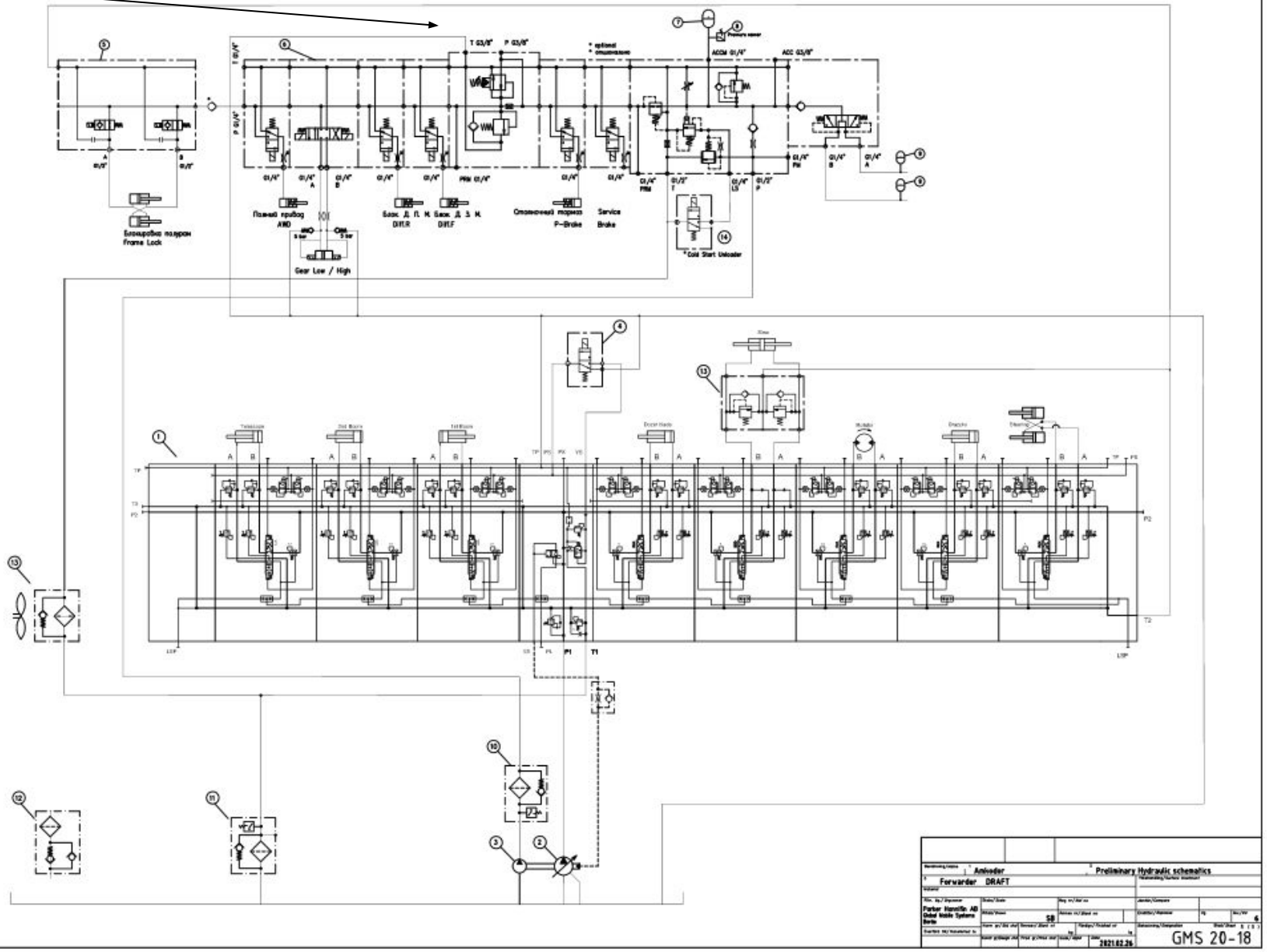
Amkodor Forwarder Proposal v.2.1

Drain better connected in the mid manifold 3/8” port than in the end plate ¼” port



Proposed solutions main components

- FV-5407 combination valve
  - K220LS-03-054508-01 : 1’st Boom, 2’nd Boom, Telescope
  - L90LS-05-050680-02 : Dozer Blade, Slew, Rotator, Grapple, Steering
- Manifold e3771979
  - Frame lock
- Manifold auxiliary functions, e3771977
  - Gear Low/high
  - AWD = All wheel drive
  - Diff.R = Differential lock rear
  - Diff.F = Differential lock front
  - P-Brake = Parking brake
  - S-Brake = Service brake, to lock when standing still
  - Accumulator charge
  - Brake accumulator supply control

- Return line filter
- Air breather filter
- Pressure line filter if needed
- P2-145cc LS pump
- Fixed gear pump

- (IQAN control system, at a later stage in the project)
- (Crimped, low cost piston accumulators (=non reparable similar to bladder))

Mid Inlet - Copy Spool, Tank Counter Pressure

[P20] Copy spool

The load signal system consists of a number of shuttle valves, which compare the load signals from different work sections and any signal received from a subsequent valve connected to the LSP port [P31]. The highest load signal is sent to the pump via the connection PL in the inlet section, or to a copy spool if the section has one. The copied load signal can then be tapped from the LS port.

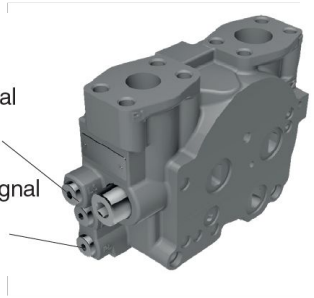
I Housing not machined for copy spool.

KS Inlet section with copy spool.

The load signal acts on a copy spool, which sends a copied load signal to the LS connection.

The system permits a certain consumption in the load signal line to the pump regulator, without the load signal being influenced, since the copied load signal in LS is supplied with oil from the pump channel instead of taking oil from a workport.

In addition, the system prevents disruptive micro-dipping of the load during the initial stage of the lifting phase.



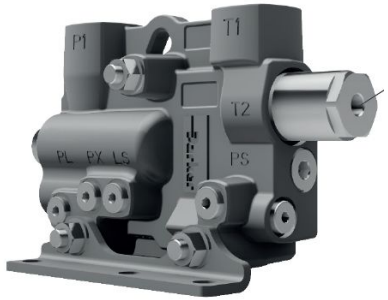
[P24] Tank connection T2

Can either be used as a tank connection or fitted with a counter pressure valve.
The counter pressure valve increases the pressure in the valve's tank gallery. By raising the counter pressure level the anti-cavitation characteristics of the K220LS is improved still further. Good characteristics eliminate the risk of cavitation and reduce the risk of damage to the cylinder seals. The characteristic are important for functions in which a lowering movement changes to a lifting movement without a time delay. For example, when an implement is lowered and then pressed down into the ground, or when a machine turns on sloping ground.

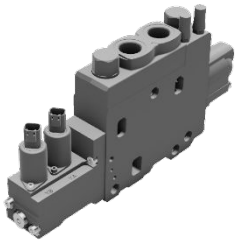
T2 Tank connection T2 open.

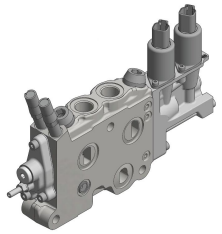
T2B Tank connection T2 plugged.

MF5 Counter pressure valve preset to give 5 bar counter pressure at a flow of 20 l/min.

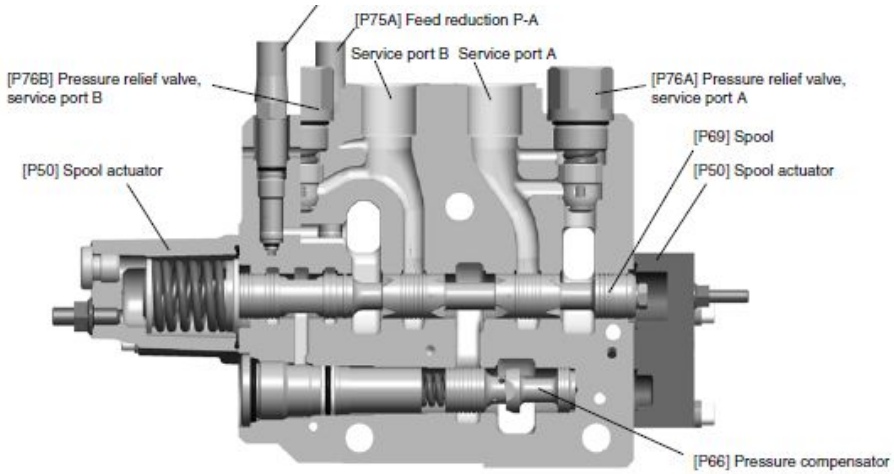


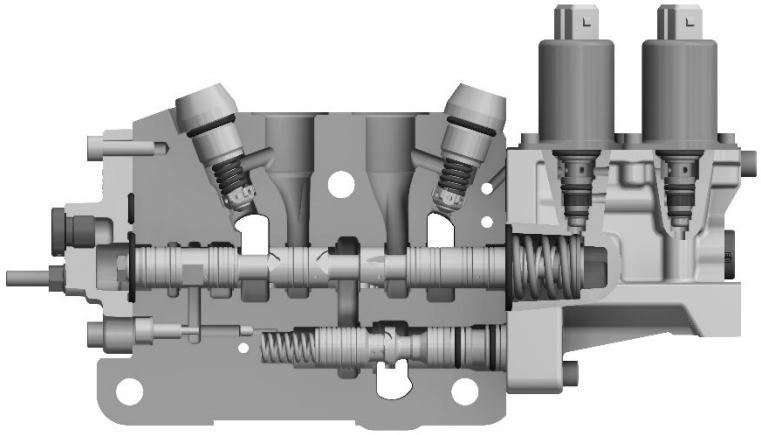
Work section K220LS & L90LS





- Many spool functions
  Function adapted spools.
- Force feedback
  Eliminates instability when activating loads with high inertia
- Feed-reducing valve
  Individual setting of maximum pressure in each work port.
- Port relief valve
  Protects valve work port and consumer from pressure peaks.
- Pressure compensator
  Maintains same speed no matter what load and pump pressure.
- Pilot solenoids
  without manual over ride, AMP connector





Crane valve – K220LS / L90LS

1st Boom

Single acting spool on to save energy and improve simultaneous operation by reducing needed pump flow.

Pressure feedback to give outstanding controllability with acceleration control.

2nd Boom and Telescope

Regenerative spools to improve simultaneous operation by reducing required pump flow (enables other functions to run faster).

Telescope – verify that the port relief and LS limiting pressures are correct.

L90LS Dozer Blade

- Consider using a load holding valve.

