Operation Manual
Of
DCL® Series Electric Actuator
（DCL-02 Series）

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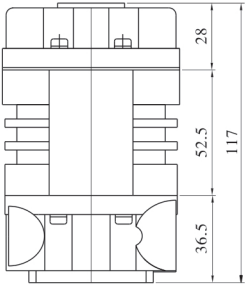
NOTES

1. ⚠ No manual operation is allowed when it is energized.
2. Do not open the rubber cover of manual operation port if you are not operating manually, so as to avoid water or dust from entering into the actuator.
3. Please not to operate the actuator out of the range of the indicator. Otherwise the actuator will not be able to work normally.
4. The actuator is equipped with overheat protection device, when the motor exceeds the temperature of 125^{0}C, the overheat protection device will switch off the motor power automatically.
5. It is necessary to install additionally the leakage protection device before it is put into operation.
6. Please confirm the input voltage and all connections.
7. It is not allowed to in series or in parallel the power lines for two or more sets of actuators, otherwise, it will cause movement out of control and motor over temperature rising due to the interference of condensers from each other.
8. It is prohibited to operate the actuator under overload condition.
9. The manufacturer will not be responsible for the improper changes and maintenance on the actuator.

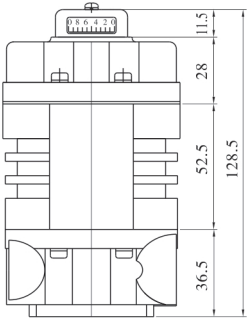
I. OVERALL DIMENSIONS

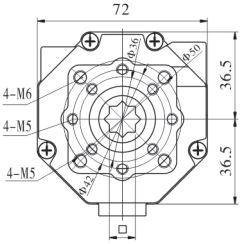
DCL—02 (Type A\B\C\G)

FLAT-TYPE OPENING INDICATION TYPE



SALIENT-TYPE OPENING INDICATION TYPE



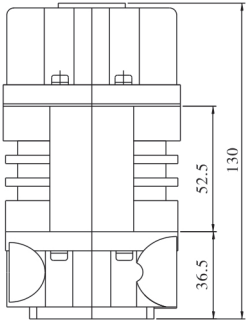


Square	□ 9x9、□ 11x11
Flange	F03、F04、F05
Valve stem	Height: ⩽ 16mm

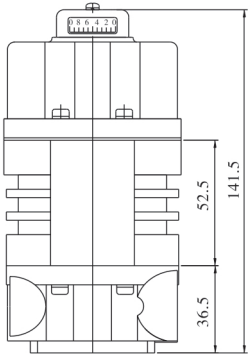
I. OVERALL DIMENSIONS

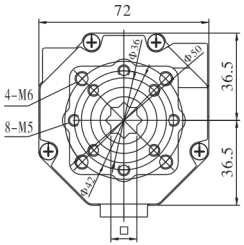
DCL—02 (Type E\GEY)

FLAT-TYPE OPENING INDICATION TYPE



SALIENT-TYPE OPENING INDICATION TYPE





Square	□ 9x9、□ 11x11
Flange	F03、F04、F05
Valve stem	Height: ⩽ 16mm

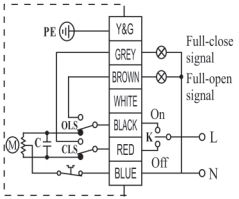
II. PERFORMANCE PARAMETERS

Type / Parameters / Power / Performance	DCL—02			
	DC24V	AC24V	AC110V	AC220V
Motor Power	8W	6W	6W	6W
Rated Current	0. 7A	1. 3A	0. 3A	0. 15A
Standard Time/Torque	15S/16N.m			
Optional Time/Torque	7S/9N.m 30S/25N.m			
Turning Angle	0~90°			
Available Control Circuit	Type G\GEY	TypeA\B\C	TypeA\B\C\E	
Total Weight	1. 0kg			
Basic Error	≤ ± 1.0%			
Reciprocating Error	No more than 1%			
Repeating Error in Actuator	≤ ± 1.0%			
Dead Space	1.0%			
Insulating Resistance	100MΩ/250VDC		100MΩ/500VDC	
withstand voltage Class	500VAC, one minute		1500VAC, one minute	
Protection Class	IP67			
Installation Angle	360°, at any angle			
Electric Interface	7- core cable for connection			
Ambient Temperature	-30℃~+60℃			
Fuse	2A	1A	1A	

III. CONTROL CIRCUIT

Type A: Limit Position Switch (Active contact)

The opening or closing operation is realized by switching open or close the circuit, outputting a group of full-open or full-close active signals.

