

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.

Here are some 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 packing and inspect to ensure that no external contaminant is present.

Step 2

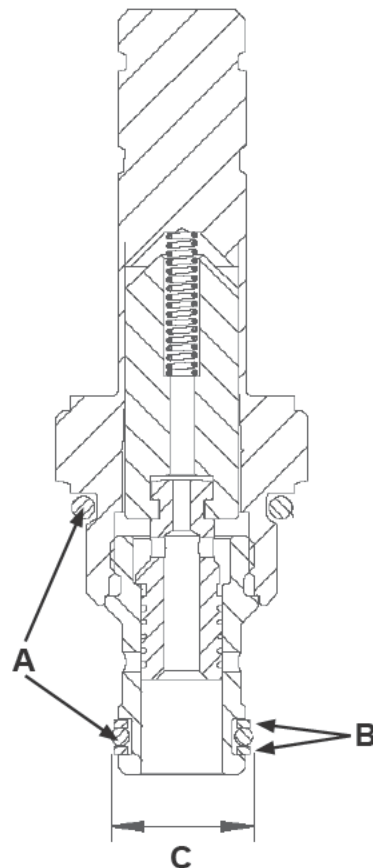
Inspect the O-rings (A) to ensure there is no damage, such as cuts or nicks.

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

NOTE: *The O-ring should always be placed 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 O-ring groove. They should not extend farther than the O-rings. **If they are sticking out, squeeze them back into the groove.**

See illustration. All seals should seat in the groove as indicated in figure C.



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

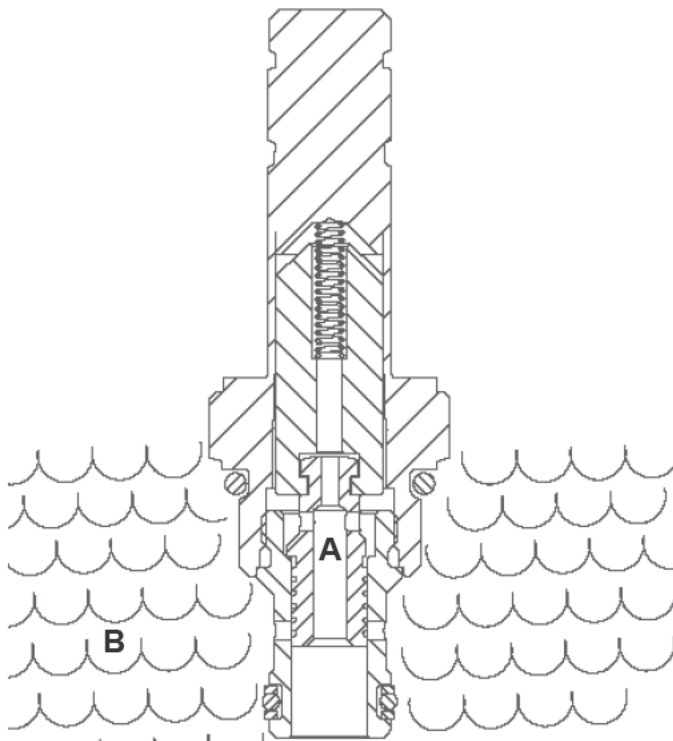
Cartridge Installation & Torque Values

Step 3

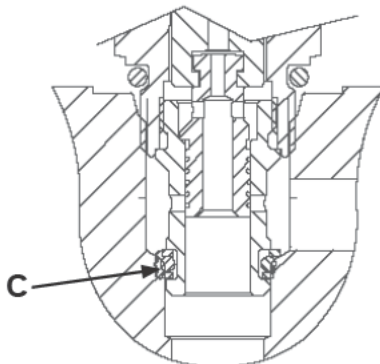
Before installing the cartridge, lubricate all seals (O-rings and back-up rings) with a small amount of the same oil that is used in the application.

To lubricate the seals, immerse the hydraulic portion of the cartridge (A) in oil (B). This will allow the cartridge and seals to easily slide into the cavity.

If the seals are too dry, the back-up rings could spin out of the cage groove (C) and cause seal damage. The diagram shows the location of the O-ring groove (C) and where the back-up ring could extrude.



