

# Workshop ESP's in the geothermal sector



ennatuurlijk aardwarmte



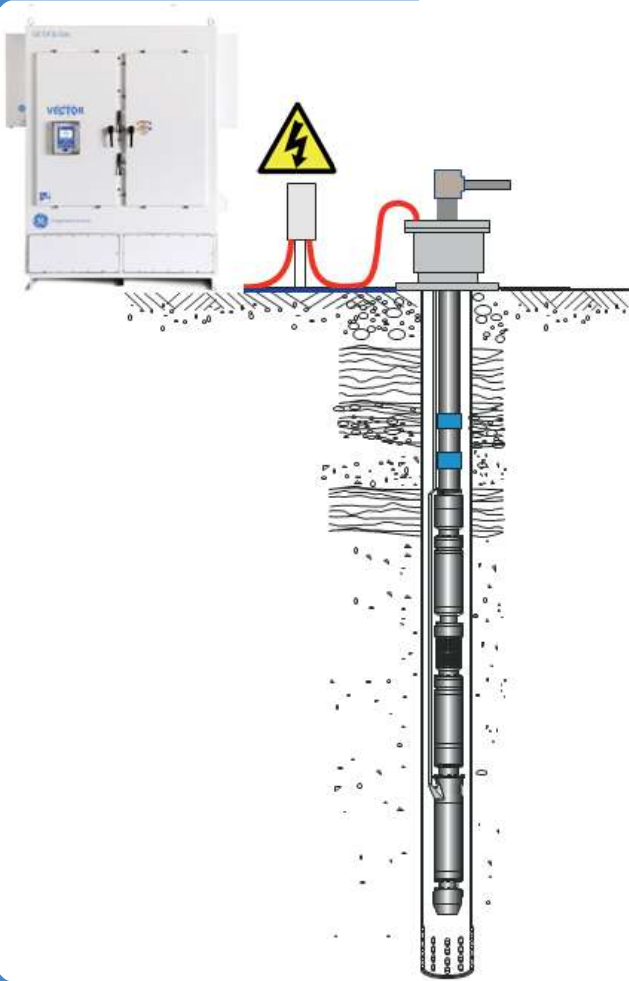
# Workshop ESP in the geothermal sector

Joost Haverman, ESP expert

## Agenda

1. Introduction
2. Share technical insights and experience
3. Discussions and challenges in the geothermal sector
4. Q&A



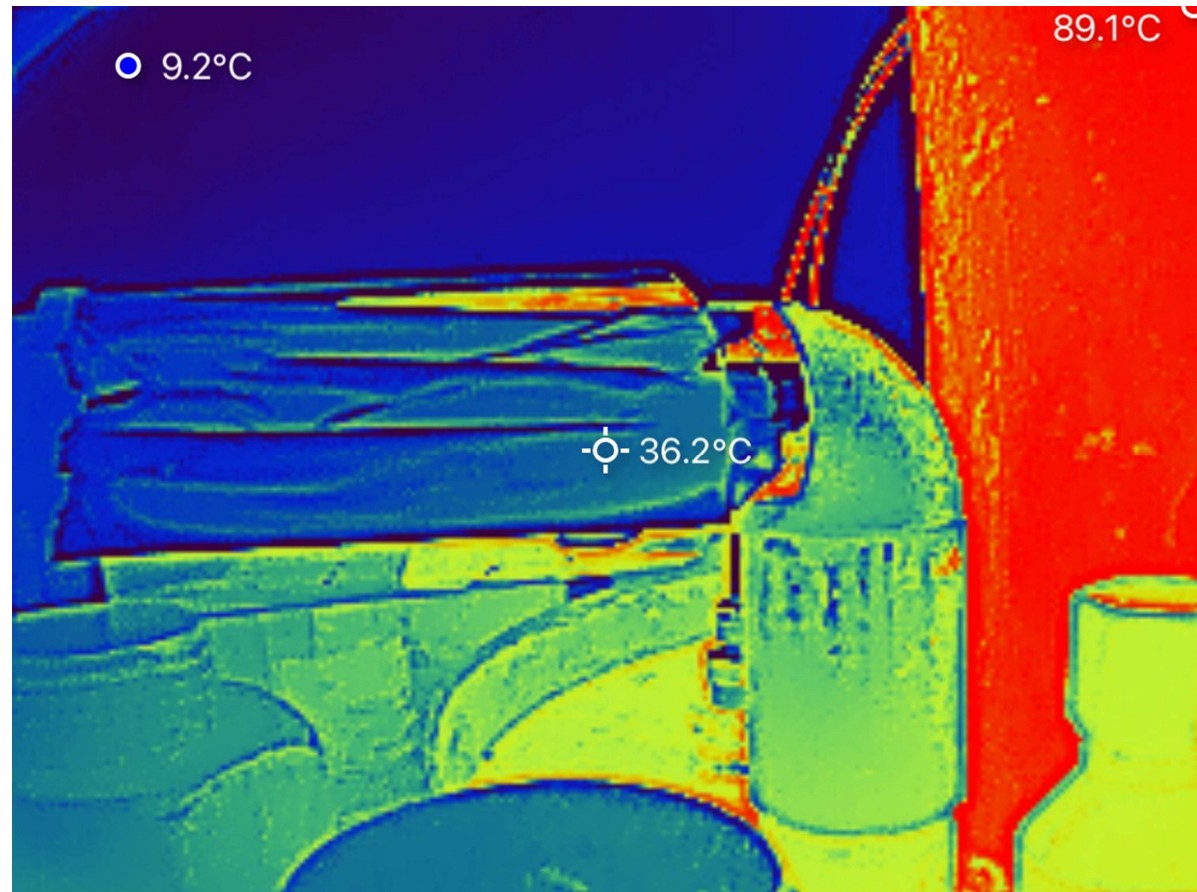


## Operating differences geothermal ESP versus oil ESP

- > • Flow cycling ( peak loading, summer/winter)
- > • Frequent thermal cycles
- > • Shallow setting depth ( lower intake pressure)
- > • Faster drawdown
- > • More start/stops
- > • Bigger size pumps
