

3. CRFlex pump

The CRFlex pump is a non-self-priming, vertical multistage centrifugal pump.

The pump consists of a base and a pump head. The chamber stack and the outer sleeve are secured between the pump head and the base by means of stay bolts.

The base has suction and discharge ports on the same level (in-line).

All pumps are equipped with a maintenance-free mechanical shaft seal of the cartridge type.

The CRFlex pump is available as a complete unit only, consisting of these parts:

- MGFlex motor
- CRI pump end.

Pumped liquids

CRFlex 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 (0 °C to +40 °C).

Sand content

Maximum sand content: 20 ppm.

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

Salt content

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

Stainless steel	Cl ⁻ content	Liquid temperature
AISI 304 (EN 1.4301)	0-300 ppm	< +104 °F (+40 °C)
	300-500 ppm	< +86 °F (+30 °C)
AISI 316 (EN 1.4401)	0-500 ppm	< +104 °F (+40 °C)

System sizing

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

The sizing tool is integrated in Grundfos WinCAPS and covers solar powered systems.

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

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

Minimum inlet pressure, NPSH

Calculation of the inlet pressure "H" is recommended in these situations:

- The liquid temperature is high.
- The flow is significantly higher than the rated flow.
- Water is drawn from depths.
- Water is drawn through long pipes.
- Inlet conditions are poor.

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump.

The maximum suction lift "H" in feet can be calculated as follows:

$$H = p_b - \text{NPSHR} - H_f - H_v - H_s$$

P_b = Barometric pressure in feet absolute.

NPSHR = Net Positive Suction Head Required in feet.
(To be read from the NPSHR curve at the highest flow the pump will be delivering).

H_f = Friction loss in suction pipe in feet.
(At the highest flow the pump will be delivering.)

H_v = Vapor pressure in feet. (To be read from the vapor pressure scale. " H_v " depends on the liquid temperature " T_m ").

H_s = Safety margin = minimum 2.0 feet.

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" feet.

If the "H" calculated is negative, an inlet pressure of minimum "H" feet is required.

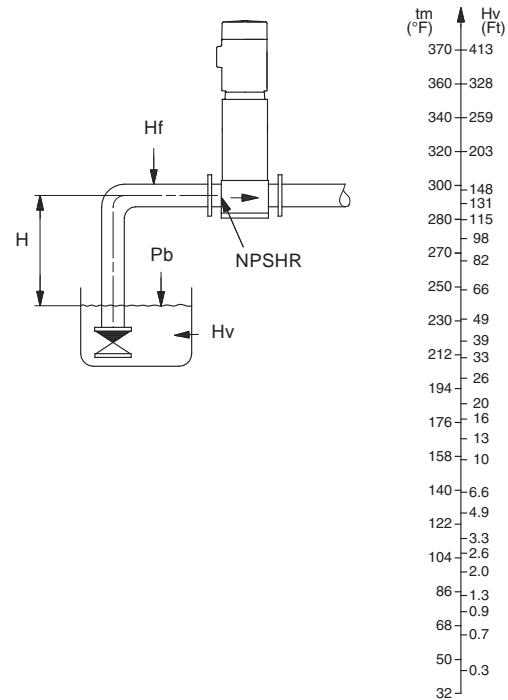


Fig. 6 Minimum inlet pressure - NPSH

Note: To avoid cavitation, never select a pump with a duty point too far to the right on the NPSH curve. Always check the NPSH value of the pump at the highest possible flow rate.