- L90LS D-spool, work port relief 230 bar, 30cSt, 50 degC nominal leakage:

  25 cm^3/min @ 100 bar

  45 cm^3/min @ 200 bar

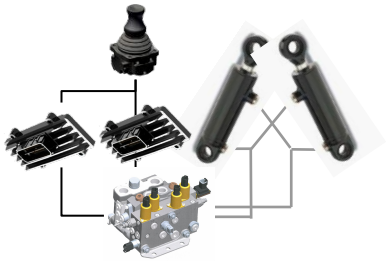
L90LS Steering Solutions

Conventional
Orbitrol System

Joystick steering
Parallel with steering
Orbitrol

Flow amplifying series
with steering pilot
Orbitrol

Full Steer-by-Wire
Stop in case of fault

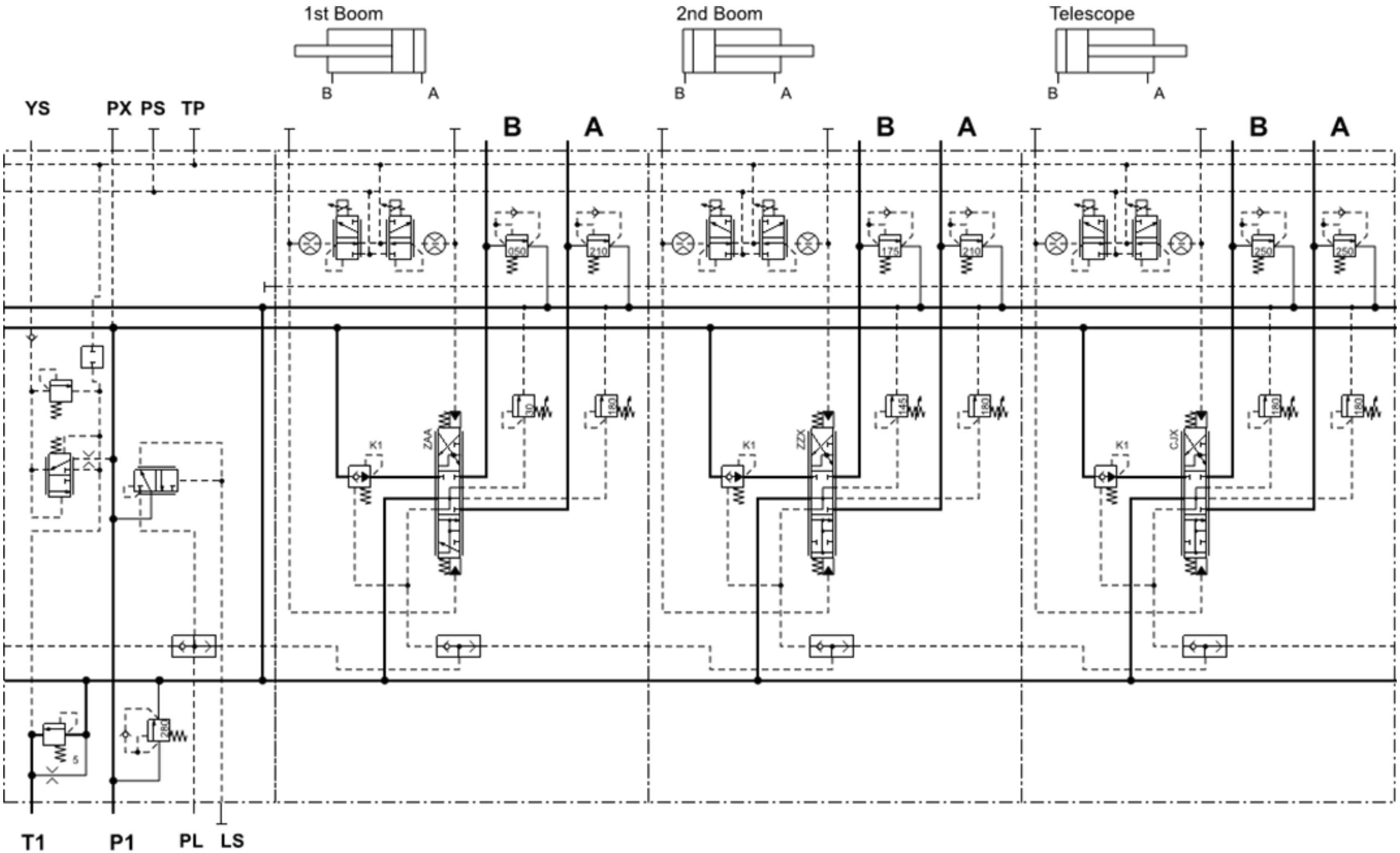


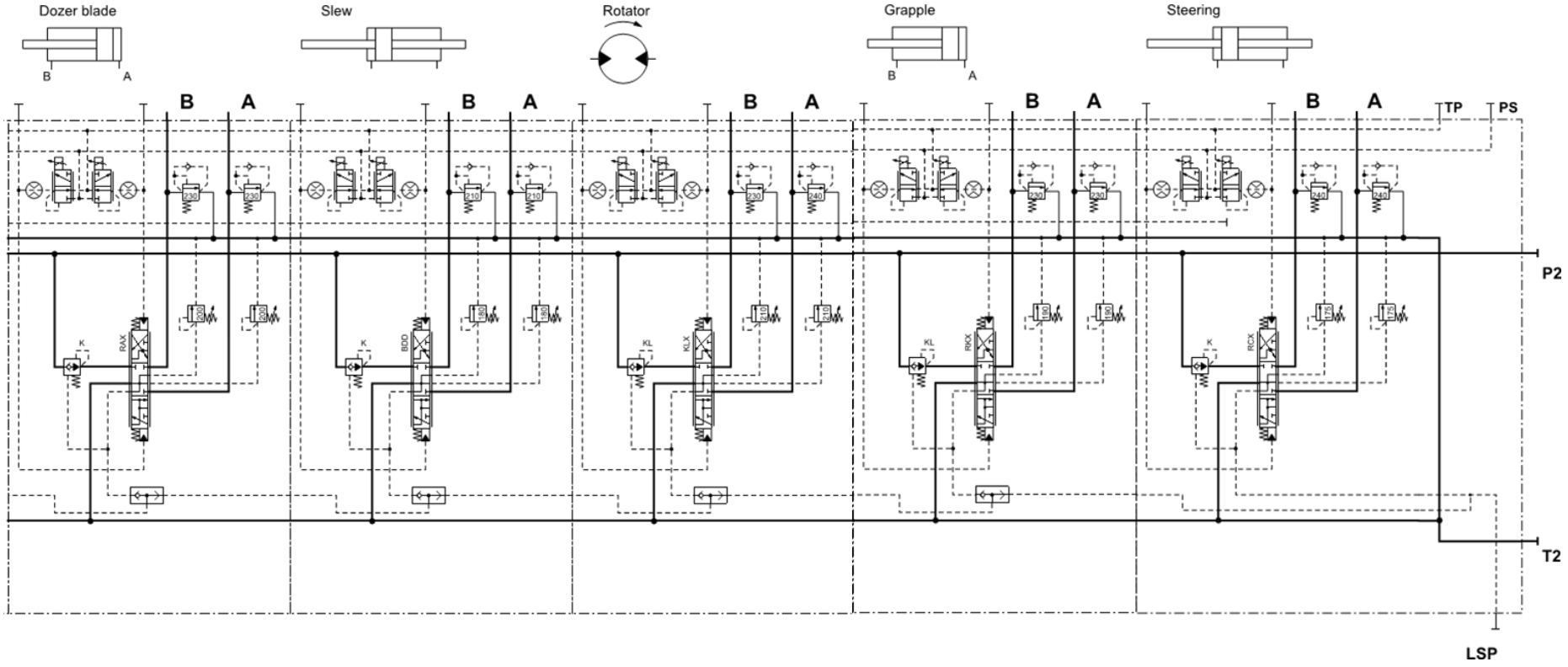
Full Steer-by-Wire
Maintain steering
in case of fault

Steering

- A standard L90 work section in this proposal. Consider using additional equipment to fullfil high enough level of safety.

- Parker has launched the SBW110 valve that facilitates fulfilment of
  ISO11850 Machinery for Forestry,
  ISO5010 Wheeled Machines-Steering

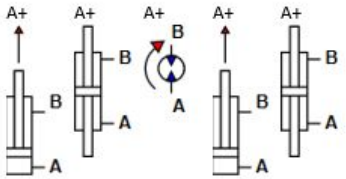

1st Boom
2nd Boom
Telescope
B
A
YS
PX
PS
TP
B
A
B
A
B
A
K1
K1
K1
T1
P1
PL
LS

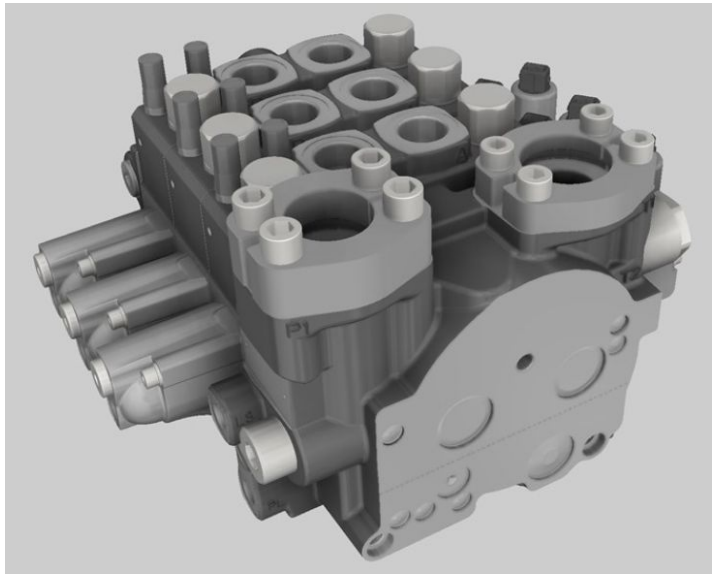

Dozer blade
Slew
Rotator
Grapple
Steering
B
A
TP
PS
P2
T2
LSP

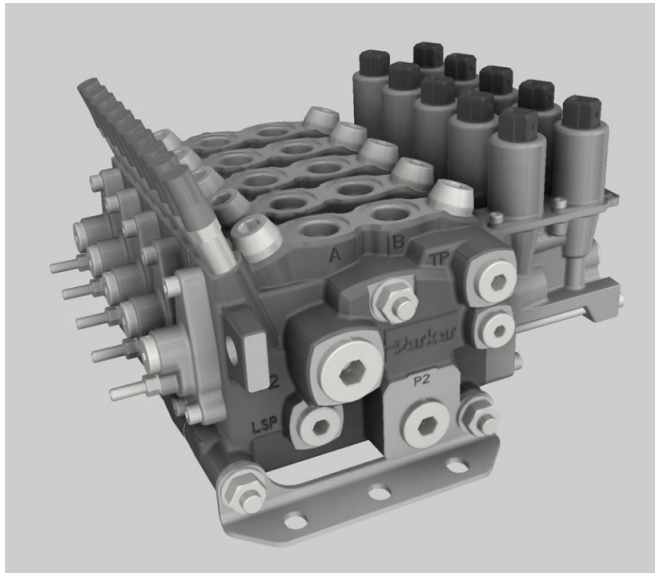
Section 1: 1st Boom
Section 2: 2nd Boom
Section 3: Telescope

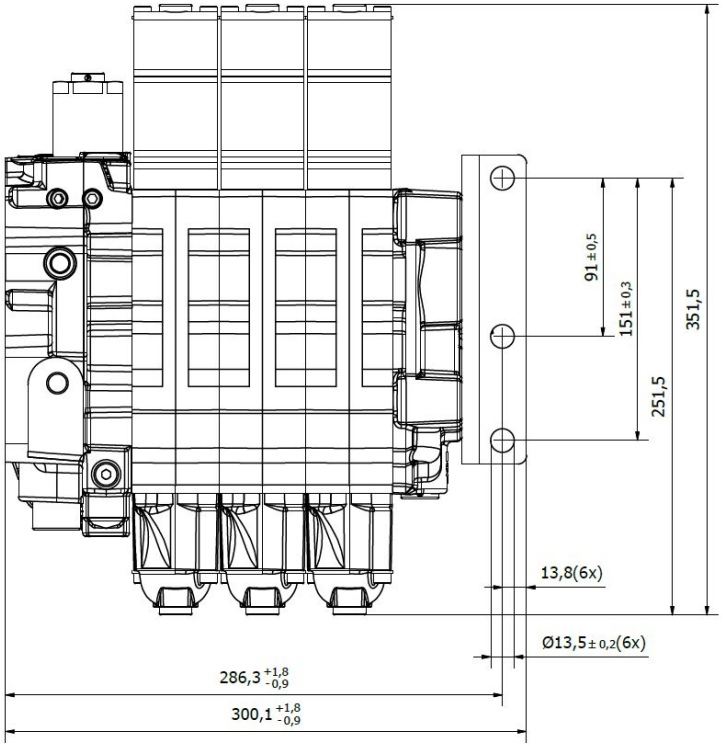
Pos	Label	1	2	3
Spool and Compensator Data				
P60	Spool function	D2	CBT	CB
P69	Spool with code	ZAA	ZZX	CJX
P66	Compensator with code	K1	K1	K1
Indata Cylinder				
S28	Cylinder diameter	110	110	
S29	Rod diameter	70	56	
S30	Number of cylinders	1	1	
S31	Area ratio	0.6	0.74	
S32	Stroke length	688	790	
S33	Stroke time +	4	7	
S34	Stroke time -	4	7	
Indata Motor				
S60	Displacement			
S61	Volume efficiency			
S62	Gear ratio			
S63	Requested rotation speed CW			
S64	Requested rotation speed CCW			
Requested flow				
P61A	Required flow port A	98	64	
P61B	Required flow port B	58	48	
Calculated Flow				
P62	Work port for + flow	A+	B+	B+
P71A	Calculated flow from workport A	121	91	76
P71B	Calculated flow from workport B	24	166	137
P72	Flow limitation	/	/	/
P72A	Max flow from workport A			
P72B	Max flow from workport B			
S40	Calculated stroke time extension +	3.2	2.7	
S41	Calculated stroke time extension -	9.9	3.7	
S42	Calculated rotation speed CW			
S43	Calculated rotation speed CCW			

