

CLS100 Proportional Load Sensing Mobile Valve

Overhaul manual / Trouble shooting guide



Powering Business Worldwide

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1.0 General information

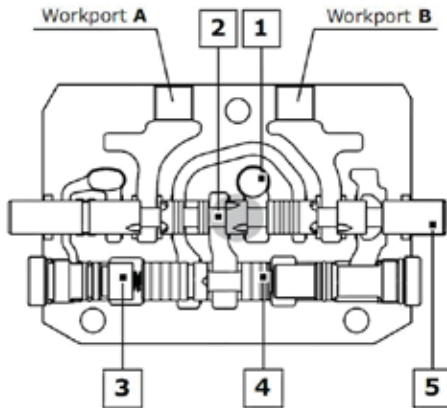
CLS100 Load Sense Sectional Mobile Valve

Rated pressure	Inlet	350 bar (5076 psi)
	Work port	350 bar (5076 psi)
	Tank port	10 bar (145 psi)
	Pilot Drain Port (D1/D2)	5 bar (73 psi)
Rated inlet flow		150 lpm (39.6 gpm)
Rated workport flow - post compensated	100 lpm (26.4 gpm) @ 14 bar at differential pressure	
Fluid cleanliness and viscosity	See Hydraulic Fluid Recommendations Bulletin 03-401	
Ambient operating temperature range	-40°C / 60°C (-40°F / 140°F)	
Oil temperature operating range	-25°C / 80°C (-13°F / 176°F)	
Construction		Sectional
Work sections		1-10
Maximum leakage, cylinder workport to tank		11 cc per minute at 100 bar (1450 psi)
Port types	Inlet and tank	SAE-12 or BSP G 3/4
	Work ports A and B	SAE-10 or BSP G 1/2
	Inlet Pr Gauge port "M", LS port and drain port	SAE-6 or BSP G 1/4
	Hydraulic pilot	SAE-6 or BSP G 1/4
	Pneumatic port	NPT 1/8" or BSP G 1/8
	Work section options	Spools
Double acting (4 way) cylinder with 4th position float		
Bi-directional (4 way) motor, full open to tank in neutral		
Actuation		Hydraulic with top ports
		Hydraulic with top ports and lever override
		Hydraulic with end ports
		Hydraulic with end ports, lever override, and configured for EH pilot valve installation
		Electrohydraulic with lever override
		Electrohydraulic only
		Electrohydraulic with hydraulic ports and lever override
		Electrohydraulic with hydraulic ports
		Manual with enclosed lever box
		Manual with exposed spool connection
Coil voltages	12 Volt DC	
	24 Volt DC	
Coil connectors	Integral Deutsch DT04-2P	
	Amp Jr. Timer connector 106462-1	
Electrohydraulic interface	Eaton HFX programmable controllers and Pro-FX™ application software	
PWM Frequency	90-120 Hz	

1.0 General information

Operating principle:

CLS100 is a load sensing and flow sharing directional control valve. The flow sharing technology applied to the standard load sensing system characterizes the new CLS100. The valve, completely pressure compensated, guarantees great controllability to all actuations, making work port flow dependent only on metering area (spool position). When flow saturation occurs the system reacts by implementing an equal reduction of pressure margin across all spools, generating a proportional reduction of work port flow.



Legends:

1. Inlet passage (high pressure)
2. Metering notches
3. Load sensing passage
4. Local compensator
5. Metering spool

Single section:

Coming from the common inlet the main flow, passing across the metering area, reaches the local compensator. Depending on the main spool chosen, the metering area controls the total amount of flow to the work port based on the margin pressures. The load sensing signal, picked up downstream the local compensator which feeds the common load-sensing line. When a single section is actuated, the local compensator fully opens to the left side, reaching its complete balanced position. The control of the LS system is made by the inlet compensator for fixed displacement pump or pump compensator for variable displacement pump.

Multi-section:

When two or more sections are actuated only one, characterized by the highest pressure (dominant), is involved in the LS signal transmission, working as briefly described in the previous paragraph. The other functions (slaves) become directly dependent on it. The common LS line transfers the information coming from the dominant local compensator to all dependent compensators. Driven by the LS signal, the unbalanced slave compensators activate the pressure compensation creating an artificial pressure drop able to keep pressure margin nominally the same on all the spools. Work port flow becomes only a function of metering area making the system totally load independent.

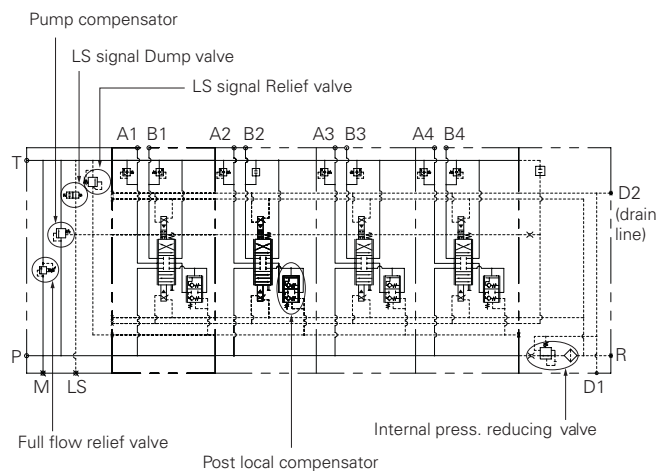
Flow sharing function:

When saturation occurs the total amount of flow required by actuators is higher than the maximum pump flow rate. When this occurs, system is no longer able to hold nominal margin pressure.. The actual margin pressure reduces according to real flow demand. Since all the local compensators have the same LS signal and the same pressure drop is applied to different metering areas, then work port flows are reduced proportionally in order to keep all actuators completely under control.

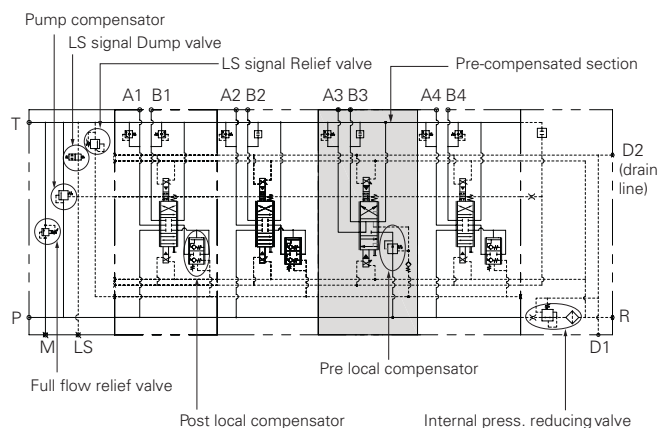
Pre and post compensated solution:

The CLS100 valve line allows the customer the ability to combine pre and post compensated valve sections in the same valve bank. The pre compensated section acts as a priority flow sharing function by diverting flow to the pre compensated function first, then to the remaining sections in the bank. The following schematics show an example of an all post compensated system, and a system with an integrated pre compensated section.

Post compensated system

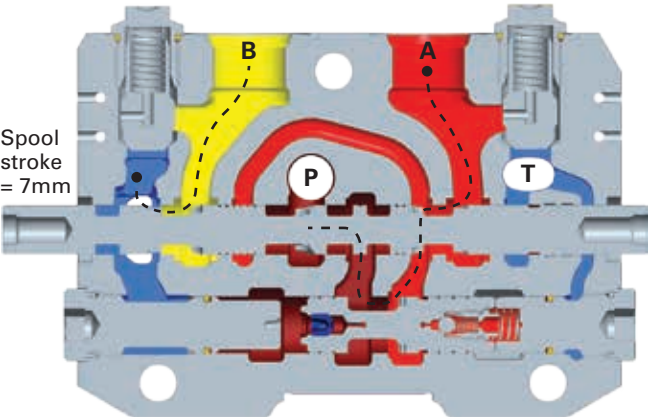


CLS100 pre and post compensated system

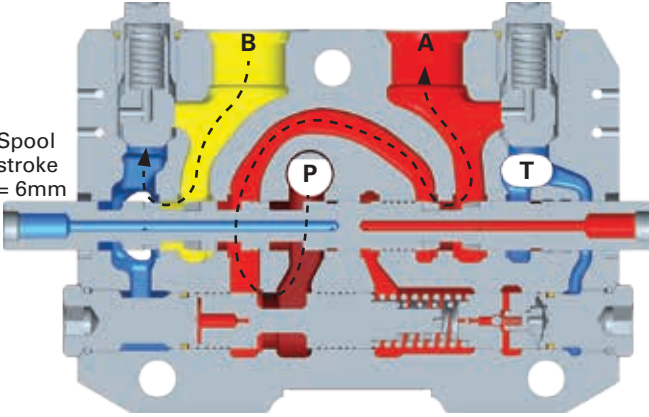


1.0 General information

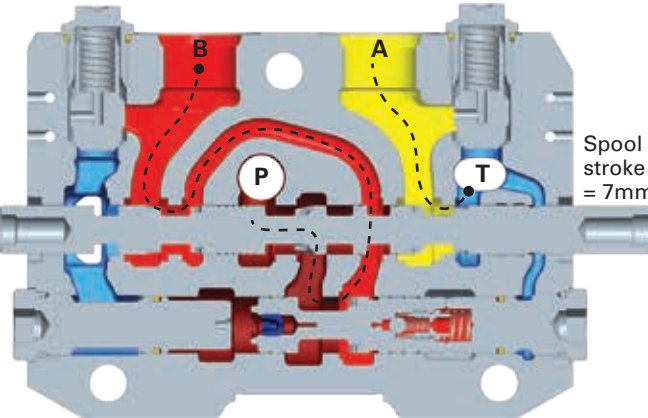
Work section flow path P-A and B-T (post comp)



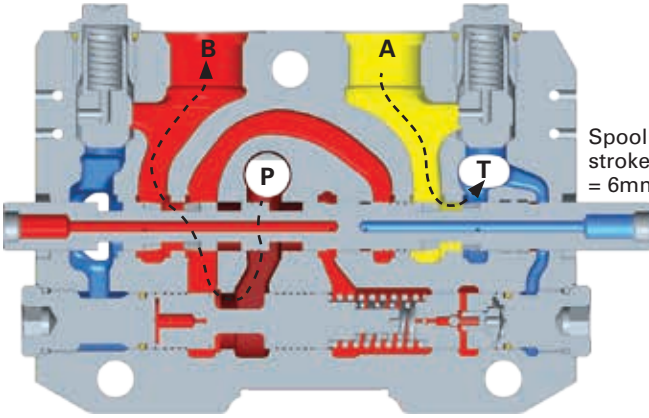
Work section flow path P-A and B-T (pre comp)



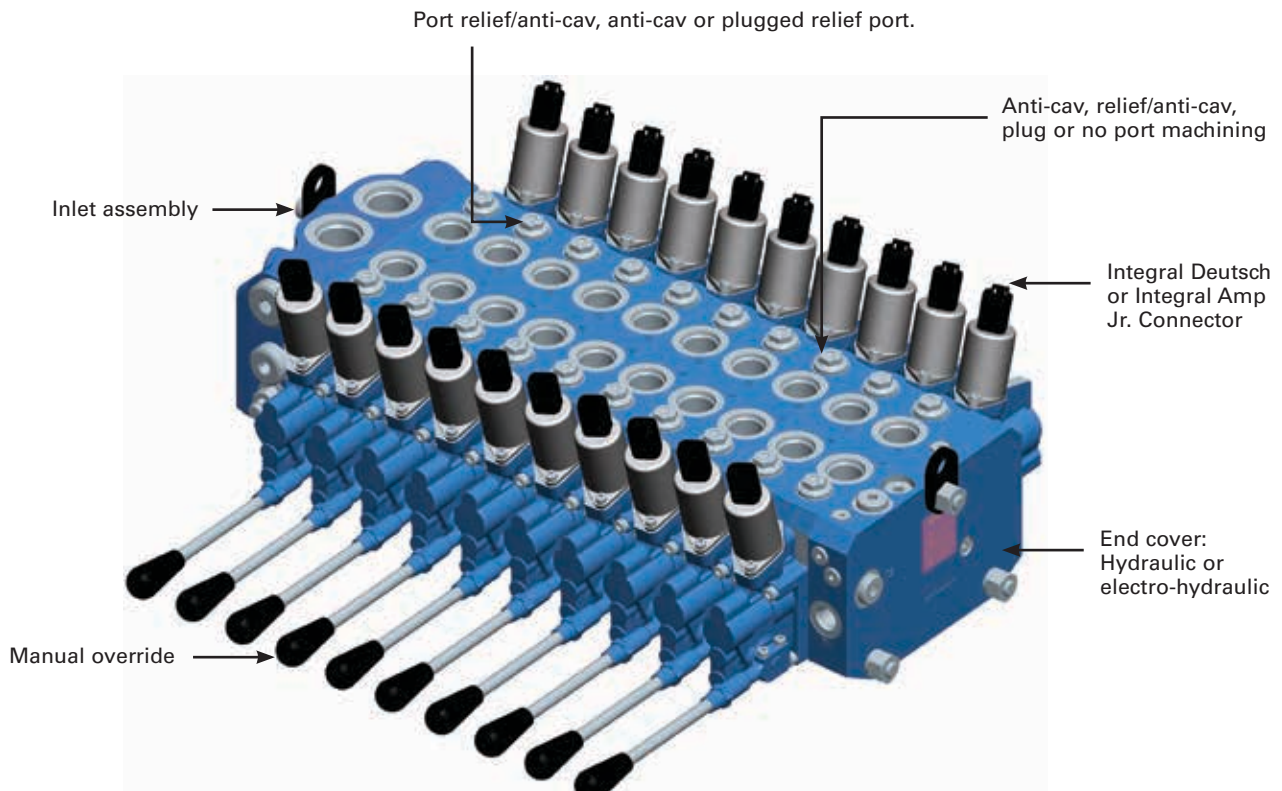
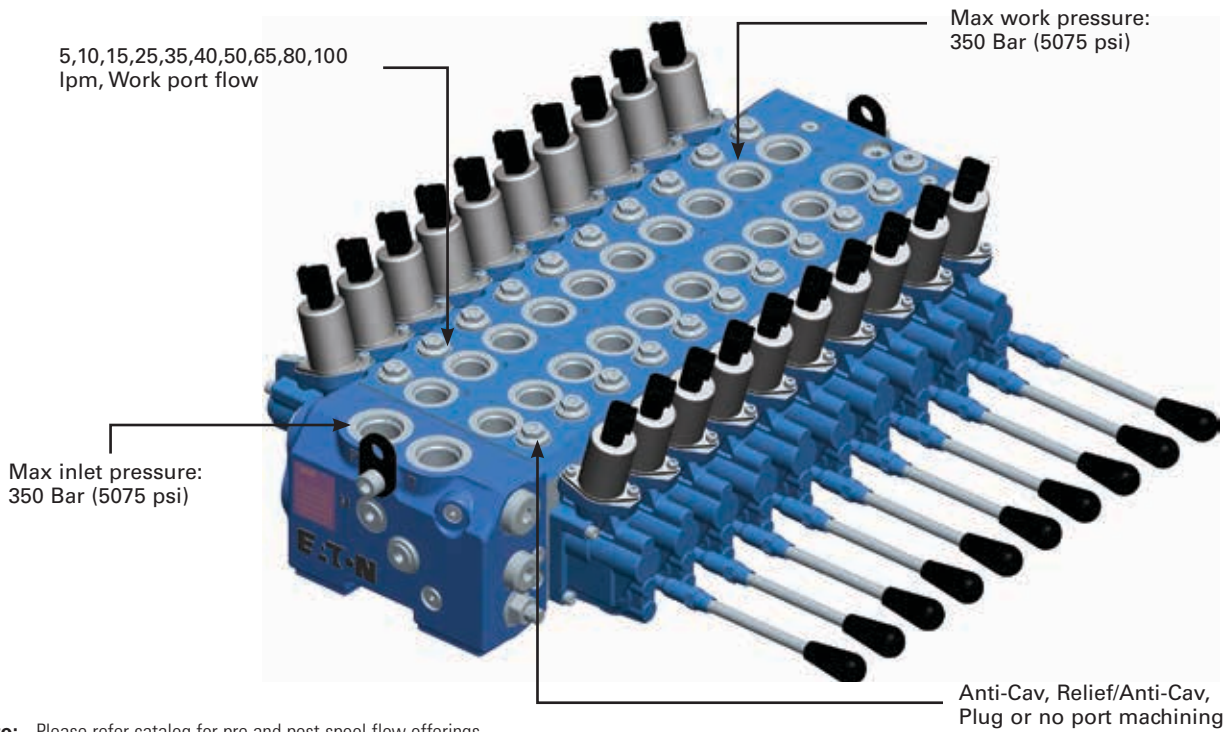
Work section flow path P-B and A-T (post comp)



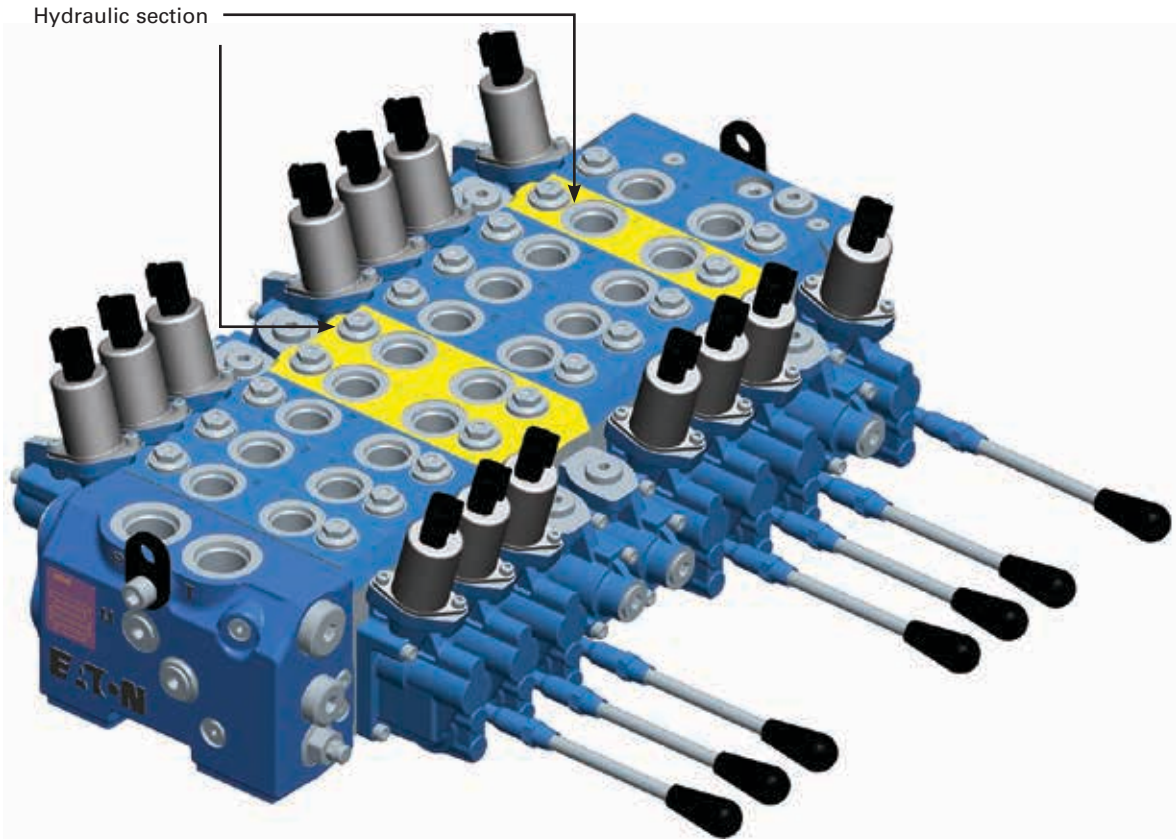
Work section flow path P-B and A-T (pre comp)