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Material specification



Fig. 7 CRFlex pump
(Note: pump pictured here without included oval flange connections)

Sectional drawing

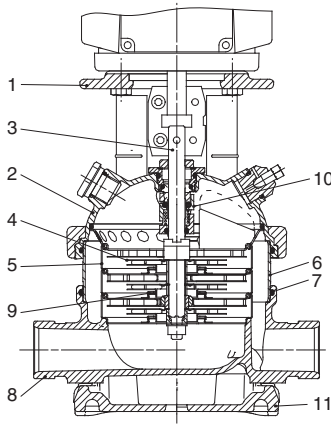


Fig. 8 Sectional drawing of CRFlex pump end

Pump materials

Pos.	Designation	Materials	EN/DIN	AISI/ASTM
1	Pump head	Cast iron EN-GJL-200 ¹⁾	EN-JL1030	ASTM 25B
2	Pump head cover	Stainless steel	1.4408	CF 8M eq. to AISI 316
3	Shaft	Stainless steel	1.4401 ²⁾ 1.4460 ³⁾	AISI 316 AISI 329
8	Base	Stainless steel	1.4408	CF 8M eq. to AISI 316
9	Neck ring	PTFE		
10	Shaft seal	Cartridge type		
11	Base plate	Cast iron EN-GJL-200 ¹⁾	EN-JL1030	ASTM 25B
	Rubber parts	EPDM or FKM		
CR(E)				
4	Impeller	Stainless steel	1.4301	AISI 304
5	Chamber	Stainless steel	1.4301	AISI 304
6	Sleeve	Stainless steel	1.4301	AISI 304
7	O-ring for sleeve	EPDM or FKM		

¹⁾ Stainless steel available on request.

²⁾ CR(E) 1S, 1, 3, 5

³⁾ CR(E) 10, 15, 20

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4. Applications

CRFlex Solar

The CRFlex Solar is the simplest system utilizing solar energy for water transfer.

Benefits

Thanks to the intelligent MGFlex motor, no further motor protection is required.

By means of an IO 50, the power supply to the pump can be switched off manually in cases such as these:

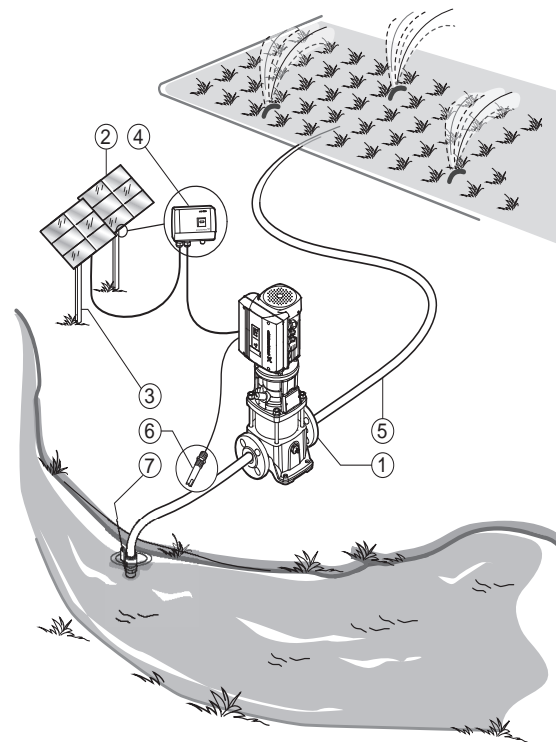
- There is no need for water supply.
- The system requires service.

The system also offers these benefits:

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

Note

1. To calculate the number of solar panels required, please use the sizing tools in Grundfos WinCAPS or WebCAPS.
2. The vertical distance between the inlet of the CRFlex pump and the dynamic level of the water source must be less than 20 feet. See also section *Minimum inlet pressure, NPSH* on p. 8.
3. The CRFlex pump must be protected against rain and direct sunlight.



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Fig. 9 CRFlex Solar

Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	IO 50 switch box
5	Water pipe
6	Dry-running sensor (optional)
7	Foot valve

CRFlex Solar with level switch

The CRFlex system allows solar energy to be stored as water in a reservoir in cases such as these:

- Water supply is needed at night.
- For short periods, the solar energy is insufficient to run the pump.
- There is a need for a backup water source.

