

CRN, CRNE high pressure

60 Hz North America

Vertical multistage centrifugal pumps



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1. Introduction

This data booklet deals with CRN, CRNE pumps for high-pressure applications.

A high pressure can be achieved in two ways:

- One pump with a frequency-controlled high-speed motor:
 - CRNE-HS, pump sizes 1 and 3. The chamber stack is upside-down compared to the CRN pump.
- Two pumps connected in series. A standard CRN (model 3-64) feeding a CRN-SF (model 3-64) high-pressure pump:
 - CRN-SF, pump sizes 3 to 64. The chamber stack is upside-down compared to the CRN pump.

The pumps described in this data booklet are CRN-SF high-pressure pumps.

The pressure generated by the high-pressure pump makes special demands on the design. This data booklet primarily describes the following aspects where the high-pressure pump differs from the feed pump:

- design
- operating conditions
- performance curves
- dimensions.

The performance curves and dimensional sketches for the CRN-SF pump range show the high-pressure pump connected in series with a feed pump with various numbers of stages.

Motors

CRN pumps are fitted with a Grundfos specified motor. The motors are all heavy-duty 2-pole, NEMA C-face motors. The pumps are supplied with WEG motors as standard. Grundfos ML motors are available on request.

The CRNE pumps are fitted with a high-speed Grundfos MGE motor with an integrated frequency converter.

Pump Energy Index (PEI)

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 the actual performance of a pump 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 to be 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.

PEI values for CRN high-pressure pumps

Product type	Poles	PEI_{CL} bare-shaft pump	PEI_{CL} pump with motor	PEI_{VL} pump with motor plus controller ¹⁾	Impeller diameter [in (mm)]
CRN, CRI 10	2	0.87	0.87	0.48	3.66 (92.9)
CRN, CRI 15	2	0.91	0.91	0.48	4.13 (104.8)
CRN, CRI 20	2	0.91	0.91	0.47	4.13 (104.8)
CRN 32	2	0.87	0.87	0.45	4.66 (118.4)
	4	0.90	0.91	0.50	
CRN 45	2	0.89	0.89	0.46	5.34 (136)
	4	0.91	0.91	0.47	
CRN 64	2	0.93	0.93	0.46	5.59 (142)
	4	0.94	0.94	0.48	

¹⁾ Grundfos CUE continuous controls.

2. Applications

The CRN high-pressure series is a multi-purpose pump range suitable for a large variety of applications demanding a reliable and cost-efficient supply.

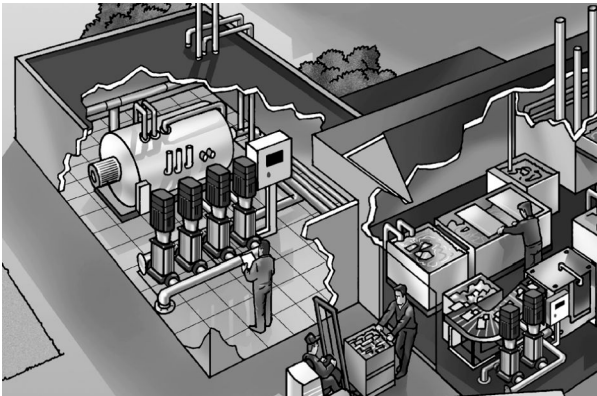
The CRN pumps handle a variety of liquids from potable water to industrial liquids within a very wide temperature range, flow rate and pressure scale.

Industry

The lists below show some general examples of applications requiring a high pressure.

Pressure boosting

- Process water systems
- washing and cleaning systems
- high-pressure washdown systems
- boiler feed and condensate systems.

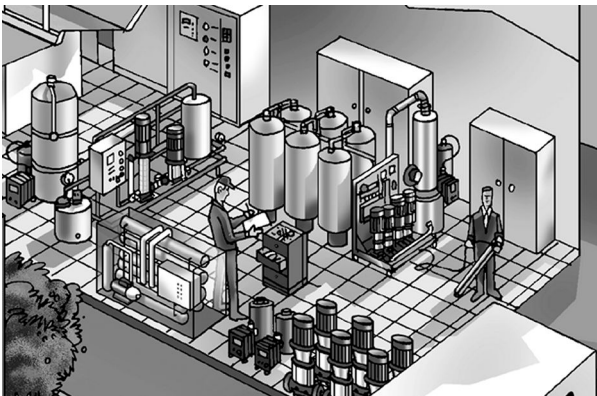


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Industrial application

Water treatment

- Ultra-filtration systems
- reverse osmosis systems.



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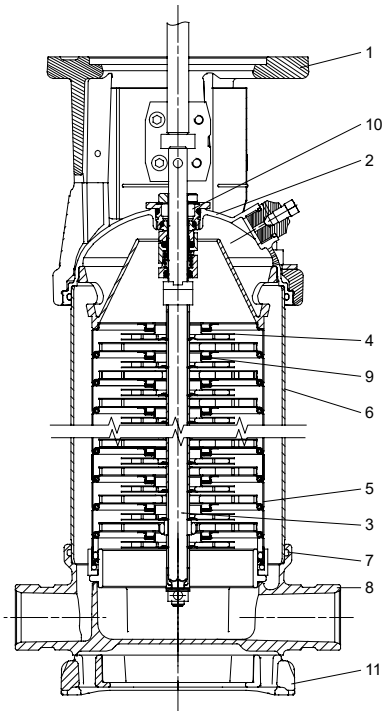
Process water treatment

3. Features and benefits

CRNE 1, 3 HS



CRNE 3 HS pump



Sectional drawing of CRNE 1 and 3 HS

Pump

CRNE-HS is a single-pump solution capable of operating at 725 psi (50 bar).

The CRNE-HS pump is a non-self-priming, vertical, multistage centrifugal pump fitted with a high-speed Grundfos MGE motor with an integrated frequency converter.

The direction of rotation is the opposite of that of standard pumps, and the chamber stack is turned upside-down. Consequently, the pumped liquid flows in the opposite direction.

This special design ensures that the shaft seal is not affected by the pump outlet pressure.

The base, pump head cover and all components in contact with the pumped liquid are made of stainless steel.

The pump has a maintenance-free mechanical cartridge shaft seal.

Operating conditions

Liquid temperature:	-4 to +248 °F (-20 to +120 °C)
Ambient temperature:	Maximum +122 °F (+50 °C)
Minimum inlet pressure:	29 psi (2 bar)
Maximum inlet pressure:	362 psi (25 bar)
Maximum operating pressure:	725 psi (50 bar)

Materials

Pos.	Designation	Material	EN/DIN	AISI/ASTM
1	Pump head	Cast iron EN-GJL-200	EN-JL1030	ASTM 25B
2	Pump head cover	Stainless steel	1.4408	CF8M (equal to AISI 316)
3	Shaft	Stainless steel	1.4401 1.4460	AISI 316 AISI 329
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, FKM, FFKM, FXM		
8	Base	Stainless steel	1.4408	CF8M (equal to AISI 316)
9	Neck ring	PTFE		
10	Shaft seal	HQQE, HQQV, HQQF, HQQK		
11	Base plate	Stainless steel ²⁾	1.4408	CF8M (equal to AISI 316)
	Other rubber parts	EPDM, FKM, FFKM, FXM		

²⁾ Stainless-steel flanges are standard for pumps with DIN flange connection.

