

HKJ/HKJM Series Intelligent electric angle travel actuator

About us

“Hurko” HKJ series intelligent electrical angle travel actuator, a very important field control equipment, has been widely used in electricity station、metallurgy、petroleum、chemistry industry、water conservancy、machine 、 light industry 、 fire protection 、 environment protection department and all so. The actuator, combined with a valve that can be one of the ball valve 、 butterfly valve 、 Air-throttle valve and all so, is appropriate to the fields of pipeline flow control、 pollutants dumping、 water treatment 、 paper making 、 ship building etc. Even in badly dangerous environment it can work reliability for its terse design. “Hurko” HKJ series actuator provides for you the most reasonable scheme in the range of 60Nm~2500Nm.

CONTENTS

Structure of HKJ intelligent electrical angle travel actuator	03
Production characteristics.....	05
Type specification table.....	06
Technical specification and performances.....	07
Optional item.....	08
Wiring diagram.....	09
Field bus control system.....	10
Dimension.....	11
Configuration table of actuator with vale.....	12
Method of configuring air-throttle valve.....	12
Service promises to customer.....	13

Structure of HKJ series intelligent electrical angle travel actuator

1. Motor: Entire seal mouse cage type asynchronous machine. It has big force at start moment and small inertia, and can be appropriate to all kinds of valve system. The motor equips a hot protector, and can be one phase power supply motor or three phases power supply motor.
 2. Observation window: It's transparent, and through it you can observe the continual position instruction provided by the instructor.
 3. Position indicator: The bell display directly assembly on the main axle, used for the dynamic instruction valve the positional information.
 4. Intelligence control unit: The control unit uses the brand-new integrated SOC chip, has the man-machine dialogue function, and highly intellectualized degree.
 5. Wire connection plug: The wiring way used in the HKJ series actuator has met the plug-in unit. Wires from outsider are all connected to the plug. So there is no necessary to disconnect a wire but tear off the plug, when to dismantle the actuator or maintenance. The plug is waterproofing and explosion-proof. This design avoids reconnecting the wires and preventing the wiring error.
 6. Torque protector: to provide the over-load protection.
- Travel switch: provided only in common type actuator (not provided in intelligence actuator)

7. Thrust force unit: The thrust force unit including the foundation and the actuation wrap. Setup of foundation conforms to the ISO5211 standard. The actuation wrap can be easily connected to all kinds of valve shafts.
8. Worm reduction gear: Precise worm gear and worm bearing adjuster reduction gear, has small clearance, high efficient, long life, low noise (max: 50dB), and self-lock function that can avoid reverse rotation when power off or signal lost suddenly.
9. Switch handle: this equipment permit switch between electrical operation and manual electrical operation mutually.
10. Manual operation: After press the switch handle to manual operation position, the actuator can be operated by the handwheel. The switch handle will be automatically switched to electrical operation model when motor works.
11. Handwheel: the size design of the handwheel guarantees security and laborsaving.

Production characteristics

Liquid crystal display

The liquid crystal display, using digitals, real time displays the valve position and the alarm information according to the work condition and instructs the close and open limit position by high brightness LED

Control model

The actuator can be controlled by remote on-off signals (or optional remote 4~20mA current signal) and local operation knob.

Status feedback

Actuator instructs to the customer the close and open limit position and malfunction alarm information by relays output (and valve position by optional 4~20mA current signal).

Debugging without uncovered

By the operation knobs, work parameters can be set and limit position can be debugged, during which the cover is no need to be opened, so the dust and humidity are prevented and security and reliability of electrical control unit are improved.

High intelligence

With the control unit using the brand-new integrated SOC chip, the actuator has the man-machine dialogue function, and highly intellectualized degree.

Closure characteristics

Because aluminum cover and box after their face bonderized have the very strong anticorrosion ability, the stationary fit places have the “o” circles, and the coordination places have the skeleton oil seal, the box body has reached the closure level:IP68. The optional explosion-proof box body can be appropriate to level IIA and IIB dangerous work environment example: No.1 area, No.2 area and all so, where filled with level T1~T4 explosible air.

High efficient and low noise

Precise worm gear and worm bearing adjuster reduction gear, has small clearance, high efficient, long life, low noise (max: 50dB).

