in the picture above. Follow the steps on the right and below to set limit switch settings and torque settings.

Closing Limit Switch Adjustment;

- Loosen the screws of the cams. The cams must be able to move independently of the shaft.
- Manually move the actuator to the closed position with the handwheel. Adjust the closing cam to press the closing limit switch and tighten the closing cam screw.

Opening Limit Switch Adjustment;

- Follow the Close Limit Switch Setting steps to make these settings.

Torque settings;

The torque setting is set by the manufacturer. It is not recommended for the user to change these settings, except in situations that do not require immediate action. It may cause electronic or mechanical failures.

You can follow the steps below to make adjustments in an emergency.

• Before making torque adjustment, disconnect the product's supply cable from the mains.

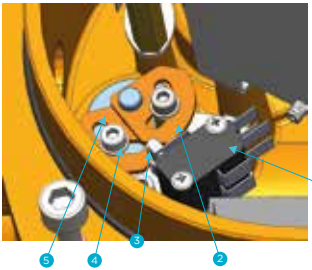
• Loosen the torque adjustment plate screws.

• Move Torque adjustment plate 1 and Torque adjustment plate 2 to the right or left. The fact that the torque adjustment plates rest on the screw means that they are adjusted to the maximum or minimum torque.

• Tighten the torque adjustment plate screws after adjustment. Turn off the product.

• Start the product by energizing it.

The user is responsible for taking precautions against problems that may occur in the system.



DEFINITIONS

1. Limit switches
2. Torque adjustment plate 1
3. Limit switch ignition key
4. Torque adjustment plate screw
5. Torque adjustment plate 2

Figure 8: Torque Adjustment Switches

4.7. Stoppers

Closing limit switches or opening limit switches may fail and lose their function. Mechanical stress occurs as a result of the closing cams or opening cams (see Figure 7) getting rid of the limit switches. As a precaution against this stress, torque limit switches (see Figure 8) are activated. The stoppers, on the other hand, end the rotation of the actuator while operating mechanically in the opening or closing direction. If there is a need for stopper adjustment, contact the manufacturer. You may cause mechanical and electronic damage to the product.

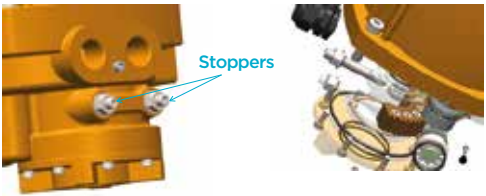
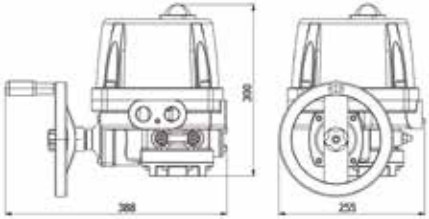


Figure 9: View of Stoppers

4.8. Technical dimensions

TREA 150 Series Actuator Technical Dimensions (Standard)



TREA 150 Series Actuator Technical Dimensions (LCU unit)

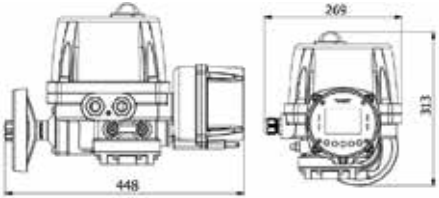


Figure 10: Technical Dimensions

4.9. Atex

Atex actuators are electrically operated, remote or local controllable, proportional or On/Off products used in explosive or hazardous environments. There are important conditions to be considered in the use of these products. In case one or more of these conditions are not met, all responsibility belongs to the user.

In Atex products;

- Appropriate Atex certified coupling should be used,
- Appropriate Atex certified cable should be used.
- The cover of the product should never be opened while the product is energized.
- Grounding from the body is required.
- For grounding, a connection cable produced in HD21 or HD22 standard with a diameter of at least 4mm2 should be used.
- Suitable for use in ZONE 1 and ZONE 2 environments (Ex II 2G Ex IIC T4 Gb).
- Our actuators are produced in accordance with LVD and EMC directives.

