



SMAPI pumps series

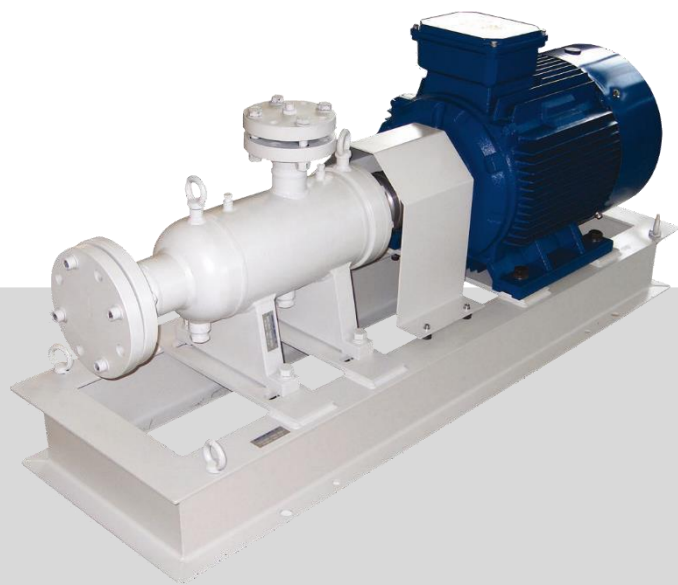
Compliant to the latest API 676 3rd regulation



COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV
= ISO 9001 =



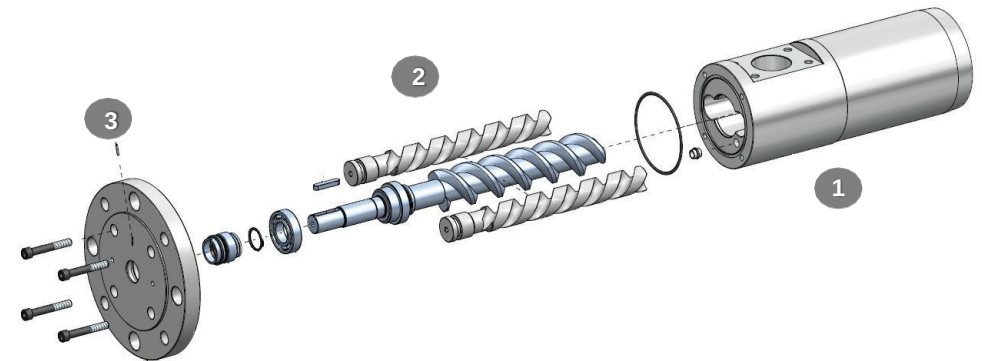
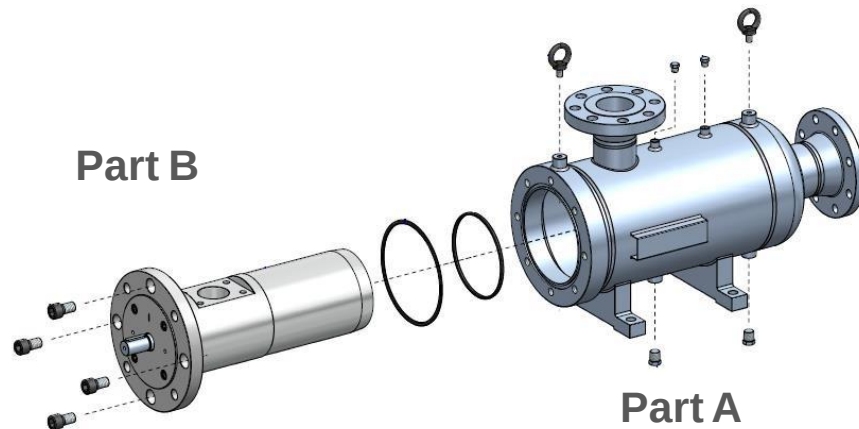
SMAPI



Models	20 – 25 – 32 – 40 – 45 – 55 – 60 – 70 – 80 – 90 – 110 – 125 – 150 – 180 – 190
Installation	Vertical, horizontal
Motor connection	SAE, DIN, ANSI
Drive loading	No axial or radial loads
Flow	From 4 to 1.800 L/min (at 2.950 rpm), over-busted from 1.800 to 4.000 L/min
Shaft rotation	Clockwise (from shaft end), suitable also for counter clockwise rotation
Shaft speed	From 300 to 3.600 rpm
Outlet pressure	Up to 60 bar continuous, up to 80 bar intermittent
Inlet pressure	Min. -0.7 bar, max. 9 bar (with mechanical seal)
Fluids	• Mineral oils HLP and HVLP • Ecologic fluids HETG, HEPG, HEE • Synthetic fluid or emulsions HFA oil-water emulsion, HFB water-oil emulsion 40% of volume, HFC water/glycol (water max 35% to 55%), HFDR phosphate ester • Lubrication high viscosity oils • Special synthetic fluids MIL-H, SKYDROL, fuel oils MGO, MDO, low sulphur MDO and HFO • DMX(ISO8217), DMA, DMB, DMC, DMZ • MAZUT, bunker oil, furnace oil, engines oil, heating oil, hydraulics oil DIN 51524 • Naphta, petrol
Viscosity	From 2 up to 10.000 cSt
API Seals	Mechanical seal: non-API, API 682 , single and double. Mechanical seal flushing system (optional) according to API PLAN 53B . Magnetic coupling option available. Seal polymer materials: NBR, FKM, FPM, EPDM (for special seals contact SETTIMA)
Acoustic emissions	From 52 up to 68 db(A) at 2.950 rpm
Body	ASME carbon steel, inox
Cartridge	Aluminium, cast iron, steel
Screw set	Steel for primary screw, cast iron for secondary screws
Environment temperature	From -20° up to +60°C
Fluid temperature	From -20° up to +180°C

