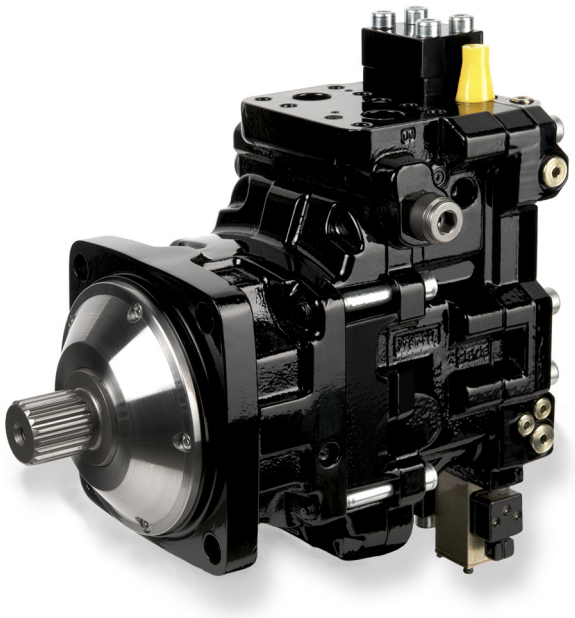
Bulletin HY30-5510-M1/UK

Service Manual
Series V14

Effective: October 2014
Supersedes: May 2012



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Conversion factors

1 kg	= 2.2046 lb
1 N	= 0.22481 lbf
1 bar	= 14.504 psi
1 l	= 0.21997 UK gallon
1 l	= 0.26417 US gallon
1 cm^3	= 0.061024 in^3
1 m	= 3.2808 feet
1 mm	= 0.03937 in
1°C	= 1.8°F + 32

General information

Series V14 is a new generation of variable displacement motors developed and manufactured by Parker Hannifin, Pump and Motor Division.
The V14 is a further development of our well known V12 motor. It is designed for both open and closed circuits, intended particularly for mobile applications.

New features:

- Increased shaft speeds
- Improved sealing
- Faster control response
- Improved shaft support
- Additional integrated functions added
- New control, HPC, for winch

...mainly thanks to:

- Re-designed piston
- O-ring seals between housings
- Enlarged setting piston
- Increased size control device
- Tapered roller bearings

Important features carried over from previous motors:

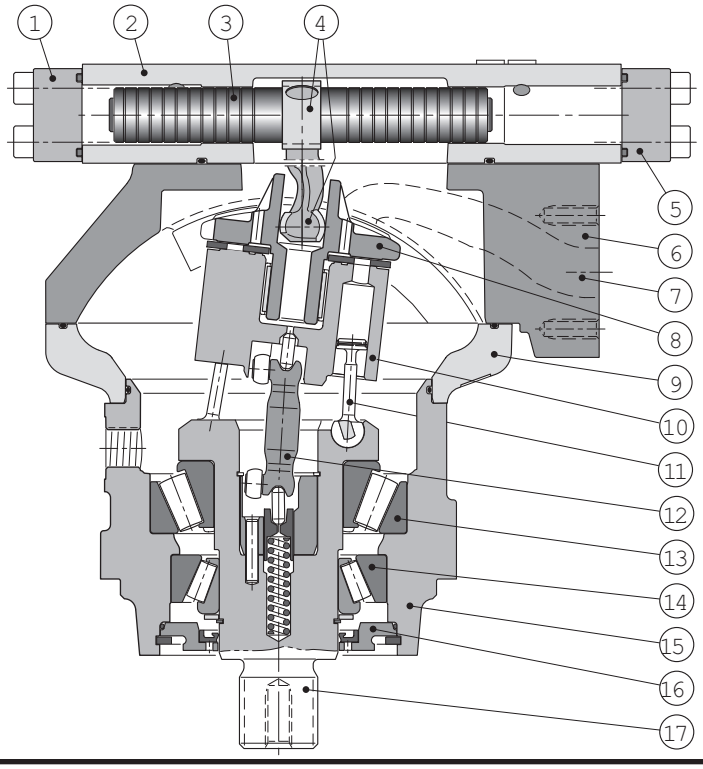
- Operating pressures to 480 bar
- High speeds, thanks to low weight pistons with laminated piston rings and a very compact design of the rotating parts.
- High overall efficiency throughout the entire displacement range
- 9 pistons provide high start-up torque and smooth operation
- Wide displacement range - 5:1
- Small envelope size and high power-to-weight ratio
- Low noise levels due to the compact, sturdy design and smooth fluid passages
- Positive piston locking, strong synchronizing shaft, heavy-duty bearings and a small number of parts add up to a very robust motor with long service life and proven reliability.

Specifications

V14 frame size	110	160
Displacement [cm³/rev]		
at 35° (max)	110	160
at 6,5° (min)	22	32
Operating pressure [bar]		
max intermittent	480	480
max continuous	420	420
Operating speed [rpm]		
max intermittent at 35° [1]	3900	3400
max continuous at 35°	3400	3000
max intermittent at 6.5°-20° [1]	6500	5700
max continuous at 6.5°-20°	5700	5000
min continuous	50	50
Flow [l/min]		
max intermittent	430	550
max continuous	375	480
Output torque [Nm]		
at 100 bar (theor.)	175	255
Max output power [kW]	262	335
Corner power [kW]		
intermittent	570	730
continuous	440	560
Mass moment of inertia		
($x10^{-3}$) [kg m^2]	8.2	14.5
Weight [kg]	54	68

[1] Max 6 seconds in any one minute.

V14 cross section



1. End cover, min displ.
2. Control module
3. Setting piston
4. Connecting arm
5. End cover, max displ.
6. Connection module
7. Main pressure port
8. Valve segment
9. Intermediate housing
10. Cylinder Barrel
11. Spherical piston with laminated piston ring
12. Synchronizing shaft
13. Inner roller bearing
14. Outer roller bearing
15. Bearing housing
16. Shaft seal with retainer
17. Output shaft

Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

Displacement limiter V14-110

Setting angle [degree]	Displace-ment [cm³/varv]	Shim maximum side [mm]	Shim mini-mum side [mm]		Setting angle [degree]	Displace-ment [cm³/varv]	Shim maximum side [mm]	Shim mini-mum side [mm]
6,5	22	58,5	9,5		20,4	67	32,0	35,5
6,9	23	58,0	10,0		20,8	68	31,5	36,0
7,2	24	57,5	10,5		21,1	69	31,0	37,0
7,5	25	57,0	11,0		21,4	70	30,0	37,5
7,8	26	56,0	11,5		21,7	71	29,5	38,0
8,1	27	55,5	12,0		22,1	72	29,0	39,0
8,4	28	55,0	12,5		22,4	73	28,0	39,5
8,7	29	54,5	13,0		22,7	74	27,5	40,0
9,0	30	54,0	13,5		23,0	75	27,0	41,0
9,3	31	53,5	14,0		23,3	76	26,0	41,5
9,6	32	53,0	15,0		23,7	77	25,5	42,0
9,9	33	52,5	15,5		24,0	78	25,0	43,0
10,2	34	52,0	16,0		24,3	79	24,0	43,5
10,5	35	51,5	16,5		24,7	80	23,5	44,5
10,8	36	51,0	17,0		25,0	81	23,0	45,0
11,1	37	50,0	17,5		25,3	82	22,0	45,5
11,4	38	49,5	18,0		25,6	83	21,0	46,5
11,7	39	49,0	18,5		26,0	84	20,5	47,0
12,0	40	48,5	19,0		26,3	85	20,0	48,0
12,3	41	48,0	20,0		26,6	86	19,0	48,5
12,7	42	47,5	20,5		27,0	87	18,5	49,5
13,0	43	46,5	21,0		27,3	88	17,5	50,0
13,3	44	46,0	21,5		27,7	89	17,0	51,0
13,6	45	45,5	22,0		28,0	90	16,0	51,5
13,9	46	45,0	22,5		28,3	91	15,0	52,5
14,2	47	44,5	23,0		28,7	92	14,5	53,0
14,5	48	44,0	24,0		29,0	93	13,5	54,0
14,8	49	43,0	24,5		29,4	94	13,0	55,0
15,1	50	42,5	25,0		29,7	95	12,0	55,5
15,4	51	42,0	25,5		30,0	96	11,0	56,5
15,7	52	41,5	26,0		30,4	97	10,5	57,5
16,0	53	41,0	27,0		30,7	98	9,5	58,0
16,4	54	40,5	27,5		31,1	99	9,0	59,0
16,7	55	40,0	28,0		31,4	100	8,0	60,0
17,0	56	39,0	28,5		31,8	101	7,0	60,5
17,3	57	38,5	29,0		32,1	102	6,0	61,5
17,6	58	38,0	30,0		32,5	103	5,5	62,5
17,9	59	37,0	30,5		32,8	104	4,5	63,5
18,2	60	36,5	31,0		33,2	105	3,5	64,0
18,5	61	35,5	32,5		33,6	106	2,5	65,0
18,9	62	35,5	32,5		33,9	107	1,5	66,0
19,2	63	34,5	33,0		34,3	108	0,5	67,0
19,5	64	34,0	33,5		34,5	109	0,0	68,0
19,8	65	33,5	34,0		34,5	110	0,0	69,0
20,1	66	33,0	35,0					

Note! There always have to be a shim on the minimum side of the -110cc motor. (9 mm)
The -110cc motor will be damaged if set below angles of 6,5°.

Displacement limiter V14-160

Setting angle [degree]	Displace-ment [cm³/varv]	Shim maximum side [mm]	Shim mini-mum side [mm]		Setting angle [degree]	Displace-ment [cm³/varv]	Shim maximum side [mm]	Shim mini-mum side [mm]
6,5	31,6	69,5	0,0		20,1	96	39,5	30,0
6,6	32	69,0	0,0		20,3	97	39,0	30,5
6,8	33	68,5	0,5		20,5	98	38,5	31,0
7,0	34	68,0	1,0		20,8	99	38,0	31,5
7,2	35	67,5	1,5		21,0	100	37,5	32,0
7,4	36	67,5	2,0		21,2	101	37,0	32,5
7,6	37	67,0	2,5		21,4	102	36,5	33,0
7,8	38	66,5	3,0		21,6	103	36,0	33,5
8,0	39	66,0	3,0		21,9	104	35,5	34,0
8,2	40	65,5	3,5		22,1	105	35,0	34,5
8,4	41	65,0	4,0		22,3	106	34,5	35,0
8,7	42	64,5	4,5		22,5	107	34,0	35,5
8,9	43	64,0	5,0		22,8	108	33,0	36,0
9,1	44	64,0	5,5		23,0	109	32,5	36,5
9,3	45	63,5	6,0		23,2	110	32,0	37,0
9,5	46	63,0	6,5		23,4	111	31,5	37,5
9,7	47	62,5	6,5		23,6	112	31,0	38,0
9,9	48	62,0	7,0		23,9	113	30,5	39,0
10,1	49	61,5	7,5		24,1	114	30,0	39,5
10,3	50	61,0	8,0		24,3	115	29,5	40,0
10,5	51	60,5	8,5		24,5	116	29,0	40,5
10,7	52	60,0	9,0		24,8	117	28,0	41,0
10,9	53	60,0	9,5		25,0	118	27,5	41,5
11,2	54	59,5	10,0		25,2	119	27,0	42,0
11,4	55	59,0	10,0		25,5	120	26,5	42,5
11,6	56	58,5	11,0		25,7	121	26,0	43,5
11,8	57	58,0	11,0		25,9	122	25,5	44,0
12,0	58	57,5	11,5		26,1	123	25,0	44,5
12,2	59	57,0	12,0		26,4	124	24,0	45,0
12,4	60	56,5	12,5		26,6	125	23,5	45,5
12,6	61	56,0	13,0		26,8	126	23,0	46,0
12,8	62	56,0	13,5		27,1	127	22,5	47,0
13,0	63	55,5	14,0		27,3	128	22,0	47,5
13,3	64	55,0	14,5		27,5	129	21,0	48,0
13,5	65	54,5	15,0		27,7	130	20,5	48,5
13,7	66	54,0	15,5		28,0	131	20,0	49,5
13,9	67	53,5	15,0		28,2	132	19,5	50,0
14,1	68	53,0	16,0		28,4	133	18,5	50,5
14,3	69	52,5	16,5		28,7	134	18,0	51,0
14,5	70	52,0	17,0		28,9	135	17,5	52,0
14,7	71	51,5	17,5		29,1	136	17,0	52,5
14,9	72	51,0	18,0		29,4	137	16,0	53,0
15,2	73	50,5	18,5		29,6	138	15,5	53,5
15,4	74	50,0	19,0		29,9	139	15,0	54,5
15,6	75	49,5	19,5		30,1	140	14,0	55,0
15,8	76	49,0	20,0		30,3	141	13,5	55,5
16,0	77	49,0	20,5		30,6	142	13,0	56,5
16,2	78	48,5	21,0		30,8	143	12,0	57,0
16,4	79	48,0	21,5		31,0	144	11,5	57,5
16,6	80	47,5	22,0		31,3	145	11,0	58,5
16,9	81	47,0	22,5		31,5	146	10,0	59,0
17,1	82	46,5	23,0		31,8	147	9,5	59,5
17,3	83	46,0	23,5		32,0	148	9,0	60,5
17,5	84	45,5	24,0		32,3	149	8,0	61,0
17,7	85	45,0	24,5		32,5	150	7,5	62,0
17,9	86	44,5	25,0		32,7	151	7,0	62,5
18,2	87	44,0	25,5		33,0	152	6,0	63,0
18,4	88	43,5	26,0		33,2	153	5,5	64,0
18,6	89	43,0	26,0		33,5	154	4,5	64,5
18,8	90	42,5	26,5		33,7	155	4,0	65,5
19,0	91	42,0	27,0		34,0	156	3,0	66,0
19,2	92	41,5	27,5		34,2	157	2,5	67,0
19,5	93	41,0	28,0		34,5	158	1,5	67,5
19,7	94	40,5	28,5		34,7	159	1,0	68,5
19,9	95	40,0	29,0		35,0	160	0,0	69,0

