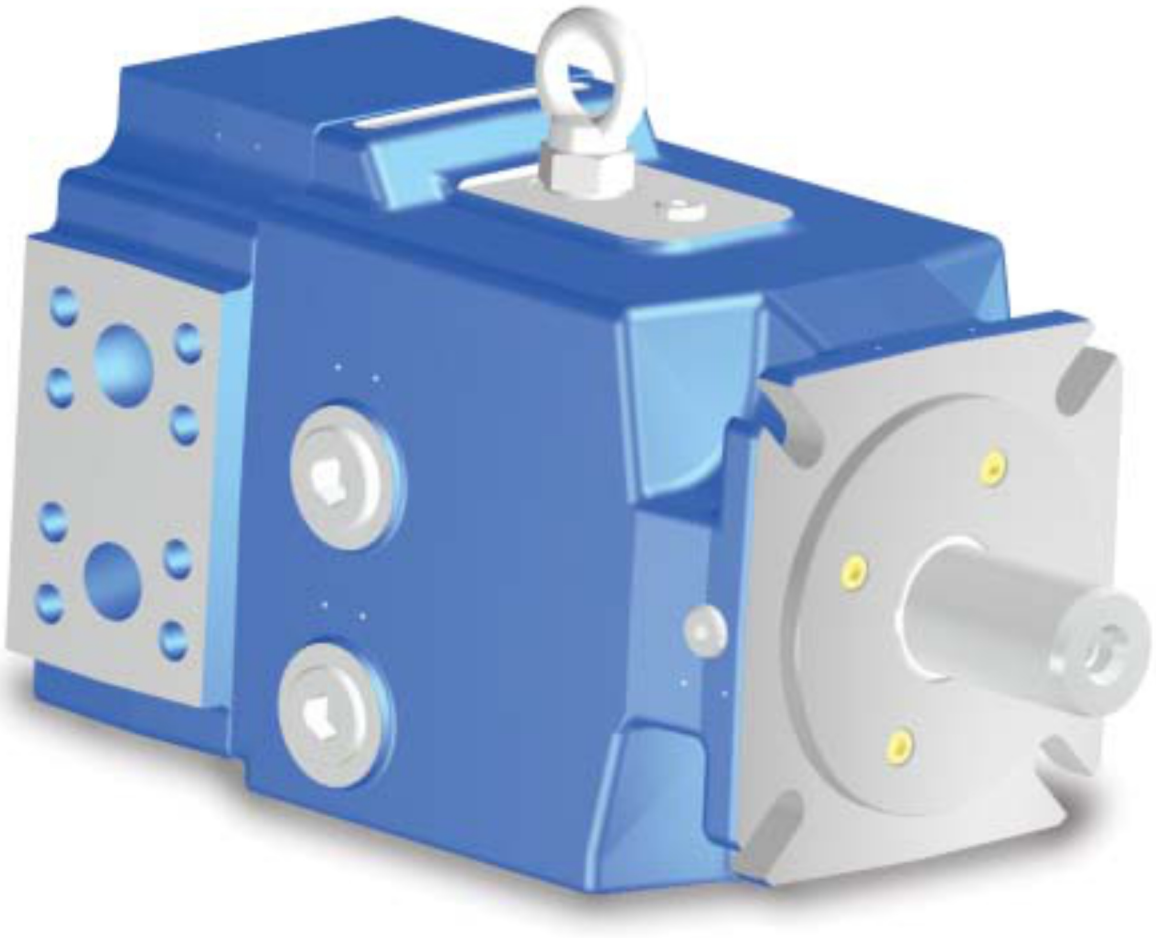
ENGINEERING
TOMORROW

Vicker's by Danfoss

Hydrokraft Piston Motors

Technical Information

MVW



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MFWS 250/360 21

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Introduction

- Axial piston motors with swash plate design can be applied to hydrostatic drives.
- Pressure up to 350bar. Rated speed up to 1800 min^{-1}.
- A range of control options allow matching of motors to any application.
- Rotating and pressure loaded parts arepressure balanced.
- High efficiency from automatic pressure balancing of cylinder block to valve plate.
- Oversized shaft bearings for long life and thru-drive capability.
- Highly resistant to dirt because of automatic wear compensation.
- Low sound level assured by swash plate design and other proven features.

AVAILABLEDISPLACEMENT SIZES
250 cm^3
360 cm^3
500 cm^3
750 cm^3

Displacement controls:

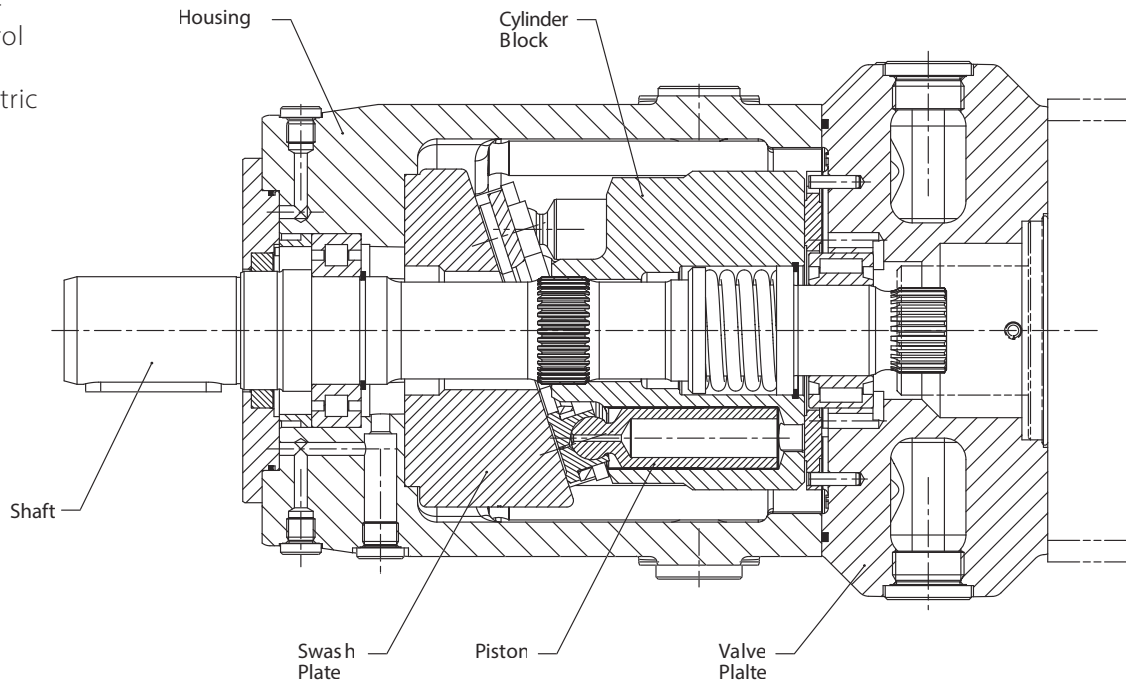
DF - Pressure compensator controlled

ES - Electric motor displacement control

SP - Displacement proportional to electric signal

DP - Displacement proportional to pressure signal

Typical Section of Transmission Pump



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

Model Code

Motors

"W" Series

Form Page

The following 42-digit coding system hasbeen developed to identify all of the configuration options for the "W" series fixed and variable displacement motors. Use this model code to specify a unit with the desired features. All 42-digits must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box. If adjustments other than the standard setting (character 34...37) or special features (character 38...40) are needed, please provide the information when ordering.

Some characters are already filled out. For such characters there is no option available.

Explanation for each character can be found as follows:

	CHARACTER	PAGE
Basic Motor Model Code	1...22	5
Control Option	23...33	6 - 1 0
Customer Adjustment Specification	34...37	6 - 1 0
Special Features	38...40	11
Design Number	41...42	11

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
M		**W**	**S**	**-**				**M**			**B**			**1**	**R**			**S**	**V**		**A**

23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
																		1	**0**

SPECIFY NON STANDARD ADJUSTMENT BELOW

SPECIFY SPECIAL FEATURE BELOW

Model Code

Motors

"W" Series - Basic Motor

M	*	W	S	—	*	*	*	M	*	*	B	*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

1 Motor
M – Base Motor

2 Displacement
F – Fixed
V – Variable

3 Pump Series
W – "W" Series (was 30 design)

4 Configuration
S – Single Unit

5 Separator

6 7 8 Displacement cm³/r
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]
??? – Non-Standard Displacement (MFW Only)

9 Basic Standard
M – Metric

10 11 Mounting Flange
7 – ISO 3019/2-200B4HW
8 – ISO 3019/2-250B4HW
*See Chart below

12 Rotation Direction
B – Both Directions

13 Adjustment Stops
0 – No Stop
4 – Mechanical Adjustment Stop Side A (MVW only)
5 – Mechanical Adjustment Stop Side B (MVW only)
6 – Mechanical Adjustment Stops Side A and B (MVW only)
NOTE:
4 is used as maximum Adjustment on Side A.
5 is used as minimum Adjustment stop side A.
When **0** is specified, minimum Adjustment Stop is set at 35% of Vgmax.
6 is the combination of **4** and **5** together.

14 Thru-drive Options
0 – None
K – Tachogenerator
E – Speed Limit Switch (Two Switches)

15 Main Ports
1 – SAE Ports - Metric Bolts

16 Main Port Orientation
R – Radial (Side Ports)

17 18 Main Drive Shaft End
1 – ISO Straight Key
2 – ISO Spline

19 Drive Shaft Seal Configuration
S – Single Shaft Seal

20 Seal Material
V – Viton*
*Viton is a trademark of E.I. Dupont (other materials available, contact your Danfoss representative)

21 Yoke Position Indicator
0 – No Position Indicator
V – Visual Position Indicator **P** – Position Sensor
M – Sensor with Visual Indicator

22 Surface Finish
A – Blue Painted
Other options on special request available. Contact Danfoss Sales.

23 Add Control Model Code
Code (characters 23...37) on the following pages.

MOUNTING FLANGE OPTIONS AVAILABLE	250	360	500	750
ISO 3019/2-200B4HW	•	•		
ISO 3019/2-250B4HW			•	•

Model Code

Motors

"W" Series - No Control

0	0	0	0	0	A	0	0	0	0	0	0	0	0	0	#
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

[23][24] **Control Type**

00 – No Control (for MFW only)

[25] **Displacement Adjustment Options**

0 – Not Applicable

[26][27] **ElectronicControls**

00 – Not Required

[28] **Yoke Displacement Zone**

A – Single Side of Center "A"

[29] **Extra Functions 0**

– Not Required

[30] **Pressure Control Options**

0 – Not Applicable

[31] **Position Monitoring 0**

– No Position Monitoring

[32] **Electric Motor Type 0**

– No Electric Motor

[33] **Control Voltage 0**

– Not Applicable

[34][35][36][37] **Customer Adjustment Specification**

0000 – None

[38] **Special Features**

Add special feature description (characters 44...46) on page 11 if required.

Model Code

Motors

"W" Series - DF Control

D	F	0	0	0	A	0	*	0	0	0	*	*	*	*	#
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

23 24 Control Type

DF – Pressure Compensator

25 Displacement Adjustment Options

0 – Not Applicable

26 27 Electronic Controls

00 – Not Required

28 Yoke Displacement Zone

A – Single Side of Center "A"

29 Extra Functions

0 – Not Required

30 Pressure Control Options

0 – Not Applicable

F – Remote Port Only

K – Electro Proportional Relief Valve
– Includes Electronic Card

31 Position Monitoring 0

– No Position Monitoring

32 Electric Motor Type 0

– No Electric Motor

33 Control Voltage 0

– Not Applicable

34 35 36 37 Customer Adjustment Specification

0000 – None

???? – Yes (Final number will be assigned by Danfoss. Specify on table below)

38 Special Features

Add special feature description (characters 38...42) on page 11 if required.