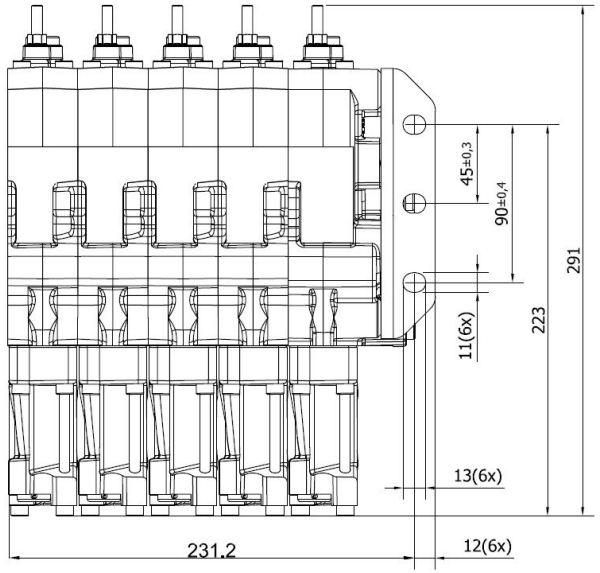
P45 Machine Function
Section 1: Dozer blade
Section 2: Slew
Section 3: Rotator
Section 4: Grapple
Section 5: Steering

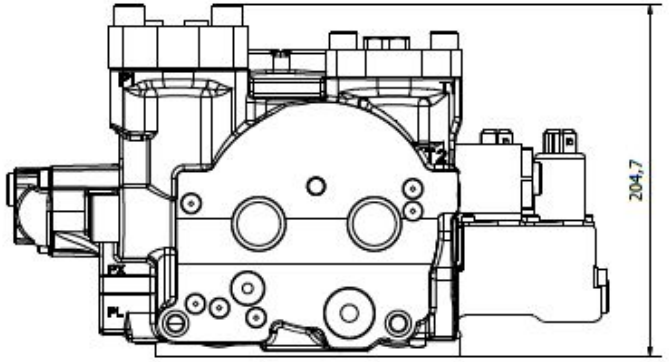
Pos	Label	1	2	3	4	5
How to Connect Workports						
P62	Work port for + flow					
Spool and Compensator Data						
P60	Spool function	D	DS	D	D	D
P69	Spool with code	RAX	BDD	KLX	RKX	RCX
P66	Compensator with code	K	K	KL	KL	K
Indata Cylinder						
S28	Cylinder diameter	100	100		90	100
S29	Rod diameter	50	60		50	56
S30	Number of cylinders	2	2		1	2
S31	Area ratio	0.75	1		0.69	1
S32	Stroke length	400	620		243	400
S33	Stroke time +	4	6		1.5	6
S34	Stroke time -	4	6		1.5	6
Requested flow						
P61A	Required flow port A	94	62		62	63
P61B	Required flow port B	71	62		43	43
Calculated Flow						
P71A	Calculated flow from workport A	94	73	14	81	95
P71B	Calculated flow from workport B	95	71	14	78	91
P72	Flow limitation	/	/	/	/	/
P72A	Max flow from workport A					
P72B	Max flow from workport B					
S40	Calculated stroke time extension +					2.7
S41	Calculated stroke time extension -					2.8
S42	Calculated rotation speed CW					
S43	Calculated rotation speed CCW					


P1

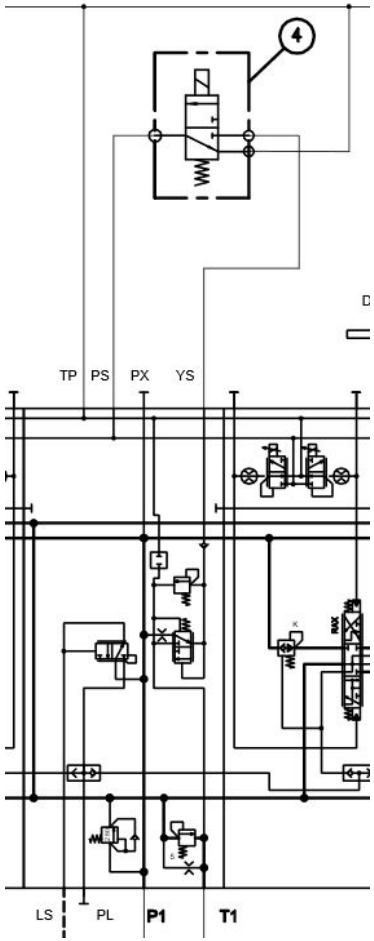

A
B
TP
Parker
P2
LSP


91 ±0,5
151 ±0,3
251,5
351,5
13,8(6x)
Ø13,5± 0,2(6x)
286,3 +1,8 -0,9
300,1 +1,8 -0,9


45±0,3
90±0,4
11(6x)
223
291
13(6x)
231.2
12(6x)


204,7
P
T
PL

Pilot Pressure Blocking

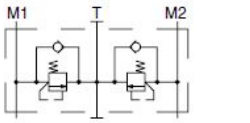


Inlet section specified for external loop of the pilot pressure

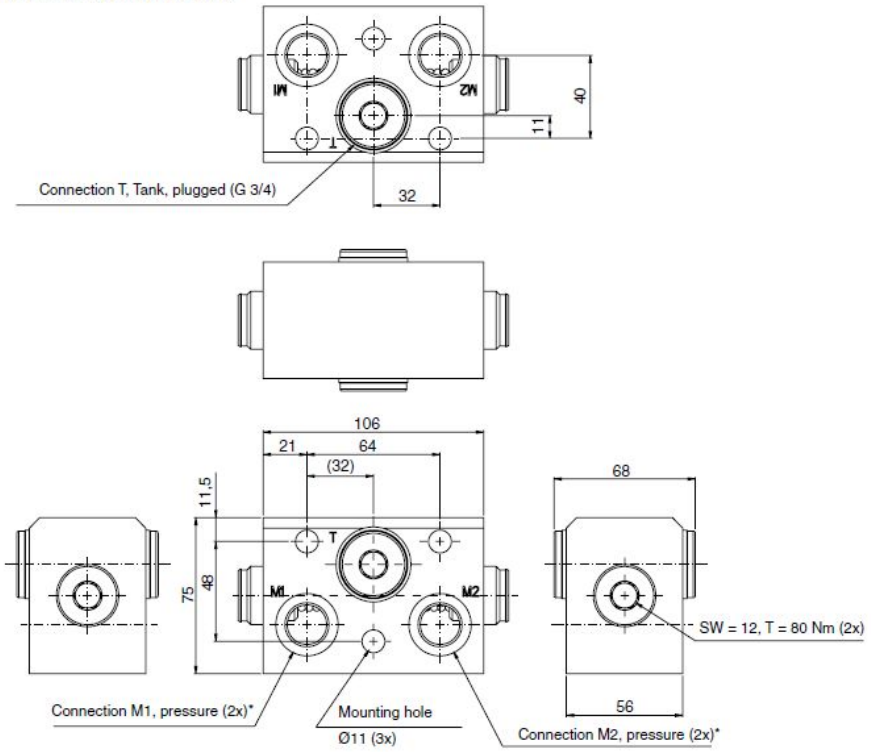
Cartridge
DSH083B
Coil
CCP024A
Body
B08-3 6B

Slew Cross-Over Valve

Double housing



Hydraulic symbol for duoble housing

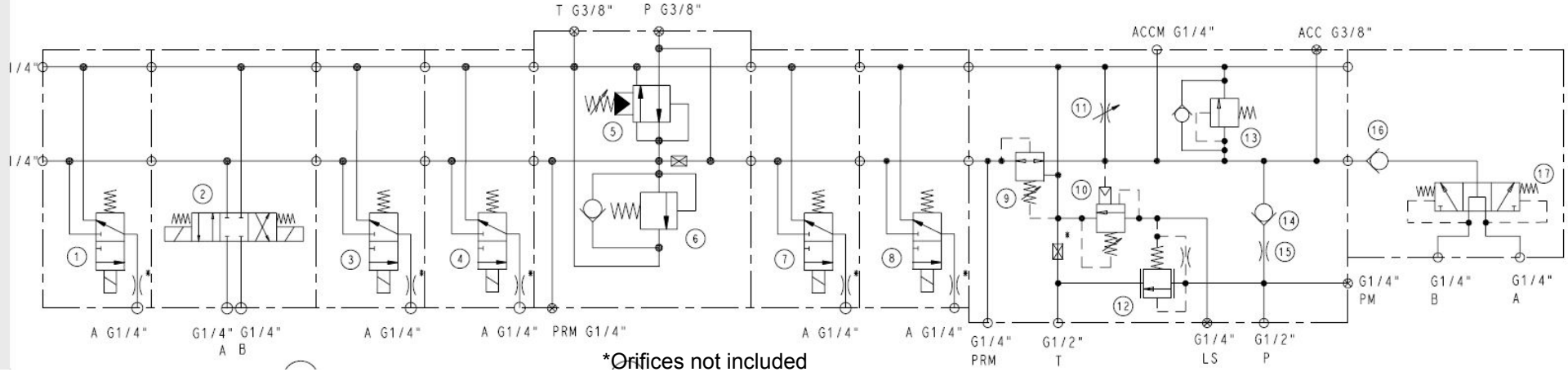


For optimised back filling of cavitating cylinder at deceleration and pressure relieves.

Separate connection to the L90 T2 port to utalise the 5 bar back pressure in the FV-valve tank gallery.

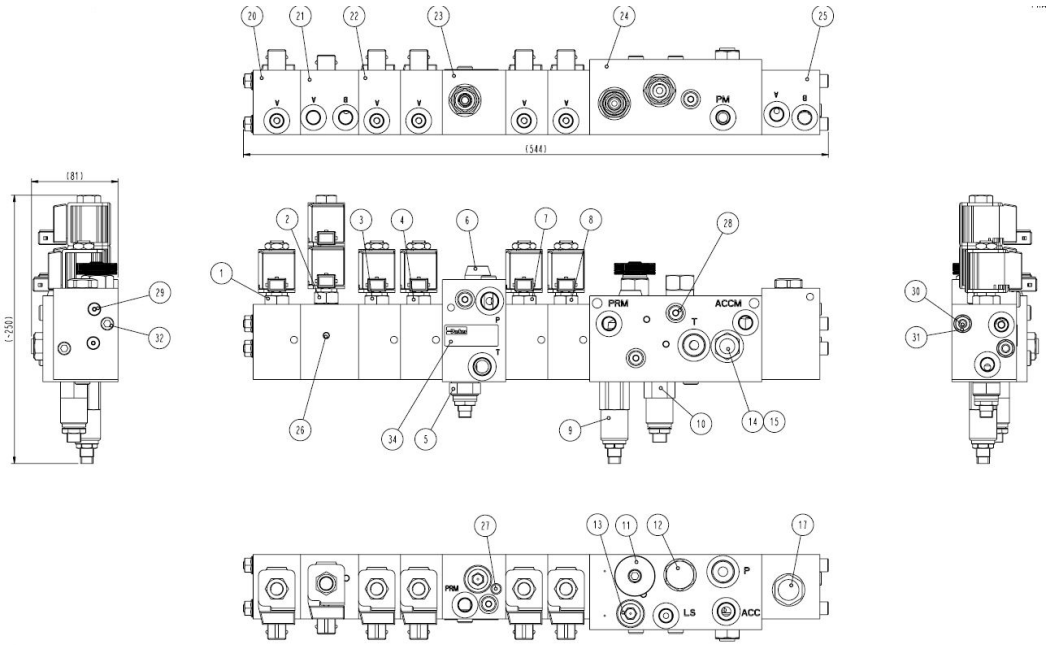
L90 work port to have check valves instead of relief-anti-cav valves.

