

High-efficiency photovoltaic module using silicon nitride multicrystalline silicon cells.

Performance

Rated power (P_{max})	135W
Power tolerance	$\pm 5\%$ (BP3135) $\pm 3\%$ (BP3130 & BP3125) and $\pm 3\%$ (BP3115 & BP3110)
Nominal voltage	12V
Limited Warranty ¹	25 years

Configuration

S BP 3125S	Clear universal frame with LoPro J-Box and polarized Multicontact (MC) connectors
J BP 3125J	Clear universal frame and standard J-Box

Electrical Characteristics²

	BP3135	BP3130	BP3125	BP3115	BP3110
Maximum power (P_{max}) ³	135W	130W	125W	115W	110W
Voltage at P_{max} (V_{mp})	17.4V	17.4V	17.4V	17.1V	16.9V
Current at P_{max} (I_{mp})	7.7A	7.5A	7.2A	6.7A	6.5A
Warranted minimum P_{max}	128.2W	126.1W	121.3W	109.3W	104.5W
Short-circuit current (I_{sc})	8.4A	8.2A	8.1A	7.5A	7.4A
Open-circuit voltage (V_{oc})	22.1V	22.0V	22.0V	21.8V	21.6V
Temperature coefficient of I_{sc}	(0.065 $\pm$ 0.015)%/°C				
Temperature coefficient of V_{oc}	-(80 $\pm$ 10)mV/°C				
Temperature coefficient of power	-(0.5 $\pm$ 0.05)%/°C				
NOCT (Air 20°C; Sun 0.8kW/m ² ; wind 1m/s)	47 $\pm$ 2°C				
Maximum series fuse rating	15A (S); 20A (J)				
Maximum system voltage	600V (US NEC rating) 1000V (TÜV Rheinland rating) 1000V (IEC 61215 rating)				



Mechanical Characteristics

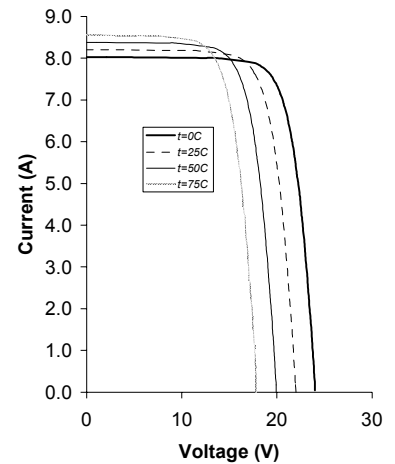
Dimensions	S,J	Length: 1510mm (59.4") Width: 674mm (26.5") Depth: 50mm (1.97")
Weight	S,J	12.0 kg (26.5 pounds)
Solar Cells	S,J	36 cells (156mm x 156mm) in a 4x9 matrix connected in series
Output Cables	S	RHW AWG# 12 (4mm ²) cable with polarized weatherproof DC rated Multicontact connectors; asymmetrical lengths - 900mm (-) and 800mm (+)
Junction Box	J	J-Version junction box with 6-terminal connection block; IP 65, accepts PG 13.5, M20, ½ inch conduit, or cable fittings accepting 6-12mm diameter cable. Terminals accept 2.5 to 10mm ² (8 to 14 AWG) wire.
Diodes	S,J	IntegraBus™ technology includes Schottky by-pass diodes integrated into the printed circuit board bus
Construction	S,J	Front: High-transmission 3mm (1/8 th inch) tempered glass; Back: Polyester; Encapsulant: EVA
Frame	S,J	Clear anodized aluminum alloy type 6063T6 Universal frame; Color: silver

1. Module Warranty: 25-year limited warranty of 80% power output; 12-year limited warranty of 90% power output; 5-year limited warranty of materials and workmanship. See your local representative for full terms of these warranties.
2. These data represent the performance of typical BP 3125 products, and are based on measurements made in accordance with ASTM E1036 corrected to SRC (STC.)
3. During the stabilization process that occurs during the first few months of deployment, module power may decrease by up to 3% from typical P_{max} .

Quality and Safety

ESTI	Module power measurements calibrated to World Radiometric Reference through ESTI (European Solar Test Installation at Ispra, Italy)
CE	Manufactured in ISO 9001-certified factories; conforms to European Community Directives 89/33/EEC, 73/23/EEC, 93/68/EEC; certified to IEC 61215
TUV	Framed modules certified by TÜV Rheinland as Safety Class II (IEC 60364) equipment for use in systems up to 1000 VDC
UL	Listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating)
FM	Approved by Factory Mutual Research in NEC Class 1, Division 2, Groups C & D hazardous locations (U)

BP 3130 I-V Curves

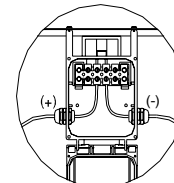
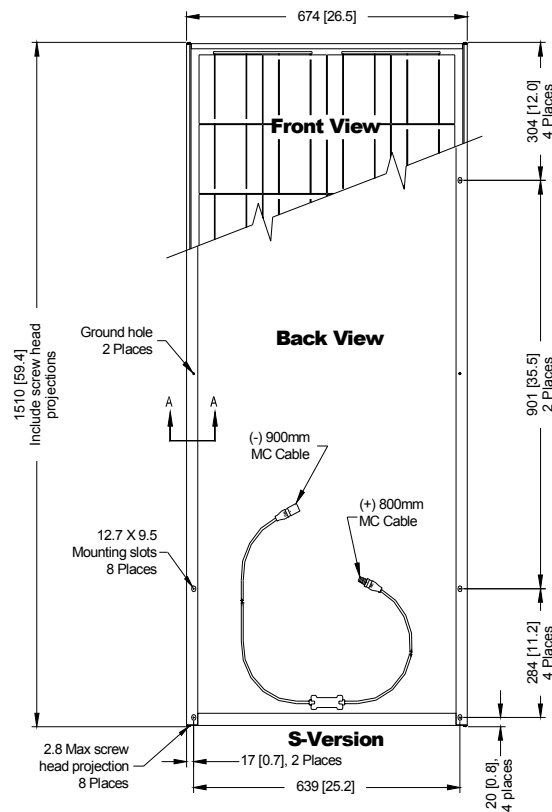


Qualification Test Parameters

Temperature cycling range	-40°C to +85°C (-40°F to 185°F)
Humidity freeze, damp heat	85% RH
Static load front and back (e.g. wind)	2,400 pa (50psf)
Front loading (e.g. snow)	5,400 pa (113psf)
Hailstone impact	25mm Ø (1 inch) at 23 m/s (52mph)

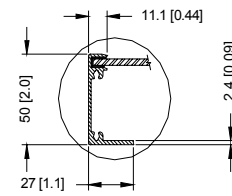
Module Diagram

Dimensions in brackets are in inches. Un-bracketed dimensions are in millimeters. Overall tolerances $\pm 3\text{mm}$ (1/8")

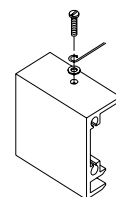


J-Version

Top View (Lid open)



Section A - A



Grounding Detail

Included with each module: self-tapping grounding screw, instruction sheet, and warranty document.

Note: This publication summarizes product warranty and specifications, which are subject to change without notice. Additional information may be found on our web site: www.bpsolar.com



ES-A SERIES photovoltaic panels

NEW BLACK FRAME



200, 205 & 210 W

Best power tolerance available (-0/+5W)

A range of high quality String Ribbon™ solar panels providing more electricity, industry-leading environmental credentials and efficient installs made with our revolutionary wafer technology.

MORE ELECTRICITY

- **Guaranteed no power below nameplate¹**
Never pay for power you're not getting
- **Get up to 5W more power than nameplate²**
More power for more electricity
- **Power calibrated by four independent test labs³**
Ensuring you get the power we promise
- **Anti-reflective treated glass**
Maximizing light capture during the whole day
- **Temperature ratings over 90%⁴**
Producing more on hot days
- **5 year workmanship and 25 year power warranty⁵**

LESS IMPACT

- **Smallest carbon footprint⁶**
Leading the fight against climate change
- **12 month energy payback⁶**
Maximizing the generation of clean electricity
- **100% cardboard free, re-usable packaging**
Minimizes job site waste and disposal costs
- **Lead-free solar cells**
Reduces the need for specialized end of life disposal

1 - Guaranteed upon initial delivery of the panel; 2 - Maximum power up to 4.99 W above nameplate rating; 3 - Power regularly calibrated by taking the straight average of test data from NREL, TÜV Rheinland PTL, TÜV Rheinland Cologne and Fraunhofer ISE; 4 - based on comparing PTC/STC ratings of major competing multi-crystalline silicon brands; 5 - For full details see the **Evergreen Solar Limited Warranty** available upon request or online. 6 - According to research carried out by the Energy Research Foundation of the Netherlands (2008) and evaluation by Evergreen Solar of latest published competitor data.



Born in the USA

This product is designed to meet UL 1703, UL 4703, UL Fire Safety Class C, IEC 61215 Ed.2 and IEC 61730 Class A standards.

String Ribbon is a trademark of Evergreen Solar, Inc.

Evergreen Solar's wafer manufacturing technology is patented in the United States and other countries.

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Electrical Characteristics

Standard Test Conditions (STC)¹

	ES-A-200 -fa3*	ES-A-205 -fa3*	ES-A-210 -fa3*	
P_{mp}^2	200	205	210	W
$P_{tolerance}$	-0/+4.99	-0/+4.99	-0/+4.99	W
$P_{mp, max}$	204.99	209.99	214.99	W
$P_{mp, min}$	200.00	205.00	210.00	W
η_{min}	12.7	13.1	13.4	%
P_{ptc}^3	180.6	185.2	189.8	W
V_{mp}	18.10	18.20	18.30	V
I_{mp}	11.05	11.27	11.48	A
V_{oc}	22.60	22.70	22.80	V
I_{sc}	11.80	11.93	12.11	A

Nominal Operating Cell Temperature Conditions (NOCT)⁴

T_{NOCT}	45.4	45.4	45.4	°C
P_{max}	146.4	150.1	153.8	W
V_{mp}	16.5	16.6	16.7	V
I_{mp}	8.87	9.04	9.21	A
V_{oc}	20.8	21.0	21.1	V
I_{sc}	9.44	9.57	9.76	A

¹ 1000 W/m², 25°C cell temperature, AM 1.5 spectrum;

² Maximum power point or rated power

³ At PV-USA Test Conditions: 1000 W/m², 20°C ambient temperature, 1 m/s wind speed

⁴ 800 W/m², 20°C ambient temperature, 1 m/s wind speed, AM 1.5 spectrum

* f-framed, a-low voltage, 3-matt blue (textured) cells and black anodized frame

Low Irradiance

The typical relative reduction of module efficiency at an irradiance of 200W/m² both at 25°C cell temperature and spectrum AM 1.5 is 0%.

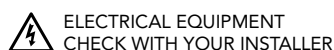
Temperature Coefficients

γP_{mp}	-0.43	%/ °C
βV_{mp}	-0.40	%/ °C
αI_{mp}	-0.03	%/ °C
βV_{oc}	-0.31	%/ °C
αI_{sc}	+0.05	%/ °C

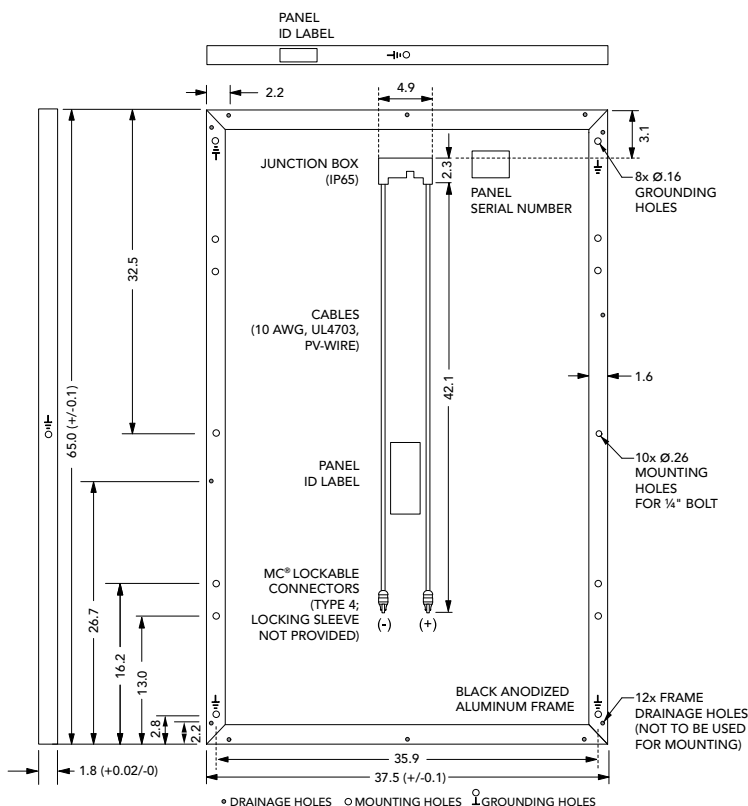
System Design

Series Fuse Rating ⁵	20 A
Maximum System Voltage (UL)	600 V

⁵ Also known as Maximum Reverse Current.



Mechanical Specifications



ALL DIMENSIONS IN INCHES; PANEL WEIGHT 41 LBS

The above drawing is a graphical representation of the product; for engineering quality drawings please contact Evergreen Solar. MC® is a registered trademark of Multi-Contact AG. Product constructed with 114 poly-crystalline silicon String Ribbon™ solar cells, anti-reflective tempered solar glass, EVA encapsulant, polymer back-skin and a black anodized double-walled aluminum frame.

Product packaged 28 per pallet and tested to International Safe Transit Association (ISTA) Standard 2B. All specifications in this product information sheet conform to EN 50380. See the **Evergreen Solar Safety, Installation and Operation Manual, Mounting Guide and Inverter Selection Guide** for further information on approved installation and use of this product.

Due to continuous innovation, research and product improvement, the specifications in this product information sheet are subject to change without notice. No rights can be derived from this product information sheet and Evergreen Solar assumes no liability whatsoever connected to or resulting from the use of any information contained herein.

Partner:

ES-A_fa3_200_205_210_US_010409; effective April 1st 2009

SQFlex

Renewable-energy based water-supply systems
50/60 Hz



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Mission

- to successfully develop, produce, and sell high quality pumps and pumping systems worldwide, contributing to a better quality of life and healthier environment.



GBJ - Bjerringbro, Denmark



GMU - Fresno, California



GPU - Olathe, Kansas



GMX - Monterrey, Mexico



GPA - Allentown, Pennsylvania

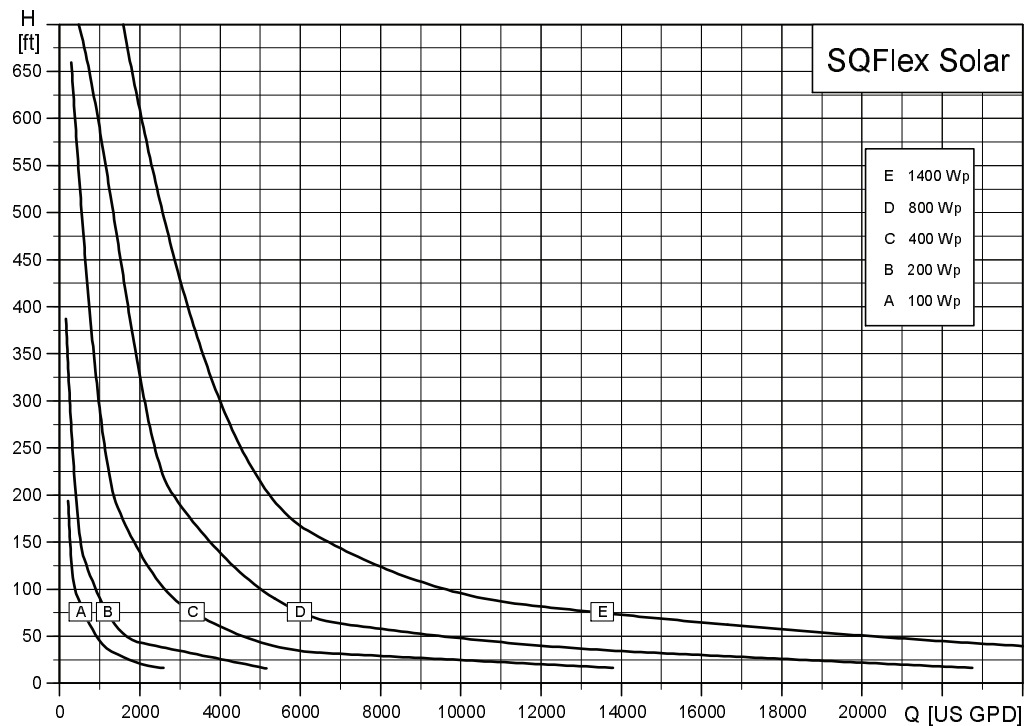


GCA - Oakville, Ontario

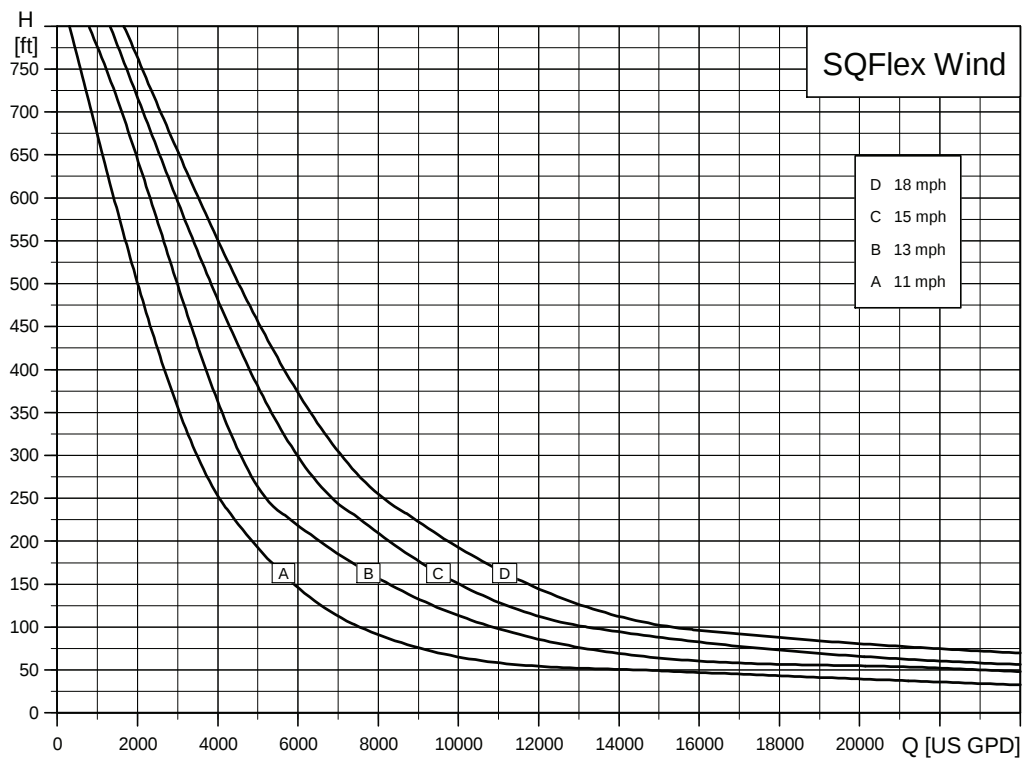
- One of the 3 largest pump companies in the world
- The second largest manufacturer of submersible motors in the world
- World's largest manufacturer of circulator pumps
- World headquarters in Denmark
- North American headquarters in Kansas City - Manufacturing in Fresno, California
- 80 companies in 45 countries
- More than 16 million motors and pumps produced annually worldwide
- North American companies operating in USA, Canada and Mexico
- Continuous reinvestment in growth and development enables the company to
- **BE** responsible, **THINK** ahead, and **INNOVATE**

Product data

Performance range, SQFlex



TM02 2433 2309



TM02 2434 2309

Note: The curves must not be used as guarantee curves.

Product data

Applications

Being designed for continuous as well as intermittent operation, the SQFlex system is especially suitable for water supply applications in remote locations, such as

- villages, schools, hospitals, single-family houses, etc.
- farms
 - watering of cattle
 - irrigation of fields and greenhouses
- game parks and game farms
 - watering applications
- conservation areas
 - surface water pumping
- floating pump installations for pumping of water from ponds and lakes.

SQFlex system

The SQFlex system is a reliable water supply system based on renewable energy sources, such as solar and wind energy. The SQFlex system incorporates an SQF submersible pump.

Very flexible as to its energy supply and performance, the SQFlex system can be combined and adapted to any need according to the conditions on the installation site.

