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Introduction

- Axial piston pumps with swash plate design for reliable operation and long life.
- Rotating and pressure loaded parts are pressure balanced.
- Wide range of available integrated charge and pilot pressure pump combinations
- Oversize shaft and shaft bearings.
- Standard available transmission circuits with integrated valves and filters to build complete closed loop system. For charge flow and flushing.
- Through drive enable multiple pump installation from a single shaft. Multiple pump combinations are also available.
- Pressure up to 420 bar. Rated speed up to 1800 rpm. Higher speeds possible.
- Large charge flow rates for low system temperature.
- · Fast response times.

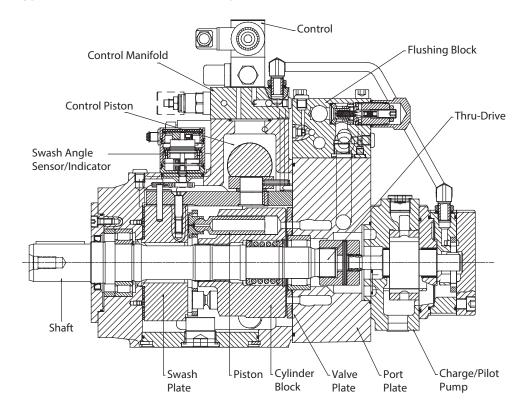
Available displacement sizes
130 ccm
180 ccm
250 ccm
360 ccm
500 ccm
750 ccm

Displacement controls:

- **SP** Displacement proportional to electric signal
- **DP** Displacement proportional to pressure signal
- **ES** Electric motor displacement control

Extra functions available for SP, & DP: Pressure Limitation and/or power control overriding function.

Typical Section of Transmission Pump





Note

Dimensional information listed in this catalog is subject to change without notice.

July 2021

Closed Circuit Pumps W Series - Basic Pumps

- Preferred standard option
- Other standard option
- Special option on request
- X Not available



T			Pump Size	130	180	250	360	500	750
	1								
V	т -	_	Transmission pump			•	•	•	
3	2		Displacement						
W	V	_	Variable	•	•	•	•	•	•
W	3		Pump Series						
Configuration S		_	•	•	•	•	•	•	•
S - Single unit F - Front unit M - Middle unit R - Rear unit □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	=		···						
Front unit		_	-			•	•	•	•
M − Middle unit R − Rear unit ○ </td <td></td> <td>_</td> <td></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>		_		0	0	0	0	0	0
Separator	M	_	Middle unit						
Separator Sepa	R	_	Rear unit	0	0	0	0	0	0
130 - 130 cri/rev (8 iñ/rev) 180 - 180 cri/rev (11 iñ/rev) 250 - 250 cri/rev (15.3 iñ/rev) 360 - 360 cri/rev (22.0 iñ/rev) 360 - 360 cri/rev (22.0 iñ/rev) 3750 - 500 cri/rev (30.5 iñ/rev) 380 - 360 cri/rev (22.0 iñ/rev) 380 - 360 cri/rev (22.0 iñ/rev) 380 - 360 cri/rev (30.5 iñ/rev) 380 - 500 cri/rev (45.8 iñ/rev) 381 - 750 cri/rev (45.8 iñ/rev) 382	5		Separator	•		•	•	•	
130	6 7	8	Displacement cm ³/rev (in ³/rev)						
250 — 250 crivrev (15.3 ifi/rev) 360 — 360 crivrev (22.0 ifi/rev) 500 — 500 crivrev (30.5 ifi/rev) 750 — 750 crivrev (45.8 ifi/rev) 8	130	_	130 cn ³ /rev (8 in ³ /rev)	•	Χ	Χ	Х	Х	Х
360 − 360 crivrev (22.0 ifi/rev)	180	_		Х			Χ	Χ	Χ
500		-							
Sasic Standard Sta		-							
Basic Standard M		_							
M − Metric ● ■ ■ ■ X		_		Λ	Х	Х	Х	Х	_
10 11				_			_		
05		_		•	•	•	•	•	•
150 3019/2-200B4HW	10 11		Mounting Flange	_	_				
08 - ISO 3019/2 8 bolt metric	05	-		•	•			Χ	Χ
OD — SAE D 4-hole flange 0 × X X X X OE — SAE E 4-hole flange X X 0 0 X X OF — SAE F 4-hole flange X X 0 0 X X I2 Rotation R — Clockwise		-							
OE SAE E 4-hole flange X X 0 X X OF SAE F 4-hole flange X X 0 X X 12 Rotation Image: Record of the control		-							-
OF - SAE F 4-hole flange X X 0 X X 12 Rotation Image: Recompt of the process of		_							
Rotation		_							
R - Clockwise L - Counter-clockwise 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			<u> </u>	^	^	0	0		
L Counter-clockwise ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○									
Maximum Displacement Screws O		_		_	^	^	_	•	•
O - Displacement adjusting screw With control DP/SP/ With control DP or SP + DF With control DP or SP + DF With control DP or SP (+ DF) + LR/ES 4 - Fixed mechanical stop ring side A 5 - Fixed mechanical stop ring side B 6 - Fixed mech. stop ring sides A & B Note: Customer adjustment required 4 used as max. volume adjustment side A 5 used as min. volume stop side A Thru-Drive Options Thru-Drive Options OOTP - None OOOO - None OOOO - SAE A OOOB - SAE B OOOC - SAE C OOOP - Pilot pump O* - * assigned by Engineering X X X X X X X X X X X X X X X X X X X	=	_		0			•	0	
With control DP/SP/ With control DP or SP + DF With control DP or SP + DF With control DP or SP (+ DF) + LR/ES 4 - Fixed mechanical stop ring side A Fixed mechanical stop ring side B Fixed mechanical stop ring	_								
With control DP or SP + DF With control DP or SP (+ DF) + LR/ES 4 - Fixed mechanical stop ring side A 5 - Fixed mechanical stop ring side B 6 - Fixed mech. stop ring sides A & B Note: Customer adjustment required 4 used as max. volume adjustment side A 5 used as min. volume stop side A Thru-Drive Options Thru-Drive Options OOTP - None OOOO - None OOOO - SAE A OOOB - SAE B OOOC - SAE C OOOP - Pilot pump O* - * assigned by Engineering X X X X X X X X X X X X X X X X X X X	U	_		Y	Y				Y
With control DP or SP (+ DF) + LR/ES							_	_	
4 - Fixed mechanical stop ring side A 5 - Fixed mechanical stop ring side B 6 - Fixed mech. stop ring sides A & B Note: Customer adjustment required 4 used as max. volume adjustment side A 5 used as min. volume stop side A Thru-Drive Options Thru-Drive Options OTP - None OOO - None OOO - SAE A OOOB - SAE B OOOC - SAE C OOOP - Pilot pump O* - * assigned by Engineering			With control DP or SP $(+ DF) + LR/ES$			_	-	-	
6 - Fixed mech. stop ring sides A & B Note: Customer adjustment required 4 used as max. volume adjustment side A 5 used as min. volume stop side A Thru-Drive Options OOTP - None OOOO - None OOOO - SAE A OOOB - SAE B OOOC - SAE C OOOP - Pilot pump 0* - * assigned by Engineering		-		0	0	0	•	0	0
Note: Customer adjustment required 4 used as max. volume adjustment side A 5 used as min. volume stop side A 14 15			. 3	0	0	0	•	0	•
4 used as max. volume adjustment side A 5 used as min. volume stop side A 14 15			. 3	•	•	0	0	0	•
5 used as min. volume stop side A 14 15 16 17 Thru-Drive Options 00TP - None • • • • • • • • • • • • • • • • • • •									
14 15 16 17 Thru-Drive Options									
16 17		ı a:	s min. volume stop side A						
0000 - None • • • • • • 000A - SAE A • • • • • • • 000B - SAE B • • • • • • • 000C - SAE C • • • • • • • • • 000P - Pilot pump • • • • • • • • • • 0* - * assigned by Engineering • • • • • • • • •			Thru-Drive Options						
000A - SAE A 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				•	•	•	•	•	
000B - SAE B 0 0 0 0 0 0 0 000C - SAE C 0 0 0 0 0 0 000P - Pilot pump 0 0 0 0 0 0 0* - * assigned by Engineering 0 0 0 0 0				•		•	•		
000C - SAE C 0 0 0 0 0 0 000P - Pilot pump 0 0 0 0 0 0 0* - * assigned by Engineering 0 0 0 0 0				0	0	0	0	0	•
000P - Pilot pump 0 0 0 0 0 0 0* - * assigned by Engineering 0 0 0 0 0									
0* - * assigned by Engineering 0 0 0 0 0									
			Pump Size						

		Pump Size	130	180	250	360	500	750
18		Main Ports						
1	_	SAE ports - Metric bolts	•	•	•	•	•	•
19		Main Port Orientation						
R	_	Radial (side ports)	•	•	•	•	•	•
20 21		Main Drive Shaft End						
01	_	ISO straight key	•	•	•	•	•	Х
02	_	ISO splines	•	•	•	•	•	
05	_	ISO special splines	0	0	0	0	0	Χ
D1	-	SAE D keyed ¾,"	0	0	Х	Х	Х	Х
	-	SAE D splined 8/16 13T	0	0	Х	Х	X	X
E2 F2	_	SAE E splined 8/16 13T SAE F splines 8/16 15T	X	X X	0	0	X X	X
22		Drive Shaft Seal Configuration			0	0		
S	_	Single shaft seal	•	•	•	•	•	•
23		Seal Material						
V	_	FKM	•	•	•	•	•	•
F	_	FKM + front bearing flushing prepared	0	•	0	0	0	•
K	_	FKM with HP lubrication	0	0	0	0	0	0
24		Yoke Position Indicator						
0	_	No position indicator	0	0	0	0	0	0
٧	-	Visual indicator	•	•		•	•	
Р	_	Voltage indicator	0	0	0	0	0	0
M	-	Voltage + visual indicator	0	0	0	0	•	
R S	_	Current indicator Current + visual indicator	0	0	0	0	0	0
	_		0	0	0	0	0	0
L	_	current + visual indicator (new design)	•	•	•	•	Χ	Χ
Oth	er c	options on request.						
25	-	Surface Coating						
A	_	Primer blue	•	•	•	•	•	•
0	_	Rust inhibitor oil	0	0	0	0	0	•
▼ 0	the	r finishes on request.						
26		Transmission circuit						
0	_	No trans. circuit (with interface closed by pla	te 9	•	•	•	•	•
1	-	with trans. circuit, filter visual ind., with HP re		•	•	•		Х
2	-	with trans. circuit, filter Elec.ind., with HP reli		•	•	•	•	Χ
3	-	with trans. circuit, without filter, with HP relie		•	•	•	•	•
4	-	with 2nd B-port, no trans. circuit, (interface closed by plate)	Х	Х	Х	Х		
5	_	with 2nd B-port, transm.block,	Х	Х	Х	Х	•	•
-		filter electr.ind, no HP relief,	.,		.`	^`		_
6	-	with 2nd B-port, transm.block,	Χ	Χ	Χ	Χ	•	•
_		no filter, no HP relief,						
7	-	with 2nd B-port, transm.block, filter electr.ind, with HP relief,	Х	Х	Х	Х		•
8	_	with 2nd B-port, transm.block, no filter,	Х	Х	Х	Х		
		with HP relief,	^	^	^	^	•	
27		Zero Position valve						
0	-	No Zero Position valve	•	•	•	•	•	•
Α	_	with Zero Position valve	0	0	0	0	0	0
		Pump Size	130	180	250	360	500	750

