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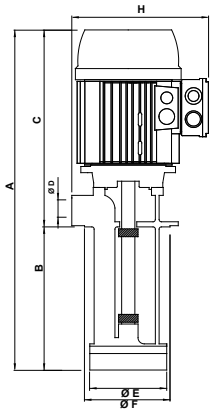
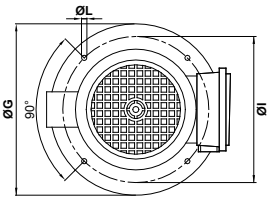
Submersible motor-driven pumps

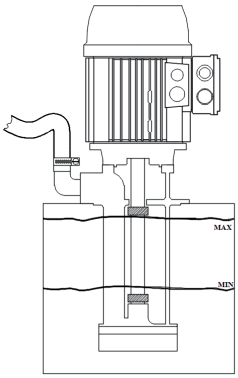
Type PPI

Uses

They are suitable for transferring liquids containing impurities up to 0.03 mm in size.
Their hydraulic components: impeller, feed screw and pump body in brass allow them to be used with emulsions and oily substances, glycol and liquids in general provided they are not oxidative for the construction materials.
Viscosity must not exceed 21 cST (3° Engel).
The temperature of the liquid must not exceed 90°C.
When using diathermic oil, the fluid temperature can reach 150°C.
They are commonly used on:
- temperature regulation systems
They are normally installed on a tank with a capacity which is proportional to their flow rate, about 3-4 cm from the bottom.
It is important to make sure that the maximum liquid level in the tank is always 3-4 cm lower than the support flange (see figure).
For different uses, please consult our Technical Office.







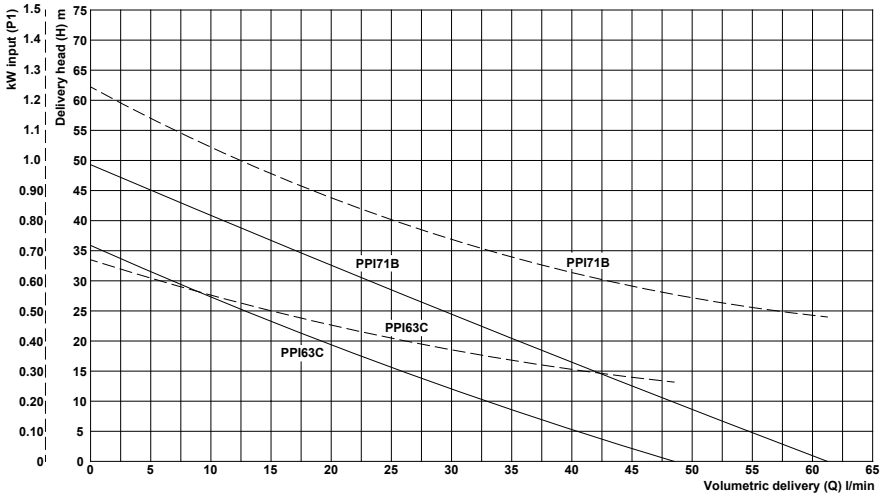
Size and weights table

Type of pump	A mm	B mm	C mm	ØD	ØE mm	ØF mm	ØG mm	H mm	ØI mm	ØL mm	Mass kg
PPI 63C	437	195	242	3/4"	98	100	130	185	115	7 (n.4)	9.1
PPI 71B	466	200	266	3/4"	98	100	130	193	115	7 (n.4)	11.4

Rating plate data

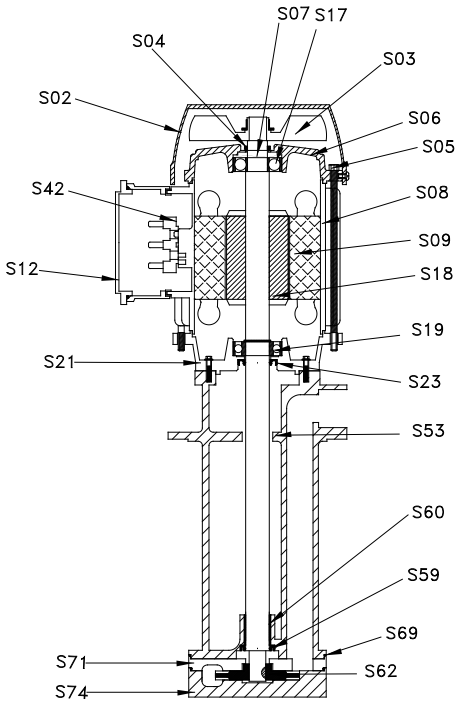
Type of pump	kW		V 230/400 - Hz 50			Q - Q_{max}	H_{max} - H
	Input (P1)	Nom. (P2)	In Amp.	n min^{-1}	cos φ	litres/min	metres
PPI 63C	0.74	0.55	2.30/1.33	2755	0.81	1 - 48	35 - 0
PPI 71B	1.20	0.90	3.83/2.21	2760	0.78	5 - 61	45 - 0

Hydraulic performance curves (peripheral impeller)



Hydraulic performance table (peripheral impeller)

Delivery head (**H**) m →	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Type of pump	Volumetric delivery (**Q**) l/min ↓														
PPI 63C	48	41	33	26	19	13	7	1							
PPI 71B	61	55	48	42	36	29	23	17	11	5					