Benefits

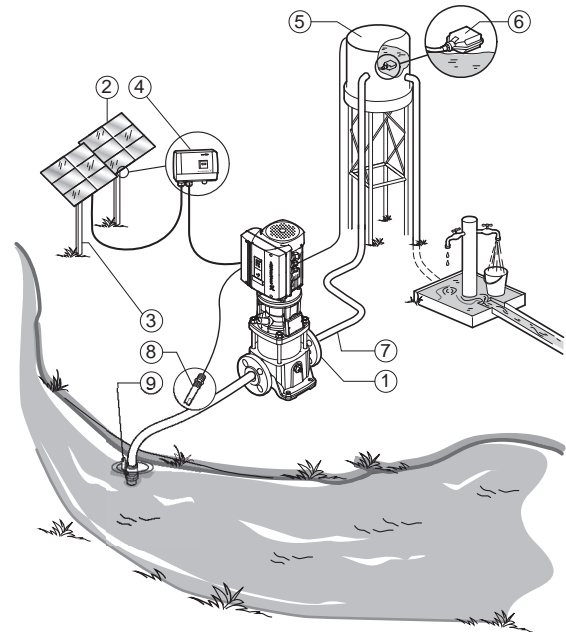
Connected directly to the electronics box on the MGFlex motor, the level switch will stop the pump when the water reservoir is full.

The system also offers these benefits:

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

Note

1. To calculate the number of solar panels required, please use the sizing tools in Grundfos WinCAPS or WebCAPS.
2. The vertical distance between the inlet of the CRFlex pump and the dynamic level of the water source must be less than 20 feet. See also section *Minimum inlet pressure, NPSH* on p. 8.
3. The CRFlex pump must be protected against rain and direct sunlight.



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Fig. 10 CRFlex Solar with level switch

Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	IO 50 switch box
5	Water reservoir
6	Level switch
7	Water pipe
8	Dry-running sensor (optional)
9	Foot valve

CRFlex Solar with generator

During periods of insufficient solar energy, the CRFlex can provide a reliable water supply when powered with a generator.

The system is connected to an external backup generator via the IO 101 and will automatically switch to operation via generator when the generator is started.

If the generator is stopped manually or runs out of fuel, the IO 101 will automatically change back to operation via solar energy.

Benefits

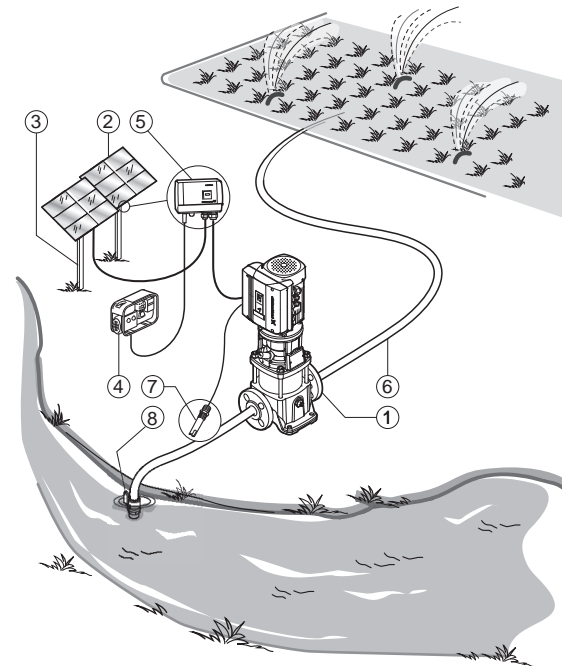
The system offers water supply during the night or during periods of insufficient solar energy.

The system also offers these benefits:

- easy installation
- few and simple components
- flexible energy supply.

Note

1. To calculate the number of solar panels required, please use the sizing tools in Grundfos WinCAPS or WebCAPS.
2. The vertical distance between the inlet of the CRFlex pump and the dynamic level of the water source must be less than 20 feet. See also section *Minimum inlet pressure, NPSH* on p. 8.
3. The CRFlex pump must be protected against rain and direct sunlight.

