

## VARIABLE DISPLACEMENT PUMP H(S)P-10V

### SERIES 31



- Industrial & Mobile, Single & Thru Shaft Models, H(S)P-10V
- 18, 28, 45, 71, 100 & 140 Frame Sizes Available
- Same Day Shipment of Units or Parts Orders
- DR, DRG, DFR, DFRI, DFLR Controls
- SAE & Metric Units

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

## SERIES 31

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#### RANGE OF PRODUCTS

25

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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### TECHNICAL DATA

1. Input operating pressure range

Absolute pressure at port S (A)

- P<sub>abs</sub> min.....0.8bar (12 psi)
- P<sub>abs</sub> max.....30bar (435 psi)

2. Output operating pressure range

Pressure at port B

- Nominal pressure P<sub>N</sub>.....280bar (4000 psi)
- Peak pressure P<sub>max</sub>.....350bar (5100 psi)
- Pressure data to DIN24312

3. Case drain pressure

Maximum pressure of leakage fluid ( at ports L, L1 ). Maximum 7 psi ( 0.5 bar ) higher than input pressure at port S, but not higher than 30 psi ( 2 bar ) absolute.

4. Direction of flow : ( S to B )

5. Table of values (theoretical values, without considering  $\eta_{mh}$  and  $\eta_v$  ; values rounded)

Size cm <sup>3</sup> /rev			18	28	45	71	100	140
Displacement	V <sub>g</sub> max	cm <sup>3</sup> /rev (in <sup>3</sup> /rev)	18 (1.10)	28 (1.71)	45 (2.75)	71 (4.33)	100 (6.1)	140 (8.54)
Max. Speed	N <sub>o</sub> max	rpm	3300	3000	2600	2200	2000	1800
Max. Flow	O <sub>o</sub> max	L / min (gpm)	59.4 (15.7)	84 (22)	117 (31)	156 (41)	200 (53)	252 (67)
Max. Power	P <sub>o</sub> max	kW (HP)	28 (36.6)	39 (51)	55 (72)	73 (96)	93 (124)	118 (156)
Max. Torque @ V <sub>g</sub> max, N <sub>o</sub> max	T <sub>max</sub>	Nm (ft - lb)	80 (58)	125 (91)	200 (146)	316 (230)w	445 (324)	623 (453)
Weight (without fluid)		Kg (lbs)	12 (27)	15 (33)	21 (46)	33 (73)	45 (99)	60 (132)

Notes: Values shown are valid for an absolute pressure of 1 bar at suction port. If the flow is reduced or if the inlet pressure is increased the speed may be increased.

6. Determination of size

$$\text{Flow } q_v = \frac{V_g \cdot n \cdot \eta_v}{231} \quad [\text{gpm}] \quad \left( q_v = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad [\text{L/min}] \right)$$

$$\text{Torque } T = \frac{V_g \cdot \Delta p}{24 \cdot \pi \cdot \eta_{mh}} \quad [\text{lb-ft}] \quad \left( T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} \quad [\text{Nm}] \right)$$

$$\text{Power } P = \frac{q_v \cdot \Delta p}{1714 \cdot \eta_t} \quad [\text{HP}] \quad \left( P = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t} \quad [\text{kW}] \right)$$

$V_g$  = Displacement per revolution in in<sup>3</sup> (cm<sup>3</sup>)  
 $\Delta p$  = Differential pressure in psi (bar)  
 $n$  = Speed in rpm (min<sup>-1</sup>)  
 $\eta_v$  = Volumetric efficiency  
 $\eta_{mh}$  = Mechanical-hydraulic efficiency  
 $\eta_t$  = Total efficiency

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

## SERIES 31

### ORDERING CODE

H(S)P-10V	O	71	DR	/	31	R	-	P	S
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#### Axial Piston Unit

Swash plate variable pump	HP-10V
Swash plate variable pump for industrial	HSP-10V

#### Mode of Operation

Pump, open circuit	O
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#### Size

Displacement $V_{gmax}$	$cm^3/rev$	18	28	45	71	100	140
	$(in^3/rev)$	(1.10)	(1.71)	(2.75)	(4.33)	(6.10)	(8.54)

#### Control Devices

Pressure control	●	●	●	●	●	●	DR
Pressure remote control							DRG
Pressure and flow control	●	●	●	●	●	●	DFR
Pressure & flow (w/ X port blocked)							DFR1
Pressure, Flow & Power control	●	●	●	●	●	●	DFLR

#### Series

Series	31
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#### Direction of Rotation

Viewed from shaft end	clockwise	R
	counter-clockwise	L

#### Seals

Buna-N (NBR per DIN ISO 1629) ;	P
FPM (fluorocarbon)	V

#### Shaft End

	18	28	45	71	100	140	
SAE-splined shaft	●	●	●	●	●	●	S
SAE-splined shaft, reinforced (higher thru drive torque)	●	●	●	●	-	-	R
SAE splined shaft, smaller size (not for pumps with thru drive)	●	-	●	●	●	-	U
SAE- splined shaft, reinforced (U-type shaft)	●	●	●	●	●	-	W
SAE- keyed shaft	●	●	●	●	●	●	K
Parallel with key DIN 6885	●	●	●	●	●	●	P

