Solar Pumping Products

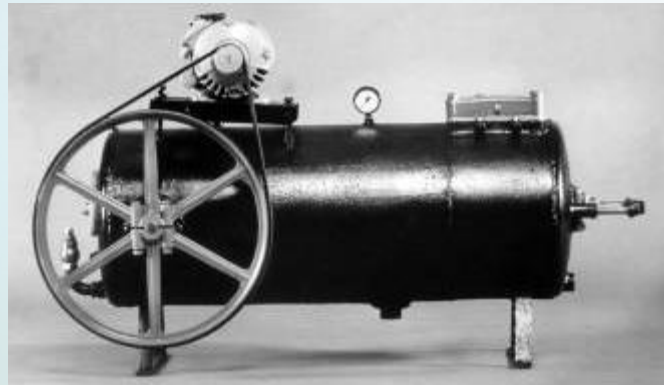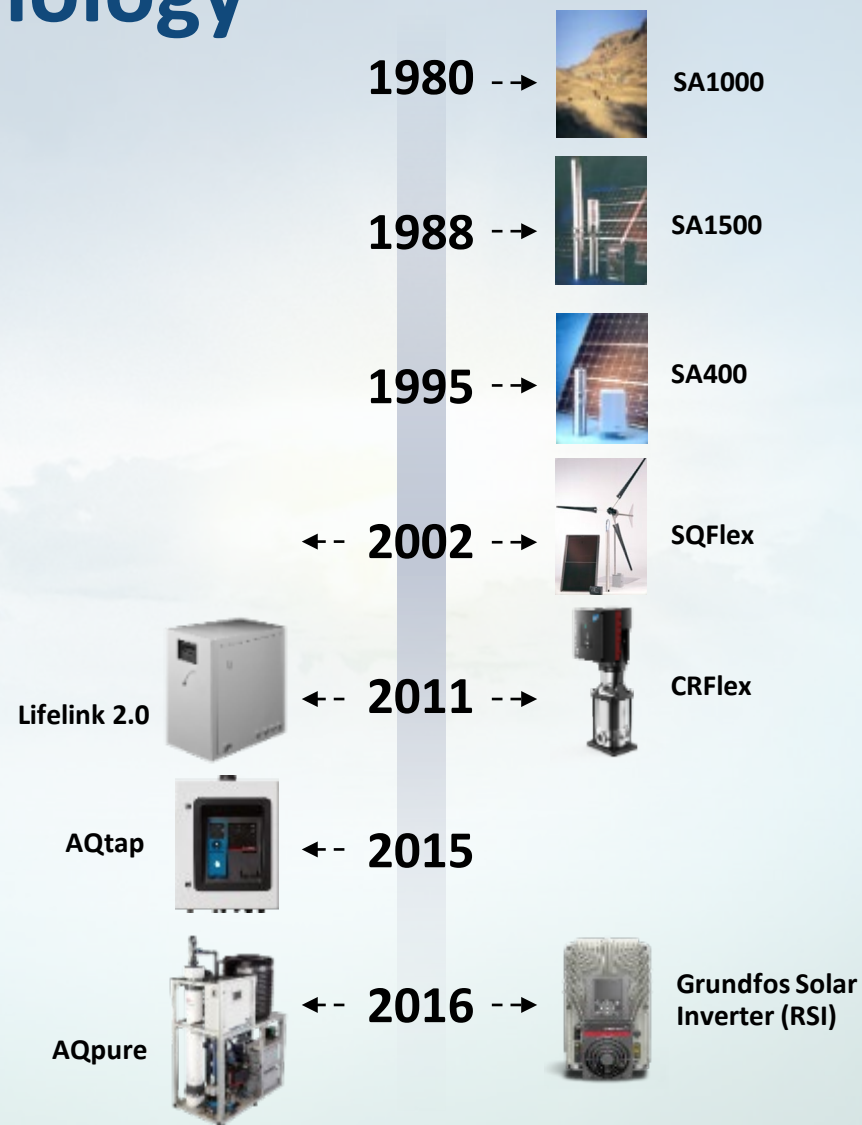## Solar Water Solution

The world's largest manufacturer of pumps and pump systems

- Founded in 1945 by Poul Due Jensen
- Annual production of more than 16 million pump units
- Turnover of DKK 27 billion in 2018
- Global coverage with more than 80 companies in 55 countries
- More than 19,000 employees worldwide

- First SP in 1968
- First solar in 1980

GRUNDFOS

Leaders in off-grid technology

- First **off-grid water supply** in 1980

- Continuously improved efficiency with the original system using an **external inverter**

- **SQFlex** submersible pump launched in 2002 with an integrated solar inverter – the **CRFlex** surface pump followed in 2011

- First water dispenser launched in 2011 – the intelligent **AQtap** water ATM followed in 2015

- **RSI** launched in 2016 for large solar water supply, perfectly matched to standard Grundfos pumps

- **AQpure** water treatment system released

1980 - → SA1000

1988 - → SA1500

1995 - → SA400

← - **2002** - → SQFlex

Lifelink 2.0 ← - **2011** - → CRFlex

AQtap ← - **2015**

AQpure ← - **2016** - → Grundfos Solar Inverter (RSI)

We've supplied hundreds of thousands of solar pumps

Toledo, Spain
- Vineyard with 2,700 vines
- Products: SP + RSI + GRM
- Solar panels: 6000 W
- Est. water consumption: 2,000 m³/hectare/year

Alentejo, Portugal
- 1500 m² greenhouses & 700 trees
- Products: SQFlex
- Energy savings of EUR 90 per month