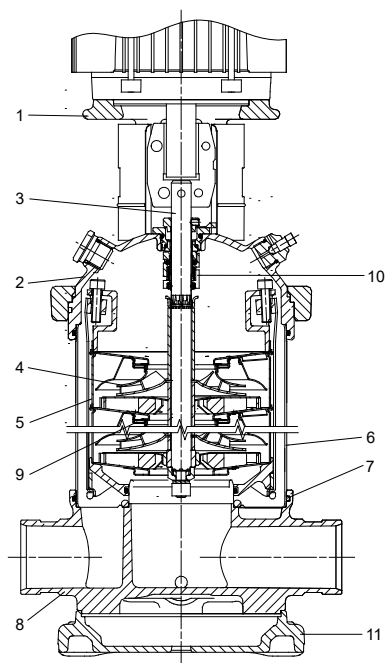
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CRN 3, 5, 10, 15, 20 SF



CRN 10 and CRN 10 SF pump system



Sectional drawing of CRN 3, 5, 10, 15, 20 SF

Pump

CRN-SF is a double-pump system capable of operating at 725 psi (50 bar).

The system consists of two pumps connected in series. One pump is a CRN pump for feeding. The other pump is a CRN-SF high-pressure pump, especially designed for high pressures.

The CRN-SF pump is a non-self-priming, vertical, multistage centrifugal pump fitted with a Grundfos MG or Innomatics motor specially modified to withstand the thrust of the motor.

The direction of rotation of the CRN-SF is the opposite of that of CRN pumps, and the chamber stack is turned upside-down. Consequently, the pumped liquid flows in the opposite direction inside the pump.

This special design ensures that the shaft seal is not affected by the pump outlet pressure.

The base, pump head cover and vital pump components are made of stainless steel. The base has in-line inlet and outlet ports with Victaulic connections.

The pump has a maintenance-free mechanical cartridge shaft seal.

Operating conditions

Liquid temperature:	-40 to +248 °F (-40 to +120 °C)
Ambient temperature:	Maximum +122 °F (+50 °C)
Minimum inlet pressure:	29 psi (2 bar)
Maximum inlet pressure:	362 psi (25 bar)
Maximum operating pressure:	725 psi (50 bar)

Materials

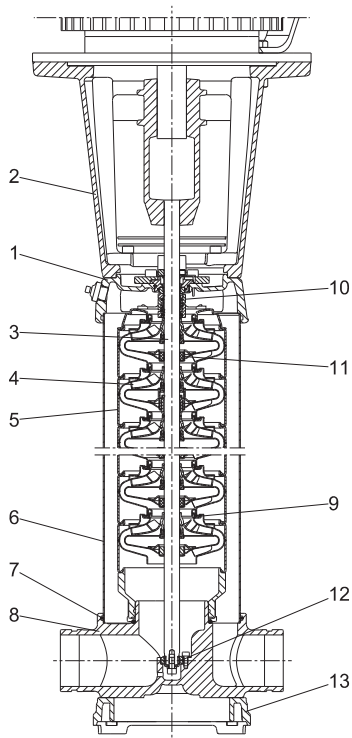
Pos.	Designation	Material	EN/DIN	AISI/ASTM
1	Pump head	Cast iron	EN-GJS-450-10	
2	Pump head cover	Stainless steel	1.4408	CF8M (equal to AISI 316)
3	Shaft	Stainless steel	1.4460	AISI 329
4	Impeller	Stainless steel	1.4401	AISI 316
5	Chamber	Stainless steel	1.4401	AISI 316
6	Sleeve	Stainless steel	1.4401	AISI 316
7	O-ring for sleeve	EPDM, FKM, FFKM, FXM	1.0037	
8	Base	Stainless steel	1.4408	CF8M (equal to AISI 316)
9	Neck ring	PTFE		
10	Shaft seal	HQQE, HQQV, HQQF, HQQK		
11	Base plate	Stainless steel ³⁾	1.4408	25BCF8M (equal to AISI 316)
	Other rubber parts	EPDM, FKM, FFKM, FXM		

³⁾ Stainless steel available on request.

CRN 32, 45, 64 SF



CRN 45 and CRN 45 SF pump system



Sectional drawing of CRN 32, 45, 64 SF

Pump

CRN-SF is a double-pump system capable of operating at 725 psi (50 bar).

The system consists of two pumps connected in series. One pump is a CRN pump for feeding. The other pump is a CRN-SF high-pressure pump, especially designed for high pressures.

The CRN-SF pump is a non-self-priming, vertical, multistage centrifugal pump fitted with a standard WEG motor and bearing flange or Innomatics motor specially modified to withstand the thrust of the pump.

The direction of rotation of the CRN-SF is the opposite of that of CRN pumps, and the chamber stack is turned upside-down. Consequently, the pumped liquid flows in the opposite direction inside the pump.

This special design ensures that the shaft seal is not affected by the pump outlet pressure.

The base, pump head cover and vital pump components are made of stainless steel. The base has in-line inlet and outlet ports.

The pump has a maintenance-free mechanical cartridge shaft seal.

Operating conditions

Liquid temperature:	-40 to +248 °F (-40 to +120 °C)
Ambient temperature:	Maximum +122 °F (+50 °C)
Minimum inlet pressure:	29 psi (2 bar)
Maximum inlet pressure:	362 psi (25 bar)
Maximum operating pressure:	725 psi (50 bar)

Materials

Pos.	Designation	Material	EN/DIN	AISI/ASTM
1	Pump head	Stainless steel	1.4408	CF8M (equal to AISI 316)
2	Motor stool	Cast iron	EN-GJL-200 ⁴⁾ EN-GJS-450-10 ⁵⁾	
3	Shaft	Stainless steel	1.4460	
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, FKM, FFKM, FXM	1.0037	
8	Base	Stainless steel	1.4408	CF8M (equal to AISI 316)
9	Neck ring	Carbon-graphite-filled PTFE		
10	Shaft seal	HQQE, HQQV, HQQF, HQQK		
11	Bearing ring	Bronze/carbon-graphite-filled PTFE		
12	Bottom bearing ring	TC/TC ⁶⁾		
13	Base plate	Stainless steel	1.4408	
	Other rubber parts	EPDM, FKM		

4) 40 and 50 hp motor.

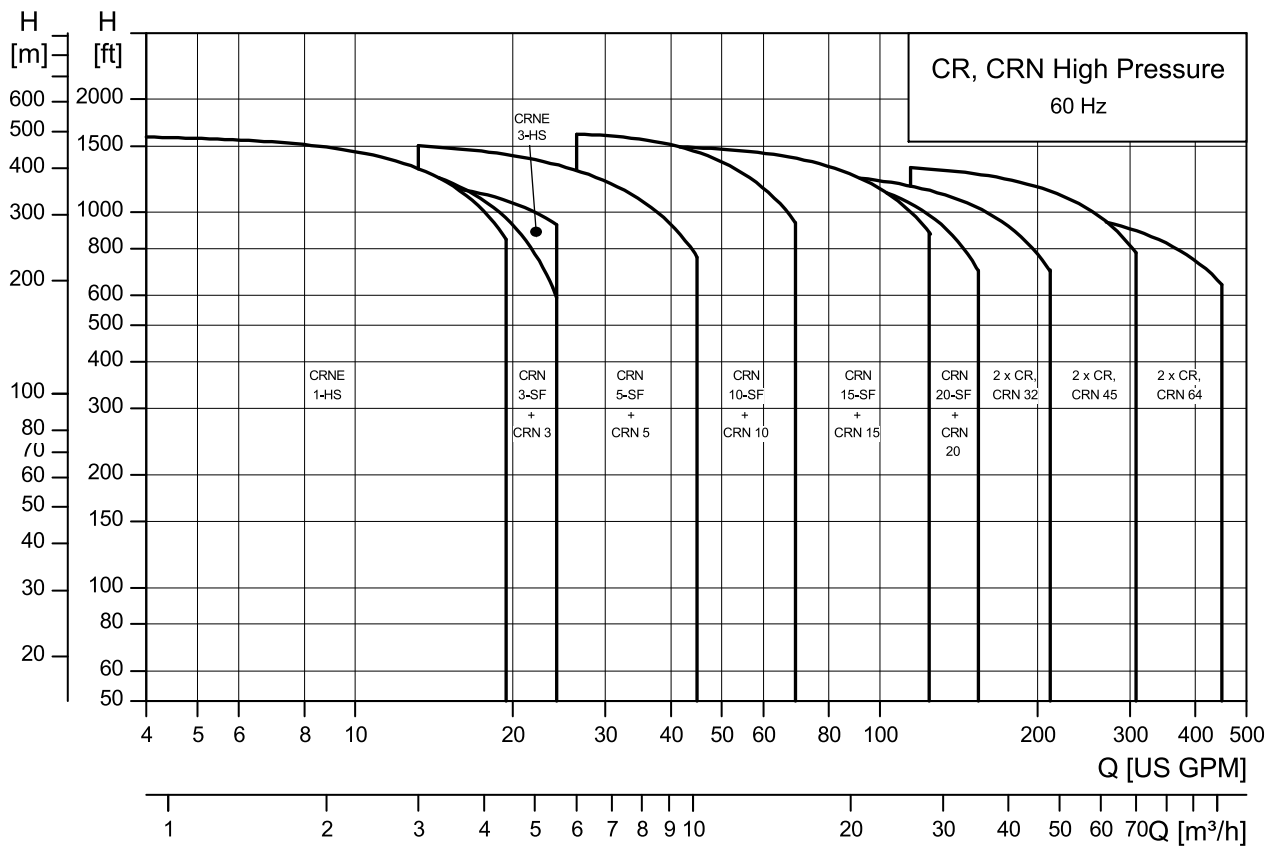
5) 60 hp motor.