- > • Higher flowrates, high flow velocities
- > • High hydraulic/overall efficiency required
- > • Inhibitor programs challenging ( environment/cost)
- > • Geothermal operator ( new, single ESP operator, experience)
- > • Main source of revenue generator
- > • Quick replacement of failed equipment

## ESP workshop

Surface  
connector  
wellhead





## ESP workshop

### Surface connector wellhead



## ESP workshop

Any thoughts?





## ESP workshop

Rerun ESP  
units?





## ESP workshop

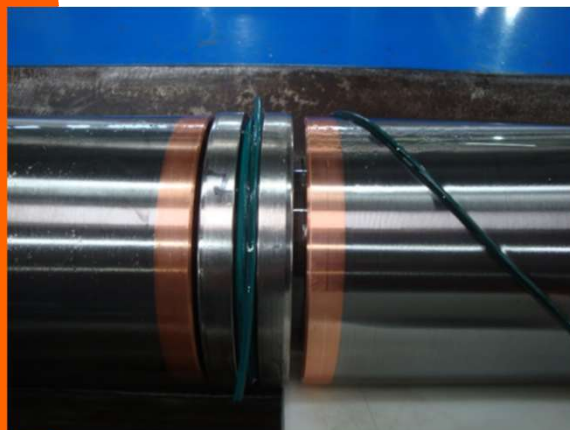
Rerun ESP  
units?





## ESP workshop

Rerun ESP  
units?