Closed Circuit Pumps
W Series -SP Control
Provided Transport Control
Control C

- Preferred standard option
- Other standard option
- Special option on request
- X Not available



	Pump Size	130	180	250	360	500	750
28 29	ControlType						
SP	– Displacement adjustment via proportional	valv	e●	•	•	•	•
30	Displacement Adjustment Options						
A	- CETOP 3 interface only	0	•	0	•	0	0
В	– CETOP 5 interface only	0	0	0	0	0	0
C	– CETOP 3 proportional valve KDG4V-3	•	•	•	•	•	
D	– CETOP 3 proportional valve KBSDG4V-3	0	0	0	0	0	0
_	with OBE						
E	 CETOP 5 proportional valve KBSDG4V-5 with OBE 	Χ	Х	0	0	0	0
G	- CETOP 3 - KBS2	0	0	0	0	0	0
Н	- CETOP 5 - KBS2	0	0	0	0	0	0
							<u> </u>
31 32	Electronic Amplifier Control						
03 00	– ER 9.3-10▲						
	– No amplifier card	0	•	0	•	0	•
	olifier card required for 26 = C, D, E						
33	Yoke Displacement Zone						
Α	Single side of centre "A"	0	•	0	•	0	0
C	– Over Center	•	•	•	•	•	•
34	Additional Functions						
0	- Not required for this control type	_	_	_	_		_
1	Pressure limiter overriding function side A	0	0	0	0	0	0
2	 Pressure limiter overriding function side B 	0	0	0	0	0	0
3	- Pressure limiter overriding function side A						
	and B						
4	- Pressure limiter and power control overrid	ing	•	0	•	0	0
_	function side A						
5	 Pressure limiter and power control overrid function side B 	ıng	0	0	0	0	•
6	 Pressure limiter and power control overrid 	ina	•	0		0	0
	function side A and B	9			0		
7	- Pressure limiter function side A and B pow	er _o	•	0	•	0	•
	control function side A						
8	- Pressure limiter function side A and B pow	er _o	•	0	•	0	•
25	control function side B						
35	Pressure Control Options						
0	– Standard screw adjustment	•		•			
F G	Remote port, only side ARemote port, only side B	0	0	0	0	0	•
H	– Remote port, only side B – Remote port, only side A and B	0	0	0	0	0	0
A	– Electro Proportional Relief Valve Side A	0	0	0	•	0	0
В	- Electro Proportional Relief Valve Side B	0	•	0	•	0	•
K	– Electro Proportional Relief Valve Side A and	d B	0	0	0	0	0
36 37 39 40	- Power (ontrol Specification						
???000							
	-??? kW at 1500 RPM Side B						
	f no power limiter override: 000 000"						
	Pump Size	130	180	250	360	500	750

	Pump Size	130	180	250	360	500	750
42	Pilot Oil Filter						
0 V E	NoneFilter with visual indicatorFilter with electrical indicator	0	0	0	0	0	0
43	Fail Safe Valve						
0	Not applicablewith solenoid valve	•	•	•	•	•	•
44	Position Monitoring						
0	– Not applicable	•	•	•	•	•	•
45	Electric MotorType						
0	– Not applicable	•	•	•	•	•	•
46	Control Voltage of Fail Safe Valve						
0	– Not applicable	•	•	•	•	•	
В	– 110 AC 50 Hz/120 AC 60 Hz	0	0	0	0	0	0
D G	– 220 AC 50 Hz/240 AC 60 Hz – 12 VDC	0	0	0	0	0	0
Н	- 24 VDC	•	•	•	•	•	•
47 48 49 50	Customer Adjustment Specification						
0000	– None	•	•	•	•	•	
****	 Danfoss assigned number as per data specified in table below ◊ 	0	0	0	0	0	0
51 52	53 Special Features						
000	– None	•	•	•	•	•	•
***	– Defined by Danfoss	0	0	0	0	0	0
54 55	Design Number						
**	– 10-99 assigned by Danfoss	•	•	•	•	•	•
	Pump Size	130	180	250	360	500	750

♦ Example for Cus			s	
Special Pressure Adjustment	Main Stage Pressure Cont	Pilot Valve rolPressure Cont	rol	
Standard setting (b		90		
Max. setting (bar)	40	350		
Customer-specified adjustment (bar)				

Special Max. Displ. Adjustment	Minimum Displacement	Maximum Displacement	
Standard	0 cm3/rev	100%	
Customer-specified			
adjustment(m²/rev)			
			• •

Note:Special pressure adjustments and/or maximum displacment adjustments are the most common reasons for using this option.

July 2021

Closed Circuit Pumps **W** Series -**DP** Control

- Preferred standard option
- Other standard option
- Special option on request
- X Not available



	Pump Size	130	180	250	360	500	750
28 29	ControlType						
DP	 Displacement adjustment proportional to pilot pressure 	•	•	•	•	•	•
30	Displacement Adjustment Options						
G	– CETOP 3 interface only	•	•	•	•	•	•
H	- Remote port¹₲"	•	•	•	•	•	•
J	 Proportional KCG relief valve including EEA-PAM amplifier card 	0	0	0	0	0	0
K	- with Prop. Relief & Direct.Valve incl. Electro	niks	0	0	0	0	0
L	– with double acting Prop.Relief valve	•	•	•	•	•	•
M	– with OBE Prop.Relief valve	0	0	0	0	0	•
N	(single side operation only)						
IN	with OBE Prop.Relief valve (double acting, overcenter)	0	0	0	0	0	0
31 32	Control Electronics						
00	– Without amplifier card	•	•	•	•	•	•
0L	- Prop.Relief with 7pole connector, 4-20mA,	0	0	0	0	0	0
01	option N only						
01	 (31,32) Prop.Relief valve with DIN43650.Plu incl. EEA.PAM 	igo	0	0	•	0	0
03	- (31,32) Prop.Relief valve with DIN43650.Plu	19	•	•	•	•	•
	incl. ER9.3	,	_				_
10	- (31,32) Prop.Relief valve with Deutsch-Plug	J, •	•	•	•	•	•
11	no Amp. card – (31,32) Prop.Relief valve with Deutsch-Plug		•	•	•	•	•
••	incl. EEA-PAM	,, •	Ū			Ĭ	
13	- (31,32) Prop.Relief valve with Deutsch-Plug	J, •	•	•	•	•	•
	incl. ER9.3						_
Note	options 01-13 only for pos.30 = L	•	•	•	•	•	_
33	Yoke Displacement Zone						
A C	Single Side of Center "A"Over Center	0	0	0	0	0	0
		•	_	•	•	_	_
34	Additional Functions						
0 1	Not required for this control typePressure limiter overriding function side A	0	0	0	0	0	0
2	- Pressure limiter overriding function side A - Pressure limiter overriding function side B	0	0	0	0	0	0
3	– Pressure limiter overriding function side A	Ŏ	ě	Ŏ	Ŏ	Ŏ	Ŏ
_	and B						
4	 Pressure limiter and power control overrid function side A 	ing	•	0	•	0	0
5	 Pressure limiter and power control overrid 	ing	•	0	•	0	0
	function side B	_	,	,	5	,	_
6	- Pressure limiter and power control overrid	ing	•	0	•	0	0
7	function side A and B - Pressure limiter function side A and B pow	or.					
7	control function side A and B pow	CIO.	•	0	•	0	0
8	 Pressure limiter function side A and B pow 	er _o	•	0	•	0	0
	control function side B						
35	Pressure Control Options		_		_		_
0	– Not required for this control type		•				•
		0	0	0	•	0	0
F G	- Remote port, only side A		6	0			
F G H	– Remote port, only side B	0	0	0	0	0	
G		0	0	0	-	0	0
G H	Remote port, only side BRemote port, only side A and B	0	•	0	•	0	0

36 37 3 39 40 4	Power Control Specification						
???000	– ??? kW at 1500 RPM Side A						
	– ??? kW at 1500 RPM Side B						
Note : I	f no power limiter override: 000 000"	400	100	250	240	=00	
	Pump Size			250 250			
	Pump Size	130	100	250	300	300	750
42	Pilot Oil Filter				_		
0	– None	•		•	•	•	
43	Fail Safe Valve						
0	– Not applicable	•	•	•	•	•	•
44	Position Monitoring						
0	– Not applicable	•	•	•	•	•	•
45	Electric MotorType						
0	– Not applicable	•	•		•		
46	Control Volatage of Zero Position Valve and Directional Control Valve						
0	– Not applicable	•			•	•	
В	– 110 AC 50 Hz/120 AC 60 Hz	0	0	0	0	0	0
D H	– 220 AC 50 Hz/240 AC 60 Hz – 24 VDC	•	•	•	•	•	•
47 48 49 50	Customer Adjustment Specification						
0000	– None	•	•		•	•	
****	 Danfoss assigned number as per data specified in table below ◊ 	0	0	0	0	0	c
51 52	53 Special Features						
000	- None	•	•	•	•	•	•
***	– Defined by Danfoss	0	0	0	0	0	О
54 55	Design Number						
**	– 10-99 assigned by Danfoss	•	•	•	•	•	•
	Pump Size	130	180	250	360	500	750

♦ Example for Customer Adjustment Specifications							
Special Pressure	_	Pilot Valve Pres	Load Sense ∆p				
Adjustment	sure Control	sure Control					
Standard setting (ba	ar 2 0	90					
Max. setting (bar)	40	350					
Customer-specified adjustment (bar)							

Special Max. Displ. Adjustment	Minimum Displacement	Maximum Displacement
Standard	0 cm3/rev	100%
Customer-specified		
adjustment(m²/rev)		
	•••••	

Note:Special pressure adjustments and/or maximum displacment adjustments are the most common reasons for using this option.

