Grundfos solar surface pump

Renewable energy-based water supply systems

GRUNDFOS

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 min^{-1}
- maximum input current of 4.6 A and 8.9 A
- enclosure class 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) pumps.

Features and benefits

Maximum Power Point Tracking (MPPT)

The motor continuously optimises 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 case 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.

Nameplate
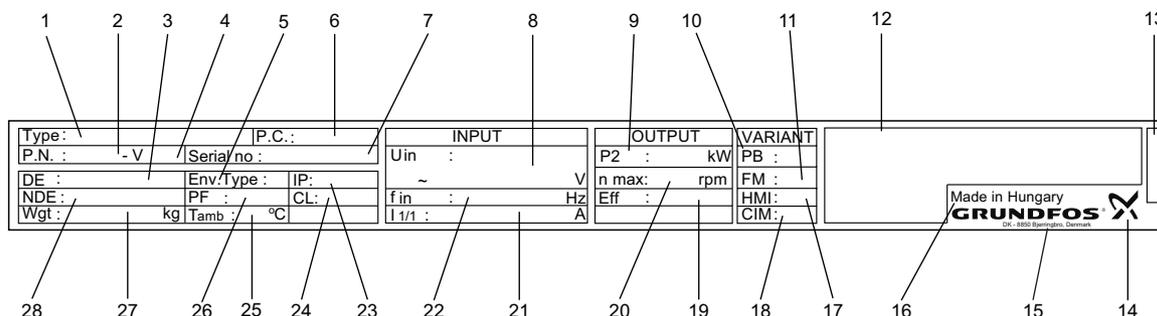
Fig. 1 Nameplate of the MGFlex motor

Pos.	Description
1	Type designation
2	Product number
3	Drive-end bearing
4	Version number
5	Environmental type
6	Production code (year and week)
7	Serial number
8	Supply voltage [V]
9	Rated power output [kW]
10	Power board
11	Functional module type
12	CE mark and approvals
13	Part number of nameplate
14	Grundfos logo

Pos.	Description
15	Grundfos company address
16	Country of manufacture
17	Human Machine Interface type
18	CIM module type
19	Motor efficiency
20	Max. motor speed [min^{-1}]
21	Max. input current [A]
22	Mains frequency [Hz]
23	Enclosure class according to IEC 60034-5
24	Insulation class according to IEC 62114
25	Max. ambient temperature [°C]
26	Power factor
27	Weight [kg]
28	Non-drive-end bearing

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. 2 in page 5.

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.

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Fig. 2 Connection terminals, FM 300

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

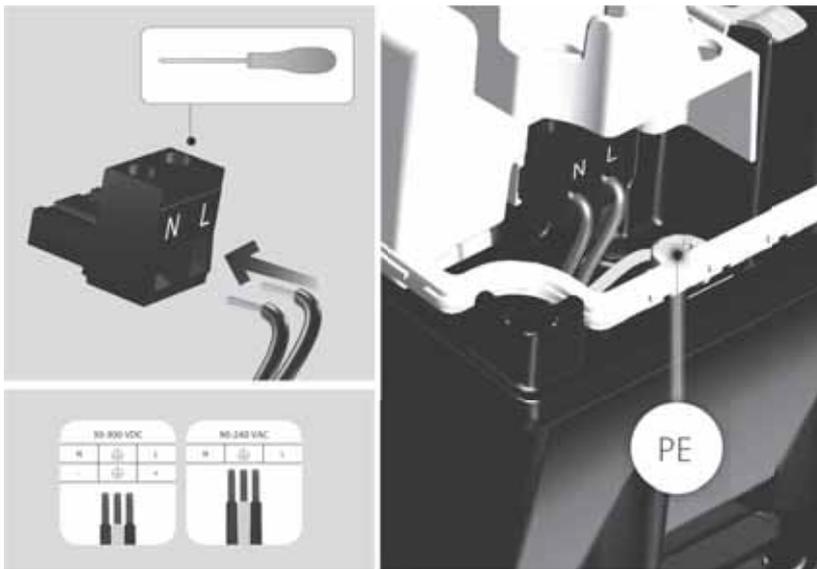| Terminal	Type	Function
NC	Normally closed contact	Signal relay 1 (LIVE or SELV)
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2 (SELV only)
C2	Common	
NO	Normally open contact	
18	GND	Ground
11	DI4/OC2	Digital input/output, configurable. Open collector: Max. 24 V resistive 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

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Wiring connections

Fig. 3 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.
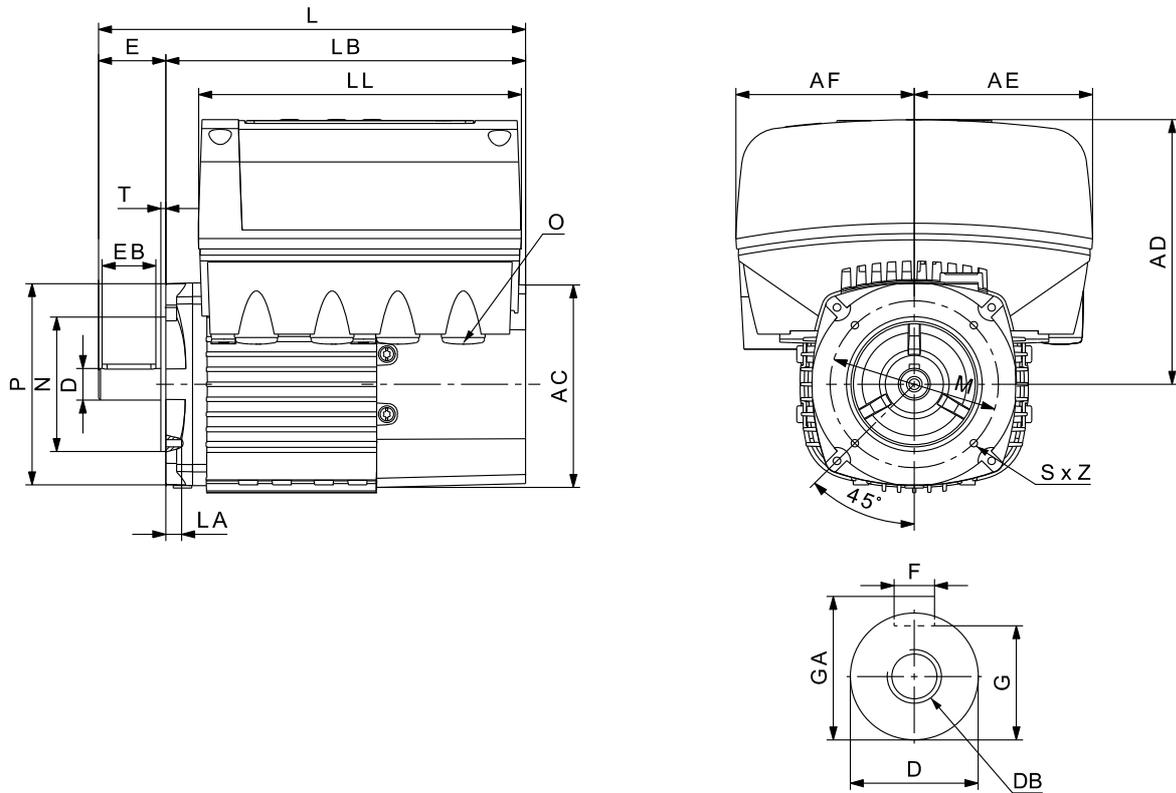

Fig. 4 Electrical connections, MGFlex motor

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Grundfos solar surface pump

Technical data

Dimensions

Fig. 5 Dimensional sketch of MGFlex

Power [kW]	Short type designation		Stator housing [mm]								Shaft end [mm]				
		IEC:	AC	AD	AE	AF	L	LB	LL	D	DB	E	EB	F	G	GA
		DIN:	g	p1						d	d6	l		u		t
0.75	MGE080A2HA		122	158	106	106	254	214	192	19	M6	40	32	6	15.5	21.5
1.50	MGE090C2HA		122	158	106	106	284	234	192	24	M8	50	40	8	20	27

Power [kW]	Short type designation		Flange [mm]						Cable entries
		IEC:	LA	M	N	P	S x Z	T	O
		DIN:	c1	e1	b1	a1	s1	f1	
0.75	MGE080A2HA		12	100	80	120	M6 x 4	3	4 x M20
1.50	MGE090C2HA		13	115	95	135	M8 x 4	3	

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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	IP55.
Motor protection	Built-in motor protection: • overvoltage and undervoltage • overload • overtemperature.
Sound pressure level	< 42 db (A) for 0.75 kW 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: -20 °C to +50 °C. During storage/transport: -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 authorised by Grundfos.
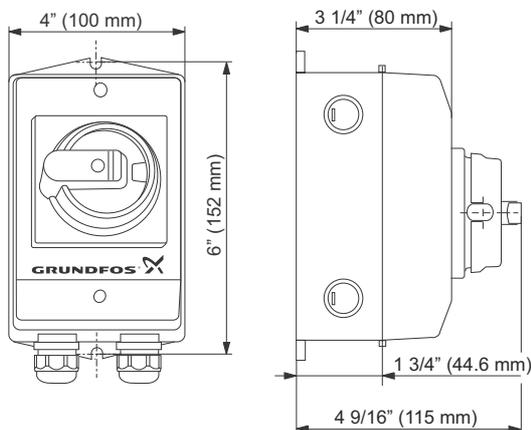
In the case of OEM usage, please contact Grundfos to obtain full warranty coverage.

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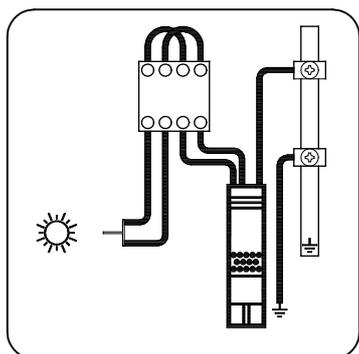
2. System components

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 system and functions as a connection box joining all necessary cables.

