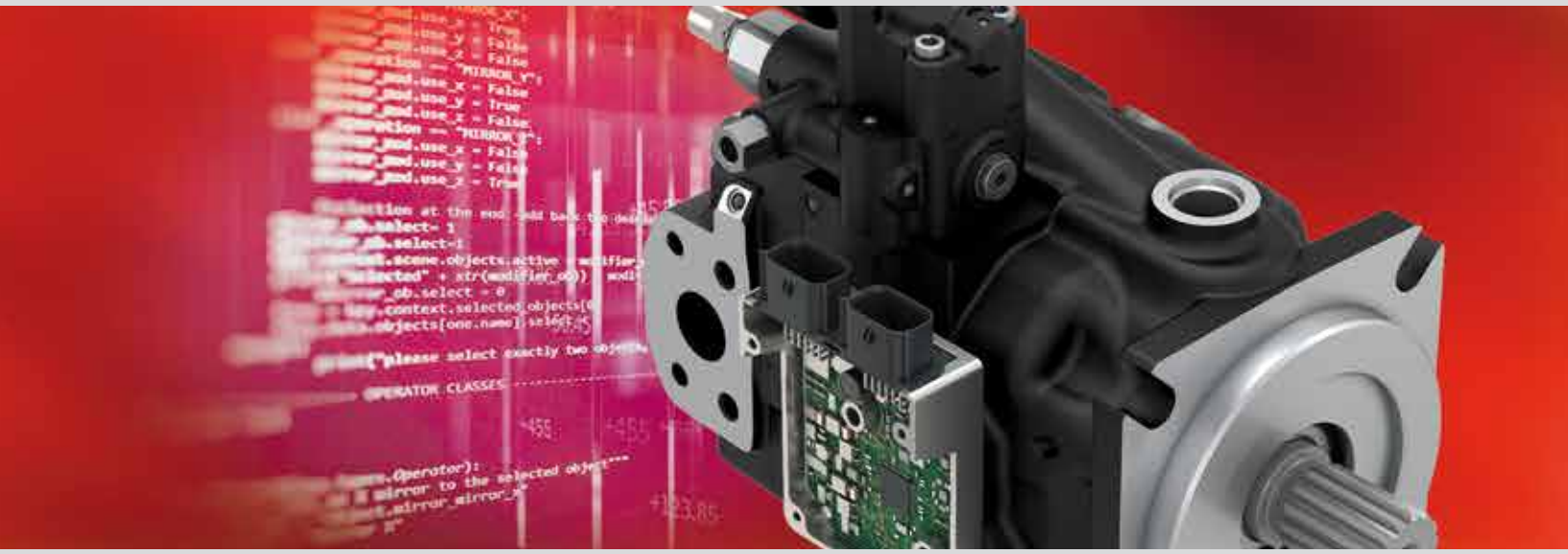
CASAPPA®
FLUID POWER DESIGN



CSP SYSTEM
CASAPPA SMART POWER SYSTEM

INDEX

Replaces: 02/02.2023

o 03/02.2024

o **Modification from former edition.**

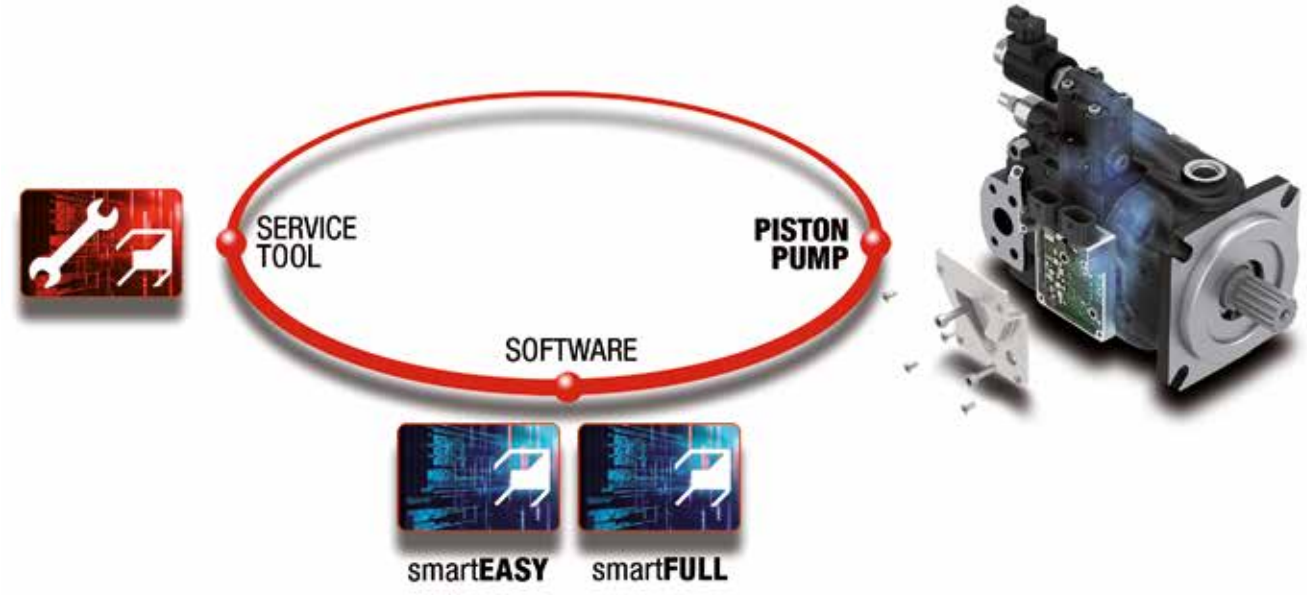
CSP - CASAPPA SMART POWER SYSTEM

Casappa Smart Power system is an evolution of the Load Sensing flow sharing system and allows to smartly manage the power of the machine hydraulic system.

Building & Construction • Material Handling - On-Highway - Agriculture

Optimization of the machine power management

Dgital transformation and upgrade of Load Sensing hydraulic control systems on mobile machines.



Software evolution

- **smartEASY & smartFULL**
  Availability of 2 different software logics

Hardware evolution

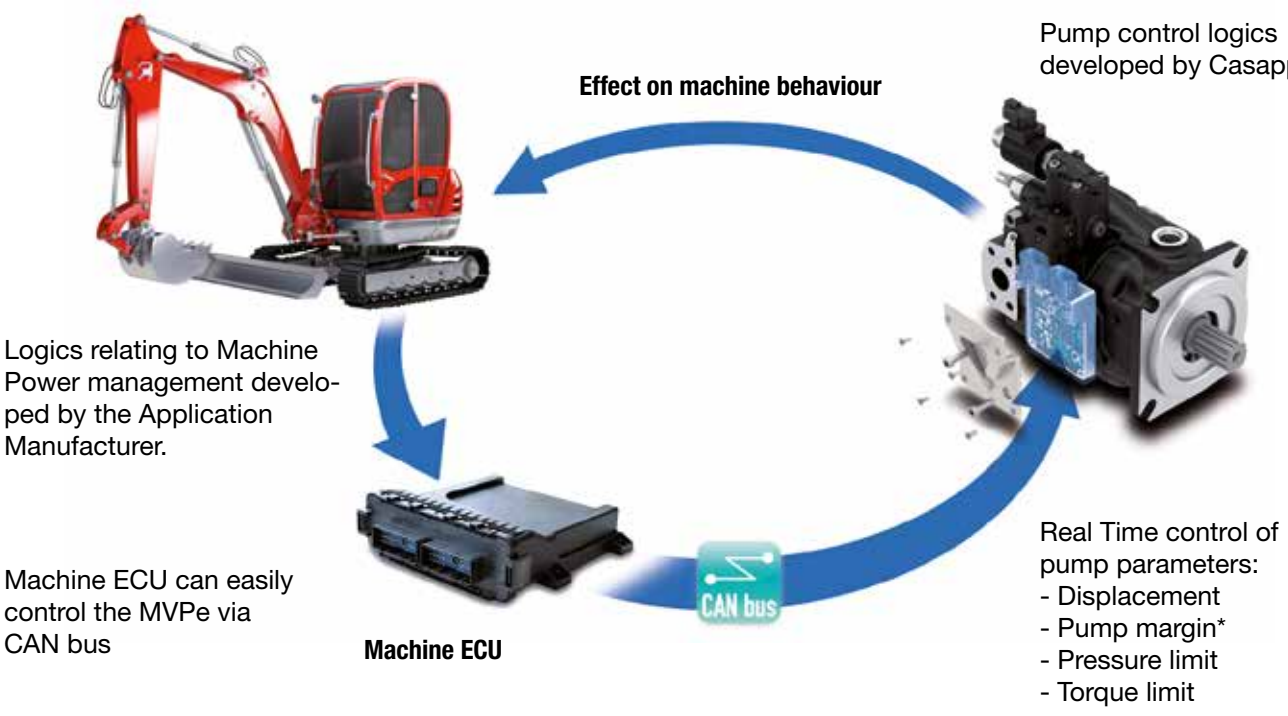
- Integration of **ECU** into the case
- **MVPe PISTON PUMP**

02/02.2023

smartEASY SOFTWARE

Pump control logics

The smartEASY software includes logics relating to real time pump control. These logics are developed by Casappa for the maximum efficiency, stability and reactivity of the pump. The logics relating to the power management strategies of the machine are freely defined and developed by the customer. The software developed by Casappa, thanks to the thorough knowledge of pump operation, ensures the optimal functioning of the pump and the maximum flexibility for the customer, since the MVPe can be easily controlled via CAN bus setpoints.



smartEASY SOFTWARE ADVANTAGES

Flexibility in controlling the pump.

- Easy interface with pump acting on different parameters (torque, pump margin*, pressure and displacement) to optimize the machine logics defined by customer.

Fine optimization of the pump functioning in relation to the desired behaviour of the machine.

- Confidence to interact with pump without compromising the pump optimal functioning.
- Accurate torque management thanks to Casappa hydraulic expertise (efficiency map).

* For this feature 2 pressure sensors (pump outlet pressure and Load Sensing pressure) are required.

Replaces: 02/02.2023

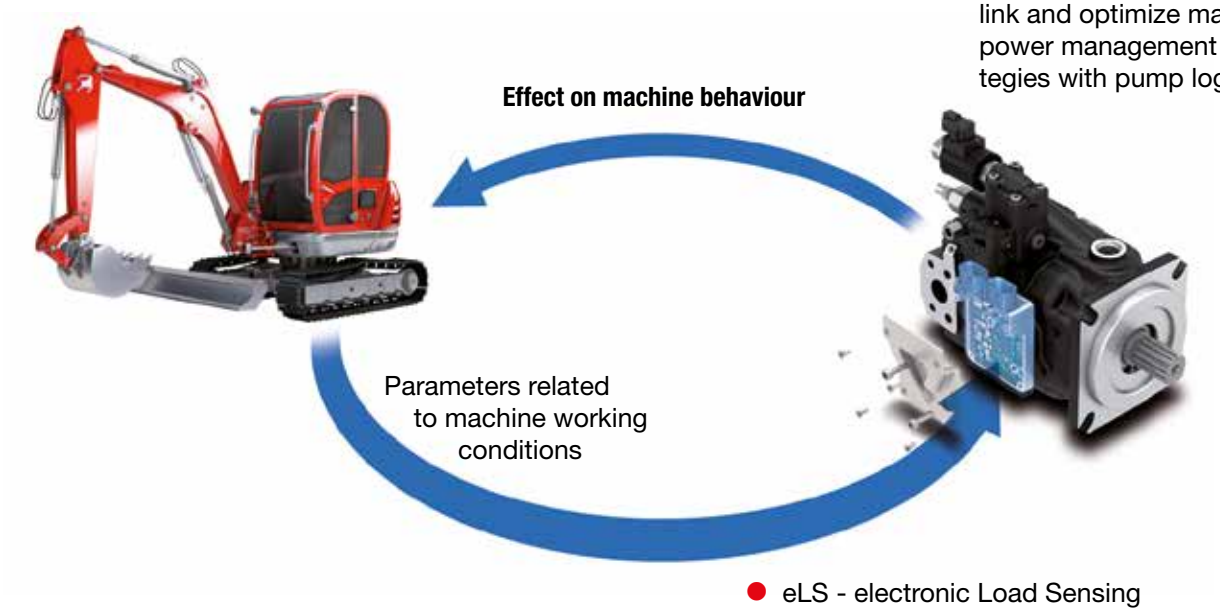
03/02.2024

smartFULL SOFTWARE

Replaces: 02/02.2023

Pump & System control logics

In addition to the pump logics, the smartFULL software also includes logics relating to the power management strategies of the machine.
These logics are developed by Casappa and customized in cooperation with customer. They define the optimal setpoints for the MVPe through different ready-to-use modules, which can be combined each other.
This software allows the definition of pump operation in relation to the desired behaviour of the machine, in terms of power management.
It uses ready-to-use software modules developed by Casappa thanks to its broaden experience in the field.



Ready-to-use modules developed by Casappa to link and optimize machine power management strategies with pump logics.

- eLS - electronic Load Sensing
- eAS - electronic AntiStall
- eTC - electronic Torque Control
- eATC - electronic Adaptive Torque Control
- Working Modes

smartFULL SOFTWARE ADVANTAGES

03/02.2024

Ready-to-use and already developed modules

- No need for CUSTOMER to invest in any logics development.

Optimization of the machine power management strategies with pump logics leading to:

- **SAVING**: possible better sizing of the engine and consequent machine cost savings.
- **USABILITY**: higher sensitivity in using the machine thanks to the electronic Load Sensing.
- **PRODUCTIVITY**: possibility to exploit full engine potential in terms of performances.
- **EMISSIONS**: optimum use of the engine and reduction of emissions thanks to electronic Torque Control.
- **FLEXIBILITY**: adaptability to different working conditions using the Working Modes module (Standard, Economy, Power, Personal).

smartFULL

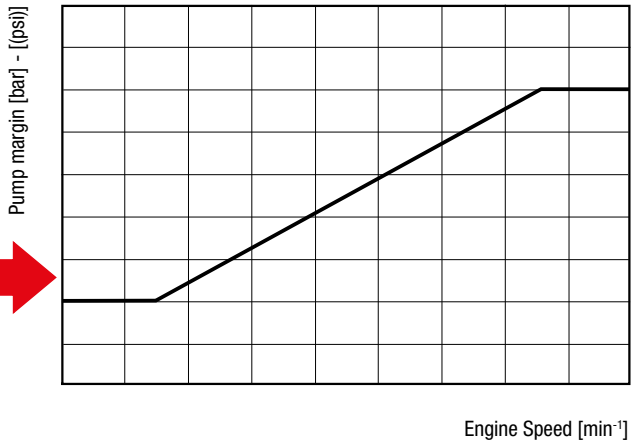
eLS - ELECTRONIC LOAD SENSING

Variable pump margin, controlled in closed loop, for maximum joystick sensitivity and adjustable machine velocity. For this feature 2 pressure sensors (pump outlet pressure and Load Sensing pressure) are required.

Hydraulic Load sensing: fixed setting

In an application with a hydraulic load sensing system, the setting of the LS regulator is fixed and represents a compromise between the speed of the machine and the wasted power.

Electronic Load Sensing: variable setting



Thanks to the eLS module, the pump flow will be functional to the real needs of the application at a given time. The controllability and maneuverability of the machine will be superior for low speed movements. At the same time the maximum flow rate will be greater, and therefore the speed of the movements will be higher when requested by the operator.

- The pump margin is controlled in closed loop by the ECU. The “speed” of the machine can be changed according to the working conditions.
- Accurate flow control.
- The maximum sensitivity of the joystick can always be maintained.
- Reduced pump margin for precise movement and less wasted power.
- Higher pump margin for higher movement speed.

01/08.2022

smartFULL eAS - ELECTRONIC ANTISTALL CONTROL

The Anti-stall function is suitable for wheeled machines, with power shared between the hydraulic circuit and the transmission. Both systems draw power from the engine, with priority given to the transmission. When the transmission is running, the power available to the hydraulic pump is limited and therefore the pump must be regulated accordingly.
By reading the information of the engine speed, the eAS monitors any drops: as the speed decreases with respect to the requested one (engine stall occuring), the pump displacement is reduced until the absorbed power does match the available power.

When the transmission stops running, all the available power can be drawn by the pump.

PHASE 1

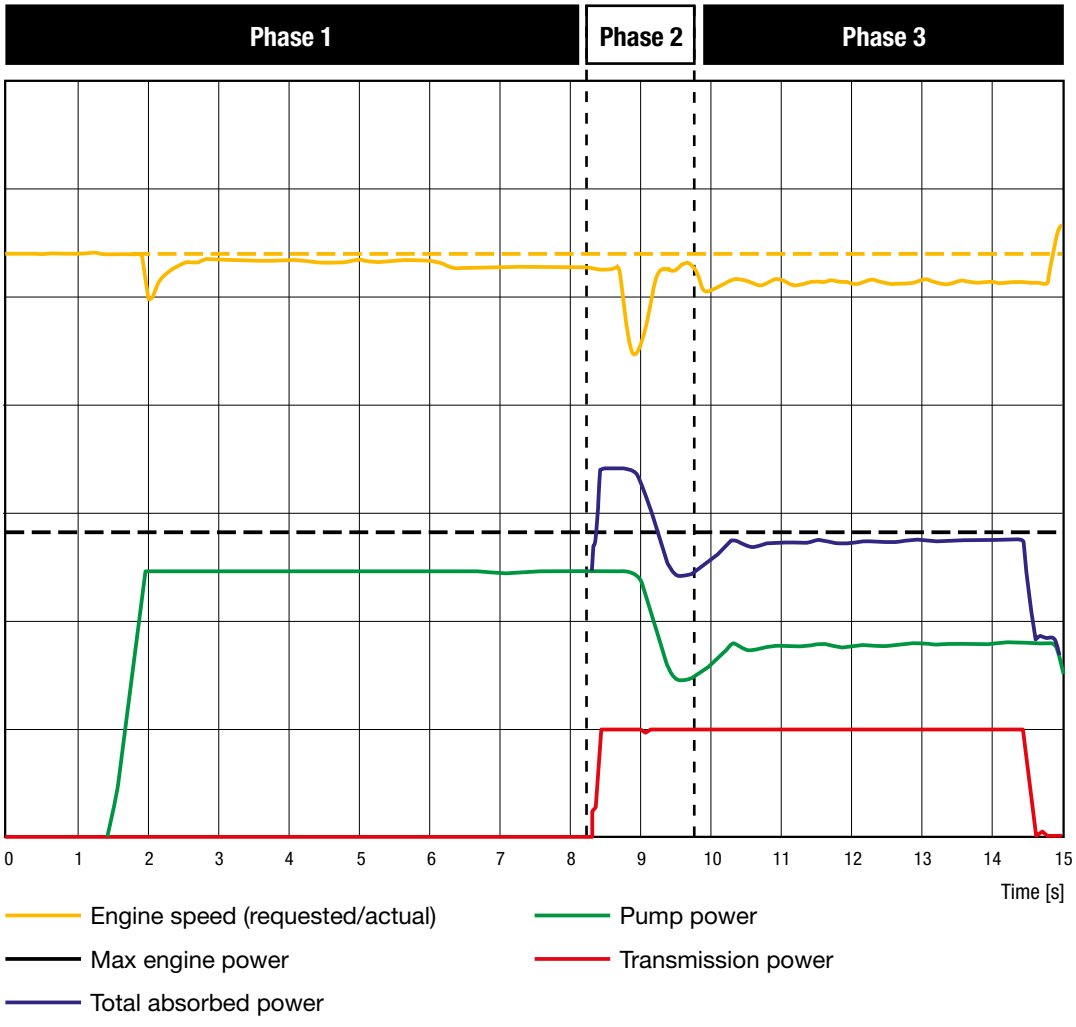
No power is absorbed by the transmission, the power absorbed by the pump is less than the total available from the motor.

PHASE 2

The transmission requests power and the sum with the power absorbed by the pump exceeds the total available. A decrease of the engine speed starts.

PHASE 3

The transmission has the priority. In order to avoid the engine stop, the electronic control reduces the pump displacement so that the total absorbed power is less than the total available power from the engine.