Open Loop Pumps
W Series -ES Control
Available to special order only

- Preferred standard option
- Other standard option
- Special option on request
- X Not available



		Pump Size	130	180	250	360	500	750
28		ControlType						
29		•						
ES	_	Electric motor displacement control Displacement Adjustment Options		_	_			_
M			0	0	0	0	0	0
N	_	Electric motor, fast response Electric motor, medium response	•	•	•	•	•	•
P	_	Electric motor, slow response	0	0	0	0	0	0
		Note: for response times for different optic see below table with standard values (response times may vary, depending on c and size of pump – final definition on requ	lesigi	n				
31 32		Control Electronics						
00	_	Not applicable	•	•	•	•	•	•
33		Yoke Displacement Zone						
Α	_	Single side of centre "A"	0	0	0	0	0	0
C	-	Over center		•		•	•	•
34		Additional Functions						
0	-	Not applicable	•	•	•	•	•	•
35		Pressure Control Options						
0	_	Not applicable	•	•	•	•	•	•
-	37 38 10 41	Power Control Specification						
000	000	– Not applicable	•	•	•	•	•	•
42		Pilot Oil Filter						
0	_	Not applicable	•	•	•	•	•	•
43		Fail Safe Valve						
0	_	Not applicable	•	•	•	•	•	•
44		Position Monitoring						
Α	_	4 limit switches	0	0	0	0	0	0
В	-	8 limit switches	0	0	0	0	0	0
P T	-	4 limit switches + sensor 8 limit switches + sensor	•	•	•	•	•	•
_	_					0		
45		Electric MotorType	•					
2	_	Motor with brake (IP54) Motor without brake (explosion-proof)	0	0	0	0	0	0
3		MOLOI WILLIOUL DIANE (ENDIOSIOII DI UUI)		-	_	-	_	-

	Pump Size	130	180	250	360	500	750
46	Control Voltage of Zero Position Valve and Directional Control Valve						
0 –	Not applicable	•	•	•	•	•	•
47 48 49 50	Customer Adjustment Specification						
0000-	None	•	•	•	•	•	
???? -	Yes (final number will be assigned by Danfoss. Specify on table below)	0	0	0	0	0	0
51	Special Features						
000	None	•	•	•	•		•
***	Defined by Danfoss	0	0	0	0	0	0
	Pump Size	130	180	250	360	500	750

 ♦ Example for Customer Adjustment Specifications

 Special Maximum
 Minimum
 Maximum

 Displacement Adjustment
 Displacement
 Displacement

 Standard
 0 cm3/rev
 100%

 Customer-specified adjustment (cm²/rev)

Note:Special response times and/or maximum displacment adjustments are the most common reasons for using this option.

Note:ES control is a non-preferred, but available control type. Please contact Hydrokaft *Technical Support for detailed specification*

Standard values

Size	130		180		250		360		500		750	
Frequency	50 Hz	60 Hz										
Fast	10	8	10	8	8	7	11	9	10	8	14	12
Medium	20	17	20	17	20	17	27	23	24	20	35	29
Slow	50	42	50	42	40	33	55	47	50	42	70	58

Numbers show approximate adjustment times from 0-100% displacement (and vice versa) in seconds.

July 2021

Model code

Combination Units

- Preferred standard option
- Other standard option
- Special option on request
- X Not available



1		Combination Unit					
T	_	Transmission Pump	•	•	•	•	•
2		Displacement					
V	_	Variable	•	•	•	•	•
3		Pump Series					
W	_	"W" Series (was 30 design)	•	•	•	•	•
4		Configuration					
c	_	-	•	•	•	•	•
5		Separator	•	•	•	•	•
6 7 8	8	First Displacement cm3/r					
130	_	130 cm3/r [7.9 in3/rev]	•	х	х	х	х
180	_	180 cm3/r [11.0 in3/rev]	Х	•	X	X	X
250	_	250 cm3/r [15.3 in3/rev]	X	Х	•	X	X
360	-	360 cm3/r [22.0 in3/rev]	X	X	Х	•	X
500	-	500 cm3/r [30.5 in3/rev]	X	X	X	Х	•
750	_	750 cm3/r [45.8 in3/rev]	0	0	0	0	X
9 10		First Control Type					
DP	_	Pressure Signal Displacement Control	•	•	•	•	•
SP	-	Proportional Valve Displacement Control	•	•	•	•	•
11 12 13		Second Displacement cm3/r					
130	_	130 cm3/r [7.9 in3/rev]					
180	-	180 cm3/r [11.0 in3/rev]		_	v	v	v
250	_	250 cm3/r [15.3 in3/rev]	X	• X	×	X	X
360	-	360 cm3/r [22.0 in3/rev]	X	X	х	x	^
500	-	500 cm3/r [30.5 in3/rev]	^	^	^	^	Ŭ
750	_	750 cm3/r [45.8 in3/rev]					
14 15		Second Control Type					
DP	-	Pressure Signal Displacement Control	•	•	•	•	X
SP		Proportional Valve Displacement Control	0	0	0	0	_X_
16 17 18		Third Displacement cm3/r					
130	_	130 cm3/r [7.9 in3/rev]	•	•	•	•	•
180	-	180 cm3/r [11.0 in3/rev]	•	•	•	•	•
250	_	250 cm3/r [15.3 in3/rev]	X	Х	Х	Х	X
360	-	360 cm3/r [22.0 in3/rev]	X	X	X	Х	X
500	-	500 cm3/r [30.5 in3/rev]	•	0	0	0	•
750	_	750 cm3/r [45.8 in3/rev]	0	0	0	0	0

19 20		Third Control Type					
DP	_	Pressure Signal Displacement Control	•	•	•	•	•
SP	-	Proportional Valve Displacement Control	0	0	0	•	0
21 22 2	23	Fourth Displacement cm3/r					
130	_	130 cm3/r [7.9 in3/rev]					
180	_	180 cm3/r [11.0 in3/rev]					
250	_	250 cm3/r [15.3 in3/rev]			_		
360	_	360 cm3/r [22.0 in3/rev]	•	•	•	•	•
500	_	500 cm3/r [30.5 in3/rev]					
750	_	750 cm3/r [45.8 in3/rev]					
24 25		Fourth Control Type					
DP	_	Pressure Signal Displacement Control	•	•	•	•	•
DP SP	_ _	Pressure Signal Displacement Control Proportional Valve Displacement Control	•	•	•	•	•
	_		•	•	•	•	•
SP 26 27		Proportional Valve Displacement Control	•	•	•	•	•
26 27 28 29	35	Proportional Valve Displacement Control Assembly Numbers	•	•	•	•	•
SP 26 27 28 29 HC81 30 31 3 33 34 3 36 37 3	35	Proportional Valve Displacement Control Assembly Numbers Defined By Danfoss	•	•	•	•	•

- For a combination of two or more units fill out this Combination Model Code.
- Start with the biggest size unit for the first displacement.
- For each unit included in this combination, a separate model code must be chosen. Use the form on page 5.
- Character 26 to 39 will be P/N of the combination. This number will be defined by Danfoss and provided in the order acknowledgement.
- Charge and Pilot Pump through drive option must be specified on the rear unit of the combination (as a special feature).
- Front and middle units shall have the through drive option of the following unit in the combination.

Example 1: Combination of two closed loop pumps

Model Code Front Unit TVWF-500M08R0000H1R02SVMA20SPC03C00000000E100H000000010

Model Code Rear Unit TVWR-250M07R000PP1R02SVMA20SPC03C00000000E100H000000010

Pump Specifications

Metric

Model			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750					
Design			Swashplate – Axial p	oiston pump								
Type of mounting			Flange or foot-mou	Flange or foot-mounted - Combination units foot mounted only								
Pipe connection ISO 6162-1 (SAE J SAE Flange ISO 6162-2 (SAE J518	,	psi	P64M (2/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P89M (3/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P89M (3/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P127M (5" - 500) P51M (2" - 6000	P127M (5" - 500) P51M (2" - 6000)					
Direction of rotation			Clockwise or counte	erclockwise								
			130/180	250	360	500	750					
	max. sp	eedrpm	1800	1800	1800	1800	1500					
	min. spe	eedrpm	150	150	150	150	150					
Mounting attitude			Optional, see releva	nt Dimensions page								
Ambient temperature range	min max	°C	-20 +50									
Mass	m	kg	130 / 140	212	220	340	395					
Moment of inertia	J	kg m³	0,045	0,146	0,152	0,5	0,55					

Note:higher / lower speed values possible depending on application conditions , contact Hydrokraft Technical Support Mass values are estimated values, final data depending on design options

			T		W 011 0 40		
Hydraulic Characteristics			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
Rated pressure (100% duty cycle)	p₁	bar	350				
Peak Pressure at outlet port as per ISO 5598-2008	p2 _{max}	bar	420				
Hydraulic fluid			Hydraulic oil to DI See Fluid Recomn	IN 51524 part 2 nendations in Appli	ication Data		
Hydraulic fluid temperature range	min	°C	-25				
	max		+90				
Viscosity range for continuous opera	ti om in	cSt	10				
	max		75				
Maximum permissible start viscosi	tymax	cSt	1000				
Note: with pressure below 100 bar and	flow below	25% of I	max. flow, max. 15 min	1			
Cleanliness	ISO 4406	5	18/15/13				
Maximum geometric displacement at shaft speed = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	t Vg	c㎡/ rev	130 / 180 130 / 180 130 / 180	250 250 250	360 360 270	500 500 500	750 750 625
Max Case pressure (overpressure) n = 1200 rev/min n = 1500 rev/min n = 1800 rev/min	P _{case}	bar	3,2 2,6 2,0	2,8 2,2 1,6	2,8 2,2 1,6	2,35 1,85 1,35	2,1 1,7 -
Drive			TVW 130/180	TVW 250	TVW360	TVW 500	TVW 750
Driving torque√p 350 bar, Vg at 1500 rev/mi η ,= 100%)	M1 _{single}	Nm	724/1002	1392	2005	2785	3481/4177
Power consumption (p350 bar, Vg at 1500 rev/min,= 100%)	P1 _{single}	kW	113 / 157	218	315	437	546/656
Combination Units			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
Maximum driving torque ISO splined shaft only	M1	Nm	2x870/2x1204	2 x 1670	2 x 2405	5000	5000

Pump Specifications

US

Model			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750				
Design			Swashplate – Axial p	iston pump							
Type of mounting			Flange or foot-mounted - Combination units foot mounted only								
Pipe connection ISO 6162-1 (SAE J5 SAE Flange ISO 6162-2 (SAE J518)	18) B A	psi	P64M (2/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P89M (3/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P89M (3/ ₂ " - 500) P32M (1/ ₄ " - 6000)	P127M (5" - 500) P51M (2" - 6000	P127M (5" - 500) P51M (2" - 6000)				
Direction of rotation			Clockwise or counter	rclockwise							
			130/180	250	360	500	750				
	max	. speedrpm	1800	1800	1800	1800	1500				
	min	. speedrpm	150	150	150	150	150				
Mounting attitude			Optional, see relevar	nt Dimensions page							
Ambient temperature range	min max	•	-4 +122								
Mass	m	lb	215	467	485	750	871				
Moment of inertia	J	lb ft²	3.46	3.46	3.61	11.9	13.1				

Note:higher / lower speed values possible depending on application conditions, contact Hydrokraft Technical Support Mass values are estimated values, final data depending on design options

Hydraulic Characteristics			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
Rated pressure (100% duty cycle)	p _N	psi	5075		· · · · · · · · · · · · · · · · · · ·		
Peak Pressure at outlet port as per ISO 5598-2008	p2 _{max}	psi	6090				
Hydraulic fluid			Hydraulic oil to DI See Fluid Recomm		ication Data		
Hydraulic fluid temperature range	min max	۰F	-13 +194				
Viscosity range for continuous opera		cSt	10 75				
Maximum permissible start viscosit	ty max	cSt	1000				