Munarya, Uganda
- Water supply, smallholder coffee farmers
- Products: SQFlex + CU200
- Pumping to 5 x 5000 litre tanks
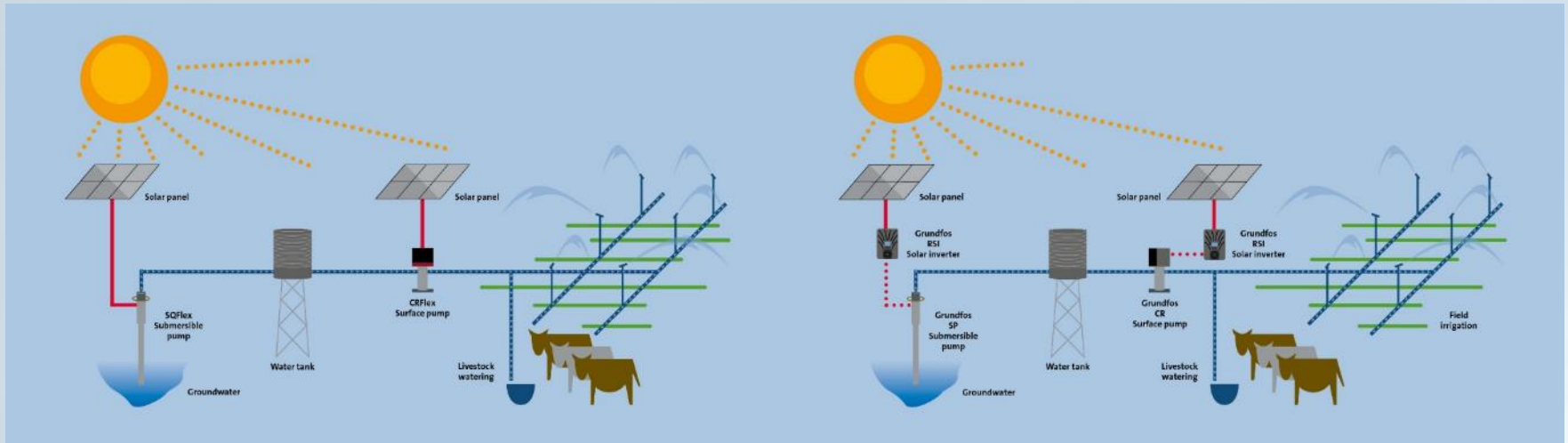- Water available from 5 water points

Sumatra, Indonesia
- Water supply for Terdjun village, population 18,000
- Products: SQFlex + CU200
- Solar panels: 900 W
- Pumping from 40 m well, 58 m head

Hamilton Downs, Australia
- 2,000 km² outback farm with 5,000 cattle
- Products: SQFlex + CU200
- Solar panels: 564 W with generator back-up
- Watering to cattle and domestic supply

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Grundfos Solar Water Solutions

Submersible

Well water intake, water transfer

Surface pump

Irrigation, water distribution, pressure boosting

SQFlex 2.5kW

- Centrifugal or Helical version
- Solar, Wind or Combi System
- AC/DC Compatible
- Built-in MPPT (drive)
- Plug and Pump
- Reliable water supply
- Virtually no maintenance
- Low Life Cycle cost

RSI solar inverter 250kW

- External Solar Drive
- MPPT function
- Up to IP 66
- UL Approval
- Maximum Amb. Temp 60°C
- Low Life Cycle cost
- Versatile system configuration
- Made in Europe

CRFlex 1.73kW

- Solar or Wind System
- AC/DC Compatible
- Built-in MPPT (drive)
- Plug and Pump
- Reliable water supply
- Virtually no maintenance
- Low Life Cycle cost

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Energy options – Grundfos Solar Water Solutions

ENERGY SOURCE

PRODUCT

RSI solar inverter

SQFlex submersible pump

MGFlex

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SQFlex - Submersible pump with built-in drive

Specifications:
- Motor size: 2.5 kW (P1)
- Flow rate (Q): 18 m³/h (90 m³/day)
- Head (H): 250 m (820 feet)
- Liquid temperature: 0 °C to +40 °C
- Enclosure class: IP68
- Installation depth max 150 m

- Voltage supply
  - 30 to 300 VDC
  - 1x90-240 VAC, 50/60 Hz
- Pump type;
  - 3" Helical
  - 3" centrifugal
  - 4" centrifugal

SQFlex features:

- Compatibility to AC and DC power sources
- Universal connection - polarity protection
- Wide voltage range
- Compatible to Solar, Wind or Combi System
- Simple installation for reliable water supply
- Dry running protection
- Works with CU200 and CIU903

GRUNDFOS

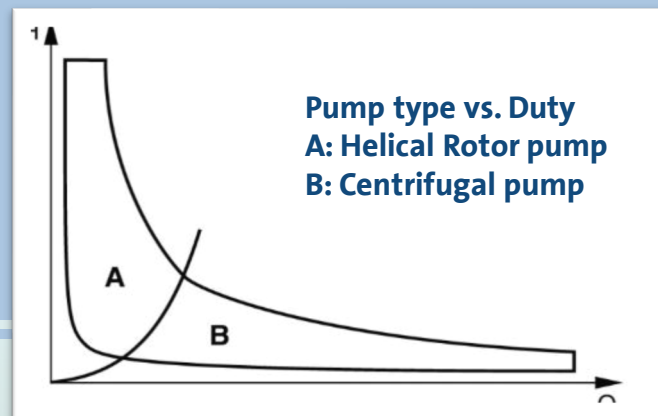# Pump technology

Helical (Positive displacement)

