Vickers®

Piston Pumps

Fixed & variable displacement high pressure single & tandem piston pumps

350 bar (5000 psi)

PV / PF / TPF / TPV – 30 Design (Open Loop)
130 cm^3/r (7.9 in^3/r)
180 cm^3/r (11 in^3/r)
250 cm^3/r (15.2 in^3/r)
360 cm^3/r (22 in^3/r)
500 cm^3/r (30.5 in^3/r)
750 cm^3/r (46 in^3/r)

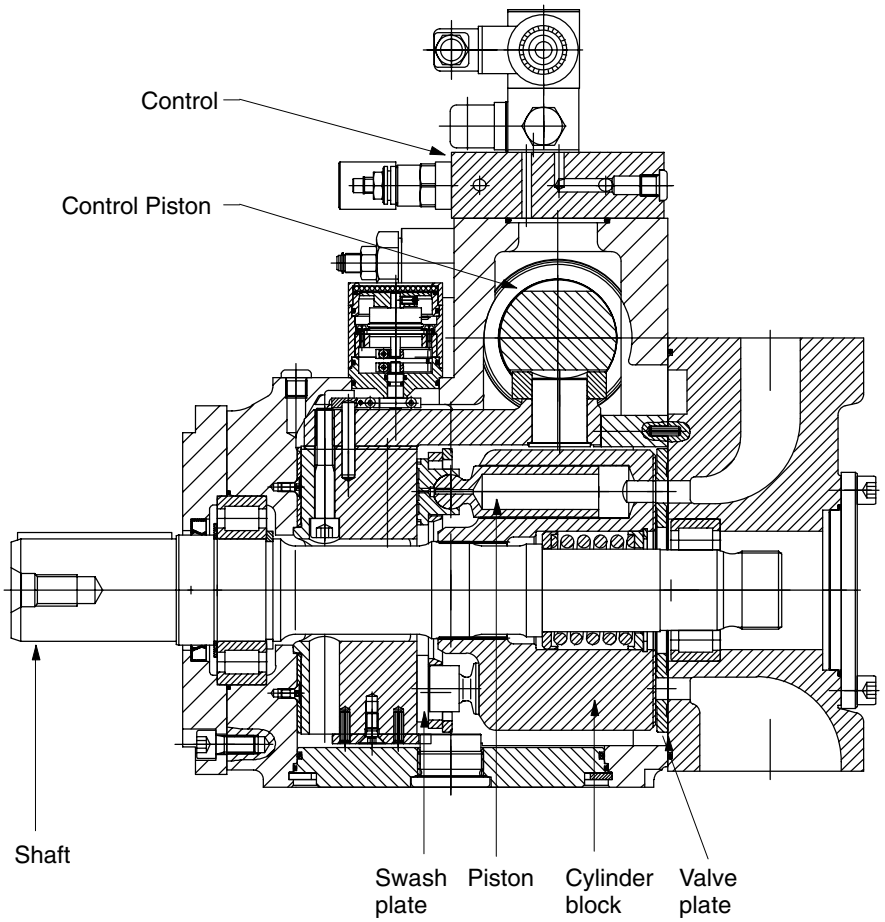
5127.03/EN/0999/A

Table of Contents

Introduction

- Axial piston pumps with swash plate design for reliable operation and long life.
- Rotating and pressure loaded parts are pressure balanced.
- Oversize shaft bearings.
- Thru drive enables multiple pump installation from a single shaft. Tandem pumps are also available.
- Fast response times.
- Open loop with high suction speed.
- “Building block” design gives these pumps a wide range of applications.

Typical section, pressure compensated pump



Model Codes

(F3) PV 250 M 7 R 1 N 1 R 1 S 1 V 30 EU *** ... 11**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 Seals

Blank – Nitrile
F3 – Viton

2 Type

PF – Fixed displacement
PV – Variable displacement
TPF – Tandem Fixed displacement
TPV – Tandem Variable displacement

3 Displacement

PF/PV Models
250 – 250,0 cm^3/r (15.2 in^3/r)
360 – 360,0 cm^3/r (22 in^3/r)
500 – 500,0 cm^3/r (30 in^3/r)
750 – 750,0 cm^3/r (46 in^3/r)

TPF/TPV Models
130 – 130,0 cm^3/r (7.93 in^3/r) TPV only
180 – 180,0 cm^3/r (11.0 in^3/r) TPV only
250 – 250,0 cm^3/r (15.2 in^3/r)
360 – 360,0 cm^3/r (22 in^3/r)
500 – 500,0 cm^3/r (30 in^3/r)

4 Build

M – ISO Metric

5 Mounting Flange

PF/PV Models	*Displacement*
7 – ISO3019/2-200B4HW	250,360
8 – ISO3019/2-250B4HW	500,750
9 – ISO315-8 hole	500
10 – ISO400-8 hole	750
TPF/TPV Models	
7 – ISO3019/2-200B4HW	130,180,250,360
8 – ISO3019/2-250B4HW	500
9 – ISO315-8 hole	500

6 Direction of rotation

R – Clockwise (std)
L – Counterclockwise

7 Displacement Adjustment Stop

PV & TPV models only

1 – Maximum displacement stop
2 – No displacement (std)
3 – Minimum displacement stop
4 – Maximum & minimum displacement stop

8 Thru drive

N – No thru drive (std)
A – SAE A with std coupling
B – SAE B with std coupling
C – SAE C with std coupling
F – ISO125B4HW with std coupling
G – ISO160B4HW with std coupling
H – ISO200B4HW with std coupling
J – ISO250B4HW with std coupling (500 & 750 only)
P – Pilot pump 8cc/r *(PV/TPV models only)*
PP – Double pilot pump 8cc/r *(TPV models only)*

9 Main Port Options

1 – SAE ports, Metric bolt holes

10 Main Port Locatioon

R – Radial – side port

11 Drive Shaft End Type

1 – ISO straight key
2 – ISO spline

12 Drive Shaft Seal

N – No shaft seal
S – Single shaft seal (std)
D – Double shaft seal

13 Yoke Displacement

PV / TPV models only

1 – Single side of center "A"
2 – Single side of center "B"
3 – Over center

14 Yoke Position Indicator

PV models only

V – Visual position indicator (std)
M – Potentiometer with visual indicator

TPV models only

L – Position limit switch
M – Potentiometer with visual indicator
N – No position indicator (std)
P – Position potentiometer
V – Visual position indicator

15 Pump Design

30

16 Special Suffix

EU11 – Surfaces nickle plated for Skydrol
EU17 – Surfaces unpainted
EU19 – Grey primer finish
EU20 – Paint to customer spec.
EU22 – Assemble to another unit (std)

17 Controls

PV / TPV models only

Refer to the following pages for control breakdown.

18 Control Design

PV models only

11

Control	Description	PV Displacements				TPV Displacements				
		250	360	500	750	130	180	250	360	500
DF	Pressure Compensated & Maximum Flow Adjuster	✓	✓	✓	✓	✓	✓	✓	✓	✓
DP	Proportional to Pilot Pressure	✓	✓	✓	✓	✓	✓	✓	✓	✓
ES	Displacement Control by Electric Motor	✓	✓	✓	✓	✓	✓	✓	✓	✓
LR	Constant Power Control	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE	Displacement Control by Adjustment Control	✓	✓	✓	✓	✓	✓	✓	✓	✓
HG	Displacement Control by Handwheel Adjuster	✓	✓	✓	✓	✓	✓	✓	✓	✓
SM	Displacement Control by Servo Valve	✓	✓	✓	✓	✓	✓	✓	✓	✓
SP	Displacement Control by Electro–Hydraulic Proportional Valve	✓	✓	✓	✓	✓	✓	✓	✓	✓

Model Codes

(F3) PV 250 M 7 R 1 N 1 R 1 S 1 V 30 EU** *** ... 11

17

17

DF Control
Pressure Compensator & Maximum Flow Adjuster

2 –Pilot operated

Maximum Flow Adjustment
F –Screw adjuster

Compensator Pressure Setting

090 – Std setting 90 bar (1300 psi)
xxx – Customer requested setting

Compensator Control
R – Remote connection port only (std.)
F – Screw adjuster on compensator (std.)
K – Electro-proportional relief valve

Pressure Limiting Valve Operator
1 – No solenoid valve (std.)
2 – Solenoid unloading valve

Solenoid Control Voltage
N – No solenoid
A – 110VAC50Hz
B – 110VAC50Hz / 120 VAC60 Hz
C – 220VAC50Hz
D – 220VAC50Hz / 240VAC60Hz
G – 12VDC
H – 24VDC

Load Sensing
1 – No load sensing (std.)
2 – Load sensing

Example of DF model:
DF 2 F 090 R 1 N 1 11

DP Control
Displacement Control Proportional to pilot pressure

1 – Mounting interface only (std.)
2 – Pilot relief & remote port
3 – Pilot relief, remote port & proportional relief (1-S/S)
4 – Pilot relief, remote port & proportional relief (2-S/S)

Power Control
N – No power control
A – Adjustable power control

Pressure Limiter
1 – Without pressure limiter (std.)
2 – With pressure limiter

Pressure Limiting Valve Operation
A – Single side of center (std.)
B – Over center

Solenoid Control Voltage
N – No solenoid
A – 110VAC50Hz
B – 110VAC50Hz / 120 VAC60 Hz
C – 220VAC50Hz
D – 220VAC50Hz / 240VAC60Hz
G – 12VDC
H – 24VDC

Example of DF model:
DP 1 N 1 A N 11

ES Control
Displacement Control by Electric Motor

Response time
8 – Seconds with 50 HZ motor (std.)
20 – Seconds with 50 HZ motor (std.)
40 – Seconds with 50 HZ motor

Position Monitoring
A – 4 limit switches (std.)
B – 8 limit switches
P – 4 limit switches & Potentiometer
P – 8 limit switches & Potentiometer

Motor Type
1 – Std motor with brake IP44 (std.)
2 – Std motor with brake IP65
3 – Motor without brake – hazardous locations

Electric Motor Voltage
E – 230 / 400 V, 50 Hz / 270 / 460 V, 3 Phase (std.)
U – 220V, 50 Hz – 1 Phase
V – 220V, 60 Hz – 1 Phase

Example of ES model:
ES 8 A 1 E 11

Model Codes

(F3) PV 250 M 7 R 1 N 1 R 1 S 1 V 30 EU** *** ... **11**

17 18

17

LR Control
Constant Power Control

*** Power setting in kW @1500 rpm, specify:
018 - 090 130 size pumps
018 - 110 180 size pumps
030 - 160 250 size pumps
045 - 250 360 size pumps
075 - 350 500 size pumps

Pressure Limiter
N – No pressure limiter (std.)
F – Pressure limiting, screw adjuster
K – Pressure limiting, electric proportional valve

Load Sensing
1 – No load sensing (std.)
2 – Load sensing

Example of LR model:

LR 011 N 1 11

SM Control
Displacement Control by Servo Valve

Power control
N – No power control (std.)
A – With adjustable power control

Pressure Limiter
1 – Without pressure limiter (std.)
2 – With pressure limiter

Pressure Limiter Valve Operation
A – Single side of center

Pilot Oil Filter
V – Filter with visual indicator (std.)
E – Filter with electrical indicator

Example of SM model:

SM N 1 A V 11

FE Control
Displacement Control by Adjustment Screw

Example of FE model:

FE 11

SP Control
Displacement Control by Electro-hydraulic Proportional Valve

E – Internal pilot supply
L – External pilot supply

Proportional Valve
1 – Mounting interface only (std.)
2 – With proportional valve NG6 std. CETOP3
3 – With proportional valve high response CETOP5

Pilot Oil Filter
N – Without filter (std.)
V – Filter with visual dirt indicator
E – Filter with electrical dirt indicator

Fail Safe Solenoid Valve
1 – Without fail safe valve (std.)
2 – With fail safe valve

Constant Power Valve
N – No power control (std.)
A – With adjustable power control

Pressure Limiter
1 – Without pressure limiter (std.)
2 – With pressure limiter

Solenoid Control Voltage
N – No solenoid
A – 110VAC50Hz
B – 110VAC50Hz / 120 VAC60 Hz
C – 220VAC50Hz
D – 220VAC50Hz / 240VAC60Hz
G – 12VDC
H – 24VDC

Example of SP model:

SP E 1 N 1 N 1 N 11

HG Control
Displacement Control by Handwheel Adjuster

Example of HG model:

HG 11

18 **Control Design**

Pump Specifications

General

Model			**PF/PV 250**	**TPF/TPV 250**	**PF/PV 360**	**TPF/ TPV 360**	**PF/PV 500**	**TPF/TPV 500**	**PF/PV 750**
Design			Axial piston pump						
Type of mounting			Flange or foot-mounting, Tandem version foot-mounting only						
Pipe connection SAE flange	B A	psi	$3^1/_2$" - 500 $1^1/_2$" - 6000	$3^1/_2$" - 500 $1^1/_2$"-6000 1)	$3^1/_2$" - 500 $1^1/_2$" - 6000	$3^1/_2$" - 500 $1^1/_2$"-6000 1)	5" - 500 2" - 6000	5" - 500 2"-6000 1)	5" – 500 2" – 6000 1)
Direction of rotation			Clockwise when viewing shaft end of pump. Counterclockwise available on request.						
Speed range	n_{min}	r/min	1800	1800	1500	1500	1800	1800	1200
Installation position			Optional, see mounting information.						
Ambient temperature range	ϑu_{min} ϑu_{max}	°C (°F)	–20 (–4) +50 (122)						
Weight	m 3)	kg (lbs.)	212 (467)	455 (1003)	220 (485)	464 (1023)	340 (750)	720 (1587)	395 (871)

Model		Units	**TPF/TPV 130**	**TPF/TPV 180**
Design			Tandem Axial piston pump	
Type of mounting			Flange or foot-mounting, Tandem version foot-mounting only	
Pipe connection SAE flange	B A	psi	$1^1/_4$" - 6000 $2^1/_2$" - 500	$1^1/_4$" - 6000 3" – 500
Direction of rotation			Clockwise when viewing shaft end of pump. Counterclockwise available on request.	
Speed range	n_{min} n_{max}	r/min	1800	
Installation position			Optional, see mounting information	
Ambient temperature range	min max	°C (°F)	–20 (–4) +50 (122)	
Weight	m 3)	kg (lbs.)	240 (529)	240 (529)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 130 cm^3/rev

Model		Units	**130 cm^3/rev**
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)
Input pressure	p_{1min} p_{1max} 5)	bar (psi)	50 (700) .85 (12)
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6092)
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)
Viscosity range for continuous operation	min max	cSt	10 75
Max permissible start viscosity	ν max	cSt	1000
Filtering		µm	18/15/13
Max geom. pump capacity n=1500 r/min n=1800	V_g 7)	cm^3 (in^3) /rev	130 (7.9) 130 (7.9)
Max geom. pump flow n=1500 r/min n=1800	Q_g	l/min (USgpm)	195 (52) 234 (62)
Case pressure	$p_{v\ max}$	bar (psi)	Max. 0,5 bar (7) over p1, max. 4 bar (60) abs. 8)
Pilot Pump		cm^3 (in^3) /rev	8 (.5) 9)

Drive specifications – 130 cm^3/rev

Model			**TPF/TPV 130**
Maximum driving torque (p_2 max., η=100%)	Nm (lb.ft.)	M_1	2 x 869 (2 x 641)
Maximum power consumption (p_2 max n=1500, η=100%)	kW (hp)	p_1	2 x 136,5 (2 x 183)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 180 cm³/rev

Model		Units	**130 cm³/rev**
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)
Input pressure	p_{1min} p_{1max} 5)	bar (psi)	50 (700) .85 (12)
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6092)
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)
Viscosity range for continuous operation	min max	cSt	10 75
Max permissible start viscosity	ν max	cSt	1000
Filtering		µm	18/15/13
Max geom. pump capacity n=1500 r/min n=1800	V_g 7)	cm^3 (in^3) /rev	180 (11) 180 (11)
Max geom. pump flow n=1500 r/min n=1800	Q_g	l/min (USgpm)	195 (52) 234 (62)
Case pressure	$p_{v\ max}$	bar (psi)	Max. 0,5 bar (7) over p1, max. 4 bar (60) abs. 8)
Pilot Pump		cm^3 (in^3) /rev	8 (.5) 9)

Drive specifications – 180 cm³/rev

Model			**TPF/TPV 180**
Maximum driving torque (p_2 max., η=100%)	Nm (lb.ft.)	M_1	2 x 1203 (2 x 887)
Maximum power consumption (p_2 max n=1500, η=100%)	kW (hp)	p_1	2 x 189 (2 x 253)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 250 series

Model		Units	PF/PV 250	TPF/TPV 250
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)	
Input pressure	p_{1min} p_{1min}	bar (psi)	1.0 abs [4] 50 (700)	
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6090)	
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request	
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)	
Viscosity range for continuous operation	min max	cSt	10 75	
Max permissible start viscosity	ν max	cSt	1000	
Filtering		µm	18/15/13	
Max geom. pump capacity n=1500 r/min n=1800	V_g [7]	cm^3 (in^3)/rev	250 (15.3)	2 x 250 (30)
Max geom. pump flow n=1500 r/min n=1800	Q_g	l/min (USgpm)	375 (100) 450 (119)	750 (198) 900 (238)
Case pressure	$p_{v\ max}$	bar (psi)	max. 0,5 (7) over p_1, max 4bar (60) abs [8]	
Pilot Pump		cm^3 (in^3)/rev	8 (.5) [9]	

Drive specifications – 250 series

Model			PF/PV 250	TPF/TPV 250
Maximum driving torque (p_2 max., η=100%)	M_1	Nm (lb.ft.)	1670 (1232)	3340 (2463)
Maximum power consumption (p_2 max n=1500, η=100%)	p_1	kW (hp)	265 (195)	530 (391)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 360 series

Model		Units	**PF/PV 360**	**TPF/TPV 360**
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)	
Input pressure	p_{1min} p_{1min}	bar (psi)	1.0 abs [4] 50 (700)	
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6090)	
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request	
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)	
Viscosity range for continuous operation	min max	cSt	10 75	10 75
Max permissible start viscosity	ν max	cSt	1000	
Filtering		µm	18/15/13	
Max geom. pump capacity n=1500 r/min	V_g [7]	cm^3 (in^3)/rev	360 (22)	2 x 360 (2x22)
Max geom. pump flow n=1500 r/min	Q_g	l/min (USgpm)	540 (143)	1080 (285)
Case pressure	$p_{v\ max}$	bar (psi)	max. 0,5 (7) over p_1, max 4bar (60) abs [8]	
Pilot Pump		cm^3 (in^3)/rev	8 (.5) [9]	

Drive specifications – 360 series

Model			**PF/PV 360**	**TPF/TPV 360**
Maximum driving torque (p_2 max., η=100%)	M_1	Nm (lb.ft.)	2406 (1775)	2 x 2406 (2 x 1775)
Maximum power consumption (p_2 max n=1500, η=100%)	p_1	kW (hp)	378 (507)	2 x 378 (2 x 507)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 500 series

Model		Units	PF/PV 500	TPF/TPV 500
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)	
Input pressure	p_{1min} p_{1min}	bar (psi)	1.0 abs [4] 50 (700)	
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6090)	
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request	
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)	
Viscosity range for continuous operation	min max	cSt	10 75	
Max permissible start viscosity	ν max	cSt	1000	
Filtering		µm	18/15/13	
Max geom. pump capacity n=1500 r/min n=1800	V_g [7]	cm^3 (in^3)/rev	500 (30) 410 (250)	2 x 500 (30) 2 x 410 (250)
Max geom. pump flow n=1500 r/min n=1800	Q_g	l/min (USgpm)	750 (198) 738 (195)	1500 (396) 1476 (390)
Case pressure	$p_{v\ max}$	bar (psi)	max. 0,5 (7) over p_1, max 4bar (60) abs [8]	
Pilot Pump		cm^3 (in^3)/rev	8 (.5) [9]	

Drive specifications – 500 series

Model			PF/PV 500	TPF/TPV 500
Maximum driving torque (p_2 max., η=100%)	M_1	Nm (lb.ft.)	3360 (2478)	5000 [6] (3688)
Maximum power consumption (p_2 max n=1500, η=100%)	p_1	kW (hp)	525 (704)	860 (1153)

1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Hydraulic characteristics – 750 series

Model		Units	**PF/PV 750**
Nominal pressure (100% duty cycle)	p_N	bar (psi)	350 (5000)
Input pressure	p_{1min} p_{1max}	bar (psi)	1.0 abs [4] 50 (700)
Max. pressure (to DIN 24312)	p_{2max}	bar (psi)	420 (6090)
Hydraulic fluid			Hydraulic oil according to DIN 51524 part 2. Other fluids available upon request
Hydraulic fluid temperature range	min max	°C (°F)	–25 (–13) (on startup) +90 (194)
Viscosity range for continuous operation	min max	cSt	10 75
Max permissible start viscosity	ν max	cSt	1000
Filtering		µm	18/15/13
Max geom. pump capacity n=1200 r/min	V_g [7]	cm^3 (in^3)/rev	750 (46)
Max geom. pump flow n=1000 r/min n=1200	Q_g	l/min (USgpm)	750 (46) 900 (55)
Case pressure	$p_{v\ max}$	bar (psi)	max. 0,5 (7) over p_1, max 4 bar (60) abs [8]
Pilot Pump		cm^3 (in^3)/rev	8 (.5) [9]

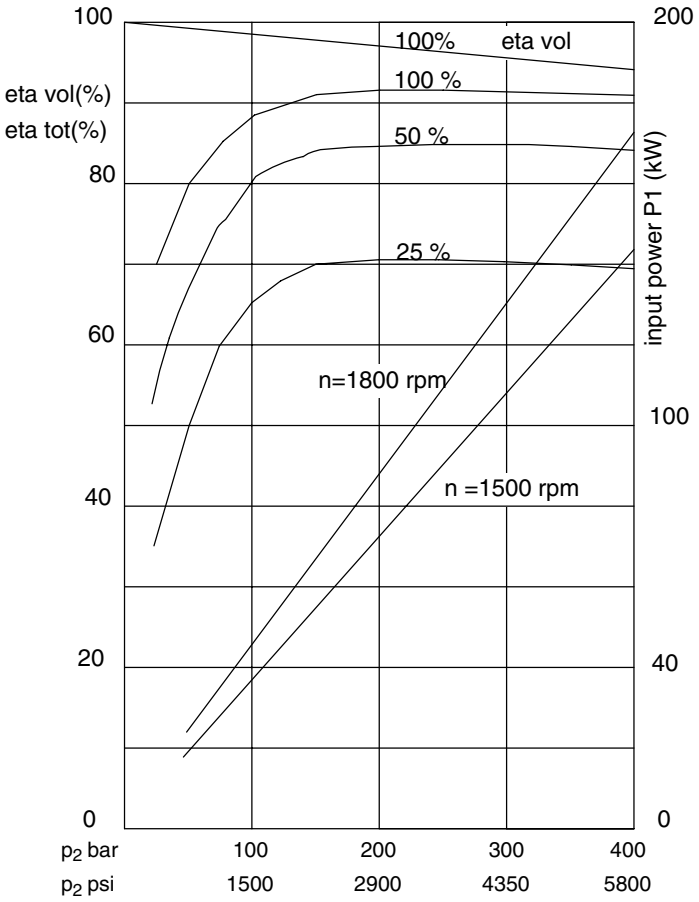
Drive specifications – 750 series

Model			**PF/PV 750**
Maximum driving torque (p_2 max., η=100%)	M_1	Nm (lb.ft.)	5013 (3697)
Maximum power consumption (p_2 max n=1200, η=100%)	p_1	kW (hp)	630 (845)

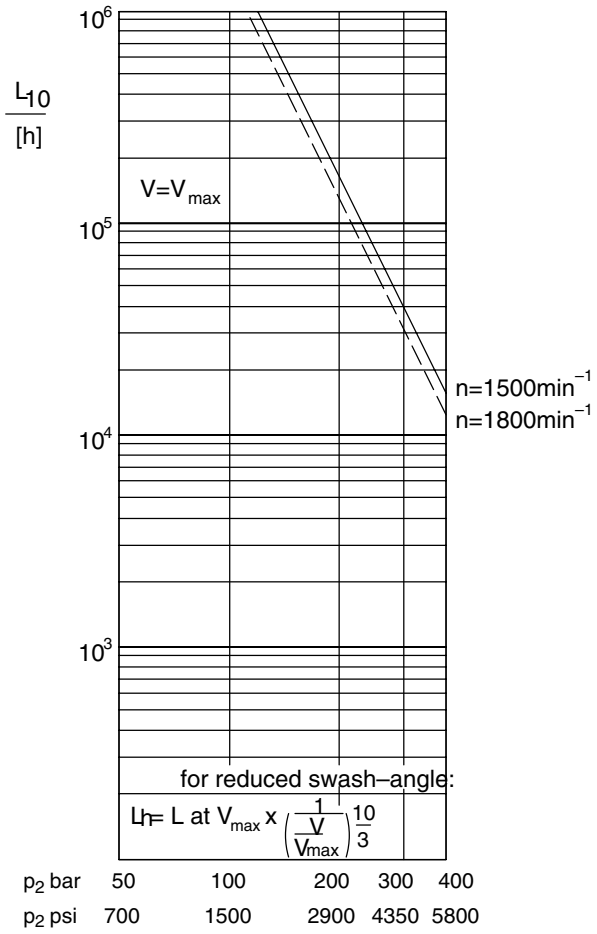
1. For tandem pumps TPF/TPV 2 each req'd
2. For 1800 rpm only 410 cm^3 (250in^3) or 2x 410 cm^3 (250in^3)
3. Including servo pistons, without control
4. Input pressure is to be assured by the user for all operating states
5. Pressure can be applied to the pump input but the sum of p_1 and p_2 must not exceed the maximum value of 420 bar (6090 psi)
6. For tandem pumps only with reduced swash angle (<80% of V_{max}), note maximum input torque.
7. Tolerance + 1%
8. With special shaft seal 6 bar (90 psi) absolute
9. Others on request

Performance Curves – 130 cm³/rev

Power efficiency performance curve



Roller bearing life



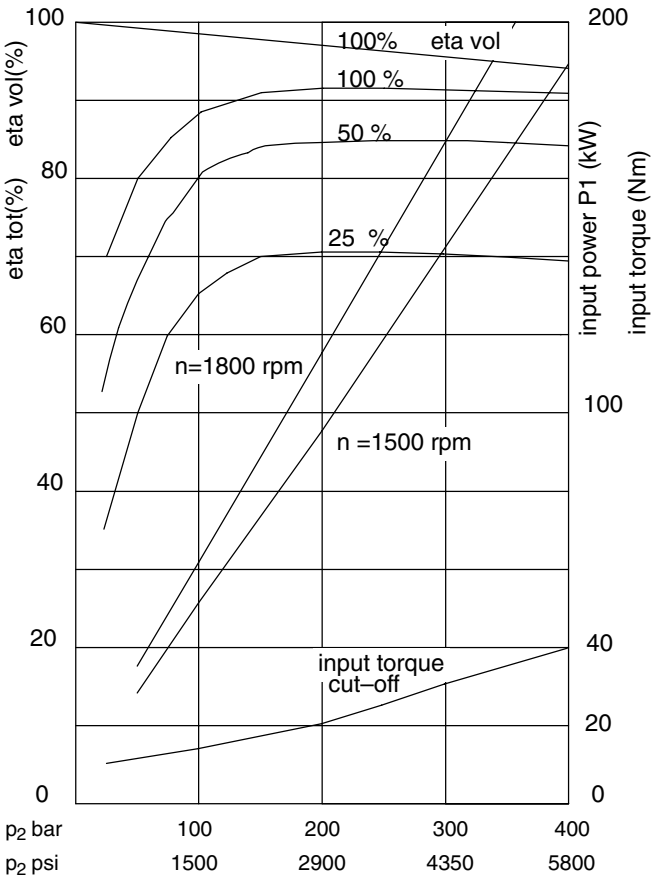
Double pumps

– For pumps and motors in tandem operation the characteristic values are as for the individual units.

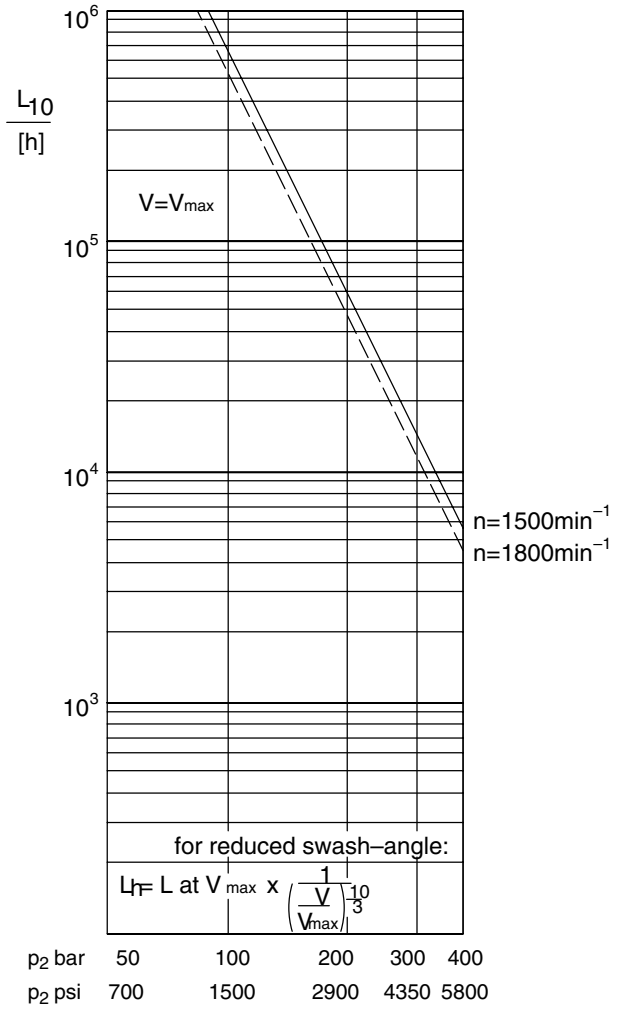
– Variable tandem units have two controls, i.e. control for each single unit.