Spare parts nomenclature

	Component	PPI 63C Materials	PPI 71B Materials
S02.	Fan cover	Nylon*	Nylon*
S03.	Fan	Nylon	Nylon
S04.	V-ring	NBR	NBR
S05.	Stay rod	Steel	Steel
S06.	Upper shield	Aluminium	Aluminium
S07.	Spring ring	Steel	Steel
S08.	Housing	Aluminium	Aluminium
S09.	Wound stator	-	-
S12.	Terminal box	Aluminium	Aluminium
S17.	Upper bearing	-	-
S18.	Axis + Rotor	(Ax.AISI 416)	(Ax.AISI 416)
S19.	Lower bearing	-	-
S21.	Motor flange	Aluminium	Aluminium
S23.	Motor seal ring	NBR	NBR
S42.	Terminal board	-	-
S53.	Pump body	Brass 58	Brass 58
S59.	Seal	NBR	NBR
S62.	Impeller	Brass 58	Brass 58
S60.	Self-lubricating bush	AISI 304	AISI 304
S69.	O-ring	NBR	NBR
S71.	Adaptor coupling	Brass 58	Brass 58
S74.	Impeller-cover	Brass 58	Brass 58

*On demand Sheet metal

*On demand Sheet metal

Vertical multistage pumps

Type HPP 80

Main applications

The pump is designed for pumping clean and non-explosive liquids without abrasive and filamentous suspended parts and with a viscosity not exceeding 20mm²/s.

The pump is designed for industrial applications:

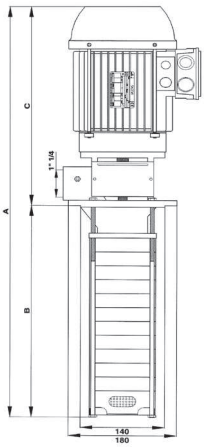
- Machine tools (grinding, lathes, drilling centres)
- Glass processing machinery
- Filtration systems
- Cooling systems
- Washing machines

Operating conditions

Liquid temperature from -15 ° C to + 90 ° C - Maximum room temperature + 40 ° C.

Electric motor:

The pump is equipped with a closed construction engine, with external ventilation, built in accordance with IEC 60034-30-1 in efficiency class IE3 (Premium Efficiency).
Degree of protection IP 55

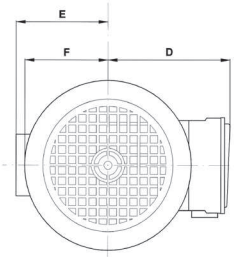


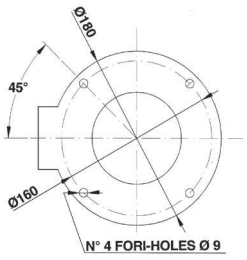
Size and weights table

Type of pump	A mm	B mm	C mm	D mm	E mm	F mm	Mass kg
HPP 80/2	535	192	343	123	99	80.5	15.5
HPP 80/4	589	246	343	123	99	80.5	18.0
HPP 80/6	643	300	343	123	99	80.5	20.5

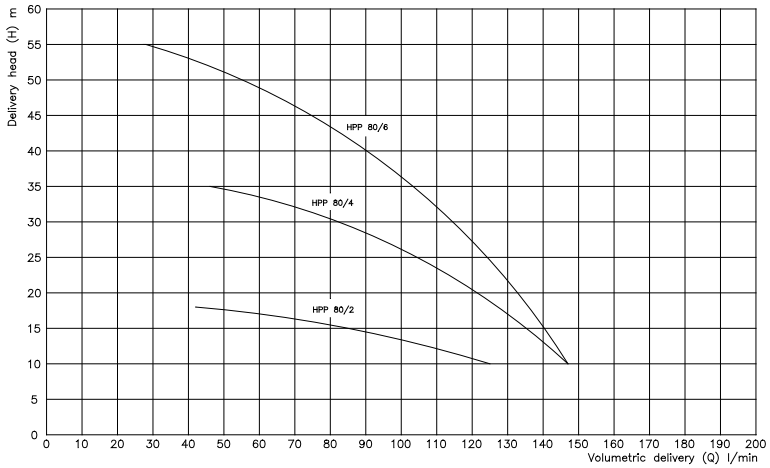
Rating plate data

Type of pump	kW		V 230/400 - Hz 50						Q_{max} - Q	H - H_{max}
	Input (P1)	Nom. (P2)	In Amp.	n min^{-1}	cos φ	IE3 η 50%	IE3 η 75%	IE3 η 100%	litres/min	metres
HPP 80/2	0.91	0.75	2.84/1.64	2845	0.80	81.9	83.2	82.5	109 - 73	12 - 16
HPP 80/4	0.91	0.75	2.84/1.64	2845	0.80	81.9	83.2	82.5	125 - 82	14 - 30
HPP 80/6	1.30	1.1	4.09/2.36	2865	0.80	83.9	85.3	84.8	138 - 49	16 - 50





Hydraulic performance curves



Hydraulic performance table

Delivery head (**H**) m → / Type of pump	10	12	14	16	18	20	25	30	35	40	45	50	55	60
	Volumetric delivery (**Q**) l/min ↓													
HPP 80/2	125	109	98	73	42									
HPP 80/4	147	141	138	133	127	123	106	82	46					
HPP 80/6	147	144	141	138	136	133	124	115	104	89	75	49	28	

Vertical multistage pumps

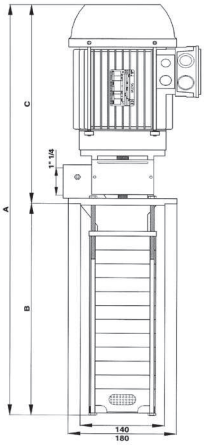
Type HPP 90

Main applications
The pump is designed for pumping clean and non-explosive liquids without abrasive and filamentous suspended parts and with a viscosity not exceeding 20mm²/s.

