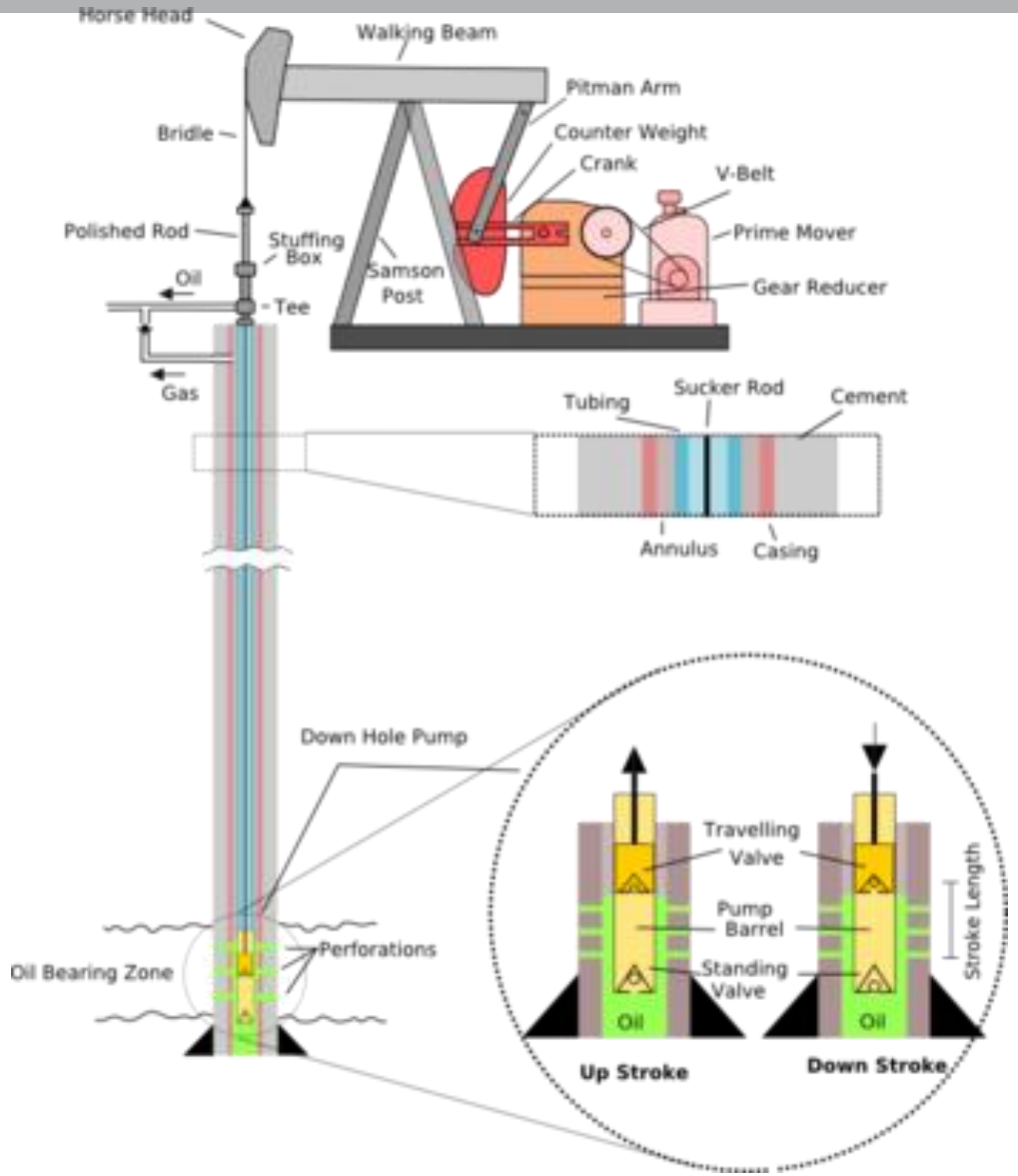
SINUS PENTA Application
OIL Artificial Lift
Pump Jacks

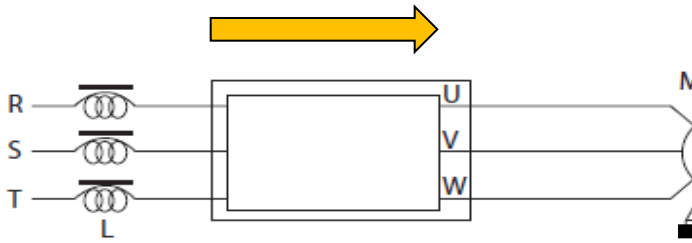
OIL Pump Jack



Other names:

- **nodding donkey**,
- **pumping unit**,
- **horsehead pump**,
- **rocking horse**,
- **beam pump**,
- **dinosaur**,
- **sucker rod pump (SRP)**,
- **grasshopper pump**,
- **thirsty bird**,
- **jack pump**,
- **popping johnny**

SINUS PENTA with input reactors



WIKIPEDIA:

A Pump Jack is the overground drive for a reciprocating piston pump in an oil well.
It is used to mechanically lift liquid out of the well if there is not enough bottom hole pressure for the liquid to flow all the way to the surface.
The arrangement is commonly used for onshore wells producing little oil. Pumpjacks are common in oil-rich areas.
Depending on the size of the pump, it generally produces 5 to 40 litres of liquid at each stroke. Often this is an emulsion of crude oil and water.
Pump size is also determined by the depth and weight of the oil to remove, with deeper extraction requiring more power to move the heavier lengths of sucker rods.

