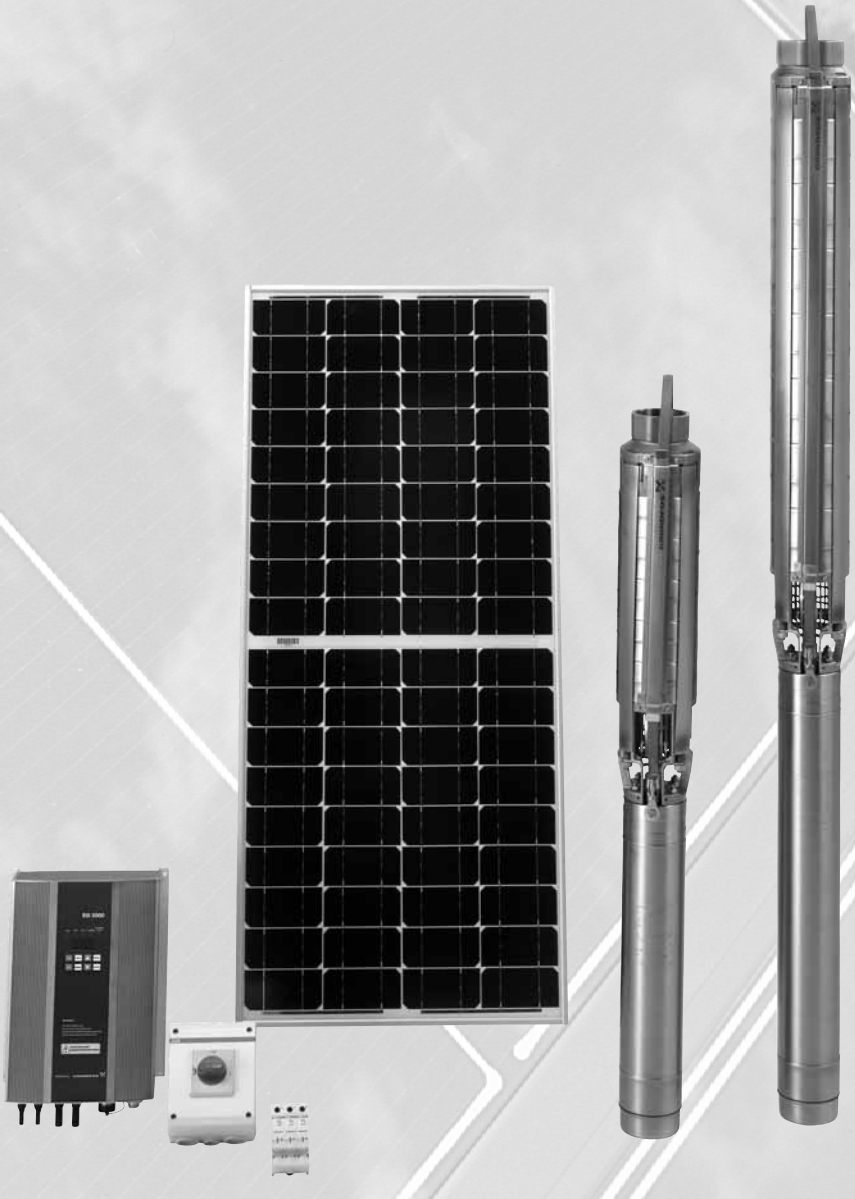
Renewable Solar Inverter, RSI

Renewable Solar Inverter for large solar powered systems
3 - 9.2 kW



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Performance range

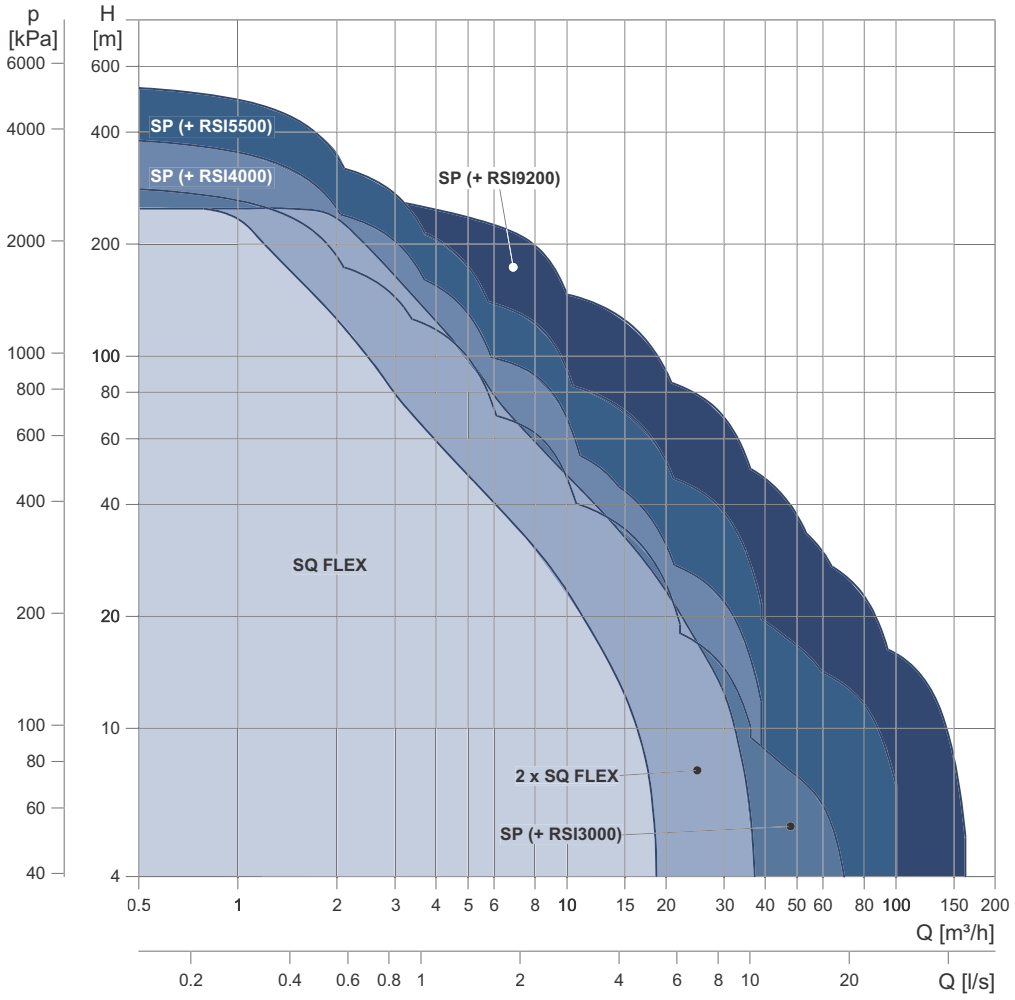

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Fig. 1 Performance range

2. Applications

The Grundfos Renewable Solar Inverter (RSI) system is designed for continuous as well as intermittent operation. The system is especially suitable for supplying water in applications such as:

- villages, schools, hospitals, and single-family houses
- farms and ranches, including watering of livestock and irrigation of crops and greenhouses
- game parks and game farms.

