

Smart Servopump - SSP

high performance p/Q control and energy saving



SSP is available in single pump (sect. 1.1) or double pump execution (sect. 1.2). SSP systems combine the typical advantages of hydraulic power transmission with the ease of control and adjustment of an electric drive while also ensuring maximum levels of energy efficiency. SSP components as well as the complete SSP unit are CE certified according to the relative norms. PMM electrical motors and D-MP drives are UL/CSA marked.

Maximum flow:	350 l/min
Maximum rated power:	100 kW
Maximum continuous pressure:	
cast iron pump	330 bar
aluminium pump	250 bar

They consist of a fixed displacement internal gear pump, driven by a permanent magnet synchronous servomotor controlled by an electronic drive. The latter controls the speed of the servomotor and therefore of the pump, to adjust the flow rate or pressure of the system based on the reference signals received from the PLC of the machine.

A dedicated algorithm optimizes the p/Q function by automatically selecting the activation of the flow or pressure control.

Compared to traditional systems, SSPs offer the following advantages:

- significant reduction in energy consumption, as the pump operates at the speed strictly necessary to generate the required flow rate / pressure
- high dynamics and precision of p/Q control thanks to a dedicated algorithm
- reduction of the noise level, thanks to the design of the pump and the variable speed
- Smart Maintenance allows to plan in advance the replacement of worn components, maximizing productivity and minimizing maintenance costs
- simplified commissioning thanks to the Smart start-up and Smart tuning functions
- possibility of customization up to 4 axes with Multiple axis function

For more details see technical table AS050

1 MODEL CODE

1.1 Single pump execution

For optimal sizing, download the sizing software S-SW-SIZING from MyAtos area at www.atos.com

SSP	-	T-SP	-	NP	-	2020L	-	1024	-	046	/	C	/	T	/	*	/	PE
Smart servopump																Series number		Seals material PE = FKM
Control logic: T-SP = alternated p/Q control with resolver																		
Fieldbus interface , serial port always present: NP = Not present BC = CANopen EH = EtherCAT BP = PROFIBUS DP EP = PROFINET RT/IRT																		
Pump PGL, cast iron pump, Pmax 330 bar (1) - see table AS300: 1011 = 10,8 cm³/rev 2040 = 39,5 cm³/rev 3080 = 80 cm³/rev 1016 = 15,6 cm³/rev 2050 = 49,5 cm³/rev 4080 = 80 cm³/rev 2020 = 20 cm³/rev 4050 = 50 cm³/rev 3100 = 100 cm³/rev 2025 = 24,5 cm³/rev 3064 = 64 cm³/rev 4100 = 100 cm³/rev 2032 = 31,6 cm³/rev 4064 = 64 cm³/rev																		
PGL, aluminium pump, Pmax 250 bar - see table AS350: 2020L = 20 cm³/rev 2040L = 40,1 cm³/rev 3080L = 80 cm³/rev 2025L = 24,5 cm³/rev 2050L = 50 cm³/rev 3100L = 100 cm³/rev 2032L = 32,1 cm³/rev 3064L = 64 cm³/rev 4125L = 125 cm³/rev																		
Port orientation see section 10 : T = standard U, V = optional																		
Hydraulic option see section 8 : C = integrated block with relief valve and pressure transducer D = as option C plus Smart Cooling functionality																		
Electronic function see section 9 : K = Drive with Safe Torque Off - always present																		
Drive D-MP - see table AS500: 022 = 22 A 060 = 57,5 A 140 = 140 A 032 = 32 A 090 = 87 A 165 = 165 A 046 = 46 A 100 = 100 A 210 = 210 A																		
Motor PMM - see table AS400: 1009 = 8,7 kW 1032 = 30 kW 2080 = 80 kW 1015 = 15 kW 2042 = 42 kW 2100 = 100 kW 1024 = 24 kW 2055 = 55 kW																		

(1) Pmax depends on the pump displacement

1.2 Double pump execution

Second pump must be selected with equal or smaller displacement than first pump

Our specialists are available to give support in the sizing of SSP double pump executions

SSP	-	T-SP	-	NP	-	2020	/	1011	-	1024	-	046	/	K	/	T	*	/	PE
Smart servopump																	Series number		Seals material PE = FKM
Control logic: T-SP = alternated p/Q control with resolver																			
Fieldbus interface , serial port always present: NP = Not present BC = CANopen EH = EtherCAT BP = PROFIBUS DP EP = PROFINET RT/IRT																			
First pump PGL, cast iron pump , Pmax 330 bar (1) - see table AS320: 1011 = 10,8 cm ³ /rev 2032 = 31,6 cm ³ /rev 3080 = 80 cm ³ /rev 1016 = 15,6 cm ³ /rev 2040 = 39,5 cm ³ /rev 3100 = 100 cm ³ /rev 2020 = 20 cm ³ /rev 2050 = 49,5 cm ³ /rev 2025 = 24,5 cm ³ /rev 3064 = 64 cm ³ /rev																			
Second pump PGL, cast iron pump , Pmax 330 bar - see table AS320: 1011 = 10,8 cm ³ /rev 1016 = 15,6 cm ³ /rev																			
															Port orientation see section 10: T = standard U, V = optional				
															Electronic function see section 9: K = Drive with Safe Torque Off (always present)				
															Drive D-MP - see table AS500: 022 = 22 A 060 = 57,5 A 140 = 140 A 032 = 32 A 090 = 87 A 165 = 165 A 046 = 46 A 100 = 100 A 210 = 210 A				
															Motor PMM - see table AS400: 1009 = 8,7 kW 1032 = 30 kW 2080 = 42 kW 1015 = 15 kW 2042 = 42 kW 2100 = 55 kW 1024 = 24 kW 2055 = 55 kW				