6) TC equals tungsten carbide (cemented).

TMO55135

TMO55408

4. Performance range



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5. Product range

CRNE 1 and 3 HS, and CRN 3 to 64 SF

CRN, CRNE pump size	1 HS	3 HS	3 SF	5 SF	10 SF	15 SF	20 SF	32 SF	45 SF	64 SF
Nominal flow rate [US gpm (m ³ /h)]	13 (3)	16 (3.6)	15 (3.4)	30 (6.8)	55 (12.5)	95 (21.5)	110 (25)	140 (31.8)	220 (50)	340 (77.2)
Flow range [US gpm (m ³ /h)]	1.3 - 19.3 (0.3 - 4.4)	1.6 - 24 (0.4 - 5.5)	1.5 - 23.8 (0.34 - 5.4)	3-45 (0.7 - 10.2)	5.5 - 70 (1.2 - 15.9)	9.5 - 125 (2.2 - 28.4)	11-155 (2.5 - 35.2)	14-210 (3.2 - 47.7)	22-310 (5 - 70.4)	34-450 (7.7 - 102.2)
Max. working pressure [psi (bar)]	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)	725 (50)
Motor power [hp]	6.2 - 10	6.2 - 10	1/3 - 5	1 1/2 - 7.5	3-15	5-25	5-25	15-40	15-60	15-50
Temperature range [°F (°C)]		-4 to +248 (-20 to +120)			-4 to +248 (-20 to +120)			-22 to +248 (-30 to +120)		
Standard versions										
CRN, CRNE:										
Stainless steel AISI 316	•	•	•	•	•	•	•	•	•	•
CRN, CRNE pipe connection										
PJE (Victaulic)	1 1/4"	1 1/4"	1 1/4"	1 1/4"	2"	2"	2"	3"	4"	4"
PJE (Victaulic) - on request	-	-	-	-	-	-	-	-	-	-
ANSI flange size	-	-	-	-	-	-	-	-	-	-
ANSI flange class	-	-	-	-	-	-	-	-	-	-
System										
One pump with TEFC/ODP motor	-	-	-	-	-	-	-	-	-	-
One pump with high-speed motor	•	•	-	-	-	-	-	-	-	-
Two pumps in series	-	-	•	•	•	•	•	•	•	•

• Available

- Not available

6. Identification

Type key

Example

CRN 32-9 S-P-A-E-HQQE

Code	Explanation
CRN	Type range: CRN
E	Pump with integrated frequency converter
32	Flow rate [gpm (m ³ /h)]
9	Number of impellers
S	Code for pump version
P	Code for pipe connection
A	Code for materials
E	Code for rubber parts
	Code for shaft seal:
H	• Shaft seal type designation
Q	• Seal face material (rotating seal face)
Q	• Seal face material (stationary seal face)
E	• Secondary seal material (rubber parts)

Key to codes

Code	Description
Pump version	
A	Basic version
B	Oversize motor
C	CR compact
D	Pump with pressure intensifier
E	Pump with certificate
F	Pump for high temperatures (with air-cooled top)
G	E-pump without operating panel
H	Horizontal version
I	Different pressure rating
J	E-pump with a different maximum speed
K	Pump with low NPSH
L	Pump including Grundfos CUE and certificate
M	Magnetic drive
N	With sensor
O	Cleaned and dried
P	Undersize motor
Q	High-pressure pump with high-speed MGE motor
R	Belt-driven pump
S	High-pressure pump
T	Thrust handling device
U	ATEX-approved pump
V	Cascade function
W	Deep-well pump with ejector
X	Special version
6	Special version with NSF 61/372 approval
Y	Electropolished
Z	Pumps with bearing flange
Pipe connection	
A	Oval flange
B	NPT thread
CA	FlexiClamp
CX	TriClamp
F	DIN flange
FC	DIN 11853-2 flange (collar flange)
FE	EN 1092-1, type E
G	ANSI flange
J	JIS flange
N	Changed diameter of ports
P	PJE coupling (Victaulic type)
X	Special version
Materials	
A	Basic version
C	Carbon-free pump
D	Carbon-graphite-filled PTFE (bearings)/tungsten carbide
E	Pickled and passivated (Only Japan)

Code	Description
H	Flanges and base plate EN 1.4408
K	Bronze (bearings)/tungsten carbide
L	Motor stool, base plate and flanges EN 1.4408
M	Motor stool, base plate, coupling and flanges EN 1.4408 and coupling guards in cobber. Bolts, nuts and spacing pipes EN 1.4401 or higher grade
N	Flanges EN 1.4408
P	PEEK neck ring
Q	Silicon carbide/silicon carbide bearing in pump and silicon carbide/silicon carbide seal faces in thrust handling device
R	Silicon carbide/silicon carbide bearing
S	PTFE neck rings
T	Base plate EN 1.4408
U	Silicon carbide/silicon carbide bearing in pump and silicon carbide/tungsten carbide seal faces in thrust handling device
W	Tungsten carbide/tungsten carbide
X	Special version
Rubber parts in pump	
E	EPDM
F	FXM (Fluoraz®)
K	FFKM (Kalrez®)
N	CR (Neoprene)
V	FKM (Viton®)
Shaft seal type designation	
A	O-ring seal with fixed driver
H	Balanced cartridge seal with O-ring
O	Double seal, back-to-back
P	Double seal, tandem
X	Special version
Seal face material (rotating and stationary seal face)	
B	Carbon, synthetic resin-impregnated
U	Cemented tungsten carbide
Q	Silicon carbide
X	Other ceramics
Secondary seal material (rubber parts)	
E	EPDM
F	FXM (Fluoraz®)
K	FFKM (Kalrez®)
V	FKM (Viton®)

Codes for motor

Code	Description
P2 [hp (kW)]	
C	0.33 (0.25)
D	0.5 (0.37)
E	0.75 (0.55)
F	1 (0.75)
G	1.5 (1.1)
H	2 (1.5)
I	3 (2.2)
K	5 (4)
L	7.5 (5.5)
M	10 (7.5)
N	15 (11)
O	20 (15)
P	25 (18.5)
Q	30 (22)
R	40 (30)
S	50 (37)
T	60 (45)
U	75 (55)
V	100 (75)
W	120 (90)
1	150 (110)
2	175 (132)
3	215 (160)
4	270 (200)
5	335 (250)
Phase and voltage (V)	
A	1 × 200-240 V
B	3 × 200-240 V
C	3 × 440-480 V
D	3 × 380-500 V
X	Not defined
Speed variant (rpm)	
A	1450-2000
B	2900-4000
C	4000-5900
2	2-pole
4	4-pole

7. Operating conditions

Ambient temperature and installation altitude

The ambient temperature and the installation altitude are important factors for the motor life as they affect the bearings and the insulation system. The installation altitude is the height of the installation site above sea level.