Note: max. start viscosity only with pressure below 100 bar and flow below 25% of max. flow, max. 15 min

Cleanliness	ISO 4406		18/15/13				
Maximum geometric displacement	Vg	in³/					
at shaft speed = 1200 rev/min	_	rev	7.9 / 11	15.2	22	30.5	45.7
n = 1500 rev/min			7.9 / 11	15.2	22	30.5	45.7
n = 1800 rev/min			7.9 / 11	15.2	16.4	30.5	38.1
Case pressure (overpressure)	p _{case}	psi					
n = 1200 rev/min			46	40	40	34	30
n = 1500 rev/min			38	32	32	27	25
n = 1800 rev/min			29	23	23	20	_
Drive			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
Driving torque√⊕ 5075 psi, Vg at 1500 rev/mi η ,= 100%)	M1 _{single}	lbf ft	534/739	1027	1479	2054	2567/3081
Power consumption +p5075 psi, Vg at 1500 rev/mi n ,= 100%)	P1 _{single}	hp	152/211	293	422	586	733/880
Combination Units			TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
Maximum driving torque	M1	lbf	2x642/2x888	2 x 1232	2 x 1774	3688	3688

ISO splined shaft only

Pump Specifications

Metric & US - All sizes

Standard values for charge and pilot pumps:

1. Displacements

Model			TVW 130	TVW 180	TVW 250	TVW 360	TVW 500	TVW 750
Displcement charge pump	Vg	cm³/rev	40	40	64	80	125	200
	Vg	in³/rev	2.44	2.44	3.91	4.88	7.63	12.2
Displacement pilot pump	Vg	cm³/rev	ca. 811 (dep	ending on desig	n status)			
	Vg	in³/rev	ca. 0.50.7 (d	lepending on des	sign status)			

2. Pressure

2a. Pressure values for normal operation conditions

	TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
charge[bar]:	20	22	22	24	26
purge[bar]:	12	14	14	16	18
charge [psi]	290	320	320	350	375
purge [psi]	175	205	205	235	260

2b. Pressure values for extended operation conditions (for higher speed and very fast up/downstroke times)

	TVW 130/180	TVW 250	TVW 360	TVW 500	TVW 750
charge[bar]:	24	28	28	30	32
purge[bar]:	16	20	20	22	24
charge [psi]	350	405	405	435	465
purge [psi]	235	290	290	320	350

Note:

- size and design of charge and pilot may change depending on design status
- short up / downstroke times will require larger pilot pump and higher pilot pressure (and/or accumulator)
- for applications with risk of drop down of charge pressure (e.g. in return line by blocking of an actuator driven, by lipudap) (motor an accumulator should be connected to transmission block (port PAC 2)

System oil viscosity 20-40cSt is recommended for optimal volumetic efficiency . case flushing oil viscosity between 40-50cSt is recommended for optimal bearing life and mechanical efficiency

Min . load pressure is depending on operation and application . Contact Hydrokraft Technical Support in case of critical conditions (high speed, very fast up/downstroke time)

Higher speed – especially for smaller sizes – is possible depending on operation conditions(be aware that lifetime of bearings will decrease with higher speed)

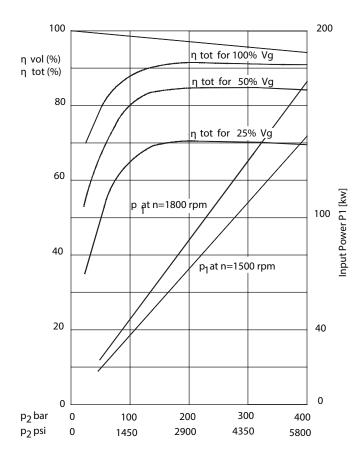
For details please contact HydrokraftTechnical Support

Lifetime of shaft seal is depending on shaft speed of the pump, fluid, case drain pressure and others . It is recommended that the average, continuous case drain pressure acc . Technical data shown above should not be exceeded (maximum permissible case pressure 4 bar absolute at min . speed) Short pressure peaks (<0,1 sec) of up to 5 bar absolute are permitted . The lifetime of shaft seal will be negatively influenced by increase of frequency of pressure peaks . Case pressure must always be equal to or greater than the outside pressure to shaft seal

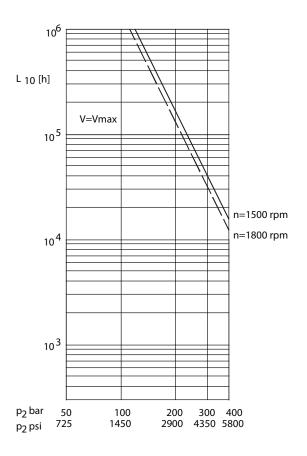
All technical data above are general values and/or guidelines; restriction may be necessary under certain opening conditions . Please be aware that pump cannot always be operated at all limits of operation conditions shown above at the same time .

Performance curves 130 Series

Power efficiency performance curve



Roller bearing life



Combination units

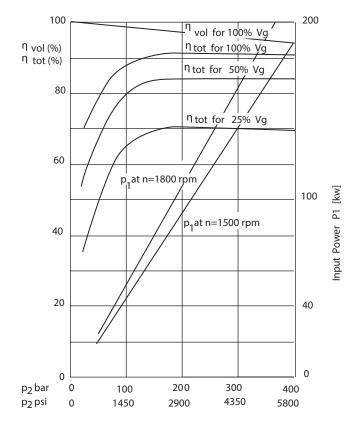
For combination pumps the characteristic values are as for the individual units.

For reduced swash-angle:

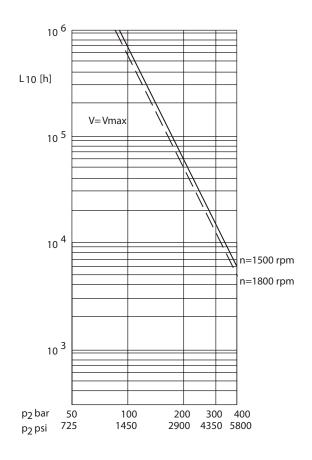
$$Lh = (L \text{ at V}_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Performance curves 180 Series

Power efficiency performance curve



Roller bearing life



Combination units

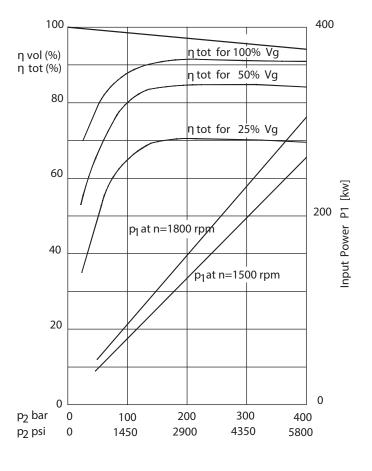
For combination pumps the characteristic values are as for the individual units.

For reduced swash-angle:

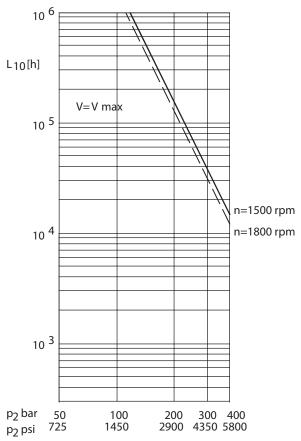
$$Lh = (L \text{ at } V_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Performance curves 250 Series

Power efficiency performance curve



Roller bearing life



Combination units

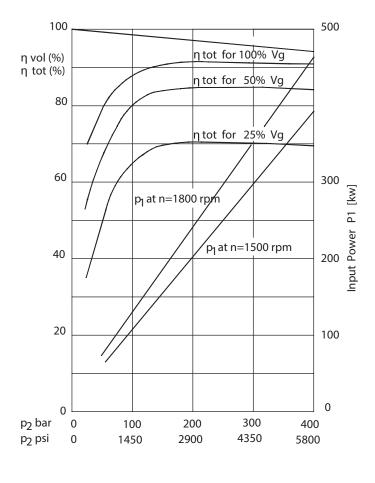
For combination pumps the characteristic values are as for the individual units.

For reduced swash-angle:

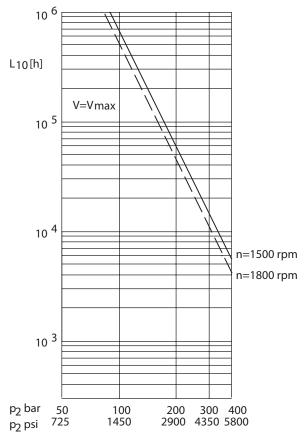
$$L_h = (L \text{ at } V_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Performance curves 360 Series

Power efficiency performance curve



Roller bearing life



Combination units

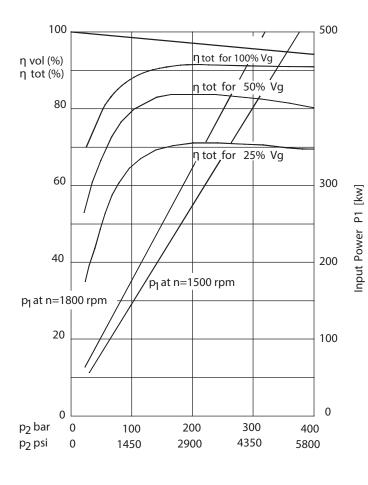
For combination pumps the characteristic values are as for the individual units.

For reduced swash-angle:

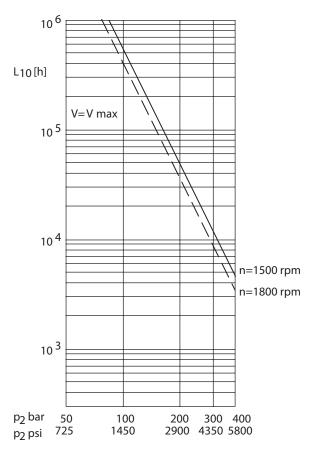
$$L_h = (L \text{ at } V_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Performance curves 500 Series

Power efficiency performance curve



Roller bearing life



Combination units

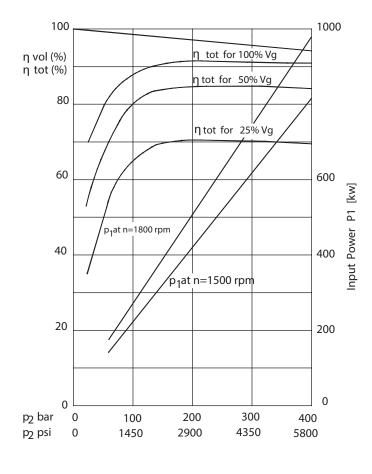
For combination pumps the characteristic values are as for the individual units. Only the torque M is limited to 5000 Nm.