Performance Curves – TPV 180 Series

Power efficiency performance curve



Roller bearing life



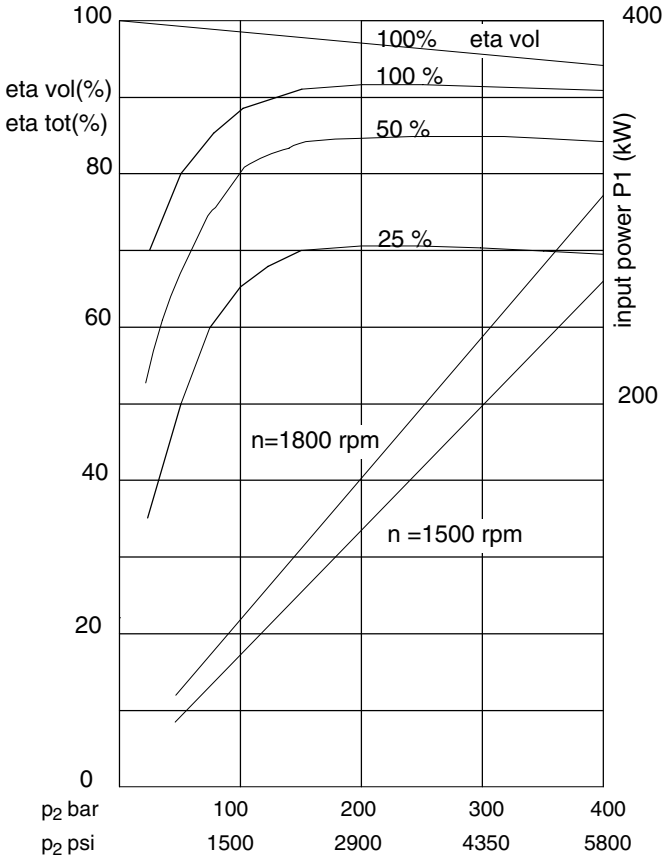
Double pumps

– For pumps and motors in tandem operation the characteristic values are as for the individual units.

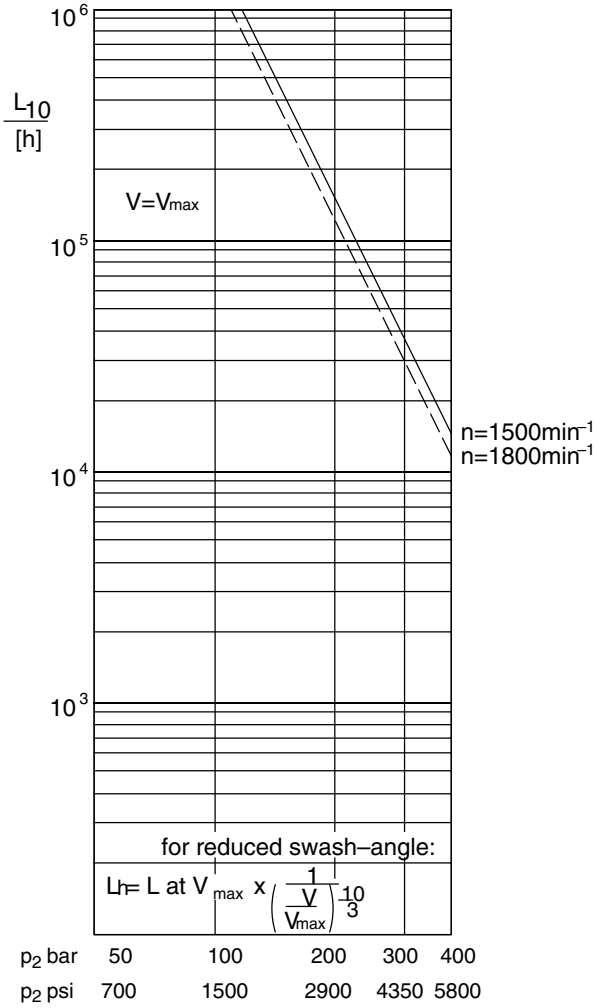
– Variable tandem units have two controls, i.e. control for each single unit.

Performance Curves – 250 Series

Power/efficiency performance curve



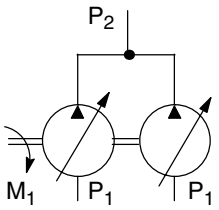
Roller bearing life



Double pumps

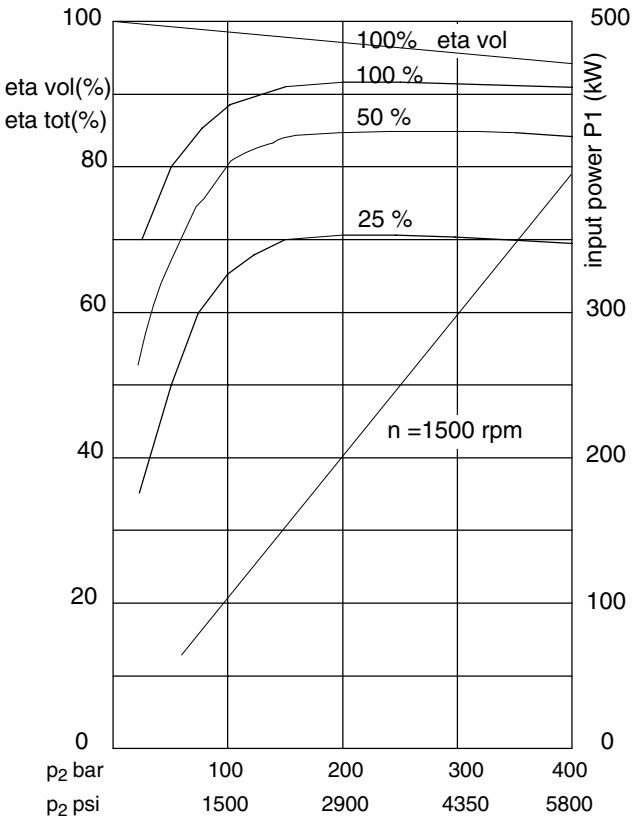
– The specifications for single units are for double pumps and double motors as well.

– A double unit can be used as a pump or motor for one or two circuits. Variable double units have two controls, i.e. one control for each single unit.

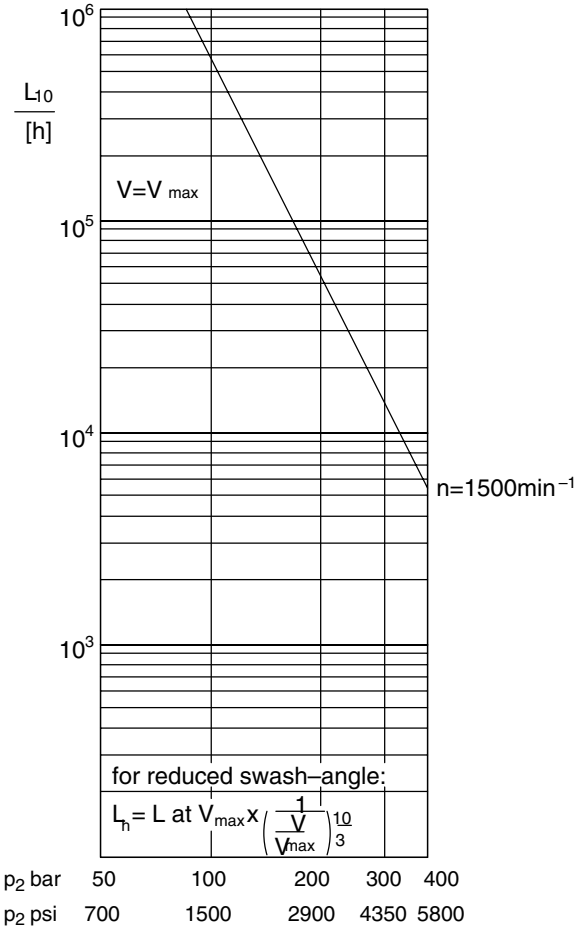


Performance Curves – 360 series

Power/efficiency performance curve



Roller bearing life



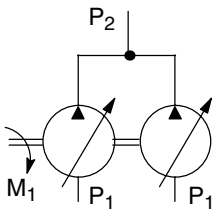
Double pumps

– The specifications are the same for single and double units.

– Only the power at the input shaft is limited to 572 kW (767 hp) n=1500 r/min.

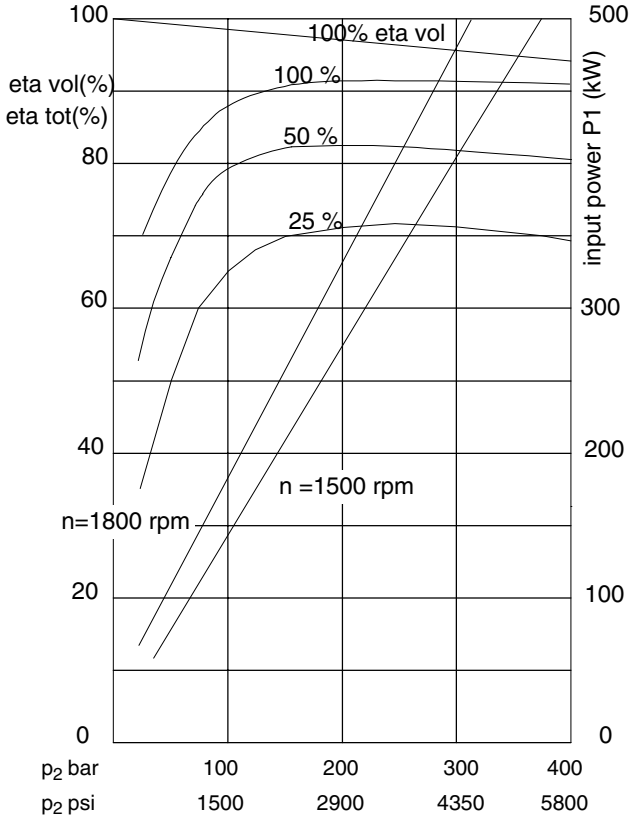
– A double unit can be used as a pump or motor for one or two circuits. Variable double units have two controls, i.e. one control for each single unit.

– The second pump can be operated at full displacement and pressure according to the specification.

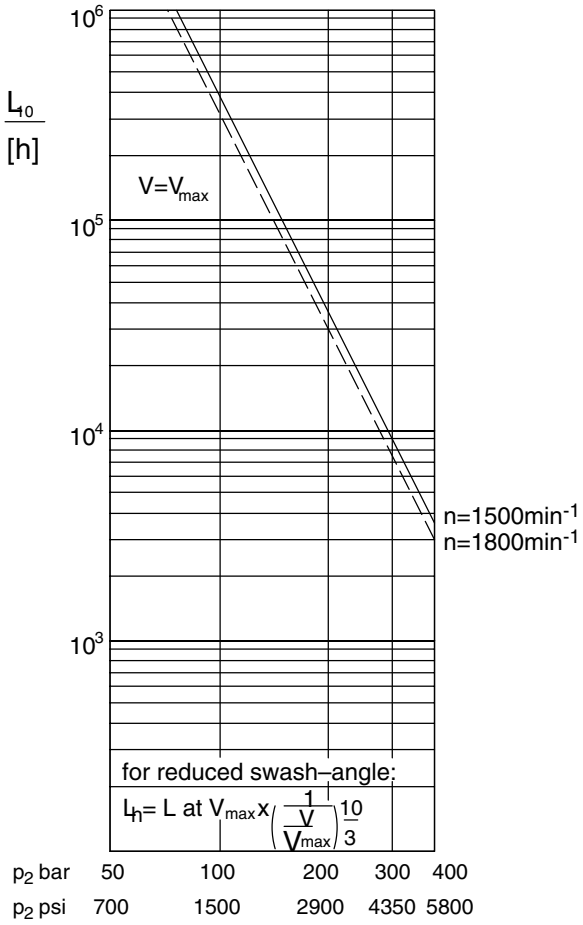


Performance Curves – 500 series

Power efficiency performance curve



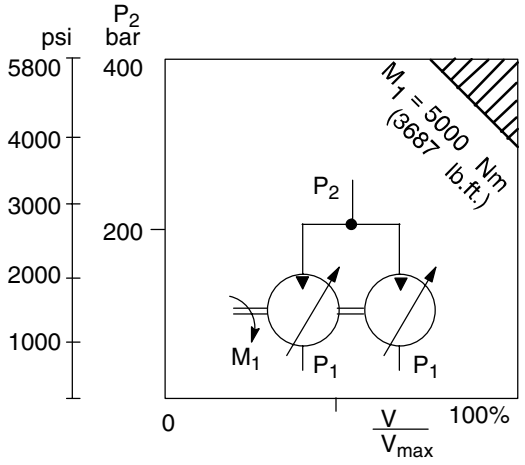
Roller bearing life



Double pumps

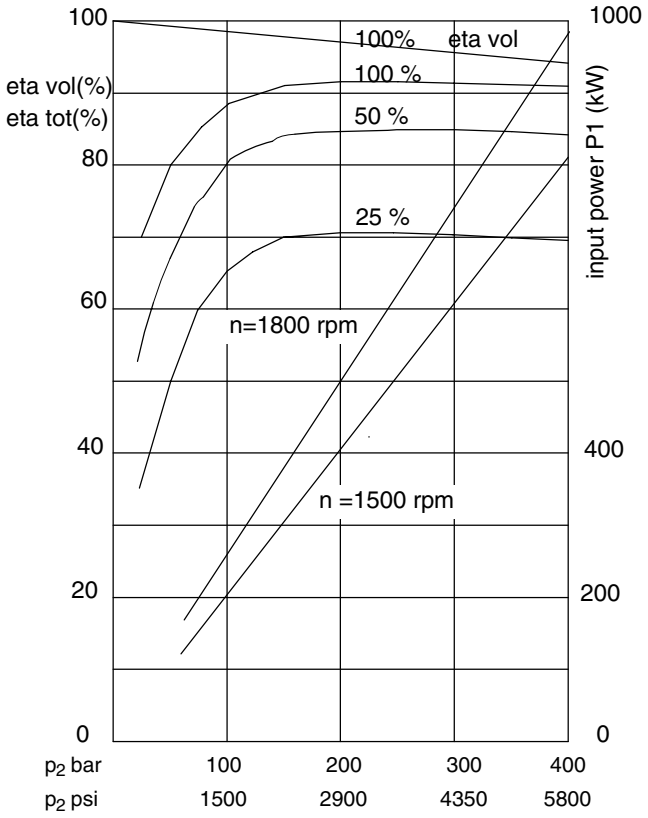
– For pumps and motors in tandem operation the characteristic values are as for the individual units. Only the basic power at the drive shaft is limited to 770 kW (1033 hp) (n=1500 r/min) or 925 kW (1240 hp).

– The tandem unit can be used as a pump or motor for one or two circuits. Variable tandem units have two controls, i.e. control for each single unit.

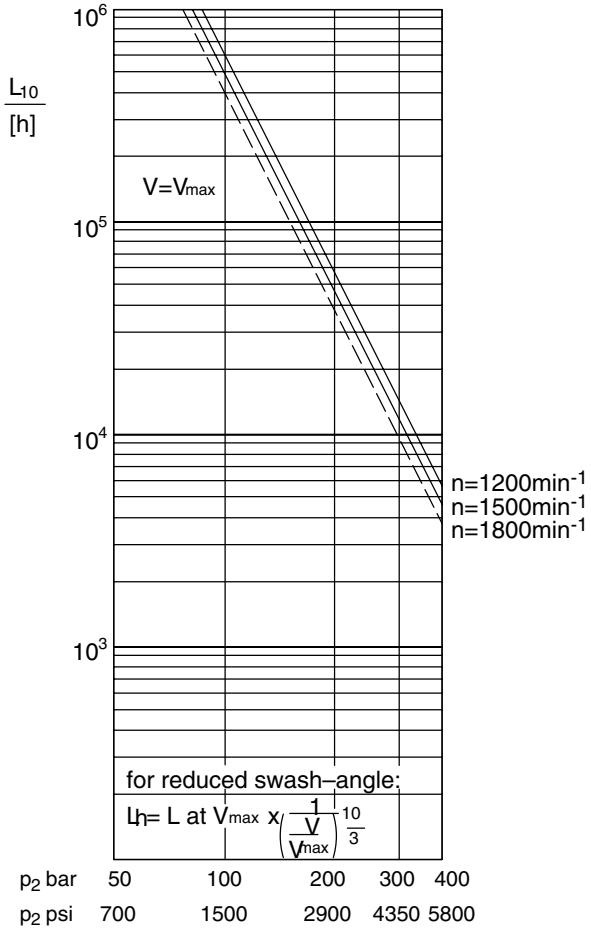


Performance Curves – 750 Series

Power/efficiency performance curve



Roller bearing life



Controls

Controls DF, LR

The pump working pressure is constant or it follows a characteristic curve independent of flow demand.

Energy saving hydraulic drives are possible with pressure compensated pumps. The oil flow is adjusted automatically to the actuator.

DF The system pressure remains constant for the entire volume flow range. System pressure can be set either manually, hydraulically or electronically using a relay valve or proportional pressure limiting valve.

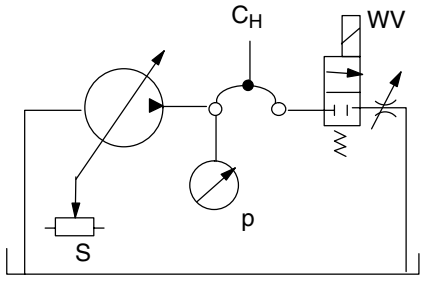
LR The P–Q characteristic curve is a hyperbola. For constant speed the drive torque, i.e. the power used, is held constant.

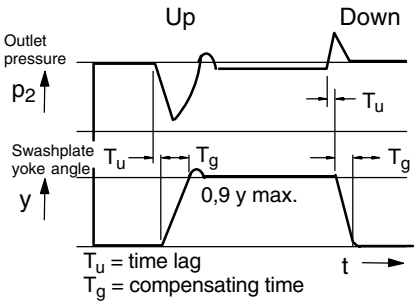
The power hyperbola can be continuously adjusted between P_{min} and P_{max}. P_{min} is given by the power loss of the pump.

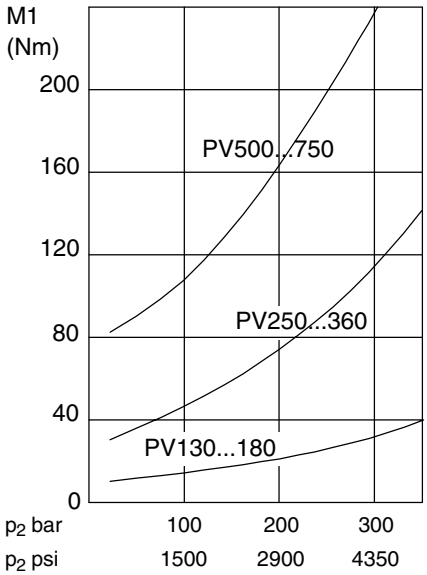
Typical controller action:

(Closing/opening the directional control valve WV)

$Q \rightarrow Q_{max}$ or $Q_{min} \rightarrow Q_{max}$
C_H – 50mm ID x 2 meters.

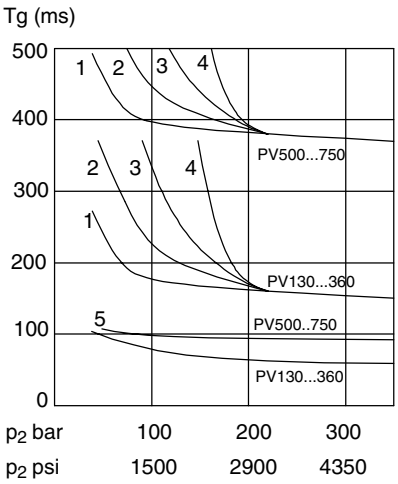






Drive torque/power “compensated”

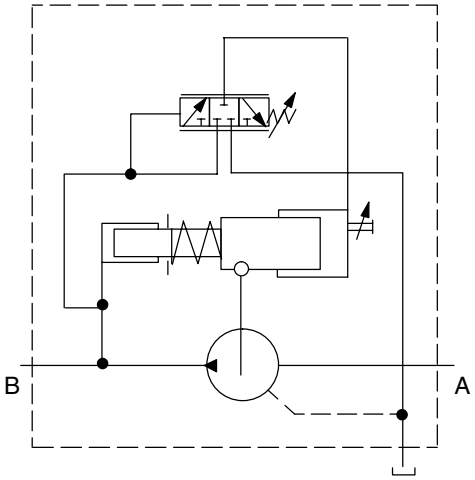
All controllers can be combined with one another, for possible variations see the circuit diagrams. The maximum working volume of the pump can be limited mechanically to between 50 and 100%.

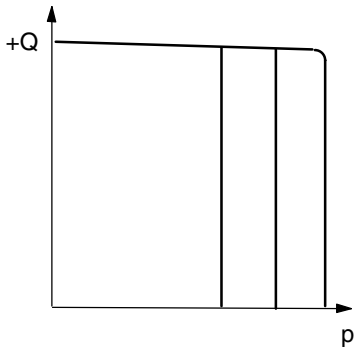


Up control time Tg (0→ 0.9 y max. 0)
① pilot operated
② direct controlled, spring I
③ direct controlled, spring II
④ direct controlled, spring III

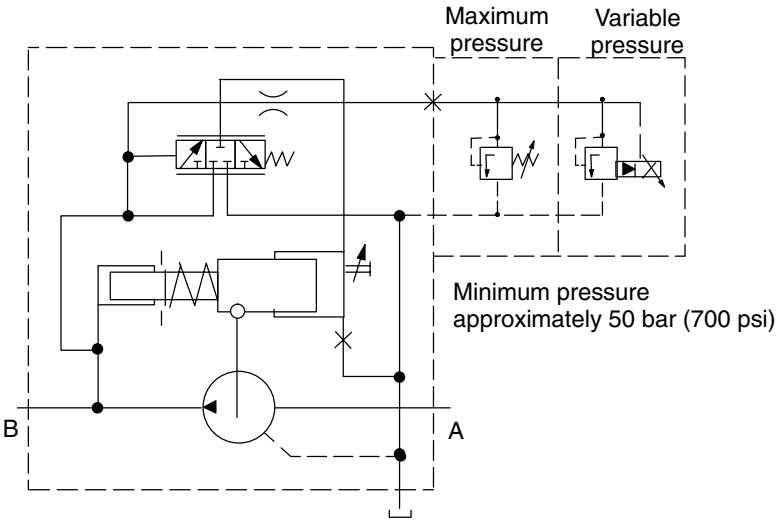
Down control time Tg (0→ 0.9 y max. 0)
⑤ direct controlled and pilot operated

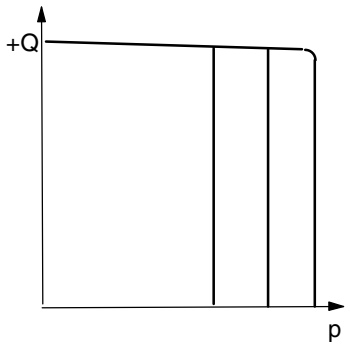
DF Pressure compensator can be adjusted mechanically.



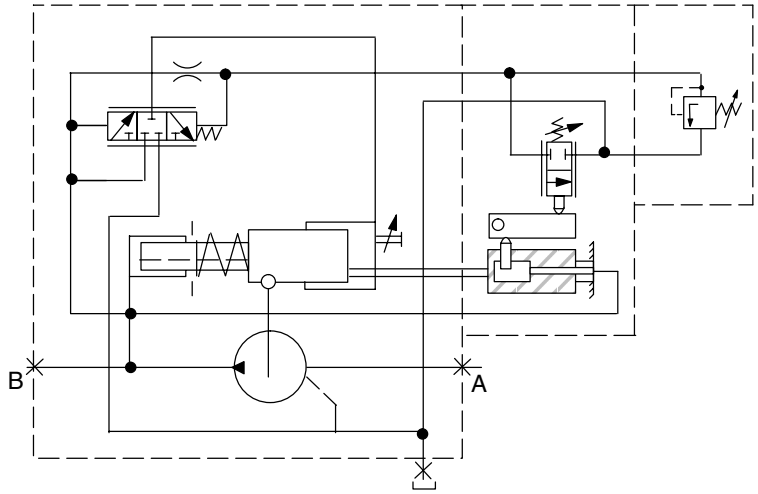


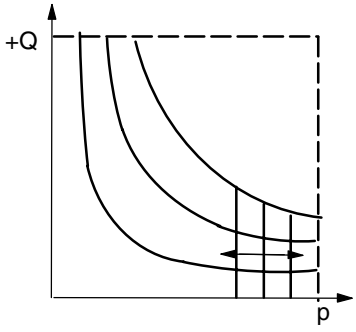
DF Pressure compensator controlled, control valve adjustable mechanically or electrically.





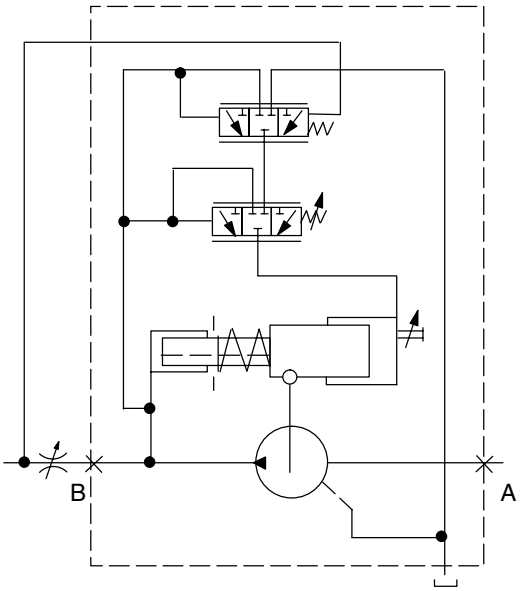
LR Constant power control with overriding pressure limiter, mechanical or hydraulic setting of pilot valve.

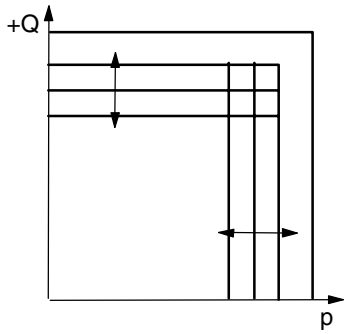




DF

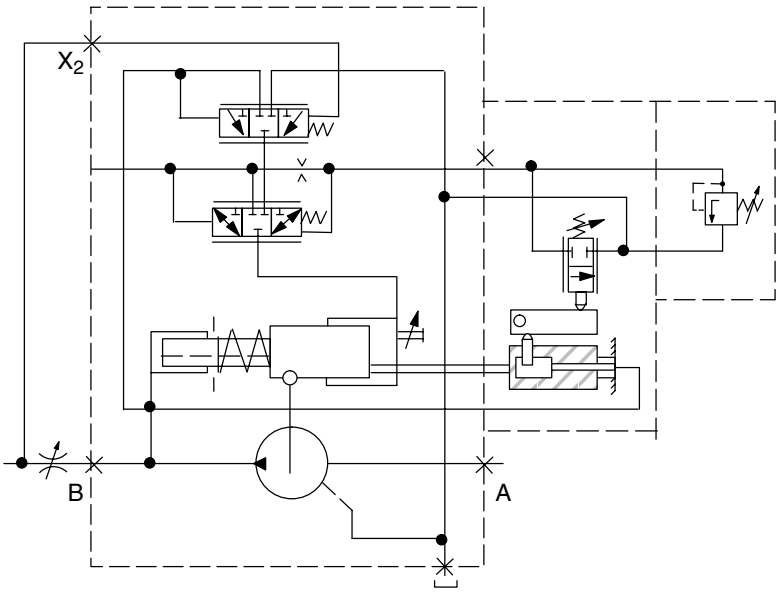
Pressure/flow control

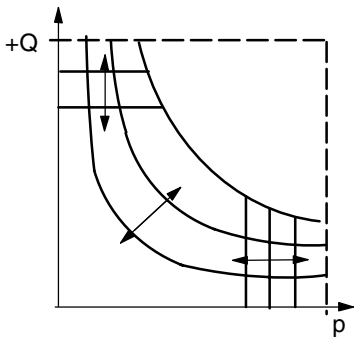




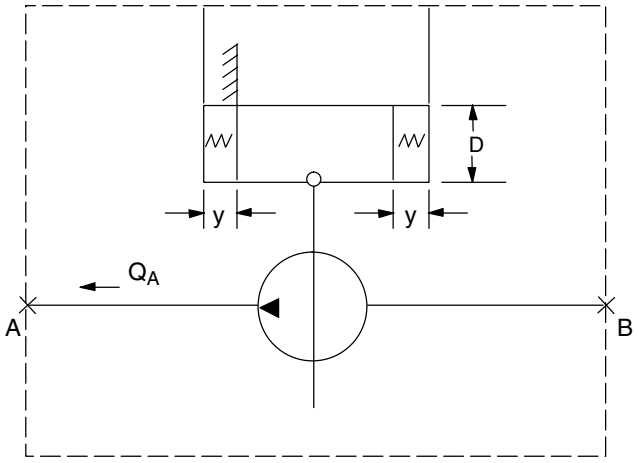
DF LR

Pressure / power / flow control





Controls for Position/Displacement



The displacement of the axial piston unit is proportional to the swash plate angle and can be adjusted by a spring centered servo piston.

The servo piston is controlled by the required input signal with a mechanical, hydraulic or electrical control device.

Economical and energy saving drives can be produced with the “building block” principle for open loop and closed circuits as well.

Controls for limitation of power and maximum pressure are available but not for the ES control.

Note: Setting the pressure compensator or a control for constant power, lower than the adjusted pilot oil pressure $p_{s\ min}$ = 80 (1160 psi), bar is not possible.

Electric motor displacement control ES

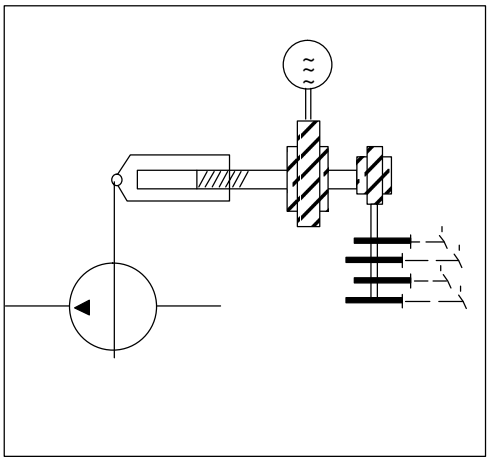
The electronic servo control unit is used for stepless adjustment. It has a three phase electric servo motor, worm gearing and a switch box with 4 and 8 limit switches for 4 or 8 positions. A potentiometer is also available.