The system components are

- SQF submersible pump
- CU 200 SQFlex control unit
- IO 50 SQFlex switch box
- IO 101 SQFlex switch box
- IO 102 SQFlex breaker box
- charge controller
- energy supply:
 - solar panels
 - wind turbine
 - generator
 - batteries.

Pump

The SQF pump range comprises two pump technologies:

- the helical rotor pump (3") for high heads and small flows.
- the centrifugal pump (4") for low heads and large flows.

The performance curves in fig. 1 illustrates the pump performance for the two pump models.

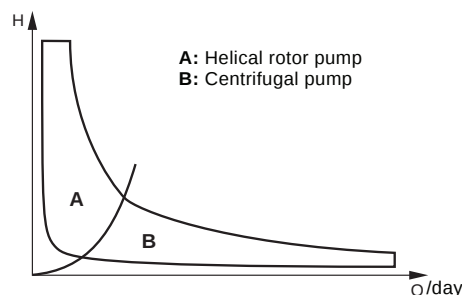


Fig. 1 Performance ranges for helical rotor and centrifugal pumps

Motor

The motor has been developed specifically for the SQFlex system and is designed according to the permanent-magnet principle with built-in electronic unit and is available in only two sizes.

The motor speed range is 500-3600 rpm, depending on power input and load.

The motor is constructed in 304 stainless steel.

Max. ratings are as follows:

- Maximum power input (P_1) of 1400 W
- maximum current of 8.4 A
- maximum speed of 3600 rpm

The pump delivers its maximum performance when one of the above parameters is reached.

Supply voltage

Flexible as regards power supply and power range, the motor can be supplied with either DC or AC voltage:

- 30-300 VDC, PE
- 1 x 90-240 V $-10\%/+6\%$, 50/60 Hz, PE.

TM02 2425 3901

Product data

CU 200 SQFlex control unit

The CU 200 is a combined status and control unit for the SQFlex pump system. Moreover, the CU 200 enables connection of a level switch placed in a water reservoir or tank.

IO 50 SQFlex switch box

The IO 50 is an on/off switch box designed for opening and closing the system power supply.

IO 101 SQFlex switch box

The IO 101 is an on/off switch box designed for opening and closing the system power supply and is used in solar-powered SQFlex systems with a back-up generator.

IO 102 SQFlex breaker box

The IO 102 is an on/off breaker box designed for opening and closing the system power supply and is used in wind-powered SQFlex systems or wind- and solar-powered SQFlex systems.

The IO 102 makes it possible to slow down or stop the wind turbine.

Charge controller

The charge controller is used when a battery backup system is installed with an SQFlex pumping system.

Solar modules

Grundfos' solar modules have been developed specifically for the SQFlex system. The solar modules are equipped with plugs and sockets enabling easy connection in series or parallel.

For further information on solar modules, please contact your local Grundfos company.

Generator

In case the power supply from its primary source of energy is temporarily insufficient or unavailable, the SQFlex system can be powered by a generator.

Batteries

The SQFlex system can be powered by batteries with a voltage supply of 30-300 VDC, maximum current 8.4 A.

Type keys

Type key for helical rotor pumps

Example	6	SQF -2
Rated flow at 3000 rpm [gpm]		
Type range		
Number of stages		

Type key for centrifugal pumps

Example	25	SQF -3
Rated flow of corresponding SP pump [gpm]		
Type range		
Number of stages		

Pumped liquids

SQF pumps are applicable in thin, clean, non-aggressive, non-explosive liquids, not containing solid or long-fibred particles larger than sand grains.

pH value: 5 to 9.

Liquid temperature: 32 °F to 104 °F.

The pump can run at free convection (~ 0 ft/s) at maximum 104 °F.

Sand content

Maximum sand content: 50 ppm.

A higher sand content will reduce the pump life considerably due to wear.

Salt content (chloride ions Cl⁻)

The table below shows the resistance of stainless steel to Cl⁻. The figures in the table are based on a pumped liquid with a pH value of 5 to 9.

Stainless steel AISI	Cl ⁻ content [ppm]	Liquid temperature [°F]
304	0-300	< 104
	300-500	< 86

Product data

Curve conditions

Performance range, SQFlex Solar

The SQFlex Solar performance range shown on page 4 is based on

- solar radiation on a tilted surface (tilt angle of 20°)
- $H_T = 6 \text{ kWh/m}^2$ per day
- ambient temperature: 85 °F
- 20° northern latitude.

Performance range, SQFlex Wind

The SQFlex Wind performance range shown on page 4 is based on

- average wind speed, measured over one month
- calculations according to Weibull's factor $k = 2$
- continuous operation over 24 hours.

Specific performance charts

The specific performance charts in the Performance Curves section of this booklet are based on the following guidelines:

- All curves show mean values.
- The curves must not be used as guarantee curves.
- Typical deviation: $\pm 15\%$.
- The measurements have been made at a water temperature of 68 °F.
- The curves apply to a kinematic viscosity of $1 \text{ mm}^2/\text{s}$ (1 cSt). If the pump is used for liquids with a viscosity higher than that of water, this will reduce the head and increase the power consumption.

Pressure loss

The QH curves are inclusive of inlet and valve losses at actual speed.

Product data

System overview

The SQFlex system can be used in a number of combinations as shown in the table below.

System	consists of the following components							
	Pump	Solar panels ★	Wind turbine	Generator/ battery/ power supply	Charge controller	Switch box or breaker box	Control unit	Additional extras
SQFlex Solar See page 11.								
						IO 50		
SQFlex Solar - with CU 200 and level switch See page 12.								
							CU 200	(★★)
SQFlex Solar - with back-up generator See page 13.								
						IO 101		
SQFlex Solar - with back-up batteries See page 14.								 Pressure tank  Pressure switch
						IO 50 or IO 101 (★★)	CU 200	
SQFlex Wind See page 15.								
						IO 102		
SQFlex Wind - with CU 200 and level switch See page 16.								
						IO 102	CU 200	(★★)
SQFlex Combo - combination of solar and wind energy See page 17.								
						IO 102		
SQFlex Combo - with CU 200 and level switch See page 17.								
						IO 102	CU 200	(★★)
SQFlex system - with generator as power supply See page 19.								
						IO 101		

★ For number of solar modules required, please consult the sizing tool in Grundfos WinCAPS/WebCAPS. ★★ Optional.

Features and benefits

Dry-running protection

The SQF pump is protected against dry running in order to prevent damage to the pump. The dry-running protection is activated by a water level electrode placed on the motor cable 12-24 in. above the pump, depending on pump type.

The water level electrode measures the contact resistance to the motor sleeve through the water. When the water level falls below the water level electrode, the pump will be cut out. The pump will automatically cut in again 5 minutes after the water level is above the water level electrode.

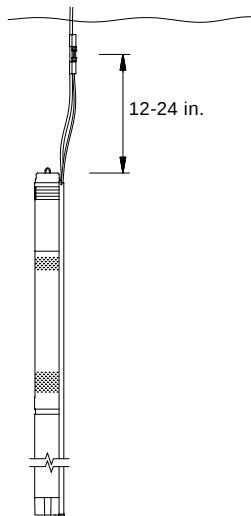


Fig. 2 Vertical installation

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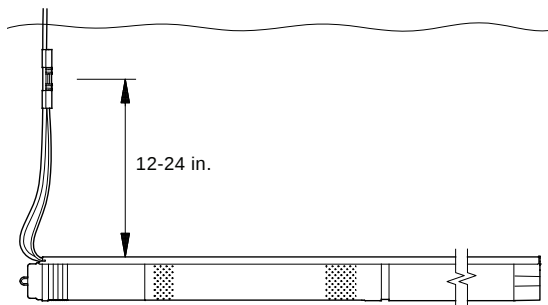


Fig. 3 Horizontal installation

TM02 2435 3901

High efficiency

The MSF 3 motor is a permanent-magnet motor (PM motor) featuring a higher efficiency within the power range compared to a conventional asynchronous motor.

In addition to this, the segmented motor stator contributes considerably to the high efficiency.

The MSF 3 motor is furthermore characterized by a high locked-rotor torque even at low power supply.

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable power supply or a faulty installation.

The pump will be cut out if the voltage falls outside the permissible voltage range. The motor is automatically cut in when the voltage is again within the permissible voltage range. Therefore no extra protection relay is needed.

Note: The MSF 3 motor is protected against transients from the power supply according to IEC 60664-1 "overvoltage category III" (4 kV). In areas with high lightning intensity, external lightning protection is recommended.

Overload protection

In case the upper load limit is exceeded, the motor will automatically compensate for this by reducing the speed. If the speed falls below 500 rpm, the motor will be cut out automatically.

The motor will remain cut out for 10 seconds after which period the pump will automatically attempt to restart.

The overload protection prevents burnout of the motor. Consequently, no extra motor protection is required.

Overtemperature protection

A permanent-magnet motor gives off very little heat to its surroundings. In combination with an efficient internal circulation system leading the heat away from the rotor, stator and bearings, this fact ensures optimum operating conditions for the motor.

As an extra protection, the electronic unit has a built-in temperature sensor. When the temperature rises above 185 °F, the motor is automatically cut out. When the temperature has dropped to 165 °F, the motor is automatically cut in again.

Features and benefits

Maximum Power Point Tracking (MPPT)

The built-in electronic unit gives the SQFlex system a number of advantages compared to conventional products. One of these advantages is the built-in microprocessor with MPPT (MPPT = **M**aximum **P**ower **P**oint Tracking).

Thanks to the MPPT-function, the pump duty point is continuously optimised according to the input power available. MPPT is only available for pumps connected to DC supply.

Wide voltage range

The wide voltage range enables the motor to operate at any voltage from 30-300 VDC or 90-240 VAC. This makes installation and sizing especially easy.

Built-in sand shield

The built-in sand shield prevents sand damage to the pump and motor by slinging it out through the oval slots located at the base of the pump end.

Reliability

The MSF 3 motor has been developed with a view to high reliability which is achieved through the following features:

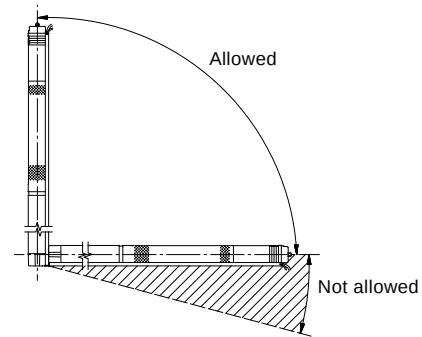
- carbon/ceramic bearings
- excellent starting capabilities
- various protection facilities.

Installation

The following features ensure simple installation of the SQF pump:

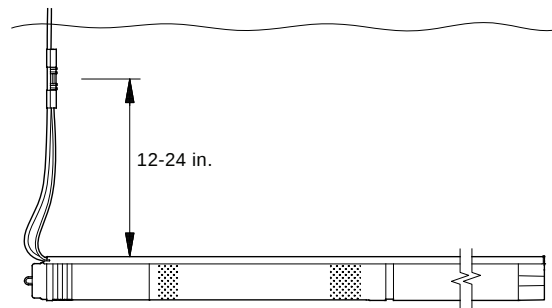
- low weight ensuring user-friendly handling
- installation in 3", 4" or larger boreholes
- only an on/off switch is needed, which means that no extra motor starter / starter box is necessary.

Note: Horizontal installation requires the water level electrode to be placed above the pump to ensure the dry-running protection.



TM02 2246 3901

Fig. 4 Installation of SQF pumps



TM02 2435 3901

Fig. 5 Horizontal installation

Service

The modular pump and motor design facilitates installation and service. The cable and the end cover with socket are fitted to the pump with screws which enable replacement.

Application examples

SQFlex Solar

The SQFlex Solar system is the simplest of the range of SQFlex systems.

Benefits

- Easy to install
- Maintenance confined to periodic cleaning of the solar panels
- Few and simple components.

The protective circuit incorporated in the motor electronic unit cuts out the pump in case of dry running or similar situations.

By using the IO 50, the power supply to the pump can be closed manually, for example when

- there is no need for water supply
- the system requires service.

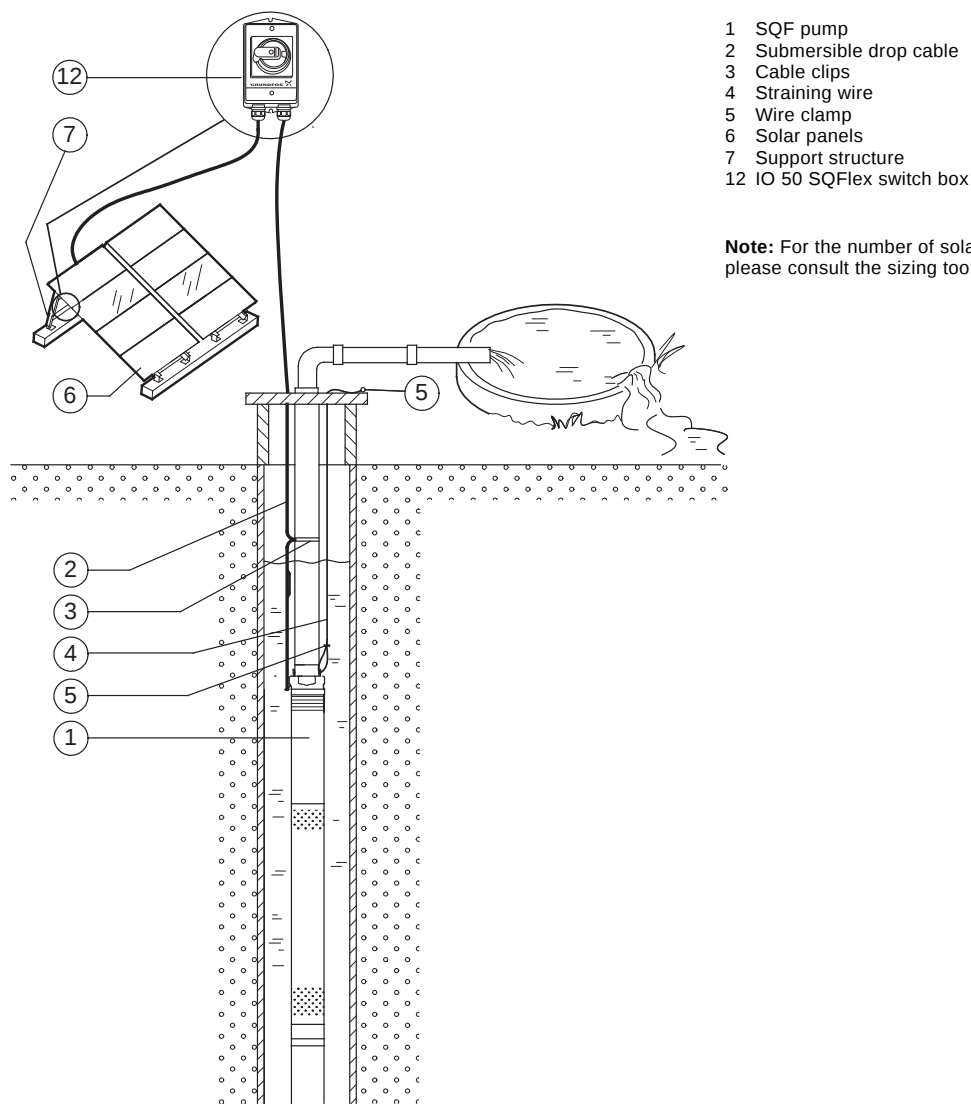


Fig. 6 SQFlex Solar

Application examples

SQFlex Solar

- with CU 200 and level switch

The SQFlex Solar system allows solar energy to be stored as water in a reservoir.

SQFlex Solar water supply systems with a water reservoir are used where

- there is a need for water supply at night
- for short periods, the solar energy is insufficient to run the pump
- there is a need for a back-up water source.

Benefits

Combined with the CU 200, the level switch acts as a pump cut-out function when the water reservoir is full.

The CU 200 offers indication of

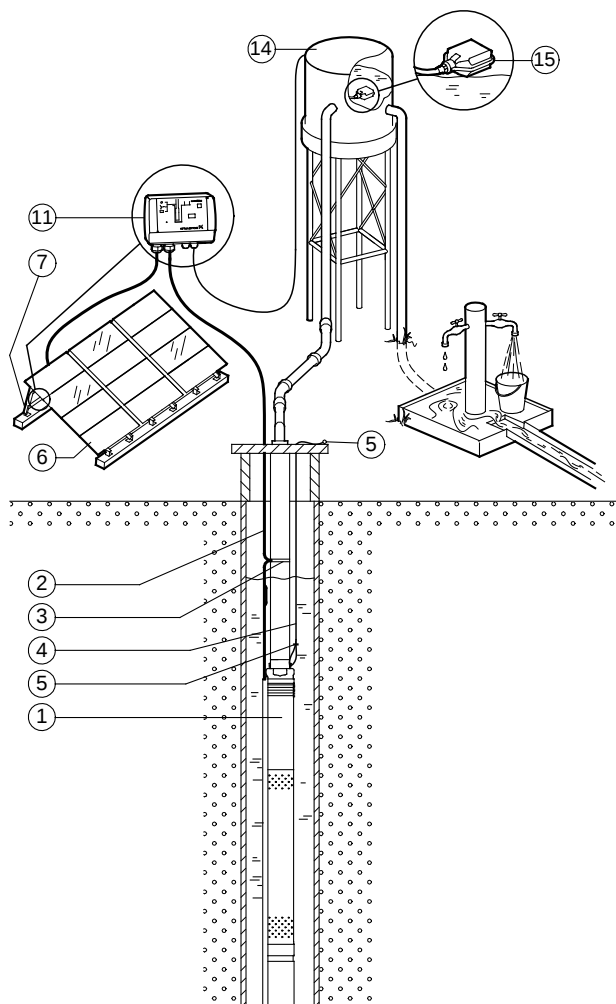
- full water reservoir (level switch activated)
- pump operation
- input power.

The CU 200 indicates operational stoppage in case of

- dry running
- service (see page 21)
- insufficient energy supply.

In addition, the system features

- easy installation
- maintenance confined to periodic cleaning of the solar panels.



- 1 SQF pump
- 2 Submersible drop cable
- 3 Cable clips
- 4 Straining wire
- 5 Wire clamp
- 6 Solar panels
- 7 Support structure
- 11 CU 200 SQFlex control unit
- 14 Water reservoir
- 15 Level switch

Note: For the number of solar modules required, please consult the sizing tool in Grundfos WinCAPS.

Fig. 7 SQFlex Solar with CU 200 and level switch

TM02 2305 4101

Application examples

SQFlex Solar

- with back-up generator

During periods of limited solar energy, the SQFlex Solar water supply system provides reliable water supply. The system is connected to an external back-up generator via the IO 101.

The system switches automatically to operation

- via generator when
 - the energy supply from the solar panels is insufficient
- via solar panels when
 - the generator is stopped manually or
 - the generator runs out of fuel.

Benefits

The system offers water supply during the night or during periods of insufficient solar energy.

Other benefits of the system include

- easy to install
- maintenance confined to periodic cleaning of the solar panels
- few and simple components
- flexible in terms of energy supply.