## ESP workshop

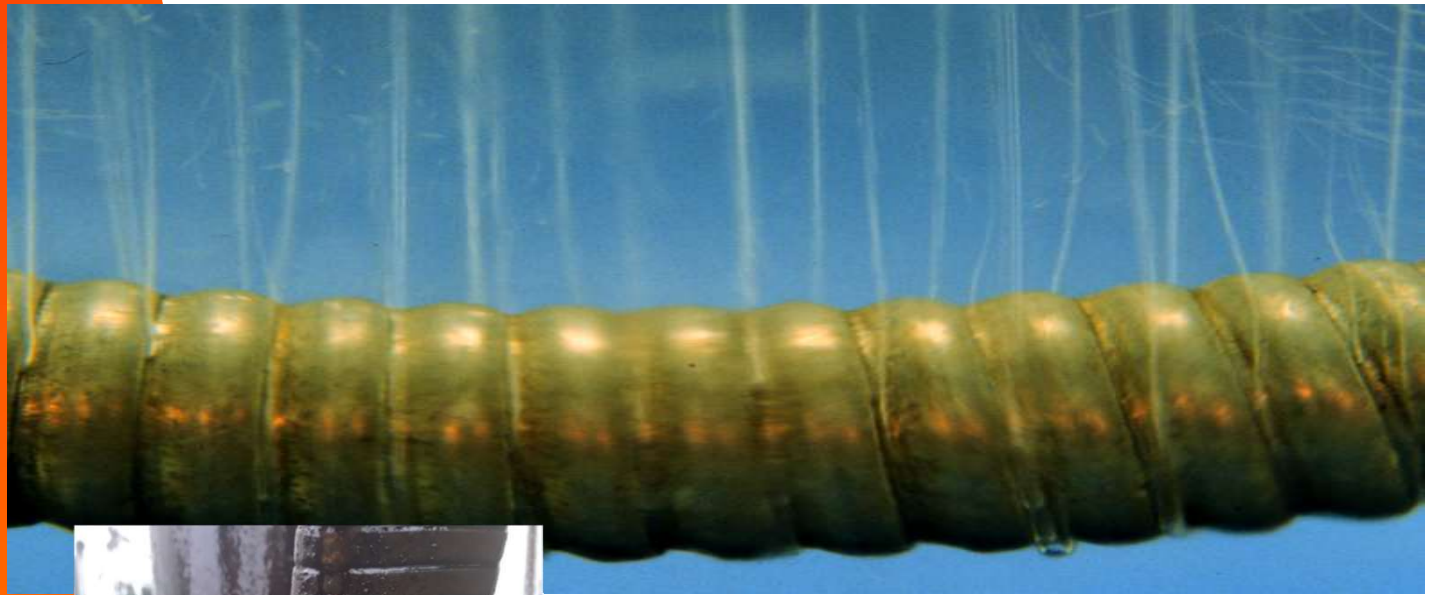
ESP centralizers  
fit for purpose  
(GRE lined, TK  
coated, 13 Cr  
casing)





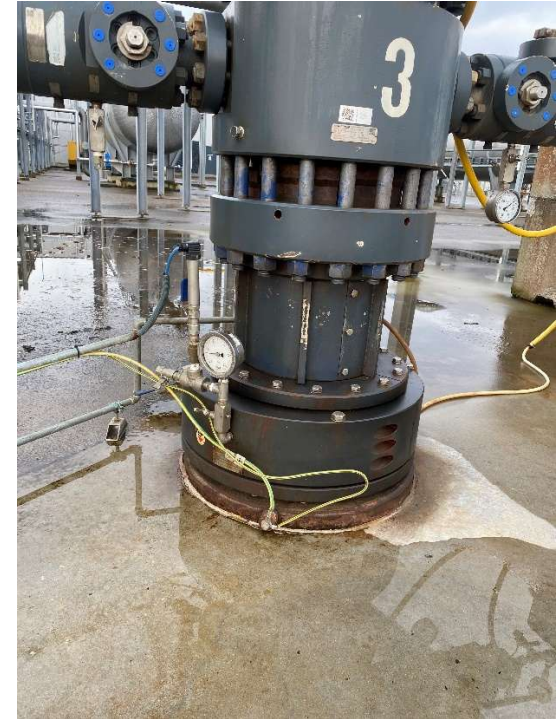
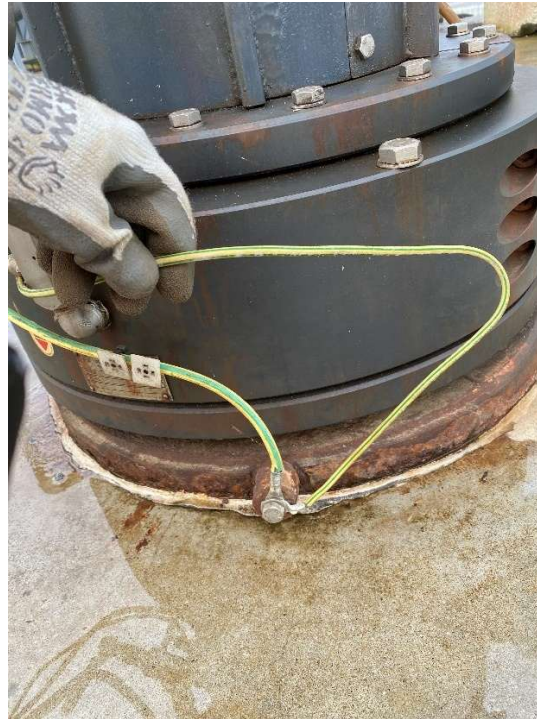
## ESP workshop

