

# CKD

## Electric Actuator



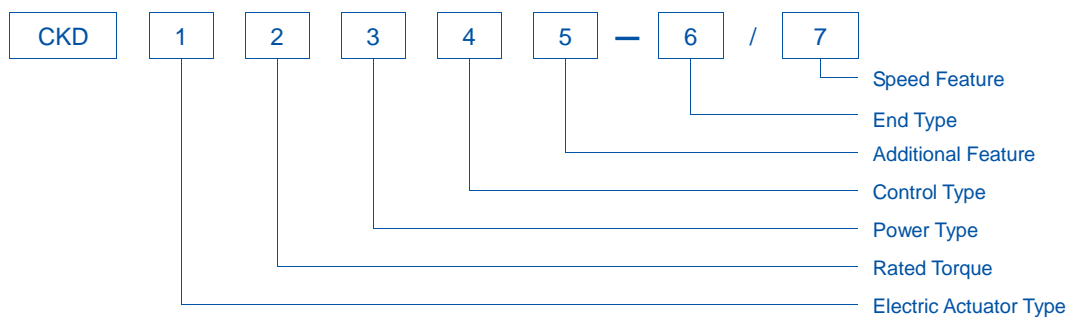
**CKD Electric Actuator**

**CKD**  
[ckdea@126.com](mailto:ckdea@126.com)

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### ORDERING GUIDE



#### 1. Electric Actuator Type

Electric Actuator Type	Code	Electric Actuator Type	Code	Electric Actuator Type	Code
Multi-turn	No code	Quarter-turn	J	Linear	M

#### 2. Rated Torque

Multi-turn (CKD)		Quarter-turn (CKDJ)		Linear (CKDM)	
Code	Torque* (N.m)	Code	Torque (N.m)	Code	Torque (KN)
4	40	10	100	6	6
10	100	25	250	10	10
16	160	40	400	16	16
25	250	60	600	25	25
40	400			40	40
60	600			60	60
90	900			100	100
100	1000				
120	1200				

\*Rated Torque herein is only for 24 RPM EA

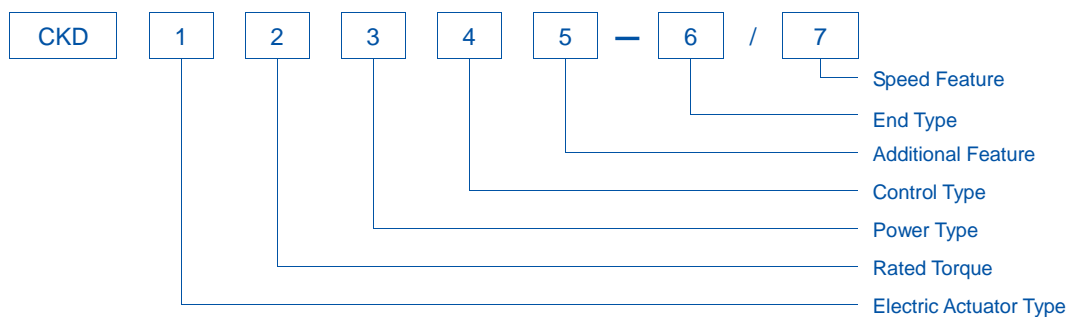
#### 3. Power Type

Motor Type	Code	Motor Type	Code
Single Phase	D	Three Phase	I

#### 4. Control Type

Control Type	Code	Control Type	Code
Without Feedback	A	Modbus Protocol	M
On-off type, Analogue Feedback	B	Modbus + On/Off	MC
On-off Input and Feedback	C	FF Fieldbus	F
Modulating type I/O Analogue	D	Profibus	P
		Profibus + On/Off	PC

### ORDERING GUIDE



#### 5. Additional Feature

Feature	Code
Constant Torque and Valve Opening Display	I
Internal Gear	R
Torque Switch not less than 1NO+1NC	T
Explosion-proof Grade: Exed II B Standard	B
Explosion-proof Grade: Exed II C Standard	C
Protection Grade: IP 68	G
Motor Insulation Grade: Class H	H