01/08.2022

smartFULL eTC - ELECTRONIC TORQUE CONTROL

Electronic torque control is suitable for crawler machines where the entire engine power is absorbed by the hydraulic pump. Compared to the hydraulic solution, the eTC module allows to exploit all the available torque in all the different working conditions.

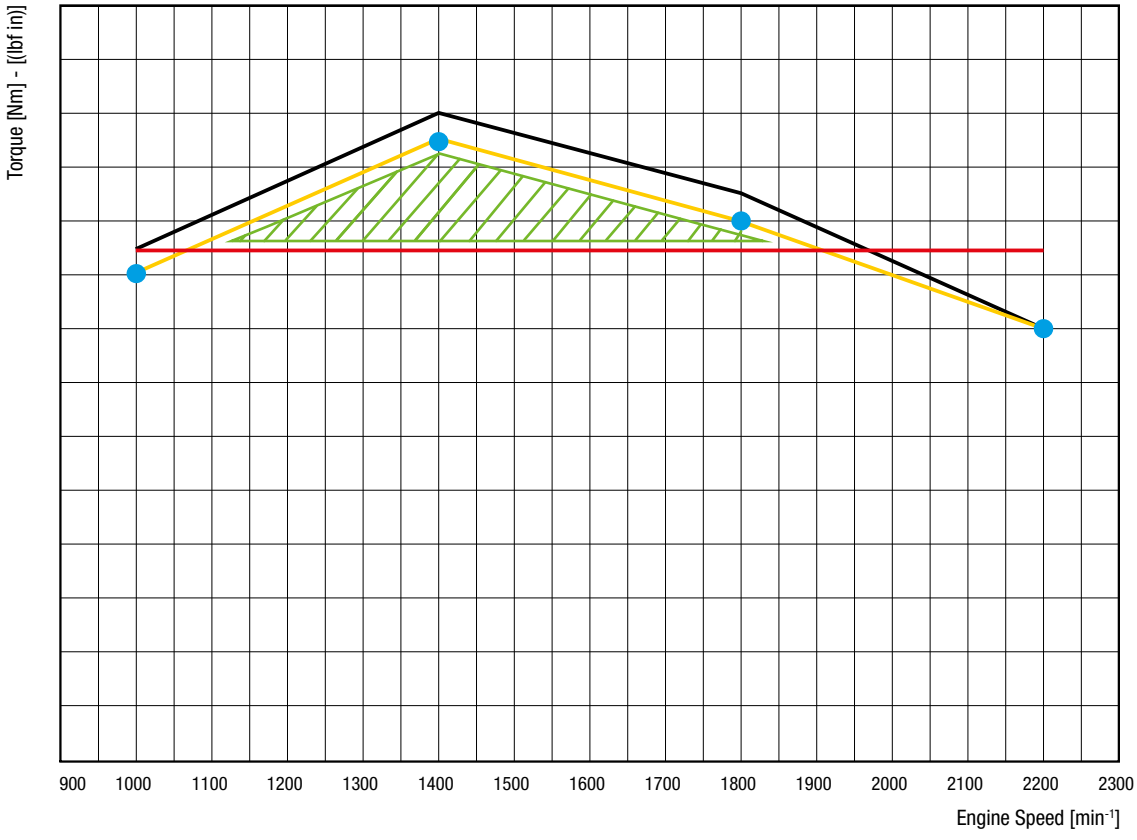
Replaces: 01/08.2022

Hydraulic torque control

The pump torque setting must match the minimum available torque of the motor to prevent shutdown (red line) -> 100% of the available engine torque is not actually used.

Electro-hydraulic torque control with eTC

The absorbed torque is electronically adjusted to a variable limit, depending on the working conditions. The pump torque can accurately match the engine torque -> Better use of engine performances.



- Engine available torque
- Torque limit adjusted by eTC
- Torque limit by hydraulic regulator

Gained torque exploited by the eTC module with respect to hydraulic torque control.

03/02.2024

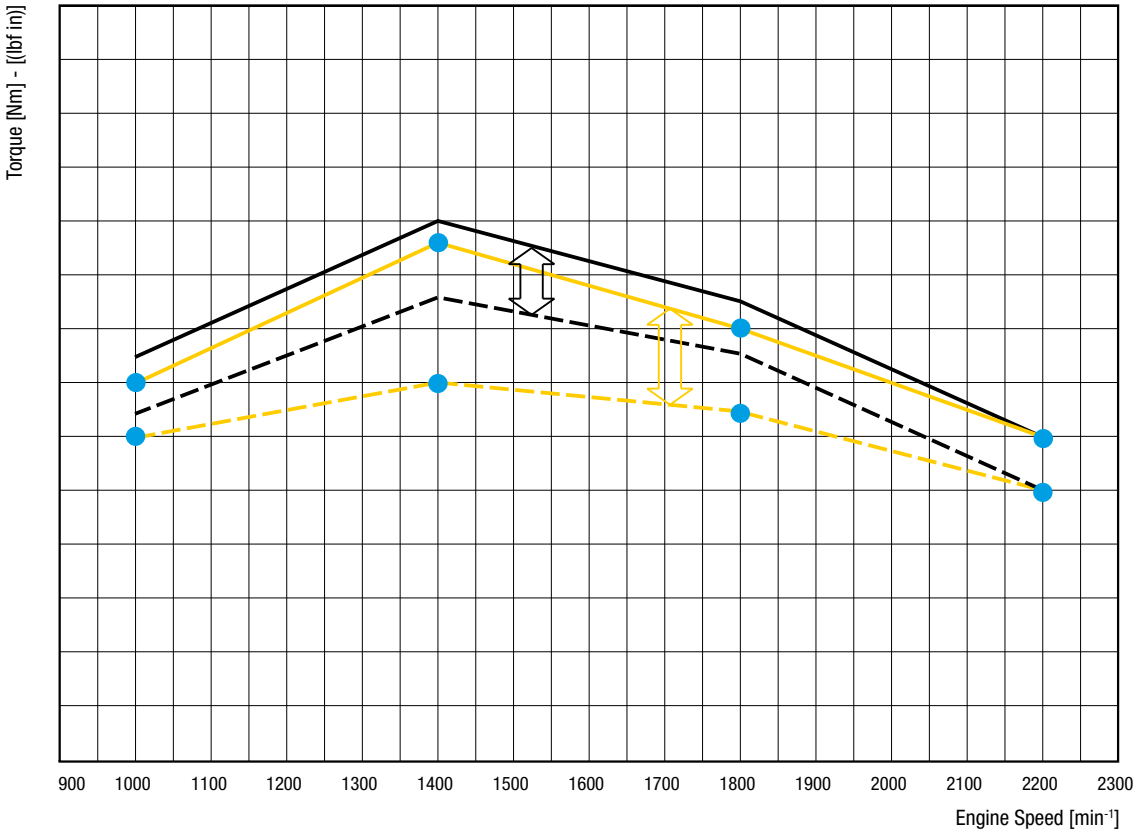
smartFULL eATC - ELECTRONIC ADAPTIVE TORQUE CONTROL

Replaces: 01/08.2022

The combination of the advantages of electronic torque and electronic antistall controls makes the eATC module suitable both for wheeled and tracked applications.
The absorbed torque is electronically adjusted to a variable limit, depending on the working conditions, as for the eTC module, but if the engine speed drops, the torque is automatically reduced. To detect stall conditions, the motor speed is continuously compared to the requested one.
Same application models can have different performances based on:

- Type of use (more or less intense)
- Place of work (altitude)
- Specificity of the single application

The “adaptive” system allows to adapt the hydraulic systm to different conditions in a precise, continuous and immediate way, always exploiting the maximum power available for the hydraulic pump.



Initial engine available torque

Reduced available torque due to transmission operation or a change in working conditions

Initial pump torque limit

Torque limit adjusted by eATC

03/02.2024

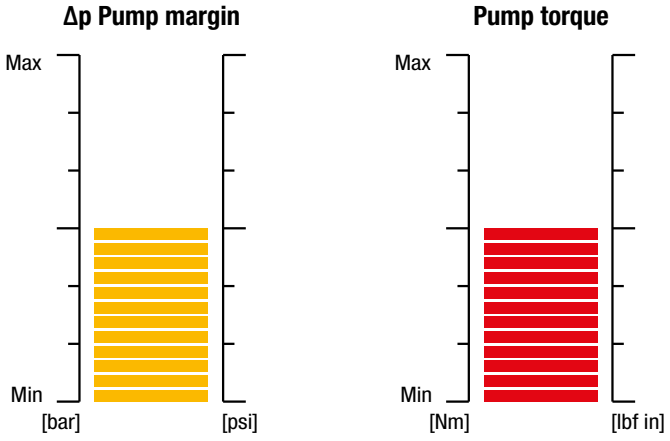
smartFULL WORKING MODES

Thanks to the Working Modes module it is possible to set different system parameters (engine speed*, pump margin, torque limit, pump reactivity) so that the user can select the desired mode during machine operation, according to specific needs.
Typical working modes are: Standard Mode, Economy Mode, Power Mode, Personal Mode. O

Replaces: 01/08.2022

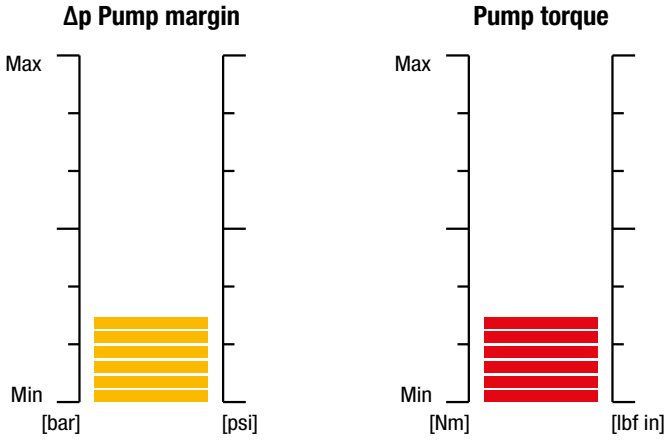
STANDARD MODE

Hydraulic system is set for standard operations, engine speed can be manually set.



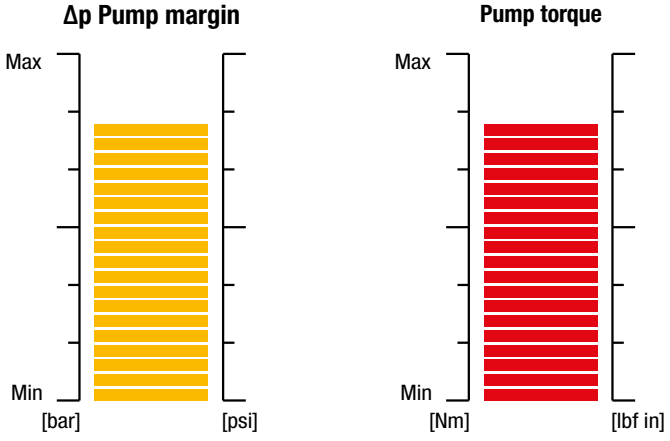
ECONOMY MODE

Engine speed* and hydraulic system are set for minimum fuel consumption.



POWER MODE

Engine speed* and hydraulic system are set for maximum productivity.



O 03/02.2024

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The working modes are customized based on customer requests.
The **PERSONAL MODE** can be customized and saved by the operator. Additional working modes can be introduced.

* The option to adjust the engine speed requires suitable engine model and engine ECU software.

CASAPPA SERVICE TOOL

Real time monitoring & set up

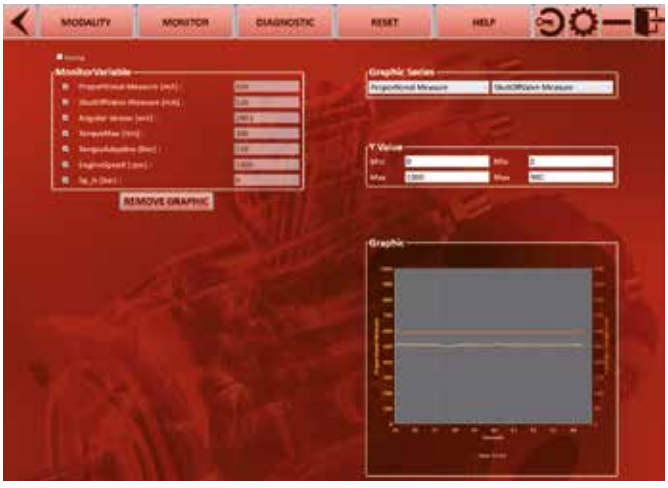
Control by Tablet - Smartphone - PC

Casappa service tool for smartEASY

Monitoring of pump working conditions.

Casappa service tool for smartFULL

Monitoring of pump working conditions and software configuration of system parameters.



01/08.2022

MVPe PISTON PUMP - INTRODUCTION

Variable displacement axial piston pumps swash plate design ideally suited for open circuit in mobile hydraulic applications.
MVPe series piston pump is an evolution of the MVP series and represents the integration in one object of:
- MVP piston pump
- Angular sensor
- Pressure electronic compensator
- Electronic control unit

DISPLACEMENTS
From 34,9 cm^3/rev (2.13 in^3/rev)
To 84,7 cm^3/rev (5.17 in^3/rev)
Available soon from 14 cm^3/rev (0.85 in^3/rev) to 34,8 cm^3/rev (2.12 in^3/rev)

PRESSURE
Max. constant operating pressure 280 bar (4060 psi)
Max. system pressure (relief valve setting) 315 bar (4568 psi)
Max. peak of pressure 350 bar (5075 psi)

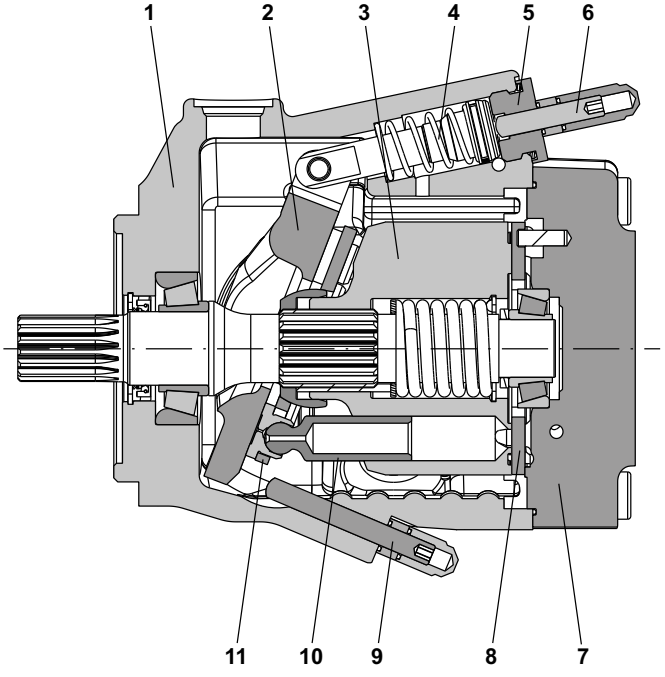
SPEED
Max. 3000 min^{-1}

APPLICATION
Medium pressure

SECTOR
Mobile

MVPe advantages

- Machine layout simplification leading to system cost savings if compared to solutions with ECU detached from the pump case.



1	Pump body
2	Swash plate
3	Cylinders block
4	Counterbalancing spring
5	Plug
6	Max. displacement limiter
7	Cover
8	Valve plate
9	Min. displacement limiter
10	Piston
11	Piston guide plate

02/02.2023

GENERAL INFORMATION / INSTRUCTIONS

DIRECTION OF ROTATION
Clockwise or anti-clockwise defined looking at the drive shaft.

HYDRAULIC FLUID
Mineral oil based hydraulic fluid conforming to DIN 51524, fire resistant fluids and biodegradable fluids according to the technical data shown in the tables on pages 16 ÷ 18. The system should be designed to prevent aeration of the hydraulic fluid.

FLUID VISCOSITY
The fluid viscosity range for optimal use of MVPE pump is between 15 and 35 cSt (77 and 163 SSU).
Functional limit conditions are:
max.: 1500 cSt (6818 SSU) at start up at minimum tempera ture of -25 °C (-13 °F) with straight and short inlet line.
min.: 10 cSt (58 SSU) at maximum temperature of 110 °C (230 °F)

FILTRATION
To ensure the optimal performance and the maximum life to the pump, the hydraulic fluid must have and maintain a fluid contamination within the values shown in the table below.

Working pressure bar (psi)	Δp < 140 (2030)	140 < Δp < 210 (2030) (3045)	Δp > 210 (3045)
Contamination class NAS 1638	9	8	7
Contamination class ISO 4406:1999	20/18/15	19/17/14	18/16/13
Achieved with filter $\beta x_{(c)} \geq 75$ according to ISO 16889	10 µm	10 µm	10 µm

Casappa recommends to use its own production filters:

IKRON® Fluid Filtration

STORAGE
The storage must be in a dry environment.
Max storage time in ideal conditions is 24 months.
The ideal storage temperature is between 5 °C (41 °F) and 20 °C (68 °F). No problem in case of temperature between -40 °C (-40 °F) and 50 °C (122 °F). Below -40 °C (-40 °F) please consult our pre-sales department.

INSTALLATION
Check that the maximum coupling eccentricity stays within 0,25 mm (0.0098 in) to reduce shaft loads due to misalignment. It is advised to use a flexible coupling suitable to absorb eventual rotational shocks. For applications with axial and radial loads exceeding published standards, consult our sales department. The direction of rotation of the pump must agree with the prime mover rotation. Before installation, the case of the pump must be filled with fluid.

LINES
The lines must have a major diameter which is at least as large as the diameter of pump ports, and must be perfectly sealed. To reduce loss of power, the lines should be as short as possible, reducing the sources of hydraulic resistance (elbow, throttling, gate valves, etc.) to a minimum. A length of flexible tubing is recommended to reduce the transmission of vibrations. Before connecting the lines, remove any plug and make sure that the lines are perfectly clean. Check that the drain line is dimensioned in a way to guarantee a case pressure lower than 1,5 bar (22 psi) absolute. The drain line must be connected directly (no filter, no valves, no oil cooler) to the tank and must terminate below the oil level. Check that the dimensions of the suction line guarantee a pressure equal or superior to 0,8 bar (12 psi). Inlet pressure less than 0,8 bar (12 psi) could cause an increase of noise emission, the decrease of the pump performances and a reduction of its life expectancy.

STARTING UP
Check that all connections are secure and that the entire system is completely clean. Add oil to the tank always using a filter. Bleed the air from the circuit to help the filling. Turn on the system for a few moments at minimum speed, then bleed the circuit again and check the level of oil in the tank. Gradually increase the pressure and speed of rotation up to the pre-set operating levels, which must stay within the stated limits as specified in the catalogue.

FOR VERY LOW TEMPERATURE

STARTING UP
We strongly recommend to warm up the oil before running the machine. If this is not possible, the warm up of the oil and of the pump should be carried out following these instructions:
- Start the pump in stand-by condition at minimum speed. Keep this working condition until the pump case reaches -20 °C (-4 °F)
- Increase slowly the displacement.Max pressure permitted: 50 bar (725 psi). The maximum permitted speed is strictly connected to the layout of the inlet circuit; check that there is no cavitation before increasing the speed.
- Keep this working condition until the oil temperature in the whole system is -10 °C (14 °F).
- Maximum pressure can be achieved from now on.
- Always check the outlet flow to prevent cavitation damage.

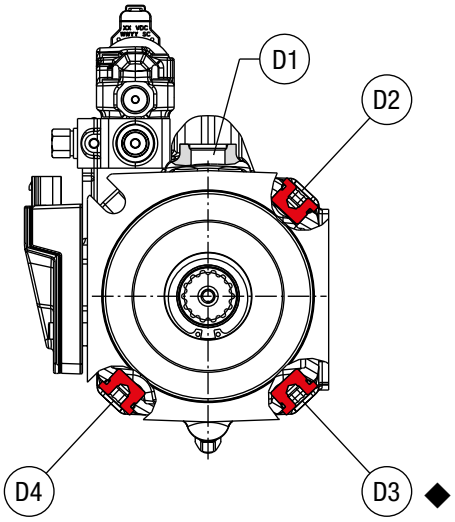
All the temperature are referred to oil with viscosity ISO VG 32 according to DIN 51 519.