High Head Performance, 3" diameter pump,
5 different variants

- High pressure
- Stable flow
- Ideal for low flow, high head, variable speed
- Same efficiency on the full curve
- Fits in smaller wells
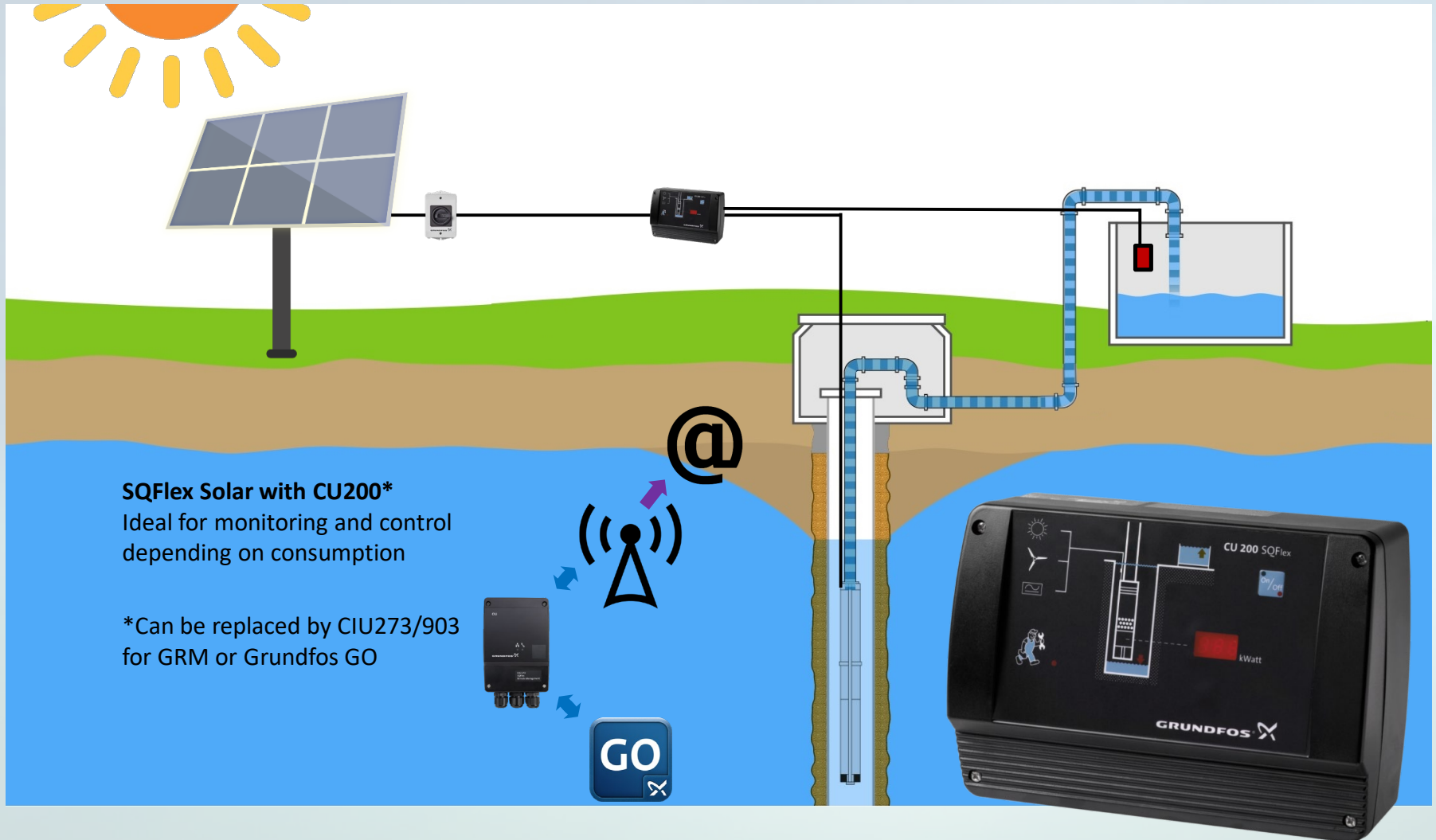
VS **Centrifugal** (velocity pump)