Ordering code

Example: **V14 - 110 - S V S - EP I 1 A - P 350 - N - 00 - 110 / 032 - 210 - 000**
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1. Frame size
   - **110** - 110 cm³/rev
   - **160** - 160 cm³/rev
2. Mounting flange
   - **C** - Cartridge (Cartridge version only -110)
   - **I** - ISO (ISO 3019/2)
   - **Z** - ZF (ISO 3019/2)
   - **S** - SAE (SAE J744c)
3. Shaft seal
   - **V** - FPM (fluorocarbon)
4. Shaft end
   - **C** - DIN (ISO version)
   - **D** - DIN (ISO version)
   - **S** - SAE (SAE version)
5. Control
   - **AC** - Pressure compensator
   - **AH** - Pressure compensator with hydraulic override
   - **AD** - Pressure compensator with electric override and break defeat
   - **EO** - Electrohydraulic, two position
   - **EP** - Electrohydraulic, proportional
   - **HO** - Hydraulic, two-position
   - **HP** - Hydraulic, proportional
6. Control signal
   - **E** - External pressure (HO, HP)
   - **H** - 24 VDC (EO, EP)
   - **L** - 12 VDC (EO, EP)
   - **I** - Internal pressure (AC, AD, AH)
   - **C** - Pressure cut off (HP)
7. Control restrictor set
   - **1** - 0,7
   - **2** - 0,8
   - **3** - 1,0 (standard)
   - **4** - 1,2
   - **5** - HPC
   - **x** - special
8. Control modulating pressure/current
   - **N** - AC, AD: 0 bar; EP: non-selectable current
   - **A** - 15 bar[1] (AC, AD, AH, HP)
   - **B** - 25 bar[1] (AC, AD, AH, HP)
   - **C** - 50 bar[1] (AC, AD, AH)
   - **D** - 80 bar[1] (AC, AD, AH)
9. Valve options
   - **N** - None
   - **B** - Brake valve and pressure relief valves
   - **L** - Flushing valve
   - **P** - Pressure relief valves
   - **R** - Optional valves
   - **W** - Load holding valve
10. Pressure relief valve opening pressure [bar] or Flushing valve restrictor. See catalogue HY30-8223/UK for further information.
    - **000** - Without Pressure relief valves
11. Sensor options
    - **N** - None
    - **C** - Prepared for setting piston position and shaft speed sensors
    - **D** - Speed and setting piston position sensors
    - **L** - Setting piston position sensor
    - **P** - Prepared for speed sensor
    - **T** - Prepared for setting piston position sensor
12. Factory issued number for special versions
13. Max displacement [cm³/rev]
14. Min displacement [cm³/rev]
15. Threshold setting
    - **AC:** select pressure between 100 and 350 [bar]
    - **EO,EP:** 12 VDC: 400 [mA]
      24 VDC: 200 [mA]
    - **HO,HP:** Factory set at 10 [bar]
      Is adjustable between 5 - 25 [bar]
16. Setting for pressure cut off (only HPC control)
    - **HPC:** Select cut off pressure between 75 - 400 [bar]

[1] Valid at max utilized displacement range

Motor installation

Direction of rotation

The V14 motor is bi-directional. Fig. 1 shows shaft rotation vs. direction of flow.

When the A port is pressurized (black arrow) the motor turns counter clockwise (left hand, L, rotation), and when the B port is pressurized (open arrow) the shaft turns clockwise (right hand, R, rotation).

Note: Before installing the V14 in series (when the A and B ports can be subject to high pressures simultaneously) contact Parker Hannifin (Mobile Controls Div.).

Filtration

Maximum motor service life is obtained when the fluid cleanliness meets or exceeds ISO code 18/13 (ISO 4406).

A 10 µm (absolute) filter is recommended.

Case pressure

The lowest and highest recommended case pressure (V14 with shaft seal type **H or V**) at selected shaft speeds is shown in the table below.

The min case pressure secures sufficient lubrication, and the max case pressure, which secures nominal seal life, should be measured at the drain port.

Size	1500	3000	4000	5000	6000
V14-110	max 10	1-6	1.5-5	2-4.5	-
V14-160	max 10	1-6	2-5.5	2.5-5.5	-

Min and max case pressure [bar] vs. shaft speed [rpm].

Note: Contact Parker Hannifin (Pump and Motor Div.) for information on other shaft seals.

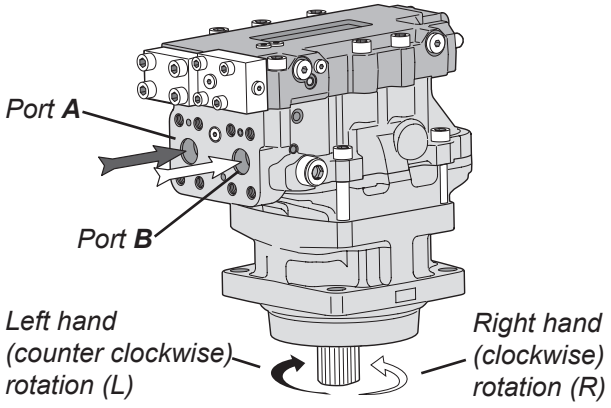


Fig. 1 (motor rotation vs. direction of flow).

Required inlet pressure

The motor operates as a pump under certain conditions. When this occurs, a minimum pressure must be maintained at the inlet port. Increased noise and gradually deteriorating performance due to cavitation may otherwise be experienced.
A 15 bar inlet pressure, measured at the motor inlet port, satisfies most operating conditions.

Contact Parker Hannifin (Mobile Controls Div.) for more specific information on inlet pressure requirements.

Note: For high speed info, see Marketing information database.

Operating temperatures

The following temperatures should not be exceeded (type **H** shaft seal):

Main circuit: 80 °C
Drain fluid: 100 °C

FPM shaft seals (type **V**) can be used to 115 °C drain fluid temperature.

Continuous operation at high power levels usually requires case flushing in order for the fluid to stay above the minimum viscosity requirements.
A flushing valve and restricting nozzle, available as an option, provide the necessary main circuit flushing flow.

Refer to fig. 2 (next page).

Drain ports
There are two drain ports on the V14; the uppermost drain port should always be utilized (fig. 3).
In order to avoid excessively high case pressure, the drain line should be connected directly to the reservoir.

NOTE: When the motor is operating, the case must be filled with fluid to at least 50%.

Hydraulic fluids
Ratings and performance data for series V14 motors are valid when a good quality, contamination-free, petroleum-based fluid is used in the hydraulic system.

Hydraulic fluids type HLP (DIN 51524), automatic transmission fluids type A, or API CD engine oils can be used.

Fire resistant fluids, when used under modified operating conditions, and synthetic fluids are also suitable.

When the hydraulic system has reached full operating temperature, the motor drain oil viscosity should be above 8 mm²/s (cSt).

At start-up, the viscosity should not exceed 1500 mm²/s.

The ideal operating range for the V14 series is 15 to 30 mm²/s.

The following information (available from Parker Hannifin, Pump and Motor Div.) provide additional information about:
- Hydraulic fluid specifications
- Fire resistant fluids

Before start-up
Make sure the motor case as well as the entire hydraulic system is filled with hydraulic fluid. The internal leakage, especially at low operating pressures, is not sufficient to provide lubrication at start-up.

Note:

A drain line spring loaded check valve (shown in fig. 2, 3 and 4) may have to be installed in order to prevent oil from being siphoned out of the motor case. This can otherwise happen e.g. if the reservoir is located below the utilized motor drain port.

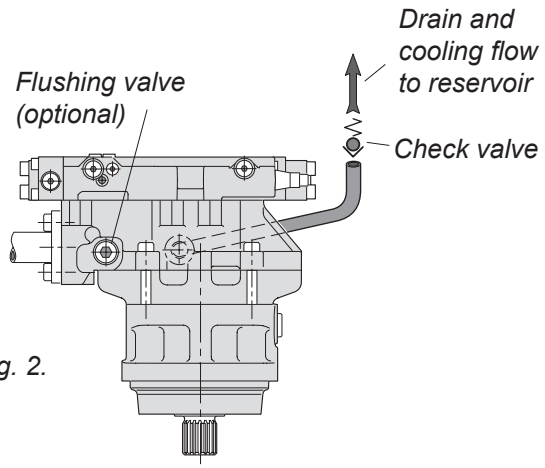


Fig. 2.

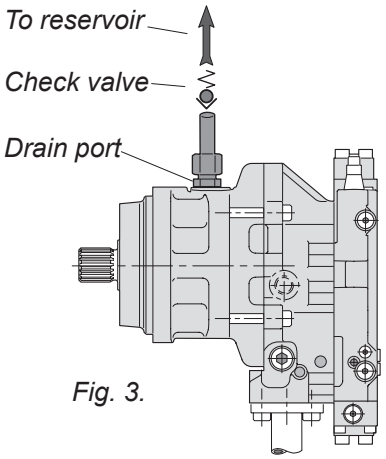


Fig. 3.

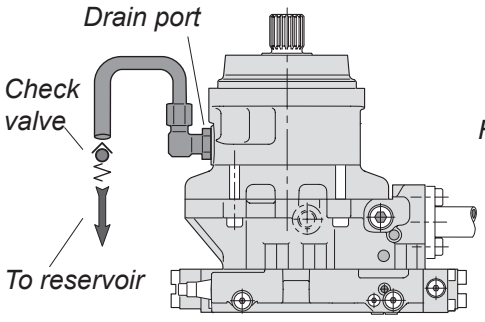


Fig. 4.

Controls - general information

The following controls satisfy most application requirements:
- AC (automatic pressure compensator)
- AD (Automatic pressure compensator with electric override and brake defeat)
- AH (automatic pressure compensator with hydraulic override)
- EO and HO (two position controls)
- EP and HP (proportional controls)

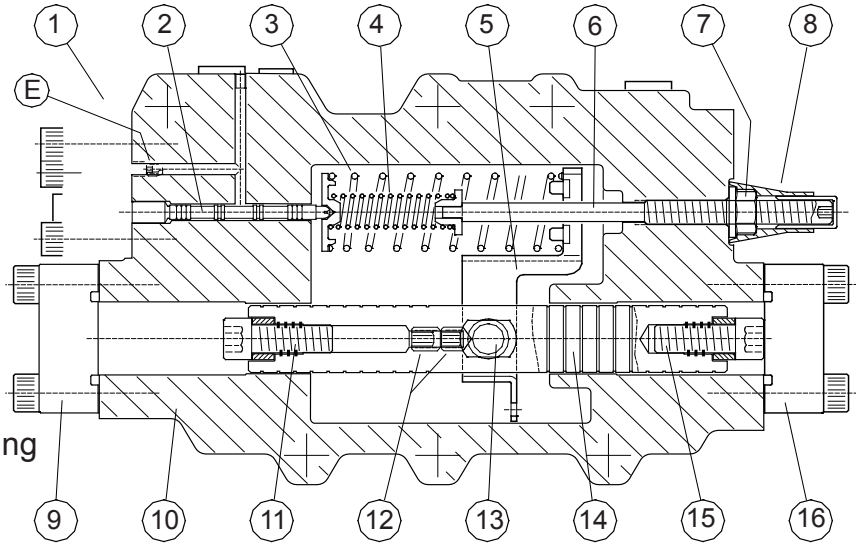
All controls utilize a servo piston that connects to the valve segment (refer to the illustration on page 4).
The built-in four-way servo valve determines the position of the servo piston and, in turn, the displacement.

The displacement angle (between output shaft and cylinder barrel) ranges from 35° (max) to 6.5° (min).
Servo supply pressure is obtained from the pressurized, main port through the corresponding, built-in shuttle valve.
The respons time (i.e. from max-to-min or from min-to-max displacement) is determined by restrictors in the servo valve supply and return lines; refer to the schematics.

AC control description

1. AC control cover
2. Servo valve spool
3. Modulating spring
4. Threshold spring
5. Feedback arm
6. Threshold adjustment screw
7. Seal nut
8*. Two-part threshold seal
9. End cover (max displ.)
10. Control module housing
11. Max displ. limiting screw/bushing
12. Set screws
13. Connecting arm
14. Setting piston
15. Min displ. limiting screw/bushing
16. End cover (min displ.)

E. Restrictor location, servo supply

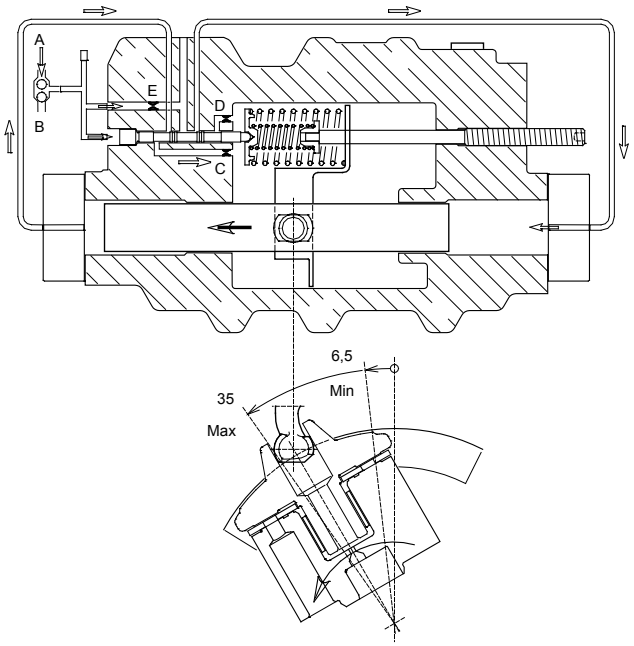


AC control module cross section (as seen from motor intermediate housing / control module interface).

