Grundfos solar surface pump

Renewable energy-based water supply systems

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Table of contents

1. MGFlex motor

The MGFlex motor is a permanent magnet motor. Motor comes with two different sizes: frame size 80/90 and with integrated frequency converter.

The frequency converter enables the motor to run at high efficiency in a wide speed range:

- power input (P1) of 40 to 880 W and 60 to 1730 W
- motor speed of 1000 to 3600 rpm
- maximum input current of 4.6 A and 8.9 A
- enclosure class TEFC/Nema 3 (IP55).

The motor is suitable for both DC and AC voltage supply:

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

The MGFlex motor can be mounted on Grundfos CR and MTR (as float pump) pump ends.

Features and benefits

Maximum Power Point Tracking (MPPT)

The motor continuously optimizes the speed according to the input power available when connected to DC supply.

Wide voltage range

The wide voltage range enables the motor to operate at any voltage from 30 to 300 VDC or 90 to 240 VAC.

Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in cases of unstable power supply or a faulty installation.
The motor will be stopped if the voltage falls outside the permissible voltage range, and it will be restarted when the voltage is again within the permissible voltage range. Therefore, no additional protection relay is required.

Overload protection

The motor incorporates thermal protection against both steady overload and stalled condition according to IEC 60034-11. It will be stopped and restarted automatically.

Connection terminals (FM 300)

The MGFlex motor with advanced functional module (FM 300) has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required.

The FM 300 has these connections:

- three analog inputs
- one analog output
- two dedicated digital inputs
- two configurable digital inputs or open-collector outputs
- Grundfos Digital Sensor input and output
- two Pt100/1000 inputs
- LiqTec sensor inputs
- two signal relay outputs
- GENIbus connection.

See fig. 1 on page 4.

Note: Digital input 1 is factory-set to be start/stop input where open circuit will result in stop. A jumper has been factory-fitted between terminals 2 and 6. Remove the jumper if digital input 1 is to be used as external start/stop or any other external function.

Note: As a precaution, the wires to be connected to the connection groups below must be separated from each other by reinforced insulation in their entire lengths.

- **Inputs and outputs**
  All inputs and outputs are internally separated from the mains-conducting parts by reinforced insulation and galvanically separated from other circuits.
  All control terminals are supplied by safety extra-low voltage (SELV), thus ensuring protection against electric shock.
- Signal relay outputs
  - **Signal relay 1:**
    LIVE[1]:
    Mains supply voltages up to 250 VAC can be connected to this output.
    SELV:
    The output is galvanically separated from other circuits. Therefore, the supply voltage or safety extra-low voltage can be connected to the output as desired.
  - **Signal relay 2:**
    SELV:
    The output is galvanically separated from other circuits. Therefore, the supply voltage or safety extra-low voltage can be connected to the output as desired.
- **Mains supply**
  (terminals N, PE, L or L1, L2, L3, PE).

A galvanically safe separation must fulfil the requirements for reinforced insulation including creepage distances and clearances specified in EN 61800-5-1.

[1] LIVE: Low voltage with the risk of electric shock if the terminals are touched.

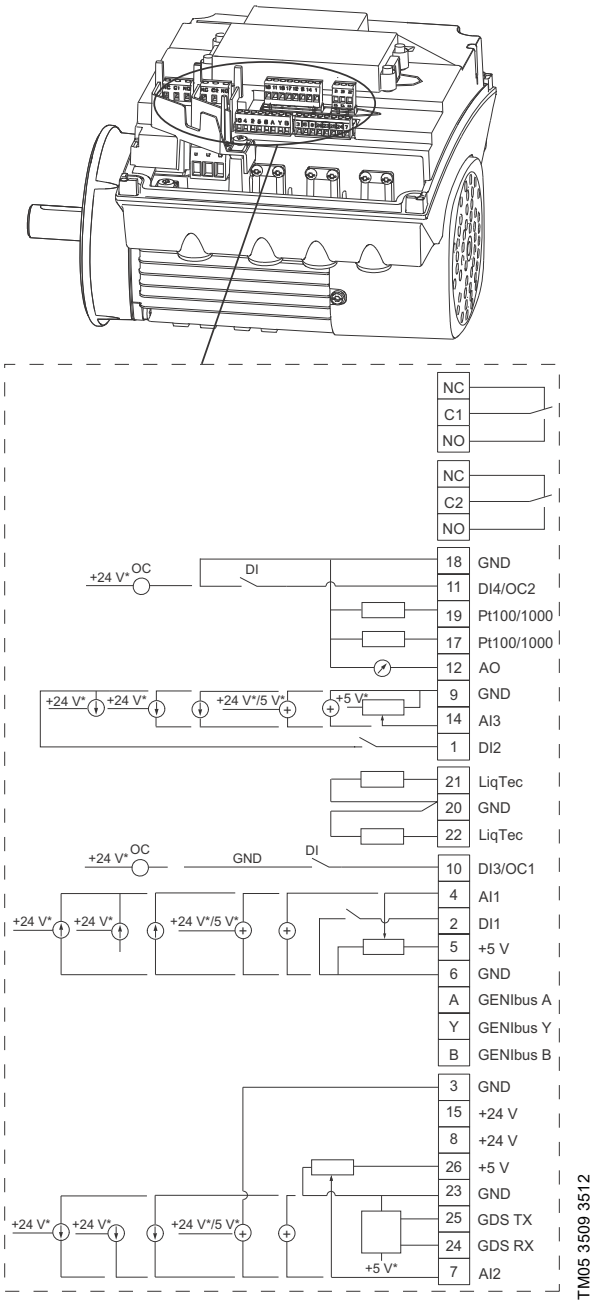

Fig. 1 Connection terminals, FM 300

* If an external supply source is used, a connection to GND must be available.

Terminal	Type	Function
NC	Normally closed contact	Signal relay 1 (LIVE or SELV)
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2 (SELV only)
C2	Common	
NO	Normally open contact	
18	GND	Ground
11	DI4/OC2	Digital input/output, configurable. Open collector: Max. 24 V resistive or inductive.
19	Pt100/1000 input 2	Pt100/1000 sensor input
17	Pt100/1000 input 1	Pt100/1000 sensor input
12	AO	Analog output: 0-20 mA / 4-20 mA 0-10 V
9	GND	Ground
14	AI3	Analog input: 0-20 mA / 4-20 mA 0-10 V
1	DI2	Digital input, configurable
21	LiqTec sensor input 1	LiqTec sensor input (white conductor)
20	GND	Ground (brown and black conductors)
22	LiqTec sensor input 2	LiqTec sensor input (blue conductor)
10	DI3/OC1	Digital input/output, configurable. Open collector: Max. 24 V resistive or inductive.
4	AI1	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V
2	DI1	Digital input, configurable
5	+5 V	Supply to potentiometer and sensor
6	GND	Ground
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Ground
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Ground
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor input
7	AI2	Analog input: 0-20 mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V

Wiring connections

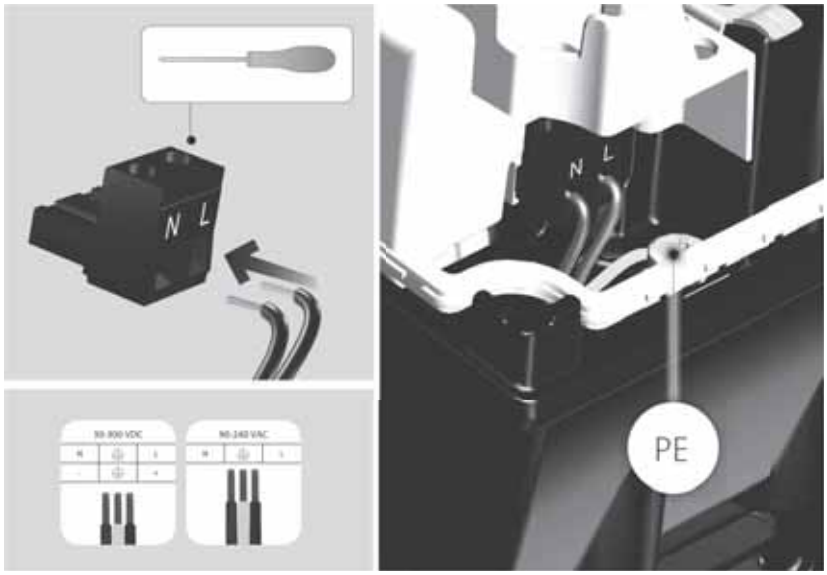

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Fig. 2 Wiring diagram

The motor is to be connected to the power supply as shown in fig. 3.

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.

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Fig. 3 Electrical connections, MGFlex motor

Technical data

Dimensions

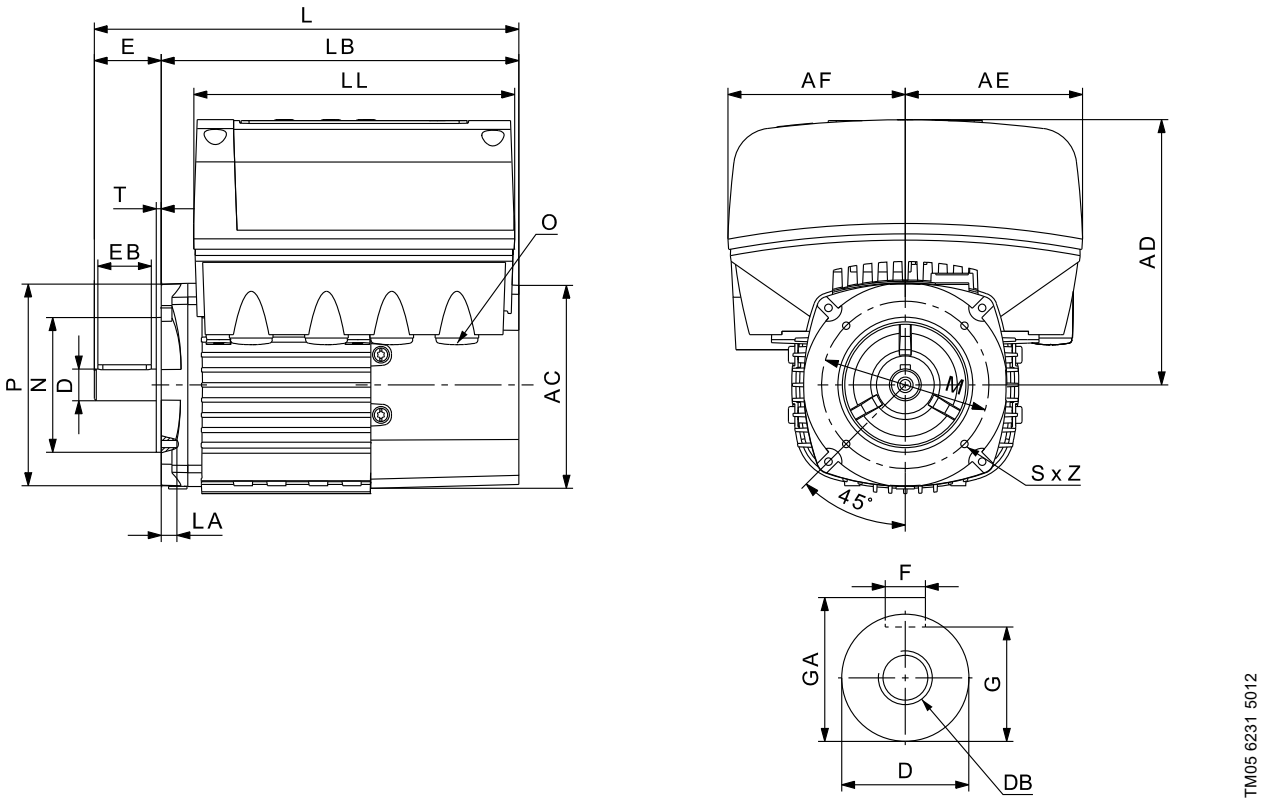

Fig. 4 Dimensional sketch of MGFlex

Power [Hp]	Short type designation	Stator housing in. [mm]							
		IEC:	AC	AD	AE	AF	L	LB	LL
		DIN:	g	p1					
1.00	MGE080A2HA		4.80 [122]	6.22 [158]	4.17 [106]	4.17 [106]	10.00 [254]	8.43 [214]	7.56 [192]
2.00	MGE090C2HA		4.80 [122]	6.22 [158]	4.17 [106]	4.17 [106]	11.18 [284]	9.21 [234]	7.56 [192]