#### 6. End Type

End Type	Code	End Type	Code
Flange	A	Lever Arm	Z

#### 7. Speed Feature

CKD4			
RPM	24	26	
CKD10/16			
RPM	24	26	48 52
CKD25			
RPM	24		
CKD40/60/90/100/120			
RPM	24	48	96

### INTRODUCTION

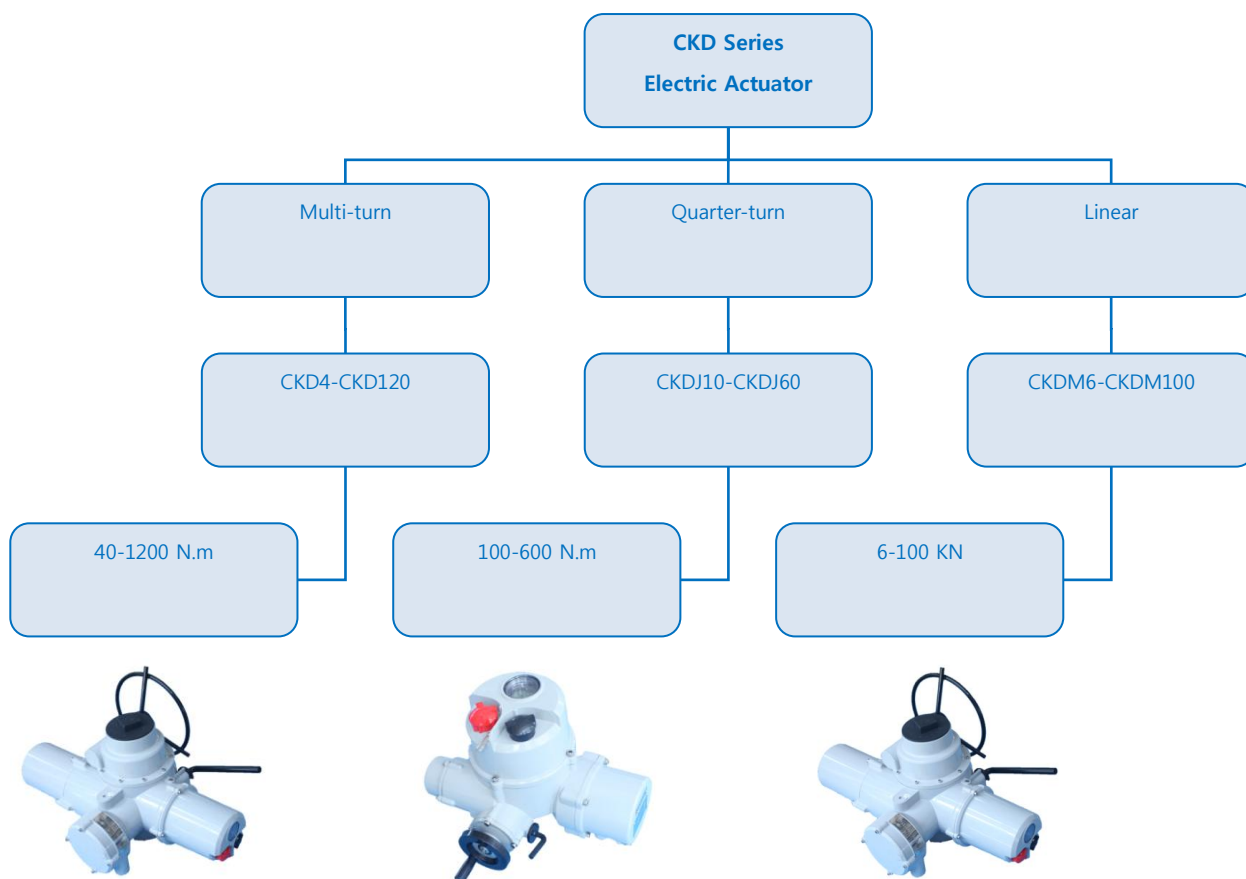
**CKD Electric Actuator Factory** is the leading manufacturer in china for producing smart type electric actuator and gearbox. It is the only qualified domestic supplier in china petro-chemical industry for supplying explosion-proof electric actuator. This achievement made us as one of the top highest standard actuator manufacturer, because we are the only one who can compete with actuator world giants.

The CKD series actuator and gear box are highly acknowledged by our customer as reliable product in various industry applications. We serve major clients in the oil, gas, power and water and waste treatment industries. Now, we are starting to build our international service network in ASEAN countries. With experience gaining and technique renovation, we believe sooner or later we will be another actuator giant in the world.

The actuator is composed of an electric motor, reduction gearing, reversing starter and a displaying window to indicate valve position and torque. All these parts are contained inside a double-sealed watertight enclosure with the highest standard up to IP68. The production line is under the control of ISO9001.



### PRODUCT RANGE



### TECHNICAL DATA

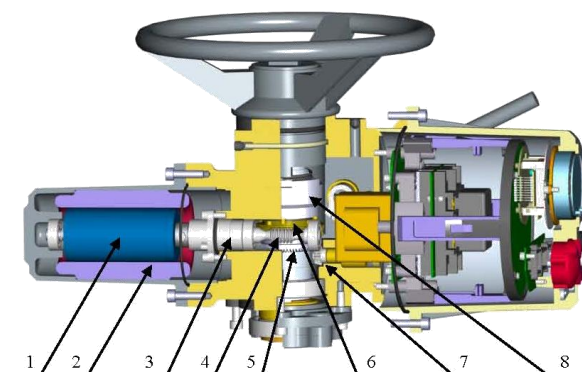
- Input signal: (4-20Ma, 0-10Ma, 0-5V, 0-10V), (Modbus, Profibus, FFBus);
- Output Signal: (4-20Ma, 0-10Ma, 0-5V, 0-10V), (Modbus, Profibus, FFBus);
- Environment Temperature: -30°C+85°C;  
(Special environment temperature is on request.)
- Relative Humidity: 5~100%;
- Power: 220V/380V/400V/415V/450V, 50/60Hz;
- Atmospheric Pressure: 80~106kPa;
- Dead Zone: 0.1%-9.9% adjustable;
- Basic Tolerance:  $\leq \pm 1.0\%$ ;
- Dampening Property: Undamped oscillation;
- Protection Class: IP67 Standard, up to IP68;
- Repeated Tolerance of movement controller:  $\leq 3^\circ$ ;
- Explosion-Proof level: Exd II BT4/CT4;
- Torque adjusting range 40~100%;



### PARTS LIST

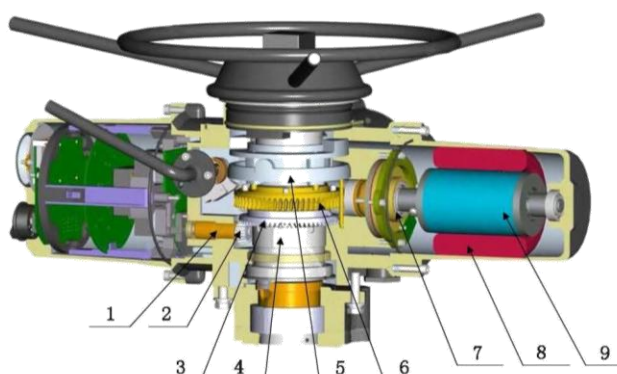
#### CKD4 – CKD25

No.	Parts Name
1	Motor Rotor
2	Motor Stator
3	Worm Seat
4	Worm Shaft
5	Spur Gear
6	Worm Gear
7	Drive Gear
8	Drive Block