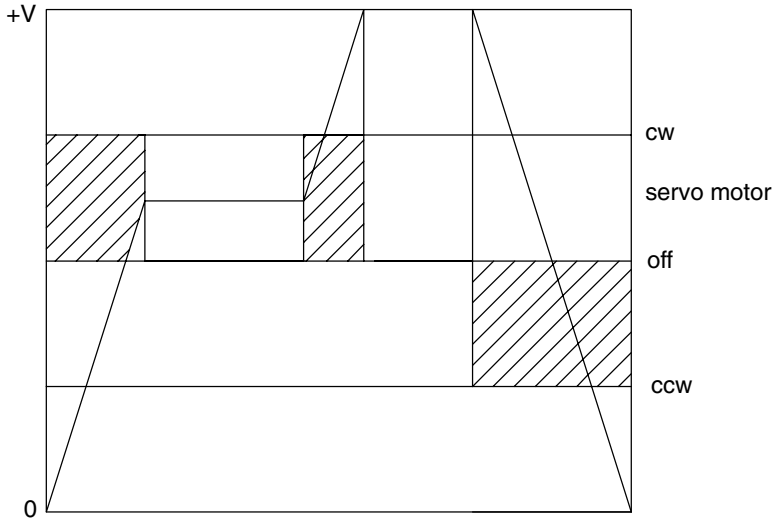
The response times from zero to maximum depends on the chosen ratio and the speed of the servo motor (this means that during operation the response times are not variable).

Explosion protection versions are also available...

Servo motor of protection type EEx e II or EEx d II (without brake)

Switch box with relay repeater for protection type EEx i II.





Response time table:

50 Hz			
Response time sec. (s)	Servo motor n [r/min]	P [W]	Total gear ratio
4	2800	550	61
8	1390	250	61
20	1390	180	152
40	1390	180	152

Response time from 0 to $+Q_{max}$ or 0 to $-Q_{max}$

Pressure proportional adjustment DP

The output flow of the pump is proportional to the pilot pressure. Each of the two pilot ports is responsible for an output flow direction.

A separate pilot oil circuit is necessary with P_{min} = 80 bar, Q_{ST} = 12 l/min (3.17 USgpm). From this the control pressure is reduced to the desired set value by means of a suitable circuit. For example with:

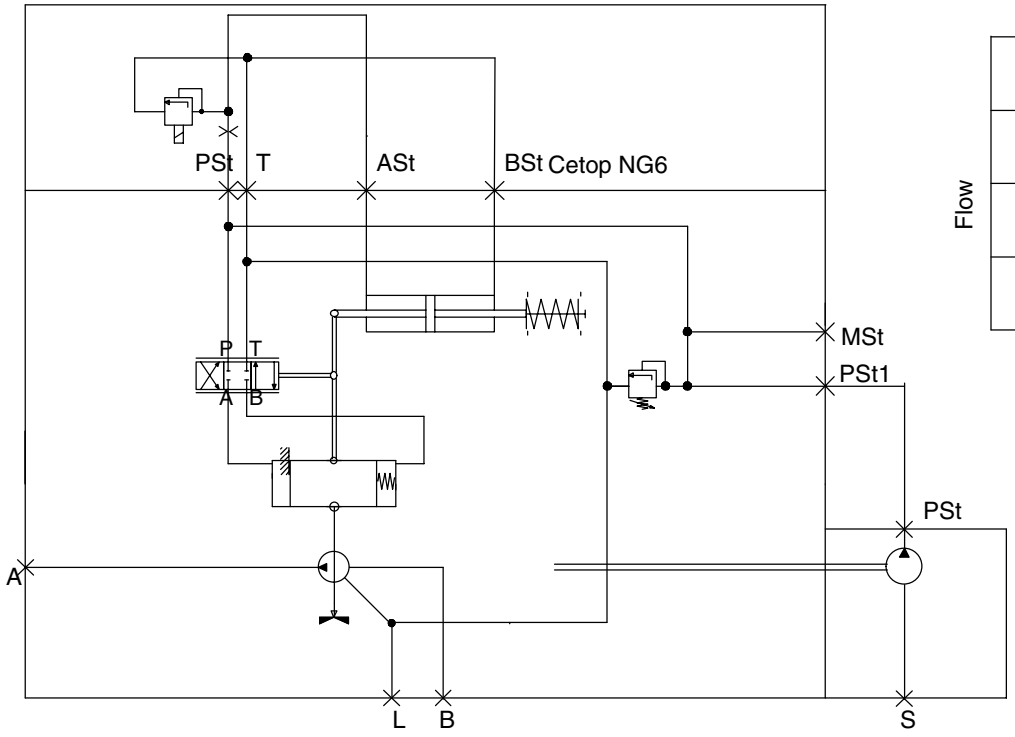
– Pressure limiting valve (mechanical or proportional) from P → T line and throttle in P line 0.8 ⌀ (0.03 in)

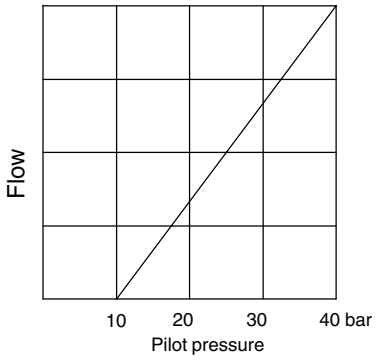
– Pressure reducing valve

– Joystick

The quantity of the pilot oil flow from/to the pilot oil ports A_{ST}/B_{ST} is irrelevant. See the SP control for the diameter of the servo piston. Response time is approximately 300 ms from q to Q_{MAX}.

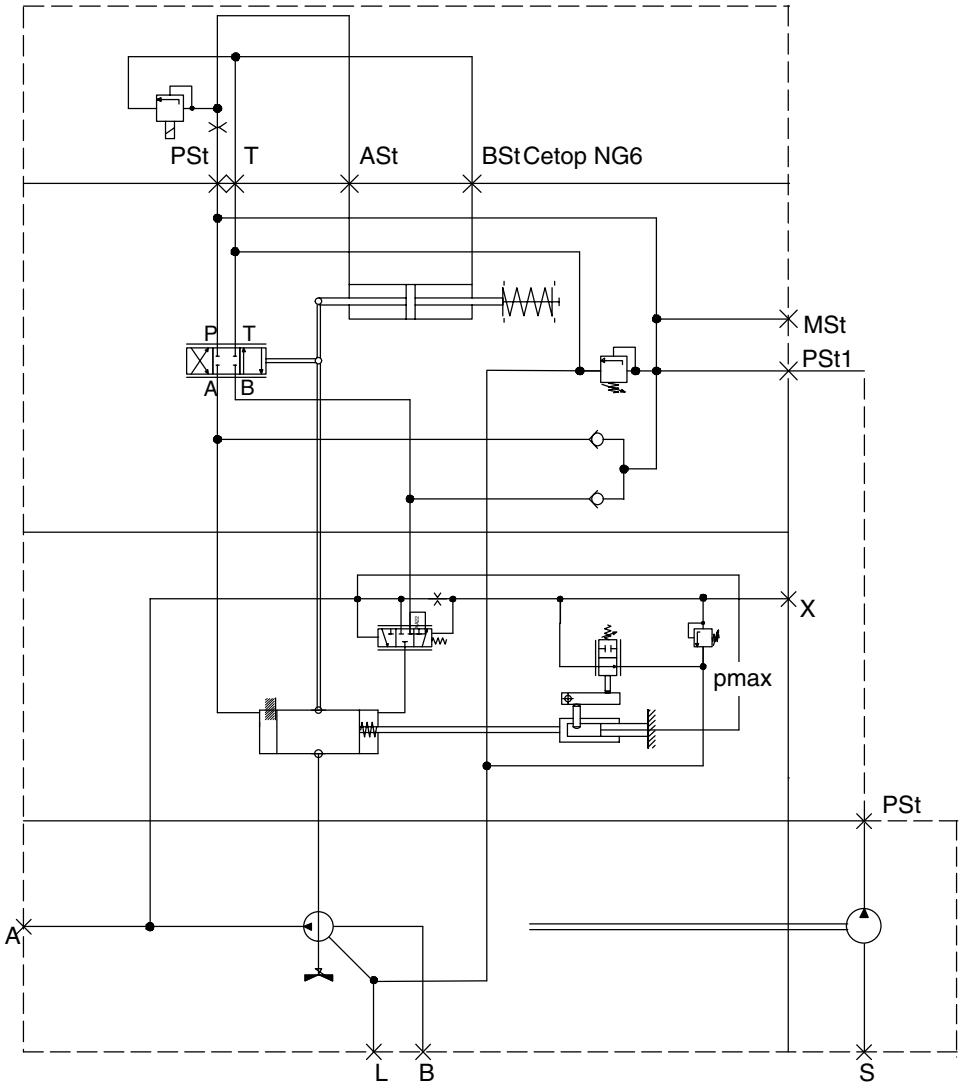
The pressure proportional adjustment can also be supplied with a pressure relief valve (see next page).





Example of application

DP control with power override control (2 quadrants) and with pressure override control (4 quadrants) and pilot oil controlled by joystick...

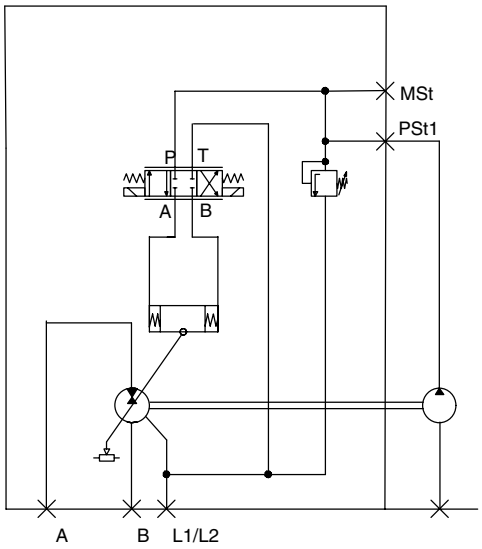


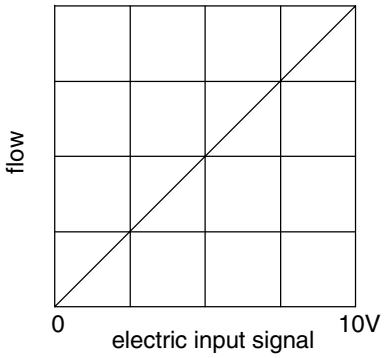
Electrohydraulic servo adjustment SP

The electro hydraulic displacement control will operate a hydrostatic drive in all four quadrants and work without throttle losses within electrically adjustable limits. This is done by controlling delivery flow with swash plate angle feedback.

All control values are recorded as an electrical signal and lead back to the control card. The proportional valve or the servo 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.



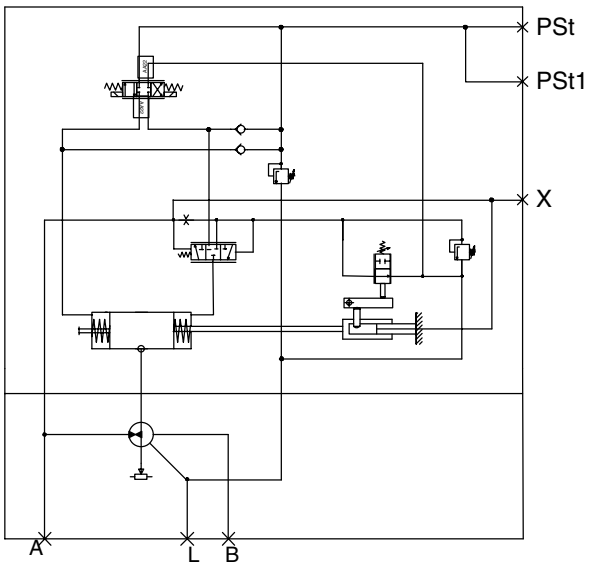


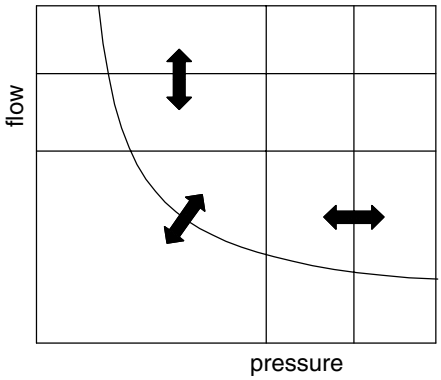
Hysteresis, consistency: approximately 1% of end value.

The SP control can also be combined with hydro–mechanical relief valves for pressure and/or power.

Example of application 1:

SP control with power limitation (2 quadrants) and pressure relief (4 quadrants).





Proportional valve	Nominal flow l/min (USgpm)	at Δp bar (psi)	Control pressure p_{St} min max bar (psi)	Control electronics	Response time $0 \leftrightarrow V_{max}$ [ms]	Servo pistons Size cm^3 (in^3)	Diameter mm (in)	Stroke mm (in)	Volume cm^3 (in^3) (per chamber)
Medium response	12 (3.17)	10 (150)	60 (870) to 80 (1160)	ER 9	250 to 800	130 (7.9) 180 (11) 250 (15.2) 360 (14.2) 500 (30.5) 750 (45.8)	60 (2.36) 60 (2.36) 75 (2.95) 75 (2.95) 75 (2.95) 75 (2.95)	21 (.83) 21 (.83) 18 (.71) 25 (.98) 22 (.87) 30 (1.18)	59 (3.60) 59 (3.60) 79 (4.82) 110 (6.71) 97 (5.92) 132 (8.06)
High response	40 (11) to 80 (21)	70 (1000)	80 (1160) to 100 (1450)	UR 100	40 to 150	130 (7.9) 180 (11) 250 (15.2) 360 (14.2) 500 (30.5) 750 (45.8)	60 (2.36) 60 (2.36) 75 (2.95) 75 (2.95) 75 (2.95) 75 (2.95)	21 (.83) 21 (.83) 18 (.71) 25 (.98) 22 (.87) 30 (1.18)	59 (3.60) 59 (3.60) 79 (4.82) 110 (6.71) 97 (5.92) 132 (8.06)

Control Cards

Operation

– ER 9

– control of swash angle (digital) for proportional valves with 2 solenoids.

– UR 100

– Digital controller for display of the following functions by modification of the software:

– control of swash plate angle.

– control of swash plate angle with electronic pressure and power limitation.

– Speed controller with pump adjustment.

– speed control for secondary unit with constant pressure network (secondary control).

SP control option: hazardous location.

Electrohydraulic displacement control SM

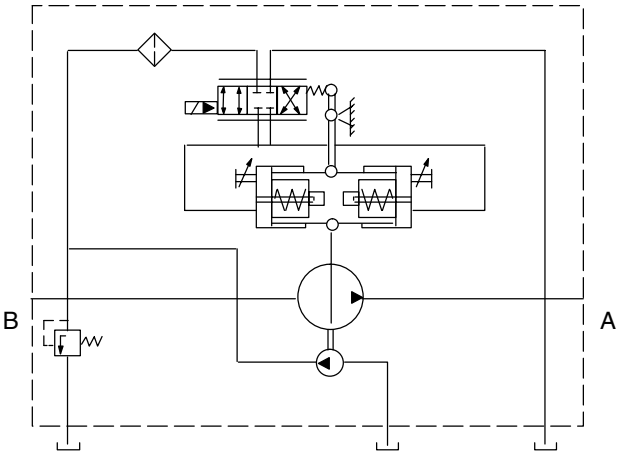
– Servo control with integrated mechanical feedback of swash plate position.

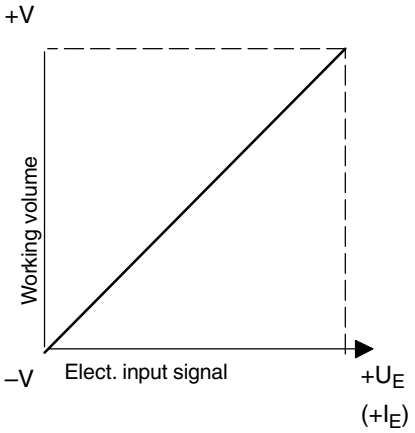
– No electronic control card necessary

– Input signal 0 ± 50 or 0 ± 100 mA

– Hysteresis, repeatability: 8% of end value

– Also available in explosion proof class EEx i II version for hazardous duty.

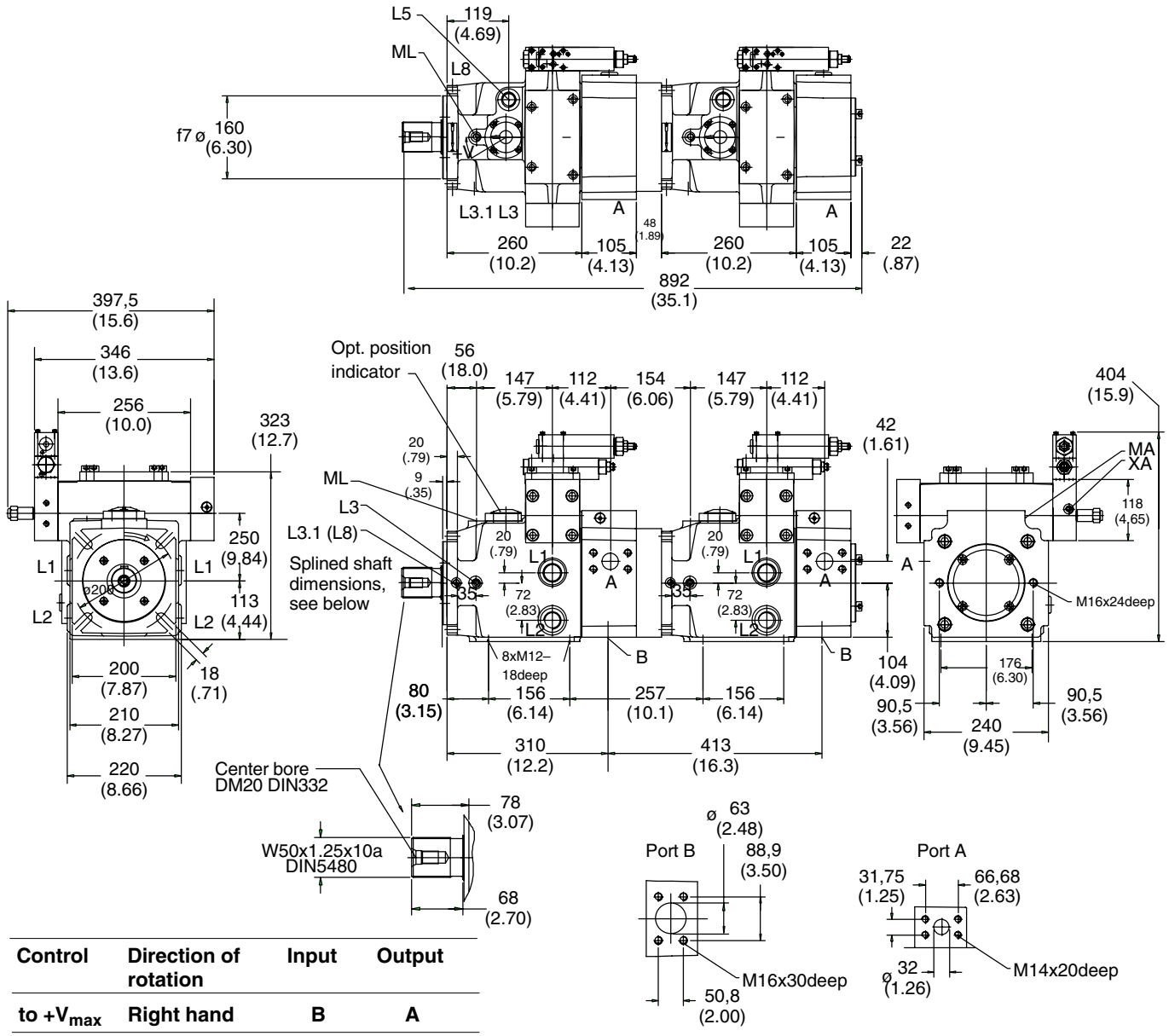




Installation Dimensions – TPV 130 series

TPV 130

Dimensions mm (in.)



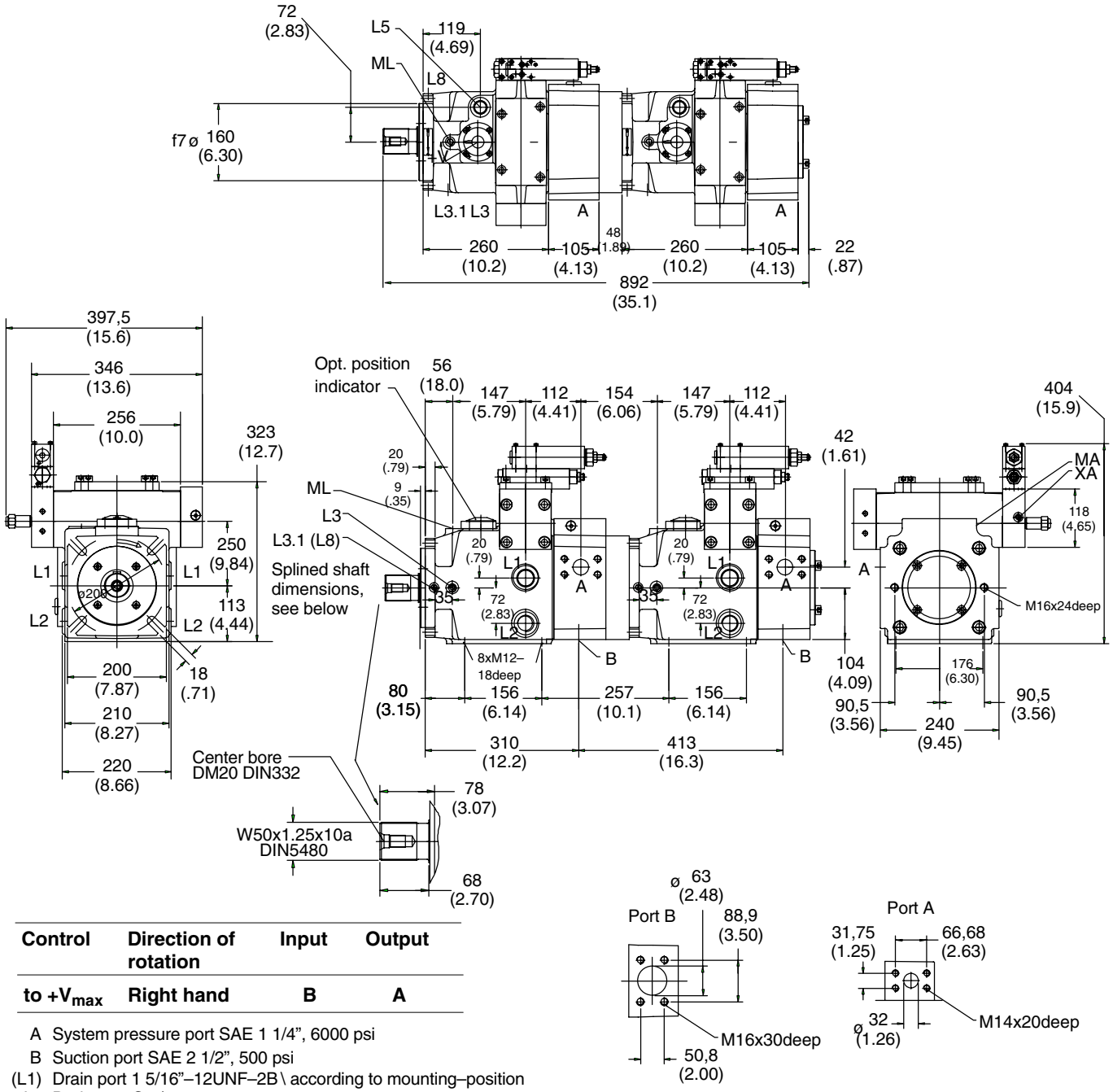
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE 1 1/4”, 6000 psi
B Suction port SAE 2 1/2”, 500 psi
(L1) Drain port 1 5/16”–12UNF–2B \according to mounting–position
L2 Drain port G1 /use upper port
(L3) Ventilation port for vertical mounting G3/8 (shaft upwards)
(L3.1) Port G1/4
L5 Oil filling plug 1 1/16–12UNF–2B
(L8) Air bleeding port G1/4
(MA) Gauge port system pressure G1/4
(ML) Gauge port of case pressure G1/4
XA Control port G1/4

Installation Dimensions – TPV 180 Series

TPV180 – DR4

Dimensions mm (in.)



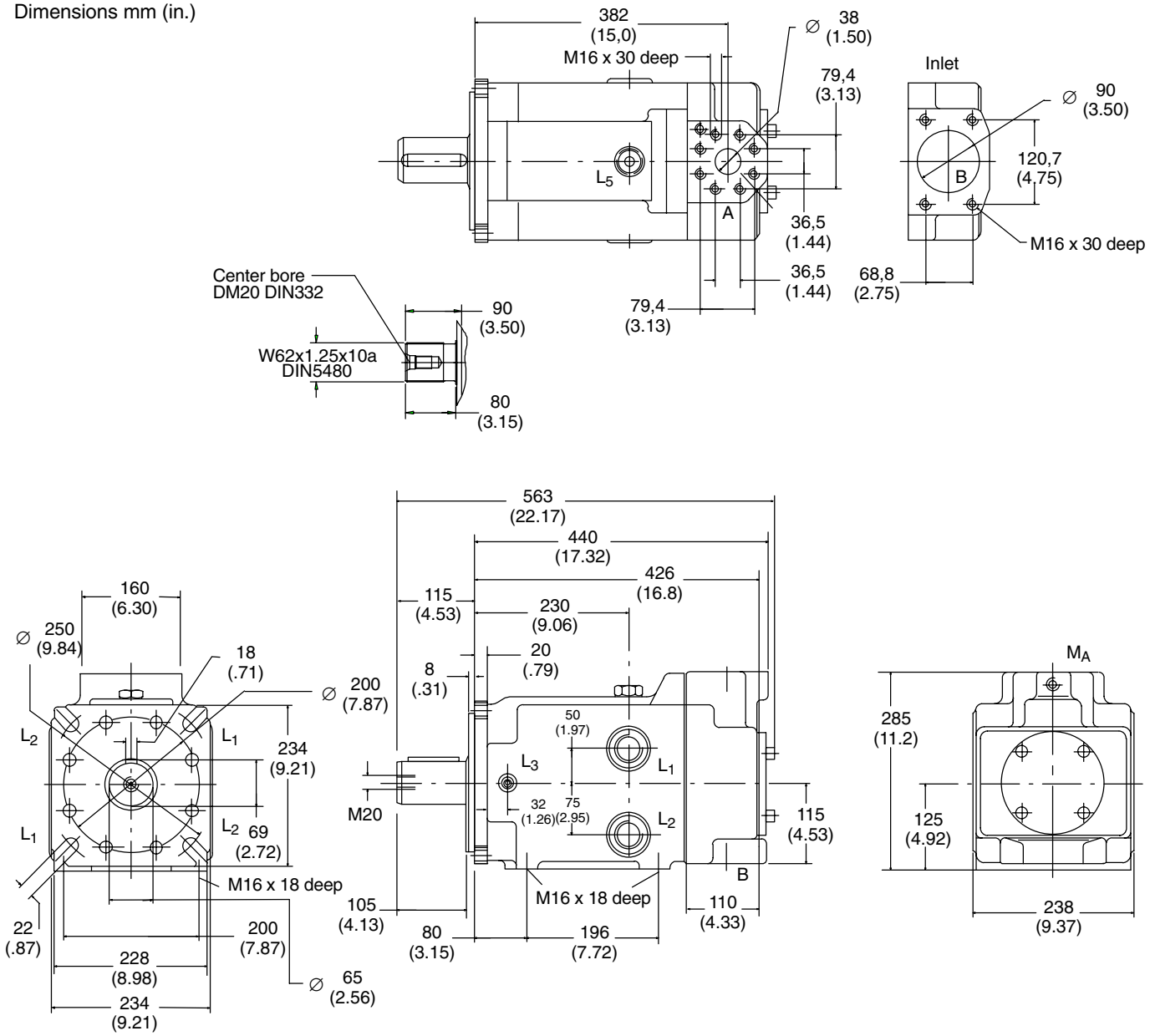
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE 1 1/4”, 6000 psi
B Suction port SAE 2 1/2”, 500 psi
(L1) Drain port 1 5/16”–12UNF–2B \ according to mounting–position
L2 Drain port G1 /use upper port
(L3) Ventilation port for vertical mounting G3/8 (shaft upwards)
(L3.1) Port G1/4
L5 Oil filling plug 1 1/16–12UNF–2B
(L8) Air bleeding port G1/4
(MA) Gauge port system pressure G1/4
(ML) Gauge port of case pressure G1/4
XA Control port G1/4

Installation Dimensions – 250 Series

PF250

Dimensions mm (in.)