Shaft end in. [mm]						
D	DB	E	EB	F	G	GA
d	d6	l		u		t
0.75 [19]	M6	1.57 [40]	1.26 [32]	0.24 [6]	0.61 [15.5]	0.85 [21.5]
0.94 [24]	M8	1.97 [50]	1.57 [40]	0.31 [8]	0.79 [20]	1.06 [27]

Power [Hp]	Short type designation	Flange in. [mm]						Cable entries
		IEC:	LA	M	N	P	S x Z	T	O
		DIN:	c1	e1	b1	a1	s1	f1	
1.00	MGE080A2HA		0.47 [12]	3.94 [100]	3.15 [80]	4.72 [120]	M6 x 4	0.12 [3]	4 x M20
2.00	MGE090C2HA		0.51 [13]	4.53 [115]	3.74 [95]	5.31 [135]	M8 x 4	0.12 [3]	

Electrical data

Power supply to pump	30-300 VDC, PE. 1 x 90-240 V, - 10 %/+ 6 %, 50/60 Hz, PE.
Energy source	Solar module. Generator. Grid.
Start/stop control	Digital input for start/stop of motor.
Power switch on/off or DC to/from AC	Max. four times per hour.
Enclosure class	TEFC/Nema 3 (IP55).
Motor protection	Built-in motor protection: • overvoltage and undervoltage • overload • overtemperature.
Sound pressure level	< 42 db (A) for 1.00 Hp motor.
Power factor	0.97.
Earth-leakage circuit breaker	If the pump/motor is connected to an earth-leakage circuit breaker (ELCB) for additional protection, this circuit breaker must trip when AC fault currents, pulsating DC or smooth DC fault currents occur.
Ambient temperature	During operation: -4 to 122 °F [-20 °C to +50 °C]. During storage/transport: -13 to 158 °F [-25 °C to +70 °C].
Relative humidity	Maximum 95 %.
Leaking current	< 3.5 mA for AC. < 10 mA for DC.
Installation outdoor	The motor/pump must be protected from rain and direct sunlight.
Marking	CE.
Insulation class	F (IEC 85).
EMC compatibility	EN 61800-3.

Motor range

Product	Power P1 [W]	Product number
MGFlex 80A	880	98367492
MGFlex 90Sc	1730	98190192

Note

Grundfos only guarantees the performance and reliability of the MGFlex motors if both conditions below are fulfilled:

1. The motor must be connected to the pump end as described in this document.
2. The assembly of the motor and the pump must be carried out by persons trained and authorized by Grundfos.

In the case of OEM usage, please contact Grundfos to obtain full warranty coverage.

2. System components

IO 50 switch box

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

The IO 50 enables manual starting and stopping of the pump in a solar-powered system and functions as a connection box joining all necessary cables.

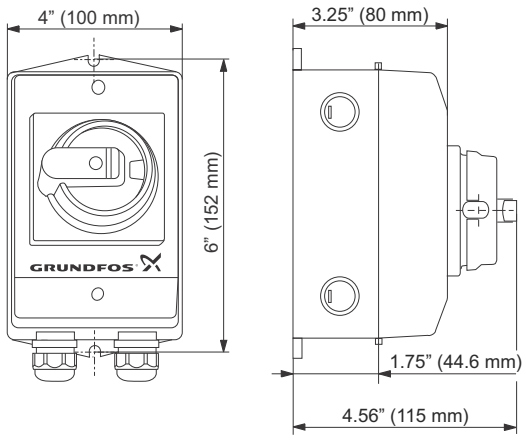

Fig. 5 IO 50 Dimensions: in. (mm)

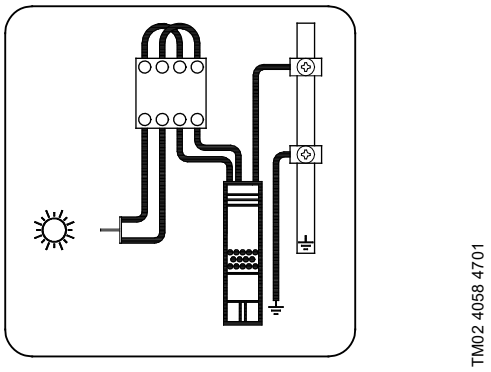

Fig. 6 Wiring diagram

Technical data

Voltage	Max. 300 VDC, 8.9 A. Max. 265 VAC, 8.9 A.
Enclosure class	IP55.
Ambient temperature	During operation: -22 to 122 °F [-30 °C to +50 °C]. During storage: -22 to 140 °F [-30 °C to +60 °C].
Marking	CE.

IO 101 switch box

The IO 101 is designed specifically for solar-powered systems. The IO 101 enables the connection of a backup 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.

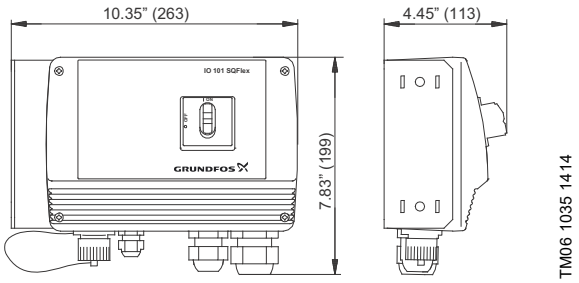

Fig. 7 IO 101 Dimensions: in. (mm)

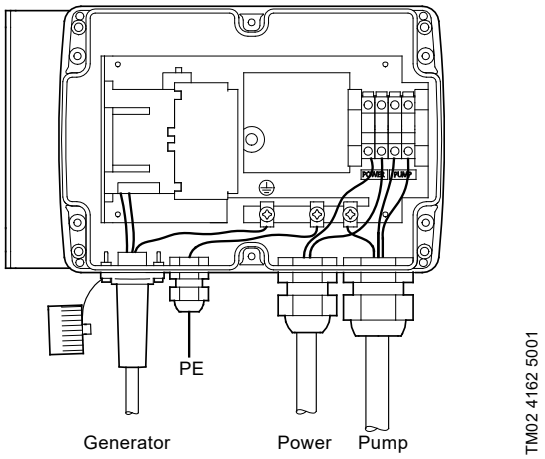

Fig. 8 Electrical connections, IO 101

Technical data

Voltage	230 VAC - 15 %/+ 10 %, 50/60 Hz (internal relay). Max. 225 VDC, 8.9 A. Max. 265 VAC, 8.9 A.
Enclosure class	IP55.
Ambient temperature	During operation: -22 to 122 °F [-30 °C to +50 °C]. During storage: -22 to 140 °F [-30 °C to +60 °C].
Marking	CE.

Generator

The generator can be either diesel or petrol-driven.
It must be running steadily before the pump is cut in.

3. CRFlex pump

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

- MGFlex motor
- CR, CRN or CRI pump end.

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Fig. 9 CRFlex pump

Pump Energy Index

Pump Energy Index (PEI) was established by the U.S. Department of Energy (DOE) and adopted by Canada as the standard metric used to evaluate pump efficiency. The value is the ratio of the pump efficiency rating (PER) divided by the calculated minimally compliant PER (PER_{STD}) for the pump type. This provides a representation of a pump's actual performance compared to the minimal standard performance required by regulation. The lower the PEI value, the more efficient a pump is at the tested operating points.

PER is determined by defined testing parameters required by the DOE. This includes testing a particular pump model at its best efficiency point (BEP).

For PEI values there are two different versions:

- • PEI_{CL} (constant load): Applies to a bare-shaft pump, and a pump sold with a motor
- • PEI_{VL} (variable load): Applies to pumps sold with a motor and controller (such as VFD, VSD)

The DOE has set the maximum PEI value as 1.00. Any pump, pump and motor, or pump, motor and controller that exceeds a PEI value of 1.00 can no longer be manufactured after January 26, 2020.

PEI is a generalized efficiency value. PEI cannot be used to determine the efficiency of a pump in a specific application.

Product type	Hp	Ph	Voltage	Pole	PEI_{VL}	Impeller diameter [in (mm)]
CRF 10-1	1	1	90-240V	2	0.42	3.66 (92.9)
CRF 10-2	2				0.41	
CRF 15-1					0.45	4.13 (105)

Pumped liquids

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

pH value: 5-9.

Liquid temperature: 32 to 248 °F [0 °C to +120 °C].

Sand content

Maximum sand content: 20 ppm.

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

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:

$H = p_b - NPSHR - H_f - H_v - H_s$

P_b = Barometric pressure in feet absolute. (Barometric pressure can be set to 33.9 feet. At sea level. In closed systems, pb indicates system pressure in feet.)

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.

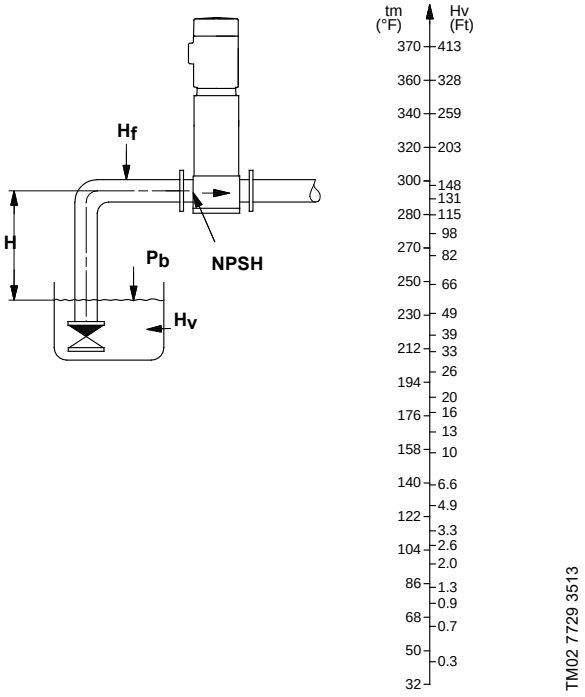


Fig. 10 Minimum inlet pressure - NPSH

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.

Material specification

Sectional drawing

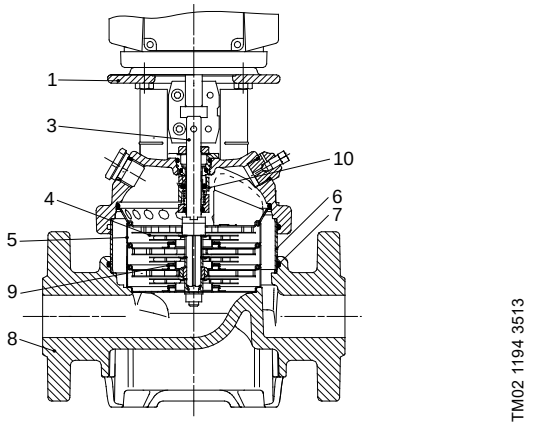


Fig. 11 Sectional drawing of CRFlex pump end

Pump materials

Pos.	Designation	Materials	AISI/ASTM
1	Pump head	Cast iron	A 48-30 B
3	Shaft	Stainless steel	AISI 316[1)] AISI 431[2)]
4	Impeller	Stainless steel	AISI 304
5	Chamber	Stainless steel	AISI 304
6	Outer sleeve	Stainless steel	AISI 304
7	O-ring for outer sleeve	EPDM or FKM	
8	Base	Cast iron	A 48-30 B
9	Neck ring	PTFE	
10	Shaft seal	Cartridge type	
	Bearing rings	Silicon carbide	
	Rubber parts	EPDM or FKM	
12	FJG flange	Cast iron	A 48-30 B

[1)] CR(E) 1s, 1, 3, 5

[2)] CR(E) 10, 15, 20

Product range

The CRFlex pump complete is supplied with a 6.56 ft [2 m] cable.