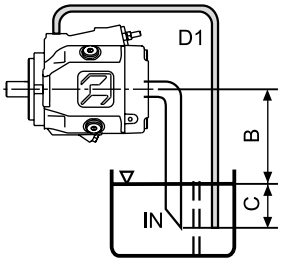
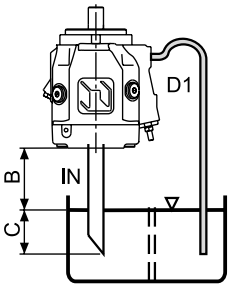
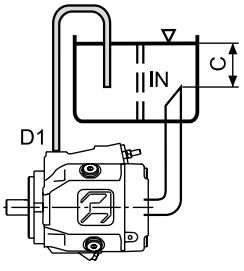
SUGGESTIONS
To prevent cavitation at low temperature we suggest:
- To warm up the tank
- To pressurize the tank
- To oversize the inlet hose

01/08.2022

MOUNTING POSITIONS

Standard pump is supplied with D1 drain hole open and D2, D3, D4 plugged (◆ if available).
Before installation fill the pump with hydraulic oil for at least 3/4 of the volume keeping it in horizontal position.
The pump can be mounted in a horizontal or vertical position.
The highest of the case drain ports must be used to keep the required filling oil.
If D1 is not the highest drain port it must be closed by moving the plug from the hole chosen for the drain line.
The pump can be located above the oil level if the absolute pressure at the inlet port stays within the stated limits.
With exception of pump mounted below the oil level, we recommend to interpose a baffle plate between inlet and drain line.
To reduce further noise emission, we recommend to mount the pump below the oil level and avoid suction lines with sharp restrictions.

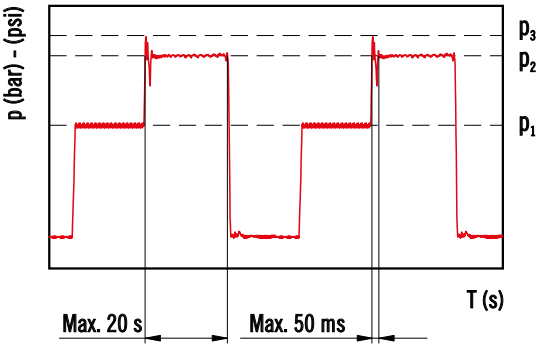


HORIZONTAL MOUNTING		VERTICAL MOUNTING	
	**Arrangement outside the tank above oil level.** Min. inlet pressure= 0,8 bar abs (24 in Hg) B ≤ 800 mm (31.4961 in) C = 200 mm (7.874 in)		**Arrangement outside the tank above oil level.** Min. inlet pressure= 0,8 bar abs (24 in Hg) B ≤ 800 mm (31.4961 in) C = 200 mm (7.874 in)
	**Arrangement outside the tank below oil level.** C = 200 mm (7.874 in)		

IN= inlet line - D1= drain line - B+C= permissible suction height - C= line immersion depth

01/08.2022

PRESSURE DEFINITION



p_1 Constant operating pressure
p_2 System pressure (relief valve setting)
p_3 Peak of pressure

The peak of pressure is the max pressure allowed and it corresponds to the overshoot of the relief valve.

Please note that both relief valve setting and overshoot must be lower than their limits.
If the relief setting is compliant but the overshoot is higher than the limit, the relief setting must be decreased until the overshoot is compliant to Casappa limit.

Please contact us for high frequency applications.

01/08.2022

FEATURES

Technical data with mineral oil

HL or **HLP** mineral oil based hydraulic fluid to DIN 51524

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. displacment (theor.) V_{max}	cm^3/rev (in^3/rev)		45 (2.75)	53,7 (3.28)	60 (3.66)	72 (4.39)	84,7 (5.17)
Inlet pressure	bar abs. (in Hg)	min.			0.8 (24)		
	bar abs. (psi)	max.			25 (363)		
Max. outlet pressure p_{max}	bar (psi)	p_1	280 (4060)	250 (3625)	280 (4060)	280 (4060)	250 (3625)
		p_2	315 (4568)	280 (4060)	315 (4568)	315 (4568)	280 (4060)
		p_3	350 (5075)	315 (4568)	350 (5075)	350 (5075)	315 (4568)
Max. drain line pressure	bar abs. (psi)				2 (29)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	3000	2500	3000	2700	2300
Max. delivery (theor.)	l/min (US gpm)	@ n_{max}	135 (35.7)	134 (35.4)	180 (47.6)	194 (51.3)	194 (51.3)
		@ 2000 min^{-1}	90 (23.8)	107 (28.3)	120 (31.7)	144 (38.0)	169 (44.7)
		@ 1500 min^{-1}	68 (18.0)	81 (21.4)	90 (23.8)	108 (28.5)	127 (33.6)
Max. power (theor.) ($\Delta p = p_{max}$ cont.)	kW (HP)	@ n_{max}	63 (84.4)	55,9 (74.9)	84 (112.6)	90,7 (121.5)	81 (108.5)
		@ 2000 min^{-1}	42 (56.3)	44,8 (60.0)	56 (75.0)	67,2 (90.0)	70,6 (94.6)
		@ 1500 min^{-1}	31,5 (42.2)	33,6 (45.0)	42 (56.3)	50,4 (67.5)	52,9 (70.9)
Max. torque (theor.)	Nm (lbf in)	@ p_{max} cont.	200,5 (1775)	213,7 (1891)	267,4 (2367)	320,9 (2840)	337 (2983)
		@ 100 bar (1450 psi)	71,6 (634)	85,5 (757)	95,5 (845)	114,6 (1014)	134,8 (1193)
Moment of inertia rotary group	kgm^2 (ft^2 lbs)		0,003 (0.07)	0,003 (0.07)	0,008 (0.19)	0,008 (0.19)	0,008 (0.19)
Fill volume	l (US gallons)		1 (0.26)	1 (0.26)	1,3 (0.34)	1,3 (0.34)	1,3 (0.34)
Mass (approx.)	kg (lbs)		19 (41.9)	19 (41.9)	22 (48.5)	22 (48.5)	22 (48.5)
Seals				N= Buna		V= Viton	
Operating temperature	°C (°F)	min.		-25 (-13)		-25 (-13)	
		max. cont.		80 (176)		110 (230)	
		max. peak		100 (212)		125 (257)	

(1) = with an inlet pressure of 1 bar abs (14.5 psi) and viscosity between 15 and 35 cSt (77 and 163 SSU).
Reducing the displacement or increasing the inlet pressure the max. speed changes. See table at page 19.
Max. speed limit are: MVPE48: 3000 min^{-1} - MVPE60: 3000 min^{-1}
Please contact us for different working conditions.

Replaces: 02/02.2023

03/02.2024

FEATURES

Technical data restrictions with fire resistant fluid

(1) = with an inlet pressure of 1 bar abs (14.5 psi) and viscosity between 15 and 35 cSt (77 and 163 SSU).

HFA - Oil emulsion in water (5 ÷ 15 % of oil)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			140 (2030)		
		p_2			150 (2175)		
		p_3			160 (2320)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2000	1700	2000	1700	1500
Seals					N= Buna		
Operating temperature	°C (°F)	min.			2 (36)		
		max.			55 (131)		
Bearing life (ref. mineral oil)	%				20 %		

HFB - Water emulsion in oil (40 % of water)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			160 (2320)		
		p_2			170 (2465)		
		p_3			180 (2610)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2150	1800	2150	1800	1600
Seals					N= Buna		
Operating temperature	°C (°F)	min.			2 (36)		
		max.			60 (140)		
Bearing life (ref. mineral oil)	%				40 %		

HFC - Water-glycol (35 ÷ 55 % of water)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			180 (2610)		
		p_2			195 (2828)		
		p_3			210 (3045)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2150	1800	2150	1800	1600
Seals					N= Buna		
Operating temperature	°C (°F)	min.			-10 (14)		
		max.			60 (140)		
Bearing life (ref. mineral oil)	%				40 %		

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FEATURES

Technical data restrictions with fire resistant fluid

(1) = with an inlet pressure of 1 bar abs (14.5 psi) and viscosity between 15 and 35 cSt (77 and 163 SSU).

HFD - Phosphate ester

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			200 (2900)		
		p_2			220 (3190)		
		p_3			240 (3480)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2150	1800	2150	1800	1600
Seals					N= Buna		
Operating temperature	°C (°F)	min.			-10 (14)		
		max.			80 (176)		
Bearing life (ref. mineral oil)	%				90 %		

Technical data restrictions with biodegradable fluids

HETG - Natural based fluid (the water content must never exceed 0,1 %)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			180 (2610)		
		p_2			195 (2828)		
		p_3			210 (3045)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2150	1800	2150	1800	1600
Seals					N= Buna		
Operating temperature	°C (°F)	min.			-10 (14)		
		max.			60 (140)		
Bearing life (ref. mineral oil)	%				50 %		

HEPG - Polyglycol based synthetic fluid (the water content must never exceed 0,1 %)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Max. outlet pressure p_{max}	bar (psi)	p_1			180 (2610)		
		p_2			195 (2828)		
		p_3			210 (3045)		
Max. speed n_{max}	min^{-1}	@ V_{max} (1)	2150	1800	2150	1800	1600
Seals					N= Viton		
Operating temperature	°C (°F)	min.			-15 (5)		
		max.			90 (194)		
Bearing life (ref. mineral oil)	%				75 %		

HEES - Synthetic esters (the water content must never exceed 0,1 %)

Pump type MVPE			48·45	48·53	60·60	60·72	60·84
Seals					N= Viton		
Operating temperature	°C (°F)	min.			-15 (5)		
		max.			80 (176)		
Bearing life (ref. mineral oil)	%				100 %		

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FEATURES

Design calculations for pump

Q	l/min (US gpm)	Flow
M	Nm (lbf in)	Torque
P	kW (HP)	Power
V	cm^3/rev (in^3/rev)	Displacement
n	min^{-1}	Speed
Δp	bar (psi)	Pressure
$\eta_v = \eta_v$ (V, Δp, n)		Volumetric efficiency
$\eta_{hm} = \eta_{hm}$ (V, Δp, n)		Hydro-mechanical efficiency
$\eta_t = \eta_v \bullet \eta_{hm}$		Overall efficiency

$$Q = Q_{theor.} \bullet \eta_v$$

$$Q_{theor.} = \frac{V\ (cm^3/rev) \bullet n\ (min^{-1})}{1000} \quad [l/min]$$

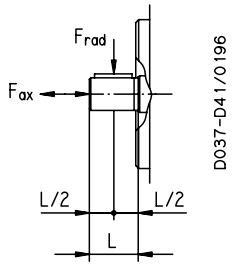
$$M = \frac{M_{theor.}}{\eta_{hm}}$$

$$M_{theor.} = \frac{\Delta p\ (bar) \bullet V\ (cm^3/rev)}{62{,}83} \quad [Nm]$$

$$P_{IN} = \frac{P_{OUT}}{\eta_t}$$

$$P_{OUT} = \frac{\Delta p\ (bar) \bullet Q\ (l/min)}{600} \quad [kW]$$

Max. permissible load on drive shaft

Pump type				MVPE 48•45	MVPE 48•53	MVPE 60•60	MVPE 60•72	MVPE 60•84
F_{ax} Axial force			N (lbf)	1500 (337)	1500 (337)	2000 (450)	2000 (450)	2000 (450)
F_{rad} Radial force		@ L/2	N (lbf)	1500 (337)	1500 (337)	3000 (675)	3000 (675)	3000 (675)

% Variation of the max. speed in relation of the inlet pressure and/or displacement reduction

Inlet pressure	Displacement %				
psi (bar abs)	65	70	80	90	100
12 (0,8)	120	115	105	97	90
13 (0,9)	120	120	110	103	95
14.5 (1,0)	120	120	115	107	100
17 (1,2)	120	120	120	113	106
20 (1,4)	120	120	120	120	112
23 (1,6)	120	120	120	120	117
29 (2,0)	120	120	120	120	120

% Variation of the max. speed

Max. speed must not exceed the limits specified at page 16.

Example 1
Displacement: 100 %
Speed: 100 %
Inlet pressure: 1,0 bar abs. (14.5 psi)

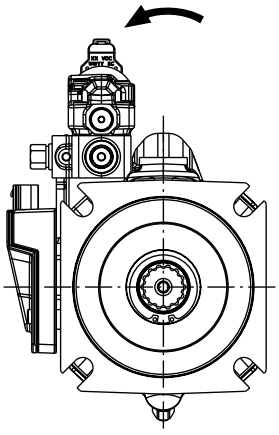
Example 2
Displacement: 80 %
Inlet pressure: 1,0 bar abs. (14.5 psi)
Speed: 115 %

02/02.2023

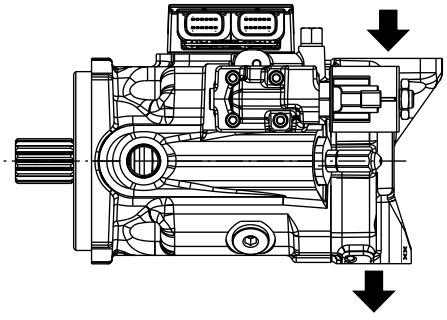
FEATURES

Definition of rotation direction looking at the drive shaft

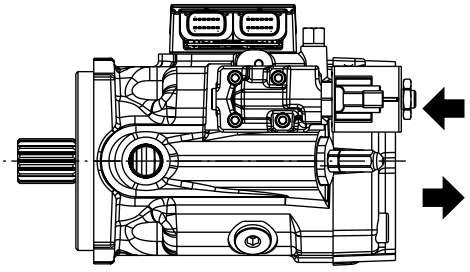
Anti-clockwise rotation



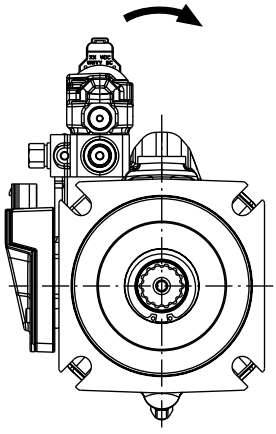
Side ports



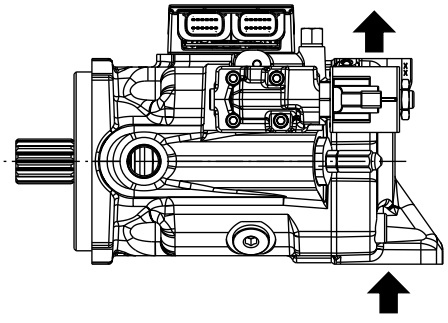
Rear ports



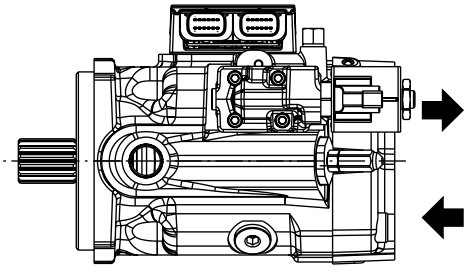
Clockwise rotation



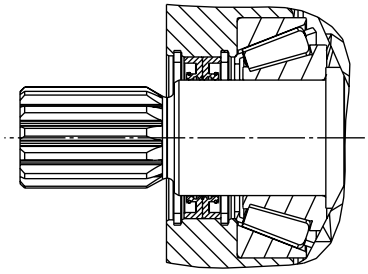
Side ports



Rear ports



DOUBLE SHAFT SEAL OPTION



The double shaft seal is available for the following configuration:

Pump type	MOUNTING FLANGES		
	S5	S7	S8
MVPE48	X		
MVPE60		X	X

X Available combination

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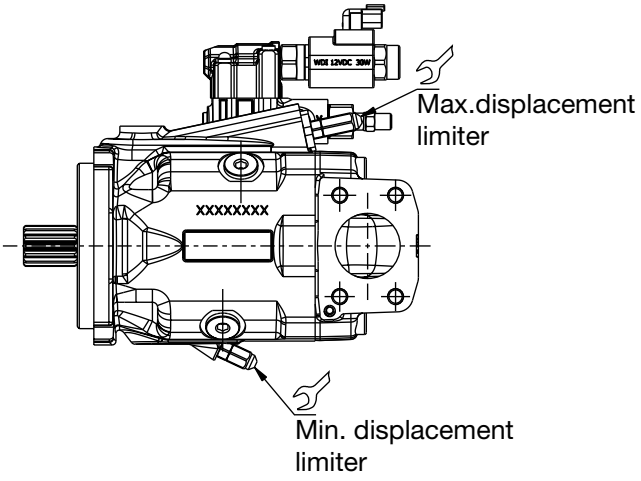
DISPLACEMENT SETTING

Replaces: 02/02.2023

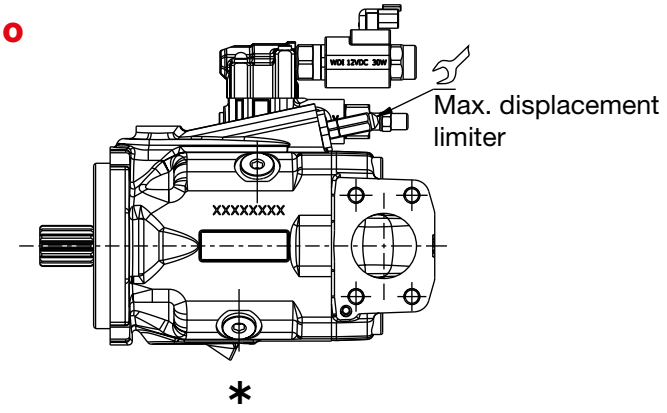


E: Max. displacement limiter (Min displacement limiter is plugged)

G: Min. and Max. displacement limiter

Tightening torque $15^{\pm 1}$ Nm (124 ÷ 142 lbf in)

o



* Special body without Min. displacement limiter is available only on request, please contact us for more information

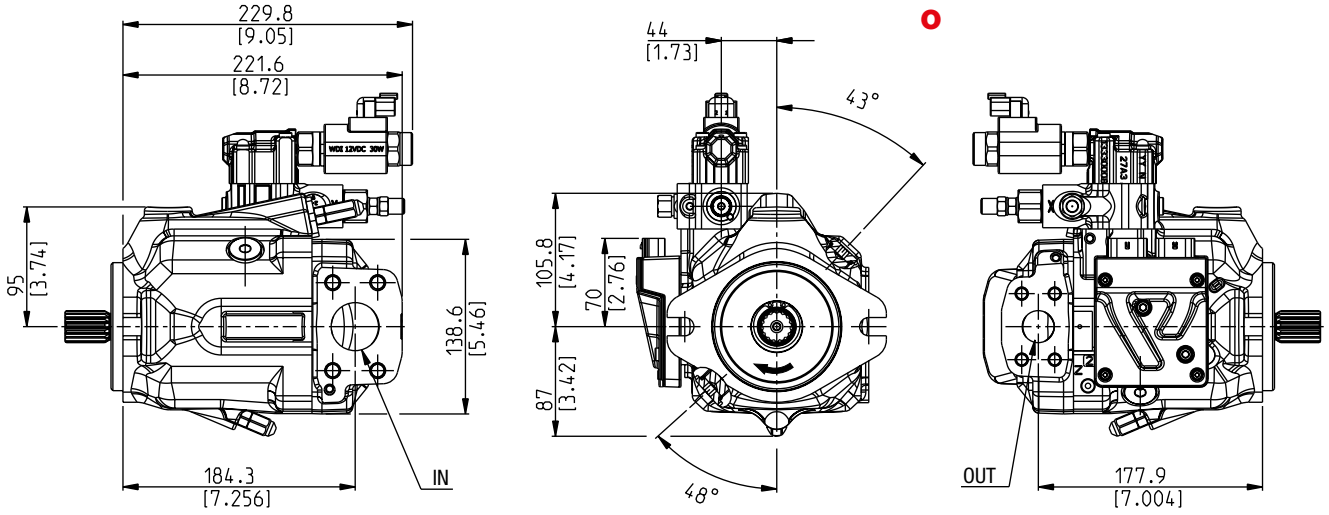
			MVPE48	MVPE60
Max. displacement setting range	cm^3/rev (in^3/rev)	from	34,9 (2.13)	55 (3.36)
		to	53,7 (3.28)	84,7 (5.17)
Min. displacement setting range	cm^3/rev (in^3/rev)	from	0	0
		to	10,7 (0.65)	38,1 (2.32)
One turn of screw changes pump displacement by approximately	cm^3/rev (in^3/rev)	E	3,2 (0.20)	5,0 (0.31)
		F	3,0 (0.18)	4,2 (0.26)

Please contact us for different setting range.