Auxiliary Manifold, e3771977

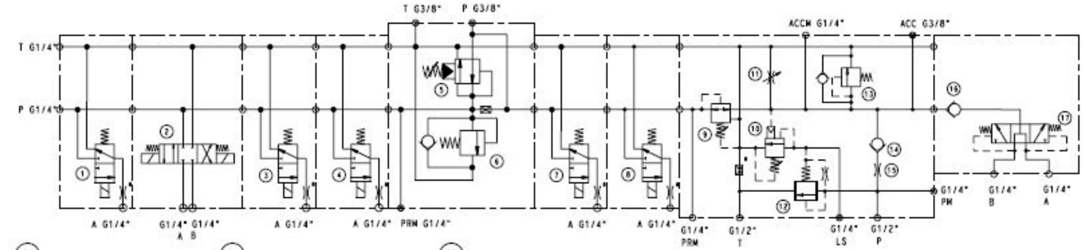


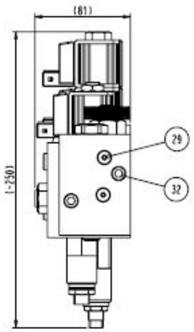
*Orifices not included

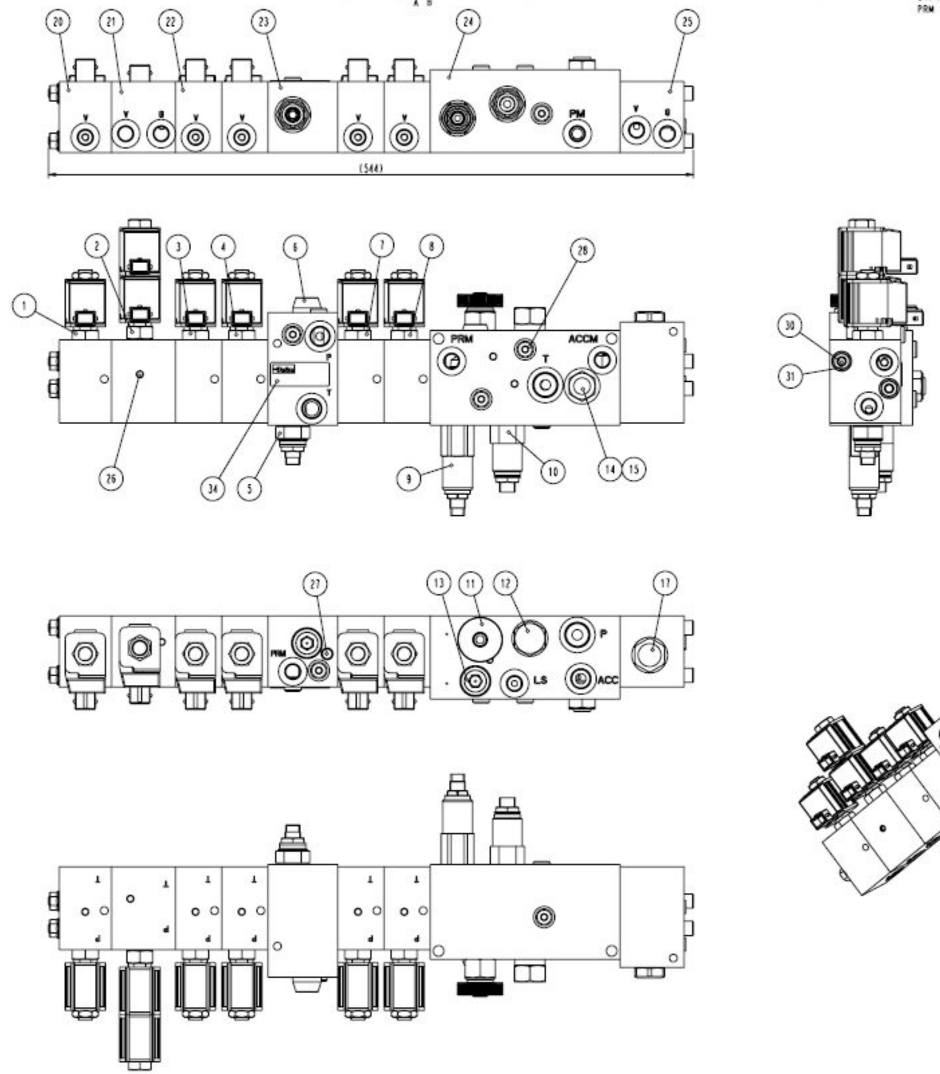
POS	ANT./ QTY	Mv Nm	ART.NR/ PART NO	BENÄMNING/ NAME	ANMÄRKNING/ REMARK
1	1			DSH083B CCP024A	
2	1 2			GS025100N CCP024A	
3	1			DSH083B CCP024A	
4	1			DSH083B CCP024A	
5	1			PRH101S10N	30 Bar
6	1			PLC053-50	
7	1			DSH083B CCP024A	
8	1			DSH083B CCP024A	
9	1			PR103S12	50 Bar
10	1			RU101S30C	180 Bar
11	1			NVH101K	
12	1			R04F3-10..0N	
13	1			PLC053-210	
14	1			D02B2-0.2N	
15	1			STRYPSKRUV/ORIFICE SCREW ∅ 2,5	a)
16	1			BACKVENTIL/CHECK VALVE RB1	
17	1			10S5	

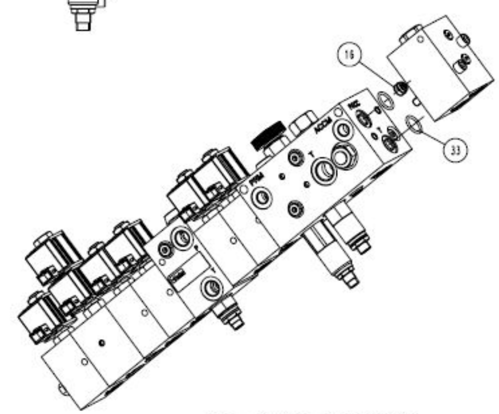


POS	ANT./ QTY	Mv Nm	ART.NR/ PART NO	BENÄMNING/ NAME	ANMÄRKNING/ REMARK
1	1	45 8	3764671 3762520	DSH083B CCP024A	
2	1 2	30 3,5	8231112718 3762520	GS025100N CCP024A	
3	1	45 8	3764671 3762520	DSH083B CCP024A	
4	1	45 8	3764671 3762520	DSH083B CCP024A	
5	1	60	3772895	PRH101S10N	30 Bar
6	1	60	3762218	PLC053-50	
7	1	45 8	3764671 3762520	DSH083B CCP024A	
8	1	45 8	3764671 3762520	DSH083B CCP024A	
9	1	60	3768993	PR103S12	50 Bar
10	1	60	3764362	RU101S30C	180 Bar
11	1	60	3766624	NVH101K	
12	1	60	3770418	R04F3-10.0N	
13	1	60	3762227	PLC053-210	
14	1	40	8231120282	D02B2-0.2N	
15	1	3	9127197112	STRYPSKRUV/ORIFICE SCREW Ø2,5	a)
16	1	15	9126900693	BACKVENTIL/CHECK VALVE RB1	
17	1	60	3769532	10S5	









POS	ANT./ QTY	Mv Nm	ART.NR/ PART NO	BENÄMNING/ NAME	ANMÄRKNING/ REMARK
20	1	-	9126466408	BLOCKHUS/MANIFOLD HOUSING	
21	1	-	91225597	BLOCKHUS/MANIFOLD HOUSING	
22	4	-	91264665	BLOCKHUS/MANIFOLD HOUSING	
23	1	-	3768094	BLOCKHUS/MANIFOLD HOUSING	
24	1	-	3766688	BLOCKHUS/MANIFOLD HOUSING	
25	1	-	E3775106	BLOCKHUS/MANIFOLD HOUSING	
26	9	-	91259599	EXP. MB 850-060	
27	1	-	91259893	EXP. MB 850-100	
28	7	15	376910201	PLUGG/PLUG G1/8"	
29	2	7	3176786801	PLUGG/PLUG 5/16" UNF	
30	2	-	9126445906	DRAGSTÅNG/TIE ROD L:332	
31	2	20	0266702402	MUTTER/NUT M6MF	
32	2	15	3768794	SKRUV/SCREW MC6S M8X65	
33	16	-	0663212401	O-RING 17,3X2,4 HNBR 90	
34	1	-	3772304	ETIKETT/LABEL 50X20	377319802, Parker

a) Tätningsvätska/Sealing fluid STD 1262,15.

Monteras och provas enl. std. MTB 9110:00/
To be assembled and tested acc. to std. MTB 9110:00

Parker Hannifin AB
Mobile Hydraulic Systems Division EMEA Borås

Skala/Scale: 1:2
Projection

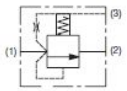
Artikelnamn: BLOCK, BYGGSYSTEM
Part title: MANIFOLD, MODULE SYSTEM
Material: -
Ytbehandling/Surface treatment: -
Dokumenttyp/Document Type: Smst/Assy
Giltighet/Validity: Prototype
Ritad för/Drawn for: M1408
Utförd av/Issued by: ULHAGG
Ersätter/Replaces
Jämför/Compare
Godkänd/Approved by
Ritning nummer/Drawing number (Art-nr/Part no): E3771977
Blad/Sht: 1(1)
Utg/Issue: -
Datum/Date

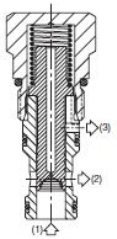
Auxiliary Manifold, e3771977

Spool Type Logic Valve
Series R04F3

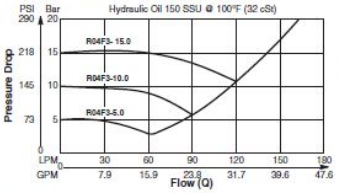
General Description
Spool Type , Normally Closed, Vent to Open Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features
- High flow capacity
- Used as high flow switching or metering element
- Can be used as main stage for a pilot operated relief or sequence valve
- Integral 250 micron pilot flow filter
- Various switching pressures available
- 1:1 pilot pressure ratio
- Hardened working parts for maximum durability
- All external parts zinc plated





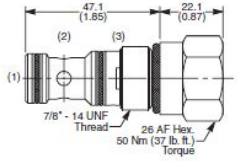
Performance Curve (Through cartridge only)
Vented Open Pressure Drop vs. Flow 1 to 2



Specifications

Rated Flow	170 LPM (45 GPM)
Nominal Flow @ 7 Bar (100 PSI)	100 LPM (26 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage @ 150 SSU (32 cst)	50 ml/min. @ 100 Bar (1450 PSI)
Switching Press.	See ordering information
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.13 kg (.29 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF

Dimensions Millimeters (Inches)



Ordering Information

R04F3	—		
10 Size Logic Element		Switching Pressure	Seals

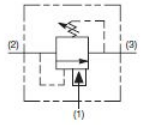
Code	Switching Pressure Non Adjustable Preset
1.0	1.0 Bar (14.5 PSI)
5.0	5.0 Bar (73 PSI) Std.
10.0	10.0 Bar (145 PSI)
15.0	15.0 Bar (218 PSI)
20.0	20.0 Bar (290 PSI)

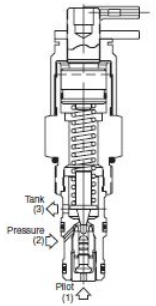
If no switching pressure is specified, valve will be supplied as R04F3-5.0N

Code	Seals / Kit. No.
N	Nitrile, Buna-N (Std.)/ (SK30504N-1)
V	Fluorocarbon / (SK30504V-1)

Differential Area Unloading Relief Valve
Series RU101

General Description
Differential Area Unloading Relief Valve. This valve is best suited for low flow accumulator unloading circuits or can be used as remote pilot valves. They provide a fixed percentage between load and unload pressures. For additional information see Technical Tips on pages PC1-PC6.