Product	Material	Pump End	Product Number
CRF 1-9	Cast iron/Stainless Steel	CR	98419320
CRF 3-5	Cast iron/Stainless Steel	CR	98419327
CRF 5-2	Cast iron/Stainless Steel	CR	98419329
CRF 10-1	Cast iron/Stainless Steel	CR	99805372
CRF 1-17	Cast iron/Stainless Steel	CR	98424448
CRF 3-11	Cast iron/Stainless Steel	CR	98424474
CRF 5-6	Cast iron/Stainless Steel	CR	98424476
CRF 10-2	Cast iron/Stainless Steel	CR	99805393
CRF 15-1	Cast iron/Stainless Steel	CR	99805394

4. Applications

The Grundfos solar surface pump system is designed for renewable energy supply. Powered by a solar panel, the system is especially suitable for supplying water in applications such as:

- irrigation
- watering of livestock
- pressure boosting
- floating pump
- recirculation of swimming-pool water (OEM).

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 19.68 ft [6 m].
   See also section *Minimum inlet pressure, NPSH* on page 9.
3. The CRFlex pump must be protected against rain and direct sunlight.

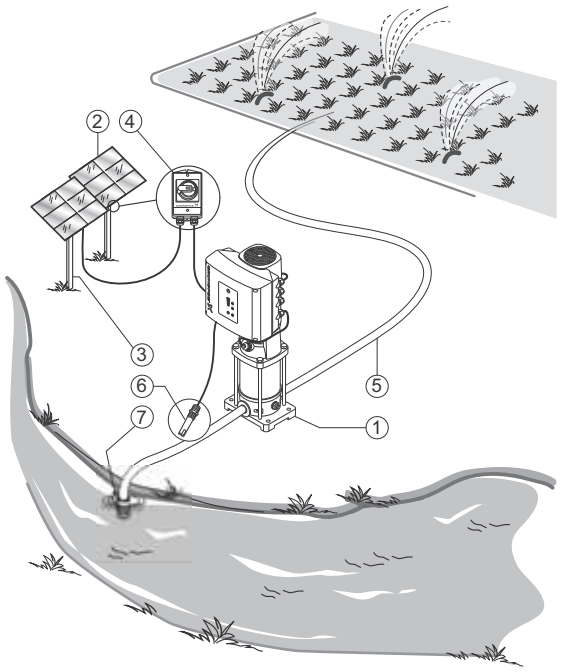


Fig. 12 CRFlex Solar

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

CRFlex Solar with level switch

The CRFlex Solar 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 19.68 ft [6 m]. See also section *Minimum inlet pressure, NPSH* on page 9.
3. The CRFlex pump must be protected against rain and direct sunlight.

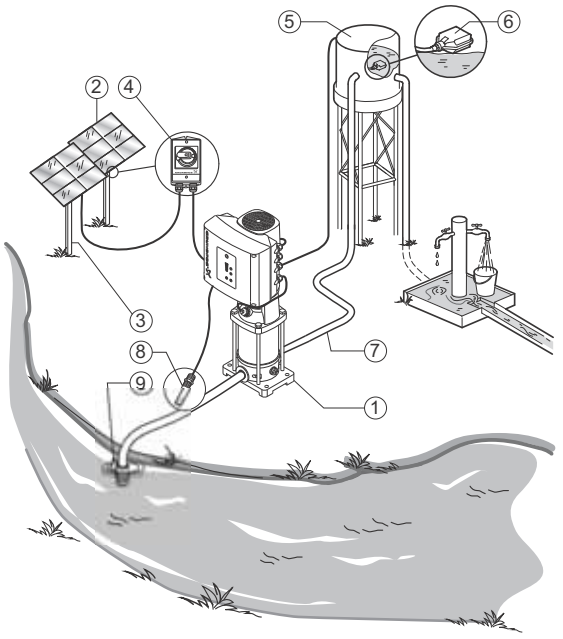


Fig. 13 CRFlex Solar with level switch

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 switch (optional)
9	Non-return valve (foot valve)

CRFlex Solar with generator

During periods of insufficient solar energy, the CRFlex Solar system provides a reliable water supply.

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
- maintenance confined to periodic cleaning of the solar panels
- 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 19.68 ft [6 m]. See also section *Minimum inlet pressure, NPSH* on page 9.
3. The CRFlex pump must be protected against rain and direct sunlight.

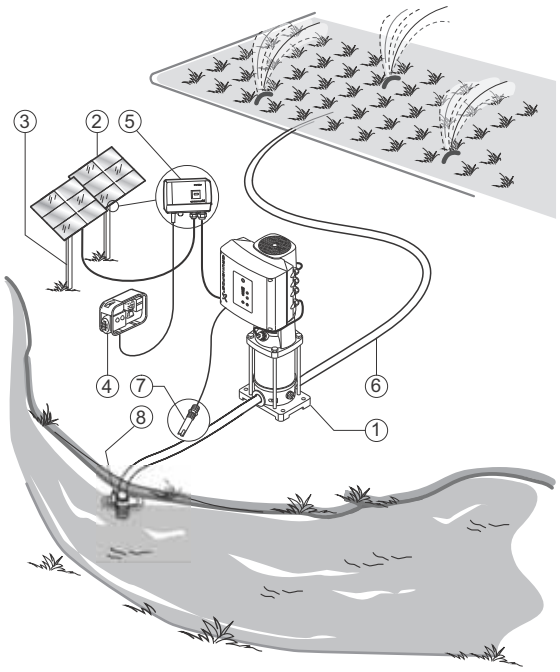


Fig. 14 CRFlex Solar with generator

Pos.	Description
1	CRFlex pump
2	Solar panels
3	Support structure
4	Generator
5	IO 101 switch box
6	Water pipe
7	Dry-running switch (optional)
8	Non-return valve (foot valve)

CRFlex Solar with level switch and generator

During periods of insufficient solar energy, the CRFlex Solar system will provide a reliable water supply.

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
- maintenance confined to periodic cleaning of the solar panels
- 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 19.68 ft [6 m].
   See also section *Minimum inlet pressure, NPSH* on page 9.
3. The CRFlex pump must be protected against rain and direct sunlight.

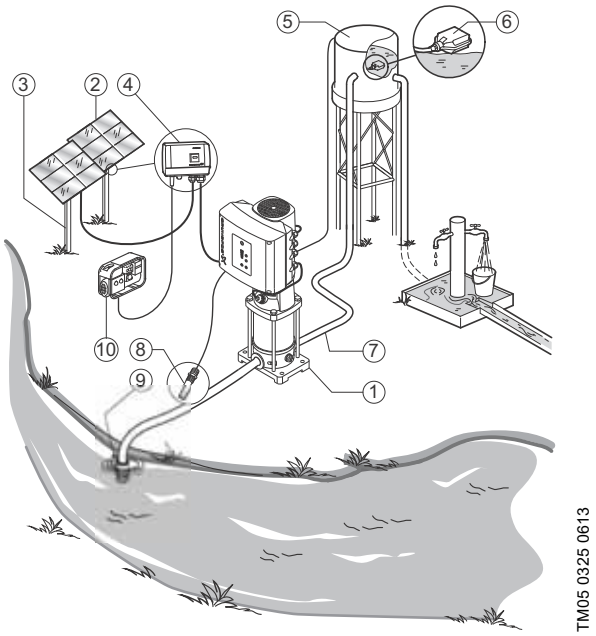


Fig. 15 CRFlex Solar with level switch and generator

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 switch (optional)
9	Non-return valve (foot valve)
10	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" [76 mm] 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 19.68 ft [6 m].
   See also section *Minimum inlet pressure, NPSH* on page 9.
3. The CRFlex pump must be protected against rain and direct sunlight.

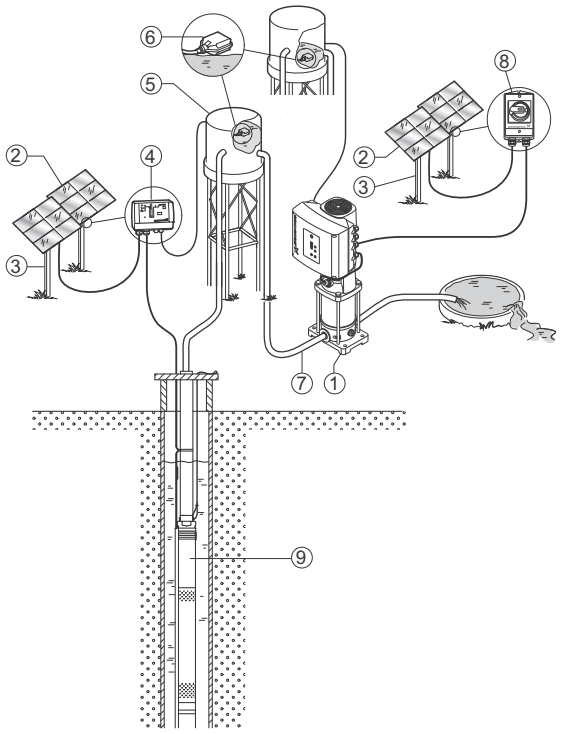


Fig. 16 CRFlex and SQFlex Solar

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

5. Accessories

IO 50 switch box

Description	Product number
IO 50 (US)	96959028

IO 101 switch box

Description	Product number
IO 101 (230 V)	96475074
IO 101 (115 V)	96481502

Dry-running switch

Description	Product number
Dry-running switch	97911215

Level switch

Description	Product number
Level switch (normally closed)	97911220
Level switch (normally open)	010748

6. Technical data

Dimensions and weights

CRF 1-9, 1-17

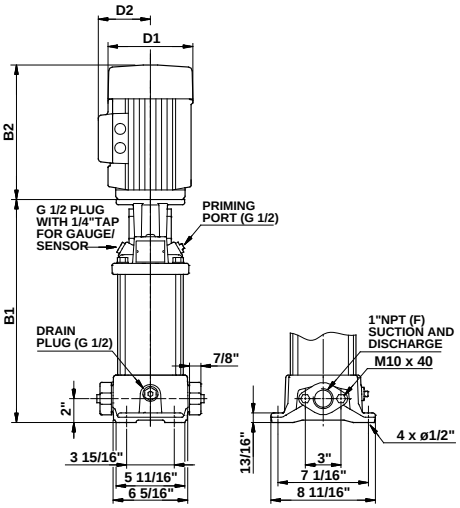


Fig. 17 Dimensional sketch of CRF 1-9, 1-17

Pump Type	Product Number	Dimensions in. [mm]					Net Weight (lbs.)	Gross Weight (lbs.)
		B1	B2	B1 + B2	D1	D2		
CRF 1-9	98419320	16.22 [412]	8.45 [215]	24.67 [627]	4.8 [122]	6.22 [158]	58	69
CRF 1-17	98424448	21.89 [556]	9.25 [235]	31.14 [791]	4.8 [122]	6.22 [158]	71	85