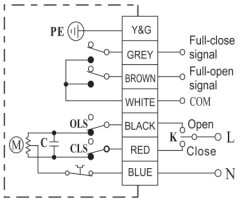


Notes of wiring terminals:

1. Terminal in blue is for the connection of zero line of power cord.
2. The connection between power phase line and terminal in red is for the operation of “close”.
3. The connection between power phase line and terminal in black is for the operation of “open”.
4. When the power phase line is connected with the terminal in red and “close” operation is at its position, the “full-close signal” indication lamp connected with terminal in grey lights up.
5. When the power phase line is connected with the terminal in black and “open” operation is at its position, the “full-open signal” indication lamp connected with terminal in brown lights up.
6. Terminal in Y&G connects PE.

Type B: Position Switch with Passive contact

The opening or closing operation is realized by switch “close” or “open” the circuit, outputting a group of full open or close passive signals.



Notes of wiring terminals:

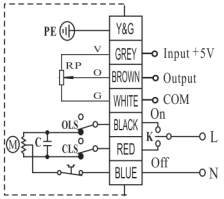
1. Terminal in blue is for the connection of zero line of power.
2. The connection between power phase line and terminal in red is for the operation of “close”.
3. The connection between power phase line and terminal in black is for the operation of “open”.
4. Terminal in white is common terminal as passive contact.
5. When it is at “open” operation position, terminal in brown will output the “Full open” signal.
6. When it is at “close” operation position, terminal in grey will output the “Full close” signal.
7. Terminal in Y&G connects PE.

Note:The internal circuit of actuator is shown in the dotted frame

III. CONTROL CIRCUIT

Type C: With digital potentiometer

The opening or closing operation is realized by switch “close” or “open” the circuit, outputting a voltage signal corresponding to the opening position.

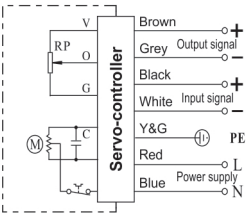


Notes of wiring terminals:

1. Terminal in blue is for the connection of zero line of power cord.
2. The connection between power phase line and terminal in red is for the operation of “close”.
3. The connection between power phase line and terminal in black is for the operation of “open”.
4. The white terminal is the COM terminal of the potentiometer.
5. The brown terminal is the moving arm terminal of the potentiometer. During "open" operation , the voltage between the COM terminal and the brown terminal increases according to the valve opening degrees.
6. The gray terminal is the power input terminal of the potentiometer.
7. Terminal in Y&G connects PE.

Type E: With Servo Controller

Input: 4~20mADC （or 1~5VDC,2~10VDC）; Output: 4~20mADC



Notes of wiring terminals:

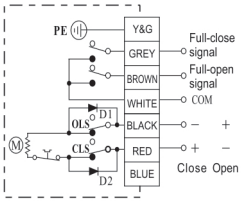
1. Blue connecting with “N”, Red with “L”.
2. White connecting with“-”of input signal, Black with “+” of input signal.
3. Grey connecting with “-“ of output signal, Brown with “+” of output signal.
4. Y&G connecting with PE.

Note:The internal circuit of actuator is shown in the dotted frame

III. CONTROL CIRCUIT

Type G: DC Control Circuit, with Passive Contact Switch

According to the single conductivity of diode, the opening and the closing operation can be realized by means of the exchanging of the positive pole and the negative pole of DC power supply and output a group of full open or close passive signals.

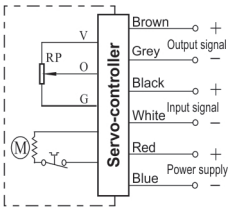


Notes of wiring terminals:

1. For the operation of “close”, the terminal in red is connected with positive pole and the terminal in black is connected with negative pole. For operation of “open”, the terminal in black is connected with positive pole and the terminal in red is connected with negative pole.
2. The terminal in white is the common terminal with passive contact.
3. When it is at “open” operation position, terminal in brown will output the “Full open” signal.
4. When it is at its “close” operation position, terminal in grey will output the “Full close” signal.
5. Terminal in Y&G connects PE.

Type GEY: With Servo Controller

Input: 4~20mADC （or 1~5VDC,2~10VDC）； Output: 4~20mADC



Notes of wiring terminals:

1. Blue connecting with “Power supply -”,Red with “Power supply+”
2. White connecting with “-” of input signal, Black with “+” of input signal.
3. Grey connecting with “-” of output signal, Brown with “+” of output signal.