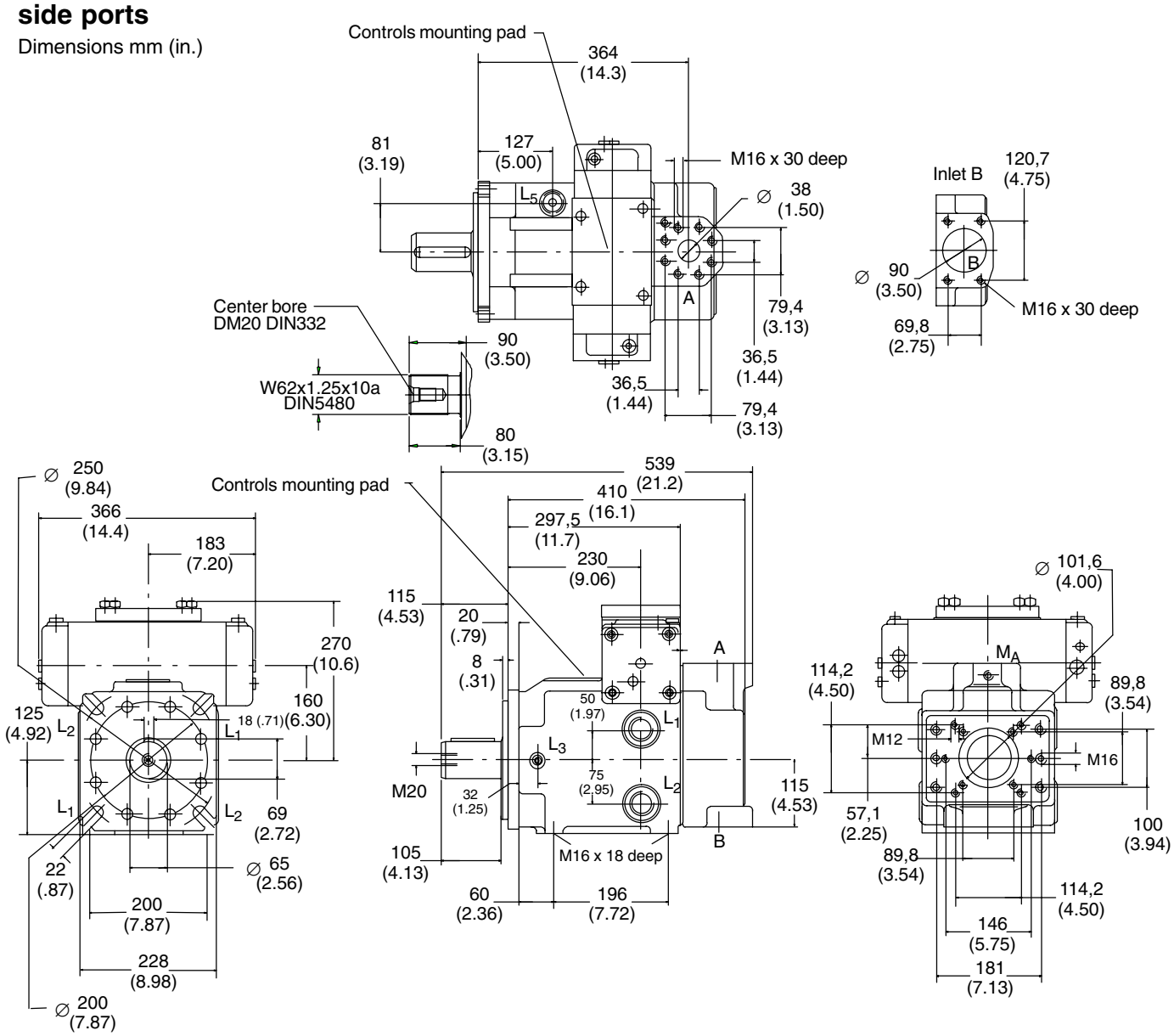


Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$, 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
L_1 Drain port $1^5/_8$ - 12 UNF-2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
L_3 Ventilation port for vertical mounting G $^3/_8$" (shaft upwards)
L_5 Oil fill plug
M_A Gauge port system pressure G $^1/_4$"

PV250
side ports

Dimensions mm (in.)



Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
L_1 Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
L_3 Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
L_5 Oil fill plug
M_A Gauge port system pressure G $^1/_4$"

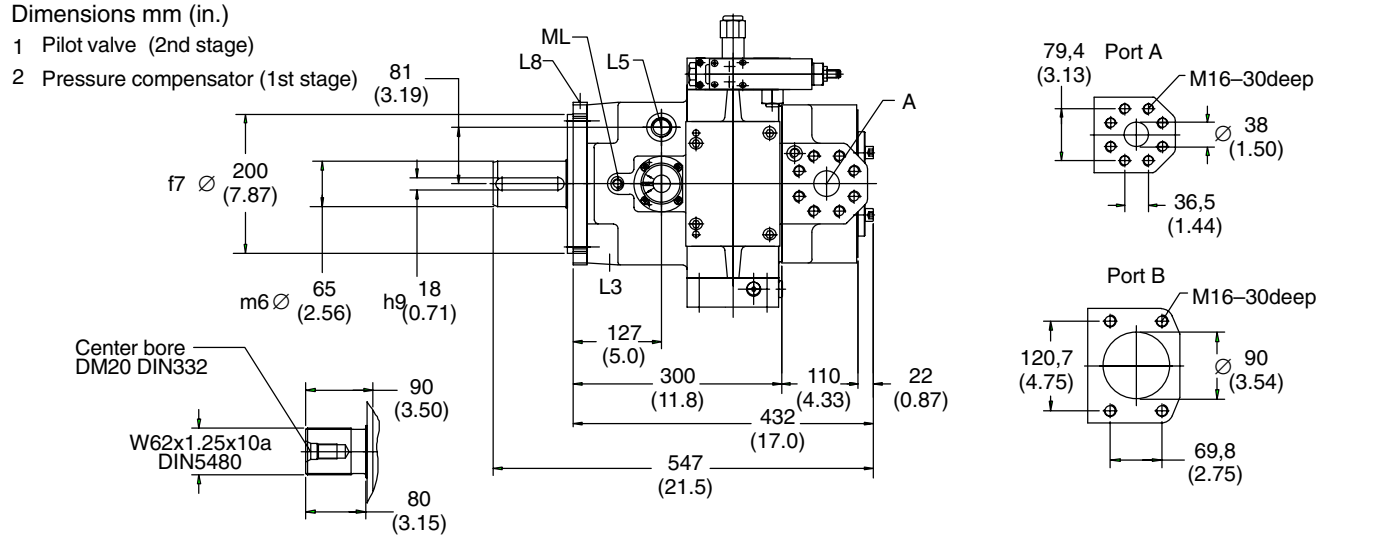
Installation Dimensions – 250 series

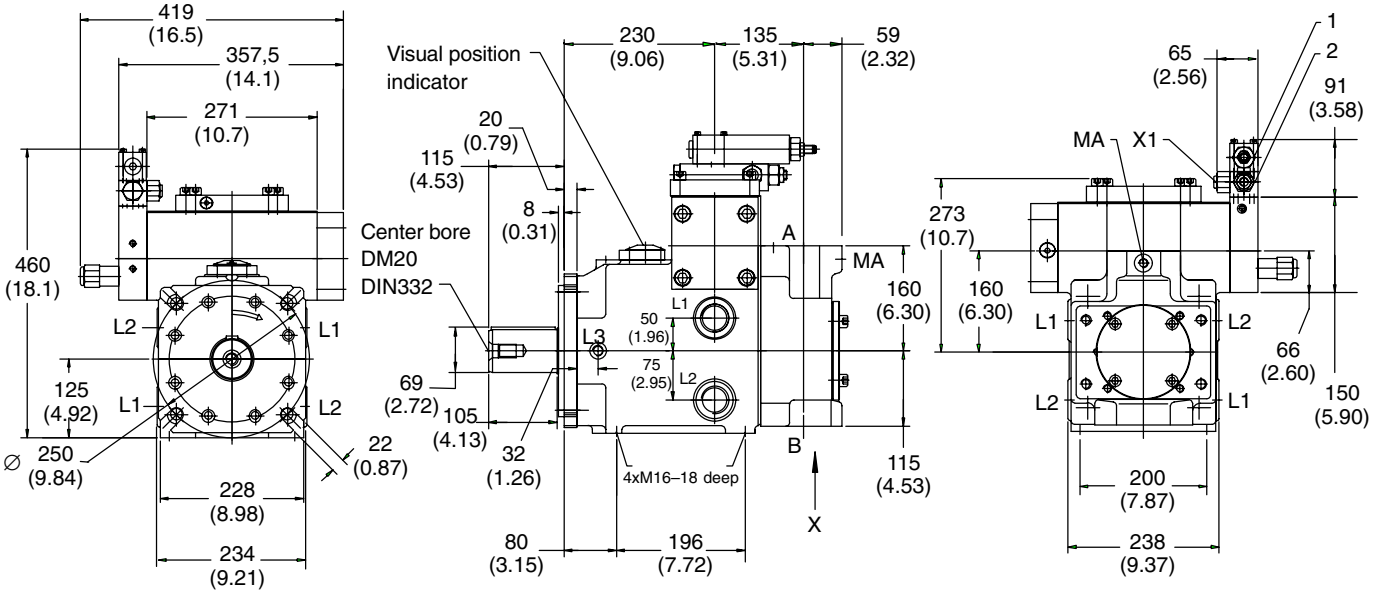
PV250 - DF2
side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)

2 Pressure compensator (1st stage)





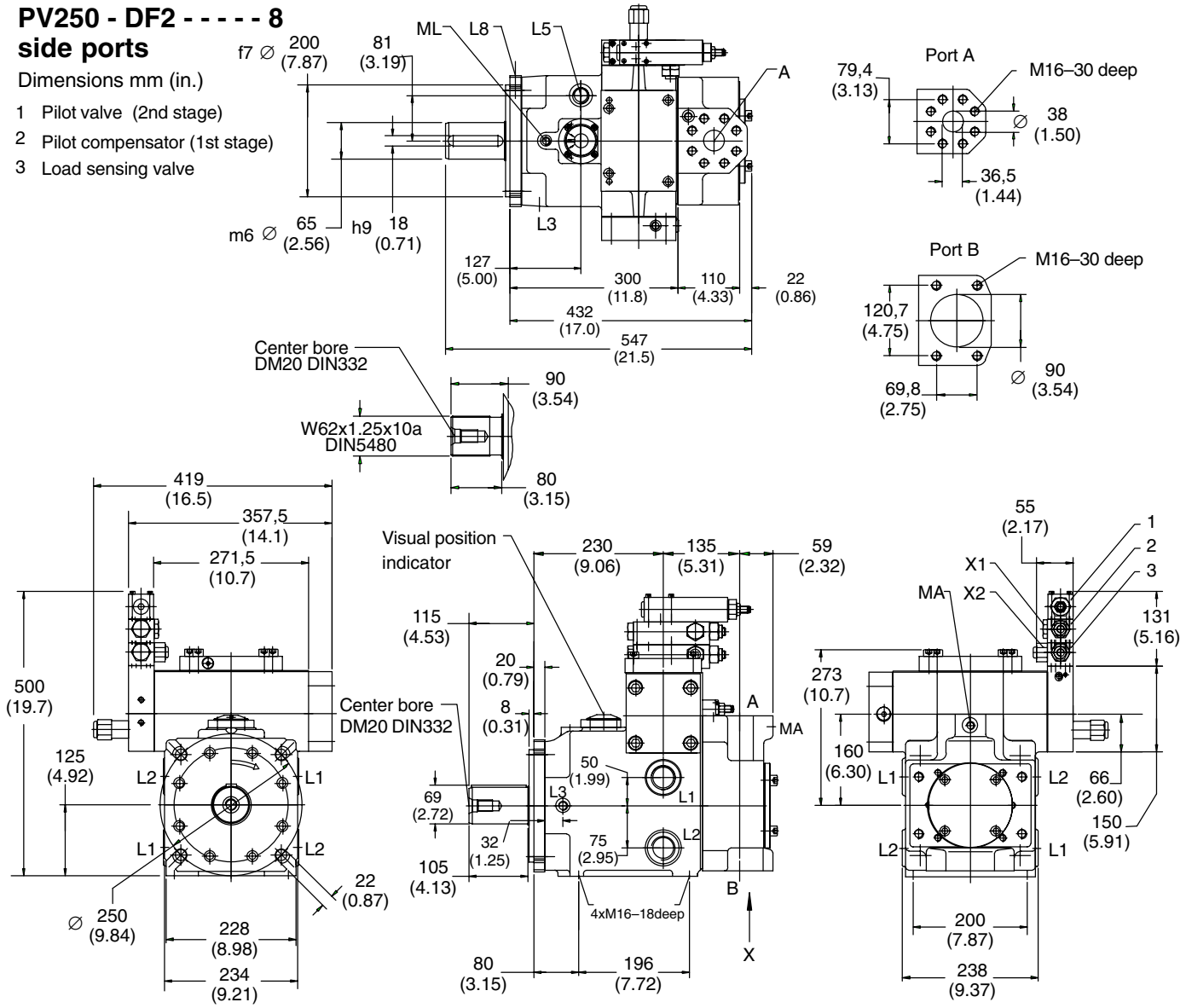
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$" – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
(MA) Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port of case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$ x 12.5 deep

PV250 - DF2 - - - - - 8 side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)
2 Pilot compensator (1st stage)
3 Load sensing valve



Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
(L_1) Drain port $1^5/_8$ "– 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
(L_3) Ventilation port for vertical mounting G $^3/_8$" (shaft upwards)
(L_5) Oil fill plug $1^1/_{16}$"– 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
(MA) Gauge port system pressure G $^1/_4$"
(M_L) Gauge port of case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$ x 12.5 deep
X2 Gauge port G $^1/_4$ x 12.5 deep

Installation Dimensions – 250 series

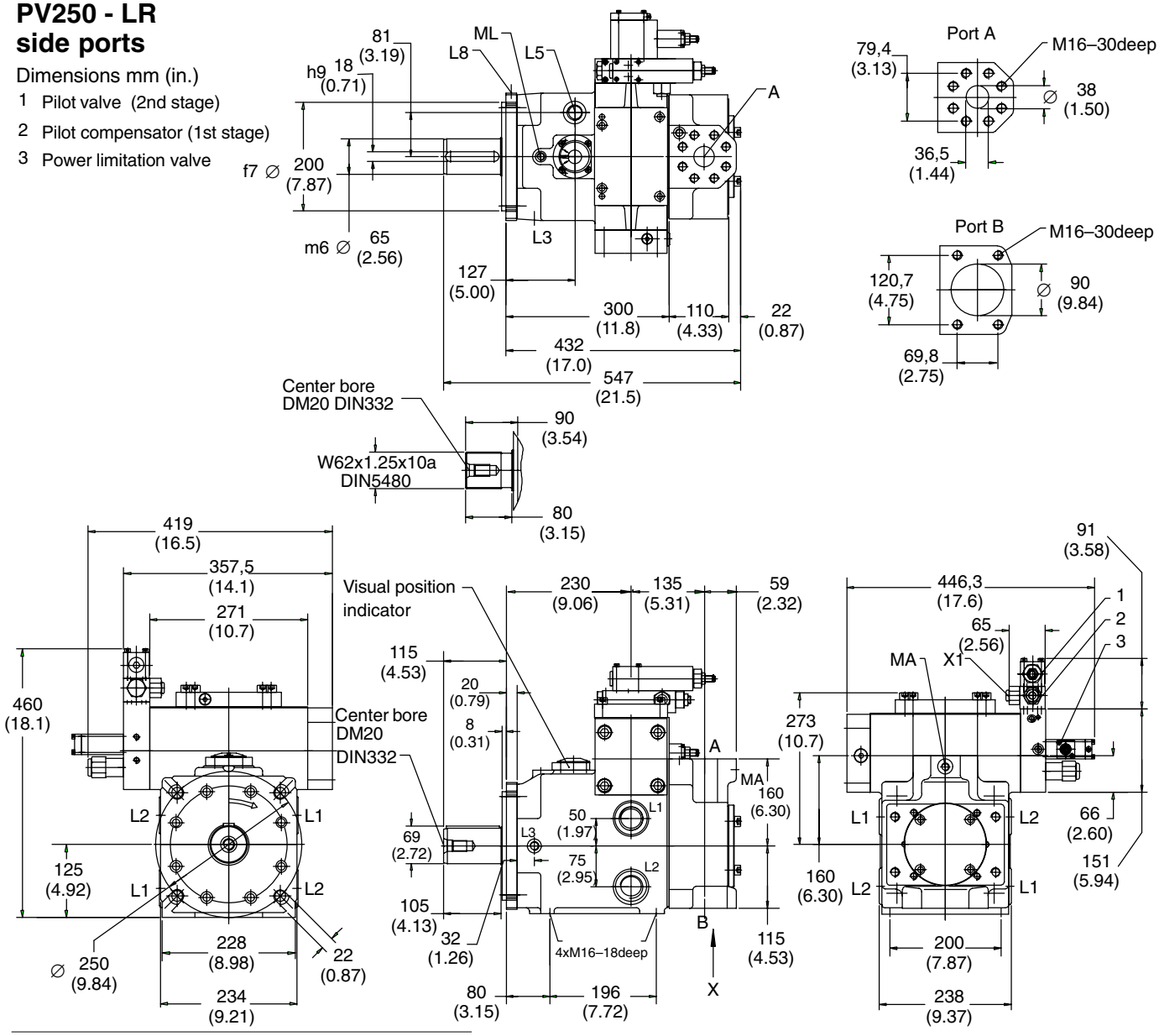
PV250 - LR side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)

2 Pilot compensator (1st stage)

3 Power limitation valve



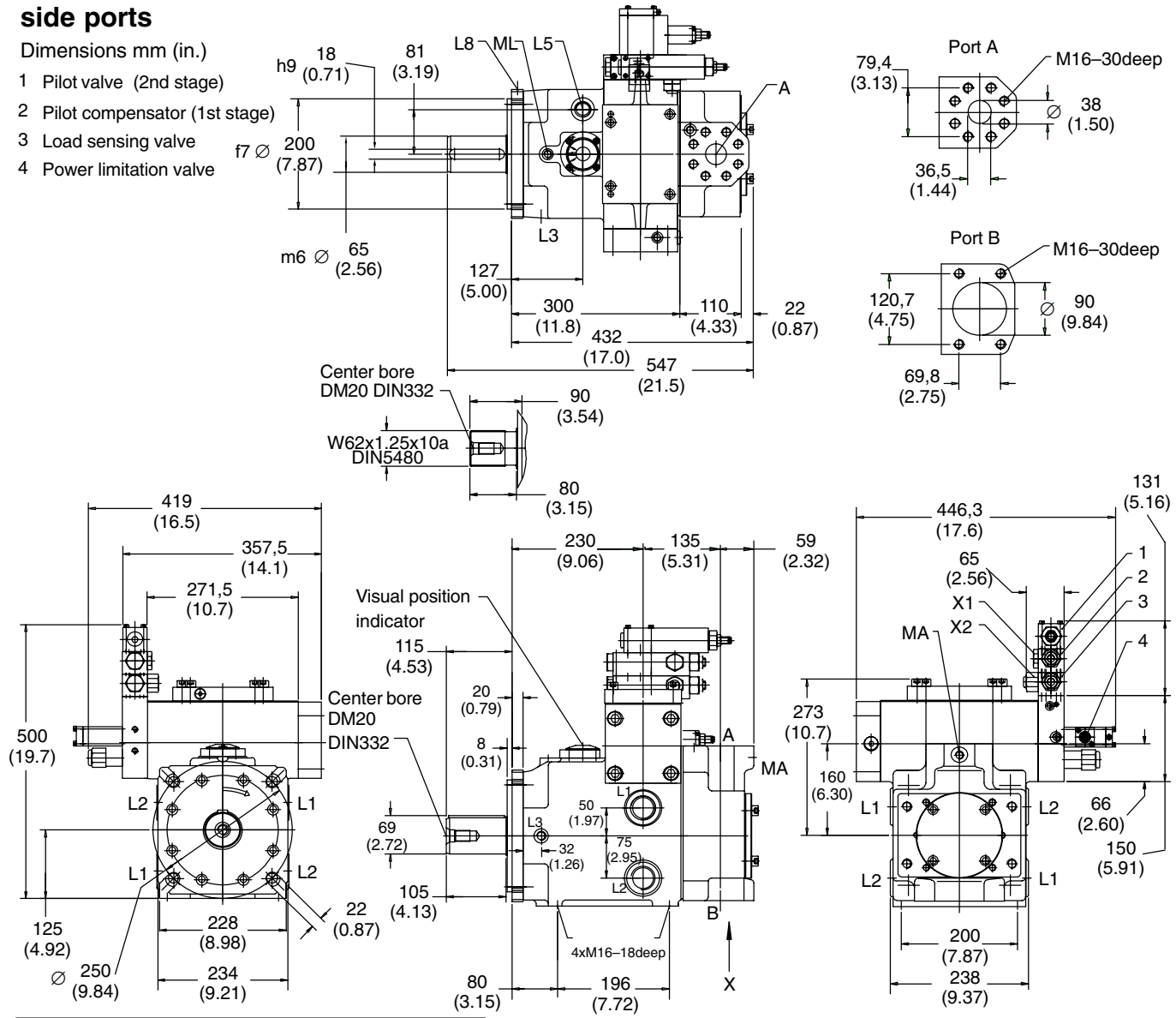
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port of case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$" x 12.5 deep

PV250 - LR - 2 side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)
2 Pilot compensator (1st stage)
3 Load sensing valve
4 Power limitation valve



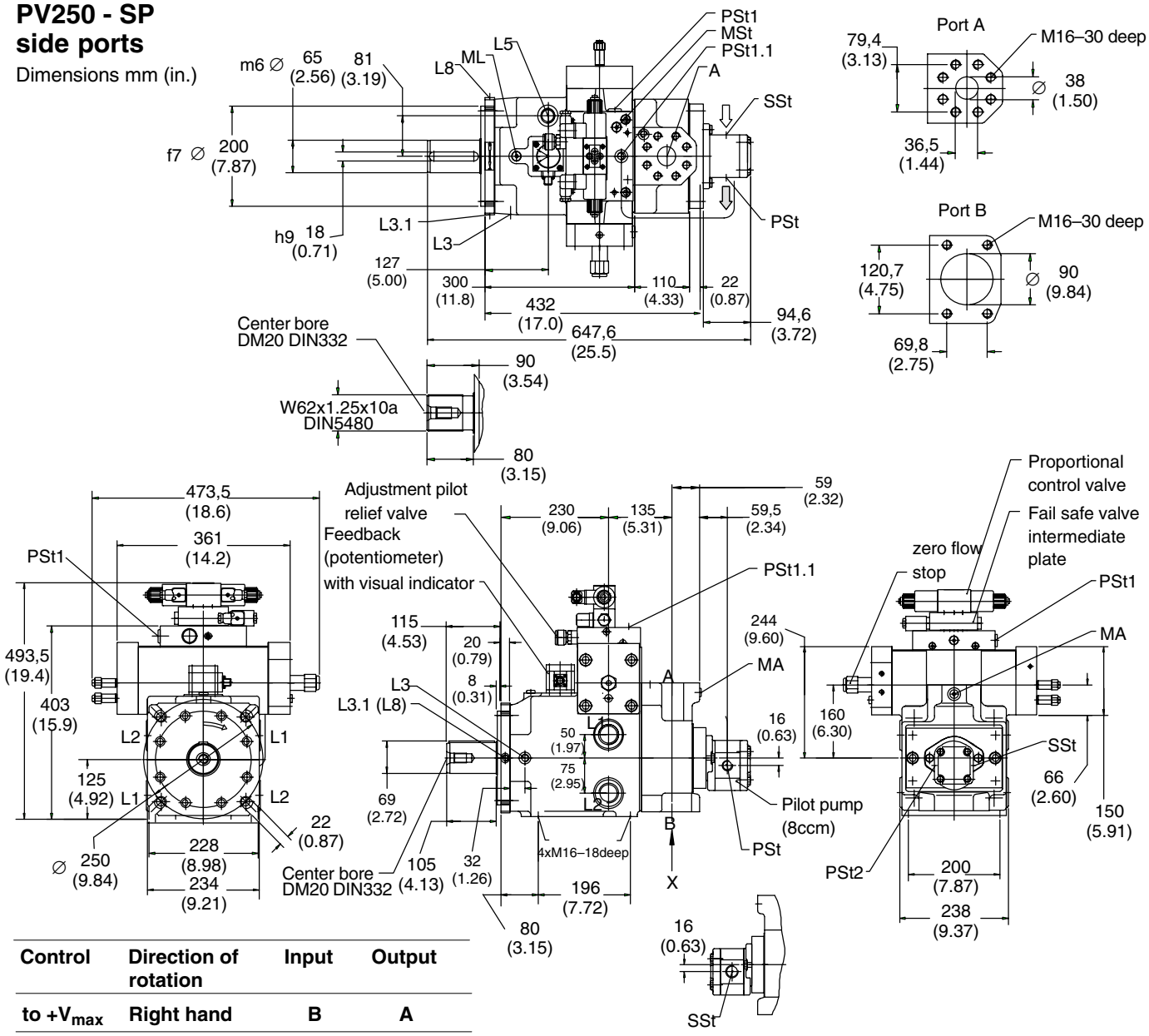
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port of case pressure G $^1/_4$"
$_{(X1)}$ Gauge port G $^1/_4$" x 12.5 deep
$_{X2}$ Gauge port G $^1/_4$" x 12.5 deep

Installation Dimensions – 250 series

PV250 - SP side ports

Dimensions mm (in.)

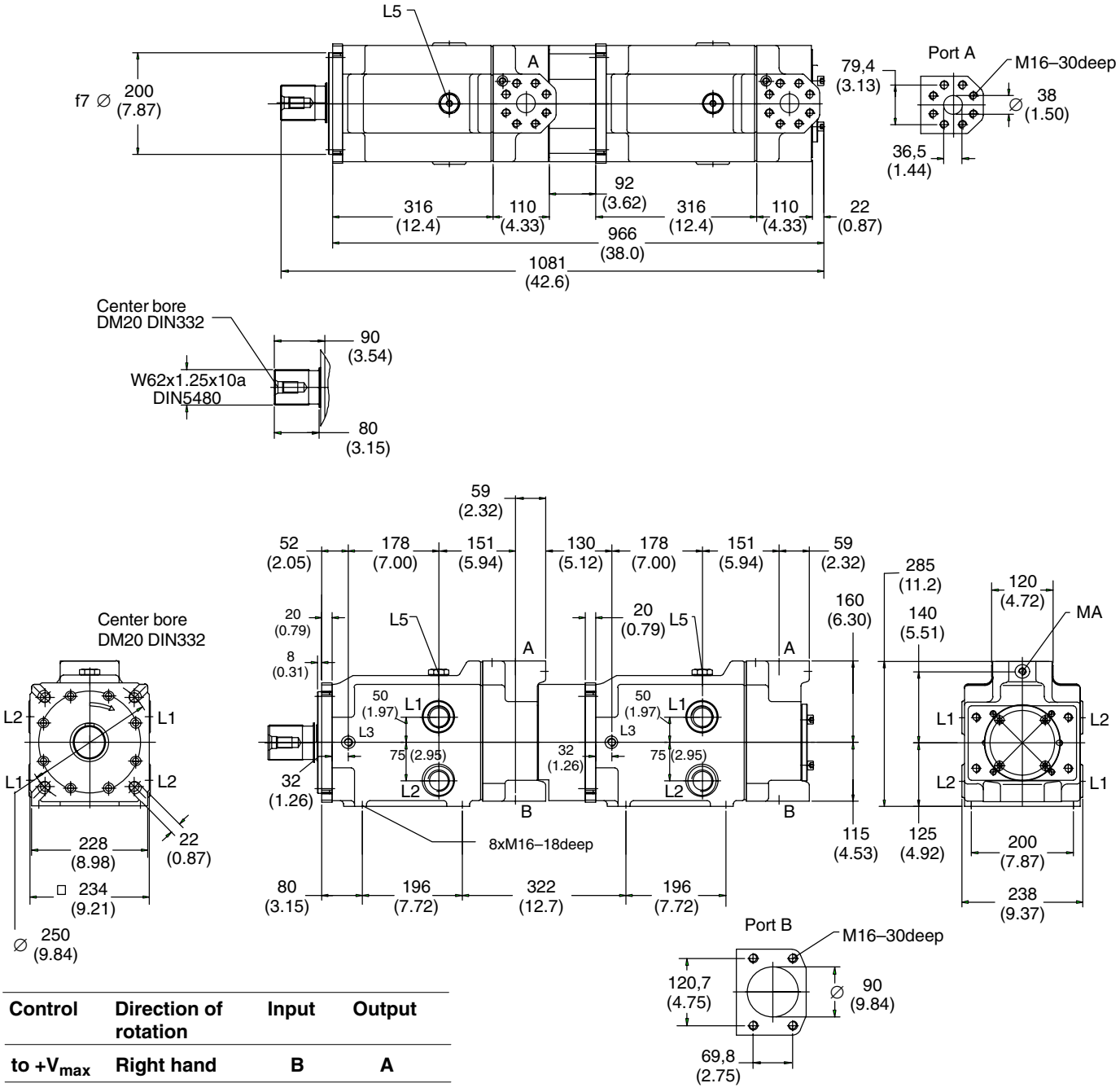


Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
(L3.1) Port G $^1/_4$"
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port of case pressure G $^1/_4$"
(MSt) Gauge port pilot pressure G $^1/_4$"
SSt Suction port of pilot pump G $^3/_4$"
PSt Outlet port of pilot pump G $^1/_2$"
(PSt1) Port of pilot pressure G $^1/_2$" (alternatively PSt1 or PSt1.1)
(PSt1) Port of pilot pressure G $^3/_8$"
XA Pilot port pressure control G $^1/_4$"

TPF250

Dimensions mm (in.)