CRF 3-5, 3-11

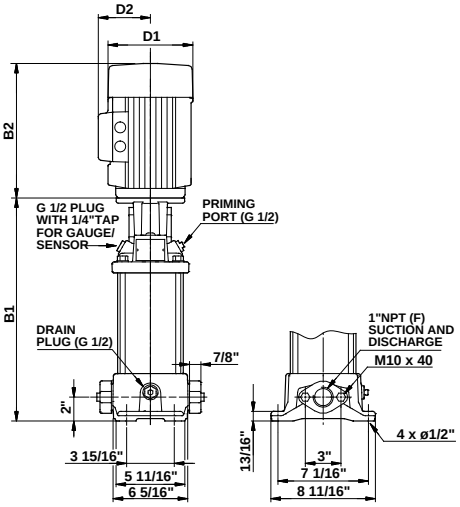


Fig. 18 Dimensional sketch of CRF 3-5, 3-11

Pump Type	Product Number	Dimensions in. [mm]					Net Weight (lbs.)	Gross Weight (lbs.)
		B1	B2	B1 + B2	D1	D2		
CRF 3-5	98419327	13.39 [340]	8.45 [215]	21.84 [555]	4.8 [122]	6.22 [158]	54	65
CRF 3-11	98424474	17.64 [448]	9.25 [235]	26.89 [683]	4.8 [122]	6.22 [158]	65	80

CRIF/CRNF 5-2, 5-6

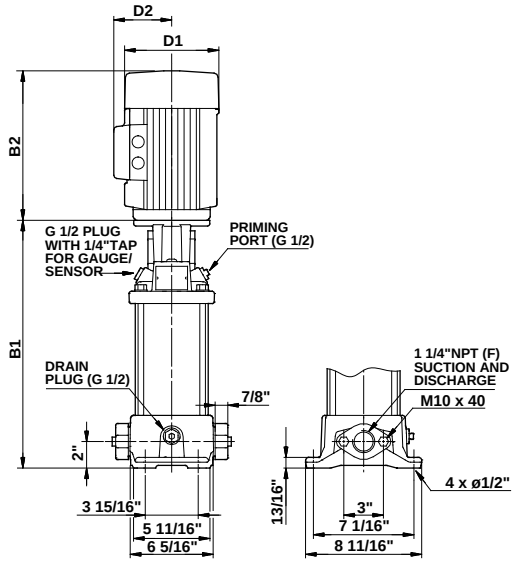


Fig. 19 Dimensional sketch of CRF 5-2, 5-6

Pump Type	Product Number	Dimensions in. [mm]					Net Weight (lbs.)	Gross Weight (lbs.)
		B1	B2	B1 + B2	D1	D2		
CRF 5-2	98419329	11.97 [304]	8.45 [215]	20.42 [519]	4.8 [122]	6.22 [158]	52	63
CRF 5-6	98424476	16.22 [412]	9.25 [235]	25.47 [647]	4.8 [122]	6.22 [158]	63	78

CRF 10-1, 10-2

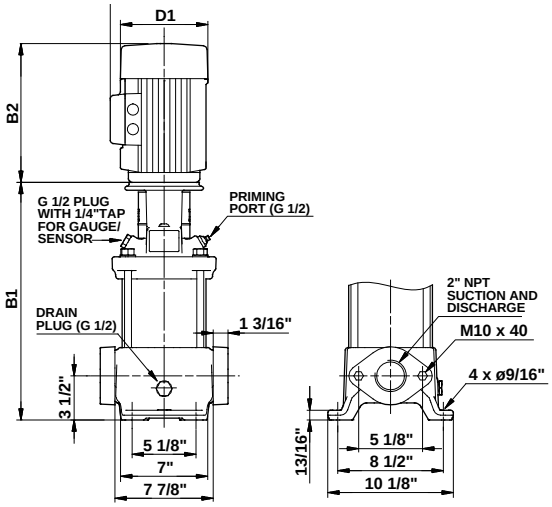


Fig. 20 Dimensional sketch of CRF 10-1, 10-2

Pump Type	Product Number	Dimensions in. [mm]					Net Weight (lbs.)	Gross Weight (lbs.)
		B1	B2	B1 + B2	D1	D2		
CRF 10-1	98419330	15.28 [388]	8.45 [215]	23.73 [603]	4.8 [122]	6.22 [158]	91	109
CRF 10-2	98424480	15.28 [388	9.25 [235]	24.53 [623]	4.8 [122]	6.22 [158]	99	113

CRF 15-1

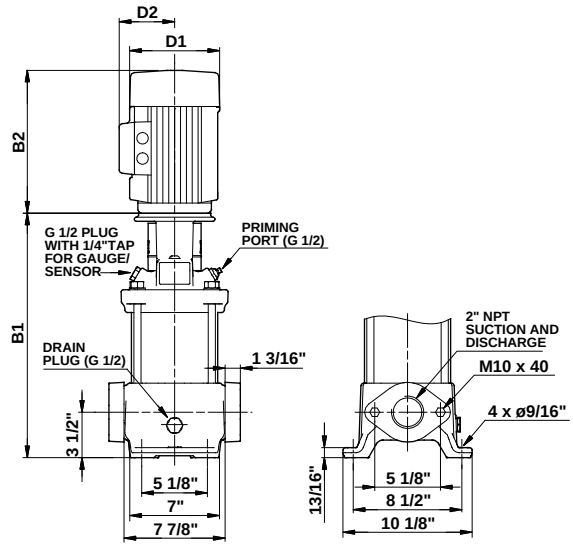


Fig. 21 Dimensional drawing sketch of CRF 15-1

Pump Type	Product Number	Dimensions in. [mm]					Net Weight (lbs.)	Gross Weight (lbs.)
		B1	B2	B1 + B2	D1	D2		
CRF 15-1	98424484	16.46 [418]	9.25 [235]	25.71 [653]	4.8 [122]	6.22 [158]	99	113

Electrical data

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

Pump type	Product number	Motor type	Maximum power input P1 [W]	Maximum current [A]
CRF 1-9	98419320	MGFlex	880	4.6
CRF 3-5	98419327	MGFlex	880	4.6
CRF 5-2	98419329	MGFlex	880	4.6
CRF 10-1	98419330	MGFlex	880	4.6
CRF 1-17	98424448	MGFlex	1730	8.9
CRF 3-11	98424474	MGFlex	1730	8.9
CRF 5-6	98424476	MGFlex	1730	8.9
CRF 10-2	98424480	MGFlex	1730	8.9
CRF 15-1	98424484	MGFlex	1730	8.9

7. Performance curves

Curve conditions

Specific performance charts

The specific performance charts on pages 20 to 29 are based on the following guidelines:

- Tolerances to ISO 9906, Annex A, if indicated.
- All curves show mean values.
- The curves must not be used as guarantee curves.
- Typical deviation: ± 15 %.
- The measurements have been made at a water temperature of 68 °F [+20 °C].
- The curves apply to a kinematic viscosity of 1 mm^2/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.

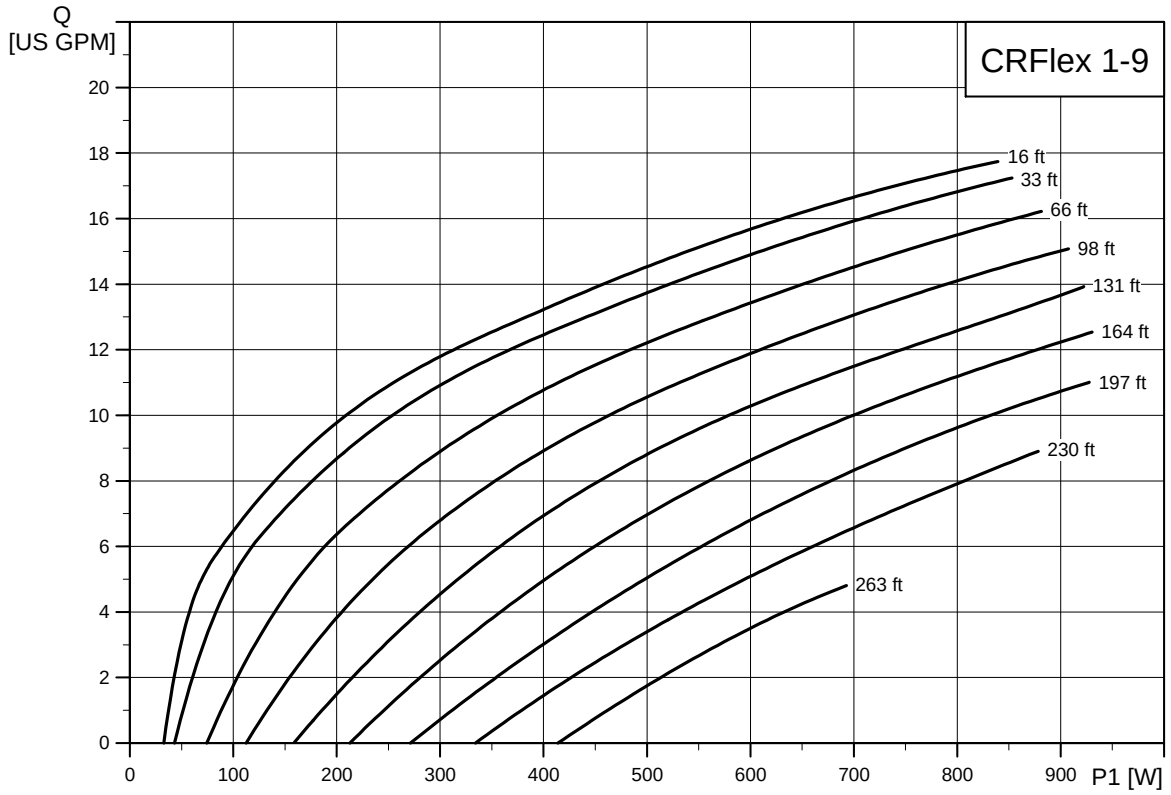
Pressure loss

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

NPSH curves

The NPSH curve is an average curve for all the variants shown. When sizing the pumps, add a safety margin of at least 2ft [0.6 m].