Self-lock

Self-lock function can avoid reverse rotation when power off or signal lost suddenly.

Coupling automatic reset

The coupling permit switch between electrical operation and manual electrical operation mutually. When the switch handle pressed to manual operation position, the actuator can be operated by the handwheel. The switch handle will be automatically switched to electrical operation model when motor works.

Handwheel

The size design of the handwheel guarantees security and laborsaving.

Motor

Entire seal mouse cage type asynchronous machine has big force at start moment and small inertia, and can be appropriate to all kinds of valve system. The motor inside equips a hot protector.

Wiring convenience

The wiring way used in the HKJ series actuator has met the plug-in unit. Wires from outsider are all connected to the plug. The plug is waterproofing and explosion-proof. This design avoids reconnecting the wires and preventing the wiring error.

Absolutely encoded position transducer

Our company's intelligence electrical actuator can optionally fit absolutely encoded position transducer to replace the position potentiometer. The absolutely encoded position transducer adopting non-touched detecting technology has extremely high precise and long life.

Main control board

Adopt four layers wiring technology, devices produced by world famous manufactory, and high quality automatic face mount craft to ensure the control core high reliability and long life. Using brand-new SOC chip as core, the electrical init is high intelligent and has man-machine dialogue function.

Remote input and relay interface board

This interface board receives on-off signals from customer and outputs the relay status to customer. All input and output are isolated from main control board through photoelectricity in this interface board, to ensure the main control board high anti-disturb.

Structurized electrical unit

The main control board and remote interface board can be extremely conveniently assembled together and disassembled. Their message passed through the connecting plug-in unit.

LCD and knob induction board

LCD, using digitals, real time displays the valve position and the alarm information according to the work condition. The knob equipping magnetic steel triggers the reed pipe through the electromagnetic induction, and its install axle does not through the box body to ensure the high closure level: IP68.

Type specification table

Table-1:

HKJ series on-off model actuator specification table (single phase power supply)								
Part number	Max torque	Rated torque	Travel time 60/50Hz	Max valve axle diameter	Motor power	Rated current 110V/220V	Handwheel circle number	weight
	Nm	Nm	S	mm	W	A	n	kg
HKJ06	60	50	14/17	22	15	1.00/0.53	8.5	11
HKJ09	90	75	14/17	22	25	1.30/0.6	8.5	11
HKJ15	150	125	17/20	22	40	1.60/0.80	10	12
HKJ19	190	160	17/20	22	45	1.70/1.10	10	13
HKJ28	280	235	20/25	22	50	2.00/1.20	12.5	17
HKJ38	380	320	20/25	32	60	2.80/1.40	12.5	18
HKJ50	500	420	20/25	32	90	3.60/1.70	12.5	19
HKJ60	600	500	24/29	42	90	3.60/1.70	14.5	22
HKJ80	800	670	24/29	42	140	4.00/2.00	14.5	23
HKJ100	1000	840	24/29	42	180	4.80/2.40	14.5	25
HKJ150	1500	1250	72/87	75	90	3.60/1.70	43.5	68
HKJ200	2000	1670	72/87	75	140	4.00/2.00	43.5	7
HKJ250	2500	2100	72/87	75	180	4.80/2.40	43.5	70
Note: motor current at start moment is as twice as rated current								

Table-2

HKJM series modulating model actuator specification table (single phase power supply)								
Part number	Max torque	Modulating torque	Travel time	Max valve axle diameter	Motor power	Rated current 110V/220V	Handwheel circle number	weight
	Nm	Nm	S	mm	W	A	n	kg
HKJM06	50	25	14/17	22	15	1.00/0.45	8.5	11
HKJM09	80	40	14/17	22	25	1.30/0.58	8.5	11
HKJM15	130	70	17/20	22	40	1.60/0.95	10	12
HKJM19	160	85	17/20	22	45	1.70/0.95	10	13
HKJM28	260	130	20/25	22	50	2.00/0.95	12.5	17
HKJM38	350	175	20/25	32	60	2.80/1.30	12.5	18
HKJM50	420	230	20/25	32	90	3.60/1.50	12.5	19
HKJM60	520	270	24/29	42	90	3.60/1.50	14.5	22
HKJM80	700	360	24/29	42	140	4.00/2.15	14.5	23
HKJM100	880	450	24/29	42	180	4.80/2.45	14.5	25
HKJM150	1350	720	72/87	75	90	3.60/1.50	43.5	68
HKJM200	1800	950	72/87	75	140	4.00/2.15	43.5	7
HKJM250	2300	1100	72/87	75	180	4.80/2.45	43.5	70
Note: motor current at start moment is as twice as rated current, and max torque is 1.2 times to rated torque								

