

ELECTRIC MOTOR DRIVE

1. Preface

The demand of control valve to be used for process control at the industries such as iron, steel, gas, oil and chemical etc. is being increased rapidly, and also required the high grade for its technic. Regarding the drive for control valve, both the pneumatic system (diaphragm type, cylinder type) and the hydraulic pressure system have been used broadly heretofore. As for the electric system, there was the technical difficulty for its control of driving torque and operating time aroused by the inertia of driving mechanism, so that it was used only for the purpose to save the valve opening labour. But when we use the motor power for the driving torque, the following great features can be obtained.

- (1) Accessory equipments such as compressor, pump and piping can be saved, thus the equipment cost shall be lowered.
- (2) As only the connection of wire is enough for its work, the fitting place can be chosen freely.
- (3) Powerful driving torque can be obtained.
- (4) Response for its command is quick.
- (5) No limitation for its driving stroke.

Thus the development of electric system for valve drive have been earnestly expected, which have been the above-mentioned features fully and also the former written weak points were eliminated.

Our Company have manufactured various kinds of electric motor drives for control valves and have so far delivered a lot of the same devices quite successfully. Moreover in response to the comprehensive demand, various systems of electric motor drives for general purpose valves developed with the Fuji peculiar technic are being manufactured and have been put on the market and we are now in the condition which satisfy the requirements of every valve makers. Herewith we would like to explain these outlines.

2. Specification

Table 1 shows the specification of both the electric motor drives for control valves and for general purpose valves.

3. Characteristics

- 1) Characteristics of Electric Motor Drives for Control Valves

(1) From the reason standing against the frequent start and stop motion, these have the excellent

Table 1 Specification

Type	Output shaft torque (kgm)	Motor output & Pole	Output revolution (rpm)	Max. stem dia. (φmm)	Electric source
K 7390-1	0.5, 1, 2	0.1 kW, 4 P 0.125 kW, 2 P	41/8 (50 c/s)		3 phase 200 V 50/60 c/s
K 7390-1 S	"	0.125/0.5 kW 8/2 P	8/32 (")		
K 7390-2	2, 4, 6	0.2 kW, 2 P	8 (")		
K 7390-3	8, 10, 15,	0.32 kW, 2 P	7 (")		
K 7390-3 S	"	0.4/1.2 kW 8/2 P	7/28 (")		
K 7393	35~70	1.5 kW, 4 P	4.5 (")		
K 7393-S	"	1.5 kW, 4 P 2.2 kW, 4 P	4.5/32 (")		
RC 910-1 or 1 A	10	0.4 kW, 4 P	28/50 (60 c/s)	40	
RC 910-2 or 2 A	20	0.75 "	"	50	
RC 910-4 or 4 A	40	1.5 "	"	60	
RC 910-6 or 6 A	60	2.2 "	"	80	
RC 910-8 or 8 A	80	3.0 "	"	80	
RC 910-10 or 10 A	100	3.7 "	"	100	
RC 911-1	10	0.4 "	24	40	
RC 911-2	20	0.75 "	"	50	
RC 911-4	40	1.5 "	"	60	
RC 911-6	60	2.2 "	"	60	
RC 911-8	80	3.0 "	"	80	
RC 911-10	100	3.7 "	"	80	

features as the electric driving and for the discontinuous control system.

(2) Special brake and clutch are being installed, thus enables quick start and stop motion, and also the stable control can be obtained.

(3) Both the limit switch for overtorque and the limit switch for position are being equipped as the automatic stopping device of motor for the valve full open and full close, thus we can use these suitably by selecting corresponding to the constructions of valves.

(4) In the case of the limit switch for torque being used, the contact pressure of valve seat at the valve full closing can be settled at a certain value. Also the excessive torque can be detected when the valve is operated abnormally, so that the valve part can be protected.

(5) Sliding resistor, having the stable function for long time, is being used to detect the opening angle, so that opening position can be transmitted accurately.

(6) Output shaft torque, when the torque switch is operating, can be settled at a suitable value by selecting the spring.

(7) At the type K 7390-1 S, K 7390-3 S, and K 7393-S, two kinds of revolutionary speed, e.i. normal revolution and rapid revolution, can be obtained.