A. Cartridge (Hydraulic Portion) Immersed
B. Hydraulic Oil

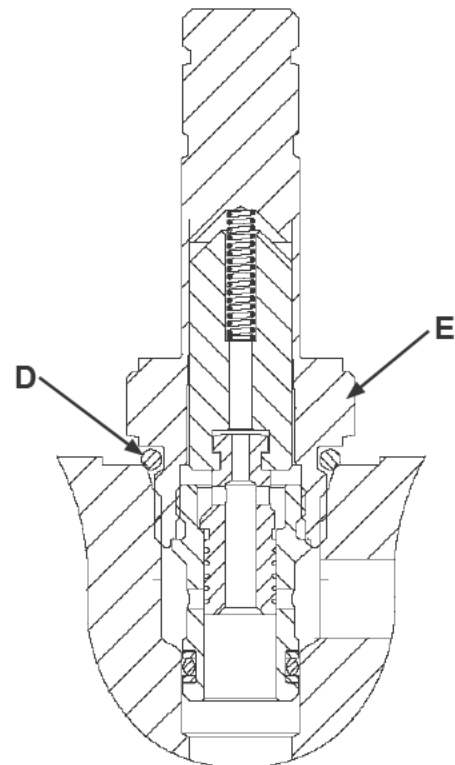


C. Cage Groove (Back-up Ring Could Extrude Here)

Step 4

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 (D) and below the hex portion of the valve stem (E). See illustration.



Cartridge Installed in Cavity (Before Tightening)
D. O-ring
E. Hex Portion of Valve Stem

Cartridge Installation & Torque Values

Step 5

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.

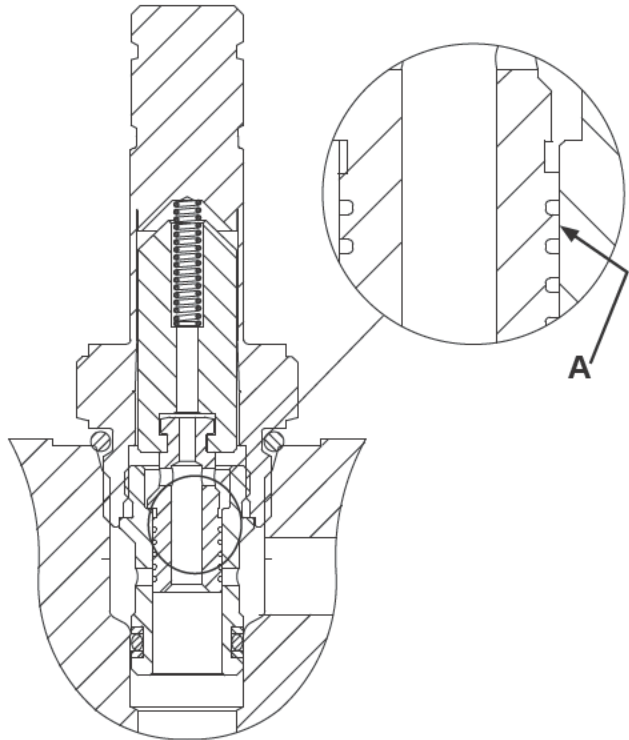
This occurs because overtightening the cartridge can deform or collapse the inside of the cage, as shown in the diagram at right (A).

COIL INSTALLATION

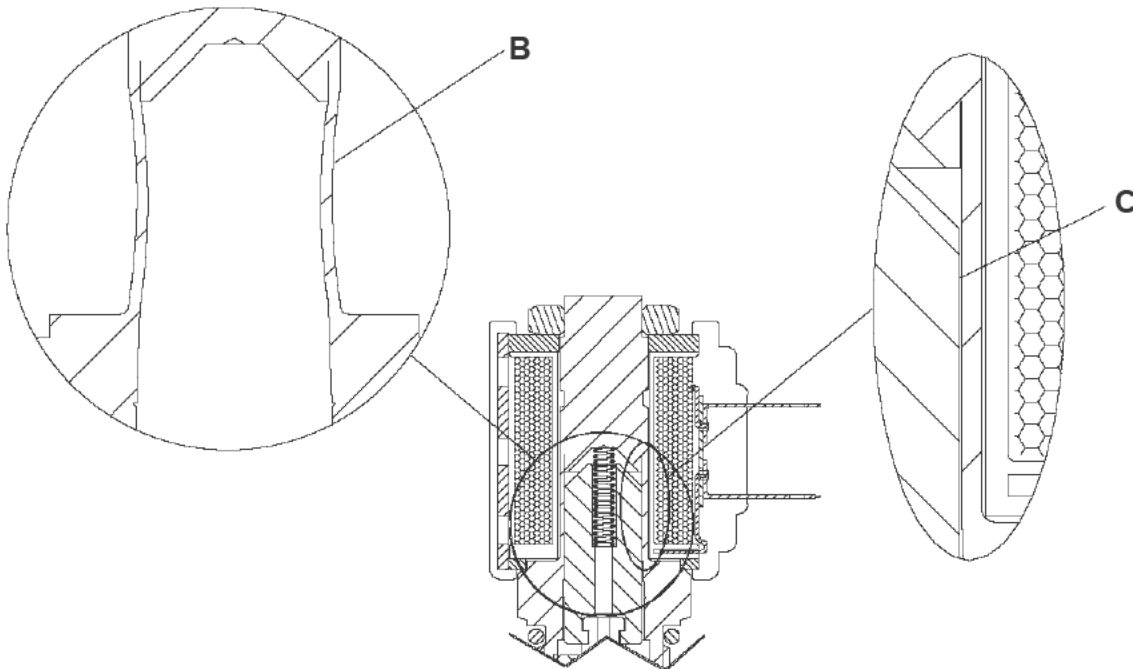
It is important to use the specified torque when tightening the coil nuts. For example, if the nut is tightened above the specification on the 08, 60, 68, 80 size 2 position actuators, the stainless steel tube could stretch.