(1) Pmax depends on the pump displacement

Other combinations are available on request, please consult Atos Technical Office

Typical double pump application

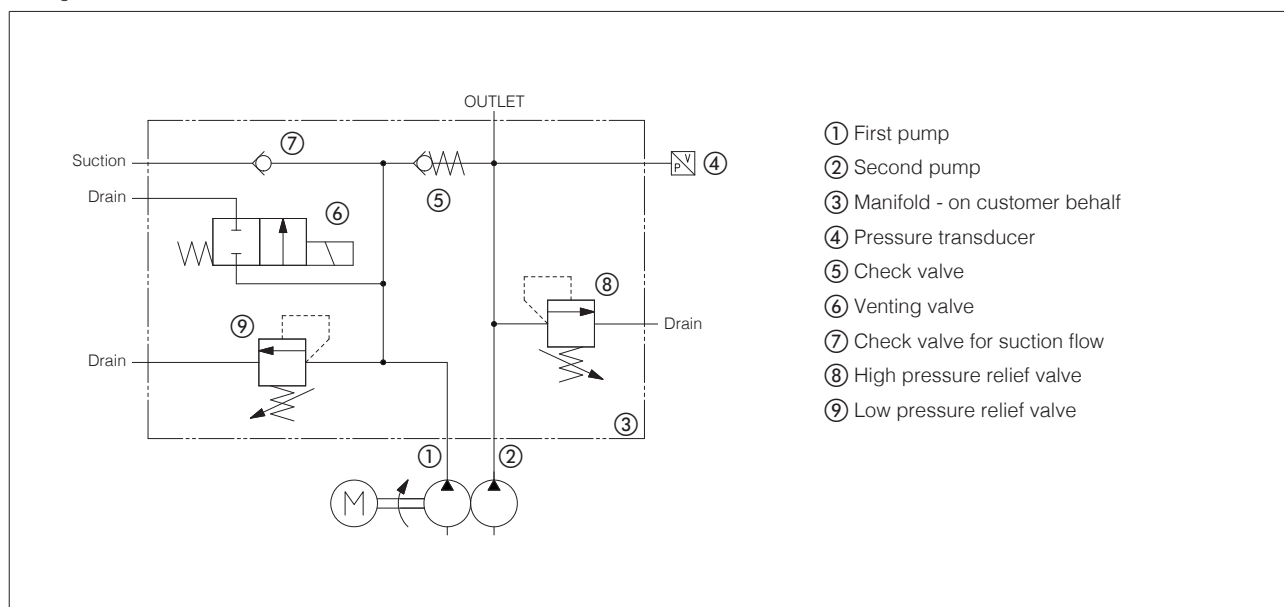
The double pump execution is particularly suitable for machine cycles in which phases with high flow rate and low pressure alternate with phases of high pressure and very low flow rate. This configuration allows, in fact, to limit the required shaft torque, reducing the size of the electrical motor and drive.

The image below represents an example of hydraulic scheme for double pump execution. The assembled manifold is on customer behalf.

The SSP with double pump execution is integrated with a dedicated algorithm which allows the system to dynamically off-load pumps ①, based on real-time pressure and flow conditions.

The system requires a venting valve ⑥ to be installed on the monitor-side pump, which must be energized when the algorithm requires it. The energization of the venting solenoid is managed automatically through a specific digital output pin on the D-MP Drive (see AS500).

The suction valve ⑦ is necessary to allow oil suction from the tank in case SSP revolves in opposite direction when in pressure control phase, while the venting valve is activated.



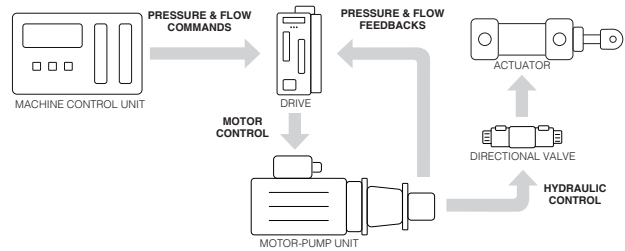
Contact the Atos technical department for more details and support regarding the sizing of the SSP with a double pump execution.

2 FUNCTIONING DESCRIPTION

SSP servopumps are designed to efficiently and accurately generate and regulate hydraulic power at every stage of the machine cycle. The ability to modulate the required flow rate or pressure by varying the number of revolutions gives it a substantial advantage in terms of energy savings compared to traditional systems that operate at constant speed. Thanks to the high dynamics and dedicated algorithms, the SSP allow you to directly control the speed of movement and the force of the hydraulic actuators with optimal levels of precision and repeatability.

They consist of an internal gear pump, a permanent magnet servomotor and an electronic drive.

The drive is connected to an angular transducer which measures the rotation speed of the servomotor and to a pressure transducer. It manages the motor power supply, the operating logic and system diagnostics.



3 PROGRAMMING TOOLS

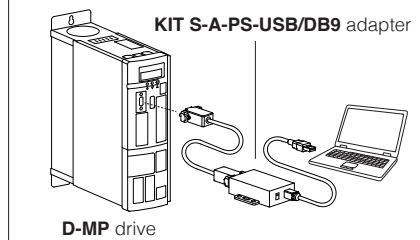
The functional parameters and configurations of the SSP servopumps can be easily set and optimized using the Atos S-SW-SETUP programming software by connecting the PC to the drive via the RS485 serial port.