4.10. Proportional control card

Proportional control unit is a control unit that allows the valve connected to the electric actuator to be opened and closed proportionally between 0 - 90° degrees with the control signals given by the user, and it can also give output signals.

The analog control signal sent to the electronic card enables the actuator to control the valve proportionally and precisely. The proportional electronic card also detects the current position of the valve and gives an analog output signal (feedback) to the user. It manages the actuator in accordance with the purpose, depending on the signal value it receives.

In use with the LCU unit, technical information such as position monitoring, position information, error, warning are provided to the user by the actuator. Functions such as remote control, local control as well as proportional and on/off control with communication protocols provide a safer dynamic environment to the user. Thanks to the Color TFT LCD Screen, it provides convenience by guiding the user in terms of easy and understandable interface design, traceability and usage.

4.11. PIU potentiometer unit

Adding a PIU (potentiometer unit) to the TREA series on-off electric actuator allows accessing the instantaneous position information of the valve and keeping the valve in the desired position. By managing the relay with PLC, the actuator can be operated at the desired angle (00 - X0).
An example connection diagram is shown in the figure below and the position of the PIU on the product is shown in figure 11.

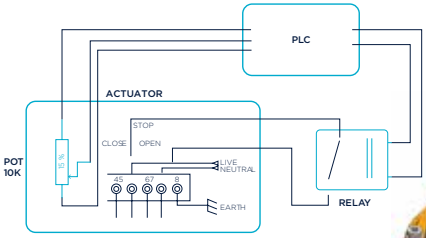


Figure 11: PIU Connection Diagram

Figure 12: PIU Connection Picture

5. CONTROL PARAMETERS

5.1. Manual control with handwheel

Handwheel control method is used in both types of electric actuators with on-off and proportional operation. This method is recommended for emergencies such as power failure and loss of control signal in the system. Another reason for recommending proportional electric actuators is that when the valve is turned with the handwheel while the control signal is still applied to the actuator, it will try to correct its position again according to the control signal applied.

Before manual control with the handwheel, manual control mode should be selected with the help of switches on the electronic card. By pulling back the handle in the middle of the manual handwheel, the actuator is put into manual control mode. The manual handwheel is turned according to the opening or closing direction. In order to switch from manual control mode to automatic control mode, the actuator will operate when power is applied and the handwheel will switch to automatic control mode.

5.2. Manual control via electronic card

Figure 13: Adjustment Keys

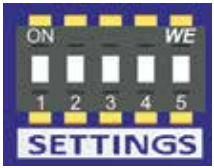


Figure 14: Adjustment Switches

DUTIES	SWITCHES									
	1		2		3		4		5	
Automatic Operating Mode	ON									
Manual Operating Mode		OFF								
Output reversible Control signal (valve closed at 4 mA, open at 20 mA)			ON							
Output reversible Control signal (valve open at 4 mA, closed at 20 mA)				OFF						
Input reversible Control signal (valve closed at 4 mA, open at 20 mA)					ON					
Input reversible Control signal (valve open at 4 mA, closed at 20 mA)						OFF				
Mevcut Pozisyonda Kal								OFF		OFF
Vanayı Aç							ON		OFF	
Vanayı kapat							OFF		ON	

Table 6: Adjustment Switches Duty Table

Automatic Operating Mode: The electric actuator is selected to operate in manual mode by bringing the leg 1 of the bottom switch to the ON (1) position.

Manual Operation Mode: The electric actuator is selected to operate in manual mode by bringing the leg 1 of the bottom switch to the OFF (2) position.

Output reversible Control signal (valve closed at 4 mA, open at 20 mA): It is the signal produced by the proportional control card according to the valve's open position. Leg 2 of the bottom switch gives an output signal of 4 mA when the valve is closed, and 20 mA when it is open, in the ON(1) position.

Output reversible Control signal (valve open at 4 mA, closed at 20 mA): It is the signal produced by the proportional control card according to the valve's open position. Leg 2 of the bottom switch gives an output signal of 20 mA when the valve is closed in the OFF (2) position, and 4 mA when it is open.