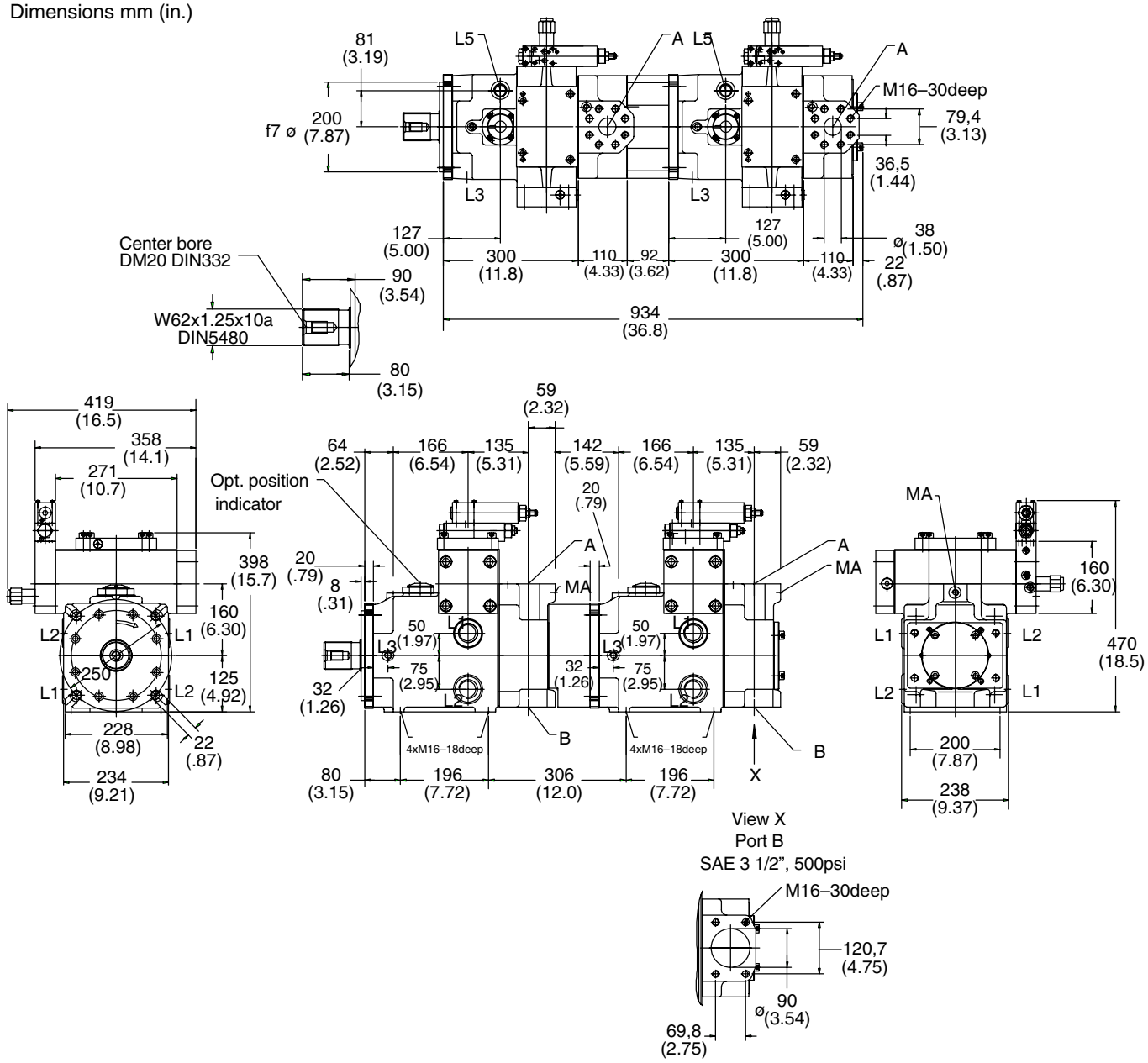
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"

Installation Dimensions – 250 series

TPV 250

Dimensions mm (in.)



Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
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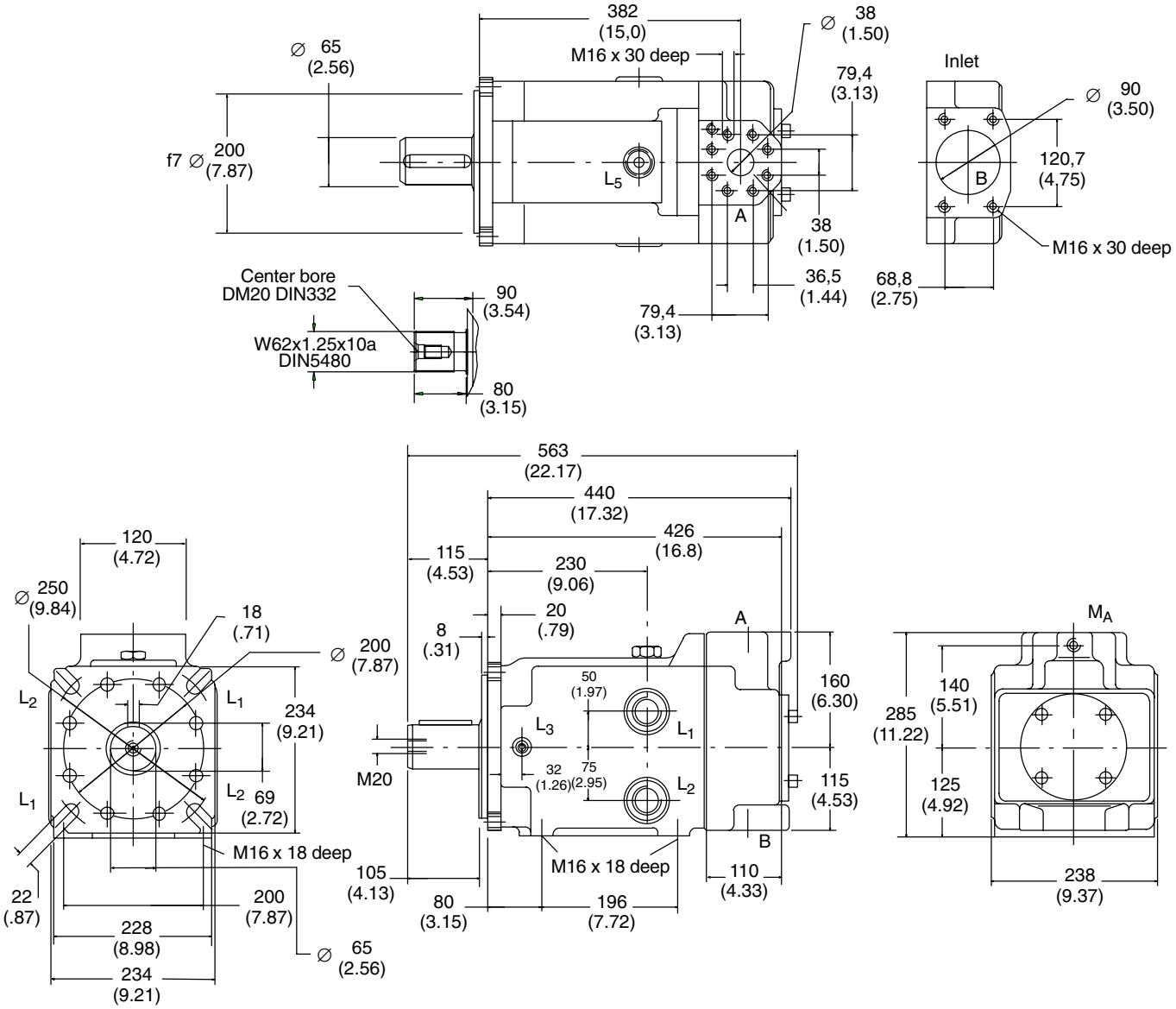
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
($M_{A)}$ Gauge port system pressure G $^1/_4$"
X_1 Pressure Control port G $^1/_4$" (piping)

Installation Dimensions – 360 series

PF360

Dimensions mm (in.)



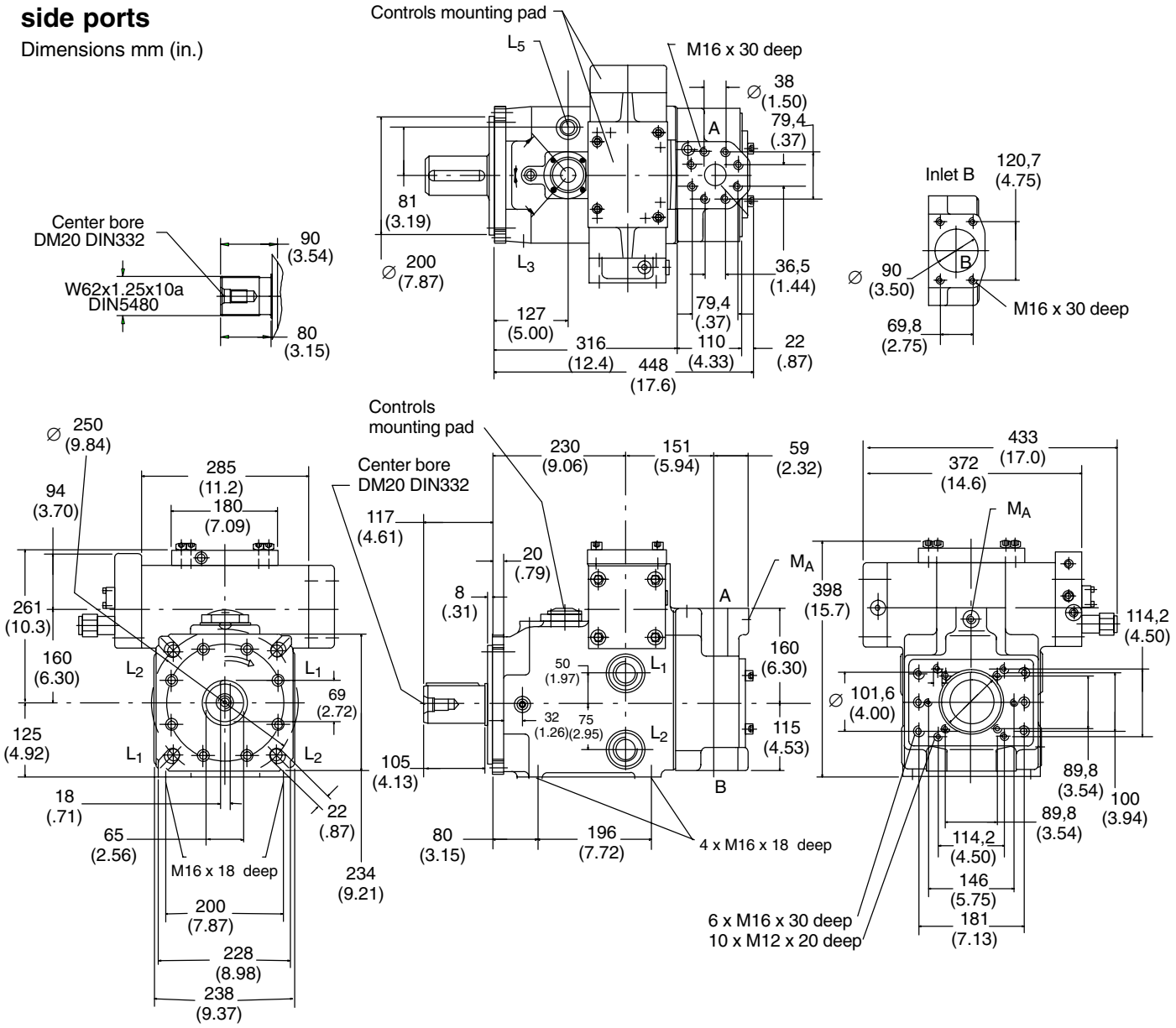
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$, 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
L_1 Drain port $1^5/_8$ - 12 UNF-2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
L_3 Ventilation port for vertical mounting G $^3/_8$" (shaft upwards)
L_5 Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
M_A Gauge port system pressure G $^1/_4$"

Installation Dimensions – 360 series

PV360
side ports

Dimensions mm (in.)



Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$”, 415 bar (6000 psi)
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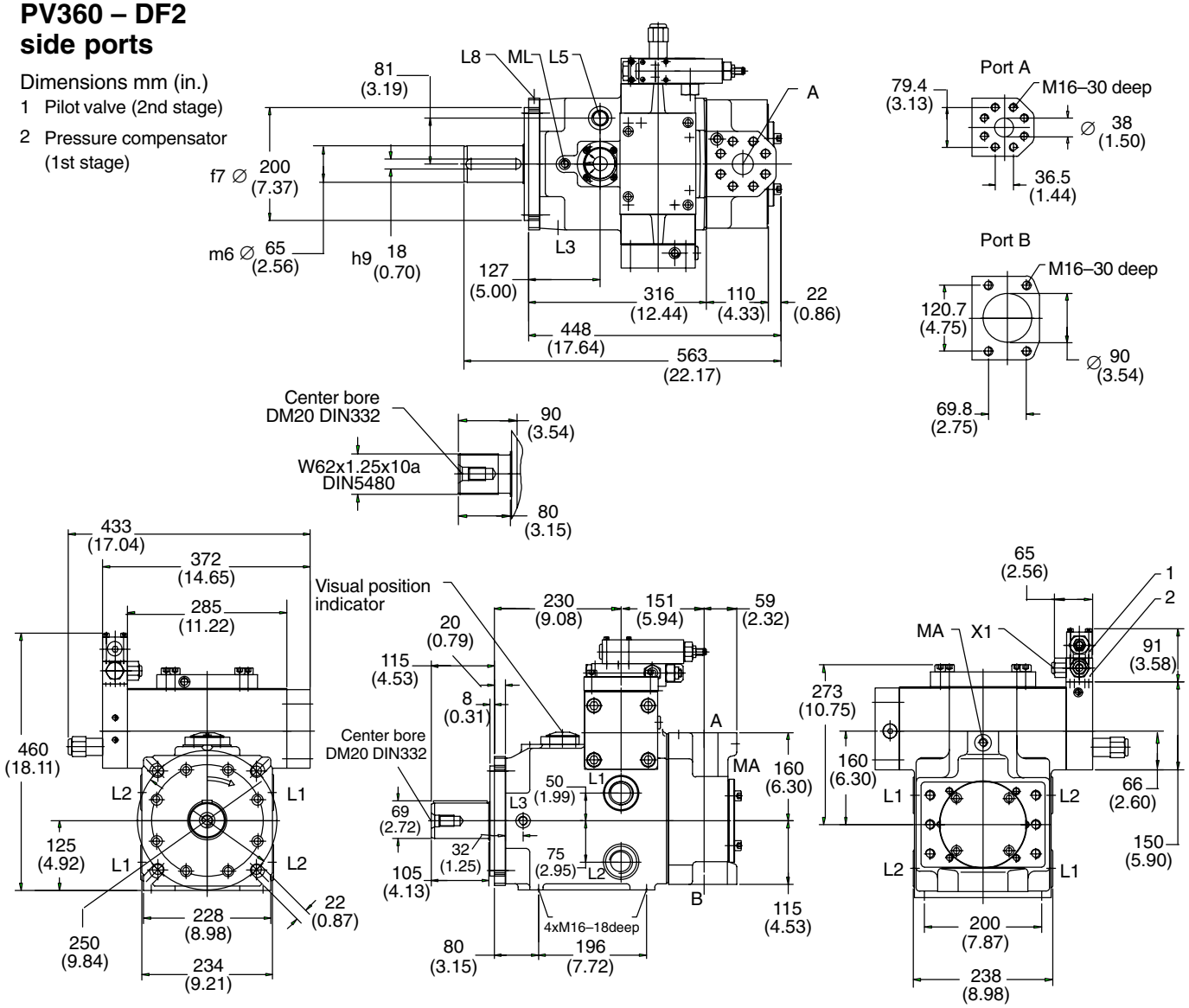
L_2 Drain port G $1^1/_4$” per mounting position use upper port
L_3 Ventilation port for vertical mounting G $^3/_8$” (Shaft upwards)
L_5 Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
M_A Gauge port system pressure G $^1/_4$”

PV360 – DF2 side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)

2 Pressure compensator (1st stage)



Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

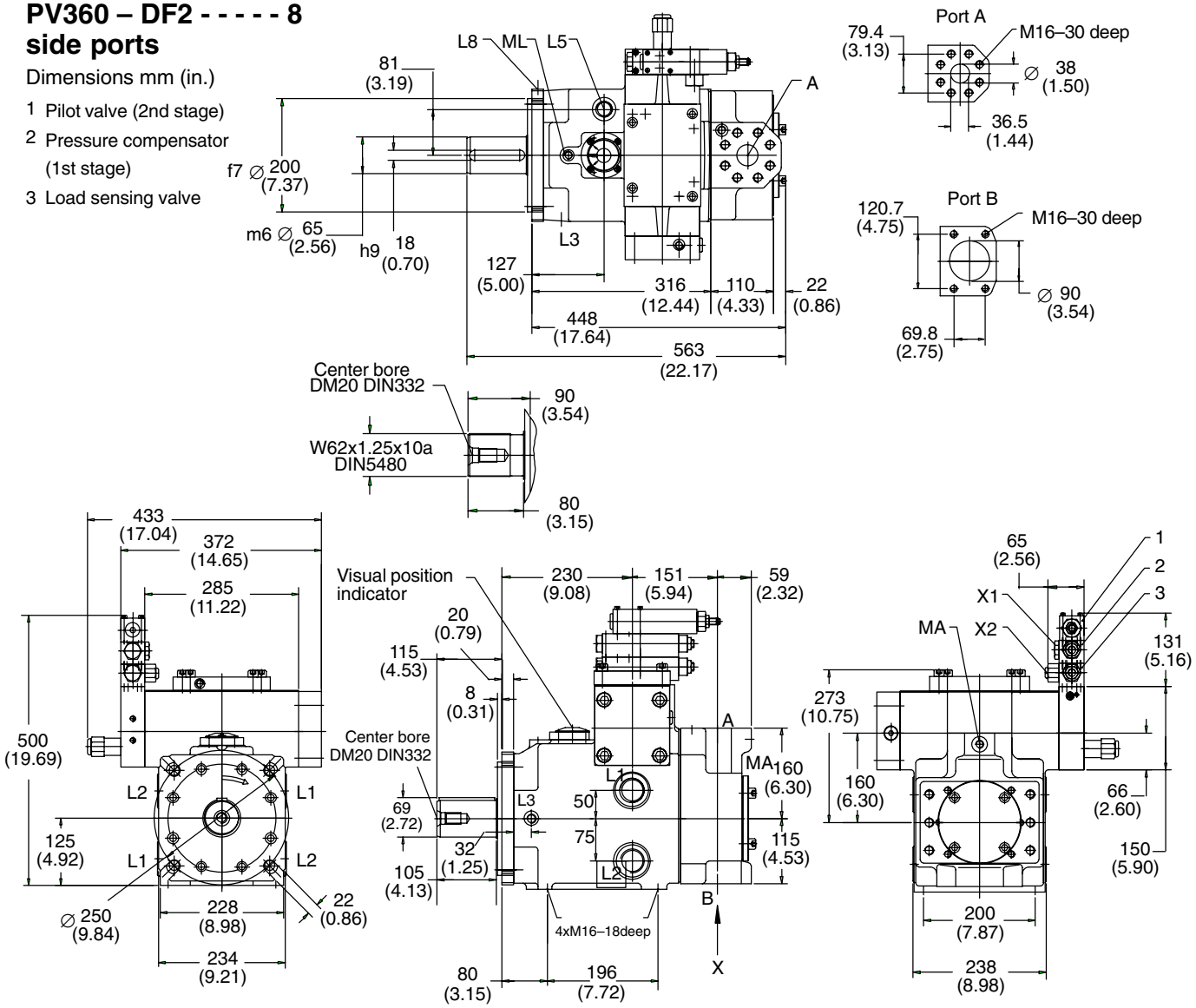
A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$" x 12.5 deep

Installation Dimensions – 360 series

PV360 – DF2 - - - - - 8 side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)
2 Pressure compensator (1st stage)
3 Load sensing valve



Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
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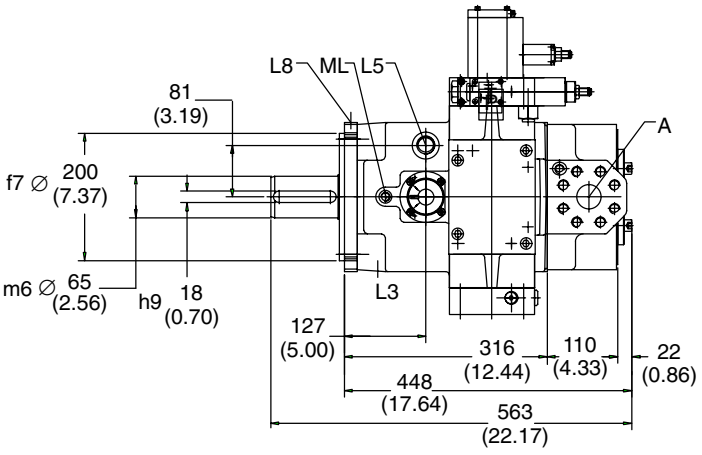
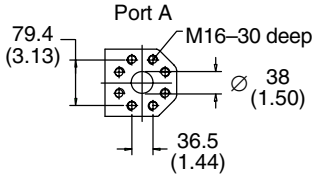
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$" x 12.5 deep
X2 Gauge port G $^1/_4$" x 12.5 deep

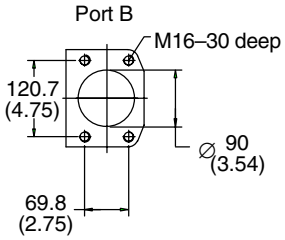
PV360 – LR side ports

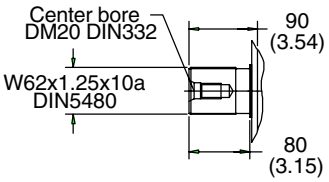
Dimensions mm (in.)

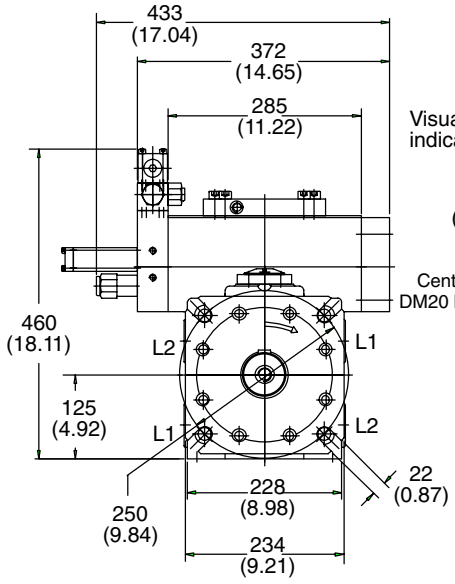
1 Pilot valve (2nd stage)
2 Pressure compensator (1st stage)
3 Power limitation valve

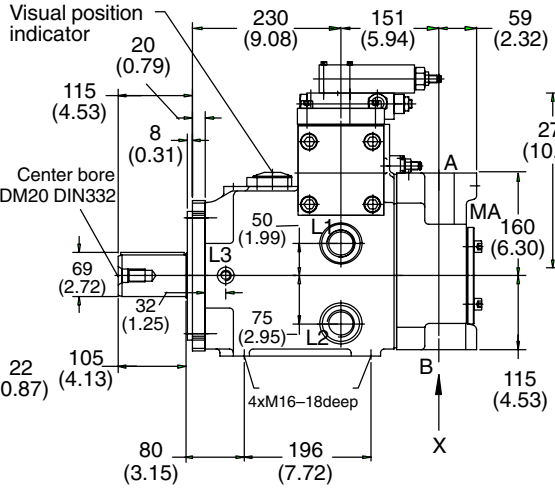


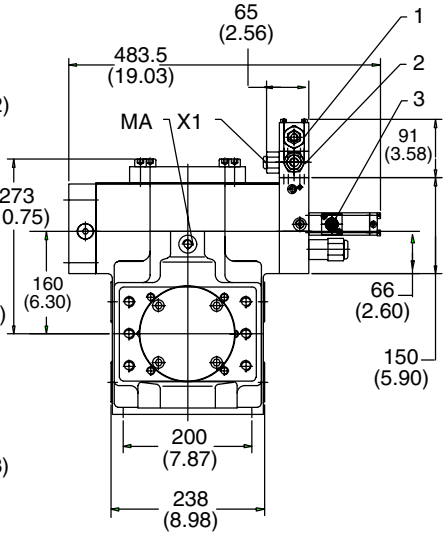












Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

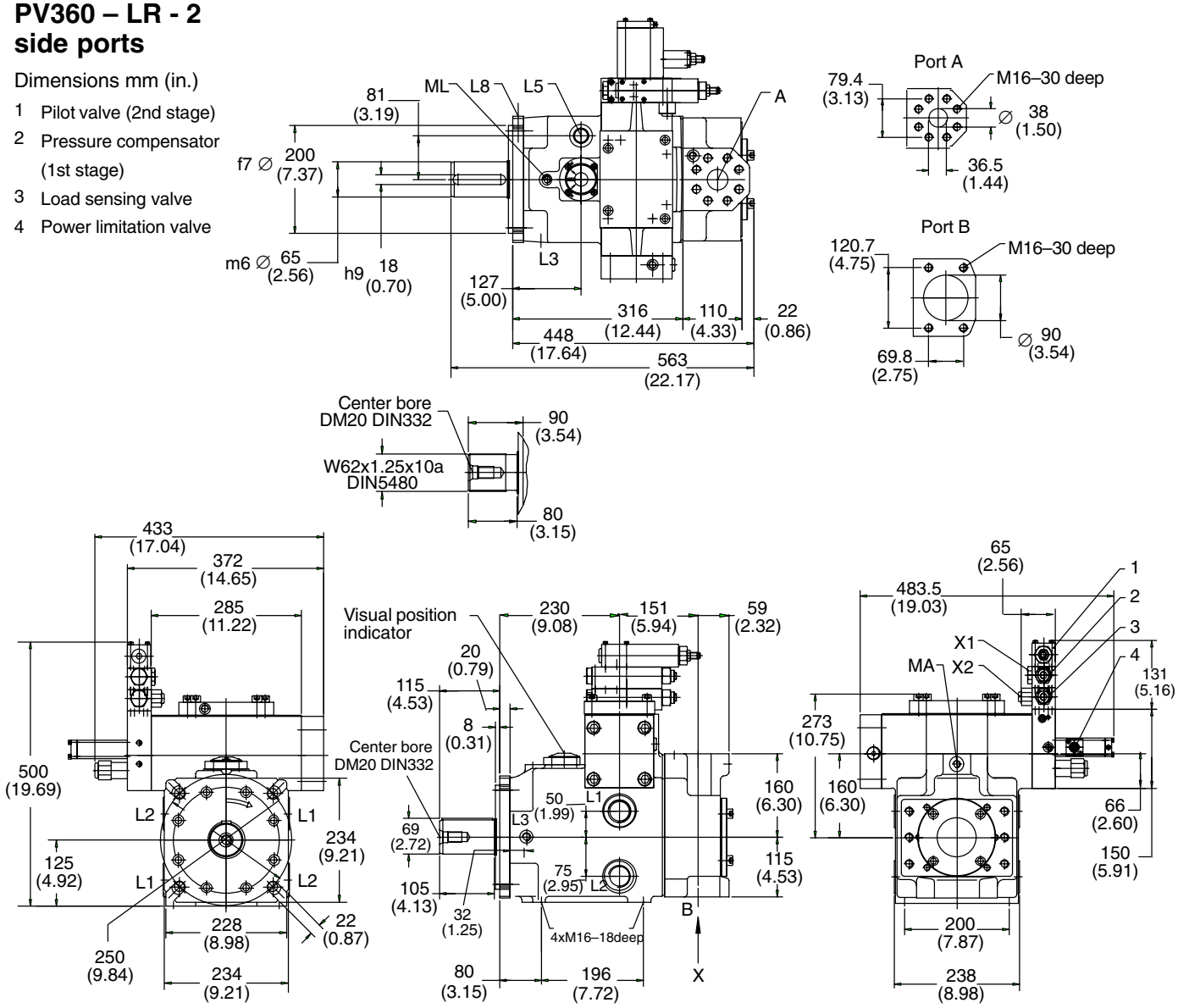
A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$" x 12.5 deep

Installation Dimensions – 360 series

PV360 – LR - 2 side ports

Dimensions mm (in.)

1 Pilot valve (2nd stage)
2 Pressure compensator (1st stage)
3 Load sensing valve
4 Power limitation valve

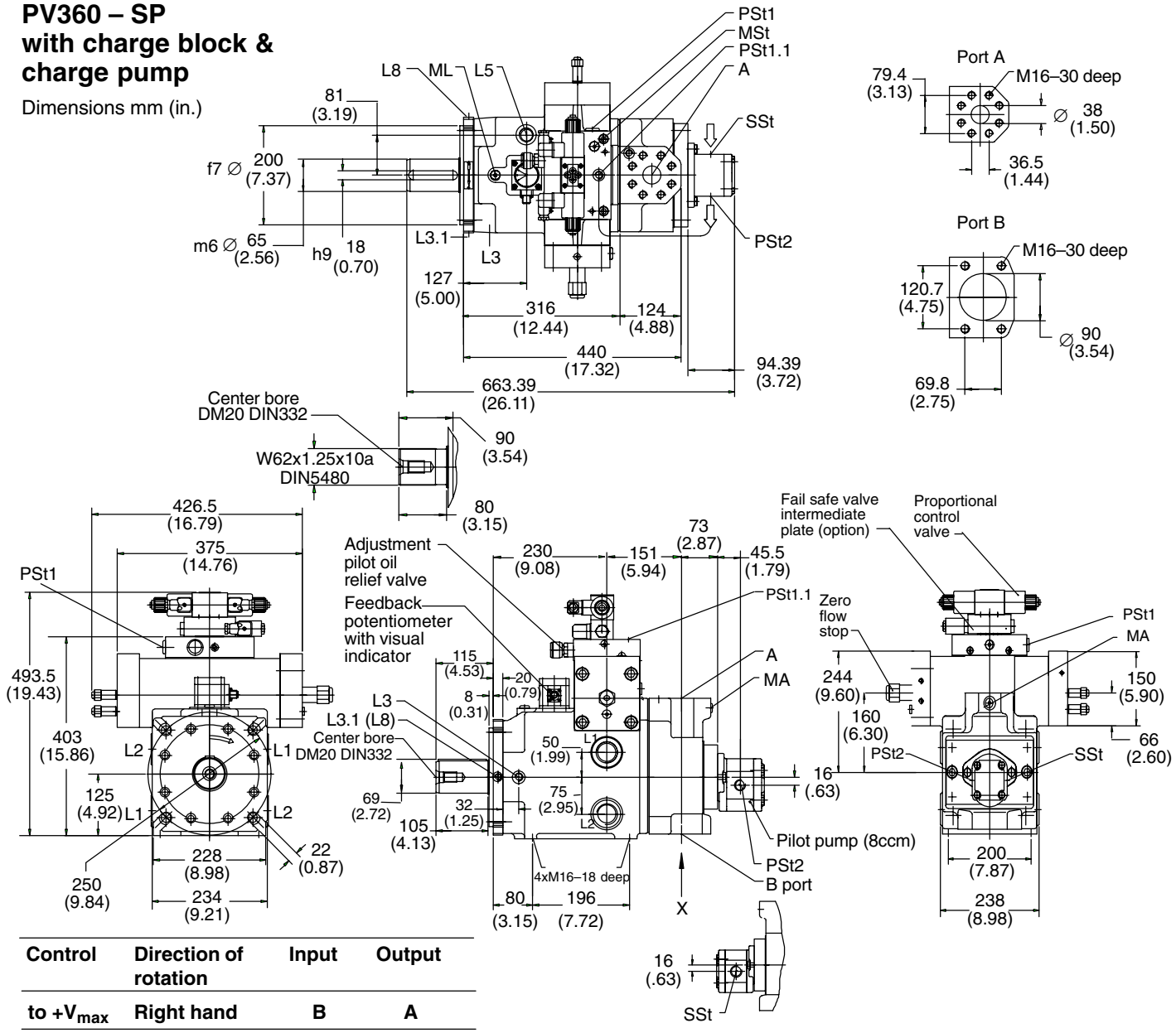


Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$ – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port case pressure G $^1/_4$"
(X1) Gauge port G $^1/_4$" x 12.5 deep
X2 Gauge port G $^1/_4$" x 12.5 deep

PV360 – SP with charge block & charge pump

Dimensions mm (in.)



