



Dry Installed, Flood Proof (*fully immersible*); Back Pull Out Volute Pumpsets

ANFP for Sewage 

ARFP for Water 

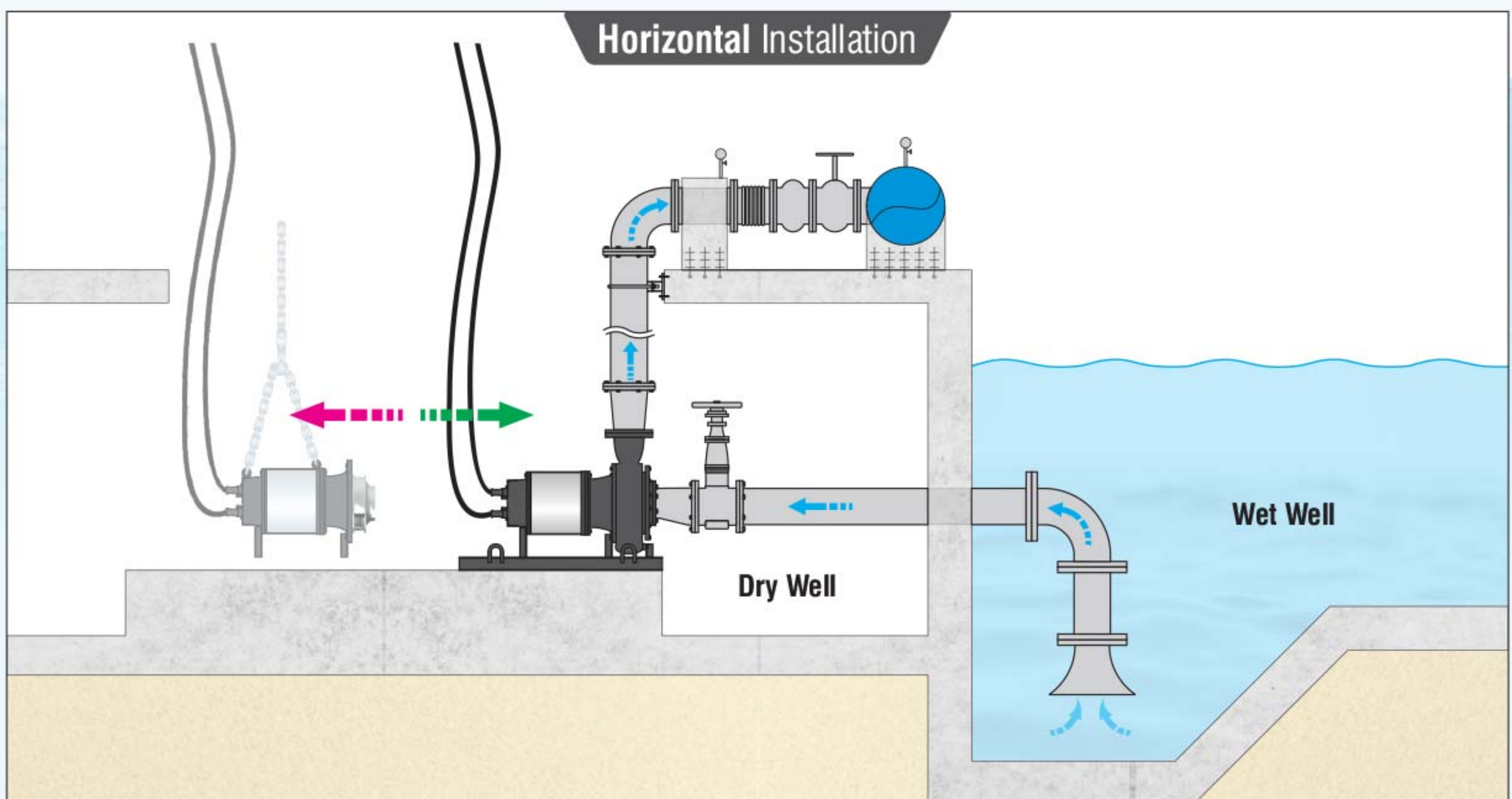
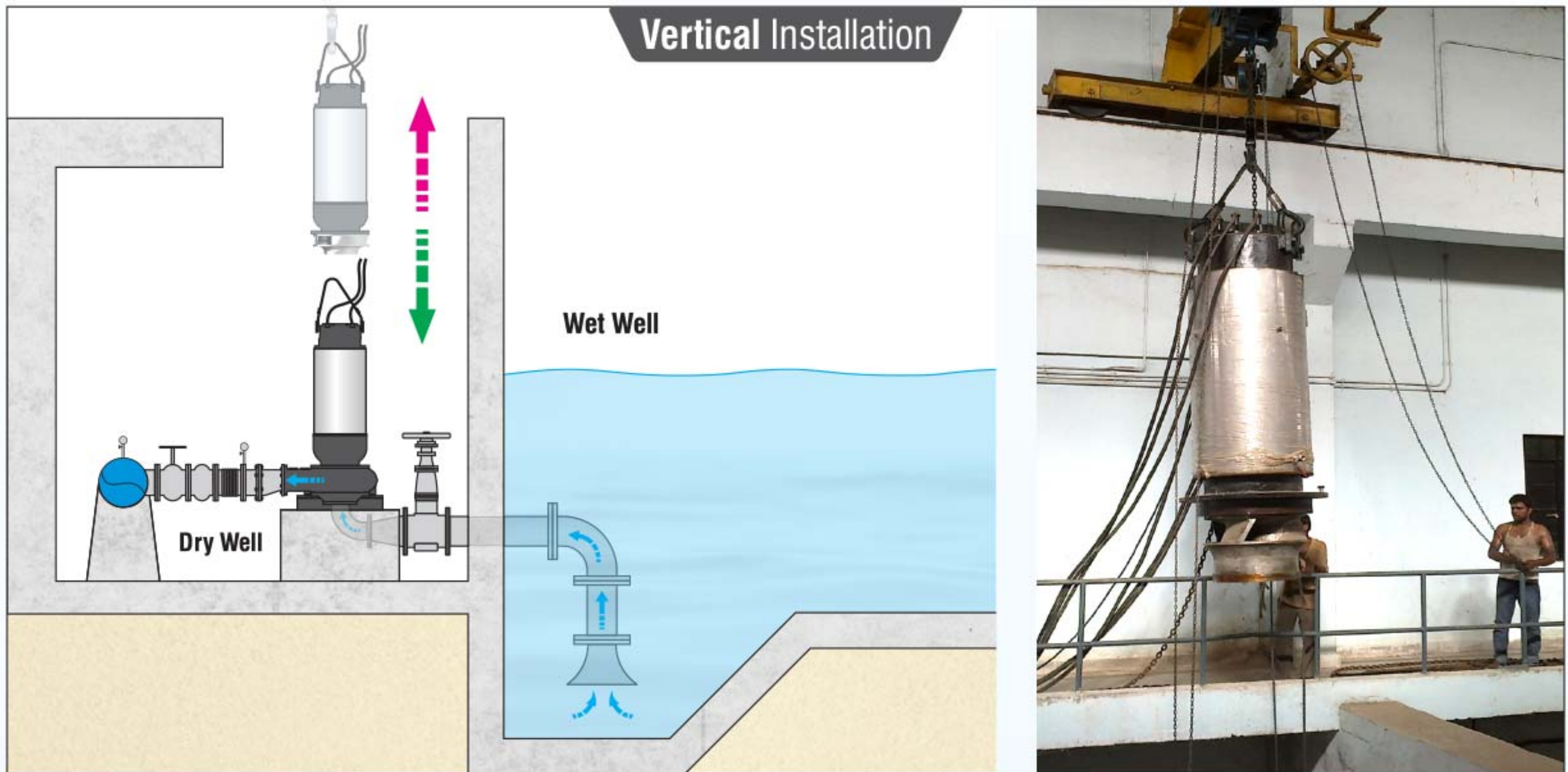
ASFP for Industrial Waste Water 



**Flood Proof
Insurance
for Dry Well
Pumping Stations**



Installation : Dry Well + Back Pullout



Thanks to **Back Pull Out design**, in the unfortunate event of Impeller Choking (*by large hard solids*); the Entire Motor + Shaft + Impeller can be pulled out as a **single unit** (*without disturbing the pipeline*); Cleaned at Ground Level & Refitted within minutes (*without the risk of misalignment*).

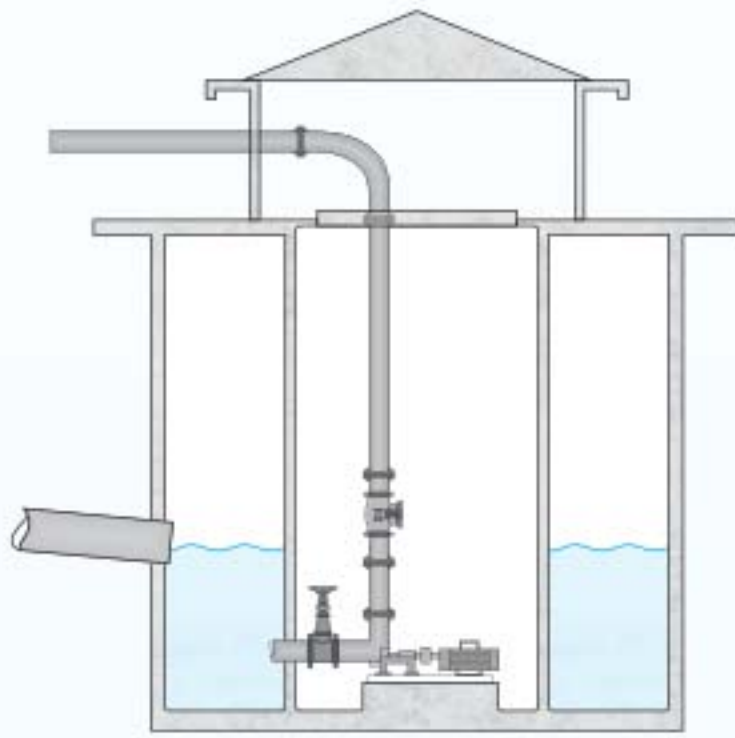
Hence Operators don't need to stay in the hot & humid Dry Well for longer durations.