Input reversible Control signal (valve closed at 4 mA, open at 20 mA): The external control signal given by the user to the actuator is inverted by the proportional control card. Leg 3 of the bottom switch closes the valve in ON (1) position at 4mA and opens at 20mA.

Input reversible Control signal (valve open at 4 mA, closed at 20 mA): The external control signal given by the user to the actuator is inverted by the proportional control card. Leg 3 of the bottom switch closes the valve in the OFF (2) position at 20mA and opens at 4mA.

Stay in Current Position: When the legs 4 and 5 of the bottom switch are OFF (2), the opening position of the valve remains in that position as a result of the power cut.

Open Valve: When the leg 4 of the bottom switch is ON(1) and the leg 5 is OFF (2), when the power is cut off, the actuator turns the valve in the opening direction.

Close Valve: When leg 4 of the bottom switch is OFF(2) and leg 5 is ON (1), as a result of power cut, the actuator rotates the valve in the closing direction.

5.3. Proportional control via electronic card

5.3.1 Control signal selection

Input control signal selection is made with the following switches. Factory setting is set to 4-20 mA. It is recommended that the user be informed about the following situations before giving the access control signal.

NOTE **Error due to improper input control signal**

Check the positions of the following switches before giving the input control signal to the actuator. Do not give control signals other than those specified in the table. Otherwise, you may operate the valve uncontrollably, cause unexpected problems in the system, or cause material damage such as electronic card failure.

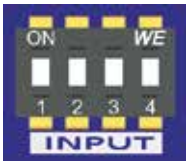


Figure 15: Control Signal Switches

INPUT CONTROL SIGNAL ADJUSTMENT SWITCHES TABLE				
Control Signal	Pin Positions			
	1	2	3	4
0 - 10 mA	OPEN	CLOSE	CLOSE	CLOSE
0 - 20 mA	OPEN	CLOSE	CLOSE	OPEN
2 - 10 mA	OPEN	CLOSE	OPEN	CLOSE
4 - 20 mA	OPEN	CLOSE	OPEN	OPEN
0 - 5 V DC	CLOSE	OPEN	CLOSE	CLOSE
0 - 10 V DC	CLOSE	OPEN	CLOSE	OPEN
1 - 5 V DC	CLOSE	OPEN	OPEN	CLOSE
2 - 10 V DC	CLOSE	OPEN	OPEN	OPEN

Table 7: Control Signal Switches Duty Table

5.3.2. Outpu signal selection (Feedback)

Output control signal selection is made with the following switches. Factory setting is set to 4-20 mA. It is recommended that the user be informed about the following situations before giving the output control signal to the system.

NOTE **Error that may occur as a result of improper output control signal**

Check the positions of the following switches before giving the system an output control signal from the actuator. The device cannot give control signals other than the specified signals. As a result of incorrect switch settings, you may cause unexpected problems in the system or cause material damage such as electronic card failure.

OUTPUT CONTROL SIGNAL ADJUSTMENT SWITCHES TABLE			
Control Signal	CONTROL PINS		
	1	2	3
0 - 10 mA	CLOSE	CLOSE	CLOSE
0 - 20 mA	CLOSE	CLOSE	OPEN
2 - 10 mA	CLOSE	OPEN	CLOSE
4 - 20 mA	CLOSE	OPEN	OPEN
0 - 5 V DC	OPEN	CLOSE	CLOSE
0 - 10 V DC	OPEN	CLOSE	OPEN
1 - 5 V DC	OPEN	OPEN	CLOSE
2 - 10 V DC	OPEN	OPEN	OPEN

Table 8: Output Control Signal Switches Duty Table

Figure 16: Output Control Signal Switches

5.3.3. Error Positions

ERROR POSITION SELECTION FROM SETTING SWITCHES		
Error Positions	CONTROL PINS	
	4	5
Stay in Current Position	CLOSE	CLOSE
Open Valve	OPEN	CLOSE
Close Valve	CLOSE	OPEN

Table 9: Error Positions

When the input control signal connected to the proportional electric actuator is cut off for any reason, the actuator behaves according to the preset settings with the SETTINGS switch. In case of signal loss, there are 3 different adjustment positions: stay in current situation, open the valve or close the valve. As the factory default setting, the valve is set to remain in its position. The setting positions made with pins 4 and 5 of the SETTINGS switch are shown in the table below.