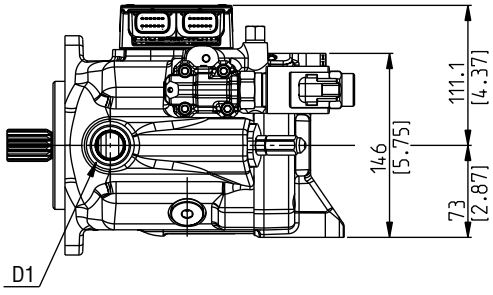
o 03/02.2024

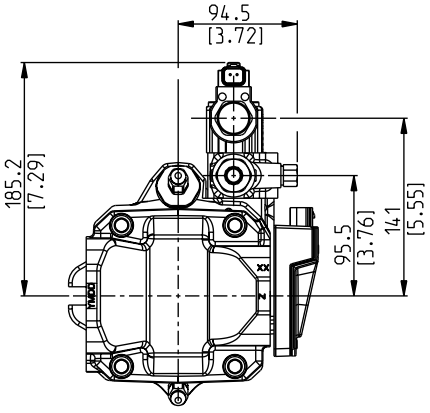
MVPE48 SIDE PORTS - DIMENSIONS L

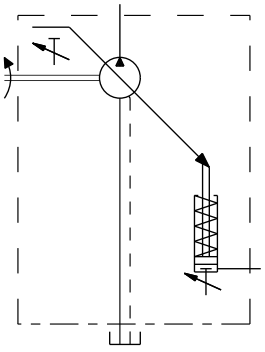
Drive shafts: see page 30
Mounting flanges: see page 32
Ports: see page 34 ÷ 36



DCAT_066_017







Replaces: 02/02.2023

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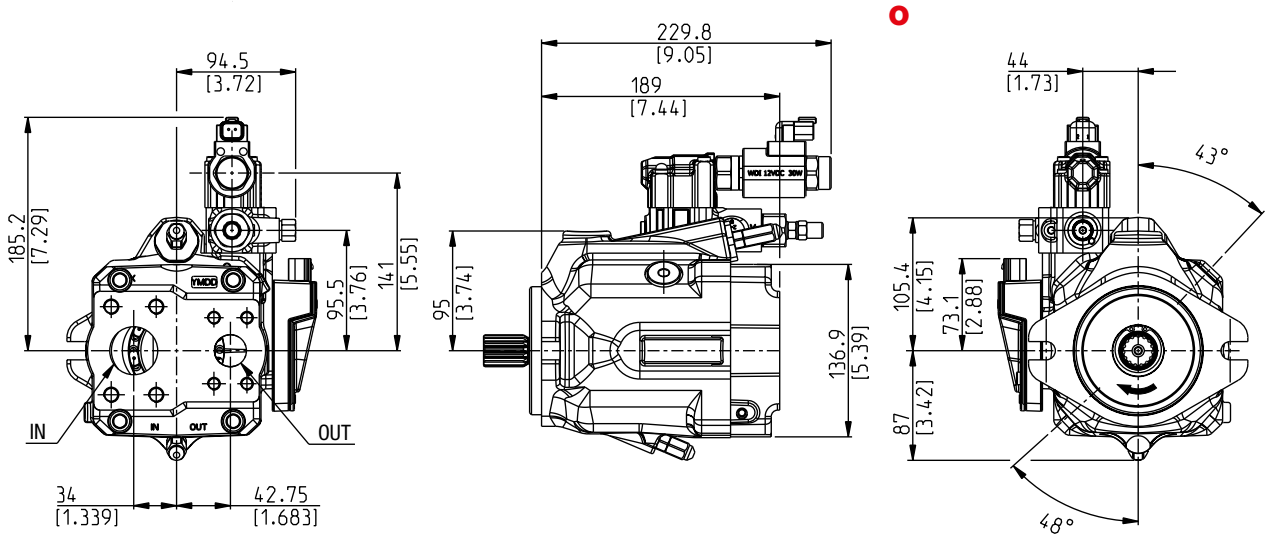
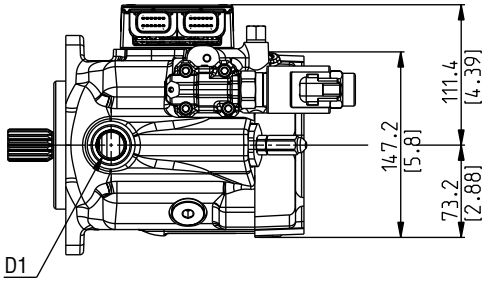
MVPE48 REAR PORTS - DIMENSIONS P

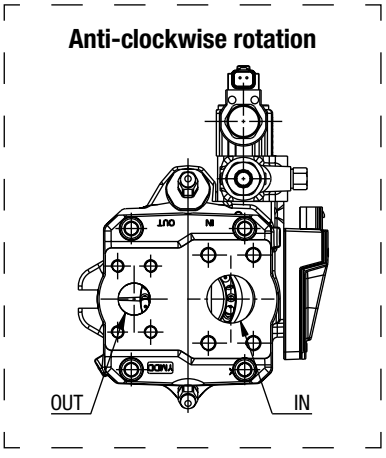
Drive shafts: see page 30
Mounting flanges: see page 32
Ports: see page 34 ÷ 36

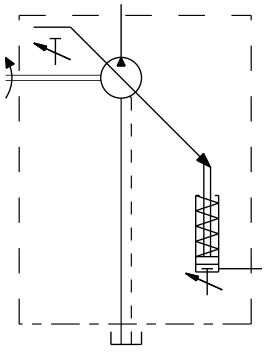
Replaces: 02/02.2023





DCAT_066_018



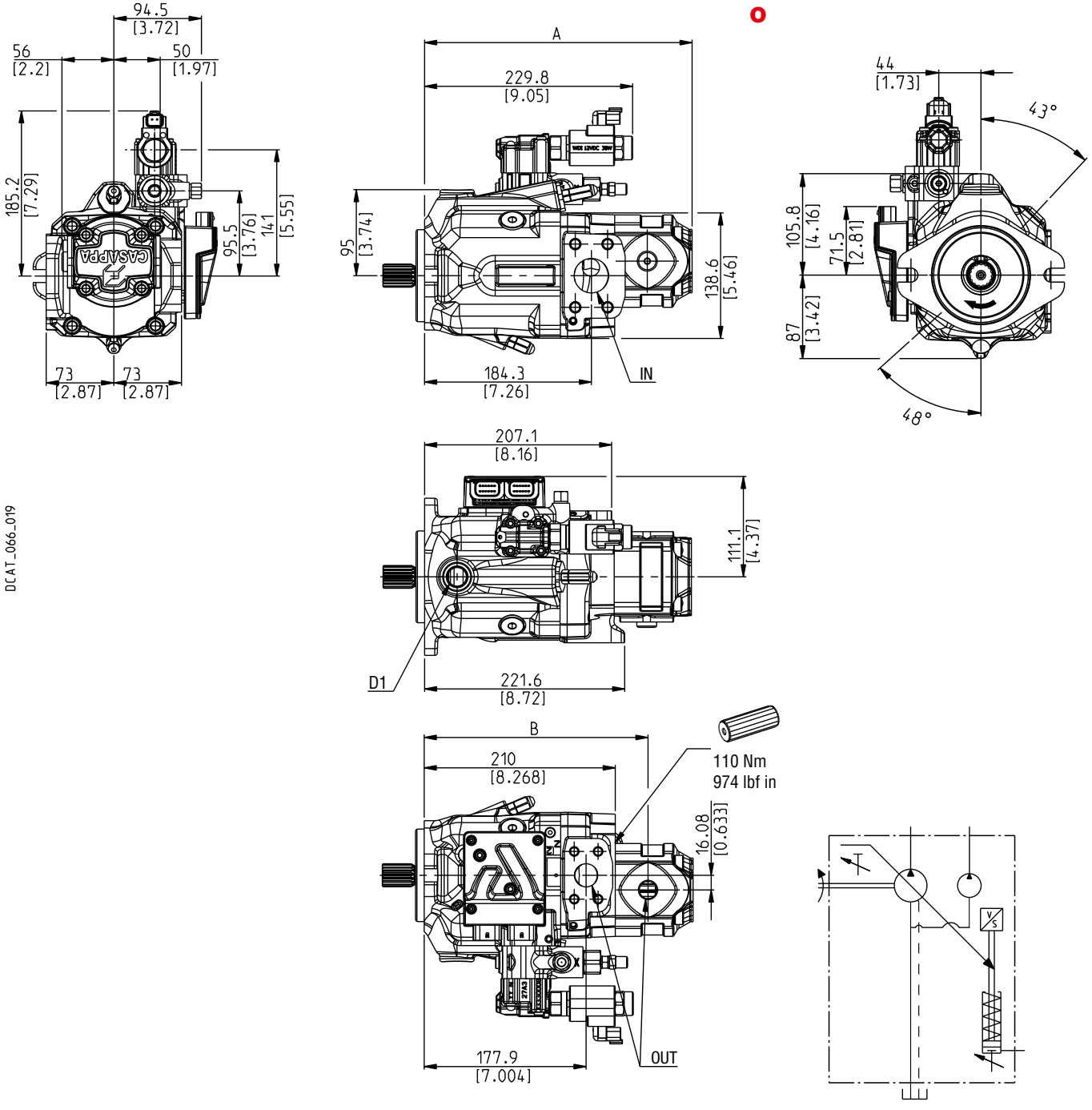


03/02.2024

MVPE48/KP20 MULTIPLE PUMPS - DIMENSIONS L

Common inlet intermediate flange:
MVPE code **P7**
KP20 code **N5**

Drive shafts: see page 30
Mounting flanges: see page 32
Ports: see page 34 ÷ 36



DCAT_066_019

Replaces: 02/02.2023

O 03/02.2024

Gear pump KAPPA 20 (for more information please see the respective technical catalogue)

Pump type	4	6,3	8	11,2	14	16	20	Dimensions	
MVPE48	263 (10.35)	265,5 (10.45)	268 (10.55)	271,5 (10.69)	275,5 (10.85)	281 (11.06)	287,5 (11.32)	mm (in)	A
	234 (9.21)	236,5 (9.31)	239 (9.41)	242,5 (9.55)	241 (9.49)	246,5 (9.70)	253 (9.96)	mm (in)	B

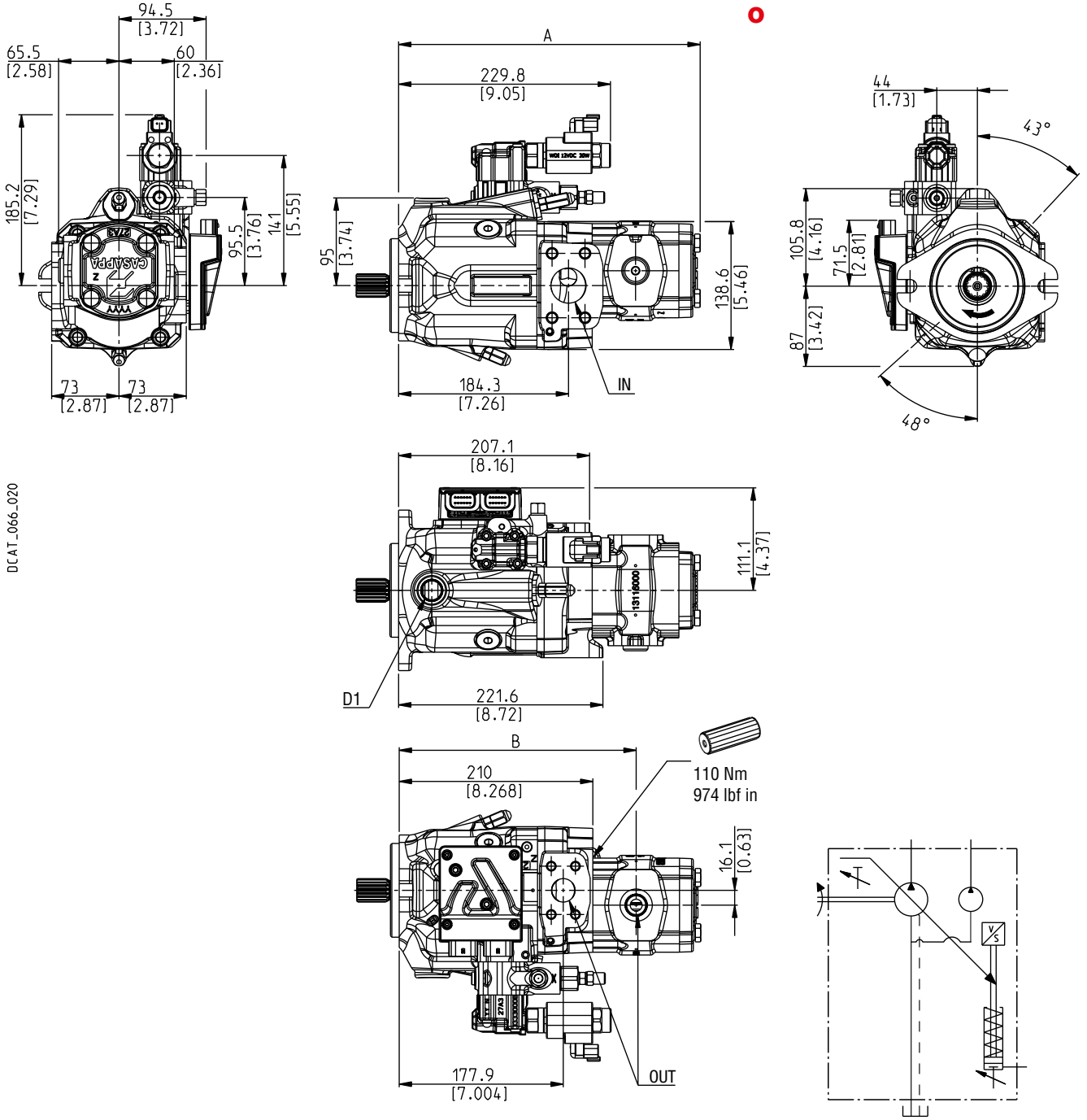
MVPE48/PHP20 MULTIPLE PUMPS - DIMENSIONS L

Common inlet intermediate flange:
MVPE code **I7**
PHP20 code **S7**

Drive shafts: see page 30
Mounting flanges: see page 32
Ports: see page 34 ÷ 36

Also available in
combination with PLP20

Replaces: 02/02.2023



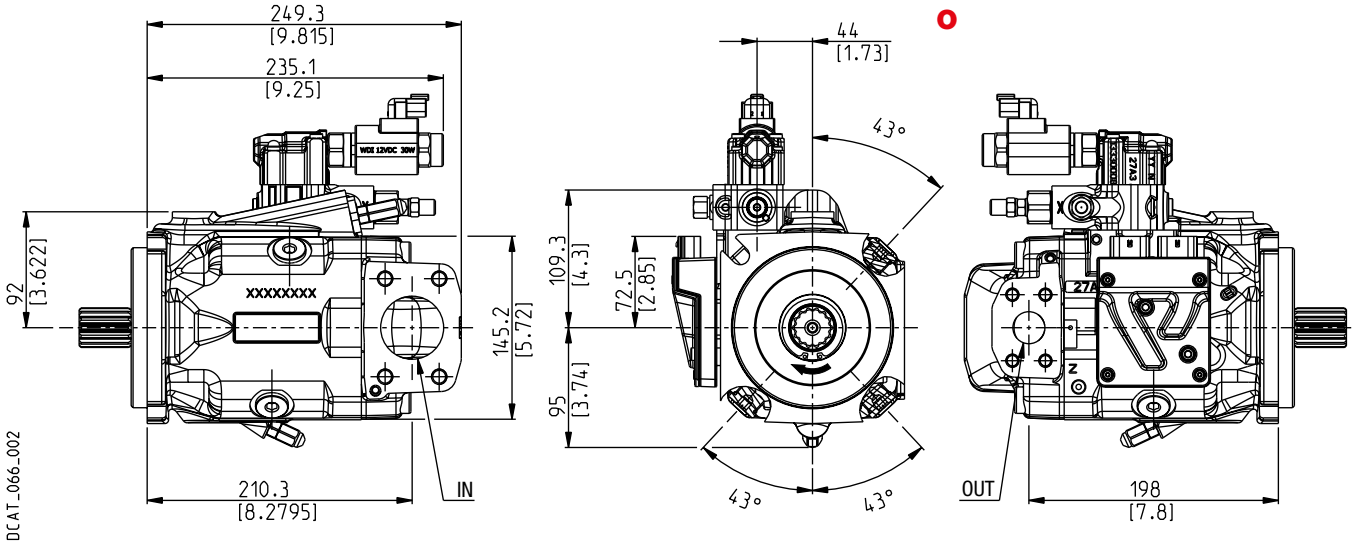
03/02.2024

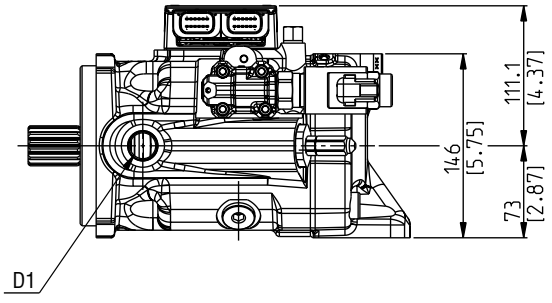
Gear pump POLARIS PH20 (for more information please see the respective technical catalogue)

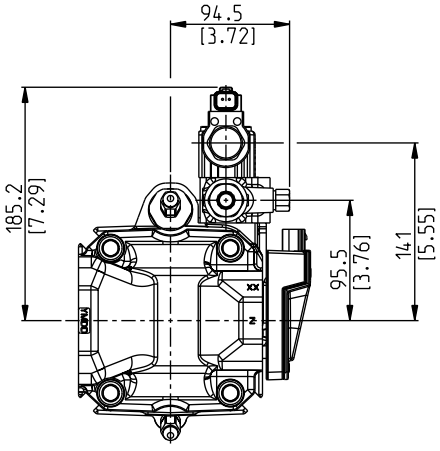
Pump type	8	10,5	11,2	14	16	18	19	20	23	24,5	25	27,8	31,5	Dimensions	
MVPE48	290,1 (11.42)	294,1 (11.58)	294,6 (11.60)	299,6 (11.80)	303,1 (11.93)	305,3 (12.02)	306,5 (12.07)	309,6 (12.19)	313,1 (12.33)	315,4 (12.42)	317,1 (12.48)	319,9 (12.59)	327,1 (12.88)	mm (in)	A
	243,5 (9.59)	246,5 (9.70)	247 (9.72)	252 (9.92)	255 (10.04)	245,9 (9.68)	246,5 (9.70)	248 (9.76)	249,7 (9.83)	250,8 (9.87)	252 (9.92)	253,4 (9.97)	257 (10.12)	mm (in)	B

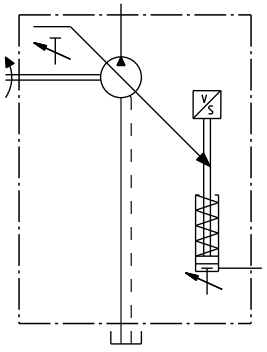
MVPE60 SIDE PORTS - DIMENSIONS L

Drive shafts: see page 31
Mounting flanges: see page 32 ÷ 33
Ports: see page 34 ÷ 36