CUSTOMER ADJUSTMENT SPECIFICATIONS

	Unit	Standard Adjustment	Customer Specified Adjustment	Remarks
All Revolution Adjustments below set at ...	rpm	1500	-	-
Mech. Stop Side A (used as max Adjustment Stop Side A)	cm^3/rev	Vgmax	-	-
Mech. Stop Side B (used as min Adjustment Stop Side A)	cm^3/rev	35% of Vgmax	-	<35% not possible
Pressure Control Main Stage	bar	20	-	-
Pressure Control Pilot Valve	bar	90	-	-

Model Code

Motors

"W" Series - ES Control

E	S	*	0	0	A	0	0	*	*	0	*	*	*	*	#
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

23 24 Control Type

ES – Electric Motor Displacement Control

25 Displacement Adjustment Options

M – Electric Motor - (Fast Response)
N – Electric Motor - (Medium Response)
P – Electric Motor - (Slow Response)

26 27 Electronic Controls 00

– Not Required

28 Yoke Displacement Zone

A – Single Side of Center "A"

29 Extra Functions 0

– Not Required

30 Pressure Control Options

0 – Not Applicable

31 Position Monitoring

A – 4 Limit Switches
B – 8 Limit Switches
P – 4 Limit Switches + Sensor
T – 8 Limit Switches + Sensor

32 Electric Motor Type

2 – Motor with Brake (IP-54)
3 – Motor without Brake (Explosion Proof)

33 Control Voltage

0 – Not Applicable

34 35 36 37 Customer Adjustment Specification

0000 – None
???? – Yes (Final number will be assigned by Danfoss. Specify on table below.)

38 Special Features

Add special feature description (characters 38...42) on page 11 if required.

CUSTOMER ADJUSTMENT SPECIFICATIONS

		Unit	Standard Adjustment	Customer Specified Adjustment	Remarks
All Revolution Adjustments below set at ...		rpm	Vgmax	-	-
Mech. Stop Side A (used as max Adjustment Stop Side A)		cm^3/rev	Vgmax	-	-
Mech. Stop Side B (used as min Adjustment Stop Side A)		cm^3/rev	35% of Vgmax	-	<35% not possible
Displacement Adjusted to…		cm^3/rev	~60% of Vgmax	-	-
Position Monitoring Switch	1	cm^3/rev	35% of Vgmax	-	<35% not possible
	2	cm^3/rev	95% of Vgmax	-	<95% not possible
	3	cm^3/rev	-	-	-
	4	cm^3/rev	-	-	-
	5	cm^3/rev	-	-	-
	6	cm^3/rev	-	-	-
	7	cm^3/rev	-	-	-
	8	cm^3/rev	-	-	-

Model Code

Motors

"W" Series - DP Control

D	P	*	0	0	A	0	0	0	0	0	*	*	*	*	#
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

23 24 Control Type

DP – Pressure Signal Adjustment Displacement Control

25 Displacement Adjustment Options

G – Mounting Interface Cetop 3 Only
H – Remote Port G 1/4
J – Proportional Relief Inc. Electronics

26 27 Electronic Controls

00 – Not Required

28 Yoke Displacement Zone

A – Single Side of Center "A"

29 Extra Functions 0

– Not Required

30 Pressure Control Options

0 – Not Applicable

31 Position Monitoring

0 –No Position Monitoring

32 Electric Motor Type 0

– No Electric Motor

33 Control Voltage

0 – Not Applicable

34 35 36 37 Customer Adjustment Specification

0000 – None
???? – Yes (Final number will be assigned by Danfoss. Specify on table below.)

38 Special Features

Add special feature description (characters 38...42) on page 11 if required.

CUSTOMER ADJUSTMENT SPECIFICATIONS

	Unit	Standard Adjustment	Customer Specified Adjustment	Remarks
All Revolution Adjustments below set at ...	rpm	1500	-	-
Pilot Pressure for Size 250 & 360 (External)	bar	60	-	-
Pilot Pressure for Size 500 & 750 (External)	bar	80	-	-
Mech. Stop Side A (used as max Adjustment Stop Side A)	cm^3/rev	Vgmax	-	-
Mech. Stop Side B (used as min Adjustment Stop Side A)	cm^3/rev	35% of Vgmax	-	<35% not possible

Model Code

Motors

"W" Series - SP Control

S	P	*	*	*	A	0	0	0	0	0	*	*	*	*	#
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

23 24 Control Type

SP – Proportional Valve Adjustment Displacement Control

25 Displacement Adjustment Options

C – With CETOP 3 Prop Valve KDG4V 3

F – With CETOP 5 Prop Valve

26 27 Electronic Controls

3 – ER 9.3 - 10 (CETOP 3)

4 – ER 9.4 - 10 (CETOP 5)

28 Yoke Displacement Zone

A – Single Side of Center "A"

29 Extra Functions 0

– Not Required

30 Pressure Control Options

0 – Not Applicable

31 Position Monitoring 0

– No Position Monitoring

32 Electric Motor Type 0

– No Electric Motor

33 Control Voltage 0

– Not Applicable

34 35 36 37 Customer Adjustment Specification

0000 – None

???? – Yes (Final number will be assigned by Danfoss. Specify on table below.)

38 Special Features

Add special feature description (characters 38...42) on page 11 if required.

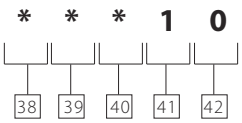
CUSTOMER ADJUSTMENT SPECIFICATIONS

	Unit	Standard Adjustment	Customer Specified Adjustment	Remarks
All Revolution Adjustments below set at ...	rpm	1500	-	-
Pilot Pressure	bar	60	-	-
Mech. Stop Side A (used as max Adjustment Stop Side A)	cm^3/rev	Vgmax	-	-
Mech. Stop Side B (used as min Adjustment Stop Side A)	cm^3/rev	35% of Vgmax	-	<35% not possible
Max. Stop by Control Side A	cm^3/rev	95% of Vgmax	EI Card Adjustment done by customer	Refer to EI Card Manual
Min. Stop by Control Side A	cm^3/rev	35% of Vgmax+/-2.5%	EI Card Adjustment done by customer	Refer to EI Card Manual
Ramp Time 0 → A For 100% Stroke	sec	0	EI Card Adjustment done by customer	Refer to EI Card Manual
Ramp Time A → 0 For 100% Stroke	sec	0	EI Card Adjustment done by customer	Refer to EI Card Manual
Preset Input Signals S1....S4	L/min	-	EI Card Adjustment done by customer	Refer to EI Card Manual

Model Code

Motors

"W" Series - Special Features



38 39 40 **Special Features**

000 – None
******* – Defined by Danfoss

41 42 **Design Number**

10 – Design Number

Motor Specifications-US

MODEL			MFW/MVW 250	MFW/MVW 360	MFW/MVW 500	MFW/MVW
Design			Swashplate type	Swashplate type	Swashplate type	Swashplate type
Type of mounting			Flange- or foot-mounted. Combination units foot mounted only			
Pipe connection SAE Flange	B A	psi psi	11/2″= 6000	11/2″= 6000	2″= 6000	2″= 6000
Direction of rotation			Bi-directional	Bi-directional	Bi-directional	Bi-directional
Speed range	n_{min} [1] n_{max} [2]	rpm rpm	80 1800	80 1800	80 1800	80 1500
Installation position			Optional, see mounting information.			
Ambient temperature range	min max	°F °F	-4 122	-4 122	-4 122	-4 122
Weight	M	lbs	467	485	750	871
Mass of inertia	J	lb·ft [2]	3.46	3.61	11.9	13.1

HYDRAULIC CHARACTERISTICS

Nominal pressure (100% duty cycle)	p_N	psi	5075	5075	5075	5075
Output pressure	p_{Amin}/p_{Bmin} p_{Bmax}/p_{Amax}	psi psi	30 Pressure can be applied to the motor outlet but the sum of p_{Amax} and p_{Bmax} must not exceed the maximum value of 6090psi.	30	30	30
Maximum pressure to DIN 24312	p_{max}	psi	6090	6090	6090	6090
Hydraulic fluid			Hydraulic oil to DIN 51524 part 2. Refer to section Application Data-Fluid Recommendations.			
Hydraulic fluid temperature range	min max	°F °F	-13 (on startup) 194	-13 (on startup) 194	-13 (on startup) 194	-13 (on startup) 194
Viscosity range for continuous operation	min max	cSt cSt	10 75	10 75	10 75	10 75
Maximum permissible start viscosity	max	cSt	1000	1000	1000	1000
Filtering	ISO 4406		18/15/13	18/15/13	18/15/13	18/15/13
Maximum geometric absorption rate [3]	at 1500 rpm at 1800 rpm	V_{gmax} V_{gmax}	in^3 in^3	15.2 15.2	22 22	30.5 45.7 30.5 -
Minimum geometric absorption rate	V_{gmin}	in^3	When no minimum adjustment stop is specified, minimum geometric absorption rate is set at 35% of V_{gmax}			
Maximum geometric motor flow	n= 1500 rpm n= 1800 rpm		99 119	142 171	198 238	297 -
Case pressure	p_{vmax}	psi	maximum 7.2psi over p_{Amin}/p_{Bmin}, p_{Vax} = 58psi abs., p_{Vax} = 87psi abs. with special shaft seal			

DRIVE

Maximum driving torque - (p_{Amax} or p_{Bmax} η=100%)	$M_{1\,Single}$	lb·ft	1232	1774	2463	3688
Maximum power consumption - n= 1800 rpm (p_{Amax} or p_{Bmax} η=100%)	$P_{1\,Single}$	hp	422	608	845	1056 (at 1500 rpm)

COMBINATION UNITS

Maximum driving torque combination unit splined shaft only	M_1	lb·ft	2x 1232	2x 1774	3688	3688

1) Minimum speed for continuous operation

2) Higher speed available on request

3) Tolerance + 1%

Motor Specifications- Metric

MODEL			MFW/MVW 250	MFW/MVW 360	MFW/MVW 500	MFW/MVW
Design			Swashplate type	Swashplate type	Swashplate type	Swashplate type
Type of mounting			Flange- or foot-mounted. Combination units foot mounted only.			
Pipe connection SAE Flange	B A	psi psi	11/2"= 6000	11/2"= 6000	2"= 6000	2"= 6000
Direction of rotation			Bi-directional	Bi-directional	Bi-directional	Bi-directional
Speed range	n_{min} [1] n_{max} [2]	min^{-1} min^{-1}	80 1800	80 1800	80 1800	80 1500
Installation position			Optional, see mounting information.			
Ambient temperature range	min max	°C °C	-20 50	-20 50	-20 50	-20 50
Weight	M	kg	212	220	340	395
Mass of inertia	J	$kg\ m^2$	0.146	0.152	0.5	0.55

HYDRAULIC CHARACTERISTICS						
Nominal pressure (100% duty cycle)	p_N	bar	350	350	350	350
Output pressure	p_{Amin}/p_{Bmin} p_{Bmax}/p_{Amax}	bar bar	2 Pressure can be applied to the motor outlet but the sum of p_{Amax} and p_{Bmax} must not exceed the maximum value of 420 bar.	2	2	2
Maximum pressure to DIN 24312	p_{max}	bar	420	420	420	420
Hydraulic fluid			Hydraulic oil to DIN 51524 part 2. Refer to section Application Data-Fluid Recommendations.			
Hydraulic fluid temperature range	min max	°C °C	-25 (on startup) 90	-25 (on startup) 90	-25 (on startup) 90	-25 (on startup) 90
Viscosity range for continuous operation	min max	cSt cSt	10 75	10 75	10 75	10 75
Maximum permissible start viscosity	max	cSt	1000	1000	1000	1000
Filtering	ISO 4406		18/15/13	18/15/13	18/15/13	18/15/13
Maximum geometric absorption rate [3] at 1500 min^{-1} at 1800 min^{-1}	V_{gmax} V_{gmax}	cm^3 cm^3	250 250	360 360	500 500	750 -
Minimum geometric absorption rate	V_{gmin}	cm^3	When no minimum adjustment stop is specified, minimum geometric absorption rate is set at 35% of V_{gmax}.			
Maximum geometric motor flow n= 1500 min^{-1} n= 1800 min^{-1}			99 119	142 171	198 238	297 -
Case pressure	p_{vmax}	bar	maximum 0.5 bar over p_{Amin}/p_{Bmin}, p_{Vax} = 4 bar abs., p_{Vax} = 6 bar abs. with special shaft seal.			