Table-3

HKJ series actuator specification table (three phases power supply)									
Part number	Max torque	Rated torque	Modulating torque	Travel time	Max valve axle diameter	Motor power	Rated current 380V/440V	Handwheel circle number	weight
	Nm	Nm	Nm	S	mm	W	A	n	kg
HJ/HJM06	60	50	30	14/17	22	15	0.25/0.14	8.5	11
HJ/HJM09	90	75	45	14/17	22	25	0.28/0.20	8.5	11
HJ/HJM15	150	125	75	17/20	22	40	0.39/0.33	10	12
HJ/HJM19	190	160	95	17/20	22	45	0.50/0.36	10	13
HJ/HJM28	280	235	140	20/25	22	50	0.40/0.34	12.5	17
HJ/HJM38	380	320	190	20/25	32	60	0.45/0.35	12.5	18
HJ/HJM50	500	420	250	20/25	32	90	0.73/0.60	12.5	19
HJ/HJM60	600	500	300	24/29	42	90	0.73/0.60	14.5	22
HJ/HJM80	800	670	400	24/29	42	140	0.80/0.72	14.5	23
HJ/HJM10	1000	840	500	24/29	42	180	0.98/0.80	14.5	25
HJ/HJM15	1500	1250	750	72/87	75	90	0.73/0.60	43.5	68
HJ/HJM20	2000	1670	1000	72/87	75	140	0.80/0.72	43.5	7
HJ/HJM25	2500	2100	1250	72/87	75	180	0.98/0.80	43.5	70

Note: motor current at start moment is as twice as rated current; Character "H" instead of "HK" , this means HJ/HJM06 is HKJ/HKJM06 in fact, the others are the same too.

Technology specification and performance

Closure level: IP68

Power supply: 110/220VAC (-15%~+10%), 50/60Hz (-2%~+2%)

380/440VAC (-10%~+10%), 50/60Hz (-2%~+2%)

Travel: 0~110°

Travel time: refer to table-1~table-3

Output torque: refer to table-1~table-3

Work environment temperature: -10~+70℃ or optional -30~+70℃

Limit position relay: Relay contact is 250VAC/5A. Basic configure contain one close limit relay and one open limit relay.

Torque relay: Relay contact is 250VAC/5A. Basic configure has no torque protection relay.

Main part materials

Box body:	Compression casting aluminum alloy
Cover:	Compression casting aluminum alloy
Worm gear:	Nickel bronze or aluminum bronze
Worm staff:	Alloy steel
Main axle:	Alloy steel
Driving wrap:	Steel or aluminum bronze
Foundation:	Modular cast iron or malleable cast iron

Surface treatment: bonderizing

Outside coating: consist of two layers, the one is metal gray paint 1M-W224 and the other is metal engine baking varnish AC-A1122

Lubrication: senior lubricant

Install: install foundation conforms to the ISO5211 standard..

Wiring holes: are a $M36 \times 1.5$ and a $M22 \times 1.5$ spiral holes or a NPT11/4" and a NPT3/4" spiral holes. Of explosion proof type are two $M20 \times 1.5$ spiral holes (the hole types must be specified when ordering)

Work frequency:

HKJ on-off model actuator is a intermittent work device, designed for the situation where action frequency less than 60 times per hour. HKJM modulating model actuator is a continuous work device, inside which the motor's driving model is non-contact SSR (solid status relay), and it can works under modulating torque with frequency not more than 1200 times per hour (single phase power supply actuator is exclusive).

Optional item

Explosion proof: box and cover are all explosion proof, and their explosion proof level is exdIIBT4 and their closure level is IP68. They can be used in level IIA and IIB environment example: NO.1 and NO.2 area etc. filled with level T1~T4 explosive mixture.

Travel angle: 120° , 135° , 180° , 270° , 300°

Valve position delivering unit: the unit linearly feedback continuous 4~20mA current to customer according to valve position.