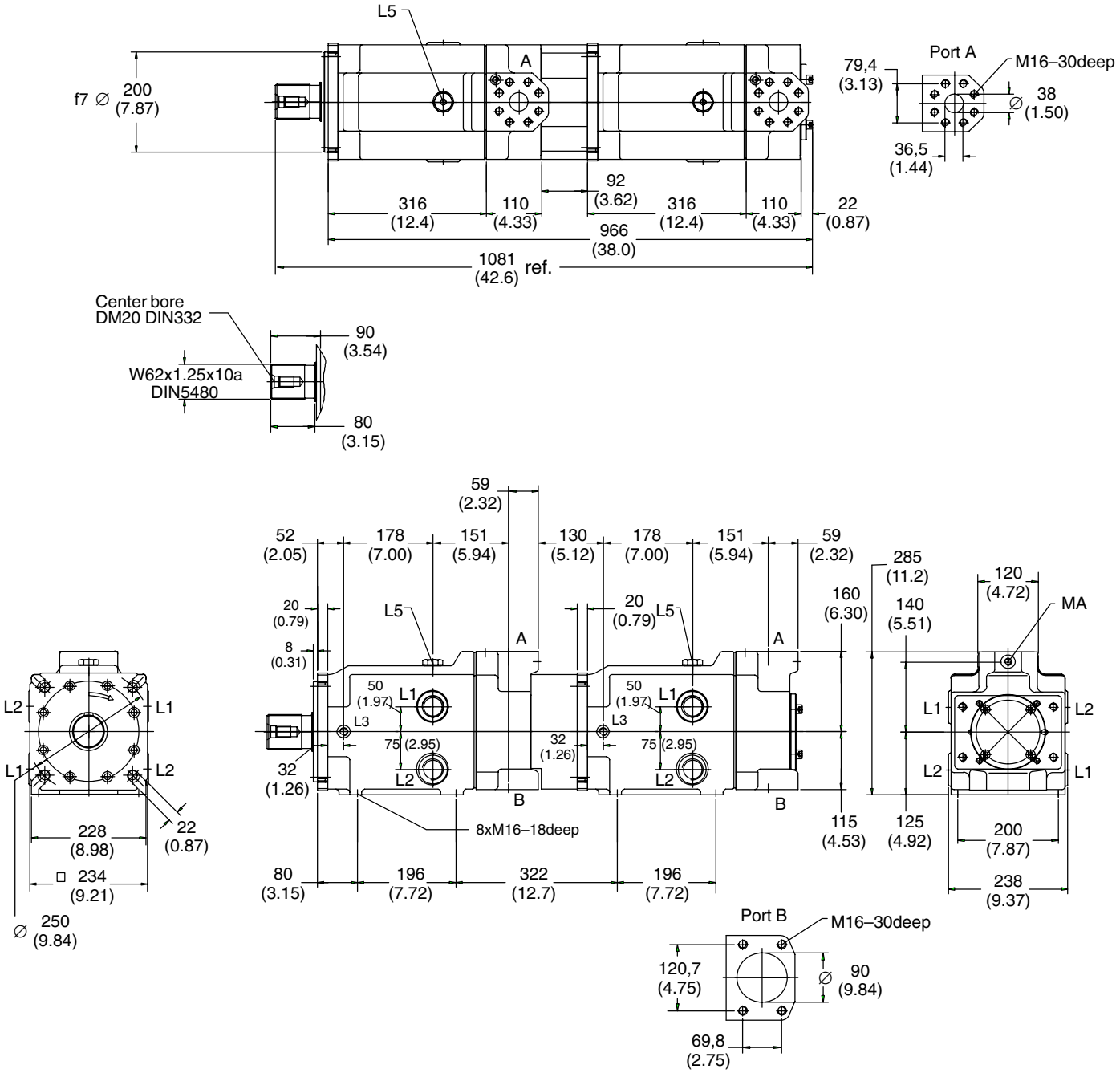
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
(L3.1) Port G $^1/_4$"
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"
($M_{L)}$ Gauge port of case pressure G $^1/_4$"
(MSt) Gauge port pilot pressure G $^1/_4$"
SSt Suction port of pilot pump G $^3/_4$"
PSt Outlet port of pilot pump G $^1/_2$"
(PSt1) Port of pilot pressure G $^1/_2$" (alternatively PSt1 or PSt1.1)
(PSt1) Port of pilot pressure G $^3/_8$"

Installation Dimensions – 360 series

TPF360

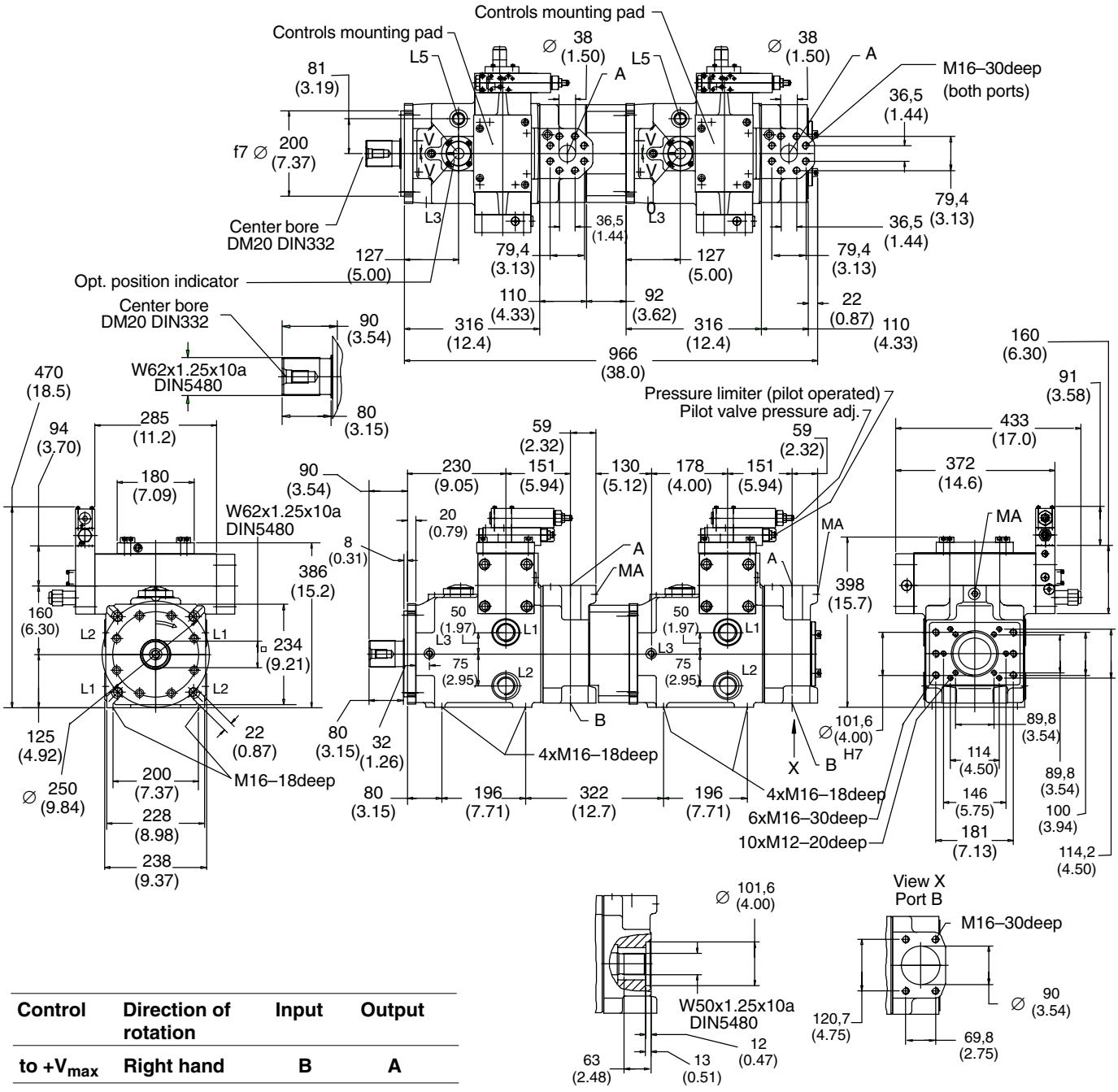
Dimensions mm (in.)



A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_4$" per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$"
($M_{A)}$ Gauge port system pressure G $^1/_4$"

TPV360 - DF2

Dimensions mm (in.)



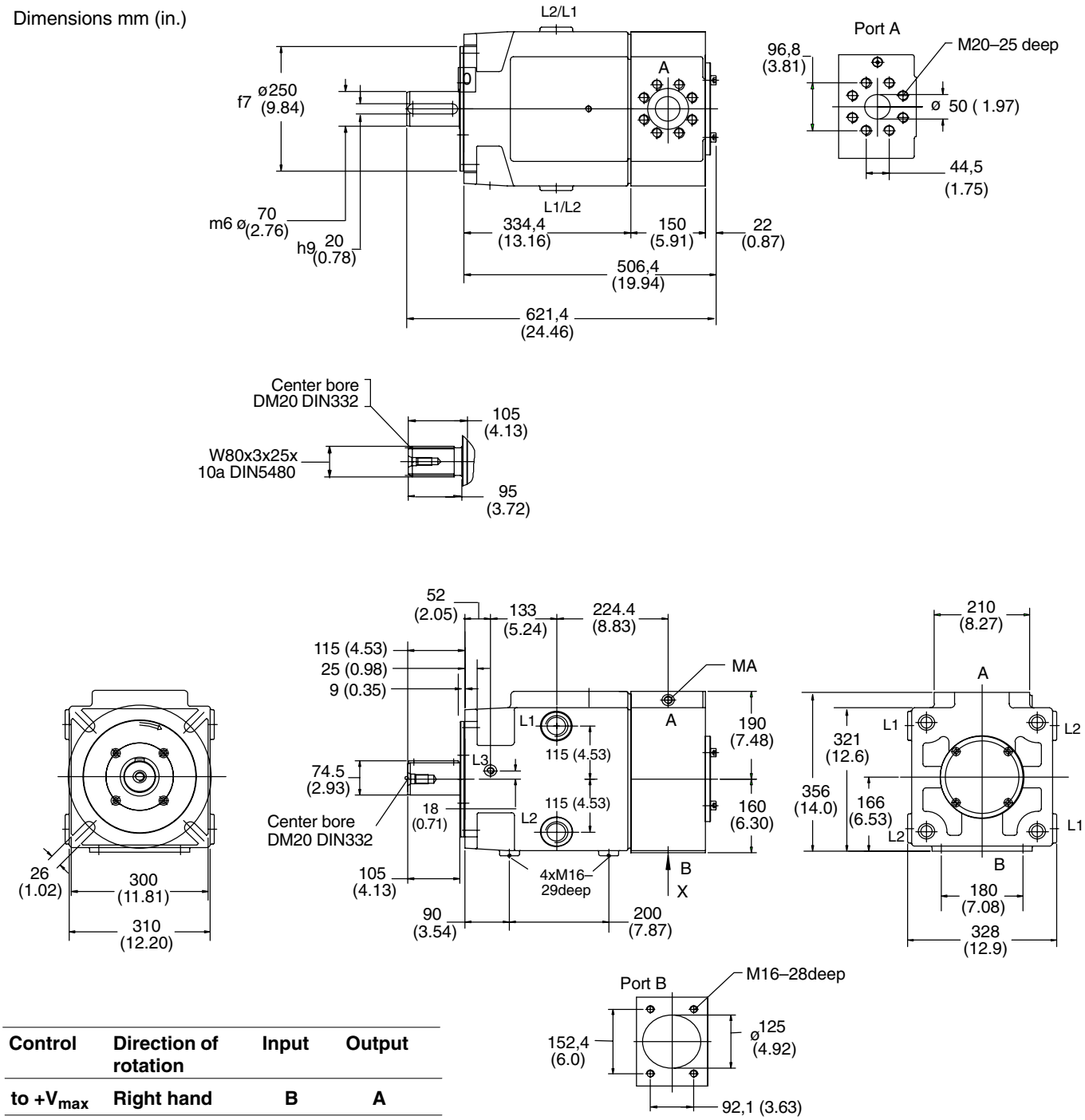
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE $1^1/_2$", 415 bar (6000 psi)
B Inlet connection SAE $3^1/_2$", 35 bar (500 psi)
L1 Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_4$" per mounting position use upper port
L3 Ventilation port for vertical mounting G $^3/_8$" (Shaft upwards)
L5 Oil fill plug $1^1/_{16}$" – 12 UNF – 2B
MA Gauge port system pressure G $^1/_4$"

Installation Dimensions – 500 series

PF 500

Dimensions mm (in.)



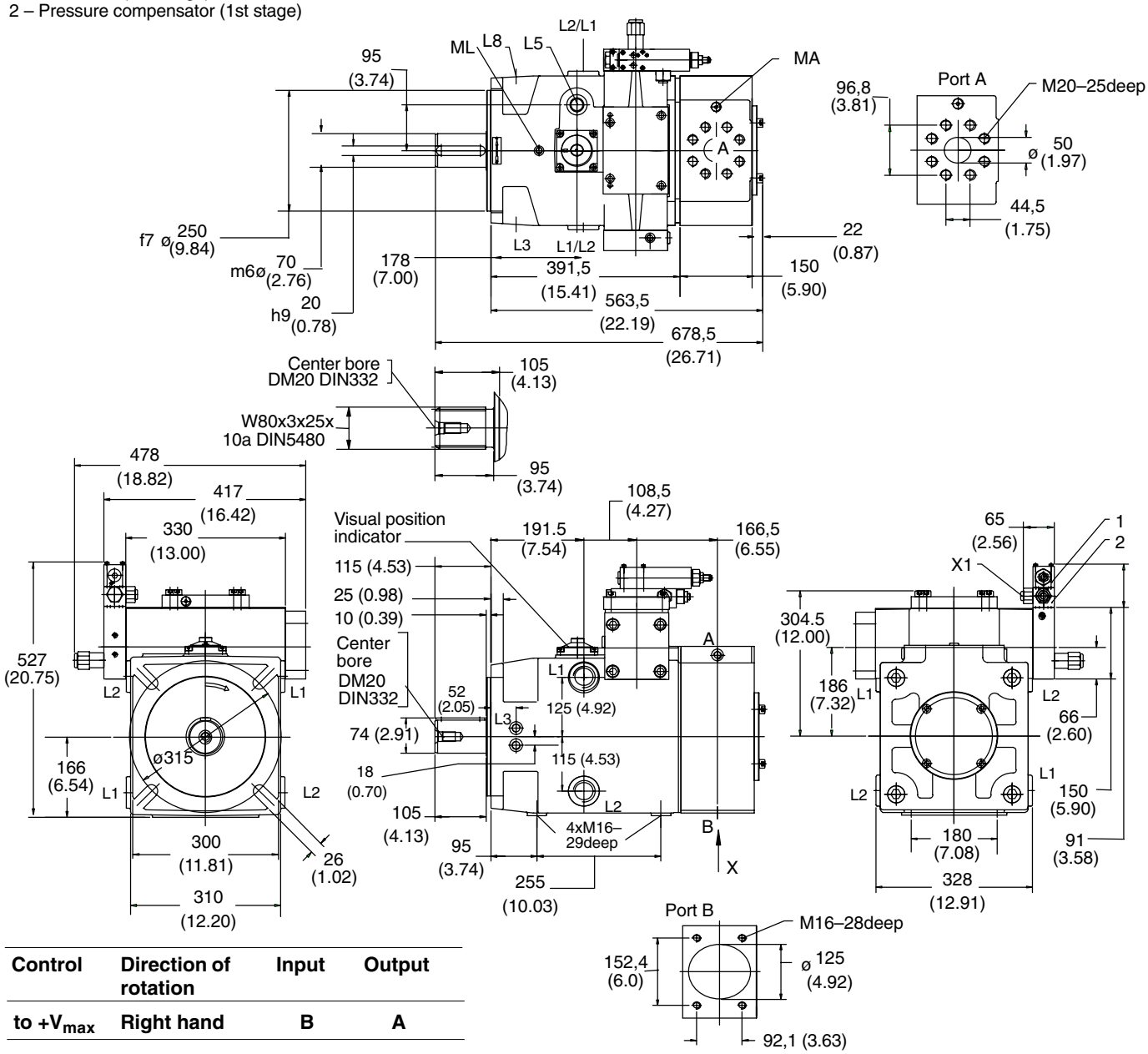
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
(L1) Drain port $1^5/_8$ ”– 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_2$” per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^1/_4$” (shaft upwards)
(MA) Gauge port system pressure G $^1/_4$”
(...) Normally plugged

PV 500-DF2

Dimensions mm (in.)

1 – Pilot valve (2nd stage)
2 – Pressure compensator (1st stage)



Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

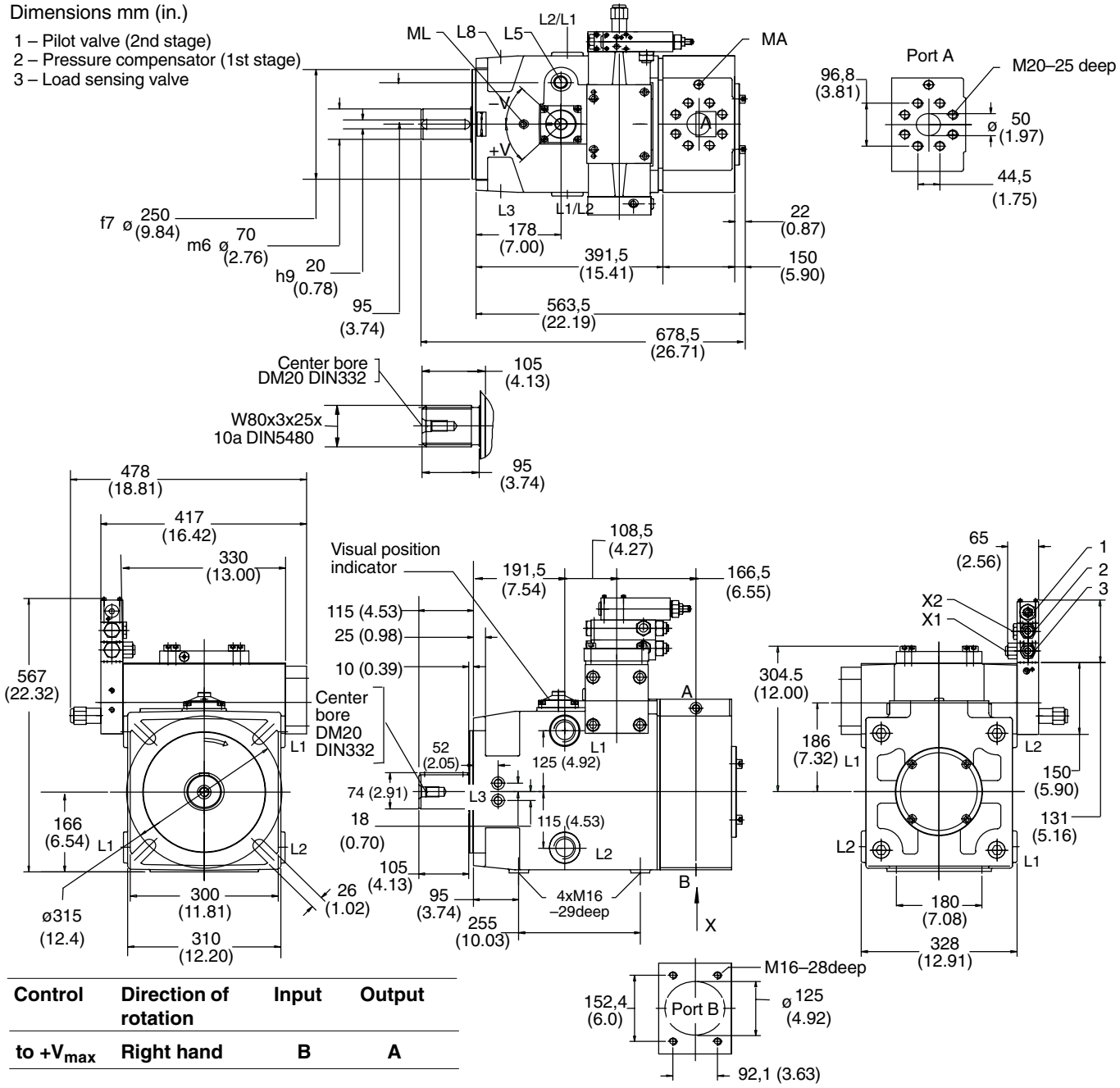
A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
(L1) Drain port $1^{5}/_{8}$” – 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^{1}/_{2}$” per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^{1}/_{4}$” (Shaft upwards)
(L5) Oil fill plug $1^{1}/_{2}$”
(L8) Air bleed port G $^{1}/_{4}$”
(MA) Gauge port system pressure G $^{1}/_{4}$”
(ML) Gauge port of case pressure G $^{1}/_{4}$”
(X1) Gauge port G $^{1}/_{4}$” x 12.5 deep
(...) Normally plugged

Installation Dimensions – 500 series

PV 500-DF2 - - - - - 8

Dimensions mm (in.)

1 – Pilot valve (2nd stage)
2 – Pressure compensator (1st stage)
3 – Load sensing valve



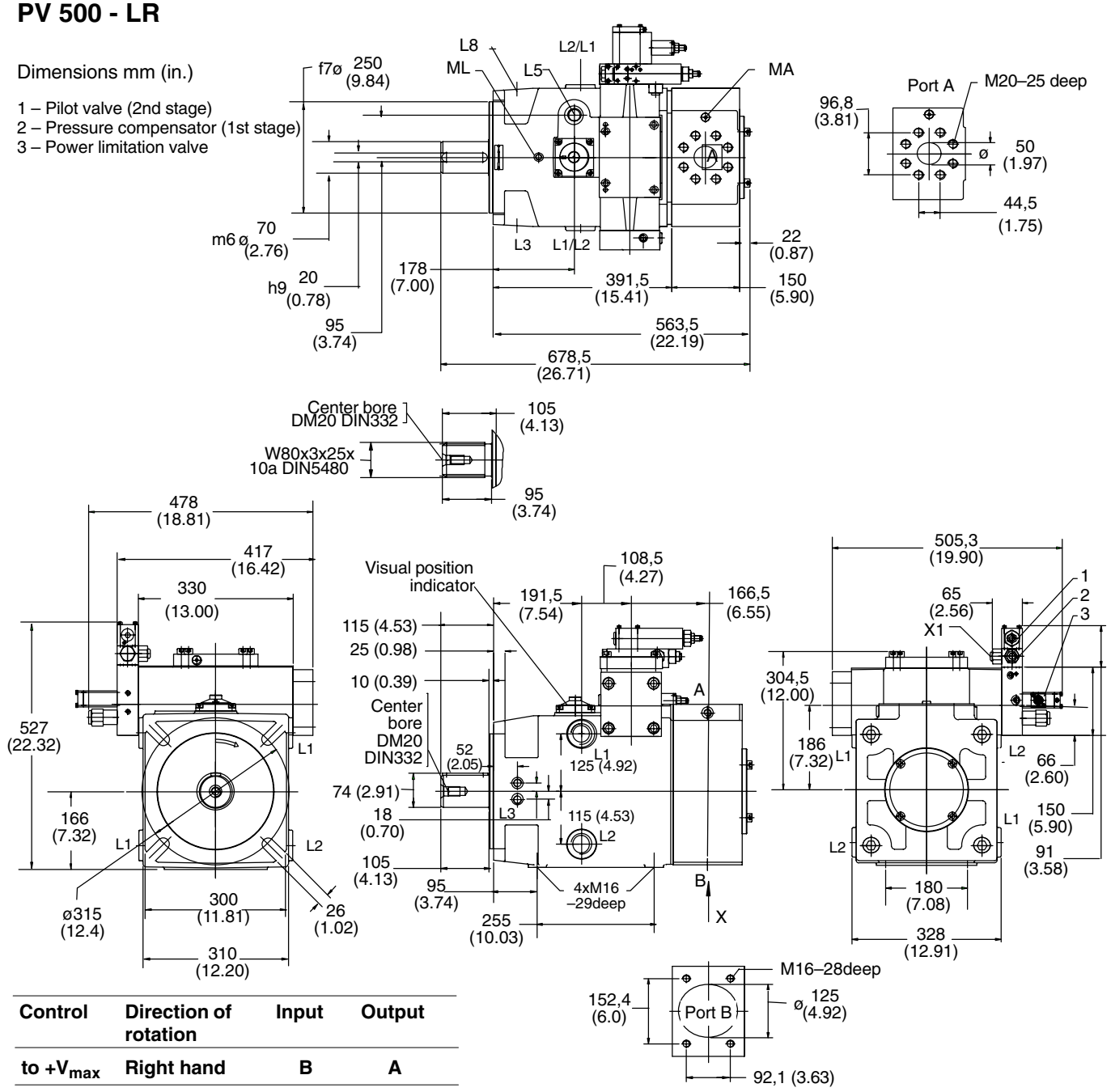
Control	Direction of rotation	Input	Output
to $+V_{max}$	**Right hand**	**B**	**A**

A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_2$” per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^1/_4$” (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_2$” – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$”
($M_{A)}$ Gauge port system pressure G $^1/_4$”
($M_{L)}$ Gauge port of case pressure G $^1/_4$”
(X1) Gauge port G $^1/_4$” x 12.5 deep
(...) Normally plugged

PV 500 - LR

Dimensions mm (in.)

1 – Pilot valve (2nd stage)
2 – Pressure compensator (1st stage)
3 – Power limitation valve



Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

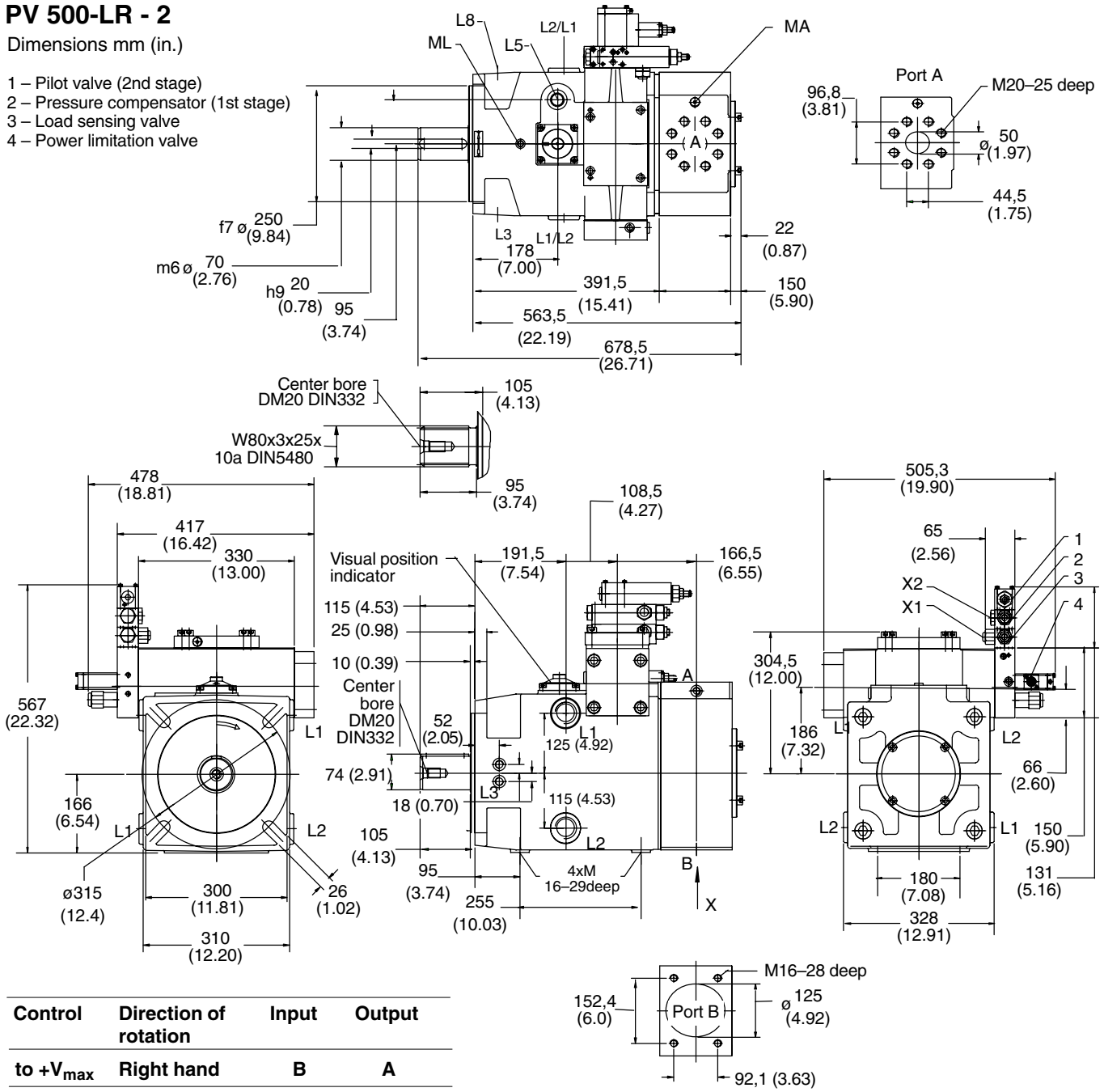
A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
($L_{1)}$ Drain port $1^5/_8$ – 12 UNF – 2B per mounting position use upper port
L_2 Drain port G $1^1/_2$” per mounting position use upper port
($L_{3)}$ Ventilation port for vertical mounting G $^1/_4$” (Shaft upwards)
($L_{5)}$ Oil fill plug $1^1/_2$” – 12 UNF – 2B
(L8) Air bleed port G $^1/_4$”
($M_{A)}$ Gauge port system pressure G $^1/_4$”
($M_{L)}$ Gauge port of case pressure G $^1/_4$”
X1 Gauge port G $^1/_4$” x 12.5 deep
(...) Normally plugged

Installation Dimensions – 500 series

PV 500-LR - 2

Dimensions mm (in.)