** Yellow seal cap is factory mounted. Red seal cap is available as spare part, part no. 3797065.*

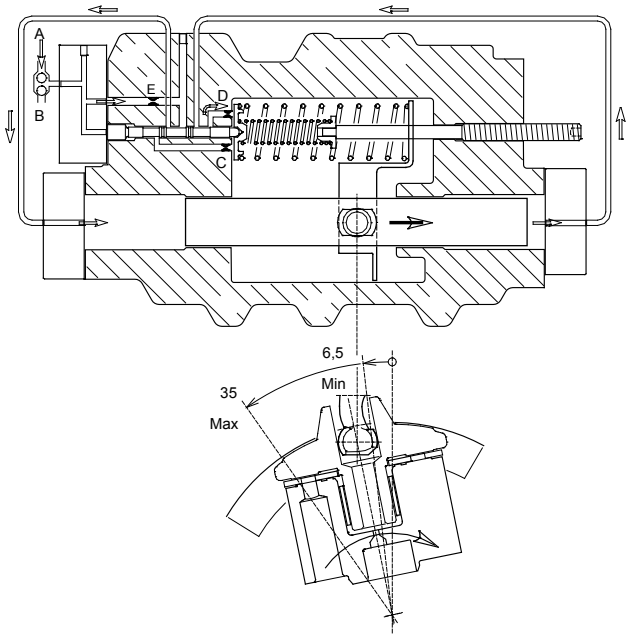
AC control function

Refer to the illustration below left:
When pressure in port A (or B) increases, the servo valve spool is pushed to the right, directing flow to the right hand setting chamber - the setting spool moves to the left; displacement and output torque increases. At the same time, the shaft speed decreases correspondingly (at a constant pump flow to the motor).



AC control function (displ. increase at increasing pressure).

Refer to the illustration below right:
When pressure in port A (or B) decreases, the servo valve spool moves to the left, directing flow to the left hand setting chamber - the setting spool moves to the right; displacement and output torque decreases. At the same time, the shaft speed increases correspondingly (at a constant pump flow to the motor).



AC control function (displ. decrease at decreasing pressure).

AC port and restrictor locations

Port connections and restrictor positions (AC control)

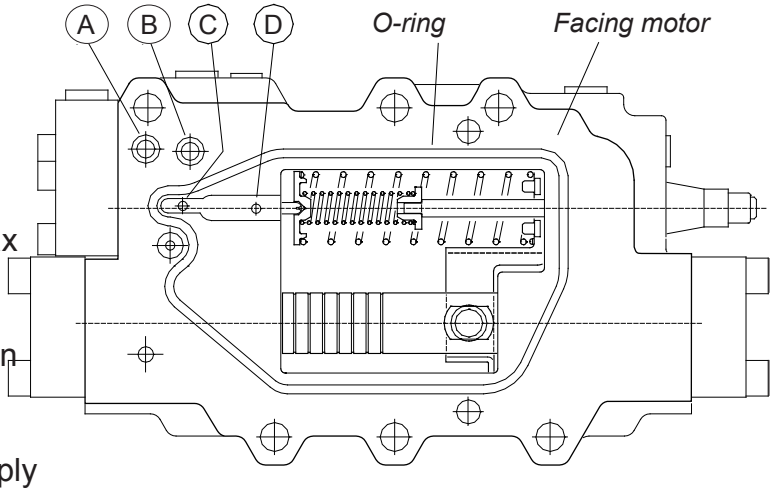
A. Port A connection

B. Port B connection

C. Restrictor position, min-to-max servo pressure (M5)

D. Restrictor location, max-to-min servo pressure (M5)

E. Restrictor location, servo supply (refer to cross section page 9)



Gauge ports AC/AD/AH control

Pressure setting procedure

The pressure setting procedure is valid for all pressure compensators (AC, AD and AH).

WARNING
In order to prevent injury to the technician or the bystanders during the adjustment procedure, all hydraulic functions on the vehicle/machine should be disabled (e.g. wheels raised off the ground, work functions disconnected).
Avoid fast forward/reversed changes that can damage the synchronizing shaft.

1. Make sure that the motor has been supplied with the correct modulating spring (ordering code and name plate information should correspond).

2. Install 0 - 600 bar (0 - 8500 psi) gauges in port X1 and X5; refer to fig. 1.

3. Turn the adjustment screw counter clockwise to ensure that the threshold spring is unloaded.
   The distance between nut and screw end is approximately 23 mm when the threshold spring is unloaded.

Note! The distance between nut and screw end should not be more than 28 mm, because of risk for loosing guiding of the spring.

4. Increase the system pressure (e.g. by blocking the motor shaft) to desi red pressure setting (read the pres sure in port X5).

5. Start to turn the threshold adjustment screw clockwise until the pressure in gauge X2 starts to increase. Right threshold pressure setting has been reached.

Note: One turn of the setting screw corresponds to 57 bar (820 psi).

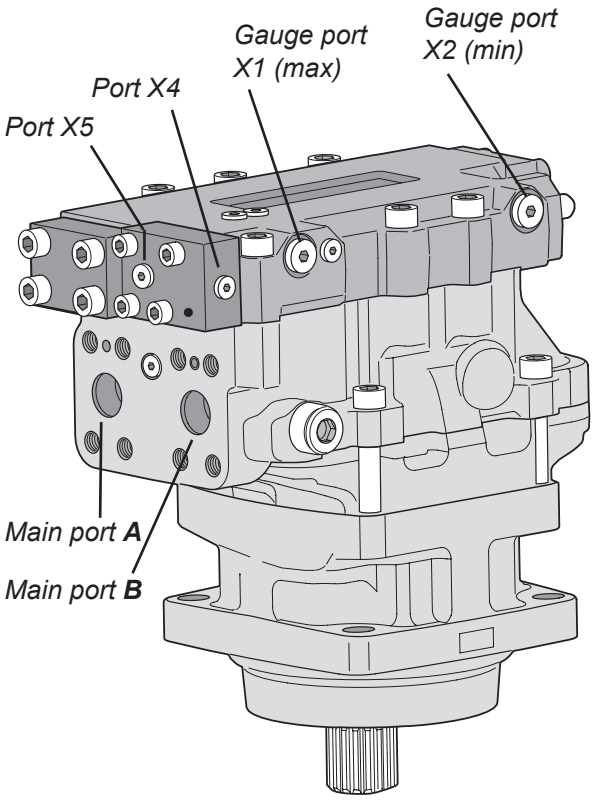


fig. 1

EO/EP/HO/HP control description

Basically, the controls function in a similar way. At increasing solenoid current (EP) or increasing pilot pressure (HP) the control moves towards the min displacement position. At decreasing current/pilot pressure, the control retracts towards max displacement.

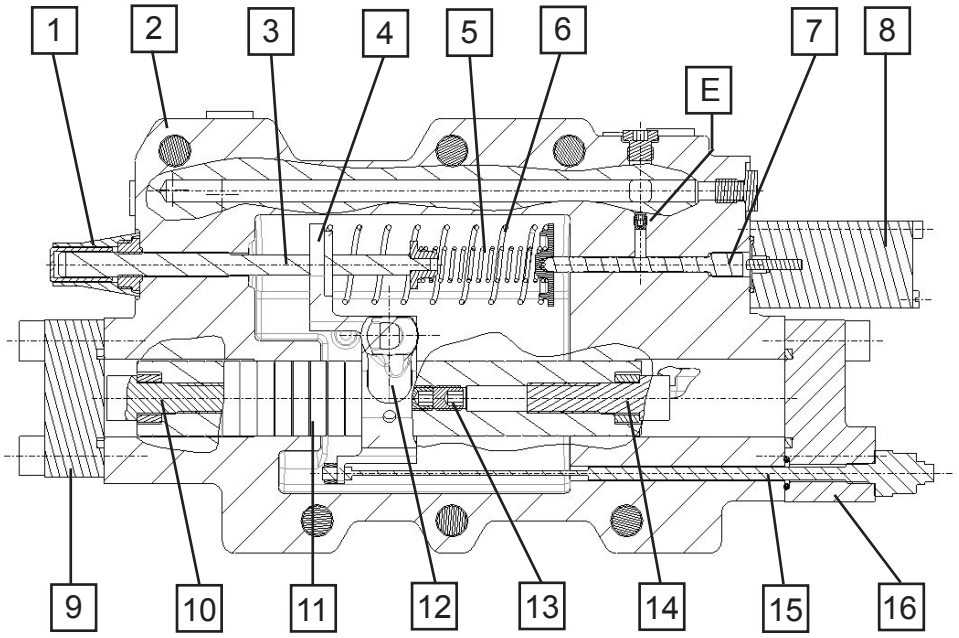
In comparison with EP and HP, the EO and HO controls have no modulating spring or feedback arm; this means that only min and max displacements (but no intermediate positions) are available with these controls.

Module cross section (EP shown)

1*. Two-part seal
2. Control module housing
3. Treshold adjustment screw
4. Feedback arm (EP, HP only)
5. Treshold spring
6. Modulating spring (EP, HP only)
7. Servo valve spool
8. Solenoid (EO, EP only); cover on HO, HP
9. End cover (max displ. limit)
10. Max displ. limiting screw/bushing
11. Setting piston
12. Connecting arm
13. Set screws
14. Min displ. limiting screw/bushing
15. Setting piston position sensor
16. End cover position sensor (min displ. limit)

E. Restrictor location, servo supply

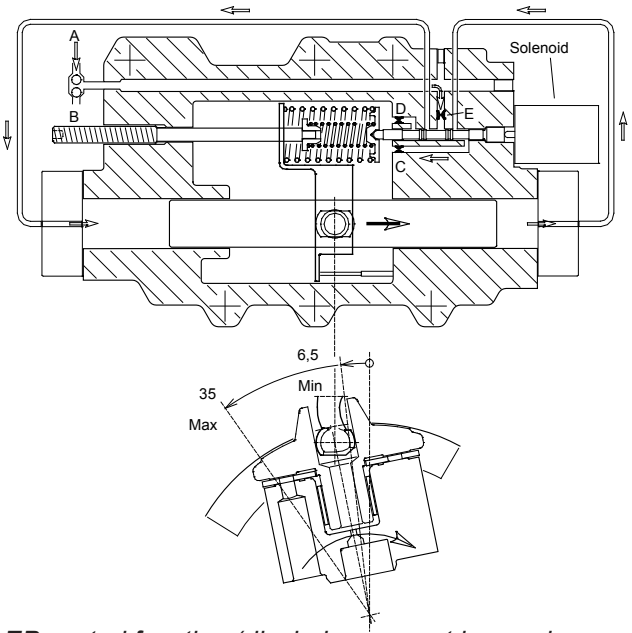
** Yellow seal cap is factory mounted. Red seal cap is available as spare part, part no. 3797065.*



EP control function

(solenoid current increasing)

Refer to the illustration below left:
At an increasing current (above the threshold value), the solenoid spool pushes left on the servo valve spool, and flow is directed to the left hand setting chamber - the setting spool moves to the right and the displacement decreases.
This means, that the shaft speed increases while the output torque decreases correspondingly (at a constant pump flow and system pressure).

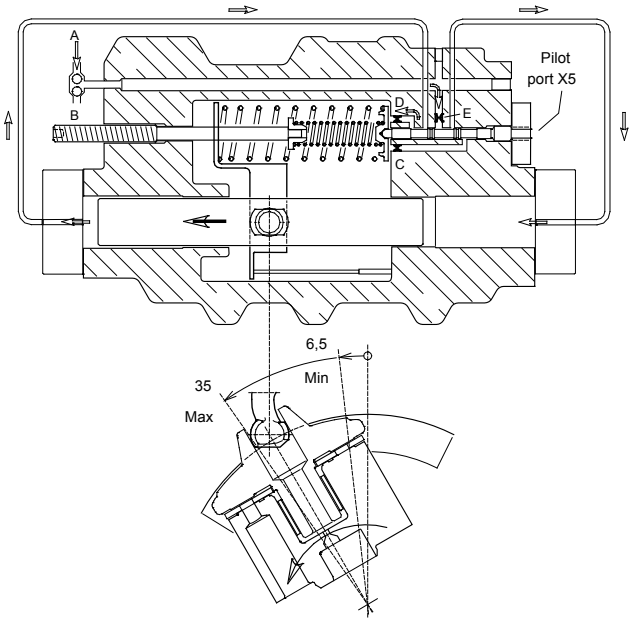


EP control function (displ. decrease at increasing current).

HP control function

(decreasing pilot pressure)

Refer to the illustration below right:
When the pilot pressure decreases, the pilot piston retracts, the servo valve spool moves to the right and flow is directed to the right hand setting chamber - the setting spool moves to the left and the displacement increases.
The shaft speed now decreases and the available output torque increases corres-pondingly (at a constant pump flow and system pressure).

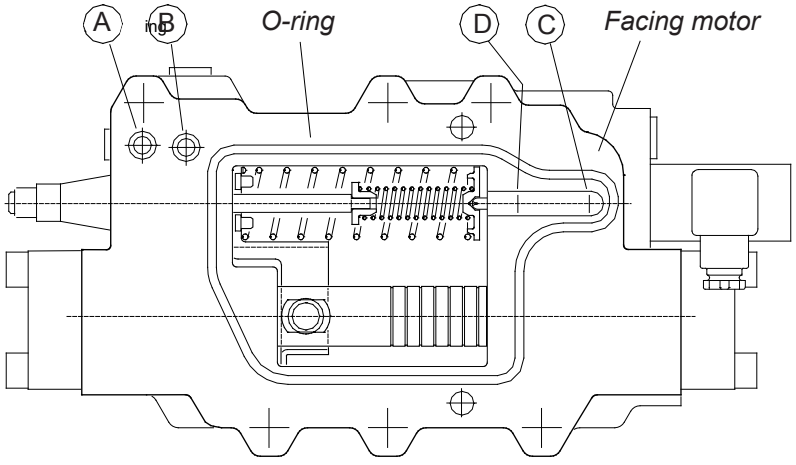


HP control function (displ. increase at decreasing pilot pressure).