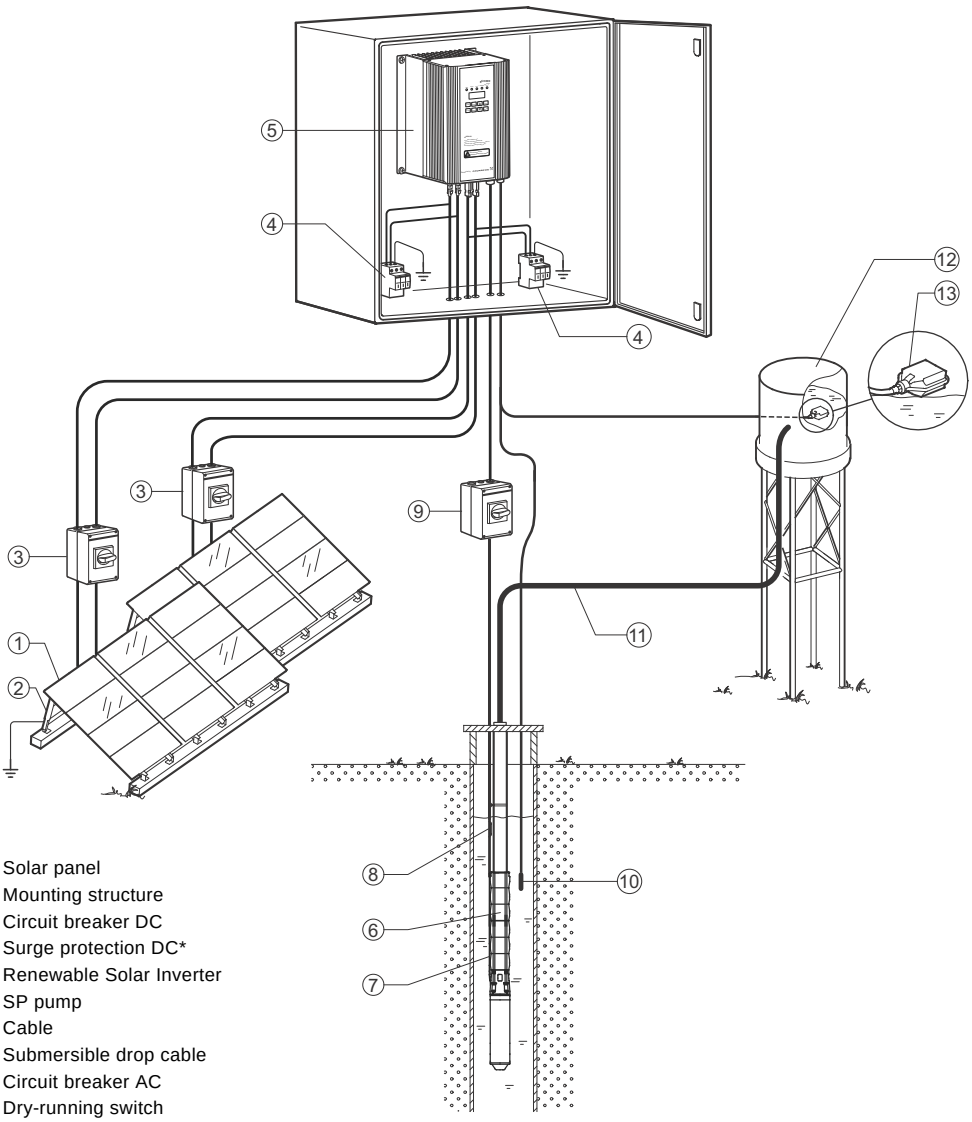
The Renewable Solar Inverter (RSI) system can be used in any existing SP pump application, thus providing a very wide range of applications. The only difference is that you use solar panels as the power supply.

Application example

The water production of an RSI system depends on the availability of solar power. The result is excess water production in the early afternoon and insufficient water production in the morning and late afternoon. A system equipped with a storage water tank enables stable water supply throughout the day.

One junction box components kit is required for each set of inputs on the DC side. A junction box components kit contains a circuit breaker and surge protection to ensure maximum safety to the user as well as the system.

Install the inverter in an indoor environment/cabinet with sufficient ventilation.



1 Solar panel
2 Mounting structure
3 Circuit breaker DC
4 Surge protection DC*
5 Renewable Solar Inverter
6 SP pump
7 Cable
8 Submersible drop cable
9 Circuit breaker AC
10 Dry-running switch
11 Pipe
12 Water tower/tank
13 Level switch

* If the distance between the solar panel and the inverter is more than 10 m, it is necessary to add extra surge protection closer to the solar panel.