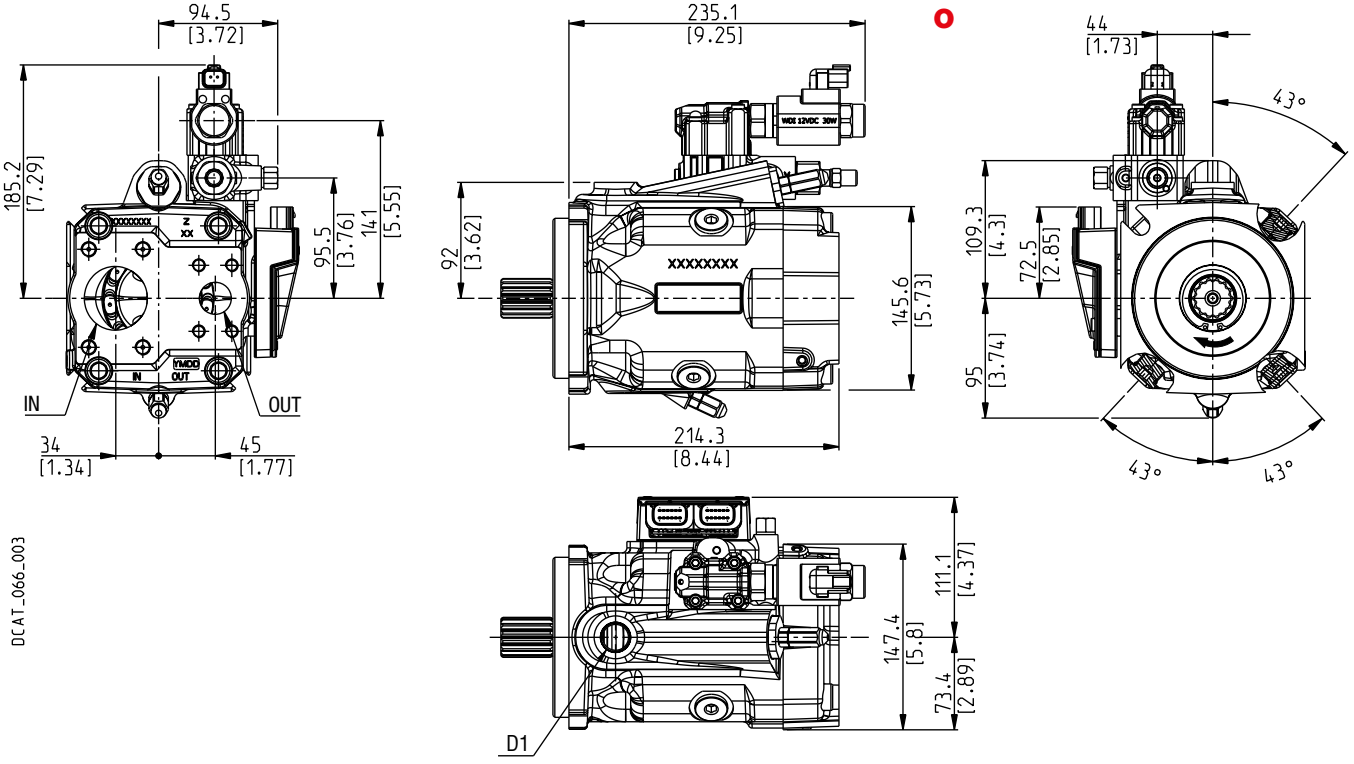
Replaces: 01/08.2022

03/02.2024

MVPE60 REAR PORTS - DIMENSIONS P

Drive shafts: see page 31
Mounting flanges: see page 32 ÷ 33
Ports: see page 34 ÷ 36

Replaces: 01/08.2022



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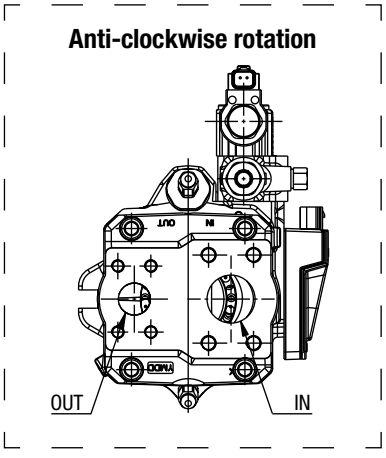
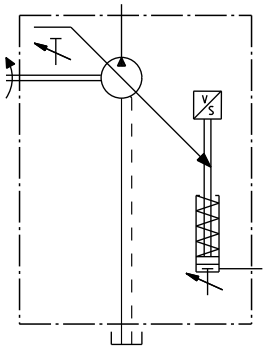


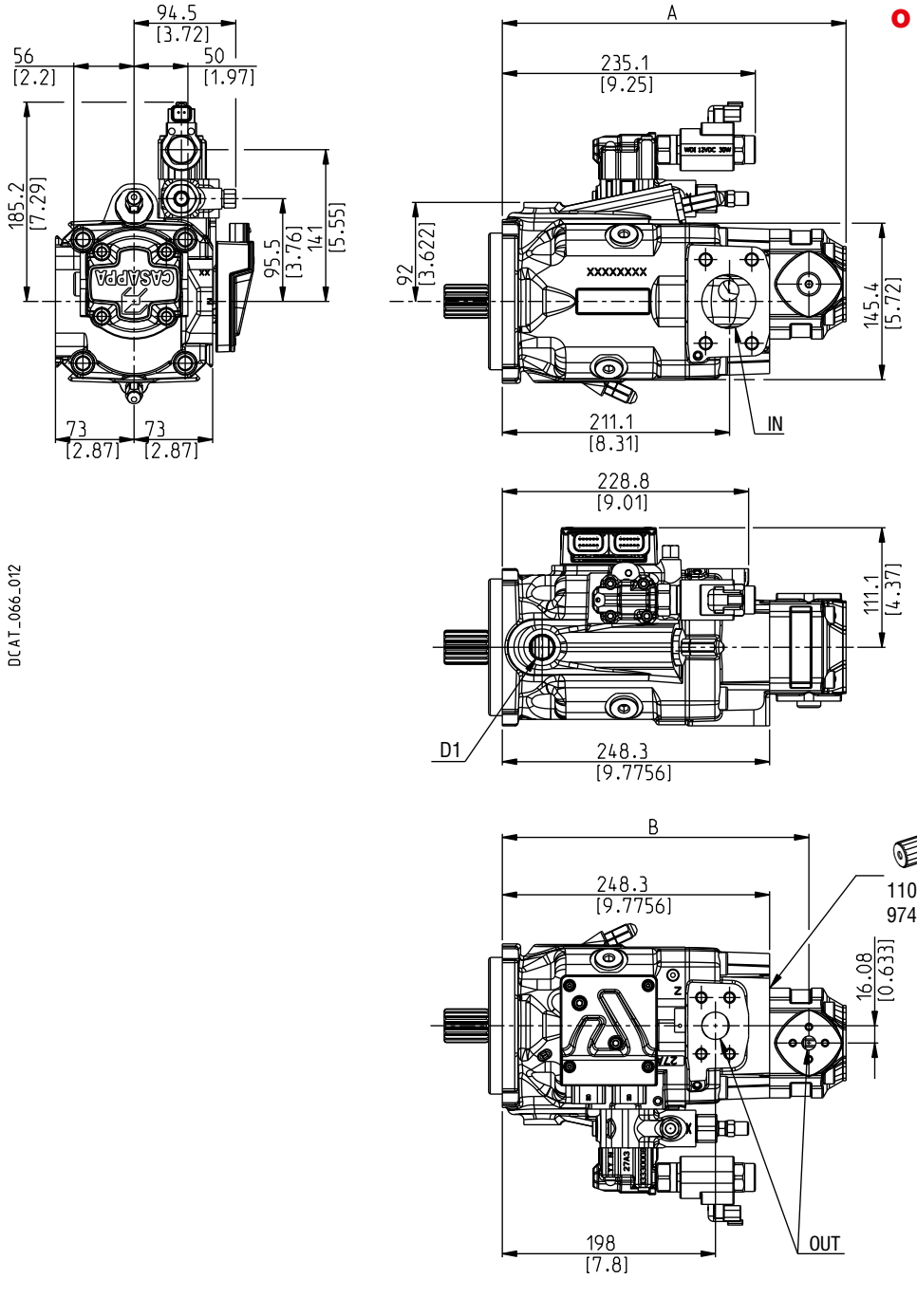


03/02.2024

MVPE60/KP20 MULTIPLE PUMPS - DIMENSIONS L

Common inlet intermediate flange:
MVPE code **P7**
KP20 code **N5**

Drive shafts: see page 31
Mounting flanges: see page 32 ÷ 33
Ports: see page 34 ÷ 36



DCAT_066_012

Replaces: 01/08.2022

O 03/02.2024

Gear pump KAPPA 20 (for more information please see the respective technical catalogue)

Pump type	4	6,3	8	11,2	14	16	20	Dimensions	
MVPE60	301,3 (11.86)	303,8 (11.96)	306,3 (12.06)	309,8 (12.20)	313,8 (12.35)	319,3 (12.57)	325,8 (12.83)	mm (in)	A
	272,3 (10.72)	274,8 (10.82)	277,3 (10.92)	280,8 (11.06)	279,3 (11.00)	284,8 (11.21)	291,3 (11.47)	mm (in)	B

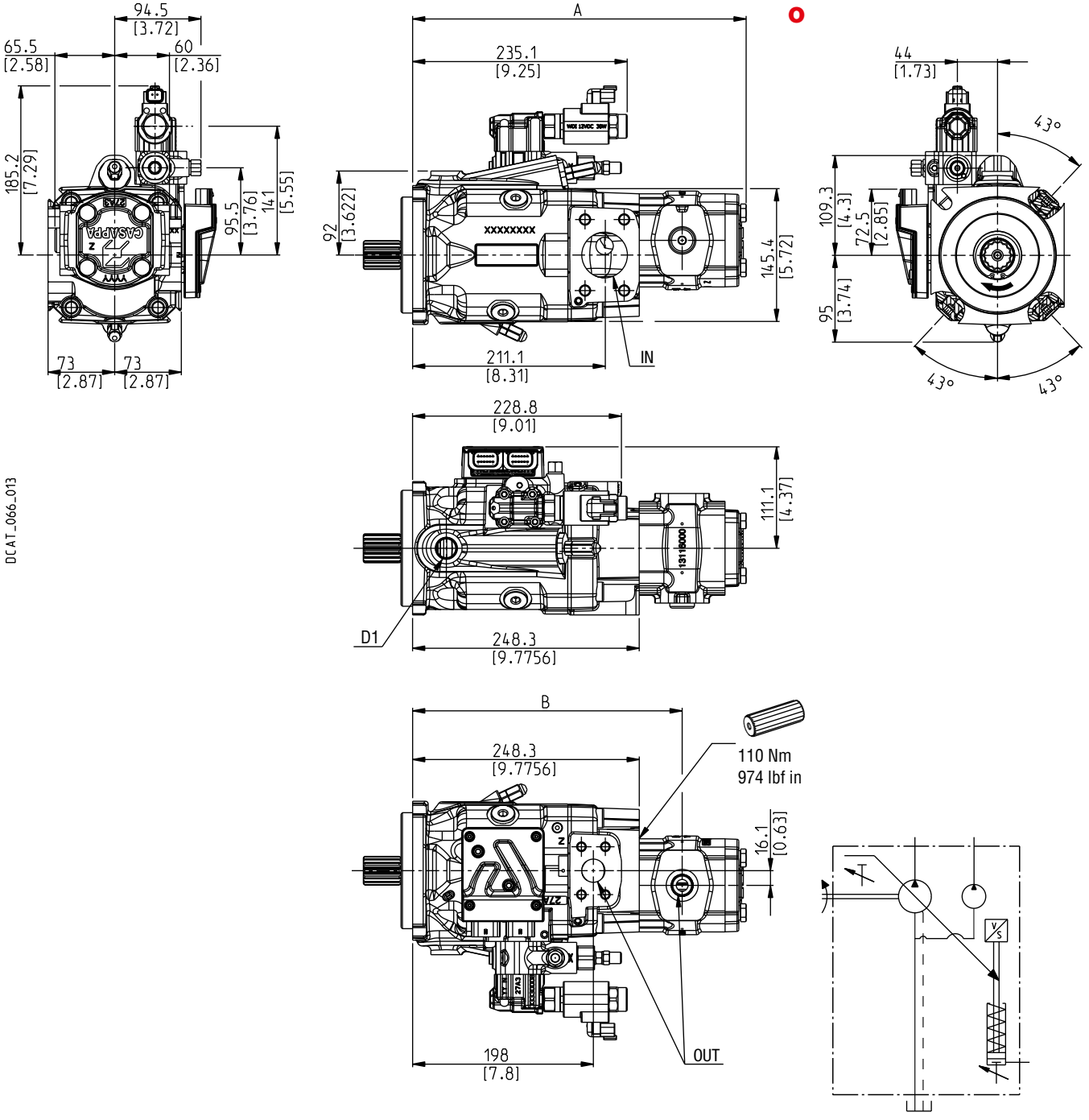
MVPE60/PHP20 MULTIPLE PUMPS - DIMENSIONS L

Common inlet intermediate flange:
MVPE code **I7**
PHP20 code **S7**

Drive shafts: see page 31
Mounting flanges: see page 32 ÷ 33
Ports: see page 34 ÷ 36

Also available in combination with PLP20

Replaces: 01/08.2022



03/02.2024

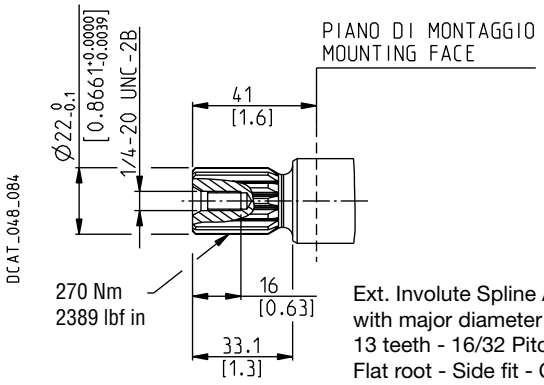
Gear pump POLARIS PH20 (for more information please see the respective technical catalogue)

Pump type	8	10,5	11,2	14	16	18	19	20	23	24,5	25	27,8	31,5	Dimensions	
MVPE60	328,4 (12.93)	332,4 (13.09)	332,9 (13.11)	337,9 (13.30)	341,4 (13.44)	343,6 (13,53)	344,8 (13.57)	347,9 (13.70)	351,4 (13.83)	353,7 (13.93)	355,4 (13.99)	358,2 (14.10)	365,4 (14.39)	mm (in)	A
	281,8 (11.09)	284,8 (11.21)	285,3 (11.23)	290,3 (11.43)	293,3 (11.55)	284,2 (11.19)	284,8 (11.21)	286,3 (11.27)	288 (11.34)	289,1 (11.38)	290,3 (11.43)	291,7 (11.48)	295,3 (11.63)	mm (in)	B

MVPE48 DRIVE SHAFTS

SAE "B" SPLINE 04

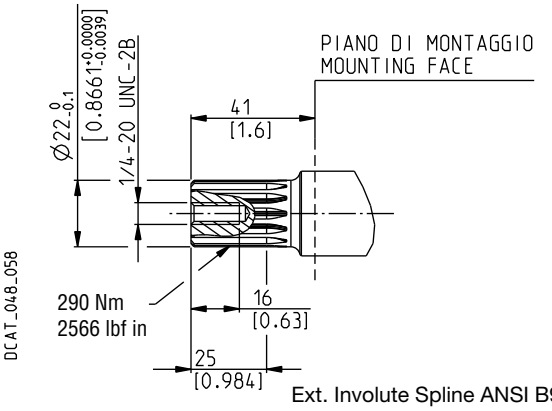
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
13 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE "B" SPLINE 4R

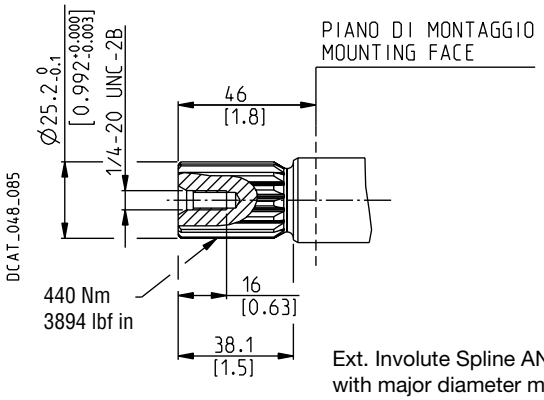
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
13 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE "BB" SPLINE 05

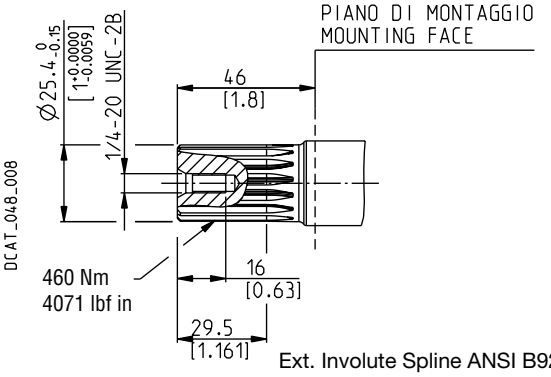
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
15 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE "BB" SPLINE 5R

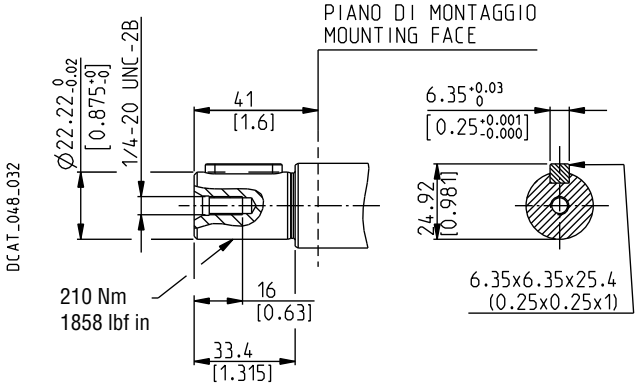
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
15 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE "B" STRAIGHT 32

Mounting face refers to flange code **S5**



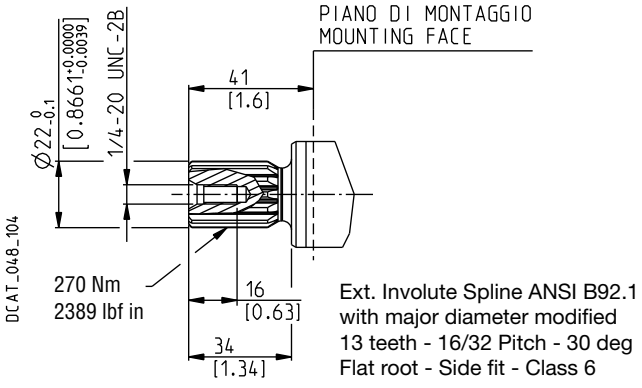
Please contact us for different drive shafts.