Motors installed up to the maximum ambient temperature and altitude can be loaded 100 %.

If the ambient temperature or the installation altitude exceeds the recommended maximum values, the motor must not be fully loaded due to risk of overheating.

Overheating may result from excessive ambient temperatures or high altitudes with low density and low cooling effect of the air.

In such cases, it may be necessary to select an oversized motor with a higher rated output. To determine the motor load, it is necessary to calculate the derated motor power.

Maximum ambient temperature and altitude for Grundfos ML motors

The maximum ambient temperature at which IE3 motors can operate is 140 °F (60 °C). The motor can run and still be within the tolerance of the insulation class at the maximum rated temperature.

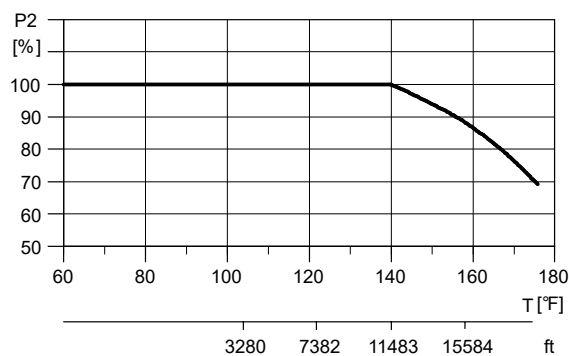
The maximum altitude is 3280 feet (1000 meters).

Motor output derating factors

If the ambient temperature exceeds the maximum temperature limits of the pump or the pump is installed at an altitude exceeding the altitude values in the chart below, the motor must not be fully loaded due to risk of overheating.

Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air at high altitudes. In such cases, it may be necessary to use a motor with a higher rated output (P2).

Motor load for Grundfos ML motors



Relationship between motor output (P2) and ambient temperature (T) and altitude (ft)

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Example of maximum motor load

From the figure above, it appears that P2 must be reduced to 88 % when a pump with a NEMA premium-efficiency ML motor is installed at 15,584 ft (4750 m) above sea level. At an ambient temperature of 167 °F (75 °C), P2 of a standard-efficiency motor must be reduced to 74 % of rated output.

In cases where both the maximum temperature and the maximum altitude are exceeded, the derating factors must be multiplied.

Example: $0.89 \times 0.89 = 0.79$.

Maximum ambient temperature and altitude for Grundfos MGE motors

The table shows the maximum permissible ambient temperature at full load and the maximum permissible installation altitude above sea level at full load.

Motor efficiency class: IE5

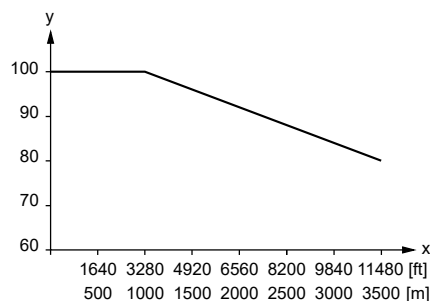
Motor power [hp]	Motor make	Phase	Max. ambient temperature [°F (°C)]	Max. altitude above sea level [ft (m)]
1-30	MGE	3	122 (50) ⁷⁾	3280 (1000)

⁷⁾ 3 x 200–240 V MGE motors are rated for a maximum ambient temperature of 104 °F (40 °C).

Motor load for Grundfos MGE motors

MGE motors can be installed up to 11480 ft (3500 m) above sea level.

Motors installed above the maximum installation altitude of 3280 ft (1000 m) above sea level must not be fully loaded. Use the below curve to calculate the derated motor power. If the required motor output exceeds the derated motor power, select an oversized motor.



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Derating of motor output power P2 % (y-axis) in relation to installation altitude above sea level in feet (x-axis)

Maximum ambient temperature and altitude for WEG and Innomatics motors

Consult Grundfos for maximum ambient temperature and altitude and de-rating of WEG and Innomatics motors.

Shaft seal operating range

The actual operating range of the shaft seal for the high-pressure pump depends on operating pressure, type of shaft seal and liquid temperature.

The following temperature ranges apply to clean water.

Operating conditions of the shaft seal for the CRN high-pressure pump

Shaft seal	Description	Max. temp. range [°F]
HQQE	O-ring (cartridge) (balanced seal), SiC/SiC, EPDM	-22 to +248
HQQV	O-ring (cartridge) (balanced seal), SiC/SiC, FKM	-4 to +194
HUBE	O-ring (cartridge) (balanced seal), TC/carbon, EPDM	+32 to +248
HUBV	O-ring (cartridge) (balanced seal), TC/carbon, FKM	+32 to +194

8. Selection

Selection of pump

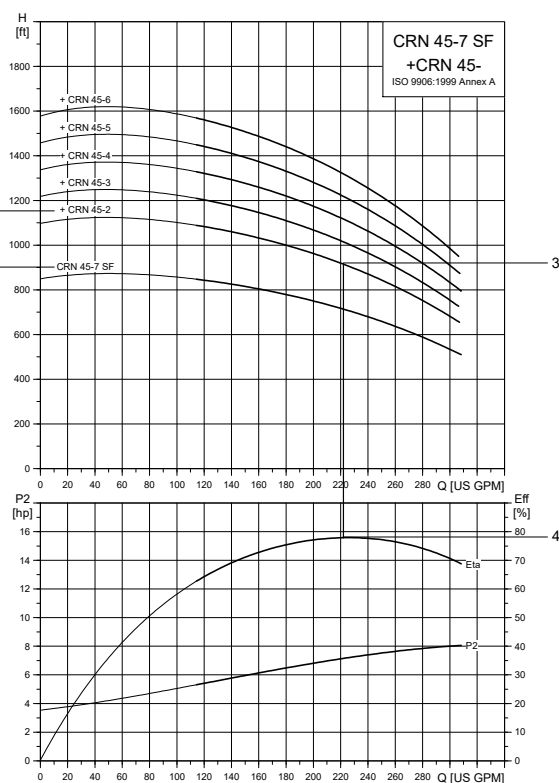
Pump size

Base the selection of the pump size on the following parameters:

- required flow rate and pressure at the duty point
- best efficiency at the estimated duty point
- pressure loss as a result of height differences
- friction loss in the pipes, for example in connection with long pipes, bends and valves.

Pump efficiency and duty point

Before determining the best efficiency point, identify the operation pattern of the pump. If the pump is expected to always operate at the same duty point, then select a pump which is operating at a duty point corresponding to the best efficiency of the pump.



Example of a duty point

Pos.	Description
1	Feed pump
2	High-pressure pump
3	Duty point
4	Best efficiency

Minimum inlet pressure, NPSH

We recommend calculation of the inlet pressure "H" 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 inlet side of the pump.