The software allows the parameterization of the drive via the RS485 serial port even if the drive is connected to the machine central unit via fieldbus.

S-SW-SETUP support: NP (Serial) BC (CANopen) EH (EtherCAT)
BP (PROFIBUS DP) EP (PROFINET)

Note: For detailed descriptions of settings, wiring and installation procedures, refer to the user manual included in S-SW-SETUP

PC connection



4 FIELDBUS

Fieldbus allows direct communication between the Drive and the machine control unit for digital reference, extended diagnostics and servopump settings. However, the fieldbus versions allow the servopump to be controlled also through analog references.

5 GENERAL CHARACTERISTICS

Installation position	Motor and pump: horizontal position Drive: wall mounting, vertical position	
Ambient temperature range	Motor and pump: -20°C ÷ 40°C Drive: -10°C ÷ 50°C	motor and drive derate in power for higher temperature
Altitude	up to 2000 m, motor and drive derate in power for higher altitude	
Compliance	CE according to EMC directive 2014/30/EU and LVD 2014/35/EU Rohs directive 2011/65/EU as last update by 2015/863/EU	

6 HYDRAULIC CHARACTERISTICS

Hydraulic fluid	HL, HLP DIN 51524...535, for other fluids contact Atos technical office		
Fluid temperature range	-20°C ÷ 80°C		
Recommended viscosity	10 ÷ 300 mm²/s - cold start max 2000 mm²/s		
Max fluid contamination level	normal operation longer life	ISO4406 class 20/18/15 NAS1638 class 9 ISO4406 class 18/16/13 NAS1638 class 7	see also filter section at www.atos.com or KTF catalog
Min/max inlet pressure	(bar abs)	from 0.8 to 2 bar. Recommended ≥ 1	

7 DRIVE ELECTRICAL CHARACTERISTICS

Rated IN voltage	[V]	200 V -10% ÷ 480 V +10% @ 45 ÷ 65 Hz for drive 022 ÷ 060 400 V -10% ÷ 480 V +10% @ 45 ÷ 65 Hz for drive 090 ÷ 210		
DC Bus voltage	[V]	280 V -10% ÷ 600 V +10% for drive 022 ÷ 060 280 V -10% ÷ 640 V +10% for drive 090 ÷ 210		
24VDC input power supply		24 Vdc ±10% @ max 1,0 A for drives type 022, 090, 100, 140, 165, 210 24 Vdc ±10% @ max 1,3 A for drive type 032 24 Vdc ±10% @ max 1,8 A for drives type 046, 060		
24VDC output power supply		24 Vdc ±10% @ max 500 mA - only for drives type 090, 100, 140, 165, 210		
Digital inputs		24 Vdc ±10% @ max 10 mA		
Digital outputs		30 Vdc @ max 60 mA		
Analog inputs		±10 V @ max 0,5 mA or 4 ÷ 20 mA (Dip-switch selectable - see user manual)		
Analog outputs		±10 V @ max 2 mA		
Protection degree to DIN EN60529		Motor: IP54 (IP65 on request); Drive: IP20		
Communication interface		Atos ASCII coding	CANopen EN50325-4 + DS408	PROFIBUS DP EN50170-2/IEC61158 EtherCAT, PROFINET IO RT / IRT EC 61158
Communication physical layer		insulated RS485	optical insulated CAN ISO11898	optical insulated RS485 Fast Ethernet, insulated 100 Base TX

8 HYDRAULIC OPTION - not for double pump execution

C = This option provides a hydraulic block mounted directly on the pump outlet, which integrates a mechanical pressure relief valve with safety function on the maximum system pressure and a pressure transducer for the feedback of the actual pressure on the delivery line.

① Mechanical pressure relief valve; the valve is supplied with zero adjustment, and must be adjusted by the user at a pressure slightly higher than the maximum pressure required by the system.

② Pressure transducer E-ATR-8/400/I - see technical table GS465

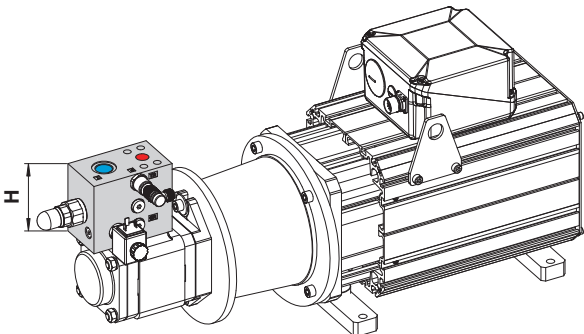
D = This option allows to protect the pump from overheating when it is subjected to particularly heavy duty cycles, in particular in the prolonged phases of static pressure control.