Note:

1. The internal circuit of actuator is shown in the dotted frame.

2.The power supply corresponding to that specified forthe type of actuator ordered must be provided at theinstallation site.

3. The Power supply and voltage shall be as followingspecified at the installation site:

AC220V±10% 50Hz/60Hz AC110V±10% 50Hz/60Hz DC24V±5%

IV.REQUIREMENT OF INSTALLATION CONDITIONS

- The product can be installed not only indoors, but also outdoors.
- The product is not explosion-proof, Care shall be taken to avoid inflammable and explosive environment.
- It is necessary to have protective cover installed, if it operates in such conditions of long time raining, directly receiving sunshine or spatter.
- Please reserve space for manual operation and maintenance..
- The ambient temperature shall be within the rang of -30℃~+60℃.

Special hint: This type of product is not for high temperature environment.

V.REQUIREMENT OF WORKING MEDIUM TEMPERATURE

- When it operates with valve, the heat of working medium will be conducted to the body of the unit, care shall be taken to the temperature rising.
- It is possible to directly install the unit if the temperature of working medium is below 80℃.
- If the temperature of working medium is higher than 80℃, direct installation is forbidden. The radiator device shall be additionally installed.

VI.REQUIREMENT OF INSTALLATION AND APPLICATION

- This type of actuator is suitable for the valves with ISO5211 standard: Installation size: F03, F04, F05, square valve stem with sizes of 11x11 or 9x9; Height: ⩽ 16mm.
- During the connection with valve, both actuator and valve must be at full close position.
- After connection with the valve, drive the electric actuator by handle for full open and full close once and confirm the operation is stable without eccentricity and distortion. Check the valve, if full close and full open in the range of opening indication of the actuator.

Special hint:

1. Too much force will lead to the electric actuator over-travel and being damaged.

VII. ELECTRIC TEST-RUN

- Connect the circuit correctly according to the control circuit diagram adhered inside the cover for Junction Box. After confirming, switch on the power supply.
- The switch is turned to CLOSE, the actuator drives the valve to close position (clockwise direction) until limit switch (K1) for close direction is actuated. The electric actuator will stop turning.
- The switch is turned to OPEN, the actuator drives the valve in a counter-clockwise direction until the limit switch (K2) is open, the electric actuator will stop turning.

VIII.ADJUSTMENT OF FLAT-TYPE OPENING INDICATIONELECTRIC LIMIT

① Drive the valve to Full- close position by handle.

② Loosen the lock screw A2 on scale plate, adjust scale plate A1, making the pointer to the "O" position on the scale plate (SHUT position), tighten Lock screw A2 on scale plate.

③ See Fig. (1), loosen fixed screw on Close -direction switch cam, turn switch cam in a clockwise direction, in turn actuate the Micro-switch K1, K2, then stop turning switch cam when you hear a "click" sound from K2 and fasten the Fixed screw on switch cam.

④ Drive the valve to Full- open position by handle, loosen fixed screw on Open-direction switch cam, turn switch cam in a counter-clockwise, in turn actuate the micro-switch K4, K3, then stop turning switch cam when you hear a "click" sound from K3 and fasten the fixed screw on switch cam.

Special Hint: K1 is Full -close signal position which advances 3° than valve Full- close position (stopper designed type, nonadjustable); K4 is Full -open signal position which advances 3° than valve Full -open Position (stopper designed type, nonadjustable); No K2,K4 micro-switch for type A.

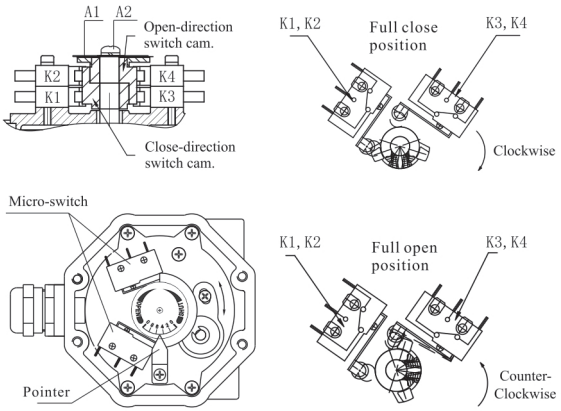


Fig.(1)

IX. ADJUSTMENT OF SALIENT TYPE OPENING INDICATION ELECTRIC LIMIT

① Drive the valve to Full -close position by handle

② See fig.(2),loosen screw A2 properly, turn opening indicator A1, making the pointer to 50% position on the A1(Yellow area), tightenScrew A2. .

