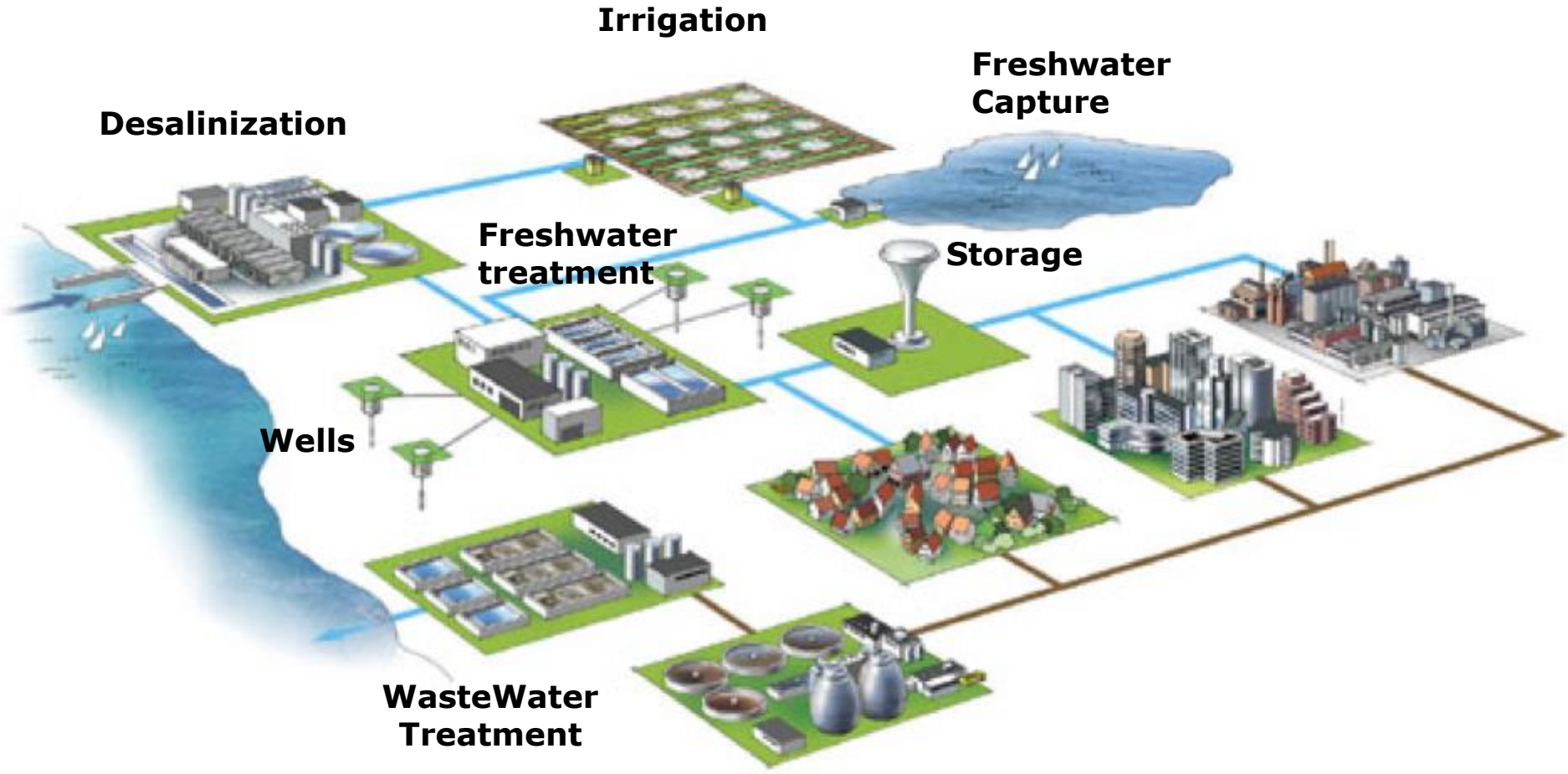