EO/EP/HO/HP port and restrictor locations

Port connections and restrictor positions (EP control)

A. Port A connection
B. Port B connection
C. Restrictor position, max-to-min servo pressure
D. Restrictor position, min-to-max servo pressure
E. Restrictor location, servo supply (refer to cross section page 12)



Gauge ports EO/EP/HO/HP

The pressure/current setting procedure is valid for all proportional and two-position controls (EO, EP, HO and HP).

> WARNING
> In order to prevent injury to the technician or the bystanders during the adjustment procedure, all hydraulic functions on the vehicle/machine should be disabled (e.g. wheels raised off the ground, work functions disconnected).
> **Avoid fast forward/reversed changes that can damage the synchronizing shaft.**

1.Make sure that the motor has been supplied with the correct modulating spring (ordering code and nameplate information should agree). The hydraulic oil should be 50°C (120°F).

2.Install 0 - 600 bar (0 - 8500 psi) gauge in port X2. Use a 0 - 60 bar (0 - 850 psi) gauge to measure pilot pressure if it is a HO or HP.

3.Turn the adjustment screw counter clockwise to ensure that the threshold spring is unloaded. The distance between nut and screw end is approximately 22 mm when the threshold spring is unloaded.

Note! If you remove solenoid or end cover the maximum distance between nut and screw end should not be more then 16 mm.
If the unit is assembled the maximum distance between nut and screw end should not be more then 22 mm.

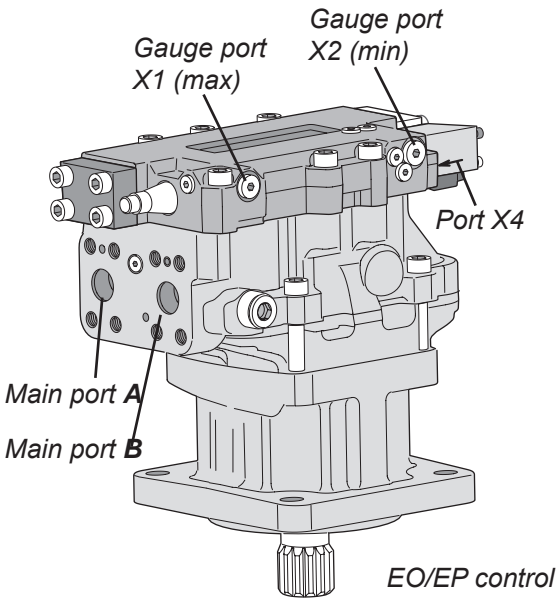
HO or HP controls
4.Pressurize port X5 to desired threshold (the control goes to min displ.).
Standard factory setting is 10 bar.
Optional setting is 5 - 25 bar.

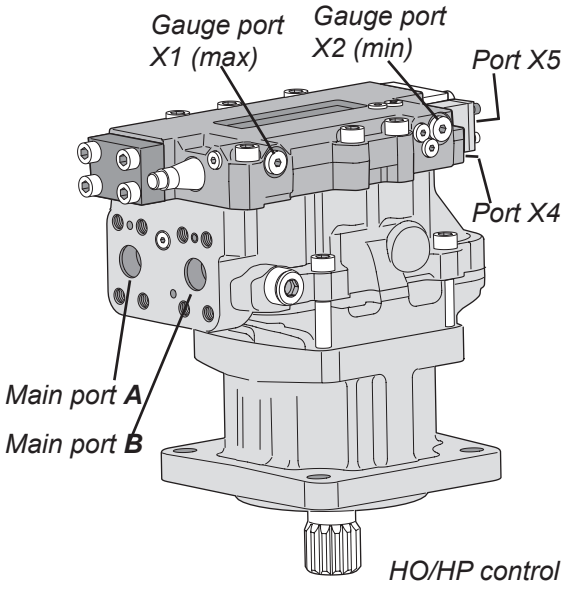
EO or EP controls
4.Apply the desired threshold current to the solenoid (the control goes to min displ.).
Standard factory setting is
400 mA (12 VDC)
200 mA (24 VDC)

5. Start to turn the threshold adjustment screw clockwise until the pressure in gauge X1 starts to increase. Right threshold pressure setting has been reached.

Note: One turn of the setting screw corresponds to:

- 40 mA on 12 VDC solenoids (EO, EP)
- 20 mA on 24 VDC solenoids (EO, EP)
- 2,1 bar (30 psi) on HO and HP controls





Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

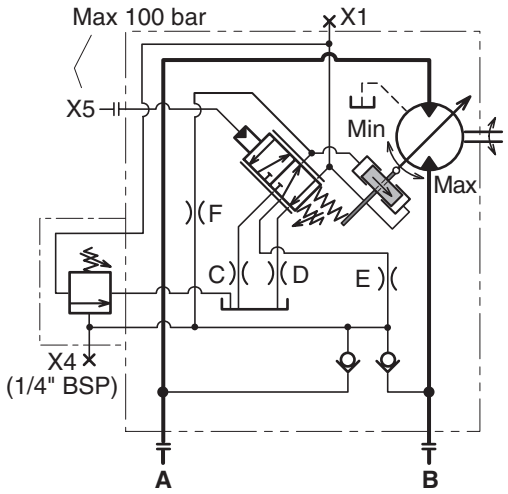
HPC, HP control with pressure cut off

- The pressure cut off overlays the HP control.

- If the system pressure increase, due to the load or reduced motor displacement, to the setting of the pressure cut off valve, the control increases displacement. When displacement increases, the available torque increases as well but the system pressure remains constant.

- Pressure cut off range is 75 - 400 bar (1100 - 5800 psi)

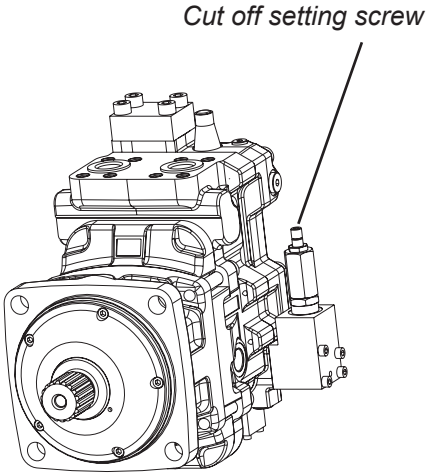
- Threshold pressure is preset from factory to 10 bar (145 psi) but is adjustable between 5 and 50 bar (70 - 700 psi).



HPC schematic (shown: port X5 not pressurized; control moving towards max displacement).

Cut off pressure setting procedure:

Untie the locking nut. One turn of the setting screw corresponds to 48 bar. When desired pressure level is reached, tighten the locking nut.



1. Install 0 - 600 bar (0 - 8500 psi) gauges in port X1 and X4 and a 0 - 60 bar (0 - 850 psi) gauge in port X5.
2. Set the cut off pressure to minimum by turning the setting screw counter-clockwise until a distinct stop is reached.
3. Set the motor displacement to minimum by applying required pressure to port X5.
4. Increase the pressure in one of the main ports A/B (e.g. by blocking the motor shaft) to desired cut off pressure level.
5. Turn the setting screw clockwise, until the pressure in port X1 reaches the same pressure level as in X4. Desired cut off pressure has been reached.

V14 Displacement limiter

Max and min displacement limiter consists of a socket head cap screw and a displacement spacer or spacers, see fig. 1. Suitable screw lengths for a particular max or min displacement range are shown in the table 1 below.

Displacement spacer (s) [mm]	*Socket head cap screw*	*Parker No.*
0 - 24	M12 x 45	3785700
25 - 39	M12 x 60	3707695
40 - 60	M12 x 80	3782519

Table 1

What length the max or min displacement spacer should have to obtain a chosen displacement is shown on page 5 and 6. The displacement spacers are available in five different lengths: 1; 1,5; 2; 5 and 10 mm. To obtain the right displacement, the spacers can be combined with each other's. The thinnest spacer has to be mounted closest to the setting piston, and the others in increasing length order.

Formula for determining the setting angle (a) at a selected displacement D_a:

$$\sin a = (D_a/D_{35}) * \sin 35°$$

where: D_{35} is max displacement at 35°

Displacement spacer changing procedure:

1. Disassemble the max or min end cover by loosen the four screws for the chosen cover.

2. Loosen the socket head cap screw from setting piston.

   Note! This must be done when the control module is assembled on the motor, otherwise the feedback arm could be damaged.

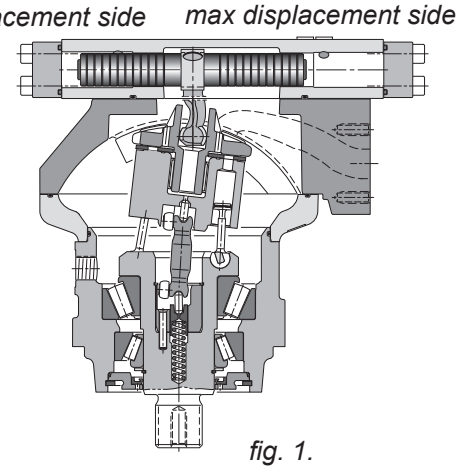


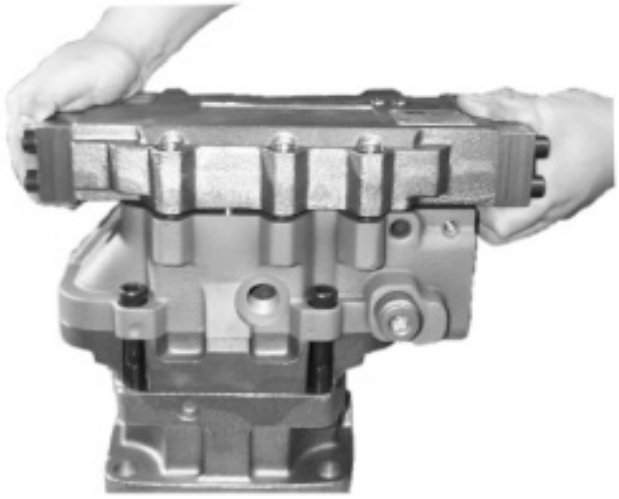
fig. 1.

3. Choose spacer (s) to obtain right displacement, see page 5 and 6, and place them on the socket head cap screw.

4. Tighten the socket head cap screw in the setting piston. The tightening torque have to be 105 ± 20 Nm.

5. Assembly the end cover. The tightening torque have to be 60 ± 10 Nm for the four screws.

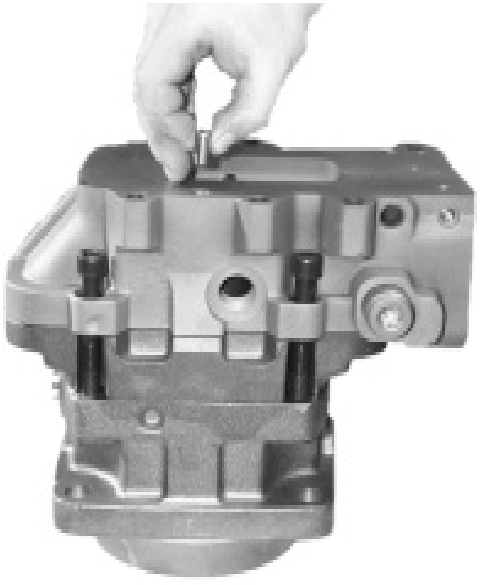
Disassembling



Remove the hexagon screws and lift the control module off.

Important! Lift the control module straight up so the two check valve balls don't fall down into the motor.

Remove the check valve balls.



Be careful, the guide pins can be loose.

Remove the hexagon screws and lift the connection module.

Lift the valve segment.

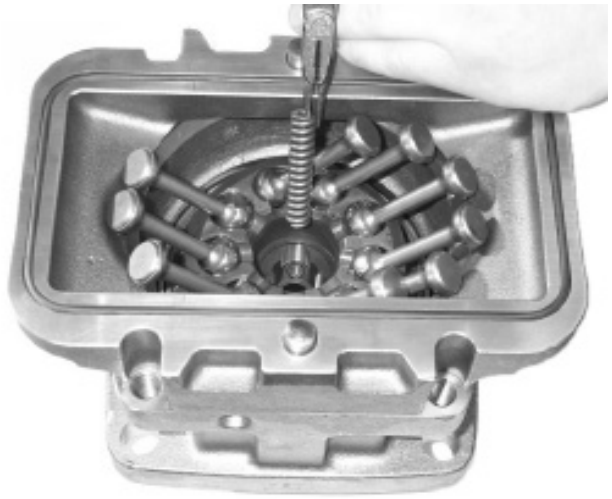
Remove the cylinder barrel.

Note! The support pin assembled between cylinder barrel and joint shaft might fall down into the motor.

Remove the joint shaft. Make sure all joint rollers follows.

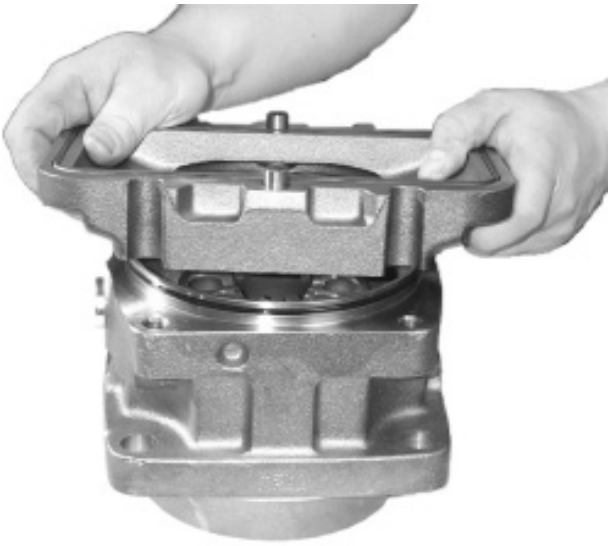
Remove the support pin assembled between joint shaft and guide pin.