Did you know? Settima SMAPI API676 pumps were utilized for diesel oil transfer during to only voyage of the **FSRU Toscana**, the colossal floating gas storage/production facility offshore Livorno. All the previous pumps were unable to manage the extreme stress of fuel injection and power generation onboard, and they failed. Coincidentally, **Settima** (meaning 'seventh' in italian language) was the seventh company appointed for the job, and the first one to succeed!

SETTIMA SMAPI API 676 pump concept



The pump is composed by:

- External body (Part A)

This part is the one which is installed into the system. The external body can be delivered in ASME carbon steel and inox, in accordance to API International Regulations.

- Internal cartridge (Part B)

The internal cartridge can be a SMT or a SMT16B pump. In case of maintenance, it can be easily removed from the case, without dismantling the system.

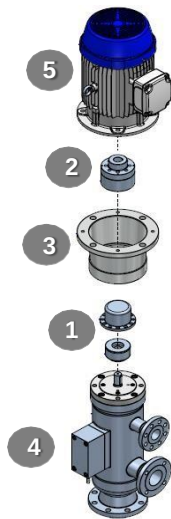
The cartridge is composed by:

1. Pump body
2. Main and idler screws
3. Flange

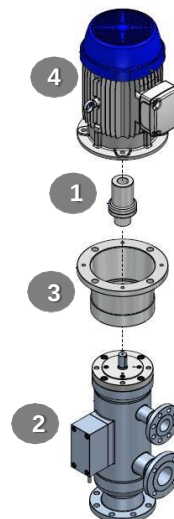
Settima SMAPI is a three screw pump fitted into an external case. Matching all of the possible applications, it can be manufactured with different structural shapes, installation possibilities and materials. Settima SMAPI pumps can always ensure flow and pressure matching to your current requirements, thanks to the possibility of customization.



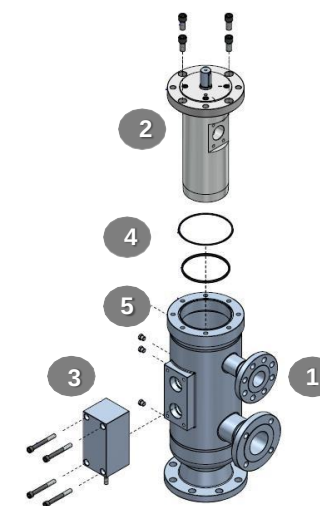
SETTIMA SMAPI API 676 pump possible vertical assembly



N°	MOTOR PUMP GROUP MAGNETIC COUPLING
1	Magnetic coupling Internal rotor and Containment shroud
2	Magnetic coupling External rotor
3	Bellhouse
4	SMAPI pump
5	Electric motor



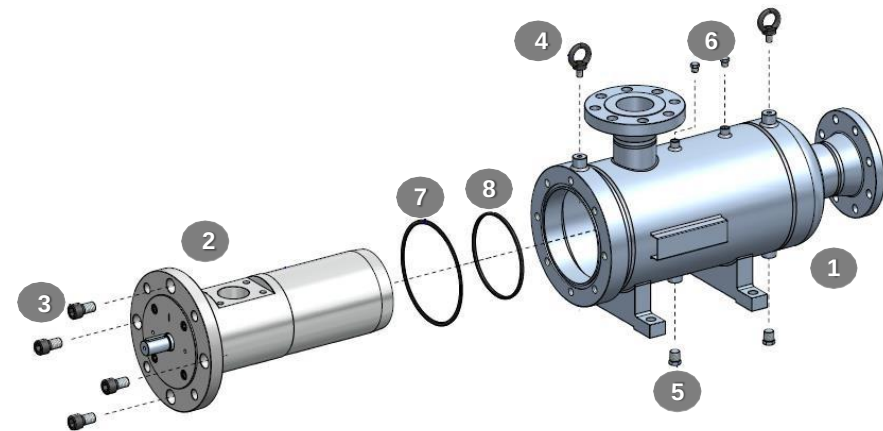
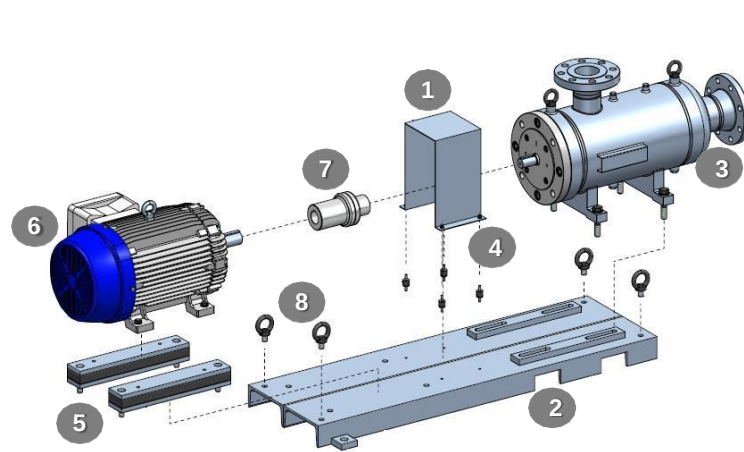
N°	MOTOR PUMP GROUP STANDARD COUPLING
1	Elastic coupling
2	SMAPI pump
3	Bellhouse
4	Electric motor