High Flow Performance, 3" + 4" diameter pump,
6 different variants

- High flow
- Flow rate changes with pressure
- Ideal for high flow, low head
- Highest efficiency in specific duty point
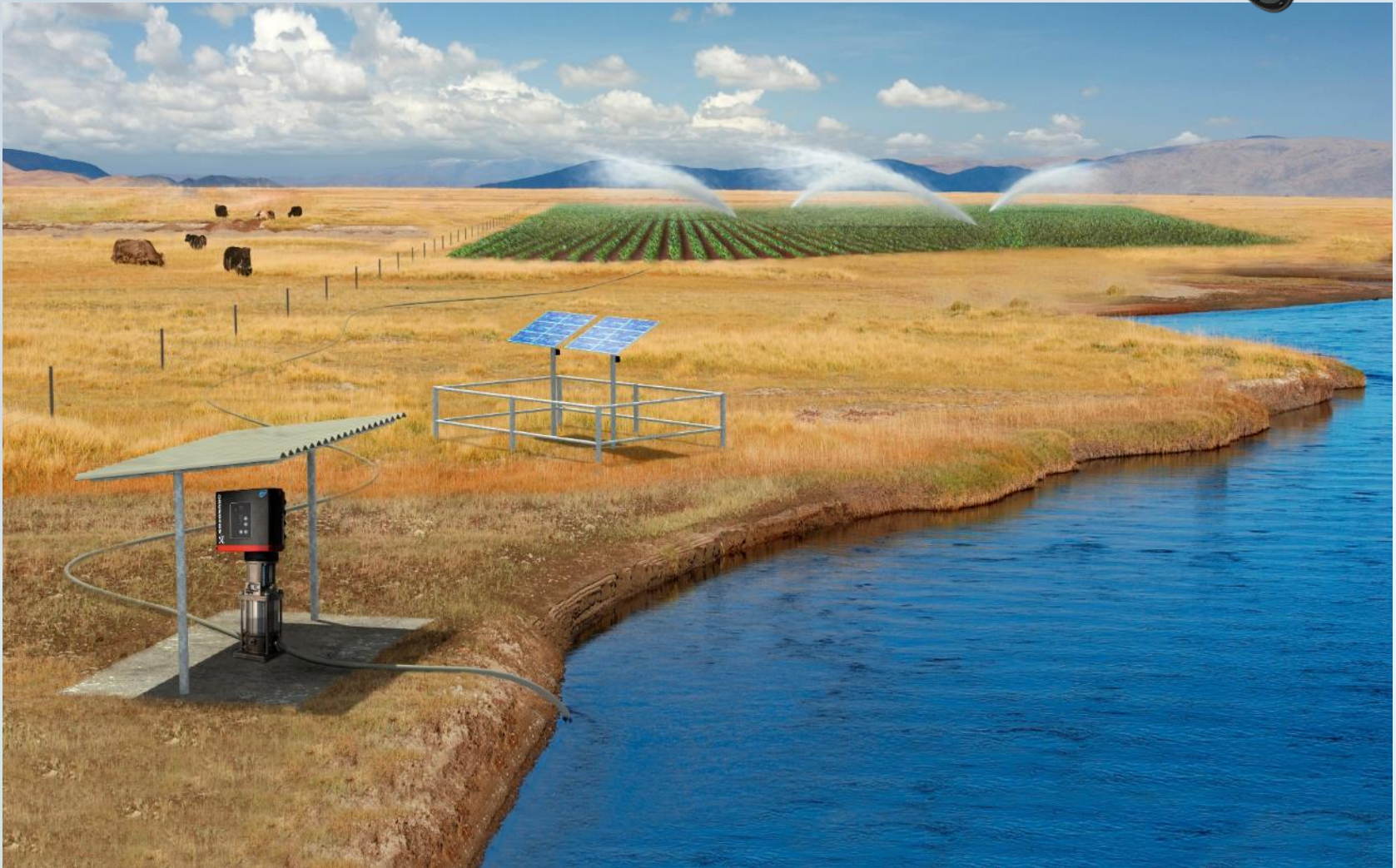- Good sand handling

Pump type vs. Duty
A: Helical Rotor pump
B: Centrifugal pump

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SQFlex system options - control

SQFlex Solar with CU200*
Ideal for monitoring and control
depending on consumption

*Can be replaced by CIU273/903
for GRM or Grundfos GO

CU 200 SQFlex

kWatt

GRUNDFOS

GRUNDFOS

Surface pump - Installation

MGFlex solar surface motor

The Grundfos **MGFlex solar surface motor** is specifically designed for solar energy applications with various Grundfos hydraulics.

When used with reliable multistage CR hydraulics, the result is the high efficiency **CRFlex solar surface pump**.

- **Built-in frequency converter** with MPPT software and motor protection
- **AC/DC** compatible
- Multiple sensor/switches connections (3x analog input and 2x digital input)
- **Wide** Voltage range
- **High efficiency**
- Wide material range
- **Easy** installation
- Motor size 0.88kW and 1.73kW (P1)
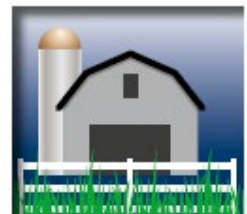- Voltage range 30-300 VDC or 1 x 90-240 VAC 50/60 Hz

IRRIGATION

LIVESTOCK

SWIMMING POOL

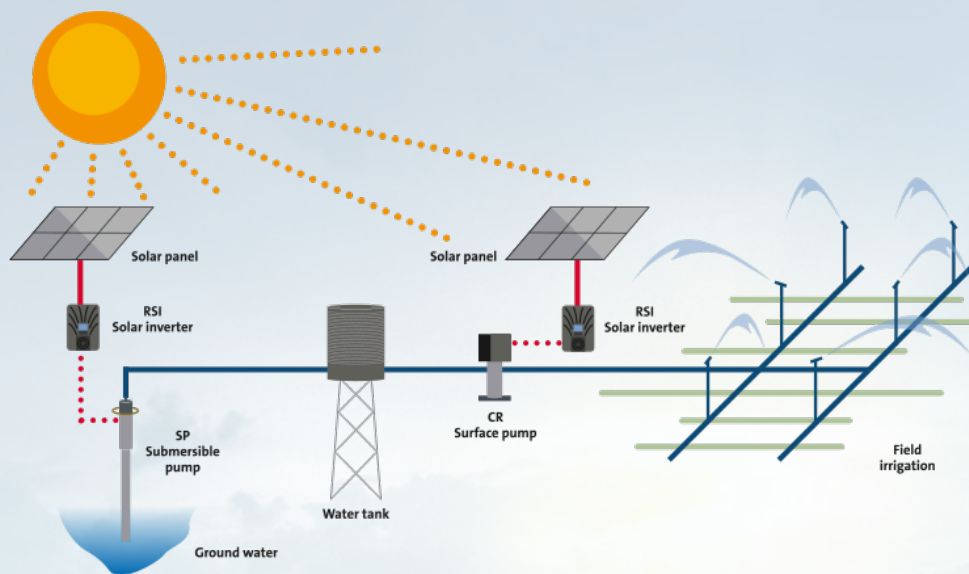FARM HOUSE

Grundfos Solar Inverter (RSI)

The intelligent off-grid **Grundfos Solar Inverter (RSI)** can power nearly all Grundfos pumps, greatly expanding possibilities for solar energy water supply systems.