For reduced swash-angle:

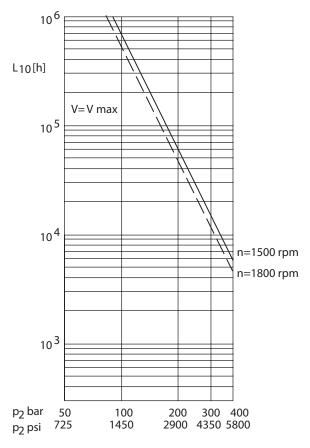
$$L_h = (L \text{ at } V_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Performance curves 750 Series

Power efficiency performance curve



Roller bearing life



For reduced swash-angle:

$$Lh = (L \text{ at } V_{max}) x \frac{1}{\sqrt{\frac{V}{V_{max}}} \frac{10}{3}}$$

Controls Option SP

General Description

The energy-saving electrohydrau lic displacement control type **SP** efficiently adjusts pump output by acting on the swashplate within electrically adjustable limits. The swashplate angle value is fed back to the controller unit via an electrical closed loop system.

Pump Dimensions with SPC03..C3 Control

For basic pump details, see general Installation Dimensions.

A proportional valve and servo piston use the controller output signal to apply the required set ting, resulting in a highly accurate dynamic control system.

Hysteresis is approximately 1% of end value. The SP control can also be combined with hydro - mechanical relief valves for pres sure and/or power control.

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position 3 options 4, 5 or 6, in combination with customer adjustment specified in positions 47 to 50).

This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation..

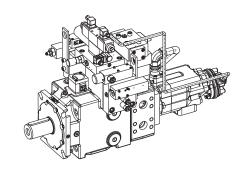
Options illustrated:

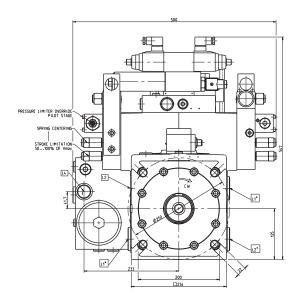
2829 = **SP** (displacement adjustment via proportional valve)

30 = C (CETOP 3 proportional valve KDG4V-3)

 $\boxed{33} = \mathbf{C}$ (over center operation)

34 = 3 (pressure limiter side A & B)





PRESSURE LIMITED DETROIDS
PRESSURE LIMITED D

dimensions shown for TVW-360 only

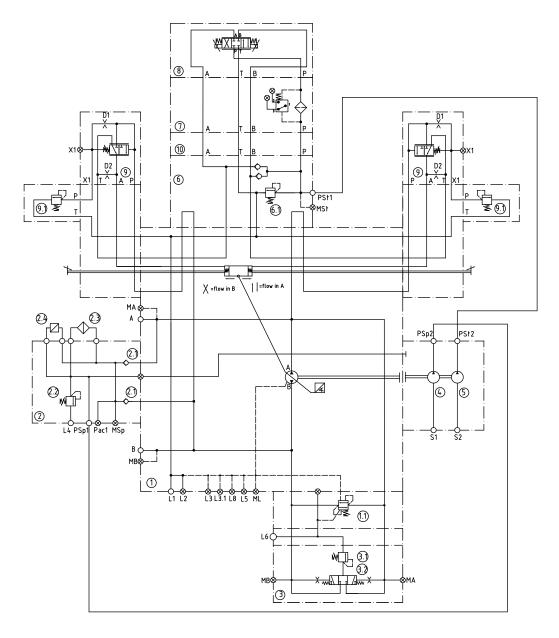
Response Time @ 1500 rev/min, SP Control with Pilot Pump Option (...OOP)

Main Pump Size Pilot Pump Size Pilot Pressure Up/Downstroke time

	(cm³/rev)	(bar)	0-100% displ. (ms) approx
130	8	60	450
180	8	60	450
250	8	60	550
360	8	60	700
500	8	90	650
750	8	90	850

Controls Option SP

with pressure limiter side A & B circuit shows TVWS-250/360M07R000TP1R**SVLA2 *SPC**C3000000E0000000000030 others on request



L1, L2 - Drain port L3 - Ventilation port for vertical mounting L3.1, L8 - Air bleading port L4 - Drain port (charge oil) L5 - Oil filling plug L6 - Drain port (flushing oil) MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure Mst - Gauge port, pilot pressure Pac1 - Accumulator port	A, B	-	System port
mounting L3.1, L8 - Air bleading port L4 - Drain port (charge oil) L5 - Oil filling plug L6 - Drain port (flushing oil) MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure	L1, L2	-	Drain port
L3.1, L8 – Air bleading port L4 – Drain port (charge oil) L5 – Oil filling plug L6 – Drain port (flushing oil) MA,MB – Gauge port, system pressure ML – Gauge port, case pressure Msp – Gauge port, charge pressure Mst – Gauge port, pilot pressure	L3	-	Ventilation port for vertical
 L4 - Drain port (charge oil) L5 - Oil filling plug L6 - Drain port (flushing oil) MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure 			mounting
L5 - Oil filling plug L6 - Drain port (flushing oil) MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure	L3.1, L8	-	Air bleading port
 L6 - Drain port (flushing oil) MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure 	L4	-	Drain port (charge oil)
 MA,MB - Gauge port, system pressure ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure 	L5	-	Oil filling plug
 ML - Gauge port, case pressure Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure 	L6	-	Drain port (flushing oil)
Msp - Gauge port, charge pressure Mst - Gauge port, pilot pressure	MA,MB	-	Gauge port, system pressure
Mst – Gauge port, pilot pressure	ML	-	Gauge port, case pressure
	Msp	-	Gauge port, charge pressure
Pac1 – Accumulator port	Mst	-	Gauge port, pilot pressure
	Pac1	-	Accumulator port

Psp1	 External port of charge pressure
Psp2	 Charge pump outlet port
PSt1	 Inlet port of pilot pressure
PSt2	 Pilot pump outlet port
X1	 Remote port pressure limiter override
S 1	 Inlet of charge pump
S2	 Inlet of pilot pump
1	- Basic pump

, , , , , , , , , , , , , , , , , , ,			
pressure	2.1	 Charge check valve 	9
 Charge pump outlet port 	2.2	 Charge pressure relif valve 	
 Inlet port of pilot pressure 	2.3	 Charge oil filter 	9.
 Pilot pump outlet port 	2.4	 Charge oil filter indicator 	
 Remote port pressure limiter 	3	 Flushing block 	10
override	3.1	 Low pressure relif valve 	
 Inlet of charge pump 	3.2.	 Flushing flow shuttle valve 	
 Inlet of pilot pump 	4	- Charge pump	
	5	 Pilot pump 	
D:	6	 Connection plate for SP-contr 	ol
- Basic pump	6.1	 Pilot pressure relif valve 	
 High pressure cross relif valve 	7	 Pilot oil filter 	

- Charge block

8	 Proportional valve
9	 Pressure limiter override-main
	stage
9.1	- Pressure limiter override-pilot
	stage
10	 Adaptor plate

Controls Option DP

General Description

Pump output flow is proportional to pilot pressure. A separate pilot oil circuit is required to reduce control pressure to the set value,.

The DP control can be used for stepless flow control with standard requirements for dynamics and accuracy. No feedback signal is needed; an optical indicator is recommended (Model Code position 4 = **V**).

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position 3 options 4, 5 or 6, in combination with customer adjustment specified in positions 47 to 50).

This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation..

Pump Dimensions with DPL....Control

For basic pump details, see general Installation Dimensions

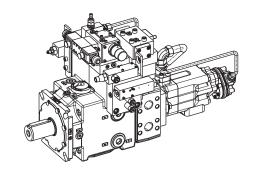
Options illustrated:

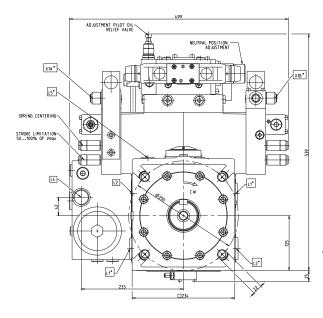
28|29| = **DP** (pilot pressure adjusted displacement)

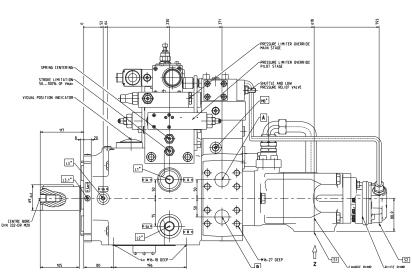
30 = **L** (with double acting Prop. Relief valve)

 $\boxed{33} = \mathbf{C}$ (over center operation)

34 = 3 (pressure limiter side A & B)





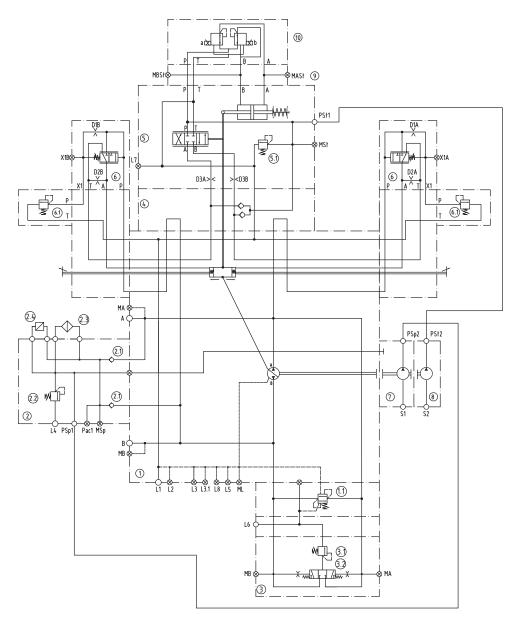


dimensions shown for TVW-360 only

Response Time @ 1500 rev/min, DP Control with Pilot Pump

Main Pu	mp Size Pilot Pump Size (cm³/rev)	Pilot Pressure (bar)	Up/Downstroke time 0-100% displ. (ms) approx.
130	8	60	1100
180	8	60	1100
250	8	60	1400
360	8	60	1600
500	8	90	1400
750	8	90	1600

Controls Option DP



A, B	 System port 	Mst	 Gauge port, pilot pressure 	1	 Basic pump 	5.1	 Pilot pressure relif valve
L1, L2	- Drain port	Pac1	 Accumulator port 	1.1	 High pressure cross relif valve 	e 6	 Pressure limiter override main
L3	 Ventilation port for vertical 	Psp1	 External port of charge 	2	 Charge block 		stage
	mounting		pressure	2.1	 Charge check valve 	6.1	 Pressure limiter override pilot
L3.1, L8	 Air bleed port 	Psp2	 Charge pump outlet port 	2.2	 Charge pressure relif valve 		stage
L4	 Drain port (charge oil) 	PSt1	 Inlet port of pilot pressure 	2.3	 Charge oil filter 	7	 Charge pump
L5	 Oil filling plug 	PSt2	 Pilot pump outlet port 	2.4	 Charge oil filter-clogging 	8	 Pilot pumo
L6	 Drain port (flushing oil) 	X1A,X1	B - Remote port pressure limited	r	indicator Flushing block	9	Sub plate
L7	 External port oil return line 		override	3	 Flushing block 	10	 Proportional control valve
	(Optional)	S1	 Inlet of charge pump 	3.1	 Low pressure relif valve 		
MA,MB	- Gauge port, system pressure	S2	 Inlet of pilot pump 	3.2.	 Flushing flow shuttle valve 		
ML	 Gauge port, case pressure 			4	 Connection plate for DP-cont 	trol	
Msp	- Gauge port, charge pressure	!		5	- Dp-Control		

Controls Options ES

Available to special order only.

