

Cartridge Installation & Torque Values



WARNING

READ THIS DOCUMENT BEFORE INSTALLING OR USING HYDRAFORCE PRODUCTS.

IMPROPER SELECTION, IMPROPER USE, USE BY ANYONE OTHER THAN TRAINED USERS HAVING APPROPRIATE TECHNICAL AND MECHANICAL EXPERTISE OR FAILURE OF HYDRAFORCE PRODUCTS OR RELATED ITEMS RESULTING THEREFROM CAN CAUSE DAMAGE TO EQUIPMENT OR PROPERTY, SERIOUS PERSONAL INJURY, OR DEATH.

Before proceeding with cartridge valve installation, please read the SAFETY INFORMATION on page 0.000.1.

Provided below are guidelines for installation of HydraForce cartridges, coils, and housings, including tables of torque settings by model number.

CARTRIDGE VALVE INSTALLATION

Step 1

Remove the cartridge from its packing and inspect to **ensure that no external contaminant is present.**

Step 2

Inspect all O-rings (A) to ensure there is no damage, such as cuts or nicks.

Step 3

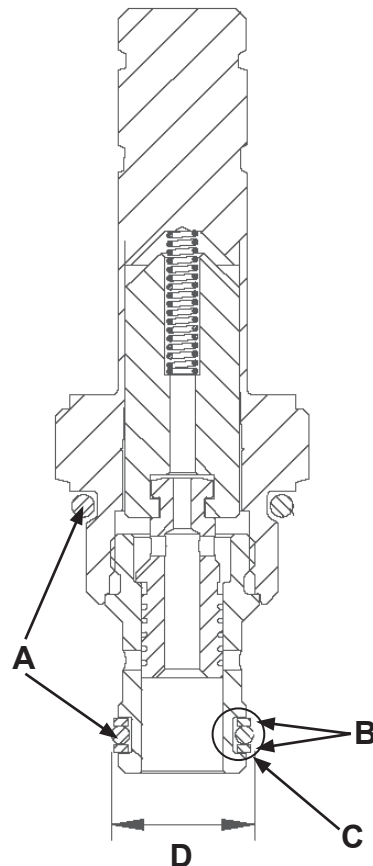
Ensure O-rings and back-up rings (B) are correctly positioned.

NOTE: *The O-ring should always be positioned toward the higher pressure port or between double back-up rings on bi-directional valves. See page 8.650.1 for O-ring installation.*

Check to ensure all back-up rings fit tightly within the cage groove.

See illustration. All seals - the O-ring and its two back-up rings - should seat in the cage groove (C) (circled area).

If the back-up rings extend out of the cage groove, past diameter (D), push them gently back into position.



- A. O-rings
- B. Back-up rings
- C. Cage groove
- D. Seals should not extend past diameter "D"

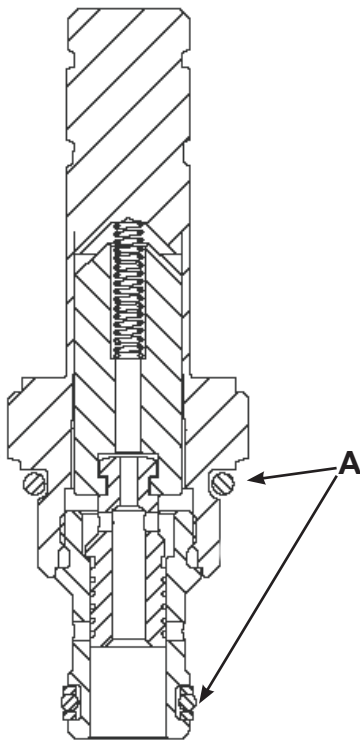
Cartridge Installation

Step 4

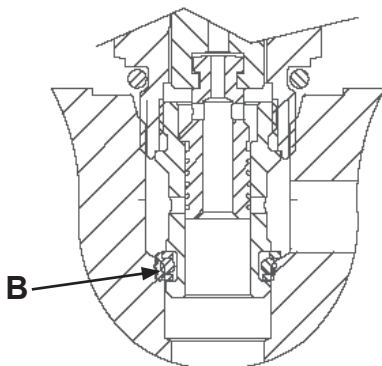
Before installing the cartridge, lubricate all seals (O-rings and back-up rings) with the same oil that is used in the application.