02/02.2023

MVPE60 DRIVE SHAFTS

SAE “B” SPLINE 04

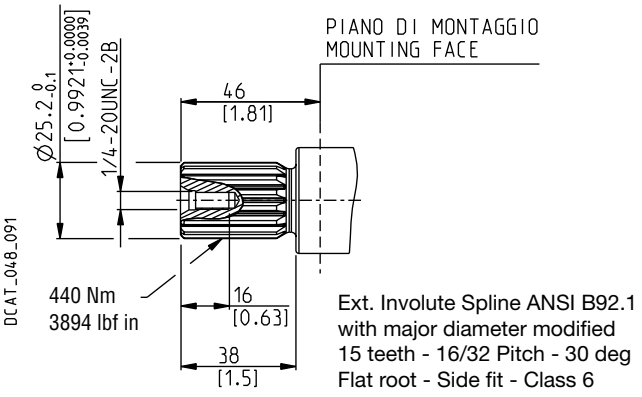
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
13 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE “BB” SPLINE 05

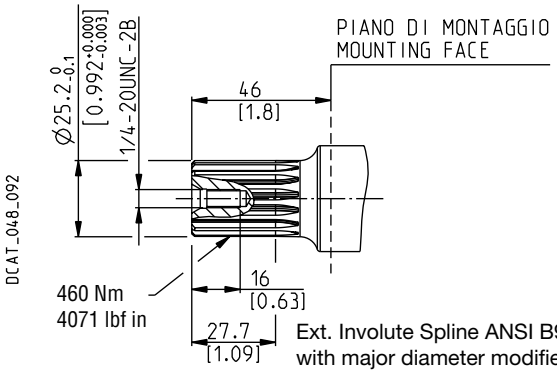
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
15 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE “BB” SPLINE 5R

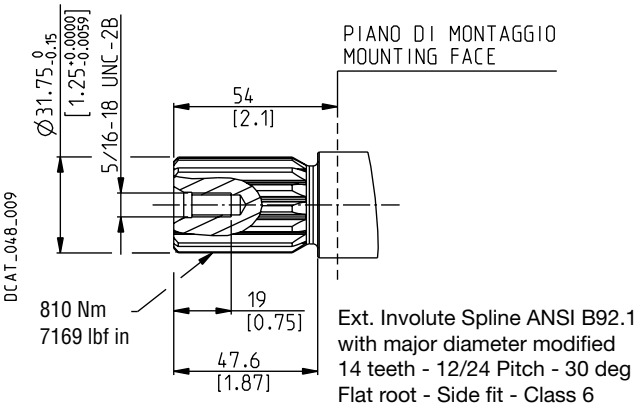
Mounting face refers to flange code **S5**



Ext. Involute Spline ANSI B92.1
with major diameter modified
15 teeth - 16/32 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE “C” SPLINE 06

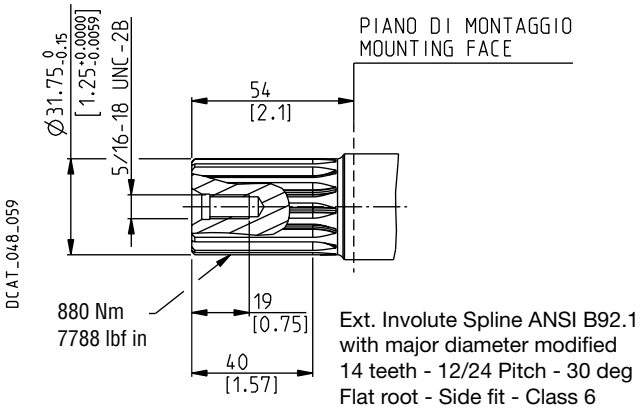
Mounting face refers to flange code **S7** and **S8**



Ext. Involute Spline ANSI B92.1
with major diameter modified
14 teeth - 12/24 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE “C” SPLINE 6R

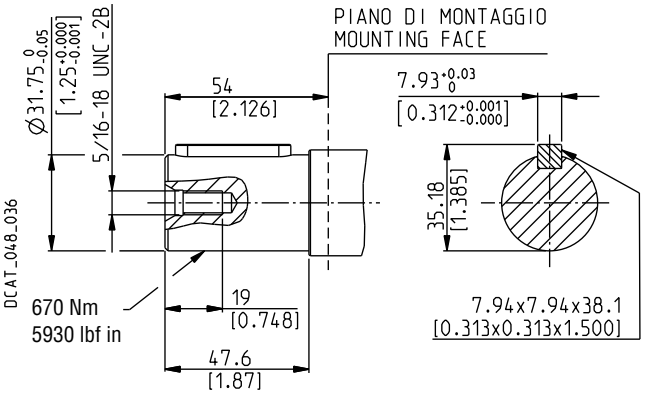
Mounting face refers to flange code **S7** and **S8**



Ext. Involute Spline ANSI B92.1
with major diameter modified
14 teeth - 12/24 Pitch - 30 deg
Flat root - Side fit - Class 6

SAE “C” STRAIGHT 34

Mounting face refers to flange code **S8**



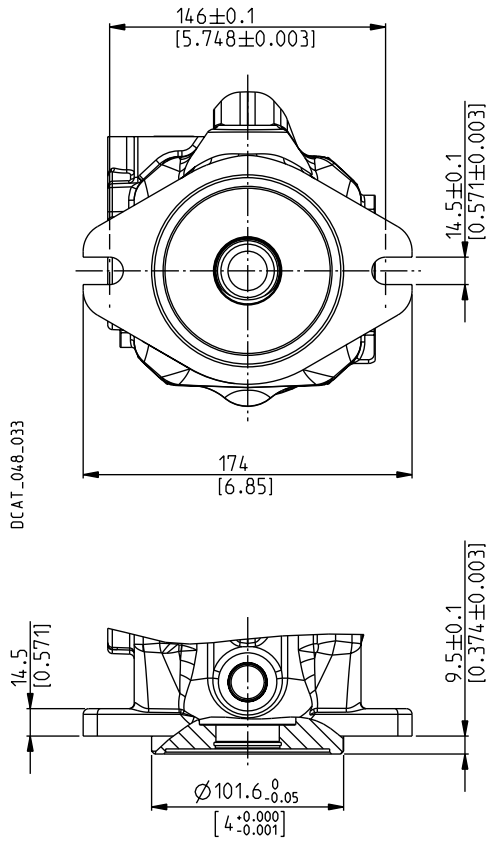
Please contact us for different drive shafts.

01/08.2022

MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE “B” 2 HOLES S5

Conforms to SAE J744

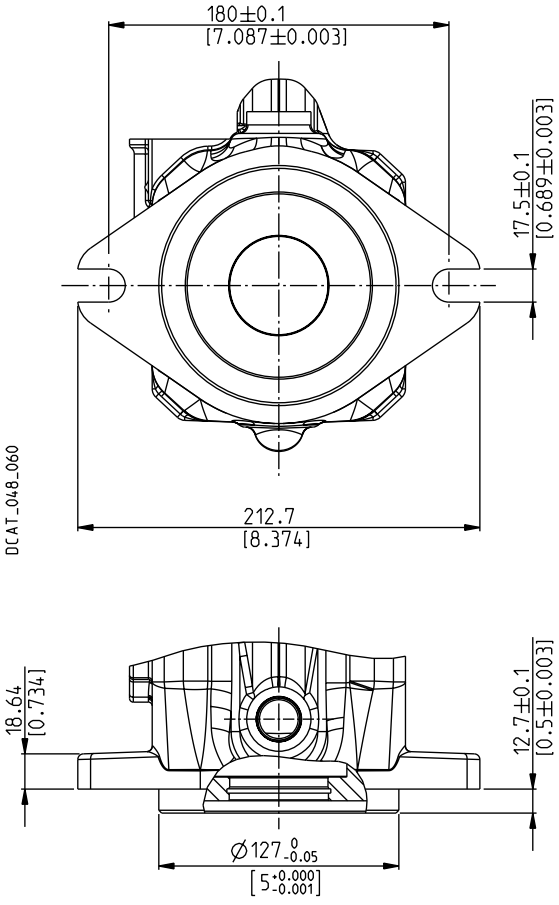


	DRIVE SHAFTS See page 30 ÷ 31							
Pump type	04	4R	32	05	5R	06	6R	34
MVPE48	X	X	X	X	X			
MVPE60	X			X	X	X	X	X

X Available combination

SAE “C” 2 HOLES S7

Conforms to SAE J744



	DRIVE SHAFTS See page 31					
Pump type	04	05	5R	06	6R	34
MVPE60	X	X	X	X	X	X

X Available combination

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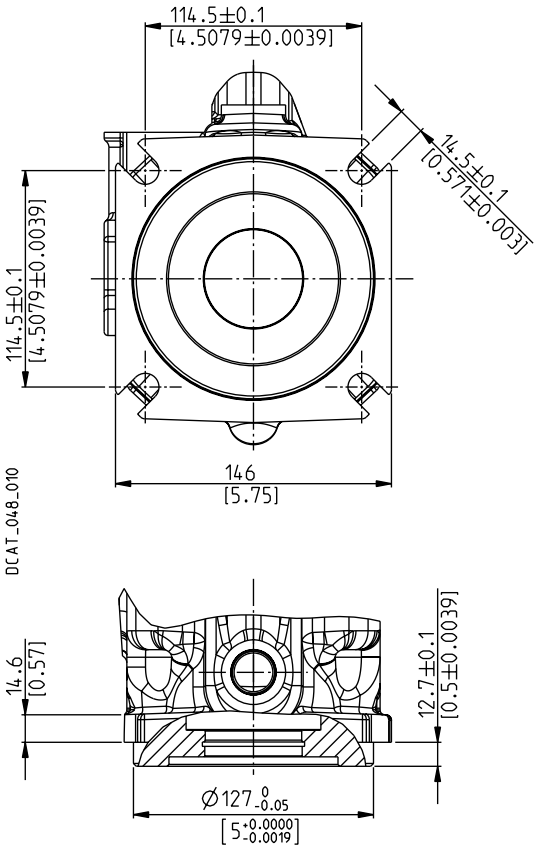
MOUNTING FLANGES AND TABLE OF COMPATIBILITY

SAE “C” 4 HOLES — S8

Conforms to SAE J744



DRIVE SHAFTS
See page 31

Pump type	04	05	5R	06	6R	34
MVPE60	X	X	X	X	X	X

X Available combination

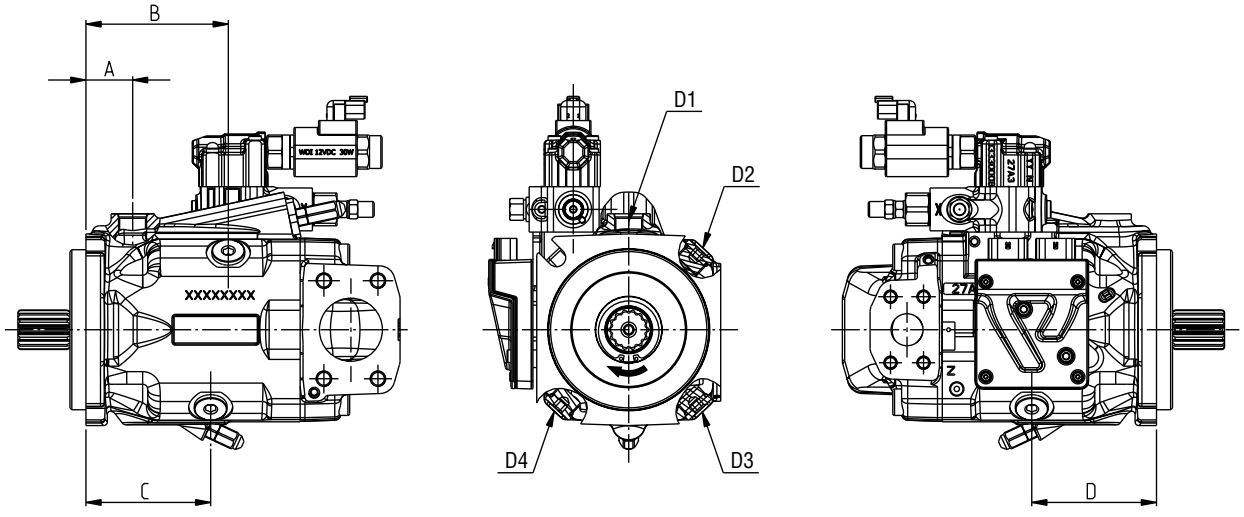
01/08.2022

PORTS TYPE

Ports type	INLET / OUTLET PORTS						DRAIN PORTS		LOAD SENSING PORTS (X)		KP20 / PHP20 GEAR PUMPS	
	Split SSM		Split SSS		SAE ODT		Gas BSPP	SAE ODT (●)	Gas BSPP (●)	SAE ODT	Gas BSPP	SAE ODT
	IN	OUT	IN	OUT	IN	OUT	D1 - D2 - D3 - D4		X		OUT	OUT
MVPE48	ME	MC	SE	SC	OH (■)	OF (■)	GD	OC	GA	03	GD	OC
MVPE60	MF	MC	SF	SC	MF	OF	GD	OC	GA	03	GD	OC

(X) Load sensing port. Please contact us for more information.
(●) Standard.
(■) Only for rear ports.

DRAIN PORTS POSITION



02/02.2023

Pump type	A	B	C	D
	mm (in)	mm (in)	mm (in)	mm (in)
MVPE48	36 (1.42)	97 (3.82)	—	97 (3.82)
MVPE60	37 (1.46)	113 (4.45)	99 (3.90)	99 (3.90)

PORTS TYPE

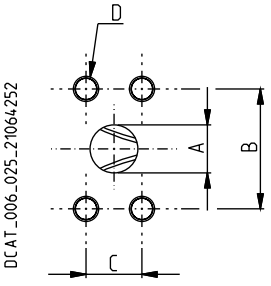
Tightening torque for low pressure side port

Tightening torque for high pressure side port

SAE FLANGED PORTS J518 - Standard pressure series 3000 psi - Code 61 — SSM

Metric thread ISO 60° conforms to ISO/R 262

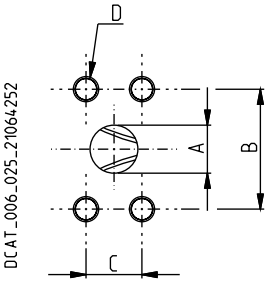
CODE	Nominal size	A	B	C	D		
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
MC	1”	25,4 (1.00)	52,4 (2.06)	26,2 (1.03)	M 10 17 (0.67)	–	30 $^{+2,5}$ (266 ÷ 288)
ME	1” 1/2	38,1 (1.50)	69,8 (2.75)	35,7 (1.41)	M 12 20 (0.79)	30 $^{+2,5}$ (266 ÷ 288)	–
MF	2”	51 (2.01)	77,8 (3.06)	42,9 (1.69)	M 12 20 (0.79)	30 $^{+2,5}$ (266 ÷ 288)	–



SAE FLANGED PORTS J518 - Standard pressure series 3000 psi - Code 61 — SSS

American straight thread UNC-UNF 60° conforms to ANSI B 1.1

CODE	Nominal size	A	B	C	D		
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	Nm (lbf in)	Nm (lbf in)
SC	1”	25,4 (1.00)	52,4 (2.06)	26,2 (1.03)	3/8 - 16 UNC-2B 17 (0.67)	–	35 $^{+2,5}$ (310 ÷ 332)
SE	1” 1/2	38,1 (1.50)	69,8 (2.75)	35,7 (1.41)	1/2 - 13 UNC-2B 20 (0.79)	30 $^{+2,5}$ (266 ÷ 288)	–
SF	2”	51 (2.01)	77,8 (3.06)	42,9 (1.69)	1/2 - 13 UNC-2B 20 (0.79)	30 $^{+2,5}$ (266 ÷ 288)	–



02/02.2023

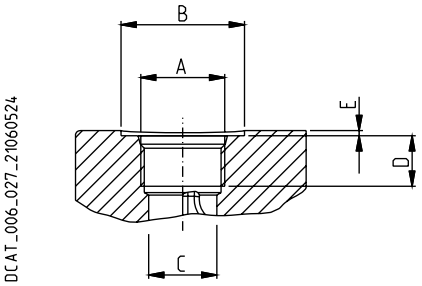
PORTS TYPE

Tightening torque for low pressure side port

Tightening torque for high pressure side port

SAE STRAIGHT THREAD PORTS J514 — ODT

American straight thread UNC-UNF 60° conforms to ANSI B 1.1

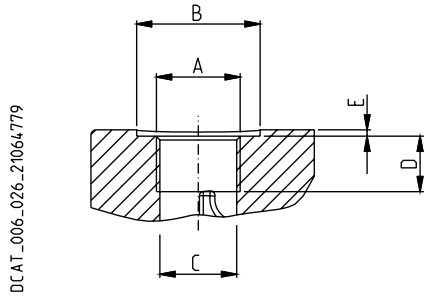


CODE	Nominal size	A	Ø B	Ø C	D	E		
		mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)	Nm (lbf in)
03 (X)	1/4”	7/16” - 20 UNF - 2B	—	9,5 (0.37)	—	—	—	12 +1 (106 ÷ 115)
0C (●)	5/8”	7/8” - 14 UNF - 2B	35 (1.38)	20,5 (0.81)	—	2 (0.08)	30 +2,5 (266 ÷ 288)	—
0C (◆)			34 (1.34)	20,5 (0.81)	17 (0.67)	0,5 (0.02)	—	70 +5 (620 ÷ 664)
0F	1”	1 5/16” - 12 UNF - 2B	—	30,5 (1.20)	20 (0.79)	—	—	170 +10 (1505 ÷ 1593)
0H	1” 1/2	1 7/8” - 12 UNF - 2B	—	45 (1.77)	20 (0.79)	—	100 +5 (885 ÷ 929)	—

(X) = Load sensing port - (●) = Drain port - (◆) = KP20 / PHP20 outlet port

GAS STRAIGHT THREAD PORTS — BSPP

British standard pipe parallel (55°) conforms to UNI - ISO 228



CODE	Nominal size	A	Ø B	Ø C	D	E		
		mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	Nm (lbf in)	Nm (lbf in)
GA (X)	1/8”	G 1/8	—	8,75 (0.34)	12 (0.47)	—	—	5 +0,25 (44 ÷ 46)
GD (●)	1/2”	G 1/2	30 (1.18)	19 (0.75)	17 (0.67)	2 (0.08)	20 +1 (177 ÷ 186)	—
GD (◆)			—	19 (0.75)	17 (0.67)	—	—	50 +2,5 (443 ÷ 465)

(X) = Load sensing port - (●) = Drain port - (◆) = KP20 / PHP20 outlet port

02/02.2023

INTEGRATED ELECTRONIC CONTROL UNIT

- 32 bit floating point Power-PC running at 120 Mhz
- 12 bit A/D converter
- CAN 2.0B port
- 2 Output stages with pulse-width-modulated current regulation (PWM)
- Download the software from a PC to the flash memory
- Can be used in all type of mobile operating machines (agriculture, forestry, building construction)
- The CAN BUS is available with CAN open and SAE J1939 standard

Working conditions

Power supply	8 ÷ 32 V DC
Operating temperature	-40 ÷ 105 °C (-40 ÷ 221 °F)
Max output current	3 A - 12 V DC
Current consumption	< 200 mA
Short circuit immunity	Against ground Against Vbb
Reverse polarity protection	Power supply lines

EMC protection

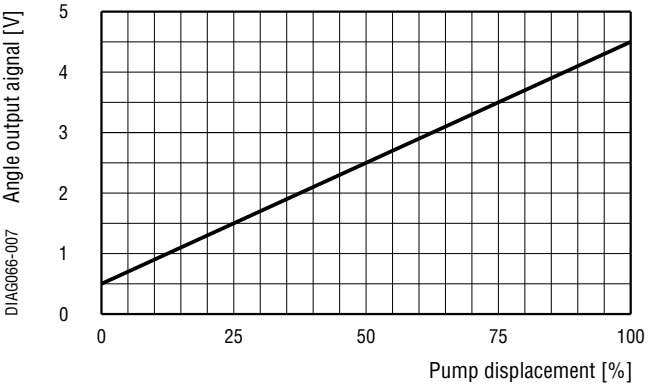
Radiated emission	Reference standards: UNI EN 14982 • Frequency range: 30 MHz ÷ 1 GHz
Radiated immunity	Reference standards: ISO11452-2 • Frequency range: 200 MHz ÷ 1 GHz Test level: 100 V/m • Frequency range: 1 GHz ÷ 2 GHz Test level: 50 V/m
Conducted immunity	Reference standards: ISO11452-4 • Frequency range: 20 MHz ÷ 220 MHz Test level: 100 mA
Load dump protection	Reference standards: ISO 7637-2 • Test level: 151 V
Electrostatic discharge	Reference standards: ISO 10605 • ±4, ±6, ±8, ±15 kV (Indirect discharge) • ±4, ±6, ±8, ±15 kV (Air discharge)

Input / Output

Analog input	4
Temperature sensor input	1
Digital/Frequency input	1
CAN BUS	1
Bluetooth	No
Proportional output	2 High Side drive 2A 2 Low Side drive 2A with current feedback

Swashplate angular sensor

Output signal	Proportional to swashplate angular position
Angular sensor resolution	0,025 % Vcc
Angular sensor repetibility	0,2°