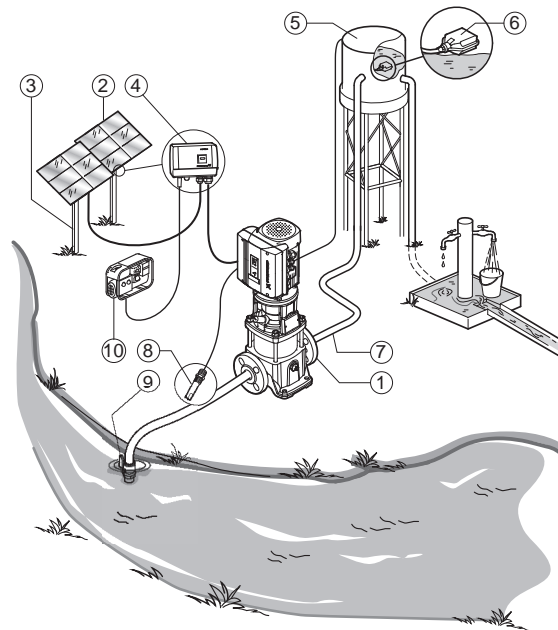


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Fig. 11 CRFlex Solar with generator

Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	Diesel- or gasoline driven generator (1 x 240 VAC max.)
5	IO 101 switch box
6	Water pipe
7	Dry-running sensor (optional)
8	Foot valve

CRFlex Solar with level switch and generator



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Fig. 12 CRFlex Solar with level switch and generator

Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	IO 101 switch box
5	Water reservoir
6	Level switch
7	Water pipe
8	Dry-running sensor (optional)
9	Foot valve
10	Diesel- or gasoline-driven generator

CRFlex and SQFlex Solar

In addition to enabling customers to store solar energy as water in a reservoir, it offers pressure boosting.

Benefits

The SQFlex pumps water from wells as small as 3-inch and stores it in a reservoir. The CRFlex pump transfers water over a long distance or increases the water pressure.

Combined with a CU 200, the level switch will stop the SQFlex when the reservoir is full.

The CU 200 offers the following indications:

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

The CU 200 indicates operational stoppage in these cases:

- dry running
- insufficient energy supply.

The system also offers these benefits:

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

See the SQFlex data booklet in WebCAPS for further information.

Note

1. To calculate the number of solar panels required, please use the sizing tools in Grundfos WinCAPS or WebCAPS.
2. The vertical distance between the inlet of the CRFlex pump and the dynamic level of the water source must be less than 20 feet. See also section *Minimum inlet pressure, NPSH* on page 8.
3. The CRFlex pump must be protected against rain and direct sunlight.

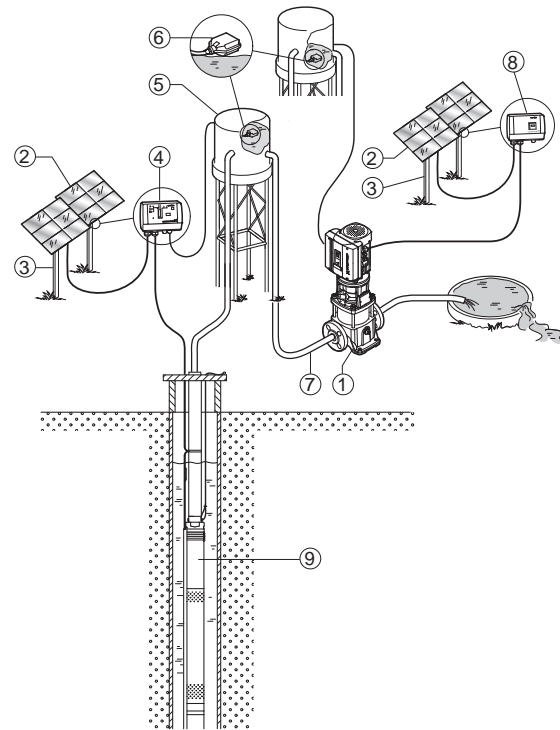


Fig. 13 CRFlex and SQFlex Solar

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Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	CU 200 control unit
5	Water reservoir
6	Level switch
7	Water pipe
8	IO 50 switch box
9	SQF pump