

Actionator Motors

Models M640, M740, M940

Specification

Function

The actionator motors position dampers, butterfly valves, slip stem valves, or any device requiring rotary or linear motion. Optional auxiliary equipment can be used to provide position feedback or supply power to other devices. Refer to Table 1.

The M640A, B and D motors are used with either a two-position controller with maintained contacts, or a floating controller. Each motor has a crankarm with adjustable throw and position.

The M740A and B motors will accept a 4-20 mA signal from a proportional controller. These motors will position the final control device at any point between full open or full closed, as determined by the controller signal.

The M740 motor Hard Manual feature allows the customer to override the motor position to fully open or fully close the valve or damper when required. The M940A and B Actionator Motors provide position proportional control of valves and other devices.

The M640B, 740B, 940B motors can be used to operate slip-stem valves of the direct action, reverse acting or three-way types using suitable linkage.

The M640D motor provides uni-directional travel with adjustable stops, factory-set at 180°.

The M940 models may be used with the external electronic motor positioner model R7195. Refer to document number 81-99-25-02.



Figure 1 – Model M640A and D, M940A Actionator Motor



Figure 2 – Model 740A Actionator Motor



Figure 3 – Model M640B, M940B Actionator Motors

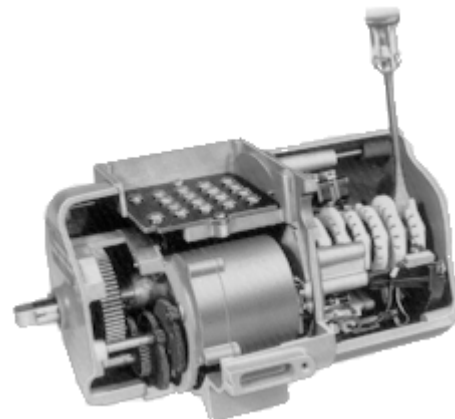


Figure 4 – M640 Motor Cutaway View of Internal Parts

Description

Refer to Figures 1-4. A sealed, die-cast aluminum case provides excellent durability. The motor shaft is sealed with an "O" ring made of oil-resistant Buna-N. It is splash-proof and can be hosed down during a cleaning operation if the drain holes are plugged. These motors meet U.L. and C.S.A. type 4 enclosure ratings, when both drain holes are plugged.

Easily accessible switches and adjustments simplify installation and the field adjustment. Cam position is easily changed by inserting a screwdriver into one of many slots on the cam and applying slight bias force. Figure 4 shows the simplicity of cam adjustment.

An internal disk brake stops and holds the load in any position. If power is removed from the motor, the brake will maintain the motor position until power is restored.

An adjustable crankarm is included with each motor for connecting the motor shaft to a ball joint and push rod.

The lifter assembly included on M640B, M740B and M940B motors has an adjustable eccentric and an internal strain relief spring to provide strain relief at both ends of the stroke.

The motors are available with timing and torque ratings shown in Table 1.

Options

Auxiliary Switches and Slidewires for M640 Actionator Motors

Auxiliary switches and slidewires provide additional switching functions for M640A motors that have a complete wire harness. Refer to Table 2 for models marked with an asterisk (*).

With the addition of an auxiliary slidewire, and M640A motor can be converted to an M940A. Auxiliary switches and slidewires cannot be added to other motors without changing the terminal board.

Auxiliary switches and slidewires can be combined to provide:

- From one to five auxiliary switches
- One balancing slidewire with up to four auxiliary switches
- One balancing slidewire with one retransmitting slidewire and up to three auxiliary switches

The following assembly numbers contain the auxiliary functions shown. Each assembly contains all the necessary hardware including cams, wipers, spacers, screws, and a wrench.

Assembly 7640MA – One auxiliary switch▷

Assembly 7640MB – Two auxiliary switches*

Assembly 7640MC – One 135-ohm slidewire*

Assembly 7640MD – One 1000-ohm slidewire*

Assembly 7640ME – One 500-ohm slidewire*

110126A – Crankarm with adjustable throw and position

24400144-001 – Adapter kit to mount R7195 to M940/M640

*Order special hub assembly (part number 132986C) with two wipers to mount two slidewires in the same motor.

