

GREATORK SERIES

Intelligent Electric Actuator



GREATORK

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ISO9001
ISO14001



THE WORLD LEADER
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SOLUTION

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Company Profile

Tefulong Group Co., Ltd is a leading intelligent electric valve actuator manufacturer in China with the brand name of Greatork. The intelligent electric actuators are our key products and widely applied in oil & gas, petrochemical, refinery, power plant, water process, wastewater treatment, pulp & paper, and other major industries.

We have a team of qualified, experienced and talented researchers & engineers from a wide variety of backgrounds in R&D centre. We are committed to keeping efforts to ensure that our actuators are the simplest to operate and the highest reliable to work with.

Our mission is to provide the industry with high-quality and cost-effective electric actuators and maximize shareholder's value. We persist on continuous improvement and product innovation to keep our competitiveness.





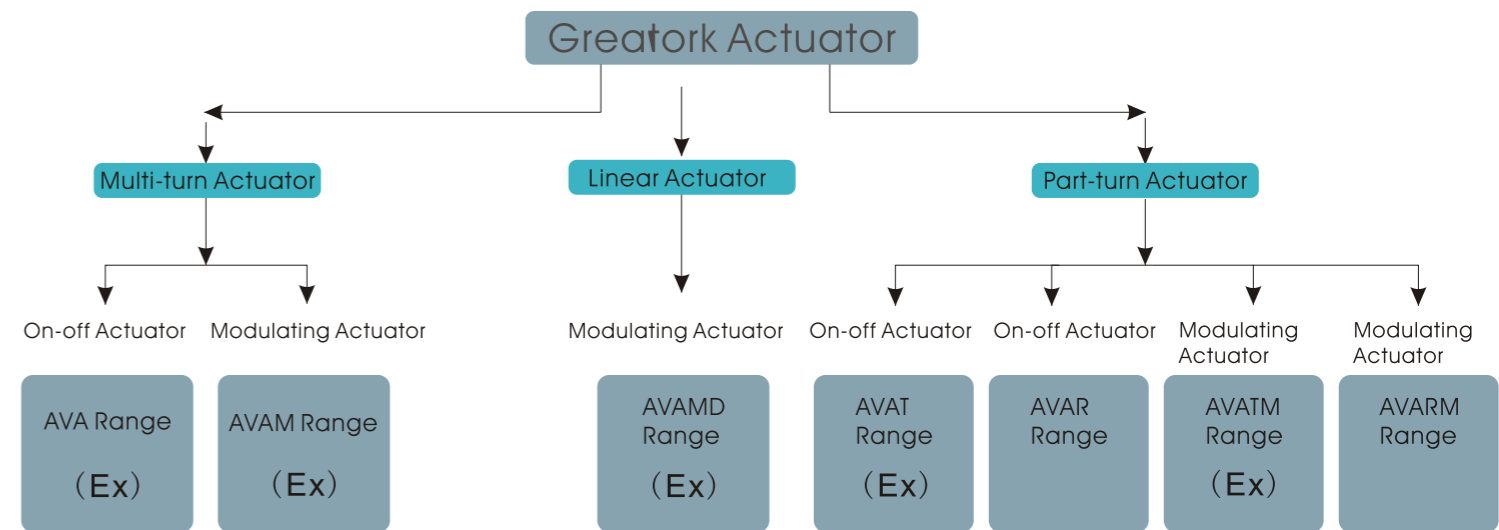
AVA(Multi-turn)



AVAT(Part-turn)



AVAR(Economy part-turn)





Non-intrusive Design

The Greatork AVA/AVAT range actuator takes the non-intrusive design. The site setting operation can be accomplished by using an infrared setting tool without removing the electric cover. Consequently, the internal electrical control parts can be protected from the site pollution. The design for local operation discards the traditional moving shafts penetrating the control enclosure and takes the hall magnetic sensor technology to control the actuator.



Reliable electronic system

Greatork actuators' electronic systems use an advanced 32-bit embedded SOC chip, which not only provides with a strong computing ability, but also integrates multifunctional circuit. It packages all the necessary electronic circuits and parts of electronic components without complex electric wiring, have a high reliability for electronic control.