③ Adjust the switch cam according to VIII③④.

④ Install cover for electric elements, tighten screw of cover.

⑤ Loosen screw A4 properly,making the any window on the opening indicator A3. Just aim Red area with "SHUT" on the opening indicator A1,tighten screw A4.

Special Hint : Yellow area indicates Full-open position.
Red area indicates Full -close position.

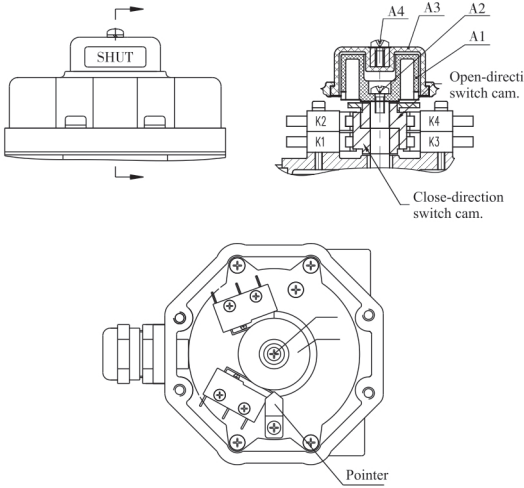
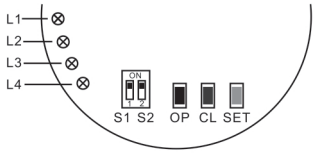


Fig.(2)

X.COMMISSIONING OF ADJUSTING TYPE(TYPE E/GEY)ACTUATOR

1.Illustration for Operation Board

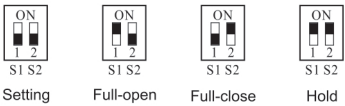
All settings & manual operation can be carry out by operation board below located on the control circuit board:



① **Dial Switch**

As shown above: Dial the Switches S1.S2 upward is ON, downward is OFF. The functions corresponding to the switches are described below:

S1 S2	Functions
OFF OFF	Under manual & setup conditions
ON OFF	Under automatic running condition, the valve is Full-open when input signal is failure.
OFF ON	Under automatic running condition, the valve is Full-close when input signal is failure.
ON ON	Under automatic running condition, the valve is Hold when input signal is failure.



X.COMMISSIONING OF ADJUSTING TYPE(TYPE E/GEY)ACTUATOR

② **Pushbutton**

●OP: Under setup condtions, actuator will operate in opening direction when the button is pressed; and the motor will stop when the button is released. The actuator is in a demarcating Full-open position when buttons Set and OP

are pressed at the same time.

● CL: Under setup conditions, actuator will operate in closing direction when the button is pressed, and the motor will stop when the button is released. The actuator is in a demarcating Full-close position when buttons Set and CL are pressed at the same time.

● Set: setting button & Under setup conditions, actuator will perform Full-open/Full- close/position demarcation & output current calibration when the Set cooperates with OP and CL.

③ **LED Indicator lamp**

L1: Green, power indicator, light on when the actuator is powered on;

L2: red, input signal failure indicator, light on when the input signal failure, light off when signal recovery;

L3: red, position detection circuit fault indicator,light on when opening potentiometer lead open/short circuit or body damaged , light off when trouble shooted;

L4: red, jam fault indicator, light on when jam fault. The fault needs to be solved, and light off when trouble shooted.

2.Setting & Commissioning

Set both S1, S2 to OFF position, go to the setting & manual condition, under this condition can proceed manual operation, stroke calibration and output current correction.

① **Manual Operation**

Press OP button, the actuator will operate to opening direction; Press CL button, the actuator will operate to closing direction; the motor will stop when these buttons are released. After finishing the stroke calibration, the output current

X.COMMISSIONING OF ADJUSTING TYPE(TYPE E/GEY)ACTUATOR

③ Full-open position calibration

Use the "OP" and "CL"buttons to adjust the actuator to the full open position. First press the "Set" button and do not release, then press the "OP "button, keep the two buttons pressed at the same time for about 3 seconds, and when the indicator L2 is on, release both buttons at the same time, L2 will be off, and the Full-close position calibration is completed.

④ Select handling method of input signal failure & get into automatic operation condition

After commissioning is completed, change the states of S1 & S2, Select handling method of the actuator when the input signal failure, quit setup and manual operation condition, that is the automatic operation condition.