▷ Order an extra spacer (part number 132985) and two 4-40 NC screws, 1-5/8 inches long (part number 80248BB), to mount five auxiliary switches in the same motor.

Accessories

Yoke Assembly

Used to mount M640B, M740B, M940B on V5011, V5013, and Fort Washington Industrial Control Valves.

Valves

Valve bodies and linkages must be ordered separately.

Dampers

Damper crank, push rod, and ball joint connected to the motor operate damper in combination with a slip-stem valve.

Table 1 – Timings and Torque Ratings Available

Motor Shaft Timing*		Motor Shaft Torque				Lifter Assembly Stem Force▷			
in seconds for 180° rotation		at 90% rated voltage		at 100% rated voltage		at 90% rated voltage		at 100% rated voltage	
(in seconds for 150° rotation)		lb-in	N•m []]	lb-in	N•m []]	lb	N•m	lb	N•m
60 Hz	50 Hz								
7.5 (6.25)	9 (7.5)	45	5.08	70	7.85	100	444.8	140	622.7
15 (12.5)	18 (15)	90	10.2	140	15.8	200	889.6	280	1245.4
30 (25)	36 (30)	180	20.3	280	31.6	300	1334.4	300	1334.4
60 (50)	72 (60)	300	33.9	300	33.0	300	1334.4	300	1334.4
120 (100)	144 (120)	300	33.9	300	33.9	300	1334.4	300	1334.4

* based on 180° rotation without a load at rated voltage, proportional style has 150°

▷ Stem force ratings determined with no load on motor shaft

] Newton-Metre.

Specifications

Operating Conditions

Operating Temperature -29 to +65°C (-20 to +150°F)

Power Consumption M640, M940: 23 watts
M740: 40VA

Performance

Maximum Load Perpendicular to Motor Shaft 90-7 Kg (200lb)

Motor Shaft Rotation M640A: Adjustable from 10 to 350°, reversible
M740A, M940A: Adjustable from 10 to 150°, reversible
M640B, M740B, M940B: Adjustable stroke from 0.64 to 3.81cm (0.25 to 1.5 inches), reversible
M640D: Adjustable position, 180° stroke, unidirectional

Auxiliary Switch Rating 7.4 maximum resistive; 120 or 240 Vac (on each switch); 1/3 Hp at 120 or 240 Vac.
1/2 amp at 120 Vdc; 1/4 amp at 240 Vdc

Design

Input Range (M740A, B only) 4-20 mA (factory adjusted) (deadband adjusted to 1%)
Guaranteed fully closed: 4.0 mA
Guaranteed start to open: 4.3 mA
Guaranteed fully open: 20.0 mA
Guaranteed start to close: 19.7 mA

Input Impedance (M740A, B only) 75 ohms Floating

Adjustments (M740A, B only) Zero adjustment: 0.8 mA to 16.8 mA
Span adjustment: 2.0 mA to 20.0 mA
Deadband adjustment: 1% to 5%

Repositions (M740A, B only)	Deadband setting	Repositions
	1%	100
	5%	20

Slidewire Resistance 135 to 1000 ohms

Motor Shaft Mounting Surface 12.7 mm long by 12.7 mm square (1/2 inch long by 1/2 inch square)
Refer to Figures 5 and 6.

Dimensions Refer to Figures 5 and 6.

Weight		
M640A	11.95 lbs.	(5.4 kg)
M640B	19.0 lbs.	(8.6 kg)
M740A	14.3 lbs.	(6.5 kg)
M740B	21.3 lbs.	(9.7 kg)
M940A	12.4 lbs.	(5.6 kg)
M940B	19.4 lbs.	(8.8 kg)

Accessories (Standard) 1. Crank arm for mounting on square end of motor shaft with a starting angle adjustable in 22-1/2° steps and with a ball joint radius adjustable from 39.7 mm (1.6 inches) to 68.2mm (2.7 inches)
2. Plug for unused conduit opening in the event that only one of the two openings is used.