Double-sealed structure

The Greatork AVA/AVAT range actuator has double-sealed watertight metallic enclosure to IP68 standards (15 meters 90 hours). Explosion-proof BT4 and CT4 are optional. The terminal compartment and the internal electrical control part are entirely separate. The internal electrical control parts can be waterproof and dustproof even when the terminal compartment cover is removed for site wiring.

Accurate torque measurement (Patent)

Greatork adopts its patented torque measurement system to ensure the overload protection of actuators and indicate the torque variation by LCD. The precise torque value is decided by the electronic signal converted from the reaction force of motor shaft's thrust transferred by pressure sensor, thus solves the problem of calculating the torque according to the changes of power frequency, voltage and temperature.

Precise valve position measurement

AVA/AVAT range actuator takes advanced hall-effect incremental absolute encoder to measure the valve position. The adoption of non-contact encoder design can avoid the disadvantages of traditional potentiometer, which is easy to wear and has short life. It increases the reliability and lifetime of the actuator. The setting range of the encoder is 2.5~150,000,000 circles. For AVA multi-turn actuator, the output angle resolution of the central axis is 7.5°. For AVAT part-turn actuator, the output angle resolution of the central axis is 0.05°.

AVA/AVAT range actuator can take the 24-bit optical absolute encoder as option. This kind of encoder uses optical encoder disk to record valve position accurately without battery when the power is off. For AVA multi-turn actuator, the output angle resolution of the central axis is 0.2° with maximum 1024 circles. For AVAT part-turn actuator, the output angle resolution of the central axis is 0.02°.



High-definition LCD

Greatork actuators incorporate a unique high-definition liquid crystal display. Large display window with backlight enables users to see valve position, torque and functional status in a long distance.

Safe and reliable protection

AVA/AVAT range actuator has powerful self-protection function. When there is any improper or wrong operation from user, the actuator will process self-protection and self-correcting.

Automatic phase correction and adjustment

With phase sequence discrimination function for power supply, Greatork actuator will rotate correctly, regardless how the three-phase sequence is. It avoids the damaging of valve and actuator because of wrong wiring.

Phase Lost Protection

To prevent overheating of three-phase motor when losing phase, the phase lost protection circuit will monitor the three-phase power continuously. If one or more phases are lost, the actuator will block the control from control circuit to motor and alarm.

Intelligent protection during valve jams

When actuators are rotating in one direction, such as opening, if the torque in this direction is larger than the set torque, the jam protection will be implemented. Jam protection has two modes. One is the general stop mode, that is when it jams, actuator stops working and displays alarm signals. At the meantime, the indication contacts movement may also be triggered. The other one is the intelligent jam protection, that is when it jams, the actuator will close the valve for a set distance, and then continue to implement the open valve order. If it still jams, the mentioned process will repeat until achieving set time. If the valve overtorques all the same, the actuator will stop working and displays alarm signals. At the meantime, the indication contacts movement may also be triggered. Intelligent jam protection can open and close the sticky valves efficiently.

Motor overheating protection

Greatork actuator motors are designed with F class insulation, which can work in extreme environments. The thermal switches embedded in the motor windings of actuators will disconnect the relevant contacts, stop actuators and display alarm signals once the winding temperature is over presetting (132°C). Motor overheating protection can be shielded via setting program.

Instantaneous reversal protection

When actuators are rotating in one direction, such as opening, if the closing signal is commanded, the internal control circuit will stop for a while before executing closing. This technology decreases the over-current damage to the motor, prolongs the contactor's service life and prevents the mechanical driving devices, such as valve stem, gearboxes damaged by shock.

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Greatork Actuator functions and features

Indication and monitoring contacts

Greatork Actuator possesses four (which can be extended to eight) sets of indication contacts with dry contact output. (Nominal capacity is 5 A 250VAC or 5 A 30VDC). Every set of indication contacts can be set as normal open and normal close according to user's requirement. The user can select 27 kinds of the trigger conditions including full open, full close and protection alarm etc. All the functions of indication contacts can be set easily via software.

Apart from the four sets of indication contacts, the actuator also has a pair of monitoring contacts which can indicate the effectiveness of actuator electrical devices. (Nominal capacity is 8 A 250VAC or 8 A 30VDC). The monitoring contacts can be triggered at any of the following conditions: Losing phase power, control power failure, selecting local control, and selecting local stop.