For basic pump details, see general installation dimensions.

General Description

This unit is used for flow adjustment. It has a 3-phase electric servo-motor, wormgear and a switchbox with 4 or (optional) 8 limit switches for different positions.

A potentiometer for stepless adjustment and/or position monitoring is also available. Response times from zero to maximum depend on the ratio selected and on the (fixed) speed of the servo-motor,

with the result that once the control is specified and built, response time are not variable in operation. Explosion Protection versions are also available.

No Pressure/Power Limiter possible!

Pump Dimensions with ESM...A2 Control

Options illustrated:

28|29 = **ES** (electric motor adjusted displacement)

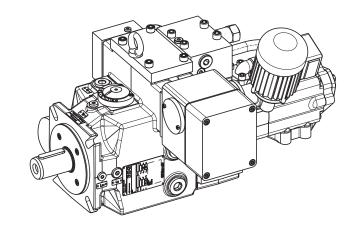
30 = M (electric motor, fast response)

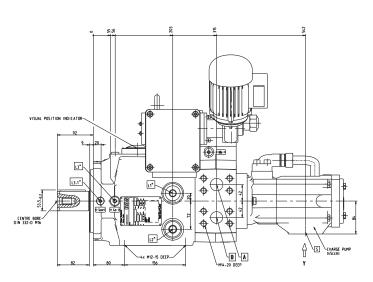
For other options and sizes, please contact Hydrokraft Technical Support = A (4 limit switches)

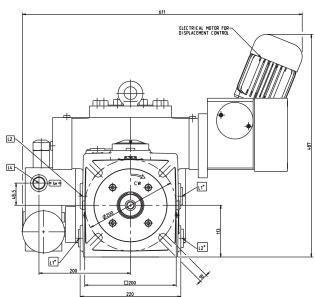
for individual nump drawings = 2 (motor with brake, IP54) for individual pump drawings.

Theoretical Response Time for Maximum Displacement

Response time from 0 to 100% displacement can vary between 5s and 70s depending on pump size, motor type and supply voltage. Contact Hydrokraft Technical Support for details.

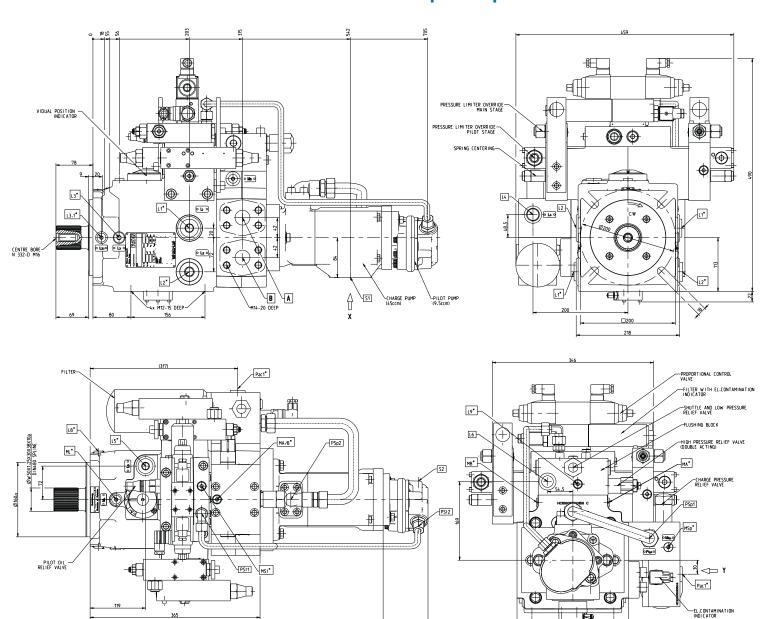






dimensions shown for TVW-180 only

General dimensions TVWS-130-SP & TVWS-180-SP pumps



Drawing shows

others on request

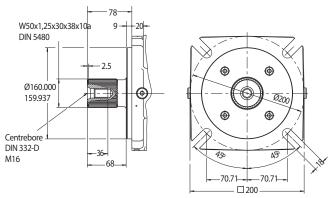
A	 "System pressure port ISO 6162-2L3 P32M (SAE J518 code 62 - 1 1/4" - 6000 PSI)" 	PORT FOR FRONT BEARING FLUSHING G3/8 (OPTIONAL) 1 – AIR BLEEDING PORT FOR	ML -	Gauge port of case pressure G 1,		INLET OF CHARGE PUMP ISO 6162-1 P64 (SAE J518 CODE 61 - 2 1/2" - 3000 PSI)
В	,	VERTICAL MOUNTING G1/4"		Accumulator port G 3/4" "External port of charge pressure G 3/4"	s2 -	INLET OF PILOT PUMP 1 5/16" - 12 UNF-28
L	(ACCORDING TO MOUNTING L8	 Oil filling plug 1 1/16"-12 UNF-2B Drain port (flushing oil) G 3/4" AIR BLEEDING PORT FOR VERTI 		Charge pump outlet port G 3/4" GAUGE PORT OF CHARGE PRESSURE G 1/4"		Port usually plugged "Remote port pressure limiter override. G 1/4"
L	POSITION USE UPPER PORT) 2 - "Drain port G 1"" (According to mounting position use upper por	CAL MOUNTING G1/4" - "Drain port for low pressure relie valve G 1/4"	ef PSt2 -	Port of pilot pressure G 3/8" Port of pilot pressure 7/8"-14 UN	IF	"Remote port pressure limiter override. G 1/4" "Gauge port system pressure G
	MA		MSt - /4"	Gauge port of pilot pressure G 1	/2	1/4"

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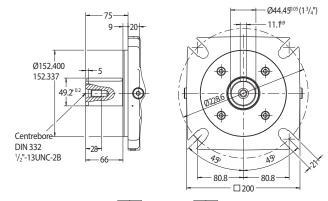
-EL. POSITION SENSOR

Shaft and Mounting options TVWS-130 & TVWS-180 pumps

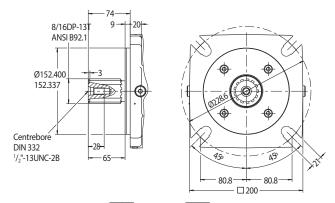
Mounting Flanges & Shaft Ends



ISO splined shaft: 10 11 = 05 & 18 19 = 02

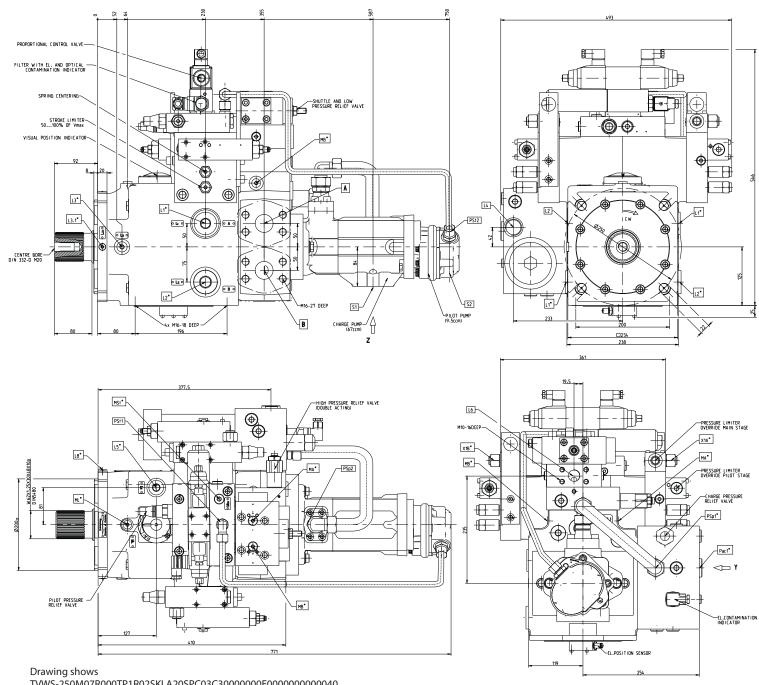


SAE D keyed shaft: 10 11 = 0D & 18 19 = D1



SAE D splined shaft: 10 11 = 0D & 18 19 = D2

General dimensions TVWS-250-SP Pumps



TVWS-250M07R000TP1R02SKLA20SPC03C30000000E000000000040

others on request

P38M (SAE J518 code 62 - 1 1/2"

"System pressure port ISO 6162-2L5 P38M (SAE J518 code 62 - 1 1/2" - 6000 PSI)"

- DRAIN PORT 1 5/8"-12 UNF-2B (ACCORDING TO MOUNTING POSITION USE UPPER PORT)

mounting position use upper por

- PORT FOR FRONT BEARING FLUSHING G3/8 (OPTIONAL)

- "System pressure port ISO 6162-2**L3.1** - AIR BLEEDING PORT FOR **VERTICAL MOUNTING G1/8"**

- Drain port (Charge oil) G 1" - OIL FILLING PLUG 1 1/16"-12 UNF-2B

"Drain port (flushing oil) ISO 6162-1 P25M"

- Air bleeding port G 1/4" - "Drain port G 1 1/4"" (According t MA - GAUGE PORT OF SYSTEM PRESSURE G 1/4"

MB - GAUGE PORT OF SYSTEM PRESSURE G 1/4"

ML - Gauge port of case pressure G 1/4S1

Pac1 - Accumulator port G 1"

PSp1- "External port of charge pressure

PSp2– Charge pump outlet port ISO 6162-1 P25 (SAE J518 CODE 61 1" - 3000 PSI)

Msp - "Gauge port of charge pressure

PSt1 - Port of pilot pressure G 3/8"

PSt2 - Port of pilot pressure 7/8"-14 UNF MSt - Gauge port of pilot pressure G 1/4"

INLET OF CHARGE PUMP ISO 6162-1 P64 (SAE J518 CODE 61 - 2

1/2" - 3000 PSI) INLET OF PILOT PUMP 1 5/16" - 12 UNF-28

...* - Port usually plugged

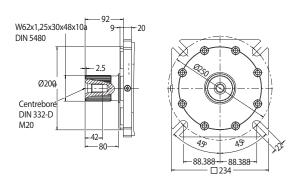
X1A - "Remote port pressure limiter override G 1/4"

"Remote port pressure limiter override G 1/4"

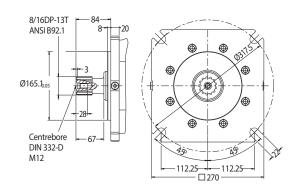
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Shaft and Mounting options TVWS-250 pumps