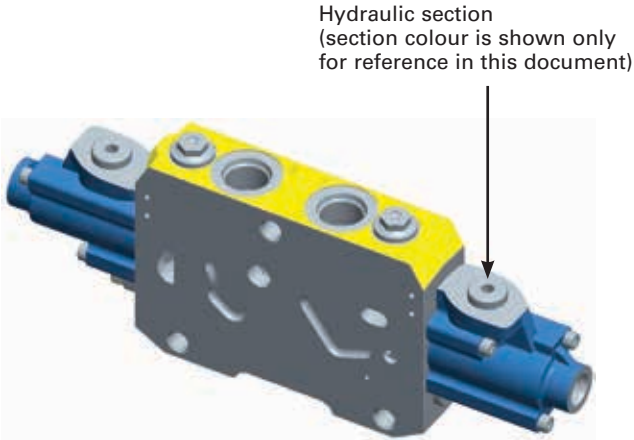
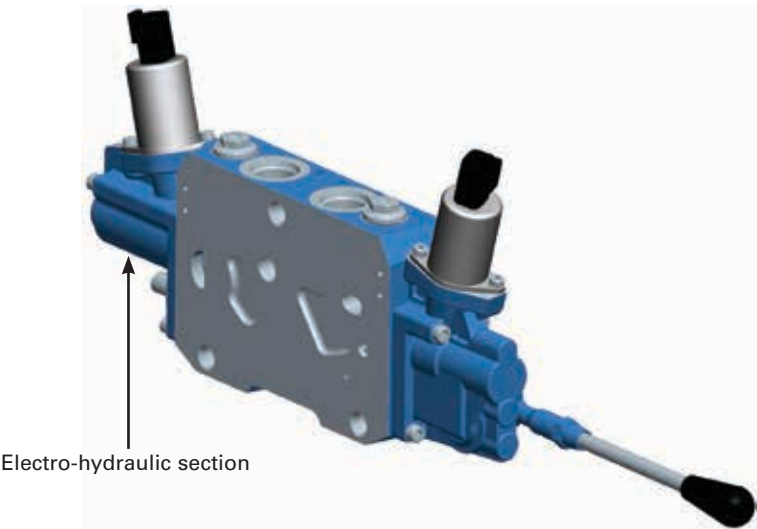
1.0 General information



1.0 General information



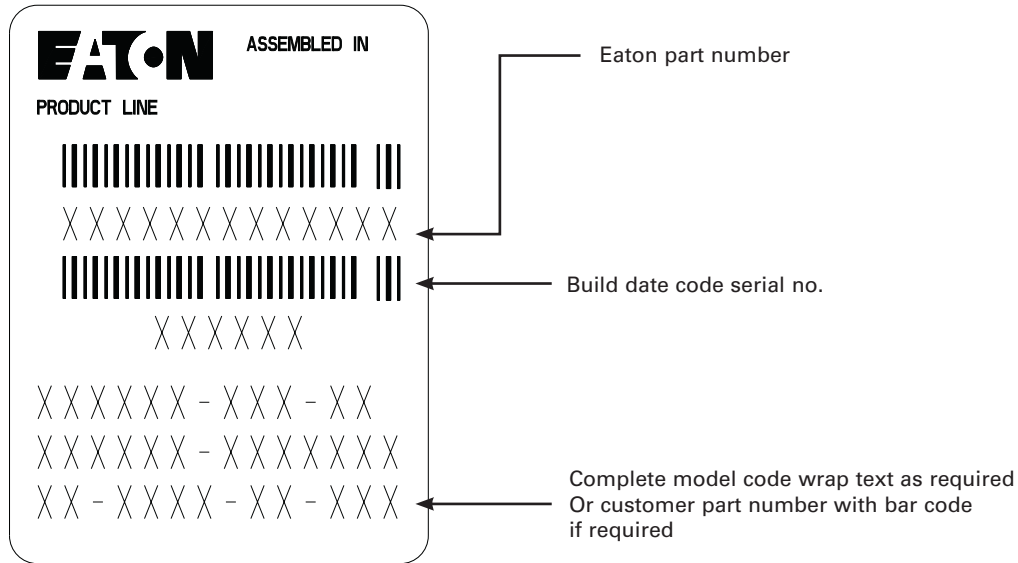
Sections can be placed in any order



1.0 General information

Identification of design level:

(Please refer labels on individual inlet/work/end section)



Last text of the model code or part number shows "A" Or "B" to identify design level.

A = Initial release

B = Latest design

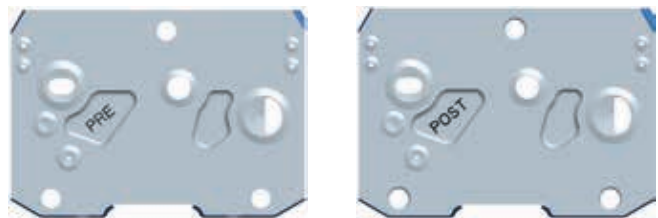
Design Level "B" can also be identified by below identification marks:

Product Identification

Eaton logo is stamped on inlet housing as shown below.

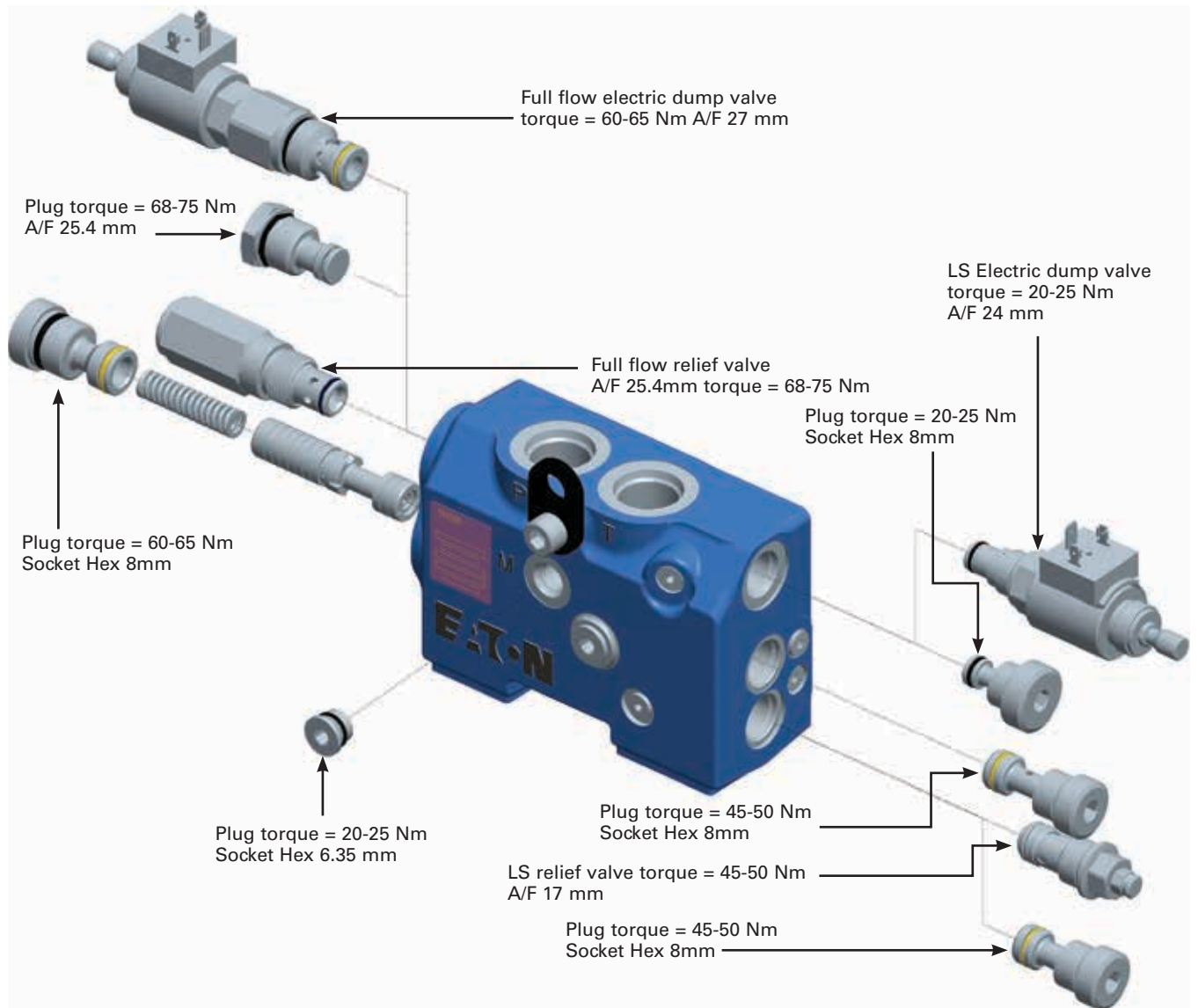


Pre or Post is stamped on work section casting as shown below.



2.0 Inlet section

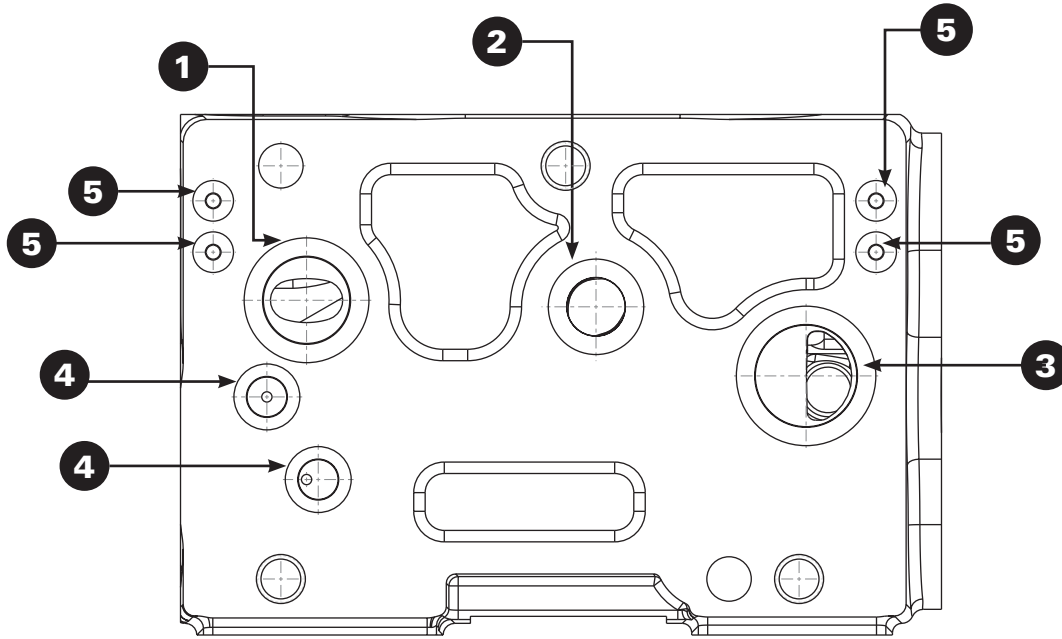
2.1 Inlet assembly:



2.0 Inlet section

2.2 Inlet interface:

(This interface kit is also applicable for work section interface)



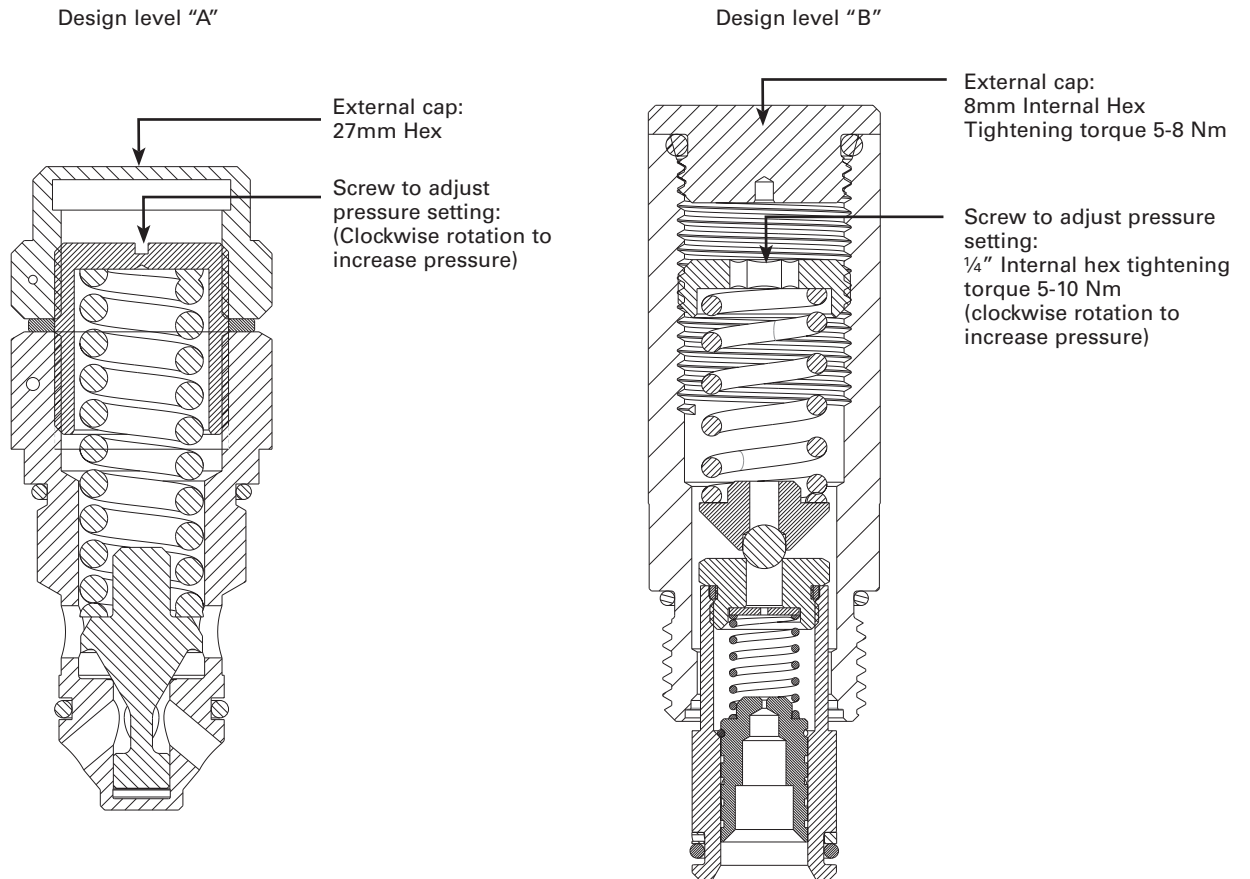
Interface Seal Kit P/N: 9901163-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16015-18-90	Nitrile (Buna-N) / -118	90	1
2	16003-12-90	Nitrile (Buna-N) / -114	90	1
3	16015-20-90	Nitrile (Buna-N) / -120	90	1
4	16015-1-90	Nitrile (Buna-N) / -013	90	2
5	16003-4	Nitrile (Buna-N) / -009	70	4

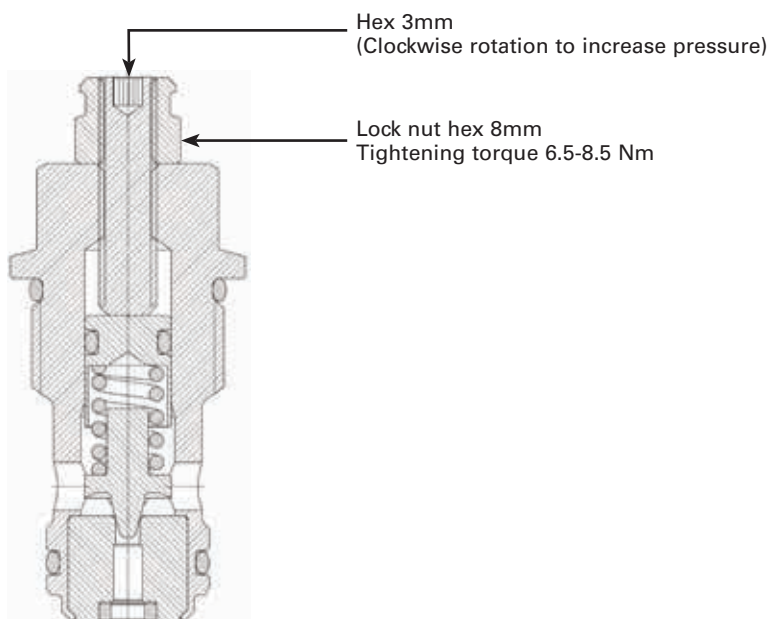
2.0 Inlet section

2.3 Inlet relief valve pressure setting adjustments:

2.3.1 Full flow relief valve:



2.3.2 Load sense relief valve



2.0 Inlet section

2.4 Inlet configuration

2.4.1 Closed center



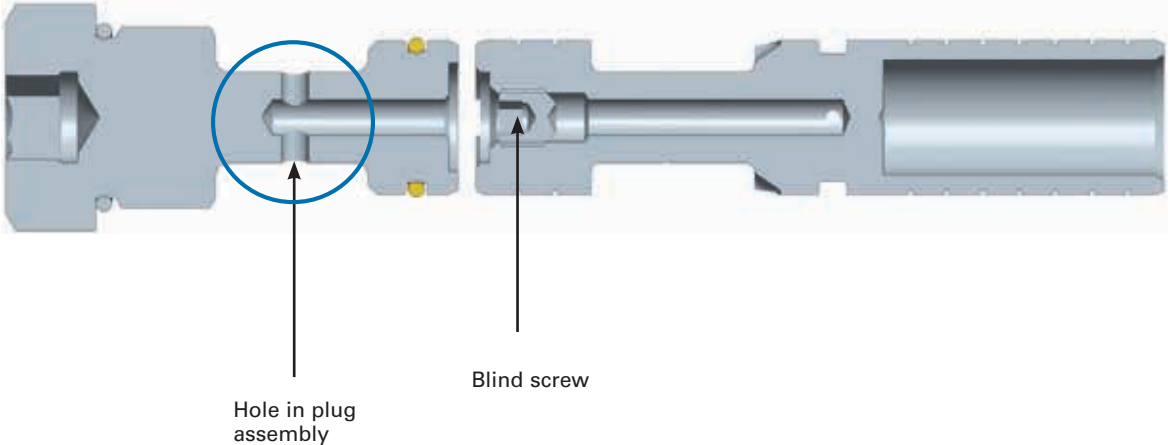
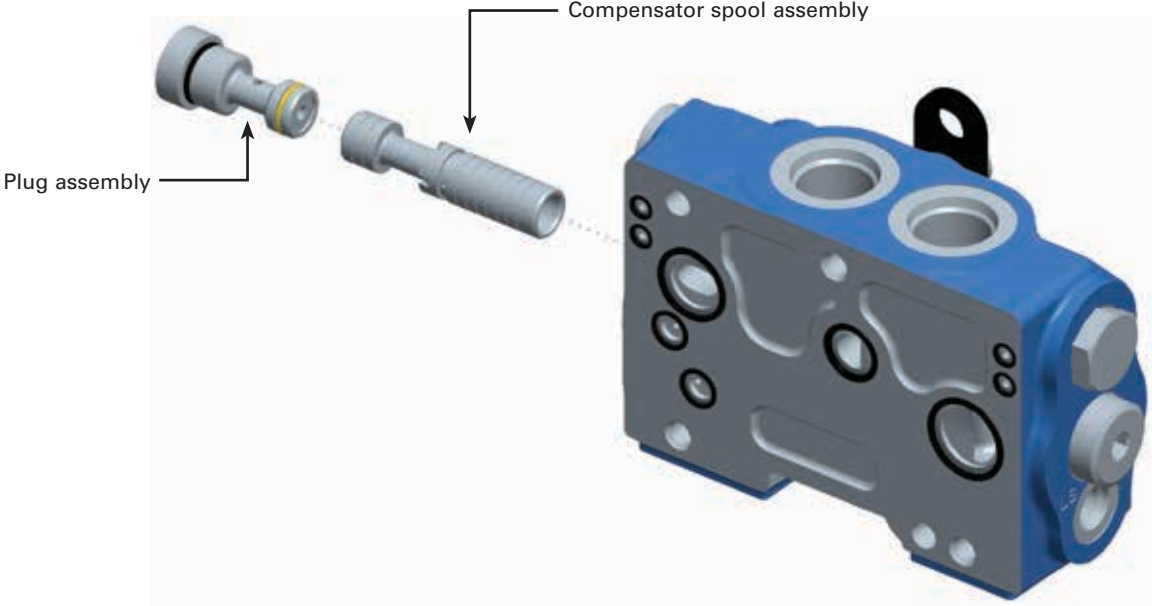
2.4.2 Open center:



2.0 Inlet section

2.5 Conversion kit

2.5.1 Open center to closed center conversion kit P/N: 9901178-000



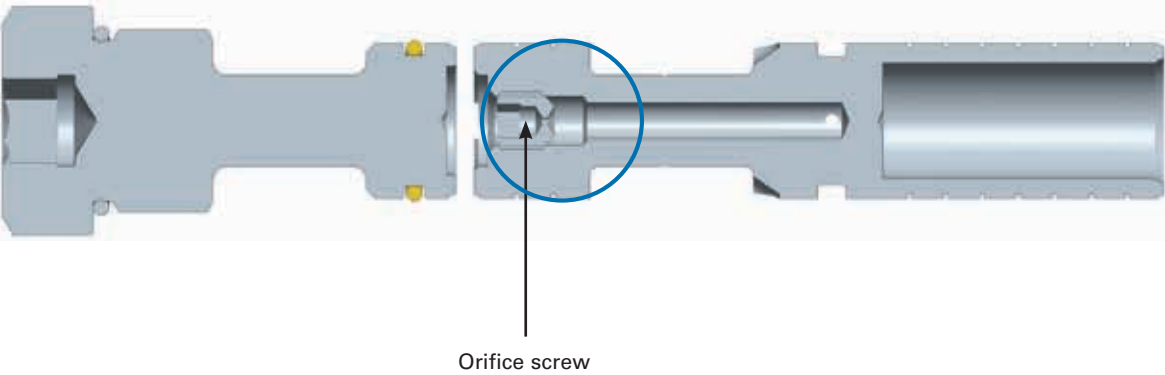
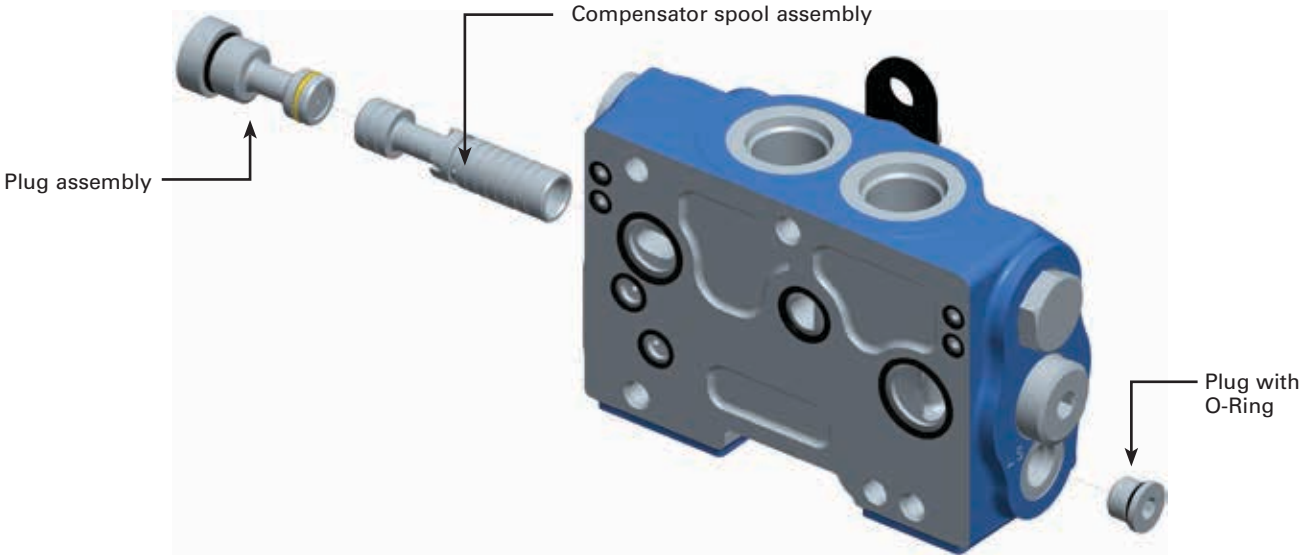
2.0 Inlet section

2.5 Conversion kit:

2.5.2 Closed center to open center conversion kit P/N:

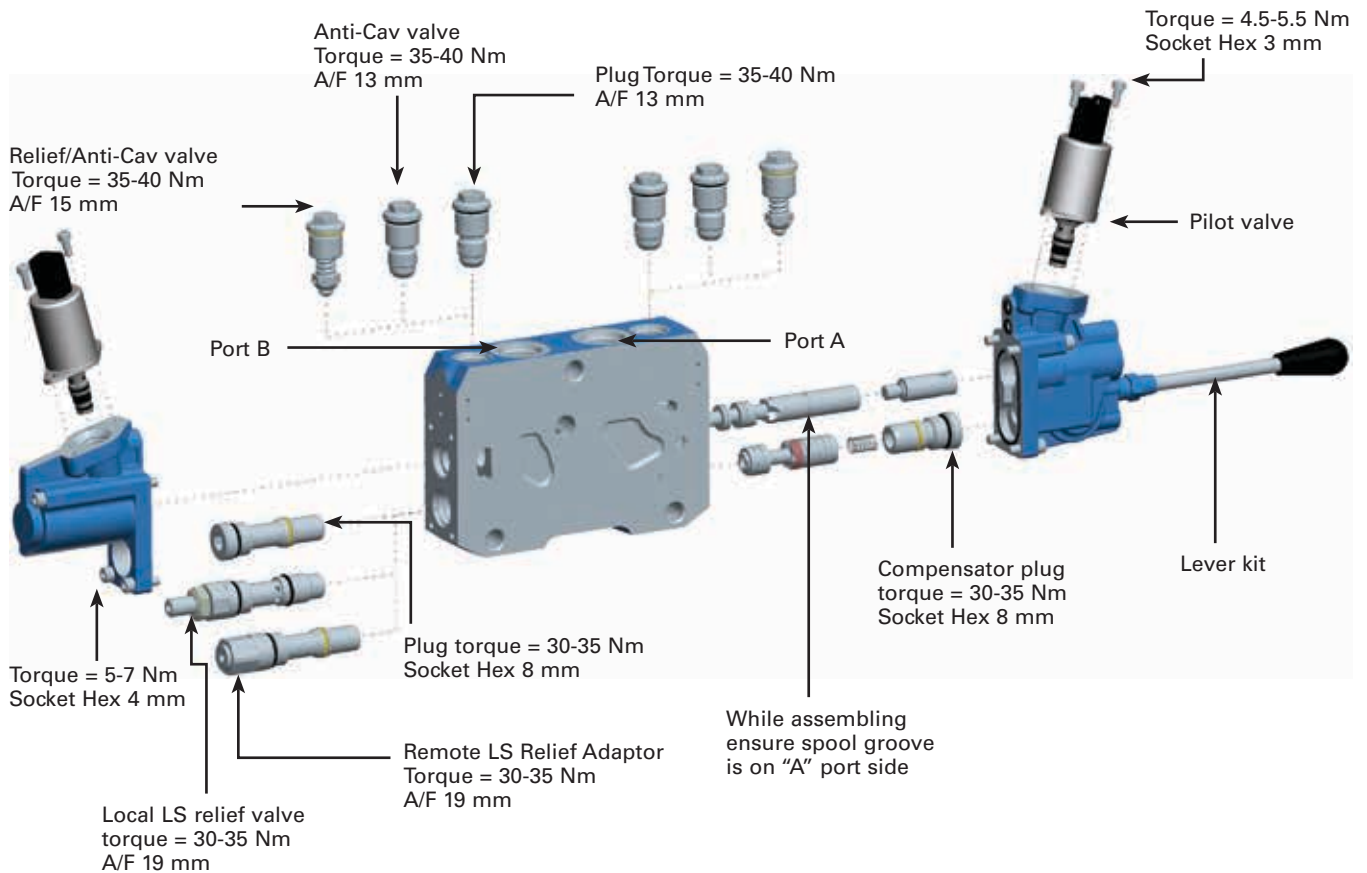
9901180-000 (for SAE port option)

9901179-000 (for BSP port option)



3.0 Work section

3.1 work section assembly (post-comp):

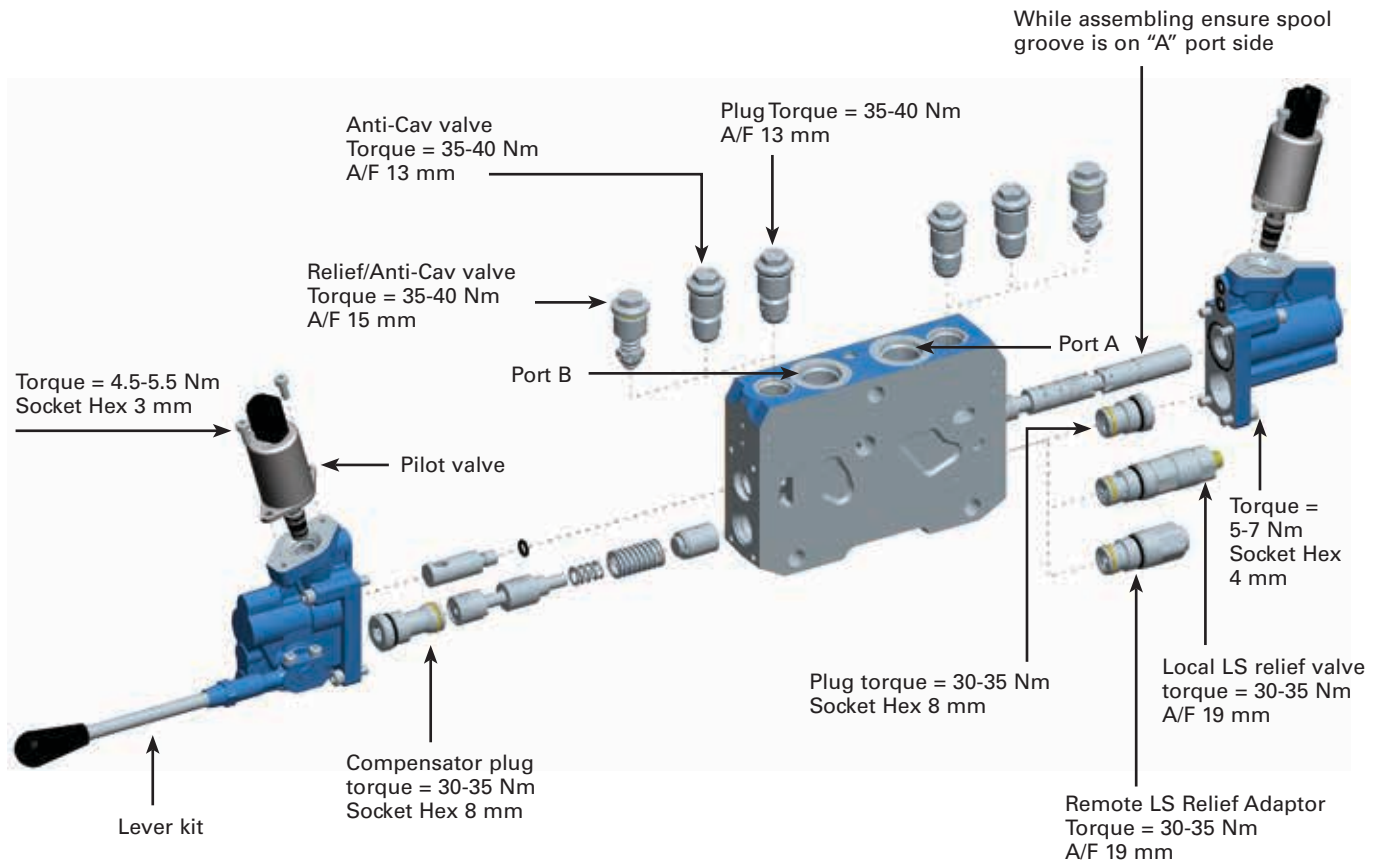


A	Anti cav	Fixed setting anticavitation valve		
R	Relief/Anti-cav	Fixed setting combined valve		
P	Plugged - work port cavities machined and plugged	Fixed setting prearrangement for auxiliary valve		

Note: Auxiliary valves (R-Relief/Anti-cav) are not field adjustable: Factory settings are available from 40 to 350 bar with 10 bar steps.

3.0 Work section

3.2 Work section assembly (pre-comp):



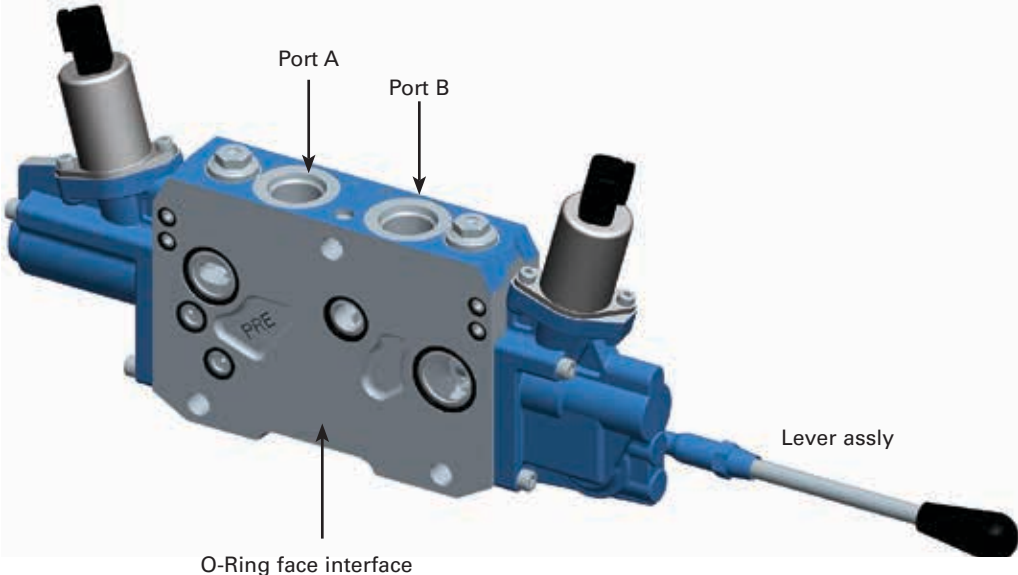
A	Anti cav	Fixed setting anticavitation valve		
R	Relief/Anti-cav	Fixed setting combined valve		
P	Plugged - work port of cavities machined and plugged	Fixed setting prearrangement for auxiliary valve		

Note: Auxiliary valves (R-Relief/Anti-cav) are not field adjustable: Factory settings are available from 40 to 350 bar with 10 bar steps.

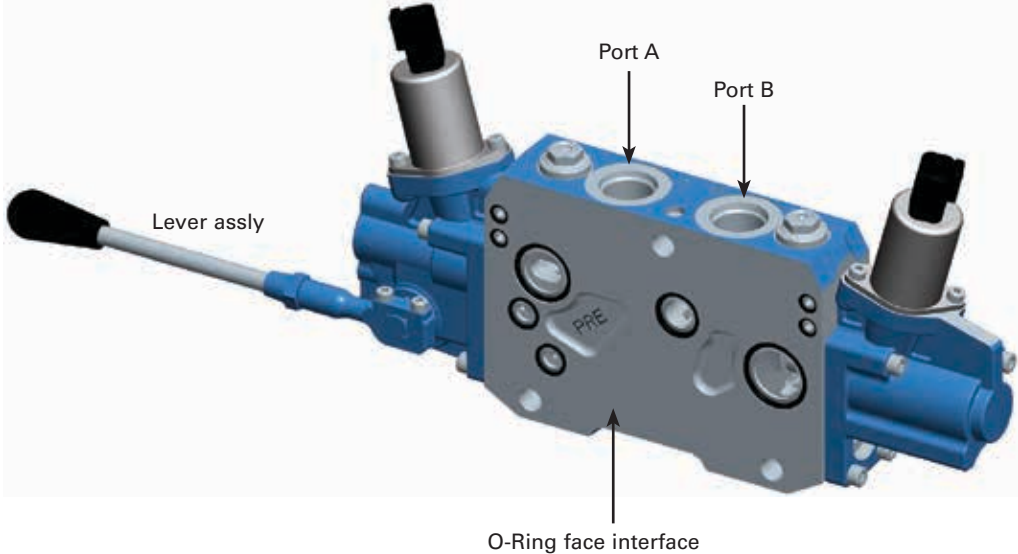
3.0 Work section

3.3 Identification of right hand (RH) and left hand (LH) build

RH Build



LH Build

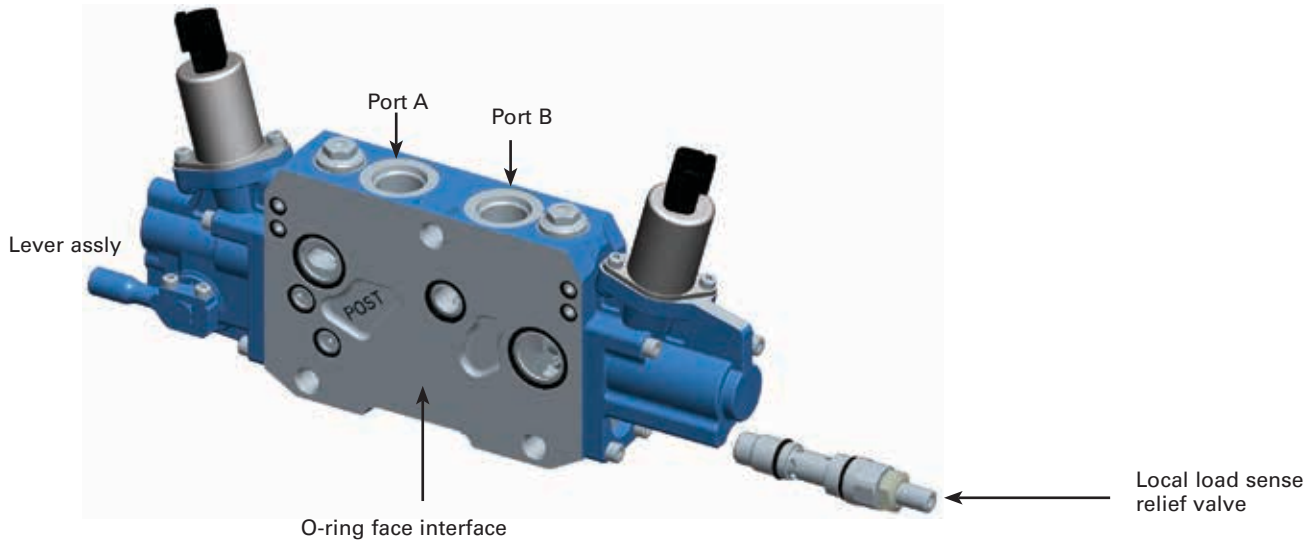


3.0 Work section

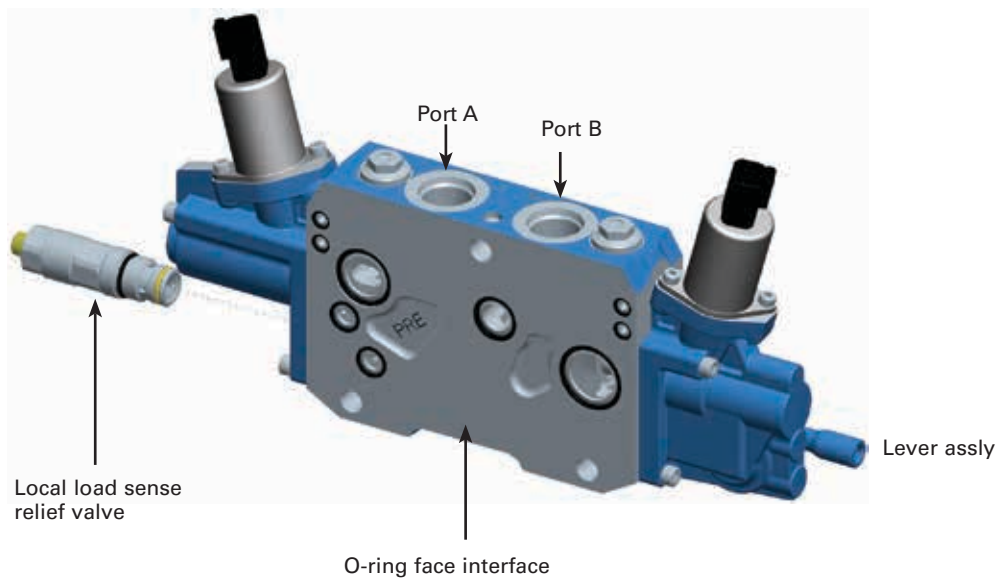
3.4 Local load sense relief valve (option):

Note: Care should be taken while ordering Local LS Relief Valve option in combination with Manual Override option. Please see below assembly possibilities.