Remove the guide pin.



Remove the compression spring.

Remove the pistons and the O-ring fitted on the intermediate housing.
The pistons should be fitted in the same ball sockets as before if you don't exchange the pistons.



Remove the intermediate housing.

Remove the retaining ring.

Remove the seal carrier with shaft seal off. Change the shaft seal. Use the old shaft seal and press down the new shaft seal into the seal carrier.

Remove the O-ring.

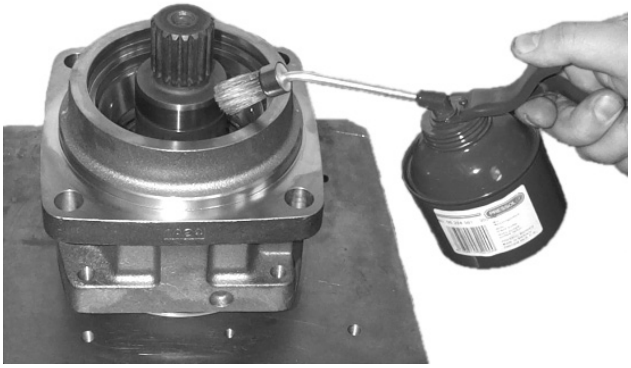
Remove the retaining ring.

Use a hydraulic press to remove the shaft.
Place something soft under the shaft to avoid damageing it.

Lift the bearing.
For disassembling the bearing on the shaft use a withdrawing tool.

Assembling

Install the bearing housing on the shaft.
Note! Place the shaft on a distance.



Lubricate the shaft with oil.

Place the bearing on the shaft and press it down.
Note! Be careful when you press so you acheive correct bearing setting, no back-lash and a low rolling friction.

Assemble the spacer washer and the retaining ring.

Assemble the O-ring.

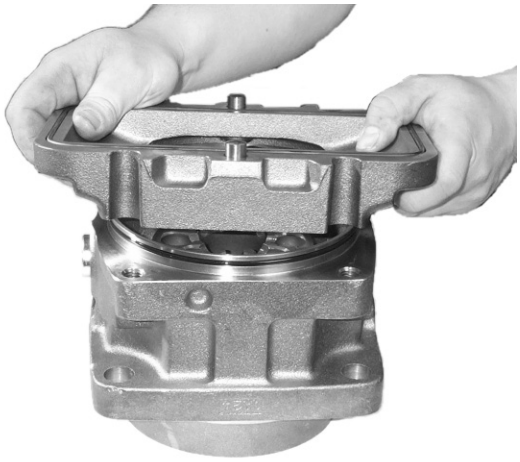
Lubricate the sealing surface with oil on the shaft.

Assemble the seal ring carrier with shaft seal.

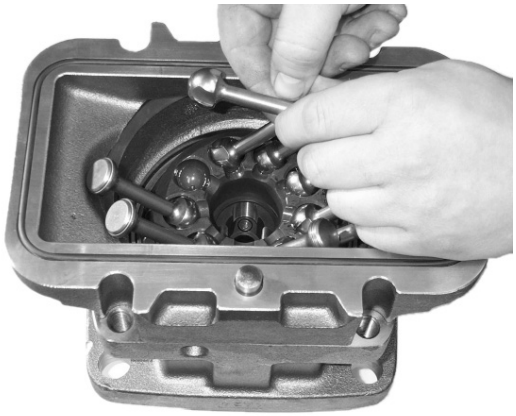
Assemble the retaining ring.

Assemble the compression spring.

Assemble the guide pin.



Assemble the intermediate housing with O-ring.



Assemble the pistons. If the pistons isn’t exchanged, assemble them in the same ball sockets as before.

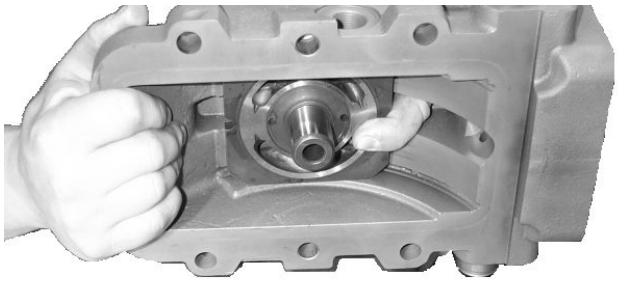
Assemble the lower support pin.

Assemble the joint shaft. Put some grease on the joint shaft so the rollers don’t fall off. Assemble the rollers with the chamfer inwards.

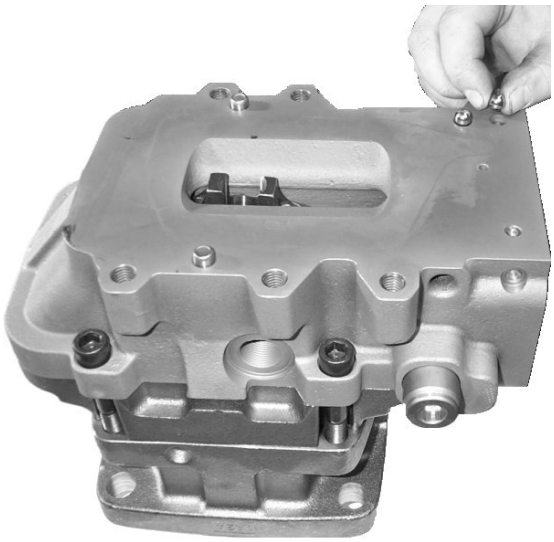
Assemble the upper support pin in the cylinder barrel. Put some grease on the pin so it don’t fall down when assembling the cylinder barrel.

Assemble the cylinder barrel.
The sliding plate is assembled with the steel side towards the cylinder barrel and the bronze side towards the valve segment.

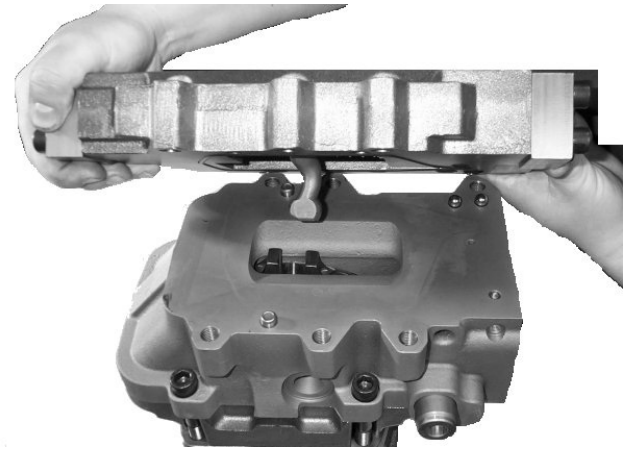
Make sure that the support pin is in the correct position by using a thin pin and feel that it is in correct position. The support pin shall stand up. It is very important.



Assemble the connection module with the valve segment and the hexagon screws,
105 ± 20 Nm (110 cc)
and 175 ± 20 Nm (160 cc).
Note! Be very careful, mind your finger.

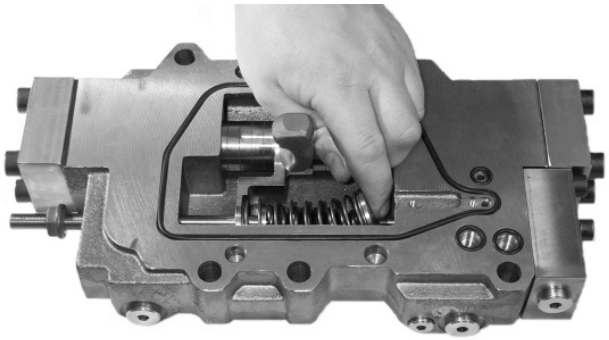


Assemble the check valve balls. Make sure that the guide pins are in place.

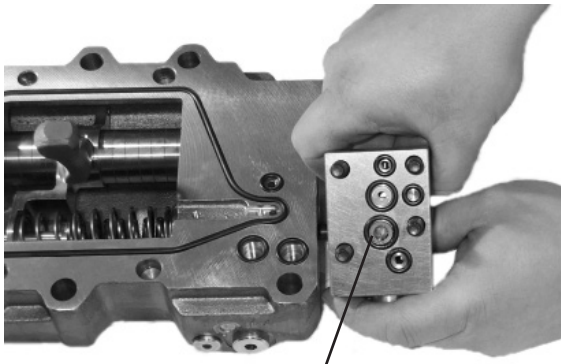


Assemble the control module, fit the setting piston arm into the valve segment. Tighten the hexagon screws, 105 ± 20Nm.

Change of Control Spring Kit and Filter (AC, AH, AD)



Turn the adjustment screw counter clockwise. Remove the spring kit.
Change the spring(s).
Put the new spring kit in position and turn the adjustment screw clockwise until the spring is preloaded.

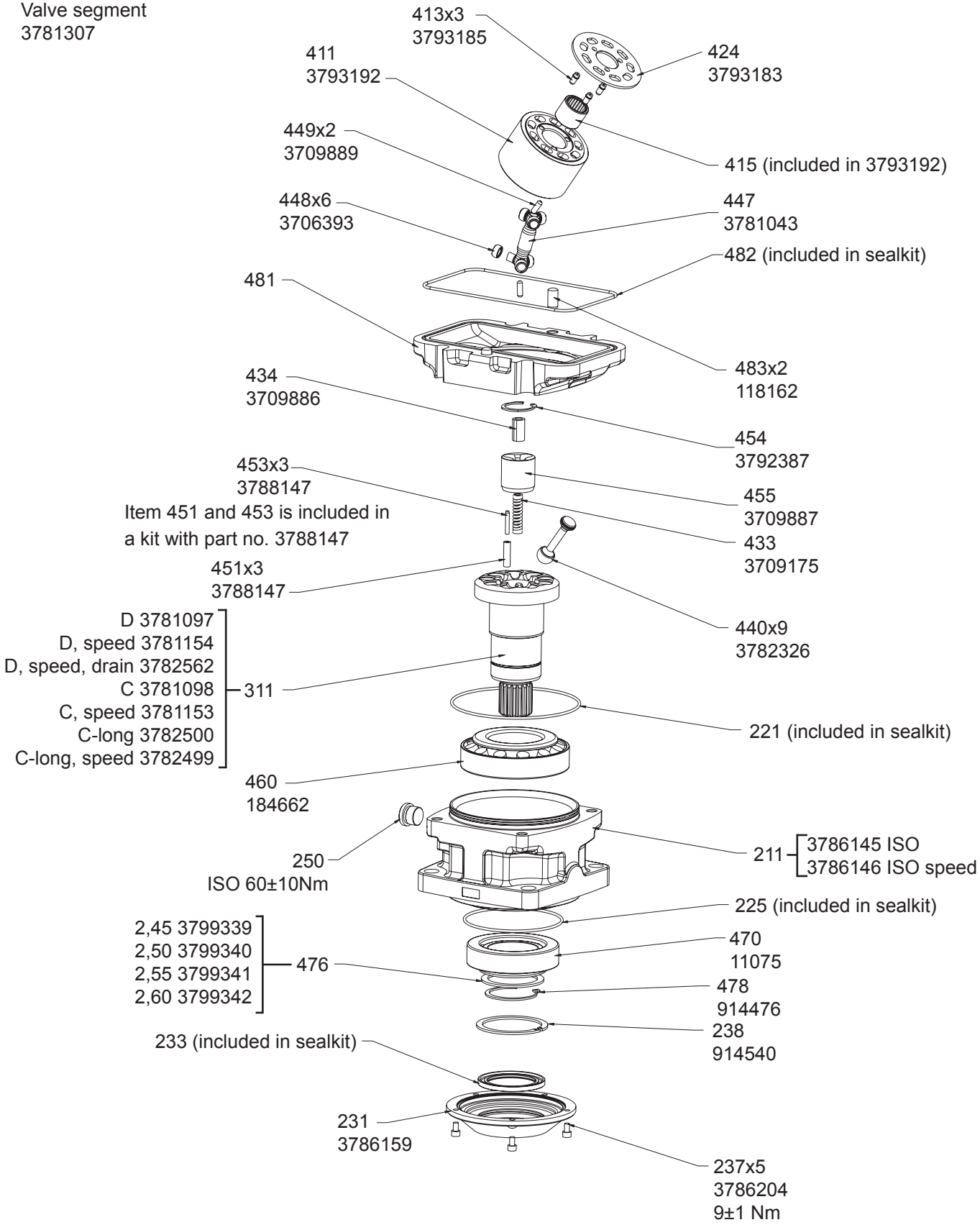


filter

If you need to change the filter remove it and place the new filter with the rounded/ meash surface upwards (i.e. the same way as the oil flows).
When the filter has been disassembled it has to be changed.