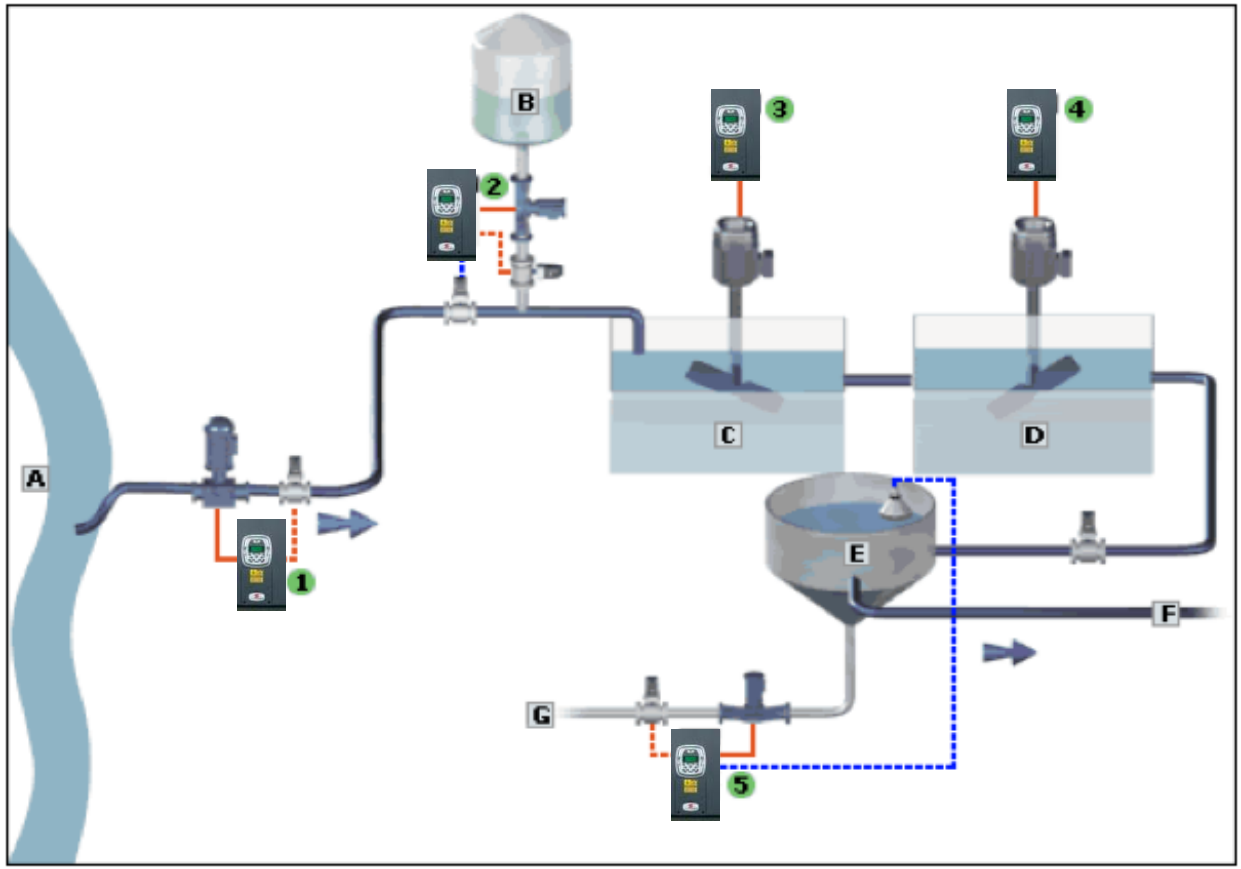
SANTERNO
CARRARO GROUP