Concept Benefits

Design Options for Non Clog Pumping Stations

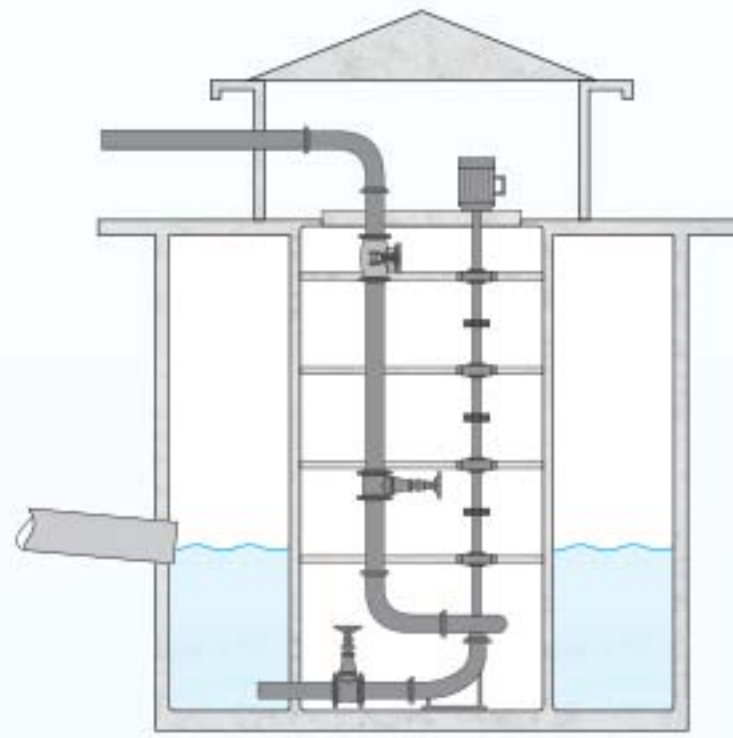
A HNC

in Wet + Dry Well



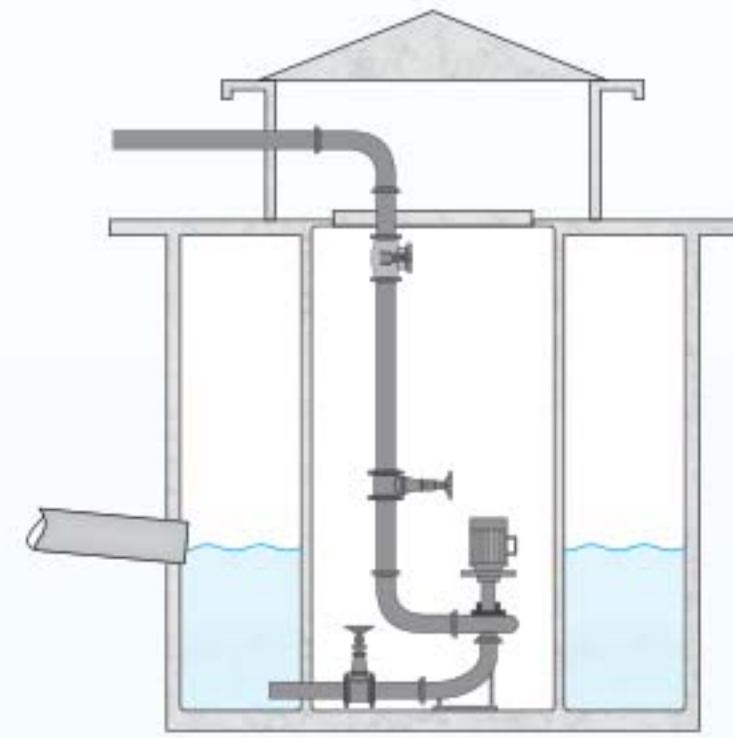
B VNC

(Long Coupled) in Wet + Dry Well



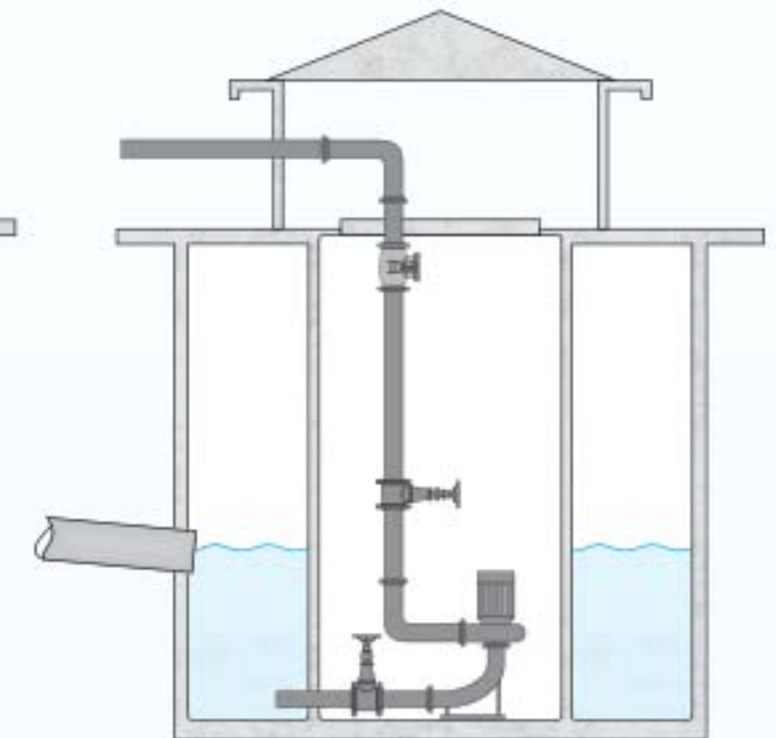
C VNC

(Short Coupled) in Wet + Dry Well



D ANFP

in Wet + Dry Well



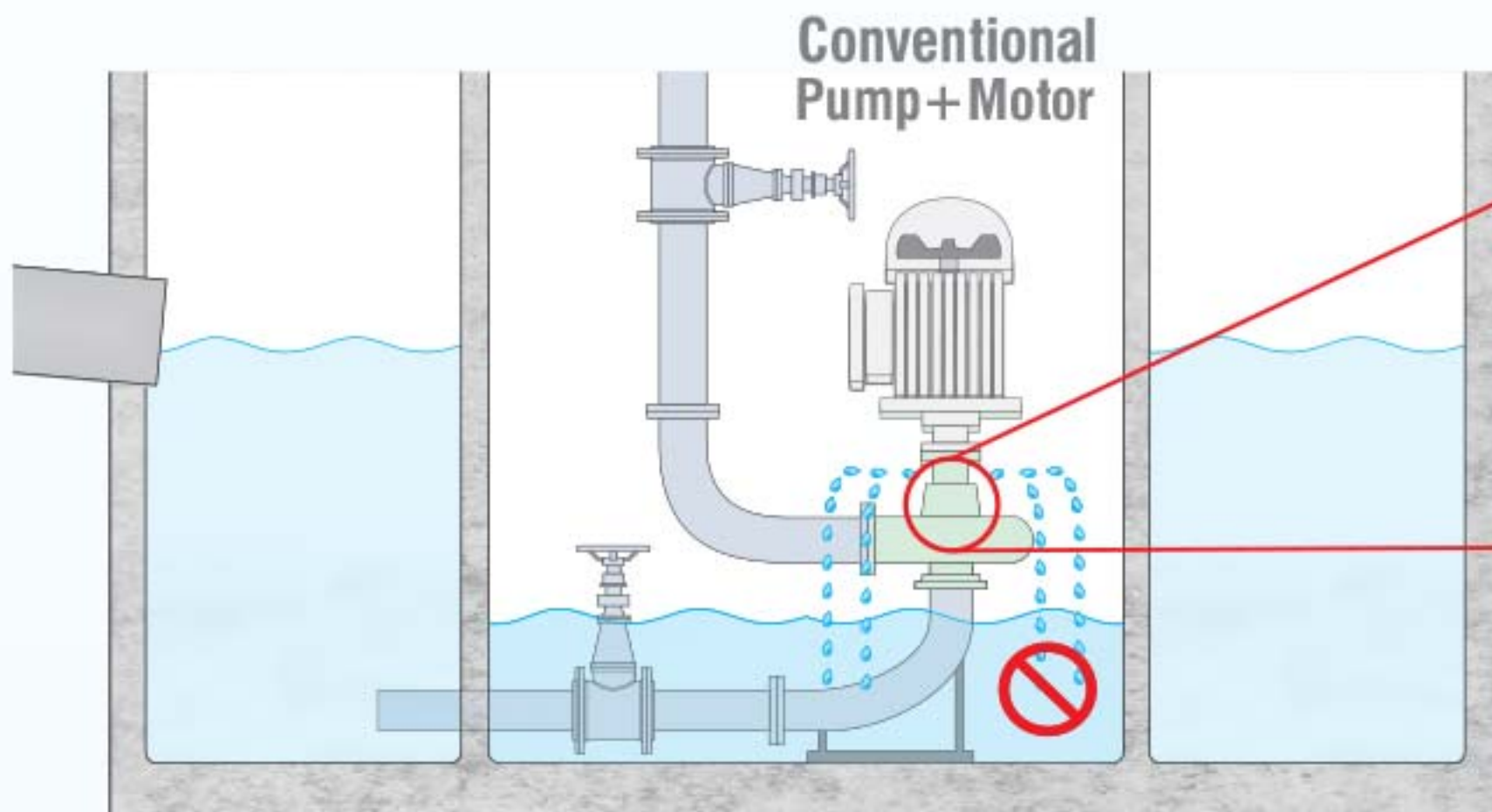
		Option A HNC	Option B VNC (Long Coupled)	Option C VNC (Short Coupled)	Option D ANFP	
Operational Aspects	Flood Proof Reliability	Operation in case of Seepage / Leakage into the Dry Well	Not Possible	Possible		
		Operation in case of Large Scale Flooding (Like in Monsoon)	Not Possible	Possible	Not Possible	Possible
	Exposure to Septic Sewage, Mosquitoes during Operation		High			Nil - because no leakage from Gland Rope
	Noise, Vibration & Harshness		High	Very High	High	Almost Nil
Maintenance Aspects	Routine Maintenance	Gland Rope Tightening / Replacement	Required			Not Required
		Regreasing				
		Oiling				
		Wearing Part Replacement				
		Drainage of Gland Leakage				
	Intermediate Bearings, Greasing / Maintenance	Not Required	Required	Not Required	Nil	
	Typical Frequency of Maintenance	~1-2 Weeks			1 Year to 2.5 Year	
Total Downtime	Very High			Very Low		
Operating Manpower Requirement (Related to Maintenance Frequency & Load)		High	High	Medium	Low	
Cost Comparison	Energy Costs		Medium	High	Medium	Low
	Operational Costs		High	Very High	High	Low
	Maintenance Costs		High	Very High	High	Very Low
	Total Life Cycle Costs		Very High	Very High	High	Very Low
	Civil Cost		Very High	High	High	Medium
Power Consumption	Pump & Motor Efficiency		Equal & High			
	Transmission Losses (Power Loss in between Motor Shaft to Pump Shaft)		Low	High (As Long Line Shaft & Bearings are Involved)	Low	Nil (As direct coupled)
	Overall Pumpset Efficiency (Pump x Transmission x Motor)		Average	Low	Average	High
	Auxiliary Power requirement	Ventilation* (Air Handling Unit)		Very High		Negligible
		Drainage of Dry Well		Yes		Nil
		Lighting in Dry Well		Yes		
	Total Auxiliary Power Requirement		High			Nil
Total Power Requirement (Cost)		High	Very High	High	Low	

*Heating of Dry Well due to motor Exhaust Air.