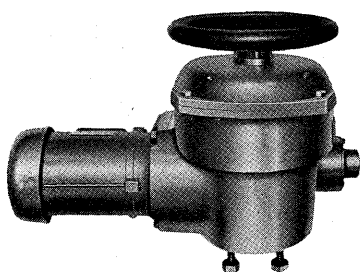


Fig. 1 Model K 7390-1

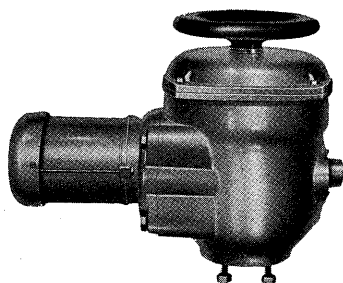


Fig. 2 Model K 7390-2

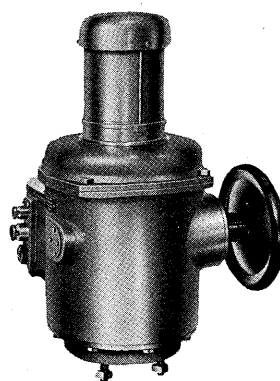


Fig. 3 Model K 7390-3

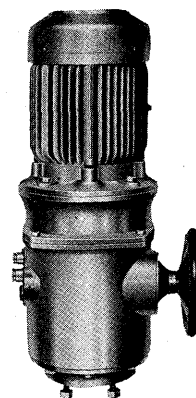


Fig. 4 Model K 7390-3 S

suitably by changing over. Also it is adequate for the high speed control in the emergency case.

(8) By using the special coupling, unnecessitating such as changing over the clutch, manual operation can be easily obtained.

(9) As high quality grease is being contained abundantly in the casing, reliable operation can be obtained without changing the oil during the long period.

2) Characteristics of Motor Drives for General Purpose Valves

(1) At the type RC 910, the adequate contact pressure of valve seat is being kept by using the torque limit at the time of valve full close, and by the position limit it stops at the time of valve full open. At the type RC 911, position limit and torque limit are provided for the both directions full close and full open, and also it is possible to make the torque limit operationable only for one direction.

(2) At each type, SB motors (self braking motor) are being used, especially designed for the motor drive, having the starting torques of 250%, the maximum torque of 300%, the braking torque of 100% each of the rated torque at 50 cycles, and the time rating is of 30 minutes.

(3) Each type can be met to the various diameters of valve stem in the large range, and also can be connected to any type of the internal screw system or the outer screw system.

(4) At the type RC 910, manual-motor drive can be easily obtained by using the simple change-lever. Manual drive is attained by manual handle through bevel gear, so that opening and closing control of valve can be quickly done. At the type RC 911, the manual handle is directly coupled to the worm gear shaft, thus the required torque is very small, resulting easy manual control.

(5) At the type RC 911, the position limit is settled by the counter mechanism, so that the adjustment of limit switches can be done simply for the valve lift in the large range.

(6) At all the type, opening is transmitted by selsyn transmitter and at the same time be indicated

by position indicator.

(7) At all the type, hammer blow mechanism through claw clutch is being equipped.

(8) At the type RC 911, mechanical over clutch is being provided which shall operate by detecting the excessive torque even when the torque limit might not be operated.

(9) At the type RC 910-A, automatic returning lever mechanism is being fitted, so that automatic motor drive is possible at that instant when electric source is applied to the motor, even when the change lever for manual-motor operation remained in the manual position.

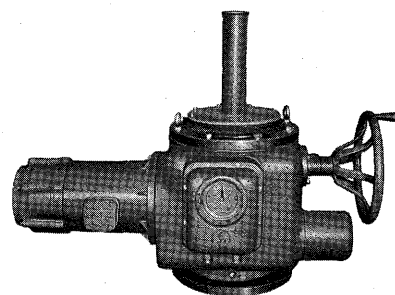


Fig. 5 Model RC 910-8

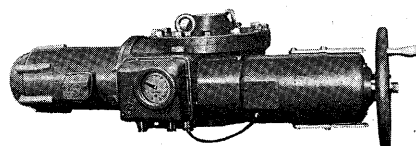


Fig. 6 Model RC-911-10

(10) For each type, large capacity one such as 15 kW, 22 kW of motor output is being manufactured according to the valve diameter, torque requirement or thrust value. Also the explosion proof construction of pressure resisting type is being supplied for chemical industries. Moreover, as special case, we have fully inverted type and also we can fulfil the requirement for the high temperature and high pressure valve, or for the especially small output such as 0.1 kW and 0.2 kW.

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