To lubricate the seals **(A)**, lightly apply a small amount of oil on them. This thin coat of oil will allow the cartridge and seals to slide more easily into the cavity.

If the seals are too dry, the back-up rings could dislodge from the cage groove (B) and cause seal damage. The diagram shows the location of the cage groove and where the back-up rings could extrude.



A. Seals (O-rings and back-up rings)

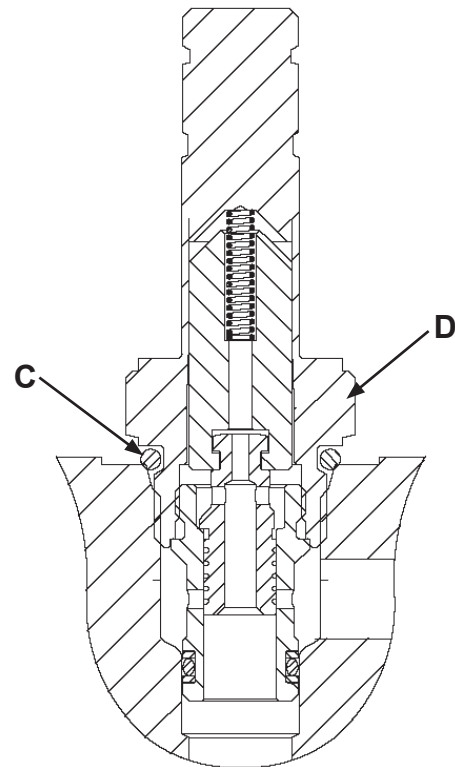


B. Cage Groove (Back-up Rings Could Extrude Here)

Step 5

It is important to install the cartridge (valve) into the cavity correctly. **Insert the cartridge into the cavity and tighten by hand in a clockwise manner.**

You should be able to screw it in with little resistance up to the O-ring **(C)** below the hex portion of the valve stem **(D)**. See illustration.



Cartridge Installed in Cavity (Before Tightening)

- C. O-ring
- D. Hex Portion of Valve Stem

Cartridge Installation

Step 6

Continue to screw in the cartridge with a torque wrench and tighten to the specified torque.

See the Cartridge Installation Torque Table on page 9.020.6. If your valve is not listed, refer to the dimensional drawing on the Catalog page for the specific valve model.

It is important to use the specified torque for each valve to ensure optimal performance of the cartridge.

If the valve is tightened above the specified torque value, it may cause the spool or poppet to stick. This occurs because overtightening the cartridge can deform or damage internal components.