Benefits of Aqua's Dry Installed, Flood Proof (fully immersible) Pumpsets



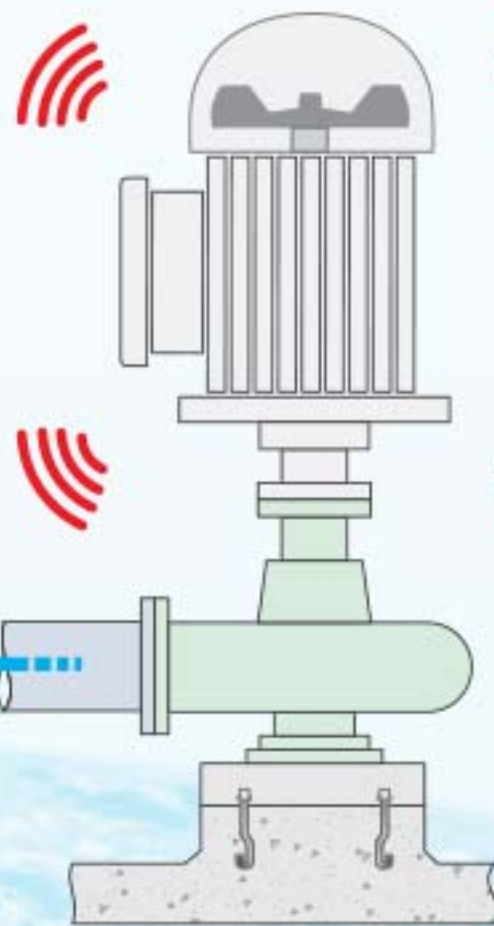
Thanks to the use of Ultra High Quality **Mechanical Shaft Seals**, there is **no Nuisance Leakage** (from Pump Gland Rope) into the Dry Well resulting into a **Dryer** & more **Hygienic** operating conditions.



....**No Need of Dewatering Pump** for Leakage Control



....**No Breeding ground for Mosquitoes**



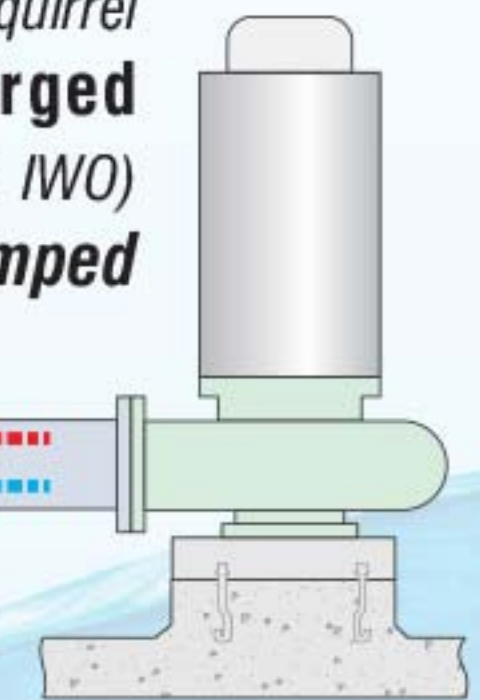
Motor Heat Disposal

Conventional Pumpsets use Totally Enclosed **AIR Fan Cooled (TEFC)** (Squirrel Cage Induction) **motor** (Shaft Mounted Fan - IC4A1A1) which **dissipate** their Heat & Noise into Dry Well...

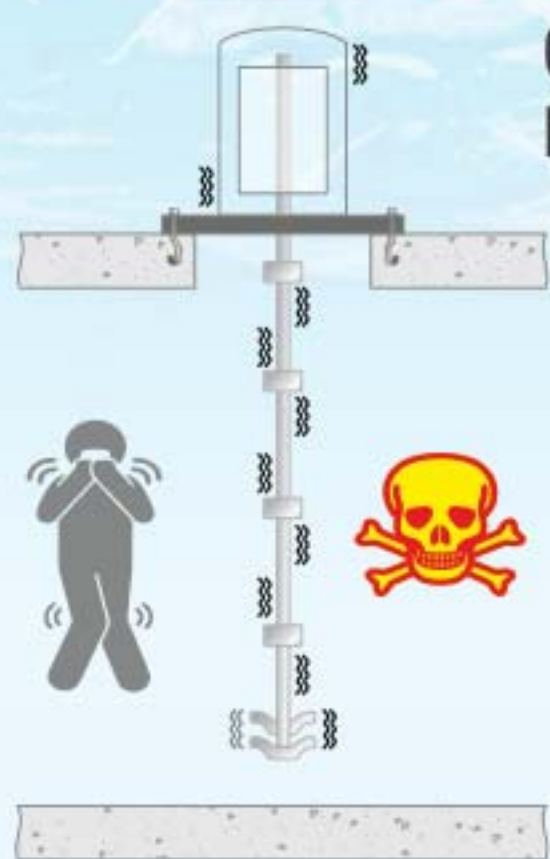


Aqua's Flood Proof Pumpsets use Totally Enclosed (IP68) **WATER Cooled (TESWC)** (Squirrel Cage Induction) **Submerged motor** (Self surface water cooled - IC4A IWO) which **dissipate** their Heat into **Pumped Liquid**...

Motor Heat Disposal into Pumped Liquid

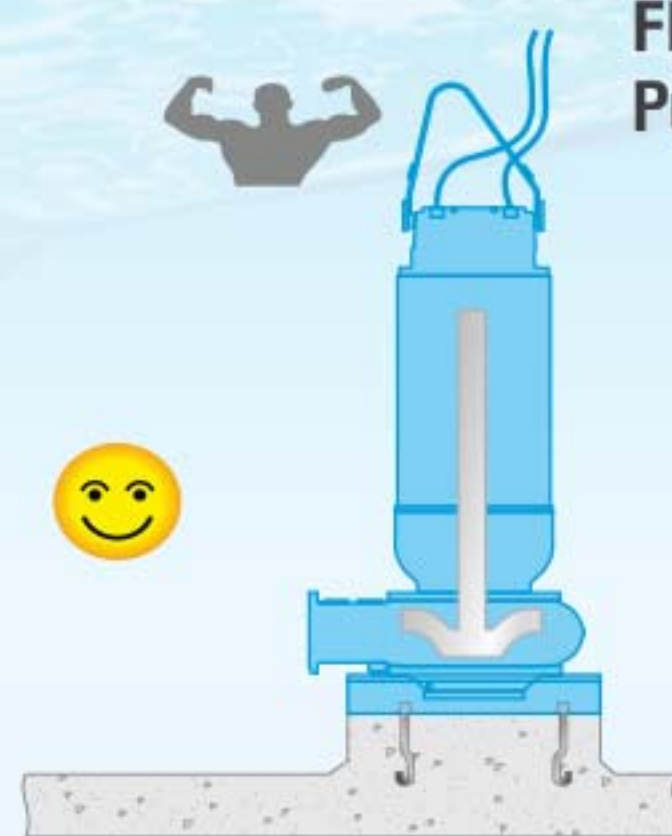


No need of Costly, Maintenance Prone & Energy Wasting Air Handling Units. (AHU)