DRIVE						
Maximum driving torque - (p_{Amax} or p_{Bmax}, η=100%)	$M_{1\ Single}$	Nm	1670	2405	3340	5000
Max. power consumption - n= 1800 min^{-1} (p_{Amax} or p_{Bmax}, η=100%)	$P_{1\ Single}$	kW	307	454	630	787

COMBINATION UNITS						
Maximum driving torque combination unit splined shaft only	M_1	Nm	2x 1670	2x 2405	5000	5000

1) Minimum speed for continuous operation

2) Higher speed available on request

3) Tolerance + 1%

Controls - Pressure Compensator, DF

"W" Series - Motors

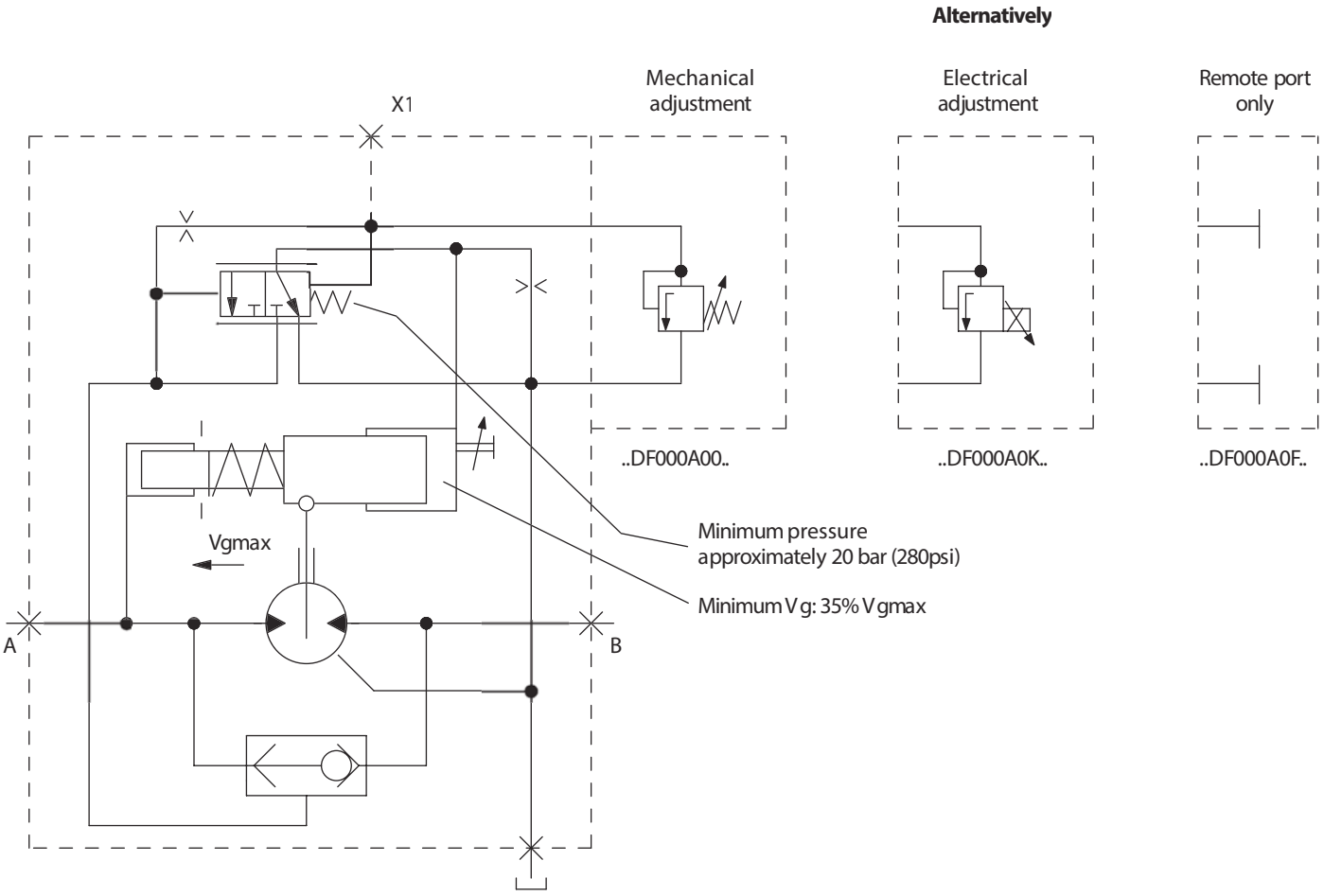
The motor will remain to the minimum volume flow rate(maximum speed, minimumtorque) until the adjusted value of pressure is reached.

Then the pump will change maximum volume flow rate (minimum speed and maximum torque).

Adjustment can be set either manually, hydraulically or electronically.

The standard Hydrokraft pressurecompensator is pilot operated and very stable.

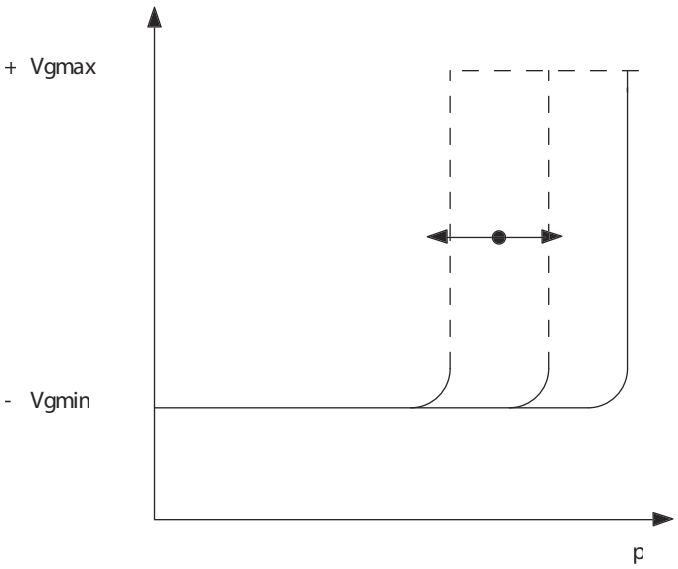
The maximum swashplate angle of the motor can be limited mechanically to between 50 and 100% by a screw.



Controls - Pressure Compensator,DF (cont.)

"W" Series - Motors

As an additional option the maximum (or mini- mum) flow can also be limited by a spacer inside the control cylinder (position number 13 in model coding, options 4, 5 or 6 in combination with customer adjustment specification position 30-37 for the set values). This solution is also recommended for very rough operating conditionsand the need for exact repeatability over a long time period. The setting must be defined before ordering and cannot be modified during operation.

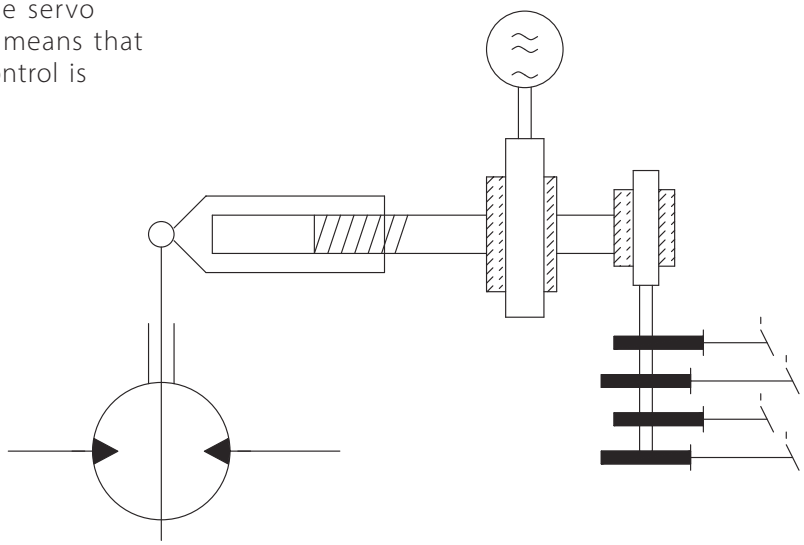


Controls - Electric Motor Displacement, ES

"W" Series - Motors

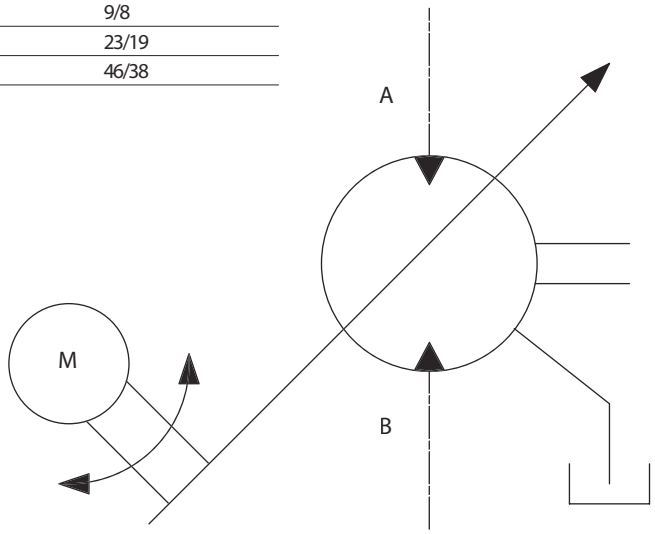
This ES-control adjusts the swash plate angle of the pump by means of a three phase electric servo motor, worm gearing and a switch box with 4 or (optional) 8 limit switches for different positions. A potentiometer for stepless adjustment and/or position monitoring is also available.

The response times from zero to maximum depends on the chosen ratio and the (fixed) speed of the servo motor (this means that once the control is defined and built, the response times are not variable during operation).



	THEORETICAL RESPONSE TIME (SEC) FOR MAXIMUM DISPLACEMENT			
SIZE	250	360	500	750
Frequency Hz	50/60	50/60	50/60	50/60
Fast	6/5	7/6	7/6	9/8
Medium	13/11	18/15	16/13	23/19
Slow	26/22	36/30	31/26	46/38

Response time from Vgmin (35%) to +Vgmax (100%)



Controls - Pressure Signal Adjustment Displacement, DP

"W" Series - Motors

The swivel angle of the motor is proportional to the pilot pressure.

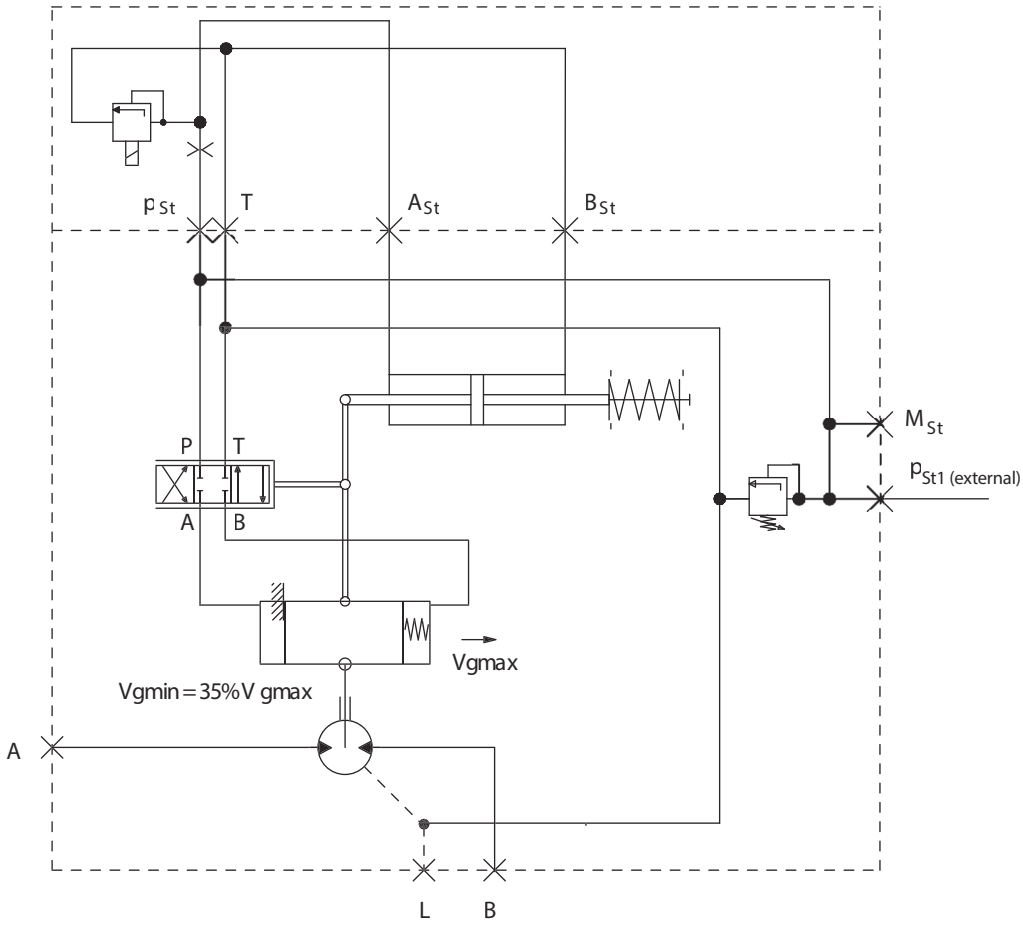
A separate pilot oil circuit is necessary. This circuit should be external to prevent the influence of variable motor speed to the pilot oil flow i.e., response time.