The pump is designed for industrial applications:
- Machine tools (grinding, lathes, drilling centres)
- Glass processing machinery
- Filtration systems
- Cooling systems
- Washing machines

Operating conditions
Liquid temperature from -15 ° C to + 90 ° C - Maximum room temperature + 40 ° C.
Electric motor:

The pump is equipped with a closed construction engine, with external ventilation, built in accordance with IEC 60034-30-1 in efficiency class IE3 (Premium Efficiency).
Degree of protection IP 55

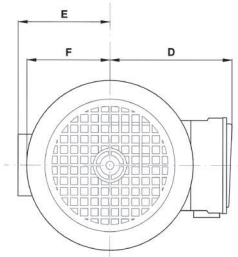


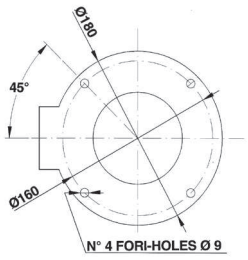
Size and weights table

Type of pump	A mm	B mm	C mm	D	E mm	F mm	Mass kg
HPP 90/8	740	354	386	129	99	89.5	25.5
HPP 90/10	794	408	386	129	99	89.5	29.0
HPP 90/12	848	462	386	129	99	89.5	30.0

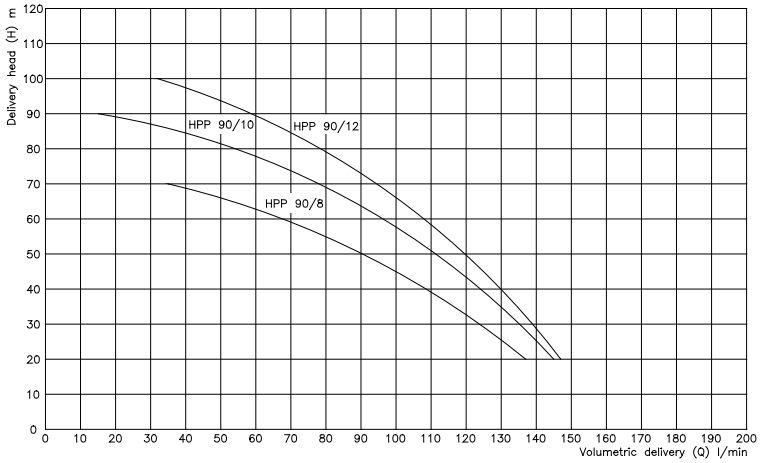
Rating plate data

Type of pump	kW		V 230/400 - Hz 50						Q_{max} - Q litres/min	H - H_{max} metres
	Input (P1)	Nom. (P2)	In Amp.	n min^{-1}	cos φ	IE3 η 50%	IE3 η 75%	IE3 η 100%		
HPP 90/8	1.76	1.5	5.5/3.1	2900	0.82	82.3	84.7	84.8	137 - 66	20 - 60
HPP 90/10	2.61	2.2	7.8/4.5	2890	0.84	85.7	86.8	86.2	135 - 54	30 - 80
HPP 90/12	2.61	2.2	7.8/4.5	2890	0.84	85.7	86.8	86.2	130 - 32	40 - 100





Hydraulic performance curves



Hydraulic performance table

Delivery head (**H**) m →	20	30	40	50	60	70	80	90	100	110	120
Type of pump	Volumetric delivery (**Q**) l/min ↓										
HPP 90/8	137	123	108	90	66	35					
HPP 90/10	145	135	125	111	98	78	54	15			
HPP 90/12	147	140	130	116	112	95	79	57	32		

Vertical multistage pumps

Type HPP 100

Main applications

The pump is designed for pumping clean and non-explosive liquids without abrasive and filamentous suspended parts and with a viscosity not exceeding 20mm²/s.

The pump is designed for industrial applications:

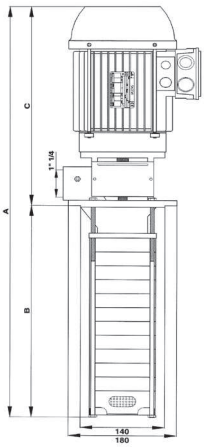
- Machine tools (grinding, lathes, drilling centres)
- Glass processing machinery
- Filtration systems
- Cooling systems
- Washing machines

Operating conditions

Liquid temperature from -15 ° C to + 90 ° C - Maximum room temperature + 40 ° C.