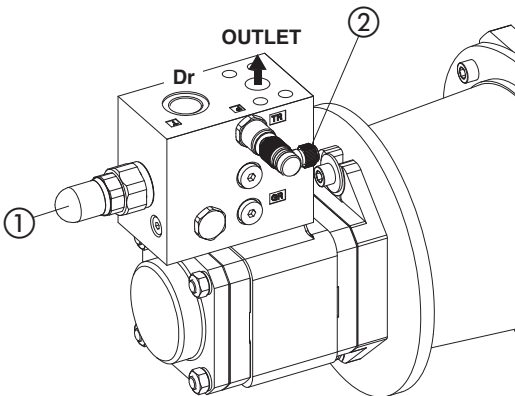
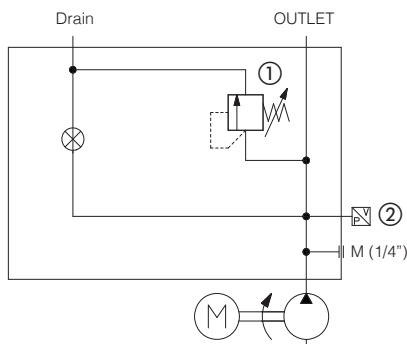
This option includes a hydraulic block with relief valve and pressure transducer, as for the /C option, with also integrated:

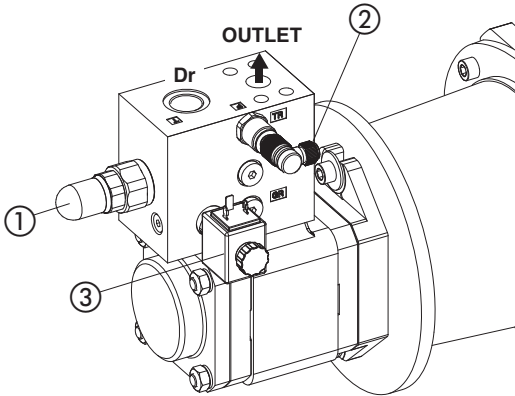
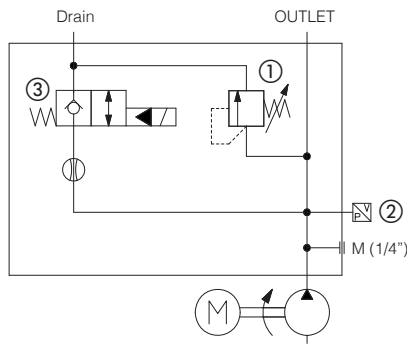
③ Smart Cooling cartridge valve JO-DL-4-2/NC-X 24DC - see technical table E105

When a temperature considered critical is reached, the Smart Cooling valve opens ③ as to cause a small recirculation of oil through the pump which protects it from dangerous overheating.

The SSP sizing software S-SW-SIZING suggests the need for the /D option based on the machine cycle.

Options C and D dimensions		SSP CODE		OUTLET	Dr (drain)	H (mm)
		SSP-T-SP**-1011		1/2" SAE3000	G1/2"	105
		SSP-T-SP**-1016				
		SSP-T-SP**-2020*		3/4" SAE3000	G3/4"	110
		SSP-T-SP**-2025*				
		SSP-T-SP**-2032*				
		SSP-T-SP**-2040*		1" SAE3000	G1"	115
		SSP-T-SP**-2050*				
		SSP-T-SP**-4050		1" SAE6000	G1"	115
		SSP-T-SP**-3064*		1" SAE6000	G1 1/4"	125
		SSP-T-SP**-4064				
		SSP-T-SP**-3080*		1 1/4" SAE6000	G1 1/2"	140
		SSP-T-SP**-4080*				
		SSP-T-SP**-3100*				
		SSP-T-SP**-4100		1 1/2" SAE6000	G 2"	140
		SSP-T-SP**-4125				

Detail option C		Hydraulic scheme option C	
			

Detail option D		Hydraulic scheme option D	
			

9 ELECTRONIC FUNCTION - always present

K = The drive implements the Safe Torque Off (STO) function as a prevention of unexpected starts according to 2006/42/EC Machinery Directive (MD) - standard EN 61800-5-2.

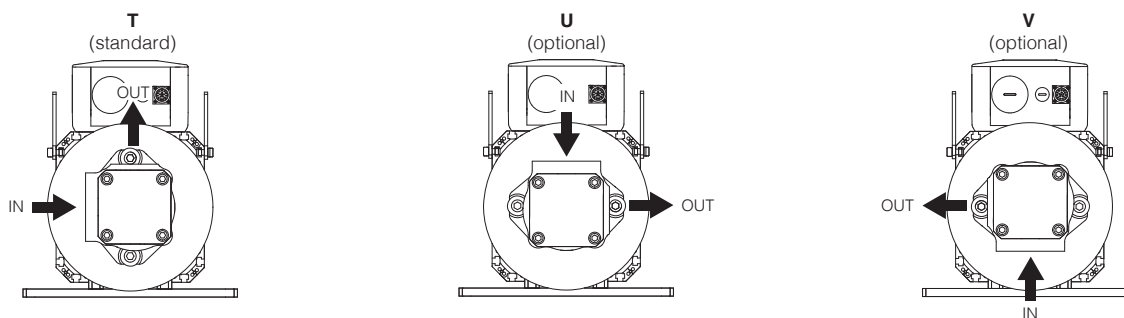
This function prevents the generation of a rotating magnetic field removing the power semiconductor control voltage allowing short-term operations (such as cleaning and / or maintenance work on parts of non-electrical devices of the machine) without disconnecting drive power supply or the connection between the drive and the servomotor.