Special note: The full open and full close calibration is in no order, but for each calibration operation both the full open and full close positions need to be calibrated.

The position of full open and full close calibration is arbitrary, if you need reverse control, you can calibrate the original full open position as full close (Set+ CL); and calibrate the original full close position as full open(Set+OP).

⑤ Output Current Correcting

The output curent of the servo-controller has been corrected at the ex-works, users no need to adjust. If output current is not 20mA with the valve Full-open or output curent is not 4mA with the valve Full-close, and allowance is more than 1%(0.16mA), you can correct it in accordance with following process if required:

Connect a DC20mA ammeter at the output current end, set all S1 and S2 to OFF position, and enter the setting state. First press the Set button and do not release, then same time press both OP and CL two buttons, when L2 light on release the three buttons at the same time, that is turning into 4mA calibratlon. Observe the indication of the ammeter. The curent will increase when button OP is pressed & it will reduce when button CL is pressed. Adjust output current to 4.00mA(±0.02). Press the Set button and L2 light off, & keeping pressing the Set button till L2 light on again,, release the button , the calibration of 4mA is completed, and turning into the calibration of 20mA automatically. Observe the indication of the ammeter, adjust current to 20mA(±0.02) by use of buttons OP & CL. Press the Set button L2 light off, and then keeping pressing the Set button till L2 light on again, release the button, the calibration of output current is completed, L2 off.

⑥ Fault judgment and treatment on control board

When a fault occurs, the fault indicator light will be on, and different lights on represents different faults.

X.COMMISSIONING OF ADJUSTING TYPE(TYPE E/GEY)ACTUATOR

● L2 on: If the input signal is less than 2.5mA or higher than 22mA, the control board considers the input signal to be invalid. Measure the input signal, if the input signal on the terminal is normal & L2 is still on,then the control board may be faulty.

● L3 on: The position detection circuit is faulty. Check whether the opening potentiometer lead is open, short circuited or whether the potentiometer itself is damaged. The voltage at both ends of the potentiometer should be about 4V if it's normal, the potentiometer center line and any one of the end's voltage should change with the potentiometer opening, if the above check is normal, L3 is still on, it may be the control board fault.

● L4 on: indicates that the operation of mechanical failure. Check whether the motor wiring is loose or open; Whether the motor itself can work normally; Use the handle to rotate the actuator in two directions respectively to check whether the actuator has jammed, if the above check result is normal and L4 is still on, it may be the control board fault.

● The opening of the actuator does not correspond to the given opening of the input signal or can not travel full stroke: check whether the output signal on the field is consistent with the standard signal, if there is no problem with the field signal, re-calibrate the full open and full close position; If the fault still can not be solved, it may be the control board fault.

● The output current does not correspond to the valve opening

If the opening potentiometer is damaged or the lead is open or short circuit, there will be a mismatch between the output current and the valve opening, and the L3 light will be on. If the potentiometer circuit fault is eliminated, and the output current cannot correspond to the valve opening after correcting the output current, it should be the control board fault.

XI.MAINTENANCE&TROUBLESHOOTING

1.Maintenance

① Since the high -grade molybdenum -base lubricant with long service life and good pressure resistance is employed, no lubrication and periodical maintenance are needed.

② If the operation of valve is rare, please drive the actuator regularly and check if there is any abnormal condition.

2.Trouble shooting

Problems	Cause	Remedy
Motor does not start.	The power cord is not plugged in	Plug in the power cord
	Broken connection ,connector and cable is disengaged.	repair the power cable Connect and fasten the cable correct
	Voltage is not right or too low	Check the voltage if it is normal
	The overheat protection device is initiated.(The ambient temperature too high, or valve clogged)	Cool down the ambient temperature. Check the valve manually, see if it can be opened and closed normally
	The micro-switch is not properly moving.	Replace the micro-switch.
	The capacitor is defective.	Contact the manufacturer and replace the capacitor.
	The diode for DC electric actuator is open.	Contact the manufacturer and replace the diode.
Indication lamp for open/close does no work	Bulb damaged	Replace the lamp
	The action of micro-switch is not proper.	Replace the micro-switch.
Motor could not stop running when reaching to the limit position	The action of micro-switch is not proper.	Replace the micro-switch.
	Misconnect the micro-switch with the control circuit.	correct the connection
	The diode of DC electric actuator is short.	Contact the manufacturer and replace the diode
Actuator got water	The glass lens for electric elements is broken	Contact the manufacturer for repair