From this, the control pressure is reduced to the desired set value by means of a suitable pres- sure control valve (with P-T line) and throttle in P line 0.8 Ø (0.03 in).

The DP-control can be used for stepless adjustment of the swashplate angle with standard requirements in dynamic and precision.

No feedback signal is needed, an optical indicator is recommended (position 21 in model coding, option "V").

The output flow of the pump is proportional to the pilot pressure.

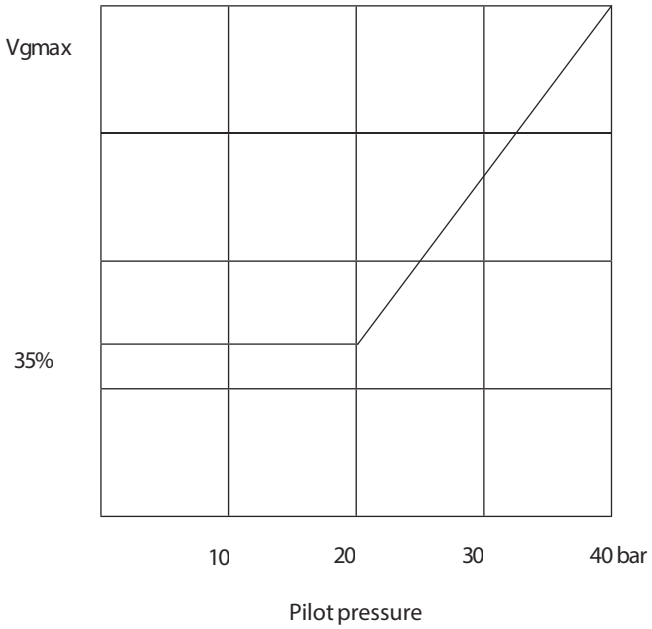


SIZE	RESPONSE TIME (SEC) WITH 12 L/MIN PILOT OIL FLOW Vgmin - Vgmax	PILOT PRESSURE pst (bar)
250/360	0,8	60
500/750	1,8	80

Controls - Pressure Signal Adjustment Displacement,DP (cont.)

"W" Series - Motors

The maximum swashplate angle of the motor can be limited mechanically to between 50% and 100% by screw. As an additional option the maximum (and/or minimum) value can be limited by a spacer inside the control cylinder (position number 13 in model coding, options 4, 5 or 6 in combination with customer adjustment specification position 34-37 for the set values). This solution is also recommended for very rough operating conditions and the need for exact repeatability over a long time period. The setting must be defined before ordering and cannot be modified during operation.



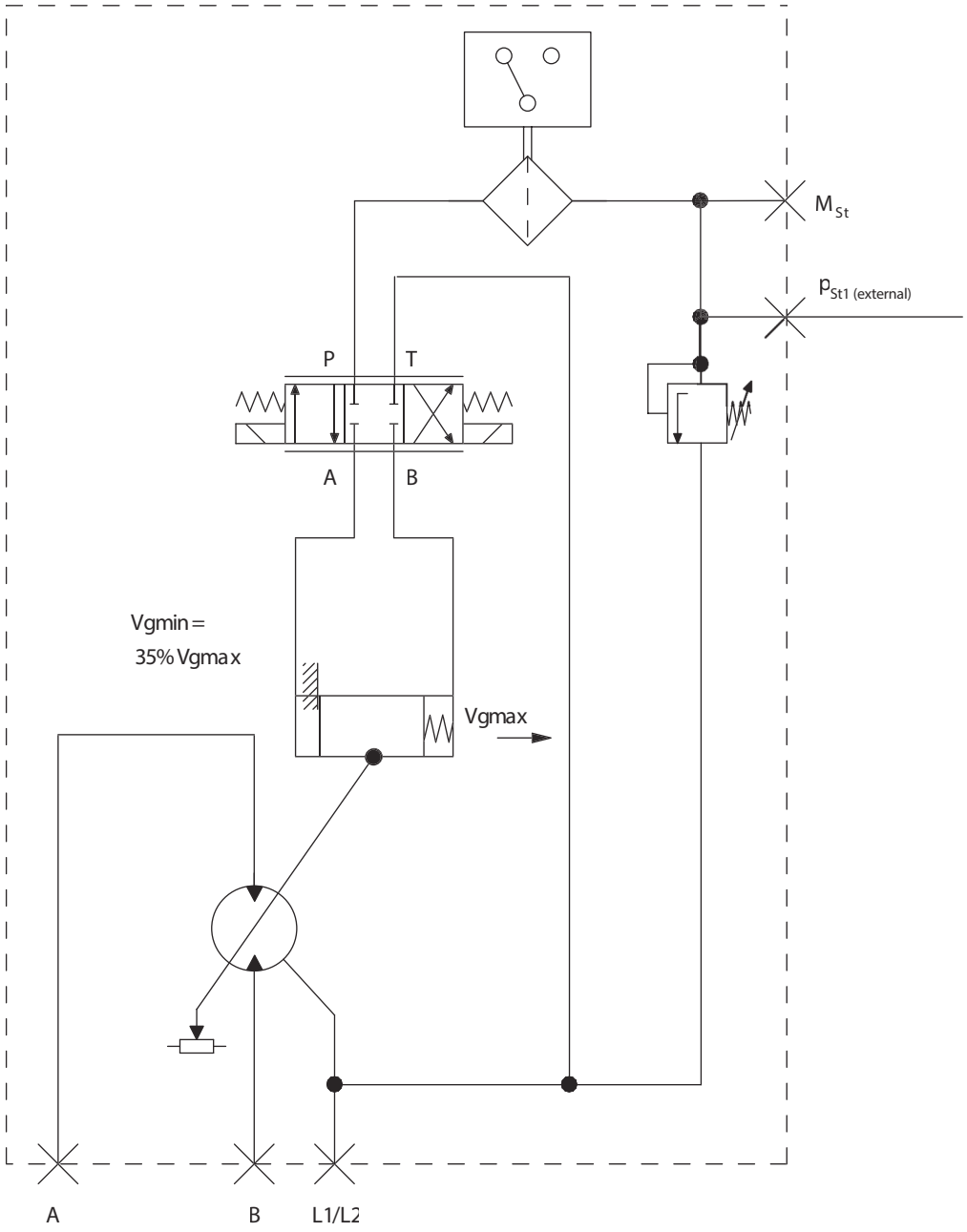
Controls - Electro Hydraulic Displacement Control, SP

"W" Series - Motors

The electrohydraulic displacement control works without throttle losses within electrically adjustable limits. This is done by controlling swash plate angle with electrical feedback (electrical closed-loop control). A separate pilot oil circuit is necessary. This circuit should be external to prevent the influence of variable motor speed to the pilot oil flow, i.e. response time.

The swashplate angle is recorded as an electrical signal and lead back to the control card. The proportional valve and servo piston transform the output signal of the control card to the desired setting. This results in a very precise and dynamic control.

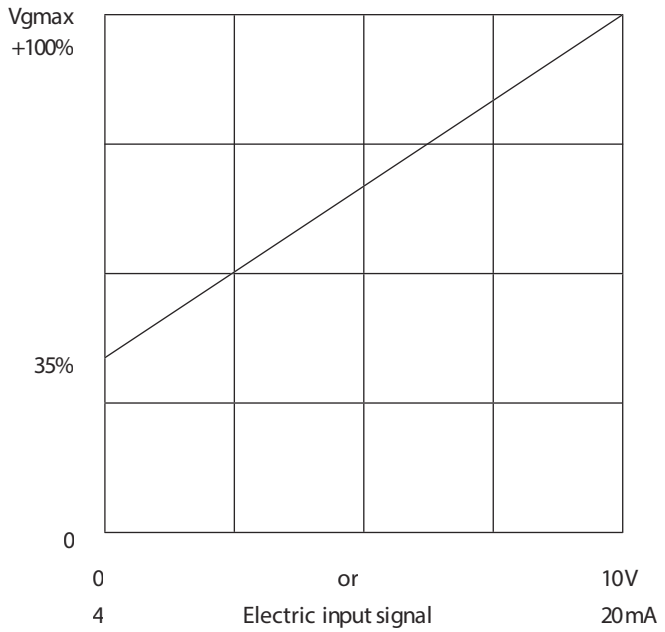
Hysteresis, consistency: approximately 1% of end value.



Controls - Electro Hydraulic Displacement Control, SP (cont.)

"W" Series - Motors

The maximum swash-plate angle of the motor can be limited mechanically to between 50% and 100% by a screw.As an additional option the maximum (and/or minimum) flow can be limited by a spacer inside the control cylinder (position number 14 in model coding, options 4, 5 or 6 in combination with customer adjustment specification position 40-43 for the set values). This solution is also recommended for very rough operating conditions and the need for exact repeatability over a long time period. The setting must be defined before ordering and cannot be modified during operation.

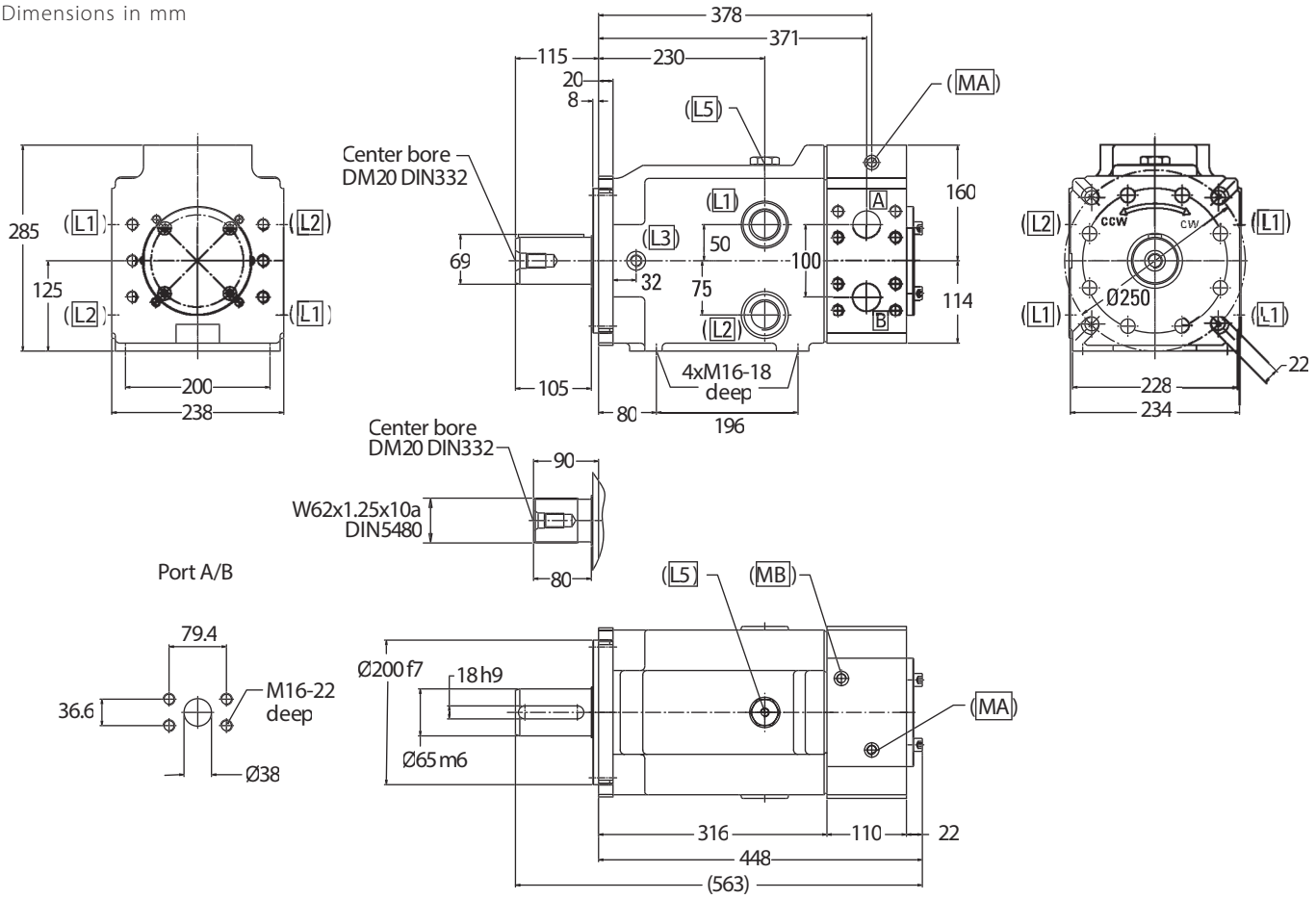


Response times - Electronic control cards

PROPORTIONAL VALVE	PILOT OIL FLOW L/min (USgpm)	CONTROL PRESSURE p_{st} bar (psi)	CONTROL ELECTRONICS (Amp. card)	RESPONSE TIME Vgmin< >Vgmax (ms)	UNIT SIZE cm^3 (in^3)	SERVO PISTON Diameter mm (in)	SERVO PISTON Stroke (min-max) mm (in)	Volume (min-max) cm_(in^3) per chamber
	-	60 (857)	-	350	250 (15.2)	75 (2.95)	12 (.46)	52 (3.11)
Medium response	12 (3.17)	60 (857)	ER9.3-10	475	360 (21.9)	75 (2.95)	16 (.64)	72 (4.33)
KDG4V3-2C20NMUH760	-	80 (1142)	-	450	500 (30.5)	75 (2.95)	15 (.56)	63 (3.82)
(CETOP 3)	-	80 (1142)	-	600	750 (45.8)	75 (2.95)	20 (.77)	86 (5.20)
High response (CETOP 5)	On Request	On Request	On Request	On Request	On Request	On Request	On Request	On Request