N°	PUMP VERTICAL ASSEMBLY
1	External Case
2	Internal Cartridge
3	RP External valve
4	Internal o-rings
5	Vents

Did you know? Settima screw pumps are positive displacement pumps designed with axial flow. Inside of the pump there are only three moving parts. The main screw is the only driven part and transmits the motion to the satellite screws. The satellite screws play also the role of creating pressure sealing areas. Settima takes great care in ensuring that all its screw pumps keep the **noise emission to a minimum level**, and are manufactured with the usual **high-quality and high-precision** standard peculiar to all of its production.

SETTIMA SMAPI API 676 pump possible horizontal assembly



**MOTOR PUMP GROUP
HORIZONTAL ASSEMBLY**

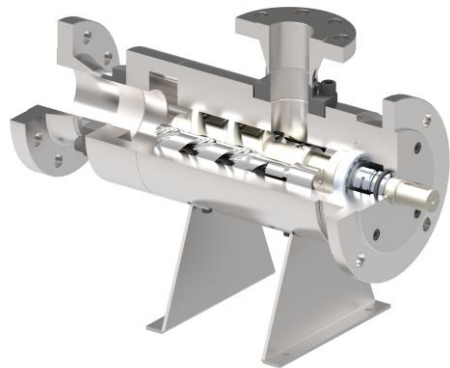
1	Carter	5	Shock absorber
2	SKID	6	Electric motor
3	SMAPI pump	7	Coupling
4	Vibration stopper	8	Golfare

**PUMP
HORIZONTAL ASSEMBLY**

1	External case	5	Drainer
2	Cartridge	6	Vent
3	Screw	7	Internal O-ring
4	Golfare	8	Internal O-ring

Did you know? Settima SMAPI (API676) GR180, the largest three-screws pump ever built in Settima, with a total motor pump unit length of 3 meters and a weight just short of 2 tons, able to manage a flow of 250L m3/hour at 1.800 rpm, has been specifically designed and manufactured to be used in a very large power plant in South Korea!

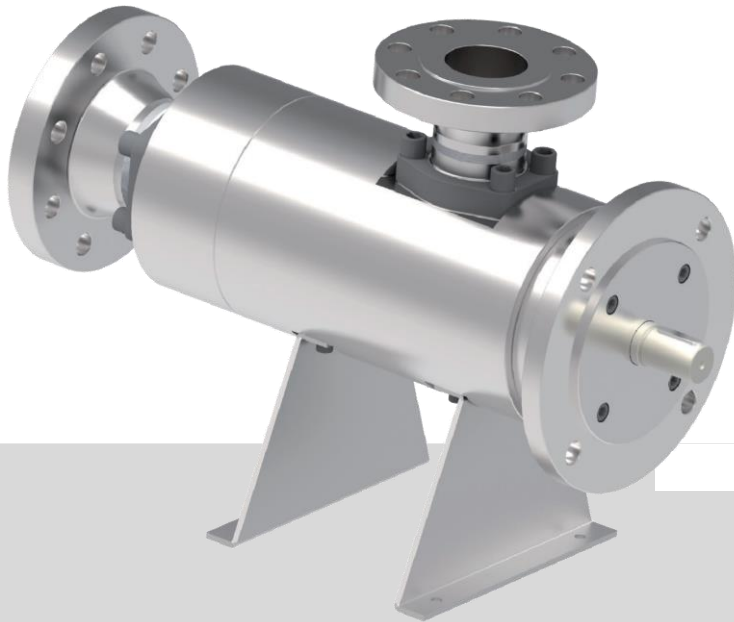
SMAPI NC



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Pump Body	ASME carbon steel
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Did you know? Settima SMAPI NC API676 pump is the new revolutionary pump that has eliminated the external case in order to give the customer a more flexible pump, lighter and less expensive always following the API676 rules. For all application were is not strictly necessary to have a pump without liner then the SMAPI NC is the perfect one and API676 compliant.