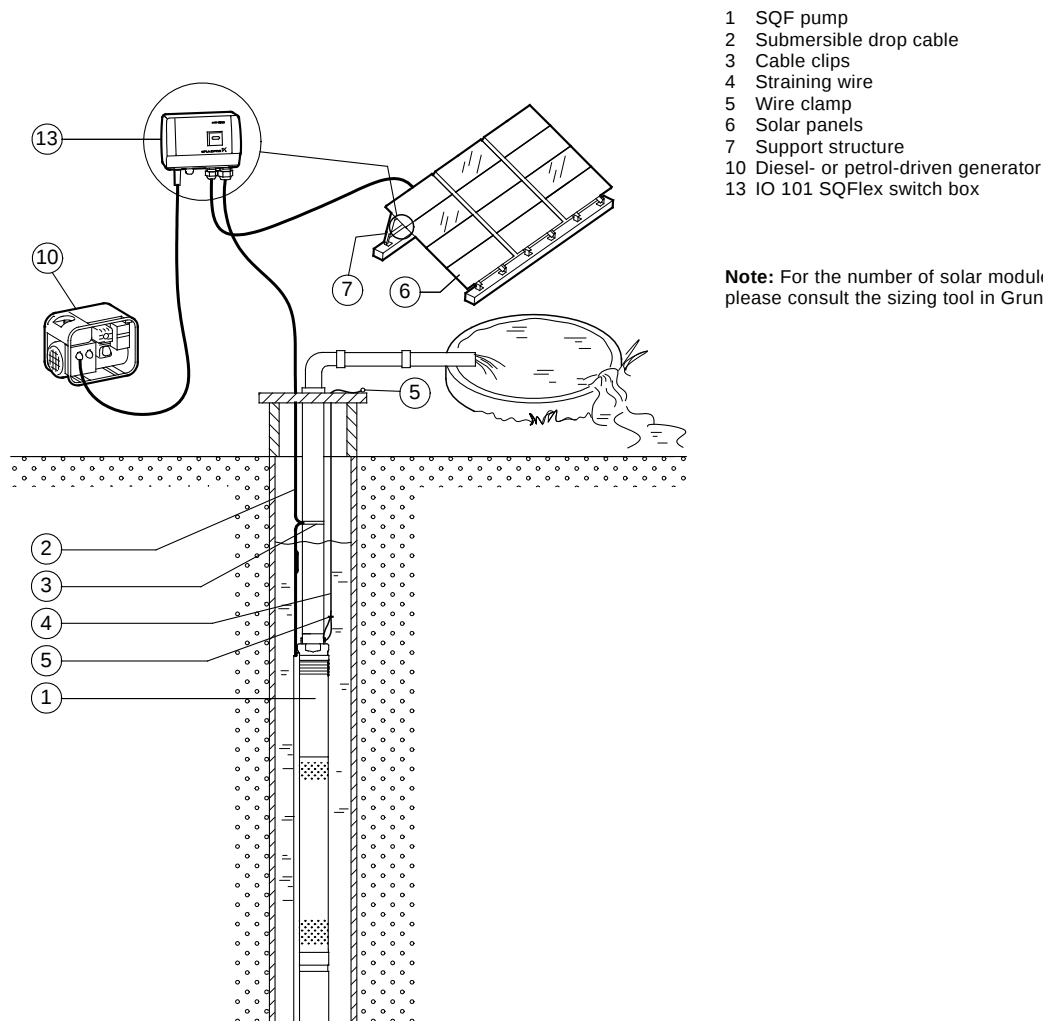


Fig. 8 SQFlex Solar with back-up generator

TM02 2309 4101

Application examples

SQFlex Solar

- with back-up batteries

During periods of limited solar energy, the SQFlex Solar system provides reliable water supply.

The supply of water is ensured by back-up batteries connected to the system via the charge controller.

The system is connected as shown in fig. 9.

- Power will be provided by the solar panels wired to produce 48-110 VDC (rated).
- Power from the solar panels will feed into a 48 VDC charge controller, which will regulate the current fed to the batteries.
- From the charge controller, power passes into the battery bank, which consists of the number of appropriately sized batteries, wired in series to achieve 48 VDC (rated) output.

- Power is drawn from the battery bank and routed through a CU 200.

Option: An IO 50 or IO 101 is to be installed to enable disconnection of the DC voltage.

If an IO 101 is installed, it is possible to add a generator to the system.

- Power is run from the CU 200 to the SQFlex pump.

Benefits

The system offers water supply during the night or during periods of insufficient solar energy.

Other benefits of the system include

- easy installation
- a minimum of maintenance
- few and simple components
- flexibility in terms of energy supply.

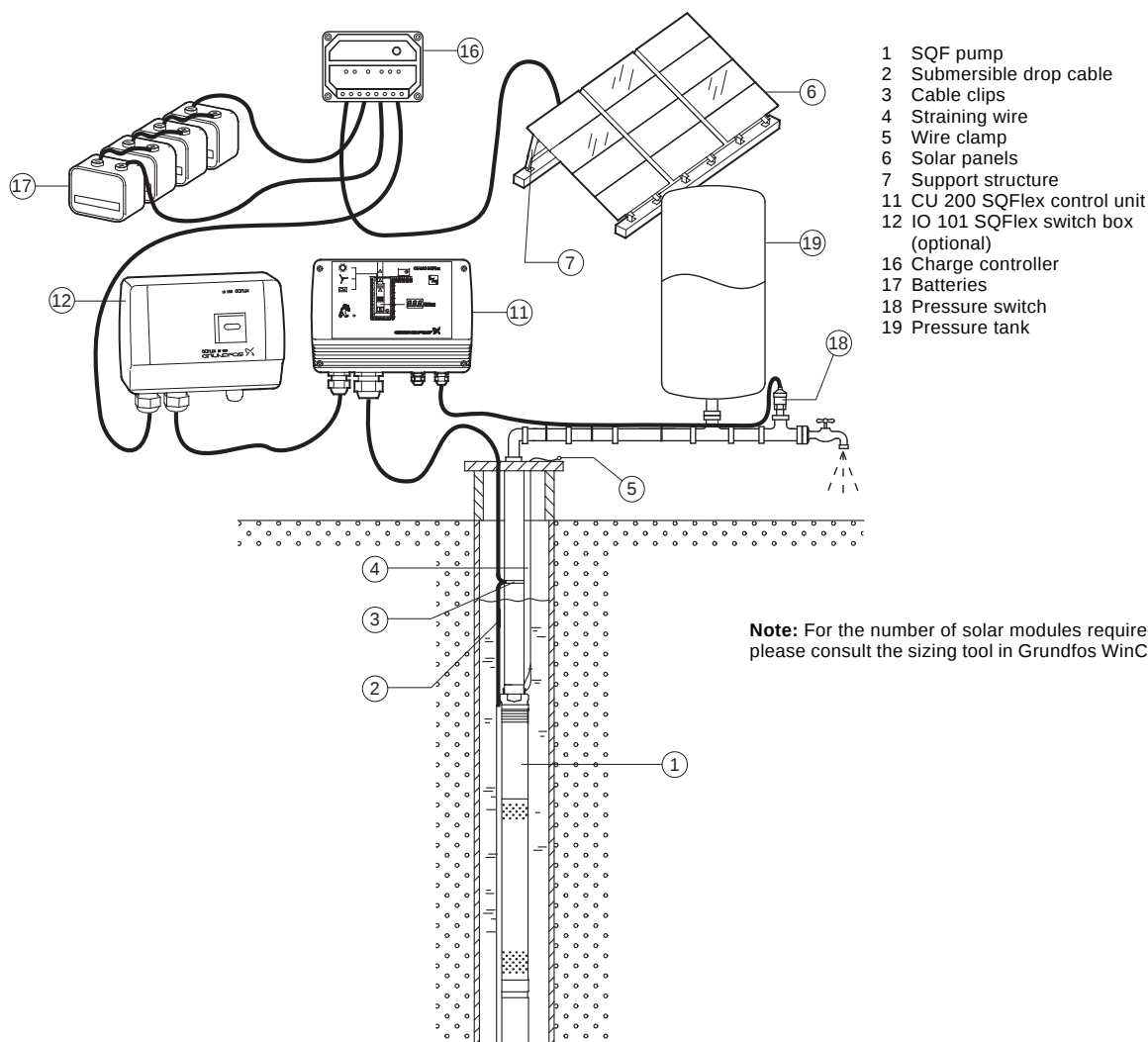


Fig. 9 SQFlex Solar with back-up batteries

Application examples

SQFlex Wind

The SQFlex Wind system is based on wind energy as the only energy source for pump operation.

The system is suitable for installation in areas where the wind is almost constant seen over a period of time.

As the turbine noise level increases with the wind speed, installation of the wind turbine near a residence is not recommended.

The IO 102 makes it possible to slow down the wind turbine when

- there is no need for water supply
- the system requires service.

Benefits

- Easy to install
- A minimum of maintenance
- Few and simple components

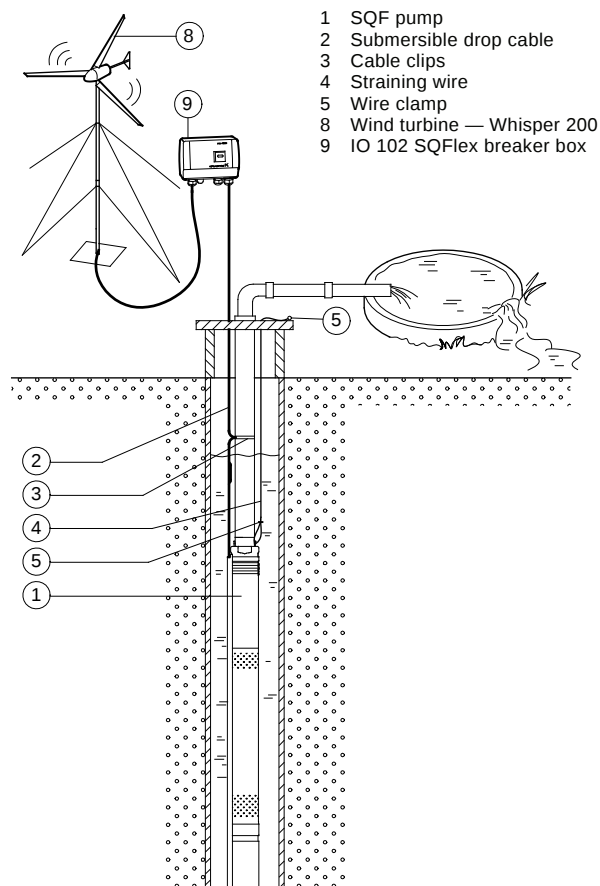


Fig. 10 SQ FlexWind

Proper siting for wind turbines

For proper wind siting you must locate your Whisper wind turbine 20 ft above any surrounding object within a 250 ft radius as shown in fig. 11.

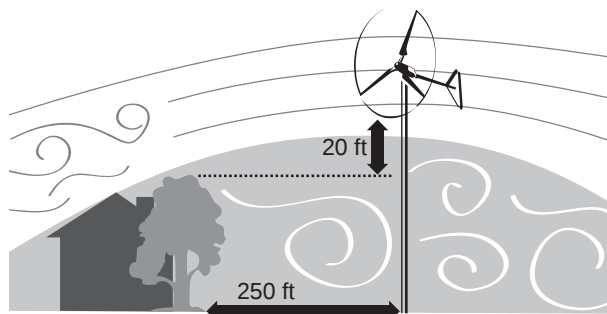
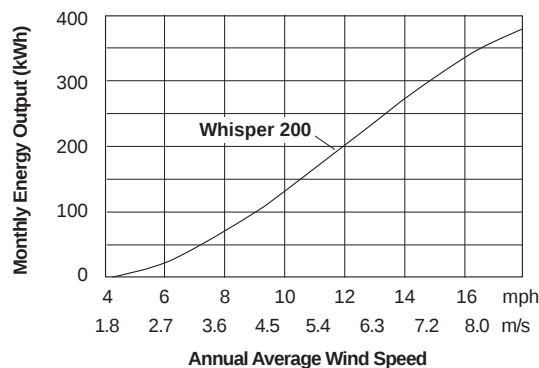
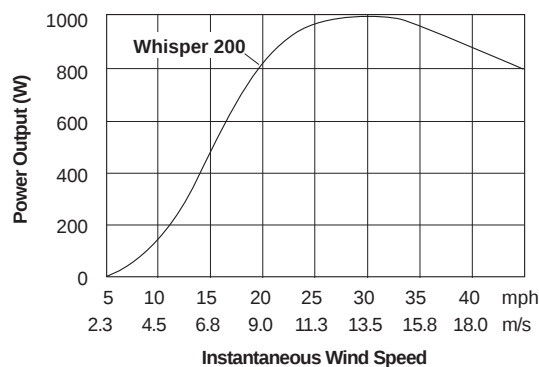


Fig. 11 Proper wind turbine siting

Wind turbine performance curves



TM02 2306 4101

Application examples

SQFlex Combo

- combination of solar and wind energy

The SQFlex Combo water supply system is ideal in areas where the solar and/or wind energy is sufficient to run the pump.

The energy supply to the pump is a combination of solar and wind energy.

As the turbine noise level increases with the wind speed, installation of the wind turbine near a residence is not recommended.

Benefits

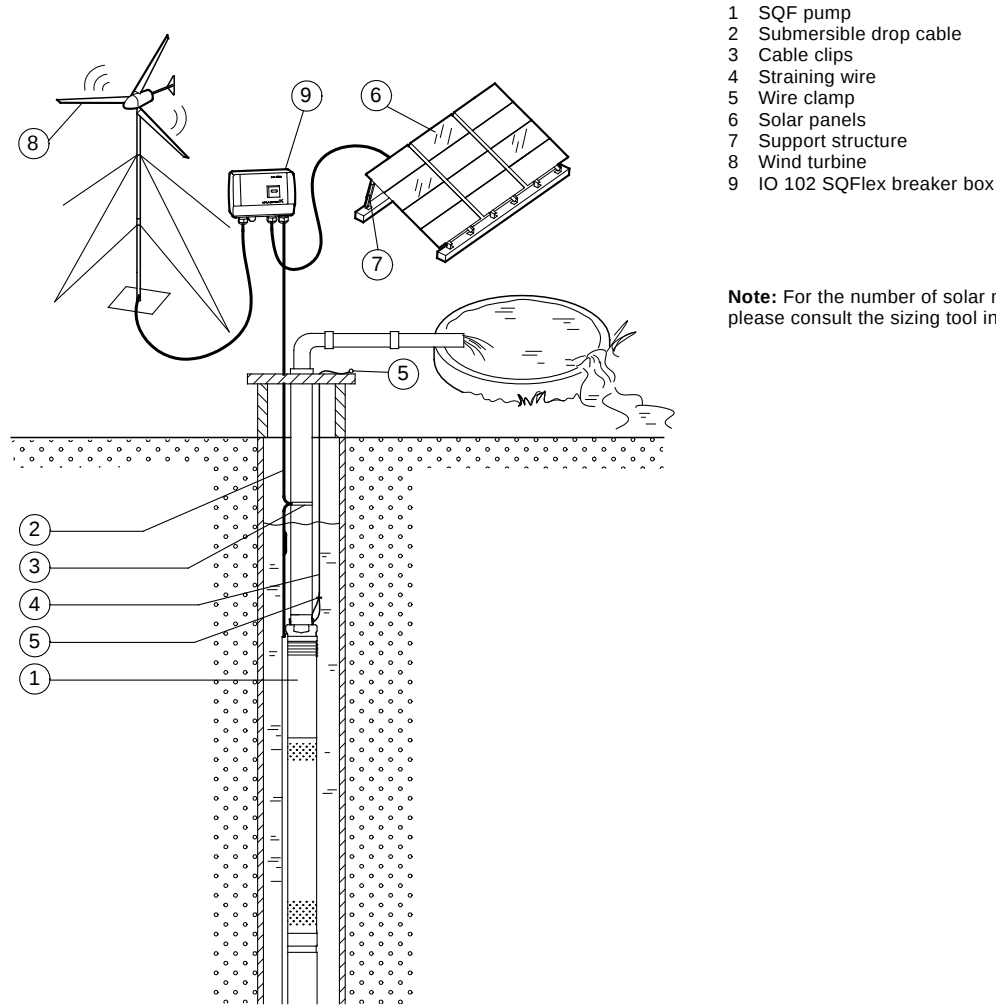
The system offers water supply during the night or during periods of insufficient solar energy.

Other benefits of the system include

- easy to install
- maintenance confined to periodic cleaning of the solar panels
- few and simple components.

The IO 102 makes it possible to switch off the power supply in the system and to slow down or stop the wind turbine when

- there is no need for water supply
- the system requires service.



Note: For the number of solar modules required, please consult the sizing tool in Grundfos WinCAPS.

Fig. 13 SQFlex Combo – combination of solar and wind energy

TM02 2307 4101

Application examples

SQFlex Combo

- with CU 200 and level switch

The SQFlex Combo system allows solar and wind energy to be stored as water in a reservoir.

SQFlex Combo water supply systems with a water reservoir are used where

- for short periods, the solar or wind energy is insufficient to run the pump
- there is a need for a back-up water source.

As the turbine noise level increases with the wind speed, installation of the wind turbine near a residence is not recommended.

Benefits

Combined with the CU 200, the level switch acts as a pump cut-out function when the water reservoir is full.

The CU 200 offers indication of

- full water reservoir (level switch activated)
- pump operation
- input power.

The CU 200 indicates operational stoppage in case of

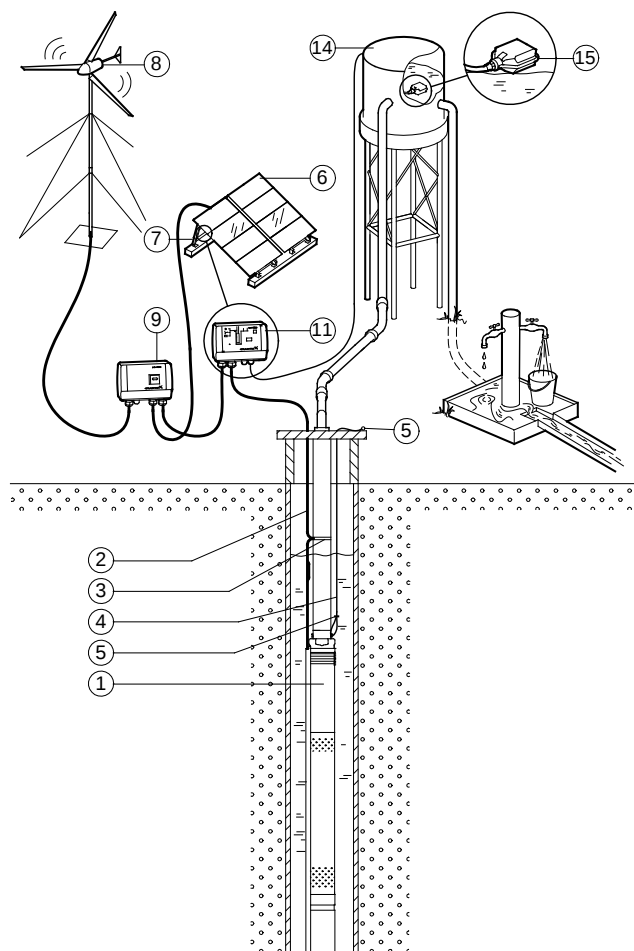
- dry running
- service (see page 21)
- insufficient energy supply.

The IO 102 makes it possible to switch off the power supply in the system and to slow down or stop the wind turbine when

- there is no need for water supply
- the system requires service.

Other benefits of the system include

- easy installation
- a minimum of maintenance.



- 1 SQF pump
- 2 Submersible drop cable
- 3 Cable clips
- 4 Straining wire
- 5 Wire clamp
- 6 Solar panels
- 7 Support structure
- 8 Wind turbine
- 9 IO 102 SQFlex breaker box
- 11 CU 200 SQFlex control unit
- 14 Water reservoir
- 15 Level switch

Note: For the number of solar modules required, please consult the sizing tool in Grundfos WinCAPS.

Fig. 14 SQFlex Combi with CU 200 and level switch

TM02 2310 4101

Application examples

SQFlex system

- with generator as power supply

The SQFlex water supply system is connected to a diesel- or petrol-driven generator.

Benefits

The system offers water supply 24 hours a day, independently of the weather.

Other benefits of the system include

- easy installation
- a minimum of maintenance required
- few and simple components.