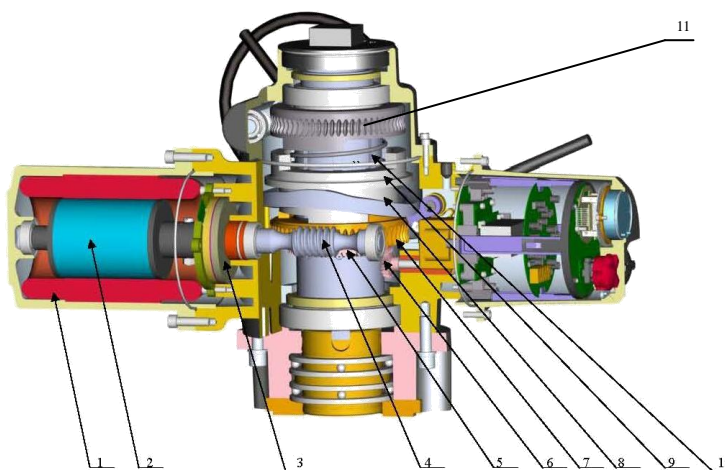
#### CKD40 – CKD60

No.	Parts Name
1	Drive Bushing
2	Drive Gear
3	Spur Gear
4	Shaft
5	Support Ring
6	Worm Gear
7	Pressure Sensor
8	Motor Stator
9	Motor Rotor



#### CKD60R – CKD120R

No.	Parts Name
1	Motor Rotor
2	Motor Stator
3	Pressure Sensor
4	Worm Shaft
5	Spur Gear
6	Drive Gear
7	Worm Gear
8	Support Ring
9	Drive Block
10	Shaft
11	Internal Gear



## ACCESSORY

### ■ Worm & Gear

Worm shaft to operate in roller bearings and be machine cut, ground, and highly polished, hot rolled steel, hardness 50-60 Rockwell Scale C bronze worm wheel with large contact area. Provide mating surfaces of dissimilar metals to prevent galling.

All thrust or torque bearing components are made of ductile iron.

Thrusts are in both directions.

Gear is oil lubricated all the times.

### ■ Motor

Class F with 15 minute duty rating or Class H with a 30 minute duty rating.

Voltage tolerance:  $\pm 10\%$ .

ABB electrometrical starter is capable of open/close 60 starts per hour.

Solid state starter for modulating service at 1200 starts per hour.

The coating color of Electric Actuator can be selected in both dark gray and white gray.

## TORQUE CALCULATION

Input Torque of Gear Box = Output Torque (Valve Shaft Torque) / Mechanical Advantage of Gear Box

Mechanical Advantage of Gear Box = Ratio of Gear Box x Mechanical Efficiency of Gear Box

Ratio of Gear Box =  $4 \times \text{Time of Valve Closing} \times \text{Speed of Electric Actuator} / 60$

Rated Torque of Electric Actuator should be no less than 1.5 times of Input Torque of Gear Box



### FEATURE

#### ■ Reliabilities

Enclosure is made by high quality aluminum alloy, and double sealed. The conduit entry and terminal compartment is completely sealed from the motor, control and switching compartments. Separated enclosure can be an option for the application which local operation is difficult.

#### ■ Motor

Squirrel cage induction type motor, Insulation Class F, 220V/380V/400V/415V/450VAC, 50/60Hz its axle and shaft are comparatively independent. The shaft is working in lubricating oil/grease, which suits a widely environmental temperature range. Featured with low inertia, high torque type of motor will offer 1.5 times rated torque for starting operation.

#### ■ Torque Test and Measurement

This system uses the pressure sensor to test the counteraction force of the pushing force of the shaft and directly change it into electric signals in tune with the output torque. The output torque value can be tested precisely without any effects which caused by power frequencies changes or technical efficiency changes of gears. It can be adjusted from 40~100%.

#### ■ Torque Protection

The torque switches are independent of voltage fluctuation, and for both directions travel. Internal setting can prevent repeated starting in the same direction. Torque sensors will guarantee the initial starting torque will not make over torque.

**Option: Torque Switch (with 1NO + 1NC, 2NO + 2NC)**

#### ■ Valve Position Control

The non-contact position measurement system is indicating 0~100% position, which transforms the rotation movement of the center column precisely into equivalent electrical signal, and sending position code after comparing the signal with the original settings in memory.

**Standard: Limit Switch (with 2NO + 2NC)**

#### ■ Hand Operation

The hand driving unit engages to work only after pressing the lever to the "hand operation" position and released. As soon as the motor starts to run, the actuator automatically enters into electric operation. As an option, locks can be used to lock the lever in the "hand operation" position or "Auto position".

#### ■ Display

All kinds of status can be displayed in the LCD window. It can be easily operated and set by build-in three LCD lights (green, yellow and red color) even at night. Back-up battery supports the LCD window displaying the valve status during a power failure. Valve opening percentage and torque changes can be shown on LCD window.

### ■ Remote controller

All parameters can be easily set by the infrared controller without removing any parts of the actuator.

### ■ Self-Testing and Diagnose

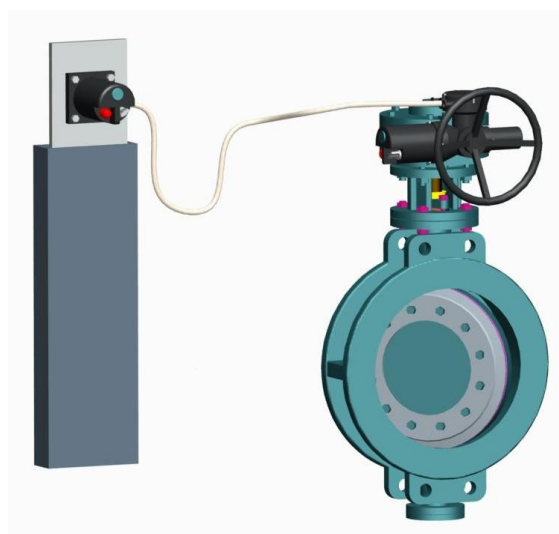
The actuator has both correction and warning functions. It automatically tests the operational circuits to ensure correct operation when electricity is connected. In the operational procedure, the electric operation will be forbidden when errors occur, at the same time, actuator send out local and remote warning signals, thus make users quickly find out the cases and make actuator back into normal working condition.

### ■ Lubrication

The actuator 'gear and gear box is lubricated with oil/grease as SAE80/90 EP grade.