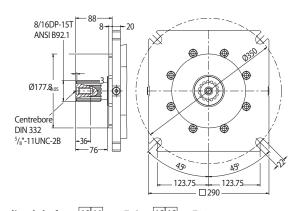
Mounting Flanges and Shaft Ends



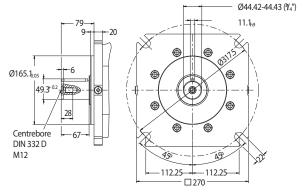
ISO splined shaft: 10 11 = 07 & 18 19 = 02



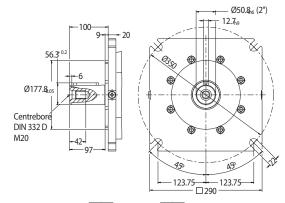
SAE E splined shaft: 10 11 = 0E & 18 19 = E2



SAE F splined shaft: $10 \ 11 = 0F \& 18 \ 19 = F2$

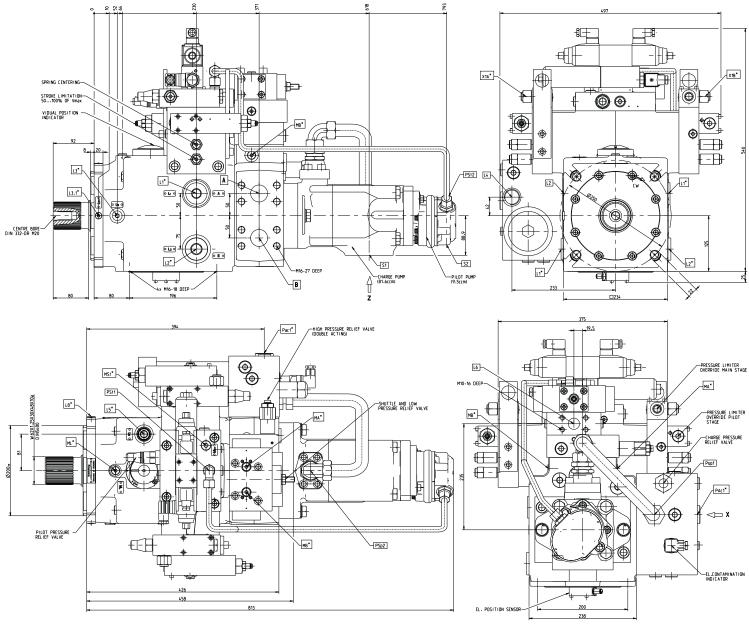


SAE E keyed shaft: 10 11 = 0E & 18 19 = E1



SAE F keyed shaft: 10 11 = 0F & 18 19 = F1

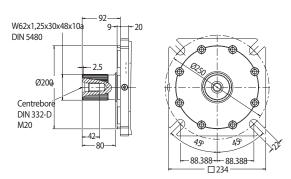
General dimensions TVWS-360-SP Pumps



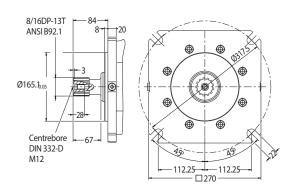
A	 "System pressure port ISO 616 P38M (SAE J518 code 62 - 1 1, 		 PORT FOR FRONT BEARING FLUSHING G3/8 (OPTIONAL) 	MB -	GAUGE PORT OF SYSTEM PRESSURE G 1/4"			Port of pilot pressure 7/8"-14 UNF Gauge port of pilot pressure G 1/4
В	- 6000 PSI)" - "System pressure port ISO 616		1 – AIR BLEEDING PORT FOR VERTICAL MOUNTING G1/8"		Gauge port of case pressure G 1 Accumulator port G 1"	/4 S 1	-	"Inlet of charge pump ISO 6162-1 P76 (SAE J518 code 61 -3" -
_	P38M (SAE J518 code 62 - 1 1/ - 6000 PSI)"	2" L4	- Drain port (Charge oil) G 1"		"External port of charge pressur			3000 PSI)"
L	- "Drain port 1 5/8""-12 UNF-2B		UNF-2B	PSp2-	G 3/4" CHARGE PUMP OUTLET PORT IS	S2 O	_	"Inlet of pilot pump 1 5/16"-12 UNF-28"
	(According to mounting posit use upper port)"	ion L6	"Drain port (flushing oil)ISO 6162-1 P25M"	Men -	6162-1 P32 "Gauge port of charge pressure			Port usually plugged "Remote port pressure limiter
L	2 - "Drain port G 1 1/4"" (Accordi	ng t e 8	 Air bleeding port G 1/4" 	wsp –	G 1/4"	A 17	• -	override G 1/4"
	mounting position use upper	por M A	- GAUGE PORT OF SYSTEM PRESSURE G 1/4"	PSt1-	Port of pilot pressure G 1/2"	X1E	3 –	"Remote port pressure limiter override G 1/4"
								0.0

Shaft and Mounting options TVWS-360 pumps

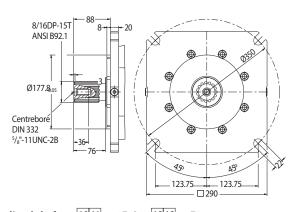
Mounting Flanges and Shaft Ends



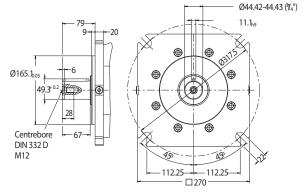
ISO splined shaft: 10 11 = 07 & 18 19 = 02



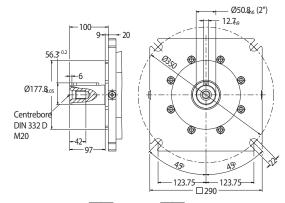
SAE E splined shaft: 10 11 = 0E & 18 19 = E2



SAE F splined shaft: 10 11 = **0F &** 18 19 = **F2**

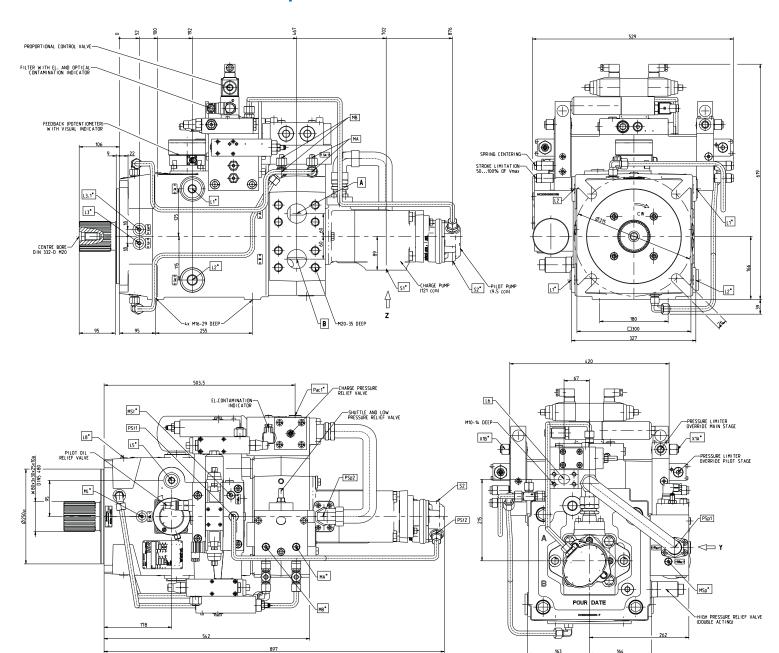


SAE E keyed shaft: 10 11 = 0E & 18 19 = E1



SAE F keyed shaft: 10 11 = 0F & 18 19 = F1

General dimensions TVWS-500-SP Pumps

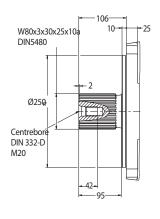


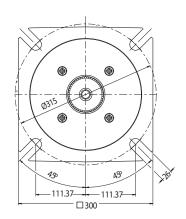
Drawing shows

	A –	 "System pressure port ISO 6162- 	2 L3	 PORT FOR FRONT BEARING 	MB -	GAUGE PORT OF SYSTEM	PSt2-	Port of pilot pressure 7/8"-14 UNF
		P51M (SAE J518 code 62 - 2" -		FLUSHING G3/8 (OPTIONAL)		PRESSURE G 1/4"	MSt -	· Gauge port of pilot pressure G 1/4'
		6000 PSI)"		- AUX. PORT FOR FRONT BEARING	3 ML -	GAUGE PORT OF CASE PRESSURE	S1 -	"Inlet port of charge pump ISO
- 1	В –	 "System pressure port ISO 6162- 	2	FLUSHING G3/8		G 1/4"		6162-1 P76"
		P51M (SAE J518 code 62 - 2" -	L4	- Drain port (Charge oil) G 1 1/4"	Pac1-	Accumulator port G 3/4"	S2 -	INLET OF PILOT PUMP 1 5/16"-12
		6000 PSI)"	L5	- OIL FILLING PLUG 1 1/16" - 12	PSp1-	"External port of charge pressure		UNF-28
1	L1 -	"Drain port 1 5/8""-12 UNF-2B		UNF-2B		G 1"	* -	Port usually plugged
		(According to mounting position use upper port)"		"Drain port (flushing oil)ISO 6162-1 P25M"	PSp2-	CHARGE PUMP OUTLET PORT ISC 6162-1 P32	X1A -	"Remote port pressure limiter override G 1/4"
	L2 -	· "Drain port G 1 1/2" (According t	OL8	 Air bleeding port G 1/4" 	Msp -	"Gauge port of charge pressure	X1B	"Remote port pressure limiter
	mounting position use upper po		Or MA – GAUGE PORT OF SYSTEM		G 1/4"			override G 1/4"
				PRESSURE G 1/4"	PSt1-	Port of pilot pressure G 3/8"		

Shaft and Mounting options TVWS-500 pumps

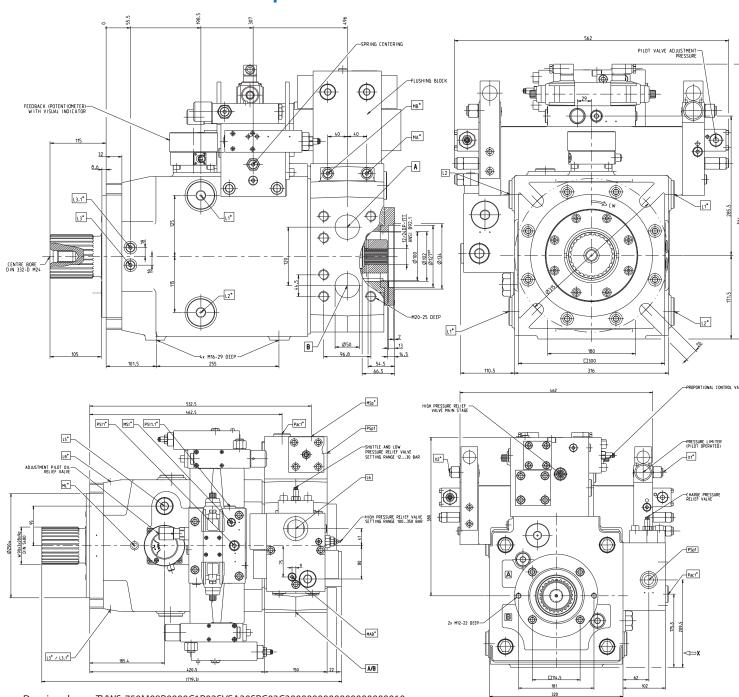
Mounting Flanges and Shaft Ends





ISO splined shaft: 10 11 = 08 & 18 19 = 02

General dimensions TVWS-750-SP Pumps



Drawing shows TVWS-750M08R0000C1R02SVSA30SPC03C300000000000000000010 others on request