Water/Wastewater and Irrigation

Water Treatment



Freshwater Capture



A – River/lake

B – Chemical Dosing

C – Rapid mixing Tank

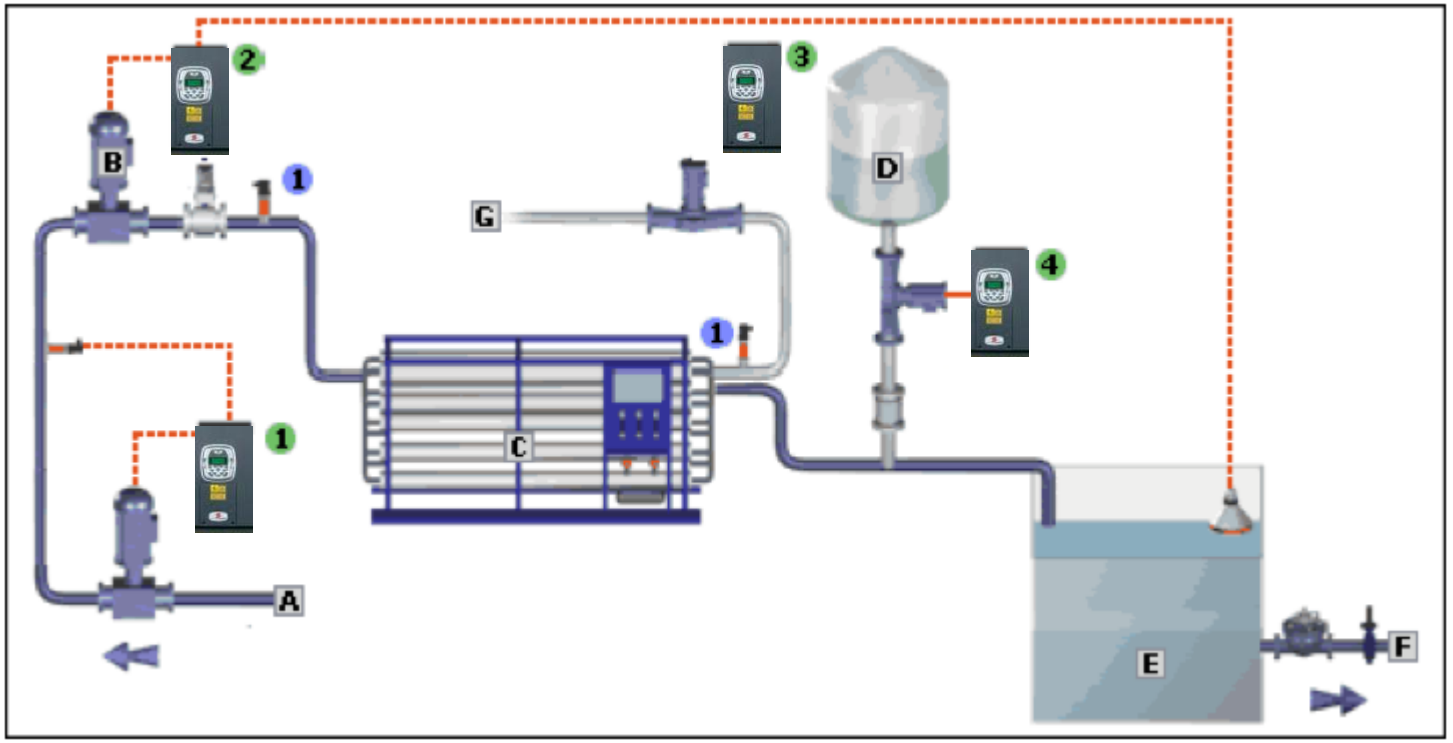
D – Floculation Tank

E – Sand Separation

F – to the secondary treatment

G – To the sewer

Desalinization of Sea Water
With Reverse Osmosis



A – Water coming from the sea

B – Booster

C – Reverse Osmosis

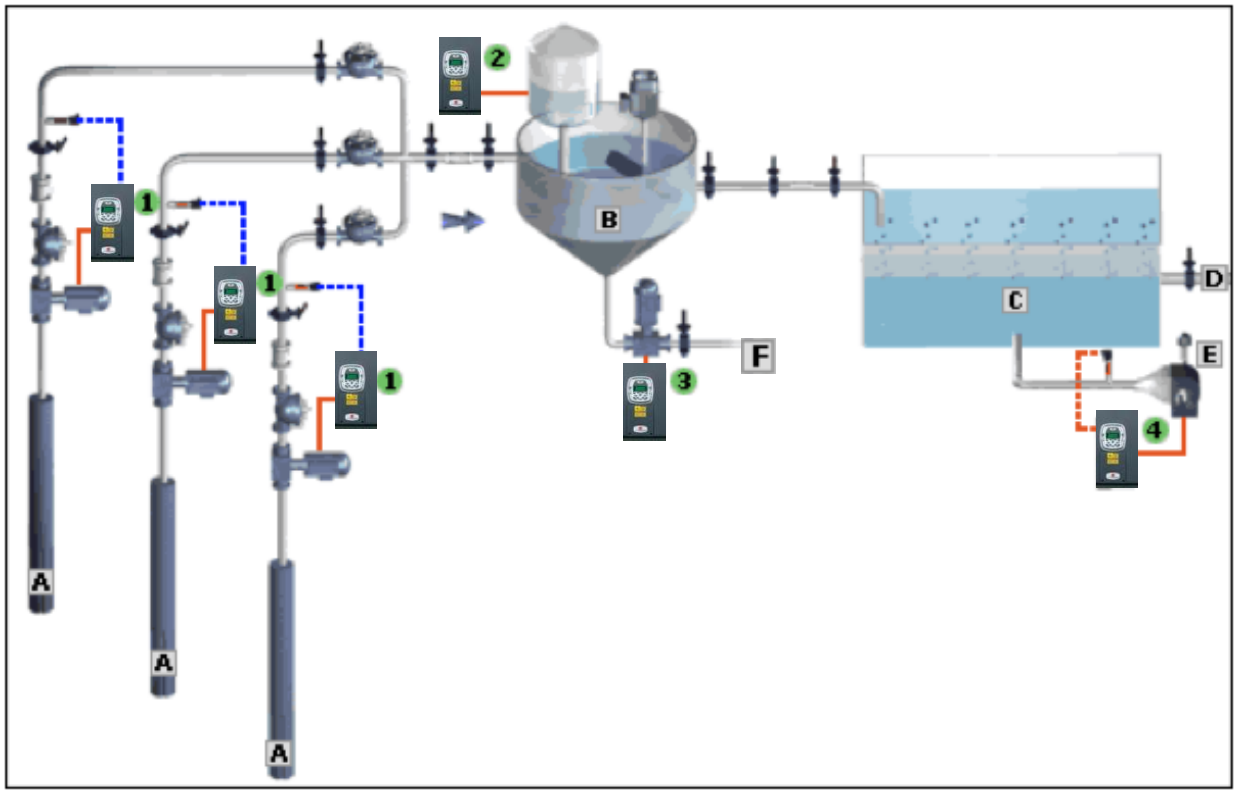
D – Chlorine Dosage

E – Water Storage

F – Distribution

G – Water With Salt

Ground Water Abstraction