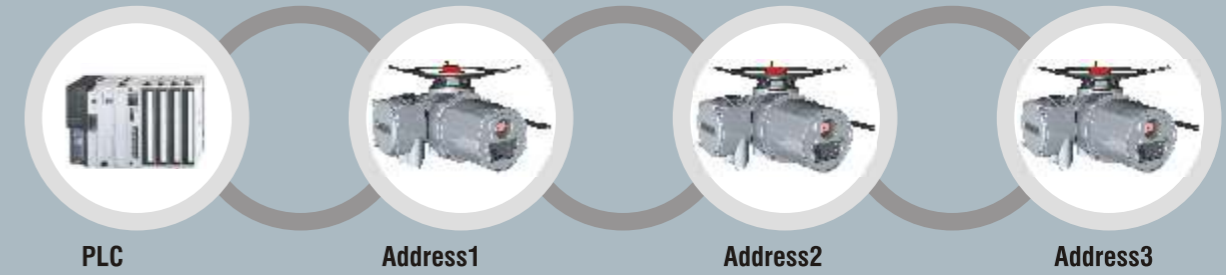
Item	Trigger conditions	Item	Trigger conditions
1	In valve closing limit position	15	Effective valve closing Interlocking signal
2	In valve opening limit position	16	Effective interlocking signal
3	Middle position	17	Effective ESD signal
4	Torque protection is active when closing valve	18	Losing phase power
5	Torque protection is active when opening valve	19	Selecting local stop
6	Torque protection is active during the stroke	20	Selecting local control
7	Torque is active at any position	21	Selecting remote control
8	Actuator is closing	22	Actuator alarm
9	Actuator is opening	23	24V power failure
10	Actuator is output rotating	24	Motor running
11	Motor stalled protection	25	Valve alarm
12	Low battery	26	Temperature protection is active
13	Manual operation of actuator	27	Control alarm
14	Effective valve opening interlocking signal		

Trigger conditions of indication contacts which can be selected by software

Backup Battery

For an easy manual operation when power is off, a backup battery is installed to activate window displaying of valve status and record valve position. After finishing the manual operation, battery will quit work status to save power. Backup battery won't lose power when main power supply is connected or power is off but no manual operation, so backup battery can last for a long time, normally more than 5 years.

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Analogue Folomatic Control (Option)

Greatork actuator Folomatic controller allows actuator to position valve automatically in proportion, according to analogue current or voltage signal. The input proportional signal comes to Folomatic controller through Linear Isolator. The controller converts the proportional signal into valve position signal and compares with current valve position to drive the actuator according the discrepancy. By adjusting the dead zone of Folomatic controller and forbidding running time, valve can avoid reciprocating oscillation.

Analogue signals	Input impedance
0-5mA	1K
0-11mA	5K
0-20mA	250
4-20mA	250
0-5V	1M
0-10V	78K
0-20V	52K

Fieldbus Control Function (Option)

The interface offered by Greatork actuator has full compatibility with Fieldbus-Mastering control systems and communication protocol. Greatork actuator can add the Fieldbus module such as Modbus, Profibus and Foundation.



Remote Indication of Valve Position

Greatork actuator's current transmitter can convert the present valve position into 4-20mA current output signal. The smallest corresponding signals can be chosen for full open or full close. At rated voltage, the maximum external impedance is 500 and the linearity of the whole stroke is less than 1%.

Greatork Actuator functions and features



Designed Service Life

At the rated torque of on-off actuator, the shortest lifetime is 30,000 times open/close/open cycles with the assumption of maximum seating torque at stroke end and an average of 1/3 maximum seating torque during stroke.

Life Test

Standard AVA/AVAT life test is based on 10,000 times open/close/open cycles (500,000 output turns) with maximum seating torque at stroke end and an average of 1/3 maximum seating torque during stroke. Actuator is stalled 25 times against a solid object to prove its durability.

Operating Temperature

Actuators are suitable for operating in -30 to +70 ° ambient temperature. Please note that the appointed operating temperature range for the hazardous area certificate should go by certificate. For temperature outside this range, please contact with Greatork.

Duty cycle

Duty cycle of motor covers S2 to S4.

Vibration

Standard AVA/AVAT range actuator is suitable for the environment where the vibration does not exceed the following standard.