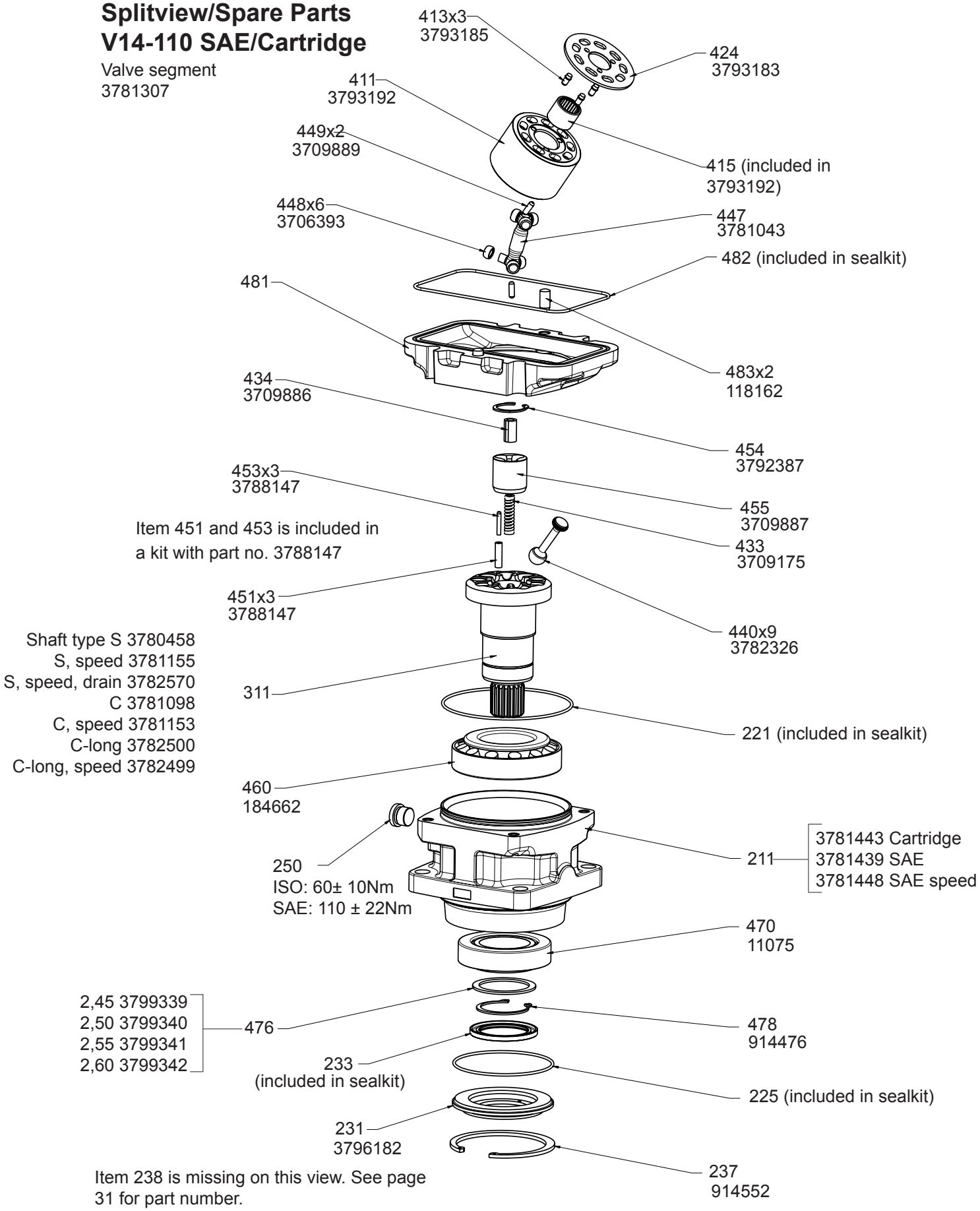
Splitview/Spare Parts
V14-110 ISO

Valve segment
3781307



Splitview/Spare Parts
V14-110 SAE/Cartridge

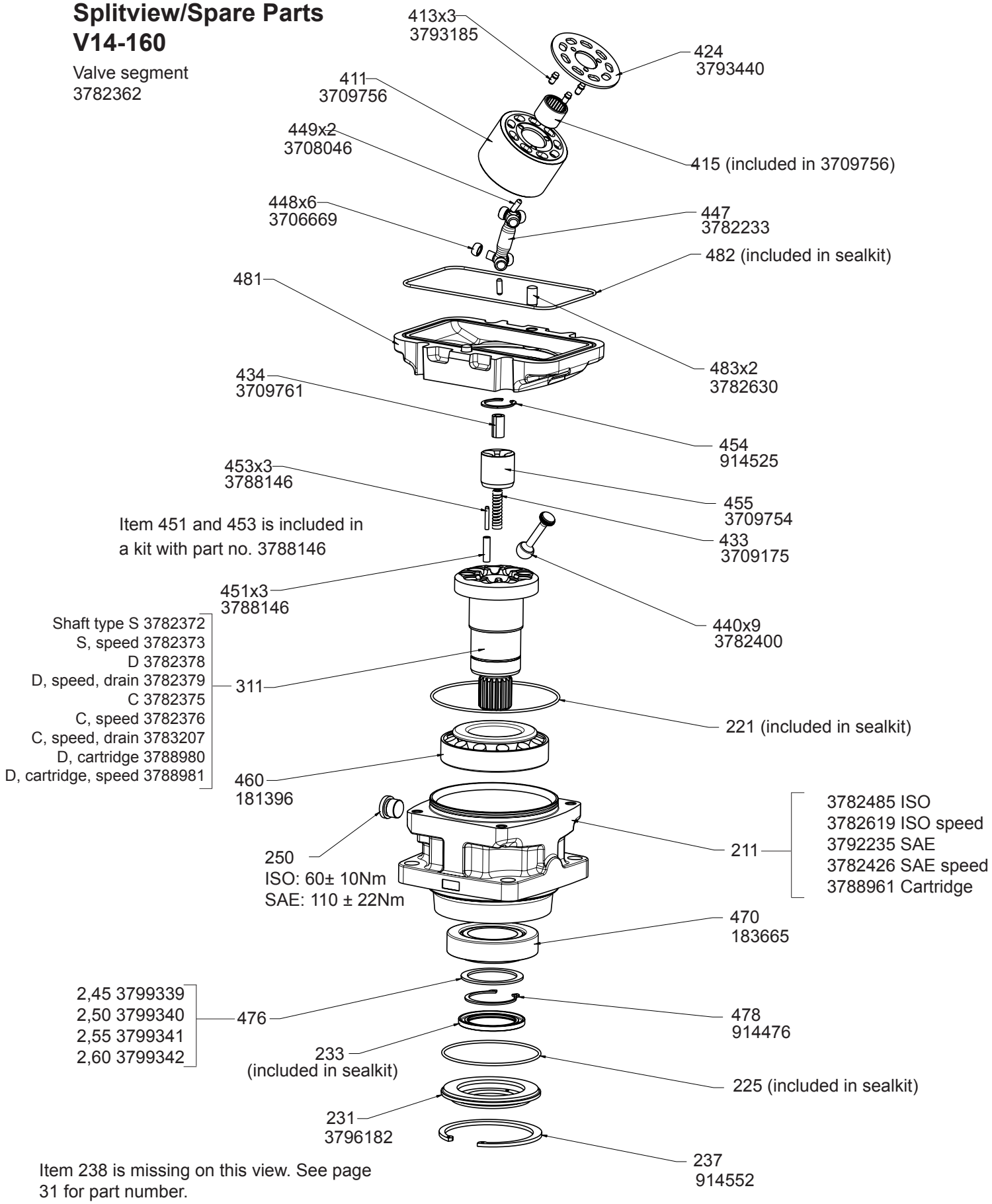
Valve segment
3781307



Item 238 is missing on this view. See page 31 for part number.

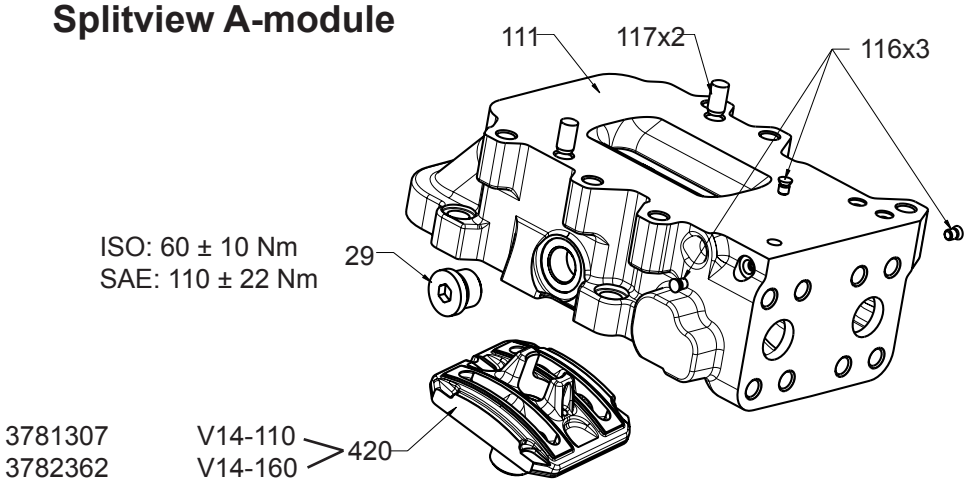
Splitview/Spare Parts V14-160

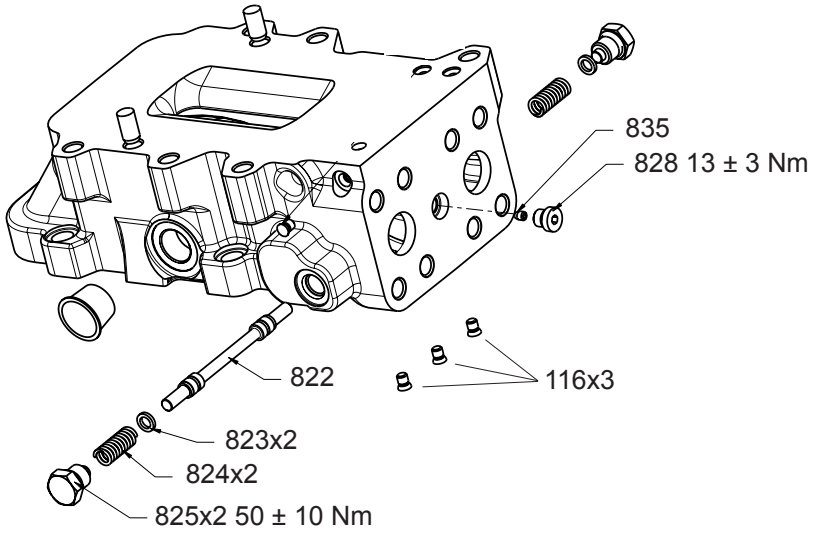
Valve segment
3782362

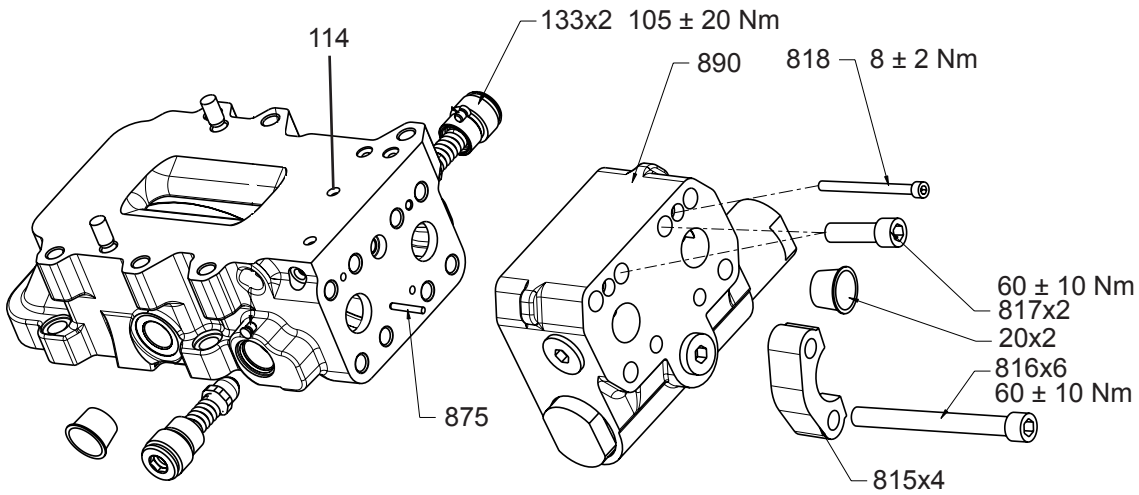


Item 238 is missing on this view. See page 31 for part number.