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

This is shown in the diagram below.



Cartridge Installed in Cavity (After Tightening)
A. Spool Could Bind Here



Effects of Over-Tightening the Coil Nut

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

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

Cartridge Installation & Torque Values

COIL INSTALLATION continued

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.

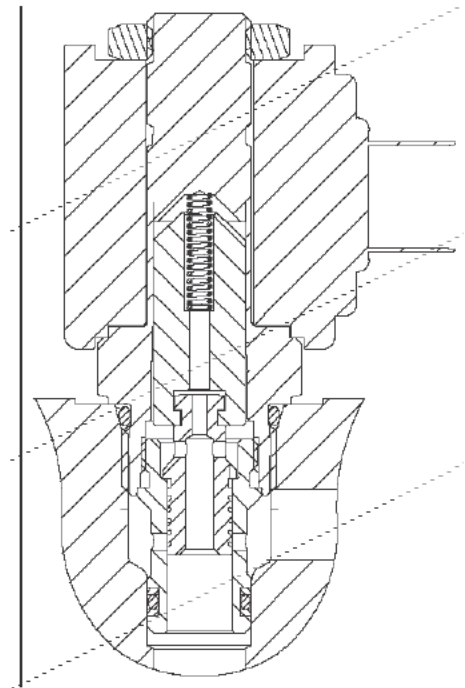
If the valve requires two coils, install them separately.

Slide the first coil over the valve stem. Place the washer on top of first coil, then install second coil.

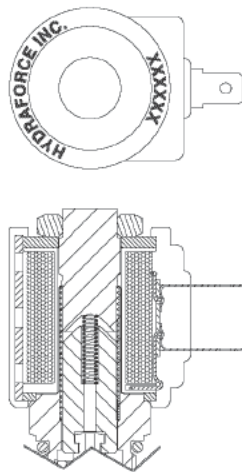
Finally, install and tighten the coil nut to the specified torque.

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 showing correct and incorrect coil installation.

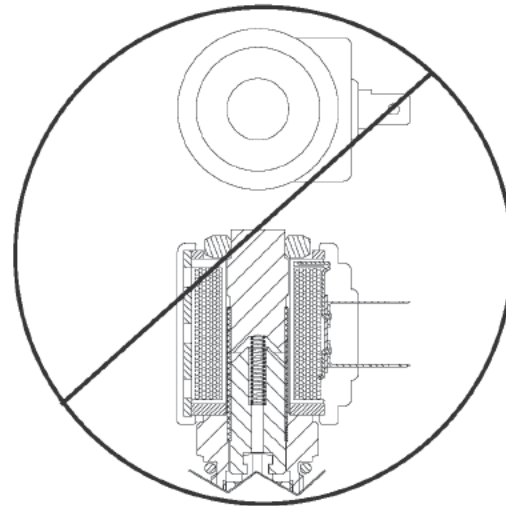
To ensure the coil is right side up, verify that the HydraForce imprint on the coil is facing upward.



Cartridge with Single Coil Installed



Correct Coil Installation



Incorrect Coil Installation

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.