Equipment induction: The cumulated vibration in 10-1000MHz frequency range must less than 1 grms.

Impact: Maximum acceleration is 5g.

Seism: If it is to operate during and after the event, frequency range is 150Hz and acceleration is 2g. If it is only required to maintain structural integrity, it is 5g.

Isolation control should be used or the actuator should be mounted far away from valve and driven by an extension shaft with vibration absorbing couplings in the place where it is excessive equipment induced vibration.

Noise

Independent tests have shown that the noise did not exceed 61dB (A) within 1M distance.



1. Torque Measurement

Greatork actuator which adopts precise pressure sensor can have fast and accurate detecting of output shaft torque.

2. Motor and Drive

Greatork three-phase squirrel-cage asynchronous motor designed by advanced special software can work in extreme environments with F class insulation. The motor shaft and worm shaft are separate in order to facilitate rapid replacement. Worm and worm shaft are immersed in lubricant to fit temperature change.

3. Terminal Compartment

Separately sealed terminal compartment can make sure of the integrity of the electrical control part even when the terminal compartment cover is removed for site wiring.

4. Thrust Base

Models below AVA06 are fitted with lubricated, removable type 'A' thrust base. Actuators can be removed without changing valve position. AVA07 and above models' thrust bases are integrated with enclosure. Simple and removable drive bushing can be machined to fit valve stem.

5. Valve Position Control

Greatork discards traditional potentiometer to measure valve position and introduce hall incremental encoder to improve the position accuracy. Optical absolute encoder as the option can record the valve position accurately without battery when the power is off.

6. Local Control

Local control switch (Local/stop/Remote) and pushbuttons are magnetic switches without penetrating shafts and control the actuator by internal magnetic reed. It can meet the requirements of tight seal and damp-proof.

7. Infrared Setting

Infrared setting tool can set and diagnose actuator through sealed indication window without removing the electric cover. The communication distance between setting tool and window is within 0.75 meter.

8. Manual Operation

The handwheel (or independently geared handwheel on larger size) can be directly driven with low speed padlockable hand/auto clutch to provide reliable emergency manual operation in the event of a power supply failure. Manual operation has lost motion "hammer blow" effect, which will facilitate easy valve operation.

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The internal structure of AVA actuator

AVA Multi-turn On-off Range Performance Data (380V 3Phase)

Model	RPM	RPM	Torque		Weight	
	50Hz	60Hz	Nm	Ft-lbf	KG	Lbs
AVA01	18	21	45	35	32	71
	24	29	45	35	32	71
	36	43	35	25	32	71
	48	57	35	25	32	71
	72	86	35	25	32	71
	96	115	30	22	32	71
AVA02	18	21	80	60	32	71
	24	29	80	60	32	71
	36	43	80	60	32	71
	48	57	80	60	32	71
	72	86	45	35	32	71
	96	115	40	29	32	71
AVA03	18	21	110	80	32	71
	24	29	110	80	32	71
AVA04	18	21	250	185	52	115
	24	29	250	185	52	115
	36	43	205	150	52	115
	48	57	205	150	52	115
	72	86	160	118	52	115
	96	115	130	96	52	115
AVA05	18	21	450	330	52	115
	24	29	450	330	52	115
	36	43	300	220	52	115
	48	57	240	175	52	115
	72	86	180	132	52	115
	96	115	150	110	52	115
AVA06	18	21	600	440	75	166
	24	29	600	440	75	166
	36	43	500	368	75	166
	48	57	450	330	75	166
	72	86	400	295	75	166
AVA07	18	21	1100	815	200	441
	24	29	1100	815	200	441
	36	43	780	575	200	441
	48	57	680	500	200	441
	72	86	550	405	200	441
	96	115	540	400	200	441
AVA08	18	21	1500	1105	230	507
	24	29	1500	1105	230	507
	36	43	1300	960	230	507
	48	57	1000	740	230	507
	72	86	800	520	230	507
	96	115	745	550	230	507
AVA09	18	21	2000	1475	230	507
	24	29	2000	1475	230	507
	36	43	1700	1255	230	507
	48	57	1350	995	230	507
	72	86	1100	810	230	507
AVA10	18	21	2500	1843	230	507
	24	29	2500	1843	230	507