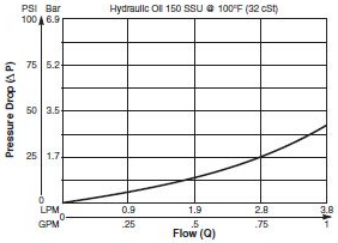


Features
- Low hysteresis
- Cartridge design
- All external parts zinc plated

Specifications

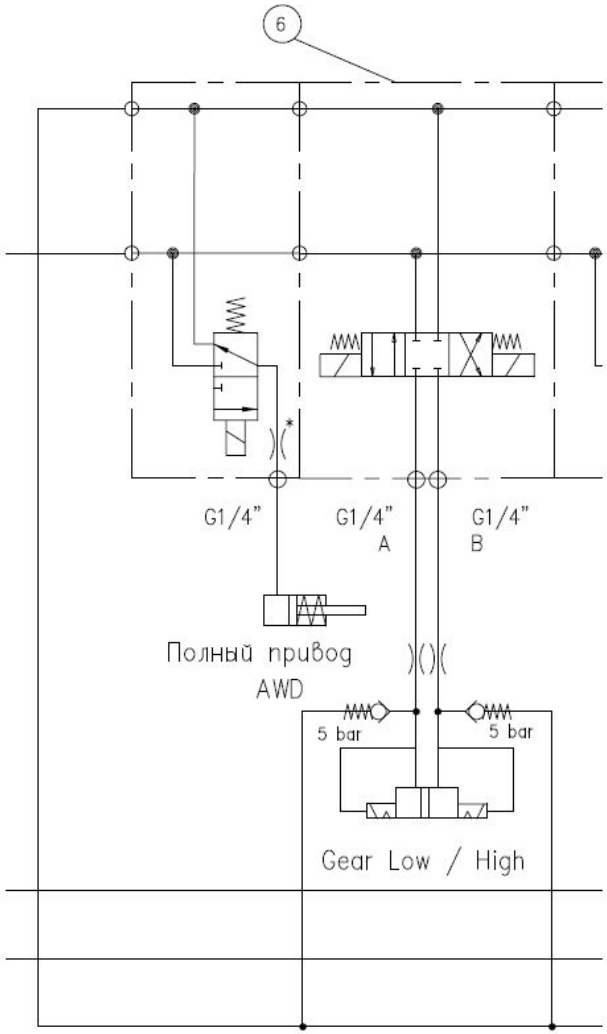
Rated Flow	3.75 LPM (1 GPM)
Maximum Pilot Flow	.94 LPM (.25 GPM)
Maximum Inlet Pressure	245 Bar (3500 PSI)
Maximum Pressure Setting	210 Bar (3000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	Port 2 to 3 10 drops/min. (0.66 cc/min.) Port 1 to 2 60 drops/min. (3 cc/min.)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.23 kg (.50 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve
Inlet Flow vs. Pressure Drop
Without pilot assist (Through cartridge only)



Parker

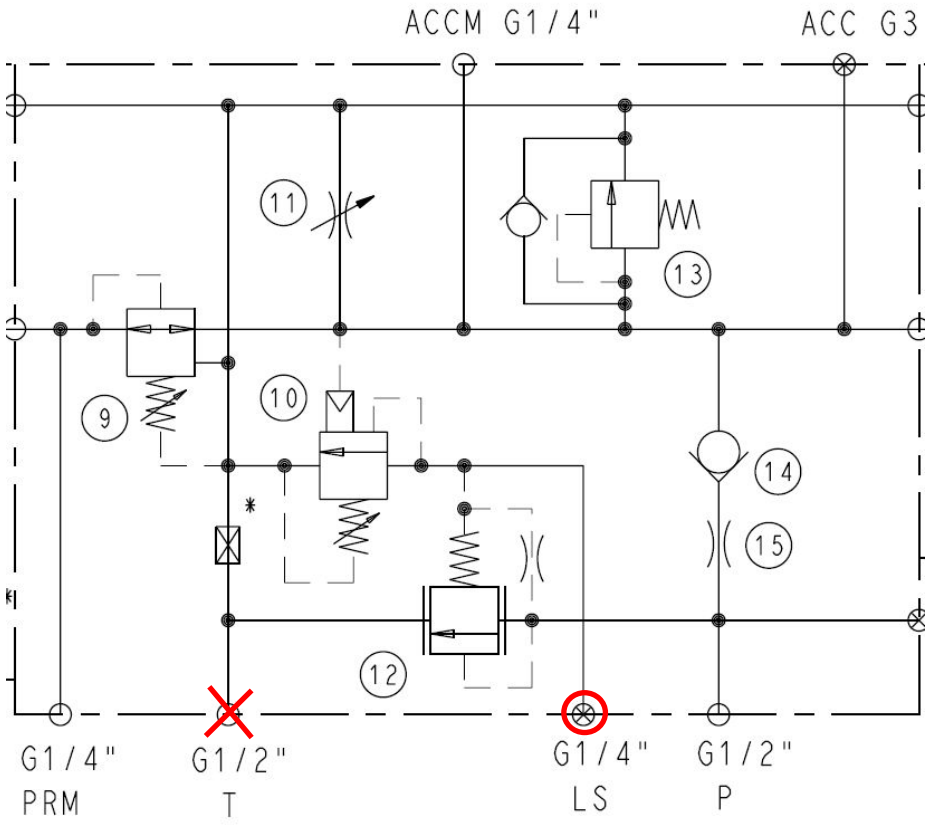
Auxiliary Manifold Gear Shift



Based on that the gear shifting mechanism have mechanical detent positions.
Shifting gear with a hydraulic puls by momentarily shifting the directional control valve.

Orifices and check valves are line mounted components.
Not included in manifold price.

Auxiliary Manifold Alternative Supplied by the LS pump

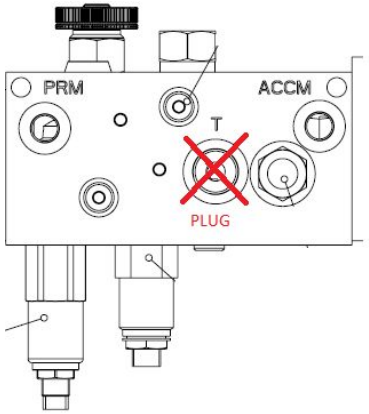


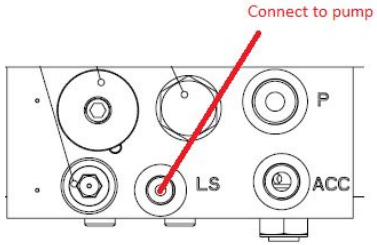
The Auxiliary Manifold can be adapted for LS pump supply.

The ½" T-port is plugged.

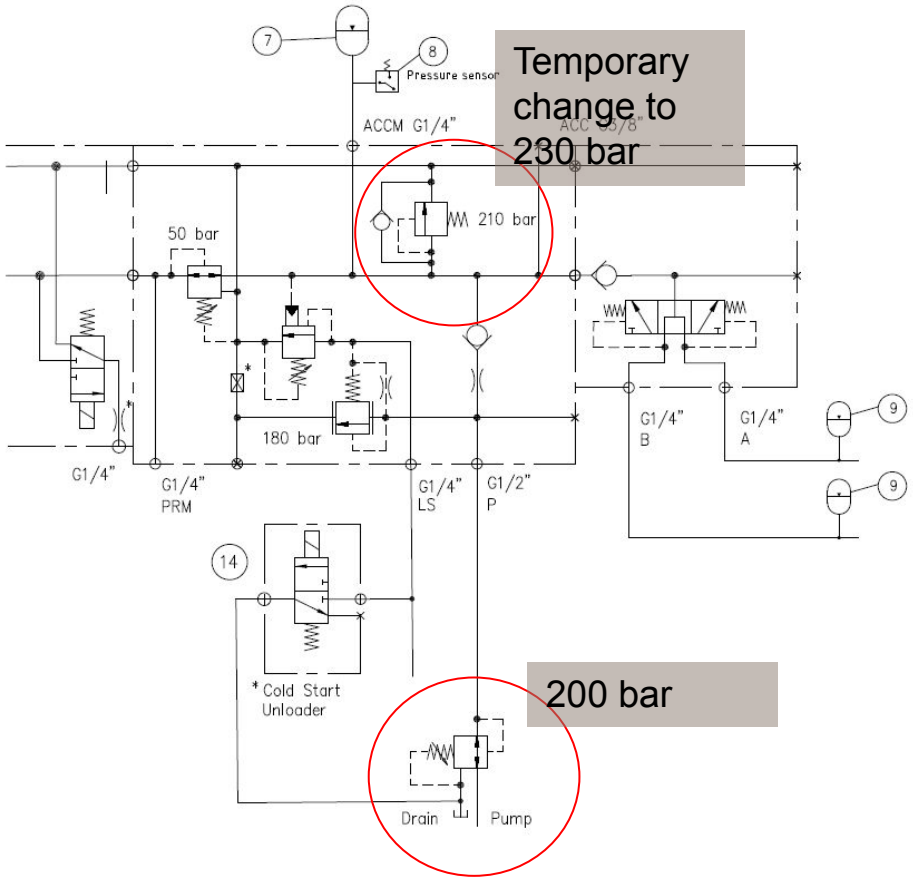
LS port is connected to the pump regulator LS signal line.

BUT! only if max system pressure level allows. If not, then a pressur reducing valve is needed in the P-line.
Relief valve #13 changed by customer to 230 bar if needed.





Auxiliary Manifold - LS system installation



Catalog HY15-3502-R/US
Technical Information

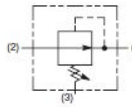
Pilot Operated Pressure Reducing Valve
Series PRH082

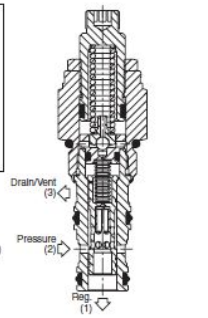
General Description

Pilot Operated Pressure Reducing Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris



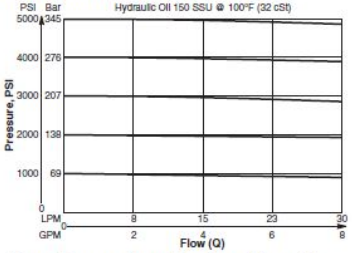


Specifications

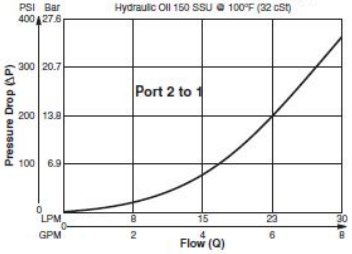
Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 25 Bar (362 PSI) **20** 44.5 Bar (646 PSI) **30** 64.2 Bar (932 PSI) **50** 137 Bar (1987 PSI)
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.56 LPM (0.15 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-45°C to +132°C ("D"-Ring) (-50°F to +270°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.11 kg (.25 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NTF08-3R Finisher NFT08-3F

Performance Curves

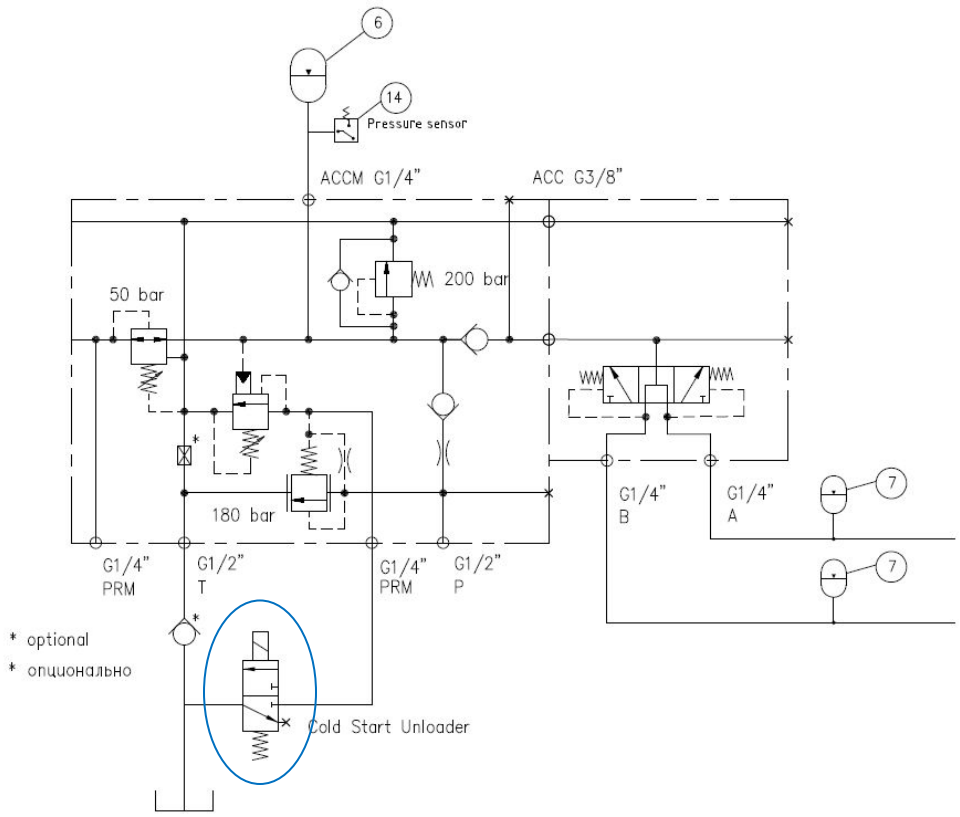
Flow vs. Pressure (Through cartridge only)



Flow vs. Pressure Drop (Through cartridge only)



Cold Start Unloader

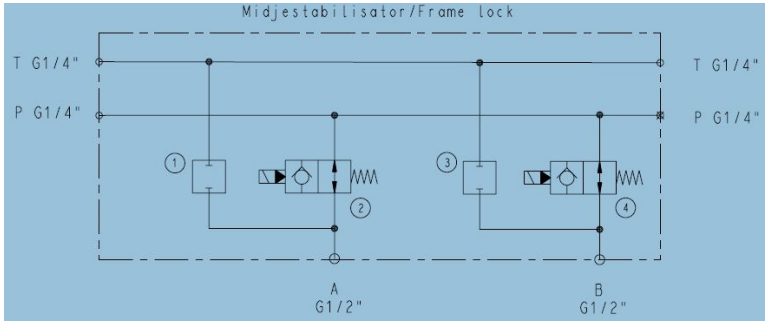


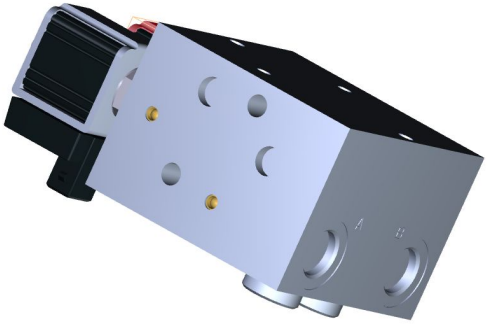
When starting the diesel engine at for example below -20ºC.
The control sysem activates the solenoid valve and drain the pilot signal to the unloader valve.
The valve is activated to be open for 10 seconds until the diesel engine has reached a steady idling speed.