Conventional Pumpsets

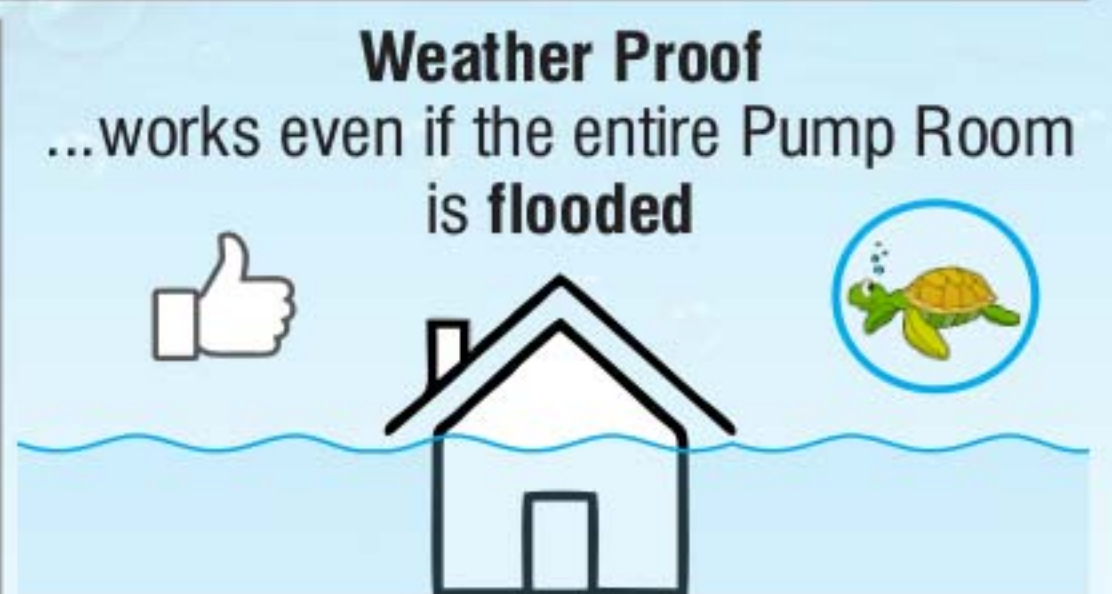
Multiple, Jointed; Slender Shafts



Flood Proof Pumpsets

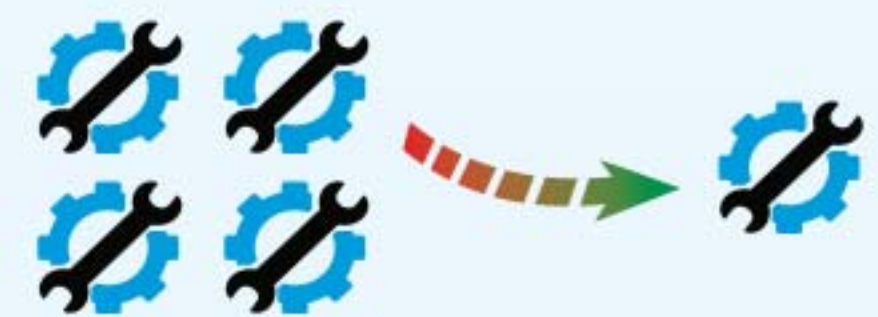
Single, Rigid; Robust Shaft

As the **Critical Speed** of Flood Proof pumpsets lies **Safely Above** it's Maximum Speed, there is **No Risk of Structural Resonance** or **Excessive Vibration** (when speed is varied with VFD)



Weather Proof

...works even if the entire Pump Room is flooded



Saves (upto 75%) Spare Parts & Consumables*



No need for Frequent Periodic....



Shafts/Sleeves &/or Coupling



Gland Packing



Oil &/or Grease



Saves (upto 33%) O&M Staff*

Design: Pumpset

Flood Proof Motor Pumpsets are the latest technological development - their Pump-end is similar to **Conventional** (*End Suction Non Clog OR Mix Flow*) **Volute pumps** while their Motor-end is much more superior than Conventional Air / Water Cooled Bare Shaft Induction motors - these motors (*already popular in Submersible pumpsets*) are **Fully Immersible** thanks to their **IP68** enclosure.

These pumpsets easily fit into existing piping systems & hence **offer a Flood Proof upgrade to your existing Dry Well pumping stations.**



Coolant Pump

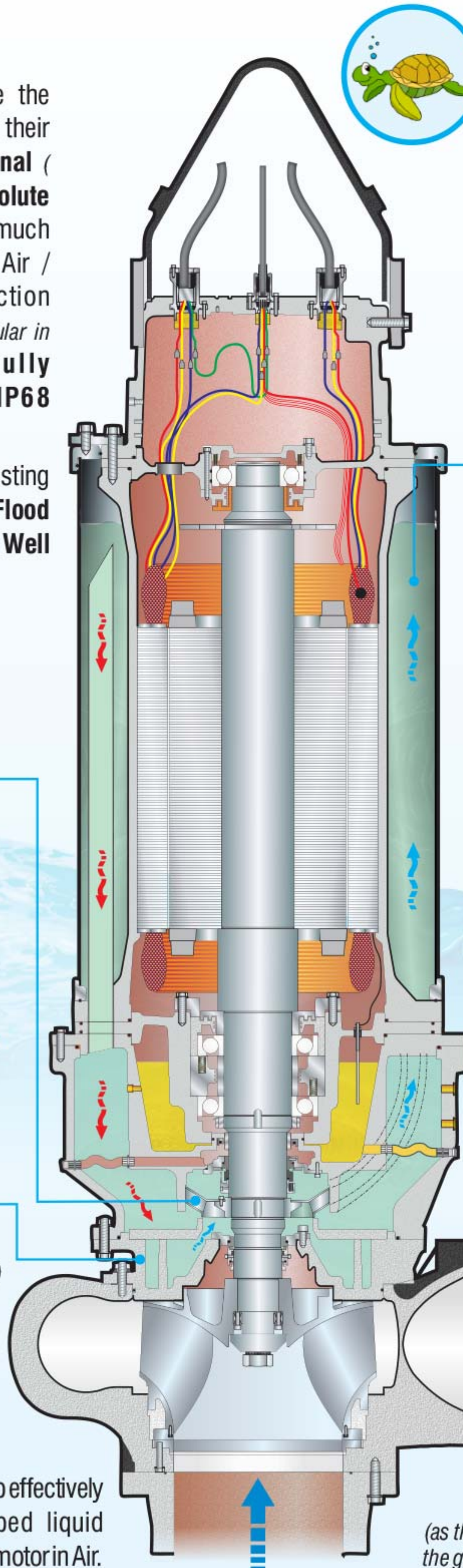
The **Inbuilt** Water + Glycol Circulating Impeller is key driven by the pumpset's shaft itself (& hence it doesn't require any additional motor or maintenance)



Heat Exchanger

The maintenance free, Inbuilt **Water (Glycol) to Water (Waste Water)** Heat Exchanger is built of sturdy **Cast Iron** & has smooth surfaces (*on the pump end*) thereby ensuring zero clogging by solids in pumped media.

The Heat Exchanger & Coolant Pump effectively transfer motor's heat to pumped liquid enabling **S1** operation even with the motor in Air.



The motor is **Amphibious** & hence can safely operate either in totally Dry or Submerged conditions.

A built in Jacket Cooling system ensures that the motor is efficiently cooled irrespective of whether or not it is submerged; while the **IP68 Enclosure** ensures that even if the surroundings are flooded, the motor is safe to run.

Design : Motor Cooling

Aqua's **Closed Loop Glycol** system uses a mixture of **Potable Water** & any commercially available Polypropylene Glycol formulations.

It has excellent heat transfer, corrosion resistance properties & is suitable for temperatures between -45°C to +55°C.

The coolant is circulated by an Inbuilt circulating Impeller through the space between the Motor Casing, Jacket Shell thereby extracting motor heat & dissipating it to pumped liquid (*via an inbuilt Heat Exchanger*).

...i.e. this is a huge benefit over Conventional Pumps (*which use Air Cooled motors (whose motor heat is dissipated into the ambient air)*)



This fully integrated, automated Closed Loop cooling system is **insensitive to impurities in the pumped liquid.**

(*as the coolant is never contaminated irrespective of the grit/silt level in pumped liquid*).

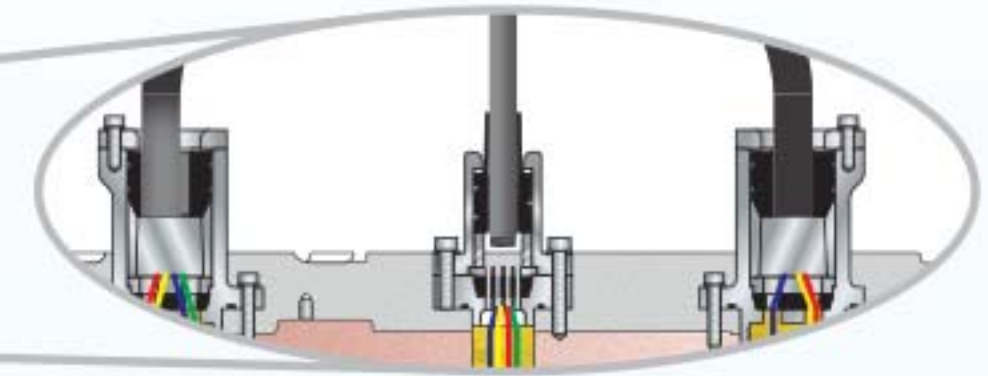
Design: Motor

The motor is **Amphibious** & hence can safely operate either in totally Dry or Submerged conditions.

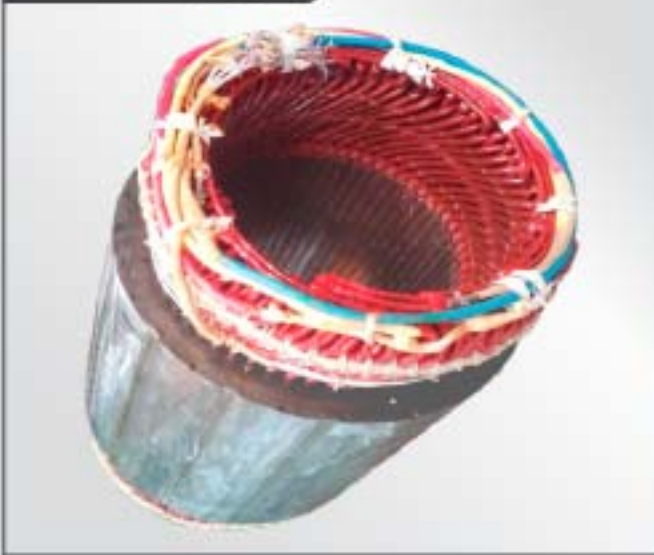


Water Proof Cable Glands

are specially designed as per **IP68** to prevent water ingress (*into the motor windings*) even in case of water flooding the dry well