Dimensions
Pumps -
MFWS 250/360

Dimensions in mm



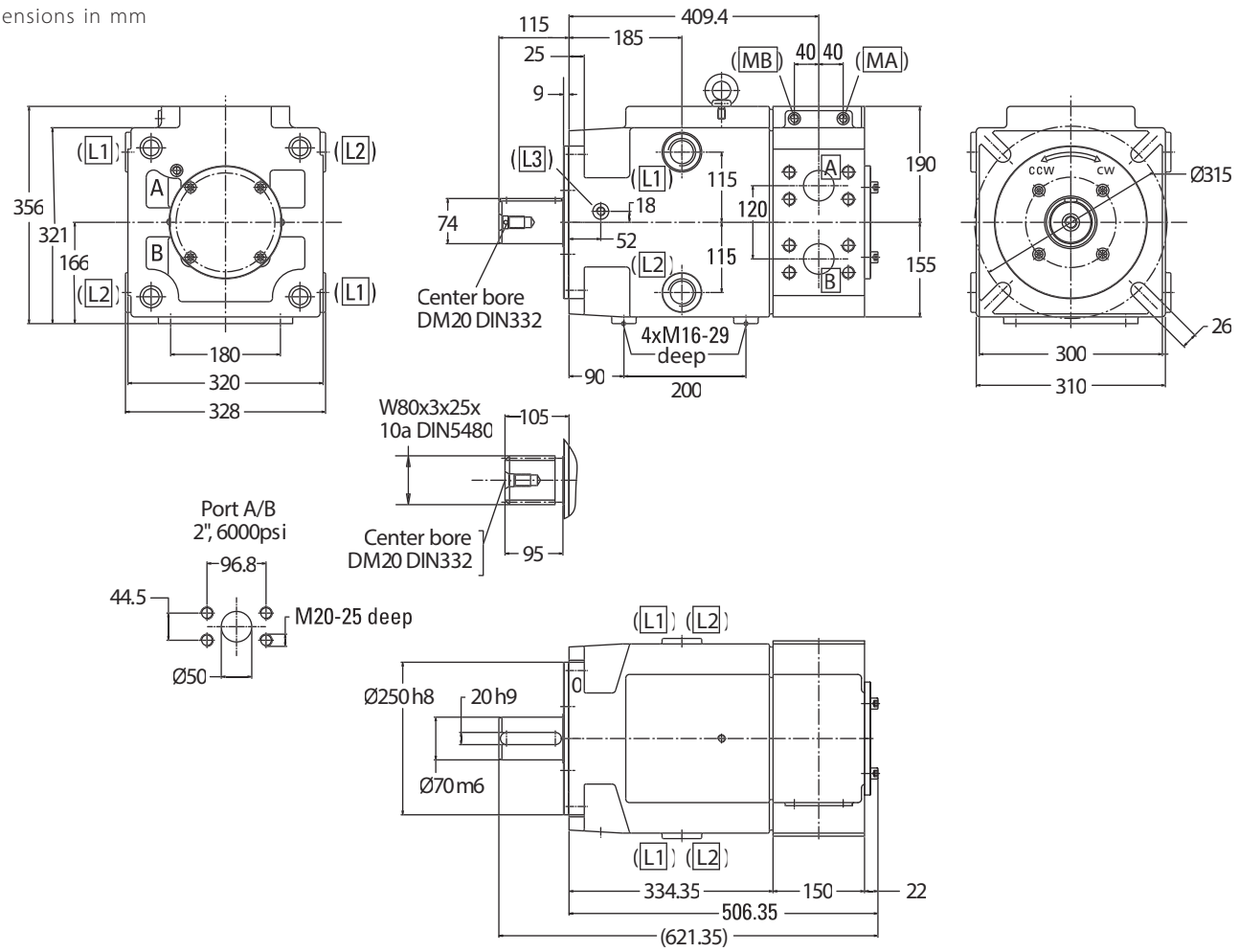
DIRECTION OF ROTATION	INPUT	OUTPUT
Right Hand Rotation	B	A
Left Hand Rotation	A	B

NON-STANDARD DISPLACEMENTS	
Standard Displacement	250 ccm/rev
Reduced Displacements Available	220 or 200 ccm/rev
Standard Displacement	360 ccm/rev
Reduced Displacements Available	308,5 ccm/rev

A	System pressure port SAE 1 1/2", (6000psi)
B	System pressure port SAE 1 1/2", (6000psi)
(L1)	Drain port 1.625-12 UNF-2B, (according to mounting position, use upper port)
(L2)	Drain port G1 1/4", (according to mounting position, use upper port)
(L3)	Ventilation port for ver- tical mounting G 3/8" (shaft upwards)
(L5)	Oil filling plug 1.0625-12 UNF-2B
(MA)	Gauge port system pressure G 1/4"
(MB)	Gauge port system pressure G 1/4"
(...)	Normally plugged

Dimensions
Pumps -
MFWS 500

Dimensions in mm



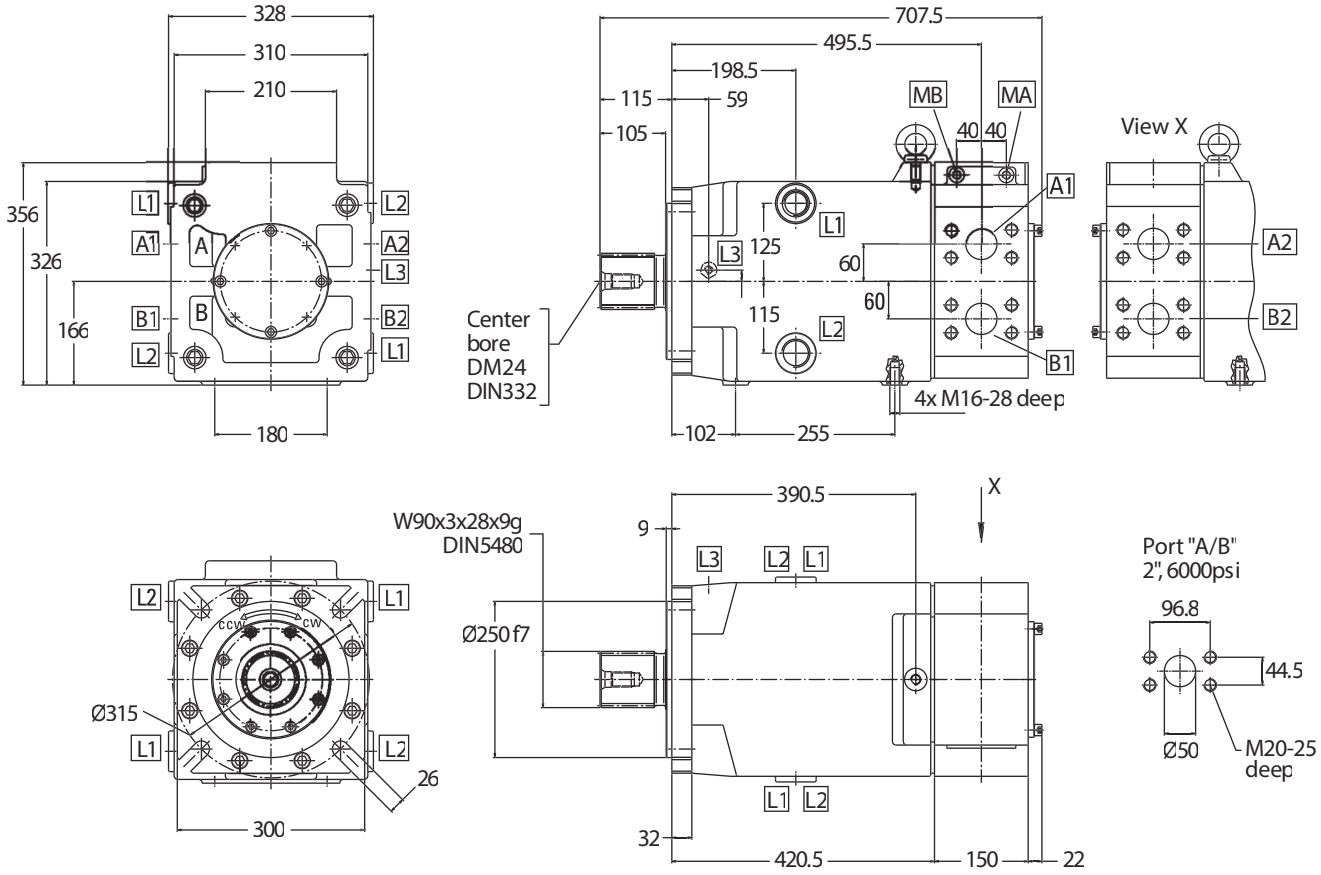
DIRECTION OF ROTATION	INPUT	OUTPUT
Right Hand Rotation	B	A
Left Hand Rotation	A	B

NON-STANDARD DISPLACEMENTS	
Standard Displacement	500 ccm/rev
Reduced Displacements Available	467 or 364 ccm/rev

A	System pressure port SAE2", (6000psi)
B	System pressure port SAE2", (6000psi)
(L1)	Drain port 1.625-12 UNF-2B, (according to mounting position, use upper port)
(L2)	Drain port G1 1/2", (according to mounting position, use upper port)
(L3)	Ventilation port for ver- tical mounting G 1/4" (shaft upwards)
(MA)	Gauge port system pressure G 1/4"
(MB)	Gauge port system pressure G 1/4"
(...)	Normally plugged

Dimensions
Pumps -
MFWS 750

Dimensions in mm



DIRECTION OF ROTATION	INPUT	OUTPUT
Right Hand Rotation	B	A
Left Hand Rotation	A	B