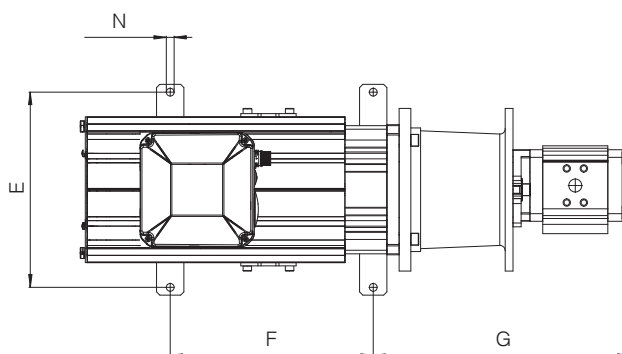
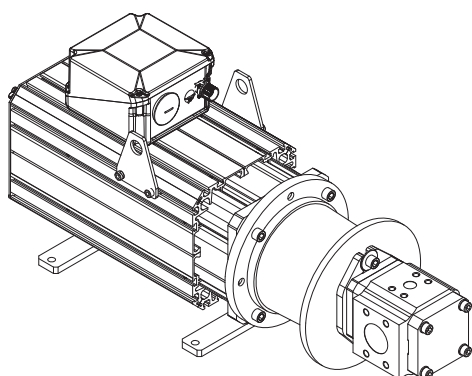
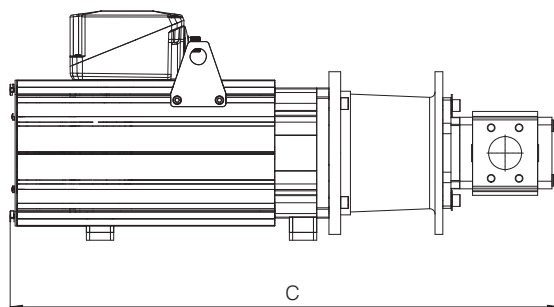
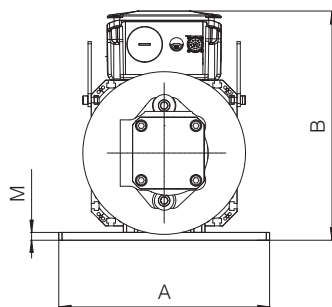
For detailed descriptions, please refer to the S-MAN-HW installation manual.

Possible combined option - not for double pump execution
/CK, /DK

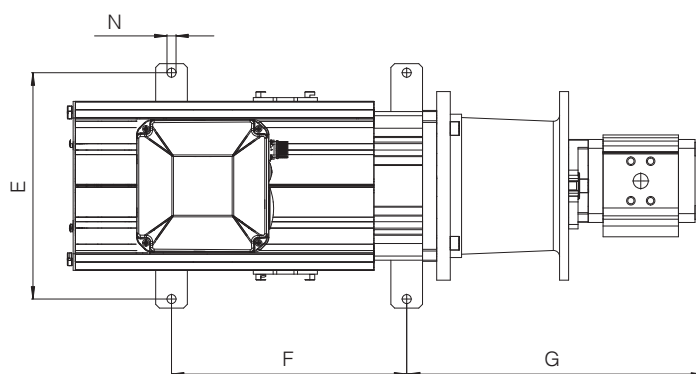
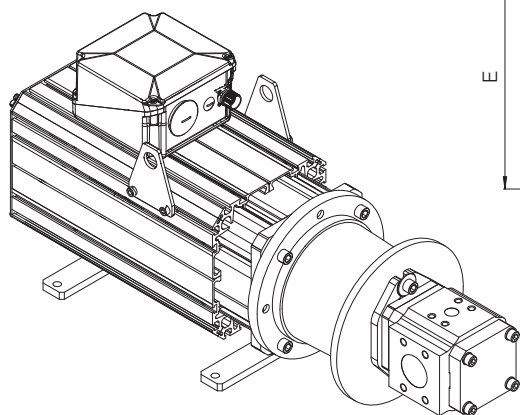
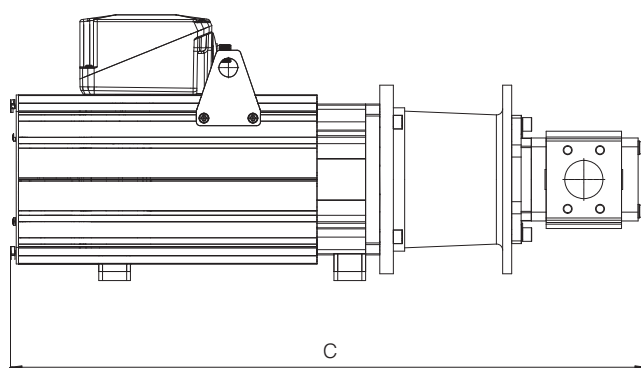
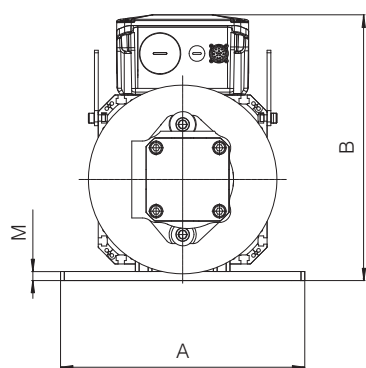
10 PORTS ORIENTATION

The pump can be supplied with inlet and outlet ports oriented in different configurations, as shown in the figure (seen from the bottom of the pump)