Electric motor:

The pump is equipped with a closed construction engine, with external ventilation, built in accordance with IEC 60034-30-1 in efficiency class IE3 (Premium Efficiency).
Degree of protection IP 55

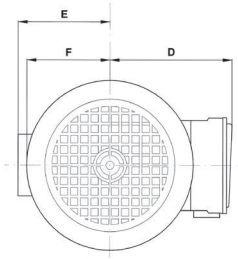


Size and weights table

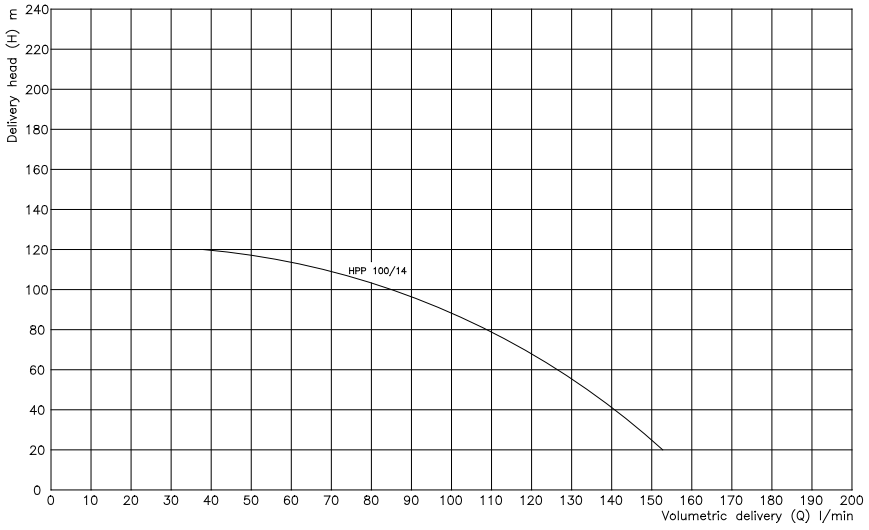
Type of pump	A mm	B mm	C mm	D	E mm	F mm	Mass kg
HPP 100/14	934	516	418	144	99	97.5	34.5

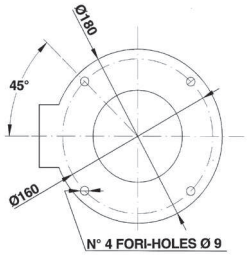
Rating plate data

Type of pump	kW		V 230/400 - Hz 50						Q_{max}-Q	H-H_{max}
	Input (P1)	Nom. (P2)	In Amp.	n min^{-1}	cos φ	**IE3** η 50%	75%	100%	litres/min	metres
HPP 100/14	3.41	3	9.8/5.7	2900	0.87	88.8	89.2	88.3	134 - 38	50 - 120



Hydraulic performance curves





Hydraulic performance table

Delivery head (**H**) m →	20	30	40	50	60	70	80	90	100	110	120	130	140
Type of pump	Volumetric delivery (**Q**) l/min ↓												
HPP 100/14	152	147	141	134	126	118	109	98	84	68	38		

Vertical multistage pumps

Type HPP 112

Main applications

The pump is designed for pumping clean and non-explosive liquids without abrasive and filamentous suspended parts and with a viscosity not exceeding 20mm²/s.

The pump is designed for industrial applications:

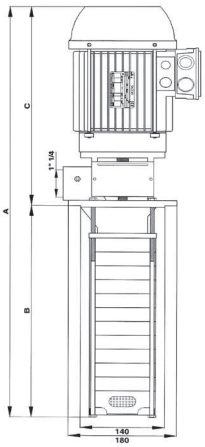
- Machine tools (grinding, lathes, drilling centres)
- Glass processing machinery
- Filtration systems
- cooling systems
- Washing machines

Operating conditions

Liquid temperature from -15 ° C to + 90 ° C - Maximum room temperature + 40 ° C.

Electric motor:

The pump is equipped with a closed construction engine, with external ventilation, built in accordance with IEC 60034-30-1 in efficiency class IE3 (Premium Efficiency).
Degree of protection IP 55

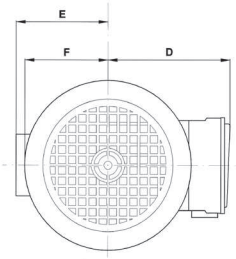


Size and weights table

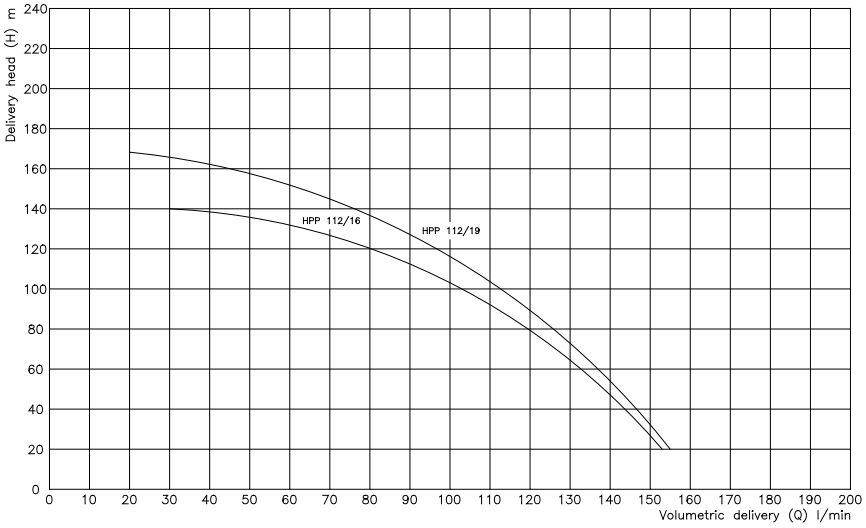
Type of pump	A mm	B mm	C mm	D	E mm	F mm	Mass kg
HPP 112/16	1010	570	440	163	99	115	44.0
HPP 112/19	1091	651	440	163	99	115	45.4