SMAPI NC



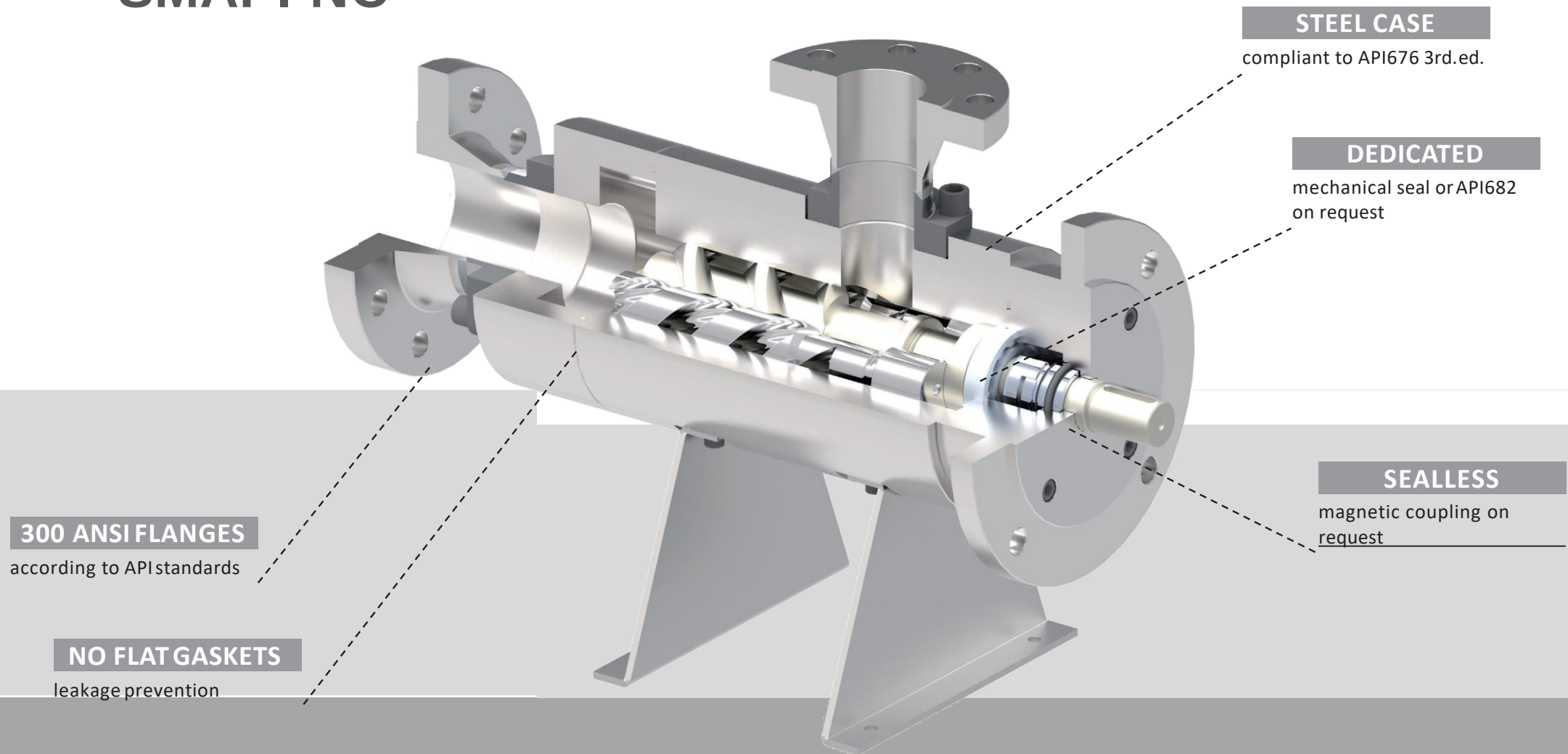
The new **SMAPI NC** pump is an **API 676** compliant three screw pump series with no separate external case and internal liner. The screws can run directly in a carbon steel casing, which eliminates any expensive internal coating and additional external casing. No flat gaskets are used but only O-ring seals to avoid the risk of leakage. As the drive screws turn, the fluid is shifted and steadily and constantly conveyed to the pump's discharge port, creating a consistent flow rate regardless the pumping pressure. This method of operation delivers smooth, constant product flow with low noise and high levels of energy efficiency.

Here a list of **benefits**:

- Ability to handle a wide range of flows, pressures, fluid types and viscosities,
- High volumetric efficiencies,
- Low mechanical vibration ensures a longer service life,
- Low internal velocities,
- Intrinsically smooth and quiet operation,
- Controllable output via variable capacities,
- High tolerances for entrained air,
- Extremely low pulsation, typical of this pump, reduces stress and prolongs life of other associated components (piping, hoses, etc.).