HT Motor

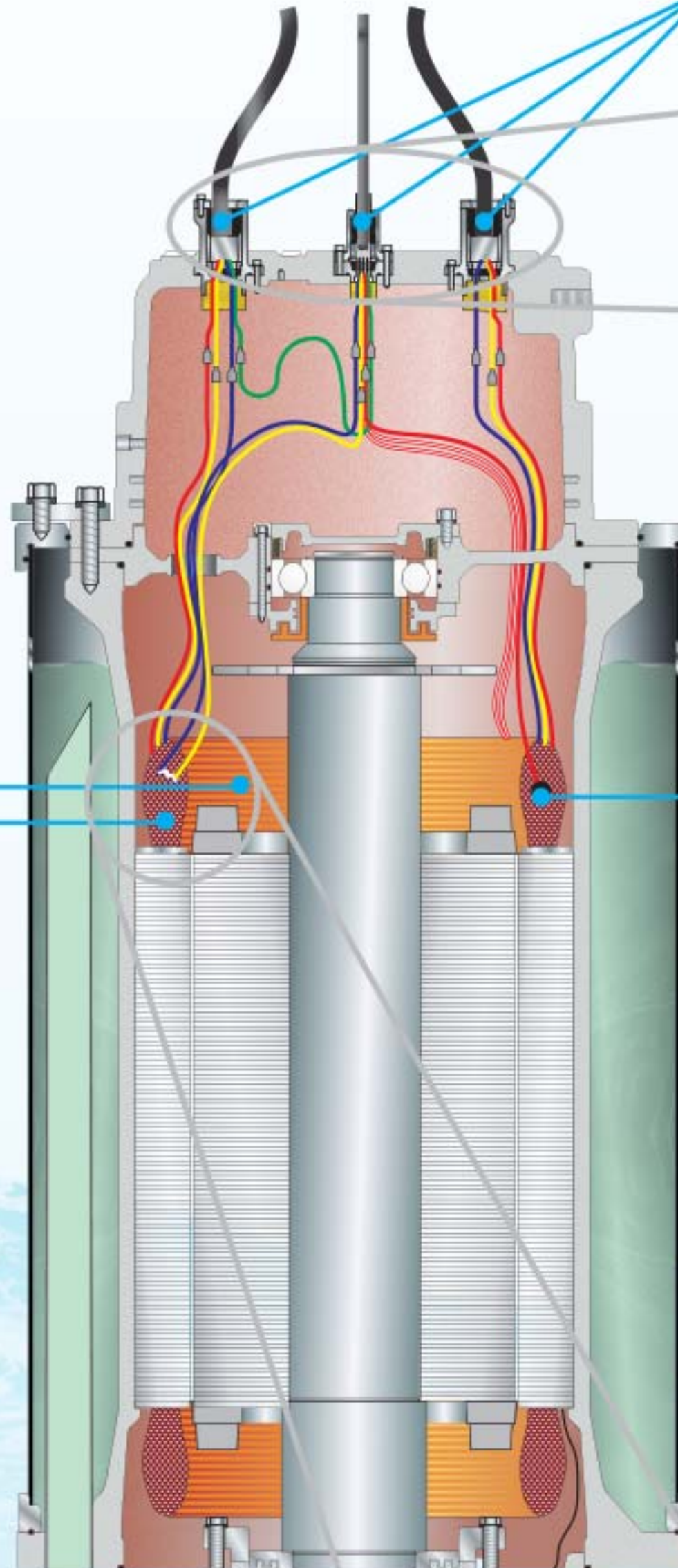


LT Motor



The Totally Enclosed, Self Circulation Water Cooled [TESWC IC-4A1W1 to IEC/IS-60034_6] motor is similar to Dry Type Induction Motor, the major difference being the Degree of Protection - it is of **IP-68** Enclosure to ensure **Hermetic Sealing** (*even if an accidental water flooding the dry-well*).

It is cooled by an inbuilt cooling mechanism which uses Potable Water + Commercially available Glycol Mixture as a Coolant.



Motor Thermal Overload Protection

Bi-Metallic switches are embedded into each phase of winding to detect accidental overheating & thereby trip off the power. Optionally Thermistors or PT 100 Transducers can also be offered.



VFD

Thanks to inbuilt, automated closed looped Glycol Water Cooling, the pumpset can also be run at **lower speeds** with

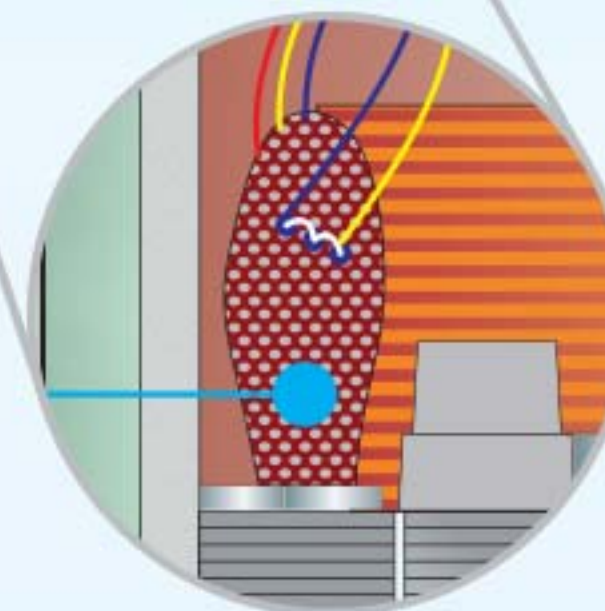
100% VFD Compatible without the risk of over heating. (*as maybe the case in Fan cooled motors using Air as it's coolant*).



World's Best, Premium Motor Insulation

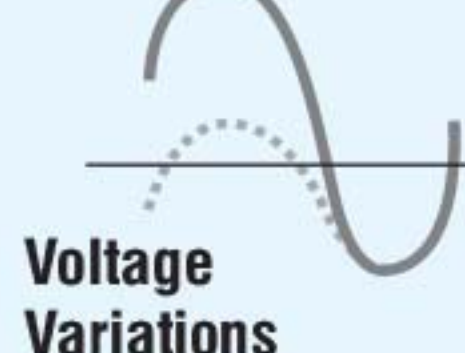
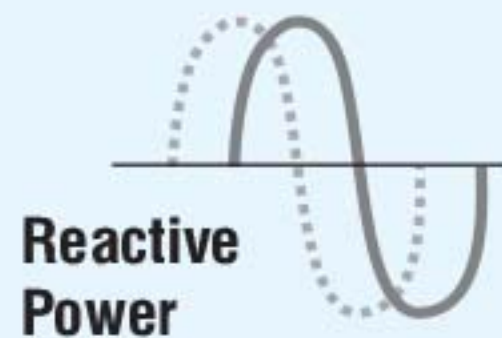
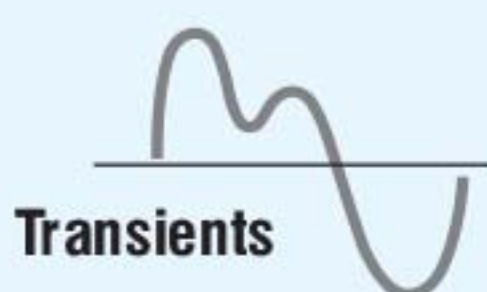


Insulation is based on "Power House" type treatment (*Mica based; Dual Vacuum Pressure Resin Impregnation (VPI)*) technology for Superb **Di-Electric Strength** due to use of costlier **Resin** (*v/s cheaper Varnish used by most Competitors*).



Thanks to **generous Reserve Margins** & Optimized Design; Aqua's Motors keep coolly working even upto +55°C.

Hence, Aqua's Motor easily tolerates :