AVA Multi-turn On-off Range Performance Data (220V 1Phase)

Model	RPM	RPM	Torque		Weight	
	50Hz	60Hz	Nm	Ft-lbf	KG	Lbs
AVA03	18	21	65	50	32	71
	24	29	60	45	32	71
AVA04	18	21	165	125	52	115
	24	29	140	105	52	115
	36	43	130	95	52	115
	48	57	125	92	52	115
	72	86	100	75	52	115
	96	115	70	51	52	115
AVA06	18	21	400	295	75	166
	24	29	350	260	75	166
	36	43	300	220	75	166
	48	57	270	200	75	166
	72	86	200	150	75	166
	96	115	170	125	75	166

AVAM Multi-turn Modulating Range Performance Data (380V 3Phase)

Model	RPM	RPM	Torque		Weight	
	50Hz	60Hz	Nm	Ft-lbf	KG	Lbs
AVAM02	18	21	50	40	32	71
	24	29	50	40	32	71
	36	43	50	40	32	71
	48	57	40	30	32	71
	72	86	25	20	32	71
AVAM03	18	21	90	65	32	71
	24	29	90	65	32	71
AVAM04	18	21	180	132	52	115
	24	29	180	132	52	115
	36	43	125	95	52	115
	48	57	125	95	52	115
AVAM05	72	86	80	60	52	115
	18	21	360	265	52	115
	24	29	360	265	52	115
AVAM06	36	43	240	177	52	115
	48	57	200	147	52	115
	18	21	480	355	75	166
AVAM06	24	29	480	355	75	166
	36	43	300	221	75	166
	48	57	260	192	75	166
	72	86	220	162	75	166

AVAM Multi-turn Modulating Range Performance Data (220V 1Phase)

Model	RPM 50Hz	RPM 60Hz	Torque		Weight	
			Nm	Ft-lbf	KG	Lbs
AVAM03	18	21	40	30	32	71
	24	29	40	30	32	71
AVAM04	18	21	100	75	52	115
	24	29	85	65	52	115
	36	43	80	60	52	115
	48	57	80	60	52	115
AVAM05	72	86	50	40	52	115
	18	21	120	90	52	115
	24	29	120	90	52	115
	36	43	90	65	52	115
AVAM06	48	57	80	60	52	115
	72	86	60	45	52	115
	18	21	240	180	75	166
	24	29	210	155	75	166
AVAM06	36	43	180	135	75	166
	48	57	160	120	75	166
	72	86	140	105	75	166

AVAMD Linear Modulating Range Performance Data (380V/220V 50Hz/60Hz)

Model	AVAMD01			AVAMD03		
Flange	F10			F10		
Worm shaft diameter/thread	25/3			25/3		
Max. Linear stroke	115					
Speed(rpm)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)
18	0.9	8.1	16.1	0.9	15.9	28.59
24	1.2	8.1	16.1	1.2	15.9	25.42
36	1.8	7.9	15	1.8	14.3	25.42
48	2.4	7.7	14.7	2.4	12.7	22.26
72	/	/	/	/	/	/

Model	AVAMD04			AVAMD04		
Flange	F14			F14		
Worm shaft diameter/thread	33/7			38/15		
Max. Linear stroke	115					
Speed(rpm)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)
18	2.1	24.26	36.4	5.4	16.7	25.1
24	2.8	24.26	36.4	7.2	16.7	25.1
36	4.2	20.22	24.3	10.8	13.9	16.7
48	5.6	16.17	20.2	14.4	11.1	13.9
72	8.4	14.15	16.1	21.6	8.9	11.1

AVA Actuator Mechanical Interface Size

Model		AVA01 AVA02 AVA03	AVA04 AVA05	AVA06	AVA07	AVA08	AVA09	AVA10
Flange	ISO5210	F10	F14	F16	F25	F30	F30	F30
	Mss sp-102	FA10	FA14	FA16	FA25	FA30	FA30	FA30
Stem acceptance diameter								
Type 'A' (max) rising	mm	32	38	54	64	70	70	70
Non-rising	mm	26	32	45	51	57	57	57
Type 'Z' (max) rising	mm	-	51	67	73	83	83	83
Non-rising	mm	-	38	51	57	73	73	73
Type 'Z3'	mm	32	51	67	-	-	-	-
Type 'B1' (fixed bore)	mm	42	60	80	100	100	120	120
Type 'B3' (fixed bore)	mm	20+	30+	40+	50	50	50	50
Type 'B4' (maximum)	mm	20+	30+	44+	50	60	60	60