Fig. 6 Dimensions, IO 50

Fig. 7 Wiring diagram

Technical data

|	
Voltage	Max. 300 VDC, 8.9 A. Max. 265 VAC, 8.9 A.
Enclosure class	IP55.
Ambient temperature	During operation: -30 °C to +50 °C. During storage: -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.
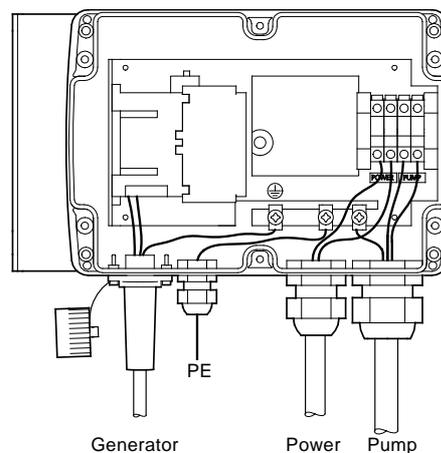
The IO 101 functions as a connection box joining all necessary cables.
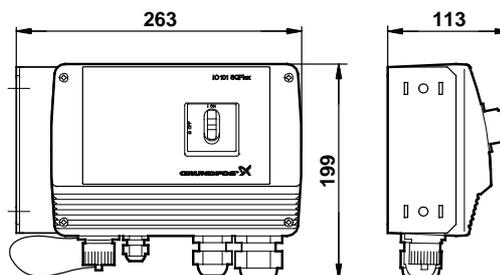
Dimensions stated in mm.

Fig. 8 Dimensions, IO 101

Fig. 9 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: -30 °C to +50 °C. During storage: -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
• CRN or CRI pump end.

Fig. 10 CRFlex pump

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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: 5-9.

Liquid temperature: 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.

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 [ppm]	Liquid temperature [°C]
EN 1.4301	0-300	< 40
	300-500	< 30
EN 1.4401	0-500	< 40

Nameplate
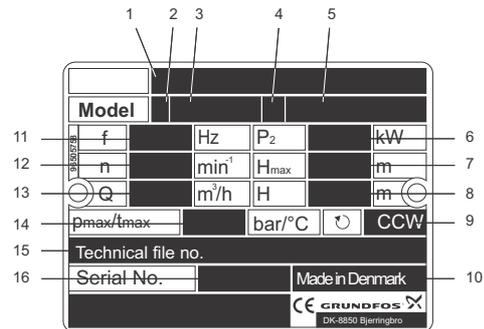
Fig. 11 Nameplate of CRFlex pump end

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Pos.	Description
1	Type designation
2	Model
3	Product number
4	Place of production
5	Production code, year and week
6	Rated shaft power [kW]
7	Closed valve head [m]
8	Head at rated flow rate [m]
9	Direction of rotation (CCW = counter-clockwise)
10	Country of production
11	Mains frequency [Hz]
12	Speed [min^{-1}]
13	Rated flow rate [m^3/h]
14	Max. pressure [bar] and temperature [°C]
15	Technical file number
16	Serial number

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 metres head can be calculated as follows:

$$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$$

p_b	=	Barometric pressure in bar. (Barometric pressure can be set to 1 bar). In closed systems, p_b indicates the system pressure in bar.
$NPSH^*$	=	Net Positive Suction Head in metres head. (To be read from the NPSH curve at the highest flow the pump will be delivering.)
H_f	=	Friction loss in suction pipe in metres head. (At the highest flow the pump will be delivering.)
H_v	=	Vapour pressure in metres head. (To be read from the vapour pressure scale."H_v" depends on the liquid temperature "T_m".)
H_s	=	Safety margin = minimum 0.5 metres head.

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

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required.
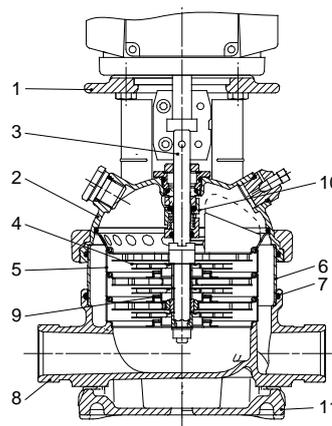
* For NPSH curves, see section *8. Appendix.*
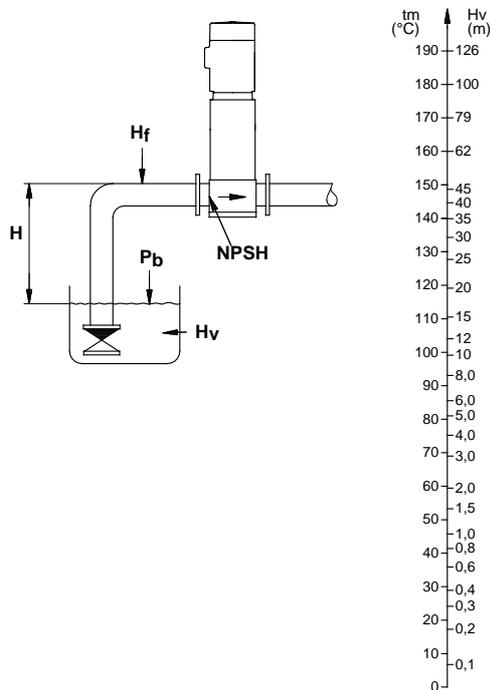
Fig. 12 Minimum inlet pressure - NPSH

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. 13 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		
CRI(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		
CRN(E)				
4	Impeller	Stainless steel	1.4401	AISI 316
5	Chamber	Stainless steel	1.4401	AISI 316
6	Sleeve	Stainless steel	1.4401	AISI 316
7	O-ring for sleeve	EPDM or FKM		

[1] Stainless steel available on request.
[2] CRI(E), CRN(E) 1S, 1, 3, 5.
[3] CRI(E), CRN(E) 10, 15, 20.

Product range

The CRFlex pump complete is supplied with a 2-metre cable.

Product	Stainless steel	Pump end	Product number
CRIF 1-9	AISI 304/EN 1.4301	CRI	98414238
CRIF 3-5	AISI 304/EN 1.4301	CRI	98414264
CRIF 5-2	AISI 304/EN 1.4301	CRI	98414267
CRIF 10-1	AISI 304/EN 1.4301	CRI	98414699
CRIF 1-17	AISI 304/EN 1.4301	CRI	98414701
CRIF 3-11	AISI 304/EN 1.4301	CRI	98414709
CRIF 5-6	AISI 304/EN 1.4301	CRI	98414724
CRIF 10-2	AISI 304/EN 1.4301	CRI	98414726
CRIF 15-1	AISI 304/EN 1.4301	CRI	98414771
CRNF 1-9	AISI 316/EN 1.4401	CRN	98415280
CRNF 3-5	AISI 316/EN 1.4401	CRN	98415292
CRNF 5-2	AISI 316/EN 1.4401	CRN	98415294
CRNF 10-1	AISI 316/EN 1.4401	CRN	98415326
CRNF 1-17	AISI 316/EN 1.4401	CRN	98415305
CRNF 3-11	AISI 316/EN 1.4401	CRN	98415330
CRNF 5-6	AISI 316/EN 1.4401	CRN	98415331
CRNE 10-2	AISI 316/EN 1.4401	CRN	98415335
CRNF 15-1	AISI 316/EN 1.4401	CRN	98415336

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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 utilising 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 6 metres.
   See also section *Minimum inlet pressure, NPSH* on page 11.
3. The CRFlex pump must be protected against rain and direct sunlight.
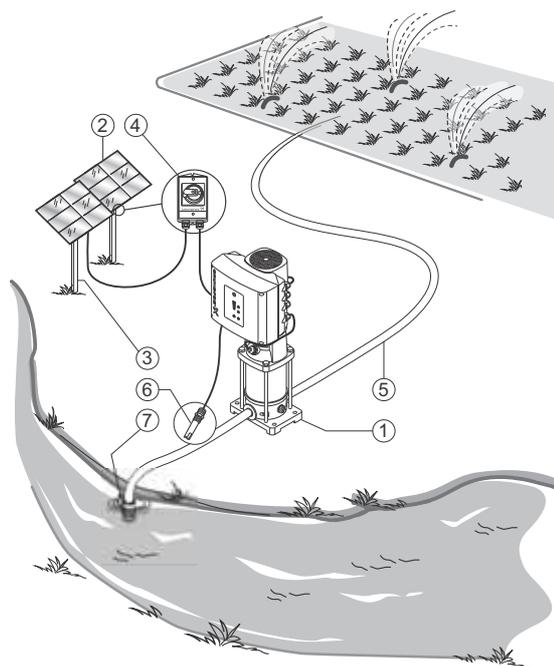
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Fig. 14 CRFlex Solar

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

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 6 metres. See also section *Minimum inlet pressure, NPSH* on page 11.
3. The CRFlex pump must be protected against rain and direct sunlight.
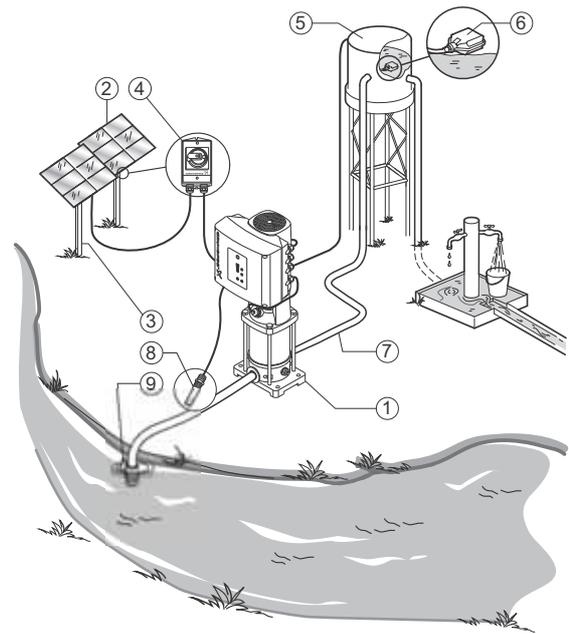
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Fig. 15 CRFlex Solar with level switch

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

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.
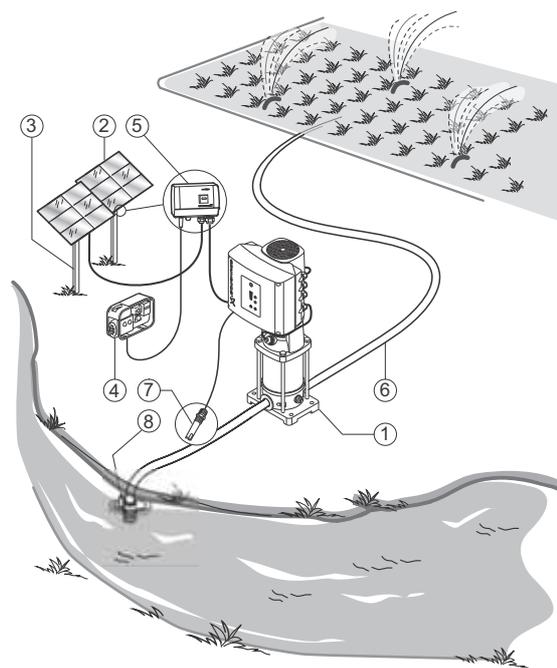
Benefits

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 6 metres. See also section *Minimum inlet pressure, NPSH* on page 11.
3. The CRFlex pump must be protected against rain and direct sunlight.