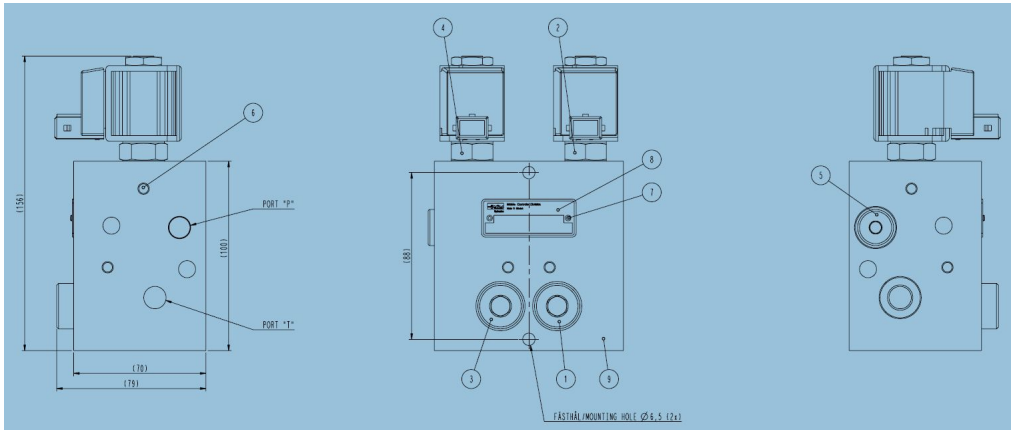
The benefit is to keep the engine start torgue as low as possible and not to discharge the battery too much.

Cartridge
DSH083B
Coil
CCP024A
Body
B08-3 6B

Frame Lock, e3771979



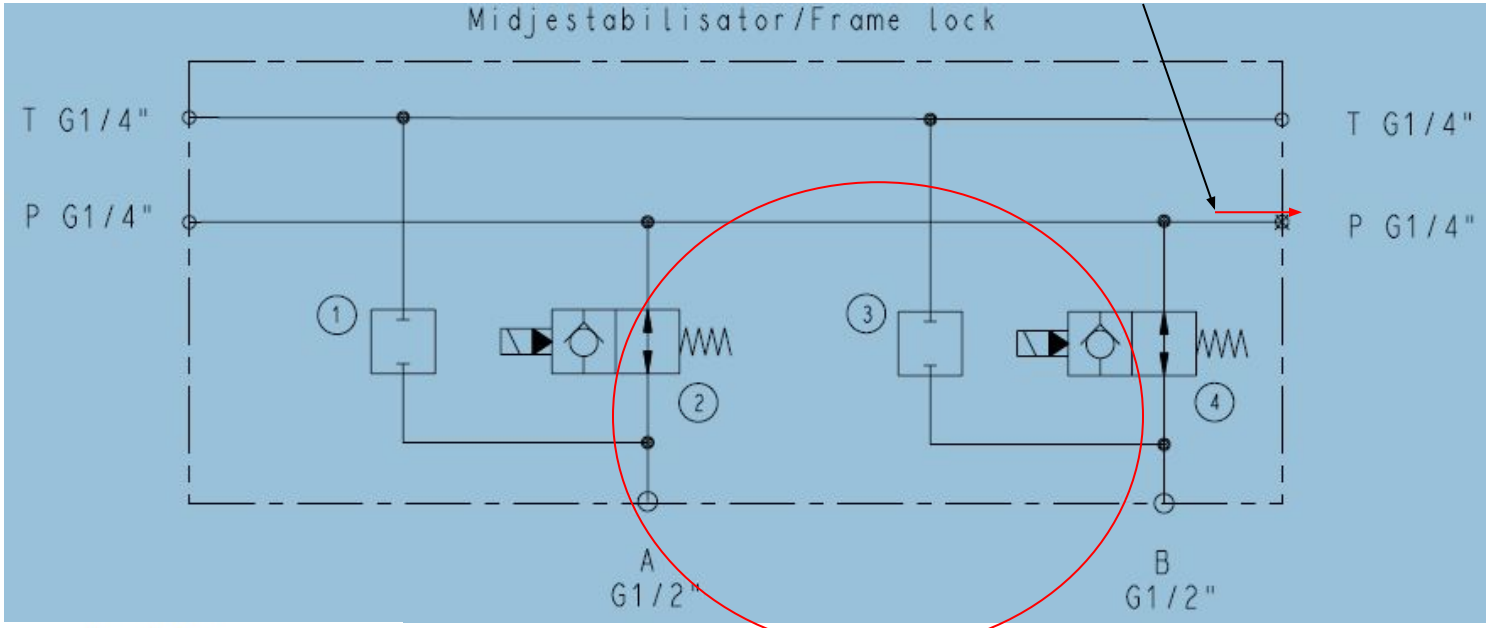


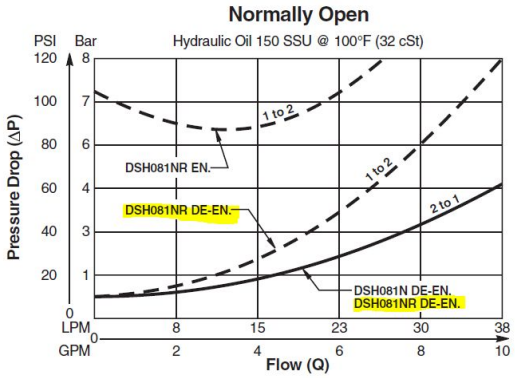


POS	ANT./ QTY	Mv Nm	ART.NR/ PART NO	BENÄMNING/ NAME
1	1	60	3762158	PLUGG/PLUG PLC053
2	1	45 8	3766315 3762520	DSH081NR CCP024A
3	1	60	3762158	PLUGG/PLUG PLC053
4	1	45 8	3766315 3762520	DSH081NR CCP024A
5	1	30	376910202	PLUGG/PLUG G1/4"
6	10	-	91259599	EXP. MB 800-060
7	2	-	91257701	SKRUV/SCREW
8	1	-	91283219	SKYLT/PLATE
9	1	-	3764466	BLOCKHUS/MANIFOLD HOUSING

Frame Lock

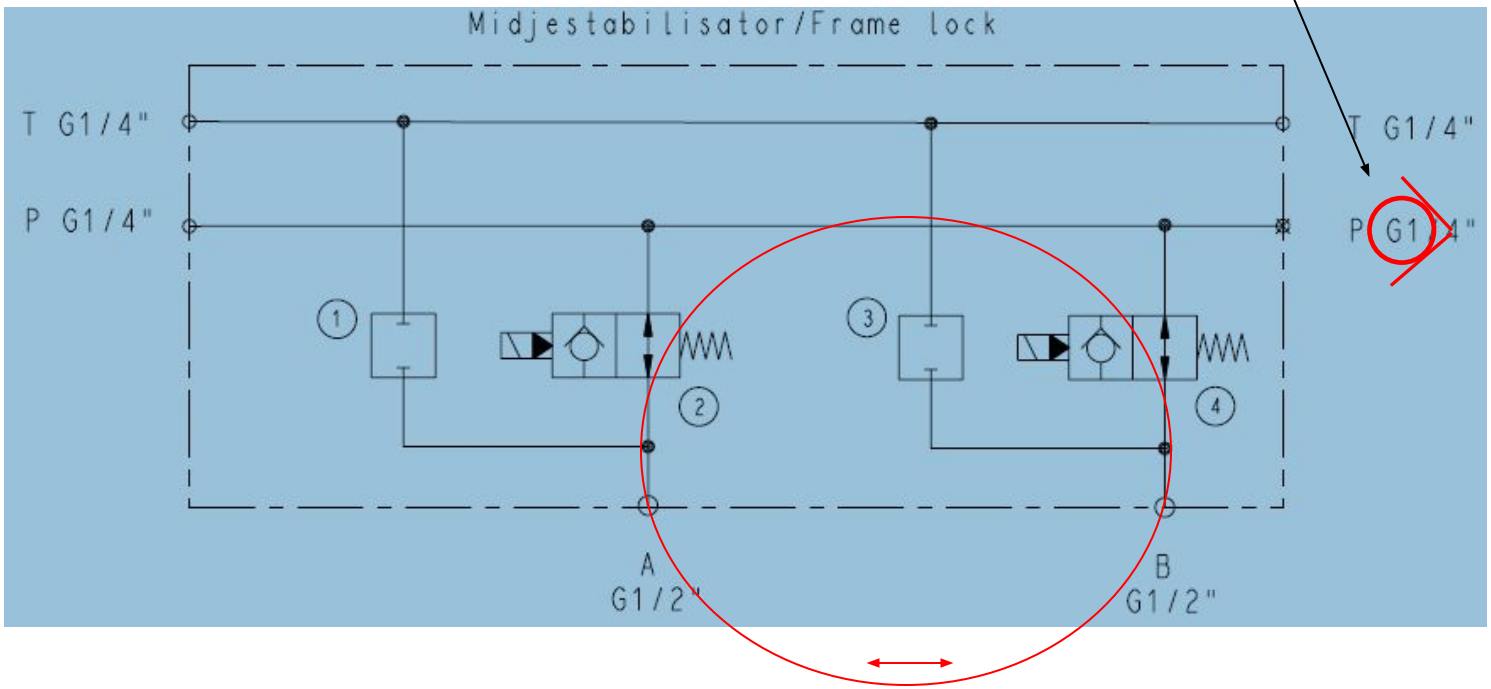
Dynamic
pressure peaks ?