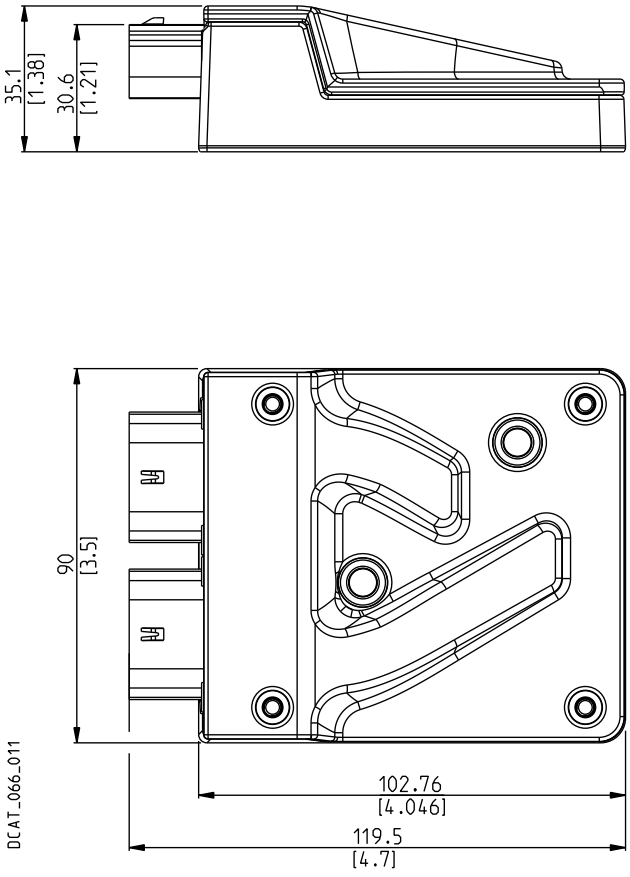


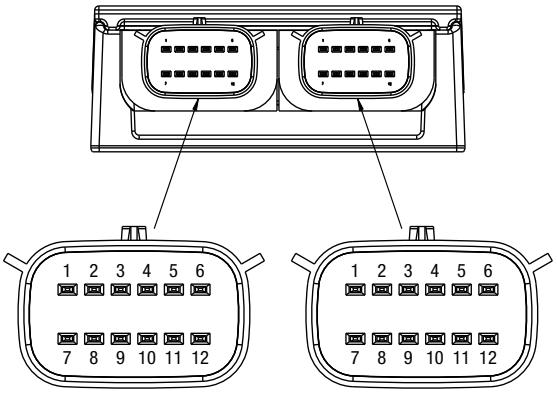
Environmental resistance

Random noise	Reference standards: EN 60068-2-64 • ASD = 0.1g² (RMS 3,3 g) • f = 10…1000Hz • Duration per axis (xyz): 8 h
Mechanical shock	Reference standards: EN 60068-2-29 • Type of shock: Half sine • Acceleration amplitude: = 40 g • Shock duration: 6 ms • 100 positive shocks for each axes • 100 negative shocks for each axes
IP67 Protection	Reference standards: EN 60529
IP6K9K Protection	Reference standards: ISO 20653
Temperature cycle test	Reference standards: ISO 16750-4 • Temperature: -40 ÷ 115 °C (-40 ÷ 239 °F) • Number of cycles: 30
Temperature shock test	Reference standards: ISO 16750-4 • 60min @ -40 °C (-40 °F) • 20min @ 115 °C (239 °F) • Number of cycles: 20
Low temperature test	Reference standards: ISO 16750-4 • Temperature: -40 °C (-40 °F) • Test duration: 24 h
High temperature test	Reference standards: ISO 16750-4 • Temperature: 115 °C (239 °F) • Test duration: 48 h

01/08.2022

INTEGRATED ELECTRONIC CONTROL UNIT





LEFT CONNECTOR
Molex Mx120 g
Connector PN 36783-1201
Mating 36792-1201

RIGHT CONNECTOR
Molex Mx120 g
Connector PN 36783-1201
Mating 36792-1201

LEFT CONNECTOR - Pinout

Pin	Function
1	Analog input 0
2	Analog input 1
3	Digital input
4	CAN termination
5	CAN LOW
6	GND
7	CAN LOW
8	CAN HIGH
9	Analog Ground
10	Machine Key signal
11	CAN HIGH
12	Power VBB

RIGHT CONNECTOR - Pinout

Pin	Function
1	Resistive input 0
2	Analog input 2
3	Proportional output PWM B-
4	Proportional output PWM B+
5	Proportional output PWM A-
6	Proportional output PWM A-
7	Analog Ground
8	Angle out
9	5 V
10	Analog input 3
11	Analog input 4
12	Power VBB

01/08.2022

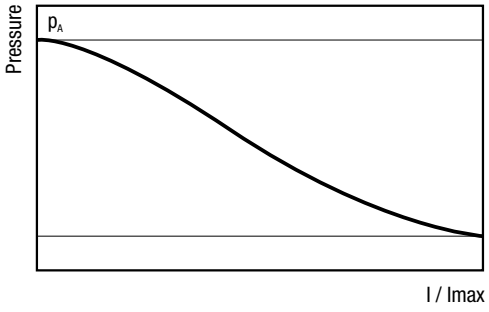
PRESSURE ELECTRONIC COMPENSATOR PLUS ANGULAR SENSOR PECA

Replaces: 01/08.2022

Regulates the pump displacement automatically to mantain the pressure below the variable limit set through a command current signal. The swivel angular sensor converts the actual position of the swashplate into a voltage output signal that is used by the integrated electronic control unit to realise pump and system control logics.

o

OPERATING CURVES

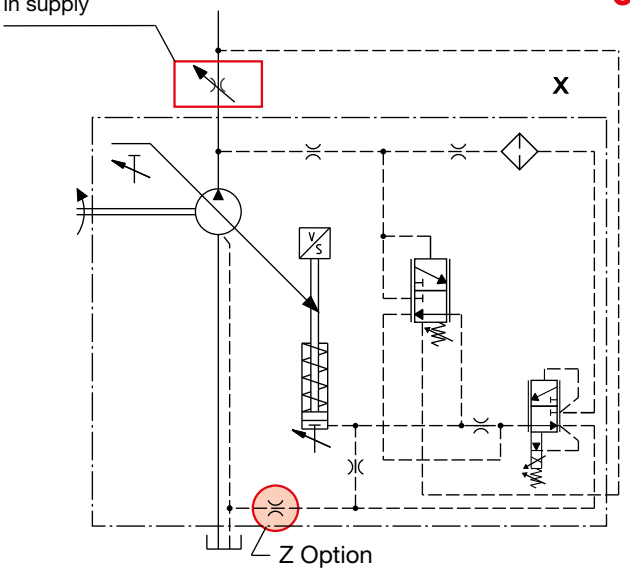


Valve code	Arrangement	Voltage
1	Normally closed	12 V DC
2	Normally closed	24 V DC

PECA - LS2 (with flow control)

Not included in supply

o



Z OPTION

Damping restrictor for critical applications.
In case of system instability or pressure oscillations, the additional damping restrictor slows down the pump control system, damping the regulation transients.
The pump recovery time increases.
The use of the damping restrictor must be evaluated and approved by Casappa technical sales department for the specific application.

o 03/02.2024

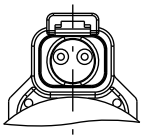
NOTES

X: Load-sensing port. Dimensions at page 34 ÷ 36.
Connectors availabitliy at page 40.
Please contact us for more information.

CONNECTORS

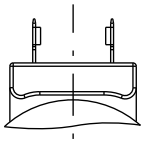
CONNECTOR: Deutsch DT04-2P **D**

Protection: IP69K with mating connector mounted



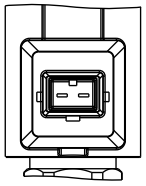
CONNECTOR: DIN 43650 **S**

Protection: IP65 with mating connector mounted



CONNECTOR: Junior Timer **JT**

Protection: IP67 with mating connector mounted



COILS FEATURES

Connector type	**D** (Deutsch DT04-2P) **S** (DIN 43650) **JT** (Junior timer)	
Voltage	12 V DC	24 V DC
Power	30 W	34 W
Resistance @ 20 °C (68 °F)	4,9 ± 3% Ω	17,1 ± 5% Ω
Dither frequency	150 Hz	150 Hz
Operating temperature	-30 ÷ 110 °C (-22 ÷ 230 °F)	-30 ÷ 110 °C (-22 ÷ 230 °F)

03/02.2024

MULTIPLE PUMPS WITH THROUGH DRIVE

THROUGH DRIVE

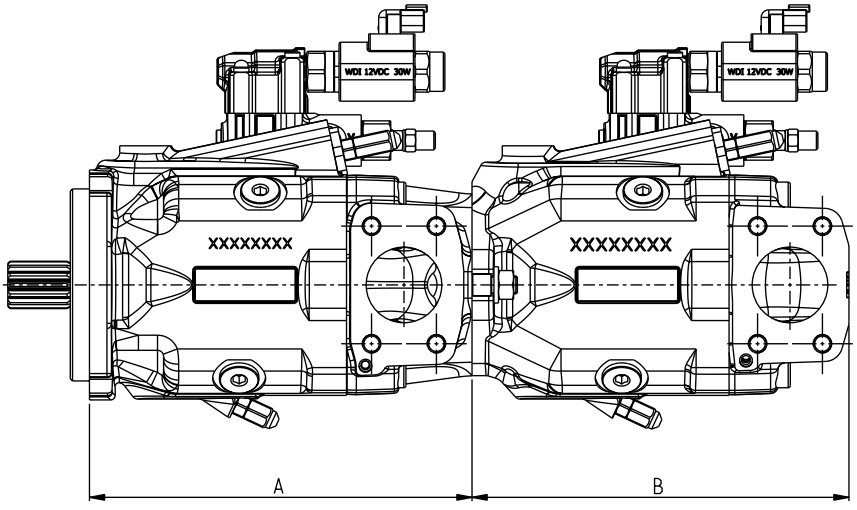
MVPE through drive axial piston pumps offer the flexibility to obtain different groups able to supply several hydraulic systems. The operating characteristics of each assembled pumps are the same as the corresponding single pumps according to the following conditions:

1) Do not exceed the maximum transmissible torque.
2) The maximum rotational speed is that of the lowest rated speed of the single unit incorporated.

M	Nm (lbf in)	Torque
V	cm^3/rev (in^3/rev)	Displacement
Δp	bar (psi)	Pressure
$\eta_{hm} = \eta_{hm}$ (V, Δp, n)		Hydro-mechanical efficiency

$$M = \frac{\Delta p\ (bar) \bullet V\ (cm^3/rev)}{62{,}83 \bullet \eta_{hm}} \quad [Nm]$$

Notes: The torque absorbed from the shaft of the first pump results from the sum of the torques due to all the single stages. The achieved value must not exceed the maximum torque limit given for the shaft of the first pump.



DCAT_066_014

A: Front section (through drive)
B: MVPE Rear pump (the same of single pump with side or rear ports)
Gear rear pump are also available, please see the respective technical catalogues.

02/02.2023

	A	
Pump type	Flanged for	Code
MVPE48	SAE B	**AS5**
MVPE60	SAE B	**AS5**

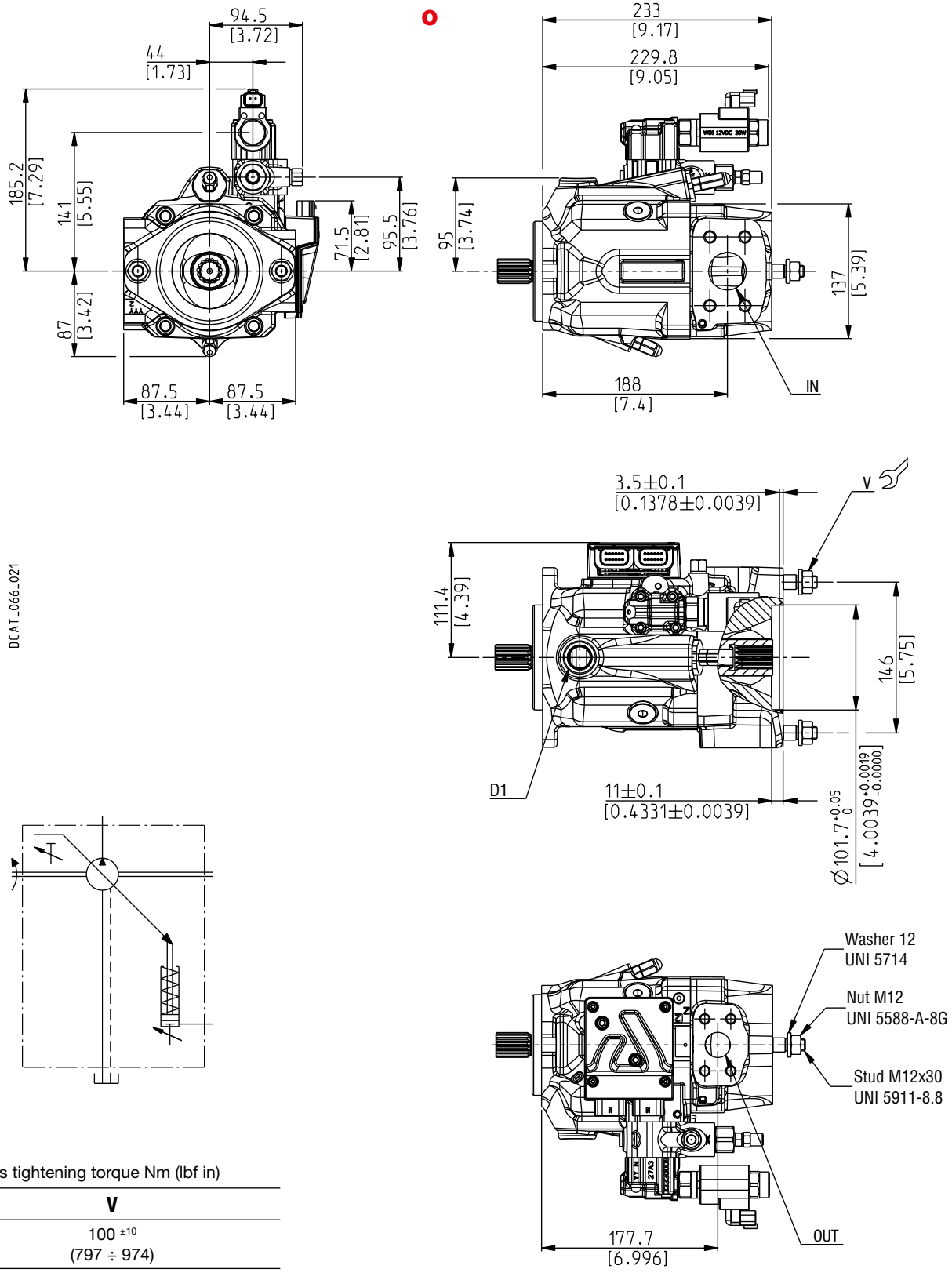
MVPE48 FRONT SECTION - DIMENSIONS AS5

Through drive SAE B

Drive shafts: see page 30
Mounting flanges: see page 32
Ports: see page 34 ÷ 36

The drawing shows a front section with clockwise rotation

Replaces: 02/02.2023



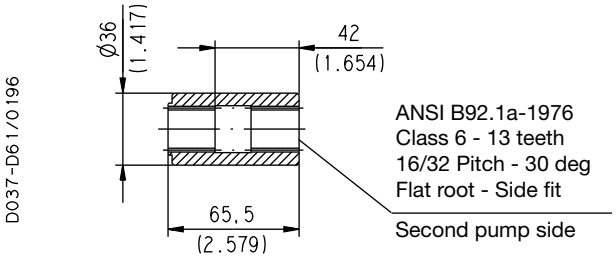
Screws tightening torque Nm (lbf in)
V
100 ±10 (797 ÷ 974)

03/02.2024

MVPE48 COUPLINGS - DIMENSIONS

SAE “B” SPLINE 04

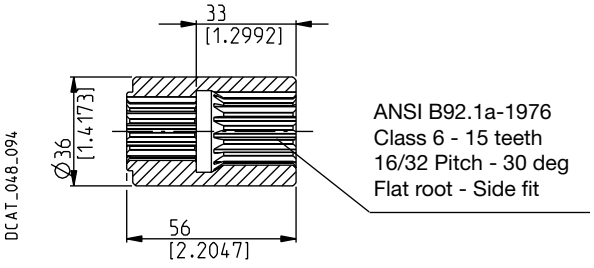
Available with flange code **AS5**



MAX 200 Nm (1770 lbf in)

SAE “BB” SPLINE 05

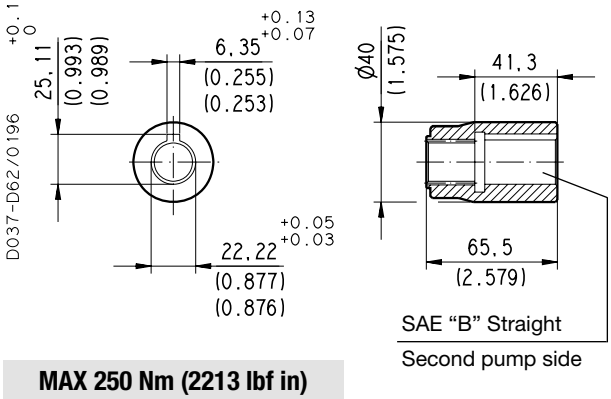
Available with flange code **AS5**



MAX 250 Nm (2213 lbf in)

SAE “B” STRAIGHT 32

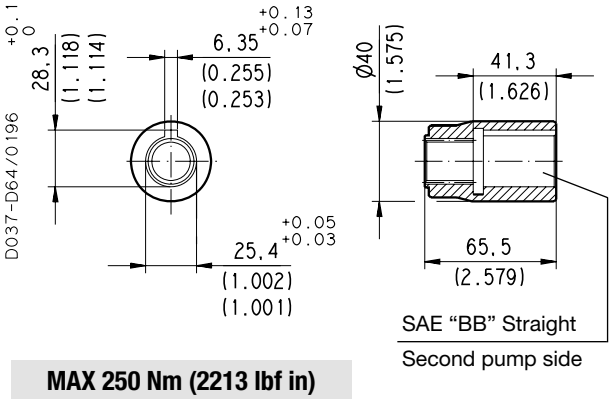
Available with flange code **AS5**



MAX 250 Nm (2213 lbf in)

SAE “BB” STRAIGHT 33

Available with flange code **AS5**



MAX 250 Nm (2213 lbf in)

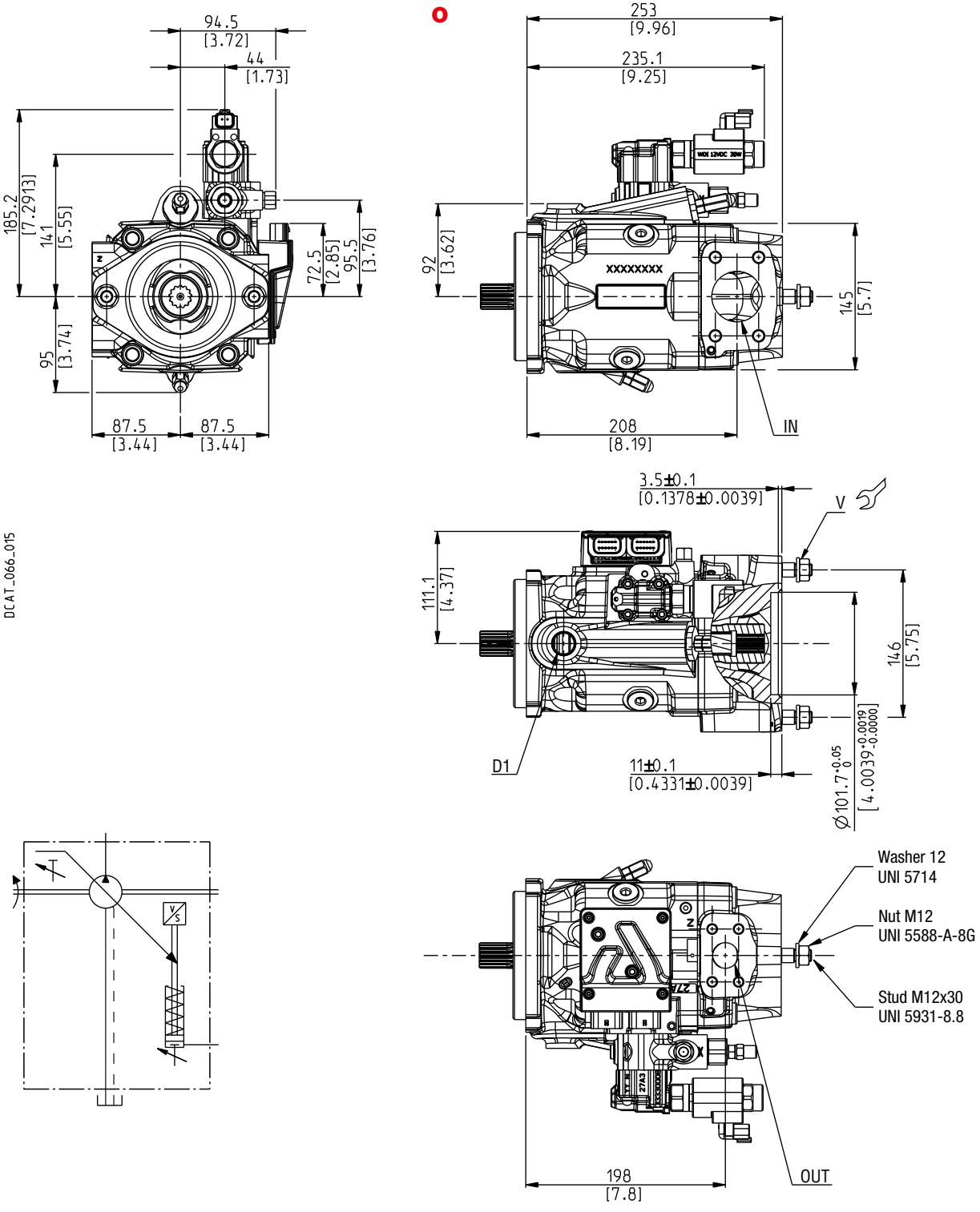
02/02.2023

MVPE60 FRONT SECTION - DIMENSIONS AS5

Through drive SAE B

Drive shafts: see page 31
Mounting flanges: see page 32 ÷ 33
Ports: see page 34 ÷ 36