3.4.1 P - Post compensated - section load sense relief: available only for LH build



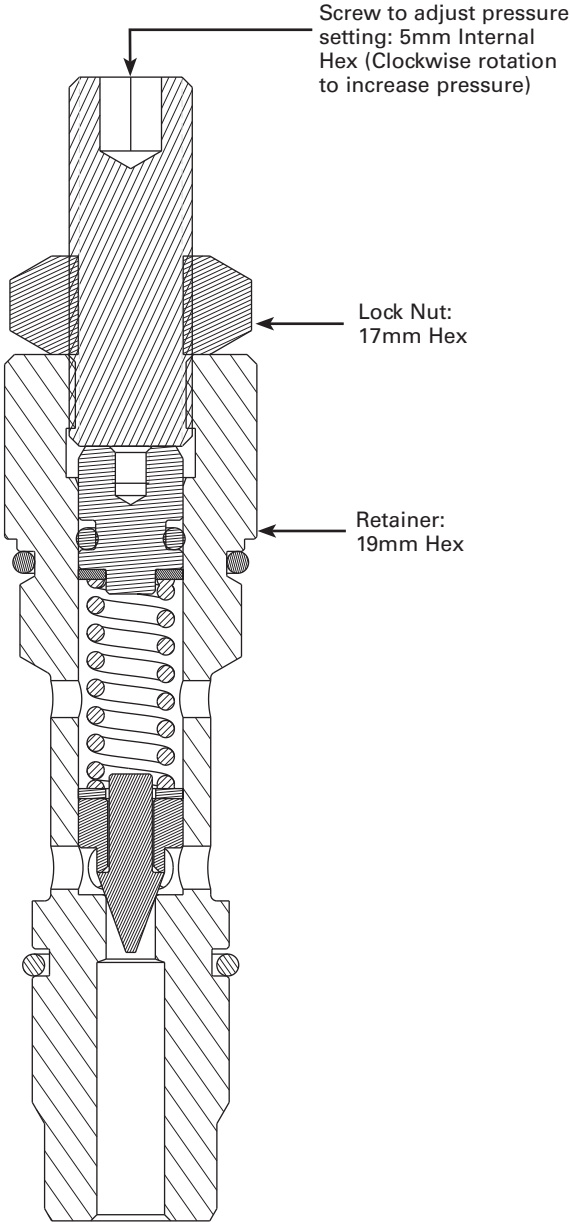
3.4.2 L - Pre compensated - section load sense relief: Available only for RH build



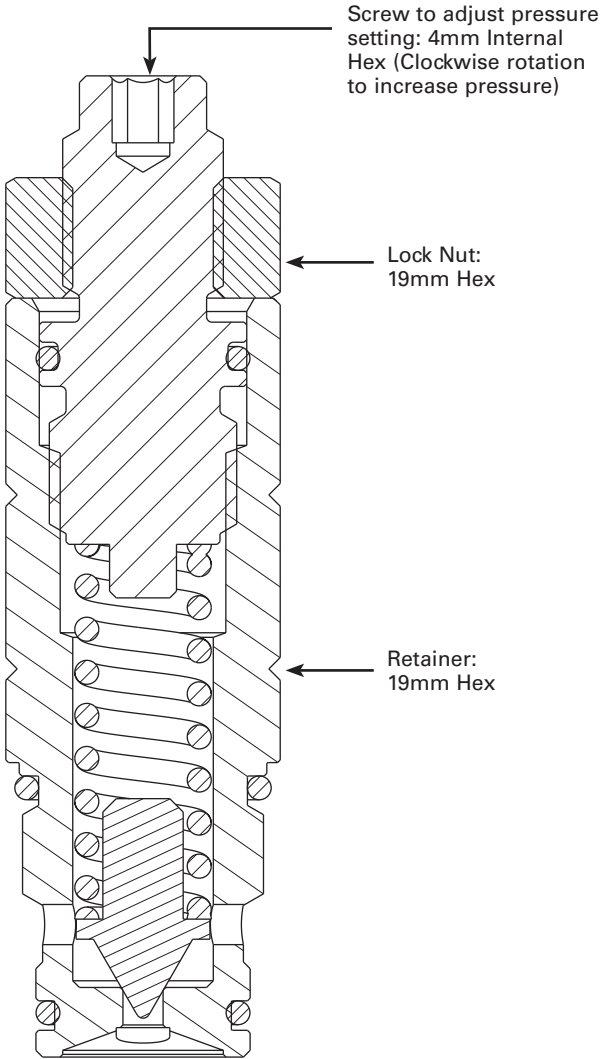
3.0 Work section

3.5 Local LS relief valve pressure setting

Post comp

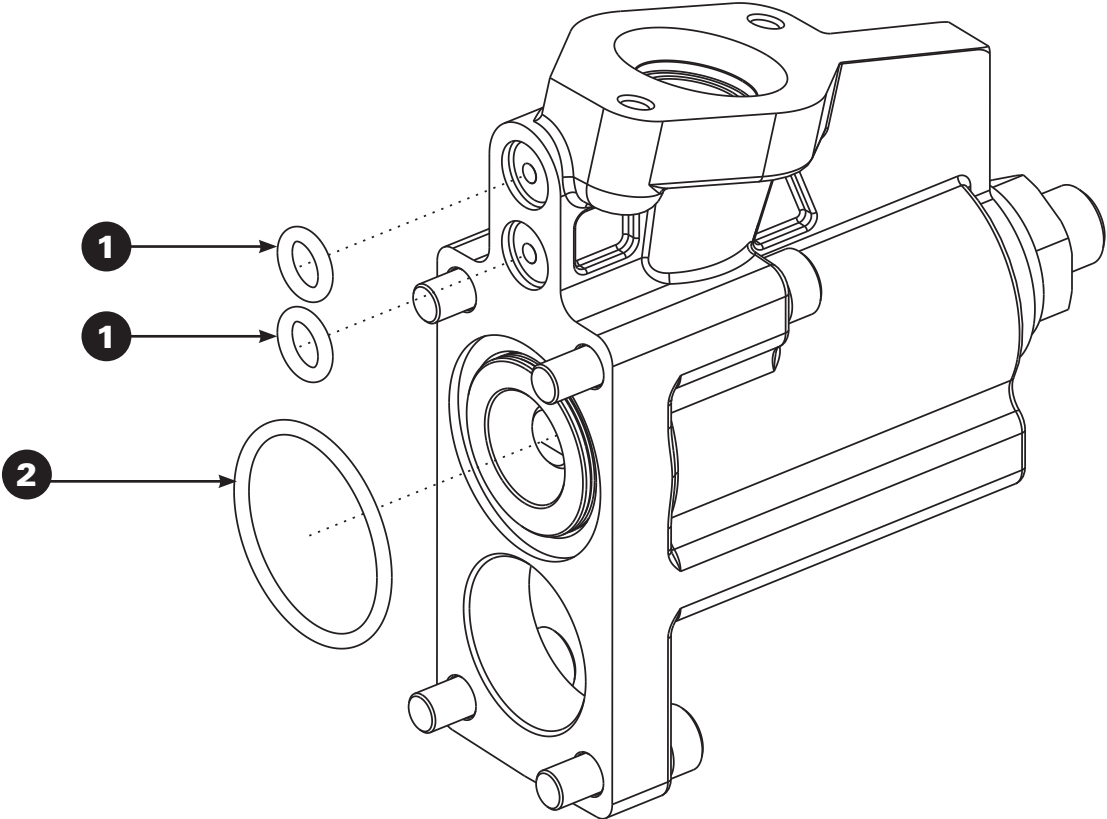


Pre comp



3.0 Work section

3.6.5. Interface seal kit for EH Actuation (spring end)

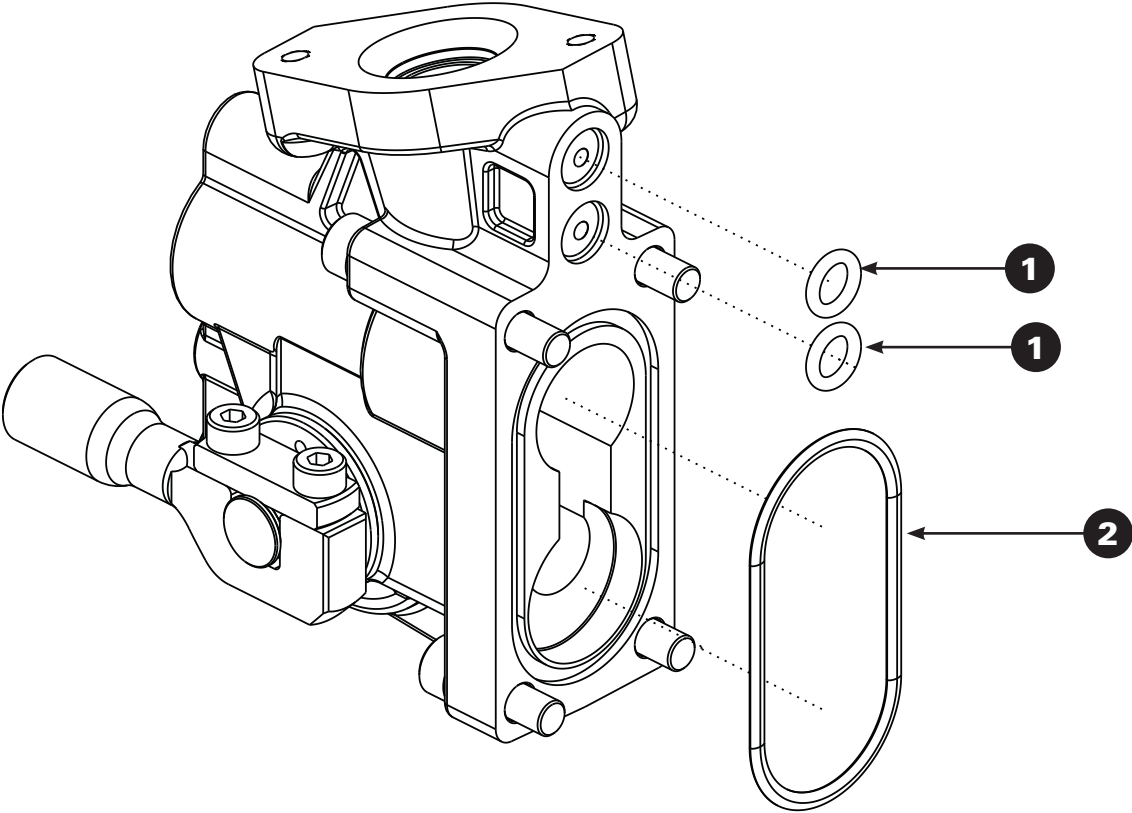


Seal kit number: 9901234-000

Ref #	Eaton part #	Material / size	Durometer	Qty
1	16003-4	Nitrile (Buna-N) / -009	70	2
2	16015-10	Nitrile (Buna-N) / -022	70	1

3.0 Work section

3.6.4. Interface seal Kit For EH actuation (lever side)



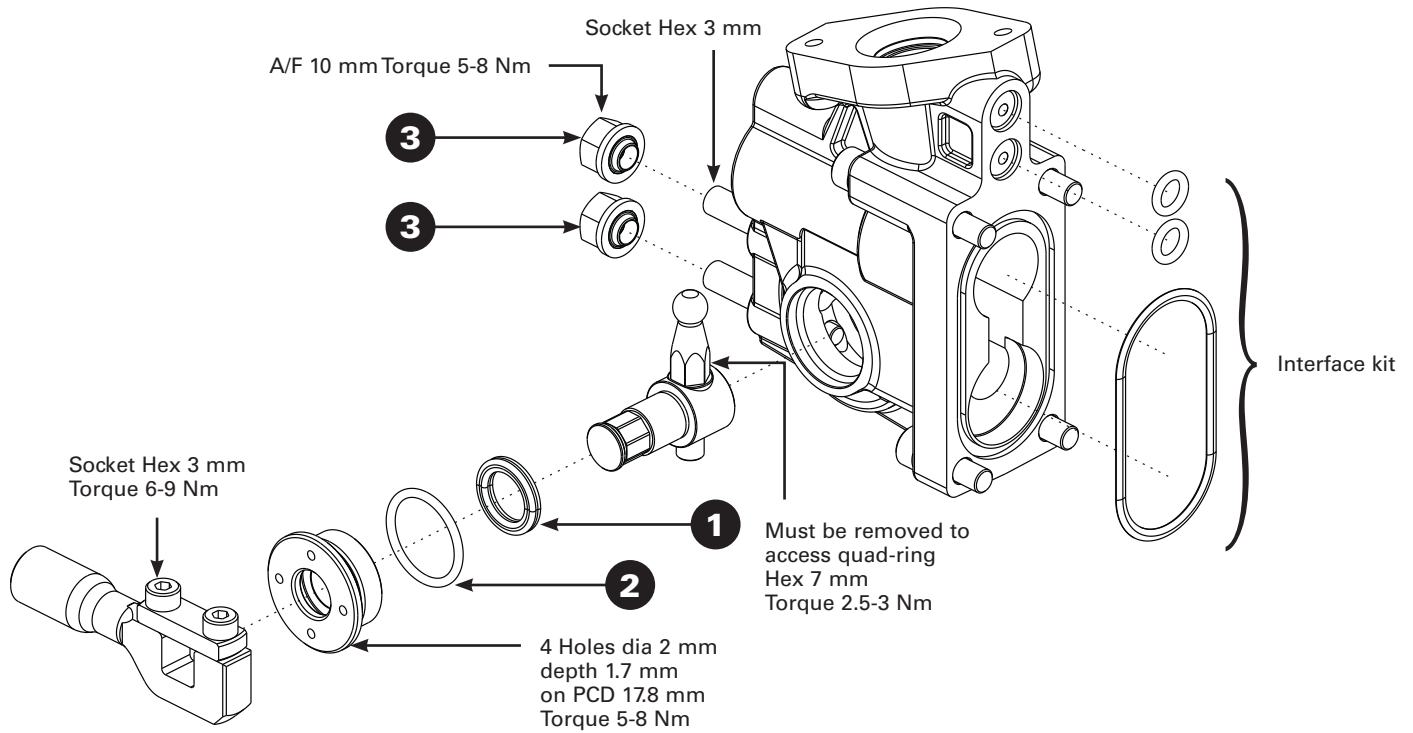
Seal kit number: 9901235-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16003-4	Nitrile (Buna-N) / -009	70	2
2	278542	Nitrile (Buna-N) / -030	70	1

3.0 Work section

3.6.6. Seal kits for lever over-ride, hyd port & stroke limiter parts:

Seal kit for EH Actuation lever side with stroke limiter (pre & post comp)

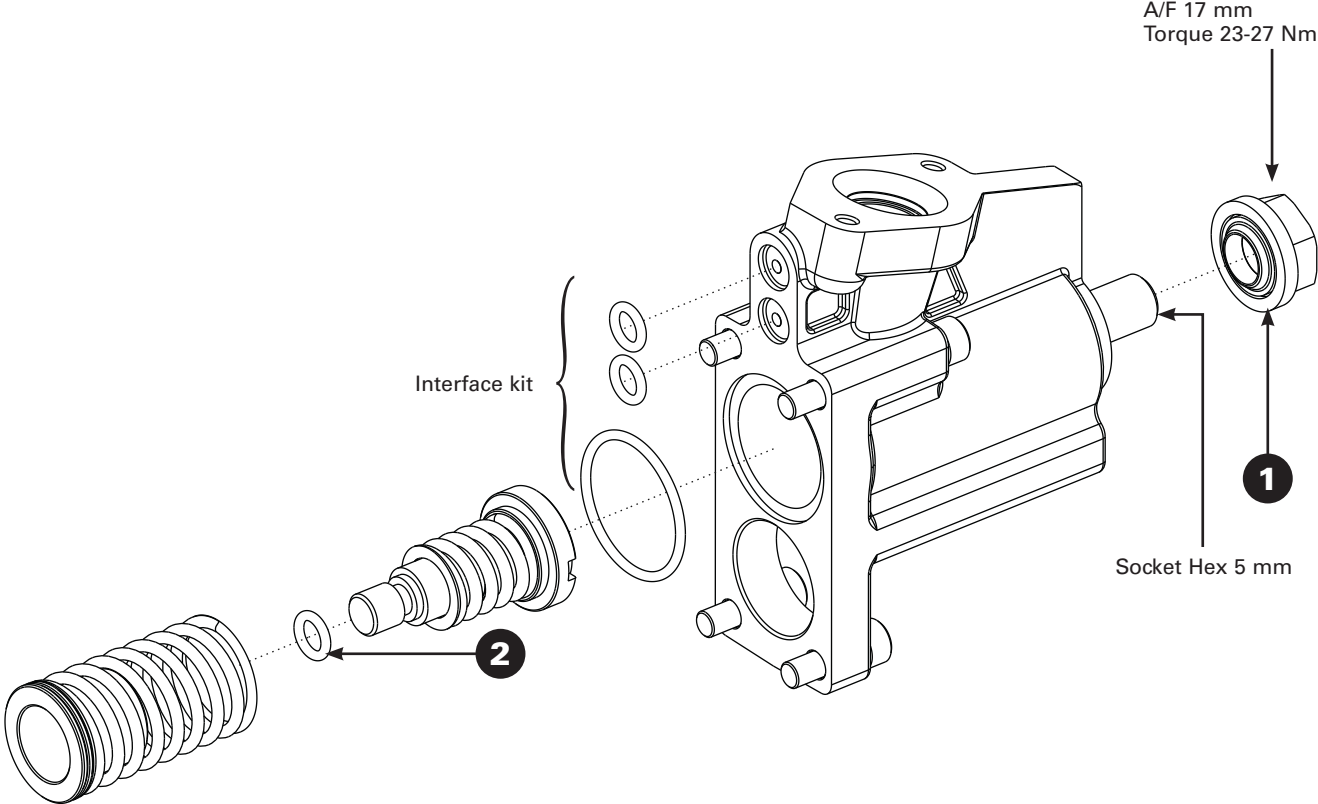


Seal kit number: 9901236-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16051-9	Nitrile (Buna-N)	70	1
2	16015-5	Nitrile (Buna-N) / (-017)	70	1
3	6041710-001	Seal lock nut M6	-	2