### ■ Backup Battery

When electricity is cut off or power failure occurred, the backup battery can supply power to the related circuits so that the actuator can still provide all kinds of valve's information to the remote control. At the same time, all the motor operation of actuator can be recorded inside the inner data recorder. LCD screen goes on with demonstrating the working status except for the lack of LCD background light and valve indication light. The battery is 9V Lithia battery that can last for 6 years.



### ■ Manual external lock in any position is an option

### ■ Oil filling / drainage is an option

Actuator Model	Oil Kind	Weight
CKD4/10/16	SAE90	0.3
CKD25	SAE90	0.5
CKD40	SAE90	1.0
CKD60	SAE90	1.0
CKD90/100/120	SAE90	3.5

### ■ Optional feature

There can be an extra control box which had the same function as the manual knobs on the electric actuator to separate the manual control function in a place where it is convenient for customer to operate. Contacts and operating parts can be made of non-corrodible metal for special application.

### SAFETY PRIORITY

#### ■ Seal Protection

The enclosure is totally waterproof, dustproof and air-free. It is fully sealed with O-rings or gasket. The rated protection class was accorded to users' need, and up to IP68. Fully wire electric motor operators at factory and furnish complete with terminal strips for external power and control connections. Wiring: copper with tropical grade PVC cover. Internal wiring to remain in a water tight compartment with external cover removed.

#### ■ Sudden Reverse Protection

The circuit can automatically keep the last order for a preset period of time when actuator receive the order of reverse turn, This will decreases the over-current damage to the motor, prolongs the contactors service life and cushion shock load to mechanical driving devices.

#### ■ Valve Protection

Valve jam is likely to happen if actuator's torque is not enough to open. A logic circuit will disconnect the contactor and stop the motor if a valve action order is given which no action is detected during a preset time. Valve alarm is shown both on local and remote displays.

#### ■ Data Protection

The data recorder can still work under the backup battery even if electricity is cut off.

#### ■ Joint Lock Protection

Under this joint lock method, a related joint lock signal is needed for effectively opening or closing valves orders. In case of any of the signals lost, actuator will keep the position. The joint lock is effective both on spot and remote.

#### ■ Emergency Shut Down (ESD)

ESD is a standard function which can be used by any remote switches or simulated circuit to handle the local and remote signals, and prevent any data loss.

#### ■ Safety Protection of Motor

##### Phase protection

The synchronize-phase will automatically adjust the phase rotation. In case, one or more phases are lost, the related circuits will stop the actuator operation and send out alarm signals accordingly.

##### Overheat Protection

The over heating protection is done by embedded thermo switches which will disconnect the relevant contacts, stop actuators, display alarm signals once the winding temperature is over +132°C.

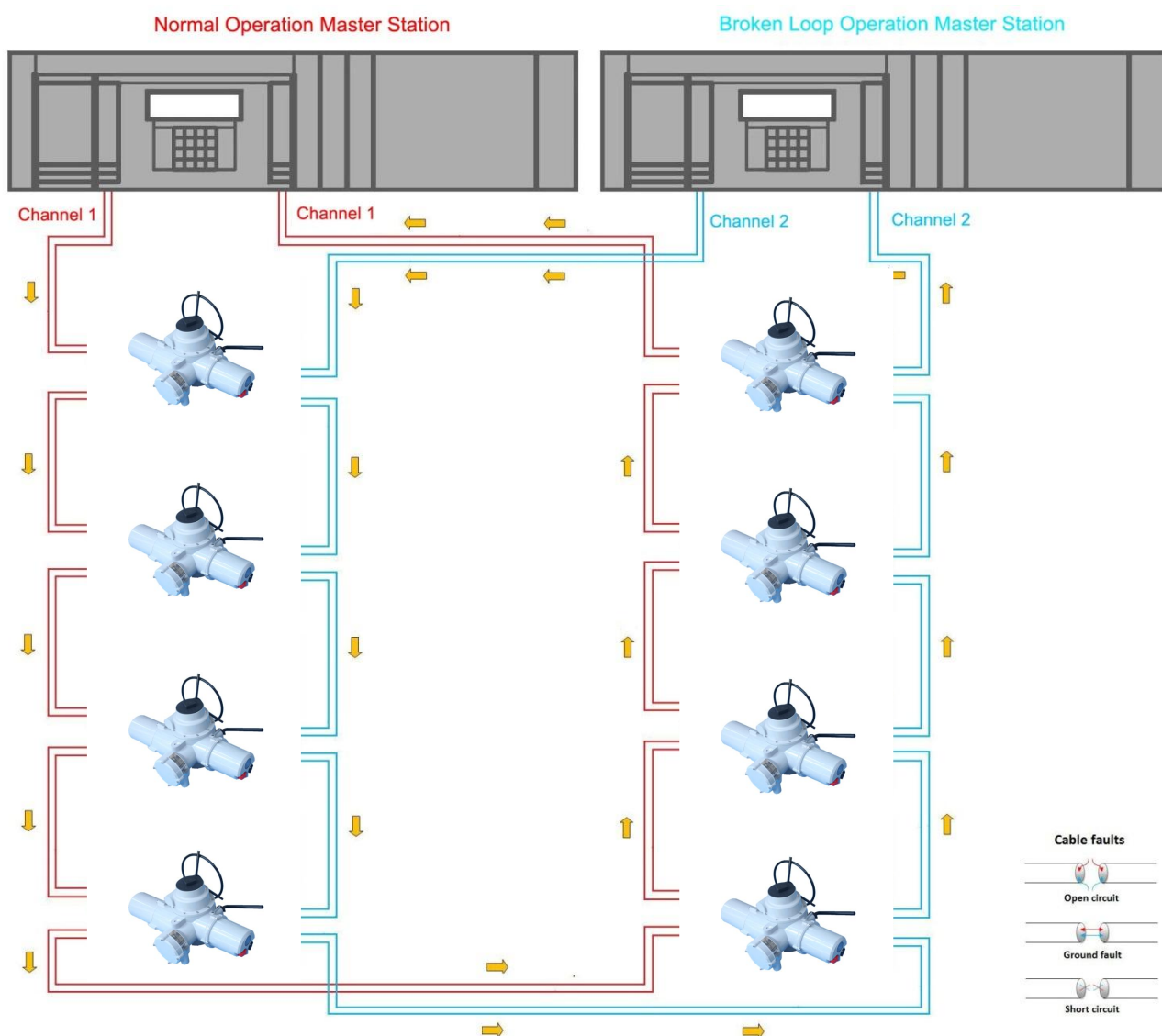
##### Over Current Protection

Motor will be stopped automatically in case of over current.