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

## SERIES 31

### ORDERING CODE

C	62	N00
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Through drives				18	28	45	71	100	140	
Without through drive (Non-Thru Drive)				●	●	●	●	●	●	N00
With through drive to accept an axial piston pump or a gear pump										
Mounting flange SAEJ744 hub sealing to mount										
82-2 (A)	3/4" keyed (A-B)	axial	H(S)P-10V18 (K)	○	●	●	●	●	●	K40 <sup>1)</sup>
101-2 (B)	7/8" keyed (B)	axial	H(S)P-10V28 (K)	-	●	●	●	●	●	K03 <sup>1)</sup>
101-2 (B-B)	1" keyed (B-B)	axial	H(S)P-10V45 (K)	-	-	●	●	●	●	K05 <sup>1)</sup>
127-2 (C)	1-1/4" keyed (C)	axial	H(S)P-10V71 (K)	-	-	-	●	●	●	K08 <sup>1)</sup>
127-2 (C)	1-1/2" keyed (C)	radial	H(S)P-10V100 (K)	-	-	-	-	●	●	K38 <sup>1)</sup>
152-4 (D)	1-3/4" keyed (D)	axial	H(S)P-10V140 (K)	-	-	-	-	-	●	K21 <sup>1)</sup>
82-2 (A)	5/8" 9T (A)	axial	H(S)P-10V18(U)	●	●	●	●	●	●	K01
82-2 (A)	3/4" 11T (A-B)	axial	H(S)P-10V18(S,R), 10(S)	●	●	●	●	●	●	K52
101-2 (B)	7/8" 13T (B)	axial	H(S)P-10V28(S,R), 45(U,W)	-	●	●	●	●	●	K68/K02
101-2 (B)	1" 15T (B-B)	axial	H(S)P-10V45(S,R), 60(U,W)	-	-	●	●	●	●	K04
127-2 (C)	1-1/4" 14T (C)	axial	H(S)P-10V71(S,R), 100 (U,W)	-	-	-	●	●	●	K07/K15
127-2 (C)	1-1/2" 17T (C-C)	axial	H(S)P-10V100(S,R), 85(S)	-	-	-	-	●	●	K24
152-4 (D)	1-3/4" 13T (D)	axial	H(S)P-10V140(S,R)	-	-	-	-	-	●	K17

<sup>1)</sup> Permitted with reduced thru drive torque

See Thru Drives section for other options

### Service Ports

(Pressure port B and Suction port S)

	18	28	45	71	100	140	
Rear ports, UNC mounting screws		●	●	●	●	-	61
Opposite side ports, UNC mounting screws	●	●	●	●	●	●	62
Rear ports, metric mounting screws		●	●	●	-	-	11
Opposite side ports, metric mounting screws		●	●	●	●	●	12
Rear ports, UNC mounting screws		-	-	●	-	-	91
Opposite side ports, UNC mounting screws		-	-	●	-	-	92
Rear ports, metric mounting screws				●		-	41
Opposite side ports, metric mounting screws		-	-	●	-	-	42

Ports 61, 11, 91 & 41 non-through drive only

### Mounting Flange

	18	28	45	71	100	140	
SAE 2 hole	●	●	●	●	●	-	C
ISO 2 hole 3019-2	●	●	●	●	●	-	A
SAE 4 hole	-	-	-	-	-	●	D
ISO 4 hole 3019-2	-	-	-	-	-	●	B

● = available  
○ = in preparation  
- = not available

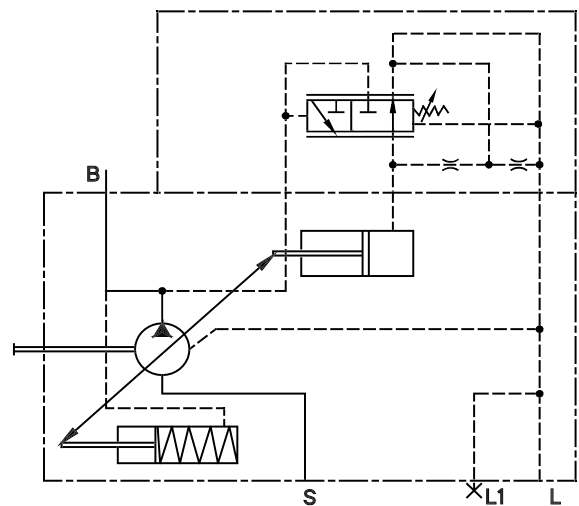
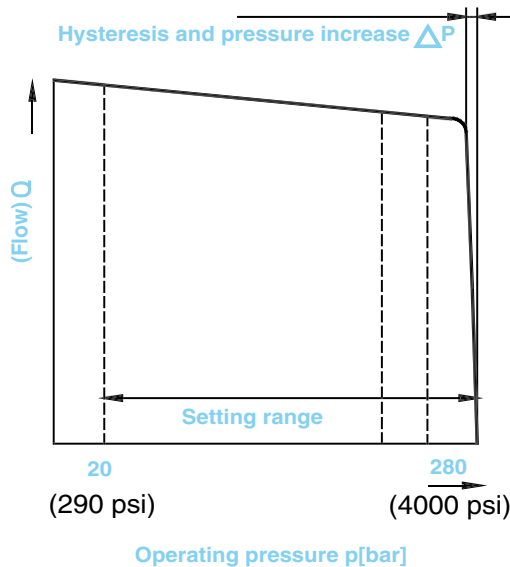
# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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### DR PRESSURE CONTROL