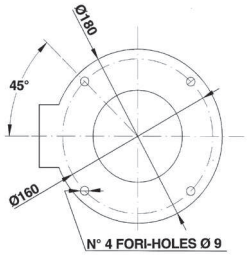
Rating plate data

Type of pump	kW		V 230/400 - Hz 50						Q_{max}-Q	H-H_{max}
	Input (P1)	Nom. (P2)	In Amp.	n min^{-1}	cos φ	IE3 η 50%	IE3 η 75%	IE3 η 100%	litres/min	metres
HPP 112/16	4.43	4	12.6/7.3	2920	0.88	86.6	88.4	88.6	134 - 30	60 - 140
HPP 112/19	4.43	4	12.6/7.3	2920	0.88	86.6	88.4	88.6	130 - 25	70 - 160



Hydraulic performance curves





Hydraulic performance table

Delivery head (**H**) m →	30	40	50	60	70	80	90	100	120	140	160	180
Type of pump	Volumetric delivery (**Q**) l/min ↓											
HPP 112/16	149	145	140	134	126	120	110	103	80	30		
HPP 112/19	151	148	142	136	132	125	119	113	99	78	43	

Use and maintenance

Via A. Pacinotti n. 2 – 30020 NOVENTA DI PIAVE (Ve) Italy- - Phone no.: +39-0421-307389 telefax no.: +39-0421-65428 email:info@sacemi.com

OPERATION AND MAINTENANCE MANUAL (ORIGINAL INSTRUCTIONS) - MOTOR-DRIVEN PUMPS SACEMI

GENERAL INFORMATION

This manual is designed to provide a general understanding of the machine and the instructions necessary for its proper installation and operation.
The manual is an integral part of the machine and must be read carefully before handling, installing and operating the machine and it must be kept for future reference.
Non-observance of the instructions in this manual, any improper use, any maintenance not carried out by specialised personnel, removal of labels and warnings of any kind, removal or tampering of protective guards and/or safety devices and any other action not expressly envisaged which may modify the solutions adopted by the Manufacturer concerning the safety of the machine or of its parts, can cause serious injury to persons and property and will relieve the Manufacturer of any responsibility. Any intervention on the machine by unauthorised personnel will result in the automatic termination of the product warranty.
The product identification number (Type) and its characteristics and a code for traceability of the date and batch of production are stamped on the nameplate of the motor-driven pump: the model information and warnings contained in this manual refer to the identifiable marks written on the nameplate.
As regards any situations not covered by this manual or any further information, please refer to our general catalogue and to the documentation available on ***www.sacemi.com*** and if required contact our commercial service

DECLARATION OF CONFORMITY:

The motor-driven pumps SACEMI type **AP-AU-EPC-HPP-IMM-MP-MPC-MSPV-PPI-SP-SPV-SQ-TR** comply with the requirements of Directives 2006/42/EC (Machinery) - 2006/95/EC (Low Voltage) - and – 2004/108/EC (CEM). They bear the conformity marking on the plate CE. Some catalogue versions and products meet the requirements laid down in EN 12157 Coolant pump units for machine tools - Nominal flow rate, dimensions (see tables at the end of the manual)

PRODUCT DESCRIPTION:

Motor-driven centrifugal pumps SACEMI are designed for the circulation of liquids in general and of cooling mixtures, according to the specific uses indicated in the tables that end this manual. The impellers are fastened directly to the extended crankshaft
The pump is equipped with a 2-pole electric motor, designed for continuous service and power supply, built according to IEC60034, cooled with external ventilation, class F winding and IP 55 protection rating.

WARNING **MAINTENANCE / STORAGE OF THE MACHINE:**

Temporary storage of the machine must be carried out inside its original packing, carefully placing the package in a stable position, in a clean and weather-protected environment which can protect the pump from foreign bodies accessing and from weathering (rain, snow, etc.) that may cause damage to its electrical parts.
The storage environment temperature must be between -20 ° C and +50 ° C.

HANDLING:

Motor-driven pumps must be handled with the utmost care and with means appropriate to their size and weight (***which can be detected from the plate on the machine or from the table at the end of the manual***). ***In particular, packed pumps must be moved in accordance with the instructions on the package***, in particular avoiding standing elongated containers on their smaller side in order to avoid any roll-over of the package. During handling and transport, be careful not to damage the delicate parts. When handling non-packed *pumps* listed in the catalogue *other than AU-TR-SQ,* only harness or pick up the machinery at its gripping points using suitable hooks or ropes**.** While handling the pumps there is a risk of injury; therefore, it is necessary to use suitable lifting devices appropriate to the weight and size of the pump together with personal protection equipment. The handling of the pump by lifting means must always take place slowly, with no uncontrolled oscillations in order to avoid unbalance and slippage**. DO NOT** pick up or harness the pump near the shaft: it could be damaged. **DO NOT** place the pump on the ground by leaning it on the impeller's base as it may overturn. When resting it on the ground temporarily, the pump must be placed horizontally, ensuring that thickening elements are placed under its ends to prevent it from tilting against the flange support or from rolling thereby damaging the housing of the electrical wiring terminal boards. Models *AU-TR-SQ* must be lifted by using a harness around the narrow neck-shaped groove between the motor body and the pump and their temporary resting on the ground must be positioned: AU pumps on their supporting tapered ring, TR-SQ ones with their motor axis horizontal, ensuring thickening elements are placed under the ends to prevent it from tilting against the flange support or from rolling thereby damaging the housing of the electrical wiring terminal boards. **DO NOT** place the pump temporarily on the ground at its engine crank rear end When handling, every care must be taken to prevent foreign bodies from entering through the engine ventilation grilles, the suction holes and the pump delivery holes.

WARNING **USE:**

Motor-driven pumps SACEMI are particularly used in the industrial field on machine tools for machining metal, plastic, glass, stones (cutting, drilling, milling, grinding, turning) and industrial applications for filtration, fluid temperature control, spray booths, surface treatment, printing machines.
The expected application for each model is specified in ***table no 3***.

WARNING **LIMITATIONS OF USE:**

Motor-driven pumps must NOT be used in explosive and / or potentially explosive environments and must NOT be used with flammable liquids or which produce harmful and/or explosive gases.
For possible uses with aggressive liquids (e.g. acids, alkali solutions) please refer to the indications given for each type of pump in our Catalogue or on our website www.sacemi.com

Pumps **must NOT** be used for heads below the lowest point of the characteristic curve shown in the catalogue as the use of the pump for heads lower than these may overload the motor. Motor-driven pumps **must NOT** be used in tanks under pressure and the installer is therefore responsible for providing the necessary technical arrangements to prevent the tank from being, even temporarily, pressurised. The pumped liquid **must NOT** exceed a viscosity of 21 cSt (3°E) and a temperature of 70°C. CSA / UL certified pumps are approved for liquid at a temperature of 30 °C / 60 ° C for UL and CSA respectively.
The maximum permissible sizes of the solid parts allowed in the pumped fluid vary for each type of pump as indicated in the tables at the end of the manual.
The motor-driven pump is built to be installed in an indoor environment or in areas protected from the weather.
The electrical data indicated on the plate must be observed for continuous service work.

WARNING **INSTALLATION:**

To lift the pump, use equipment and accessories as indicated in the "Handling" section.
To avoid leakage and ensure the maximum flow, please use pipes with diameters equal to the pump delivery hole.
DO NOT use rigid couplings between pump delivery and plant (except for the envisaged types).
Ensure the pump is perfectly primed before turning it on.
Ensure there are no obstructions preventing the normal cooling air flow to the engine fan.
Motor-driven pumps must be secured to avoid vibrations or movements which could damage the piping.
DO NOT insert your fingers in the intake duct for any reason as there is a risk of injury by touching the impeller.
The installer is responsible for making sure that all technical and plant precautions are put into place and maintained in the specific installation in order to ensure that the mechanical and hydraulic requirements listed below for each type are complied with.

AU Type Pumps:

The pump must be installed on the top of the tank and secured with appropriate bolts / screws. For proper operation of the pump and to ensure its correct sealing, the pump must be primed before use; the priming operation must be repeated whenever the pump sucks air due to a lack of liquid.
The pump must NOT run in the absence of liquid.

SQ Type Pumps:
The SQ type pump must be installed on a side wall of the tank.
The pump must be secured to the tank with appropriate screws, placing a seal between the tank surface and the suction inlet of the pump.
The pump must NOT run in the absence of liquid.
For proper operation of the pump and to ensure its correct sealing, it is essential to comply with the minimum level of liquid in the tank. ***(table no 2)***

TR Type Pumps:
To ensure greater stability to the TR type pump, use rigid suction and delivery pipes.
The pump must NOT run in the absence of liquid.
For proper operation of the pump and to ensure its correct sealing, it is essential that the machinery is positioned under a constant head. ***(table no 2)***

AP-EPC-HPP-IMM-MP-MPC-MSPV-PPI-SP-SPV type pumps:
The pump must be installed by fixing the coupling flange to the top of the tank and the pump body immersed in the liquid.
Use the appropriate screws to anchor the flange to the tank.
The maximum liquid level in the tank must always be 3-4 cm below the support flange, while the minimum level must always be above the suction chamber**.** The suction hole is located on the bottom of the pump body. The minimum distance between the intake hole and the bottom of the tank must be calculated in order to avoid cavitation and to prevent impurities from leaking into the fluid flow.

When installing pumps with a plastic body, please:
- **Do NOT** use rigid fittings and / or conical threaded connections;
- only use liquid or very thin sealants (film);
- be careful when screwing the coupling to the pump delivery, not to force it beyond the stop positioned inside the pipe coupling and, in any case, not to apply a clamping force above 40 kgm (390 Nm)

Failure to observe these warnings can irreparably damage the pump delivery hole.

WIRING:

The motor-driven pump is designed for a permanent electrical connection other than a plug.
The wiring must be carried out by qualified personnel, in accordance with the regulations in force in the country of use and must always provide for the grounding of the machine.
The motor voltage and frequency must comply with those indicated on the rating plate.