### SPECIAL FEATURE

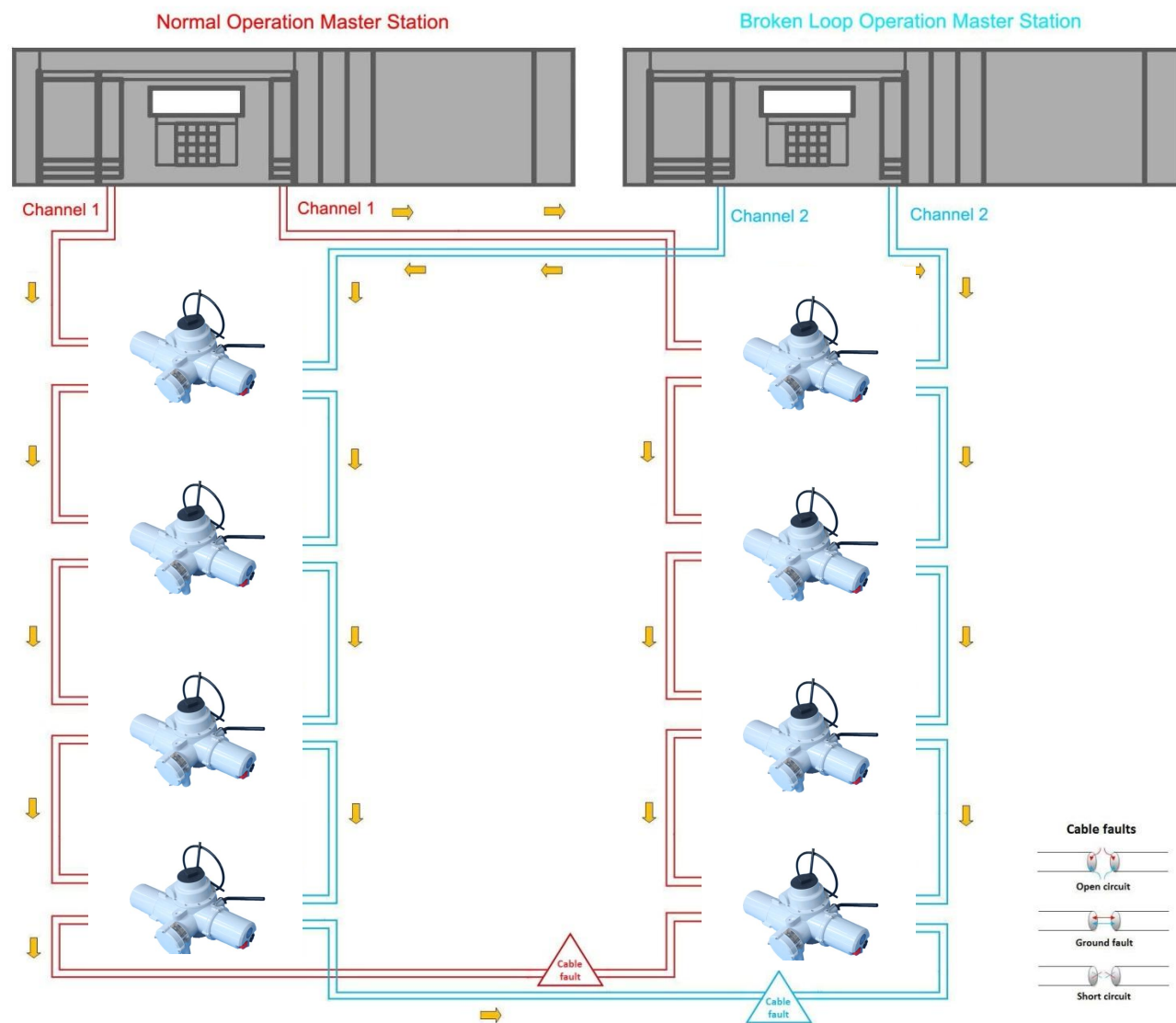
#### Double-loop

**Field bus**-The actuator interface confirms to any fieldbus-mastering control systems and communication protocols. All bus control loop can be doubled for safety purpose as an option.



### Double-loop

**Field bus-**The actuator interface conforms to any fieldbus-mastering control systems and communication protocols. All bus control loop can be doubled for safety purpose as an option.



### MULTI TURN ELECTRIC ACTUATOR

Multi-turn Electric Actuators are fundamental actuators. There are altogether nine basic models of multi-reverse Electric Actuators. The Torque ranges from 40 N·m to 1200 N·m. Please consult factory for special application and requirement.



MULTI TURN EA

#### ■ Sizing

Actuator Model	Rated Torque (N·m)	Speed (RPM)	Rated Torque (N·m)	Speed (RPM)	Rated Torque (N·m)	Speed (RPM)	Flange No.
CKD4	40	24	/	/	/	/	F10
CKD10	100	24, 26	60	48, 52	/	/	F10
CKD16	160	24, 26	100	48, 52	/	/	F10
CKD25	250	24	/	/	/	/	F14
CKD40	400	24	240	48	150	96	F16
CKD60	600	24	420	48	300	96	F16
CKD90	900	24	700	48	500	96	F25
CKD100	1000	24	700	48	500	96	F25
CKD120	1200	24	900	48	650	96	F25

\*Electric Actuators of bigger torque are available on request.

#### ■ Application



\* The pictures are for reference only.



### Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>1</sub>	E	F	G	H	I	J	K	L	M	d	d <sub>1</sub>
CKD4/10/16	420	270	125	220	280	145	229	45	390	140	107	70	200	265	350	255	26	Tr32

Flange No.	Φd <sub>1</sub>	Φd <sub>2</sub>	Φd <sub>3</sub>	Φd <sub>4</sub>	h	No. of Bolt Hole
F10	125	70	102	M10	3	4

\*Reserve the right, without notice, to alter or improve the designs of the products herein.

### Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	E	F	G	H	I	J	K	d	d <sub>1</sub>
CKD25	375	180	132	214	490	178	229	280	45	60	240	340	385	255	30	Tr34

Flange No.	Φd <sub>1</sub>	Φd <sub>2</sub>	Φd <sub>3</sub>	Φd <sub>4</sub>	h	No. of Bolt Hole
F14	175	100	140	M16	4	4

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### Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	E	F	G	H	I	J	K	d	d <sub>1</sub>
CKD40/60	430	210	154	214	800	196	229	300	45	60	260	360	400	255	42	Tr48

Technical drawings of the CKD40/60 electric actuator showing front, side, and top views with dimension lines and labels.

Labels in drawings:

- $\Phi D_0$
- $\Phi D$
- $\Phi d_1$ -Max. Screw Hole Dia.
- $\Phi d$ -Max Key Hole Dia.
- $\Phi D_1$
- $\Phi D_2$
- $\Phi d_4$
- $\Phi d_2$
- $\Phi d_3$
- $\Phi d_1$

Flange No.	$\Phi d_1$	$\Phi d_2$	$\Phi d_3$	$\Phi d_4$	h	No. of Bolt Hole
F16	210	130	165	M20	5	4

Technical drawing of the flange showing dimensions and bolt hole locations.

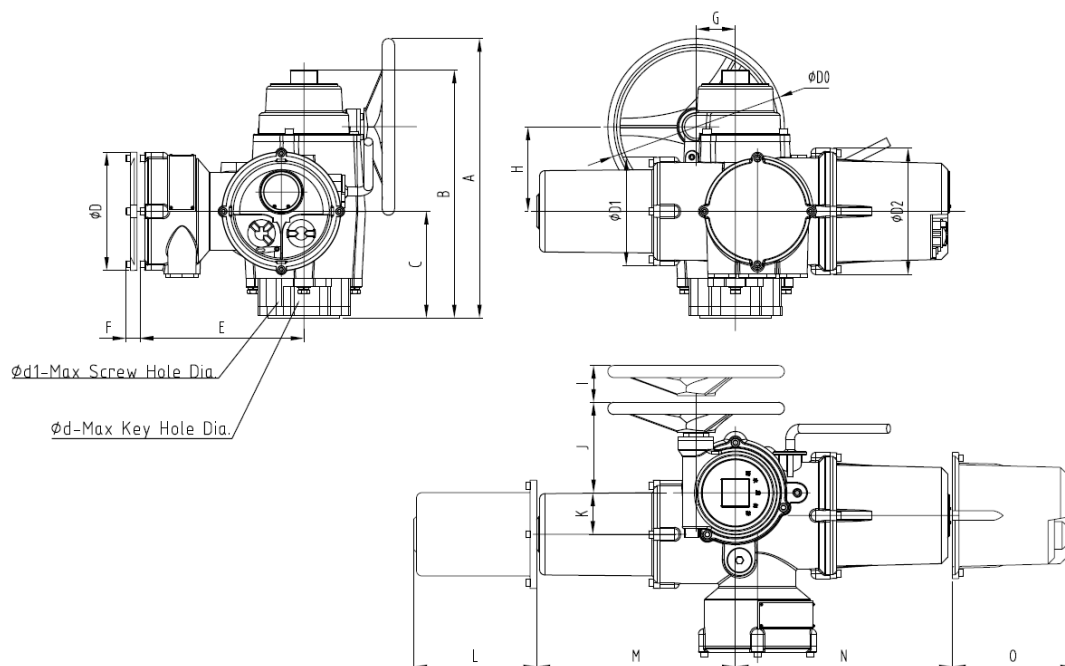
Labels in drawing:

- $\Phi d_4$
- $\Phi d_2$
- $\Phi d_3$
- $\Phi d_1$
- h

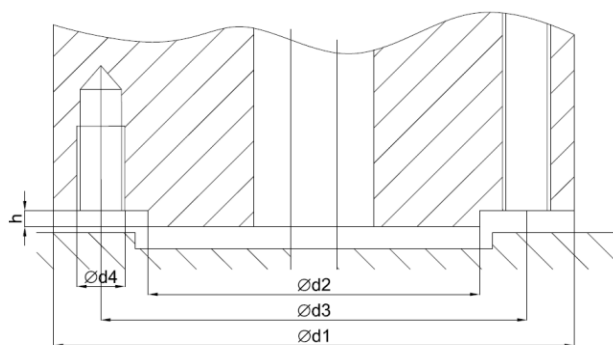
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## ■ Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	E	F	G	H	I	J	K	L	M	N	O	d	d <sub>i</sub>
CKD60R	530	470	210	214	320	196	229	300	45	72	155	80	180	75	260	360	400	255	42	Tr48



Flange No.	$\Phi d_1$	$\Phi d_2$	$\Phi d_3$	$\Phi d_4$	h	No. of Bolt Hole
F16	210	130	165	M20	5	4



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### Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	E	F	G	H	I	J	K	d	d <sub>1</sub>
CKD90R	350	45	570	214	730	195	190	440	210	430	255	85	108	300	445	48	Tr52

Technical drawings of the CKD90R electric actuator showing front, side, and top views with dimension lines A through K and diameters ØD, ØD1, ØD2, ØD3, and ØD0. Labels include:  $\phi d_1$ -Max Screw Hole Dia.,  $\phi d$ -Max Key Hole Dia., and  $\phi D$ .