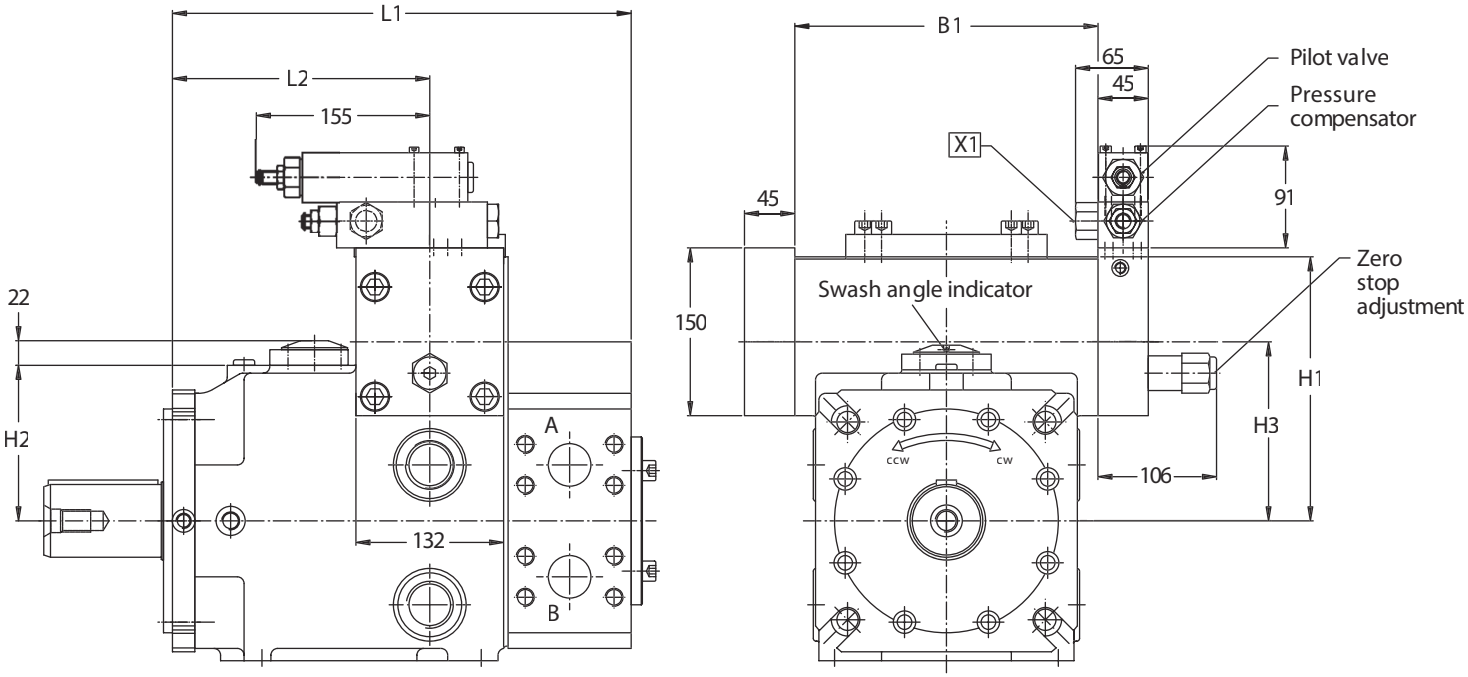
NON-STANDARD DISPLACEMENTS	
Standard Displacement	750 ccm/rev
Reduced Displacements Available	712.5 ccm/rev

A1/A2	System pressure port SAE2", (6000psi)
B1/B2	System pressure port SAE2", (6000psi)
(L1)	Drain port 1.625-12 UNF-2B, (according to mounting position, use upper port)
(L2)	Drain port G1 1/2", (according to mounting position, use upper port)
(L3)	Ventilation port for ver- tical mounting G 1/4" (shaft upwards)
MA	Gauge port system pressure G 1/4"
MB	Gauge port system pressure G 1/4"
(...)	Normally plugged

Dimensions
Controls -
MVWS 250/750

Pressure Compensator, DF

Dimensions in mm



X1 Gauge Port G 1/4-12,5 dee p

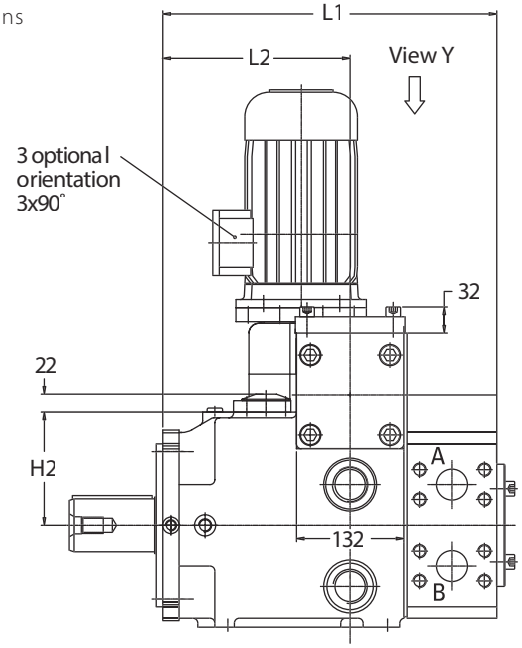
DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

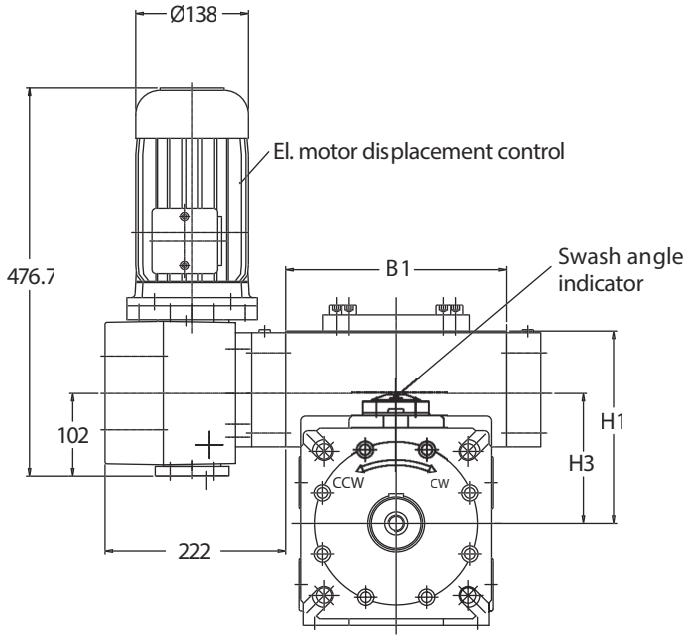
	L1		L2		B1	H1	H2
250	410	230	271	236	135	160	
360	426	230	285	236	135	160	
500	541.5	300	330	267.5	172	186	
750	571	307	372	270	172	188.5	

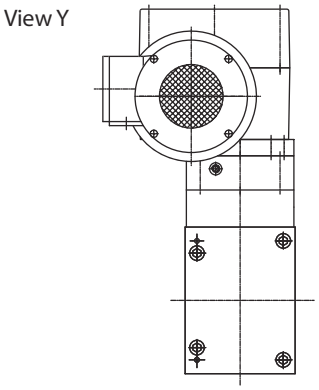
Dimensions
Controls -
MVWS 250...750

Electronic Motor
Displacement Control, ES

Dimensions
in mm





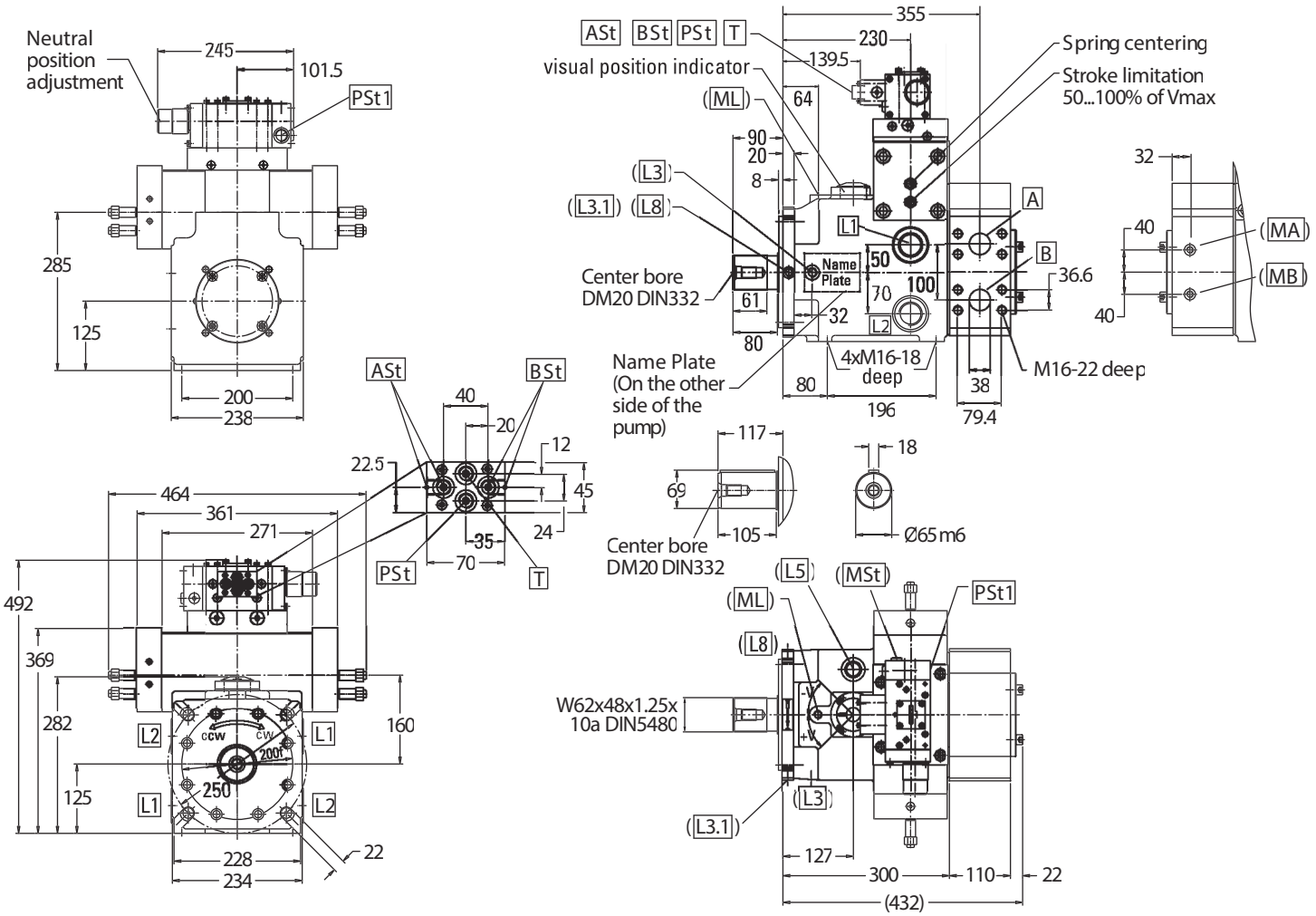


	L1	L2	B1	H1	H2	H3
250	410	230	271	236	135	160
350	426	230	285	236	135	160
500	541.5	300	330	267.5	172	186
750	571	307	372	270	172	188.5

Dimensions Controls - MVWS 250

Pressure Signal
Displacement Control, DP

Dimensions in mm



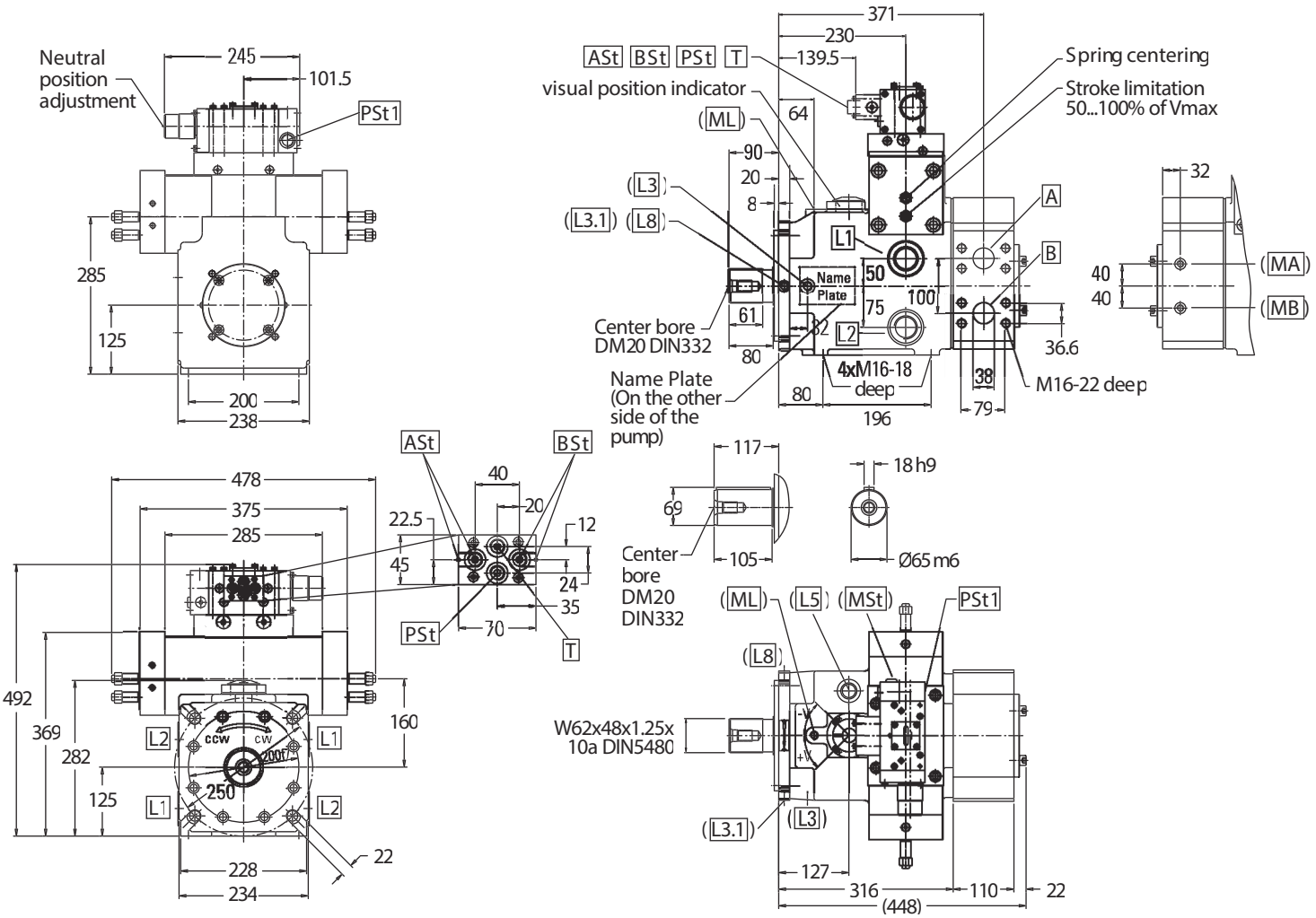
DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