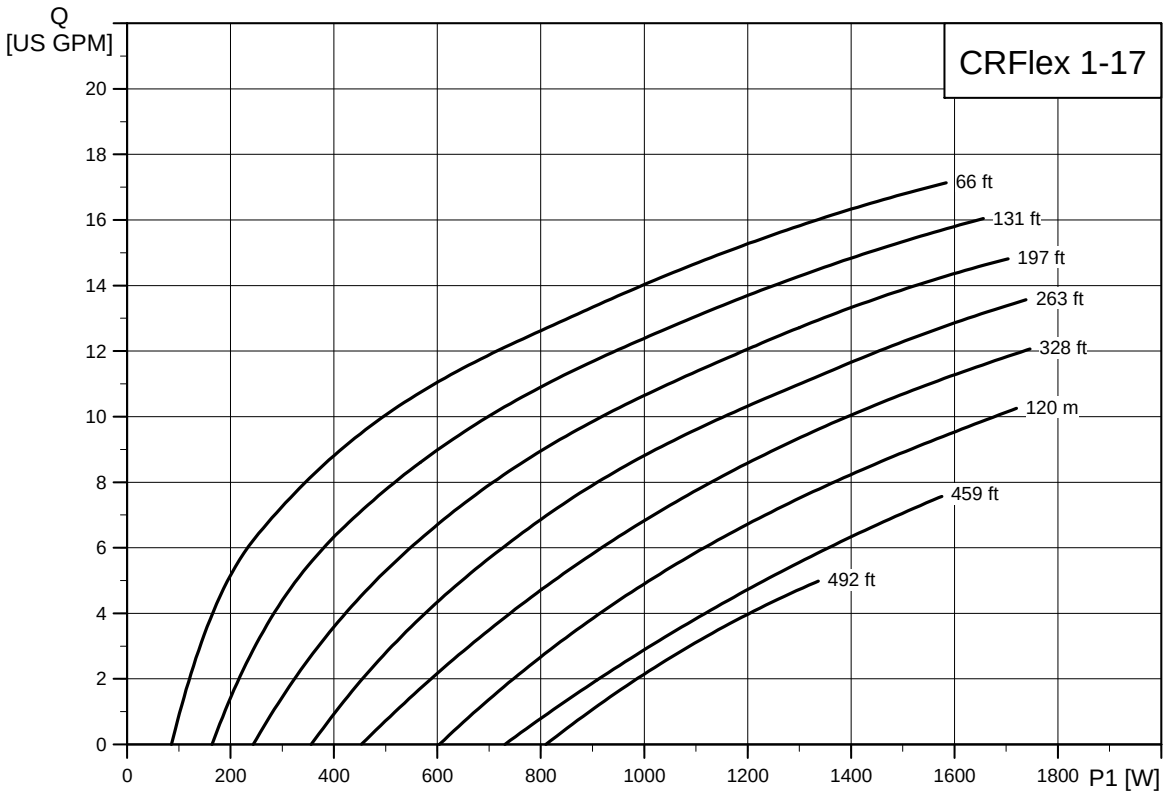
CRFlex 1-9



TM05 9220 0414

Fig. 22 Performance curves, CRFlex 1-9

CRFlex 1-17



TM05 9221 0414

Fig. 23 Performance curves, CRFlex 1-17

CRFlex 3-5

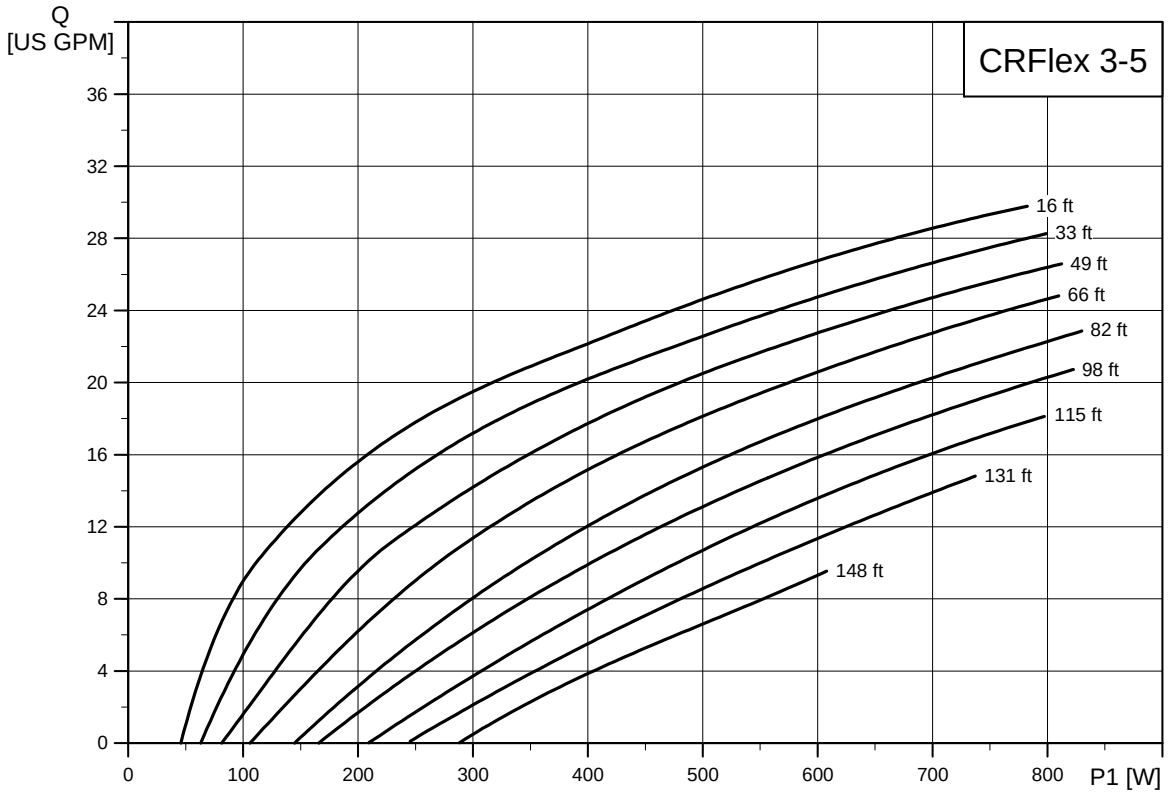


Fig. 24 Performance curves, CRFlex 3-5

CRFlex 3-11

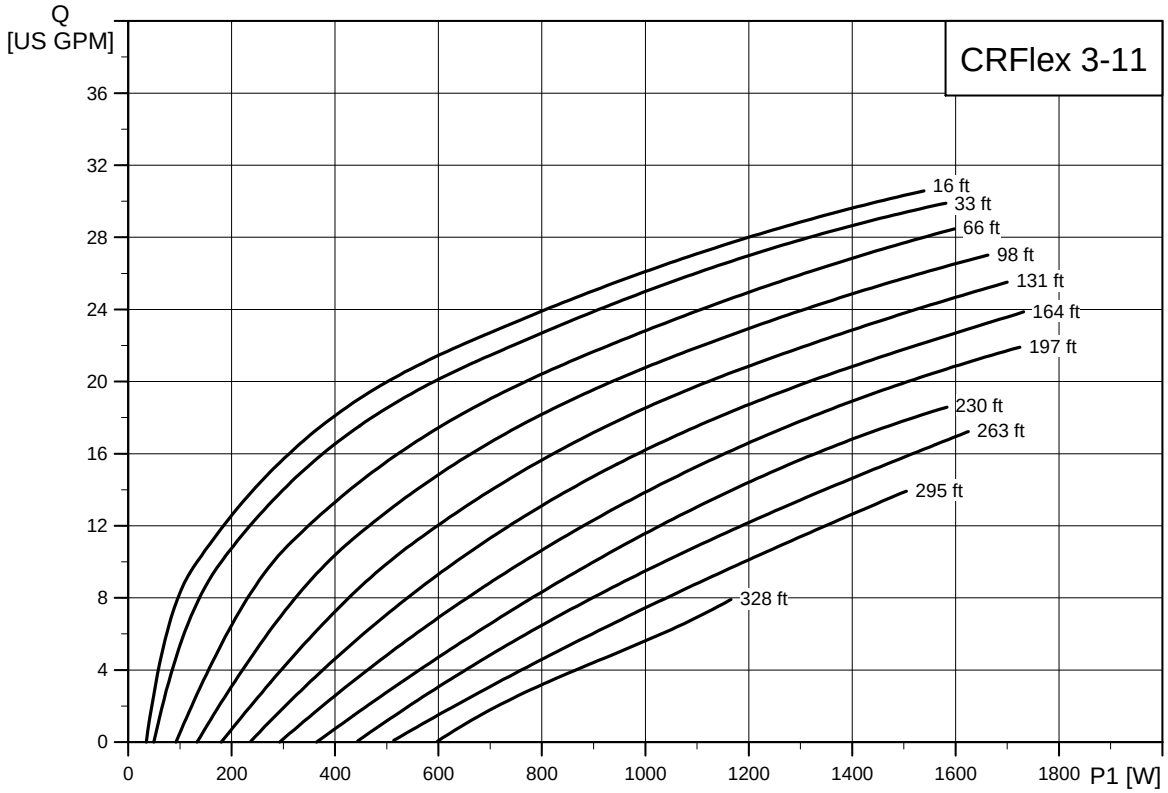


Fig. 25 Performance curves, CRFlex 3-11

CRFlex 5-2

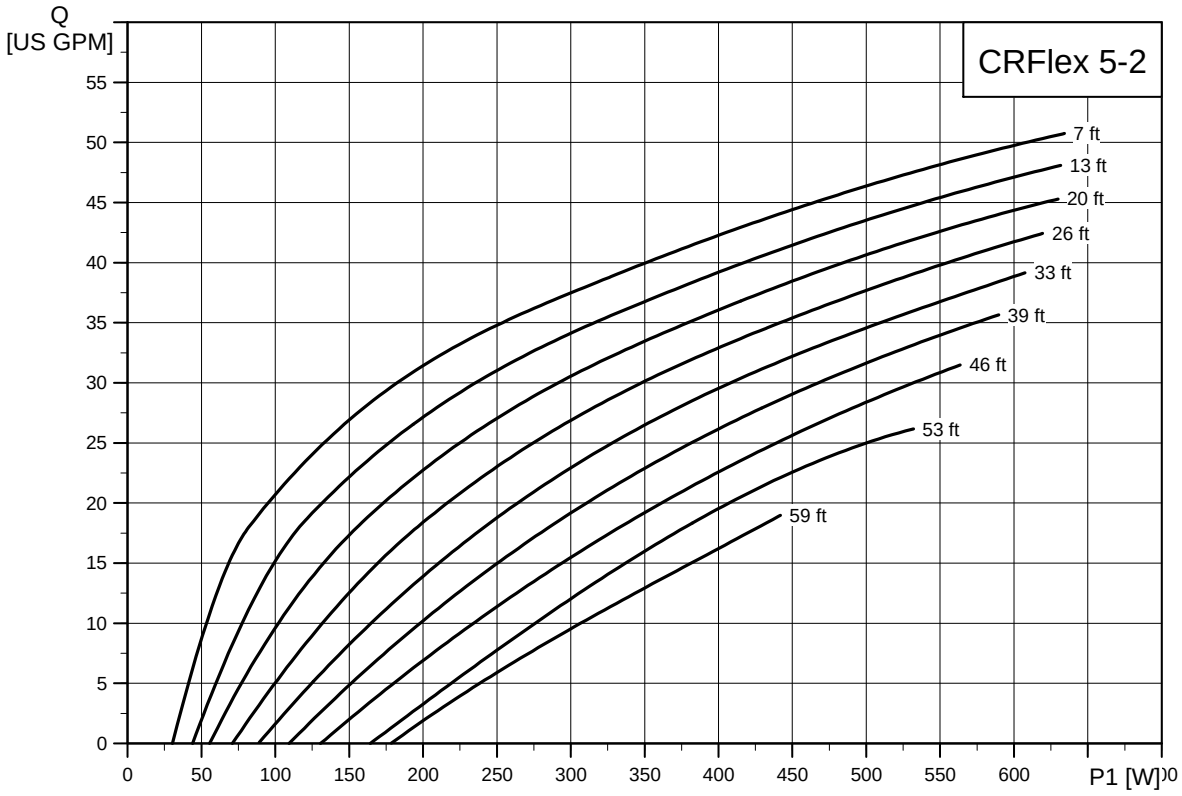
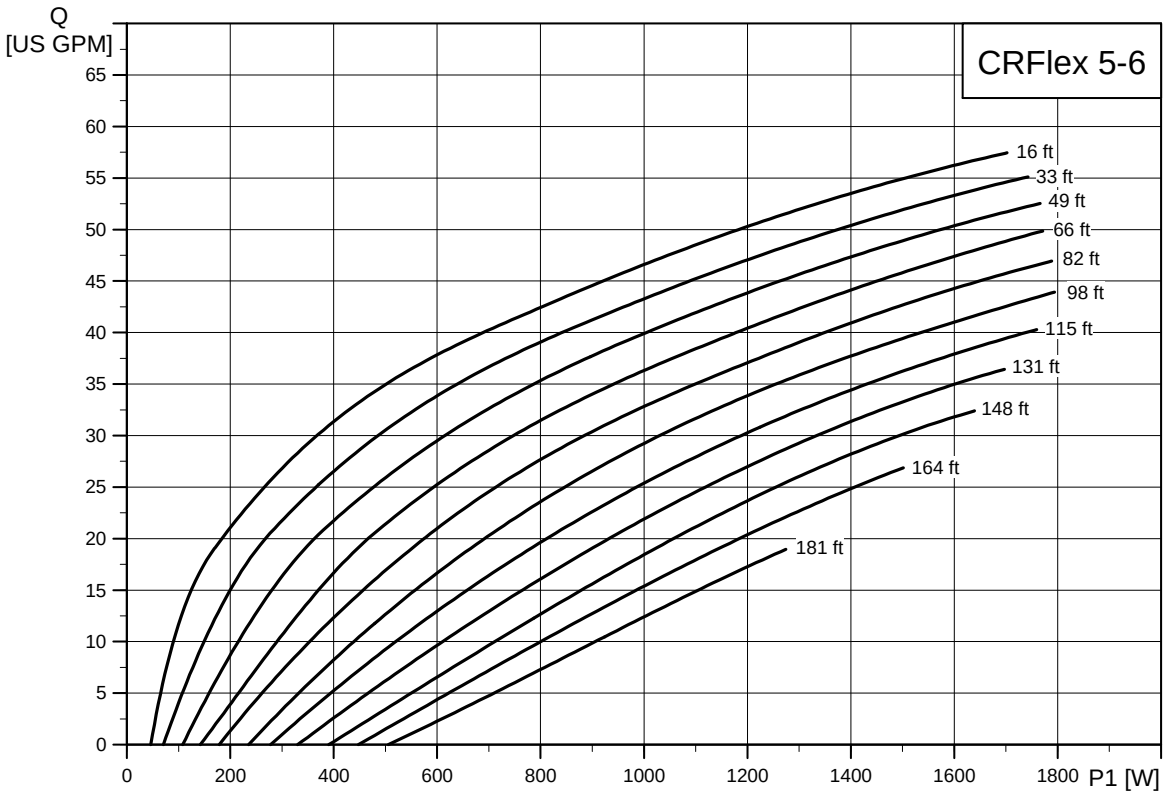