Model	AVAMD05					
Flange	F14					
Worm shaft diameter/thread	33/7			38/15		
Max. Linear stroke	115					
Speed(rpm)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)	Linear speed (mm/sec)	Modulating Thrust(KN)	Rating Seat Thrust(KN)
18	2.5	45.5	60.7	5.4	31.3	41.7
24	3.4	45.5	60.7	7.3	31.3	41.7
36	5	38.4	48.5	10.8	26.4	33.3
48	6.8	30.3	40.4	14.4	20.85	27.8
72	10.1	30.3	40.4	21.6	20.85	27.8

AVAT Quarter-turn On-off Range Performance Data

Model	Flange	Stem Dia. (mm)		Voltage (V)	Frequency (Hz)	90° Operating Time(S)	Torque		Weight	
		Key	Square				Nm	Ft-lbf	KG	Lbs
AVAT01	F07	28	19	380	50/60	18-20	125	90	24	53
				220	50/60	12--15	100	75	24	53
AVAT02	F07	28	19	380	50/60	18-20	250	185	24	53
	F10	42	27	220	50/60	16-18	200	150	24	53
AVAT03	F10	42	27	380	50/60	26-30	500	370	24	53
				220	50/60	25-29	400	295	35	77
AVAT04	F12	50	32	380	50/60	38-40	1000	740	35	77
	F14	60	36	220	50/60	42-48	800	590	35	77
AVAT05	F12	50	32	380	50/60	46-50	1500	1105	35	77
	F14	60	36	220	50/60	46-52	1200	885	35	77
AVAT06	F14	60	36	380	50/60	58-60	2000	1475	35	77
				220	50/60	58-62	1600	1180	35	77

AVATM Quarter-turn Modulating Range Performance Data

Model	Flange	Stem Dia. (mm)		Voltage (V)	Frequency (Hz)	90° Operating Time(S)	Torque		Weight	
		Key	Square				Nm	Ft-lbf	KG	Lbs
AVATM01	F07	28	19	380	50/60	18-20	125	90	24	53
				220	50/60	12--15	100	75	24	53
AVATM02	F07	28	19	380	50/60	18-20	215	160	24	53
		42	27	220	50/60	16-18	150	110	24	53
AVATM03	F10	42	27	380	50/60	26-30	300	220	24	53
				220	50/60	25-29	200	150	35	77
AVATM04	F12	50	32	380	50/60	38-40	700	515	35	77
	F14	60	36	220	50/60	42-48	600	440	35	77
AVATM05	F12	50	32	380	50/60	46-50	1100	810	35	77
	F14	60	36	220	50/60	46-52	1000	740	35	77
AVATM06	F14	60	36	380	50/60	58-60	1500	1110	35	77
				220	50/60	58-62	1300	960	35	77

AVAR Range Electric Actuator

In order to meet the needs of the market, Greatork has developed brand new AVAR range part-turn electric actuator on the basis of AVAT range actuator. AVAR actuator with the torque range from 50Nm to 1000Nm has the characteristics of smart, simple structure, complete function, reliable quality and competitive price.

Features and Functions of AVAR Electric Actuator

AVAR range actuator simplifies parts function of AVAT range without lowering its performance and introduces dot matrix LCD as well as absolute encoder to make it more personified.

AVAR Reserved Functions of AVAT as Listed:

- Non-intrusive design
- Auto phase correction
- Instantaneous reversal protection
- Motor overheating protection
- 4 sets of indication contacts
- Analogue Folomatic control (option)
- Fieldbus (option)



AVAR Changed Functions of AVAT as Listed:

- Button setting of parameters
AVAR actuator changes the parameter setting mode and uses the pushbutton to set parameters instead of infrared setting tool which is used by AVAT.
- High-brightness Industrial LCD Display
AVAR series adopt high-brightness large-screen LCD display which can show Chinese or English menu clearly.
- Absolute Encoder Measurement of Valve Position
AVAR range actuator takes advanced 12-bit hall magnetic absolute encoder, which can record the valve position accurately without battery when the power is off. The accuracy of the valve position measurement can be 0.08°.