Pump Jack video

Oil Field with SINUS PENTA | RUSSIA

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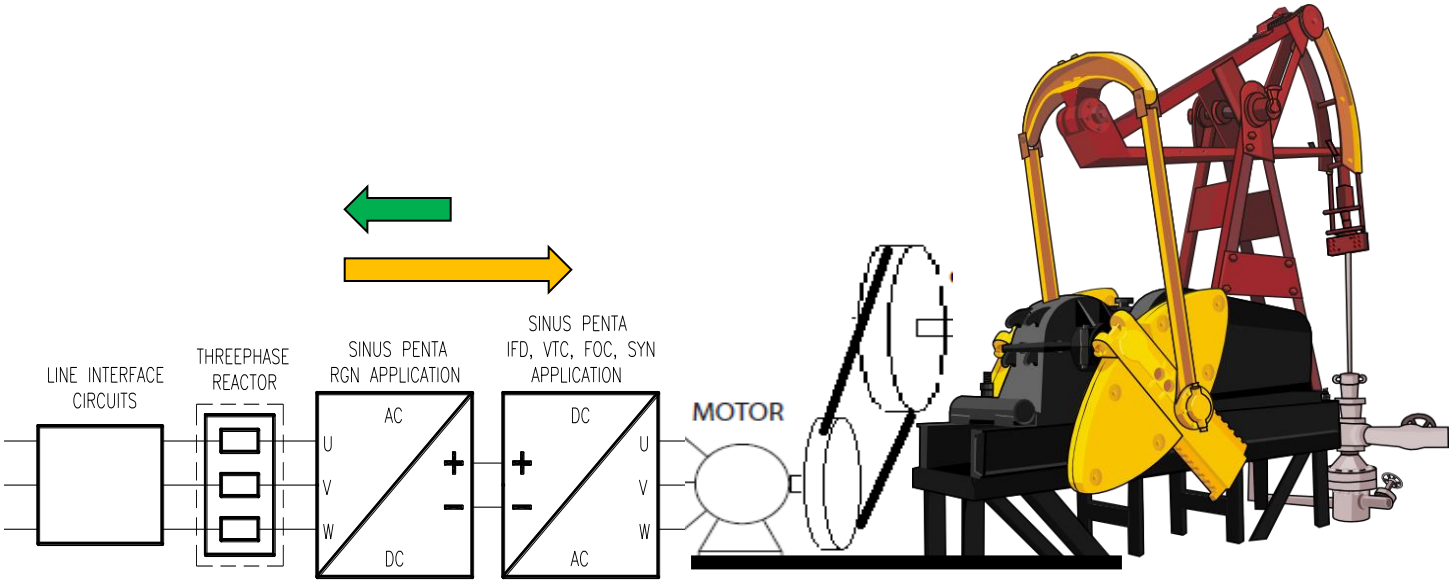

15% up to 22% energy saving

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Pump Jack: CCW Inc.