The pressure control serves to maintain a constant pressure in the hydraulic system within the control range of the pump. The pump therefore supplies only the amount of hydraulic fluid required by the actuators. Pressure may be smoothly set at the pilot valve.

Static characteristic  
( at  $n_1 = 1450\text{rpm}$  ;  $t_{oil} = 50^\circ\text{C}$  )  $122^\circ\text{F}$



#### Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

### CONTROL DATA

Hysteresis and repetitive accuracy  $\Delta p$ ..... max. 3 bar (45 psi)

Size		18	28	45	71	100	140
$\Delta p$	Bar (psi)	4 (58)	4 (58)	6 (87)	8 (116)	10 (145)	12 (174)

Pilot oil consumption.....max. approx. 3 L/min (0.8 gpm)

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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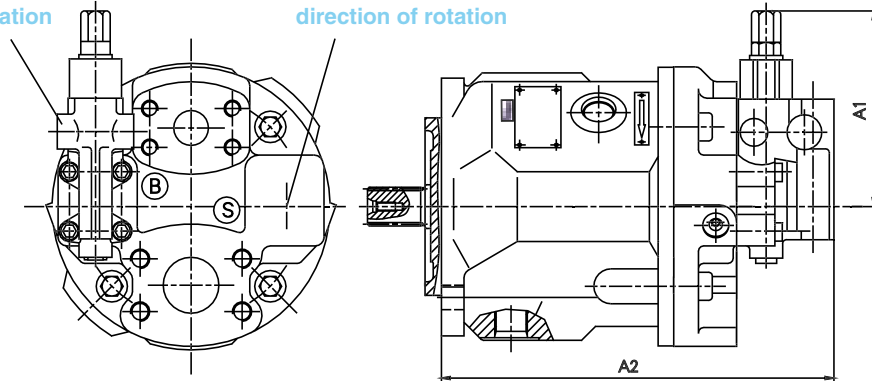
### UNIT DIMENSIONS DR

SERVICE PORTS AT REAR; MODELS 61N00 AND 11N00

Sizes 18 to 140

Mounting of pilot valve for clockwise direction of rotation

Mounting of pilot valve for anticlockwise direction of rotation



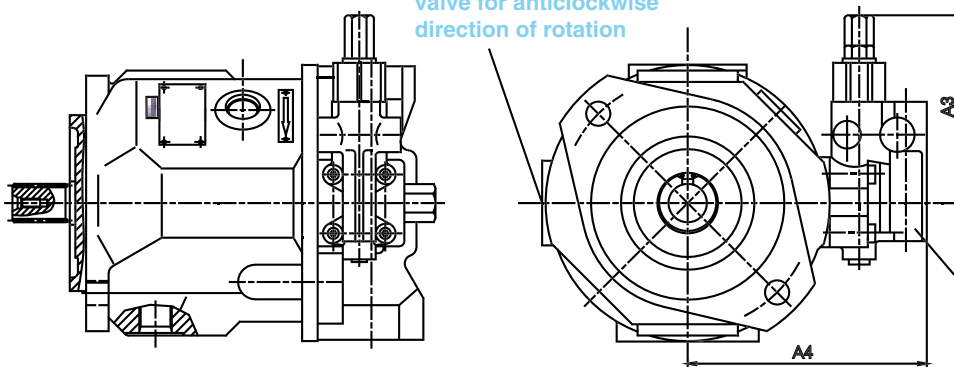
### UNIT DIMENSIONS DR

SERVICE PORTS ON SIDE; MODELS 62N00 AND 12N00

Sizes 18 to 140

Mounting of pilot valve for anticlockwise direction of rotation

Mounting of pilot valve for clockwise direction of rotation



Sizes	A1 mm (in)	A2 mm (in)	A3 mm (in)	A4 mm (in)
18	110 (4.33")	-	105 (4.13")	126 (4.96")
28	108.5 (4.27")	226.2 (8.91")	108.5 (4.27")	136 (5.35")
45	108.5 (4.27")	245 (9.65")	108.5 (4.27")	146 (5.75")
71	106 (4.17")	279 (10.98")	108.5 (4.27")	160 (6.3")
100	108.5 (4.27")	344 (13.54")	108.5 (4.27")	158 (6.22")
140	126 (4.964")	-	127 (5.0")	169 (6.65")