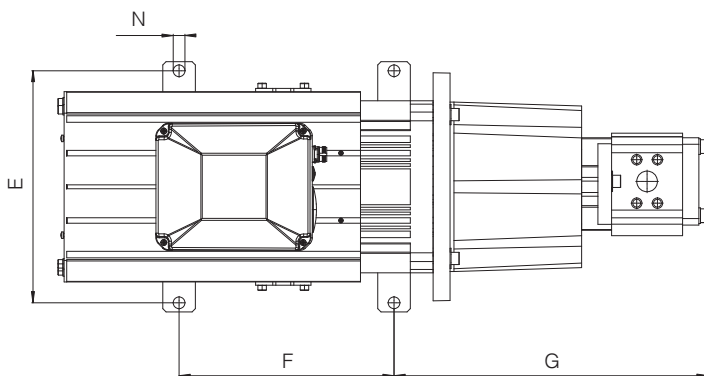
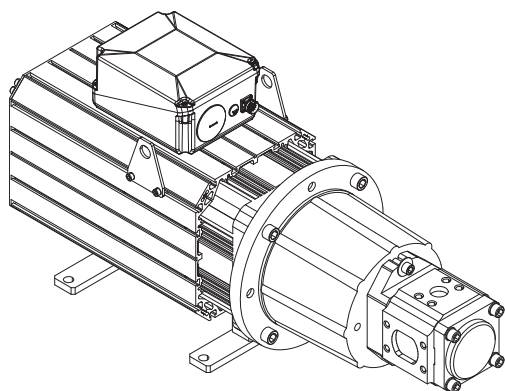
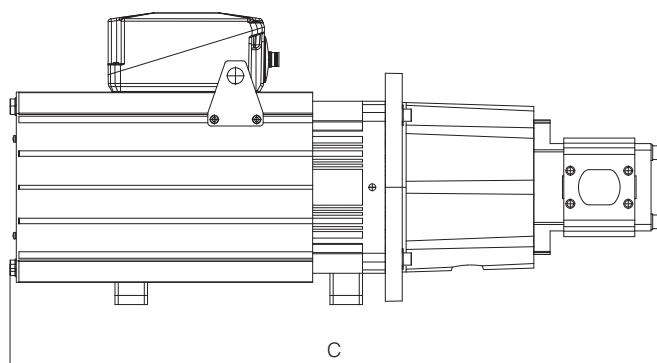
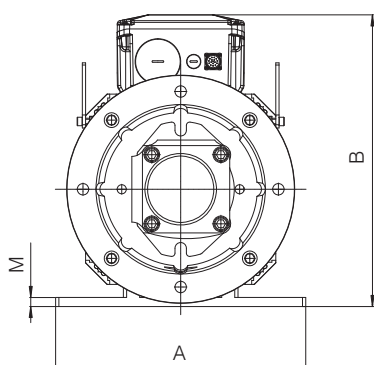




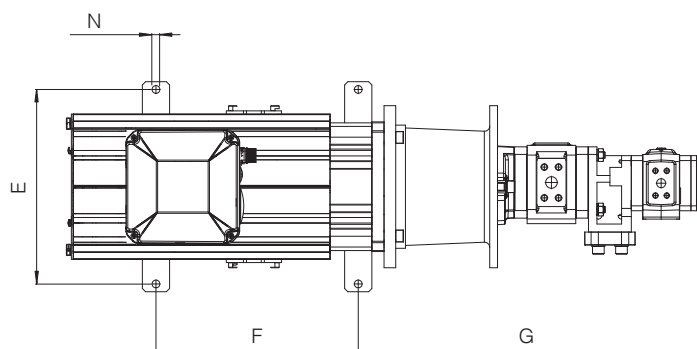
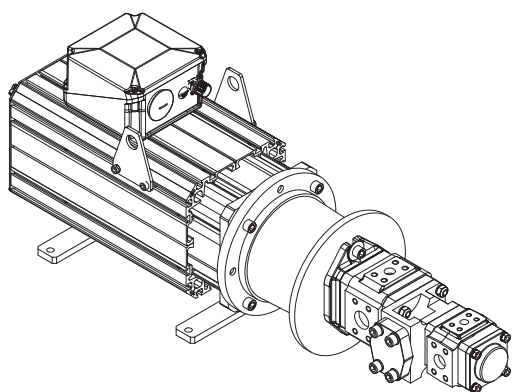
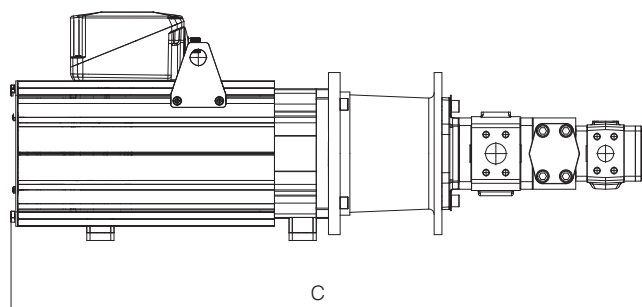
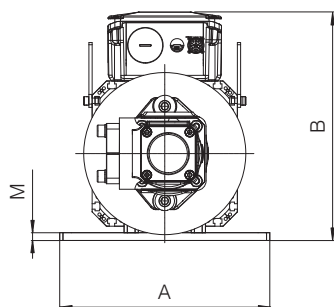
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SSP-*.1016-1009-*	324	335	640	300	168	334	12	12	56
SSP-*.1016-1015-*		355	710		240				68
SSP-*.2020*-1009-*	324	335	680	300	168	373	12	12	62
SSP-*.2020*-1015-*		355	750		240				74
SSP-*.2020*-1024-*			820		312				90
SSP-*.2020-1032-*			890		385				105
SSP-*.2025-1009-*	324	335	680	300	168	363	12	12	62
SSP-*.2025-1015-*		355	750		240				75
SSP-*.2025-1024-*			820		312				90
SSP-*.2025-1032-*			890		385				106
SSP-*.2032*-1009-*	324	335	680	300	168	368	12	12	63
SSP-*.2032*-1015-*		355	750		240				76
SSP-*.2032*-1024-*			820		312				91
SSP-*.2032*-1032-*			890		385				107
SSP-*.2032-2042-*	384	435	890	356	275	417	14	18	145
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SSP-*.2040*-1024-*			830		312				94
SSP-*.2040*-1032-*			900		385				110
SSP-*.2040*-2042-*	384	435	900	356	275	430	14	18	148
SSP-*.2050*-1009-*	324	355	700	300	168	395	12	12	69
SSP-*.2050*-1015-*			770	300	240				81
SSP-*.2050*-1024-*			840		312				96
SSP-*.2050*-1032-*			910		385				112
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SSP-*.2050*-2055-*		450	970		330				172