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Fig. 2 RSI application example

3. Product introduction

Type key

Code	Example	RSI	3000
RSI	= Renewable Solar Inverter		
3000	= Max. power input to motor [W]		

Features and benefits

Maximum power point tracking (MPPT)

The inverter has built-in electronics with MPPT function. The inverter will continuously optimise according to the DC input power available.

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of faulty installation. The inverter will cut out power connection to the motor if the voltage falls outside the allowed voltage limits. The inverter will stay in the same fault mode with the error code displayed on the inverter until the inverter is being reset.

Overload protection

Overload may occur if the maximum allowed frequency is set too high or a wrong pump is used. The inverter will cut out power connection to the motor if overload occurs. The inverter will stay in the same fault mode with the error code displayed on the inverter until the inverter is being reset.

Overcurrent protection

Overcurrent may occur if, for example, a wrong cable size is used. The inverter will cut out power connection to the motor if the current falls outside the allowed current limits. The inverter will stay in the same fault mode with the error code displayed on the inverter until the inverter is being reset.

Note: For the protection to function properly, the actual current value must be adjusted according to the maximum current attained at the maximum frequency shortly after the system started operation.

Overtemperature protection

Overtemperature of the inverter may occur if appropriate ventilation is not available or the ambient temperature is too high. The inverter will cut out power connection to the motor if overtemperature occurs in the inverter. The inverter will stay in the same fault mode with the error code displayed on the inverter until the inverter is being reset.

Note: The inverter does not detect motor temperature or protect the motor against overtemperature.

No-load protection

No-load situation of the inverter may occur if, for example, the cable to the motor is broken. The inverter will cut out power connection to the motor if no-load occurs. The inverter will stay in the same fault mode with the error code displayed on the inverter until the inverter is being reset.

Note: For the protection to function properly, please check the RSI installation and operating instructions carefully during the operation.

Operation history memory

The inverter will store historical operating data. The data can be retrieved through the menu on the inverter. Data can be retrieved for every minute of operation up to two years back.

4. System components

An RSI system consists of a standard SP pump, a Renewable Solar Inverter (RSI), ranging from 3 to 9.2 kW, and accessories. The RSI system is configured especially to run with Grundfos SP pumps.

The RSI system components are:

- SP submersible pump, 50 Hz
- Renewable Solar Inverter (RSI)
- junction box components kit, DC
  - circuit breaker, DC
  - surge protection, DC
- circuit breaker, AC
- solar panel
- dry-running switch
- level switch (optional).

SP submersible pump

The SP pump is available as complete unit or as separate motor or pump.

SP pump selection for RSI system:

- SP submersible pump, 50 Hz
- power supply: 3 x 380 VAC.
- Material: 1.4301, 1.4401 or 1.4539.

Standard SP pumps can only be operated by AC power supply. Do not connect the SP pump directly to solar panel.

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Fig. 3 SP pumps

Renewable Solar Inverter (RSI)

RSI is an off-grid solar inverter converting the DC power output from the solar panel to AC power supply for SP pump operation.

The RSI inverter has a built-in MPPT software, protection features as well as operating history memory, see *Features and benefits*. The maximum power delivered to the motor ranges from 3 to 9.2 kW.

The RSI inverter has either two sets or four sets of power inputs. Each set of inputs has a limit of maximum 750 V and 15 A from the solar panel.

Indoor installation requires ventilation.

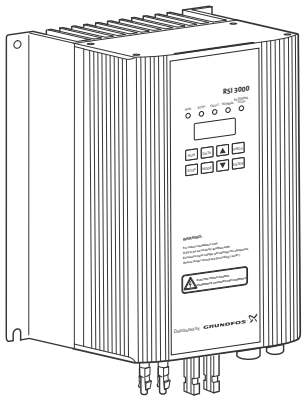

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Fig. 4 RSI inverter

The RSI inverter combined with controller and protection units can be used for:

- maximum power point tracking (MPPT)
- DC to three-phase AC conversion
- connection to dry-running switch
- connection to level switch
- operating history inquiry.