The arrangement of the connecting bridges **"Y or Δ"** must correspond to the wiring diagram inside the terminal board cover.
Check that the direction of rotation of the pump is the one indicated by the arrow on the pump body. Should the rotation direction be incorrect, stop the motor, disconnect the power line and reverse two phases of the power supply. Always check that the current absorbed by the pump during operation is never higher than the rating indicated on the plate.
We recommend the use of cables and plugs with the appropriate section for the currents absorbed by the electric motor that equips the machine; please remember that the absorbed current when turning the pump on can be much higher than those indicated on the plate.

As the standard construction of the motor-driven pump does not include any overload protection, the installer must provide a separate and adequate protection.
Make sure that fuses, circuit breakers and thermal relays are properly dimensioned.

Direction of rotation of the motor:
As regards AP-AU-EPC-IMM-MP-MPC-MSPV-PPI-SP-SPV-SQ-TR pumps, if you look at the motor's fan cover from above, the cooling fan must turn to the right (clockwise).
As regards HPP pumps, if you look at the motor's fan cover from above, the cooling fan must turn to the left (anticlockwise).

WARNING **INSTRUCTIONS FOR USE:**

The machine must always be positioned with the motor axis in a vertical position in order to work correctly. The working environment temperature must be between -20 ° C and +40 ° C.
Although the pumps are designed to tolerate the presence of impurities contained in liquids (with the quantities indicated in ***table no 1***), it is still recommended to prepare appropriate decanting zones (e.g. dividing the tank into compartments), in compliance with the installation rules. As regards self-priming pumps, an initial trigger must be provided by filling the suction or delivery pipe.
Should there be a leakage of liquid from the inlet of the axle into the suction / discharge chamber in pumps equipped with a mechanical seal, stop the machine and check the damaged part. In the event of electrical failure on a machine equipped with a single-phase motor, the operator must pay attention to possible electrostatic phenomena due to the capacitor.
The outer casing of the motor can reach 70°C; thus, it is advisable, for prolonged operations on this surface, to use appropriate protections (gloves).
For the Lp acoustic pressure level see ***table no 1***.

WARNING **MAINTENANCE:**

The pump does not require any special scheduled maintenance work in addition to the necessary periodic cleaning of the impeller and of the feed screw from the impurities present in the liquid.
To replace bearings, mechanical seals and/or components of the electric motor, refer to the technical data sheets in our general catalogue and to the documentation available on the website ***www.sacemi.com*** or contact our commercial service.
All maintenance operations must be carried out by qualified personnel, with the machine not running and disconnected from the mains.

DECOMMISSIONING OF THE MACHINE AND WASTE DISPOSAL:

The decommissioning of the motor-driven pump must be carried out by competent personnel who must safely remove the electrical, hydraulic and mechanical connections in that order, making the installation completely inoperative and secure (e.g. protect/close the lights in the empty tank). Finally, dismantling must be carried out in appropriate structures, in full compliance with the applicable laws of the user's country concerning waste disposal and separate collection, bearing in mind the materials forming the pump as detailed in ***table no 1***.

Symbols used / terminology

WARNING	**Warning**		**General danger**		**Electrical shock hazard**
It warns that failure to comply with the prescriptions involves a risk of damage to the machine		It warns that non-observance entails a risk of harming people and/or things		It warns of the presence of high voltage with the risk of electric shock	

Table no 1	Technical features

Type of pump	Main components	Impurities allowed mm	Weight kg		Lp (db)
			Range		
AP 80B	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤2	37	48	<70
AP 90A	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤2	41	51	73
AP 90B	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤2	43	53	75
AP 100A	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤2	48	58	78
AP 112B	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤2	59	71	76
AU	Steel - Aluminium - Cast Iron - Plastics - Brass - Copper - Paints	≤ 0.03	4	6	<70
EPC 63-71-80	Steel - Aluminium - Cast Iron - Plastics - Brass - Copper - Paints	≤ 0.03	8	18	<70
EPC 90	Steel - Aluminium - Cast Iron - Plastics - Brass - Copper - Paints	≤ 0.03	30	32	<70
PPI 63-71	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 0.03	9	12	<70
HPP 80	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 1	15	21	<70
HPP 90	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 1	25	30	<70
HPP 100-112	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 1	34	46	78
IMM 40-50	Steel - Aluminium - Plastics - Copper - Paints	≤ 3	1	2	<70
IMM 63	Steel - Aluminium - Plastics - Copper - Paints	≤ 3	5	6	<70
IMM 71	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 3	9	12	<70
IMM 80	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 3	14	19	<70
IMM 90A	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 4	47	50	73
IMM 90 B	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 4	49	52	75
IMM 100	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 4	53	56	78
MP 63-71	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 3	6	11	<70
MP 80-90	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 3	16	24	<70
MP 100	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤ 3	32	36	<70
MPC 80	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤2	15	19	<70
MPC 90	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤2	25	29	<70
MPC 100	Steel - Aluminium - Plastics - Brass - Copper - Paints	≤2	38	43	<70
MSPV 71-80	Steel - Aluminium - Plastics - Copper - Paints	≤ 3	9	14	<70
SP 12-18-25-33	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 3	5	9	<70
SP 50-75-100-150	Steel - Aluminium - Cast Iron - Plastics - Copper - Paints	≤ 3	13	22	<70
SPV 12-18-25-33	Steel - Aluminium - Plastics - Copper - Paints	≤ 3	2	6	<70
SPV 50-75-100-150	Steel - Aluminium - Plastics - Copper - Paints	≤ 3	7	15	<70
SQ	Steel - Aluminium - Plastics - Cast Iron - Brass - Copper - Paints	≤ 3	3	18	<70
TR	Steel - Aluminium - Plastics - Cast Iron - Brass - Copper - Paints	≤ 3	12	15	<70
HPP 80	Steel - Aluminium - Plastics - Cast Iron - Copper - Paints	0	15	21	<70
HPP 90	Steel - Aluminium - Plastics - Cast Iron - Copper - Paints	0	25	30	<70
HPP 100	Steel - Aluminium - Plastics - Cast Iron - Copper - Paints	0	30		<70
HPP 112	Steel - Aluminium - Plastics - Cast Iron - Copper - Paints	0	44	46	<70