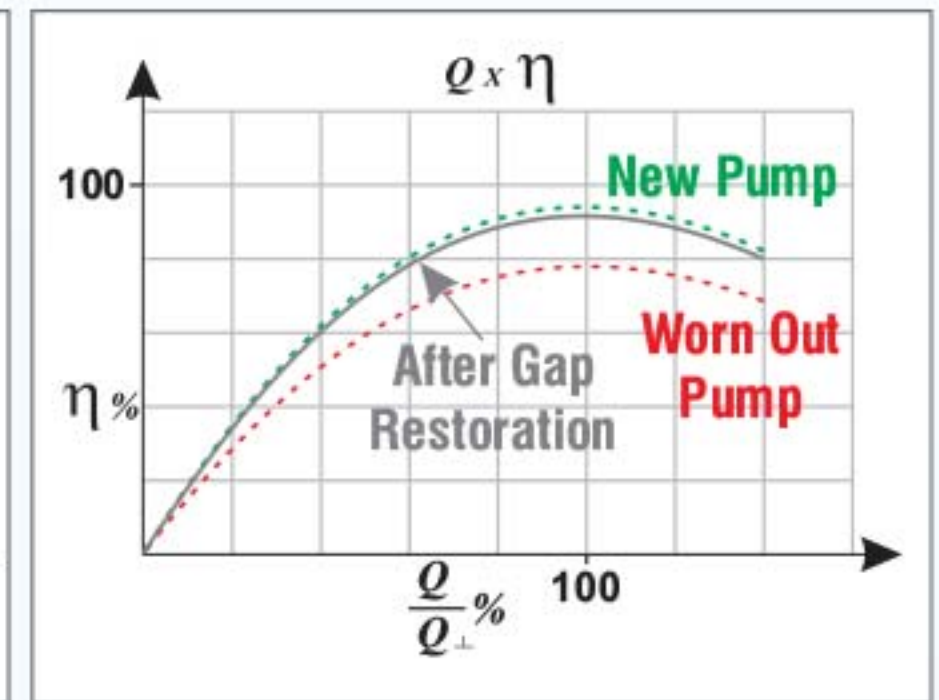
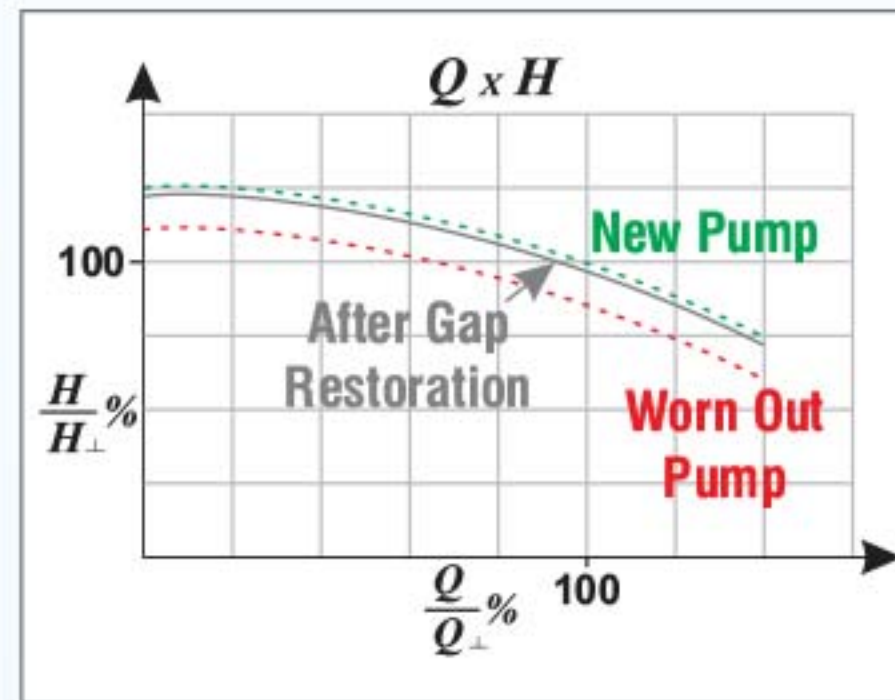
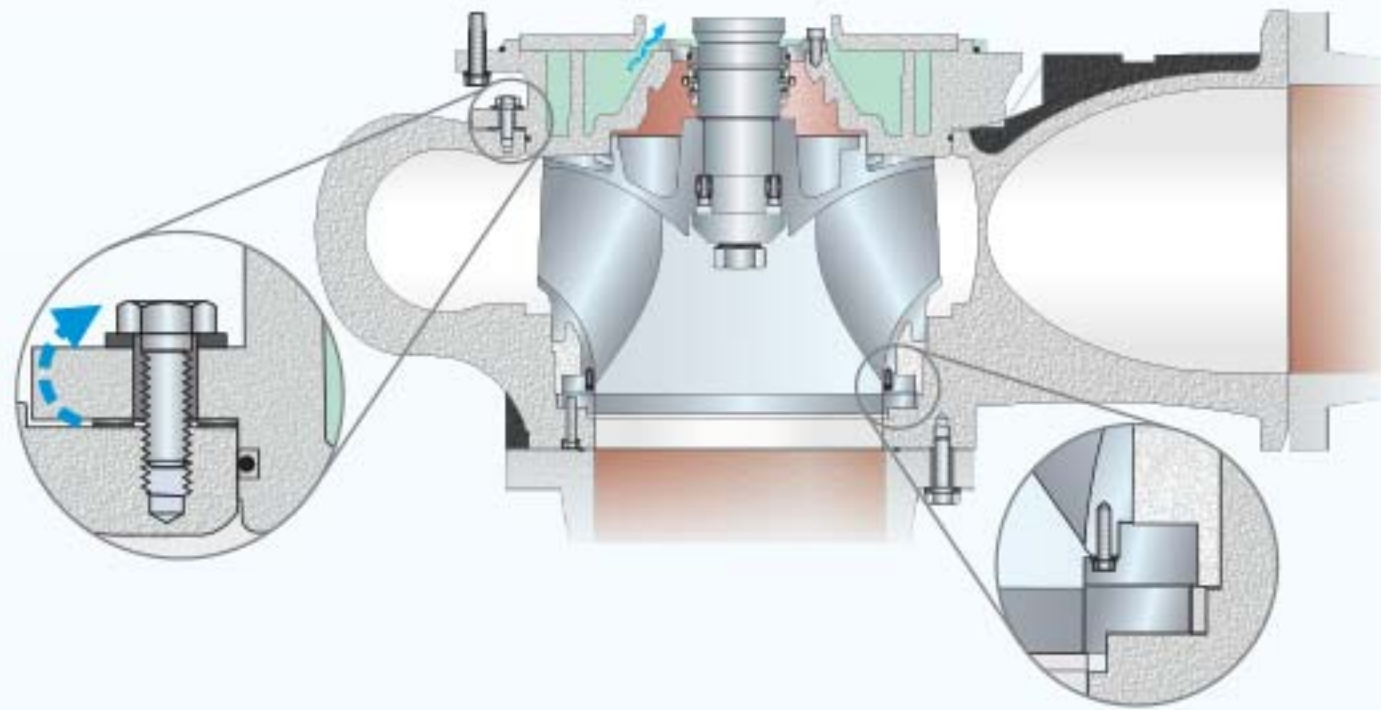
Design: Pump End



Smart Set Hydraulics : For Restoration of Efficiency

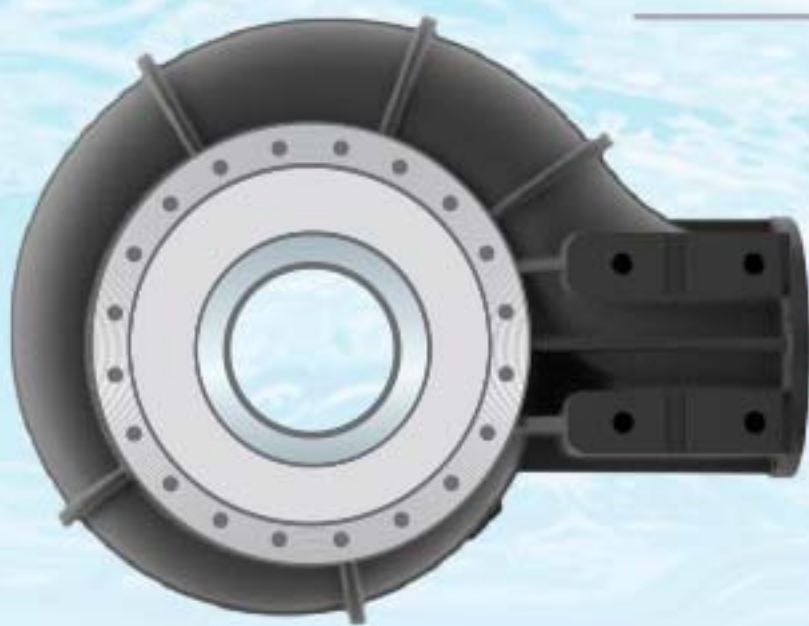
Sustenance of Pump's Efficiency is **inversely** proportional to the Leakage Gap (*between its Impeller -Casing Wearing Rings/ Faces*)

During pumping, prima facie due to Small Solid particles (*Silt, Ash, Grit, etc*) in the pumped liquid; the Surfaces of Wearing Rings/ Faces **erode** & unfortunately **enlarge** this Leakage Gap (*causing an unavoidable drop of efficiency*) - to **restore** the pump's efficiency, this (*increased*) Gap needs to be **decreased** (*as near as possible back to original levels*)



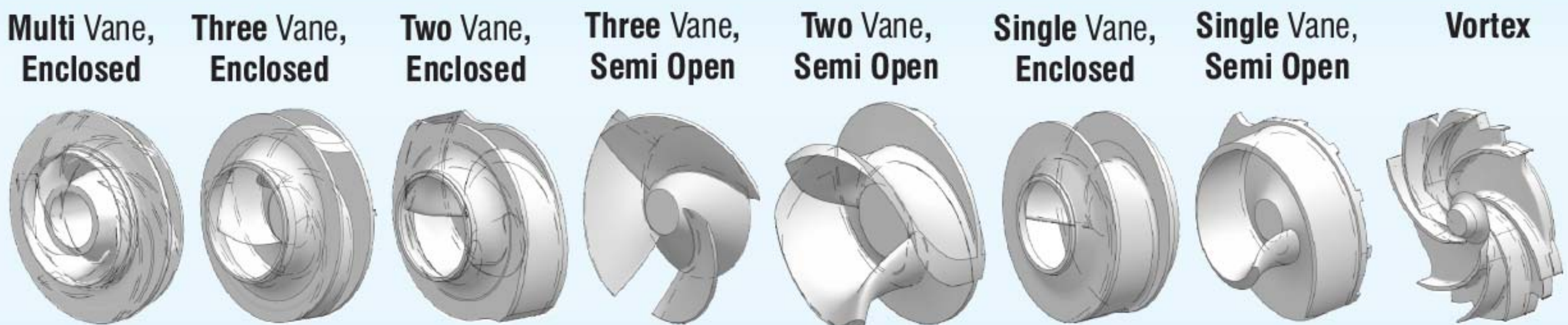
In competing pump's designs, the Geometry of this Wearing Ring / Face Gap is **Cylindrical** which forces the Customer to **buy new Spare** Wearing Rings - replacing Wearing Rings is a Costly & Time Consuming affair.

However, as a part of our Least Life Cycle Cost designs (*considering increased erosion due to excessive Silt, Ash & Grit in Indian conditions*); Aqua has designed an **Axial** Geometry (*for its Wearing Rings/ Faces*) which enables Restoration of the Leakage Gap without the need of Spare Wearing Rings & within minutes (*by simply changing over position of the Packing Washers*) - i.e. at **Zero Cost**



Pump Casing is of End Suction **Volute** type & Impeller is mounted **directly** on to the Extended Shaft of the motor hence **eliminating alignment & vibration problems**.

A wide variety of Impellers for optimal Efficiency & Non Clogging performance in every type of liquid



Improving Efficiency



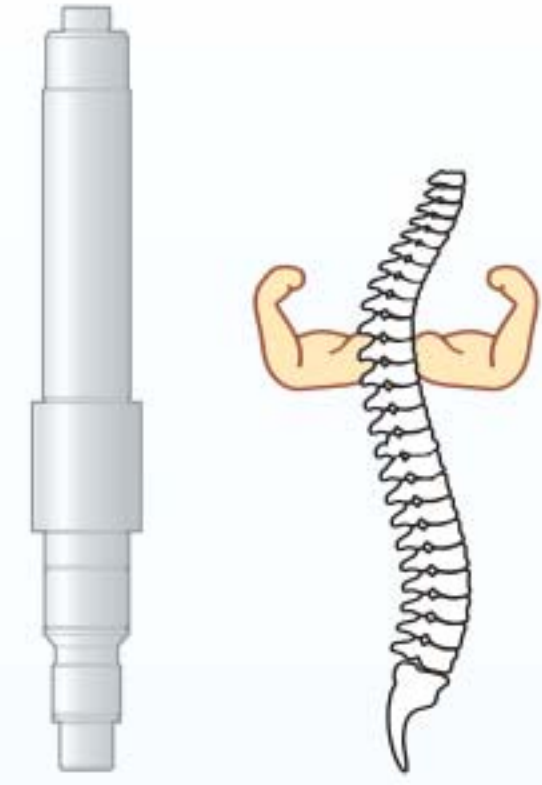
Improving Non Clogging Reliability



Design : Shaft

Pump Clogging though un-desirable, is often unavoidable, It causes severe Stress on Shaft. To tackle this problem, Aqua's Pumpsets are built with an **Oversized** Stainless Steel **Shaft** & designed **without** Any **Sleeves** (*below the Mechanical Seals*) thereby **Eliminating shaft failures, Reducing Maintenance** & the eliminating need of **Spare Parts** for **15years**.