- Works with almost any Grundfos pump **up to 250 kW**
- Retro fit AC system to solar

GRUNDFOS

RSI benefits

- **AC/DC compatible:** Can switch to mains power or generator if required, simply connect the two power sources via an external switchover box. Supports power blending.

- **Quick setup Wizard:** Set up in less than 5 minutes. All that is required is confirmation of motor type and pre-set value. Set up in the workshop for easy plug-and-pump onsite.

- **Build in pump selection:** Relevant pump parameters are pre-programmed

- **Advanced MPPT software:** Continuously optimises the system, improving power and water output by up to 30 %.

- **Up to IP66 enclosure class:** No need to use a weatherproof cabinet, saving on installation costs.
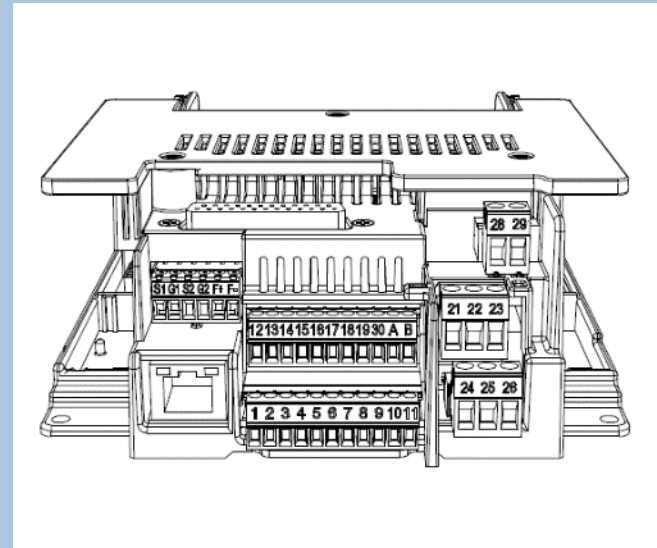
GRUNDFOS

Pre-configured digital inputs

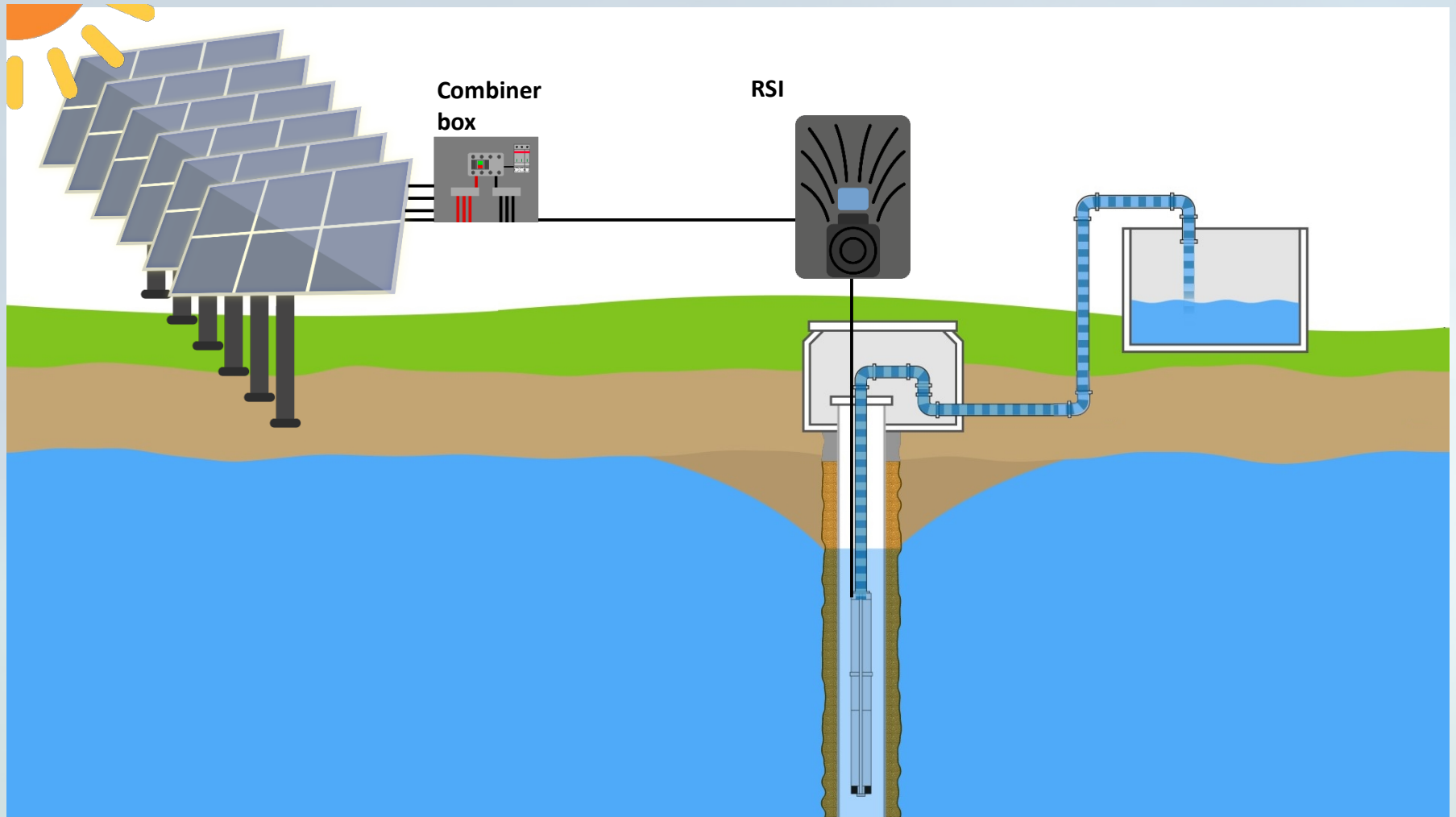The **RSI** comes with a number of **pre-configured digital inputs**.