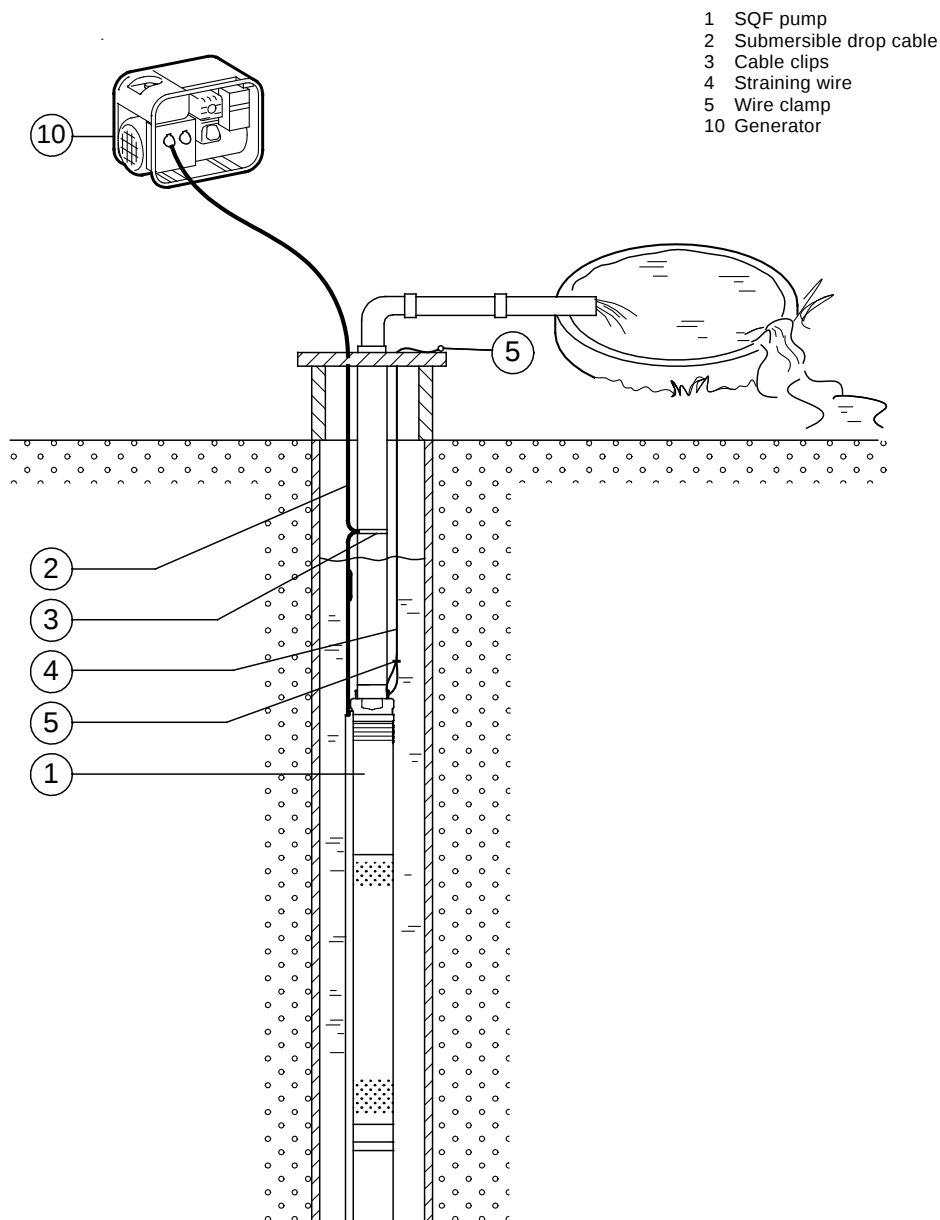


Fig. 15 SQFlex system with generator as power supply.

TM02 2311 4101

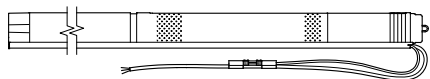
System components

SQF submersible pump

The SQF pump is available as a complete unit only.

The SQF pump complete comprises

- motor
- 6 ft cable with water level electrode and socket
- cable guard.



TM02 2217 3901

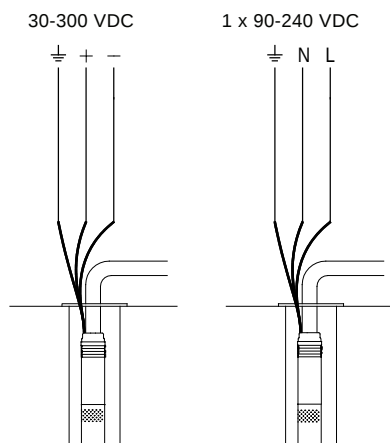
Fig. 16 SQF pump

Currently the complete range consists of six centrifugal pumps and five helical rotor pumps. The centrifugal pumps are adapted from Grundfos' present 4" SP range (16S, 25S, 40S, and 60S). These pumps are used when lower heads and higher flow rates are required.

The positive displacement helical pump ends are 3" in diameter and available in five models ranging from 3 to 11 gpm. These are designed for higher head and lower flow requirements. The pump rotor is a single-twisted helix (spiral) made of hard-chromium plated stainless steel. During operation, the rotor rotates eccentrically in a double helical elastic stator.

The motor is to be connected to the power supply as shown in fig. 17.

As the integrated electronic unit enables the motor to handle both DC and AC supply voltages, it makes no difference how the wires "+" and "-" or "N" and "L" are connected.



TM02 2437 3901

Fig. 17 Wiring diagram

CU 200 SQFlex control unit

The CU 200 is a combined status, control and communication unit especially developed for the SQFlex system. The CU 200 also enables connection of a level switch.

The CU 200 incorporates cable entries for

- power supply connection (pos. 6)
- pump connection (pos. 7)
- earth connection (pos. 8)
- level switch connection (pos. 9).

(The position numbers in brackets refer to fig. 18.)

Communication between the CU 200 and the pump takes place via the pump power supply cable. This is called mains borne signalling (or Power Line Communication), and this principle means that no extra cables between the CU 200 and the pump are required.

It is possible to start, stop and reset the pump with the on/off button (pos. 1). The CU 200 offers

- system monitoring
- alarm indication.

The following indications allow the operation of the pump to be monitored:

- water reservoir is full (level switch) (pos. 2)
- pump is running (pos. 3)
- input power (pos. 11).

The CU 200 offers the following alarm indications:

- Dry running (pos. 10)
- Service needed (pos. 5) in case of
 - no contact to pump
 - overvoltage
 - overtemperature
 - overload.

In addition, the CU 200 shows the symbols of the energy supply options (pos. 4).

System components

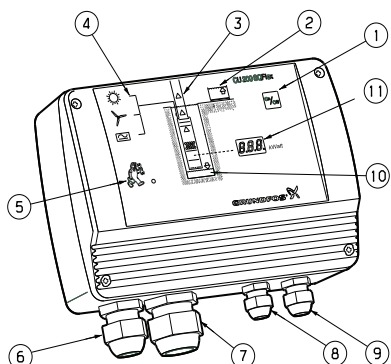


Fig. 18 CU 200 elements

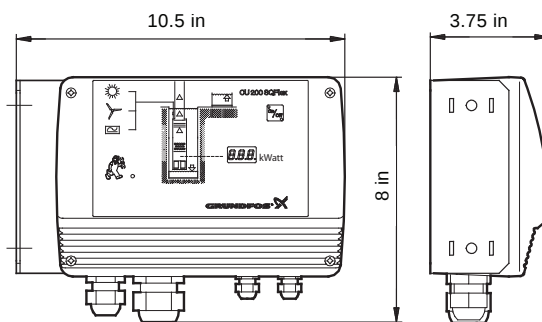


Fig. 19 CU 200, dimensional sketch

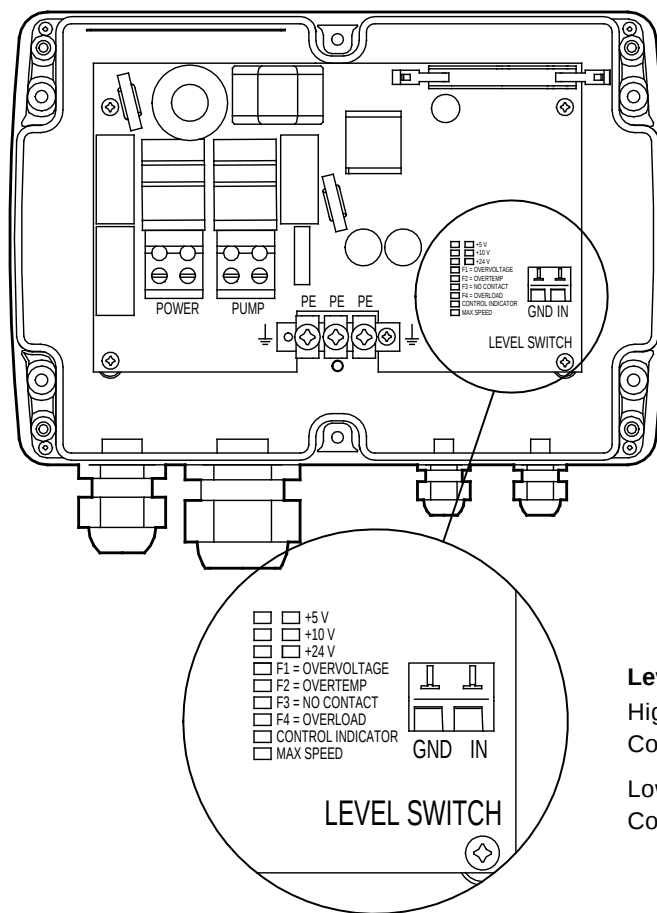


Fig. 20 Electrical connections, CU 200

Level switch input
 High water level:
 Contact is closed.
 Low water level:
 Contact is open.

System components

IO 50 SQFlex switch box

The IO 50 is designed specifically for solar-powered SQFlex systems.

The IO 50 enables manual starting and stopping of the pump in an SQFlex Solar system and functions as a connection box joining all necessary cables.

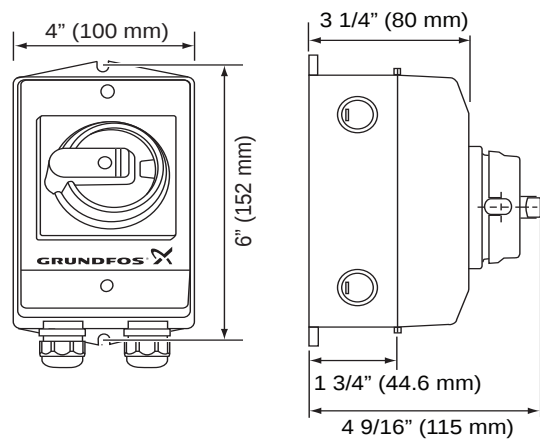


Fig. 21 IO 50, dimensional sketch

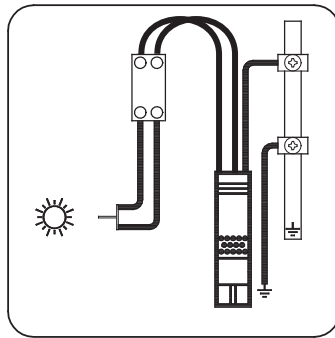


Fig. 22 Wiring diagram

TM02 4058 4701

IO 101 SQFlex switch box

The IO 101 is designed specifically for solar-powered SQFlex systems.

The IO 101 enables the connection of a back-up generator in case of insufficient solar energy. The switching between solar power and generator must be made manually.

In case the generator is stopped manually or runs out of fuel, the IO 101 will automatically change over to the solar panels.

The IO 101 functions as a connection box joining all necessary cables.

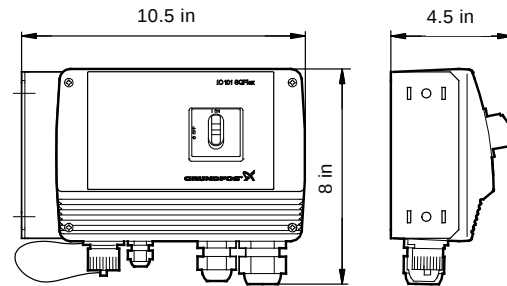


Fig. 23 IO 101, dimensional sketch

TM02 2546 4003

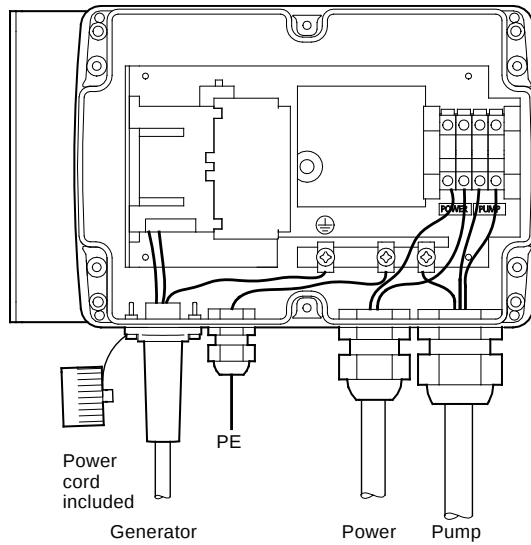


Fig. 24 Electrical connections

TM02 4162 5001

System components

IO 102 SQFlex breaker box

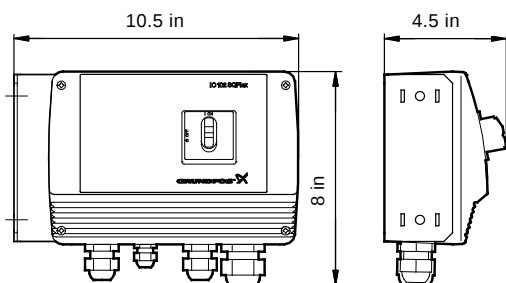
The IO 102 is designed specifically for wind-powered SQFlex systems.

The IO 102 enables manual starting and stopping of the pump in an SQFlex Wind system or an SQFlex Combo system.

The on/off switch has a built-in "electrical brake" for the turbine. When the switch is in "off" position, the turbine stops or slows down.

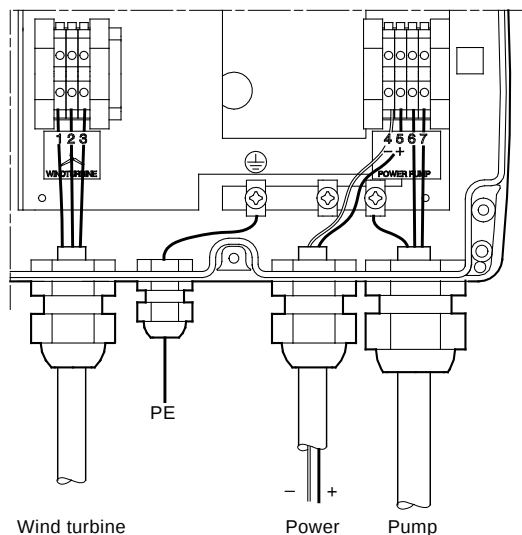
The IO 102 rectifies the three-phase AC voltage from the wind turbine into DC voltage. Furthermore, the IO 102 enables the combination of wind energy from the wind turbine and solar energy from the solar panels.

The IO 102 functions as a connection box joining all necessary cables.



TM02 4232 4003

Fig. 25 IO 102, dimensional sketch



TM02 4312 0502

Fig. 26 Electrical connections

Charge controller

The charge controller is used when a battery backup system is installed with an SQFlex pumping system. These systems are typically used in applications where the pump is not running during most of the peak sun hours of the day, or where it is impossible or impractical to store large volumes of water. Examples include remote homes or cabins, automatic livestock waterers and very low-yielding wells.

The charge controller is a fully automatic battery charger and the only setting required is the selection of battery type.

There are three battery types to choose from:

- gel battery
- sealed battery
- flooded battery.

The charge controller enables manual disconnection of the pump, the solar modules or both at the same time.

Wind turbine

Grundfos offers a Whisper 200 wind turbine.

The IO 102 functions as a breaker box and must be included in wind-powered SQFlex systems.

Note: The IO 102 must be ordered separately.

Generator

The generator can be either diesel- or gasoline-driven.

The generator must be running steadily before the pump is cut in.

System sizing

Sizing of SQFlex system

Grundfos has developed a PC-based sizing tool enabling the sizing of SQFlex systems.

The sizing tool is integrated in Grundfos WinCAPS and covers both solar- and wind-powered systems. Visit Grundfos.com to use WebCAPS, our online version of WinCAPS.

The following three parameters must be known for the sizing of the optimum SQFlex system:

- installation location
- maximum head required
- quantity of water required.

With a view to the sizing of a correct solar-powered SQFlex system, the world has been divided into six regions:

- North America
- South America
- Australia/New Zealand
- Asia/Pacific
- Southern Africa
- Europe/Middle East/Northern Africa.

Each region is divided into a number of zones according to the solar radiation in kWh/m² per day.

Voltage effect on pump efficiency

The pump efficiency can vary quite a bit depending on input voltage. This chart shows the dropoff in efficiency as the voltage gets lower. For example, if you have two systems with the exact same wattage rating, but System A is running at 120V and System B is running at 35V, System A will produce 20% more water than System B.

SQ Flex optimal efficiency	
Panel output voltage	(% loss in gallons/day)
120V - 300V	- 0 %
90V	- 5 %
60V	- 10 %
35V	- 20 %

Solar panel wiring

Methods of solar panel wiring

Solar panels can be connected in one of three methods:

1. Series wiring
2. Parallel wiring
3. Series/parallel wiring (a combination of the two)

The Grundfos SQFlex pump is most efficient at voltages of 120V and above, up to a max of 300V. To maximize pump performance connect panels to obtain at least 120V.

Series wiring

All solar panels have a negative (-) and a positive (+) terminal.

When wiring panels in series, voltages add and amperage stays the same.

To wire panels in series connect the positive terminal of one panel to the negative terminal of the next panel.

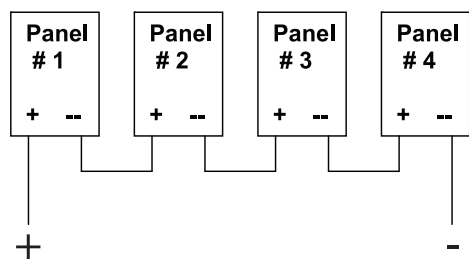


Fig. 27 Solar panel wiring in series

Panel voltages add in series, so if the panels in fig. 27 are rated at 33.3v (GF80), then the total voltage will be:

$$33.3 + 33.3 + 33.3 + 33.3 = 133V$$

Panel amperage remains the same, so if each panel produces 2.4 amps, then the total current will be 2.4 amps.

Panel wattage always adds, so if each panel is rated at 80W the total wattage (Watts = Volts x Amps) output will be:

$$80 + 80 + 80 + 80 = 320W$$

Parallel wiring

When wiring panels in parallel, results are the opposite of series wiring, that is, amperages add and voltage stays the same.

To wire panels in parallel, connect the positive terminal of each panel to the positive terminal of the other panels and negative terminal of each panel to the negative terminal of the other panels.

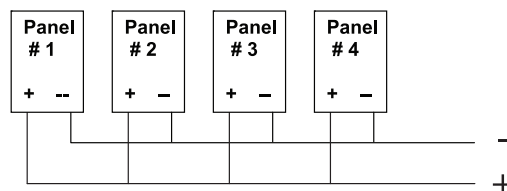


Fig. 28 Solar panel wiring in parallel

Panel voltage remains the same, so if the panels in fig. 28 produce 33V each, then the total output will be 33V.

Panel amperage adds in parallel, so if the panels in fig. 28 are rated at 2.4A, then the total current will be:

$$2.4 + 2.4 + 2.4 + 2.4 = 9.6A$$

Panel wattage always adds, so if each panel is rated at 80W the total wattage (Watts = Volts x Amps) output will be:

$$80 + 80 + 80 + 80 = 320W$$

Series/parallel circuits

A series/parallel circuit is simply two or more series circuits that are wired together in parallel.

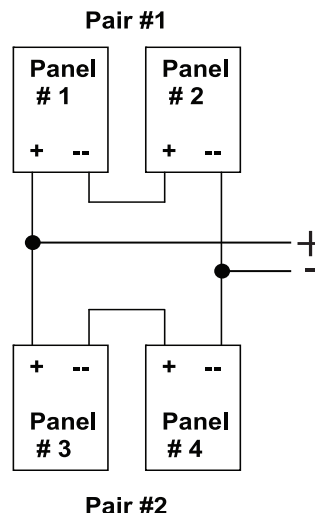


Fig. 29 Solar panel wiring in series/parallel circuit

In fig. 29 two separate pairs of panels have been wired in series and each of these series pairs have been wired together in parallel.

To determine the total voltage and amp output of this array, consider first each pair of panels wired in series. Think of each pair as a single panel. Each panel has a rating of 33V, 2.4A and 80W. Remember that in series, voltage adds, while amperage remains the same. Pair #1 provides $33 + 33 = 66V$ and 2.4A. Pair #2 provides the same (continued on next page).

Solar panel wiring

Now add the two pairs in parallel. Remember in parallel, voltage remains the same and amperage adds. Each pair produces 66V, so total voltage = 66V. Each pair produces 2.4A, so total amperage is 2.4 + 2.4 = 4.8A. Watts always add, so 80W x 4 = 320W.

Cable sizing chart

Since the SQFlex motor operates at peak efficiency with 120V or greater applied, we strongly recommend configuring panels to achieve 120V or greater.

Lower voltages result in greater losses in the drop cable, and it is important to the customer to make efficient use of every watt generated. Additionally, significant savings in drop cable costs can be realized by configuring for higher voltages.

Panels	Power (Wp)	Voltage (Vmp)	14 AWG	12 AWG	10 AWG	Amps	Series	Parallel
1	80	33	82	130	207	2.4	1	
2	160	67	164	261	415	2.4	2	
3	240	100	246	391	622	2.4	3	
4	320	133	328	522	829	2.4	4	
5	400	167	410	652	1037	2.4	5	
6	480	200	493	783	1244	2.4	6	
7	560	233	575	913	1451	2.4	7	
8	640	266	657	1044	1659	2.4	8	
8	640	133	164	261	415	4.8	4	2
9	720	100	82	130	207	7.2	3	3
10	800	167	205	326	518	4.8	5	2
12	960	200	246	391	622	4.8	6	2
14	1120	233	287	457	726	4.8	7	2
15	1200	167	137	217	346	7.2	5	3
16	1280	133	82	130	207	9.6	4	4
18	1440	200	164	261	415	7.2	6	3

Notes:

Max. cable length in ft; uses a max. 3 % voltage drop.