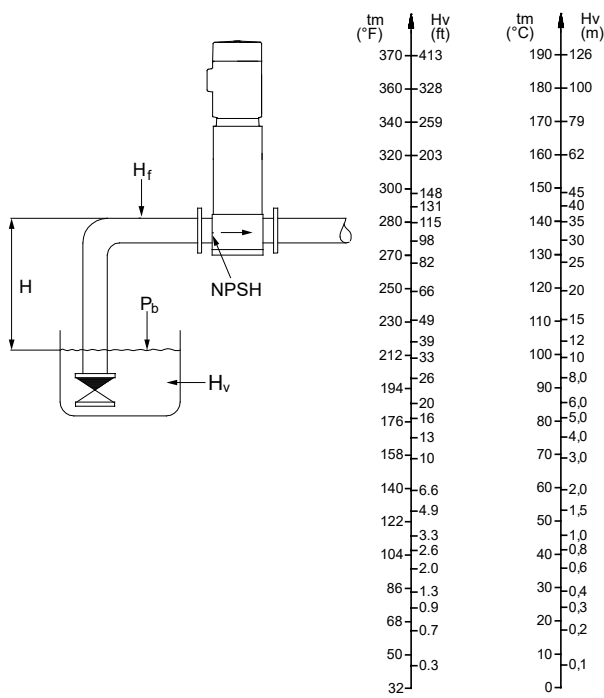
The maximum suction lift "H" in feet of head can be calculated as follows:

$$H = p_b \times 2.31 - \text{NPSH} - H_f - H_v - H_s$$

	Barometric pressure in psi.
p_b	The barometric pressure can be set to 14.5 psi (1 bar). In closed systems, p_b indicates the system pressure in psi.
	Net Positive Suction Head in feet of head.
NPSH	To be read from the NPSH curve at the highest flow the pump will be delivering.
H_f	Friction loss in inlet pipe in feet of head, at the highest flow the pump will be delivering.
	Vapor pressure in feet of head.
H_v	To be read from the vapor pressure scale. H_v depends on the liquid temperature t_m .
H_s	Safety margin = minimum 1.64 feet (0.5 meters) of head.

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

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



TM079036

Minimum inlet pressure, NPSH

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.

Inlet pressure and operating pressure

Do not exceed the limit values for these pressures:

- minimum inlet pressure
- maximum inlet pressure
- maximum operating pressure.

Examples of operating and inlet pressures

The values for the operating pressures and inlet pressures must not be considered individually. The outlet pressure must be equal to or lower than the maximum operating pressure.

See the following examples:

Example 1:

The following pumps in series are selected.

First-stage pump: CRN 5-24.

Second-stage pump: CRN 5-24 SF.

	CRN 5-24 [psi]	CRN 5-24 SF [psi]
Maximum operating pressure	362	725
Maximum inlet pressure	218	362
Outlet pressure against a closed valve	345	

In this example, the pump outlet pressure against a closed valve for the first-stage pump is 345 psi.

The inlet pressure added to the outlet pressure against a closed valve must not exceed the maximum operating pressure of the pump. The maximum operating pressure of the CRN 5-24 is 362 psi.

The first-stage pump is not allowed to operate at the maximum inlet pressure of 218 psi, since the maximum inlet pressure (218 psi) added to the outlet pressure against a closed valve (345 psi) is greater than the maximum operating pressure of the pump (362 psi).

The maximum allowed inlet pressure of the pump is 17 psi, that is the difference between the maximum operating pressure of the pump (362 psi) and the outlet pressure against a closed valve (345 psi).

Example 2:

The following pumps in series are selected.

First-stage pump: CRN 45-4.

Second-stage pump: CRN 45-7 SF.

	CRN 45-4 [psi]	CRN 45-7 SF [psi]
Maximum operating pressure	435	725
Maximum inlet pressure	217	362
Outlet pressure against a closed valve	215	

In this example, the pump outlet pressure against a closed valve for the first-stage pump is 215 psi.

The inlet pressure added to the outlet pressure against a closed valve must not exceed the maximum operating pressure of the pump. The maximum operating pressure of the CRN 45-4 is 435 psi.

The first-stage pump is allowed to operate at the maximum inlet pressure of 217 psi, since the maximum inlet pressure (217 psi) added to the outlet pressure against a closed valve (215 psi) is less than the maximum operating pressure of the pump (435 psi).

Shaft seal

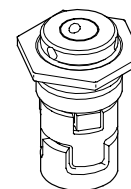
As standard, the CRN high-pressure range is fitted with an HQQE shaft seal suitable for the most common high-pressure applications.

These key parameters must be taken into account when selecting the shaft seal:

- type of pumped liquid
- liquid temperature.

Grundfos offers a wide range of shaft seal variants to meet specific demands.

For proper lubrication of the shaft seal, be sure to note the operating conditions for the pump.



TM020538

Shaft seal

Servicing shaft seals

Replacement shaft seals are available as complete service kits.

Shaft seals fitted on CRN 95-185 pumps with $\varnothing 1.1$ in ($\varnothing 28$ mm) or $\varnothing 1.4$ in ($\varnothing 36$ mm) shaft ends are serviceable. This means that the wear parts in these shaft seals are available as service kits and can be replaced without having to renew the complete shaft seal.

All service kits include detailed instructions on how to carry out the replacement.

Pumped liquids

The pumps are suitable for pumping thin, non-explosive liquids, not containing solid particles or fibers. The liquid must not attack the pump materials.

CRN pumps are suitable for industrial liquids and are to be used in systems where all parts in contact with the liquid must be made of high-grade stainless steel.

List of pumped liquids

A number of typical liquids are listed below.

Other pump versions may be applicable, but those stated in the list are considered to be the best choices.

The table is intended as a general guide only and cannot replace actual testing of the pumped liquids and pump materials under specific working conditions.

Therefore, use the list with some caution. Factors such as those mentioned below may affect the chemical resistance of a specific pump version:

- concentration of the pumped liquid
- liquid temperature
- pressure.

Take safety precautions when pumping dangerous liquids.

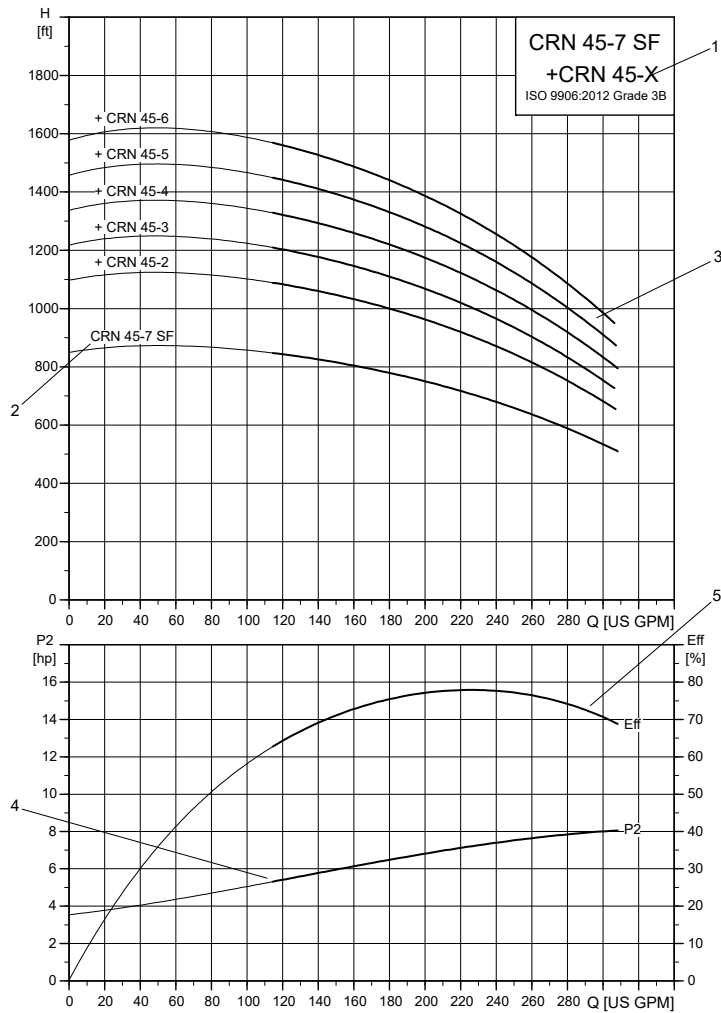
Notes

D	Often with additives.
E	The density and/or viscosity differ from that/those of water. Take this factor into account when calculating motor output and pump performance.
F	Pump selection depends on many factors. Contact Grundfos.
H	Risk of crystallization/precipitation in shaft seal.
1	Highly flammable liquid.
2	Combustible liquid.
3	Insoluble in water.
4	Low self-ignition point.