A	System pressure port SAE 11/2", (6000psi)	(L1)	Drain port 1 5/8"-12 UNF-2B, (according to mounting position, use upper port)
B	System pressure port SAE 11/2", (6000psi)	L2	Drain port G1 1/4", (according to mounting position, use upper port)
Ast	Port of pilot pres- sure side "A", G 1/4"	(L3)	Ventilation port for ver- tical mounting G 3/8" (shaft upwards)
Bst	Port of pilot pres- sure side "B", G 1/4"	(L3.1)	Port G 1/4"
		(L5)	Oil filling plug 1 1/16"-UNF-2B
		(L8)	Air bleeding port port G 1/4"
		(MA)	Gauge port system pressure G 1/4"
		(MB)	Gauge port system pressure G 1/4"
		(ML)	Gauge port of case pressure G 1/4"
		(Mst)	Gauge port of case pressure G 1/4"
		Pst	Port of pilot pres- sure G 1/4"
		Pst1	Port of pilot pres- sure G 1/2"
		T	Tank port G 1/2"
		(...)	Normally plugged

Dimensions Controls - MVWS 360

Pressure Signal
Displacement Control, DP

Dimensions in mm



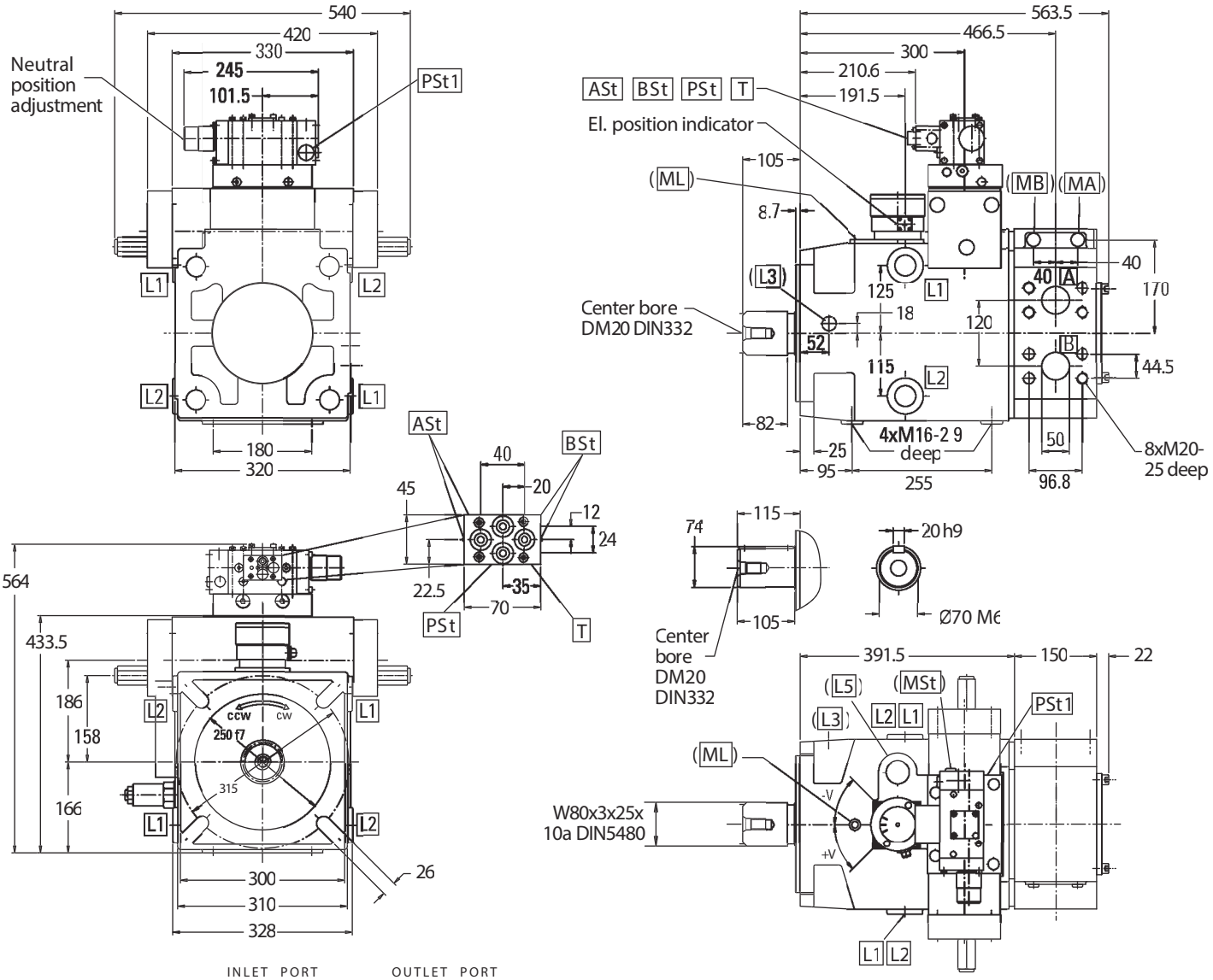
DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

A	System pressure port SAE 1 1/2", (6000psi)	(L1)	Drain port 1 5/8"-12 UNF-2B, according to mounting position, use upper por	(L5)	Oil filling plug 1 1/16"- UNF-2B	(Mst)	Gauge port of case pressure G 1/4"
B	System pressure port SAE 1 1/2", (6000psi)	(L2)	Drain port G1 1/4", according to mountin position, use upper port	(L8)	Air bleeding port port G 1/4"	Pst	Port of pilot pressure G 1/4"
Ast	Port of pilot pres- sure side "A", G 1/4"	(L3)	Ventilation port for vertical mounting G 3/8" (shaft upwards)	(MA)	Gauge port system pressure G 1/4"	Pst1	Port of pilot pressure G 1/2"
Bst	Port of pilot pressure side "B", G 1/4"	(L3.1)	Port G 1/4""	(MB)	Gauge port system pressure G 1/4"	T	Tank port G 1/4"
				(ML)	Gauge port of case pressure G 1/4"	(...)	Normally plugged

Dimensions Controls - MVWS 500

Pressure Signal
Displacement Control, DP

Dimensions in mm



DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

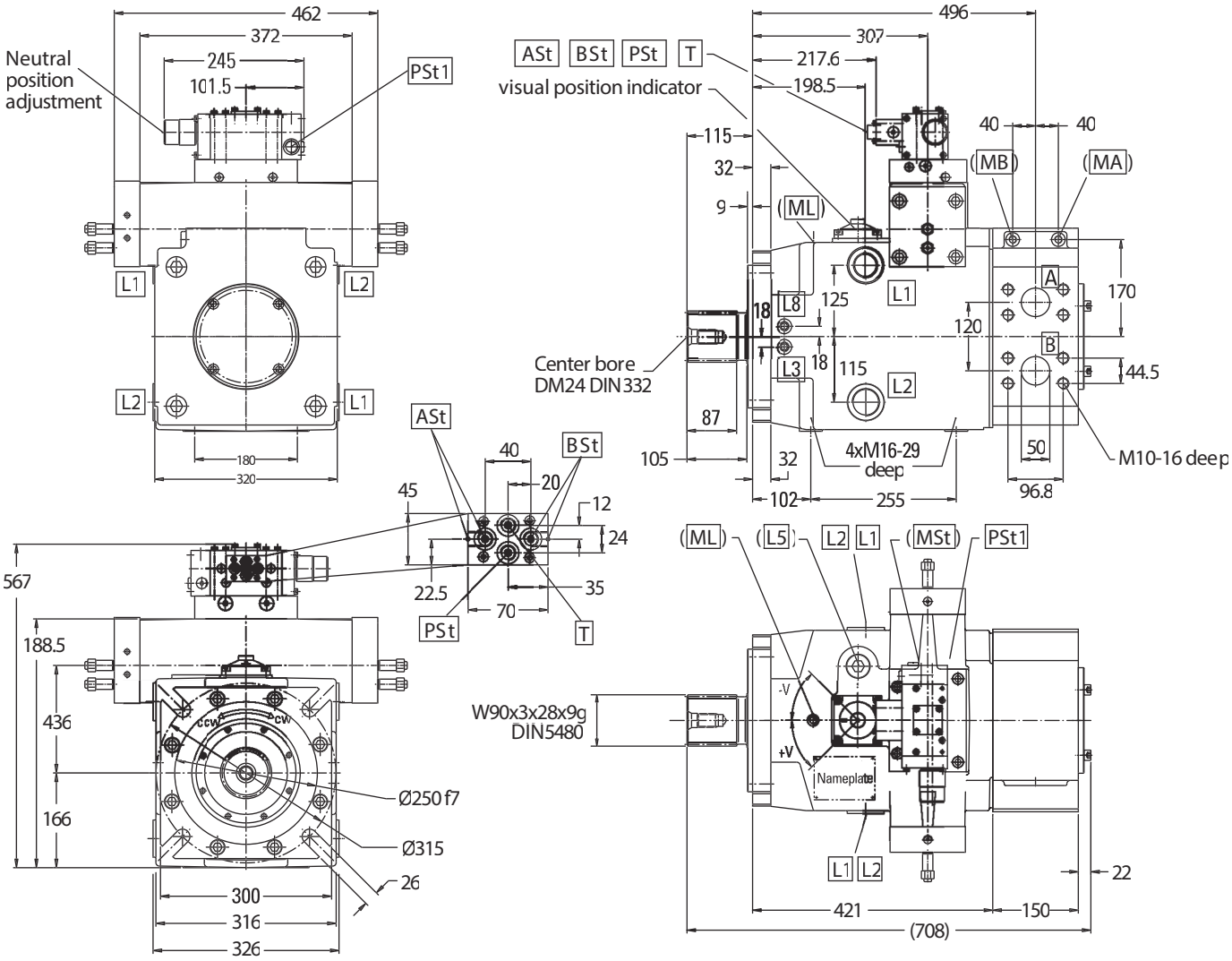
A	System pressure port SAE2", (6000psi)	L2	Drain port G1 1/2", (according to mounting position, use upper port)
B	System pressure port SAE2", (6000psi)	(L3)	Ventilation port for vertical mounting G 3/8" (shaft upwards)
(L1)	Drain port 1 5/8"-12 UNF-2B, (according to mounting position, use upper port)	(L5)	Oil filling plug 1 1/16"-UNF-2B

(MA)	Gauge port system A_{st} pressure 1/4"		Port of pilot pressure side "A" G 1/4"
(MB)	Gauge port system B_{st} pressure 1/4"		Port of pilot pressure side "B" G 1/4"
(ML)	Gauge port of case P_{st} pressure G 1/4"		Port of pilot pressure G 1/4"
(M_{st})	Gauge port of case P_{st1} pressure G 1/4"		Port of pilot pressure G 1/2"
		T	Tank port G 1/4"
		(...)	Normally plugged