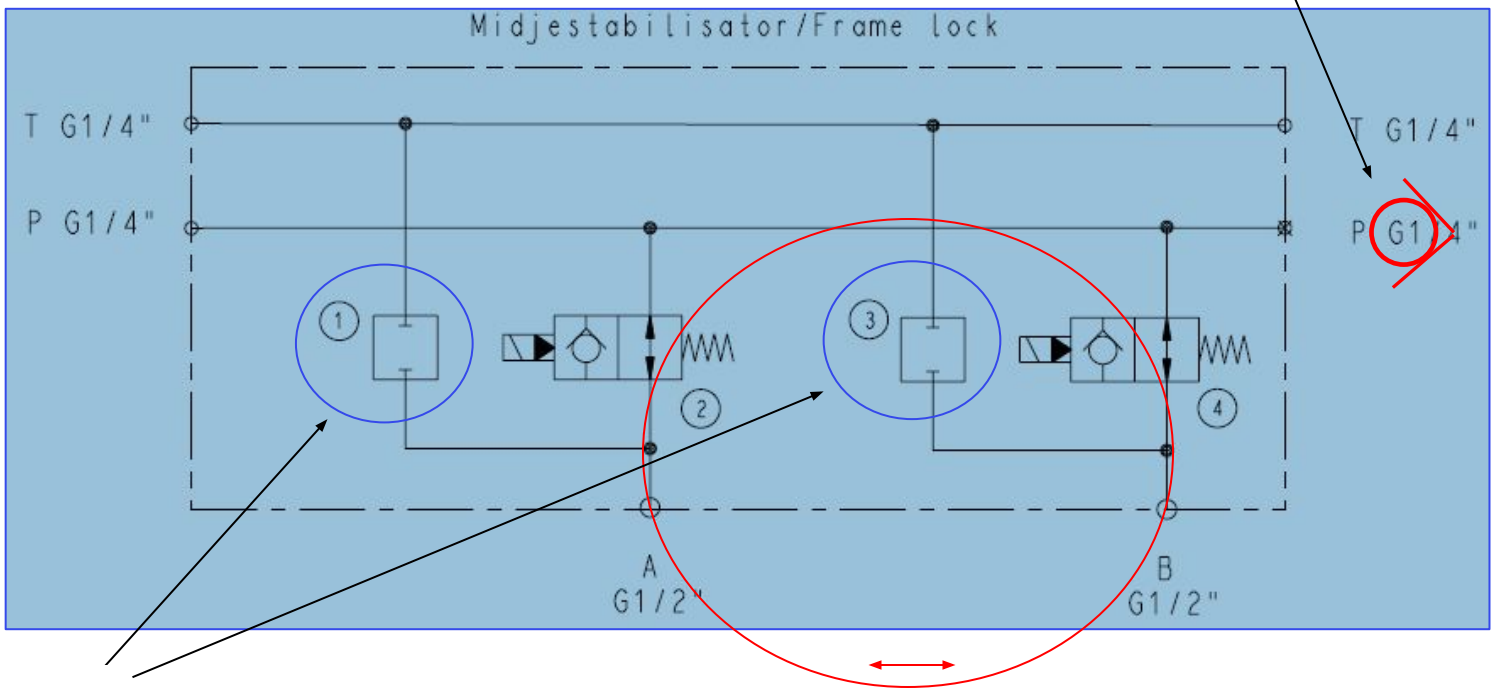
Frame Lock alternatives

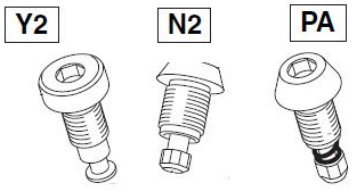
Dynamic pressure peaks ?
Check valve up stream.



Frame Lock alternatives

Dynamic pressure peaks ?
Check valve up stream.





Y2- plug
N2- check valve
PA - Relief & check valve

Return Line Filter,

Filter selection parameters

Estimated return oil flow at simultaneous operation, Example:

Slew 65 Lpm

1st Boom Lift 60 Lpm

2nd boom lift 70 Lpm

Tele In 70 Lpm

+aux manifold 20Lpm

- Say total about ~ 350 Lpm

Operating Limitations due to temperature and viscosity:

- 50 Lpm @ viscosity 1000 cSt
- 350 Lpm @ viscosity 125 - 15 cSt

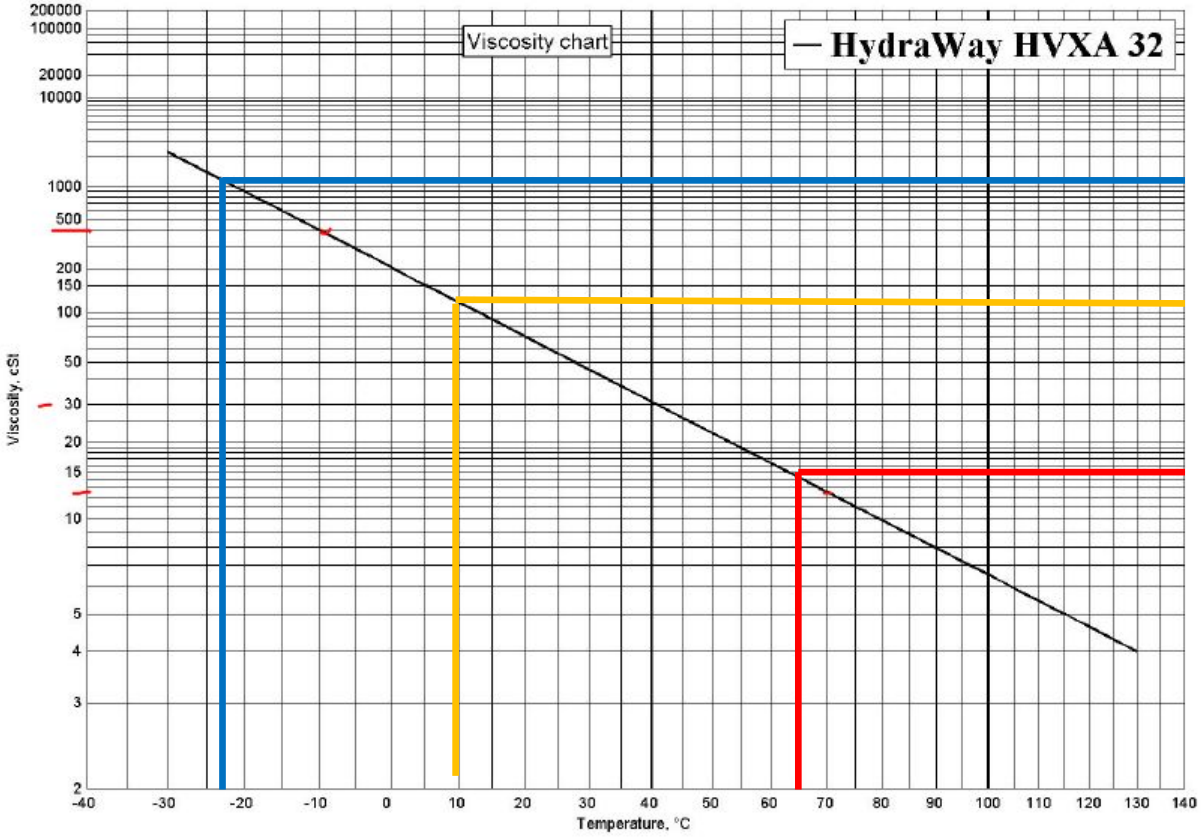
- Select cleanliness target typically 18/16/13 ISO4406 - usually matches 10 micron Beta200
- By-pass valve 1,7 bar
- Initial pressure drop ratio relationship 1/3 of the By-pass -> target dp of about ~ 0,5 bar
- Double the element size to get 3 times as much life expectancy on the element.
  Say dp ~0,25 bar @ 350 Lpm

Oil EXAMPLE

Filter selection parameters

VI 173

500 cSt @ -10deg
12,5 St @70deg
13,5cSt @ 80deg



– 20°C / 1000 cST
Reduced speed:
~50 LPM

+ 10°C / 125cSt
Full operation:
~350 Lpm

+ 65°C / 15cSt
Full operation:
~350 Lpm

Size3 Return Line Filter, Pressure drop

Cold condition (1000 cSt)

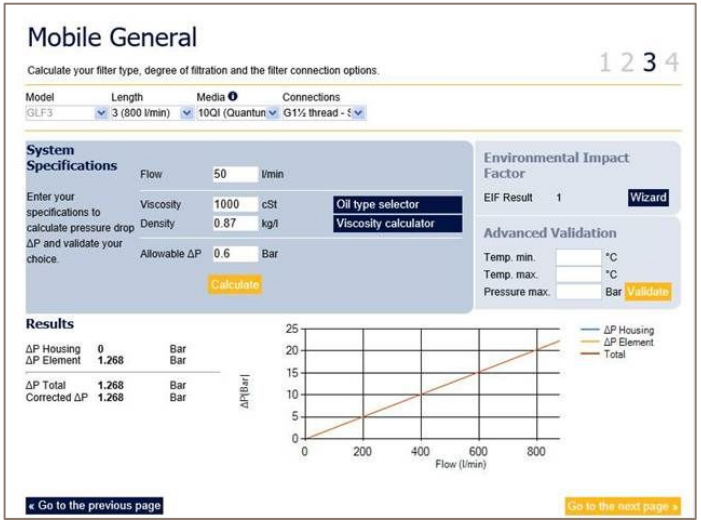
GLF32 10 micron @ 50 l/min, 1000 cSt -> dp 1,6 bar
GLF33 10 micron @ 50 l/min, 1000 cSt -> dp 1,3 bar

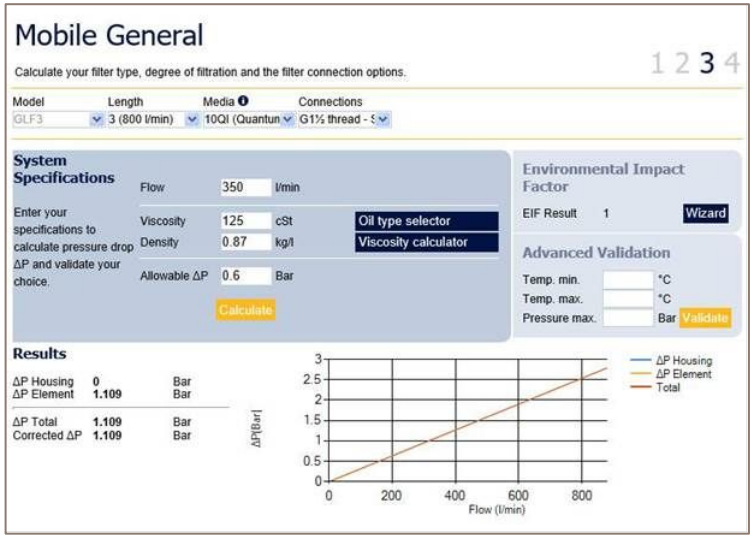
Normal operation (125 cSt +10C)

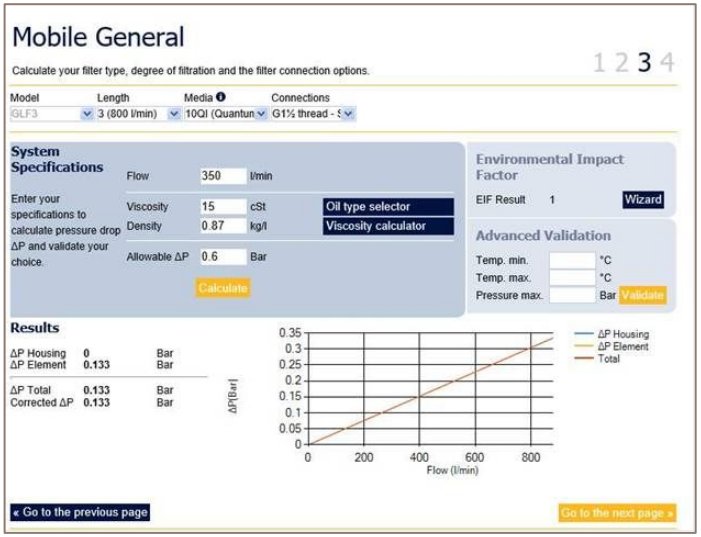
GLF32 10 micron @ 350 l/min, 125 cSt -> dp 1,4 bar
GLF33 10 micron @ 350 l/min, 125 cSt -> dp 1,1 bar

Normal operation (15 cSt +65C)

GLF32 10 micron @ 350 l/min, 15 cSt -> dp 0,17 bar
GLF33 10 micron @ 350 l/min, 15 cSt -> dp 0,13 bar