Fig. 16 CRFlex Solar with generator

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

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CRFlex Solar with level switch and generator

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

The supply of water is ensured by a diesel or petrol-driven generator connected to the system via the IO 101. The system 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.
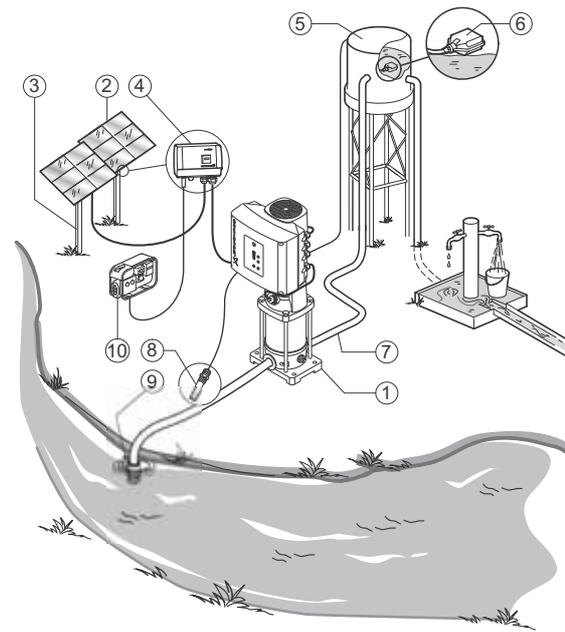
Benefits

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 6 metres.
   See also section *Minimum inlet pressure, NPSH* on page 11.
3. The CRFlex pump must be protected against rain and direct sunlight.

Fig. 17 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
10	Diesel or petrol-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" 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 6 metres.
    See also section *Minimum inlet pressure, NPSH* on page 11.
3. The CRFlex pump must be protected against rain and direct sunlight.
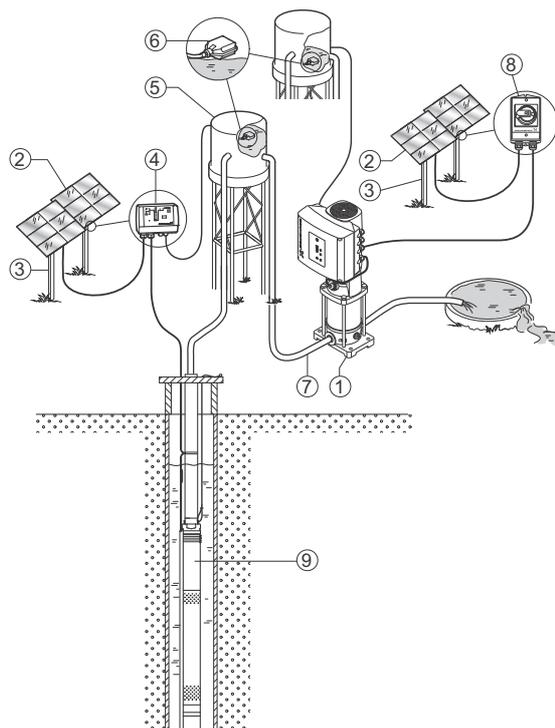
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Fig. 18 CRFlex and SQFlex Solar

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 (metric)	97907253
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

CRIF/CRNF 1-9, 1-17

Fig. 19 Dimensional sketch of CRIF/CRNF 1-9, 1-17

Pump type	Product number	Dimensions [mm]				Net weight [kg]	Gross weight [kg]	Shipping volume [m³]
		B1	B1 + B2	D1	D2			
CRIF 1-9	98414238	371	585	159	185	26.3	29.0	0.05
CRIF 1-17	98414701	531	765	122	158	33.3	38.0	0.15
CRNF 1-9	98415280	371	585	159	185	26.0	28.0	0.05
CRNF 1-17	98415305	531	765	122	158	33.5	39.2	0.15

CRIF/CRNF 3-5, 3-11

Fig. 20 Dimensional sketch of CRIF/CRNF 3-5, 3-11

Pump type	Product number	Dimensions [mm]				Net weight [kg]	Gross weight [kg]	Shipping volume [m³]
		B1	B1 + B2	D1	D2			
CRIF 3-5	98414264	299	513	159	185	24.0	27.7	0.05
CRIF 3-11	98414709	423	657	122	158	31.1	34.0	0.14
CRNF 3-5	98415292	299	513	159	185	23.8	26.5	0.05
CRNF 3-11	98415330	423	657	122	158	31.1	34.0	0.14

Technical data

CRIF/CRNF 5-2, 5-6

Fig. 21 Dimensional sketch of CRIF/CRNF 5-2, 5-6

Pump type	Product number	Dimensions [mm]				Net weight [kg]	Gross weight [kg]	Shipping volume [m³]
		B1	B1 + B2	D1	D2			
CRIF 5-2	98414267	257	471	122	158	21.6	24.3	0.04
CRIF 5-6	98414724	387	621	122	158	30.2	33.1	0.14
CRNF 5-2	98415294	257	471	122	158	21.9	24.6	0.04
CRNF 5-6	98415331	387	621	122	158	30.1	33.0	0.14

CRIF/CRNF 10-1, 10-2

Fig. 22 Dimensional sketch of CRIF/CRNF 10-1, 10-2

Pump type	Product number	Dimensions [mm]				Net weight [kg]	Gross weight [kg]	Shipping volume [m³]
		B1	B1 + B2	D1	D2			
CRIF 10-1	98414699	357	571	159	185	33.7	36.7	0.08
CRIF 10-2	98414726	373	607	122	158	40.0	44.0	0.14
CRNF 10-1	98415326	357	571	159	185	34.0	37.0	0.08
CRNE 10-2	98415335	373	607	122	158	40.0	49.0	0.14

CRIF/CRNF 15-1

Fig. 23 Dimensional drawing sketch of CRIF/CRNF 15-1

Pump type	Product number	Dimensions [mm]				Net weight [kg]	Gross weight [kg]	Shipping volume [m³]
		B1	B1 + B2	D1	D2			
CRIF 15-1	98414771	413	647	122	158	41.0	44.0	0.14
CRNF 15-1	98415336	413	647	122	158	41.0	45.0	0.14

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]	Pump type	Product number	Motor type	Maximum power input P1 [W]	Maximum current [A]
CRIF 1-9	98414238	MGFlex	880	4.6	CRNF 1-9	98415280	MGFlex	880	4.6
CRIF 3-5	98414264	MGFlex	880	4.6	CRNF 3-5	98415292	MGFlex	880	4.6
CRIF 5-2	98414267	MGFlex	880	4.6	CRNF 5-2	98415294	MGFlex	880	4.6
CRIF 10-1	98414699	MGFlex	880	4.6	CRNF 10-1	98415326	MGFlex	880	4.6
CRIF 1-17	98414701	MGFlex	1730	8.9	CRNF 1-17	98415305	MGFlex	1730	8.9
CRIF 3-11	98414709	MGFlex	1730	8.9	CRNF 3-11	98415330	MGFlex	1730	8.9
CRIF 5-6	98414724	MGFlex	1730	8.9	CRNF 5-6	98415331	MGFlex	1730	8.9
CRIF 10-2	98414726	MGFlex	1730	8.9	CRNE 10-2	98415335	MGFlex	1730	8.9
CRIF 15-1	98414771	MGFlex	1730	8.9	CRNF 15-1	98415336	MGFlex	1730	8.9

7. Performance curves

Curve conditions

Specific performance charts

The specific performance charts on pages 22 to 31 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 +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 0.5 m.

CRFlex 1-9
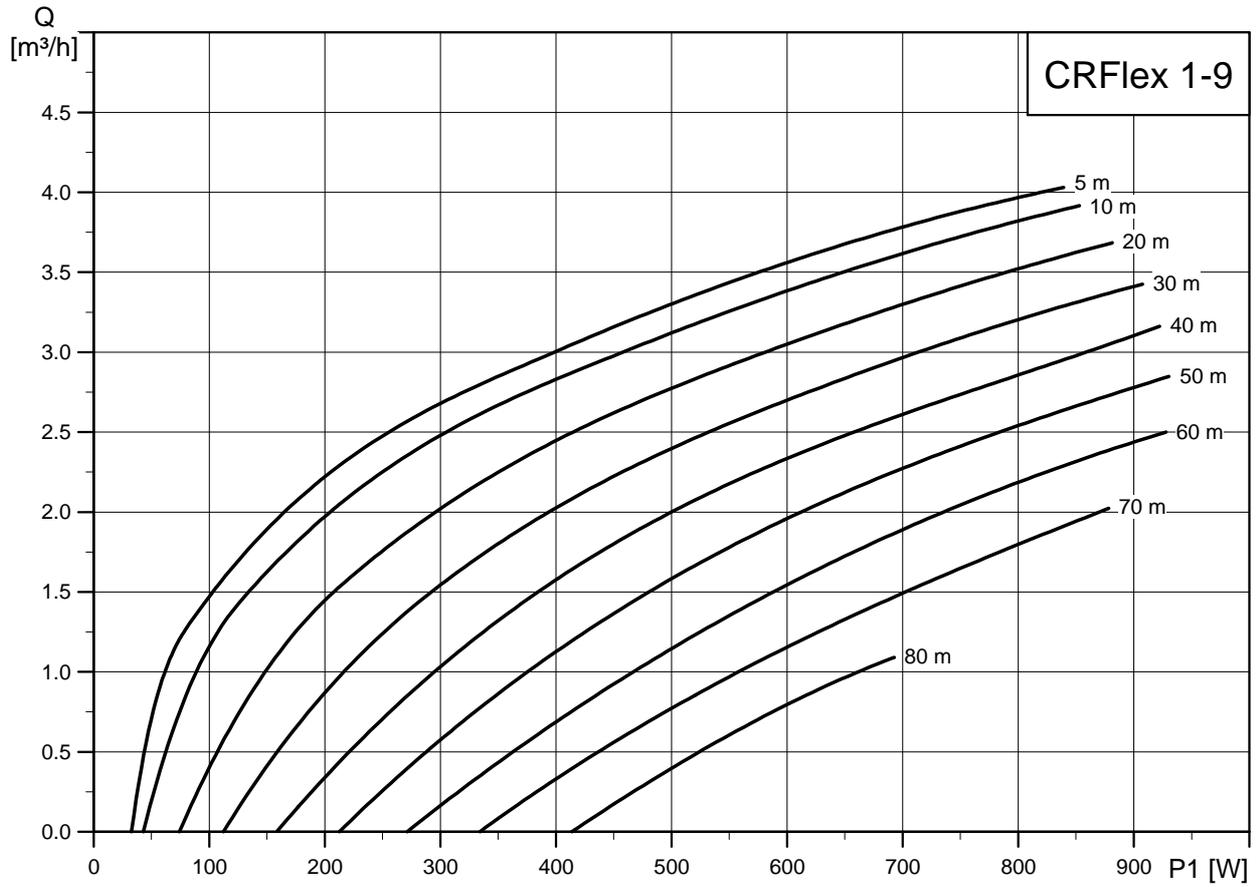
Fig. 24 Performance curves, CRFlex 1-9