Cartridge Installation & Torque Values

Cartridge Installation Torque

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

Model	Ft-lbs	Nm	Model	Ft-lbs	Nm	Model	Ft-lbs	Nm
BV10	24-26	32.6-35.4	EV58	19-21	25.8-28.6	PC08	19-21	25.8-28.6
CB10	24-26	32.6-35.4	FC08	19-21	25.8-28.6	PC10	24-26	32.6-35.4
CR08	19-21	25.8-28.6	FC10	24-26	32.6-35.4	PD10	24-26	32.6-35.4
CR10	24-26	32.6-35.4	FC12	33-37	44.9-50.3	PD12	33-37	44.9-50.3
CV04-20	12-14	16.3-19	FD10	24-26	32.6-35.4	PD16	46-54	62.6-73.4
CV04-B20	4-5	5.4-6.8	FD12	33-37	44.9-50.3	PD42	65-75	88.4-102
CV06	7-8	9.5-10.8	FD16	46-54	62.6-73.4	PE12	33-37	44.9-50.3
CV08	19-21	25.8-28.6	FD50	46-54	62.6-73.4	PE16	46-54	62.6-73.4
CV10	24-26	32.6-35.4	FD52	73-77	99-104.4	PE42	65-75	88.4-102
CV12	33-37	44.9-50.3	FD56	98-102	133-138	PR08	19-21	25.8-28.6
CV16	46-54	62.6-73.4	FR08	19-21	25.8-28.6	PR10	24-26	32.6-35.4
CV42	110-130	150-177	FR10	24-26	32.6-35.4	PR12	33-37	44.9-50.3
CV50	24-26	32.6-35.4	FR12	33-37	44.9-50.3	PR50	24-26	32.6-35.4
DC08	19-21	25.8-28.6	FR16-20F	98-102	133-138	PR58	25	33.9
DC10	24-26	32.6-35.4	FR16-30F	46-54	62.6-73.4	PRES50-30	50-55	67.8-74.6
EC08	19-21	25.8-28.6	FR50	33-37	44.9-50.3	PS08-30	19-21	25.8-28.6
EC10	24-26	32.6-35.4	FRRV10	24-26	32.6-35.4	PS10	24-26	32.6-35.4
EC12-30, -32, 34, -35, -40	33-37	44.9-50.3	FRRV12	33-37	44.9-50.3	PS50	25	33.9
EC12-42, -43	73-77	99-104.4	HCV16-20	195-205	265-278	PV08	19-21	25.8-28.6
EC16-32, -34, -40	46-54	62.6-73.4	HCV42-M20	290-300	394-420	PV16	46-54	62.6-73.4
EC16-42, -43	98-102	133-138	HEC32-43	490-510	665-690	PV42	65-75	88.4-102
EC42	65-75	88.4-102	HP10	24-26	32.6-35.4	PV70	24-26	32.6-35.4
EC50	33-37	44.9-50.3	HP16	46-54	62.6-73.4	PV72	33-37	44.9-50.3
ECR16	46-54	62.6-73.4	HS10	24-26	32.6-35.4	PV76	46-54	62.6-73.4
EHPR08	19-21	25.8-28.6	HS50	24-26	32.5-35.3	RV08	19-21	25.8-28.6
EHPR98	0.9-1.1	1.2-1.5	HS52	33-37	44.9-50.3	RV10	24-26	32.6-35.4
EP08	19-21	25.8-28.6	HSP16-20	195-205	265-278	RV12	33-37	44.9-50.3
EP10	24-26	32.6-35.4	HSV10	75-85	102-115	RV16	46-54	62.6-73.4
EP12	33-37	44.9-50.3	KS10	24-26	32.6-35.4	RV50	24-26	32.6-35.4
EP16	46-54	62.6-73.4	LS04-B30	4-5	5.4-6.8	RV52	33-37	44.9-50.3
EP20	65-75	88.4-102	LS08-30	19-21	25.8-28.6	RV56	46-54	62.6-73.4
EPFR16	46-54	62.6-73.4	LS10	24-26	32.6-35.4	RV58	19-21	25.8-28.6
EPFR20	65-75	88.4-102	LS50	25	33.9	RVCV56	150	203.4
EPFR50	24-26	32.6-35.4	MD10	24-26	32.6-35.4	RVD50	46-54	62.6-73.4
EPFR52	33-37	44.9-50.3	MP08	19-21	25.8-28.6	SF08	19-21	25.8-28.6
EPFR58	20	27.1	MP10	24-26	32.6-35.4	SF20	65-75	88.4-102
ER10	24-26	32.6-35.4	MP58	20	27.4	SL08	19-21	25.8-28.6
ER12	33-37	44.9-50.3	MR10	24-26	32.6-35.4	SP08-20, -21, -22, -24, -25, 46R, -47C, CL, D, DL	19-21	25.8-28.6
EV10	24-26	32.6-35.4	MV08	19-21	25.8-28.6	SP08-57D	25-30	33.9-40.7
EV12	33-37	44.9-50.3	NV08	19-21	25.8-28.6	SP08-58D	19-21	25.8-28.6
EV16	46-54	62.6-73.4	NV10	24-26	32.6-35.4	SP10-20, -21, -24	33-37	44.9-50.3
EV20	65-75	88.4-102	NV12	33-37	44.9-50.3			

Continued on next page . . .