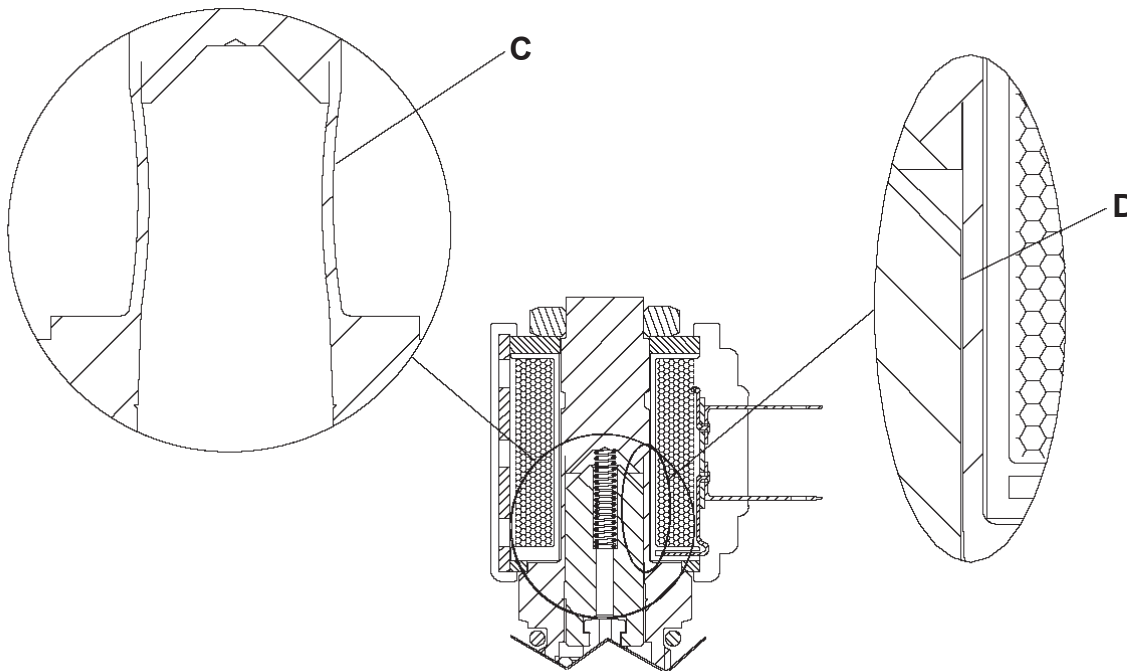
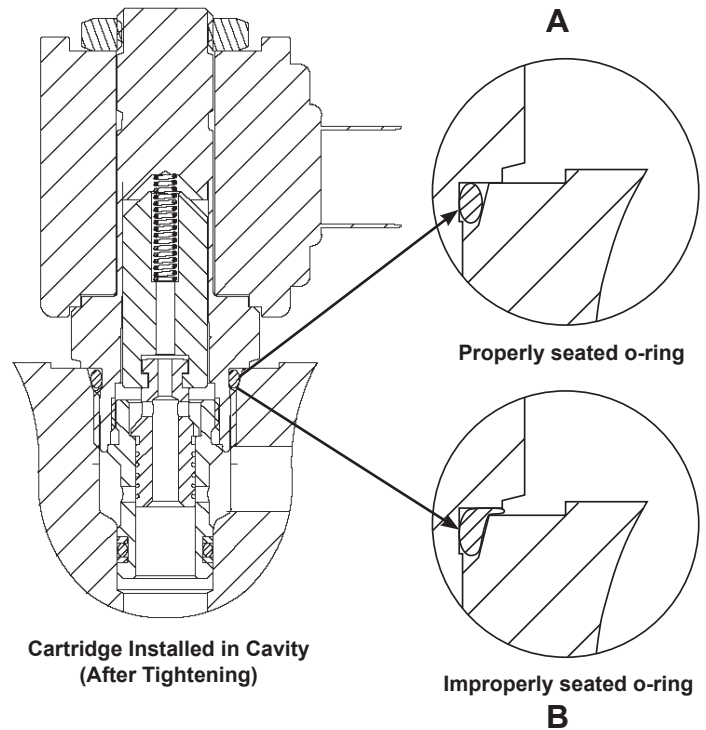
Before installing the coil, inspect the cartridge to ensure the O-ring is properly seated (**A**).

COIL INSTALLATION

It is important to use the specified torque when tightening the coil nuts. For example, **if the nut is tightened above the specification on the 08, 60, 68, 80 size 2 position actuators, the stainless steel tube may stretch.**

The stretching causes the inside of the tube around the plunger to collapse (**C**), which may cause the plunger to stick (**D**) in the energized or de-energized position.

This is shown in the diagram below.