The Internal Structure of AVAR Actuator

2. Mainboard

The adoption of SOC chip and high integrated circuit design provide actuator with multiple functions such as fault detection, self-protection and alarm.

Therefore, the reliability of actuator is improved.

3. Valve position control

Hall absolute encoder driven by mainshaft can measure the valve position accurately.

6. Power supply board

The electronic components used to control motor, power supply and other parts are integrated on the power supply board.

1. Liquid crystal Display

Dot Matrix LCD with blue backlight can clearly show Chinese or English menu. Real-time valve position, torque value, actuator current status and fault information will also be shown. At the bottom of the screen, there are three high brightness diodes which can indicate open, close and middle position of valve.

4. Button

There are four buttons called local/remote/menu button, open/plus button, close/minus button and stop/enter button on the actuator. User can set up various functions of actuator easily with these buttons.

5. Motor

Greatork uses high torque, low inertia squirrel cage motor with F class enamel-insulated wire and two internal thermal switches.

10. Clutch

Clutch is used to switch manual and electric operation.

7. Handwheel

Actuator has a handwheel, which can operate the valve by user when power is off. The dimension of the handwheel is designed for labor saving.

8. Handle

Turning the handle can switch the actuator to manual status when manual operation is needed.

9. Worm and worm shaft

Two-stage worm reducer has large transmission ratio, low noise (50dB is the highest) and self-lock functions.

11. Base

The installation dimension of the base conforms to ISO5211 standard and the drive bush can be machined according to the requirement of user.

12. Terminal compartment

The double-seal design of the terminal compartment can protect the internal electric components from the outside hazardous gas during site wiring.

AVAR Quarter-turn On-off Range Performance Data

Model	Specification	Voltage (V)	Frequency (Hz)	Time (S)	Torque		Weight	
					Nm	Ft-lbf	KG	Lbs
AVAR200	AVAR5	380	50/60	20	50	40	14	31
		220	50/60	20	40	30	14	31
	AVAR10	380	50/60	20	100	75	14	31
		220	50/60	20	60	45	14	31
	AVAR15	380	50/60	20	150	110	14	31
		220	50/60	20	80	60	14	31
	AVAR20	380	50/60	20	200	150	14	31
		220	50/60	20	100	75	14	31
AVAR500	AVAR30	380	50/60	30	300	220	17	38
		220	50/60	30	150	110	17	38
	AVAR40	380	50/60	30	400	295	17	38
		220	50/60	30	175	130	17	38
	AVAR50	380	50/60	30	500	370	17	38
		220	50/60	30	220	160	17	38
AVAR1000	AVAR60	380	50/60	30	600	445	25	55
		220	50/60	30	300	220	25	55
	AVAR80	380	50/60	30	800	590	25	55
		220	50/60	30	400	295	25	55
	AVAR100	380	50/60	30	1000	740	25	55
		220	50/60	30	500	365	25	55

AVARM Quarter-turn Modulating Range Performance Data

Model	Specification	Voltage (V)	Frequency (Hz)	Time (S)	Torque		Weight	
					Nm	Ft-lbf	KG	Lbs
AVARM200	AVARM5	380	50/60	20	50	40	14	31
		220	50/60	20	40	30	14	31
	AVARM10	380	50/60	20	60	45	14	31
		220	50/60	20	40	30	14	31
	AVARM15	380	50/60	20	100	75	14	31
		220	50/60	20	55	40	14	31
	AVARM20	380	50/60	20	140	105	14	31
		220	50/60	20	70	50	14	31
AVARM500	AVARM30	380	50/60	30	180	130	17	38
		220	50/60	30	100	75	17	38
	AVARM40	380	50/60	30	240	175	17	38
		220	50/60	30	140	105	17	38
	AVARM50	380	50/60	30	300	220	17	38
		220	50/60	30	180	135	17	38
AVARM1000	AVARM60	380	50/60	30	360	265	25	55
		220	50/60	30	250	185	25	55
	AVARM80	380	50/60	30	480	355	25	55
		220	50/60	30	300	220	25	55
	AVARM100	380	50/60	30	600	445	25	55
		220	50/60	30	350	265	25	55