Cartridge Installation & Torque Values

Continued from previous page.

Cartridge Installation Torque					
Model	Ft-lbs	Nm	Model	Ft-lbs	Nm
SP10-46R, -47C&D, -57C&D, -58C&D	24-26	32.6-35.4	TS38-20	24-26	32.6-35.4
SP12	33-37	44.9-50.3	TS38-21	19-21	25.8-28.6
SP16	46-54	62.6-73.4	TS58-20	24-26	32.6-35.4
SPCL10	24-26	32.7-35.4	TS90	25-27	34-36.7
SPCL16	46-54	62.4-73.2	TS98	24-26	32.6-35.4
SV07	19-21	25.8-28.6	UP10	25-27	34-37
SV08	19-21	25.8-28.6	ZL70	24-27	32.6-36.7
SV10	24-26	32.7-35.4	ZL72	33-37	44.9-50.3
SV12-20, -21, -22 -23, -28, -29	33-37	44.9-50.3	ZL76	46-54	62.6-73.4
SV12-24, -25, -31 -33, -34, -40, -41, -42, -60	52-60	70.7-81.6			
SV16	46-54	62.6-73.4			
SV20	65-75	88.4-102			
SV38	19-21	25.8-28.6			
SV58	19-21	25.8-28.6			
SV80	24-26	33.9-36.6			
SV98	2-3	3-4			
SVCL10	33-37	44.9-50.3			
SVCV08	19-21	25.8-28.6			
SVCV12	33-37	44.7-50.2			
SVRV10	24-26	32.7-35.4			
SVRV12	33-37	44.7-50.2			
SV80	24-26	32.6-35.4			
SV98	19-21	25.8-28.6			
TR04-B20	4-5	5.4-6.8			
TS08	19-21	25.8-28.6			
TS10	24-26	34-36.7			
TS12	33-37	44.9-50.3			

Coil Nut Installation Torque		
Model	Ft-lbs	Nm
EHPR08	5-7	6.8-9.5
CR08, CR10	5-7	6.8-9.5
FC10, FC12	5-7	6.8-9.5
FR10, FR12	5-7	6.8-9.5
KS10	5-7	6.8-9.5
NV08, NV10, NV12	5-7	6.8-9.5
PR08, PR10, PR50	5-7	6.8-9.5
PS08, PS10, PS50	5-7	6.8-9.5
PV08	5-7	6.8-9.5
PV70, PV72	10-12	13.6-16.3
RV	5-7	6.8-9.5
SF08, SL08	4-5	5.4-6.8
SV07	4-5	5.4-6.8
SV08, SV80, SV98	4-5	5.4-6.8
SV08-W, SV80-W, SV98-W	6-7	8.1-9.5
SV10, SV16, SV38, SV58, w/D-Coil	5-7	6.8-9.5
SV10W, SV16W, SV38W, SV58W	9-10	12.2-13.6
SV10, SV16, SV38, SV58, w/E-Coil	7-10	9.5-13.6
SV12-20, -21, -22 -23 w/D-Coil	5-7	6.8-9.5
SV12-20W, -21W -22W, -23W	7-10	9.5-13.6
SV12-20, -21, -22 -23 w/E-Coil	7-10	9.5-13.6
SV12-24, -25, -3x, -4x	7-10	9.5-13.6
SV20	4-5	5.4-6.8
TS08, TS98	4-5	5.4-6.8
TS10, TS12	7-10	9.5-13.6
TS38-20	4-5	5.4-6.8
TS38-21	7-10	9.5-13.6
UP10-30	5-7	6.8-9.5
ZL72	10-12	13.6-16.3

Drop-In Valves Mounting Screw Torque		
Model	Ft-lbs	Nm
SV98-T39	2.2-3	3-4
SV98-T40	2.2-3	3-4
TS98-T34	2.2-3	3-4