### Cable decompression



## ESP workshop

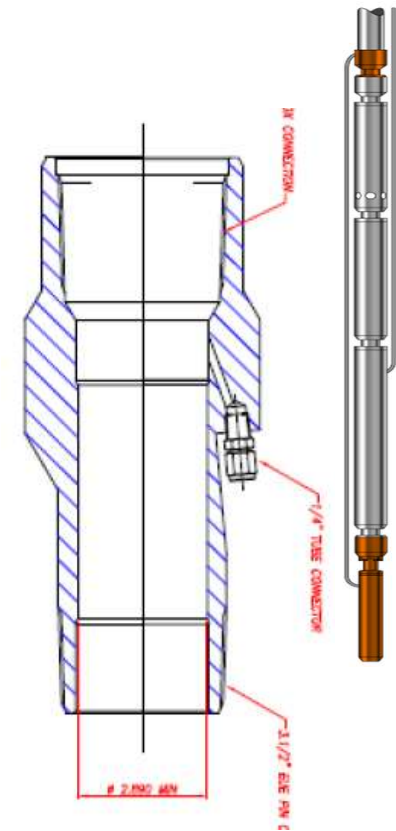
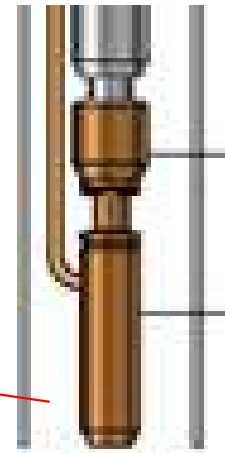
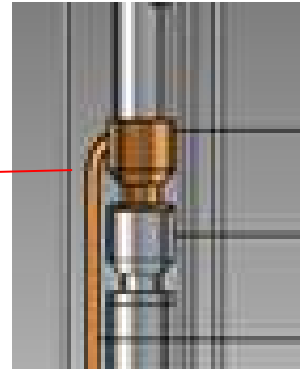
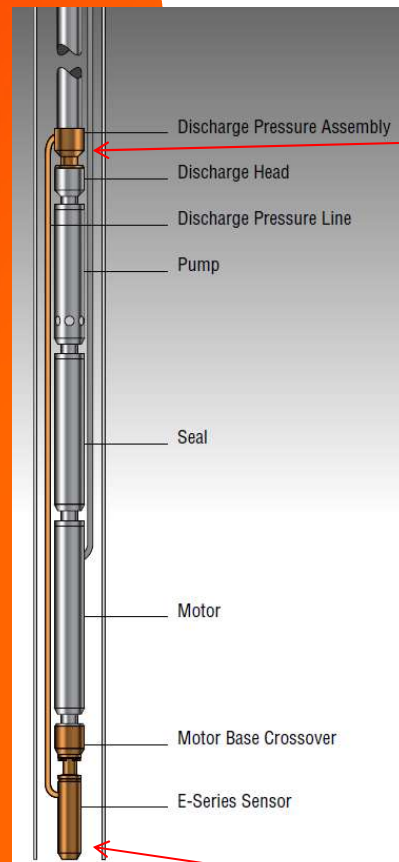
ESP sensor data  
issues  
(grounding)





## ESP workshop

ESP sensor  
Pump  
discharge data



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## ESP workshop

Drive settings  
matching with  
motor

frequency (Hz)	Measured voltage (V)	Optimal voltage ( V)*	Deviation %
50	3373	3540	-4,7%
55	3715	4020	-7,5%
58	3915	4340	-9,8%