# VARIABLE DISPLACEMENT PUMP H(S)P-10V

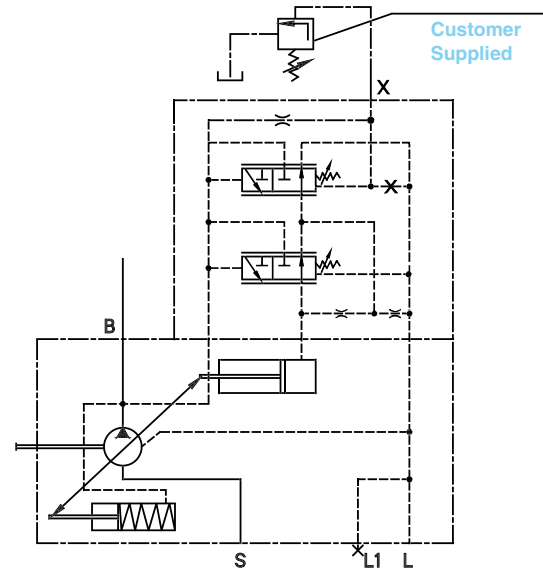
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### DRG PRESSURE CONTROL, REMOTE CONTROL

Function and design for DRG.

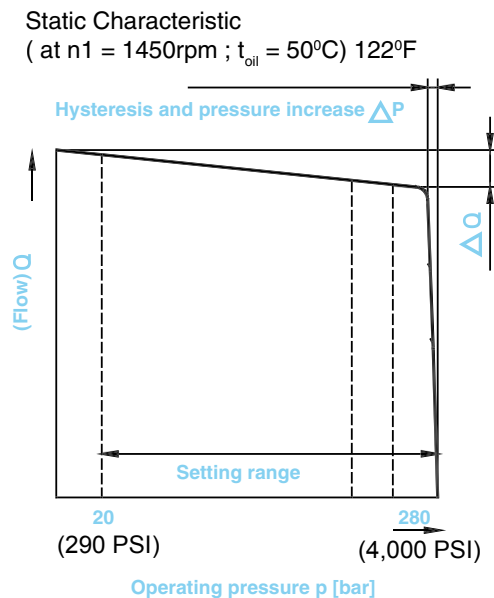
A pressure relief valve may be externally piped to port X for remote control purposes. It is not, however, included with DRG control.

The differential pressure at the pilot valve is set as standard to 20 bar (290 psi) and this results in a pilot flow of (0.4gpm) 1.5 L/min. If another setting is required (in the range 10-22 bar), please state this in clear text.



#### Ports

<b>B</b>	Pressure port
<b>S</b>	Suction port
<b>L, L1</b>	Case drain ports (L1 sealed)
<b>X</b>	Pilot pressure port



### CONTROL DATA

Hysteresis and repetitive accuracy p.....max 3 bar (45 psi)

Max. pressure increases

Size		18	28	45	71	100	140
$\Delta p$	Bar (psi)	4 (58)	4 (58)	6 (87)	8 (116)	10 (145)	12 (174)

Pilot oil consumption.....max. approx. 4.5 L/min(1.19gpm)



# VARIABLE DISPLACEMENT PUMP H(S)P-10V

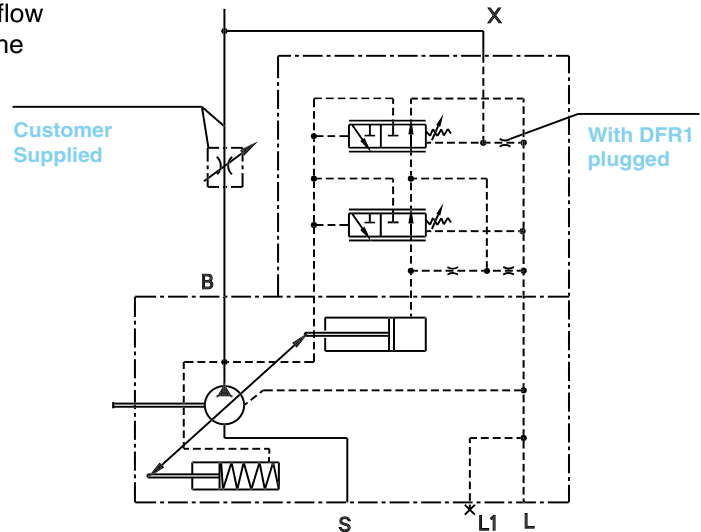
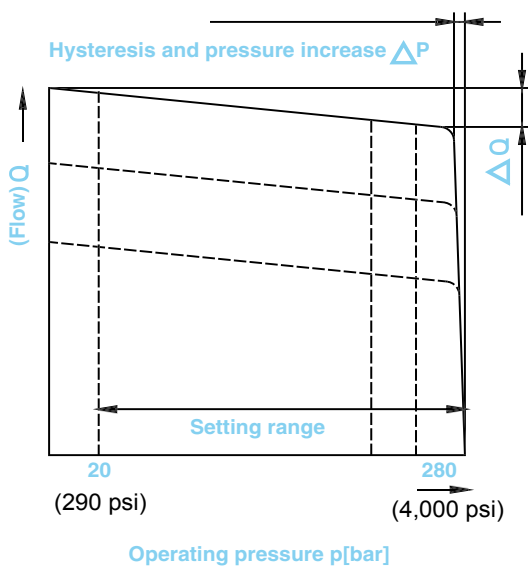
## SERIES 31

### DFR/DFR1 PRESSURE/FLOW CONTROL

In addition to the pressure control function, the pump flow may be varied by means of a differential pressure at the actuator (e.g. an orifice).