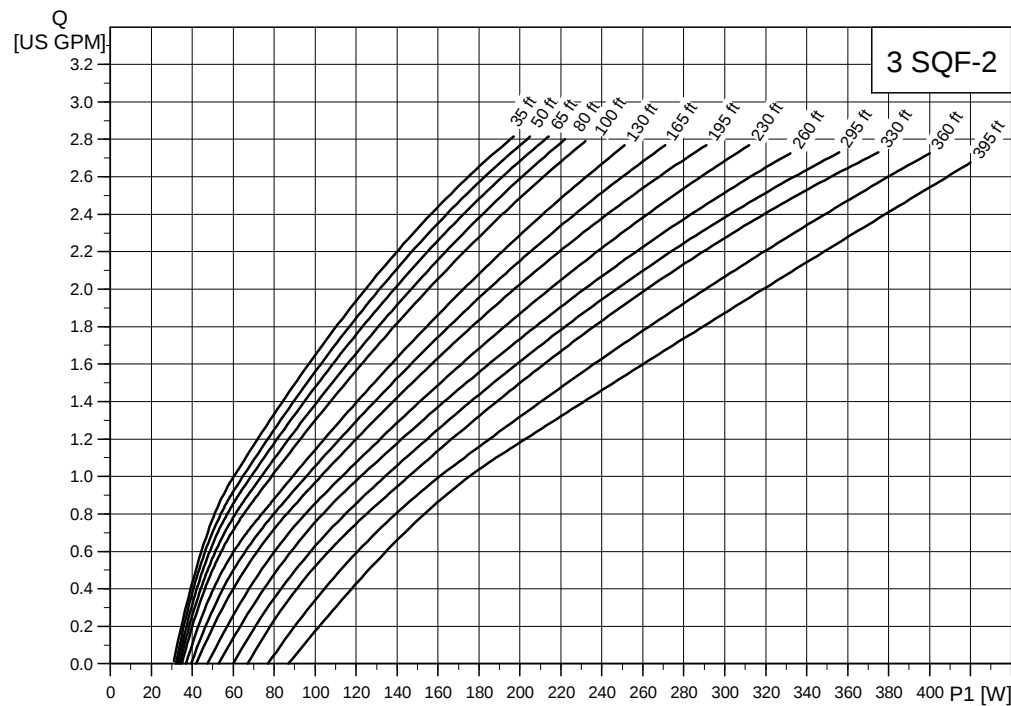
Based on the Grundfos GF80 panel.

Max. cable length between CU200 and SQFlex = 650 ft.

Performance curves

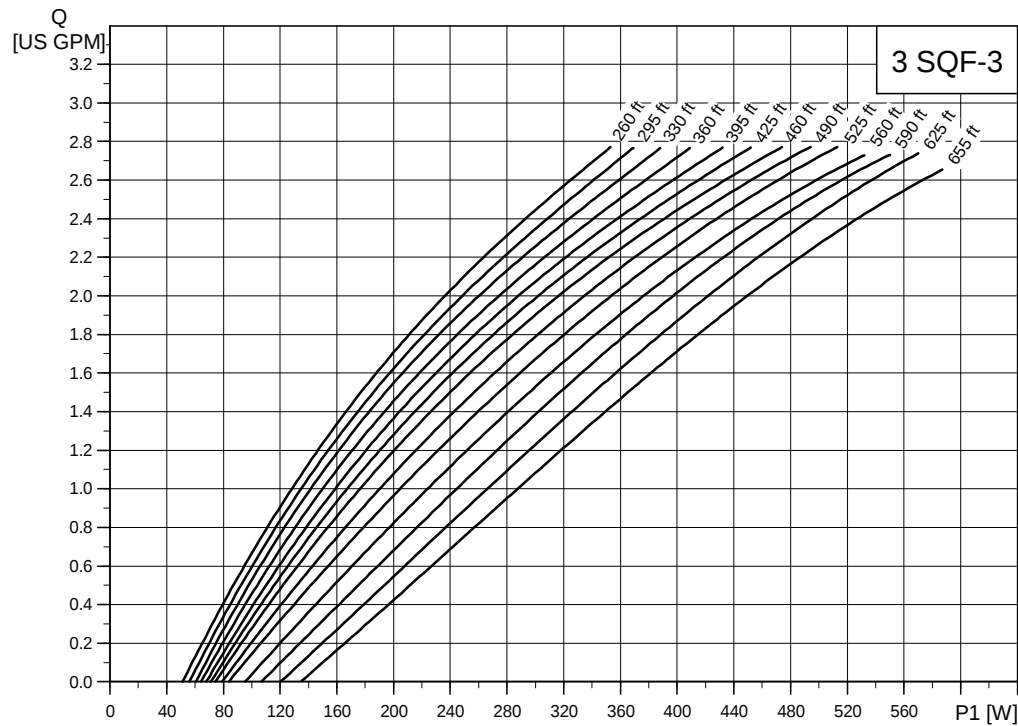
3 SQF-2
3 SQF-3

3 SQF-2



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3 SQF-3



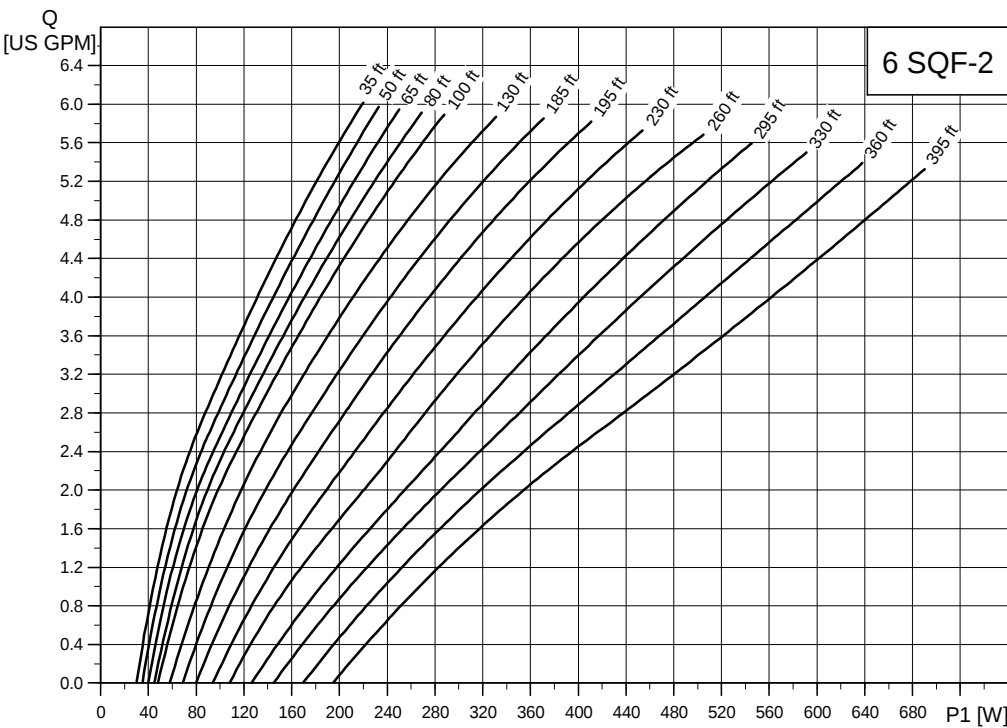
TM03 3930 2309

Note: Max. P1 (W) shown on curve represents max. motor RPM.

Performance curves

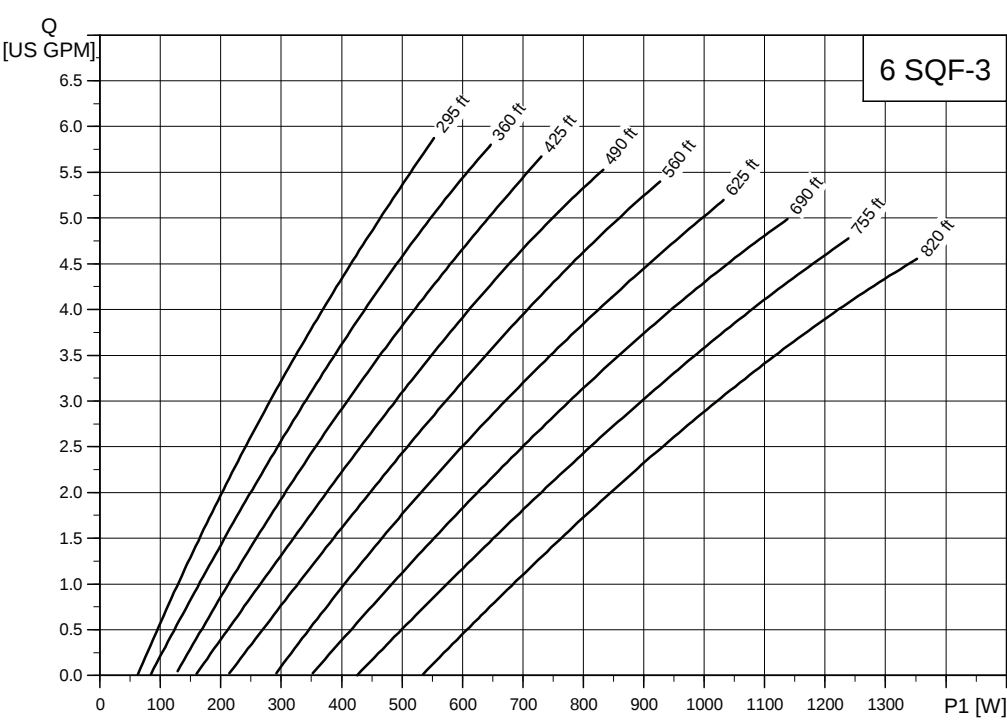
6 SQF-2
6 SQF-3

6 SQF-2



TM02 2427 2309

6 SQF-3



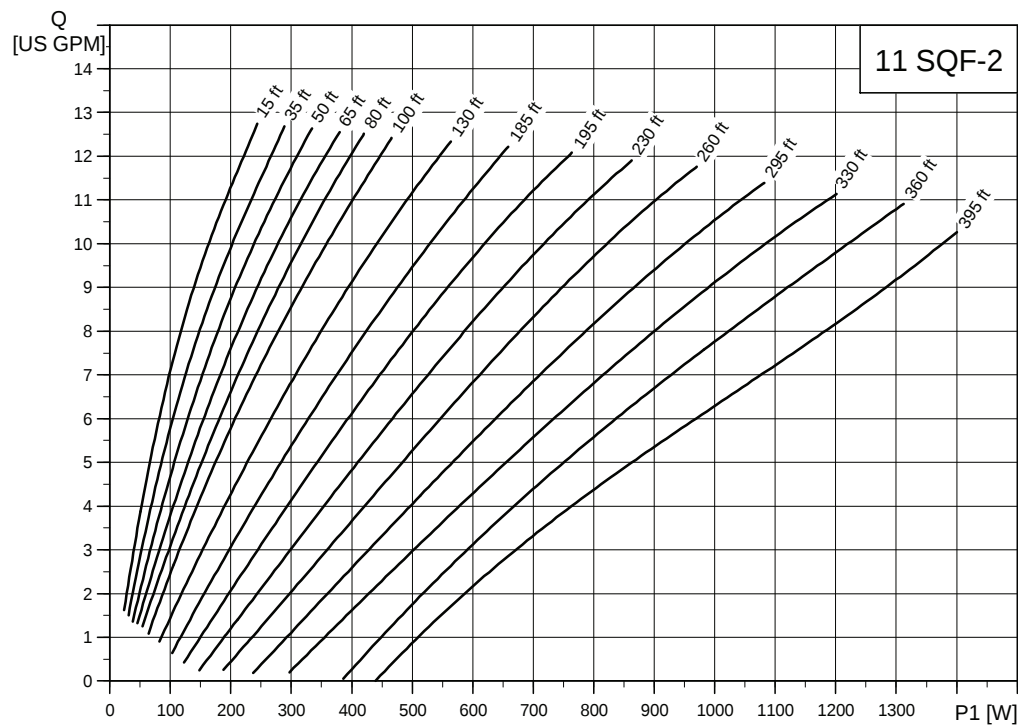
TM02 4648 2309

Note: Max. $P1$ (W) shown on curve represents max. motor RPM.

Performance curves

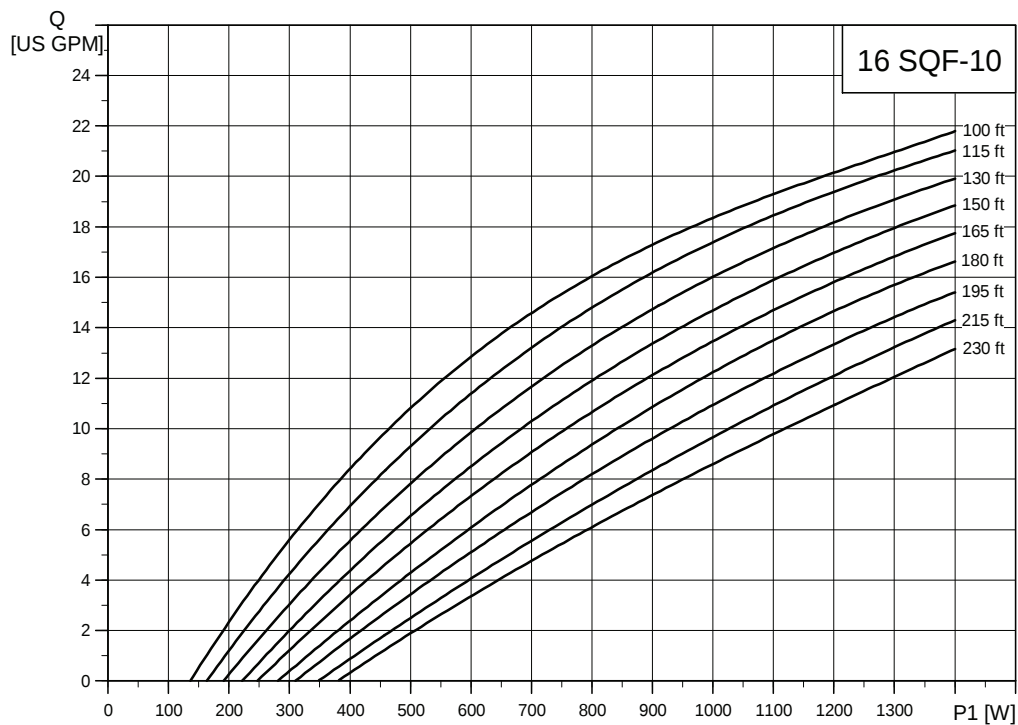
11 SQF-2
16 SQF-10

11 SQF-2



TM02 2428 2309

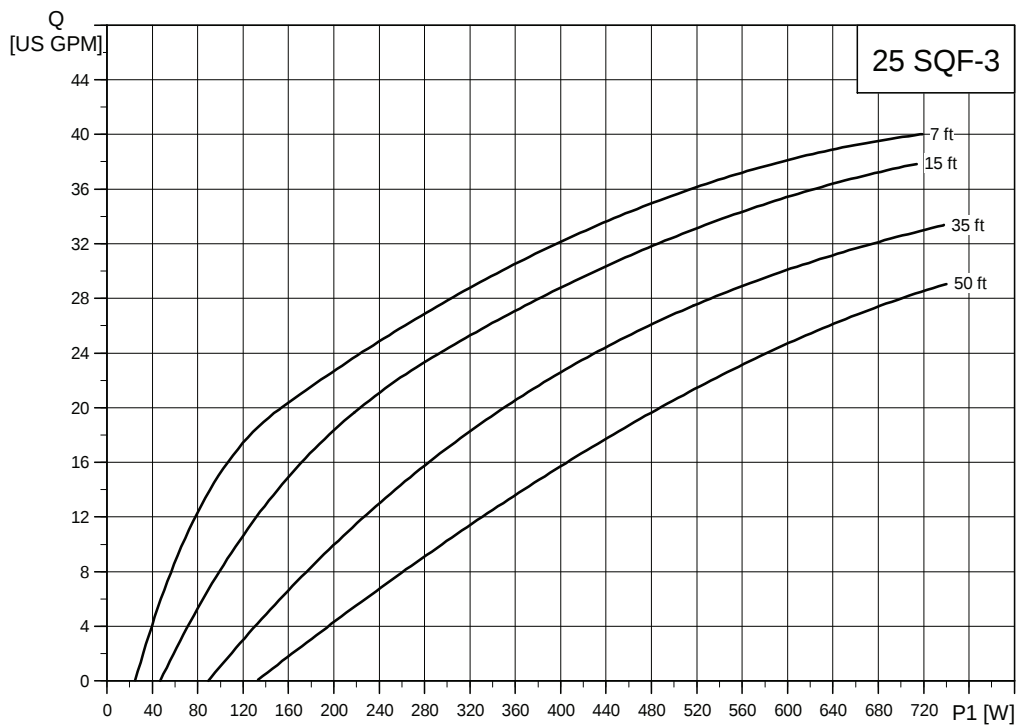
16 SQF-10



TM03 3931 2309

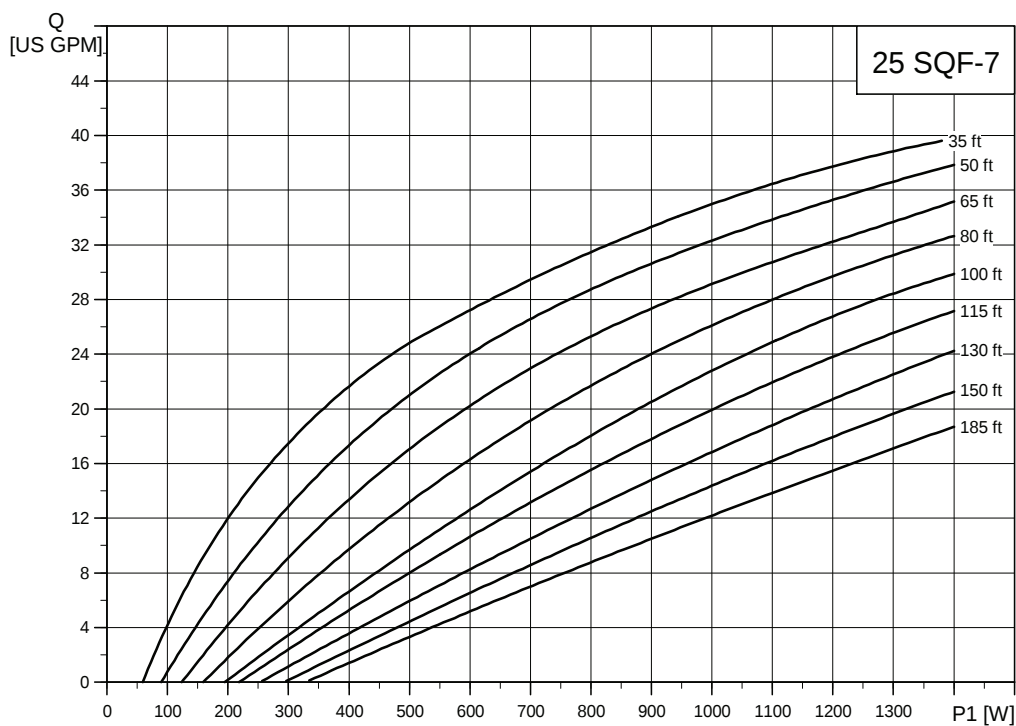
Note: Max. P1 (W) shown on curve represents max. motor RPM.