OverSized Mono Shaft for Fail Safe Operation



Design : Bearings

All **Thrusts** are absorbed by **Grease Lubricated Anti Friction Bearings** located deep inside the motor.

Superb Bearing Life
thanks to Heavy Duty Designs (upto Triplex arrangements are offered)



Premium, **Ultra Long Life; Synthetic Grease** ensures a Typical Re-Greasing Interval of **5** years.



Design : Seals

Shaft Sealing is by means of **Two**, Independent, high quality Bi-Directional; **Mechanical Seals** (& the Primary seal is always of **Silicon Carbide** faces to withstand Erosion incase of increased silt & grit content in sewage/ water) hence there is Zero Leakage of water/ septic sewage into the Dry Well from the Shaft Gland.



Seals have **L10H** life in excess of **50,000** hours &/or **5** years.



Design : InBuilt Monitoring Systems

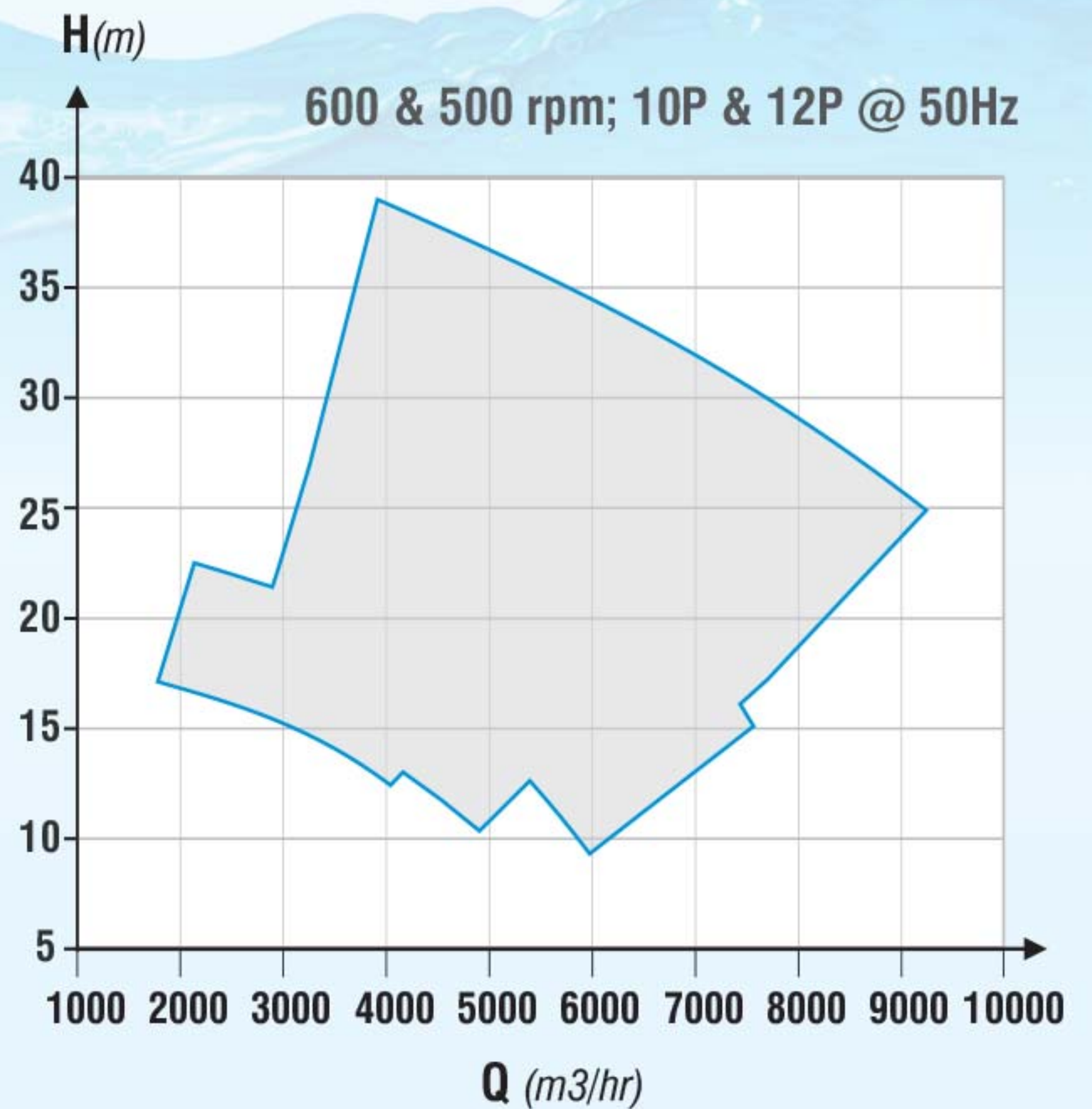
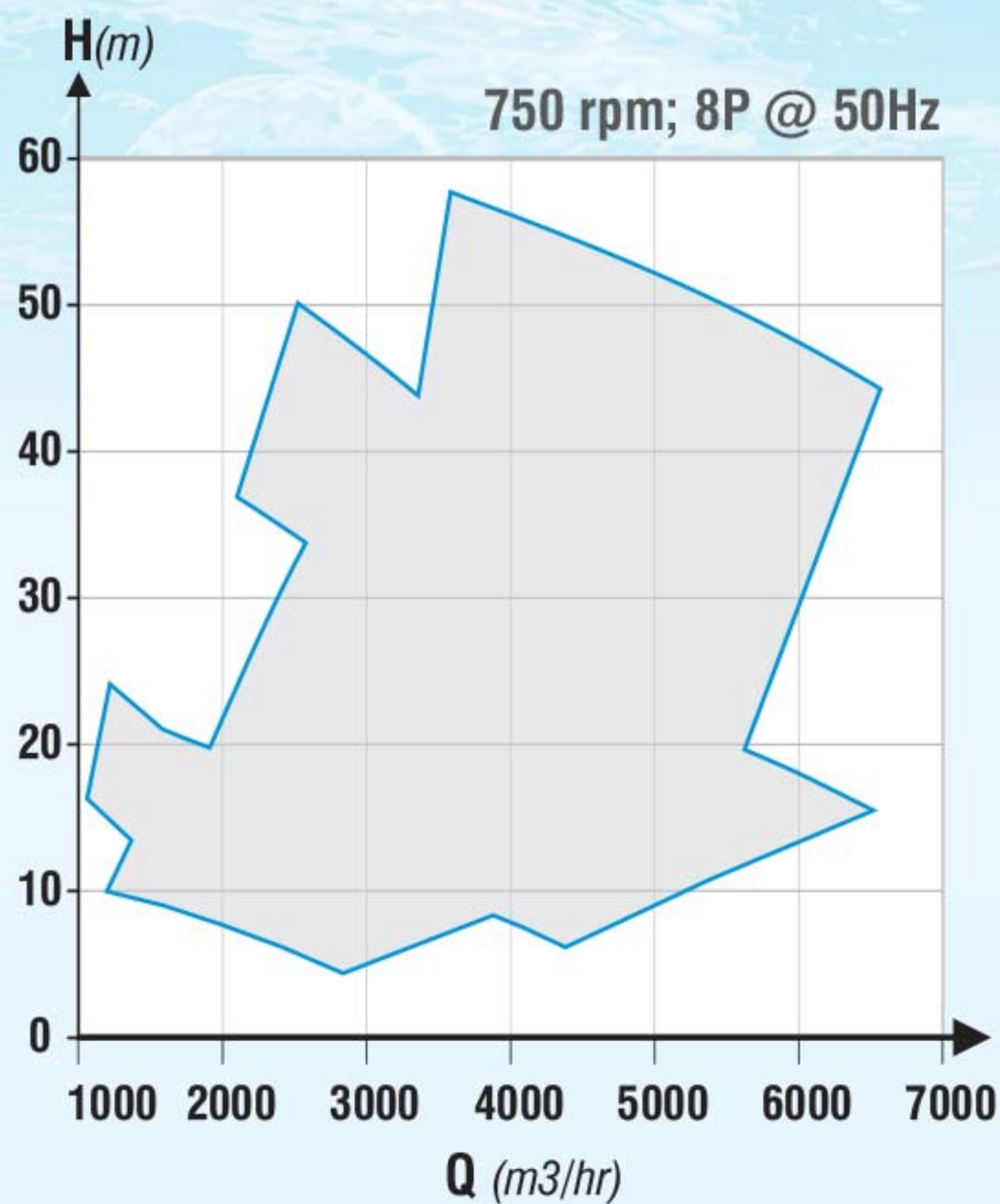
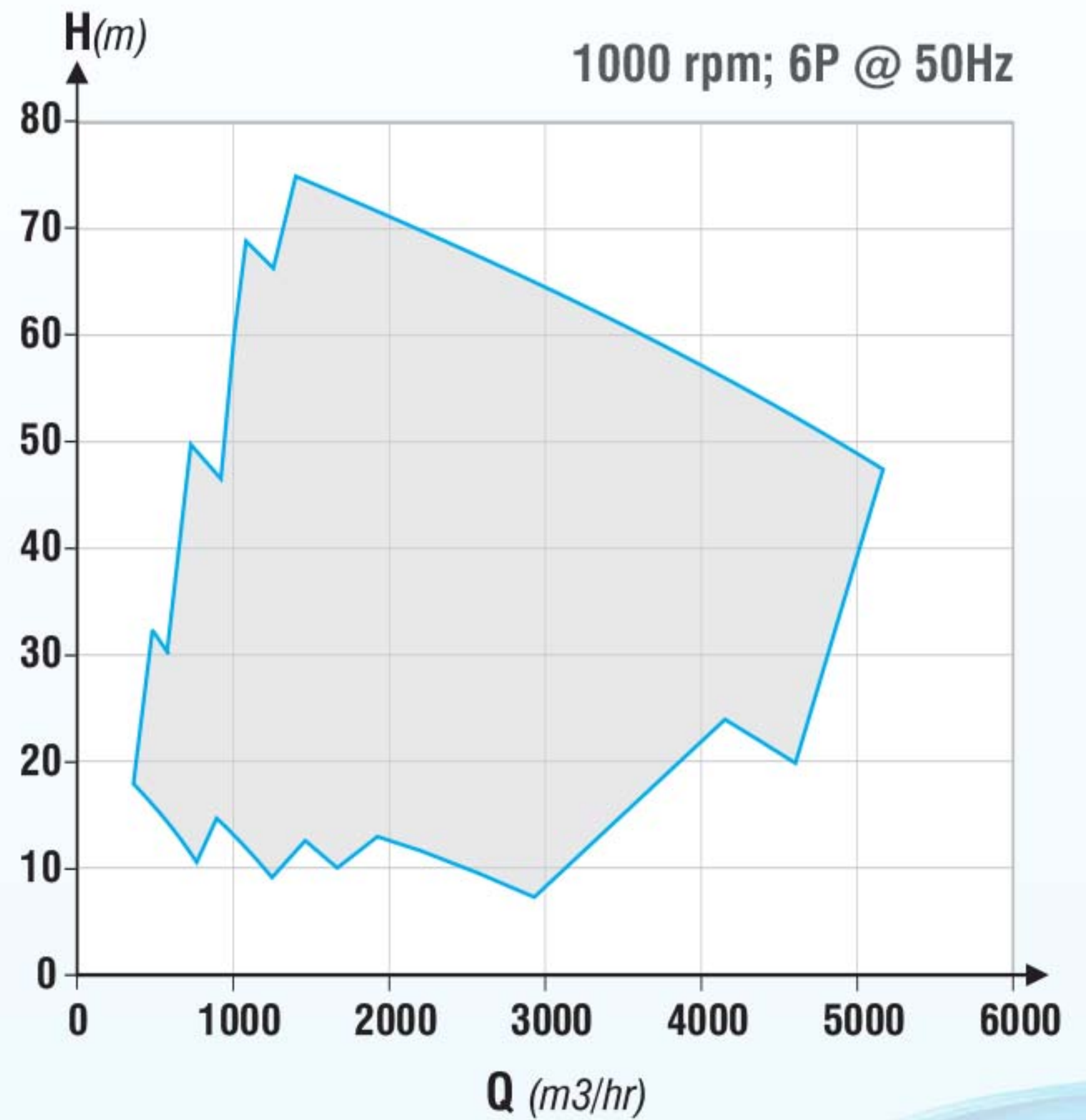
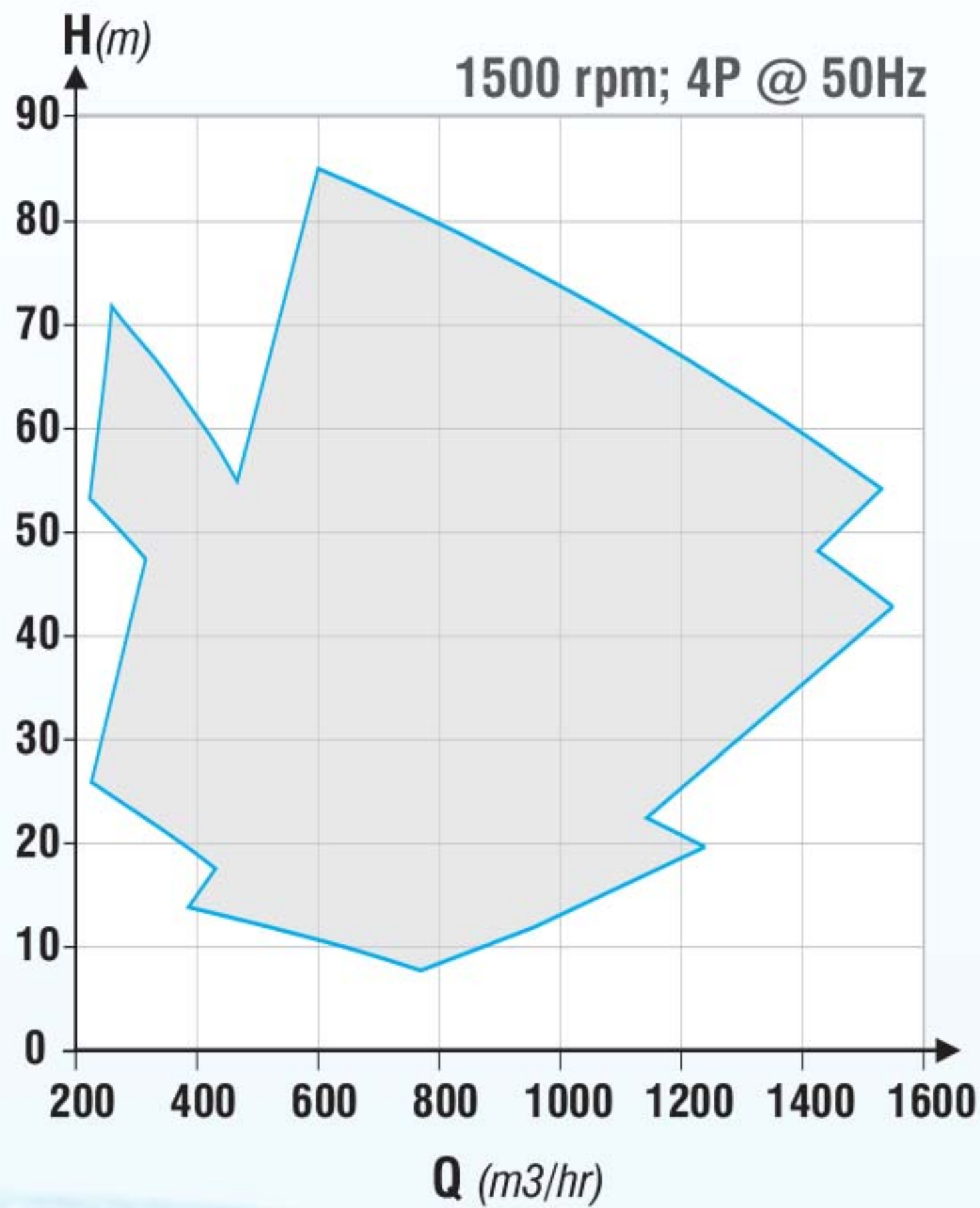