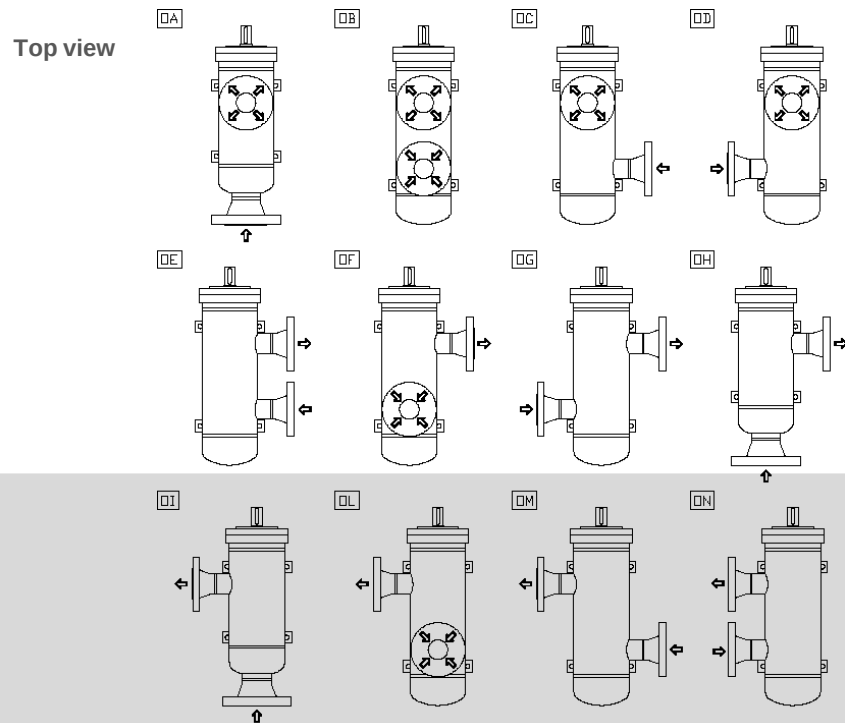
The new **SMAPI NC** is the right pump capable to highly reduce the standard costs of API676 pumps, ensuring a perfect operability in the various segments of oil and gas production: upstream, midstream and downstream.

SMAPI NC

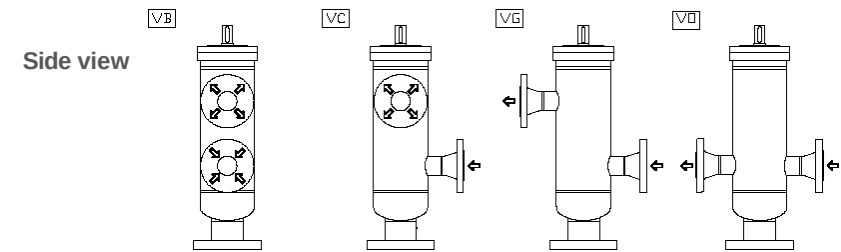


SETTIMA SMAPI API676 ports configuration

Horizontal pump available configurations



Vertical pump available configurations



Did you know? Settima Meccanica is one of the few European pump manufacturing company (worldwide too) which is able to design and manufacture a fully **API676 compliant** pump. **Settima** can provide the clients with the pumps and all the necessary documentation and certifications to meet the severe American Petroleum Institute standards. Ask **Settima** for the fully API676 **SMAPI676**!



SETTIMA SMAPI API 676 pump materials

Standard

External case	ASME carbon steel, inox
Cartridge	Aluminium, cast iron, steel
Main screw	Steel
Idler screw	Cast iron
Covers	Cast iron
Shaft seals	NBR
Shaft rotation	Clockwise (from shaft end)

Options

Pump body	Cast iron internal coating (GZ), Carbon steel internal coating (AZ), Cast iron, Carbon steel, Varnishing	
Shaft seal	Mechanical seal: non-API, API 682 , single and double. Mechanical seal flushing system (optional) according to API PLAN 53B . Magnetic coupling option available. Seal polymer materials: NBR, FKM, FPM, EPDM (for special seals contact SETTIMA)	
Screw treatments	Core hardened steel, Surface treated (phosphating)	
Port types	A=in M=out	ANSI (150, 300, 600), DN (10, 16, 25, 40) ANSI M, DNM
Ports configuration	O=horizontal V=vertical	OA, OB, OC, OD, OE, OF, OG, OH, OI, OL, OM, ON, VB, VC, VG
Shaft rotation	Counter clockwise (from shaft end)	

Did you know? Settima built several **SMAPI 100% API676 compliant** and supplied them to the **Shin Nippon Project**. Those **SMAPI**, thanks to a high-reliability mechanical seal, were fully complying with the **API 682 requirements**, and so they were certified by the American Petroleum Institute!