5.3.4 Reversible input control signals

The factory setting of the reversible control signal is made to close the valve at low signal level and open at high signal level. To reverse the control signal, set pin 3 of the SETTINGS switch to the ON(1) position.

E.g;
If the 4 - 20 mA input is set to receive the control signal, the actuator behaves as follows when the control signal is applied:
If the 3rd pin of the Settings(SETTINGS) switch is in the ON(1) position, 4mA :
4mA : Opens completely
20 mA : Completely closed
If the 3rd pin of the Settings(SETTINGS) switch is in the OFF(2) position
4 mA : Completely closed
20 mA : Fully open

5.3.5. Reversible output control signals

The user can reverse the input signal as well as the output signal (feedback). This setting can be done by turning the 2nd pin of the Settings (SETTINGS) switch to the ON (1) position. Based on the example given in the Reverseble Input Control signal, normally the electric actuator will output 4mA when the valve is in the fully closed position, while the output will give 20mA when reversed. This setting applies to all different output signals.

5.3.6. Automatic calibration

• Make electrical connections and cam settings.
• Set pin (1) of the SETTINGS switch to the OFF (2) position.
• Press the SET and OPEN keys at the same time.
• You will see that the Power LED is constantly lit. Green, yellow, blue and red leds will turn on, respectively, and then the electric actuator will start automatic calibration.

• Release the held SET and OPEN keys.
• When the automatic calibration starts, the electric actuator will first completely close the valve. During the closing of the valve, the RGB1 led will flash in blue and green, and will turn green in the fully closed position. Thus, the limit where the valve must remain fully closed has been set.
• After the valve is fully closed, it will work in the opening direction again. During the power-on process, the RGB1 led will flash red and blue, and the RBG1 led will turn red in the fully open position. Thus, the full opening limit value of the valve was determined.
• When the calibration process is completed successfully, the LEDs will turn off one by one, and the calibration will be completed. Thus, the proportional electric actuator will detect in which angle range it works and provide a smooth control.

NOTE

Difficulty due to calibration error

If the automatic calibration process is interrupted for any reason, check the settings again and calibrate again. Failure to calibrate properly may prevent the product from working properly.

Figure 17: Set Open Keys

5.3.7. Restart while in protection mode

Proportional electric actuators automatically protect themselves when subjected to excessive torque or high temperature. It activates the fault relay and lights the leds on the control card according to the fault mode, indicating which of the over torque or high temperature protections it has entered. After the faults related to excessive torque protection or high temperature have been cleared, the actuator can be restarted by following the steps below.
• Take the actuator under manual control from the SETTINGS switches on the electronic board.
• Remove any valve jams with the OPEN, CLOSE keys or the handwheel.
• Exit the protection by pressing and holding the SET and CLOSE keys simultaneously for 5 seconds.
• Keep the SET, OPEN keys pressed at the same time and wait for the leds to turn on in sequence (green - yellow - blue - red). When the LEDs are lit, automatic calibration starts and wait for the automatic calibration to complete.

5.3.8. Led lights and their meanings

There are two different LED groups, RGB1 and sequential, on the actuator control card. These leds are lit in different patterns for operation, orientation and information. The table below shows the meanings of the LEDs. S in the table represents sequential combustion with F flashing. Wait for it to light up in red. When the LEDs are lit, automatic calibration starts and wait for the automatic calibration to complete.