Fig. 26 Performance curves, CRFlex 5-2

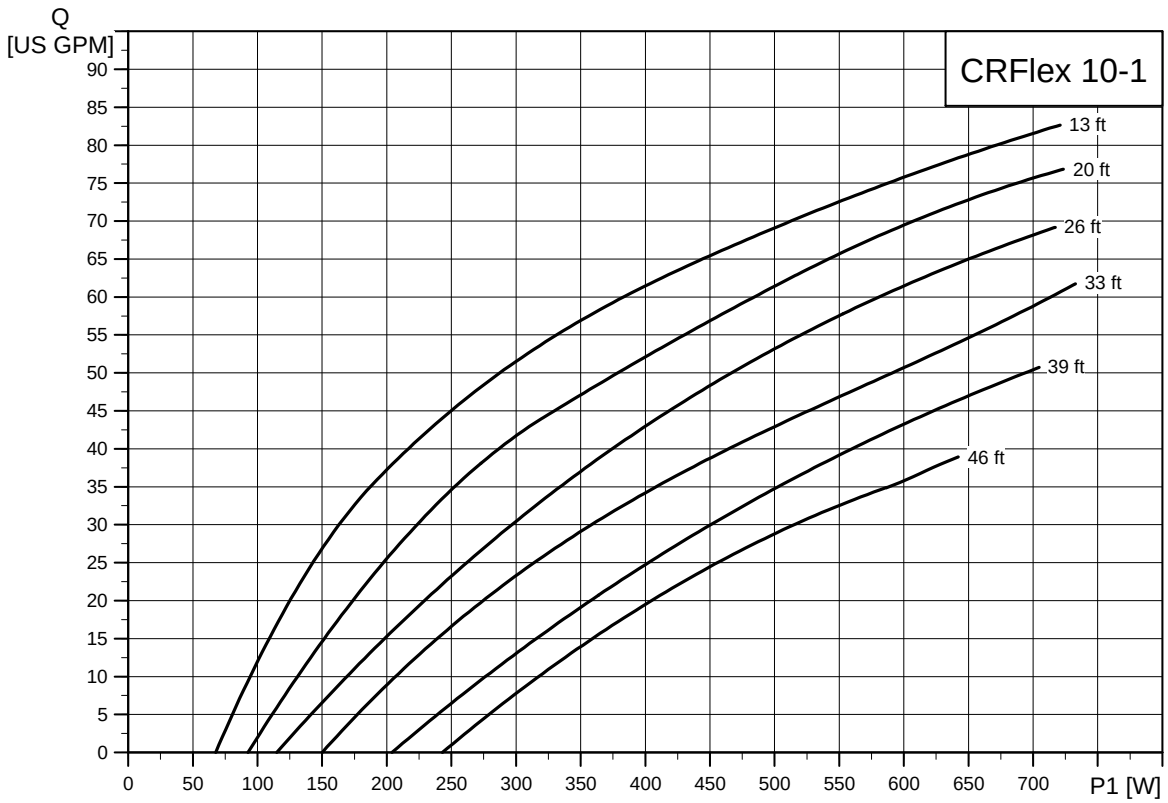
CRFlex 5-6



TM05 9225 0414

Fig. 27 Performance curves, CRFlex 5-6

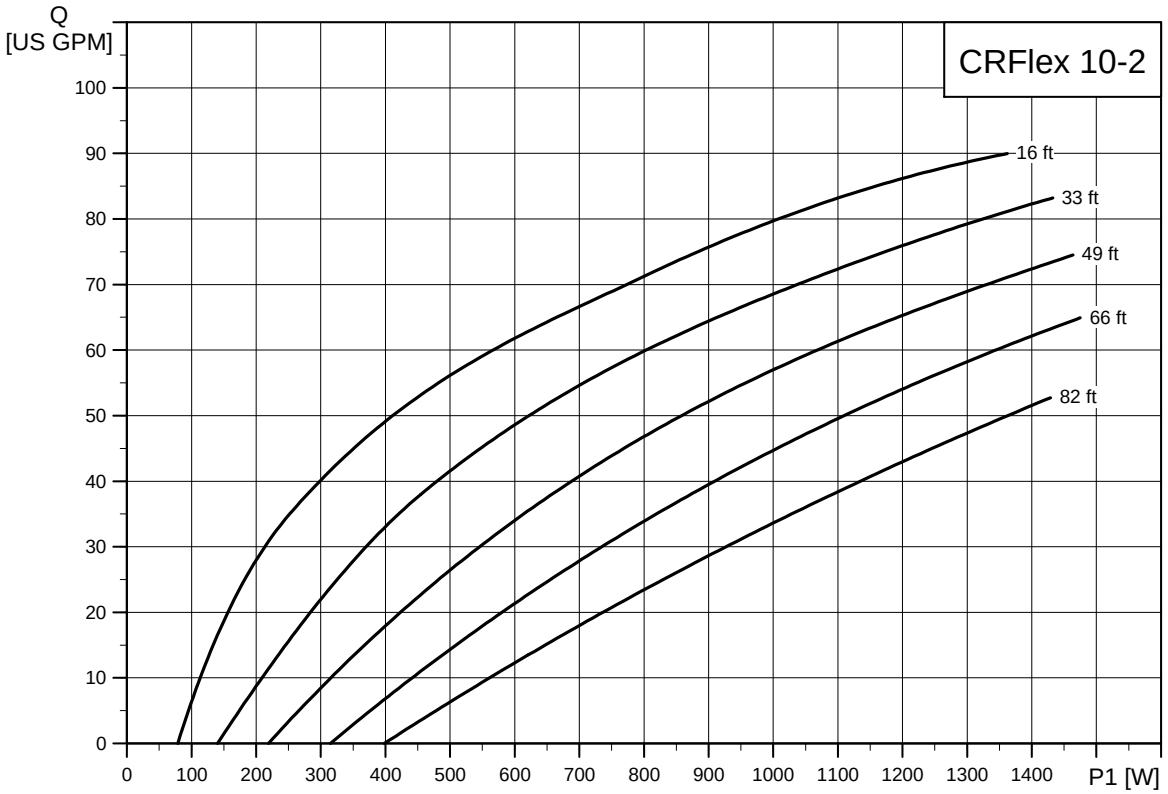
CRFlex 10-1



TM05 9226 0414

Fig. 28 Performance curves, CRFlex 10-1

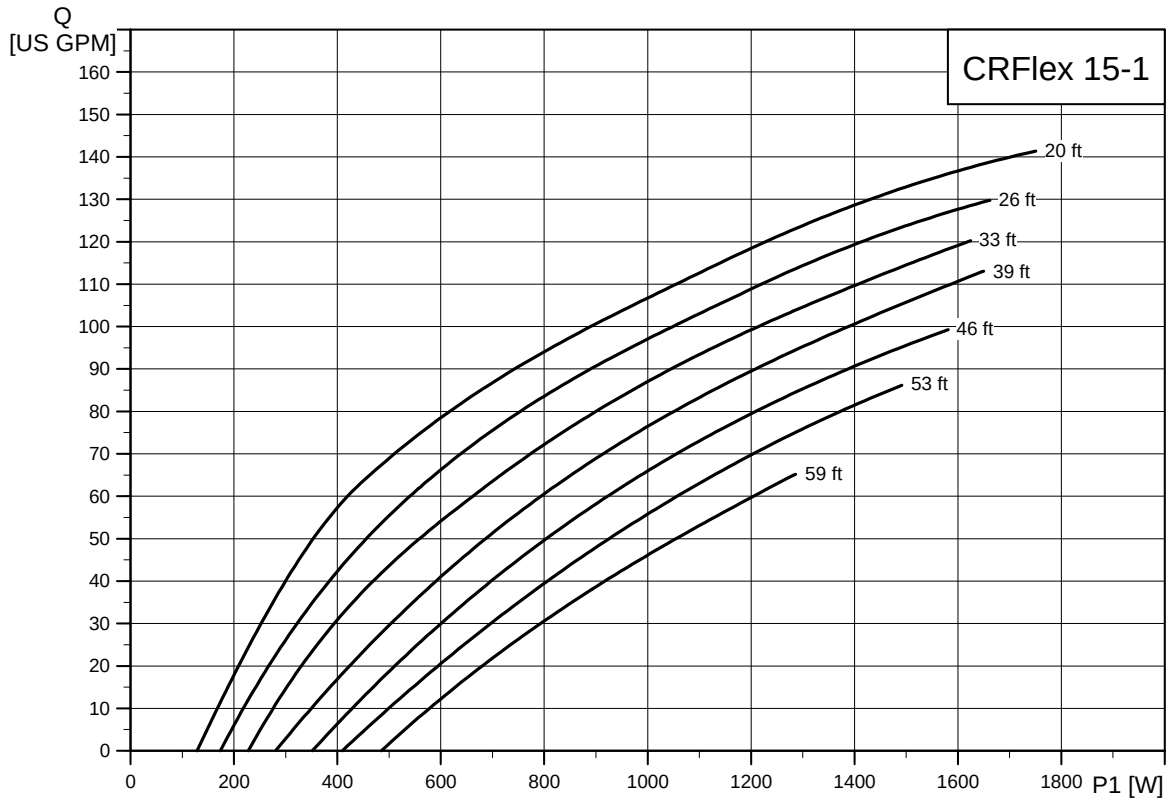
CRFlex 10-2



TM05 9227 0414

Fig. 29 Performance curves, CRFlex 10-2

CRFlex 15-1



TM05 9228 0414

Fig. 30 Performance curves, CRFlex 15-1

8. Appendix

Performance curves, CR, CRI, CRN 1