3.0 Work section

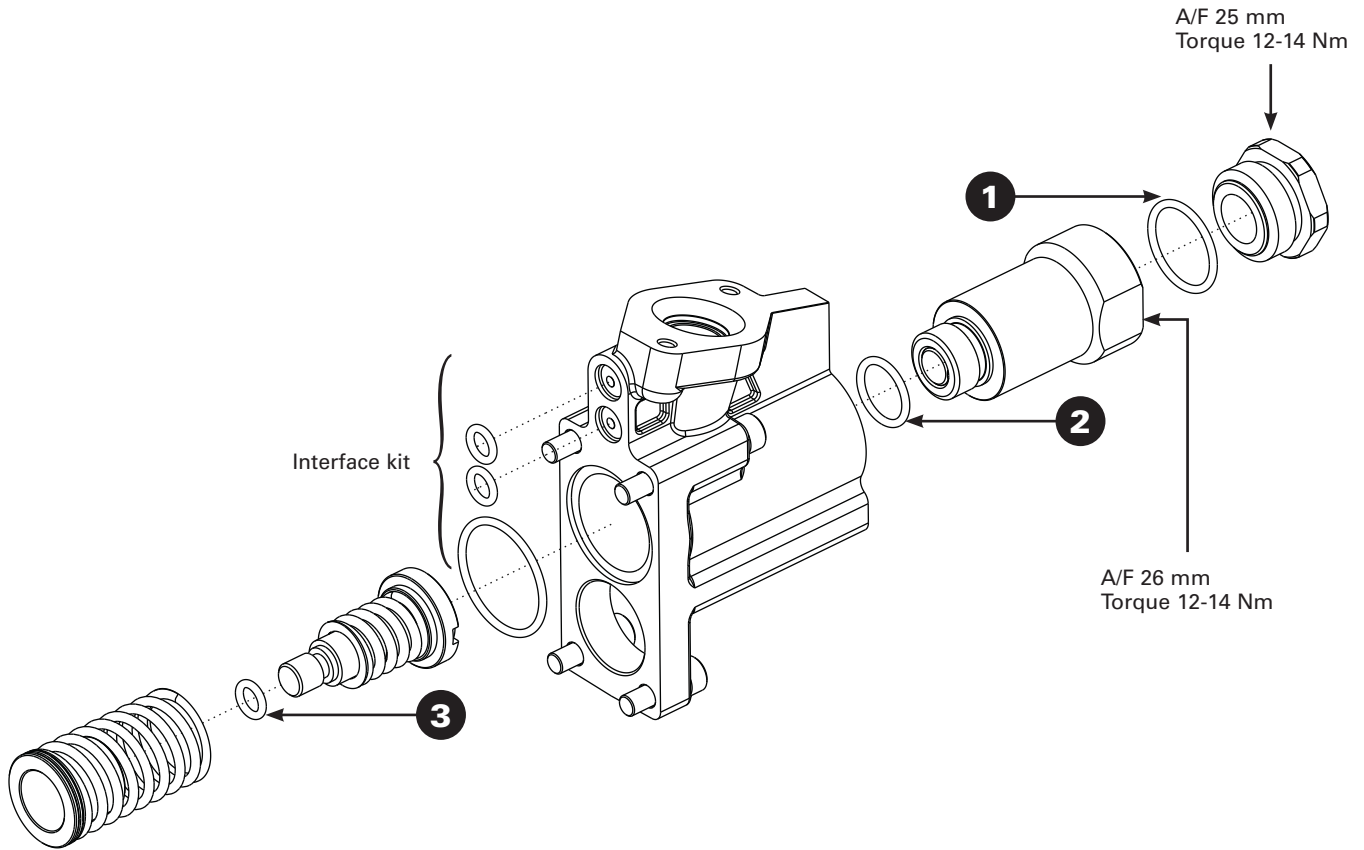
3.6.7 Seal kit for EH actuation spring side with stroke limiter (pre-comp)



Seal kit number: 9901237-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	6037602-001	Seal Lock nut M10	-	1
2	16003-4-90	Nitrile (Buna-N) / (-009)	90	1

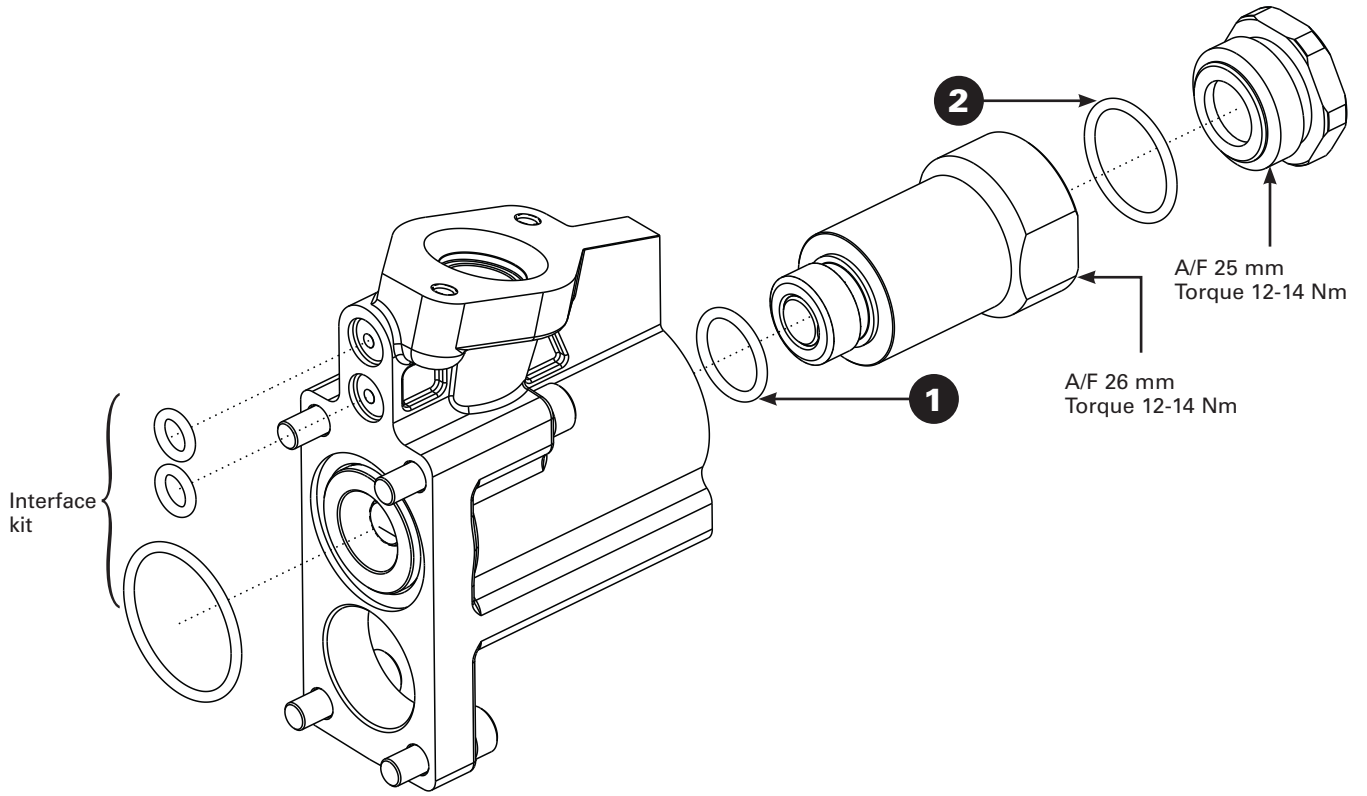
3.6.8. Seal kit for EH actuation spring side with Hyd.Port option (pre-comp)



Seal kit number: 9901238-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16015-6	Nitrile (Buna-N) / (-018)	70	1
2	6037168-002	Nitrile (Buna-N) / (6-129)	70	1
3	16003-4-90	Nitrile (Buna-N) / -009	90	1

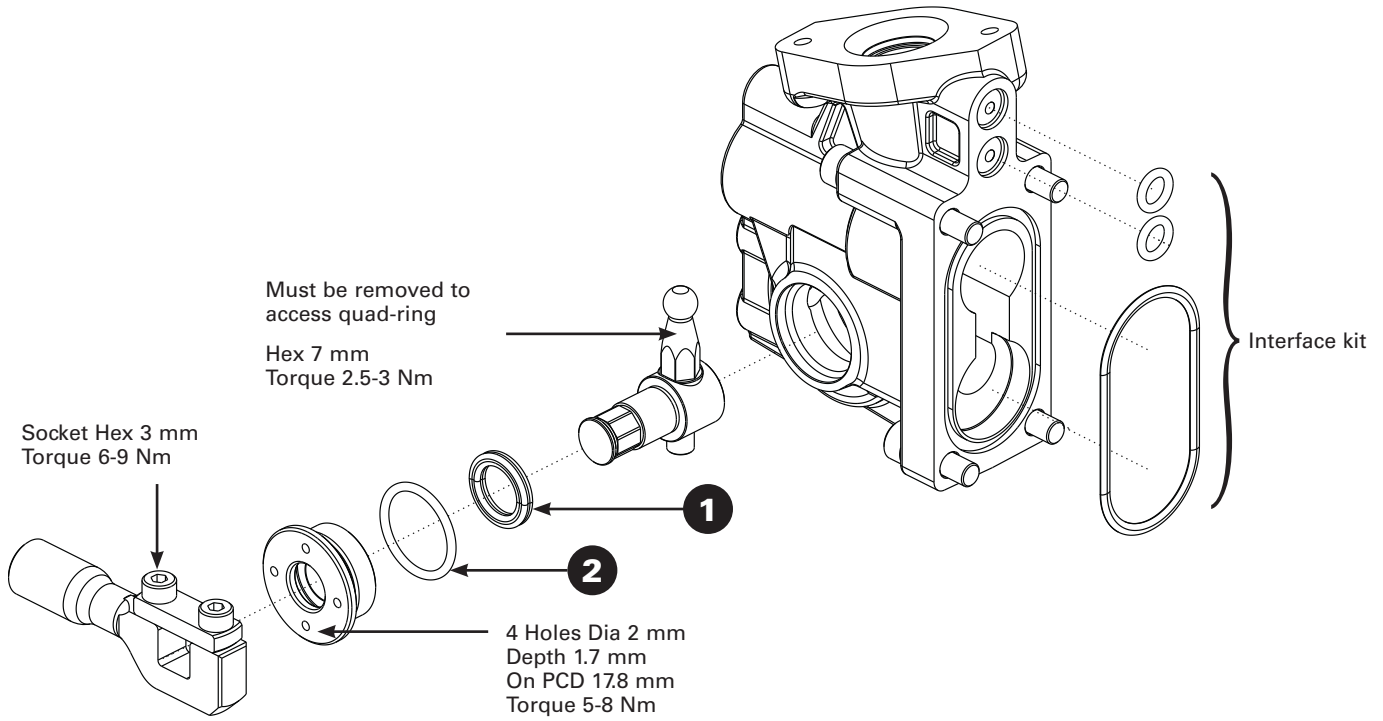
3.6.9. Seal kit for EH & Hyd. Port option, spring side (post-comp)



Seal kit number: 9901239-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	6037168-002	Nitrile (Buna-N) / (6-129)	70	1
2	16015-6	Nitrile (Buna-N) / (-018)	70	1

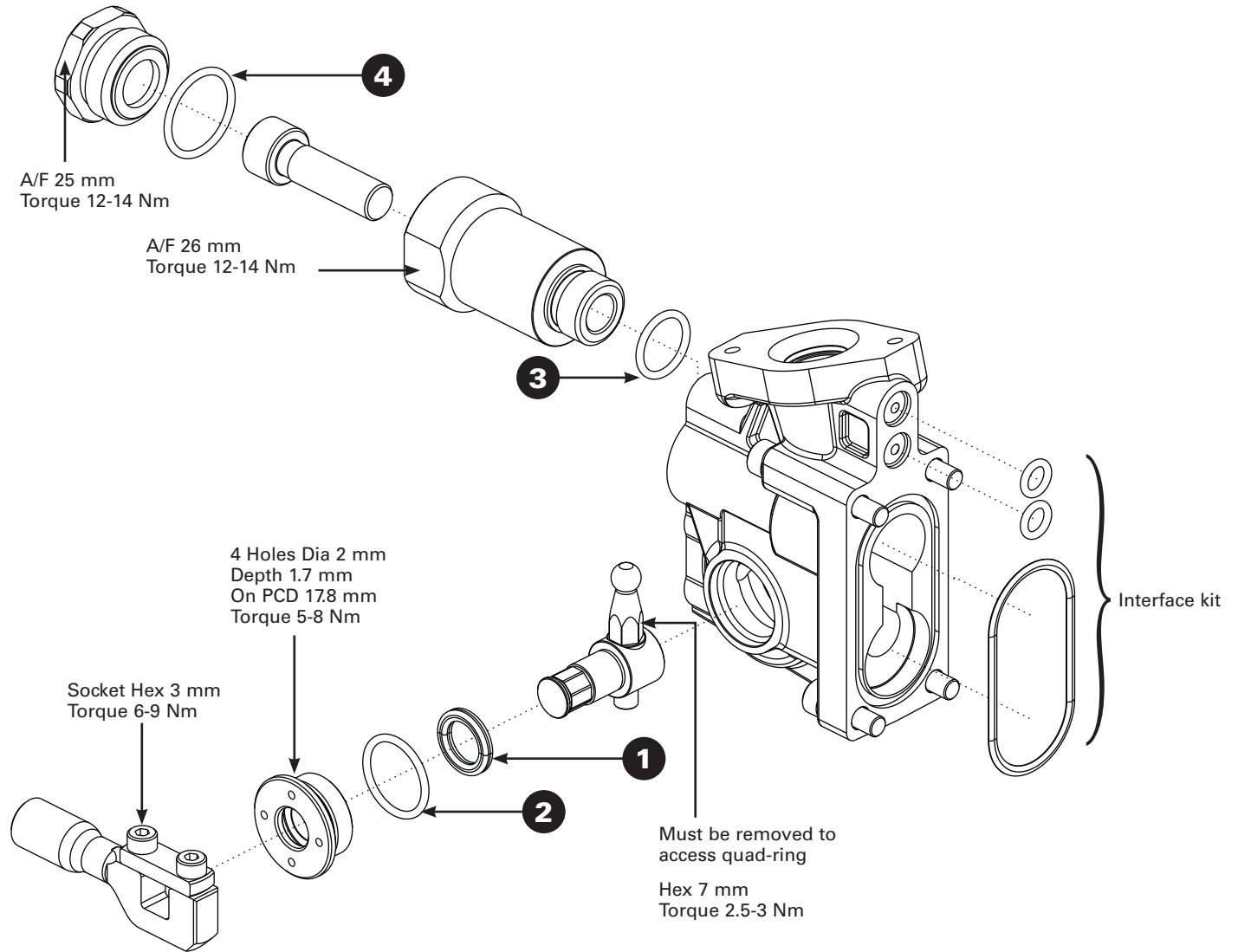
3.6.10. Seal kit for EH actuation with lever over-ride (pre & post comp)



Seal kit number: 9901240-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16051-9	Nitrile (Buna-N)	70	1
2	16015-5	Nitrile (Buna-N) / (-017)	70	1

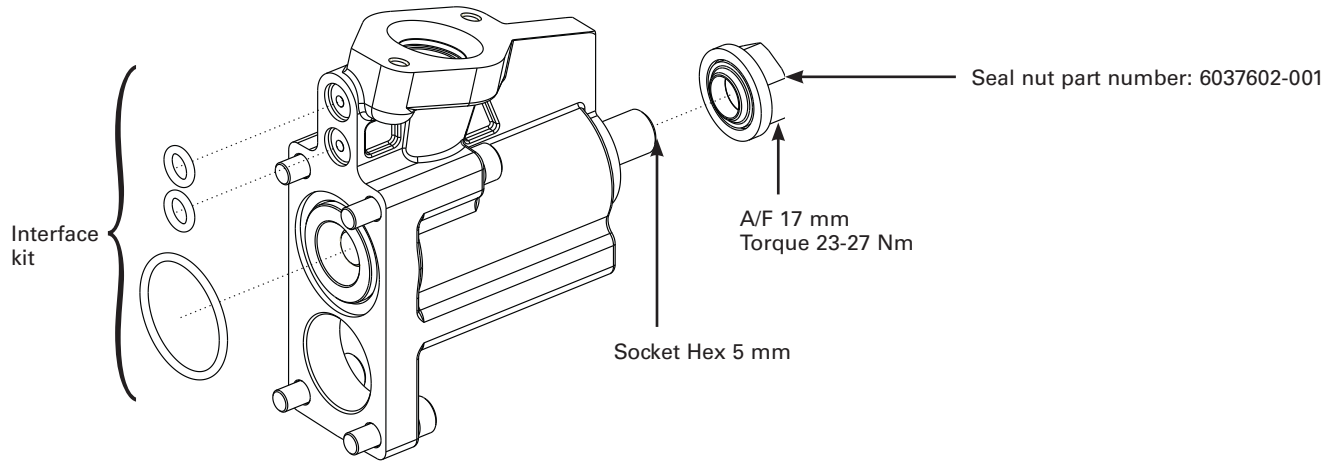
3.6.11. Seal kit for eh actuation with lever over-ride and hyd.Port option (pre & post comp):



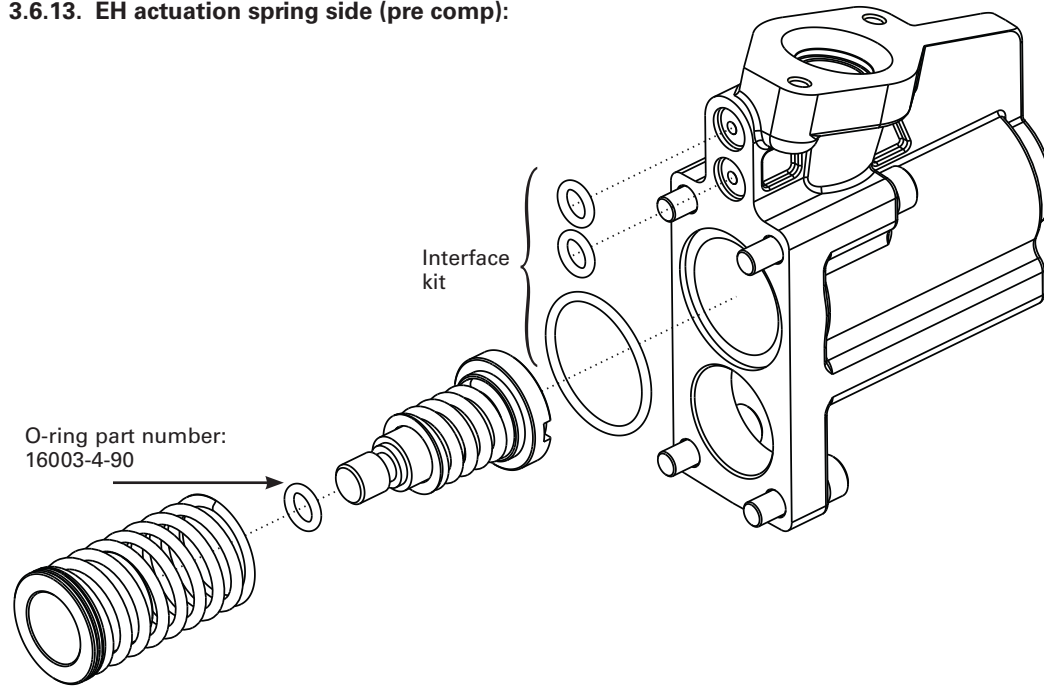
Seal kit number: 9901241-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16051-9	Nitrile (Buna-N)	70	1
2	16015-5	Nitrile (Buna-N) / (-017)	70	1
3	6037168-002	Nitrile (Buna-N) / (6-129)	70	1
4	16015-6	Nitrile (Buna-N) / (-018)	70	1