Flange No.	$\Phi d_1$	$\Phi d_2$	$\Phi d_3$	$\Phi d_4$	h	No. of Bolt Hole
F25	300	200	254	M16	5	8

Technical drawing of the flange showing dimensions  $\Phi d_1$ ,  $\Phi d_2$ ,  $\Phi d_3$ , and  $\Phi d_4$ .

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### Dimension

Actuator Model	A	B	C	D	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	E	F	G	H	I	J	K	L	M	N	d	d <sub>1</sub>
CKD100R/120R	230	40	620	214	370	195	190	420	210	350	120	45	550	430	255	300	445	48	Tr52

Technical drawings of the CKD100R/120R electric actuator showing front, side, and top views with dimension lines A through N and diameters d, d<sub>1</sub>, d<sub>2</sub>, d<sub>3</sub>, d<sub>4</sub>.

Labels in drawings:

- φd1-Max Screw Hole Dia.
- φd-Max Key Hole Dia.

Flange No.	Φd <sub>1</sub>	Φd <sub>2</sub>	Φd <sub>3</sub>	Φd <sub>4</sub>	h	No. of Bolt Hole
F25	300	200	254	M16	5	8

Technical drawing of the flange F25 showing dimensions d<sub>1</sub>, d<sub>2</sub>, d<sub>3</sub>, d<sub>4</sub> and height h.

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### QUARTER TURN ELECTRIC ACTUATOR

Quarter-turn Electric Actuators refer to part of reverse Electric Actuators. Torque ranges from 100N·m to 600N·m.

For application with higher torque more than 600N·m, we offer multi-turn Gear Box solution, please consult with factory.

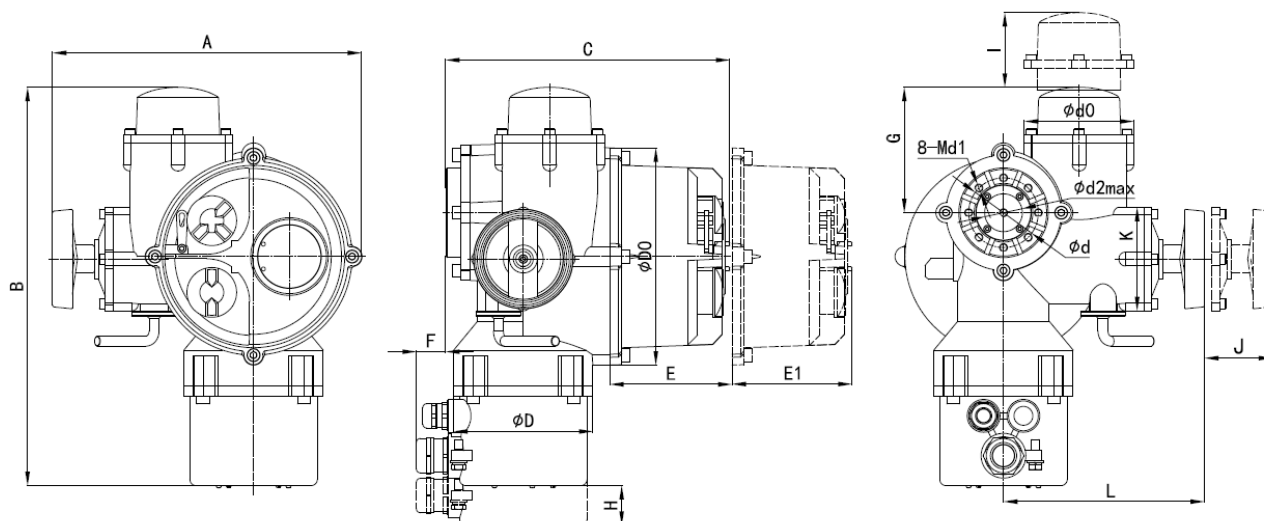
Color of black as standard and cold grey type is in process of designing and testing, which is set to come into service to substitute for black type soon.



#### Sizing

Actuator Model	Rated Torque (N·m)	90° Travel Time (s)	Flange No.
CKDJ10	100	25	F07
CKDJ25/40	250/400	25	F10
CKDJ60	600	25	F12