Preconfigured digitial inputs:

- **Digital Input 1**: Start (Start/stop function)
- **Digital Input 2**: Tank max. level (Level switch in tank)
- **Digital Input 3**: Well min. level (Level switch in well)
- **Digital Input 4**: Flow switch (Normal), can also be used with delay to protect against dry running and running against closed valve (Protect)
- **Digital Input 5**: Flow meter (Pulsating)
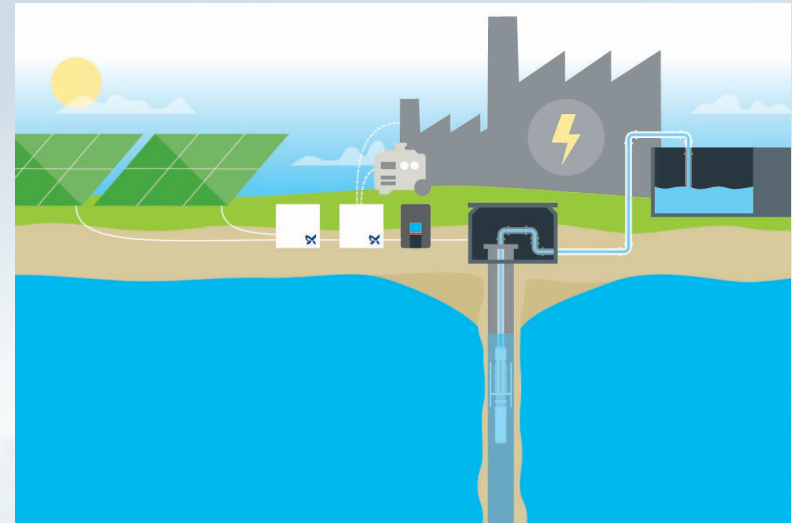- **Digital Input 6**: AC Mains