Approval Bodies

Underwriters Laboratories: File E84572, Guide XAPX

Canadian Standards Association: File Number LR 47125

All 120 and 240 volt models are U.L. and C.S.A. certified for type 4 enclosures. To comply, motors are supplied with both drain holes sealed with self-tapping screws. The lowest level drain screw may be removed, if venting or draining is desired; but U.L. and C.S.A. enclosure standards are not maintained when drain holes are left open.

TABLE 2 – M640, M740, M940 Actionator Motors**Models M640 and M740**

Model Number		Voltage	Timing (Seconds)	Auxiliary Equipment
M640A	1121*	120V	7.5	--
M640A	1022	120V	15	--
M640A	1139*			
M640A	1196*	240V	15	--
M640A	1048	120V	15	2 SPDT
M640A	1204*			1 SPDT
M640A	1055	120V	30	--
M640A	1147*			
M640A	1246	120V	30	2 SPDT
M640A	1063	120V	30	1 SPDT
M640A	1170*	240V	30	--
M640A	1089	120V	60	--
M640A	1154*			
M640A	1188*	240V	60	--
M640A	1162*	120V	120	--
M640A	1253**	120V	15	2 SPDT
M640A	1279	220V	60	
M640B	1054*	120V	30	--
M640B	1062*	120V	60	--
M640D	1003	120V	15	
M640D	1011	120V	15	2 SPDT in Tandem
M740A	1004	120V	15	--
M740A	1012	120V	30	--
M740A	1038	120V	60	--
M740A	1053	120V	120	--
M740A	1020	120V	30	2 SPDT
M740A	1046	120V	60	2 SPDT
M740A	1061	120V	60	One 135Ω Retransmitting Slidewire
M740A	1079	120V	15	2 SPDT
M740A	1095	220V	60	2 SPDT
M740A	1103	120V	60	2 SPDT, One 1000Ω Retransmitting Slidewire
M740A	1137	120V	7.5	--
M740A	1145	120V	30	2 SPDT, One 135Ω Retransmitting Slidewire
M740A	1152	120v	60	2 SPDT, One 135Ω Retransmitting Slidewire
M740A	1178	120V	30	90° Rotation
M740B	1003	120V	60	--
M740B	1011	120V	30	--
M740B	1029	120V	15	--
M740B	1045	120V	15	2 SPDT
M740B	1060	120V	15	2 SPDT

TABLE 2 – M640, M740, M940 Actionator Motors (continued)

M940 Models

Model Number	Voltage	Timing (Seconds)	Auxiliary Equipment
M940A 1000	120V	15	--
M940A 1026	120V	30	--
M940A 1042	220V	30	
M940A 1059	120V	30	2 SPDT
M940A 1158	120V	30	1 SPDT
M940A 1067	120V	60	--
M940A 1075	240V	60	--
M940A 1083	220V	60	--
M940A 1091	120V	60	One 1000Ω Balance Slidewire
M940A 1109	120V	120	--
M940A 1125	120V	60	One 135Ω Retransmitting Slidewire
M940A 1133	120V	60	1 SPDT
M940A 1141	120V	120	2 SPDT
M940A 1216	220V	60	2 SPDT One 1000Ω Retransmitting Slidewire
M940A 1240	120V	60	2 SPDT
M940A 1265	120V	15	2 SPDT, One 135Ω Retransmitting Slidewire
M940A 1273	120V	30	2 SPDT, One 135Ω Retransmitting Slidewire
M940B 1009	120V	15	--
M940B 1058	120V	15	One 135Ω Retransmitting Slidewire and one 1000Ω Balance Slidewire
M940B 1074	120V	60	2 SPDT
M940B 1017	120V	30	--
M940B 1025	120V	60	--
M940B 1041	120V	60	One 135Ω Retransmitting Slidewire
M940B 1082	220V	60	One 135Ω Retransmitting Slidewire
M940B 1116*	120V	60	2 SPDT, One 135Ω Retransmitting Slidewire

*Wired for field addition of auxiliary switches, balancing and retransmitting slidewire.

**Auxiliary switch cams are momentary make at the switch point rather than continuous make through the remaining motor stroke.