Table no 2	Motor wiring

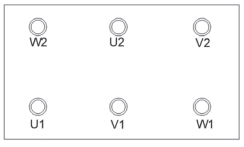
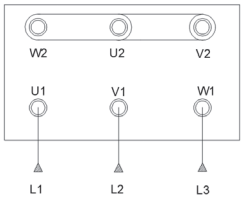
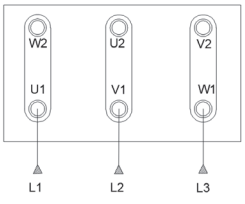
Terminals of the terminal board	Connection λ	Connection Λ
		

Table no 3	Table showing possible uses

Type	Uses	Type of fluid
IMM 40	Cutting - drilling	Oil-oily emulsions
IMM 50 A	Cutting - drilling - milling - conditioning	Oil-oily emulsions
IMM 63-71-80	Turning - filtration - milling - grinding - glass processing	Oil-oily emulsions
IMM 90-100	Turning - filtration - grinding - spray booths	Oil - oily emulsions - paint water
SPV 12-18	Cutting - drilling - milling - conditioning - glass processing	Oil-oily emulsions
SPV 25-33-50-75-100-150	Cutting - drilling - milling - printing - glass processing	Oil-oily emulsions - glycol
SP 12-18	Milling - turning - drilling	Oil-oily emulsions
SP 25-33-50-75-100-150	Milling - turning - drilling - grinding – filtration	Oil-oily emulsions
AU 56-63	Recirculation- suction	Oil-oily emulsions
71 - 80	Recirculation- transfer	Oil - oily emulsions - alkaline solutions
SQ 56-63-71-80	Milling - turning - drilling - surface treatment	Oil - oily emulsions - alkaline solutions
AP 80-90-100-112	Turning - filtration - grinding - surface treatment	Oil - oily emulsions - alkaline solutions
MP 63-71-80-90-100	Turning - filtration - grinding	Oil-oily emulsions
MPC 80-90-100	Turning - filtration - grinding	Oil-oily emulsions
MSPV 71-80	Cutting - drilling - milling - printing - glass processing	Oil-oily emulsions - glycol
EPC 63-71-80-90	Deep-hole-drilling-cooling	Oil-oily emulsions - glycol
PPI 63 - 71	Thermoregulation	Diathermic oil

TROUBLESHOOTING GUIDELINES

Flaw detected	Possible causes	Possible solution
The engine does not start - No noise	- flaw in motor terminal box connections - flaw in the power supply wiring	- Check the motor terminal board connections - Check the power line - Check all switches, fuses and thermal protectors
The engine does not start - Humming perception	- motor failure due to no winding - power line flaw due to phase failure - blocked impeller - blocked bearing - blocked bushing - blocked seal	- Check the motor terminal board connections - Check motor winding - Check the power line - Replace the impeller - Replace bearing - Replace bushing - Replace seal
The motor runs, but there is no liquid flowing	- the liquid level in the tank is below the minimum required - the impeller is damaged and/or occluded - suction hole occluded - delivery pipe is closed	- Top up the minimum level of liquid in the tank - Clean the impeller and replace it if damaged - Clean suction hole - Clean the suction and pumping chamber - Clean the delivery pipe
Insufficient pressure and flow	- wrong motor rotation direction - impeller, suction chamber, delivery pipe clogged with impurities - the impeller is damaged - suction chamber, pumping chamber are damaged	- Restore the correct rotation direction of the motor - Clean the impeller, the suction chamber and delivery pipe - Replace the impeller - Replace the delivery pipe, the suction and pumping chambers
Motor power absorption is too high	- too many impurities - friction between moving parts - liquid density beyond the limits of use	- Remove impurities other than those allowed - Identify and replace defective components - Restore liquid density within the limits of use

CUL/US ADDITIONAL INFORMATION

WARNINGS:

- The installer must provide motor protection against overloads.
- The installer must protect the pump to avoid it being used with no liquid.
- **Electric shock hazard** – This pump has not been evaluated for use in swimming pools and / or equivalent environments.
- Motors designed for dual voltage operation indicate the electrical data for which they have been factory-set.

CAUTION:

- These pumps have been evaluated only to be used with water.

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