Warning
CUE is not suitable for off-grid solar system use.

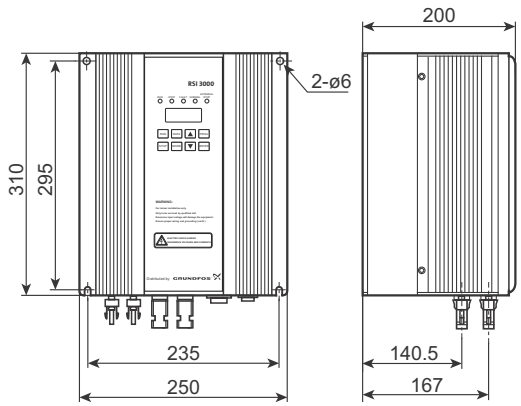

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Fig. 5 Dimensions [mm], RSI inverter

Circuit breaker, AC

An AC circuit breaker is a standard circuit breaker used for normal three-phase power connection.

Solar panel

The solar panel offered by Grundfos is specially selected for Grundfos renewable products.

All Grundfos solar panels are equipped with plugs and sockets enabling easy connection. The number of solar panels required depends on the water quantity required, water pressure required and installation location.

Dry-running switch

The dry-running switch is recommended for all submersible pump operation. The switch can prevent the risk of the pump operating in a dry well, which could result in damage of the pump.

Junction box components kit, DC

Circuit breaker, DC

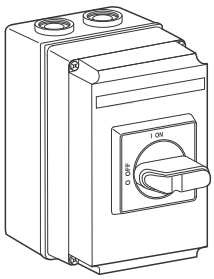

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Fig. 6 Circuit breaker

The DC circuit breaker is suitable for the solar-powered RSI system.

The circuit breaker enables manual starting and stopping of the system. At least one DC circuit breaker is required for each set of inputs to the RSI inverter. We recommend to install two DC circuit breakers for each set of inputs if the distance between the solar panel and the inverter is more than 10 m. To install the circuit breaker, a torx screwdriver, Tx8, is needed.

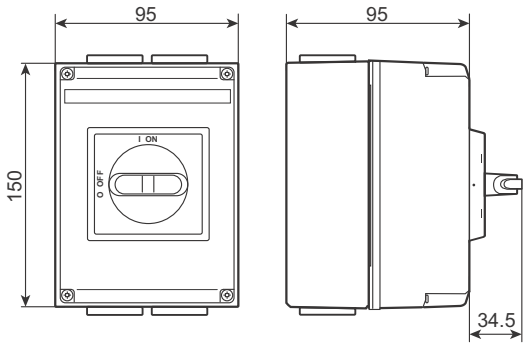

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Fig. 7 Dimensions [mm], circuit breaker

Surge protection, DC

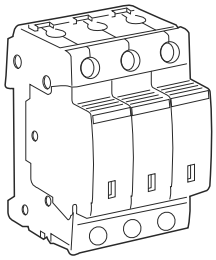

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Fig. 8 Surge protection

The DC surge protection is suitable for the solar-powered RSI system.

The surge protection gives a very safe and reliable protection of the system by having a quick response. At least one DC surge protection is required for each set of inputs to the RSI inverter. We recommend to install two DC surge protections for each set of inputs if the distance between the solar panel and the inverter is more than 10 m.

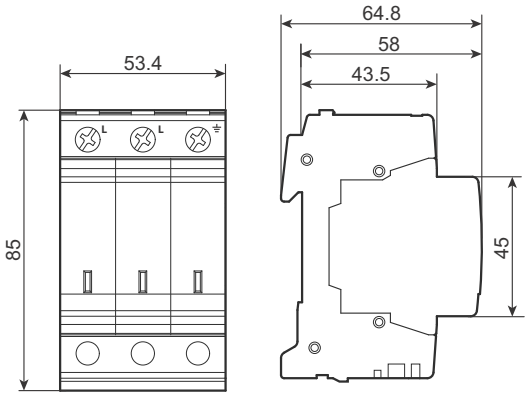

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Fig. 9 Dimensions [mm], surge protection

Level switch (optional)

A level switch serves as a start/stop control that depends on the water level in the storage water tank.