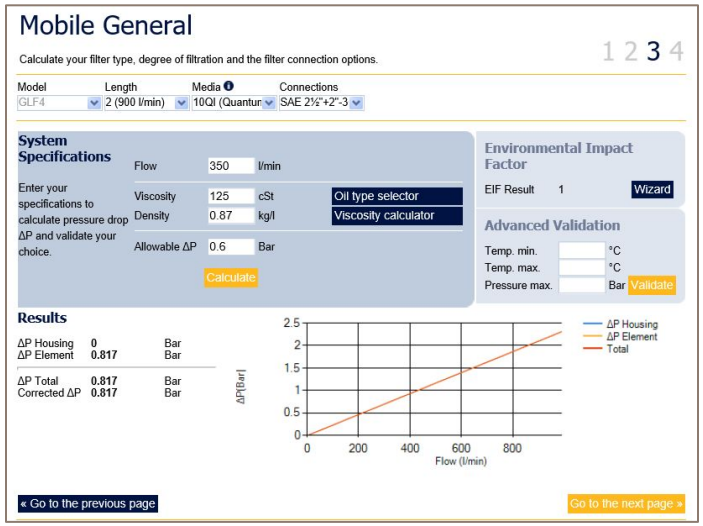
Size4 Return Line Filter, Pressure drop

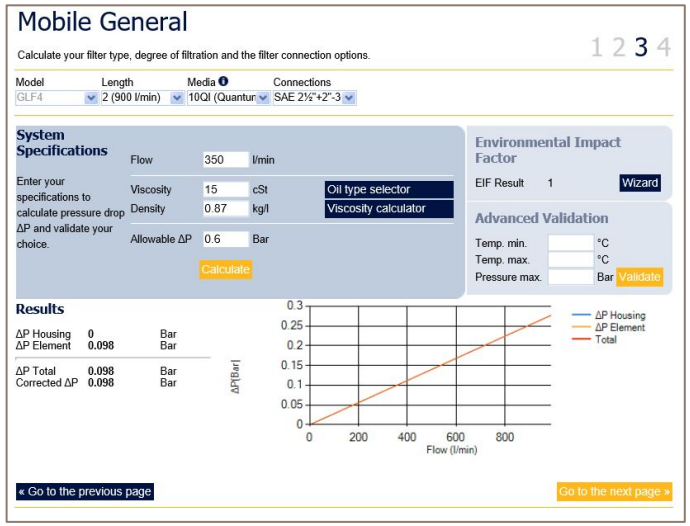
The critical situation - warming up from cold condition
Allowing full operation

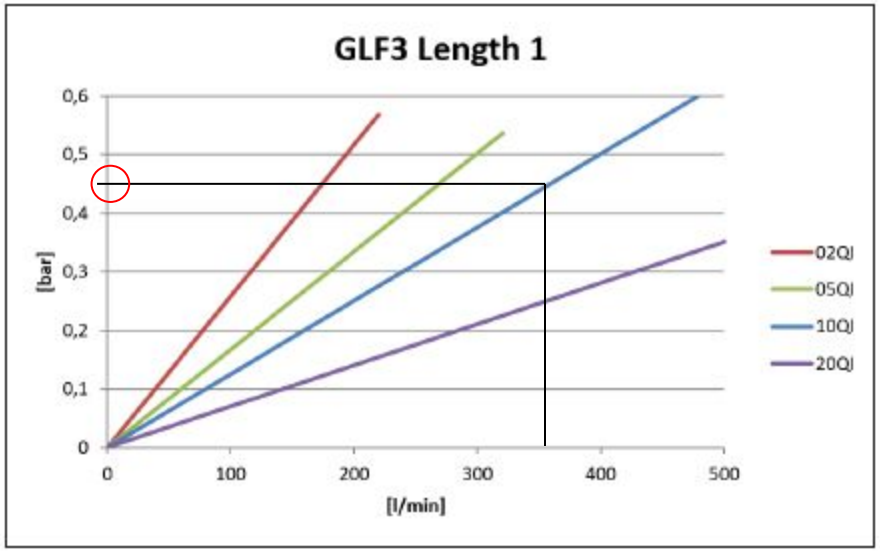
GLF33 10 micron @ 350 l/min, 125 cSt -> dp 1,1 bar
GLF42 10 micron @ 350 l/min, 125 cSt -> dp 0,8 bar

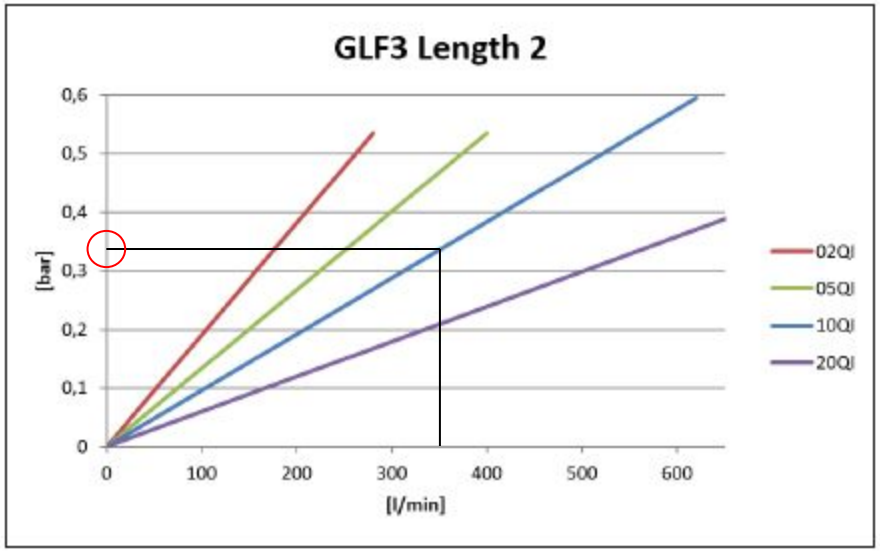
Normal operation (15 cSt +65C)

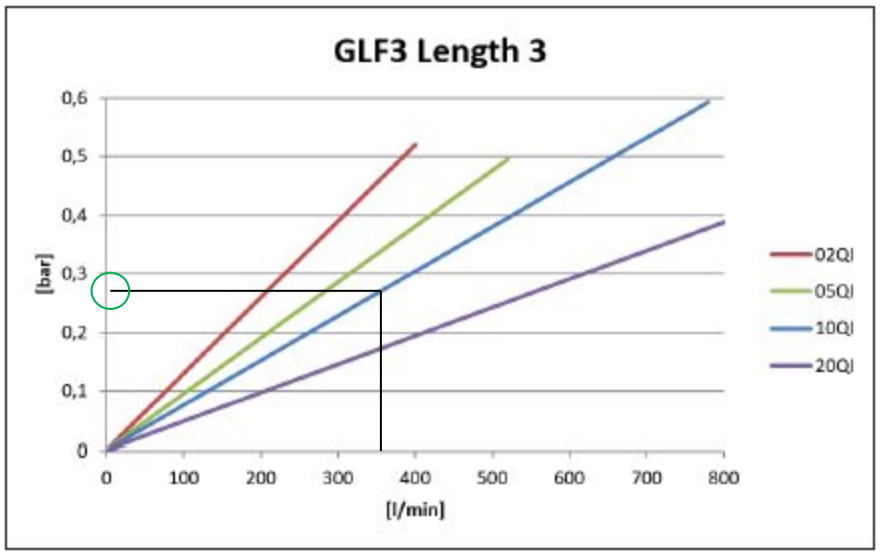
GLF33 10 micron @ 350 l/min, 15 cSt -> dp 0,13 bar
GLF42 10 micron @ 350 l/min, 15 cSt -> dp 0,02 bar

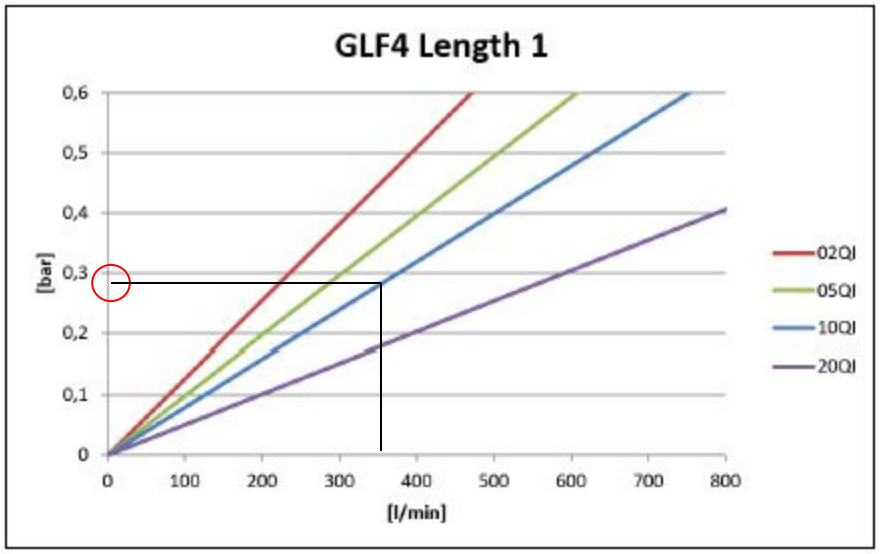




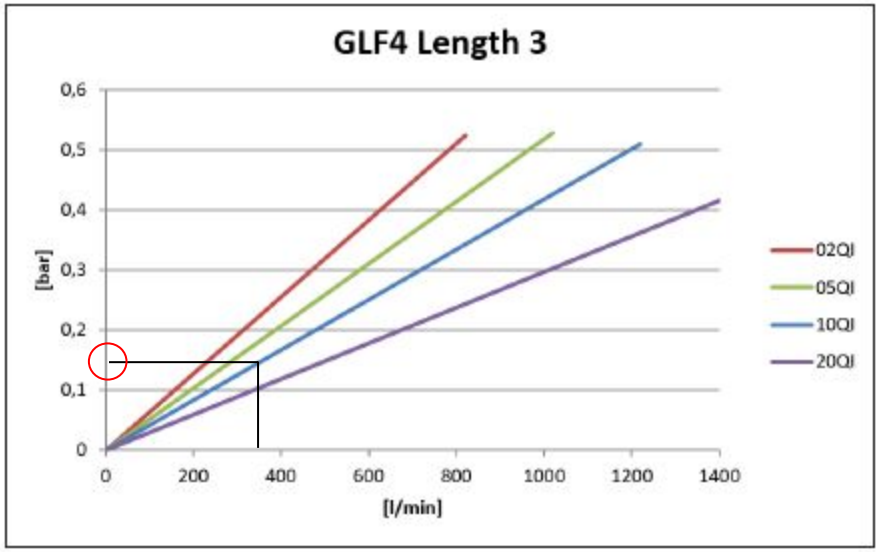

GLF3 Length 1
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
100
200
300
400
500
[l/min]
02QI
05QI
10QI
20QI

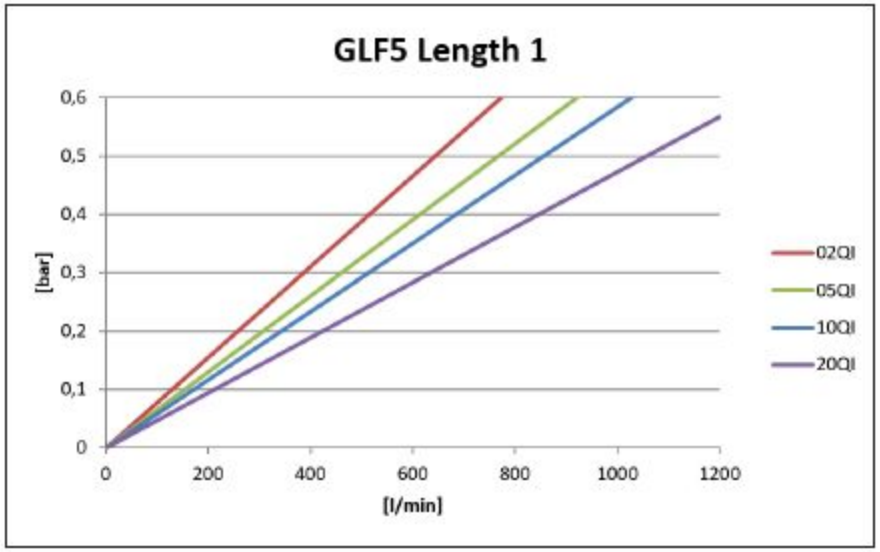

GLF3 Length 2
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
100
200
300
400
500
600
[l/min]
02QI
05QI
10QI
20QI


GLF3 Length 3
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
100
200
300
400
500
600
700
800
[l/min]
02QI
05QI
10QI
20QI


GLF4 Length 1
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
100
200
300
400
500
600
700
800
[l/min]
02QI
05QI
10QI
20QI


GLF4 Length 2
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
200
400
600
800
1000
1200
[l/min]
02QI
05QI
10QI
20QI


GLF4 Length 3
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
200
400
600
800
1000
1200
1400
[l/min]
02QI
05QI
10QI
20QI


GLF5 Length 1
0,6
0,5
0,4
0,3
0,2
0,1
0
[bar]
0
200
400
600
800
1000
1200
[l/min]
02QI
05QI
10QI
20QI

Return Line Filter,

Filter selection

Filter configuration:

- GLF4 Length2, (alternatively GLF3 Length3)
- Funnel
- Magnet column
- Filling port
- GLI version instead of GLF ?
- Further options to be discussed with the customer..

- ..


Thank You!
Parker