The drawing shows a front section with clockwise rotation



Screws tightening torque Nm (lbf in)
V
100 ±10 (797 ÷ 974)

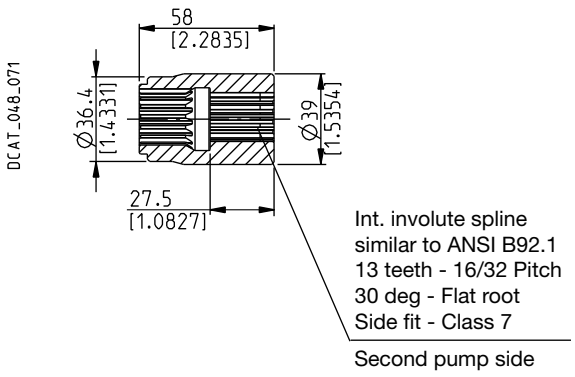
Replaces: 01/08.2022

03/02.2024

MVPE60 COUPLINGS - DIMENSIONS

SAE “B” SPLINE 04

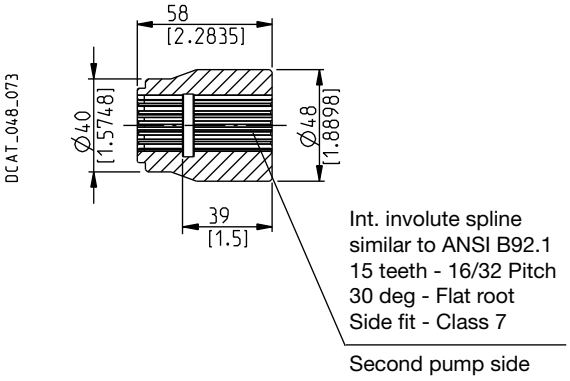
Available with flange code **AS5**



MAX 200 Nm (1770 lbf in)

SAE “BB” SPLINE 05

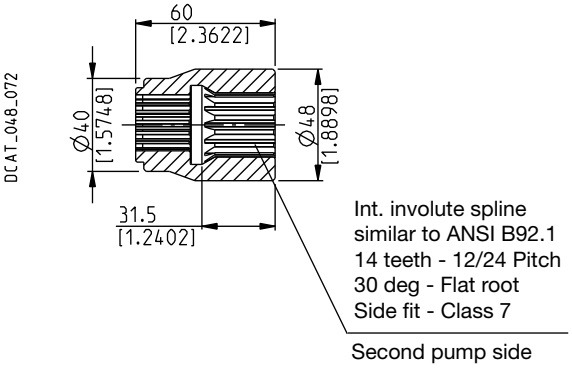
Available with flange code **AS5**



MAX 250 Nm (2213 lbf in)

SAE “C” SPLINE 06

Available with flange code **AS5**

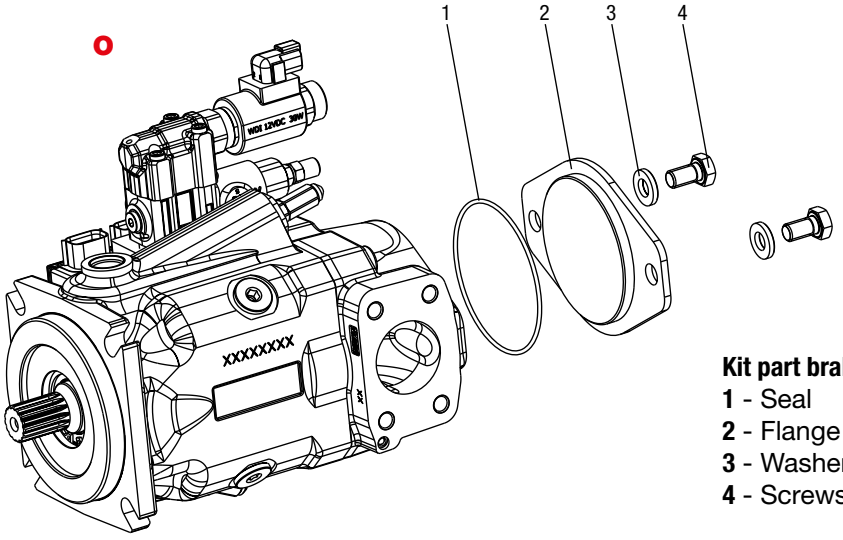


MAX 430 Nm (3806 lbf in)

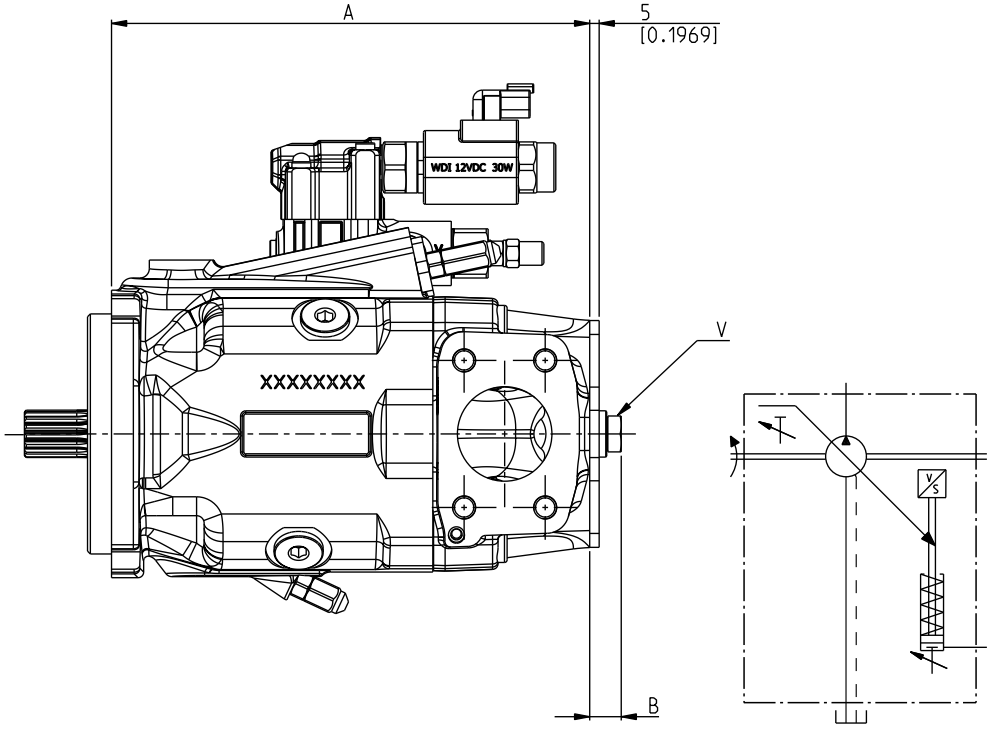
01/08.2022

FRONT SECTION KIT COVER

Kit cover is available to obtain single pumps starting from the front sections of multiple pumps.
Before closing the intermediate flange check that the coupling has been removed.



Kit part brake down
1 - Seal
2 - Flange
3 - Washers
4 - Screws



DCAT_066_016

Front section					Kit cover
Pump type	Flanged for	Code	**A** mm (in)	**B** mm (in)	Code
MVPE48	SAE B	AS5	233 (9.1732)	16 (0.6299)	**62100007**
MVPE60	SAE B	AS5	253 (9.9606)	16 (0.6299)	

Screws tightening torque Nm (lbf in)
V
20 ±1 (159 ÷ 195)

Replaces: 02/02.2023

03/02.2024

NOTES

01/08.2022

HOW TO ORDER SINGLE PUMPS

1	2		3	4		5	6		7		8 ...
MVPE60-60	S	-	06	S8	-	L	MF/MC	-	N	-	...

1 Pump type (max. displacement)	Code
45 cm³/rev (2.75 in³/rev)	MVPE48-45
53,7 cm³/rev (3.28 in³/rev)	MVPE48-53
60 cm³/rev (3.66 in³/rev)	MVPE60-60
72 cm³/rev (4.39 in³/rev)	MVPE60-72
84,7 cm³/rev (5.17 in³/rev)	MVPE60-84

2 Rotation	Code
Anti-clockwise	S
Clockwise	D

3 Drive shaft (a)	Code
SAE “B” spline (13 teeth)	04
SAE “B” spline (13 teeth)	4R
SAE “B” straight	32
SAE “BB” spline (15 teeth)	05
SAE “BB” spline (15 teeth)	5R
SAE “C” spline (14 teeth)	06
SAE “C” spline (14 teeth)	6R
SAE “C” straight	34

4 Mounting flange (a)	Code
SAE “B” 2 holes	S5
SAE “C” 2 holes	S7
SAE “C” 4 holes	S8

5 Ports position	Code
Side	L
Rear	P

Code	6 Inlet/outlet ports		
	Nominal size		Pump type
	Inlet IN	Outlet OUT	
	SAE 3000	SAE 3000	
SAE FLANGED PORTS METRIC THREAD (SSM)			
ME/MC	1” 1/2	1”	MVPE48
MF/MC	2”	1”	MVPE60
SAE FLANGED PORTS UNC THREAD (SSS)			
SE/SC	1” 1/2	1”	MVPE48
SF/SC	2”	1”	MVPE60
SAE STRAIGHT THREAD PORTS (ODT)			
OH/OF (b)	1” 1/2	1”	MVPE48
MF/OF	2”	1”	MVPE60

Code	7 Seals
N	Buna (standard)
V	Viton

Code	8 Regulators
...	See how to order at page 49

(a) Drive shafts availability at pages 30 ÷ 31 and mounting flanges availability at pages 32 ÷ 33

(b) Only for rear ports

02/02.2023

HOW TO ORDER REGULATORS

PRESSURE ELECTRONIC COMPENSATOR

Pressure electronic compensator plus angular sensor and flow control

8		9		10		11		12		13		14		15		16		17
PECA	-	1	-	A	-	LS2	-	Z		...	/	...	-	D	-	G	-	DP

Replaces: 01/08.2022

8	Regulators type	Code
Pressure electronic compensator plus swashplate angular sensor		PECA

9	Valve type	Code
Normally closed 12 V DC		1
Normally closed 24 V DC		2

10	Position	Code
Position 0°		A
Position 90°		B

11	Flow control option	Code
Flow compensator for remote control		LS2

12	Restrictor option	Code
Without restrictor (standard - no code)		
Damping restrictor (only for critical applications)		Z

Code	Min. pressure setting	13
...	Please specify the requested value in bar	

Code	Max. pressure setting	14
...	Please specify the requested value in bar	

Code	O Connector type	15
D	Deutsch DT04-2P	
S	DIN 43650	
JT	Junior timer	

Code	Displacement limiter	16
E	Max. displacement limiter	
G	Min. and Max. displacement limiter	

Code	Double shaft seal option	17
	Without double shaft seal (standard - no code)	
DP	Double shaft seal (availability at page 20)	

O 03/02.2024

ORDER EXAMPLE

MVPE60 pump with pressure electronic compensator plus angular sensor and flow control:

MVPE60.60S-06S8-LMF/MC-N-PECA-1-A-LS2-100/300-D-G-DP

HOW TO ORDER MULTIPLE PUMPS - PISTON PUMP/GEAR PUMP

COMMON INLET

1	2	3	4	5	6	7	8 ...	9	10	11	7	12	
MVPE60-60	S	-	06	S8	-	L	MF/MC	- N -	...	- G -	DP	- P7	- A	/
							Front section							
KP20-6,3	S	-			-	L	**/GD	-				N5 - N - P		
							Rear section							

1 Pump type (max. displacement)	Code
Front section - The same of single pumps	MVPE ...
Rear section - KAPPA 20 gear pumps (a)	KP 20 ...
Rear section - POLARIS PH gear pumps (b)	PHP 20 ...

2 Rotation	Code
Anti-clockwise	S
Clockwise	D

3 Drive shaft (c)	Code
SAE “B” spline (13 teeth)	04
SAE “B” spline (13 teeth)	4R
SAE “B” straight	32
SAE “BB” spline (15 teeth)	05
SAE “BB” spline (15 teeth)	5R
SAE “C” spline (14 teeth)	06
SAE “C” spline (14 teeth)	6R
SAE “C” straight	34

4 Mounting flange (c)	Code
SAE “B” 2 holes	S5
SAE “C” 2 holes	S7
SAE “C” 4 holes	S8

5 Ports position	Code
Side	L

6 Inlet/outlet ports (a) - (b)			Code
Pump type	Nominal size		
	Inlet IN	Outlet OUT	
	SAE 3000	SAE 6000	
SAE FLANGED PORTS METRIC THREAD (SSM)			
MVPE48	1” 1/2	1”	ME/MC
MVPE60	2”	1” 1/4	MF/MC
SAE FLANGED PORTS UNC THREAD (SSS)			
MVPE48	1” 1/2	1”	SE/SC
MVPE60	2”	1”	SF/SC
SAE STRAIGHT THREAD PORTS (ODT)			
MVPE48	—	—	
MVPE60	2”	1”	MF/OF

Code	Seals 7
N	Buna (standard)
V	Viton

Code	Regulators 8
...	See how to order on page 49

Code	Displacement limiter 9
E	Max. displacement limiter
G	Min. and Max. displacement limiter

Code	Double shaft seal option 10
	Without double shaft seal (standard - no code)
DP	Double shaft seal (availability at page 20)

Code	Intermediate flange 11
	FRONT SECTION
P7	Flanged for KP20
I7	Flanged for PHP20
	REAR SECTION
N5	Kappa 20 (common inlet)
S7	Polaris PHP 20 (common inlet)

Code	Sections 12
A	Front
P	Rear

Omit code only if ordering assembled multiple pumps

(a) KAPPA 20 gear pumps:
displacements at page 24 and 28 ports at page 34. For more information, please see the respective technical catalogue

(b) POLARIS PH gear pumps:
displacements at page 25 and 29 ports at page 34. For more information, please see the respective technical catalogue

(c) Drive shafts availability at pages 30 ÷ 31 and mounting flanges availability at pages 32 ÷ 33

02/02.2023

HOW TO ORDER MULTIPLE PUMPS - PISTON PUMP/GEAR PUMP

ORDER EXAMPLE

Common inlet double pump MVPE60 with pressure electronic compensator plus angular sensor and flow control + PHP20 gear pump.

INDIVIDUAL SECTIONS

Front section	**MVPE60.60S-06S8-LMF/MC-N-PECA-1-A-LS2-100/300-D-G-DP-I7-A**
Rear section	**PHP 20.23S-L **/GD-S7-N-P**

ASSEMBLED DOUBLE PUMP	**MVPE60.60S-06S8-LMF/MC-N-PECA-1-A-LS2-100/300-D-G-DP/PHP 20.23-L**/GD**

01/08.2022

HOW TO ORDER MULTIPLE PUMPS - PISTON PUMP/PISTON PUMP

Through drive

1	2	3	4	5	6	7	8 ...	9	10	11	12	
MVPE60-60	S	-	06	S8	-	L	MF/MC	-	N	-	...	-	G	-	AS5	-	04	-	DP	/

Front section (through drive)

MVPE60-60	S	-	04	S5	-	L	MF/MC	-	N	-	...	-	G							

Rear section (single pump)

1 Pump type (max. displacement)	Code
Front section MVPE (the same of single pumps) (a)	MVPE ...
Rear section MVPE (the same of single pumps) (a)	MVPE ...

2 Rotation	Code
Anti-clockwise	S
Clockwise	D

3 Drive shaft (b)	Code
SAE “B” spline (13 teeth)	04
SAE “B” spline (13 teeth)	4R
SAE “B” straight	32
SAE “BB” spline (15 teeth)	05
SAE “BB” spline (15 teeth)	5R
SAE “C” spline (14 teeth)	06
SAE “C” spline (14 teeth)	6R
SAE “C” straight	34

4 Mounting flange (b)	Code
SAE “B” 2 holes	S5
SAE “C” 2 holes	S7
SAE “C” 4 holes	S8

5 Ports position	Code
Side	L

6 Inlet/outlet ports			Code
Pump type	Nominal size		
	Inlet IN	Outlet OUT	
	SAE 3000	SAE 6000	
SAE FLANGED PORTS METRIC THREAD (SSM)			
MVPE48	1” 1/2	1”	ME/MC
MVPE60	2”	1” 1/4	MF/MC
SAE FLANGED PORTS UNC THREAD (SSS)			
MVPE48	1” 1/2	1”	SE/SC
MVPE60	2”	1”	SF/SC
SAE STRAIGHT THREAD PORTS (ODT)			
MVPE48	—	—	
MVPE60	2”	1”	MF/OF

Code	7 Seals
N	Buna (standard)
V	Viton

Code	8 Regulators
...	See how to order on page 49

Code	9 Displacement limiter
E	Max. displacement limiter
G	Min. and Max. displacement limiter

Code	10 Intermediate flange (c)
AS5	SAE “B” 2 holes

Code	11 Coupling (d)
04	SAE “B” spline (13 teeth)
32	SAE “B” straight
05	SAE “BB” spline (15 teeth)
33	SAE “BB” straight
06	SAE “C” spline (14 teeth)

Code	12 Double shaft seal option
	Without double shaft seal (standard - no code)
DP	Double shaft seal (availability at page 20)

02/02.2023

Omit code only if ordering assembled multiple pumps

(a) Displacements at page 48

(b) Drive shafts availability at pages 30 ÷ 31 and mounting flanges availability at pages 32 ÷ 33

(c) Intermediate flange availability at page 40

(d) Couplings availability:
MVPE48 on page 43
MVPE60 on page 45

HOW TO ORDER MULTIPLE PUMPS - PISTON PUMP/PISTON PUMP

ORDER EXAMPLE

Through drive double pump MVPE60 with pressure electronic compensator plus angular sensor and flow control.

INDIVIDUAL SECTIONS

Front section	MVPE60.60S-06S8-LMF/MC-N-PECA-1-A-LS2-100/300-D-G-AS5/04-DP
Rear section	MVPE60.60S-04S5-LMF/MC-N-PECA-1-A-LS2-100/300-D-G

ASSEMBLED DOUBLE PUMP

MVPE60.60S-06S8-LMF/MC-N-PECA-1-A-LS2-100/300-D-G-DP/ MVPE60.60S-04S5-LMF/MC-N-PECA-1-A-LS2-100/300-D-G

01/08.2022

NOTES

01/08.2022

CSP 03 T A Edition: 03/02.2024 Replaces: 02/02.2023

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