5. Technical data

RSI Renewable Solar Inverter

Description	RSI 3000	RSI 4000	RSI 5500	RSI 9200
Min. ambient temperature [°C]	-10	-10	-10	-10
Max. ambient temperature [°C]	50	50	50	50
Max. relative humidity [%]	95	95	95	95
Max. P1, motor [kW]	3	4	5.5	9.2
Min. recommended MPP voltage [V]	530	530	530	530
Max. recommended MPP voltage [V]	600	600	600	600
Max. DC input voltage [V]	750	750	750	750
Max. DC input current per set [A]	15	15	15	15
Min. frequency [Hz]	30	30	30	30
Max. frequency [Hz]	53	53	53	53
Phase	3	3	3	3
Rated output voltage, AC [V]	380	380	380	380
Max. output current, AC [V]	9	13	18	24
Enclosure class	IP41	IP41	IP41	IP41
Net weight [kg]	7.2	7.3	7.7	8.2
Gross weight [kg]	9.5	9.6	10	10.5
Length [mm]	425	425	425	425
Width [mm]	325	325	325	325
Height [mm]	285	285	285	285

Circuit breaker, DC

Voltage, DC [V]	1000
Current [A]	16
Weight [kg]	1.05
Marking	IEC 60047

Surge protection, DC

Voltage, DC [V]	1000
Current [A]	40,000
Weight [kg]	0.375
Marking	CE

6. Product number

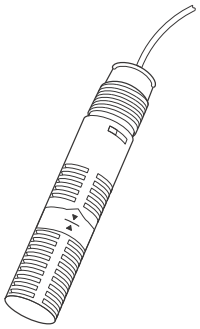
RSI Renewable Solar Inverter

RSI inverter	Max. P1 to motor	Product number
RSI 3000	3 kW	98449972
RSI 4000	4 kW	98449973
RSI 5500	5.5 kW	98449975
RSI 9200	9.2 kW	98449977

Junction box components kit

Description	Product number
Junction box components kit, DC	98298572
Circuit breaker, DC	98341686
Surge protection, DC	98341687

Dry-running switch



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Description	Product number
Dry-running switch	98347579

Level switch (optional)

TM02 2407 4201

Description	Product number
Level switch	010748

High water level: Contact is closed.
Low water level: Contact is open.

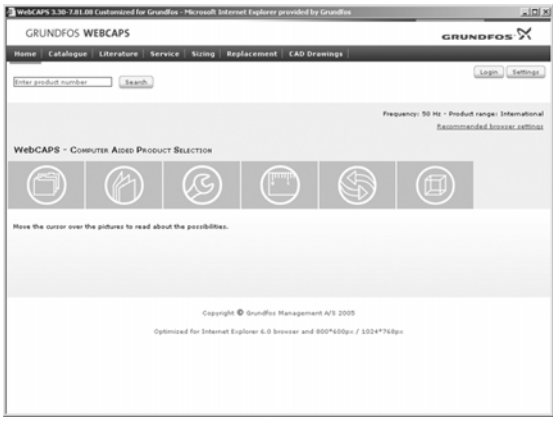
7. Appendix

The table below shows the recommended cable size (diameter in mm^2) to be used between solar panel and RSI inverter in order to keep the power loss lower than 2 % at 20 °C.