Dimensions: $\frac{\text{millimeters}}{\text{inches}}$

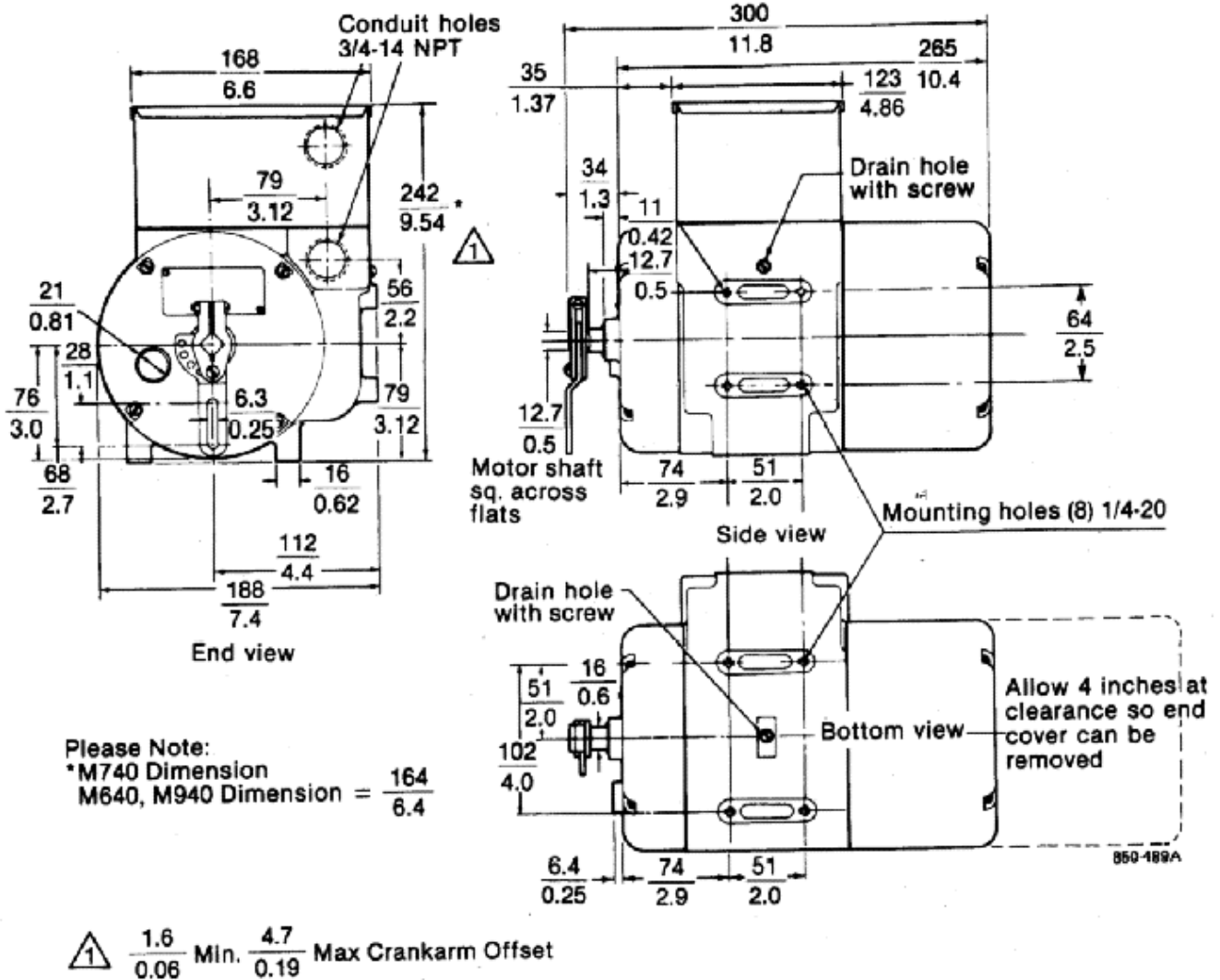


Figure 5 – Motor dimensions – M640A, M740A, M940A

Dimensions: $\frac{\text{millimeters}}{\text{inches}}$

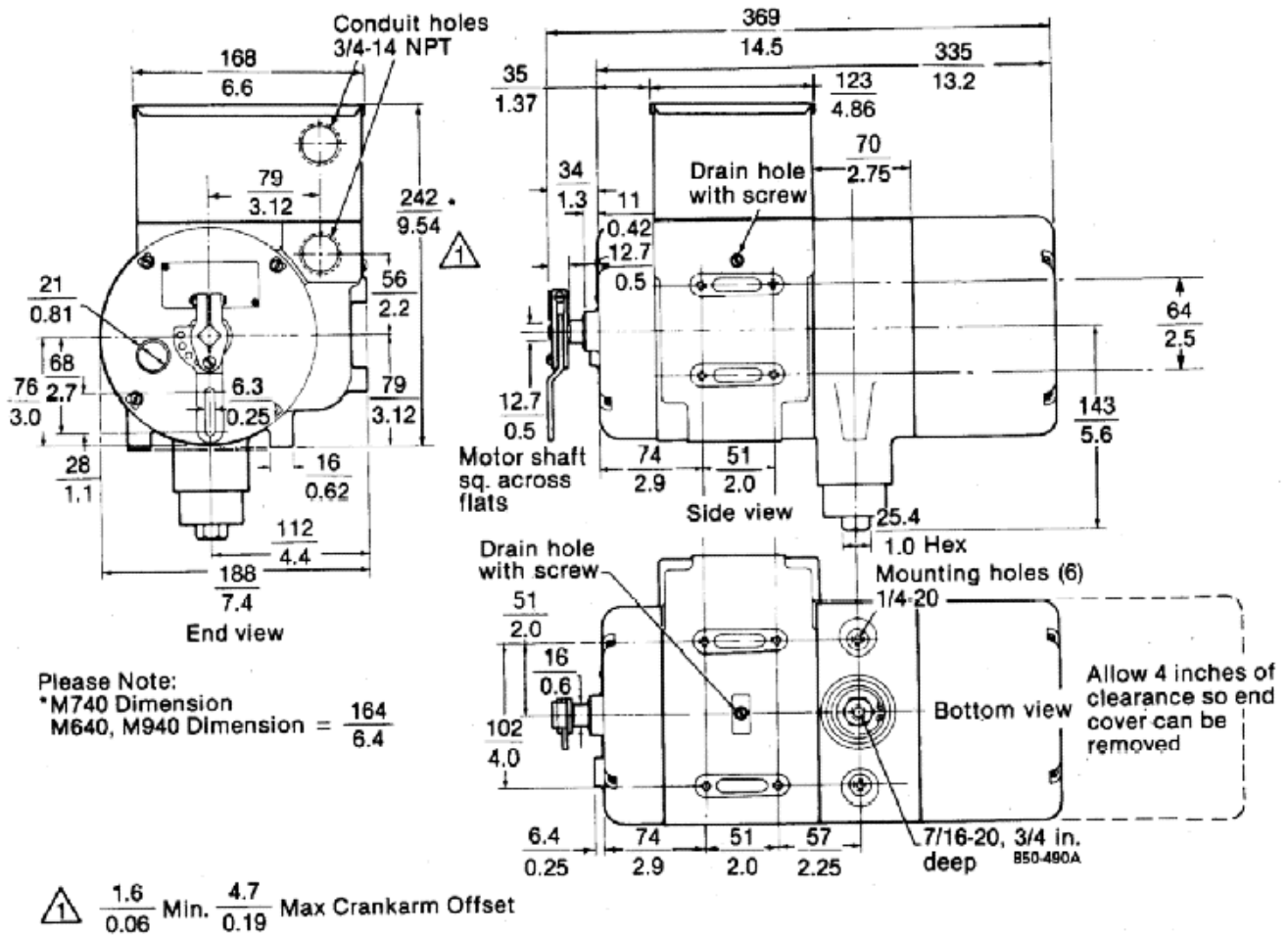


Figure 6 – Motor dimensions – M640B, M740B, M940B

Ordering Information

When ordering, specify:
Complete Model Number
(Refer to Table 1.)

Options if desired:

- a. Assembly number of auxiliary switches and slidewires for M640 motors (Select from listing under "Options").
- b. Slidewire resistance for M940 motor.
- c. Other Option Accessories.

Specifications are subject to change without notice