CRFlex 1-17
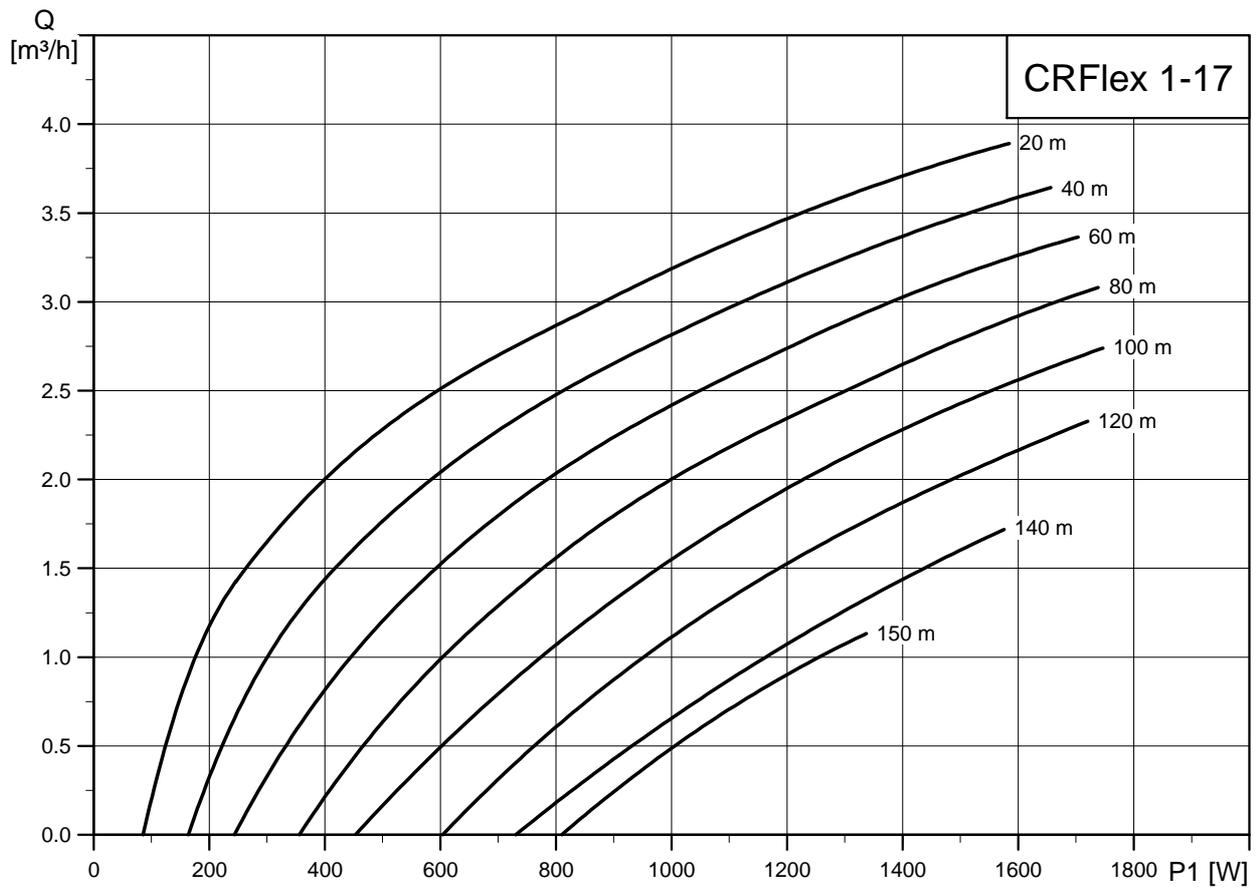
Fig. 25 Performance curves, CRFlex 1-17

CRFlex 3-5
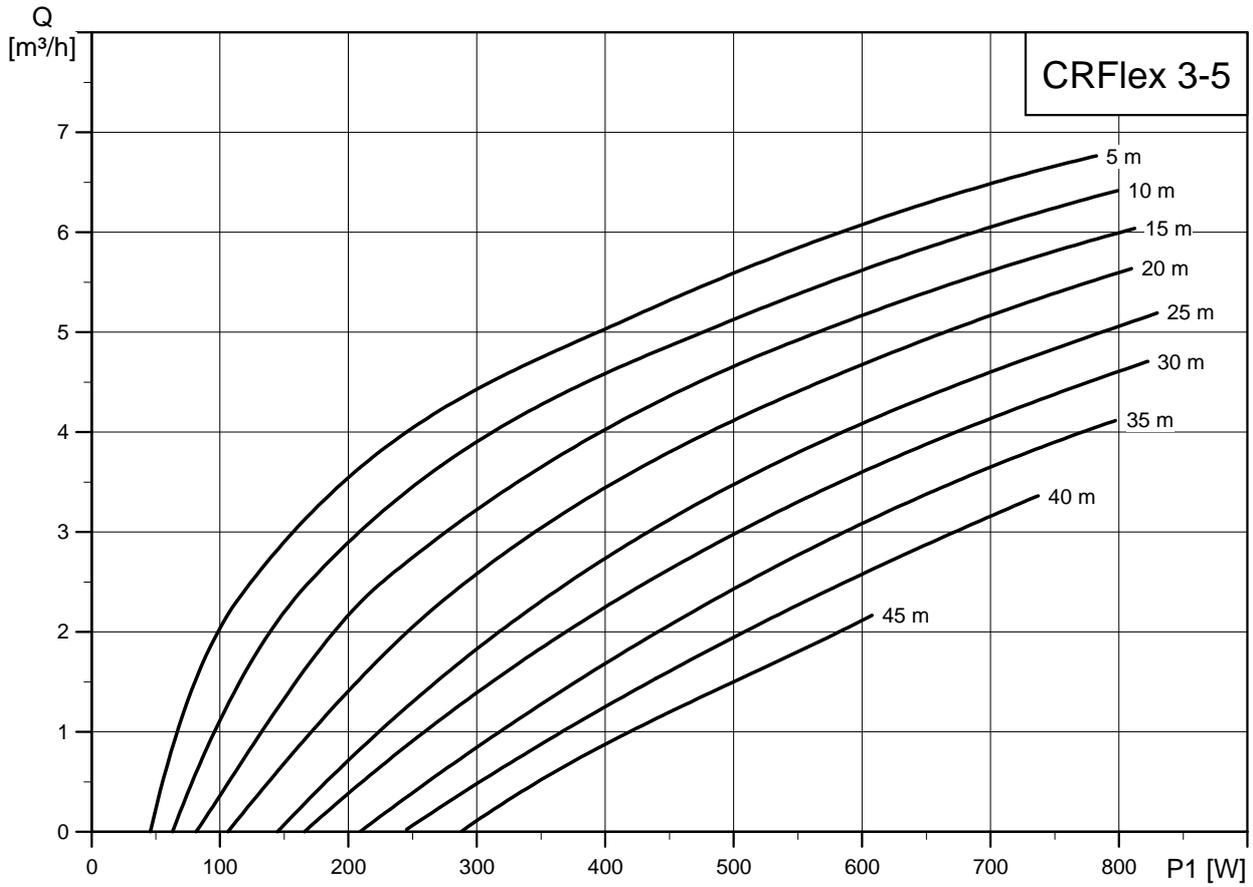
Fig. 26 Performance curves, CRFlex 3-5

TM05 0757 0813

CRFlex 3-11
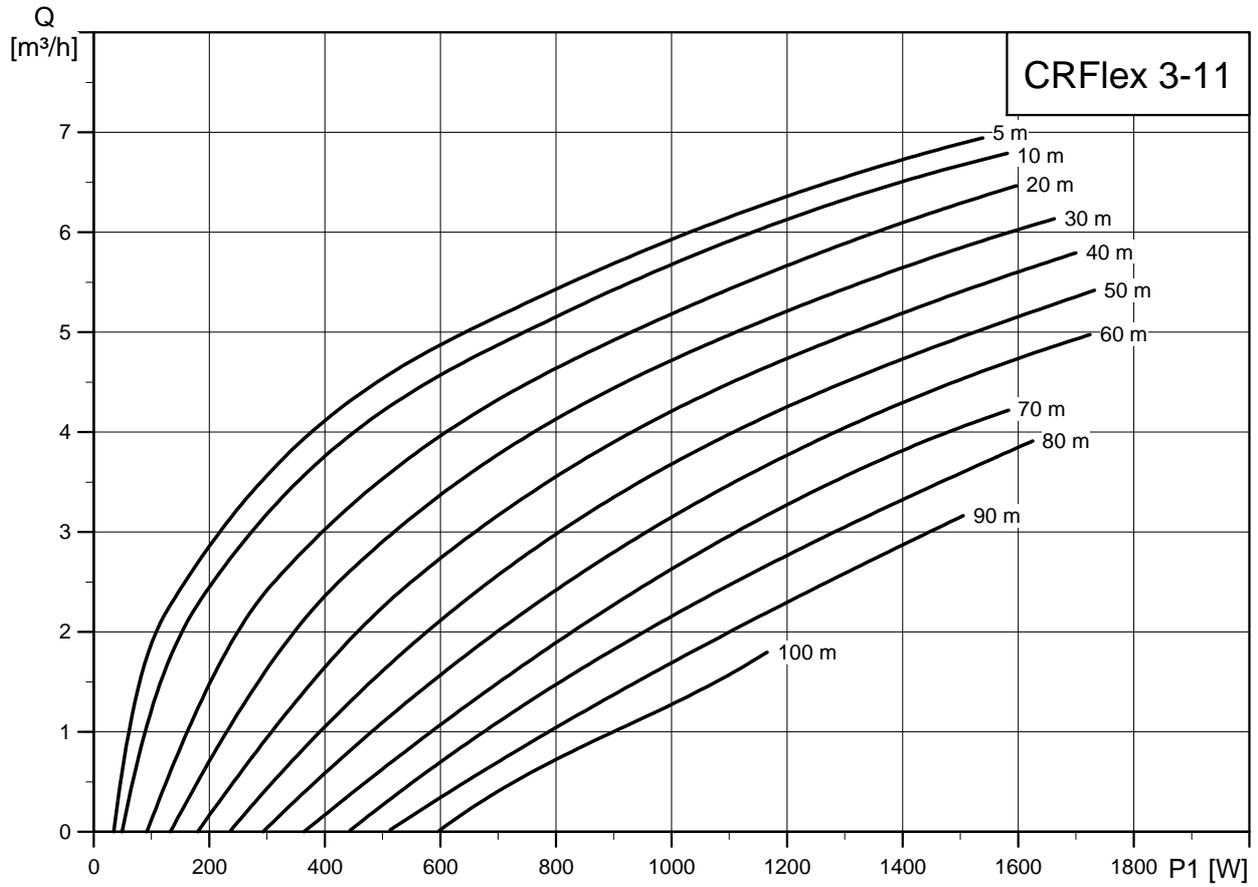
Fig. 27 Performance curves, CRFlex 3-11