Splitview A-module

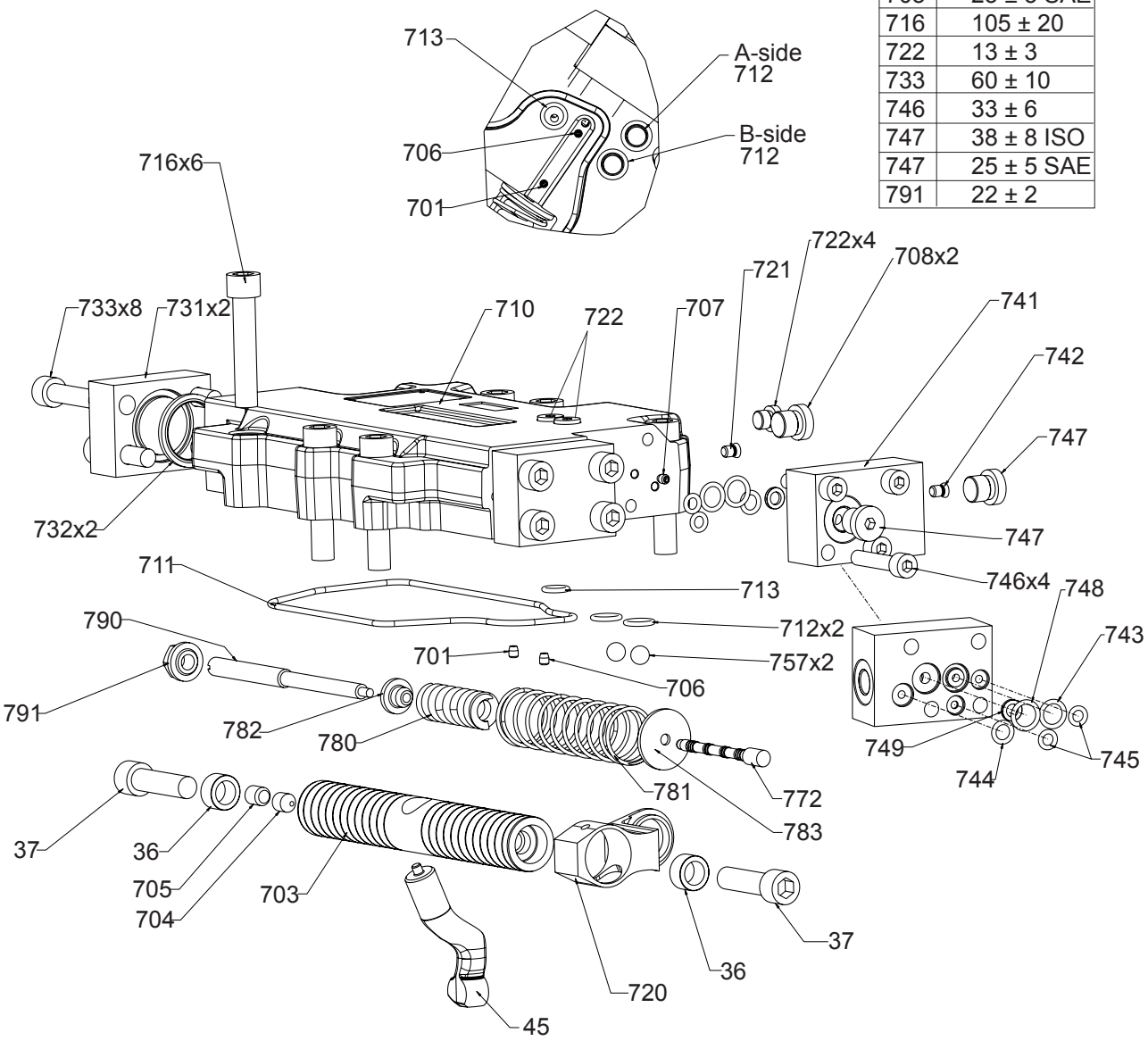






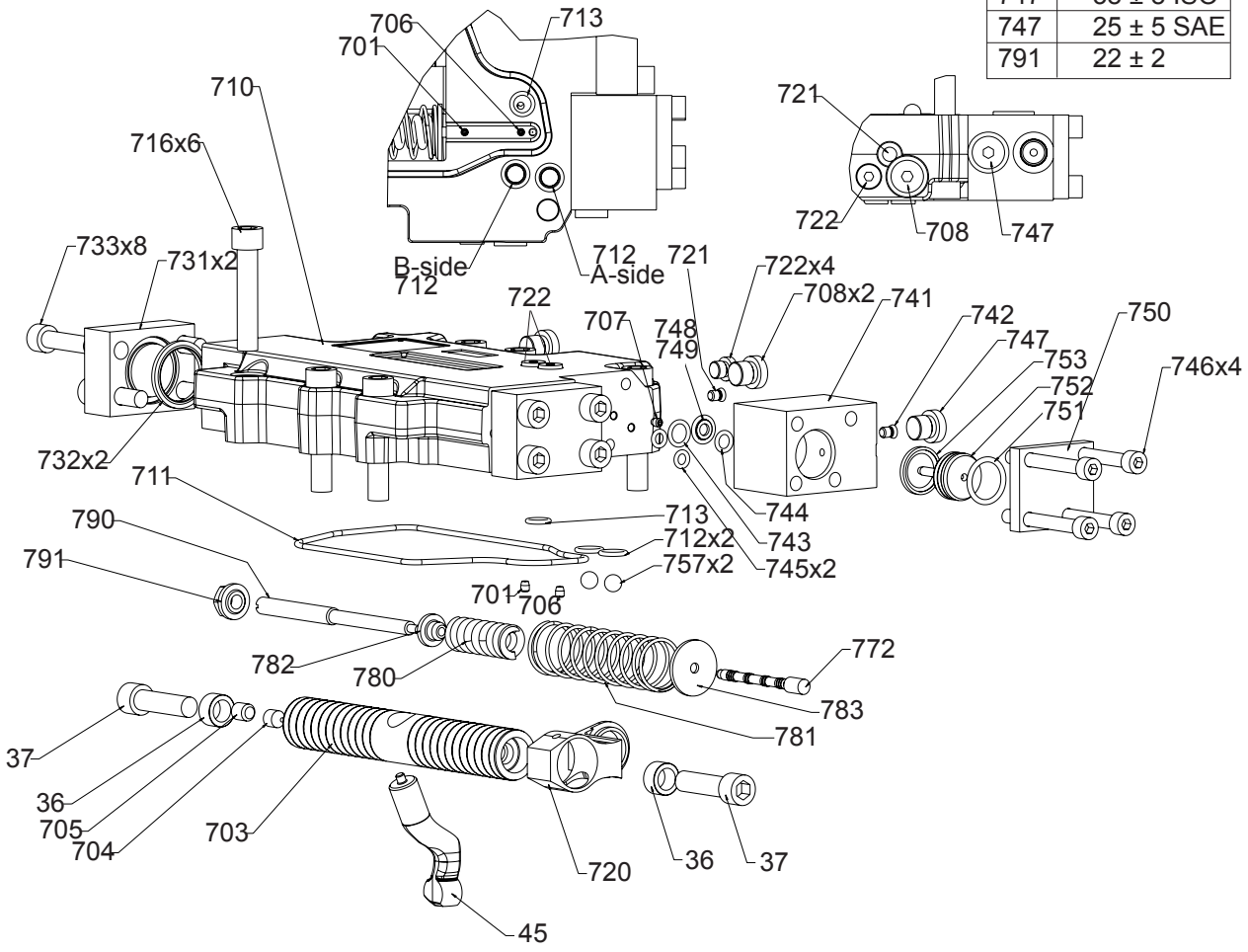
Splitview AC Control

Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
708	38 ± 8 ISO
708	25 ± 5 SAE
716	105 ± 20
722	13 ± 3
733	60 ± 10
746	33 ± 6
747	38 ± 8 ISO
747	25 ± 5 SAE
791	22 ± 2



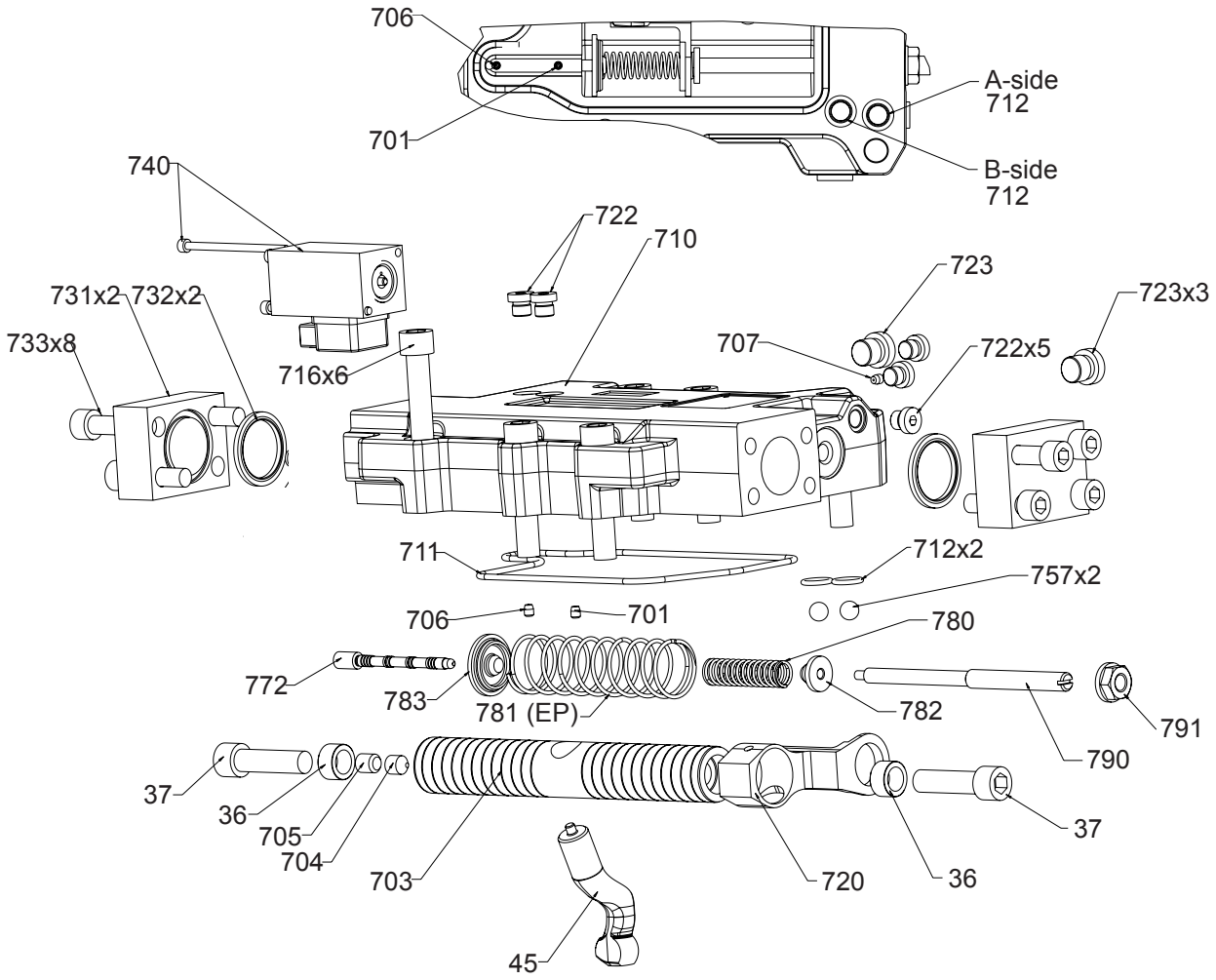
Splitview AH Control

Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
708	38 ± 8 ISO
708	25 ± 5 SAE
716	105 ± 20
722	13 ± 3
733	60 ± 10
746	33 ± 6
747	38 ± 8 ISO
747	25 ± 5 SAE
791	22 ± 2



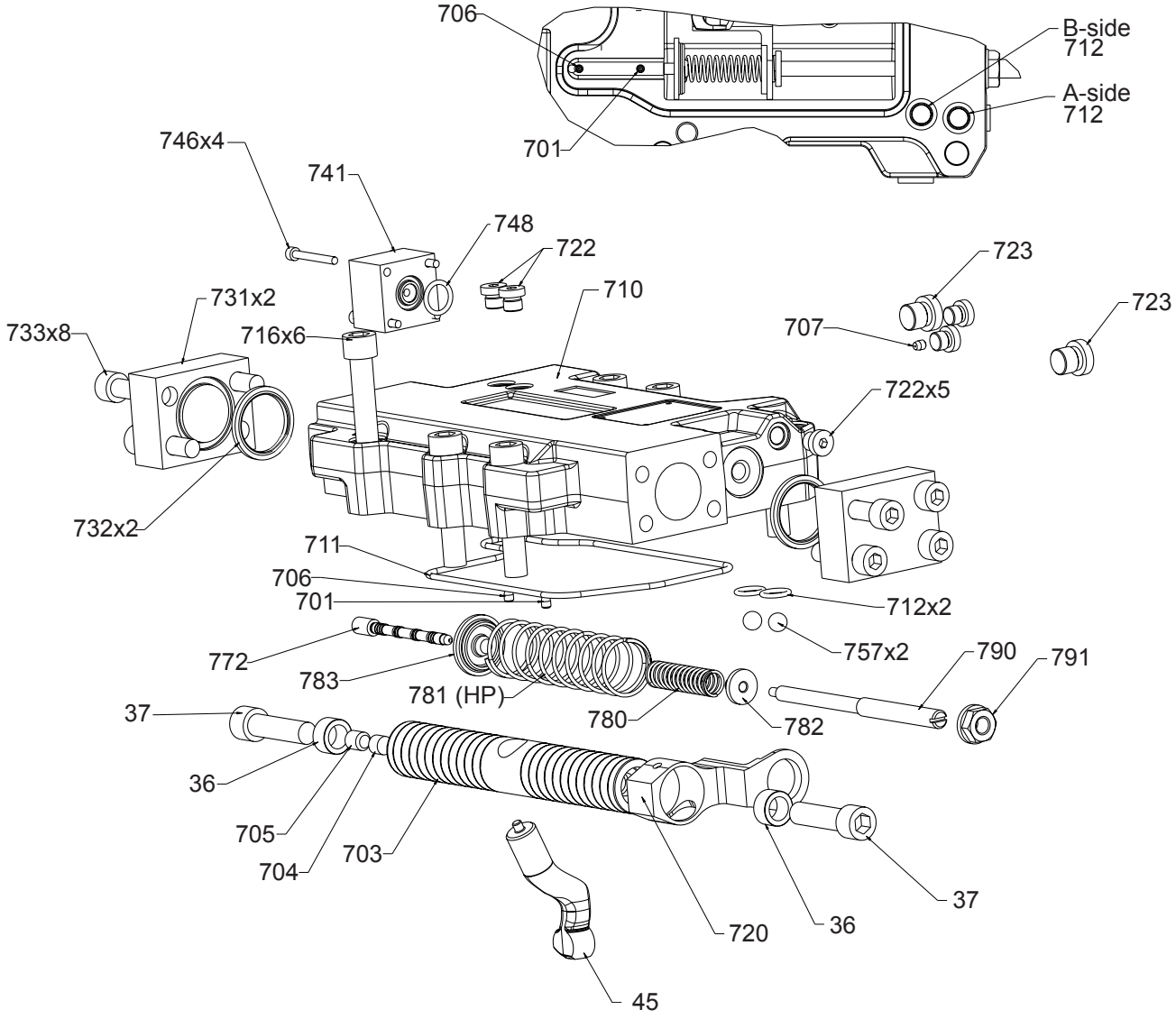
Splitview EP/EO Control

Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
716	105 ± 20
722	13 ± 2
723	38 ± 8 ISO
723	25 ± 5 SAE
733	60 ± 10
740	3 ± 0.5
791	22 ± 2