SETTIMA SMAPI NC API 676 pump materials

Standard

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Pump Body	Carbonsteel
Main screw	Steel
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Shaft rotation	Clockwise (from shaft end)

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SETTIMA SMAPI API 676 applications



Oil&Gas: heating oil delivery and pipeline for off-shore platforms, refineries, petrochemical industry.



Power Gen.: lube and off-line filtration for engines, lube and cooling for turbo machinery, oil jacking.



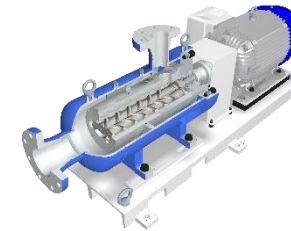
Fuel oil handling: hydraulic pumps for heating offuel oils, lowering viscosity



Fuel Boosting Injection: Hydraulic Pump for fuel oil injection for turbine boosting.

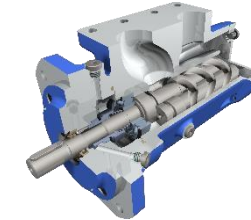
Settima range of specialized pumps for fuel oil applications are designed to handle ultra low sulphur fuels, such as the LS 380, the LS 180 and the LS MGO, according to the latest severe API regulations and ISO 8217 standard

SETTIMA FUEL OIL HANDLING PUMPS



SMAPI

- Fuel Oil Transfer
- Fuel Boosting Injection
- Boiler Fuel Transfer



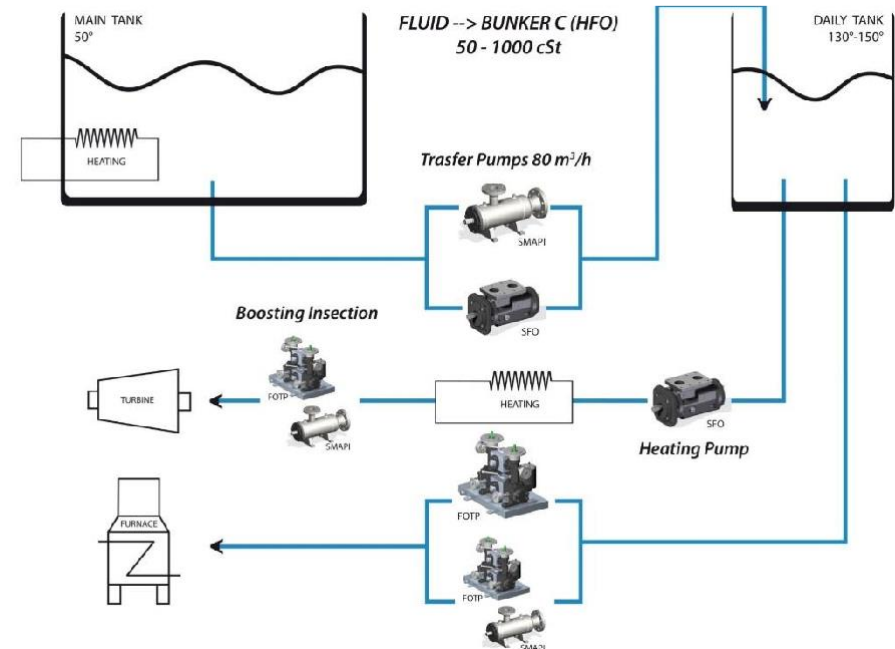
SFO

- Fuel Oil Transfer
- Fuel Oil Heating



FOTP

- Fuel Boosting Injection
- Boiler Fuel Transfer



NO-SEAL (MAGNETIC COUPLING)

SETTIMA SMAPI pumps can be equipped, upon request, with a Magnetic Coupling seal. Magnetic coupling are high technology seals, with extremely high reliability and high performances, guaranteed to be absolutely totally leakage free.

SETTIMA can provide this seal alone, or with an already perfectly compatible bellhouse. SETTIMA **engineers study very carefully every customer's single specific installation, and they can offer him with** a complete solution, from the motor pump unit, to the correct magnetic seal and the compatible bellhouse, everything tested and ready to use.



	MAGNETIC COUPLING seal
SEAL MATERIALS	Stainless steel, Hastelloy, PEEK, ceramic
FLUIDS MANAGED	All standard oils, fuels, emulsion and fluids, plus all fluids unsuited for use with NBR/Viton/EPDM/PTFE lip seals or with mechanical seal materials
TEMPERATURE RANGE	Up to +130° C standard, up to 300° C with ceramic seal
ORDER CODE	Ask SETTIMA: tell us the specifics of your installation, our engineers will provide you a solution!