Working mode	Red Led	Blue Led	Yellow Led	Green Led	RGB Led			Description
Automatic Mod								Working in automatic mode
Manual Mod								Working in manual mode
Automatic Mod					F		F	Opening
						F	F	Closing
								Fully open
								Fully close
								Middle
Manual Mod					F		F	Opening
						F	F	Closing
								Fully open
								Fully close
								Middle
Malfunction Mode	F							Not Opened/ closed warning
	F							High temperature/ high moisture
	F							Low temperature
	F		F					No input signal
	F	F						No position information
PST Mode								PST test cannot be done
								PST test in progress
					F		F	Opening valve
						F	F	Closing valve
								Fully open
								Middle
Calibration Mode	S	S	S	S				SET and OPEN buttons pressed for 3 seconds
						F	F	Calibration started, valve is closing
								closing calibration completed
					F		F	Opening valve
								Opening calibration completed
	F	F	F	F				Calibration finished

Table 10. Meanings of Led lights

6. ELECTRICAL CONNECTIONS

Before making the electric actuator connection, the user should have information about the actuator in hand. According to the product in hand, user can make electrical connections from the connection diagrams given below. Before operating the actuator, make sure the connections are correct.

- All personnel working with this device must comply with the safety and warnings specified in the safety instructions in order to prevent personal injury and damage to the product.
- Installation, electrical connection, commissioning, operation and maintenance must be performed by suitably qualified personnel authorized by the end user or contractor.
- Personnel must fully read and understand the instructions before working on this product.