Simple, Uncomplicated yet Effective

- **SSLD** detects Pressurized Water Leakage from Mechanical Seals.
- **CCWLD** detects Accidental Water Leakage from Cable Sheath's Cuts &/or Nicks into the Motor.
- **SBWLD** detects Accidental Water Leakage in to Motor's Stator Chamber.
- **BTDs** in the form of Bi-metallic Switches (*for All Pumpsets*) & **RTD's** (PT100 - 3 Wire Simplex type - from Size > 150kW) to monitor Bearing Temperature (*without any Additional Cost*)[#].
- **WTDs** in the form of Bi-metallic Switches (*for All Pumpsets*) & **RTD's** (PT100 - 3 Wire Simplex type - 1 per each Phase - from Size > 150kW) to monitor Winding Temperature (*without any Additional Cost*)[#].

[#]requires additional communication hardware

Typical Performance Range



Standard Technical Specifications

Pump	Discharge Sizes	DN 250 to 800mm
	Flow Rate	Upto 9,500 m ³ /hr
	Head	Up to 85m
Motor	Ratings	22.5kW to 1000 kW
	Speeds	1500, 1000, 750, 600 & 500rpm (<i>synchronous</i>)
	Duty & Enclosure	S1 & Exceeding IP 68
	Supply Options	3Ø; 415V, 3300V, 6600V, 11000V
Intelligent InBuilt Monitoring	Secondary Seal Leakage Monitoring (SSLD)	By built in Detection System
	Cable Connection Chamber Water Leakage Detector (CCWLD)	Typically Available from size 200kW* & above
	Winding Temp Detector (WTD)	Available by default by Bimetallic Switches in each phase (PT100 optionally available for sizes 150kW & above)
	Drive End Bearing Temperature Detector (BTD) (DE)	Available by default by Bimetallic Switches from size 22 kW & above (PT100 optionally available for sizes 150kW & above)
	Non Drive End Bearing Temperature Detector (BTD) (NDE)	Available by default by Bimetallic Switches from size 22 kW & above (PT100 optionally available for sizes 150kW & above)
	Stator Chamber Water Leakage Detector (SBWLD)	Available from size 45 kW & above

Material of Construction (MoC)

	Option 1	Option 2
Pump Volute Casing	Grey Cast Iron, Ductile CI, NiResist, NiAL Bronze (NAB)	CF8, CF8M, CD4MCu
Impeller / Propeller	CF8, CF8M	CD4MCu
Motor Casing, Cable, Terminal Chamber	Grey Cast Iron	CF8, CF8M, CD4MCu
Oil Chamber	Grey Cast Iron, Ductile CI	CF8, CF8M, CD4MCu
Shaft	Stainless Steel (SS401 / SS431)	
Fasteners	Stainless Steel (A2 - SS304)	Stainless Steel (A4 - SS316)
Jacket Cell	Stainless Steel (SS304)	Stainless Steel (SS316)
Elastomers	Nitrile	Viton
Mechanical Shaft Seals	Primary (Pump Side)	Silicon Carbide v/s Silicon Carbide
	Secondary (Motor Side)	Cast Chrome Moly Steel v/s Resin Impregnated Carbon
Wearing Ring / Plate (Casing)	Stainless Steel	
Motor Squirrel Cage Rotor Bars	Aluminum bar	Copper bar
Cables	PVC insulated, Copper Cored	ERPS insulated, Copper Cored
Oil	Eco friendly Paraffin White Oil ISO VG 20 or 30	
Portable Stand / Sole Plate	MS Fabricated	

Vertical Installation



Horizontal Installation





Globally Un-Matched Range

(of Sub pumps)

upto 25,000m³/hr, 450m, 3,350hp,
11KV & DN 2100mm

World's 2nd Largest Plant

(dedicated to Sub pumps)

in terms of Area & Capacity

The Largest & Fastest Growing

(of Sub pumps)

Manufacturer of India...

Field Proven Installations

(of Sub pumps)

upto 12,240m³/hr, 1,400hp

A Pan India Support set up



Global Technologies...

...Locally Sustainable Pumps

World's 2nd Largest Plant (for submersibles)

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