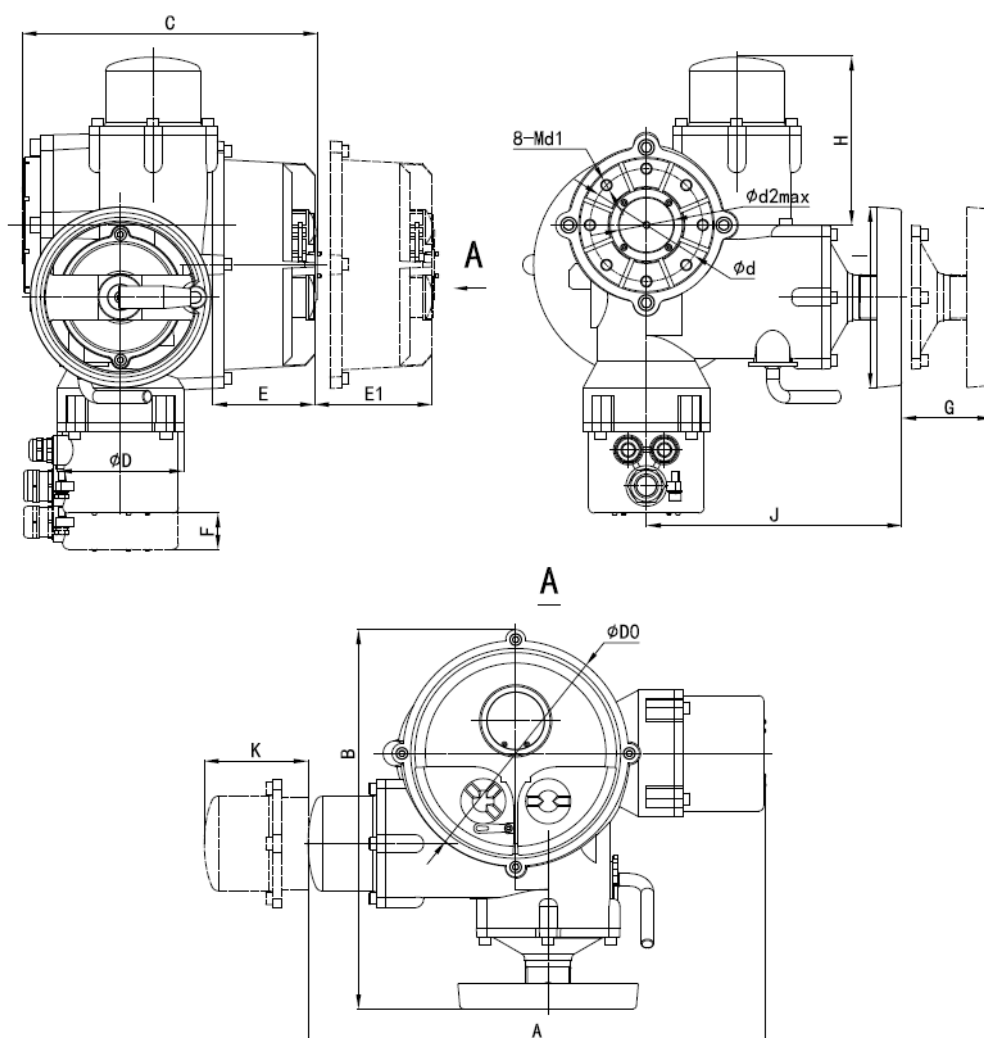
#### Dimension



Actuator Model	A	B	C	D	D <sub>0</sub>	E	E <sub>1</sub>	F	G	H	I	J	K	d	d <sub>0</sub>	d <sub>1</sub>	d <sub>2</sub>
CKDJ10	311	400	286	140	219	120	120	30	130	40	75	40	104	70	110	8	22

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### ■ Dimension



Actuator Model	A	B	C	D	D <sub>0</sub>	E	E <sub>1</sub>	F	G	H	I	J	K	d	d <sub>1</sub>	d <sub>2</sub>
CKDJ25/40	507	420	328	140	250	113	130	40	100	187	200	283	115	102	12	30
CKDJ60	507	420	328	140	250	113	130	40	100	187	200	283	115	125	12	31

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### LINEAR ELECTRIC ACTUATOR

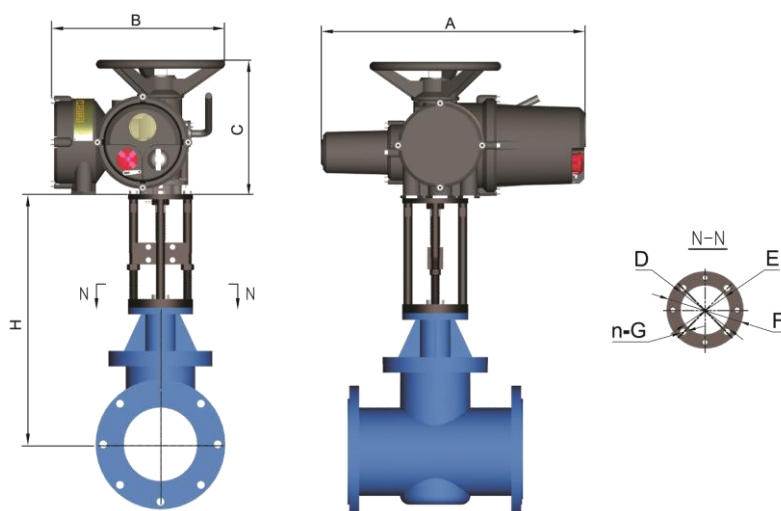
Linear Electric Actuator is composed of multi-turn Electric Actuator (CKD series) and yoke. There are seven basic models. The output force ranges from 6~100kN. Please consult factory for special application and requirement.



#### Sizing

Actuator Model	Yoke Model	Output Force (KN)	Speed (rpm)	Travel (mm)	Flange No.
CKDM6	JZ4	6	24, 26	200	F10
CKDM10	JZ10	10	24, 26	200	F10
CKDM16	JZ16	16	24, 26	200	F10
CKDM25	JZ25	25	24	230	F10
CKDM40	JZ40	40	24	250	F14
CKDM60	JZ60	60	24	250	F16
CKDM100	JZ100	100	24	250	F16

#### Dimension



Actuator Model	A	B	C
CKDM6/10/16/25	610	410	330
CKDM40	760	610	390
CKDM60/100	790	790	410

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### STANDARD

Specification	Standard
Fieldbus Standard	IEC61158 GB/T16657.2-1996 (Fieldbus standard for use in industrial control system Part 2: Physical layer specification and service definition)
System Security Standard	IEC61508 ISA-S84.01 DIN19250
Power Standard	EN50160
Seal Standard	IEC60529 GB/T 4942.2-93 (Degrees of protection provided by enclosures for low-voltage apparatus) IP68/IP65
Magnetic Compatibility Standard (EMC)	89/336/EEC 92/31/EEC
Explosion-proof Standard	CENELEC EN50014 & EN50018 (Explosion-proof class EexD IIBT4 or EexD IICT4) CEN: Tally with the exterior shell of explosion-proof standard of CENELEC EexD IIB or EexD IIC GB3836.1-2000 (Electrical apparatus for explosive gas atmospheres Part 1: General requirements) GB3836.2-2000 (Electrical apparatus for explosive gas atmospheres Part 2: flameproof enclosure d") (Explosion-proof Class Exd IIBT4 and Exd IICT4) DL/T 642-1997 (Electric valve actuators for flameproof)
Actuator Standard	JB/T 8219-1999 (Electrical actuators for industrial-process Measurement and control system)
Safety-low pressure	73/23/EEC 93/68/EEC EN60204-11993
Safety-machinery	89/392/EEC 91/368/EEC
Installation Size Standard	ISO5211 ISO5210 GB12222, GB12223 (Multi-turn and Part-turn valve actuators attachments)
Motor Standard	IEC34
Electric Connection Standard	GB2681
Environment Standard	GB3797 GB/T2423.4

# CERTIFICATE