CRFlex 5-2
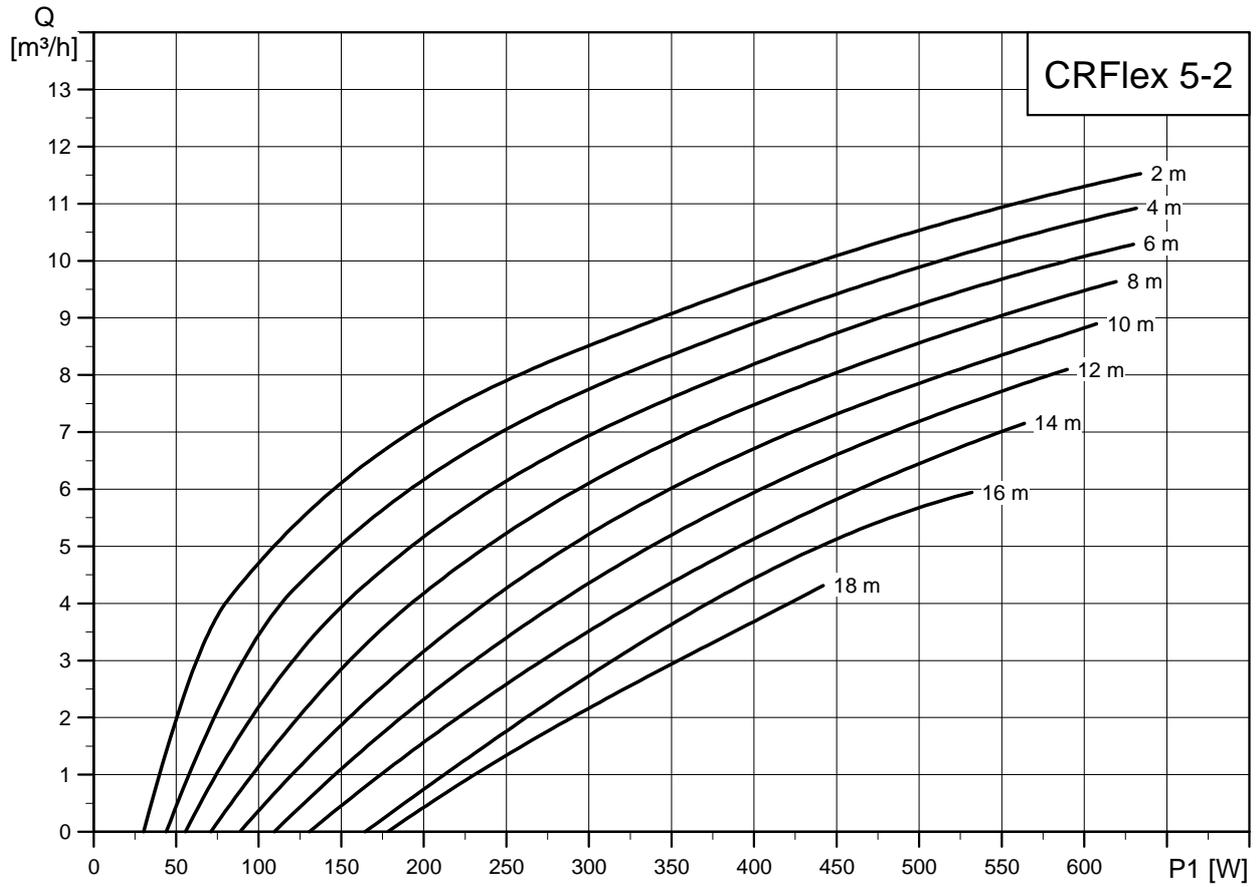
Fig. 28 Performance curves, CRFlex 5-2

CRFlex 5-6
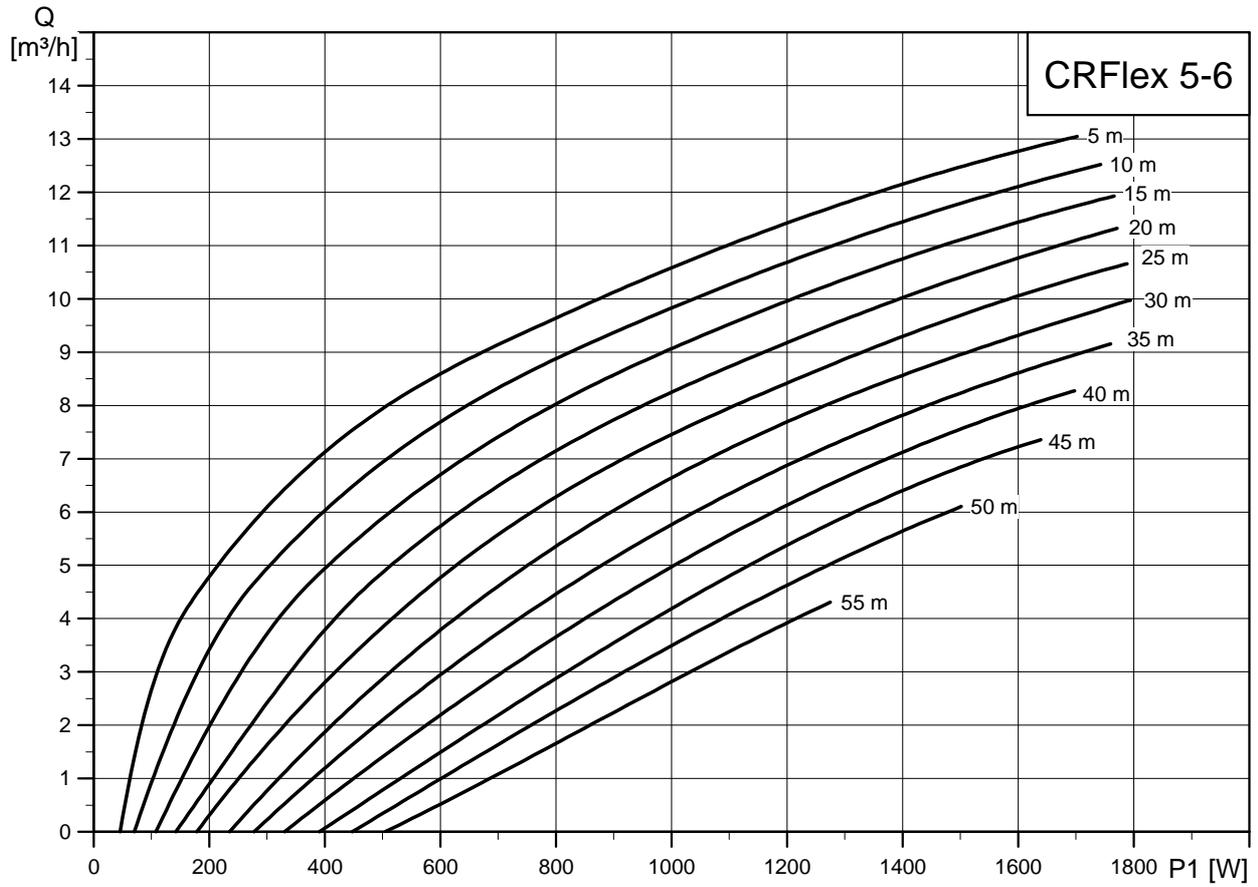
Fig. 29 Performance curves, CRFlex 5-6

CRFlex 10-1
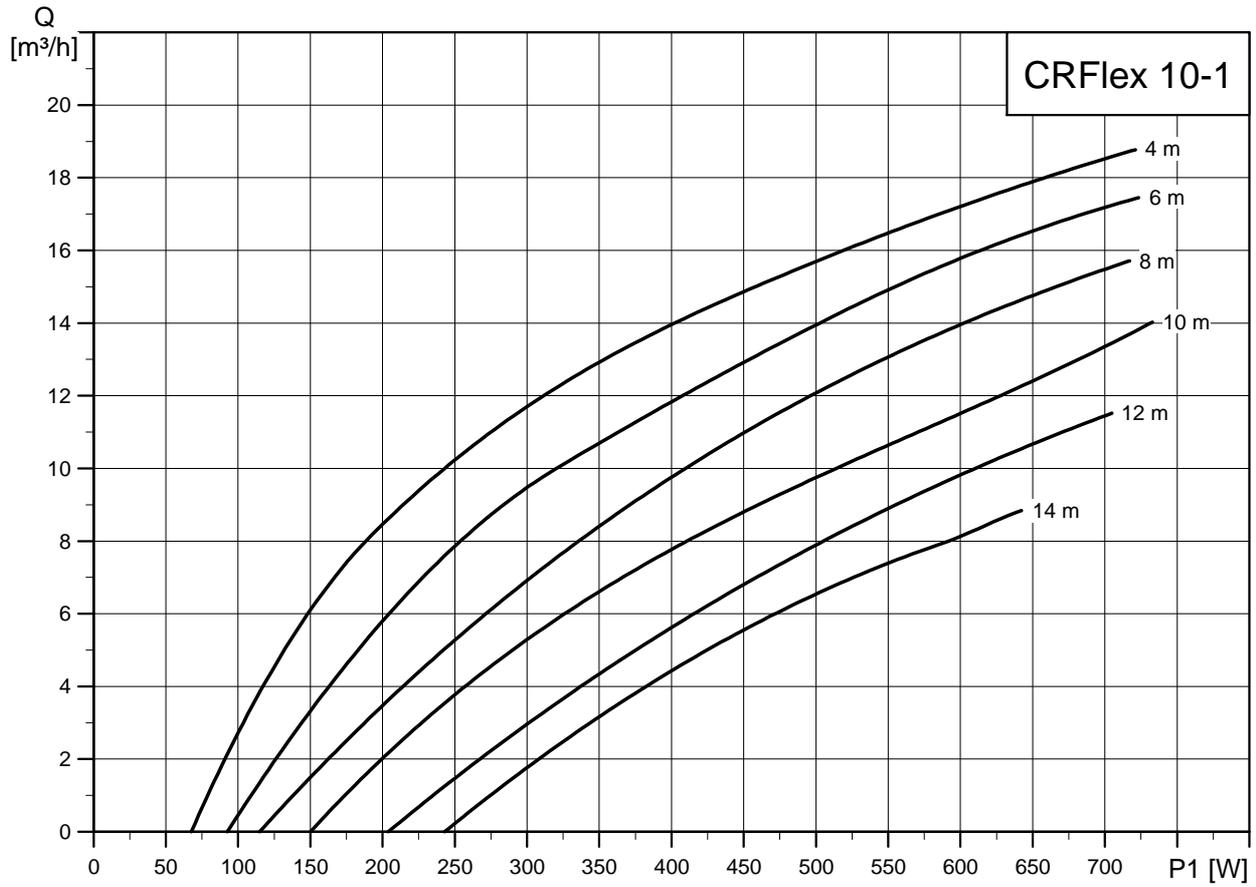
Fig. 30 Performance curves, CRFlex 10-1