* Digital inputs, should be connected with 24VDC

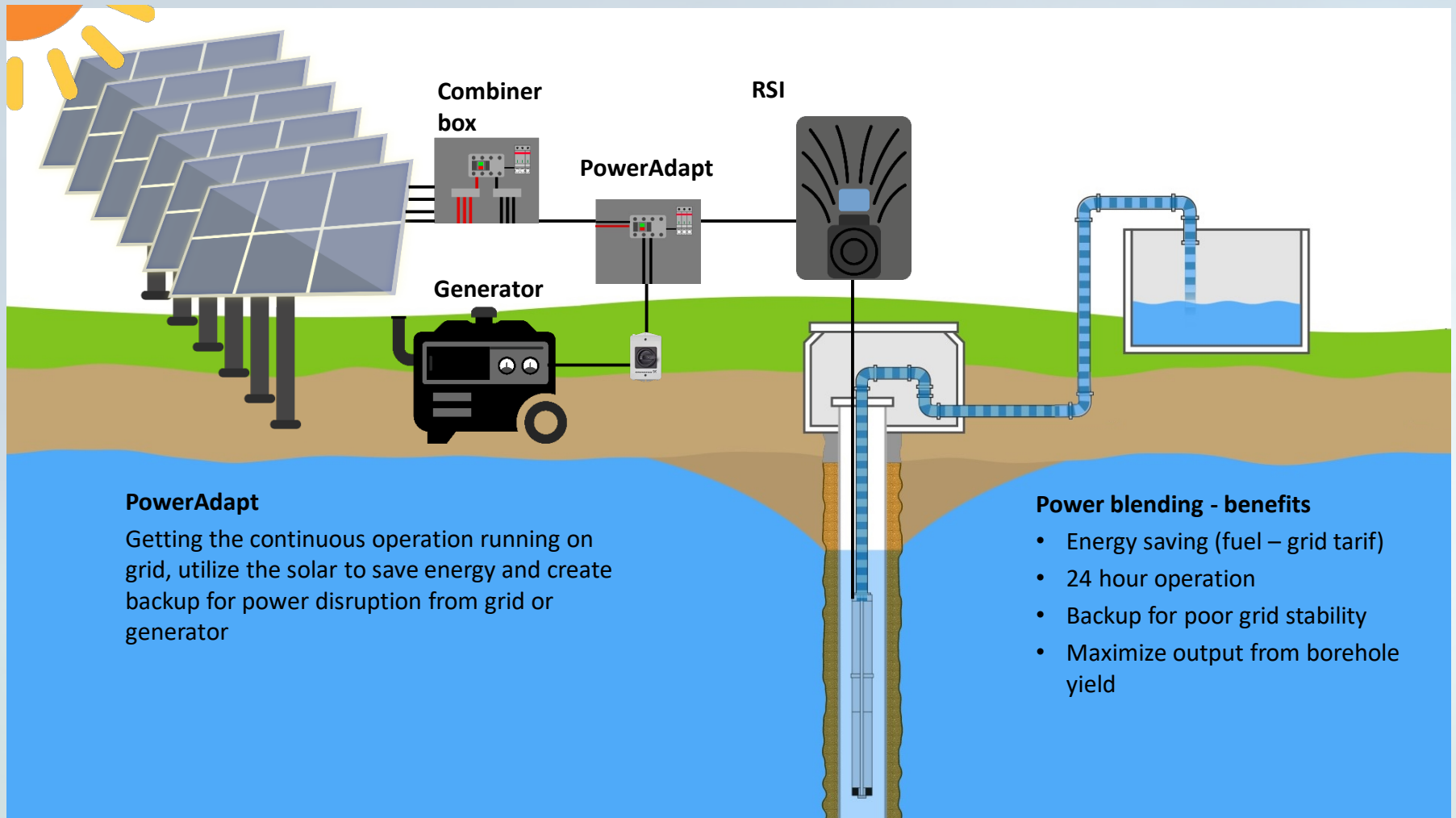**GRUNDFOS**

RSI

Combiner box

RSI

GRUNDFOS

Grundfos *PowerAdapt*

Enabling a seamless 24/7 operation experience, *PowerAdapt* will use solar power as primary source and top up the missing power with the connected AC supply in order to create a constant power output.
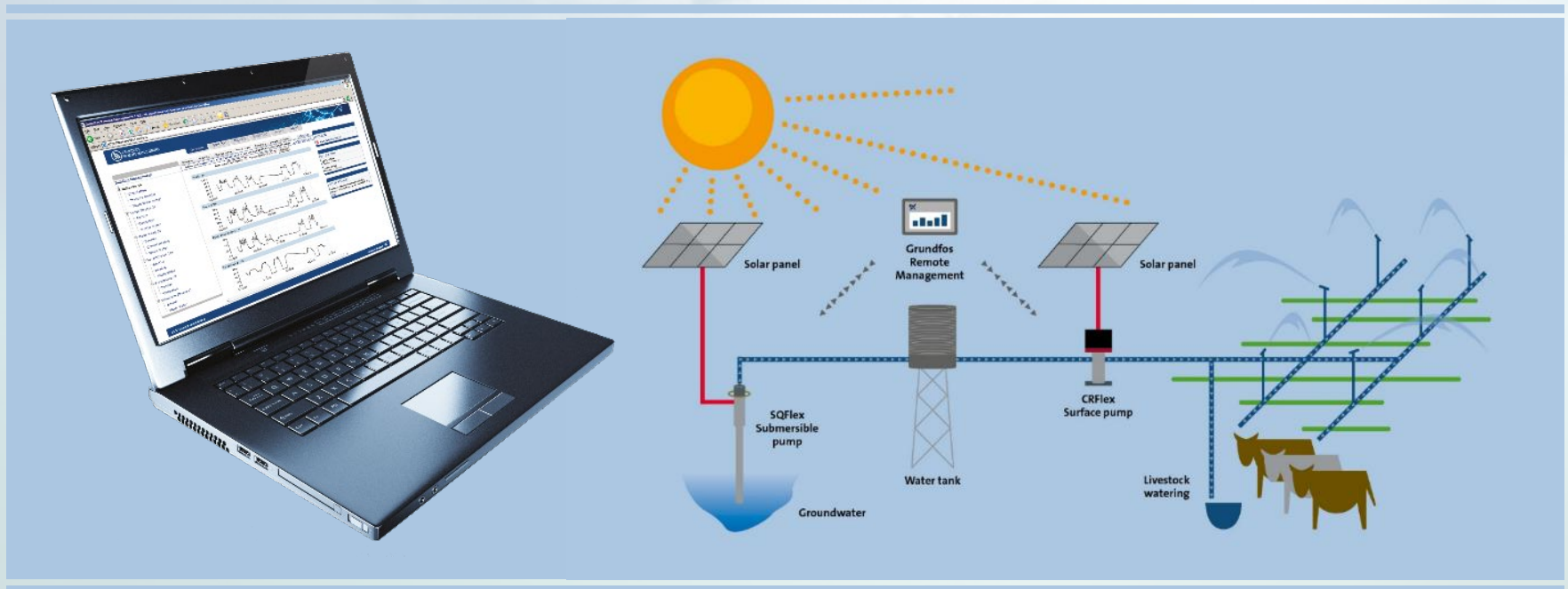
GRUNDFOS

RSI with PowerAdapt

Combiner box

RSI

PowerAdapt

Generator

PowerAdapt

Getting the continuous operation running on grid, utilize the solar to save energy and create backup for power disruption from grid or generator

Power blending - benefits

- Energy saving (fuel – grid tarif)
- 24 hour operation
- Backup for poor grid stability
- Maximize output from borehole yield