25 SQF-3



TM02 2429 2309

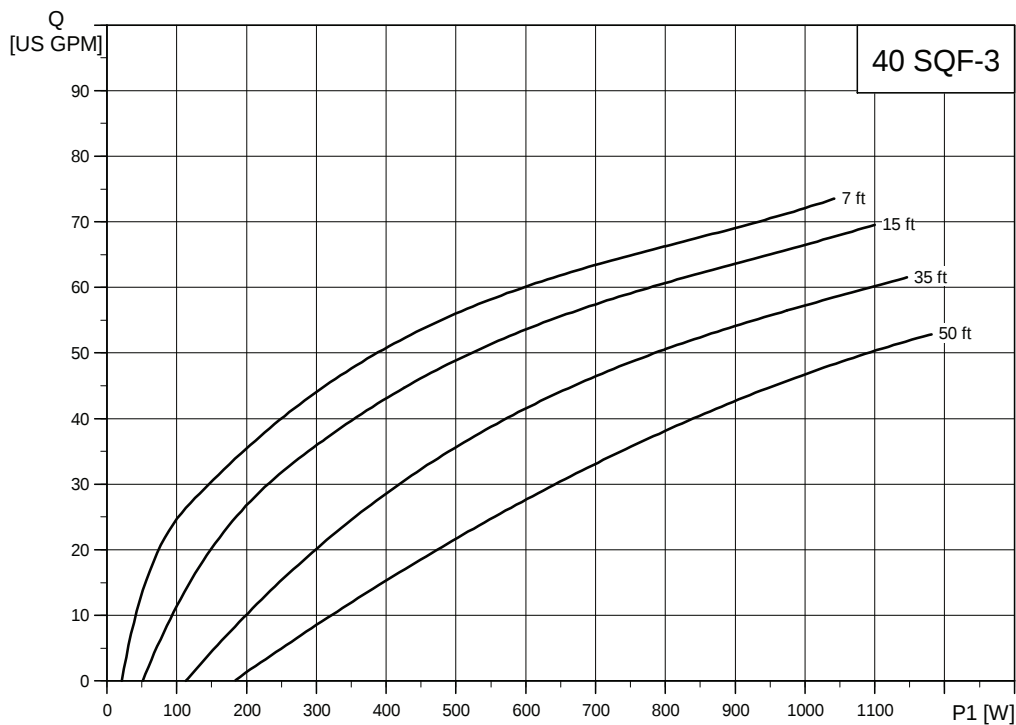
25 SQF-7



TM02 2430 2309

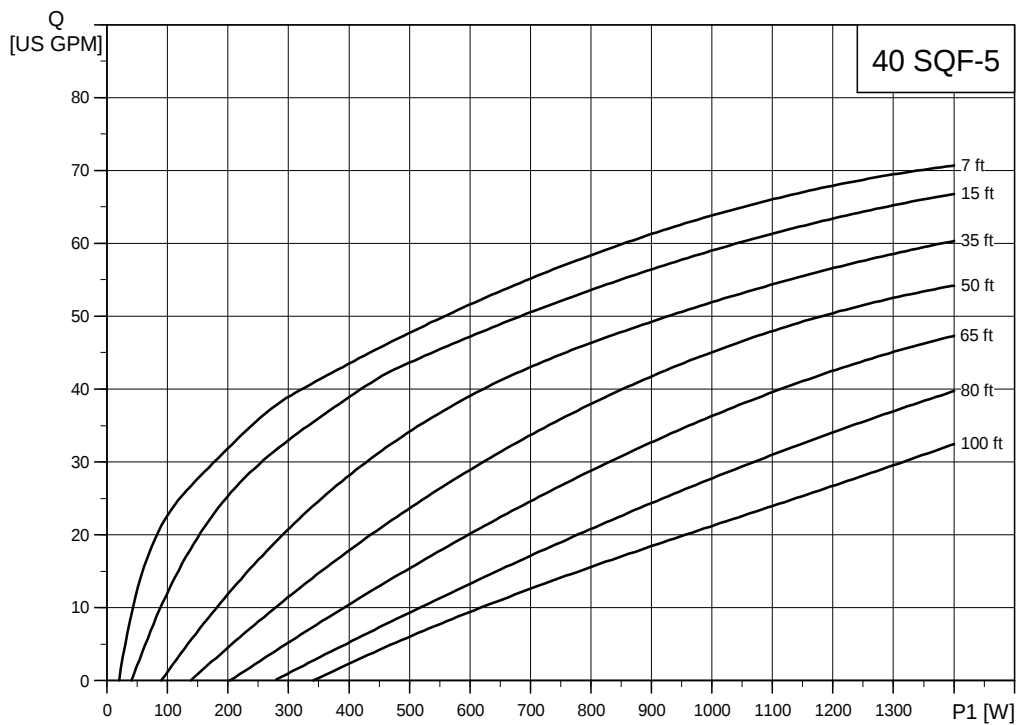
Note: Max. P1 (W) shown on curve represents max. motor RPM.

40 SQF-3



TM02 2431 2309

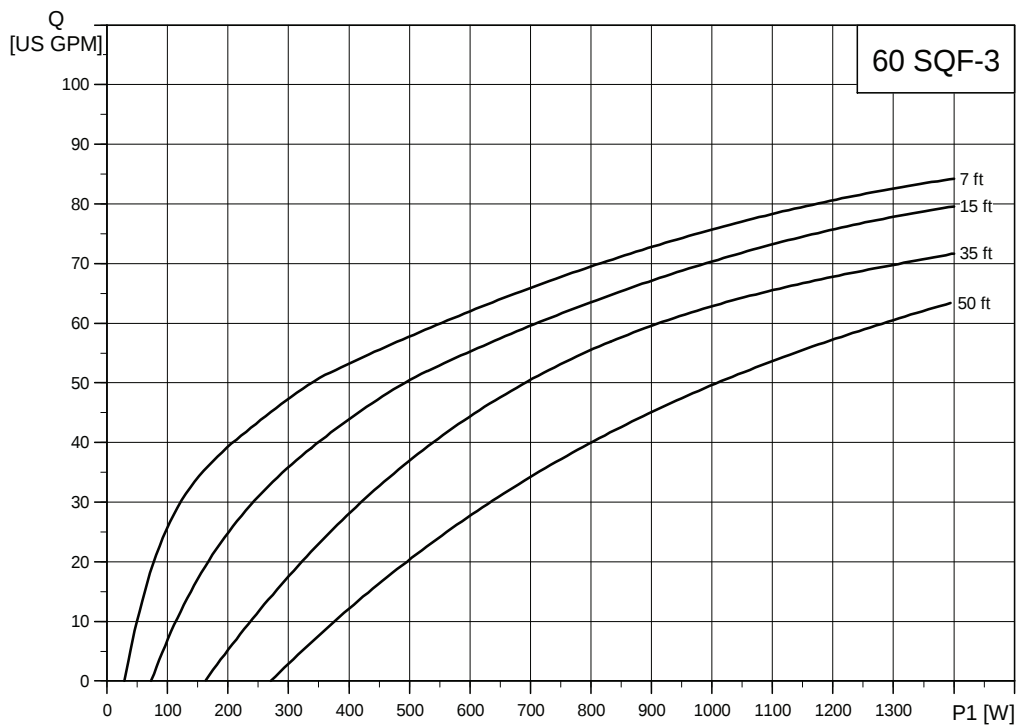
40 SQF-5



TM03 3932 2309

Note: Max. P1 (W) shown on curve represents max. motor RPM.

60 SQF-3

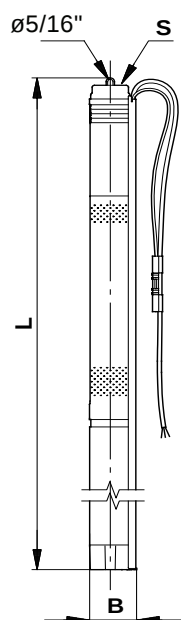


Note: Max. P1 (W) shown on curve represents max. motor RPM.

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Technical data

Dimensions and weights



TM02 2209 3901

Pump type	Dimensions [in]			Net weight [lb]★	Gross weight [lb]★	Shipping volume [ft³]★
	L	B	S			
3 SQF-2	47 *	2.9	1" NPT	17	21	0.85
3 SQF-3	49 *	2.9	1" NPT	17.5	21	0.85
6 SQF-2	48 *	2.9	1" NPT	17.5	21	0.85
6 SQF-3	51	2.9	1" NPT	1.8	2.2	0.85
11 SQF-2	49 *	2.9	1 1/4" NPT	18	22	0.85
16 SQF-10	38	3.9	1 1/4" NPT	21	24	1.00
25 SQF-3	32	3.9	1 1/2" NPT	18	21	1.00
25 SQF-7	35	3.9	1 1/2" NPT	19.5	23	1.00
40 SQF-3	36	3.9	2" NPT	21	24	1.00
40 SQF-5	40	3.9	2" NPT	23	26.5	1.00
60 SQF-3	39	3.9	2" NPT	24	27	1.00

★ Pump complete

Electrical data

30-300 VDC or 1 x 90-240 VAC, 50/60 Hz

Pump type	Motor type	Max. power input P ₁ [W]	Max. current [A]
3 SQF-2	MSF 3	900	8.4
3 SQF-3	MSF 3	900	8.4
6 SQF-2	MSF 3	900	8.4
6 SQF-3	MSF 3	900	8.4
11 SQF-2	MSF 3	900	8.4
16 SQF-10	MSF 3	1400	8.4
25 SQF-3	MSF 3	1400	8.4
25 SQF-7	MSF 3	1400	8.4
40 SQF-3	MSF 3	1400	8.4
40 SQF-5	MSF 3	1400	8.4
60 SQF-3	MSF 3	1400	8.4

Technical data

SQF pump

Power supply to pump	30-300 VDC, PE. 1 x 90-240 V –10%/+6%, 50/60 Hz, PE.
Run-up time	Depends on the energy source.
Start/stop	No limitation to the number of starts/stops per hour.
Enclosure class	IP 68.
Motor protection	Built into the pump. Protection against • dry running by means of a water level electrode • overvoltage and undervoltage • overload • overtemperature.
Conductivity	≥ 70 µS/cm (micro siemens).
Sound pressure level	The sound pressure level of the pump is lower than the limiting values stated in the EC Machinery Directive.
Radio noise	The SQF complies with the EMC Directive 89/336/EEC. Approved according to the standards EN 61000-6-2 and EN 61000-6-3.
Reset function	The SQF can be reset via the CU 200 or by disconnecting the power supply for 1 minute.
Power factor	PF = 1.
Operation via generator	Voltage: 230 VAC –10%/+6%. The generator output must be • minimum 1000 W (helical rotor pumps) • minimum 1500 W (centrifugal pumps).
Earth-leakage circuit breaker	If the pump is connected to an electric installation where an earth-leakage circuit breaker (ELCB) is used as an additional protection, this circuit breaker must trip out when earth fault currents with DC content (pulsating DC) occur.
Borehole diameter	3 SQF, 6 SQF, 11 SQF: Minimum: 3 in. 16 SQF, 25 SQF, 40 SQF, 60 SQF: Minimum: 4 in.
Installation depth	Minimum: The pump must be completely submerged in the pumped liquid. Maximum: 500 ft below the static water table (220 psi).
Suction strainer	Holes of the suction strainer: 3 SQF, 6 SQF, 11 SQF: ø0.090 in. 16 SQF, 25 SQF: ø0.10 in. 40 SQF, 60 SQF: 0.16 in x 0.80 in.
Pumped liquids	pH 5 to 9. Sand content up to 50 ppm.
Marking	CE.

CU 200 SQFlex control unit

Voltage	30-300 VDC, 8.4 A. 90-240 VAC, 8.4 A.
Power consumption	5 W.
Current consumption	Maximum 130 mA.
Pump cable	Maximum length between the CU 200 and the pump: 650 ft. Maximum length between the CU 200 and the level switch: 2000 ft.
Back-up fuse	Maximum 10 A.
Radio noise	The CU 200 complies with the EMC Directive 89/336/EEC. Approved according to the standards EN 55014 and 55014-2.
Relative air humidity	95%.
Enclosure class	IP 55.
Ambient temperature	During operation: –22 °F to +122 °F. During storage: –22 °F to +140 °F.
Marking	CE.
Weight	4.5 lb.

Technical data

IO 50 SQFlex switch box

Voltage	Maximum 300 VDC, 8.4 A. Maximum 265 VAC, 8.4 A.
Enclosure class	IP 66.
Ambient temperature	During operation: -22 °F to +122 °F. During storage: -22 °F to +140 °F.
Marking	CE.

IO 101 SQFlex switch box

Voltage	230 VAC -15%/+10%, 50/60 Hz (internal relay). Maximum 225 VDC, 8.4 A. Maximum 265 VAC, 8.4 A.
Enclosure class	IP 55.
Ambient temperature	During operation: -22 °F to +122 °F. During storage: -22 °F to +140 °F.
Marking	CE.

IO 102 SQFlex breaker box

Voltage	Maximum 225 VDC, 8.4 A. Maximum 265 VAC, 8.4 A.
Enclosure class	IP 55.
Ambient temperature	During operation: -22 °F to +122 °F. During storage: -22 °F to +140 °F.
Marking	CE.

Charge controller

Voltage (solar input)	Maximum 110 VDC.
Current (solar input)	Maximum 15 A.
Output current (load)	Maximum 15 A.
Ambient temperature	-40 °F to +140 °F.
Weight	0.75 lb.

Technical data

Material specification, helical rotor pump

Pos.	Component	Material	SQF AISI
1	Valve casing	Polyamide	
1a	Discharge chamber	Stainless steel	304
1d	O-ring	NBR	
2	Valve cup	Polyamide	
3	Valve seat	NBR	
6	Flange, upper	Stainless steel	304
7a	Circlip	Stainless spring steel	310
9	Pump stator	Stainless steel/EPDM	304
13	Pump rotor	Stainless steel	304
16	Torsion shaft	Stainless steel	316
39	Valve spring	Stainless spring steel	316 LN
55	Outer sleeve	Stainless steel	304
70	Valve guide	Polyamide	
159c	Sand shield	Polyamide	
	Cable guard	Stainless steel	304
	Screws for cable guard	Stainless steel	316

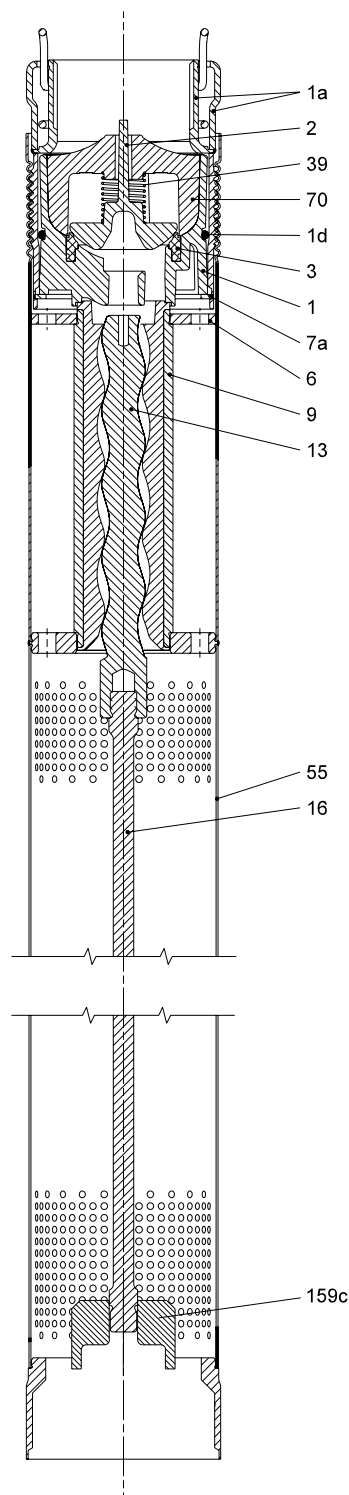


Fig. 30 Example: 6 SQF-2

TM02 2213 0207

Technical data

Material specification, centrifugal pump

Pos.	Component	Material	SQF
			AISI
1	Valve casing	Stainless steel	304
4	Chamber, top	Stainless steel	304
6	Top bearing	NBR	
7	Neck ring	NBR/PPS	
8	Bearing	NBR	
9	Chamber, complete	Stainless steel	304
11	Nut for split cone	Stainless steel	304
12	Split cone	Stainless steel	304
13	Impeller	Stainless steel	304
14	Inlet part	Stainless steel	304
14a	Connecting piece, complete (MSF 3 adapter)	Stainless steel	304
15	Strainer	Stainless steel	304
16	Shaft, cylindrical	Stainless steel	431
17	Strap	Stainless steel	304
18	Cable guard, pump	Stainless steel	304
18c	Cable guard, motor	Stainless steel	304
19	Nut for strap	Stainless steel	304
19a	Nut	Stainless steel	316
24	Coupling with nut	Stainless steel	329
24a	Supporting ring	Stainless steel	316
24b	Spline protector	NBR	
25	Retainer for neck ring, complete	Stainless steel	304
85	Stop ring (only 25 SQF and 60 SQF)	Carbon/graphite PTFE	
	Screws for cable guard	Stainless steel	316

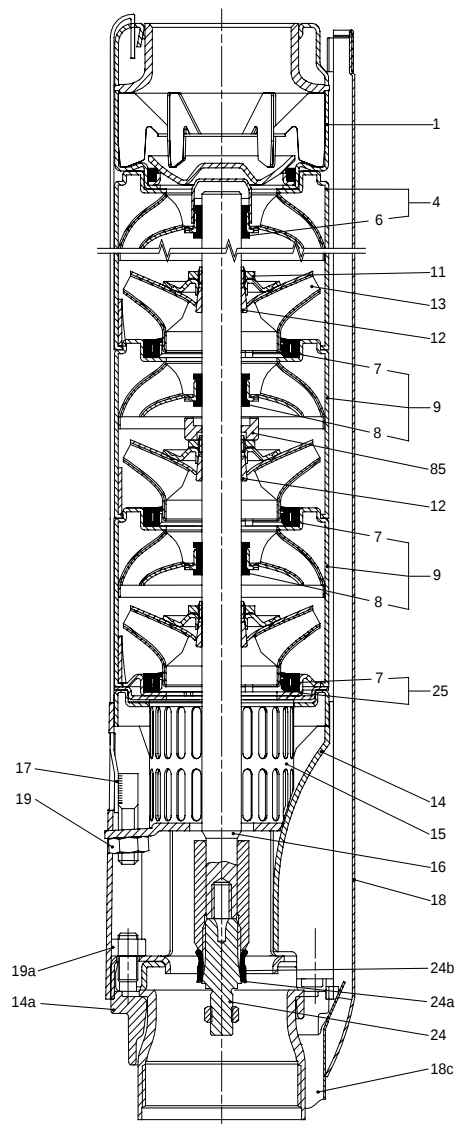


Fig. 31 Example: 60 SQF-3

TM02 2439 4301

Technical data

Material specification, motor

Pos.	Component	Material	MSF 3
			AISI
201	Stator with sleeve, complete	Stainless steel	304
202	Rotor	Stainless steel	304
202a	Stop ring	PP	
202c	Shaft end	Stainless steel	316
203	Thrust bearing, stationary	Stainless steel/carbon	316
205	Bearing plate with radial bearing	Silicon carbide	304
206	Thrust bearing, rotating	Stainless steel/aluminium oxide Al_2O_3	316
220	Motor cable with plug		
222a	Filling plug	NBR	
223	Electronic unit		
224	O-ring	NBR	
225	Top cover	NBR	
232	Shaft seal	NBR	
243	Thrust-bearing housing	Stainless steel	316
	Four screws (M4)	Stainless steel	316

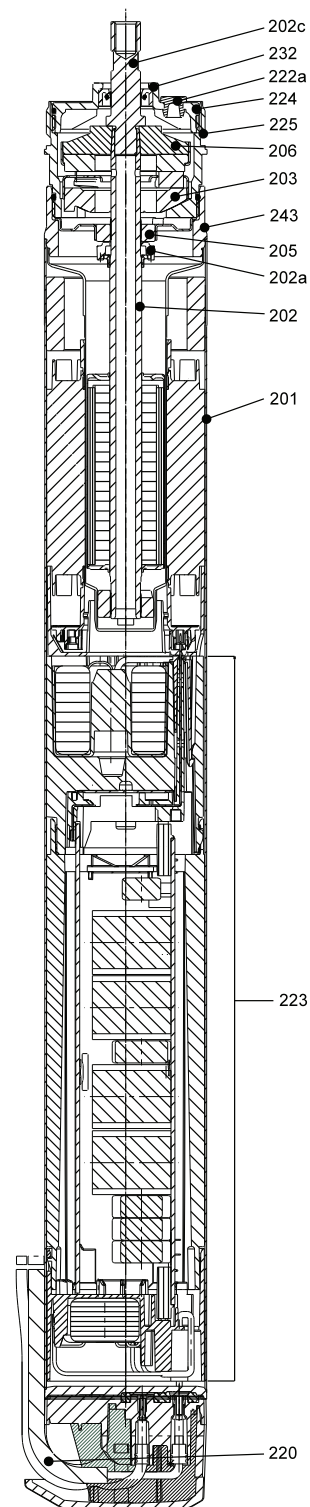


Fig. 32 MSF 3

TM02 2215 1806

Product numbers

SQF submersible pump

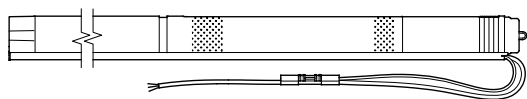


Fig. 33 SQF pump

The SQF pump complete is supplied with 6 ft cable.