Effects of Over-Tightening the Coil Nut

C. The middle of the tube stretches and collapses inward.

D. When the tube (C) is stretched, it squeezes the plunger (D).

Coil and Housings Installation

COIL INSTALLATION Cont

Step 1

If the valve uses a single coil, slide the coil over the valve stem. Tighten the coil nut to the specified torque. See the specifications in the Coil Nut Installation Torque Table on page 9.020.6.

If the valve requires two coils, follow Step 2.

Step 2 (Two-Coil Valves Only)

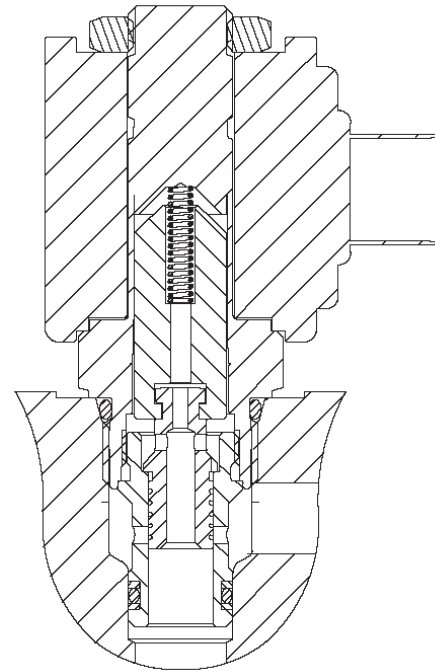
Slide the first coil over the valve stem. Place the washer on top of first coil. Install the second coil.

Step 3

Finally, install and tighten the coil nut to the specified torque.

NOTE: It is important to install coils correctly to ensure they operate as designed. **If a coil is installed upside down, the magnetic flux path will be weak and will not be able to shift the spool or poppet.** See diagram below showing correct and incorrect coil installation.

To ensure the coil is right side up, verify that the HydraForce imprint on the coil is facing upward.



Cartridge with Single Coil Installed

HOUSINGS

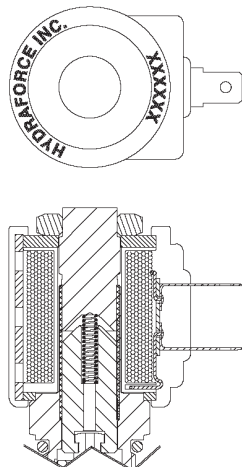
Step 1

Verify correct plumbing of housing by referring to specific product catalog pages for port logic.

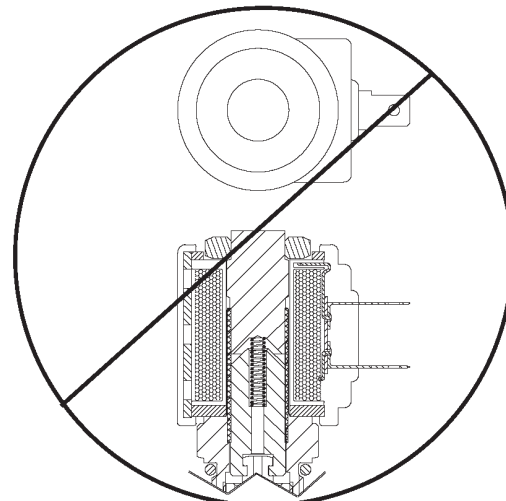
Step 2

Inspect cavity for burrs or other machining irregularities which could damage O-rings during installation.

If separation from the mounting surface is required, refer to page 8.250.1 for panel mount spacer plates.



Correct Coil Installation



Incorrect Coil Installation

TECHNICAL REFERENCE

Torque Values

Cartridge Installation Torque

Listed by valve size, then in alpha-numeric order by valve model number - refer to Catalog if your valve's torque setting is not listed here.