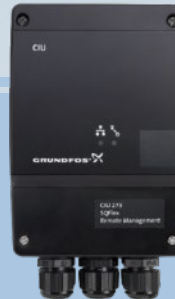be think innovate

GRUNDFOS

System monitoring with GRM

Grundfos Remote Management is a cost-effective and straightforward way to monitor and manage pump installations. It reduces the need for onsite inspections and in the event of an alarm or warning, the relevant people are notified directly.
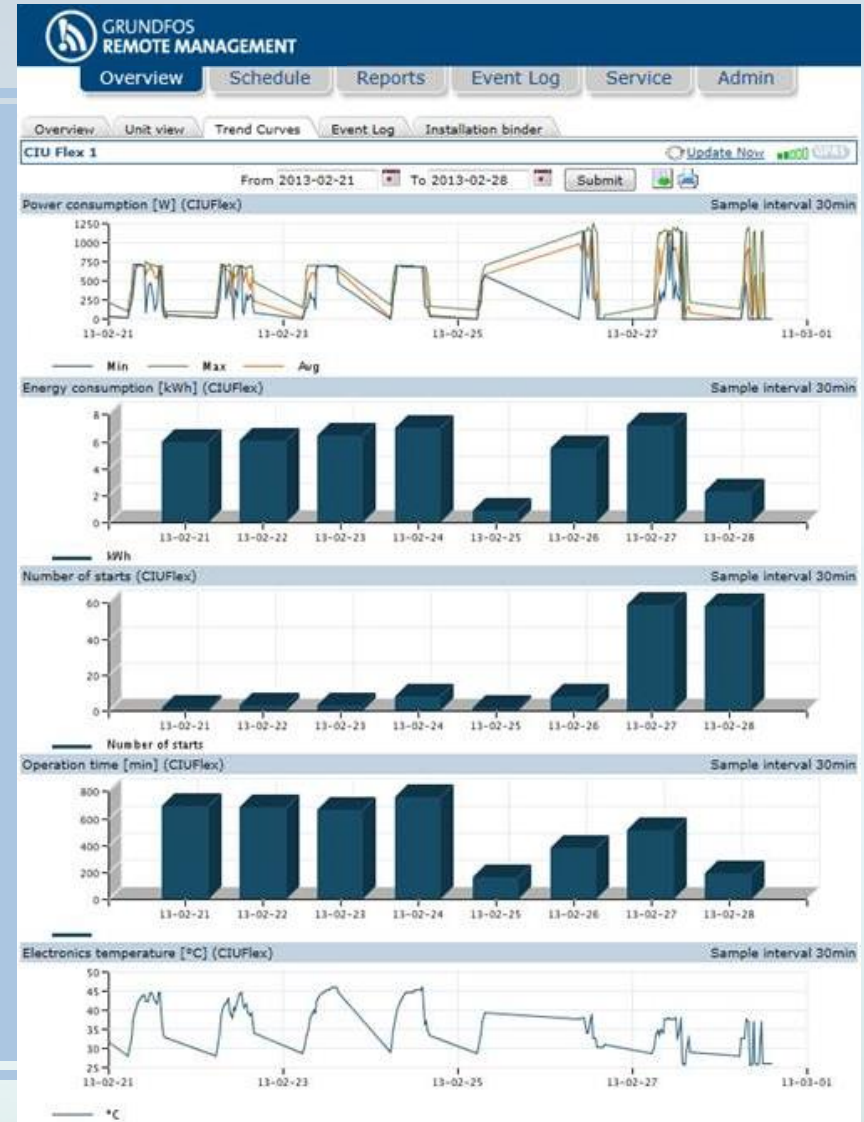
GRUNDFOS

Monitoring GRM

Why

- Get information of operation
- Detailed VFD/motor
- Trend curves
- Alarm / Warnings

Overview	Unit view	Settings	Trend Curves
CIUFlex (1) Last Updated: **Jan 18, 2016 6:57:46 AM**			

Status Information	
Operating Mode	Pump running
Voltage	166.8 V
Speed	2650 rpm
Power consumption	450 W
Electronics temperature	42 °C
DI 1 (Start/Stop)	Start
DI 2 (Levelswitch)	Inactive

Operation Log	
Operating hours	2542 h
Number of starts	2133
Energy consumption	2185 kWh
Volume	74534.8 m³

Latest Events	
Date	Log message

Benefits

- Trend curves
- React on actual events
- Minimize service visits
- Preventive maintenance

GRUNDFOS

Preparation for solar installation

Sizing / Selection:

- GPC desktop version

- www.grundfos.com

- www.product-selection.grundfos.com

- Fill in needed information:
    - Location
    - Static and dynamic head or TDH
    - Water per day (6 hours*safe yield)
- Size and Select

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GRUNDFOS

Puerto Rico

Situation: Disaster help

- Water supply during power outage
    - Backup for grid
    - Energy saving by switching

- **Products used**
    - Retro fitting to installed pumps
        - (SP's, CR's etc.)
    - RSI
    - Typical 5-15 kW solar power

GRUNDFOS

Ethiopia - Bui

Situation: Water supply

- Ground water supply with transfer
  - Deep well 200m
  - Transfer 5 km

- **Products used**
  - 1 x SP 7
  - 1 x RSI 15kW
  - 114 pcs of 270Wp solar panel

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GRUNDFOS

Nepal, Kathmandu

Situation: Drinking water

- Ground water pumping to storage tank
  - Used for drinking water
    - Communities 500-1000 people
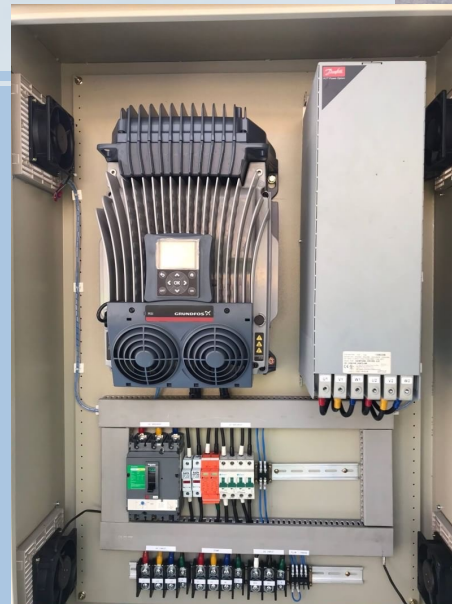   - Mountains farmers

- **Products used**
  - 1 x SP 17
  - 1 x RSI 30kW
  - 38 pcs of 350Wp solar panel

GRUNDFOS

Thailand, Lumpang Province

Situation: Water transfer

- Water transfer from lake to storage
  - Used for irrigation and farming
  - 1000 people

- **Products used**
  - 4 x CR 32
  - 4 x RSI 30kW
  - 130 pcs of 400Wp solar panel

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GRUNDFOS

India, Pradikala, Nagpur

Situation: Drinking water

- Dual system for easy access to water all year
  - Hand pump for bad weather
  - SQFlex delivers water even in dry season when water level drops below 50-70m

- **Products used**
  - "Dual" hand pump with SQFlex
  - 1 x CU200
  - 3 * 270W solar panels

GRUNDFOS

Thank you