SETTIMA SMAPI API 676 Tests and Certifications

Title	Description	Released by
Static test	Pressure test @ 1.5 times the working pressure	Settima
Dynamic test	Running test at working conditions	Settima
Material certification	EN10204 3.1b	Settima
Atex certification	Area: CE eX II 2 GD ck T3	Settima
Standard ISO	ISO 9001:2000 – DNV	Settima
Statement of fact, type approval, witnessed test		ABS, BV, DNV, LLOYD, RINA, CCS, RS, GL, KR, NK



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= ISO 9001 =

SETTIMA SMAPI API 676 Documentation

Each SMAPI pump is delivered with the following documentation

- Test report (static & dynamic test)
- Technical data sheet
- Performance data

Tipo pompa / Pump type

Classe pompa / Pump class

Tipo pompa / Pump Type

Grandezza / Group

Passo / Pitch

SMAPI

GRxx SMAPI xxxL TM

xx

xx

Caratteristiche funzionamento / Operations data

Fluido di lavoro/Work fluid	oil ISO VG 32	1	2	3	4	5
Punti di Lavoro/Operating Point						
Viscosità/Viscosity	v mm ² /s	xx				
Densità/Specific Gravity	p kg/m ³					
Temperatura/Temperature	°C	xx				
Velocità di Rotazione/Speed	n 1/min	xx				
Press.mandata/Disch.Press	pd bar	xx				
Press. Aspirazione/Suction Press.	ps bar	xx				
Press.Diff./Diff.Press.	dp bar	xx				
Portata/Flow	Q l/min	xx				
	Q m ³ /h	xx				
Potenza Assorbita/Shaft Power	P kW	xx				
Rendimento Vol./Vol.Efficiency	η %	xx				
rendimento mecc./Mech.Efficiency	η %	xx				
Rendimento Totale/Total.Efficiency	η %	xx				
Velocità Assiale/Axial Speed	v m/s	xx				
	NPSHR	xx				
Rumorosità/Sound Pressure	L db(A)	-				
Potenza Installata/Motor Power	kW	-				

Materiale / Material information

Corpo Pompa/ Pump Casing	CAST IRON GJL 250 EN 1561
Coperchio/Cover	-
Camicia viti/Casing Insert	Carbon Steel EN 10297-1
Rivestimento Camicia/Liner Coating	-
Viti/Screw	CENTRAL UNI 10167-LATERAL UNI 10171
Bronzine/Bearing Bushes	-
Cassa Stoppa/Sealing Casing	-
Supporto Cuscinetti/Bearing Casing	-
Guarnizioni/Flat Seal	FKM
Tenuta Albero/Shaft Seal	mechanical FLUITEN type US3-material Y1Z32
Flange/Flanges	Suct.:xx" ANSI 300 lb WN Disch.: xx" ANSI 300 lb WN
Motore Elettrico/Electric Motor	-
Valvola di Sicurezza/Safety Valve	-
Foro de-aerazione/De-aeration bore	Not applicable

Test

PERFORMANCE GUARANTEE

Exception to API 676

Hydrostatic Test

Performance Test

Noise Measurement

Other Tests

API 676 LATEST EDITION

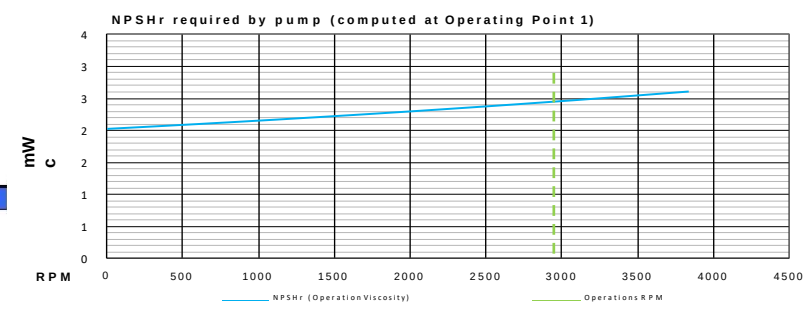
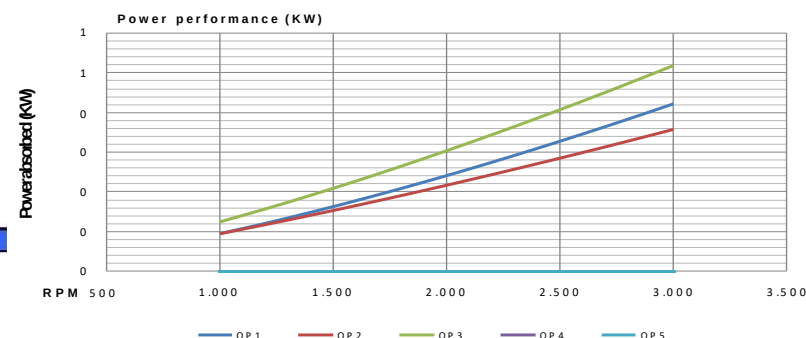
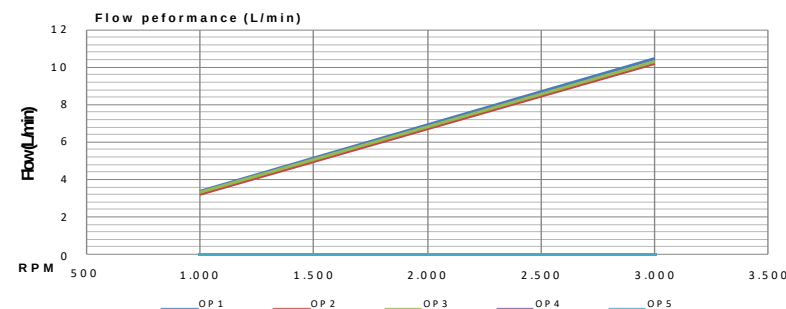
see the enclosed document