First Step



A – Pump

B - Clarifier

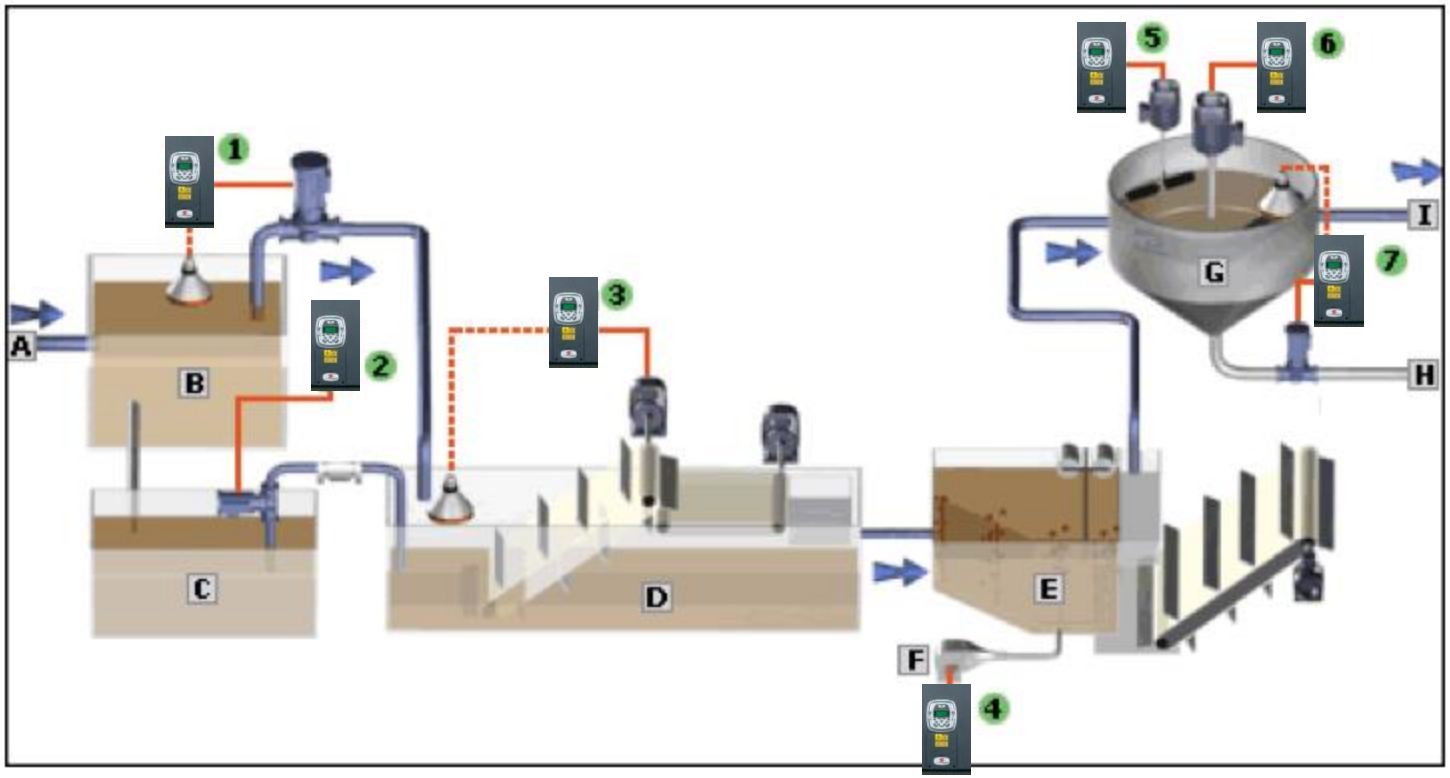
C – Aeration

D – To the next step

E –Blower

F – To the sewer

Wastewater Treatment



A – From the Sewer

B – Elevation

C – Auxialiary Tank

D – Removal of sand

E – Removal of sand and grease

F – Aeration

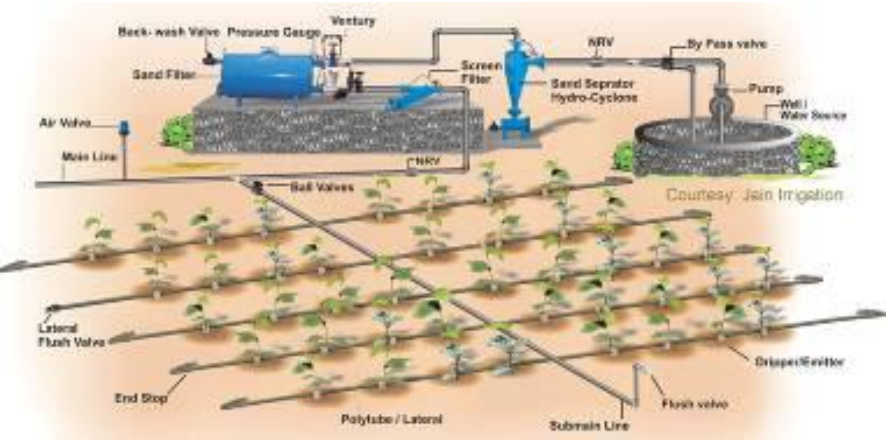
G – Sludge Separation

H – Sludge

G – To the second step

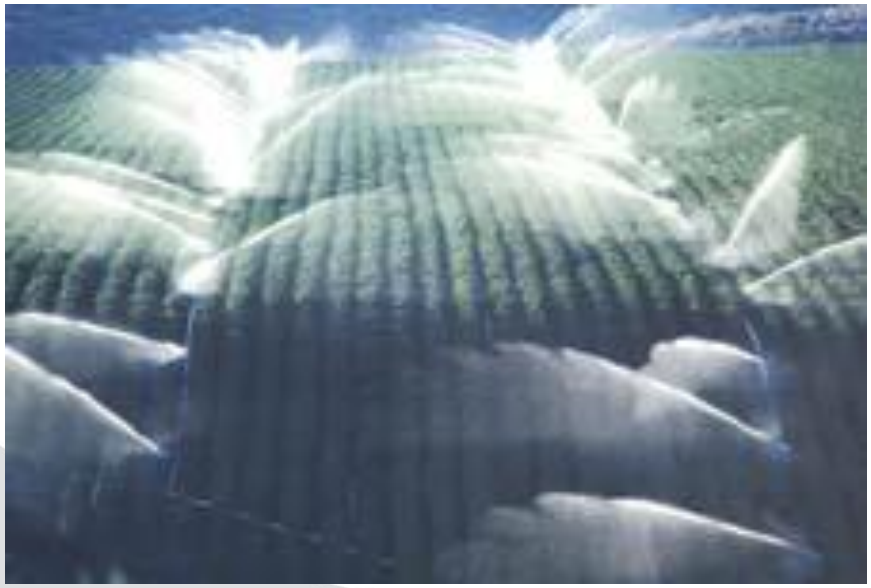
Irrigation

- 45% of irrigation water supply is for food production (Source: WWF)
- In 2011 world water consuming was 9,087 billion cubic meters
  - Water spent for Irrigation 7270 billion cubic meters → 80%
  - Water spent for Population 1817 billion cubic meters → 9%



Irrigation for Drip/Trickle

- Drip or Trickle irrigation supplies water directly onto or below the soil surface.
- Very efficient way of irrigation
- Mainly used in small areas and parks
- Low pressure system



Irrigation with Sprinkler

- Fixed Installation
- High Pressure System
- Rotoring head sprinkler distributes water
- High level of evaporation
- Wind sensible system

Mobile Sprinkler

- Mobile system
- High pressure system
- Used in small areas for sports and parks.
- The system can have a length of 750 mt. but can be also longest
- High level of evaporization
- Wind sensible system

Irrigation with center pivot

- System used to cover big areas
- Fixed Installation, the irrigation arm moves itself in circle around the center pivot
- Diameters up to 1 km
- Relatively low level of evaporization, sprinklers are mounted as close as possible to the vegetation.