Pump type	Pump size	Product number
		SQF
3 SQF 2	3"	95027332
3 SQF 3	3"	95027333
6 SQF 2	3"	95027334
6 SFQ 3	3"	96834840
11 SQF 2	3"	95027335
16 SQF 10	4"	95027350
25 SQF 3	4"	95027351
25 SQF 7	4"	95027353
40 SQF 3	4"	95027354
40 SQF 5	4"	95027355
60 SQF 3	4"	95027443

CU 200 SQFlex control unit

Product	Product number
CU 200 SQFlex	96625360

IO 50 SQFlex switch box

Product	Product number
IO 50 SQFlex	96959028

IO 101 SQFlex switch box

Product	Product number
IO 101 SQFlex	96481502

IO 102 SQFlex breaker box

Product	Product number
IO 102 SQFlex for wind turbine	96475065

Charge controller

Product	Product number
Charge controller	96023194

Submersible drop cables

The submersible drop cables for SQF pumps are approved for use with potable water (KTW-approved). The cables are made of EPR (ethylene-propylene rubber).

Sizing of cable

Use the following formula:

$$L = \frac{\Delta P \times q \times V_{mp}^2}{W_p \times 0.00162} [\text{ft}]$$

where

L = Length of cable [ft]

ΔP = Power loss [%]

q = Cross section of submersible drop cable [in²]

V_{mp} = Maximum power voltage [V]

W_p = Watt peak [Wp]

The sizing tool in Grundfos WinCAPS makes it possible to calculate the exact losses.

Accessories

Whisper 200 wind turbine

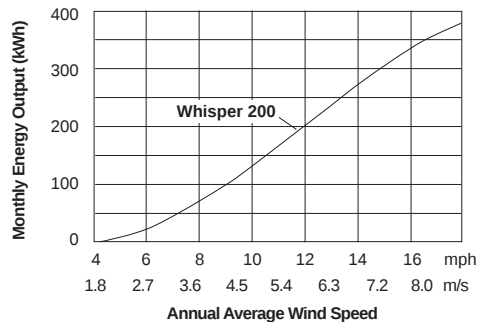
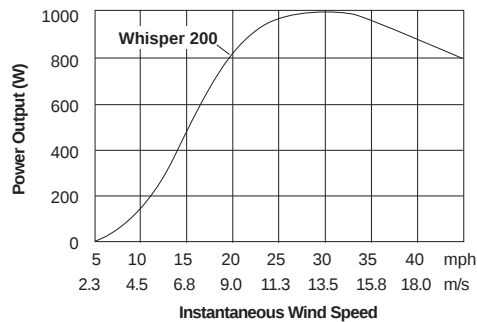


TM02 7886 4403

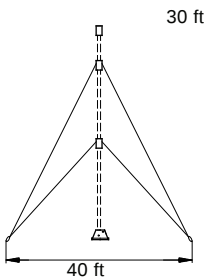
Description	Product number
Whisper 200 wind turbine	96472120

Specifications
 Rotor diameter: 9 ft.
 Weight: 65 lb.
 Mount: 2.5" Schedule 40.
 Start-up wind speed: 7 mph.

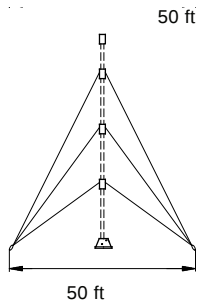
Wind turbine selection



Tower kit for Whisper 200



TM02 5582 3502



TM02 5582 3502

Description	Height [ft]	Product number
Tower kit for Whisper 200	30	96475066
	50	96475067

Note: The pipes are not included.
 For tower pipe selection, see below.

Tower installation kit

Description	Product number
Tower installation kit	96475069

Note: The gin pole is not included.
 For tower pipe selection, see page 41.

Accessories

Tower pipe selection

The tower kit is designed to use a 2½" outside diameter pipe.

The following table shows the recommended wall thickness of the pipes, depending on the maximum speed of the wind at the location:

Maximum wind speed [mph]	Recommended wall thickness [in]
80	0.090
90	0.120
110	0.140

The wall thickness of the gin pole must be minimum 0.062 in.

Pipe pieces needed

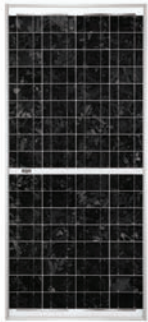
Tower kit, 30 ft

- One 13 ft length of pipe for tower.
- One 17 ft length of pipe for tower.
- One 15 ft length of pipe for gin pole.

Tower kit, 50 ft

- Two 15 ft lengths of pipe for tower.
- One 20 ft length of pipe for tower.
- One 19 ft length of pipe for gin pole.

GF80 solar panel



GrA6559p_w

Fig. 34 GF80 solar panel

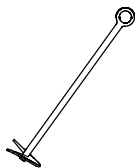
This chart lists the characteristics of the GF80 solar panel:

GF80 solar panel	
Peak power (P_{max})	80 [W]
Voltage (V_{mp})	33.3 [V]
Current (I_{mp})	2.4 [A]
Open circuit voltage (V_{oc})	41.5 [V]
Short circuit current (I_{sc})	2.6 [A]
Reference cell temperature (T_{cref})	77 °F / 25 °C
Solar irradiation at reference cell temperature (I_{tref})	1000 [W/m ²]
Net weight	17.0 [lbs] / 7.7 [kg]
Shipping volume	2.12 [ft ³] / 0.06 [m ³]

Description	Product number
GF80 solar panel	96616391
2-panel pole mount support 2-1/2" NPT	91126069
4-panel pole mount support 3" NPT	96529744
8-panel pole mount support 4" NPT	96529746
Inter-array wire kit	91126023
Array to controller wire kit	91126024

Accessories

Auger/anchor



TM02 2571 4501

Description	Length [ft]	Product number
Auger/anchor (4 pcs.)	4	96475068

Grease

Description	Product number
Grease for lubrication of motor shaft	96037562

Level switch



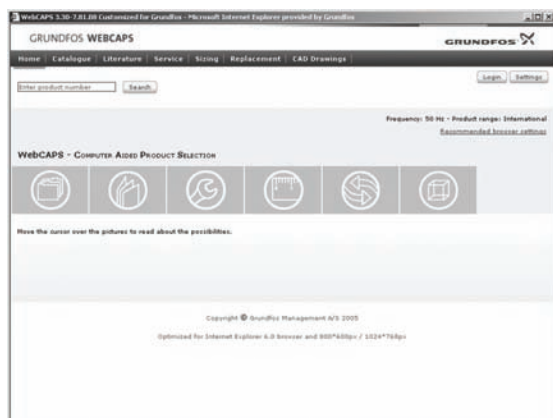
TM02 2407 4201

Description	Product number
Level switch	010748

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

Further product documentation

WebCAPS

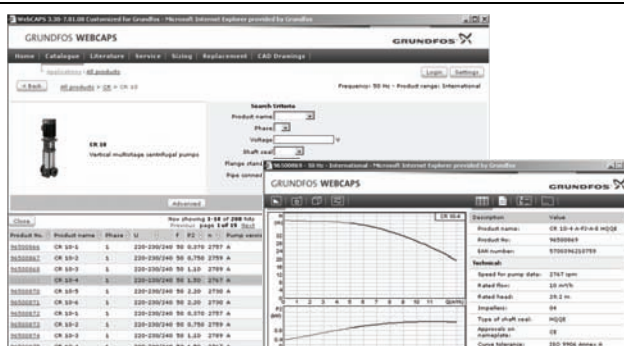


WebCAPS is a **Web-based Computer Aided Product Selection** program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 22 languages.

In WebCAPS, all information is divided into 6 sections:

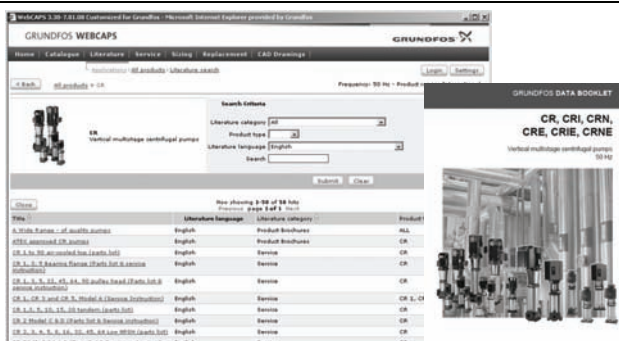
- Catalog
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalog

This section is based on fields of application and pump types, and contains

- 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

In this section you can access all the latest documents of a given pump, such as

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

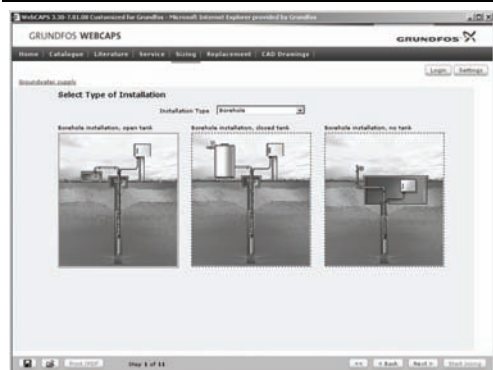


Service

This section contains an easy-to-use interactive service catalog. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.

Furthermore, this section contains service videos showing you how to replace service parts.

Further product documentation



Sizing

This section is based on different fields of application and installation examples, and gives easy step-by-step instructions on how to

- 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.
- analyze 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 it with a more efficient Grundfos pump.

The section contains replacement data on 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. 35 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 185,000 Grundfos products in more than 22 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 CD-ROM and updated once a year.

L-SP-TL-014 0809

Repl. Rev. 0807

US

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Subject to alterations.

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GRUNDFOS 

GRUNDFOS DATA SHEET

GF 80

GF 80 solar modules are suitable for the SQFlex water supply system based on renewable energy sources.

GF 80 solar modules consist of 68 multicrystalline silicon solar cells in series with bypass diodes. The solar cells are laminated between sheets of ethylene vinyl acetate (EVA) and 3 mm high-transmissivity low-iron tempered glass.

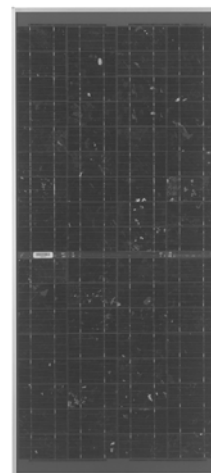
Each solar module is equipped with plugs and sockets for easy connection of several modules in parallel or series. The solar modules must be mounted on a support structure, tilted at an angle ensuring optimum utilisation of the solar energy.

Quality

- Manufactured in ISO 9001-certified factories.
- Listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating).
- GF 80 is CE marked.
- Compliant with the requirements of IEC 61215 including:
 - thermal cycling between -40°F and $+185^{\circ}\text{F}$ (-40°C and $+85^{\circ}\text{C}$) at 85% relative humidity,
 - simulated impact of one inch hail at 52 mph (terminal velocity),
 - a "damp heat" test, consisting of 1000 hours of exposure to 185°F (85°C) and 85% relative humidity,
 - a "hot spot" test determining a module's ability to tolerate localised shadowing (which can cause reverse-biased operation and localised heating),
 - static mechanical load, front and back, of 2400 Pa (0.35 psi/50 psf) corresponding to a windspeed of 81 mph (130 km/h); front load (e.g. snow) of 5400 Pa (0.78 psi/113 psf).

Warranties

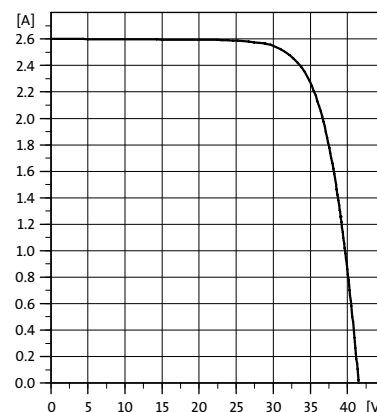
- Power output: 25 years.
- Workmanship: 2 years.



D062721

Performance

The performance chart below shows the relationship between the current [A] and the voltage [V].

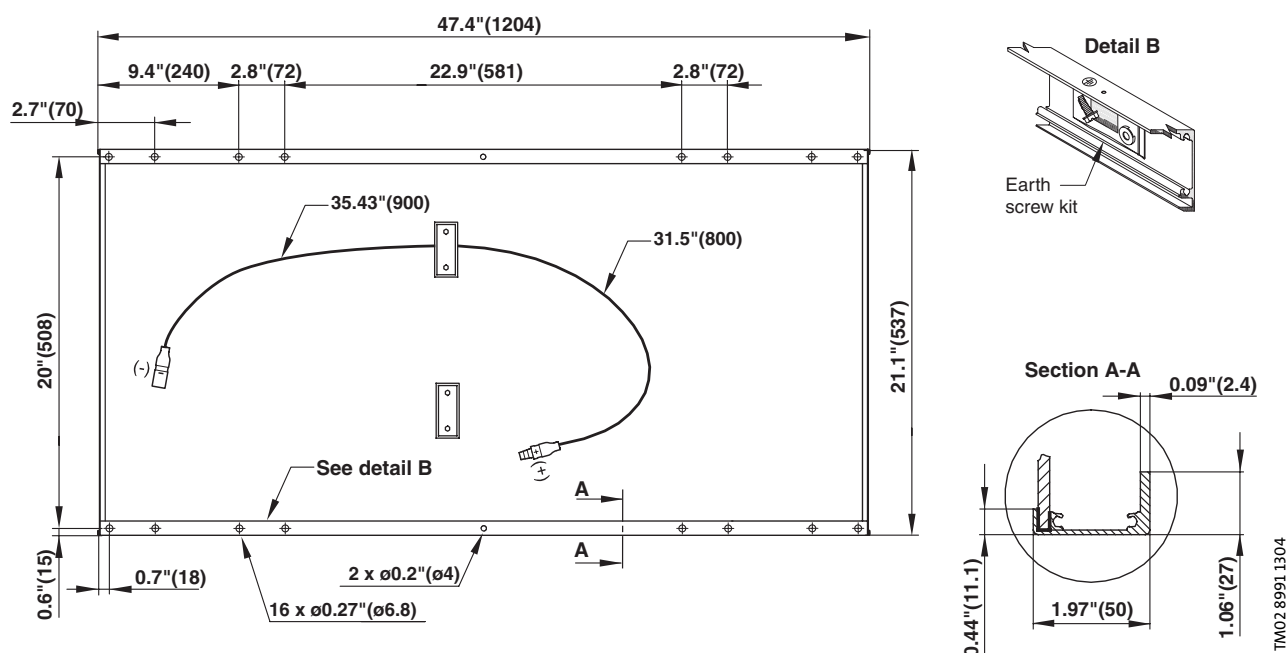


TM03 3383 0306

Characteristics

GF 80	
Peak power (P_{max})	80 [W]
Voltage (V_{mp})	33.3 [V]
Current (I_{mp})	2.4 [A]
Open circuit voltage (V_{oc})	41.5 [V]
Short circuit current (I_{sc})	2.6 [A]
Reference cell temperature (T_{cref})	77°F / 25°C
Solar irradiation at reference cell temperature (I_{tref})	1000 [W/m ²]
Net weight	17.0 [lbs]/7.7 [kg]
Shipping volume	2.12 [ft ³]/0.06 [m ³]

Construction and dimensions



Product range

The table to the right shows the relationship between the possible number of solar modules installed and the number of wire kits, conduits and cable guards required.

The product numbers are shown just below the heading.

The following combinations are available:

Standard:

- Solar module GF 80
- Array-to-controller wire kit
- Array-to-array wire kit

Option 1: For protection of array-to-controller wire

- Solar module GF 80
- Array-to-controller wire kit
- Array-to-array wire kit
- Conduit for array-to-controller wire

Option 2: Full protection of all wires

- Solar module GF 80
- Array-to-controller wire kit
- Conduit for array-to-controller wire
- Cable guard
- Array-to-array wire kit inclusive conduit

Solar module GF 80	Array-to-controller wire kit ¹	Array-to-array wire kit	Conduit for array-to-controller wire ²	Cable guard	Array-to-array wire kit inclusive conduit ³
96616391	91126024	91126023	96521496	96537654	96537655
2	1	0	1	2	0
3	1	0	1	3	0
4	1	0	1	4	0
5	1	0	1	5	0
6	1	0	1	6	0
7	1	0	1	7	0
8	1	1	1	8	1
9	1	2	1	9	2
10	1	1	1	10	1
12	1	1	1	12	1
14	1	1	1	14	1
15	1	2	1	15	2
16	1	3	1	16	3
18	1	2	1	18	2
20	1	3	1	20	3

¹ length 32.8 ft/10 m

² length 71 in/1800 mm

³ length 50 in/1275 mm

Support structures are available on request.

96618292 0106	GB

Subject to alterations.

New Release
Greater Field Performance



135 WATT

HIGH EFFICIENCY MULTICRYSTAL
PHOTOVOLTAIC MODULE



KD135SX-UPU

NEC 2008 Compliant
UL1703, Class C



CUTTING EDGE TECHNOLOGY

As a pioneer with 35 years in solar, Kyocera demonstrates leadership in the development of solar energy products. Kyocera's *Kaizen* Philosophy, commitment to continuous improvement, is shown by repeatedly achieving world record cell efficiencies.

Kyocera Quality Built In:

- New frame technology allows for end mounting under 2400 Pa (50 psf) or wind speeds of 130 mph (ASTM E1830) and traditional mounting under 5400 Pa (113 psf) to support increased snow load
- UV stabilized, aesthetically pleasing black anodized frame
- Supported by all major mounting structure manufacturers
- Easily accessible grounding points on all four corners for fast installation
- Proven junction box technology

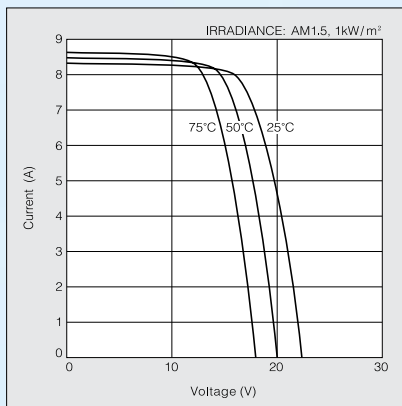
Kyocera manufactures and assembles solar cells and modules at its own worldwide production sites using a true vertical integration process. This superior approach gives Kyocera complete control over every step of the manufacturing process, producing modules with the industry's tightest power tolerance, promising high quality and efficiency.

- Built-In Quality for Off-Grid Applications
- Proven Superior Field Performance
- Tight Power Tolerance
- 20 Year Warranty
- 5 Year Workmanship Warranty

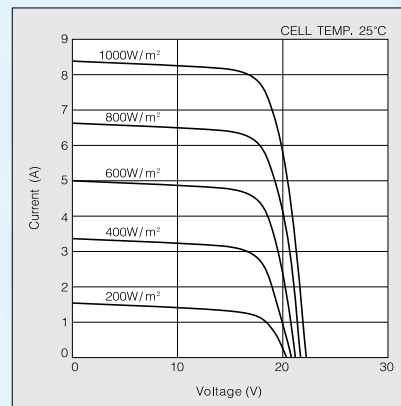
KD135SX-UPU

ELECTRICAL CHARACTERISTICS

Current-Voltage characteristics of Photovoltaic Module KD135SX-UPU at various cell temperatures



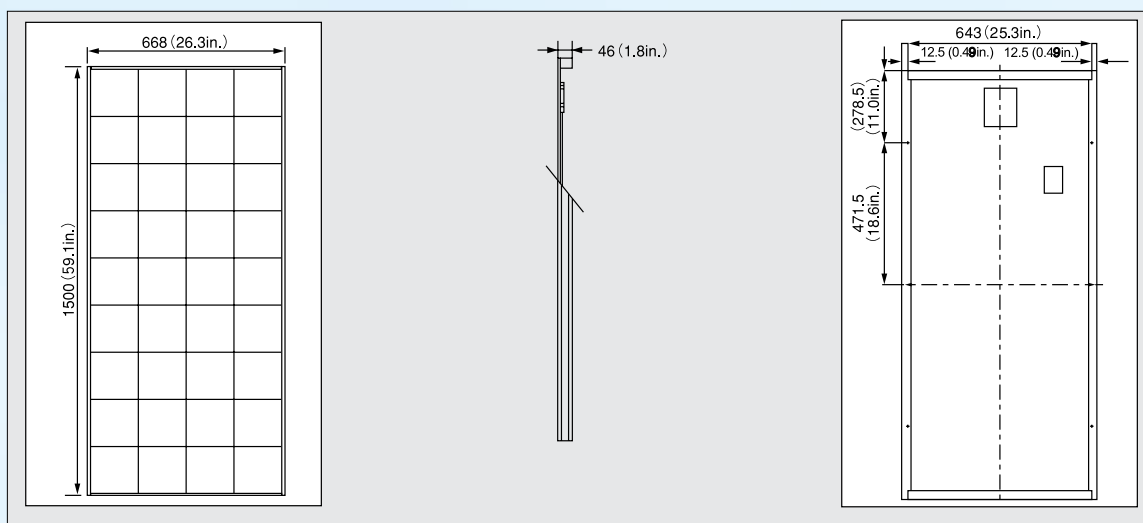
Current-Voltage characteristics of Photovoltaic Module KD135SX-UPU at various irradiance levels



SPECIFICATIONS

Physical Specifications

Unit : mm (in.)