General Guidelines

Valve Size	Ft-lbs	Nm
04	12-14	16.3-19.0
04-BX	4-5	5.4-6.8
07, 08, 09	19-21	25.8-28.5
58	24-26	32.5-35.3
10	24-26	32.5-35.3
50	33-37	44.7-50.2
12	33-37	44.7-50.2
52	46-54	62.4-73.2
16	46-54	62.4-73.2
56	33-37	44.7-50.2
20	65-75	88.1-101.7
42M20	110-130	149.1-176.3

Special Torque Values for Specified Cartridge Valves

Model	Ft-lbs	Nm	Model	Ft-lbs	Nm
CP42-M4X	65-75	88.4-102	PR50-38	25-27	33.9-36.6
CV50-20	24-26	32.6-35.4	PRES50-30	50-55	67.8-74.6
EC08	19-21	25.8-28.5	PV42-M30	65-75	88.4-102
EC10-40	33-37	44.7-50.2	RVCV56-20	147-153	199.3-207.4
EC12-42, -43	73-77	99-104.4	RVD50	47-53	63.7-71.9
EC16-32, -42, -43	98-101.7	132.8-138.3	GRVD50, RVD50-20	47-53	63.7-71.9
EC42-M40, -M42, -M43	65-75	88.4-102	SF20-22, -23	65-75	88.4-102
ED56-42, -43	98-102	132.8-138.2	SP08-57D (M)	25-30	33.9-40.7
EPFR50-S35	24-26	32.6-35.4	SP10-20, -21, -24	33-37	44.7-50.2
EPFR52-S35	33-37	44.7-50.2	SV12-24, -25, -31 -33, -34, -40R, -41, -42, -60	52-60	70.7-81.3
EPFR58-35	19-20	25.8-28.5	SV38-20, -26, -28 -30, -31J, -38	19-21	25.8-28.5
EV58-34	19-21	25.8-28.5	SV58-20, -21, -21P, -25, -30, -40, -41	19-21	25.8-28.5
FD50-44, -45	46-54	63.4-73.2	SV80-61	24-26	32.6-35.4
FD52-45	73-77	99-104.4	SV88-20	19-21	25.8-28.5
FD56-44, -45	98-102	132.8-138.3	SVCL10-30, -32	33-37	44.7-50.2
FR16-20F	98-102	132.8-138.3	TS38-20, -21	19-21	25.8-28.5
FR50-20F, -23, -28	33-37	44.7-50.2	TS80-30	24-25	32.6-33.9
HS50-42, -43	24-26	32.5-35.4	TS90-31	24-25	32.6-33.9
HS52-42, -43	33-37	44.7-50.2	TS98-30, 31	24-25	32.6-33.9
LS50-30	24-26	32.6-35.4			
PE42-S67X	65-75	88.4-102			

Drop-In Valves - Mounting Screw Torque

Model Code	Screw Part No.	Torque
SV98-T39, T40	4000039	2.2-3 ft. lb./ 3-4 Nm
TS98-T34		
EHPR98-T33, T35, T38	4001015	0.9-1.1 ft.lb./ 1.2-1.5 Nm

Adjustment Option A, B, C, L Style Nut/Cap Torque

Model Code	Nut/Cap Part No.	Torque
CR, FC, FR, FRRV, KS, NV, PR, PS, RV, RVCV, RVD, UP	7004400 7006700 7006750 7046100 7054670	5-7 ft. lb./6.8-9.5 Nm