- P51M (SAE J518 code 62 2" 6000 PSI)"
- "System pressure port ISO 6162-25 P51M (SAE J518 code 62 - 2" -
- "Drain port 1 5/8""-12 UNF-2B (According to mounting position_9 use upper port)"
- "Drain port G 1 1/2"" (According L2 mounting position use upper port)
- PORT FOR FRONT BEARING FLUSHING G3/8 (OPTIONAL)

- "System pressure port ISO 6162-**13.1** AUX. PORT FOR FRONT BEARING **MB** FLUSHING G3/8
 - Drain port (Charge oil) G 1 1/4"
 - OIL FILLING PLUG 1 1/16'-12 UNF-2B
 - Drain port (flushing oil) G 1 1/4"
 - Air bleeding port G 1/4"
 - not applicable (delete this port **PSp2** NA in description)
 - **GAUGE PORT OF SYSTEM** PRESSURE G 1/4"
- GAUGE PORT OF SYSTEM PRESSURE G 1/4"
- GAUGE PORT OF CASE PRESSURE 1 G 1/4"
- Pac1 Accumulator port G 1 1/4"
- PSp1 "External port of charge pressureX1A G 1' X1B
- GAUGE PORT OF CHARGE PRESSURE G 1/4"
- **PSt1** Port of pilot pressure G 1/2"
- PSt2 NA

- MSt GAUGE PORT OF PILOT PRESSURE G 1/4"
- NA **S2** Port usually plugged
 - "Remote port pressure limiter override G 1/4" "Remote port pressure limiter
- override G 1/4" "Gauge port system pressure G MAB
- PSt1.1 PORT OF PILOT PRESSURE G 3/8"

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Shaft and Mounting options TVWS-750 pumps

Mounting Flanges and Shaft Ends

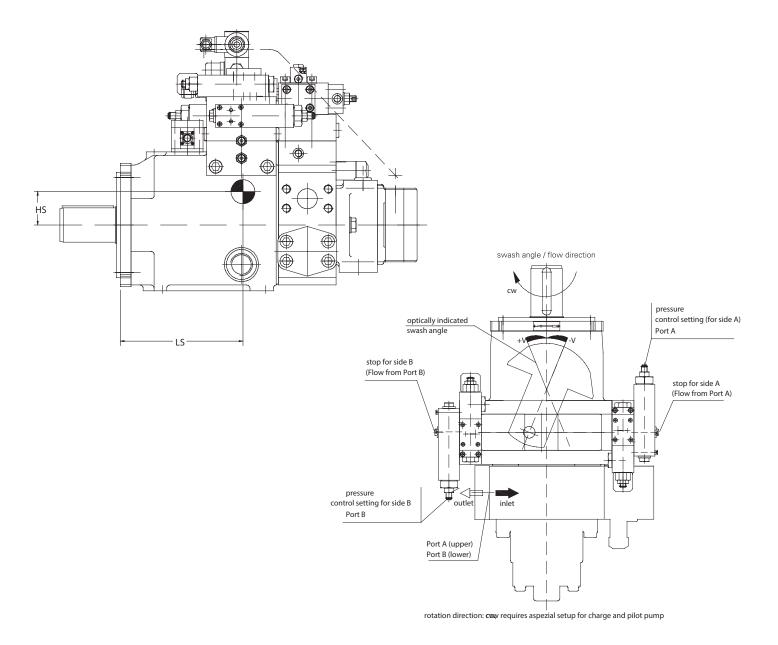
ISO splined shaft: 10 11 = 08 & 18 19 = 02

as illustrated on the previous page is the only arrangement suitable for

Hydrokraft pumps TVW-750.

TVWS

Position of Center of Gravity

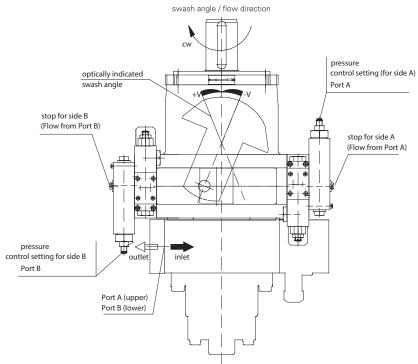


TVW SIZE	WEIGHT KG	LS MM	HS MM
130	160	205	55
180	165	205	55
250	235	233	63
360	240	250	63
500	420	306	55
750	460	318	65

	ACTUATOR STOP A (+V)	PISTON STOP B (-V)
Inlet port	В	A
Outlet port	A	В

TVWS

Swash Angle/ Flow Direction



rotation direction: cww requires aspezial setup for charge and pilot pump

	ACTUATOR STOP A (+V)	PISTON STOP B (-V)
Inlet port	В	A
Outlet port	A	В

Installation and Start-up

Warning: Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

Drive Data

Mounting attitude should be horizontal using appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult Hydrokraft Technical Support or look to the "Hydrokraft Application Guide-line Presentation" if a different arrangement is required.

In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult for specific limits.

Direction of shaft rotation, viewed from the prime mover end, must be as indicated in the model designation on the pump – either right hand (clockwise) or left hand (counterclockwise).

Direct coaxial drive through a flexible coupling is recommended. If drives imposing radial shaft loads are considered, please consult your Hydrokraft Technical Support.

Start-up Procedure

Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

Caution: Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, and that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

If the reservoir has a sight gage, make sure the fluid is clear – not milky.

Cleanliness

if is recommended to run the unit first at no load to flush-out any in-built contaminations. Disconnect working pipes of the hydraulic motor and interconnect them directly (short circuit). Insert filter, direct in front of pump, into the inlet pipe - observe delivery direction - pressure resistance 25 bar, filter mesh 25 um absolute, running time approx, 1/2 hour, probably also at reduced delivery rate (according to circumstances).

Air bleeding

The drain line must be arranged in such a way that the motor housing is kept full of oil at all times. if necessary, the drain line is to be looped above the hydraulic motor. For any installation, the highest drain port is to be used.

Operation start

Check rotation direction of hydraulic motor shaft by momentarity pump flow to an inlet port of hydraulic motor and observe rotation. if the direction is wrong interchange the two working lines. Additional recommendations and guidelines are shown in Hydrokraft Application Guide-line Presentation (available on request)

Application Data and Fluid Recommendations

Fluid Cleanliness

Hydrokraft pumps are rated in antiwear petroleum fluids with a contamination level of 18/15/13 per ISO 4066. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Hydrokraft Technical Support for specific duty cycle recommendation. Danfoss Hydrokraft pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfac tory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air. Essential information on the correct methods for treating hydraulic fluid

is included in Danfoss publication
"Danfoss Guide to Systemic
Contamination Control" available
from your local Danfoss distributor. In
this publication, filtration and
cleanliness levels for extending the
life of axial piston pumps and other
system components are listed.
Included is an excellent discussion
of the selection of products
needed to control fluid condition.

71		Rated	Maximum Speed (rev/mi■)		Recommended	Maximum	Bearing Life	
	Classification	Pressure pa (bar)	130 & 180 cm	250 &360 cm	500 & 750 cm	Seal Material	Operating Tem perature(C)	
Water Glyco ▶	HFC	250	1800	1500	1250	NBR	45	25-100%
HFDR(phosphate ester based	l) HFDR	350	1500	1200	1000	FKM	60	100%▼
HFDU (glycol based)	HFDU	350	1500	1200	1000	FKM	60	100%▼
HFDU (ester based)	HFDU	350	1800	1500	1250	FKM	60	100%▼
HEES (synthetic ester)	HEES	350	1800	1500	1250	FKM	60	100%▼

- See general specifications for speed limitation depending on displacement.
- ▲ For HFC operation, bearing flushing is mandatory. Highest speed only recommended at optimized application conditions.

 Use Model Code 21 = "C" for seal option, and c ontact your Danfoss Representative for validation.

 Seal material can differ on an individual pump depending on specific seal function.

 Bearing life with HFC fluid depends significantly on fluid temperature, cleanliness, quality, flushing and application parameters. Typical values vary between 25% and 100% compared to mineral oil.
- ▼ Only fluids with fully saturated esters (iodine value <10) should be used.

 HFDU and HEES fluids can be used at full ratings, but need to be monitored continuosly to maintain quality and performance. The following important values should always be checked:
 - Water content (<= 500 ppm)
 - Fluid cleanliness (18/15/13 per ISO 4406)
- -TAN value (no significant change from new oil)
- Viscosity (no significant change from new oil)
- Additives (no significant change from new oil)

Under harsh operation conditions, especially with regard to temperature and water content, ester-based HFDU and HFDR fluids are prone to hydrolysis, the resulting chemical processes and products of which could damage seals and other pump components. In general, the susceptibility to temperature and contamination is significantly higher than with standard mineral oils.

In line with Danfoss warranty conditions covering use of HFDR/HFDU/HEES fluids, fluid-related damage is excluded.

Case/Bearing Flushing

Case and bearing flushing are strongly recommended for all conditions where the pump is operating at following conditions -24h/7d operation mode with high speed and high operation pressureand/or- intervals at low pressure i.e. <20 bar (<300 psi) and/or low flow at high pressure-other unusual operation conditions

Estimated Flushing Flow Values at 1500 rev/min

Pump Size (cm³/rev)	Flushing Flow (l/min)
130/180	4/5,5
250/360	7,5/11
500	15
750	20

Vertical Mounting

Vertical mounting of Hydrokraft pumps is possible, but venting and lubrication of shaft bearings can require special flushing and installation procedures. For details, please refer to the Hydrokraft Application Guideline Presentation available from your Danfoss Representative. High pressure lubrication / Hydrostatic Balancing for Yoke Bearings (half-cup bearings)

High-pressure bearing lubrication and balancing (Model Code 21 = "K") is recommeded for operating conditions with either high cycle frequencies (very short up/downstroke times) and/or where the swashplate is constantly maintained at a certain angle for long periods of time (compensated mode).



For details and additional information, please refer to the "Hydrokraft Application Guideline Presentation" available from your Danfoss Representative.



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- Electric converters
- Electric machines
- Electric motors
- · Gear motors
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- Hydraulic integrated circuits (HICs)
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- PLUS+1® sensors
- PLUS+1® software
- PLUS+1° software services, support and training
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