In model DFR1 the X orifice is plugged.

Static Characteristic  
( at  $n_1 = 1450\text{rpm}$  ;  $t_{oil} = 50^\circ\text{C}$ )  $122^\circ\text{F}$



#### Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
X	Pilot pressure port

### FLOW CONTROL/DIFFERENTIAL PRESSURE

Standard setting: 14 bar (203psi). If a different setting is required, please state in clear text.

When port X is unloaded to tank, a zero stroke pressure ("stand by") of  $p = 18 \pm 2$  bar (260  $\pm$  30 psi) results.

### CONTROL DATA

For pressure control technical data see DR Pressure control

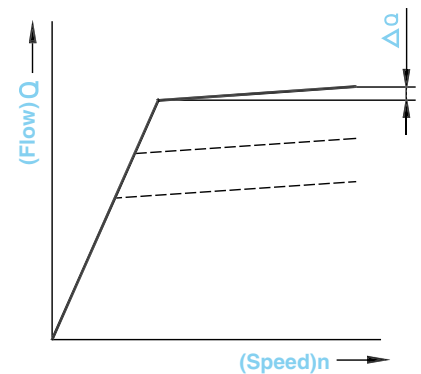
Max. flow deviation (hysteresis and increase) measured at drive speed  $n = 1450$  rpm

Size	18	28	45	71	100	140
▲ $Q_{max}$ (gpm) L/min	0.9 (0.24)	1.0 (0.26)	1.8 (0.48)	2.8 (0.74)	4.0 (1.06)	6.0 (1.6)

Pilot oil consumption DFR.....max. approx. 3-4, 5 L/min (0.70-1.19 gpm)

Pilot oil consumption DFR1.....max. approx. 3 L/min (0.70 gpm)

Static characteristic at variable speed



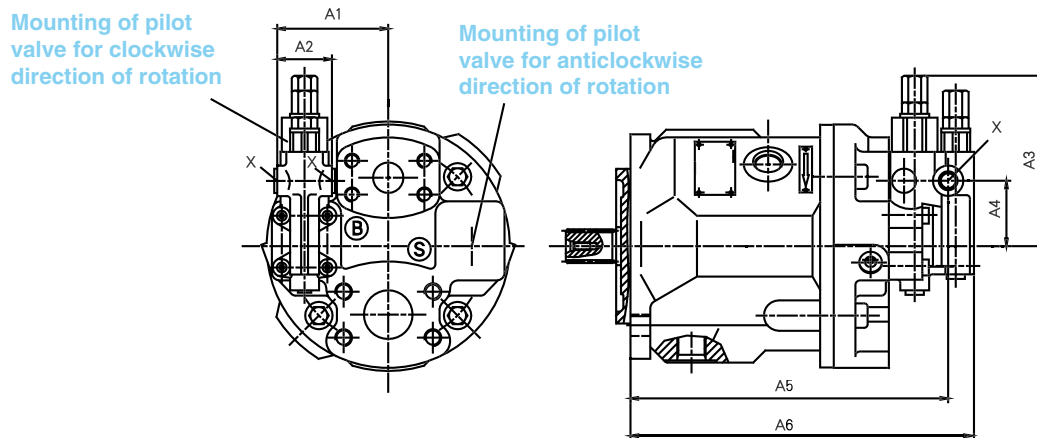
# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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### UNIT DIMENSIONS DFR / DFRI / DRG