Proportional control unit: this unit receives the 4~20mA current input, and drives the valve to the expected position according to the input current.

Status feedback relay contact:

1. the number of the close limit relay contact and open limit relay contact each can be: ①1 couple; ②2 couple; ③3 couple.
2. 1 couple of close over-torque relay contacts and 1 couple of open over-torque relay contacts.
3. 1 couple of monitor relay contacts (monitors status of power off, short phase, model knob not in remote position, and proportional control signal lost).

Note: When the close and open torque relay contacts are selected, the max number for each close limit and open limit relay contacts is 2. The type of

the contacts (normal open or normal close) can be specially changed by customer in ordering book.

Absolutely encoded position transducer: non-touched detect absolutely encoded position transducer compared with conductive plastics potentiometer has the advantages: no wears, high precise, long life. Refer to the figure-1

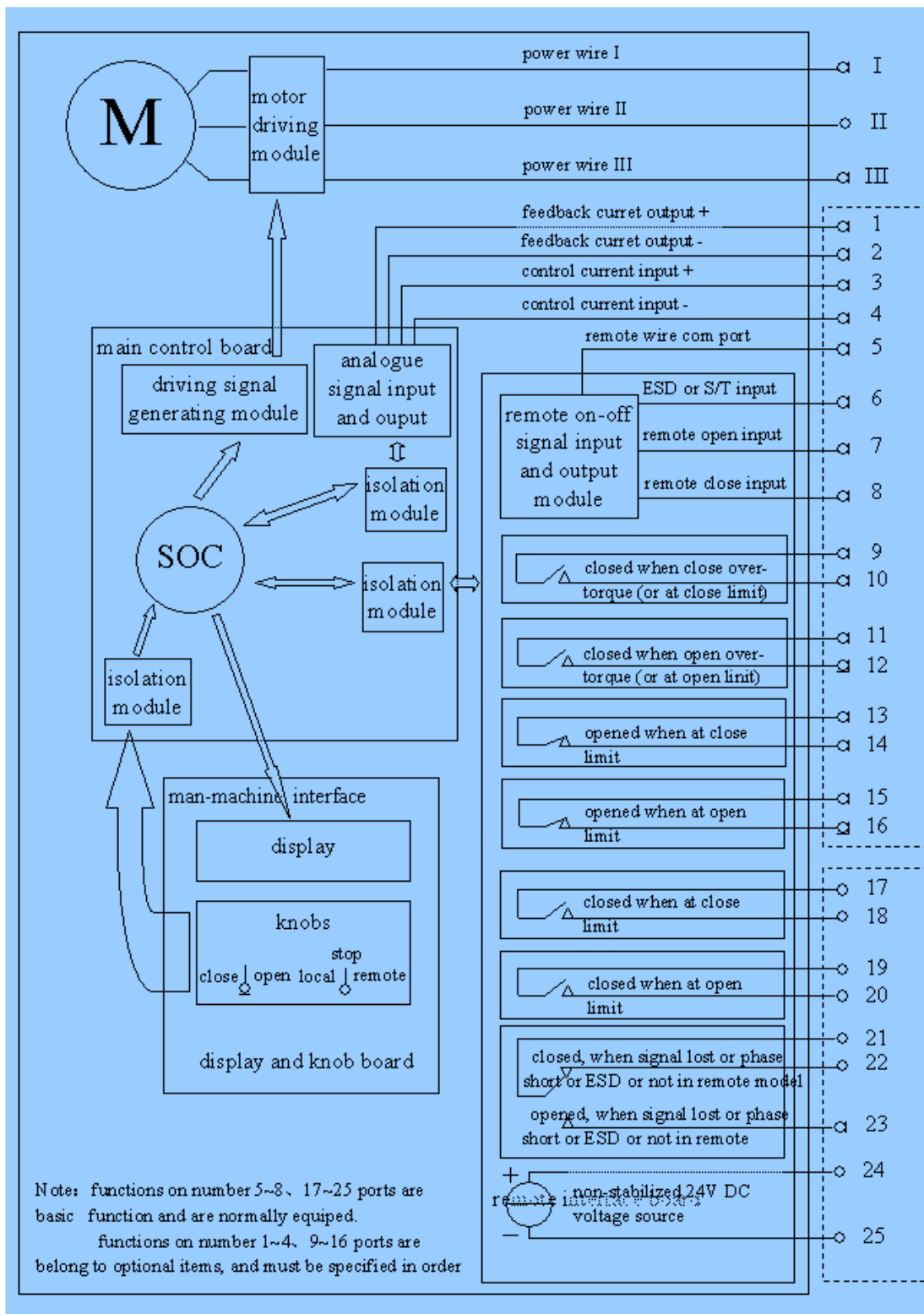
Common type HKJ actuator: this type is a economical one, in which there is no intelligence control unit. A additional outside control box is needed to control it. Its closure and explosion proof level is the same as intelligence one.