CRFlex 10-2
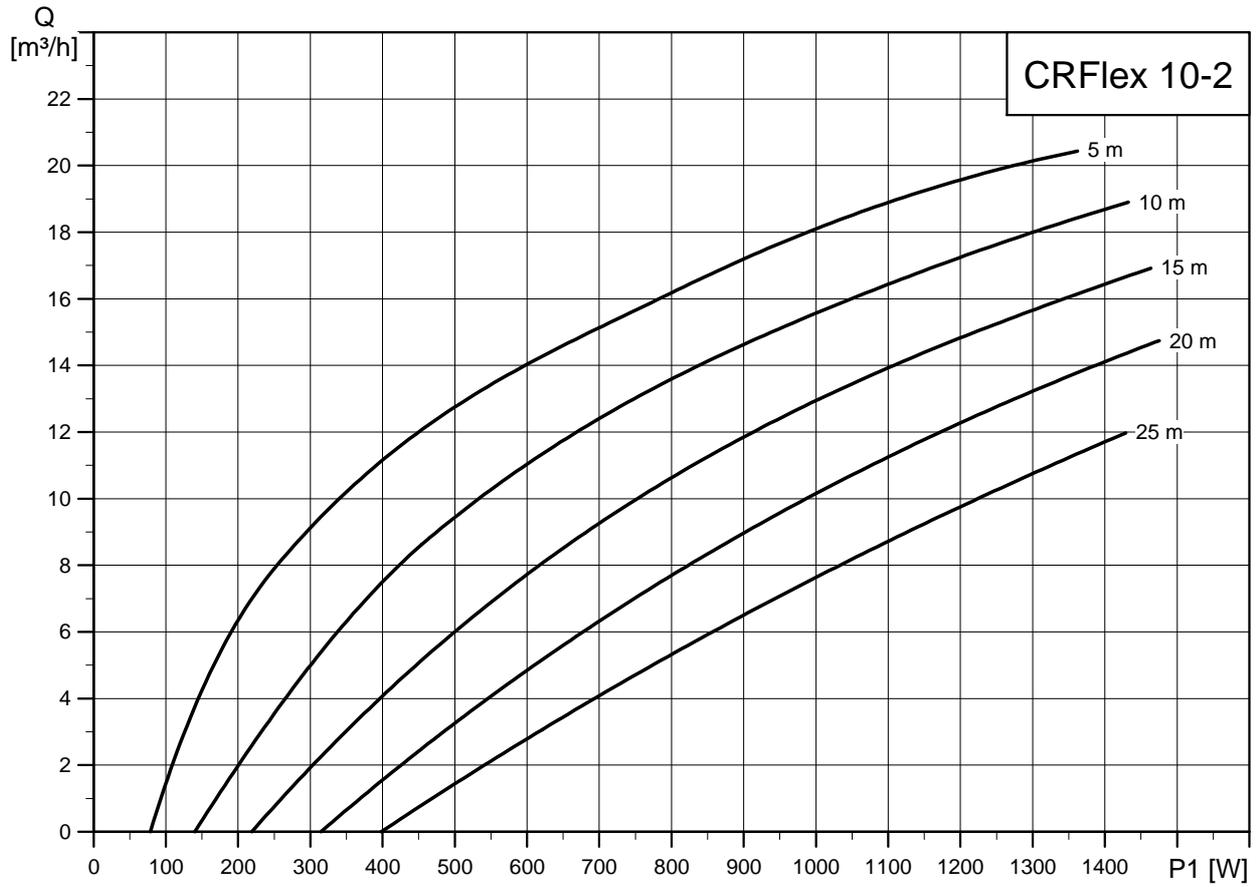
Fig. 31 Performance curves, CRFlex 10-2

CRFlex 15-1
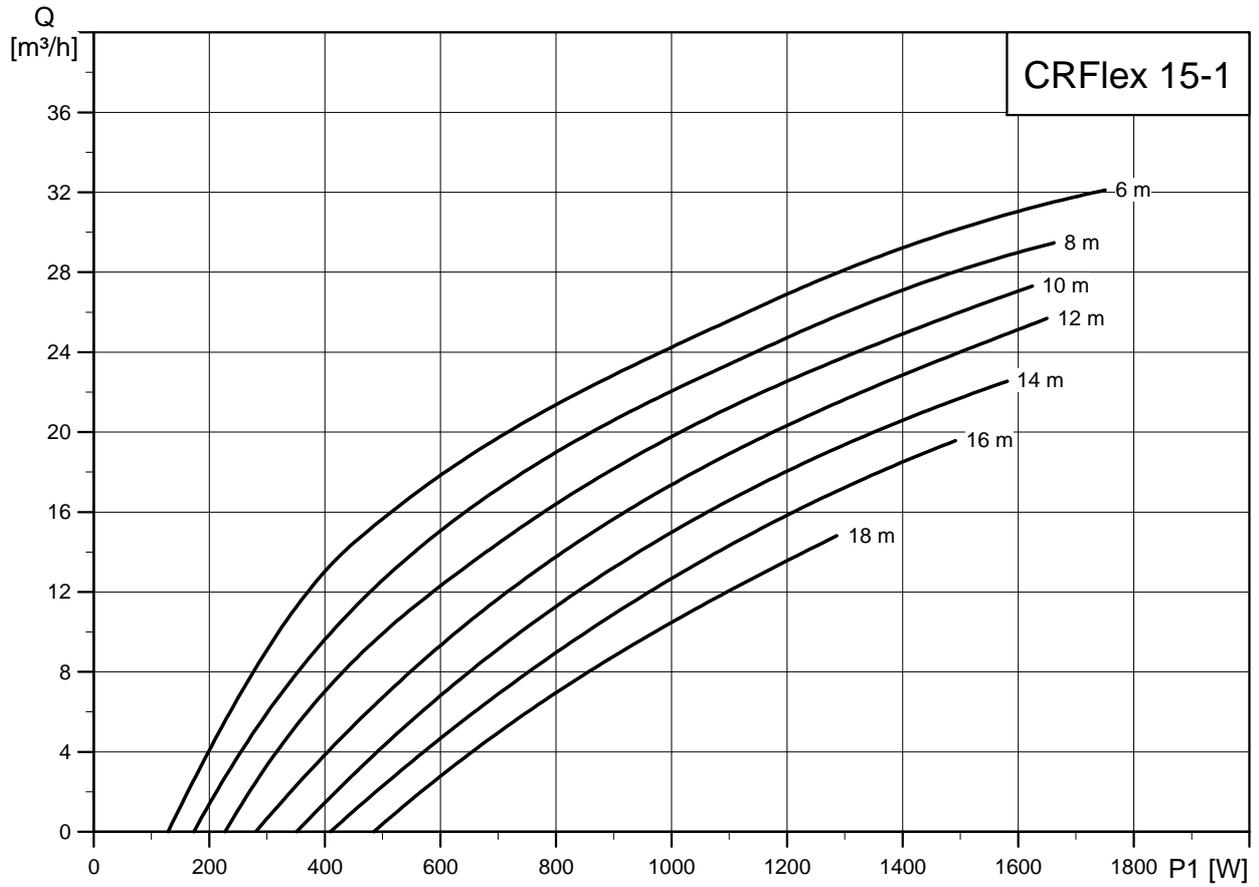
Fig. 32 Performance curves, CRFlex 15-1