Current in cable [A]	Distance between solar panel and RSI												
	30 m	60 m	90 m	120 m	150 m	180 m	210 m	240 m	270 m	300 m	330 m	360 m	390 m
	Recommended cable size [mm^2]												
3	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	4	4	6
6	1.5	1.5	1.5	2.5	2.5	4	4	4	6	6	6	6	10
9	1.5	1.5	2.5	4	4	6	6	6	10	10	10	10	16
12	1.5	2.5	4	4	6	6	10	10	10	10	16	16	16
15	1.5	2.5	4	6	6	10	10	10	16	16	16	16	16

8. Further product information

WebCAPS

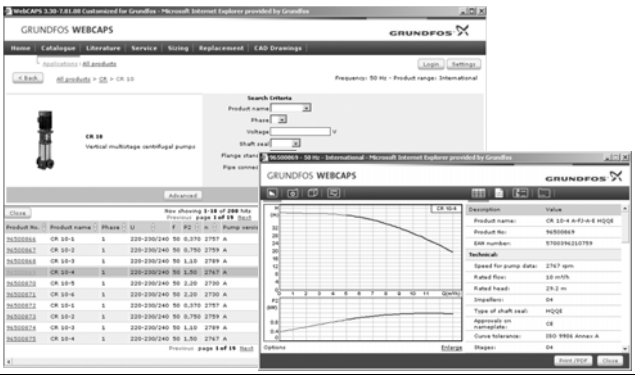


WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

WebCAPS contains detailed information on more than 220,000 Grundfos products in more than 30 languages.

Information in WebCAPS is divided into six sections:

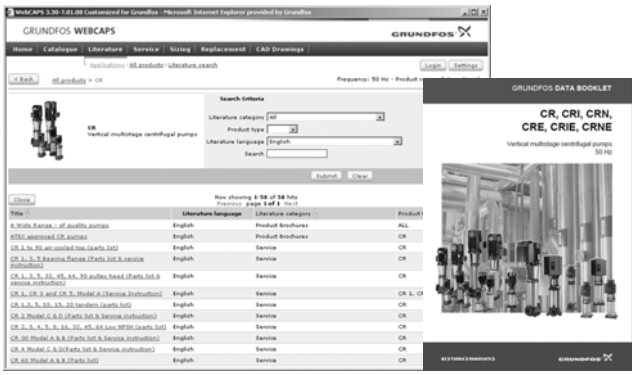
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalogue

Based on fields of application and pump types, this section contains the following:

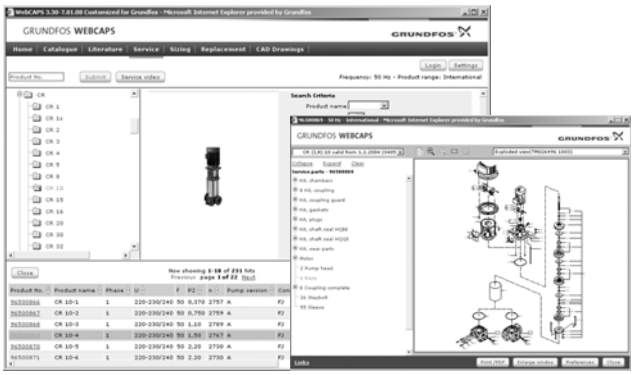
- technical data
- curves (QH, Eta, P1, P2, etc.) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

This section contains all the latest documents of a given pump, such as

- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.
Furthermore, the section contains service videos showing you how to replace service parts.

Sizing

This section is based on different fields of application and installation examples and gives easy step-by-step instructions in how to size a product:

- Select the most suitable and efficient pump for your installation.
- Carry out advanced calculations based on energy, consumption, payback periods, load profiles, life cycle costs, etc.
- Analyse your selected pump via the built-in life cycle cost tool.
- Determine the flow velocity in wastewater applications, etc.

Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.
The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.

CAD drawings

In this section, it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

2-dimensional drawings:
- .dxf, wireframe drawings
- .dwg, wireframe drawings.

3-dimensional drawings:
- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.

WinCAPS

Fig. 10 WinCAPS DVD

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed information on more than 220,000 Grundfos products in more than 30 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no internet connection is available.

WinCAPS is available on DVD and updated once a year.

GO CAPS

Mobile solution for professionals on the GO!

CAPS functionality on the mobile workplace.

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Subject to alterations.

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