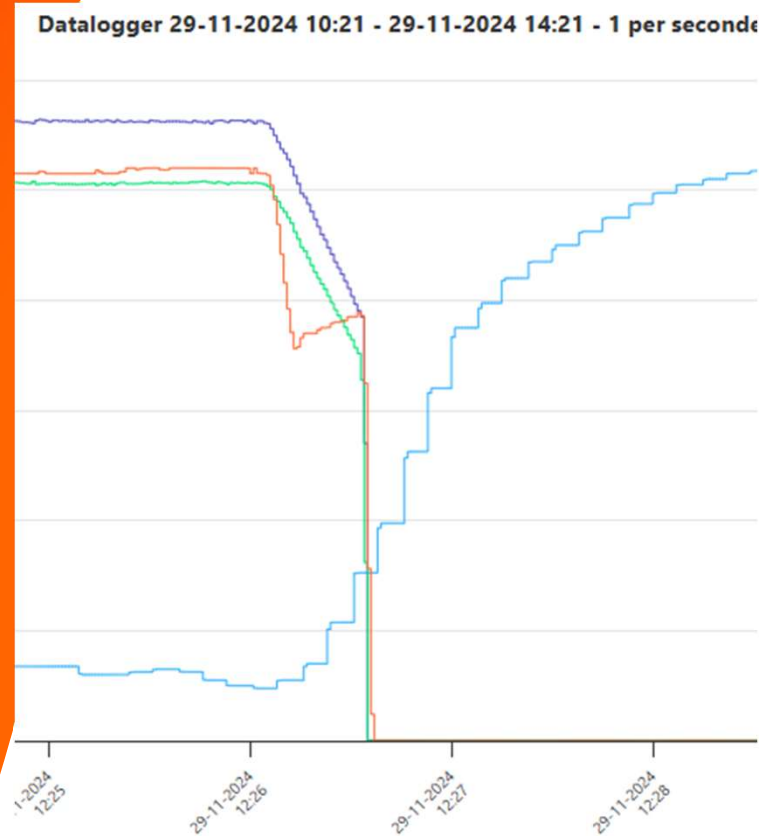
\* as per AutographPC calculation





# ESP workshop

## Drive settings



- ESP 4 DH Sensor inlaat druk (Pi)
- ESP 4 frequentie [Hz]
- ESP 4 spanning [V]
- ESP 4 stroom [A]

## ESP workshop

Equipment PRE  
checks before  
install





## ESP workshop

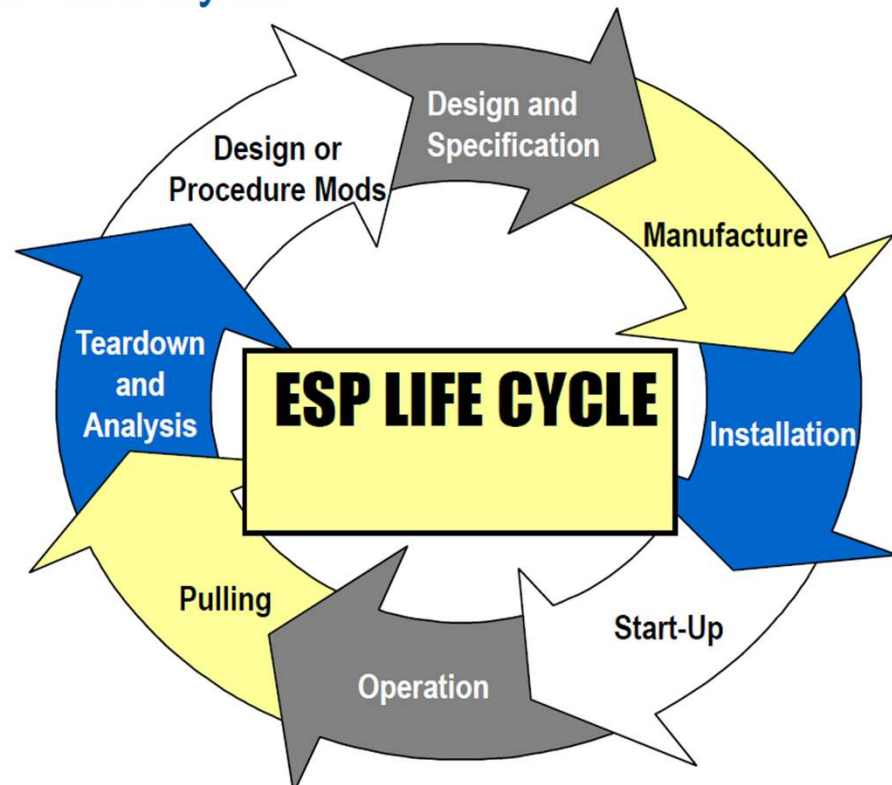
### Pothed connection



ESP workshop

Product  
optimization

## The ESP Life Cycle





# Titel

## Questions?



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