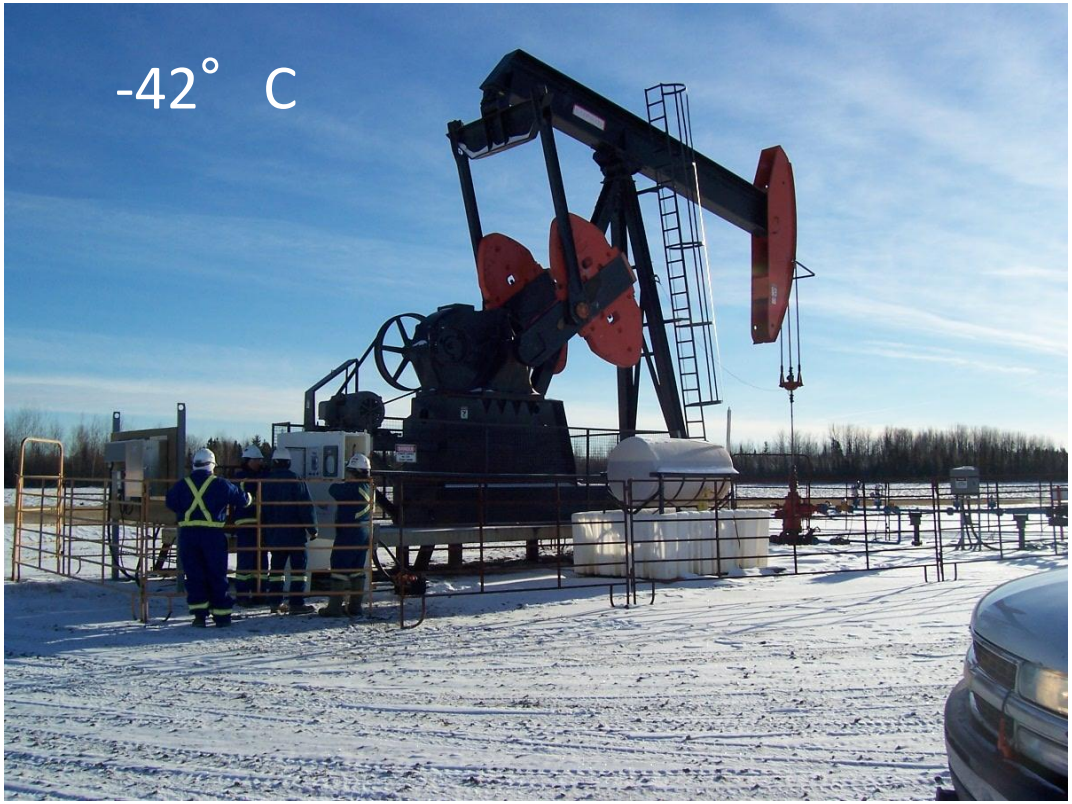
Pump Jacks: Our Partner

CCW Inc. is a manufacturer and supplier of high-quality, custom-designed energy efficiency systems for the oil and gas industry.

The Enersaver:

David Gray former President of CCW

Pump Jack: CCW Inc.



"I remember this day very well it was -42° C… a very cold installation day The site is in Northern Alberta approximately 350 km north of Edmonton.
This specific system has ran Perfect for the past 42 months !"

Michael Lesanko
VP of Products - CCW

Pump Jacks

Project: Overview

Santerno Products:
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3 cabinet 125HP,
1 cabinet 100HP
1 cabinet 75HP

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Oil Field | California - USA

Project: Overview

These systems enable up to 22% energy saving.
A 125hp pump jack absorbs approx. $100k electric energy
($450k when diesel generation solutions are adopted).
Santerno inverters dramatically reduce those costs.
Payback is no longer than 2 years for grid-tied solutions, but diesel generator solutions provide instant payback..

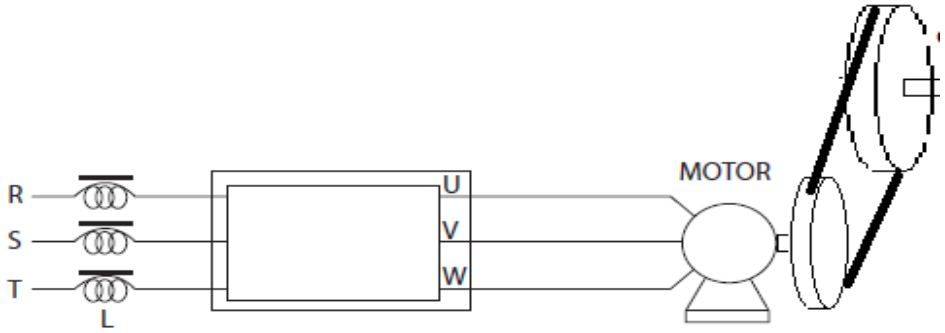
Oil Field with SINUS PENTA AFE Cabinet
California - USA

Protections against Overvoltage

In a system **without AFE** (direct connection to the grid) Sinus Penta operates internal algorithms to protects against possible Overvoltages coming from the mechanical energy regenerated during the braking half of the working cycle:

VTC and **FOC** Controls: Torque Limit

IFD Control: Frequency Increase



Torque Limit Due to Overvoltage

VTC and **FOC** controls: a special functionality is available, allowing reducing the resisting torque due to DC-bus voltage increase, in order to prevent the Overvoltage alarm from tripping.
A PI regulator is implemented to keep DC voltage below a preset threshold, thus limiting the maximum value of the resisting torque.
In **FOC** control, this function is enabled only if **C210**=0.
The regulator may be adjusted in **VTC** control only. Parameters **C213a** and **C213b** are the regulator's proportional gain and integral gain respectively. Parameter **C213c** sets the voltage threshold, that equals:
Vth = **C213c** * Vunlock /100
where Vunlock depends on the drive voltage class and is typically higher than the voltage threshold activating the braking resistor.
Parameter **C213d** enables reducing the rotor flux when the regulator activates, thus further limiting the DC voltage increase.

CAUTION The reduction of the resisting torque generated by the function above affects the speed control when the motor accelerates due to external causes.

Frequency Increase Due to Overvoltage

IFD control: parameter **C213** causes a step increase of the output frequency to limit the DC bus voltage increase due to an abrupt change (decrease) of the motor load torque.

CAUTION The reduction of the resisting torque generated by the function above affects the speed control when the motor accelerates due to external causes.

SANTERNO
CARRARO GROUP

www.santerno.com