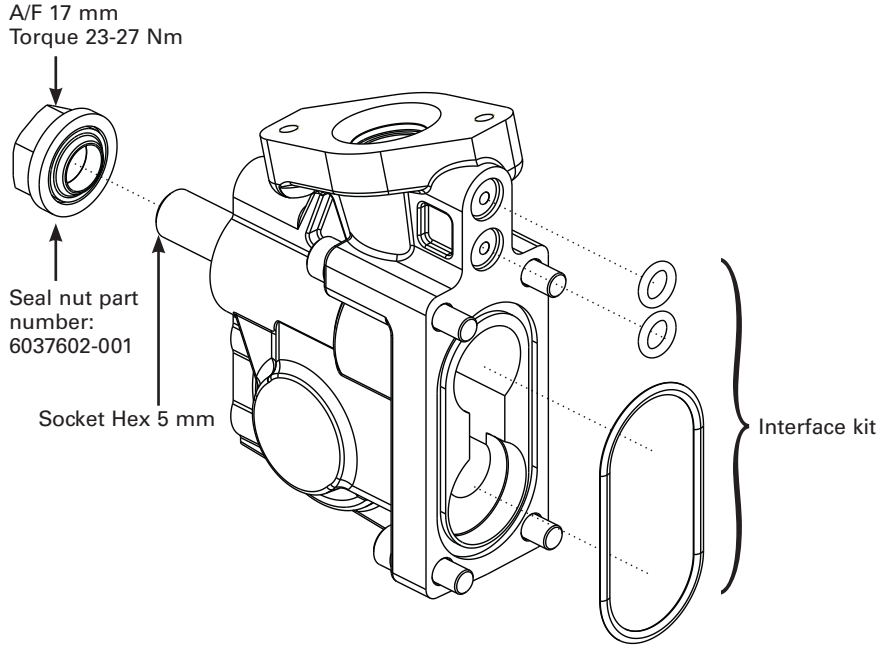
3.6.12. EH Actuation with stroke limiter, spring side (pre & post comp):



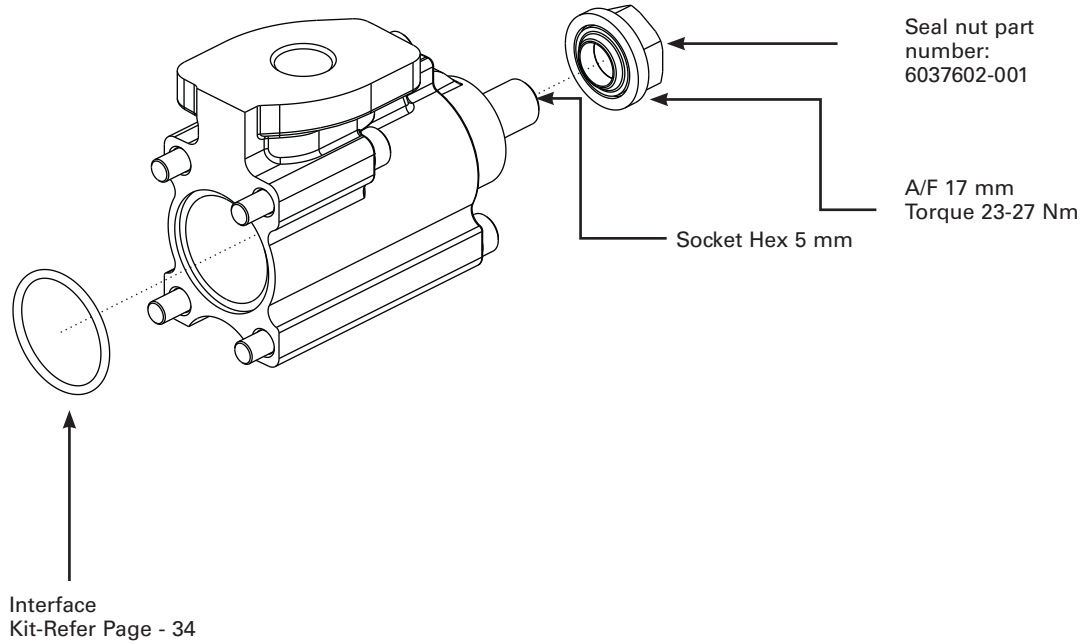
3.6.13. EH actuation spring side (pre comp):



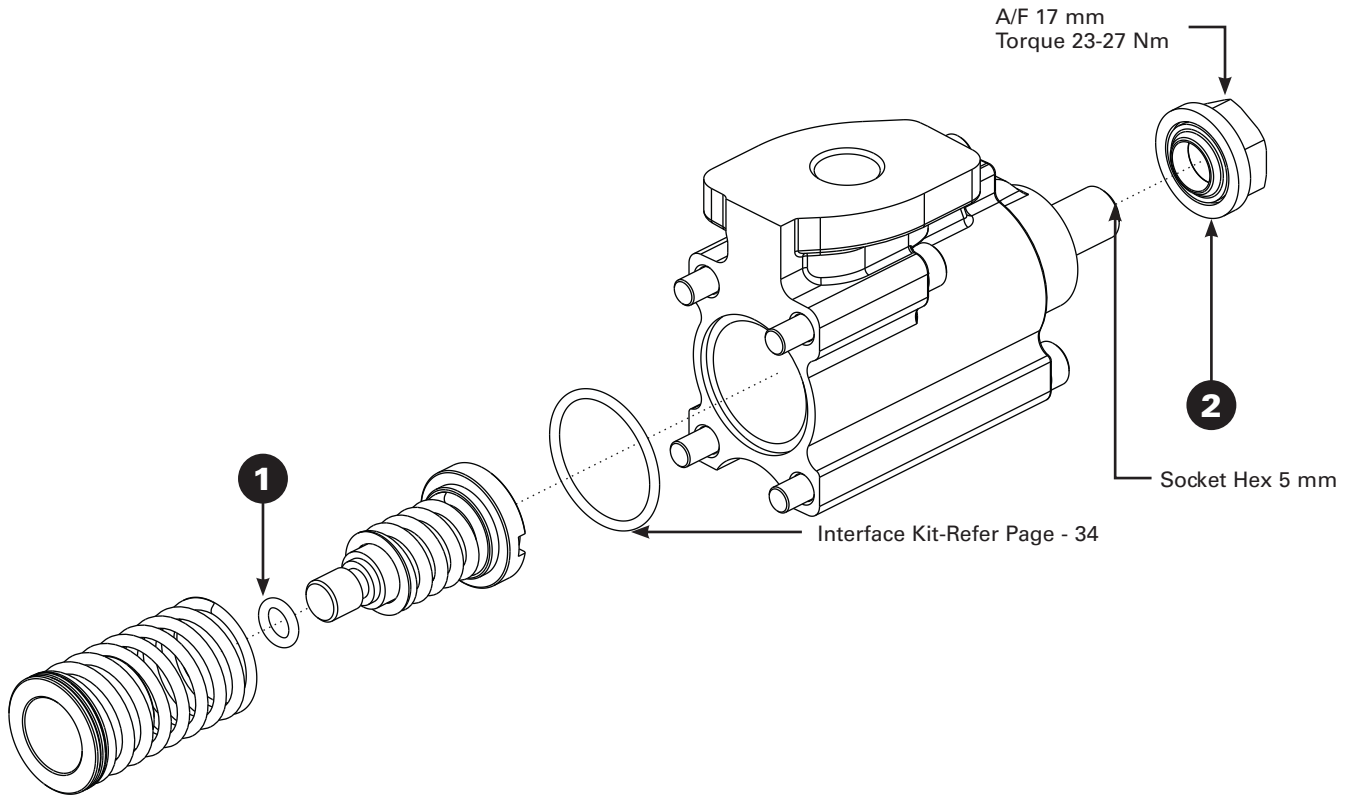
3.6.14. EH Actuation without lever over-ride, with stroke limiter (pre & post comp):



3.6.15. Seal nut for Hyd. Actuation with stroke limiter (post comp):



3.6.16. Seal kit for Hyd. actuation with stroke limiter (pre comp):

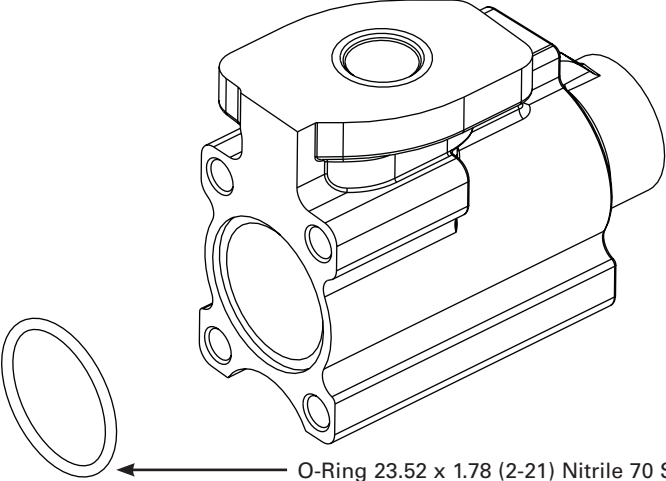


Seal Kit Hydraulic Act. with stroke limiter (Pre-Comp)
P/N: 9901242-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	16003-4-90	Nitrile (Buna-N) / -009	90	1
2	6037602-001	Seal Nut M10	-	1

3.0 Work section

3.2.17. Interface seal for hydraulic actuations:

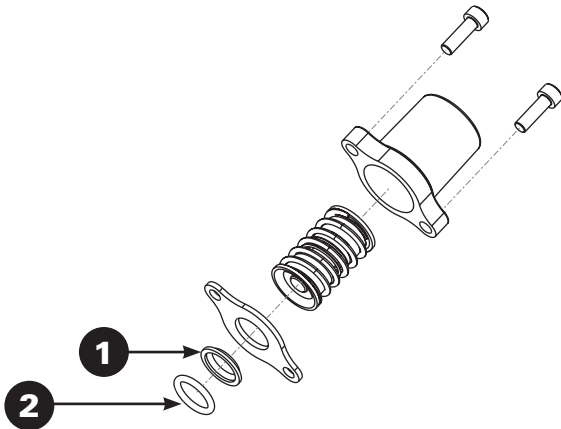


O-Ring 23.52 x 1.78 (2-21) Nitrile 70 Shore Part number: 16015-9

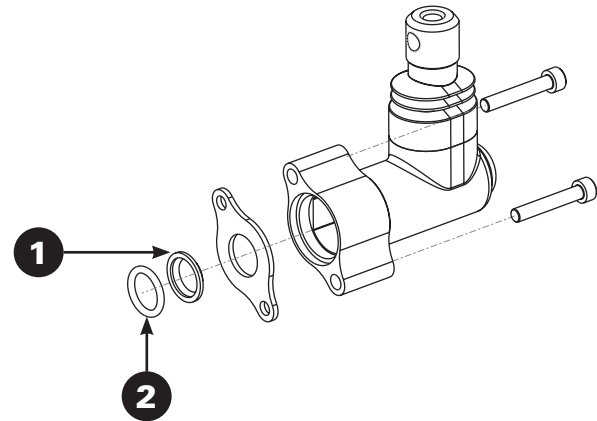
3.0 Work section

3.6.18. Interface seal kit for manual actuations:

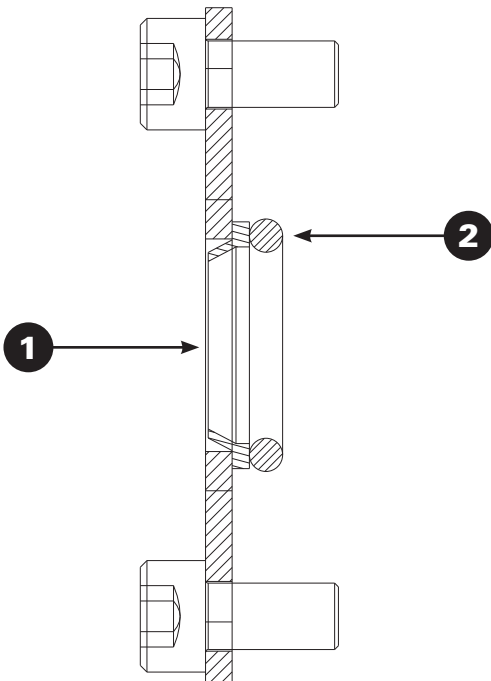
(Spring end)



(Lever end)



Manual actuation without lever box:



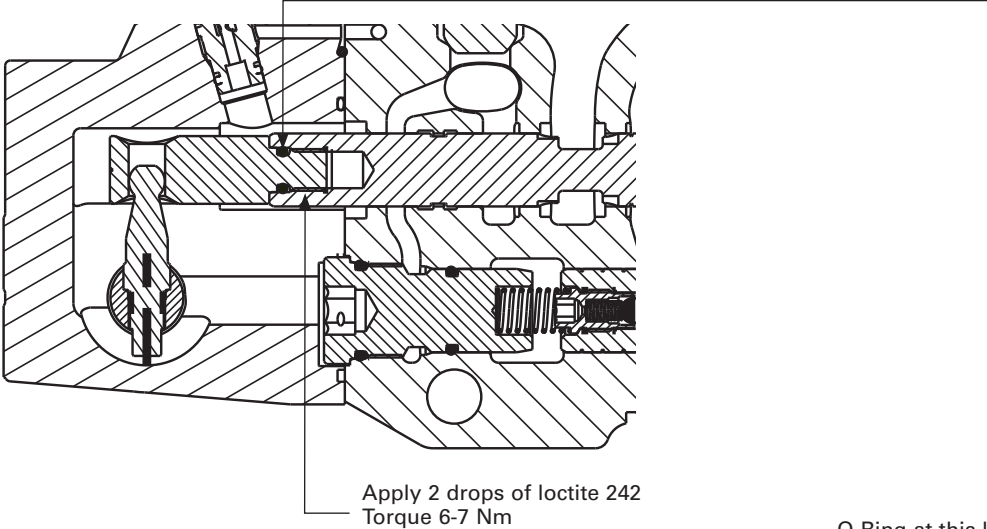
Seal Kit for Manual Actuation With/Without Lever Box
Seal Kit P/N : 9901169-000

Ref #	Eaton part #	Material / Size	Durometer	Qty
1	6037239-001	Dust Seal	--	1
2	6037168-015	Nitrile 14.00*2.50	70	1

3.0 Work section

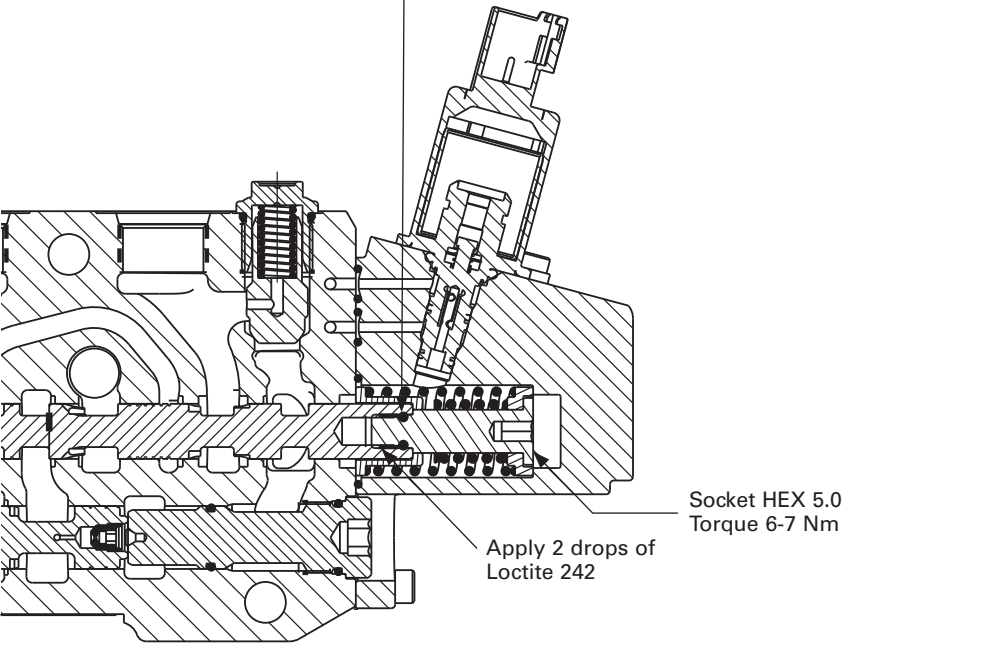
3.7 Spool End Arrangements

3.7.1. Spool with lever override:



O-Ring at this location is applicable only for pre-comp work Sections.
O-ring P/N: 16003-4-90

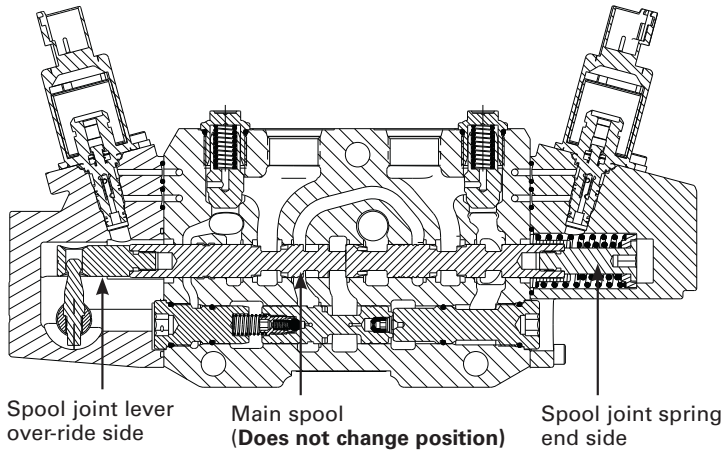
3.7.2. Spool-spring arrangement:



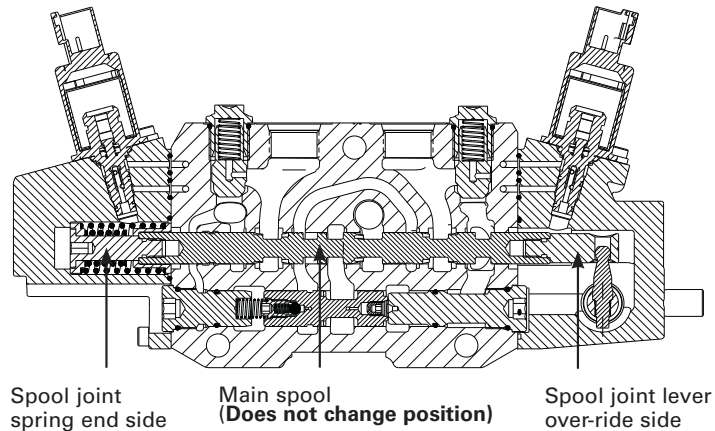
3.0 Work section

Procedure to change the build of a section from LH to RH or RH to LH build

Work section assembly LH build



Work section assembly RH build



To convert LH to RH build, below procedure is to be followed.

- Remove actuator end cap assemblies.
- Remove spool from section body from spring end side. It will be observed that spring sub-assembly will be in assembled condition to the spool.
- Preferably, it is best to mount spool into a collet in order to secure it. Spool can also be placed inside a rubber hose and clamped into a vise to avoid damage to spool diameter.
- Remove spool joints from both ends of the spool. It may take considerable torque to overcome the loctite while removing spool joints.
- Reinstall the spool joint and spool joint with spring assembly onto the opposite ends of the spool.
- Re-install the spool into work section. Please note spool orientation should be same and only spool joint orientation will be swapped.
- Then reassemble spring cap actuations by installing them on the opposite section ends. Care must be taken to ensure all cap orings are properly installed before attaching the cap to the section housing. Ensure the override pawl engages the spool clevis.
- Similar procedure can be followed to change from RH build to LH build.

3.0 Work section

3.8 Pilot valves:

General data

Installation position:	Any
Weight:	175g
Protection class	DIN 40050-9; IP6k 6/IPX9K
Electrical connection:	Deutsch connector DT04-2P
Min supply voltage:	12VDC/24VDC
Supply pressure:	35 ±2 BAR
Max supply pressure:	50 BAR
Standards cited:	ISO: 4406 DIN EN 60068 DIN EN 51524 DIN 40050-9 DIN 50021-SS
Usage of dropped down valves:	No warranty of valve function can be given if dropped down valves are mounted
Varnishing of connector:	No warranty of the connector resistance can be given by varnishing the connector
Screen function:	Specified values refer to clean screens, if more than 50% of the screen is contaminated, a break of the screen can follow.