6.1. 230V AC Proportional Electric Actuator Connection Diagram

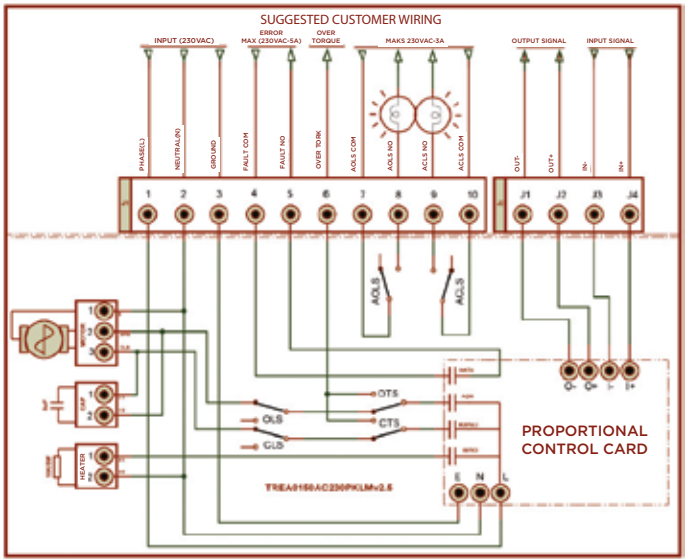


Figure 18: 230V AC Proportional Electric Actuator Connection Diagram

6.2. 24V DC Proportional Electric Actuator Connection Diagram

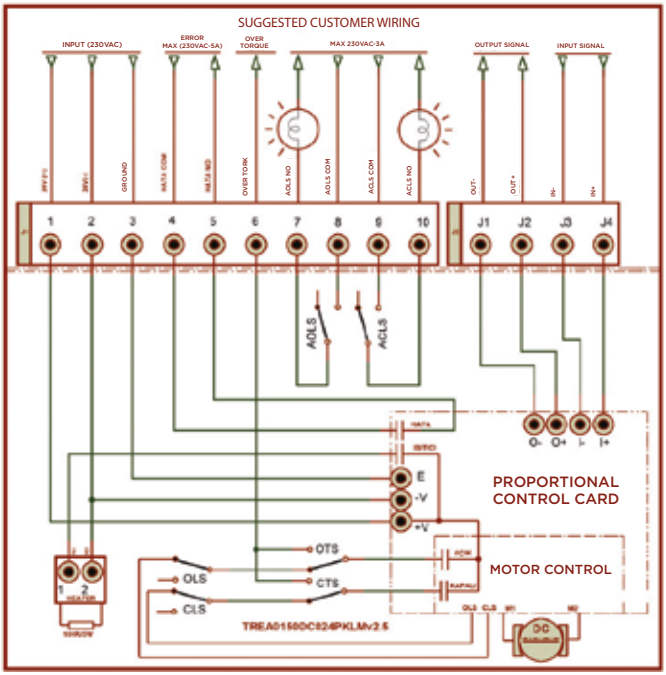


Figure 19: 24V DC Proportional Electric Actuator Connection Diagram

6.3. 230V AC ON/OFF Electric Actuator Connection Diagram

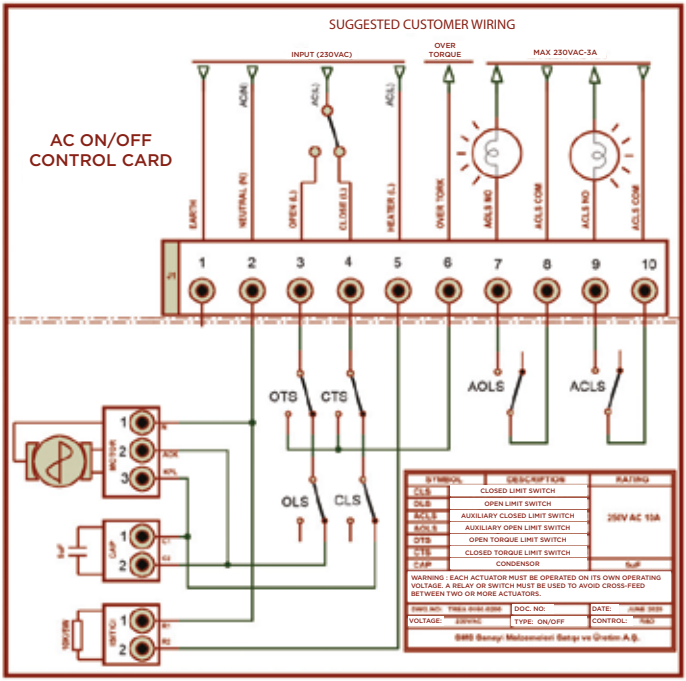


Figure 20: 230V AC ON/OFF Electric Actuator Connection Diagram

6.4. 24V DC ON/OFF Electric Actuator Connection Diagram

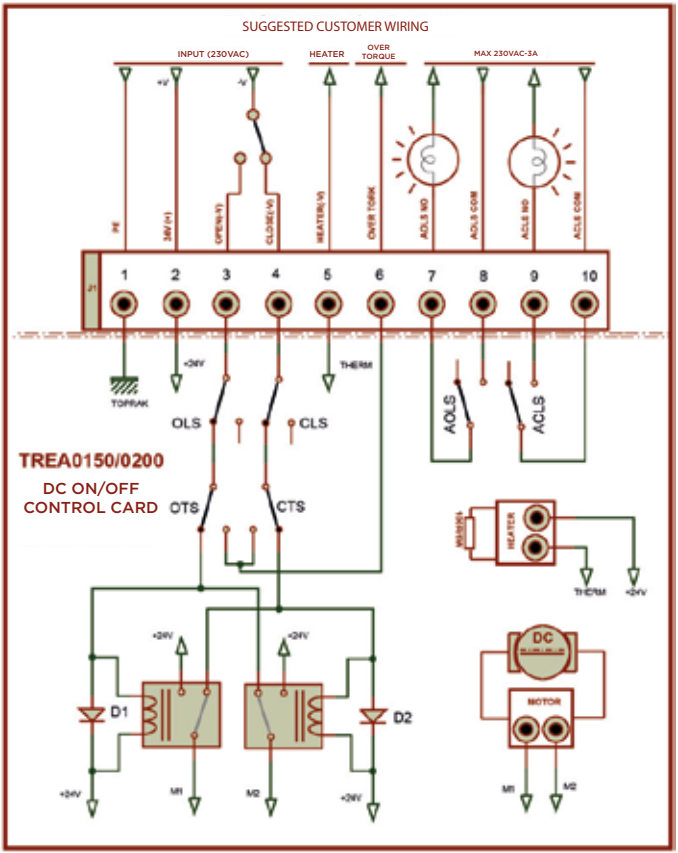


Figure 21: 24V DC ON/OFF Electric Actuator Connection Diagram

7. SPARE PARTS

- For actuator spare parts, please contact the manufacturer.
- Use recommended spare parts.

NOTE

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