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OPTIONAL

on request

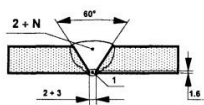


Performance data
(on the left):

- Flow /RPM
- Power /RPM
- NPSH requested by the pump

SETTIMA SMAPI API 676 Documentation

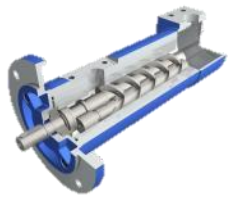
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 SETTIMA MECCANICA 29020 Vico Conca Settima (Cossato) - Piacenza - Italy Tel: +39 0523 557623 - Fax: +39 0523 557258 C.F.P. I. 0011800258 www.settima.it		WELDING PROCEDURE SPECIFICATION ACCORDING TO ASME CODE SECT. IX		NO. PS04/08	REV. 0
				Sheet 1 of 2	
Company Name Settima Meccanica Srl		By //			
Welding Procedure Specification NO. PS 04/08		Date 08/11/2008			
Supporting PQR NO. PS 04/08		Rev. 0		Date 08/11/2008	
Welding Process (es) FCAW		Type (s) MANUAL (FCAW)			
JOINTS (QW - 402)		Details			
Joint Design SEE SKETCH					
Backing (yes) NO (no) //					
Backing Material (Type) NO					
BASE METALS (QW - 403)					
P - N	I	Group N.	2	to P - N	I
OR					
Specification type and grade		ASTM A 516 Gr. 65			
to Specification type and grade		ASTM A 516 Gr.65			
OR					
Chem. Analysis and Mech. Prop.		//			
to Chem. Analysis and Mech. Prop.		//			
Thickness Range :					
Base Metal :		Groove 5 mm ~ 20mm (W.O. Impact) 10 mm ~ 20mm (White. Impact)		Fillet //	
Deposited Weld Metal		Groove 20 mm MAX FCAW			
Pipe Dia. Range :		Groove ≥ 73 mm		Fillet All	
Other		THICKNESS OF TEST COUPON = 10 mm			
FILLER METALS (QW - 404)					
F - N	FCAW : 6	Other //			
A - N	FCAW : 1	Other //			
Spec. N. (SFA)	FCAW : 5.18				
AWS N. (Class.)	FCAW : E 70 C3 M				
Size of filler metals	FCAW : Ø 1.2 mm - ETC 6206				
Flux /Wire /Class	N/A				
Flux Trade Name	N/A				
Consumable insert	N.A.				
POSITION (QW - 405)					
Position (s) of Groove 1G					
Welding Progression:		Uphill //		Downhill //	
Position (s) of Fillet //					
POSTWELD HEAT TREATMENT (QW - 407)					
Temperature Range N/A					
Time Range N/A					
Other N/A					

Welding certification



Settima full complement of products:



SMT – high-pressure industrial, lube and tool machines



SMT16B – cooling, filtration and lube oil



SMT8B – compact cooling and filtration



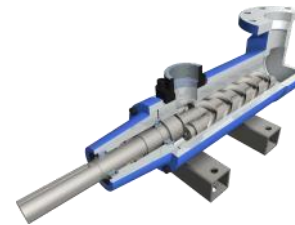
SFO – shipyards diesel oil handling



SMAPI (API676) – wide range of marine and industrial applications



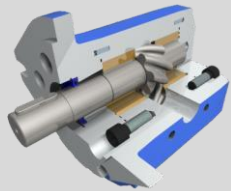
FOTP – high-reliability boiler ignition/feeding marine application



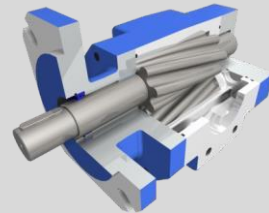
SMTU – USA lifts and freight elevators



SM – lifts and freight elevators



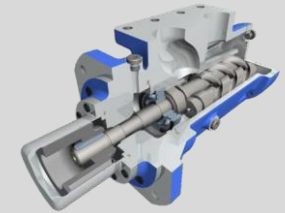
CONTINUUM® – high-pressure, no-noise fluid power applications



2VHL CONTINUUM® – low-pressure no-noise lube oil services



FLOWMETERS – high-pressure, high-precision flow measurement



MAGNETIC COUPLING – seal-less option for no medium leakage

Engineering and certification are a resource for our customers. If some certification is not available today, it could be available soon: ask Settima and we will answer.



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