1 – Pilot valve (2nd stage)
2 – Pressure compensator (1st stage)
3 – Load sensing valve
4 – Power limitation valve



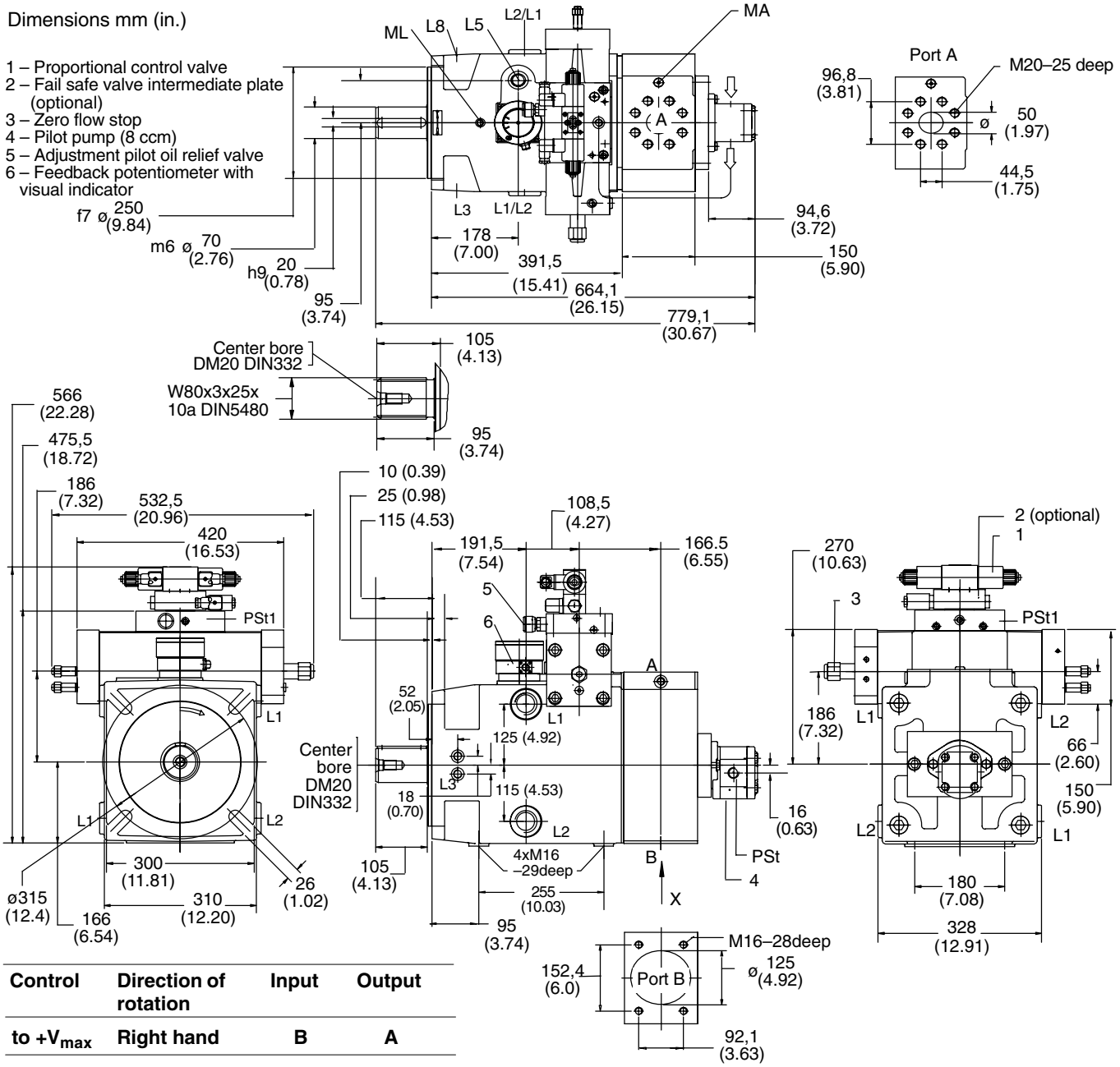
Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
(L1) Drain port $1^5/_{8”}$ – 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_2$” per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^1/_4$” (Shaft upwards)
(L5) Oil fill plug G $1^1/_2$”
(L8) Air bleed port G $^1/_4$”
(MA) Gauge port system pressure G $^1/_4$”
(ML) Gauge port of case pressure G $^1/_4$”
(X1) Gauge port G 1/4” x 12.5 deep
X2 Gauge port G 1/4” x 12.5 deep

PV 500-SP

Dimensions mm (in.)

1 – Proportional control valve
2 – Fail safe valve intermediate plate (optional)
3 – Zero flow stop
4 – Pilot pump (8 ccm)
5 – Adjustment pilot oil relief valve
6 – Feedback potentiometer with visual indicator



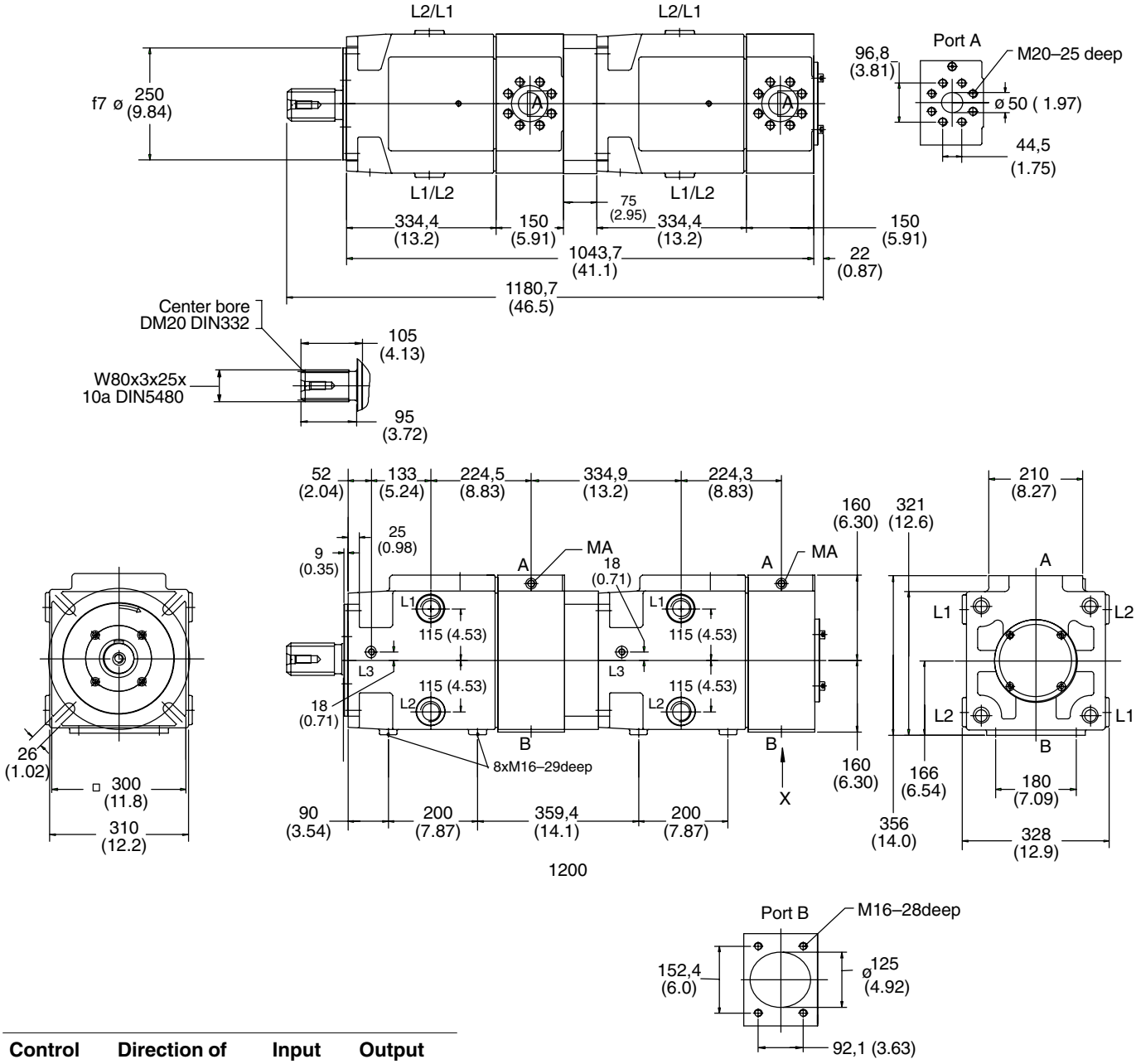
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE 2", 415 bar (6000 psi)
B Inlet connection SAE $5^1/_2$", 35 bar (500 psi)
(L1) Drain port $1^5/_8$" – 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_2$" per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^1/_4$" (Shaft upwards)
(L_5) Oil fill plug G 1^1/2"
(L8) Air bleed port G $^1/_4$"
(MA) Gauge port system pressure G $^1/_4$"
(ML) Gauge port of case pressure G $^1/_4$"
(MSt) Gauge port pilot pressure G $^1/_4$"
PSt1 Port of pilot pressure G $^1/_2$"
XA Control port G $^1/_4$"

Installation Dimensions – 500 series

TPF 500

Dimensions mm (in.)

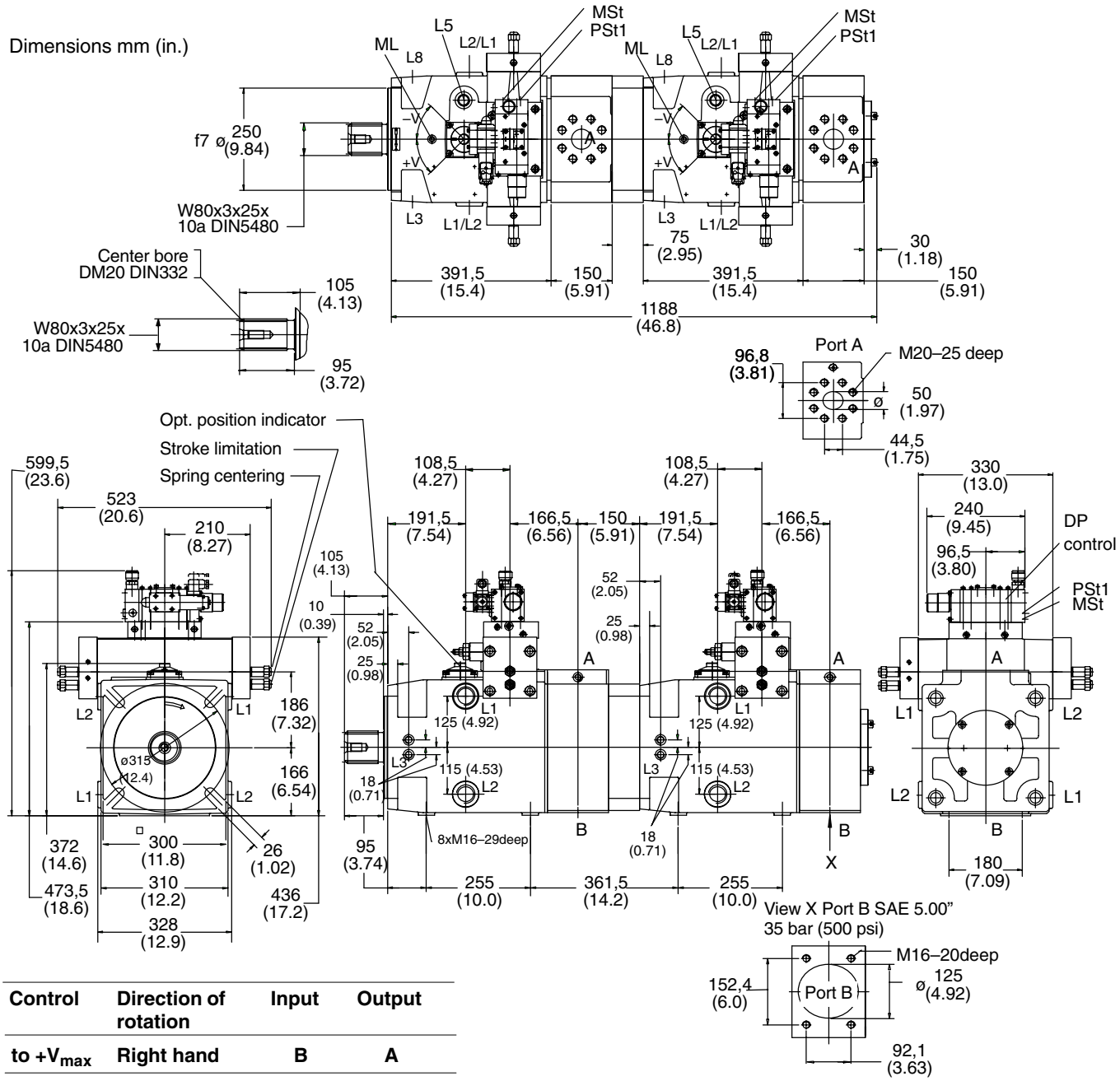


Control	Direction of rotation	Input	Output
to +V_{max}	**Right hand**	**B**	**A**

A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
(L1) Drain port $1^5/_8$ ”– 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_2$” per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^1/_4$” (shaft upwards)
(MA) Gauge port system pressure G $^1/_4$”
(...) Normally plugged

TPV 500-DP

Dimensions mm (in.)



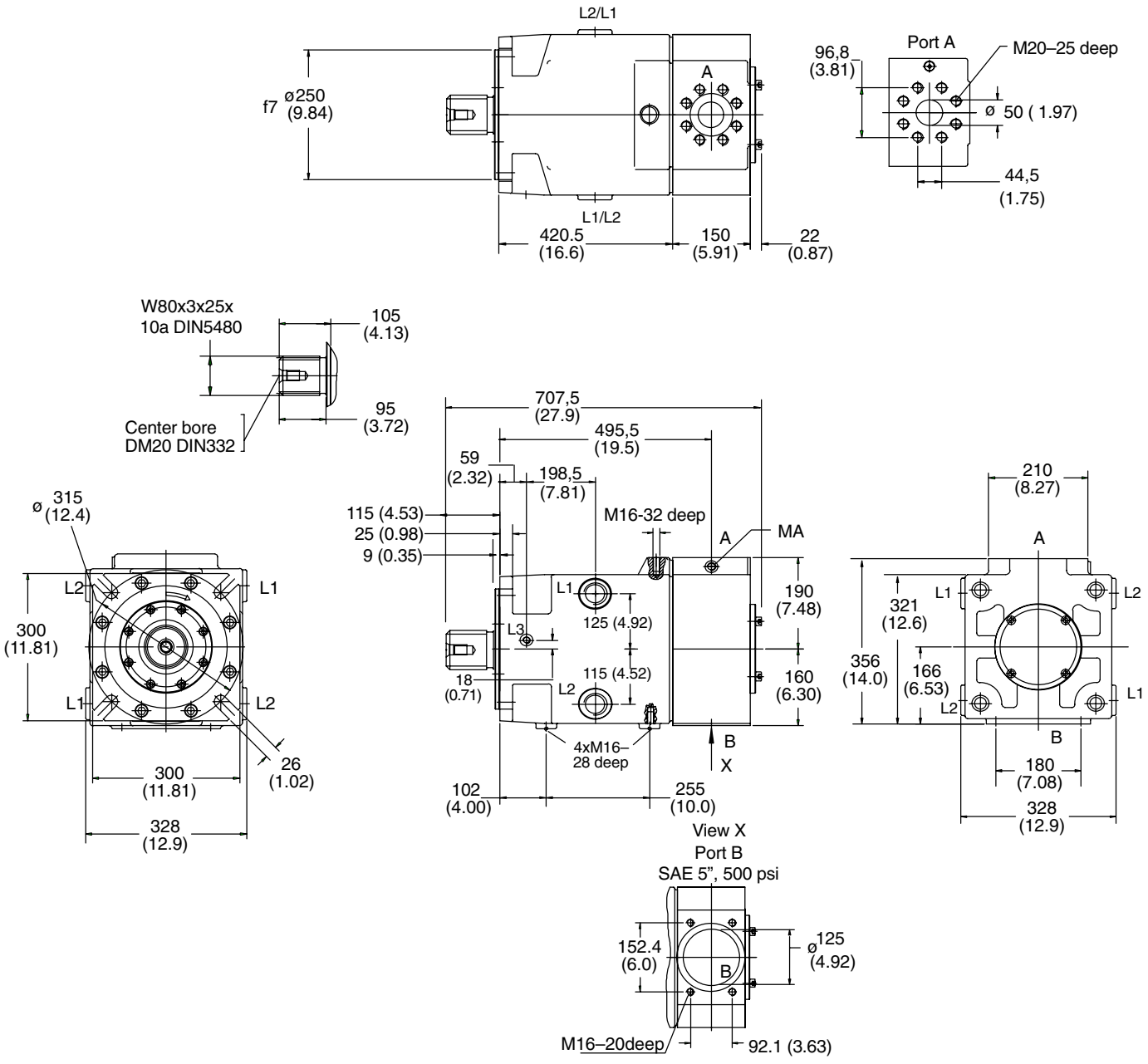
Control	Direction of rotation	Input	Output
to $+V_{max}$	Right hand	B	A

A System pressure port SAE 2", 415 bar (6000 psi)
B Inlet connection SAE $5^1/_2$", 35 bar (500 psi)
(L1) Drain port $1^5/_8$" – 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^1/_2$" per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^1/_4$" (Shaft upwards)
($L_{5)}$ Oil fill plug G 1^1/2"
(L8) Air bleed port G $^1/_4$"
(MA) Gauge port system pressure G $^1/_4$"
(ML) Gauge port of case pressure G $^1/_4$"
(MSt) Gauge port pilot pressure G $^1/_4$"
PSt1 Port of pilot pressure G $^1/_2$"
XA Control port G $^1/_4$"

Installation Dimensions – 750 series

PF 750

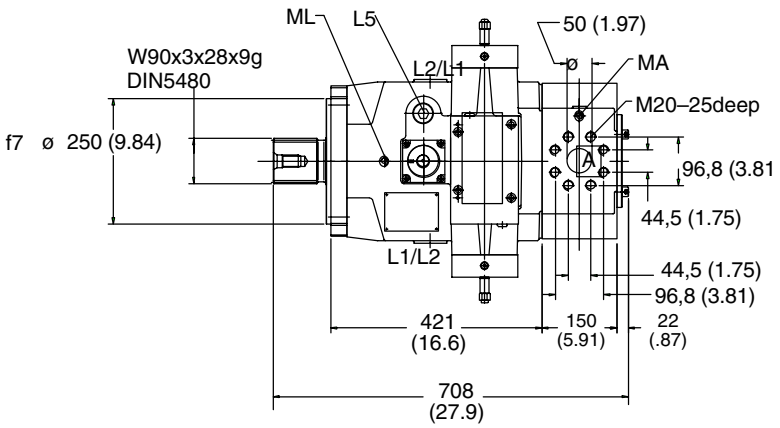
Dimensions mm (in.)

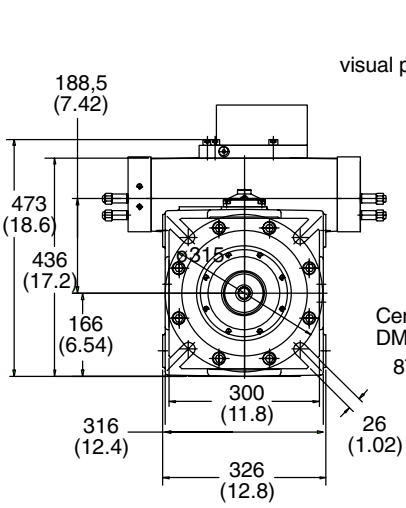


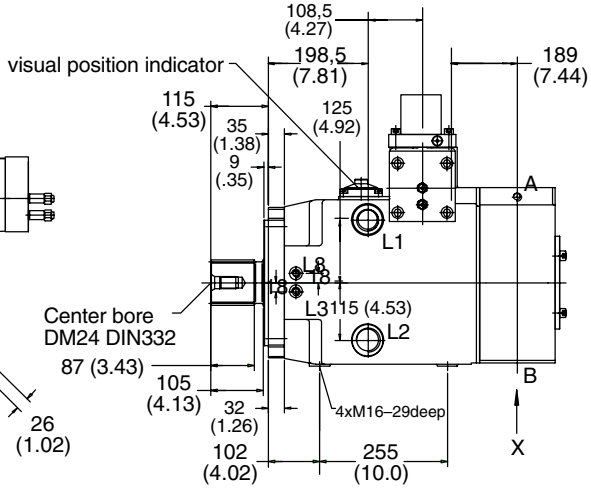
A System pressure port SAE 2”, 415 bar (6000 psi)
B Inlet connection SAE 5”, 35 bar (500 psi)
(L1) Drain port $1^{5}/_{8}$ ”– 12 UNF – 2B per mounting position use upper port
L2 Drain port G $1^{1}/_{2}$” per mounting position use upper port
(L3) Ventilation port for vertical mounting G $^{1}/_{4}$” (shaft upwards)
(MA) Gauge port system pressure G $^{1}/_{4}$”

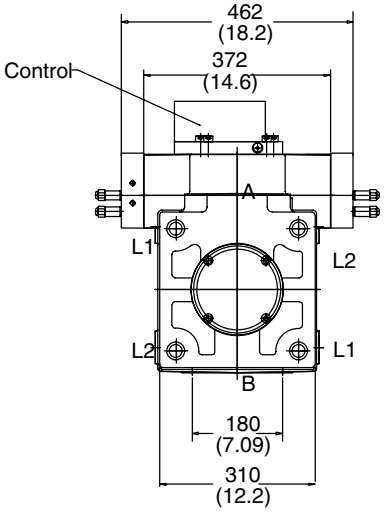
PV 750

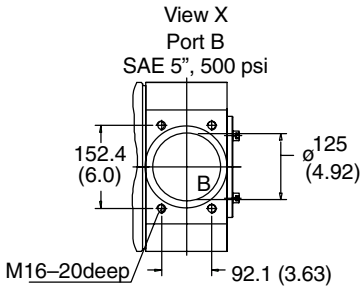
Dimensions mm (in.)











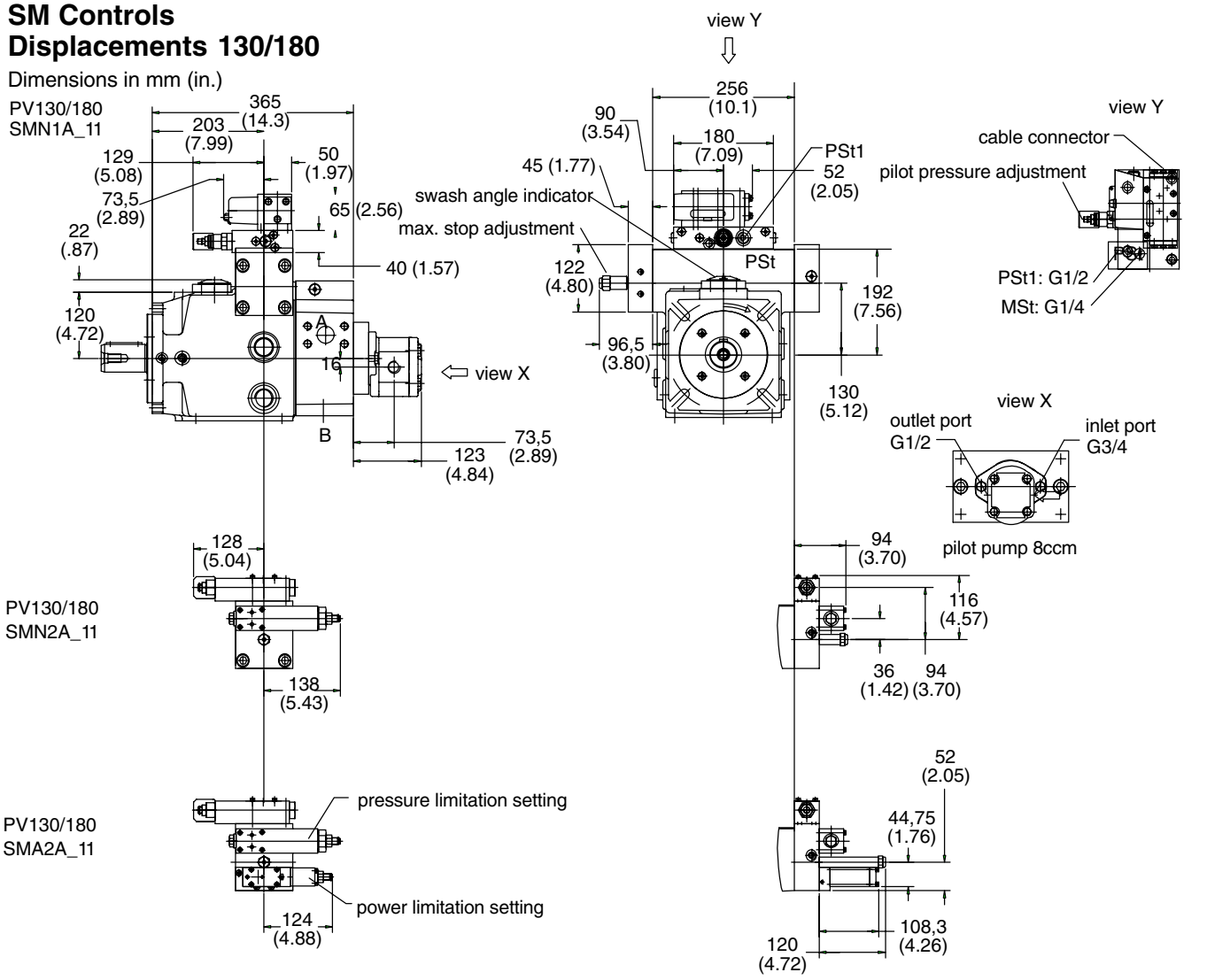
Control	Direction of rotation	Input	Output
to + Vmax	Right hand rotation	B	A
	Left hand rotation	A	B
to – Vmax	Right hand rotation	A	B
	Left hand rotation	B	A

A System pressure port SAE 2”, 6000 psi
B System pressure port SAE 2”, 6000 psi
(L1) Drain port 1 5/8”–12UNF–2B } according to mounting–position
L2 Drain port G 1 1/2 } use upper port
(L3) Ventilation port for vertical mounting G1/4 (shaft upwards)
(L5) Oil filling plug 1 1/16”–12UNF
(L8) Air bleeding port G1/4
(MA) Gauge port system pressure G1/4
(MB) Gauge port system pressure G1/4
(ML) Gauge port case pressure G1/4

Installation Dimensions – controls

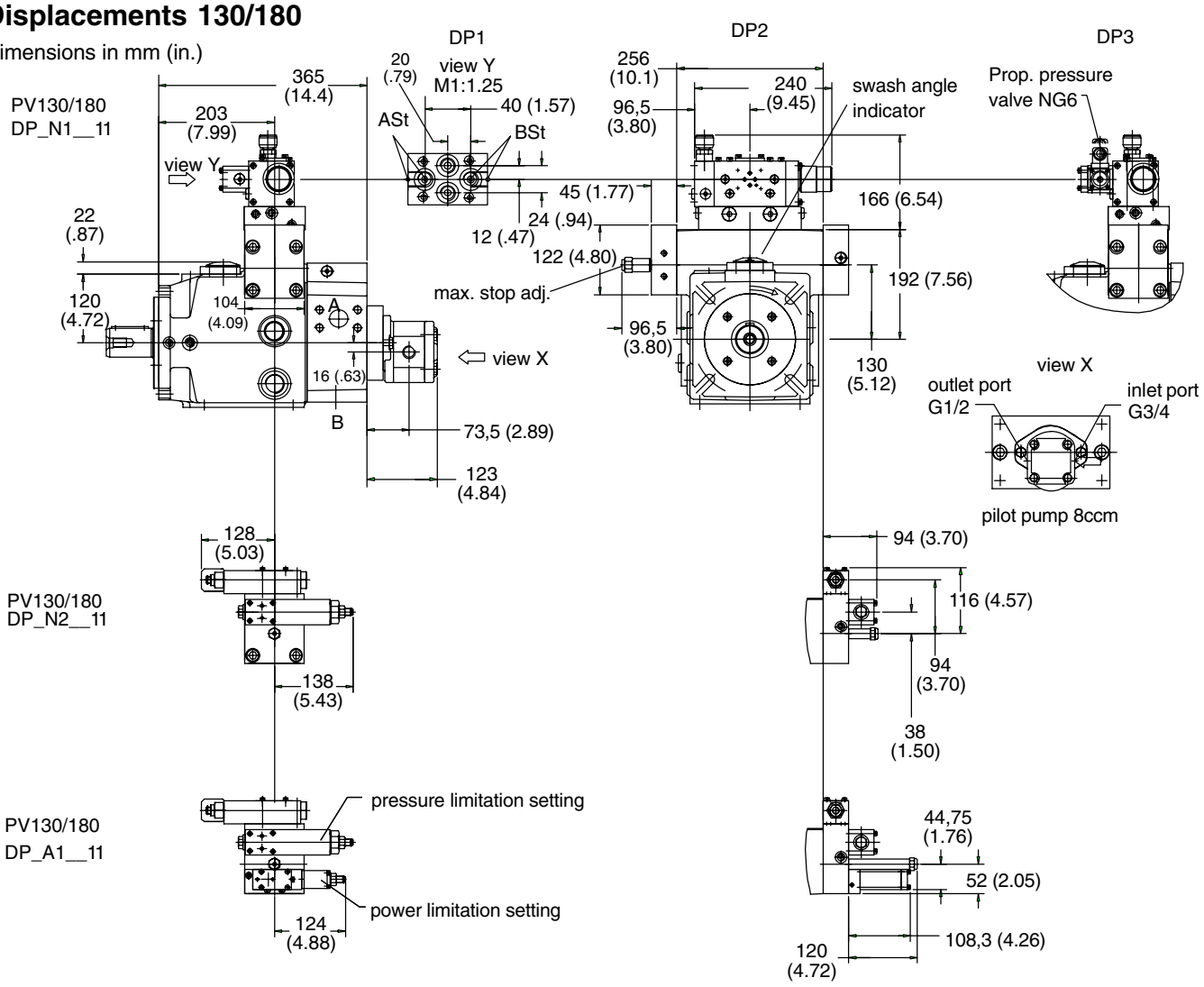
SM Controls
Displacements 130/180

Dimensions in mm (in.)