Pumped liquid	Chemical formula	Note	Liquid concentration, liquid temperature	CRN
Acetic acid	CH ₃ COOH	-	5 %, 68 °F (20 °C)	HQQE
Acetone	CH ₃ COCH ₃	1, F	100 %, 68 °F (20 °C)	HQQE
Alkaline degreasing agent		D, F	-	-
Ammonium bicarbonate	NH ₄ HCO ₃	E	20 %, 86 °F (86 °F (30 °C))	HQQE
Ammonium hydroxide	NH ₄ OH	-	20 %, 104 °F (40 °C)	-
Aviation fuel		1, 3, 4, F	100 %, 68 °F (20 °C)	-
Benzoic acid	C ₆ H ₅ COOH	H	0.5 %, 68 °F (20 °C)	HQQV
Boiler water		-	< 248 °F (120 °C)	-
		F	248-356 °F (120-180 °C)	-
Calcareous water		-	< 194 °F (90 °C)	-
Calcium acetate (as coolant with inhibitor)	Ca(CH ₃ COO) ₂	D, E	30 %, 122 °F (50 °C)	-
Calcium hydroxide	Ca (OH) ₂	E	Saturated solution, 122 °F (50 °C)	-
Chloride-containing water		F	< 86 °F (30 °C), maximum 500 ppm	HQQE
Chromic acid	H ₂ CrO ₄	H	1 %, 68 °F (20 °C)	HQQV
Citric acid	HOC(CH ₂ CO ₂ H) ₂ COOH	H	5 %, 104 °F (40 °C)	HQQE
Completely desalinated water (demineralized water)		-	248 °F (120 °C)	HQQE
Condensate		-	248 °F (120 °C)	-
Copper sulphate	CuSO ₄	E	10 %, 122 °F (50 °C)	HQQE
Corn oil		D, E, 3	100 %, 176 °F (80 °C)	-
Diesel oil		2, 3, 4, F	100 %, 68 °F (20 °C)	-
Domestic hot water (potable water)		-	< 248 °F (120 °C)	-
Ethanol (ethyl alcohol)	C ₂ H ₅ OH	1, F	100 %, 68 °F (20 °C)	-
Ethylene glycol	HOCH ₂ CH ₂ OH	D, E	50 %, 122 °F (50 °C)	-
Formic acid	HCOOH	-	5 %, 68 °F (20 °C)	HQQE
Glycerine (glycerol)	OHCH ₂ CH(OH)CH ₂ OH	D, E	50 %, 122 °F (50 °C)	-
Hydraulic oil (mineral)		E, 2, 3	100 %, 212 °F (100 °C)	-
Hydraulic oil (synthetic)		E, 2, 3	100 %, 212 °F (100 °C)	-
Isopropyl alcohol	CH ₃ CHOHCH ₃	1, F	100 %, 68 °F (20 °C)	-
Lactic acid	CH ₃ CH(OH)COOH	E, H	10 %, 68 °F (20 °C)	HQQV
Linoleic acid	C ₁₇ H ₃₁ COOH	E, 3	100 %, 68 °F (20 °C)	-
Methanol (methyl alcohol)	CH ₃ OH	1, F	100 %, 68 °F (20 °C)	-
Motor oil		E, 2, 3	100 %, 176 °F (80 °C)	-
Naphthalene	C ₁₀ H ₈	E, H	100 %, 176 °F (80 °C)	-
Nitric acid	HNO ₃	F	1 %, 68 °F (20 °C)	HQQE
Oil-containing water		-	< 212 °F (100 °C)	-
Olive oil		D, E, 3	100 %, 176 °F (80 °C)	-
Oxalic acid	(COOH) ₂	H	1 %, 68 °F (20 °C)	HQQE
Ozone-containing water	(O ₃)	-	< 212 °F (100 °C)	HQQE
Peanut oil		D, E, 3	100 %, 176 °F (80 °C)	-
Petrol		1, 3, 4, F	100 %, 68 °F (20 °C)	-
Phosphoric acid	H ₃ PO ₄	E	20 %, 68 °F (20 °C)	HQQE
Propanol	C ₃ H ₇ OH	1, F	100 %, 68 °F (20 °C)	-
Propylene glycol	CH ₃ CH(OH)CH ₂ OH	D, E	50 %, 194 °F (90 °C)	-
Potassium carbonate	K ₂ CO ₃	E	20 %, 122 °F (50 °C)	-
Potassium formate (as coolant with inhibitor)	KOOCH	D, E	30 %, 122 °F (50 °C)	-
Potassium hydroxide	KOH	E	20 %, 122 °F (50 °C)	HQQE
Potassium permanganate	KMnO ₄	-	5 %, 68 °F (20 °C)	HQQE
Rape seed oil		D, E, 3	100 %, 176 °F (80 °C)	-

Pumped liquid	Chemical formula	Note	Liquid concentration, liquid temperature	CRN
Salicylic acid	$C_6H_4(OH)COOH$	H	0.1 %, 68 °F (20 °C)	HQQE
Silicone oil		E, 3	100 %	-
Sodium bicarbonate	$NaHCO_3$	E	10 %, 140 °F (60 °C)	HQQE
Sodium chloride (as coolant)	$NaCl$	D, E	30 %, < 41 °F (5 °C), pH > 8	-
Sodium hydroxide	$NaOH$	E	20 %, 122 °F (50 °C)	HQQE
Sodium hypochlorite	$NaOCl$	F	0.1 %, 68 °F (20 °C)	HQQV
Sodium nitrate	$NaNO_3$	E	10 %, 140 °F (60 °C)	HQQE
Sodium phosphate	Na_3PO_4	E, H	10 %, 140 °F (60 °C)	HQQE
Sodium sulphate	Na_2SO_4	E, H	10 %, 140 °F (60 °C)	HQQE
Softened water		-	< 248 °F (120 °C)	HQQE
Soya oil		D, E, 3	100 %, 176 °F (80 °C)	-
Sulphuric acid	H_2SO_4	F	1 %, 68 °F (20 °C)	HQQV
Sulphurous acid	H_2SO_3	-	1 %, 68 °F (20 °C)	HQQE
Unsalted swimming-pool water		-	Approx. 2 ppm free chlorine (Cl_2)	-

How to read the curve charts



TM085591

How to read the curve charts

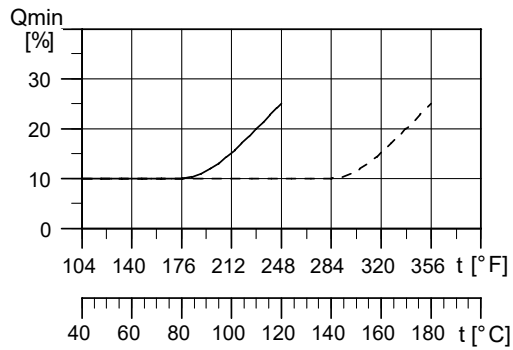
Pos.	Description
1	Pump type and ISO standard. Pump type with two pumps connected in series: feed pump + high-pressure pump. Example: CRN 45 + CRN 45-7 SF.
2	This is the high-pressure flip stack pump. The bold curves indicate the recommended duty range for best efficiency.
3	These are the CRN pumps used as feed pumps for the high-pressure pump. The bold curves indicate the recommended duty range for best efficiency.
4	The power curve indicates the pump input power per stage.
5	The Eff curve shows the efficiency of a pump with an average number of stages.