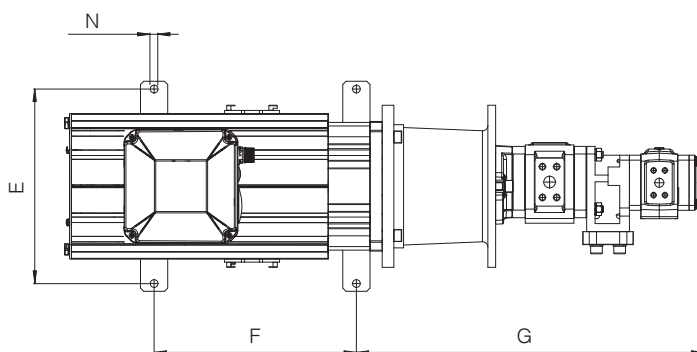
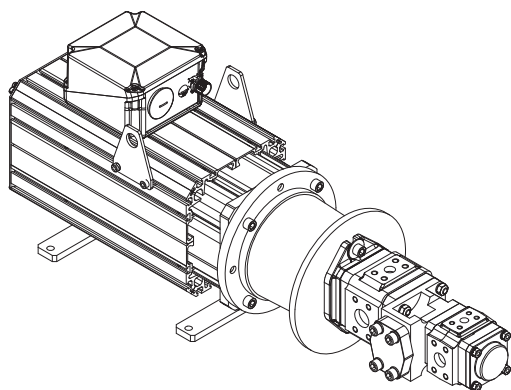
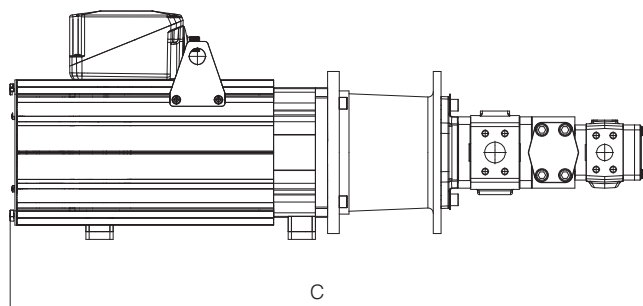
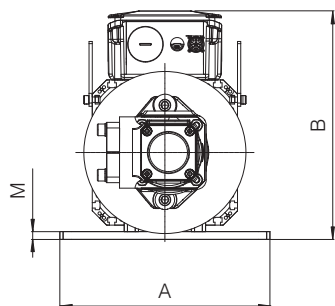
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SSP-*-3064*-2042-*	384	435	930	356	275	456.5	14	18	149
SSP-*-3064*-2055-*		450	980		330				170
SSP-*-3064*-2080-*			112		476				213
SSP-*-3080*-1024-*	324	355	840	300	312	395.5	12	12	97
SSP-*-3080*-1032-*			920		385				113
SSP-*-3080*-2042-*	384	435	940	356	275	468.5	14	12	151
SSP-*-3080*-2055-*		450	1000		330				172
SSP-*-3080*-2080-*			1123		476				216
SSP-*-3080*-2100-*			1200		583				257
SSP-*-3100*-1024-*	324	355	860	300	312	411.5	12	12	98
SSP-*-3100*-1032-*		355	930		385	411.5	12	12	115
SSP-*-3100*-2042-*	384	435	950	356	275	484.5	14	18	152
SSP-*-3100*-2055-*		450	1011		330				174
SSP-*-3100*-2080-*			1140		476				217
SSP-*-3100*-2100-*		490	1210		583				258
SSP-*-4050*-1015-*	324	355	810	300	240	427	12	12	108
SSP-*-4050*-1024-*			870		312				122
SSP-*-4050*-1032-*			950		385				138
SSP-*-4050*-2042-*	384	435	950	356	275	481	14	18	166
SSP-*-4050*-2055-*		450	1011		330				187
SSP-*-4050*-2080-*			1155		476	500			239