Electrical data

Voltage	12V DC	24V DC
R20 (Ohm)	4.72 ±5%	20.8 ±5%
I (mA)	600 ±10	300 ±10
I _{max} (mA)	1500 ±10	750 ±10

Flow measurement P-A

Flow (lpm)	Delta P (bar)	Inlet (bar)
4	<12	35±2

Internal leakage - 35 bar supply

Leakage energized:	A-T	<150 (ml/min)
Leakage de-energized:	P-T	<30 (ml/min)

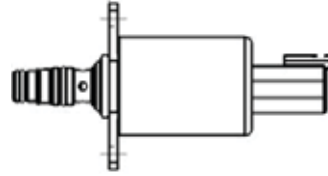
Temperature operating range

Ambient temperature:	-30°C to +80°C
Fluid temperature:	-30°C to +105°

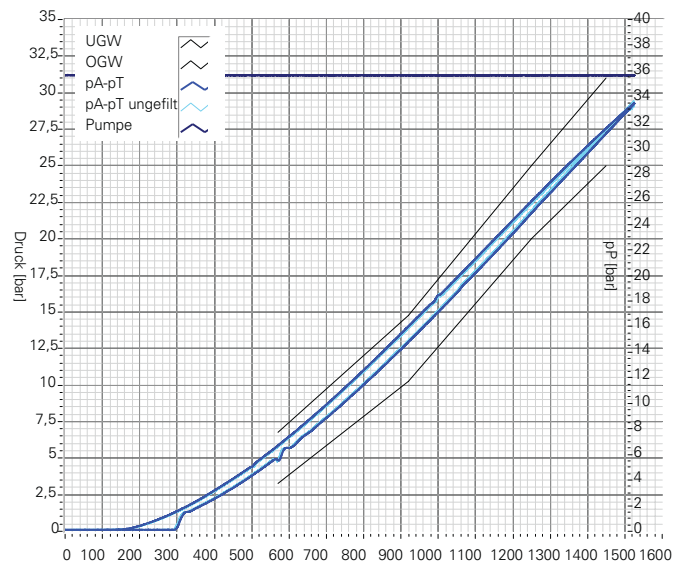
Ref: Thomas product specification LHP-39

Note: Pilot valve part numbers are mentioned on work section assembly part list (Section 5.2)

Typical performance

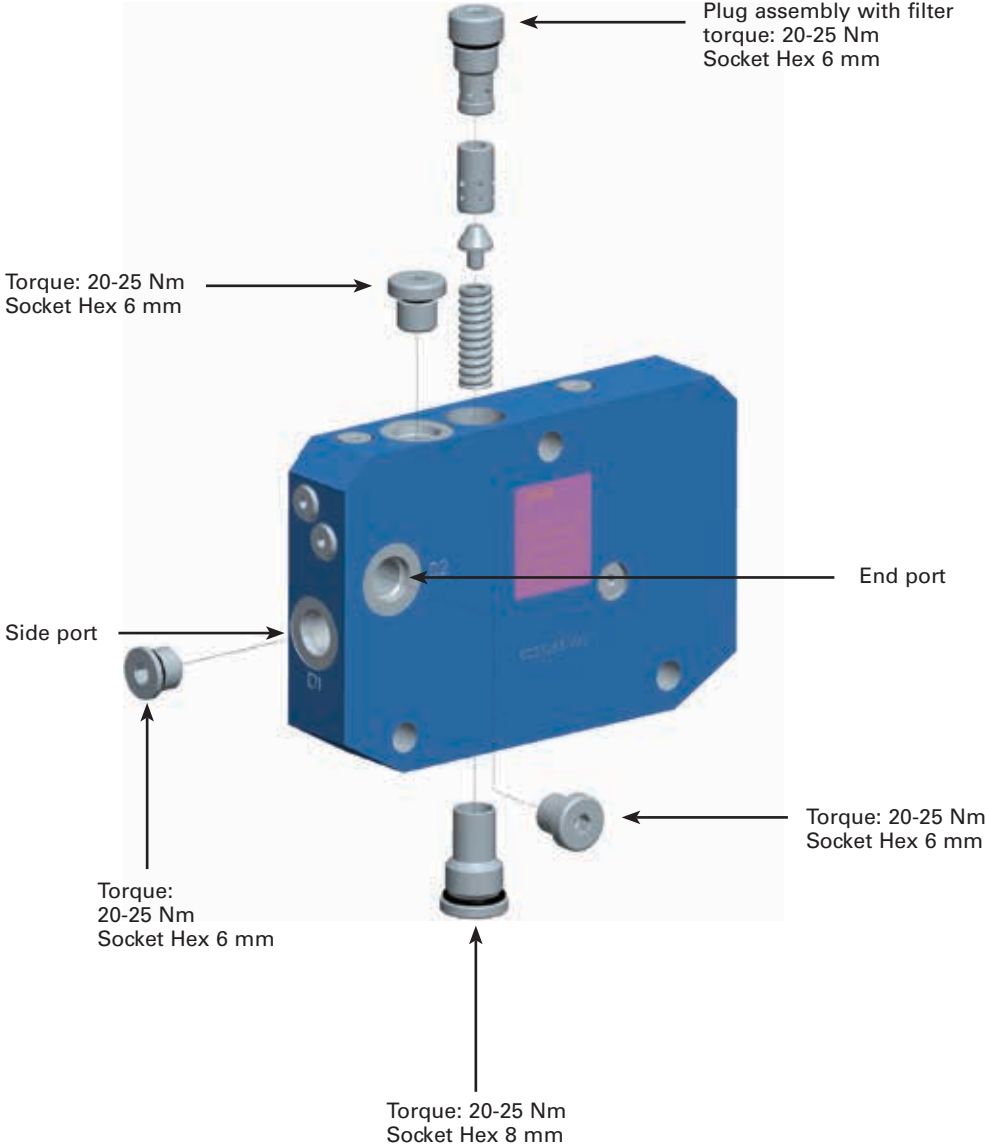


P-I: Characteristic curve (12V)



4.0 End covers

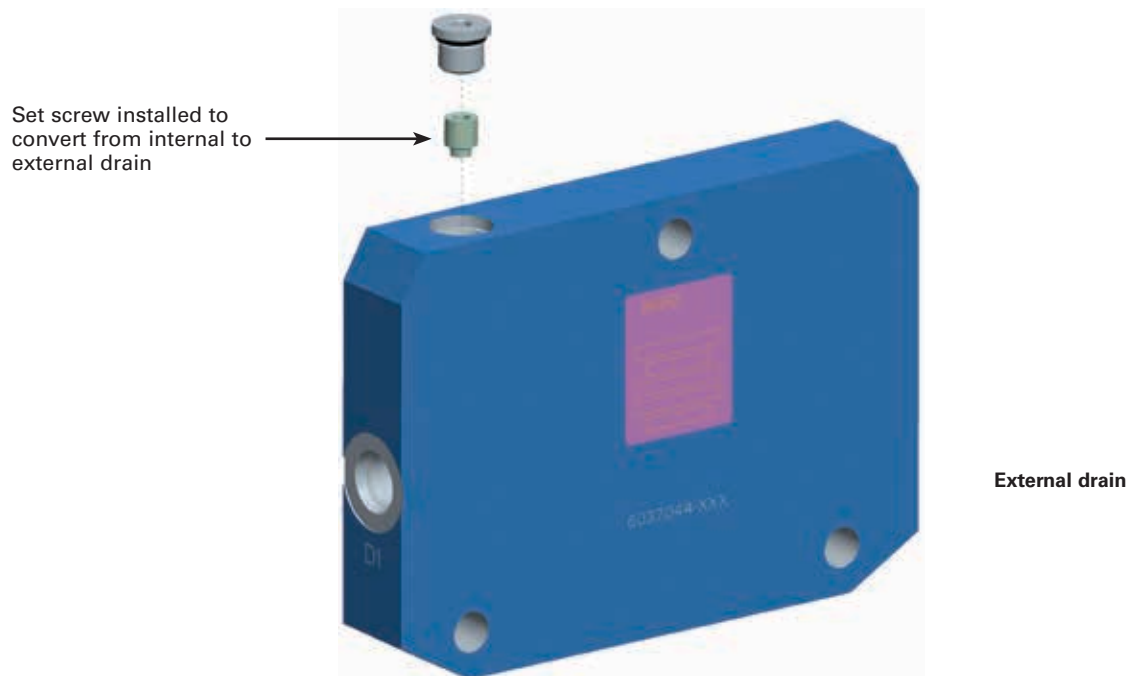
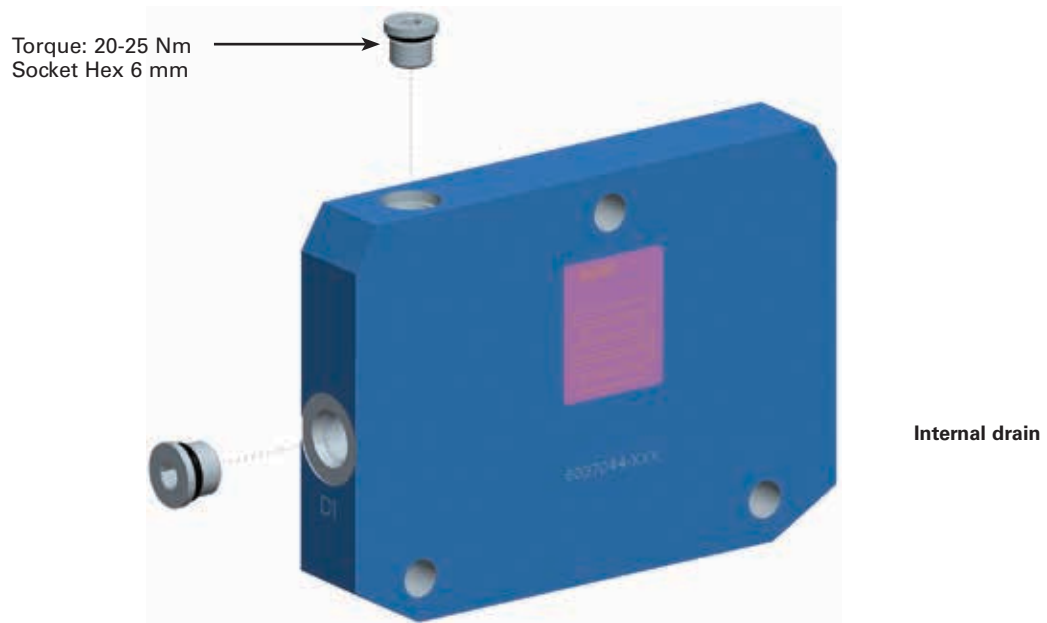
4.1 EH End plate assembly:



Note: Refer Section 5.3.1 For conversion between end port to side port option

4.0 End covers

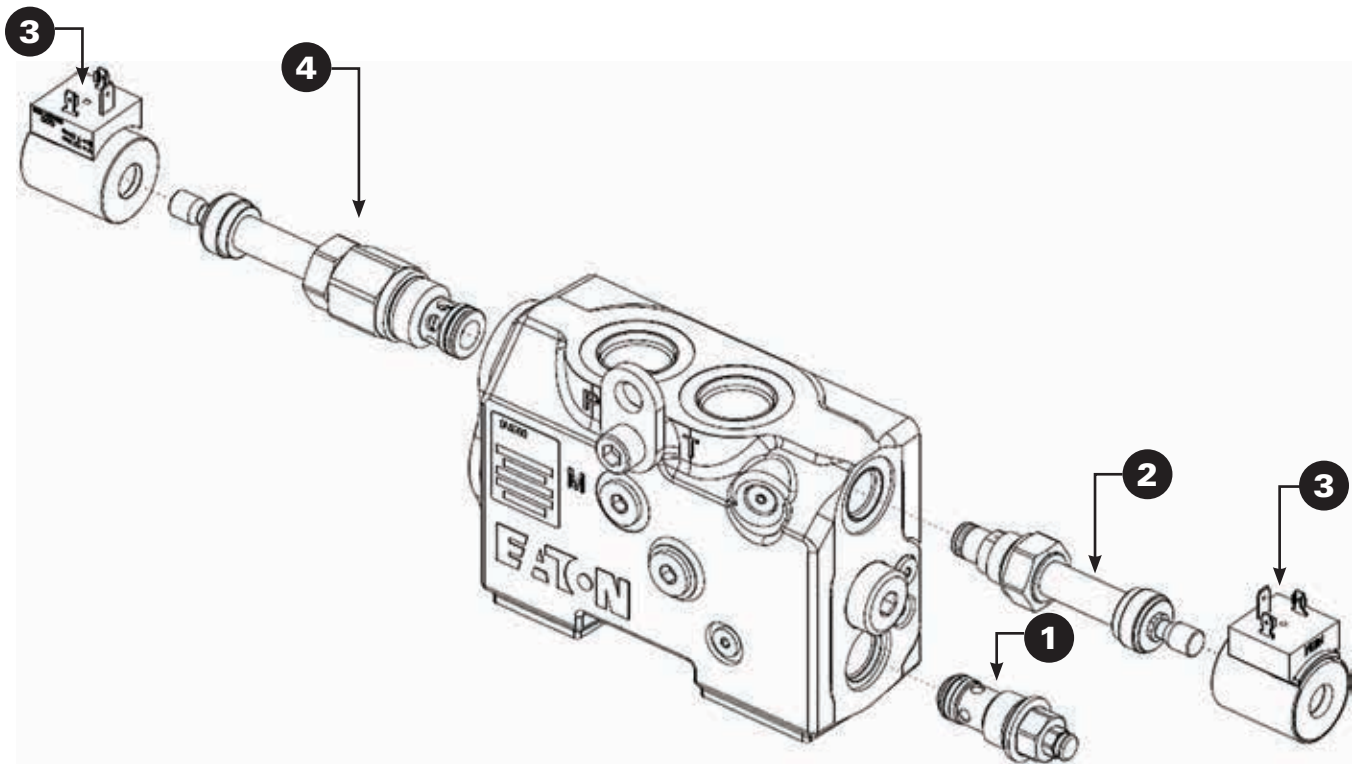
4.2 Hyd End plate assembly: Internal and external drain port option



Note: Refer section 5.3.2 for conversion between internal and external drain option.

5.0 Part list

5.1 Inlet assembly:

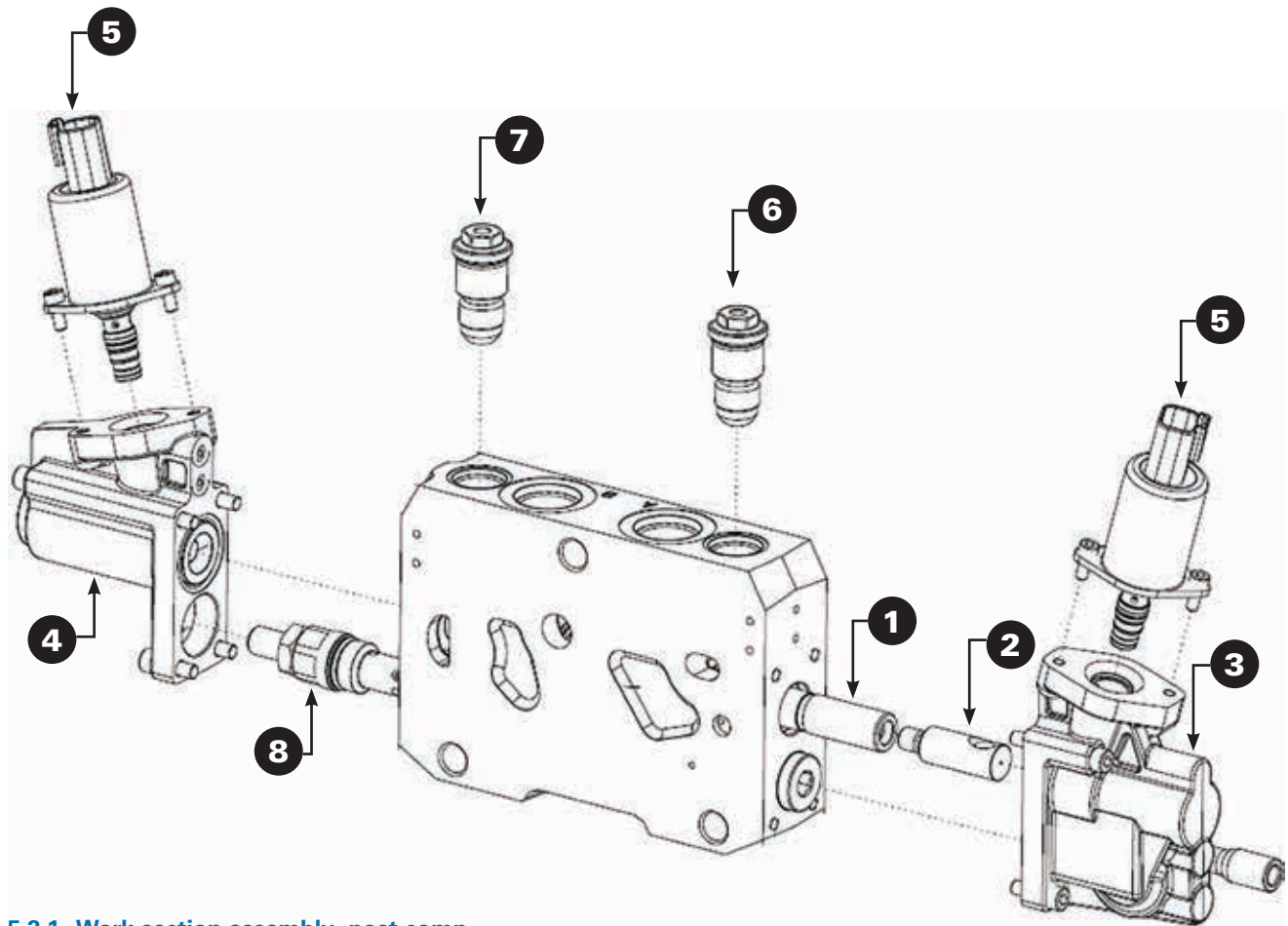


Ref #	Description	Eaton P/N	Qty	Note
1	LS pressure relief valve	6037161-001*	1	Setting range: 50-250 bar
		6037161-002*	1	Setting range: 255-350 bar
	LS relief plug	6037291-001	1	
2	LS plug at LS Dump valve	6036884-001	1	
	LS electric dump valve	6037163-001	1	For coil order per ref #3
3	Coil kit	6039324-001	1	DIN 43650 ISO 4400 - 12 Vdc
		6039324-002	1	DIN 43650 ISO 4400 - 24 Vdc
		6039324-003	1	DEUTSCH DT 4 - 12 Vdc
		6039324-004	1	DEUTSCH DT 4 - 24 Vdc
		6039324-005	1	AMP JUNIOR - 12 Vdc
		6039324-006	1	AMP JUNIOR - 24 Vdc
4	Full flow pilot operated pressure relief valve	02-164229*	1	
	Full flow relief plug assembly	34600-302	1	
	Full flow elec dump valve	6036882-001	1	For Coil Order Per Ref #3

Note: 1) Cannot have full flow relief valve and full flow dump valve in the same inlet
 2) Full flow relief valve and full flow dump cavities are different. These are not interchangeable.
 3) *This valve pressure setting will be as per CLS inlet model code

5.0 Part list

5.2 Work section assembly:



5.2.1. Work section assembly- post comp.

Ref #	Description	Eaton P/N	Qty	Note	
1	D- Double acting (4 way) cylinder	6036979-001	1	Spool 5 L/Min	
		6036981-001	1	Spool 10 L/Min	
		6036977-001	1	Spool 15 L/Min	
		6036982-001	1	Spool 25 L/Min	
		6036976-001	1	Spool 35 L/Min	
		6039964-001	1	Spool 40 L/Min	
		6036974-001	1	Spool 50 L/Min	
		6036978-001	1	Spool 65 L/Min	
		6036975-001	1	Spool 80 L/Min	
		6036980-001	1	Spool 100 L/Min	
		H- Bi-Directional (4 way) motor, fu ll open to tank in neutral	6036991-001	1	Spool 5 L/Min
			6037261-001	1	Spool 10 L/Min
			6037262-001	1	Spool 15 L/Min
			6036990-001	1	Spool 25 L/Min
	6036986-001		1	Spool 35 L/Min	
	6037260-001		1	Spool 50 L/Min	
	6036989-001		1	Spool 65 L/Min	
	6036983-001	1	Spool 80 L/Min		
	6037226-001	1	Spool 100 L/Min		