8. Appendix

Performance curves, CRI, CRN 1
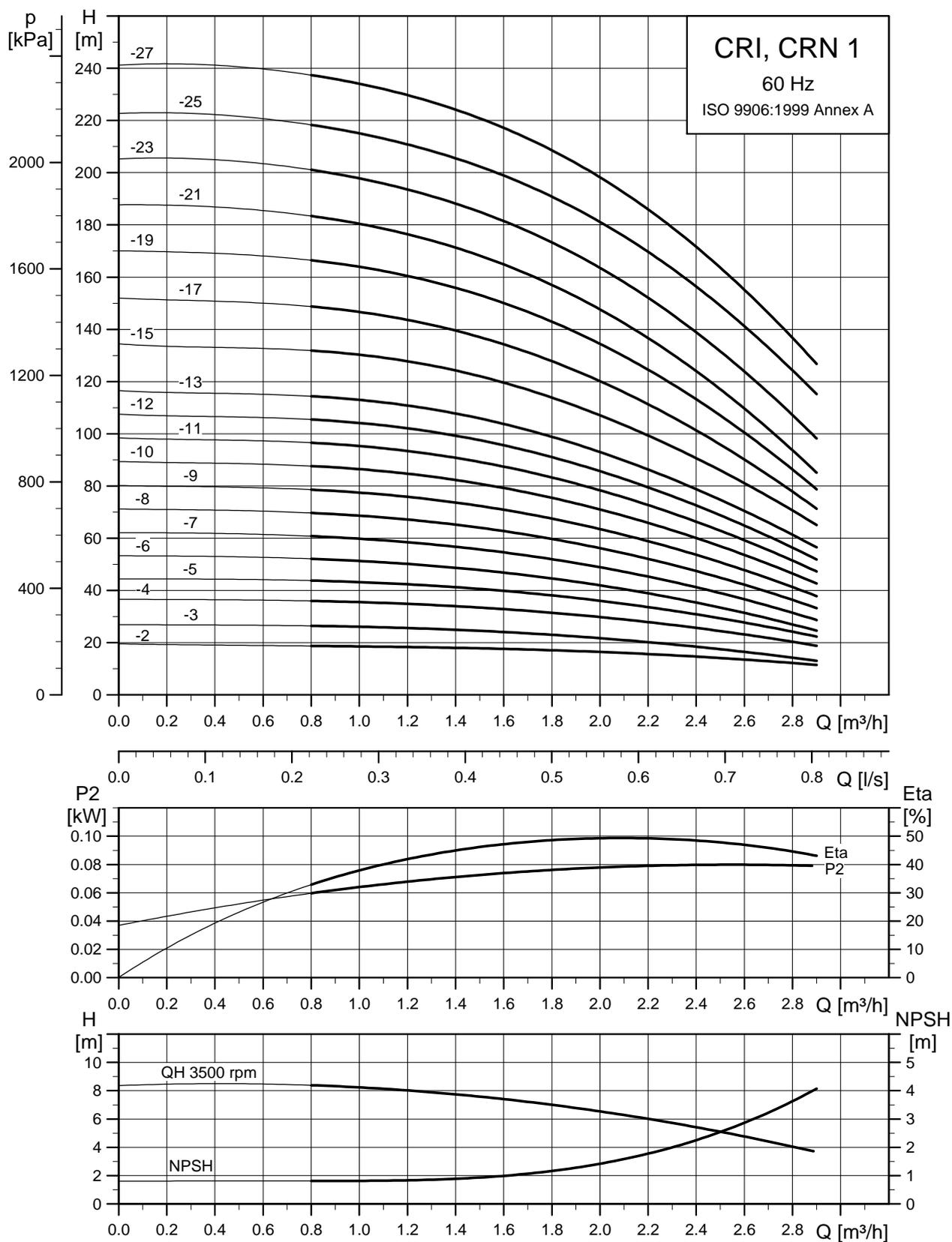
Fig. 33 Performance curves, CRI, CRN 1

Performance curves, CRI, CRN 3
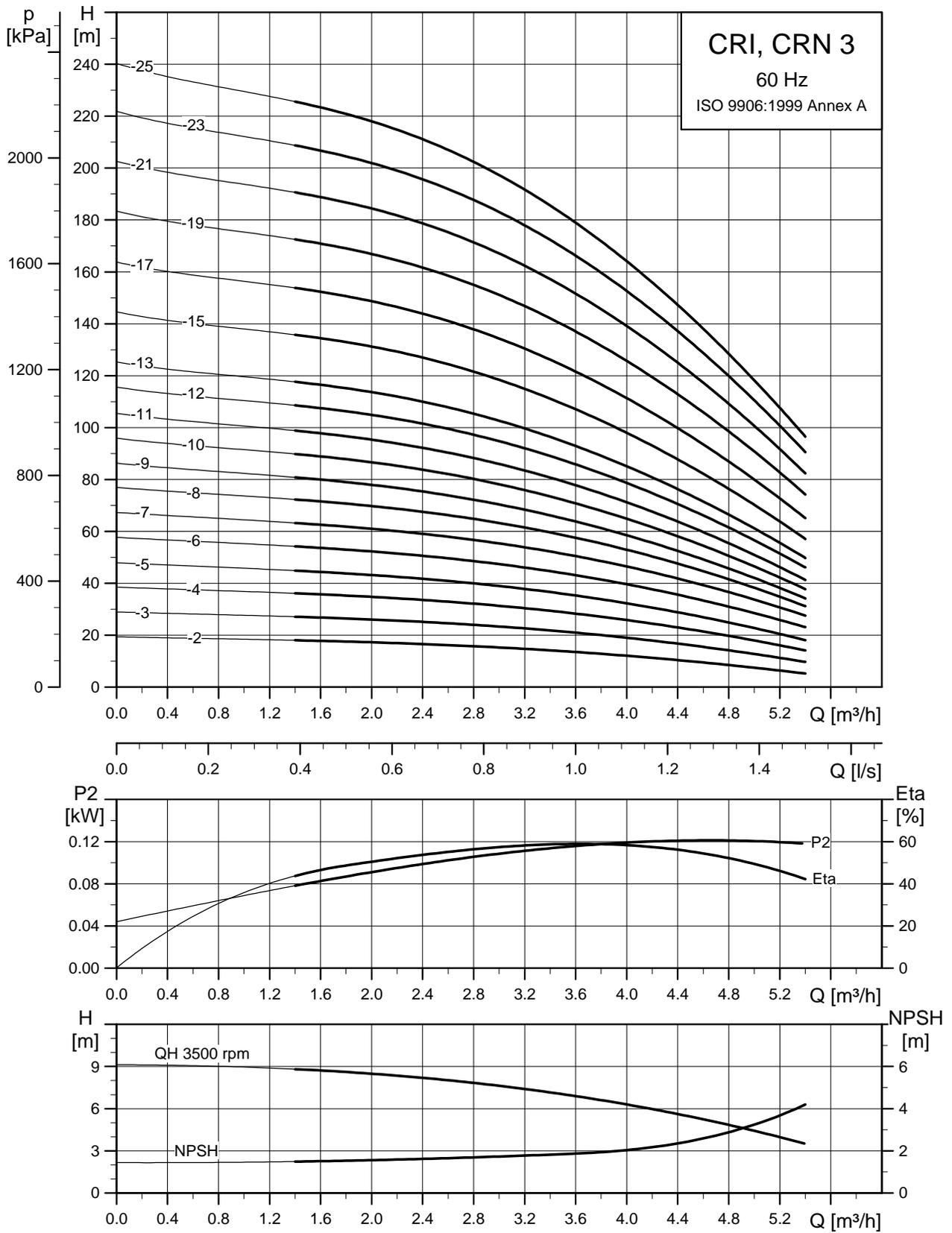
Fig. 34 Performance curves, CRI, CRN 3

TM02 7313 0713

Performance curves, CRI, CRN 5
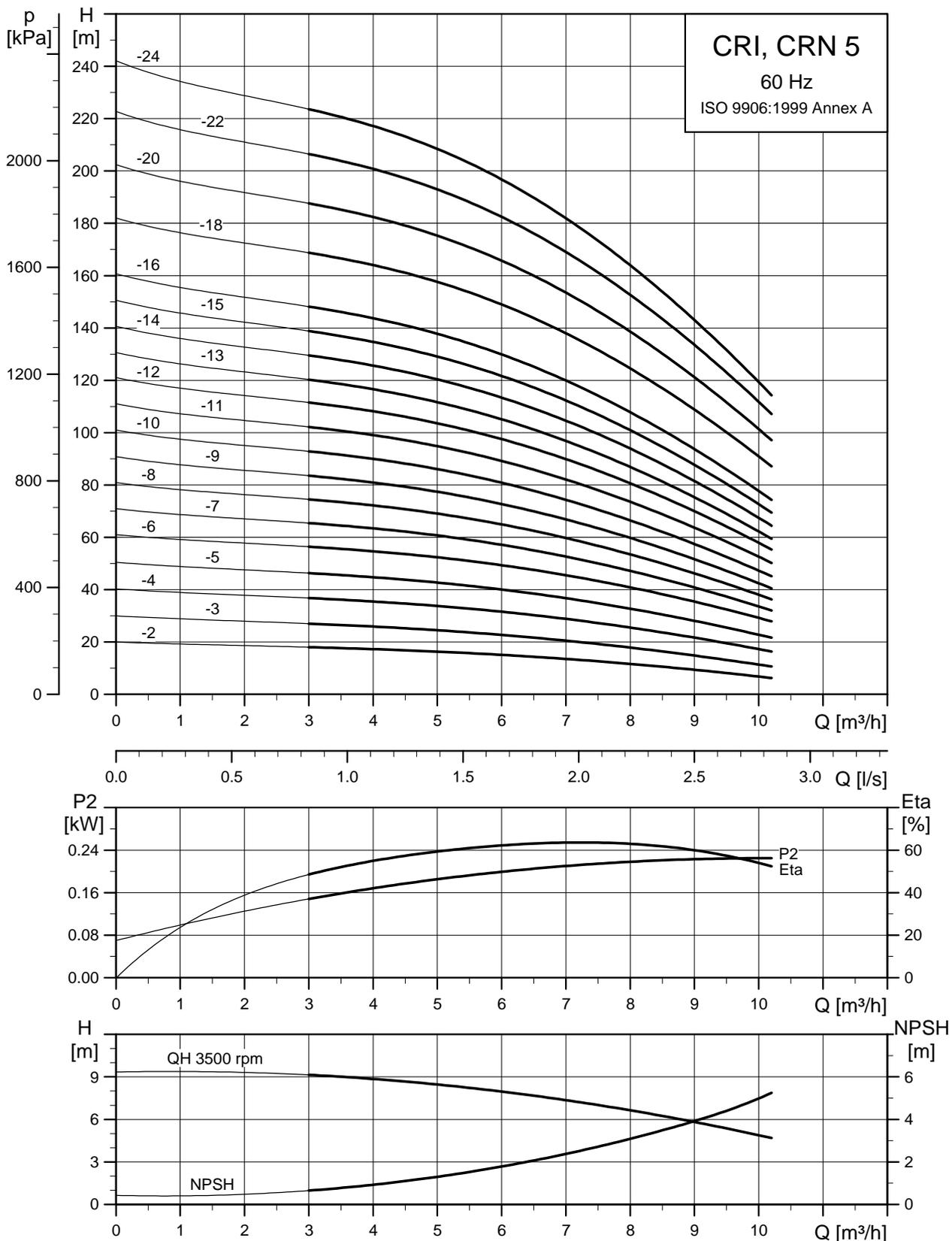
Fig. 35 Performance curves, CRI, CRN 5