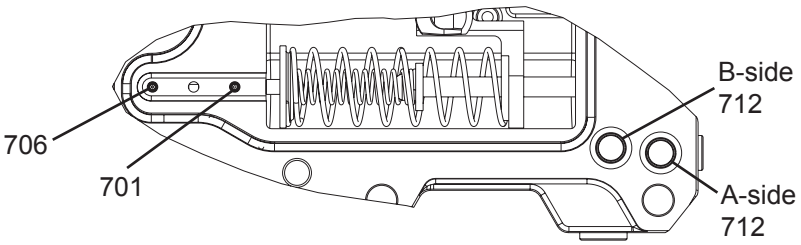
Splitview HP/HO Control

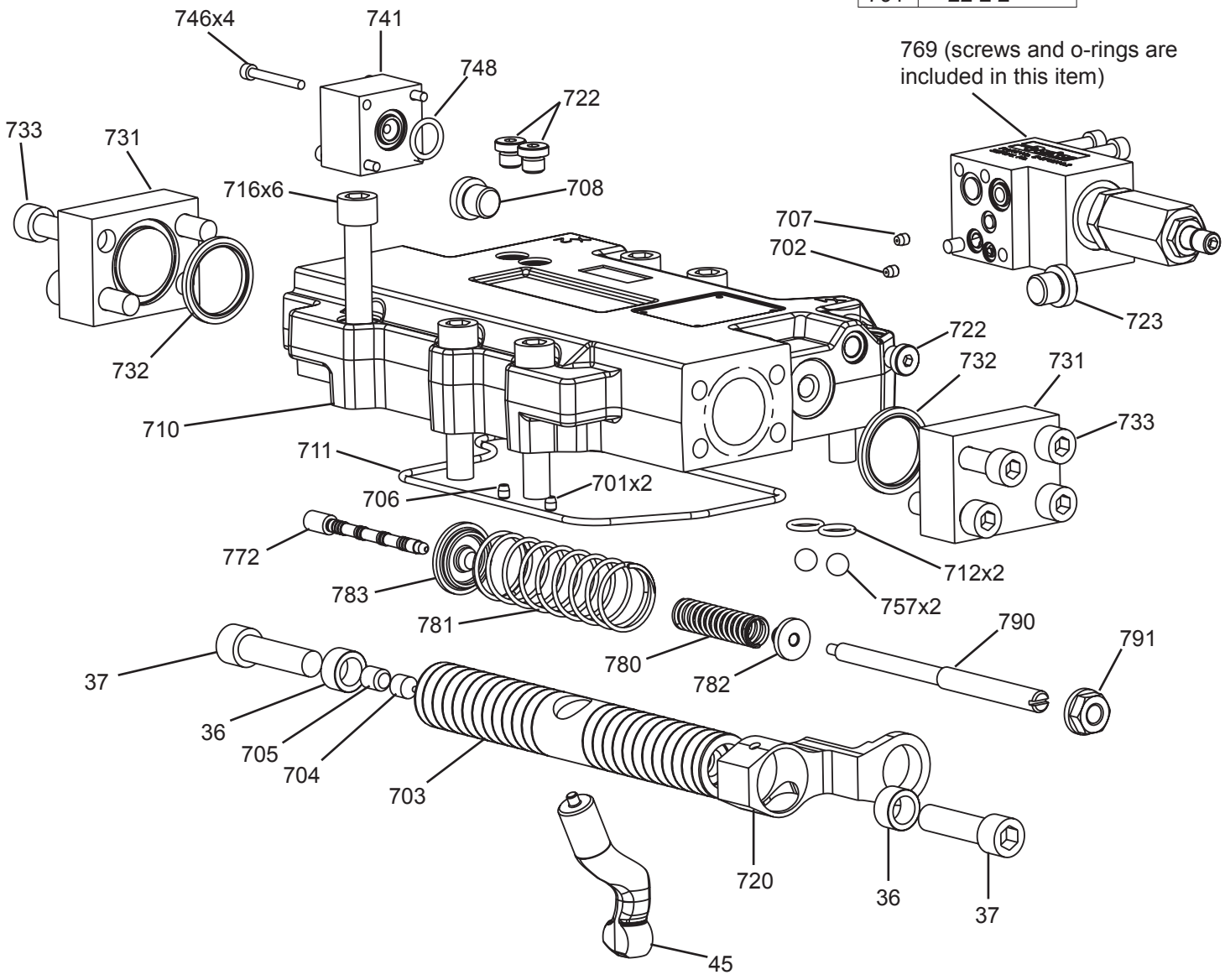
Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
708	38 ± 8 ISO
708	25 ± 5 SAE
716	105 ± 20
722	13 ± 2
723	38 ± 8 ISO
723	25 ± 5 SAE
733	60 ± 10
746	5 ± 0.5
791	22 ± 2



Splitview HPC Control

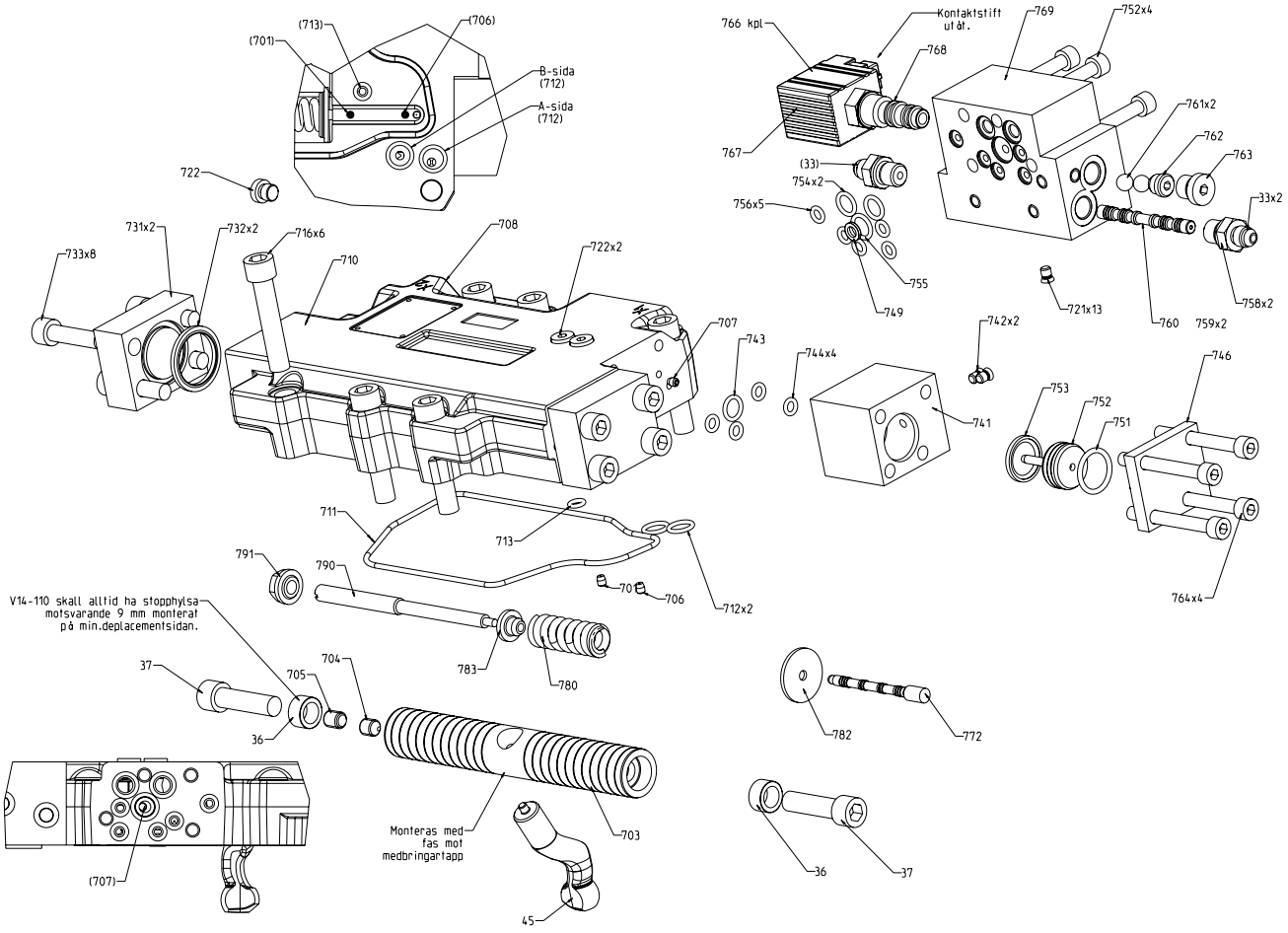
Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
702	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
708	38 ± 8 ISO
708	25 ± 5 SAE
716	105 ± 20
722	13 ± 2
723	38 ± 8 ISO
723	25 ± 5 SAE
733	60 ± 10
746	5 ± 0.5
769	12 ± 2
791	22 ± 2





Splitview ADH Control

Item	Torque (Nm)
37	105 ± 20
701	1.2 ± 0.2
704	14 ± 4
705	26 ± 6
706	1.2 ± 0.2
707	1.2 ± 0.2
708	38 ± 8 ISO
708	25 ± 5 SAE
716	105 ± 20
722	13 ± 2
733	60 ± 10
752	40 ± 8
763	38 ± 8 ISO
763	25 ± 5 SAE
764	40 ± 8
766	3,4 ± 0,5
768	31 ± 6
791	22 ± 2



Spare Part Kits for V14-110/160

Items included in the Seal Kit.
221, 225, 227, 233, 482, 711, 712, 713, 732, 743, 744, 745, 748, 749, 751, 753, 754, 755, 756, 759, 791

Unit	Part no.
V14-110/160	3782299

Items included in Stop Washer Kit A.
36

Unit	Part no.
V14-110	3782305
V14-160	3782305

For piston ring kits see SI 08/02

Control	Part no.
HPC assy, item 769	3787924

Parts Specification

Item	Description 110/160
36	Stop Washer
221	O-ring 144,5*3 V70 / 168*3 V70
225	O-ring 114,5*3 V80
227	O-ring 192*4 V70 (only cartridge)
233	Shaft Seal 60*80*7
311	Shaft type C
411	Cylinder Barrel
413	Guide Pin
415	Needle Bearing HK 2526 / HK 3026
424	Sliding Plate
433	Compression Spring
434	Guide Pin
440	Piston Assy
447	Joint Shaft
448	Joint Roller
449	Support Pin
451	Spring Pin 8*30 / 10*35
453	Pin 4,5*28 / 5,6*34
454	Retaining Ring JV 40 / SGH 45
455	Joint Coupling
476	Spacer Washer
482	O-ring 197*3 V80 / 224*3 V80
711	O-ring 162*3 V70
712	O-ring 12,3*2,4 V90
713	O-ring 6,3*2,4 V80 AD
713	O-ring 10,3*2,4 V80 AH/AC
732	Flange Sealing SAE 1”
743	O-ring 11,3*2,4 V80
744	O-ring 6,3*2,4 V80 AD
744	O-ring 8,3*2,4 V90 AH/AC
745	O-ring 6,3*2,4 V80 AH/AC
748	O-ring 12,3*2,4 V90 AH/AC
748	O-ring 14,3*2,4 V80 HO/HP
749	Filter
751	O-ring 22,2*3 V90
753	Piston Seal Assy
754	O-ring 10,3*2,4 V80
755	O-ring 12,3*2,4 V90
756	O-ring 6,3*2,4 V80
759	Seal Washer M14
769	HPC assy
791	Seal Nut M10*1

Test procedure

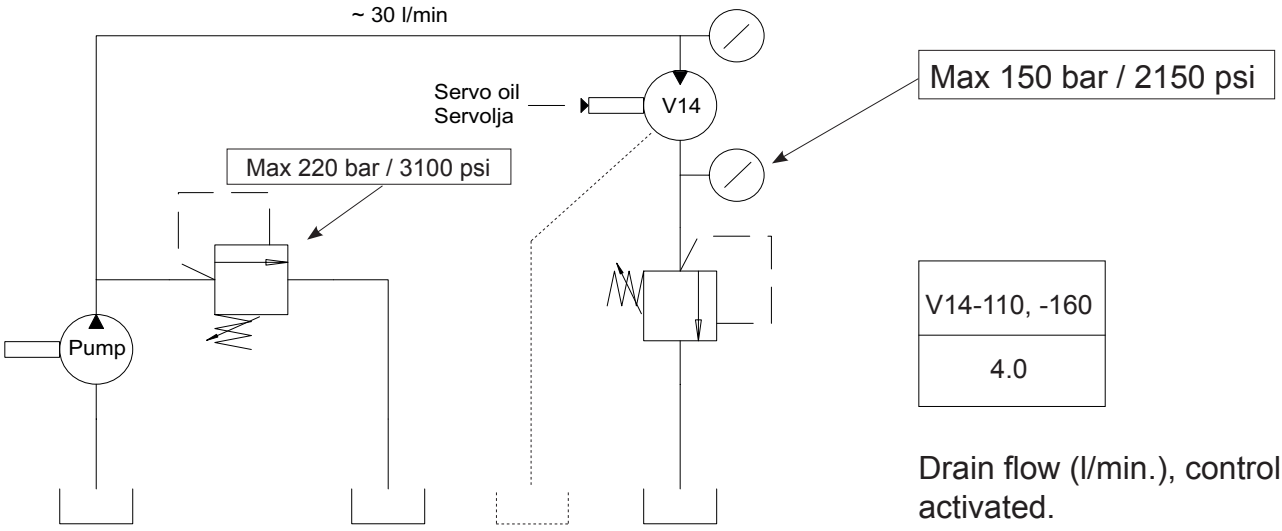
Use a test stand that supplies a flow of about 30 l/min. and pressures of up to 300 bar. A secondary flow of 3-5 l/min. at a pressure of 25 bar is required to supply low pressure for externally supplied controls.
EP control requires an amplifier supplying correct current according to specification.

Test

1. Fill housing with hydraulic fluid and start the pump in the test stand.

2. Increase the pressure with the restrictor valve on the return line. Max allowed pressure is 150 bar / 2150 psi.

3. Check the drain flow and compare with the table.



V14-110, -160
4.0

Drain flow (l/min.), control not activated.

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