Guidelines to performance curves

The guidelines below apply to the performance curves:

- Tolerances to ANSI or ISO standards, such as ISO 9906:2012, Grade 3B, if indicated on the curve chart.
- The motors used for the measurements are standard Grundfos-specified motors.
- Measurements have been made with airless water at a temperature of 68 °F (20 °C).
- The curves apply to the following kinematic viscosity: $\nu = 1 \text{ mm}^2/\text{s}$ (1 cSt).
- Due to risk of overheating, the pumps must not be used at a flow rate below the minimum flow rate.
- The QH curves apply to a rated motor speed of a three-phase mains-operated motor. For realistic curves, go to the Grundfos Product Center (<http://product-selection.grundfos.com>) and insert data.

The curve below shows the minimum flow rate as a percentage of the rated flow rate in relation to the liquid temperature. The dotted line shows a CRN pump fitted with an air-cooled top assembly.

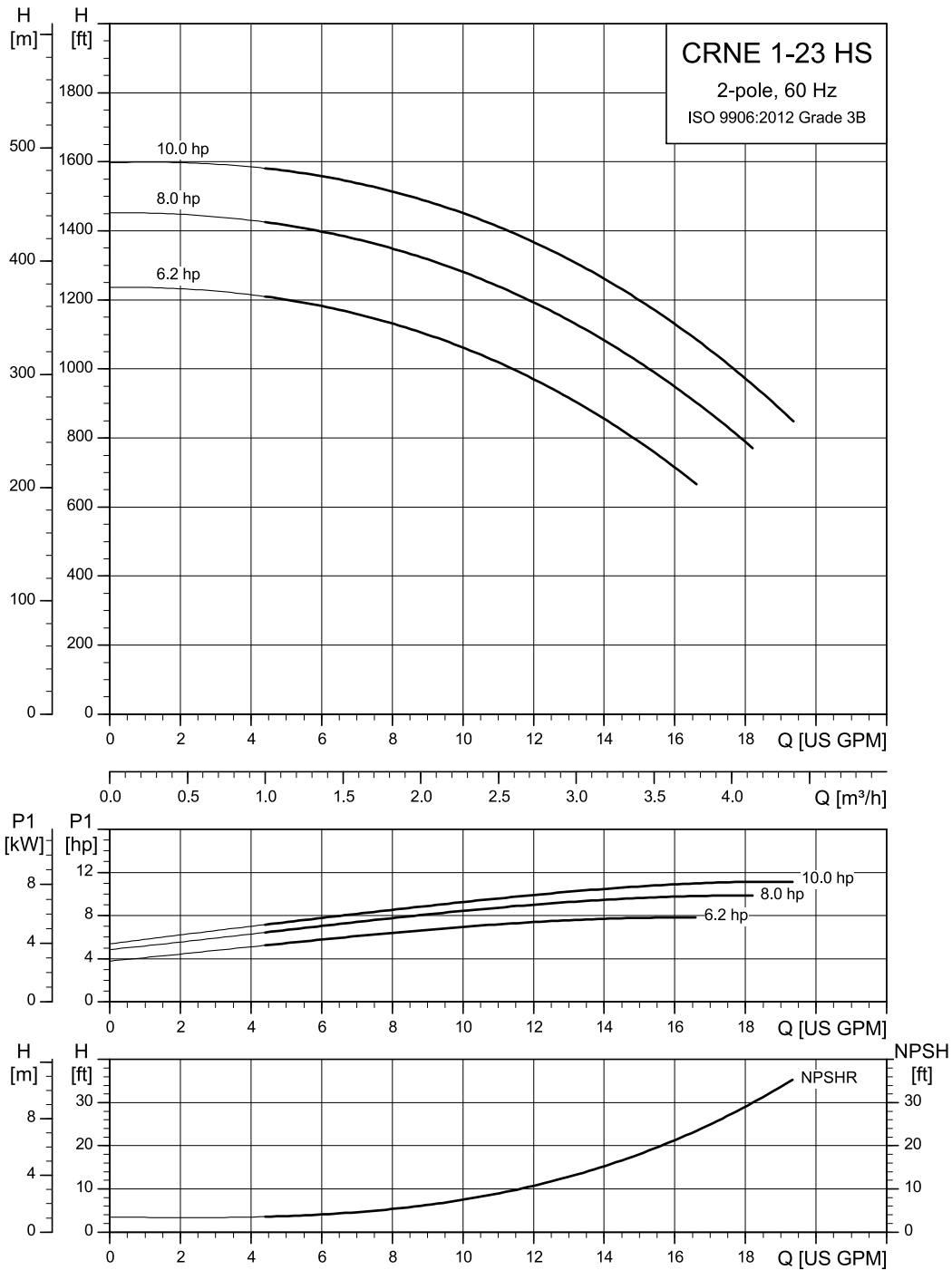


TM027538

Minimum flow rate

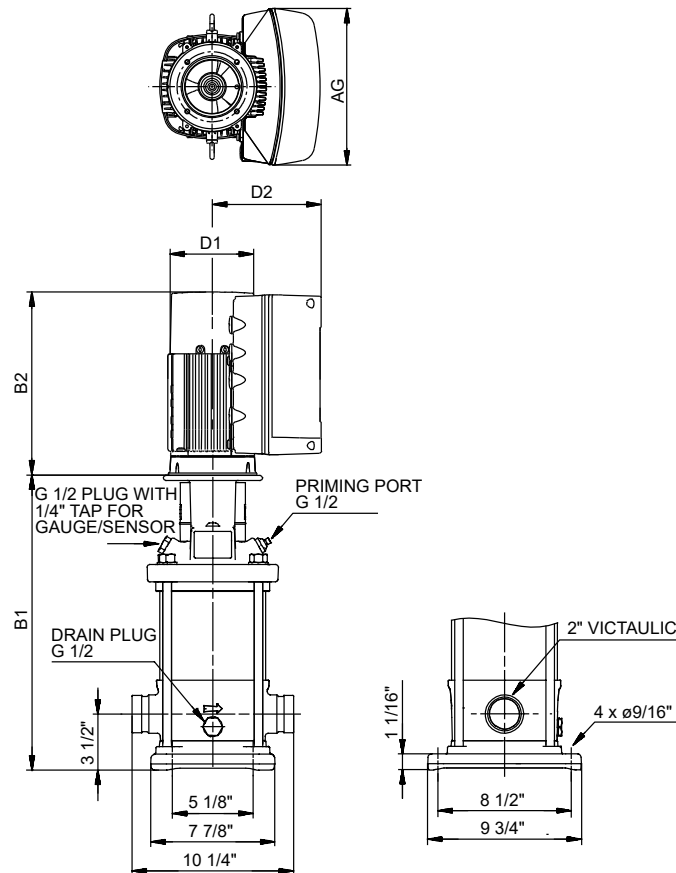
9. Performance curves and technical data