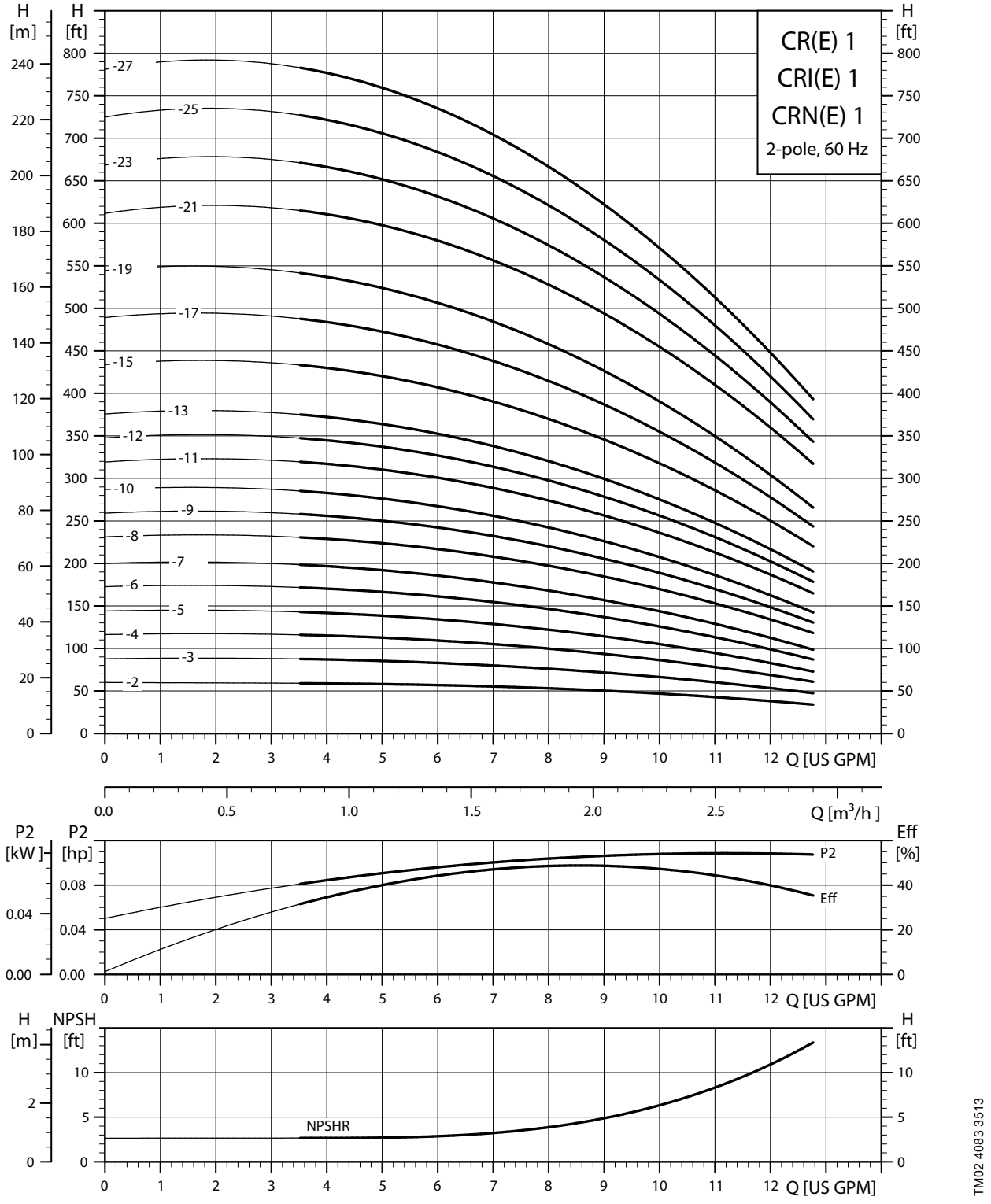


Fig. 31 Performance curves, CR, CRI, CRN 1

Performance curves, CR, CRI, CRN 3

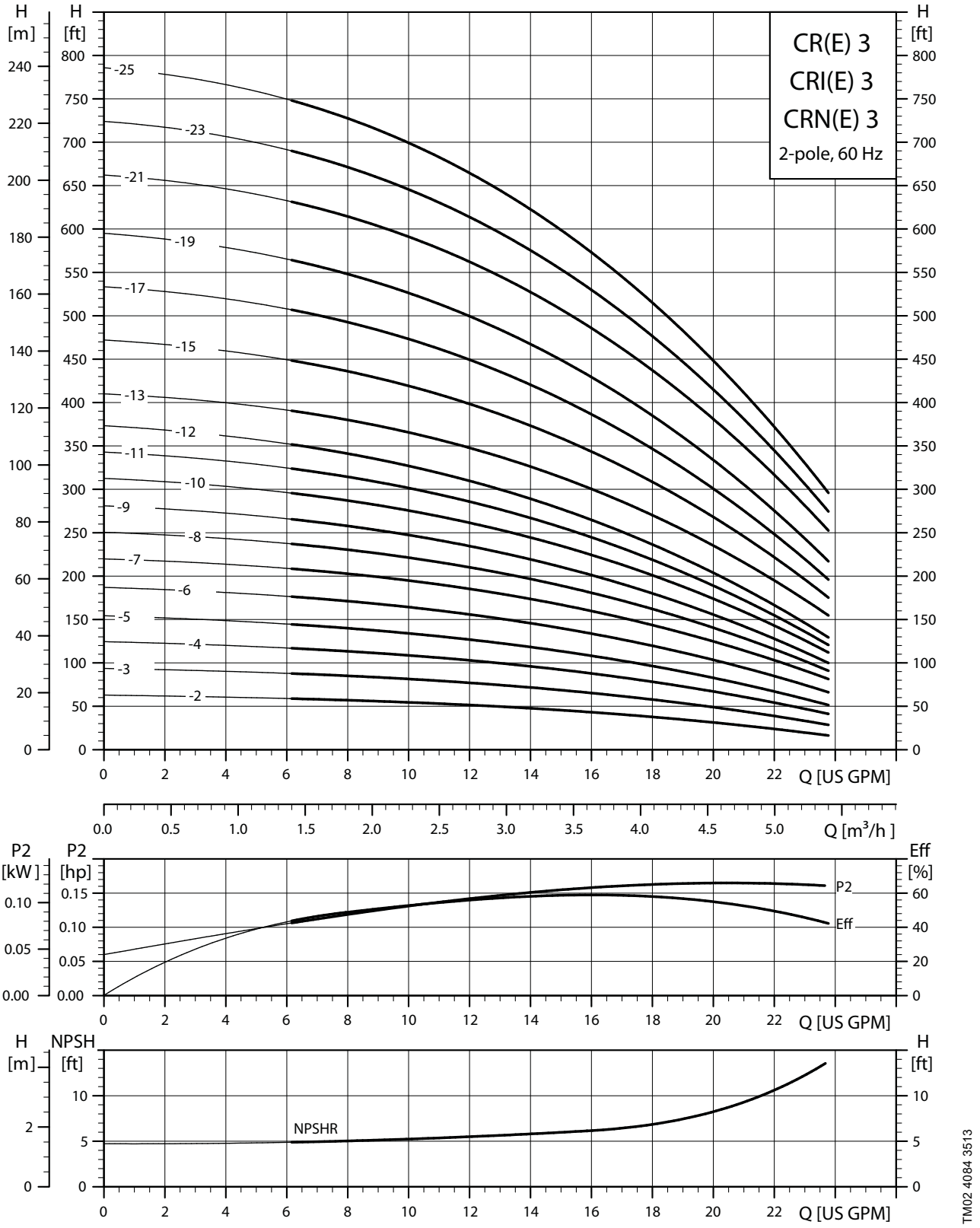


Fig. 32 Performance curves, CR, CRI, CRN 3

Performance curves, CR, CRI, CRN 5

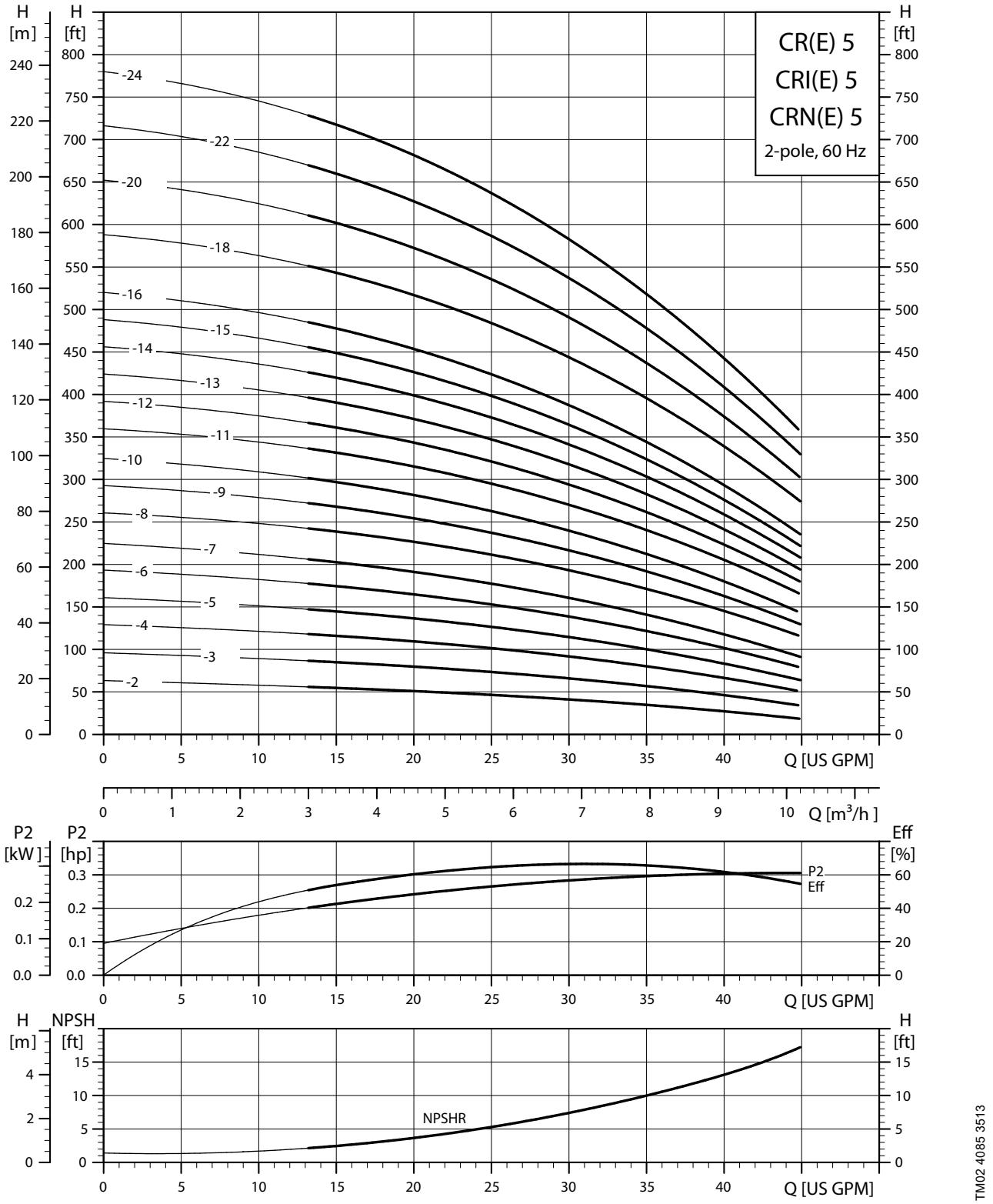


Fig. 33 Performance curves, CR, CRI, CRN 5

Performance curves, CR, CRI, CRN 10

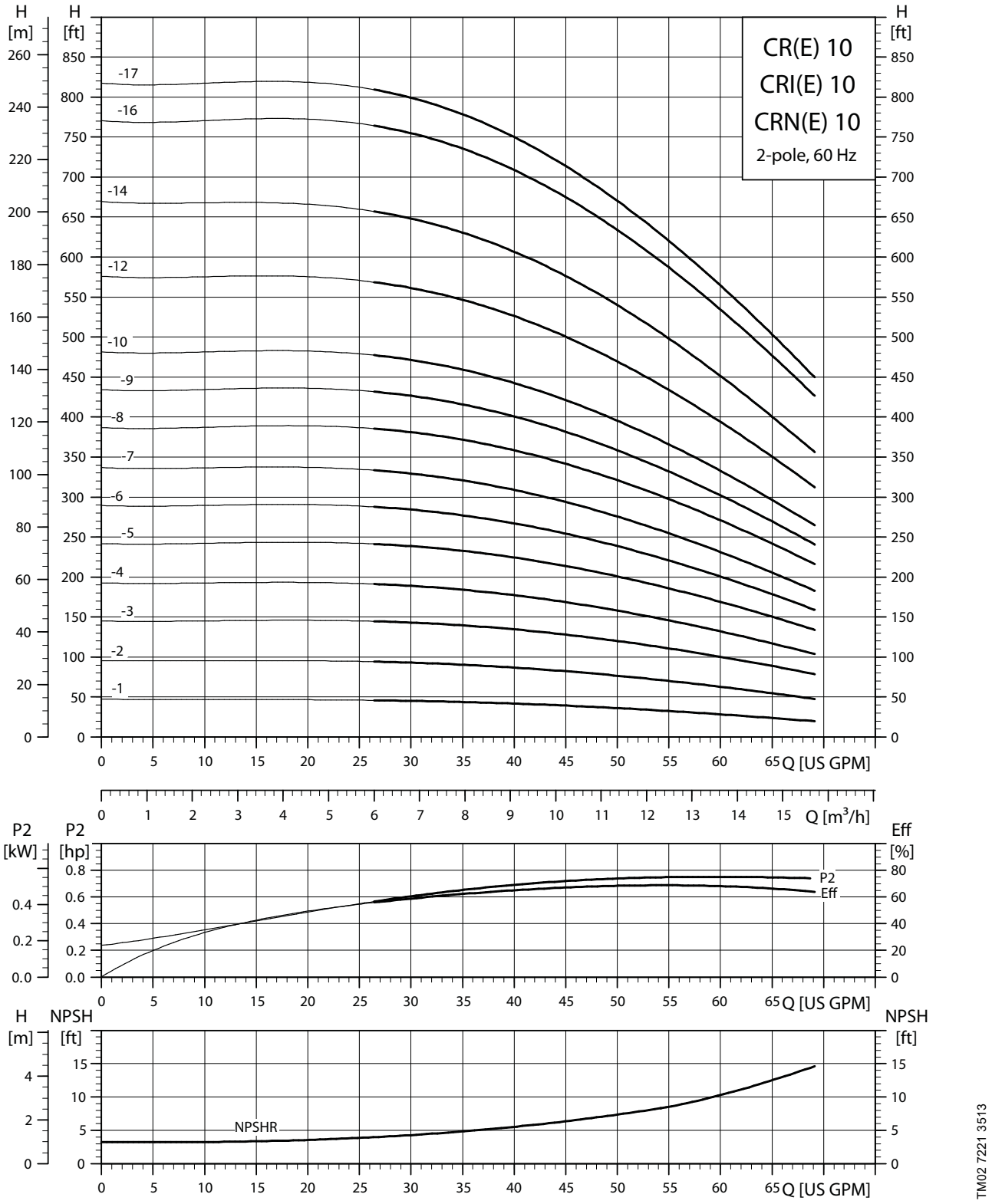


Fig. 34 Performance curves, CR, CRI, CRN 10

Performance curves, CR, CRI, CRN 15