Surface Flood Irrigation

- Very common
- Simple
- Tipycal for rice

Advantages
Rice cultivation

- 1º Produced flow is exactly the needed flow for the consuption
- 2º For those specific cases where the pump works to extract water with flow variation, there is a risk of the pump cavitate.
- 3º The motor current does not suffer peak in the match, ie, rises slowly and gradually (0A to rated current of the motor plate);
- 4º Nos 1° levantes de rio, toda vez que houver uma variação de nível, possibilita que a rotação do motor seja diminuída, causando com isso uma economia de consumo proporcional e tempos de parada para troca do sistema mecânico de polias;

Adavnages
Rice cultivation

- 6º In dams, irrigation equipment, are sized to provide the desired flow when it reaches the minimum level, so the rotation and consumption can be reduced up to about half the length of Irrigation;

- 7º Due to weather conditions, it's hard to plant the entire area of the crop in the same period, consequently, with the drive, it is not necessary to start irrigation with maximum power equipment this is useful to avoid wasting water and energy;

- 8º When, the end of irrigation, the same situation occurs because often part of the crop has been harvested, it is not necessary the equipment working at full load;

- 9° The majority of farmers, use more of a variety of rice seed on the same with different cycle range: long (± 110 days of irrigation) and short cycle range (± 90 days irrigation). They start irrigation in the same moment for any kind of rice. This means that the ent of it wil be in different time, the use of inverter reduces the consumption of energy and water at the end of irrigation period;

Advantages
Rice Cultivation

- 10º After the first irrigation, water consumption decreases because the soil is already wet;
- 11° Easy correction of power factor.
- 12° Increase durability of the system (piping, pump and motor), because there are no unexpected starts and stops;
- 13° There is no limit on the number of starts that can be made every hour.

Extraction level names:
1st water extraction level
01 200CV motor
01 20MNI Worthington pump
Current: 280A
Voltage: 430V

Extraction level names :
1st water extraction level
01 200CV motor
01 20MNI pump
Current: 270A

Contolled flow of water
Using Drive

Irrigated field
Per gravidity (water filling)

Details: Rice cultivation

Installations

Centrifugl Pumps

Power (kW) varies in cube of speeds variation (RPMs) !

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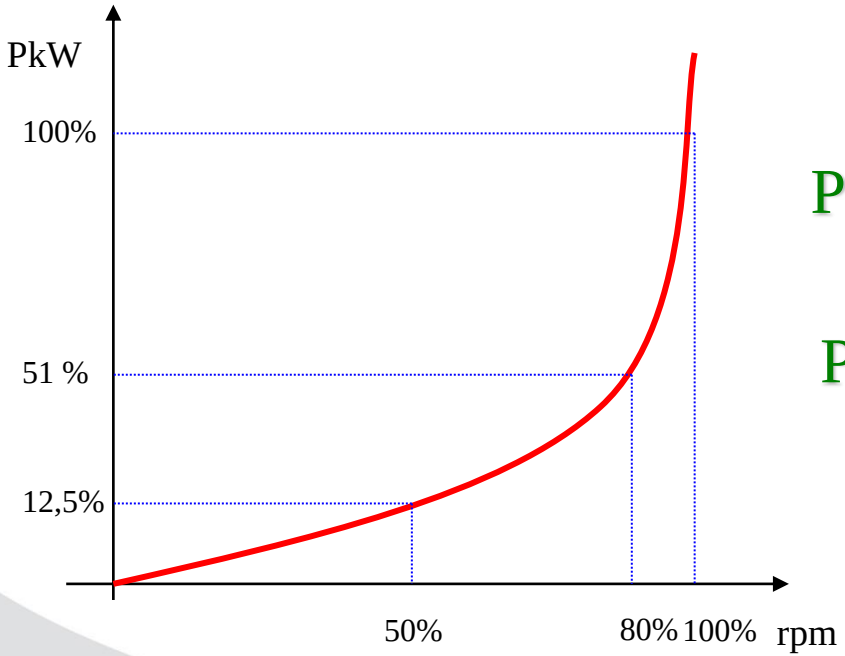
Speed: 1.415RPM
Current: 214A
*Quadratic Torque



$$P2 = \left(\frac{n2}{n1}\right)^3 * P1$$

$$P2 = 1 - \left(\frac{1.415}{1.800}\right)^3 = 0{,}515$$

51,5%
Energy Saving