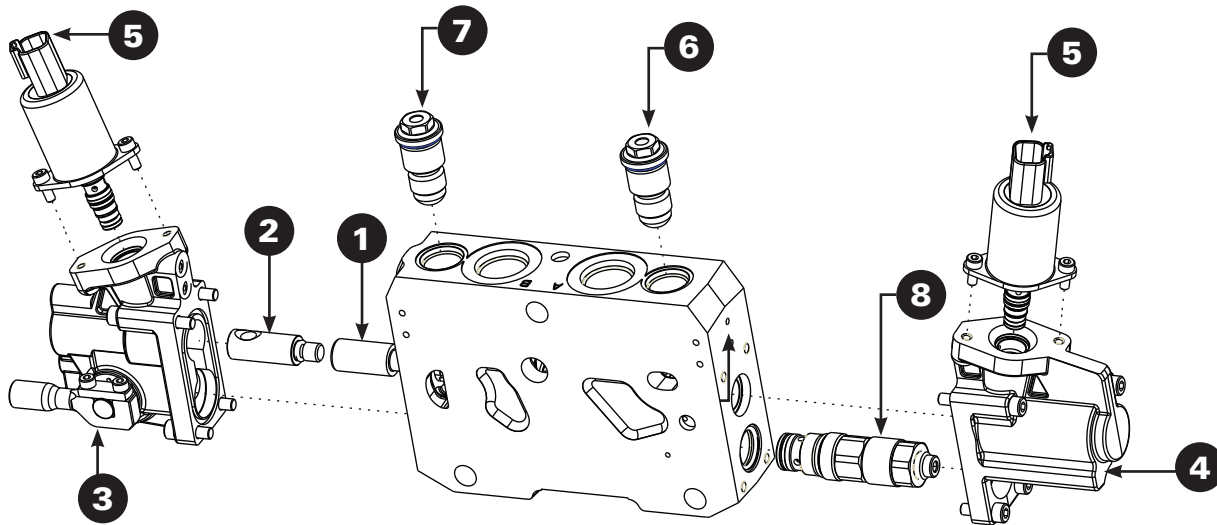
Ref #	Description	Eaton P/N	Qty	Note
1	F - Double acting (4 way) cylinder with fourth position float	6036985-001	1	Spool 10 L/Min
		6036988-001	1	Spool 35 L/Min
		6036987-001	1	Spool 65 L/Min
		6036984-001	1	Spool 80 L/Min
2	Spool end kit	6038704-001	1	For manual actuation exposed connection
		6038681-001	1	For manual with enclosed lever box
		6037442-001	1	For hydraulic and EH
		6041533-001	1	For manual float enclosed lever
		6042014-001	1	For hydraulic float
		6041968-001	1	For EH float
3	Actuation S/A (with or without lever over-ride side)	6037235-001	1	Manual with enclosed lever box
		6037236-001	1	Manual with exposed spool connection
		6041381-001	1	Manual with enclosed lever box - float
		6037363-001	1	Hydraulic with top ports (BSP-1/4" Port)
		6037363-002		Hydraulic with top ports (SAE-6 Port)
		6037371-001	1	Hydraulic with end ports (BSP-1/4" Port)
		6037371-002		Hydraulic with end ports (SAE-6 Port)
		6037375-001	1	Hydraulic with stroke limiter (BSP-1/4" Port)
		6037375-002		Hydraulic with stroke limiter (SAE-6 Port)
		6037388-001	1	Hydraulic with lever over-ride (BSP-1/4" Port)
		6037388-002		Hydraulic with lever over-ride (SAE-6 Port)
		6041775-001	1	Hydraulic with lever over-ride & Stroke Limiter (BSP-1/4" Port)
		6041775-002		Hydraulic with lever over-ride & Stroke Limiter (SAE-6 Port)
		6041652-001	1	EH with lever over-ride
		6037211-001	1	EH with lever over-ride & stroke limiter
		6041653-001	1	EH without lever over-ride
		6037213-001	1	EH without lever over ride with stroke limiter
		6041657-001	1	EH with lever over-ride & Hyd port option (BSP-1/4" Port)
		6041657-002		EH with lever over-ride & Hyd port option (SAE-6 Port)
		6037215-001	1	EH without lever over-ride & Hyd port option (BSP-1/4" Port)
6037215-002		EH without lever over-ride & Hyd port option (SAE-6 Port)		
4	Actuation S/A (spring side)	6041336-001	1	Manual standard spring
		6037240-001	1	Manual detent in A and B
		6041366-001	1	Manual float detent in 4th position
		6037345-001	1	Manual spool position indicator
		6037364-001	1	Hydraulic with top ports (BSP-1/4" Port)
		6037364-002		Hydraulic with top ports (SAE-6 Port)
		6037372-001	1	Hydraulic with end ports (BSP-1/4" Port)
		6037372-002		Hydraulic with end ports (SAE-6 Port)
		6037376-001	1	Hydraulic with stroke limiter (BSP-1/4" Port)
		6037376-002		Hydraulic with stroke limiter (SAE-6 Port)
		6037409-001	1	Hydraulic with top ports on EH housing (BSP-1/4" Port)
		6037409-002		Hydraulic with top ports on EH housing (SAE-6 Port)
		6041654-001	1	EH Actuation
		6037249-001	1	EH Actuation with stroke limiter
		6037296-001	1	EH Spool position indicator
		6041658-001	1	EH With Hyd port option (BSP-1/4" Port)
		6041658-002		EH with Hyd port option (SAE-6 Port)

Ref #	Description	Eaton P/N	Qty	Note
5	Pilot valve (proportional pressure reducing valve)	308AA00654A	2	Pilot valve-12V-deutsch (DT04-2P)
		308AA00656A		Pilot valve-24V-deutsch (DT04-2P)
		308AA00680A		Pilot valve-12V-Amp Jr connector
		308AA00681A		Pilot valve-24V-Amp Jr connector
6	Port-A option function	6037175-001	1	A - Anticavitation
		6037357-XXX*		R - Anticavitation/relief function
		6037664-001		P - Plugged - work port relief cavities machined and plugged
7	Port-B option function	6037175-001	1	A - Anticavitation
		6037357-XXX*		R - Anticavitation/relief function
		6037664-001		P - Plugged - Work port relief cavities machined and plugged
8	Local load sense relief valve	6037359-001	1	Local LS RV, 30-80 Bar
		6037359-002		Local LS RV, 85-200 Bar
		6037359-003		Local LS RV, 205-350 Bar
	Local load sense plug	6037303-001		Plug assembly

* Pressure Setting To Be Mentioned At XXX Between 040-350 Bar In 10 Bar Increments

5.0 Part list

5.2.2 Work section assembly - pre comp.



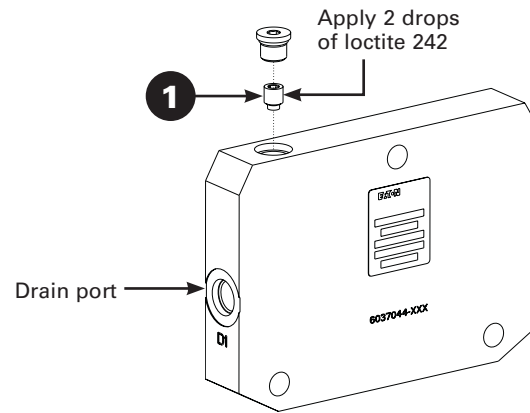
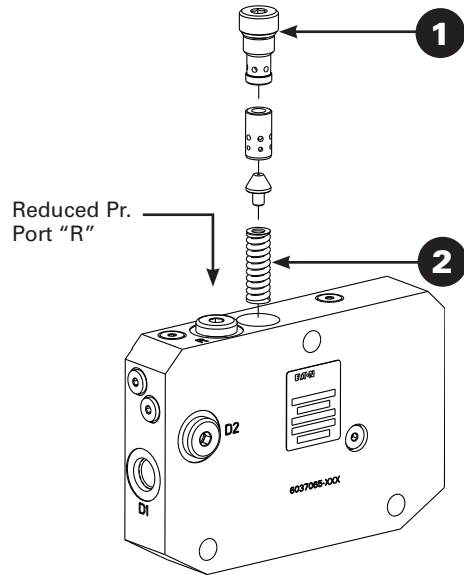
Ref #	Description	Eaton P/N	Qty	Note
1	D- Double acting (4 way) cylinder	6037055-001	1	Spool 15 L/Min
		6037056-001	1	Spool 25 L/Min
		6037057-001	1	Spool 40 L/Min
		6037058-001	1	Spool 65 L/Min
		6037062-001	1	Spool 15 L/Min
		6037061-001	1	Spool 25 L/Min
		6037060-001	1	Spool 40 L/Min
H- Bi-Directional (4 way) motor, full open to tank in neutral	6037059-001	1	Spool 65 L/Min	
	6037060-001	1	Spool 40 L/Min	
	6037061-001	1	Spool 25 L/Min	
	6037062-001	1	Spool 15 L/Min	
	6037059-001	1	Spool 65 L/Min	
2	Spool end kit	6038708-001	1	For hydraulic and EH actuation
		6038706-001	1	For manual with enclosed lever
		6038707-001	1	For manual with exposed spool
3	Actuation S/A (with or without lever over-ride side)	6037235-001	1	Manual with enclosed lever box
		6037236-001	1	Manual with exposed spool connection
		6037363-001	1	Hydraulic with top ports (BSP-1/4" Port)
		6037363-002	1	Hydraulic with top ports (SAE-6 Port)
		6037371-001	1	Hydraulic with end ports (BSP-1/4" Port)
		6037371-002	1	Hydraulic with end ports (SAE-6 Port)
		6037375-001	1	Hydraulic with stroke limiter (BSP-1/4" Port)
		6037375-002	1	Hydraulic with stroke limiter (SAE-6 Port)
		6037388-001	1	Hydraulic with lever over-ride (BSP-1/4" Port)
		6037388-002	1	Hydraulic with lever over-ride (SAE-6 Port)
		6041775-001	1	Hydraulic with lever over-ride & stroke limiter (BSP-1/4" Port)
		6041775-002	1	Hydraulic with lever over-ride & stroke limiter (SAE-6 Port)
		6041652-001	1	EH With lever over-ride
		6037211-001	1	EH With lever over-ride & stroke limiter
		6041653-001	1	EH Without lever over-ride
6037213-001	1	EH without lever over ride with stroke limiter		
6041657-001	1	EH with lever over-ride & Hyd port option (BSP-1/4" Port)		
6041657-002	1	EH with lever over-ride & Hyd port option (SAE-6 Port)		
6037215-001	1	EH without lever over-ride & Hyd port option (BSP-1/4" Port)		
6037215-002	1	EH without lever over-ride & Hyd port option (SAE-6 Port)		

Ref #	Description	Eaton P/N	Qty	Note
4	Actuation S/A (spring side)	6037218-001	1	Manual standard spring
		6037385-001	1	Hydraulic with top ports (BSP-1/4" Port)
		6037385-002		Hydraulic with top ports (SAE-6 Port)
		6037391-001	1	Hydraulic with end ports (BSP-1/4" Port)
		6037391-002		Hydraulic with end ports (SAE-6 Port)
		6037392-001	1	Hydraulic with stroke limiter (BSP-1/4" Port)
		6037392-002		Hydraulic with stroke limiter (SAE-6 Port)
		6037305-001	1	Hydraulic with top ports on EH housing (BSP-1/4" Port)
		6037305-002		Hydraulic with top ports on EH housing (SAE-6 Port)
		6041655-001	1	EH Actuation
		6037294-001	1	EH Actuation with stroke limiter
		6037295-001	1	EH Spool position indicator
		6041659-001	1	EH With Hyd port option (BSP-1/4" Port)
		6041659-002		EH With Hyd port option (SAE-6 Port)
5	Pilot valve (proportional pressure reducing valve)	308AA00654A	2	Pilot Valve-12V-DEUTSCH (DT04-2P)
		308AA00656A		Pilot Valve-24V-DEUTSCH (DT04-2P)
		308AA00680A		Pilot Valve-12V-Amp Jr Connector
		308AA00681A		Pilot Valve-24V-Amp Jr Connector
6	Port-A option function	6037175-001	1	A- Anticavitation
		6037357-XXX*		R-Anticavitation/relief function
		6037664-001		P- Plugged - work port relief cavities machined and plugged
7	Port-B option function	6037175-001	1	A- Anticavitation
		6037357-XXX*		R-Anticavitation/relief function
		6037664-001		P- Plugged - work port relief cavities machined and plugged
8	Local Load Sense Relief Valve	6039303-001	1	Local LS RV, 50-170 Bar
		6039303-002		Local LS RV, 175-350 Bar
	Local Load Sense Plug	6038732-001		Plug assembly

* Pressure setting to be mentioned at XXX between 040-350 Bar in 10 Bar increments

5.0 Part list

5.3 End plate assembly:



5.3.1 EH End plate assembly

Ref #	Description	Eaton P/N	Qty	Notes
1	Plug S/A with filter screen	6037466-001	1	
2	Compression spring	6036899-001	1	-

Note: 1) Sidedrain port option shown. To convert to end drain port option exchange plugs at ports "D1" and "D2" as required.
2) External reduced pressure port "R" is available as shown. Currently shown it plugged with standard SAE-6 or 1/4" BSP plug as per model code selection.

5.3.2 Hydraulic / Manual end plate assembly

Ref #	Description	Eaton P/N	Qty	Notes
1	Set screw	16139-506	1	

Note: External drain port option shown. To convert to internal drain, item #1 can be omitted and drain port can be plugged with standard SAE-6 Or 1/4" BSP plug as per model code selection .

6.0 Trouble shooting

Potential issue	Possible cause (s)	Checkup	Remedy
External leakage	Interface O-ring failures between a. Inlet and work section b. Adjacent work sections c. Work section and end cap d. End cap and work section	Dis-assemble and inspect for O-ring damage or missing	Replace damaged/missing O-rings
	a. Low tie rod tightening torque b. Low end cap mounting screw tightening torque c. Low cartridge valve torques	Check tie rod, end cap clamping and cartridge valve torque	Tighten tie rod, end cap mounting screw and cartridge valve with specified clamping torque
No movement of any attachment when command signal is given (No flow through any of the section)	Inlet compensator spool stuck open due to contamination	a. Measure inlet pressure and LS pressure b. Remove and inspect inlet compensator spool and bore c. Measure oil cleanliness level	a. Clean the spool and bore, if damaged replace the inlet assly b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Inlet compensator spring break	a. Measure inlet pressure and LS pressure b. Remove inlet compensator and inspect spring	Replace the spring if found broken
	Inlet relief valve issue (Spring break or spool stuck open)	Measure inlet pressure and LS pressure	Replace inlet relief valve if found faulty.
	Incorrect inlet main relief or inlet LS relief setting	Measure inlet pressure and LS pressure	Adjust the relief setting to required pressure.
	Pressure reducing valve (PRV) spool stuck closed or high leakage between PRV spool and seat (Only for electrohydraulic end cap)	a. Measure reduced pressure b. Remove PRV and inspect reducing valve spool , poppet and bore c. Measure oil cleanliness level	a. Clean reducing valve spool and bore and if damaged replace b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Pressure Reducing Valve (PRV) spring break (Only for electrohydraulic end cover)	a. Measure reduced pressure. b. Remove PRV and inspect reducing valve spring	If spring found broken replace the PRV assembly
	Filter in PRV valve getting clogged	a. Measure reduced pressure b. Remove PRV and inspect the filter c. Measure oil cleanliness	a. Replace the plug assembly with filter b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
No movement in a particular attachment when command signal is given (No flow through particular section)	Main spool stuck	a. Measure inlet, work port and load sense pressure. b. Remove and inspect spool and bore. c. Ensure tie rod torque are not high. d. Measure Oil cleanliness level	a. Clean the main spool and bore. If damaged replace the spool and body b. Apply specified tie rod torque. c. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Main spool mounted backwards	a. Remove main spool and check LS groove location	a. Ensure LS groove on spool is towards 'A' port side
	Section compensator Spool stuck	a. Measure inlet, work port and load sense pressure b. Remove and inspect spool and bore c. Measure Oil cleanliness level	a. Clean the compensator spool and bore. If damaged replace the spool and body b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Section compensator orifice clogged due to contamination	a. Measure inlet, work port and load sense pressure b. Remove spool c. Measure Oil cleanliness level	a. Replace the Orifice b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	No electrical signal to EH Pilot valve (EH actuation).	Verify the pilot valve is receiving electrical signal with proper voltage and current	Ensure proper electrical signal is available to the pilot valves
	Incorrect setting of section LS relief valve	Measure LS pressure and Inlet pressure	Adjust the LS relief valve to required pressure and tighten the lock nut
	Loosened adjusting screw of LS relief valve		Adjust the LS relief valve to required pressure and tighten the lock nut
	EH Pilot valve malfunction (EH actuation)	Replace and test with new pilot valve	Replace EH Pilot valve if found faulty
	Less pilot pressure supply to actuation (Hydraulic actuation)	Measure pilot pressure	Ensure proper pilot pressure signal is supplied to the actuations.

Potential Issue	Possible cause (s)	Checkup	Remedy
Low attachment speed (Low flow)	Inlet comp spring break	a. Measure inlet pressure and LS pressure b. Remove inlet compensator and inspect spring	Replace the spring if found broken
	Incorrect inlet main relief or inlet LS relief setting	Measure inlet pressure and LS pressure	Adjust the relief setting to required pressure.
	Incorrect Relief/Anti Cav valve setting	Measure inlet pressure, work port pressure and LS pressure	Replace relief/anti cav valve with correct setting
	Inadequate electrical signal to EH Pilot valve (EH actuation).	Verify the pilot valve is receiving electrical signal with proper voltage and current	Ensure proper electrical signal is available to the pilot valves
	EH Pilot valve malfunction (EH actuation)	Replace and test with new pilot valve	Replace EH pilot valve if found faulty.
	Inadequate pilot pressure supply to actuation (Hydraulic actuation)	Measure pilot pressure	Ensure proper pilot pressure signal is supplied to the actuators.
	In correct stroke limiter setting	Move the stroke limiter completely out and check the speed	adjust the stroke limiter to proper setting
	Pressure Reducing Valve (PRV) spool stuck or high leakage between PRV spool and seat (Only for EH end cover)	a. Measure reduced pressure b. Remove PRV and inspect reducing valve spool , poppet and bore c. Measure oil cleanliness level	a. Clean reducing valve spool and bore and if damaged replace b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
Attachment drops down in neutral condition (No load holding)	Filter in PRV valve getting clogged	a. Measure reduced pressure b. Remove PRV and inspect the filter c. Measure oil cleanliness	a. Replace the plug assembly with filter b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Main Spool stuck due to contamination	a. Measure inlet, work port and load sense pressure. b. Remove and inspect spool and bore. c. Measure Oil cleanliness level	a. Clean the main spool and bore. If damaged replace the spool and body b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Wrong Main spool assembled, Motor spool instead of cylinder spool	a. Remove the main spool and confirm motor (H) or cylinder spool (D)	a. If wrong spool installed, replace the spool and then tighten the spool ends with specified torque
	Spool wear	a. Remove and inspect spool and bore. b. Measure Oil cleanliness level	a. Replace the spool if damaged b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Leakage through Aux Valve	c. Remove the aux valve and inspect the seat of the aux valve a. Measure Oil cleanliness level	a. Replace the aux valve if the seat is damaged b. Ensure oil cleanliness level of 18/16/14 per ISO 4406
	Incorrect Relief/Anti Cav setting	a. Measure inlet pressure, work port pressure and LS pressure	a. Replace relief/anti cav with correct setting

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