Auxiliary limit position switch: provides dry contact signal at the corresponding valve position (triggered by cam). Refer to figure-2.

Auxiliary torque protection switch: provides dry contact signal to control unit when over-loaded (triggered by cam). Refer to figure-3.

Position instruction unit: the electrical part can select conductive plastics potentiometer or absolutely encoded position transducer. The machine part has anti-gear-clearance function, and can precisely transfer valve position information in time. Refer to figure-4.

HKJ intelligence actuator wiring diagram



Field bus control system

A communication card installed inside can provide remote control and status feedback through a couple of twisted pair line. The communication distance reaches 20km without any repeater using RS485 as physical and data link layers protocol. Communication protocol can be one of the below:

Modbus

Hurko actuator inside can install a single channel or double channel communication card, and through it can provide full control functions and status datum. Even system variable for example: device address and baud rate also can be set remotely by modbus.

Profibus

Actuator with profibus card inside can be connected to profibus network, and through the profibus network can receive all control commands from remote master station and perform them, and also transfer all feedback status datum.

Foundation

Actuator that has match foundation card can connect to foundation network. The foundation module is as programmable as other digital or analog module. Actuator with foundation card can communicate each other without any master system.

Dimension

Table-2

Type	HKJ06 HKJ09	HKJ15 HKJ19	HKJ28 HKJ38 HKJ50	HKJ60 HKJ80 HKJ100	HKJ150 HKJ200 HKJ250
D (MAX)	22	22	32	42	75
E	55	57	75	85	120
F	43	43	52	59	109
G	2	2	2	2	7
H	355	385	408	448	448
I	56	77	83	99	99
J	175	184	202	226	226
K	60	60	70	78	78
L	213	213	250	283	283
M	273	273	320	361	361
N	102	120	145	175	236
O	68	85	99	116	116
P	113	139	159	191	191
Q	235	265	288	328	328
R	108	108	130	178	178
S	102	102	125	170	170
T					538
U					176
X					450
Y					16
Z					375

Valve with actuator configuration table

Pipeline pressure: 1Mpa (10kg/cm²)

Part number	Butterfly valve	Two-way valve	T-valve
HKJ06	80	40	40
HKJ09	100	50	50
HKJ15	125	65	65
HKJ19	150	80	80
HKJ28	200	100	100
HKJ38	250		
HKJ50		125	125
HKJ60	300	150	150
HKJ80	350		
HKJ100		200	
HKJ150	400/450		
HKJ200	500	250	200
HKJ250	600	300	250

Unit: mm

Calculating method matching air throttle valve

1. Circulation air throttle

$$T = \frac{d^3 \times \Delta p}{12 \times n} \times 10^{-8} \times 1.8 \quad (\text{Nm})$$

Loaded bearing=1.8

Unloaded bearing=2.5

2. Fan type air throttle

$$T = \frac{a^2 \times b \times \Delta p}{8 \times n} \times 10^{-8} \times 1.8$$

a=width

b=length

d=diameter

Δp =pressure (9.8Pa)

n=fan blade number

Services promise to customer

Hurko company follows closely on the industrial automation and information technology innovation, pays attention to user highly the requires as well as benefits, and unceasing finds problems and solves problems to conform leading position throughout in the aspects of satisfying customer, maintain production competitive power, Prompt delivery, and quick post-sale service.

All management according to quality document, all operation according to operation standard procedure, all statement expressed by quality datum, and all work one time to complete are the quality criterion of Hurko company. Every product throughout producing process from investing to delivering is checked strictly, and this ensures product reliability.

Though all have been changing greatly in latest years, our target of pursuing quality and service unchanged.