SERVICE PORTS AT REAR; MODELS 61N00 AND 11N00

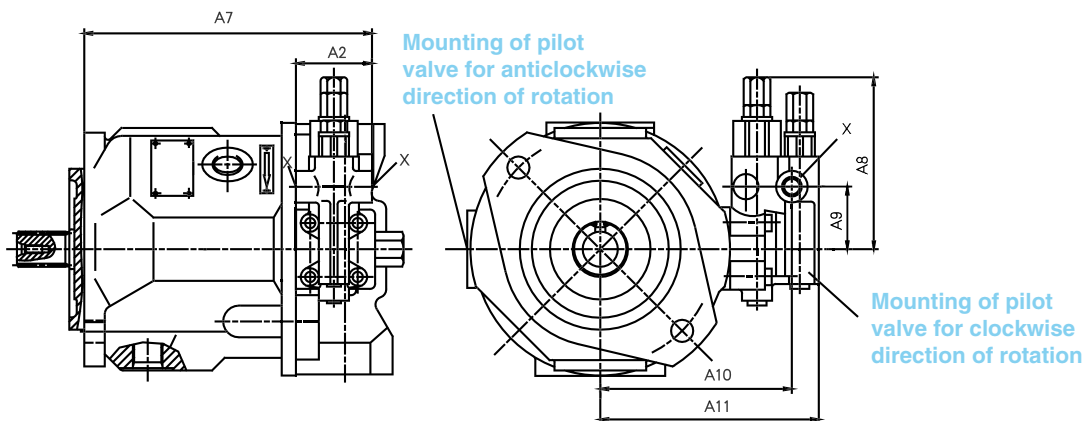
Sizes 18 to 140



### UNIT DIMENSIONS DFR / DFRI / DRG

SERVICE PORTS ON SIDE; MODELS 62N00 AND 12N00

Sizes 18 to 140



Sizes mm (in)	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	X
18	-	36(1.42)	-	-	-	-	166(6.54)	105(4.13)	40(1.57)	109(4.29)	126(4.96)	7/16-20UNF-2B
28	73(2.87)	36(1.42)	108.5(4.27)	43(1.69)	209.2(8.23)	226.2(8.9)	176(6.9)	108.5(4.27)	40(1.57)	119(4.69)	136(5.35)	7/16-20UNF-2B
45	82 (3.21)	36(1.42)	108.5(4.27)	40(1.57)	229(8.98)	245(9.65)	191(7.5)	108.5(4.27)	40(1.57)	129(5.08)	146(5.75)	7/16-20UNF-2B
71	91 (3.60)	36(1.42)	106(4.17)	42(1.65)	262(10.31)	279(10.98)	219(8.6)	108.5(4.27)	40(1.57)	143(5.63)	160(6.30)	7/16-20UNF-2B
100	96.3 (3.79)	36(1.42)	108.5(4.27)	40(1.57)	327(12.87)	344(13.54)	287(11.3)	108.5(4.27)	40(1.57)	141(5.55)	158(6.22)	7/16-20UNF-2B
140	140 (5.51)	36(1.42)	-	27(1.06)	353(13.9)	379(14.92)	258(10.16)	127(5.0)	27(1.06)	183(7.2)	209(8.23)	9/16-18UNF-2B

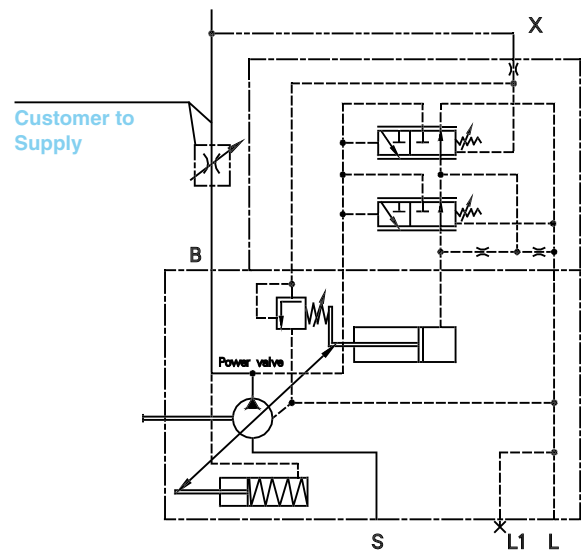
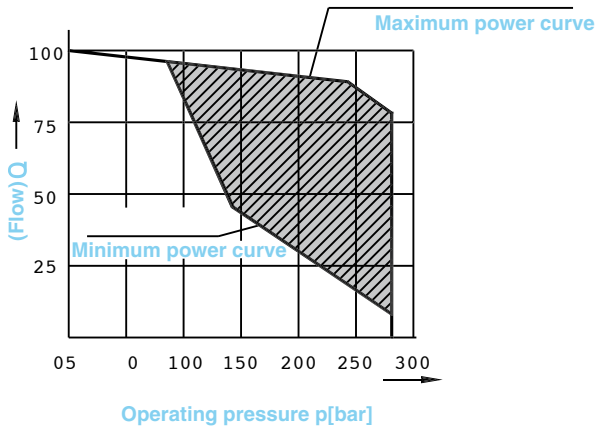
# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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### DFLR PRESSURE / FLOW / POWER CONTROL

In order to achieve a constant drive torque with a varying operating pressure, the swivel angle and with it the output flow from the axial piston unit is varied so that the product of flow and pressure remain constant.

Flow control is possible below the limit of the power curve.



**Ports**

<b>B</b>	Pressure port
<b>S</b>	Suction port
<b>L, L1</b>	Case drain ports (L1 sealed)
<b>X</b>	Pilot pressure port

The power characteristic is factory - set, so please enter details in clear text, e.g. 20kW at 1450 rpm (5HP, 1800RPM).

### CONTROL DATA

For pressure control technical data see DR Pressure control.  
 For flow control technical data see DFR control.