Dimensions Controls - MVWS 750

Pressure Signal
Displacement Control, DP

Dimensions in mm



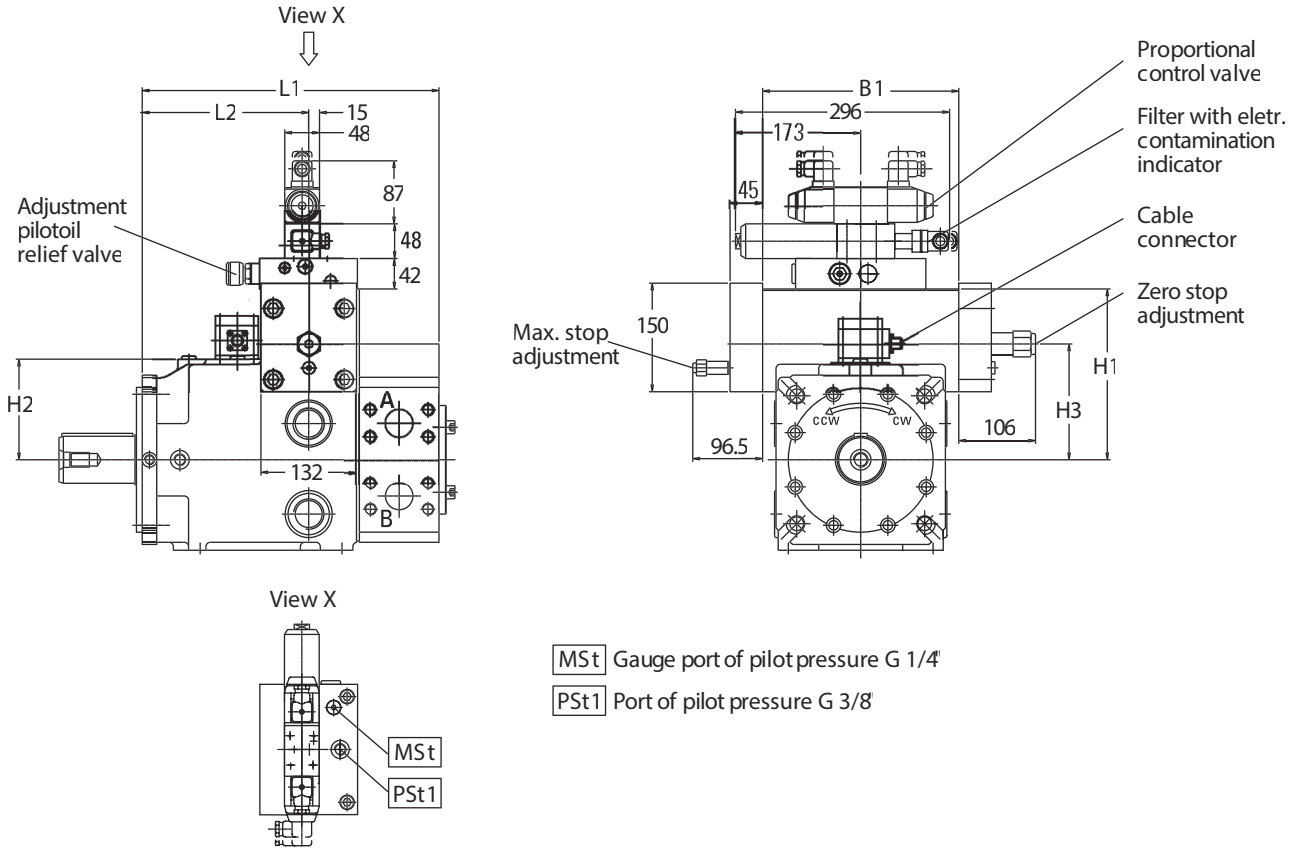
DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

A	System pressure port SAE2", (6000psi)	L2	Drain port G1 1/2", (according to mounting position, use upper port)	(L8)	Air bleeding port port (M_{st}) G 1/4"		Gauge port of case pressure G 1/4"
B	System pressure port SAE2", (6000psi)			(MA)	Gauge port system P_{st} pressure G 1/4"		Port of pilot pressure G 1/4"
(L1)	Drain port 1 5/8"-12 UNF-2B, (according to mounting position, use upper port)	(L3)	Ventilation port for vertical mounting G 3/8" (shaft upwards)	(MB)	Gauge port system P_{st1} pressure G 1/4"		Port of pilot pressure G 1/2"
		(L5)	Oil filling plug 1 1/16"-UNF-2B	(ML)	Gauge port of case (...) pressure G 1/4"		Normally plugged

Dimensions
Controls -
MVWS 250/750

Electrohydraulic
Displacement Control, SP

Dimensions in mm



DIRECTION OF ROTATION	INLET PORT (high pressure side)	OUTLET PORT (low pressure side)
Right Hand Rotation	B	A
Left Hand Rotation	A	B

	L1		L2		B1	H1	H2
250	410	230	271	236	135	160	
360	426	230	285	236	135	160	
500	541.5	300	330	267.5	172	186	
750	571	307	372	270	172	188.5	

AvailableFlanges/ Shaft Ends

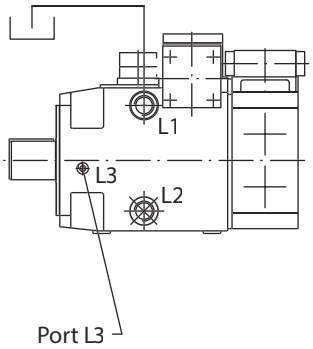
FLANGE		130	180	250	360	500	750
ISO				CYLINDRICAL SHAFT			
5	160-4	50 Dia.	50 Dia.	-	-	-	-
6	200-4	-	-	65 Dia.	65 Dia.	-	-
7	250-4	-	-	-	-	70 Dia.	Spline Only
8	315-8	-	-	-	-	70 Dia.	Spline Only
9	400-8	-	-	-	-	70 Dia.	Spline Only
ISO				SPLINED SHAFT DIN 5480			
10	160-4	W 50x1,25	W 50x1,25.	-	-	-	-
11	200-4	-	-	W 62x1,25	W 62x1,25	-	-
12	250-4	-	-	-	-	W 80x3	W 90x3
13	315-8	-	-	-	-	W 80x3	W 90x3
14	400-8	-	-	-	-	W 80x3	W 90x3

Note: In case of alternating load it's highly recommended to use as a splined shaft together with a split screw fastened coupling.

INSTALLATION POSITION DRAIN PIPING

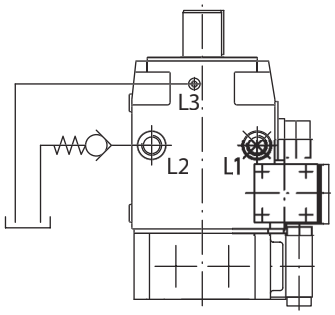
Shaft Horizontal

Highest drain port is to be used. Drain line must be arranged in such a way that motor housing is kept full at all times. If necessary, the drain line is to be looped above the motor.



Shaft Up

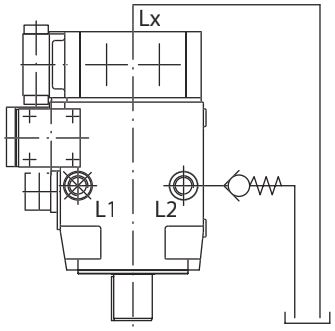
Use venting port L3. Pre-load drain port L1 with 0,2 bar (3psi).



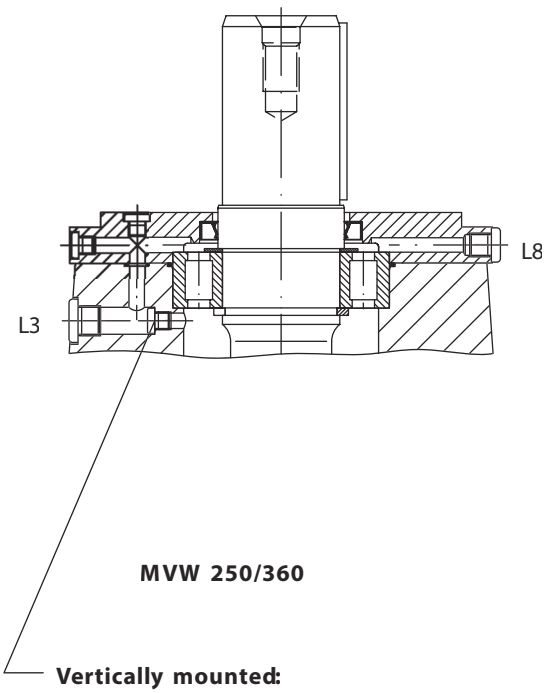
INSTALLATION POSITION DRAIN PIPING

Shaft Down

Use venting port Lx (provided only on request). Pre-load drain port L1 with 0,2 bar (3psi).



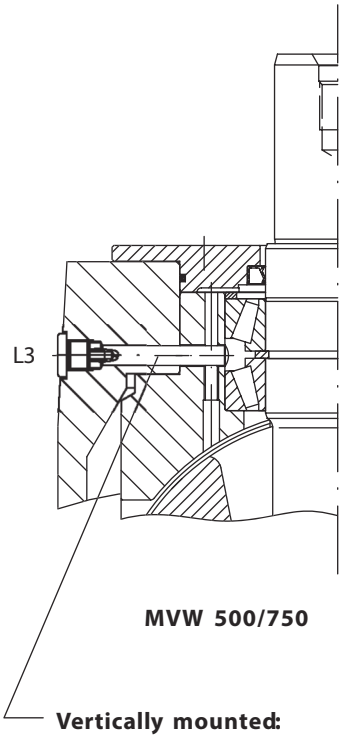
Note: Drain piping shown, with respect to installation positions, is required for proper bearing lubrication. Also see case flushing information on next page.



MVW 250/360

Vertically mounted:
Internal connection closed with plug G 1/8"

Horizontally mounted:
Internal connection open
L3 plugged



MVW 500/750

Vertically mounted:
Internal connection closed with
pin no. HC40608210140 1

Horizontally mounted:
Internal connection open
L3 plugged

Application Data
Fluid Recommendations

Case Flushing Requirements

A check valve must not be used in the drain pipe. The drain pipe must interminate below the oil level in the reservoir.

For all other conditions with low pressure <20 bar (<300psi) and low flow (<10% of Qmax) case flushing is required.

For operation with special fluids HFB and HFC, case flushing is recommended.

Flushing Flow

Flushing flow via the pump case should be >1% of maximum pump flow. Maximum flushing flow depends on case pressure.

Notes:

- All listed ratings are based on the use of a good quality fluid.
- Alternative fluids have a reduced tolerance for contamination over petroleum base fluids. Good filtration is, therefore, critical.
- The motors will provide exceptional life when used with a good quality clean fluid at the pump ratings specified for that fluid.

Fluids

Motors in this catalog are primarily designed to operate with conventional petroleum-based hydraulic oil. Alternative fluids and restrictions:

- Fluid maintenance is critical to the durability of all hydraulic components, and particularly so with hydraulic motors. This becomes even more of a factor when alternative fluids are used. All types of alternative fluids require extensive maintenance in order to maintain proper levels of water content, acidity, viscosity and contamination.

Fluid Cleanliness

These motors are rated for anti-wear petroleum fluids with a contamination level of 18/15/13 per ISO 4406. Operation in fluids with higher contaminal levels than this is not recommended and may reduce the life of the pump components. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Danfoss representative for special duty cycle recommendations.

Danfoss motors, as well as any variable displacement piston motors, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown, however, that pump and hydraulic systemslives are not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of inclusion of air.

Essential information on the correct methods for treating hydraulicfluid is included in Danfoss publication 561- "Vickers 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.

Ordering Procedure

When ordering, please specify full model designation of items required, see "Model Codes" section of this catalog.

Note The Following:

- Designation of variable displacement pumps must include the supplementary designation of the required control type.

FLUIDS

TYPE	CLASSIFICATION	MAX. PRESSURE BAR	MAX. SPEED RPM	RECOMMENDED SEAL MATERIAL	MAX. OPERATING TEMPERATURE °C	BEARING LIFE
Oil in Water Emulsion	HFAE	Not Rated				0%
Water in Oil Emulsion	HFB	250	1800	Fluorocarbon	49	50%
Water Glycol	HFC	250	1800	Fluorocarbon	49	25%
Phosphate Ester	HFDR	350/420	1800	Fluorocarbon	66	100%
Polyol Ester	HFDU	350/420	1800	Fluorocarbon	66	100%

*Refer to the general specifications for the displacement speed limitation

ENGINEERING
TOMORROW

Products we offer:

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- Electric converters
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- Electric motors
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- Gear pumps
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