Specifications

Electrical Performance under Standard Test Conditions (*STC)

Maximum Power (Pmax)	135W (+5%/-5%)
Maximum Power Voltage (Vmpp)	17.7V
Maximum Power Current (Imp)	7.63A
Open Circuit Voltage (Voc)	22.1V
Short Circuit Current (Isc)	8.37A
Max System Voltage	600V
Temperature Coefficient of Voc	-8.0x10 ⁻² V/°C
Temperature Coefficient of Isc	5.02x10 ⁻³ A/°C

*STC : Irradiance 1000W/m², AM1.5 spectrum, cell temperature 25°

Electrical Performance at 800W/m², *NOCT, AM1.5

Maximum Power (Pmax)	95W
Maximum Power Voltage (Vmpp)	15.7V
Maximum Power Current (Imp)	6.10A
Open Circuit Voltage (Voc)	20.0V
Short Circuit Current (Isc)	6.79A

*NOCT (Nominal Operating Cell Temperature) :47.9°C

Cells

Number per Module	36
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Module Characteristics

Length x Width x Depth	1500mm(59.1in.)x668mm(26.3in.)x46mm(1.8in.)
Weight	12.5kg(27.5lbs.)

Junction Box Characteristics

Length x Width x Depth	150mm(5.9in.)x140mm(5.5in.)x37.2mm(1.5in.)
IP Code	IP65

Others

*Operating Temperature	-40°~90°C
Maximum Fuse	15A

*This temperature is based on cell temperature.

ISO 9001 and ISO 14001 Certified and Registered

www.kyocerasolar.com

800-223-9580 toll free 800-523-2329 fax



KC65GX-2P

Módulos de alto rendimiento fotovoltaicos policristalinos



TECNOLOGÍA PUNTA

Debido a la investigación intensiva, el constante desarrollo de los procesos de producción, así como una fabricación altamente automatizada, los módulos solares policristalinos de Kyocera ofrecen un extraordinario nivel de calidad, así como un alto rendimiento. Las células solares incorporadas de Kyocera con las medidas estándar de 15 cm x 15,5 cm, alcanzan un rendimiento de 16 % y garantizan una producción energética muy alta de las instalaciones fotovoltaicas.

Para protegerlas contra las condiciones climáticas más adversas, las células están incrustadas entre una protección de cristal endurecido (resistencia al granizado ensayada según IEC 61215 ed. 2 por TÜV) y láminas de EVA. La parte trasera está sellada con láminas PET. El laminado está engastado en un marco de aluminio estable que es fácil de montar.

La caja de empalme del dorso dispone de diodos de derivación que evitan el riesgo de sobrecalentamiento de células solares individuales (efecto hotspot). Los módulos PV pueden ser cableados fácilmente mediante cables solares premontados y enchufes multicontacto.

Kyocera fabrica todos los componentes en instalaciones propias (sin comprar productos intermedios) para garantizar la alta calidad de sus productos.

EJEMPLOS DE USO

- Soluciones aisladas (electricidad para casas aisladas, casas de verano, huertos, etc.)
- Alimentación eléctrica para pueblos apartados e instalaciones médicas en regiones rurales y áreas de desarrollo
- Suministro para emergencias, protección civil
- Sistemas de bombeo (abastecimiento de agua potable y riego)
- Telecomunicaciones (redes de telefonía móvil, centrales de amplificación, etc.)
- Gasoil & Gas (protección anticorrosiva, control, supervisión, etc.)



TUVdotCOM Service: plataforma en Internet para calidad y seguridad comprobada
TUVdotCOM-ID: 0000022553
IEC 61215 ed. 2, IEC 61730 y Categoría de protección II
Kyocera es una empresa certificada según ISO 9001 y ISO 14001

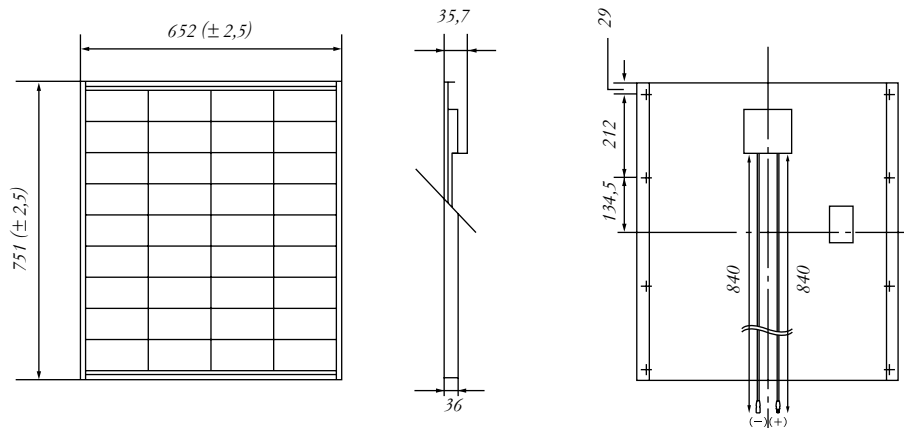


**KYOCERA
SOLAR**

We care!

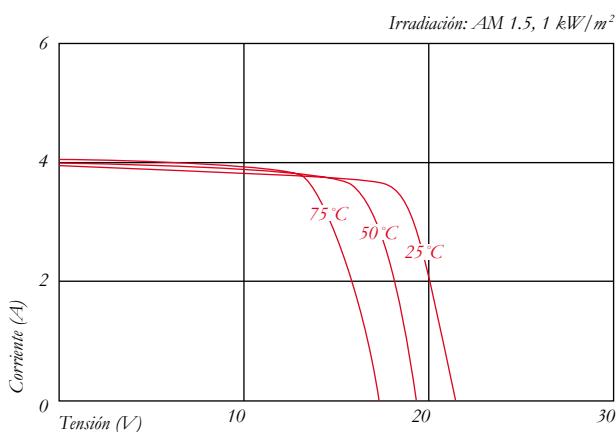
ESPECIFICACIONES

en mm

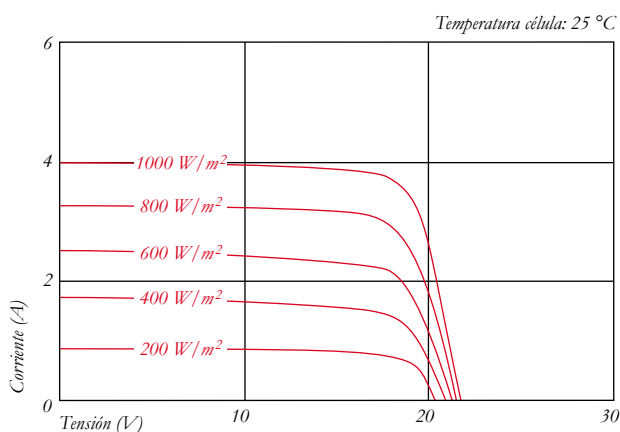


CARACTERÍSTICAS ELÉCTRICAS

Curva característica de tensión y corriente a distintas temperaturas de la célula



Curva característica de tensión y corriente con distinta irradiación



CARACTERÍSTICAS ELÉCTRICAS

Tipo de módulo PV		KC65GX-2P
A 1000 W/m² (STC)*		
Potencia nominal P	[W]	65
Tensión de sistema máx.	[V]	750
Tensión con potencia nominal	[V]	17,4
Corriente con potencia nominal	[A]	3,75
Tensión marcha en vacío	[V]	21,7
Corriente de cortocircuito	[A]	3,99
A 800 W/m² (NOCT)**		
Potencia nominal P	[W]	46
Tensión con potencia nominal	[V]	15,3
Corriente con potencia nominal	[A]	3,01
Tensión marcha en vacío	[V]	19,7
Corriente de cortocircuito	[A]	3,22
NOCT	[°C]	47
Tolerancia de potencia	[%]	+10 / -5
Resistencia a la corriente inversa I _R	[A]	6
Protección máx. del string	[A]	6
Coefficiente de temperatura de la tensión de marcha en vacío	[V/°C]	-8,21x10 ⁻²
Coefficiente de temperatura de la corriente de cortocircuito	[A/°C]	1,59x10 ⁻³
Coefficiente de temperatura a Pmax	[W/°C]	-3,24x10 ⁻¹
Reducción del nivel de eficacia de 1000 W/m² a 200 W/m²	[%]	6,1

MEDIDAS

Longitud	[mm]	751 (±2,5)
Ancho	[mm]	652 (±2,5)
Altura / incl. caja de contacto	[mm]	36 / 36
Peso	[kg]	6,0
Cable	[mm]	(+)840 / (-)840
Tipo de conexión	MC PV-KBT3 / MC PV-KST3	
Caja de contacto	[mm]	100x108x15
Código IP	IP65	

DATOS GENERALES

Garantía de rendimiento	10*** / 20 años****
Garantía	2 años

CÉLULAS

Cantidad por módulo	36
Tecnología celular	policristalina
Tamaño celular	rectangular
Conexión de células	3 busbar

* Los índices eléctricos son válidos en condiciones de prueba estándar (STC): Irradiación de 1000 W/m², masa de aire AM 1,5 y temperatura celular de 25 °C.

** Los índices bajo temperatura operativa nominal de las células (NOCT): Irradiación de 800 W/m², masa de aire AM 1,5, velocidad del viento de 1m/s y temperatura ambiente de 20 °C.

*** 10 años el 90 % de la potencia mínima especificada P bajo condiciones de prueba normalizadas (STC)

**** 20 años el 80 % de la potencia mínima especificada P bajo condiciones de prueba normalizadas (STC)

Su distribuidor Kyocera local:

**KYOCERA
SOLAR**

We care!

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PRESUPUESTO**MARTA CALVO LÓPEZ**

Nif:

ALCORISA
TERUEL - ESPAÑA

Serie / Código	Fecha	Cliente	Agente	Divisa	Página	Copia			
A / 2011021	19/04/2010	736		EUR	1 de 1	Original			
Referencia	Descripción			Cantidad	Precio	% Dto.	Importe		
026022249038	MÓDULO FOT. ISOFOTÓN IS-150/24. 150WP.24V (2S/1P)			2	346,11		692,22		
026021136000	BOMBA SUMERGIBLE SQFLEX 2.5-2 USO SOLAR, ROTOR HELICOIDAL DOS ETAPAS			1	1.648,20		1.648,20		
026021101001	CUADRO Y UNIDAD DE CONTROL GRUNDFOS PARA SONDAS (NO INCLUIDAS) SQF, CU 200			1	397,42		397,42		
002602141005	ESTRUCTURA CON INCLINACIÓN (15-30-45º) 6 MÓDULOS ALUMINIO			1	165,49		165,49		
017011563000	METRO DE TUBO PE ALIMENT. A.D. TUBO 40 16 AT MT			12	1,45		17,40		
038001546000	INTERRUPTOR DE NIVEL -POZO Y DEPÓSITO			1	25,65		25,65		
012000439008	CABLE SEÑAL BOMBA NIVEL DEPÓSITO H07RNF 3G1,50			12	1,15		13,80		
016033901003	ACCESORIOS INOX, ACCESORIOS PE Y PEQUEÑO MATERIAL...			1	86,40		86,40		
016033539005	MONTAJE, INSTALACIÓN , PORTES PRUEBAS Y PUESTA EN MARCHA DE TODOS LOS EQUIPOS MENCIONADOS EN LA PRESENTE OFERTA (NO INCLUIDA OBRA CIVIL)			1	822,00		822,00		
NOTA	LA OFERTA ESTÁ BASADA EN LA INFORMACIÓN APORTADA POR USTEDES. SERÍA NECESARIA UNA VISITA PREVIA AL LUGAR DE LA INSTALACIÓN PARA CONCRETAR DISTANCIAS, UBIACIONES, Y COMENTAR LA FUNCIONALIDAD DEL SISTEM			1	0,00		0,00		

Suma Importes	% Dto.PP	Importe Dto.PP	SubTotal	Portes	Gastos	TOTAL	
3.868,58		0,00	3.868,58	0,00	0,00	4.487,55	
Desglose del I.V.A.				Forma de Pago y Entidad Bancaria			
Base	% IVA	Cuota IVA	% R.E.	Cuota RE	ANTICIPO PRESUPUESTO		
3.868,58	16%	618,97	0%	0,00			
3.868,58		618,97		0,00			

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609 782944
964 591124

Teruel

46

DOCUMENTO	NÚMERO	PAG.	FECHA
Presupuesto	000011	1	25/04/2010

C.I.F./N.I.F.	AGENTE	FORMA DE PAGO
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ARTICULO	DESCRIPCIÓN	CANTIDAD	PRECIO UD.	SUBTOTAL	DTO.	TOTAL
001	Aerogenerador Southwest Windpower Air-x Land	1	905,00	905,00		905,00
002	Poste	1	867,19	867,19		867,19
003	Panel Fotovoltaico TrinaSolar Monocristalino de 180Wp de 72 células TSM 180.	1	402,00	402,00		402,00
004	Estructura Panel Solar.	1	93,00	93,00		93,00
005	Bomba Sumergible 9300	1	794,00	794,00		794,00
006	Control Bomba 9300. Toma Sonda nivel depósito.	1	144,00	144,00		144,00
007	Conjunto conexiones plug kit	1	172,00	172,00		172,00
008	Regulador Steca Solarix 12A 12/24	1	119,00	119,00		119,00
009	Cableado	1	125,00	125,00		125,00
010	Mano de obra del instalador	1	660,00	660,00		660,00

TIPO	IMPORTE	DESCUENTO	PRONTO PAGO	PORTES	FINANCIACIÓN	BASE	I.V.A.	R.E.
16,00	4.281,19					4.281,19	684,99	
7,00								
4,00								

TOTAL: 4.966,18

OBSERVACIONES

BOMBA SUMERGIBLE SERIE 9300

SHURFLO presenta la serie **9300**, constituida por bombas sumergibles robustas y duraderas.

La serie 9300 de SHURflo está respaldada por 25 años de experiencia en investigación e ingeniería, lo cual ha propiciado el diseño de una bomba resistente y de poco peso.

SHURflo, además, ofrece una amplia variedad de piezas y elementos para una fácil instalación y reparación.

La bomba sumergible SHURflo 9300 está diseñada para ser usada en pozos de agua con un diámetro interno a partir de 10,2 cm. La bomba tiene una potencia máxima de elevación vertical de 70 metros hasta el tanque de almacenamiento.

En su elevación vertical máxima la bomba consume solamente 4 amperios.

Características

- Fuerte construcción, y poco peso (2,7 Kgs).
- Fijaciones anticorrosión (acero inoxidable).
- Posibilidad de funcionamiento sin agua.
- Bypass interno para la protección de la bomba.
- Larga vida, tensión de funcionamiento 24 Vdc.
- Fácilmente reparable en el sitio.

Aplicaciones

- Riego.
- Estanques.
- Viviendas aisladas.
- Almacenamiento de agua.

Optimizador

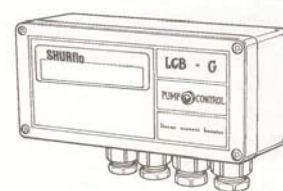
(Accesorio recomendado)

El uso de un optimizador de corriente, aumenta hasta un 30% el caudal bombeado ya que tiene un seguidor del punto de máxima potencia del panel solar y entrega a la bomba la energía variando la tensión e intensidad a un punto de trabajo donde el caudal es máximo. Esta prestación es muy efectiva en horas de baja radiación, situaciones habituales durante las mañanas, tardes y días nublados. No obstante, la bomba puede funcionar sin optimizador conectándola a una batería de 24 V.



Existen dos tipos de optimizador:

- **LCB-G75:** Incorpora un convertidor DC/DC, permitiendo alimentar a la bomba tanto a 12 como a 24 V (1 ó 2 módulos solares). Dispone de toma para una boya de nivel de estanque, y toma para sondas de nivel de pozo (estas últimas incluidas con el LCB-G75). Incorpora botón ON/OFF.



902-200 (LCB-G)

- **LCB-GO:** Para uso único en 24 V (dos módulos solares). Incorpora toma para sondas de nivel de depósito, pero no permite conexión de sondas de pozo.



902-100 (LCB-O)

ESPECIFICACIONES TÉCNICAS

Diseño de bomba	Bomba de desplazamiento positivo con 3 cámaras de impulsión.
Motor	Magnético permanente, P/N 11-175, protección térmica.
Voltaje	24 VDC nominal.
Amperaje	4,0 máximo.
Bypass interno	105-110 PSI max. (7,2-7,5 BA).
Subida máxima	Máximo 70 metros.
Inmersión máxima	Máximo 30 metros.
Puerto de salida	Rosca macho de 1/2" (12,7mm).
Toma de agua	Malla de acero inoxidable.
Materiales	Plásticos de gran resistencia. / Fijaciones de acero inoxidable.
Aplicaciones típicas	Agua potable.
Peso neto	2,7 kgs
Embalaje	60 x 45 x 18 cm (3,5 kg)

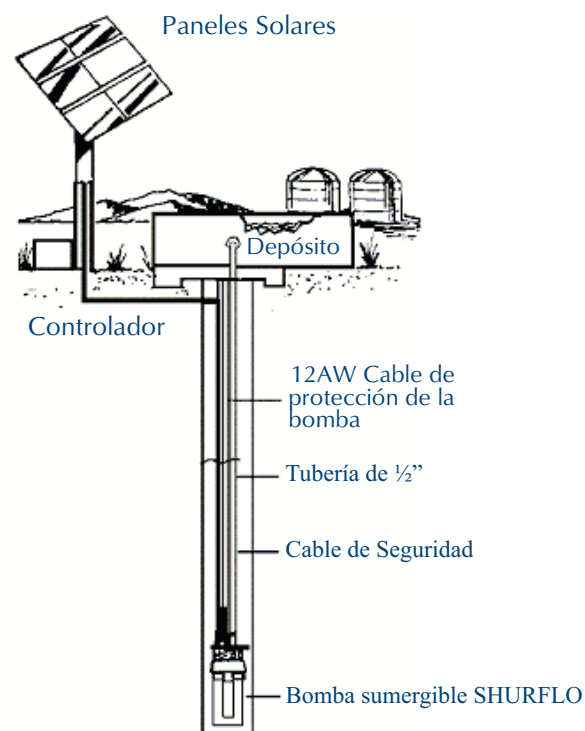
CÓDIGO	REFERENCIA	DESCRIPCIÓN
A028	Bomba 9300	Bomba sumergible 24 V, 70 m profundidad.
A033	Optimizador LCB-G75	Permite funcionamiento 12 ó 24 V. Incluye sondas de pozo.
A034	Optimizador LCB-GO	Sólo para 24 V. No permite sondas para pozo. Sólo de depósito.

CAUDAL A 12 VDC (Con LCB-G75)

Altura	Caudal / Hora	Campo Solar	Corriente
Metros	Litros	Potencia Mínima Total	Amperios
6,1	212	22	1,2
12,2	204	28	1,5
18,3	197	33	1,8
24,4	189	37	2,0
30,6	186	40	2,1
36,6	178	45	2,4
42,7	174	51	2,7
48,8	166	56	3,0
64,9	163	61	3,3
61,0	155	64	3,4
70,1	136	72	3,9

CAUDAL A 24 VDC

Altura	Caudal/Hora	Campo Solar	Corriente
Metros	Litros	Potencia Mínima Total	Amperios
6,1	443	58	1,5
12,2	432	65	1,7
18,3	413	78	2,1
24,4	401	89	2,4
30,6	390	99	2,6
36,6	382	104	2,8
42,7	375	115	3,1
48,8	371	123	3,3
64,9	362	135	3,6
61,0	345	141	3,8
70,1	310	155	4,1



REPUESTOS BOMBA DISPONIBLES

- (A) Plataforma de anclaje
- (B) Kit de cable / clavija
- (C) Kit de válvula
- (D) Juego de motor
- (A) Carcasa
- (B) Juegos de filtros de pantalla
- (C) Juntas
- (D) Kit de herramientas