MODEL CODE	A	B	C	E	F	G	M	N	Mass [Kg]
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SSP-*.4064-1032-*			960		385				140
SSP-*.4064-2042-*	384	445	48	356	275	492	14	18	168
SSP-*.4064-2055-*		450	1020		330				189
SSP-*.4064-2080-*			1166		476	511			241
SSP-*.4080-1024-*	324	355	890	300	312	447	12	12	126
SSP-*.4080-1032-*			970		385				142
SSP-*.4080-2042-*	384	435	970	356	275	501	14	18	170
SSP-*.4080-2055-*		450	1032		330				191
SSP-*.4080-2080-*			1175		476	520			243
SSP-*.4080-2100-*			1250		583				284
SSP-*.4100-1032-*	324	355	980	300	385	460	12	12	145
SSP-*.4100-2042-*	384	435	980	356	275	514	14	18	173
SSP-*.4100-2055-*		450	1040		330				194
SSP-*.4100-2080-*			1188		476	533			246
SSP-*.4100-2100-*			1260		583				287
SSP-*.4125L-2042-*	384	435	980	356	275	509	14	18	162
SSP-*.4125L-2055-*		450	1032		330				183
SSP-*.4125L-2080-*			1150		476	528			229
SSP-*.4125L-2100-*		490	1183		583				234



MODEL CODE	A	B	C	E	F	G	M	N	Mass [Kg]
SSP- * -1011/1011-1009-*	324	335	757	300	168	451	12	12	61
SSP- * -1011/1011-1015-*		355	827		240				73
SSP- * -1016/1011-1009-*	324	335	767	300	168	461	12	12	61
SSP- * -1016/1011-1015-*		355	837		240				73
SSP- * -2020/1011-1009-*	324	335	817	300	168	510	12	12	67
SSP- * -2020/1011-1015-*		355	887		240				79
SSP- * -2020/1011-1024-*			957		312				95
SSP- * -2020/1011-1032-*			1027		385				110
SSP- * -2025/1011-1009-*	324	335	816	300	168	499	12	12	67
SSP- * -2025/1011-1015-*		355	886		240				80
SSP- * -2025/1011-1024-*			956		312				95
SSP- * -2025/1011-1032-*			1026		385				111
SSP- * -2032/1011-1009-*	324	335	816	300	168	504	12	12	68
SSP- * -2032/1011-1015-*		355	886		240				81
SSP- * -2032/1011-1024-*			956		312				96
SSP- * -2032/1011-1032-*			1026		385				112
SSP- * -2032/1011-2042-*	384	435	1026	356	275	553	14	18	150
SSP- * -2040/1011-1009-*	324	355	826	300	168	517	12	12	72
SSP- * -2040/1011-1015-*			896	300	240				84
SSP- * -2040/1011-1024-*			966		312				99
SSP- * -2040/1011-1032-*			1036		385				115
SSP- * -2040/1011-2042-*	384	435	1036	356	275	566	14	18	153
SSP- * -2050/1011-1009-*	324	355	836	300	168	531	12	12	74
SSP- * -2050/1011-1015-*			906	300	240				86
SSP- * -2050/1011-1024-*			976		312				101
SSP- * -2050/1011-1032-*			1046		385				117
SSP- * -2050/1011-2042-*	384	435	1046	356	275	580	14	18	155
SSP- * -2050/1011-2055-*		450	1106		330				177



MODEL CODE	A	B	C	E	F	G	M	N	Mass [Kg]
SSP-*-1016/1016-1009-*	324	335	777	300	168	471	12	12	65
SSP-*-1016/1016-1015-*		355	847		240				74
SSP-*-2020/1016-1009-*	324	335	806	300	168	510	12	12	68
SSP-*-2020/1016-1015-*		355	876		240				80
SSP-*-2020/1016-1024-*			946		312				96
SSP-*-2020/1016-1032-*			1016		385				111
SSP-*-2025/1016-1009-*		335	799	300	168	500	12	12	68
SSP-*-2025/1016-1015-*	324	355	869		240				81
SSP-*-2025/1016-1024-*			939		312				96
SSP-*-2025/1016-1032-*			1009		385				111
SSP-*-2032/1016-1009-*	324	335	826	300	168	505	12	12	69
SSP-*-2032/1016-1015-*		355	896		240				82
SSP-*-2032/1016-1024-*			966		312				97
SSP-*-2032/1016-1032-*			1036		385				114
SSP-*-2032/1016-2042-*	384	435	1036	356	275	554	14	18	151
SSP-*-2040/1016-1009-*	324	355	836	300	168	518	12	12	73
SSP-*-2040/1016-1015-*			906	300	240				85
SSP-*-2040/1016-1024-*			976		312				100
SSP-*-2040/1016-1032-*			1036		385				116
SSP-*-2040/1016-2042-*	384	435	1036	356	275	567	14	18	154
SSP-*-2050/1016-1009-*	324	355	846	300	168	532	12	12	75
SSP-*-2050/1016-1015-*			916	300	240				87
SSP-*-2050/1016-1024-*			986		312				102
SSP-*-2050/1016-1032-*			1056		385				118
SSP-*-2050/1016-2042-*	384	435	1056	356	275	581	14	18	156
SSP-*-2050/1016-2055-*		450	1116		330				178

13 RELATED DOCUMENTATION

AS050 Basics for Smart Servopumps - SSP
AS200 Sizing criteria for servopumps
AS300 PGI cast iron internal gear pumps, high pressure
AS320 PGIX cast iron double internal gear pumps, high pressure
AS350 PGIL aluminium internal gear pumps
AS400 PMM high performance synchronous servomotors
AS500 D-MP electronic drives

AS800 Programming tools for pumps & servopumps
AS810 Accessories for servopumps
AS910 Operating and maintenance information for servopumps
GS510 Fieldbus
QA100 Quickstart for SSP servopumps commissioning
S-MAN-HW Servopumps installation manual
S-MAN-SW Servopumps programming software manual