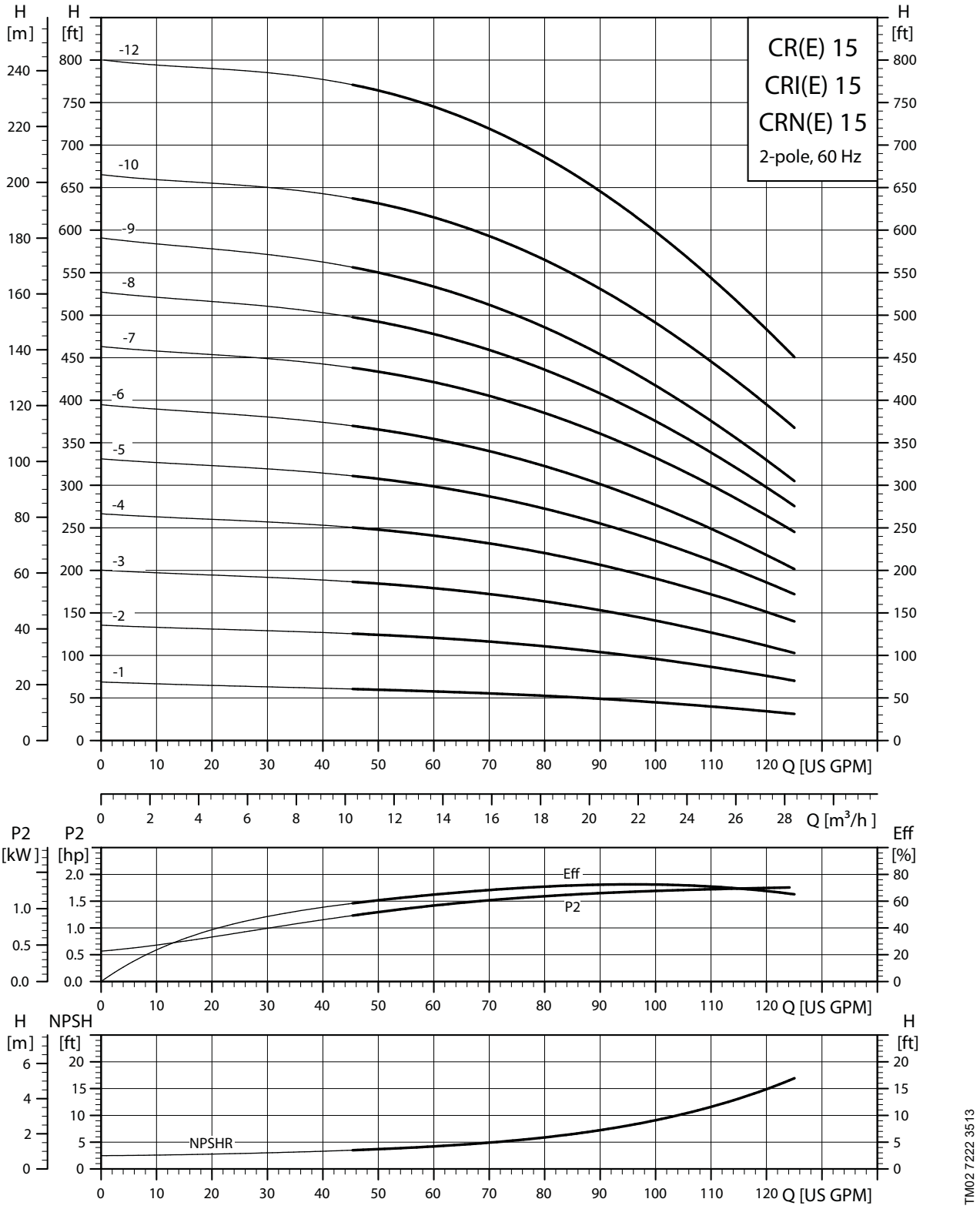


Fig. 35 Performance curves, CR, CRI, CRN 15

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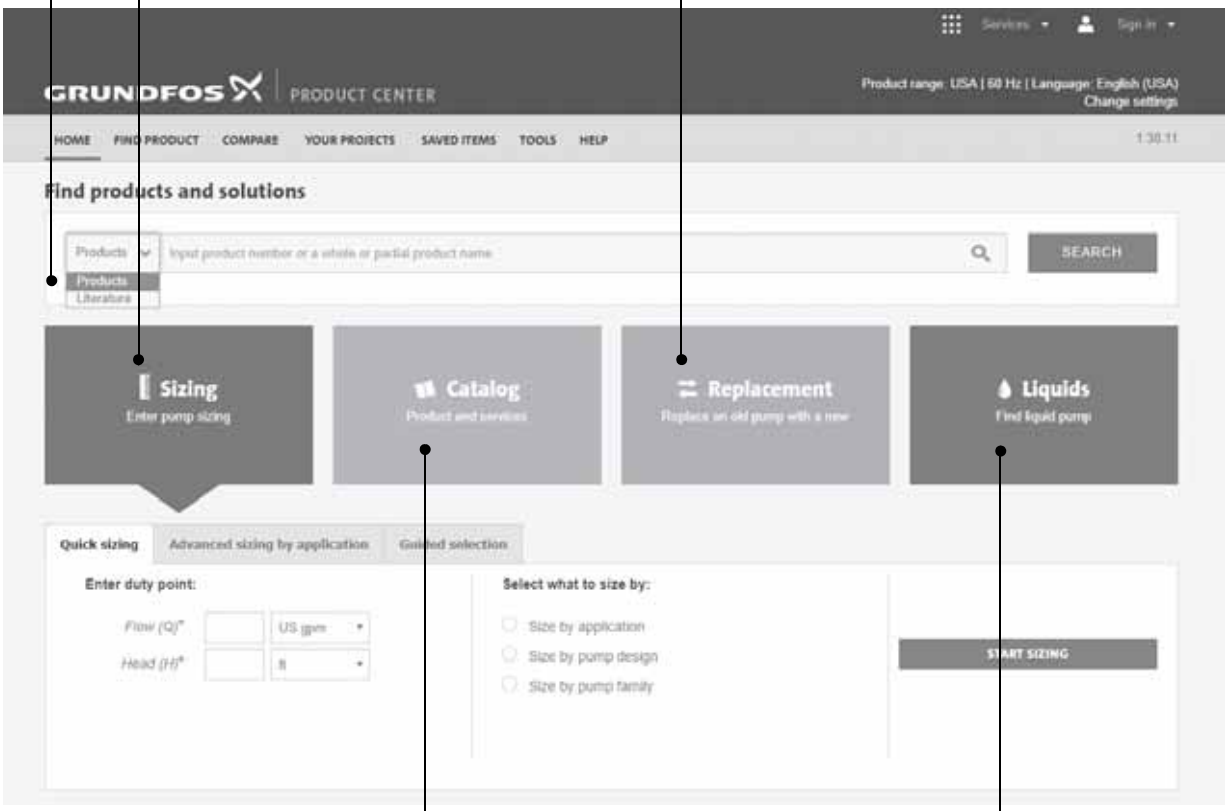
This drop-down menu enables you to set the search function to "Products" or "Literature".

"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product. Search results will include information on the following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



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