Torque Values

HyPerformance™ Valves

Valve Size	Model Code	Durabar Cavity	Aluminum Cavity
6-Size	HCV06-20, HLS06-30	19-21 ft. lb./ 26-28 Nm	N/A
	HLS06-B30	7-8 ft.lb./ 9.5-11 Nm	N/A
8-Size	HCV08-2x, HPC08-30	40-45 ft.lb./ 54-61 Nm	30-35 ft.lb./ 41-47 Nm
10-Size	HCV10-20, HFR10-32, HSV10-XX, HSP10-XX, HSPEC10-30	75-85 ft.lb./ 102-115 Nm	60-65 ft.lb./ 81-88 Nm
	HPCV10	95-100 ft.lb./ 129-136 Nm	90-100 ft. lb./ 122-136 Nm
12-Size	HCV12-20, HPCV12, HSV12- 4X, HEV12-S38, HEC12-XX, HPV12-XX, HPD12-S67	115-125 ft.lb./ 156-170 Nm	90-100 ft.lb./ 122-136 Nm
	HSV12-2x, HSP12-2x	135-145 ft.lb./ 183-196 Nm	90-100 ft.lb./ 122-136 Nm
16-Size	HCV16-XX, HSP16-2x, HEV16-S34, HEC16-32, HPV16-30, HPD16-4x, HPE16-4x, HEP16-S35	190-210 ft. lb./ 258-285 Nm	175-185 ft.lb./ 237-250 Nm
	HPCV16, HPD16- S5x, HPD16-6x, HPE16-S6x	220-230 ft.lb./ 298-311 Nm	175-185 ft.lb./ 237-250 Nm
M42- Size	HCV42-M20, HEV42-S34, HPD42-XXX, HPE42-XXX, HEP42-S3x	290-310 ft.lb./ 394-420 Nm	220-230 ft.lb./ 298-311 Nm
32-Size	HEC32-43	490-510 ft.lb./ 665-690 Nm	N/A

Coil Nut Installation Torque

Model Code	Nut Part No.	Torque
EHPR01, 08-33	7045330	5-7 ft.lb./6.8-9.5 Nm
PV08-3x	7045330	5-7 ft.lb./6.8-9.5 Nm
PV70, 72-XX(M)	7004360 (7004370)	10-12 ft.lb./13.6-16.3 Nm
SF, SL08-XXX	7004400 7004490	4-5 ft.lb./5.4-6.8 Nm
SF, SL08-XXW	7045420	4-5 ft.lb./5.4-6.8 Nm
SV07-31	7004400	4-5 ft.lb./5.4-6.8 Nm
SV08, -80, -98-XXX	7004400	4-5 ft.lb./5.4-6.8 Nm
	7004410	
	7004490	
	7004380	
SV08-80, 98-XXW	7045420	5 ft.lb./6.8 Nm Max
	7045430	4-7 ft.lb./5.4-9.5 Nm
SV10, 16, 38, 58- XXX	7004400	5-7 ft.lb./6.8-9.5 Nm
	7004590	
	7004380 7004420	
SV10, 16, 38, 58- XXW	7045450 7045410	9-10 ft.lb./12.2-13.6 Nm
SV12-20, -21, -22, -23	7004400	5-7 ft.lb./6.8-9.5 Nm
	7004590	
	7004380	
	7004420	
SV12-20W, -21W, -22W, -23W	7045450 7045410	7-10 ft. lb./9.5-13.6 Nm
SV12-24, -25, -3x, -4x	7085180	7-10 ft. lb./9.5-13.6 Nm
SV20-22, -S38, -S38M, -S39, S39P	7004400	4-5 ft.lb./5.4-6.8 Nm
	7004490	
	7004410	
	7006760	
TS08-20	7004410	4-5 ft.lb./5.4-6.8 Nm
TS08-27	7045330	4-5 ft.lb./5.4-6.8 Nm
TS10, 12-26, -30	7004560	5-7 ft.lb./6.8-9.5 Nm
TS10, 12-27	4540550	4-5 ft.lb./5.4-6.8 Nm
TS38, 58-20	450560	4-5 ft.lb./5.4-6.8 Nm
TS38, 58-21	4540550	4-5 ft.lb./5.4-6.8 Nm
TS80, 98-30	7004410	5-7 ft.lb./6.8-9.5 Nm
TS90, 98-31	4540560	5-7 ft.lb./6.8-9.5 Nm
	7004410	
ZL72-XX(M)	7004360 (7004370)	10-12 ft. lb./ 13.6-16.3 Nm