Start of control.....from 80 bar (1,160 psi)  
 Pilot oil consumption.....max. approx. 5.5 L/min (1.45 gpm)

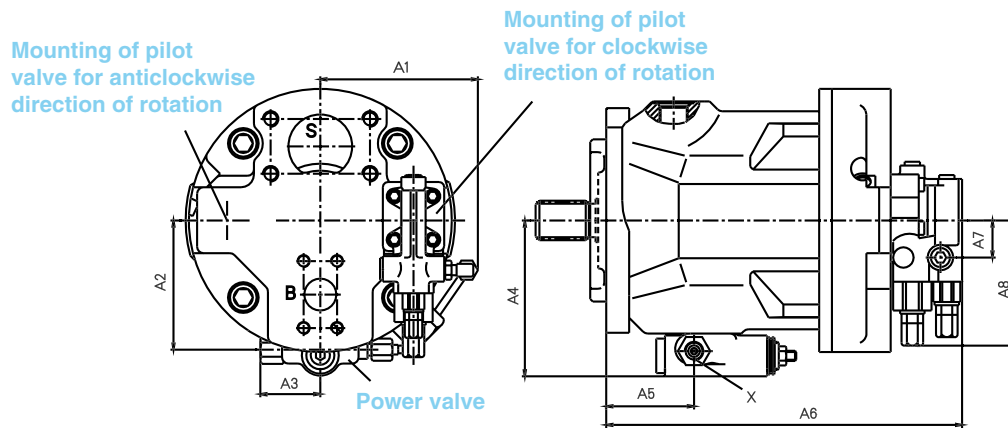
# VARIABLE DISPLACEMENT PUMP H(S)P-10V

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### UNIT DIMENSIONS DFLR

SERVICE PORTS AT REAR; MODELS 61N00 AND 11N00

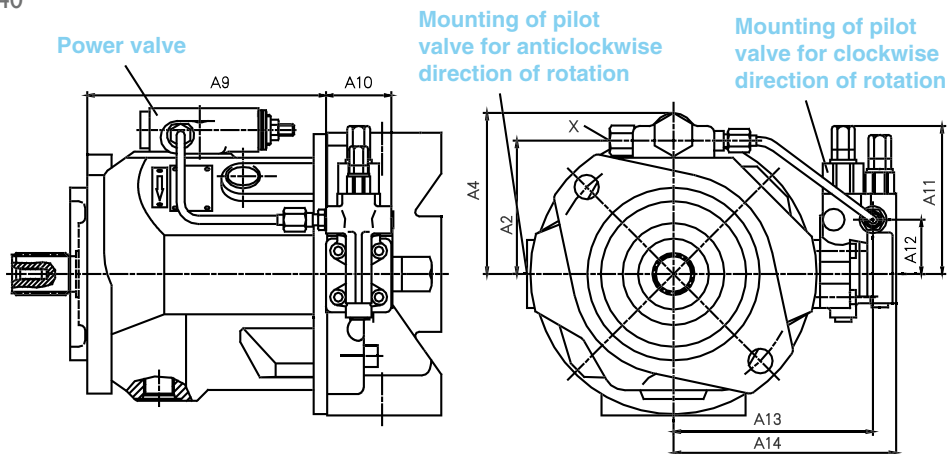
Sizes 18 to 140



### UNIT DIMENSIONS DFLR

SERVICE PORTS ON SIDE; MODELS 62N00 AND 12N00

Sizes 18 to 140



Sizes mm(in)	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	X
28	120(4.72)	87.5(3.44)	47(1.9)	108.5(4.27)	48(1.89)	226.2(8.9)	43(1.69)	108.5(4.27)	140(5.51)	36(1.42)	108.5(4.27)	40(1.57)	119(4.69)	136(5.35)	7/16-20UNF-2B x 0.39H
45	129(5.08)	92.8(3.65)	47(1.9)	112.5(4.43)	55(2.17)	245(9.65)	40(1.57)	108.5(4.27)	155(6.10)	36(1.42)	108.5(4.27)	40(1.57)	129(5.08)	146(5.75)	7/16-20UNF-2B x 0.39H
71	139(5.47)	103.5(4.07)	47(1.9)	124(4.88)	69(2.72)	279(10.98)	42(1.65)	106(4.17)	218.8(8.61)	36(1.42)	108.5(4.27)	40(1.57)	143(5.63)	160(6.30)	7/16-20UNF-2B x 0.39H
100	145(5.71)	112.6(4.43)	47(1.9)	132.5(5.22)	110.8(4.36)	344(13.54)	40(1.57)	108.5(4.27)	250(9.84)	36(1.42)	108.5(4.27)	40(1.57)	148(5.83)	165(6.50)	M14 x 1.5-6H
140	148(5.83)	140(5.51)	-	140(5.51)	99(3.90)	379(14.92)	209(8.23)	183(7.2)	-	-	127(5.00)	27(1.06)	183(7.29)	209(8.23)	9/16-18UNF-2B x 0.51H