DP Controls
Displacements 130/180

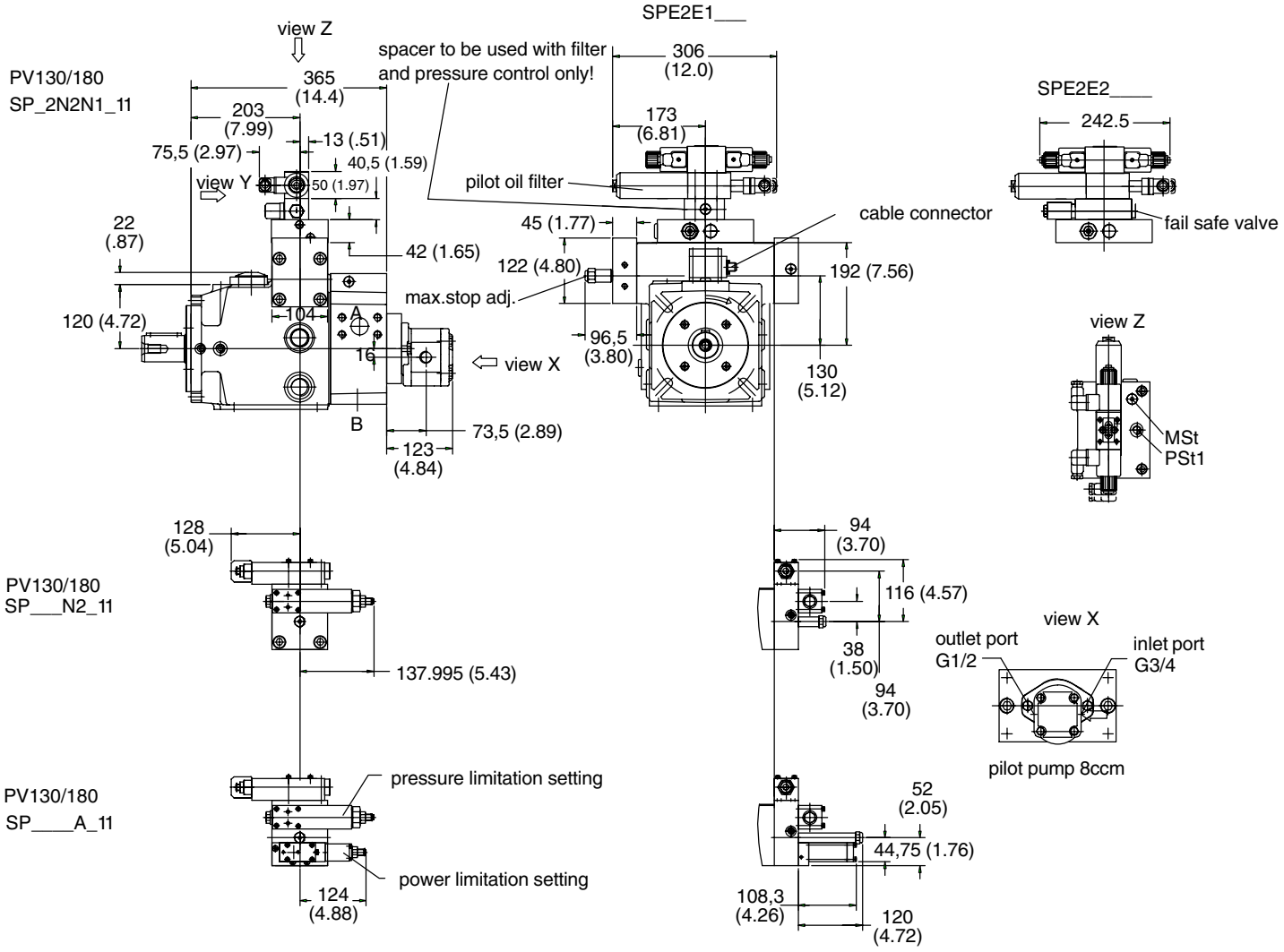
Dimensions in mm (in.)



Installation Dimensions – controls

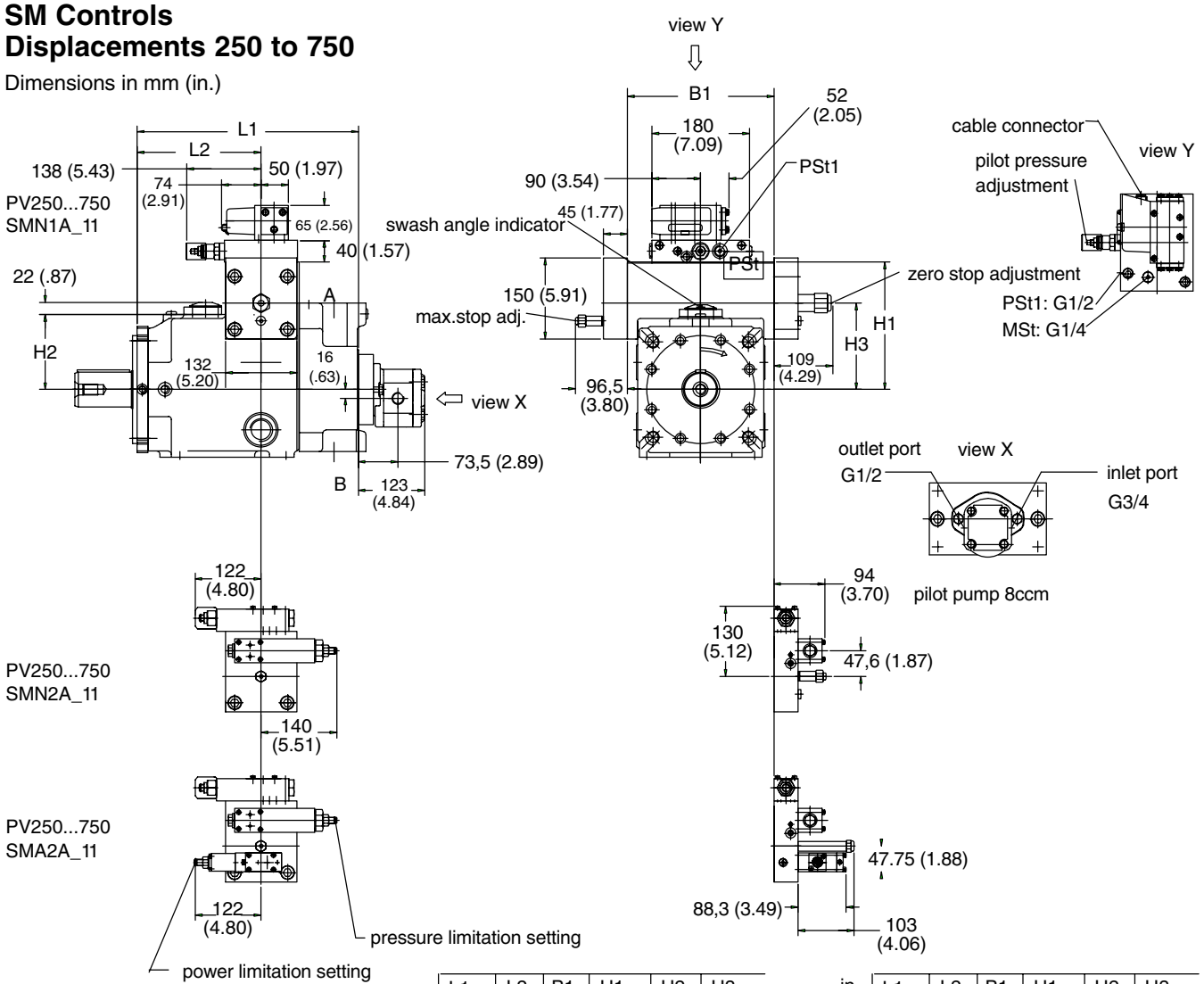
SP Controls
Displacements 130/180

Dimensions in mm (in.)



SM Controls
Displacements 250 to 750

Dimensions in mm (in.)



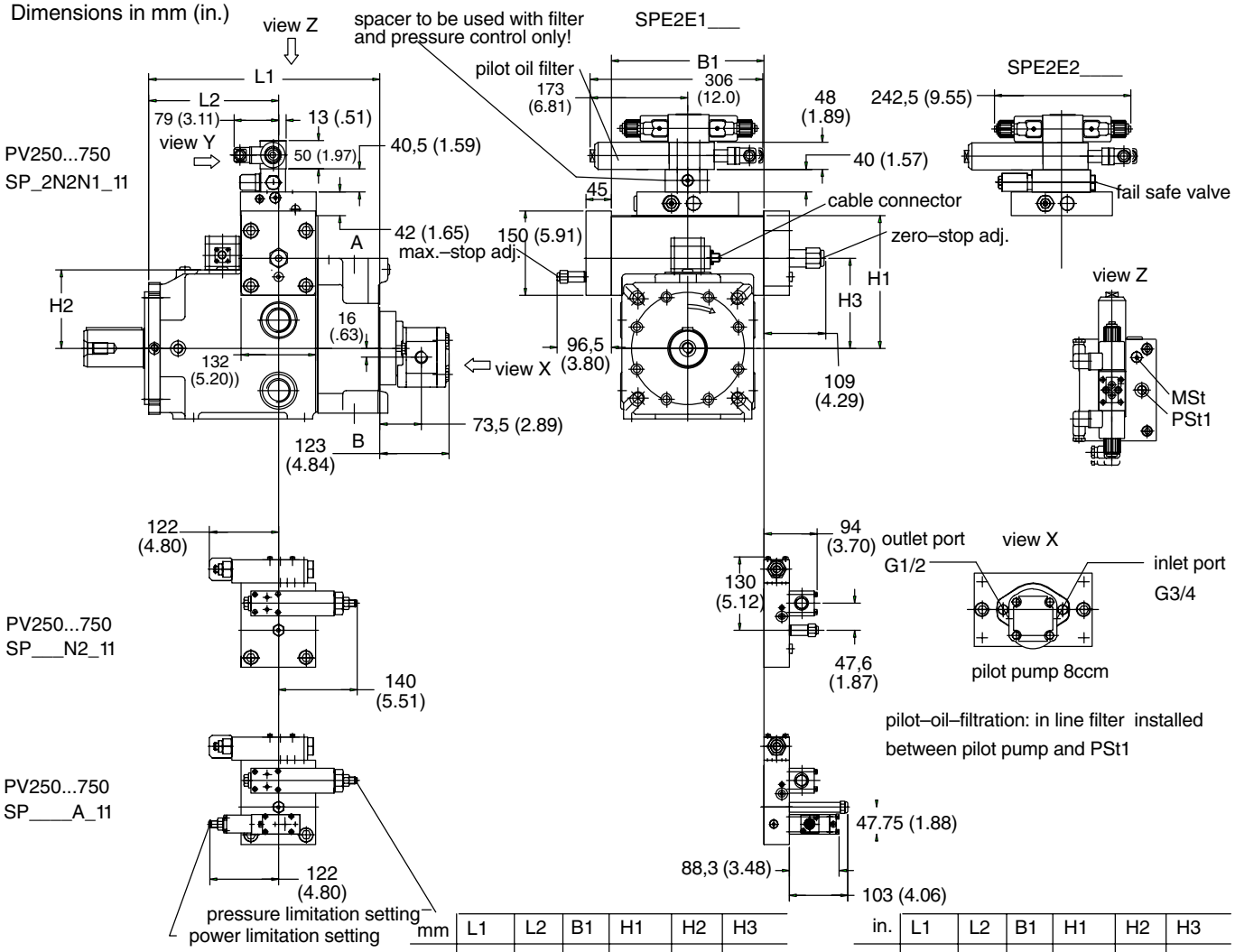
mm	L1	L2	B1	H1	H2	H3
250	410	230	271	236	135	160
360	426	230	285	236	135	160
500	541.5	300	330	267.5	172	186
750	571	307	372	270	172	188.5

in.	L1	L2	B1	H1	H2	H3
250	16.1	9.06	10.7	9.29	5.31	6.30
360	16.8	9.06	11.2	9.29	5.31	6.30
500	21.3	11.8	13.0	10.5	6.77	7.32
750	22.5	12.1	14.6	10.6	6.77	7.42

Installation Dimensions – controls

SP Controls
Displacements 250 to 750

Dimensions in mm (in.)

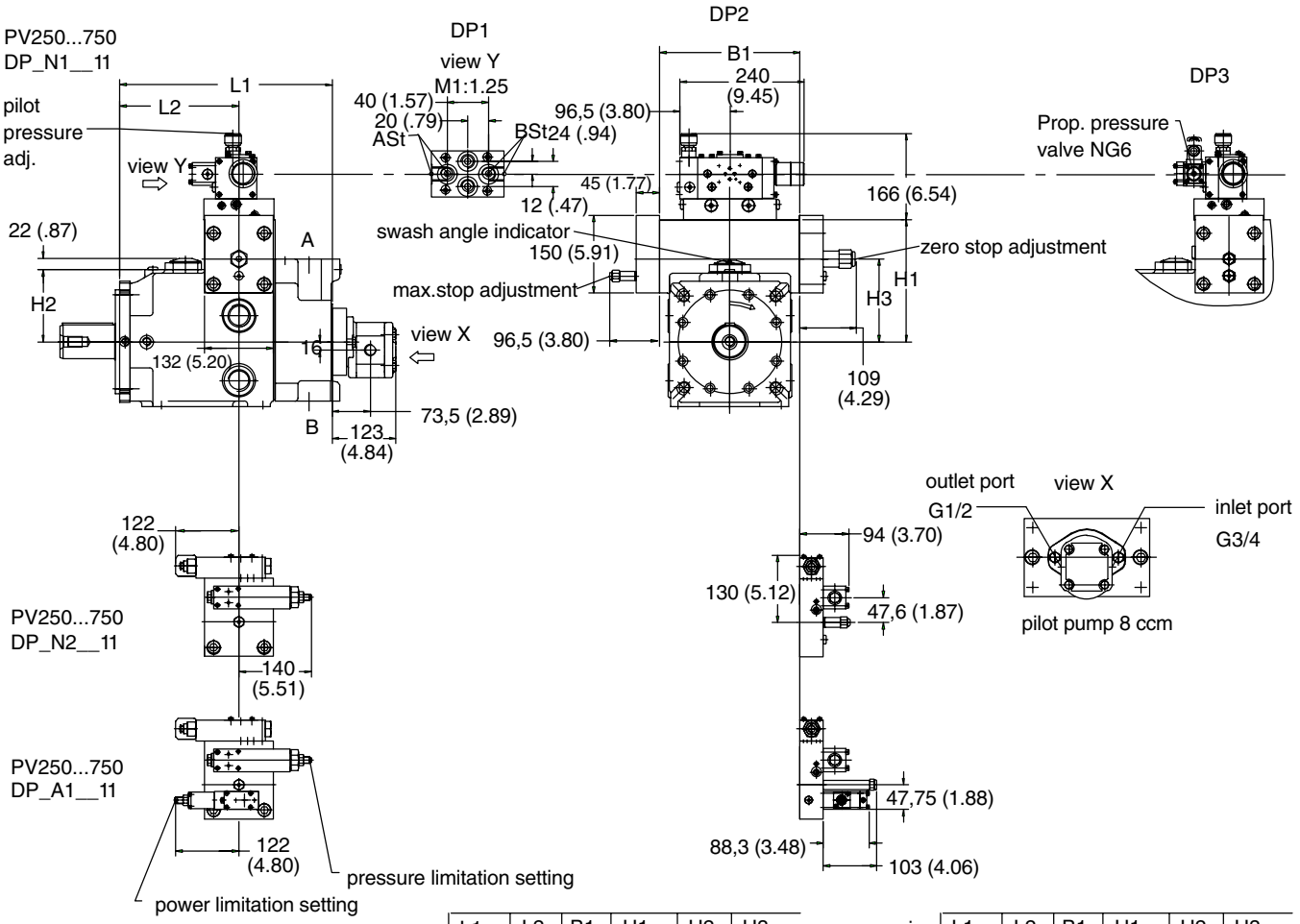


mm	L1	L2	B1	H1	H2	H3
250	410	230	271	236	135	160
360	426	230	285	236	135	160
500	541.5	300	330	267.5	172	186
750	571	307	372	270	172	188.5

in.	L1	L2	B1	H1	H2	H3
250	16.1	9.06	10.7	9.29	5.31	6.30
360	16.8	9.06	11.2	9.29	5.31	6.30
500	21.3	11.8	13.0	10.5	6.77	7.32
750	22.5	12.1	14.6	10.6	6.77	7.42

DP Controls
Displacements 250 to 750

Dimensions in mm (in.)



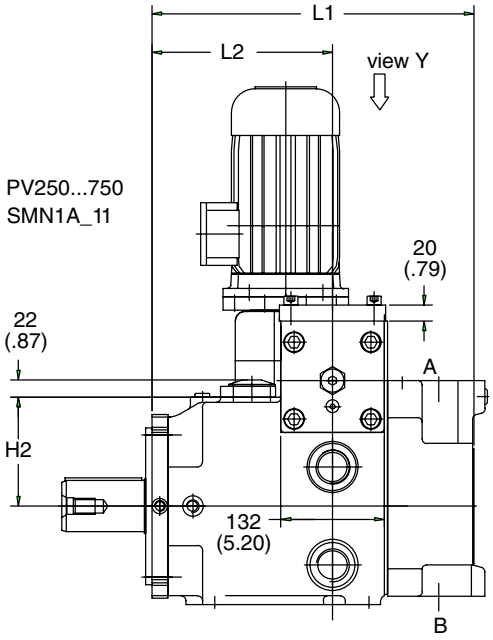
mm	L1	L2	B1	H1	H2	H3
250	410	230	271	236	135	160
360	426	230	285	236	135	160
500	541.5	300	330	267.5	172	186
750	571	307	372	270	172	188.5

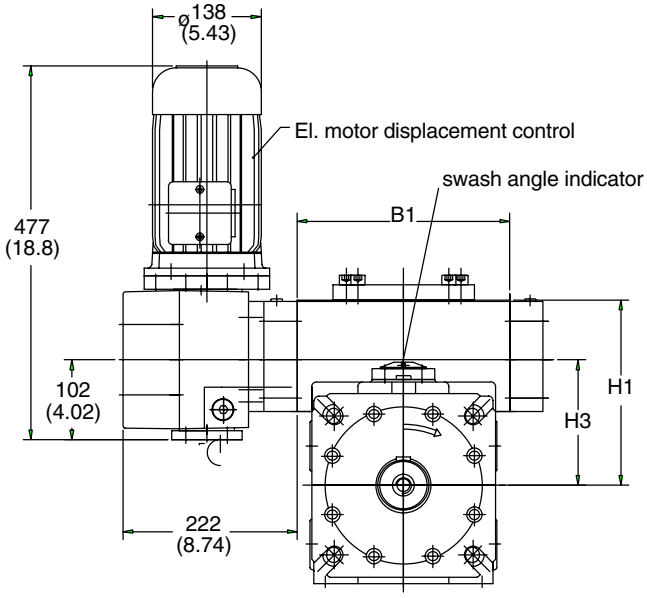
in.	L1	L2	B1	H1	H2	H3
250	16.1	9.06	10.7	9.29	5.31	6.30
360	16.8	9.06	11.2	9.29	5.31	6.30
500	21.3	11.8	13.0	10.5	6.77	7.32
750	22.5	12.1	14.6	10.6	6.77	7.42

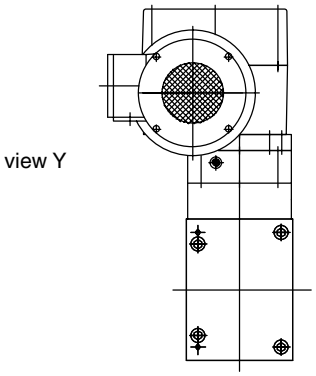
Installation Dimensions – controls

ES Control
Displacements 130 to 750

Dimensions in mm (in.)







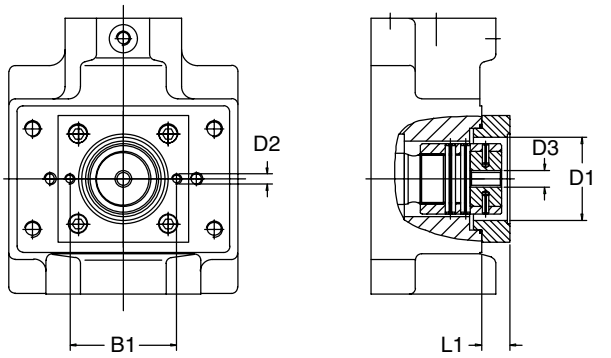
mm	L1	L2	B1	H1	H2	H3
130	–	–	–	–	–	–
180	–	–	–	–	–	–
250	410	230	271	236	135	160
360	426	230	285	236	135	160
500	541.5	300	330	267.5	172	186
750	571	307	372	270	172	188.5

in.	L1	L2	B1	H1	H2	H3
130	–	–	–	–	–	–
180	–	–	–	–	–	–
250	16.1	9.06	10.7	9.29	5.31	6.30
360	16.8	9.06	11.2	9.29	5.31	6.30
500	21.3	11.8	13.0	10.5	6.77	7.32
750	22.4	12.1	14.6	10.6	6.77	7.42

PV130 to 750

Dimensions in mm (in.)

SAE"A, B, C" Pump 130 to 750

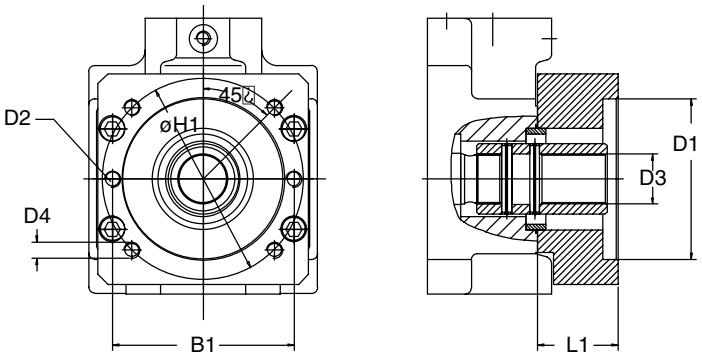


		B1	D1	D2	D3	L1
BG 130/180	SAE"A"	106 (4.17)	82.55 (3.25)	M10	16/32DP–9T	28 (1.10)
	SAE"B"	146 (5.75)	101,6 (4.00)	M12	16/32DP–13T	28 (1.10)
	–	–	–	–	–	–

BG 250/360	SAE"A"	106 (4.17)	82.55 (3.25)	M10	16/32DP–9T	28 (1.10)
	SAE"B"	146 (5.75)	101,6 (4.00)	M12	16/32DP–13T	28 (1.10)
	SAE"C"	181 (7.13	127 (5.00)	M16	12/24DP–14T	28 (1.10)

BG 500/750	SAE"A"	106 (4.17)	82.55 (3.25)	M10	16/32DP–9T	28 (1.10)
	SAE"B"	146 (5.75)	101,6 (4.00)	M12	16/32DP–13T	28 (1.10)
	SAE"C"	181 (7.13)	127 (5.00)	M16	12/24DP–14T	28 (1.10)

ISO–125...250 Pump 130 to750



extra bores for two bolt–flange

		B1	D1	D2	D3 [DIN5480]	D4	H1	L1
BG 130/180	ISO–125	180 (7.09)	125 (4.92)	M16	N40x1.25x10a	M12	160 (6.30)	48 (1.89)
	ISO–160	–	160 (6.30)	–	N50x1.25x10a	M16	200 (7.87)	48 (1.89)

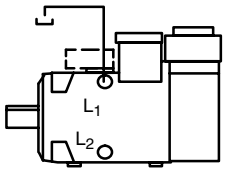
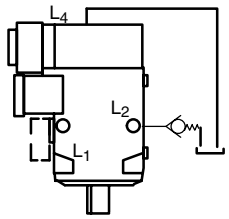
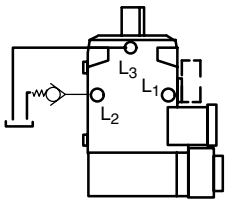
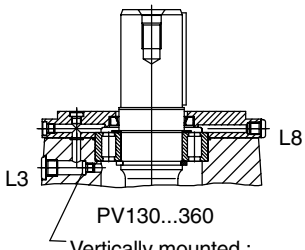
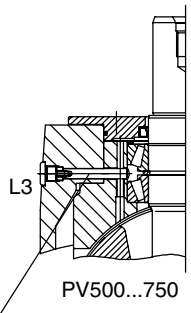
BG 250/360	ISO–125	180 (7.09)	125 (4.92)	M16	N40x1.25x10a	M12	160 (6.30)	92 (3.62)
	ISO–160	–	160 (6.30)	–	N50x1.25x10a	M16	200 (7.87)	92 (3.62)
	ISO–200	–	200 (7.87)	–	N62x1.25x10a	M20	250 (9.84)	92 (3.62)

BG 500/750	ISO–125	180 (7.09)	125 (4.92)	M16	N40x1.25x10a	M12	160 (6.30)	75 (2.95)
	ISO–160	–	160 (6.30)	–	N50x1.25x10a	M16	200 (7.87)	75 (2.95)
	ISO–200	–	200 (7.87)	–	N62x1.25x10a	M20	250 (9.84)	75 (2.95)
	ISO–250	–	250 (9.84)	–	N80x3x28x10a	M24	315 (12.4)	75 (2.95)

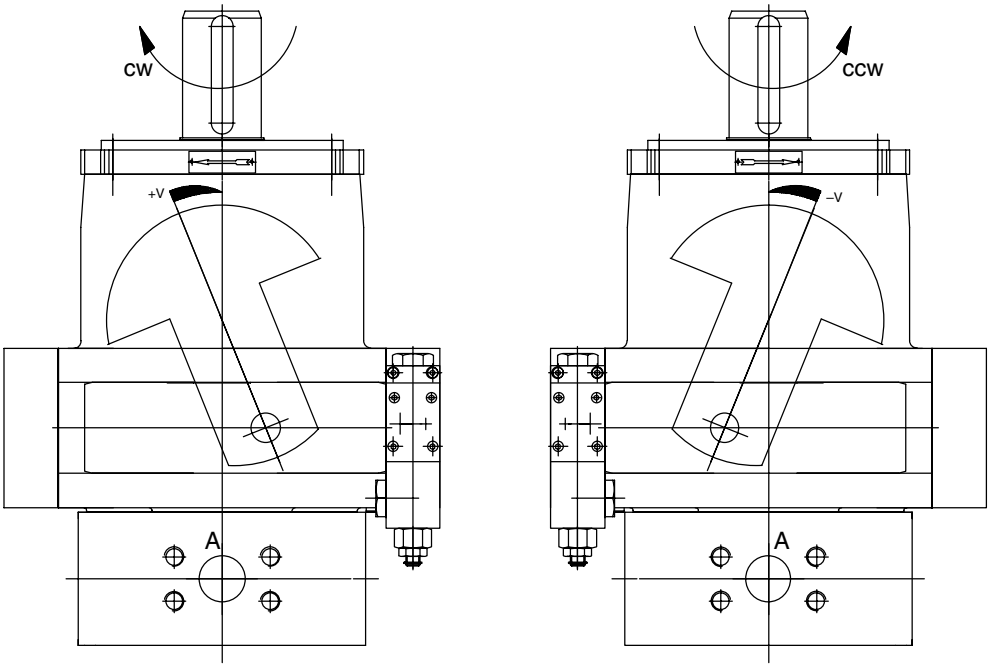
Application Data

Installation position

Installation position is optional however note bearing lubrication with respect to mounting position.

Installation position	Drain piping	Installation position	Drain piping
Shaft horizontal Pump can be rotated freely about the lateral axis Use the highest overflow oil outlet, L_1 or L_2		Shaft pointing downwards Use ventilation line L_4 (Available upon request). Prime main overflow oil outlet L_2 (L_1) with 0,2 bar (2.9 psi).	
Shaft pointing upwards Use ventilation line L_3. Pre load drain port overflow oil outlet L_2 (L_1) with 0,2 bar (2.9 psi).		 Vertically mounted : Internal connection closed with plug G1/8 L3 used as venting port Horizontally mounted : Internal connection open L3 plugged	 Internal connection closed with pin no. 40.6082.1014–01 L8 used as venting port Internal connection open L3 plugged

Swash Plate Angle & Flow Direction



Case flushing requirements

Case flushing is not necessary for open loop pumps with DR or LR controls.

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

Case flushing is not necessary for open loop pumps with DF controls if flushing or return oil is drained via the case.

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

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

Flushing flow

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

Fluids

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

NOTE:

1. All maximum speed figures are based on atmospheric pressure (1.0 bar absolute) at pump inlet. This requires an overhead reservoir.
2. All listed ratings are based on the use of a good quality fluid.
3. Alternative fluids have a reduced tolerance for contamination over petroleum base fluids. Good filtration is therefore critical.

Pressure and flow ratings of hydraulic components generally have to be reduced when alternative fluids are used.

Because hydraulic pumps depend on the pumping fluid for dynamic lubrication, it is necessary to alter the ratings in order to retain the durability and operating life that is expected in today's hydraulic systems.

These pumps will provide exceptional life when used with a good quality clean fluid at the pump ratings specified for that fluid.

Fluid maintenance is critical to the durability of all hydraulic components, and particularly so woth hydraulic pumps. 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 pumps are rated for anti-wear petroleum fluids with a contamination level of 18/15/13 (Vickers) or ISO 18/14. 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 Vickers representative for specific duty cycle recommendations.

Vickers 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 satisfactory 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 Vickers publication 561 – "Vickers Guide to Systemic Contamination Control" – available from your local Vickers 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 designations of items required; see "Model codes" section of this catalog.

Note the following:
– Designations 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. Operature Temperature °C
Oil-in-Water Emulsion	HFAE	Not Rated			
Water-in-Oil Emulsion	HFB	250	1800	Nitrile	49
Water Glycol	HFC	250	1800	Nitrile	49
Phosphate Ester	HFDR	350 / 420	1800	Fluorocarbon	66
Polyol Ester	HFDU	350 / 420	1800	Fluorocarbon or High ACN Nitrile	66