Performance curves, CRI, CRN 10
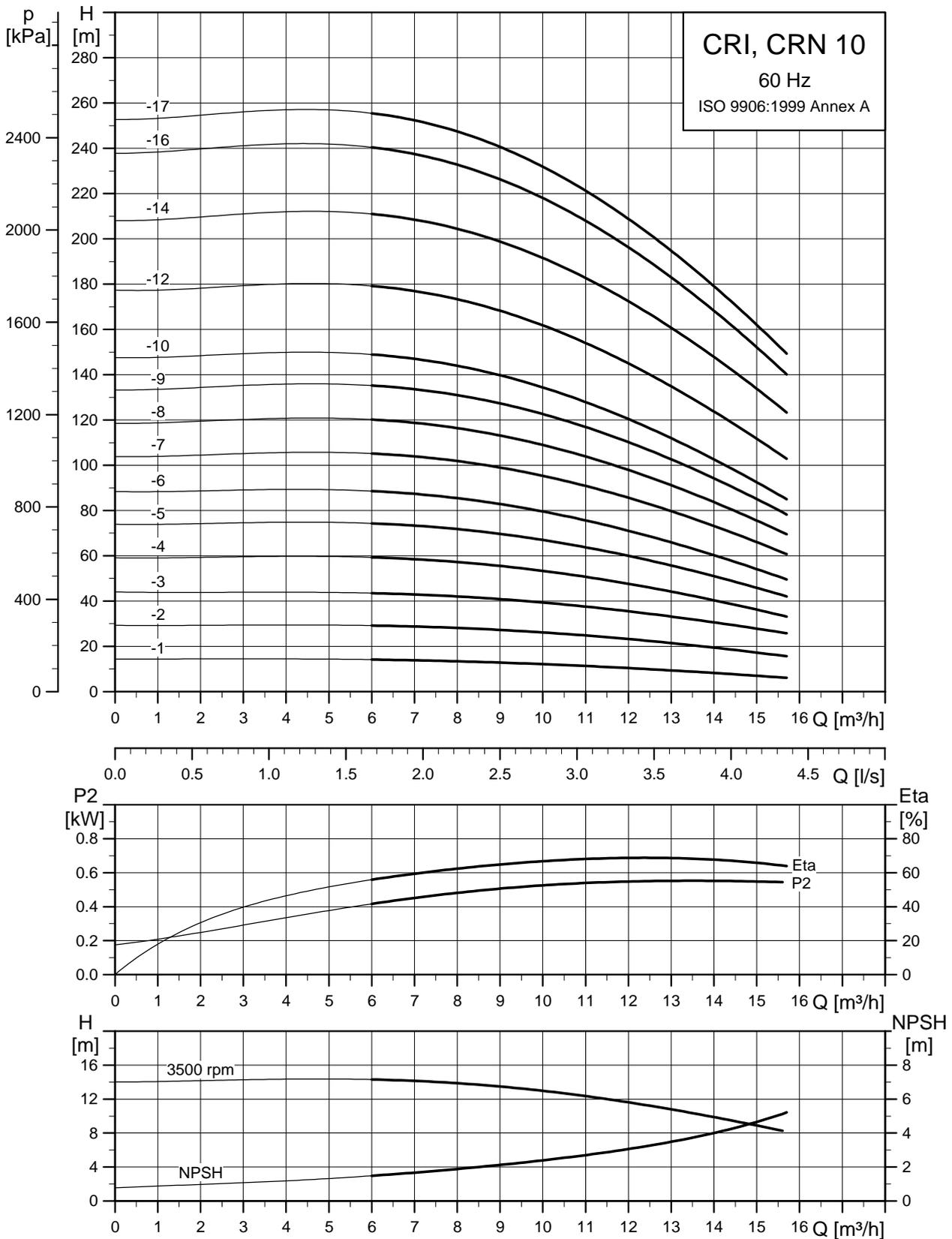
Fig. 36 Performance curves, CRI, CRN 10

TM02 7317 0713

Performance curves, CRI, CRN 15

Performance curves, CRI, CRN 15
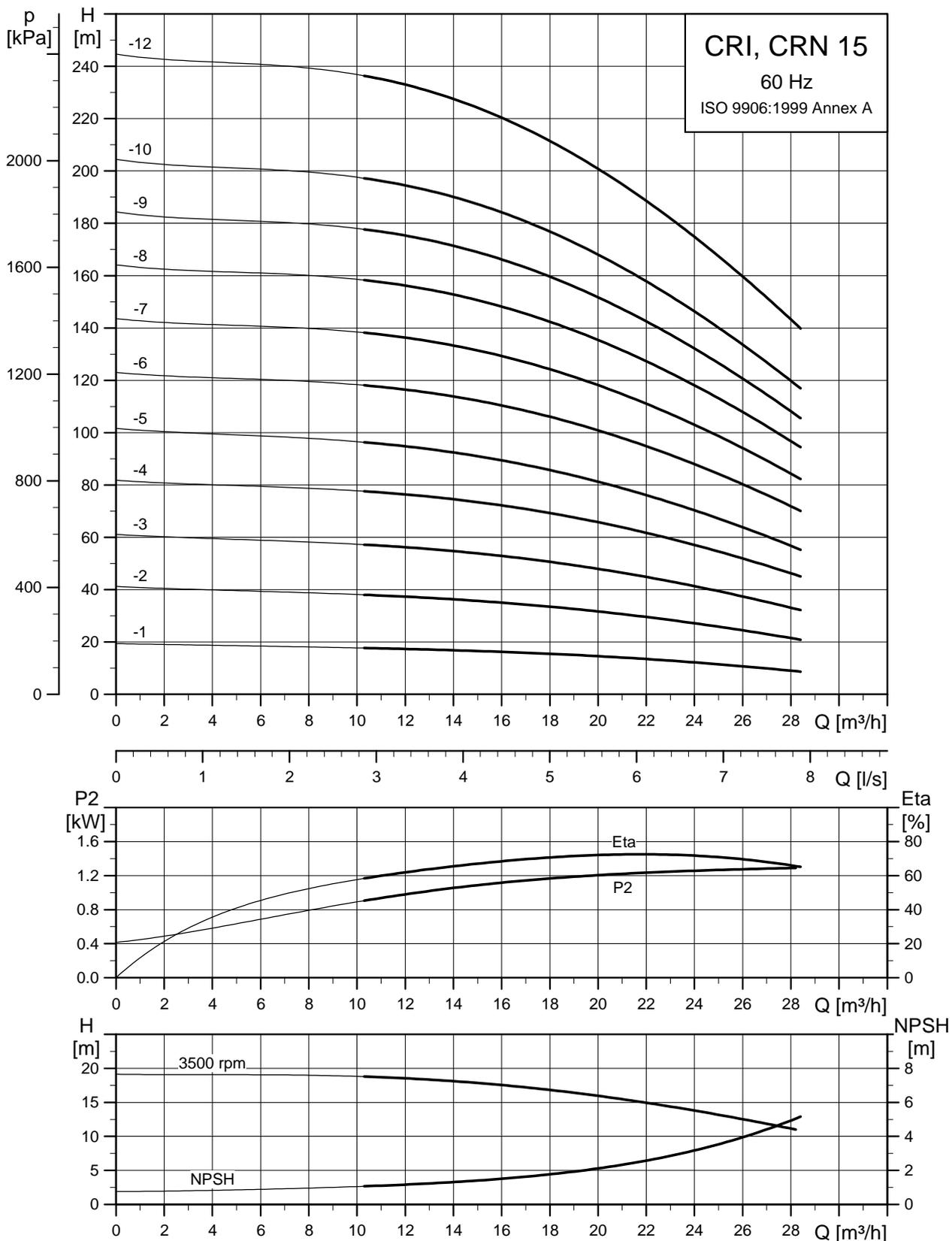
Fig. 37 Performance curves, CRI, CRN 15

TM02 7319 0713

9. Further product documentation

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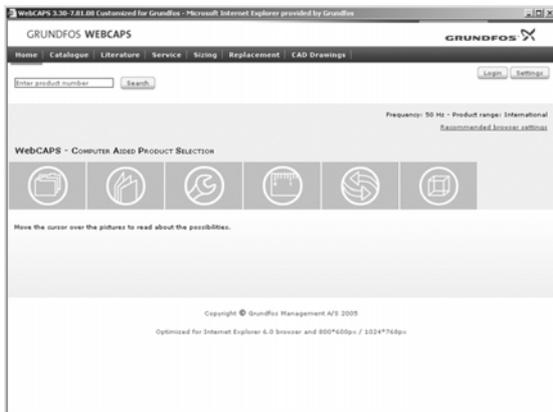
WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 20 languages.

In WebCAPS, all information is divided into 6 sections:

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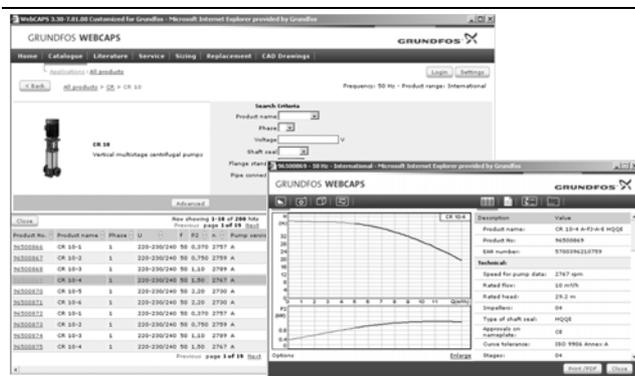
Catalogue

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.
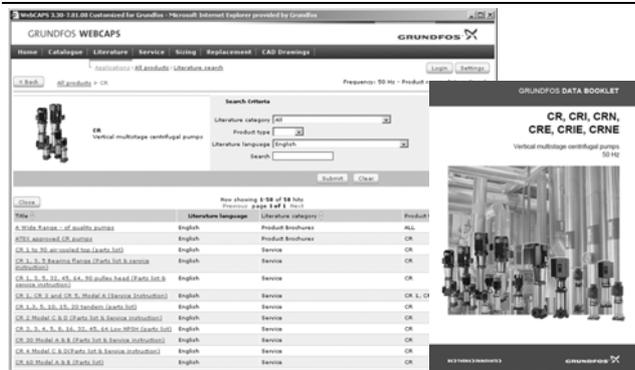
Literature

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 catalogue and Service kit instructions
- quick guides
- product brochures, etc.

Service

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

Sizing

This section is based on different fields of application and installation examples, and gives easy step-by-step instructions in how to
- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyse your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications, etc.

Replacement

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

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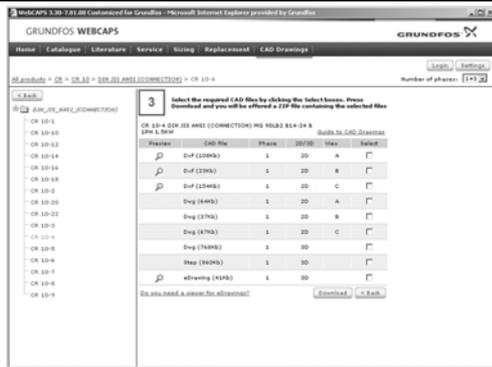
CAD drawings

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

These formats are available in WebCAPS:

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

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

WinCAPS

Fig. 38 WinCAPS CD-ROM

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed information on more than 185,000 Grundfos products in more than 20 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.

Subject to alterations.

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ECM: 1113381

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