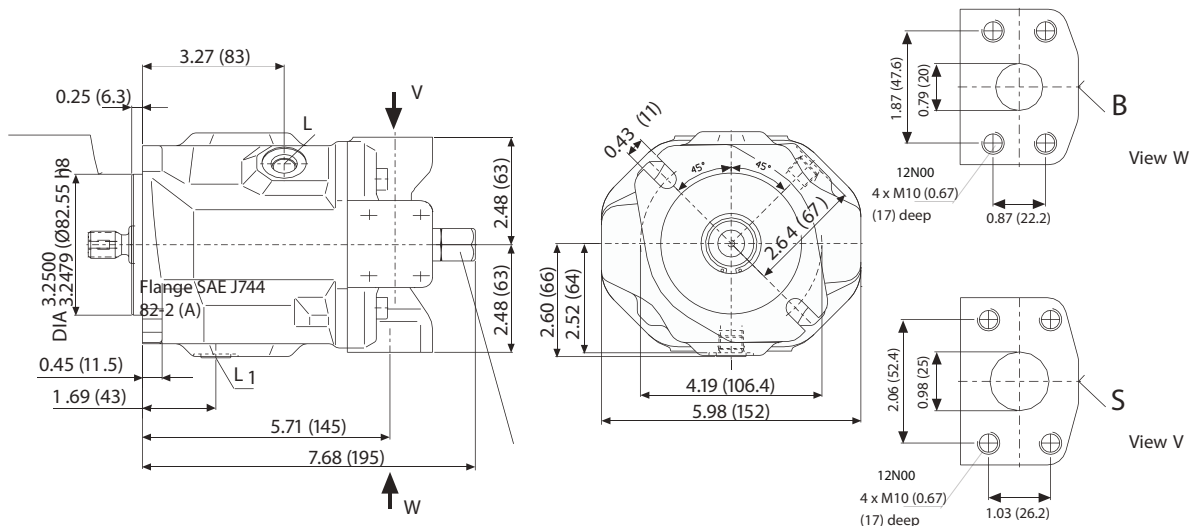
# MOUNTING DIMENSIONS, SIZE 18

## SERIES 31

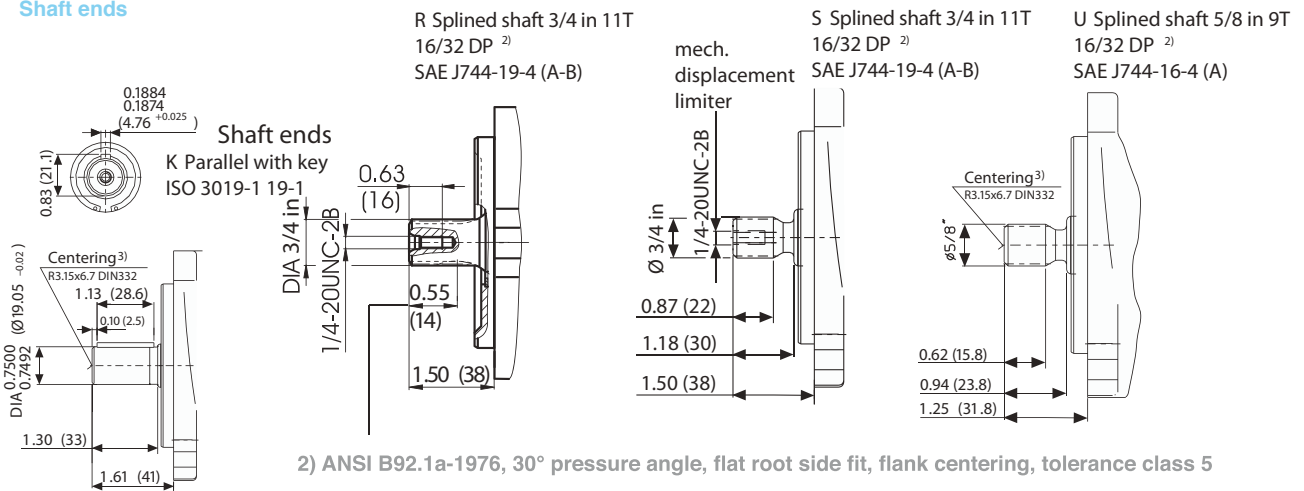
### H(S)P-10V18

SERVICE PORTS ON SIDE; NON THROUGH DRIVE, MODELS 62N00 AND 12N00

Without Considering Adjustment



#### Shaft ends



#### Ports

Designation	Port for	Standard	Size	Peak Pressure [psi (bar)]	Tightening Torque Max [lb-ft (Nm)]
B	Pressure port (standard pressure range) Threading in bolt holes	SAE J518 ISO 68	3/4 in 3/8-16 UNC-2B; 0.79 (20) deep	5100 (350)	29 (40)
S	Inlet (standard pressure range ) Threading in bolt holes	SAE J518 ISO 68	1 in 3/8-15 UNC-2B; 0.79 (20) deep	75 (5)	29 (40)
L, L <sub>1</sub>	Case drain (L <sub>1</sub> plugged)	ISO 11926	9/16-18 UNF-2B	30 (2)	59 (80)
X	Pilot Pressure	ISO 11926	7/16-20 UNF-2B; 0.39 (10) deep	5100 (350)	29 (40)
X	Control pressure for DG control	DIN 3852	R 1/4 in	1740 (120)	48 (70)

1) Dependent on the installation position, port L or L<sub>1</sub> must be connected

# MOUNTING DIMENSIONS, SIZE 28

## SERIES 31

### H(S)P-10V28

SERVICE PORTS AT SIDE AND REAR; NON THROUGH DRIVE

Without Considering Adjustment