CRNE 1-HS



TM085688

Dimensional sketches



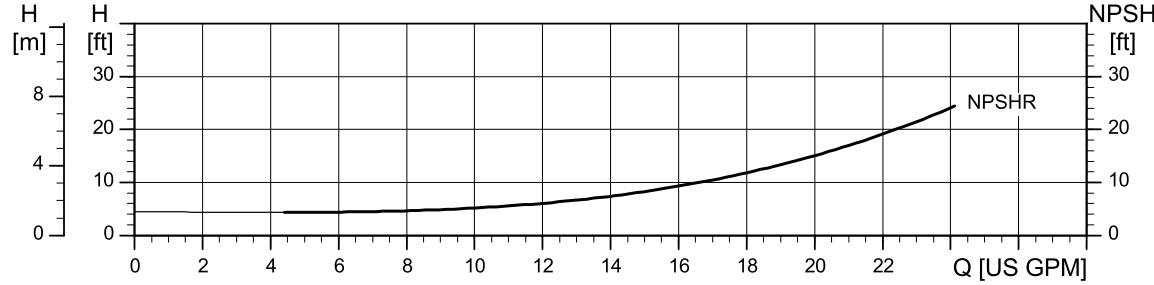
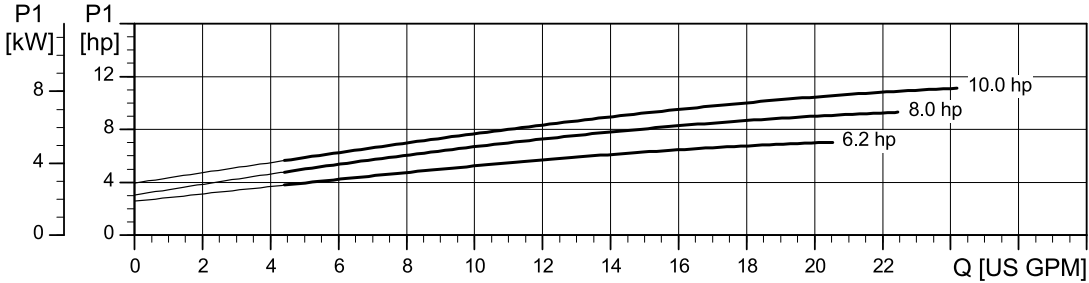
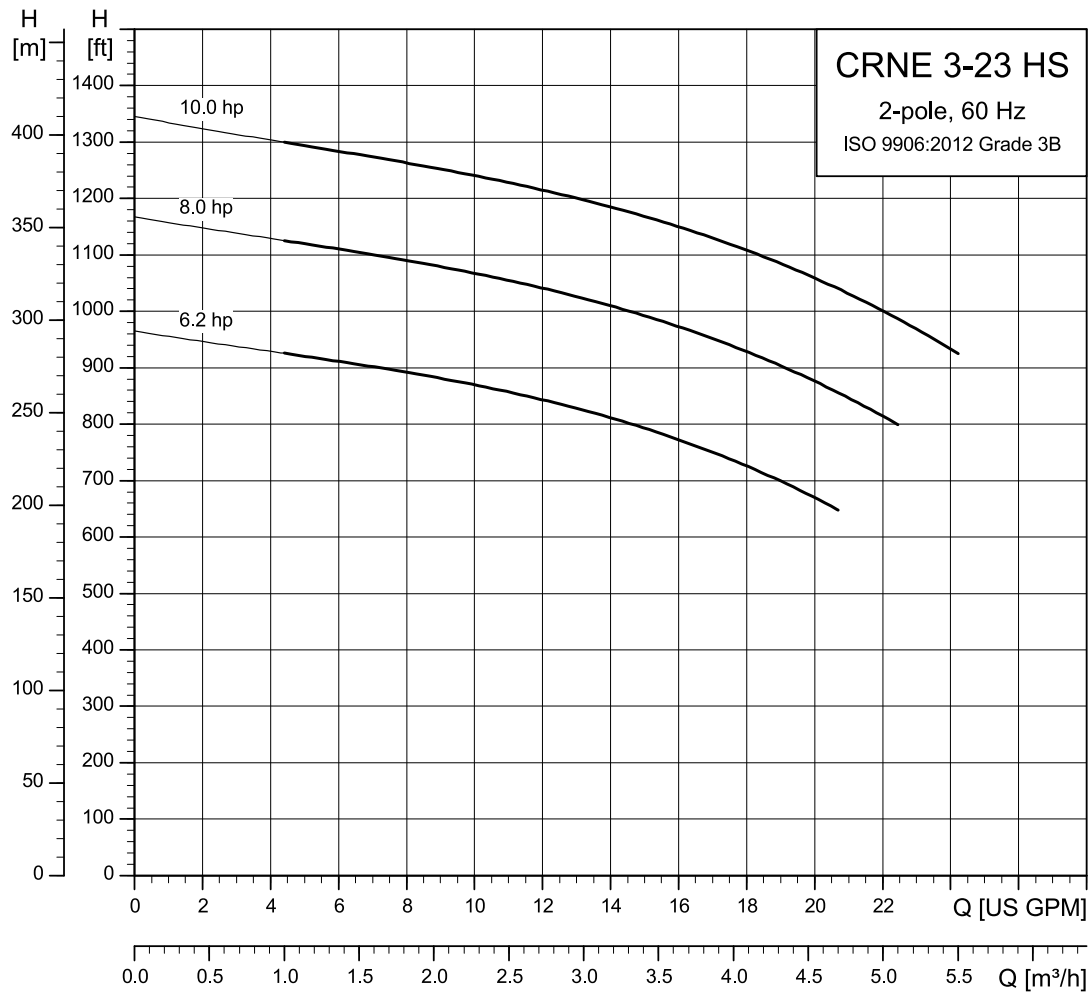
TM069220

Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]				PJE TEFC B1+B2	PJE net. wt. ⁸⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2	AG		
CRNE 1-23 HS	5	3	380-500	112MC	26.77 (680)	7.52 (191)	7.91 (201)	11.46 (291)	39.92 (1014)	110.2 (50)
CRNE 1-23 HS	7.5	3	380-500	132E	26.77 (680)	7.52 (191)	7.91 (201)	11.46 (291)	39.92 (1014)	116.8 (53)
CRNE 1-23 HS	10	3	380-500	132F	26.77 (680)	10.04 (255)	9.33 (237)	13.62 (346)	42.05 (1068)	163.1 (74)

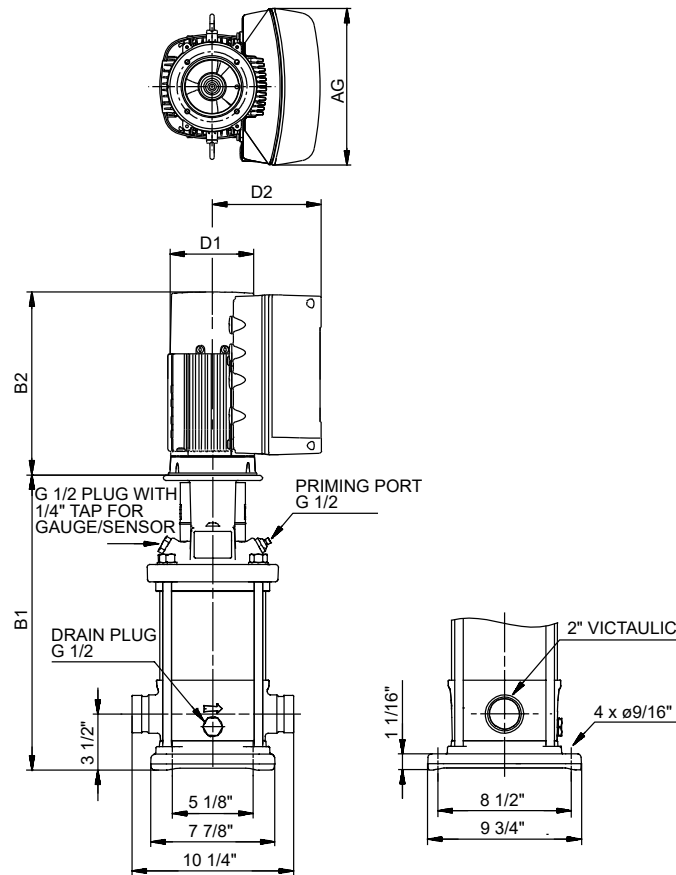
⁸⁾ Weights are based on a pump with a Grundfos MGE motor.

CRNE 3-HS



TM085689

Dimensional sketches



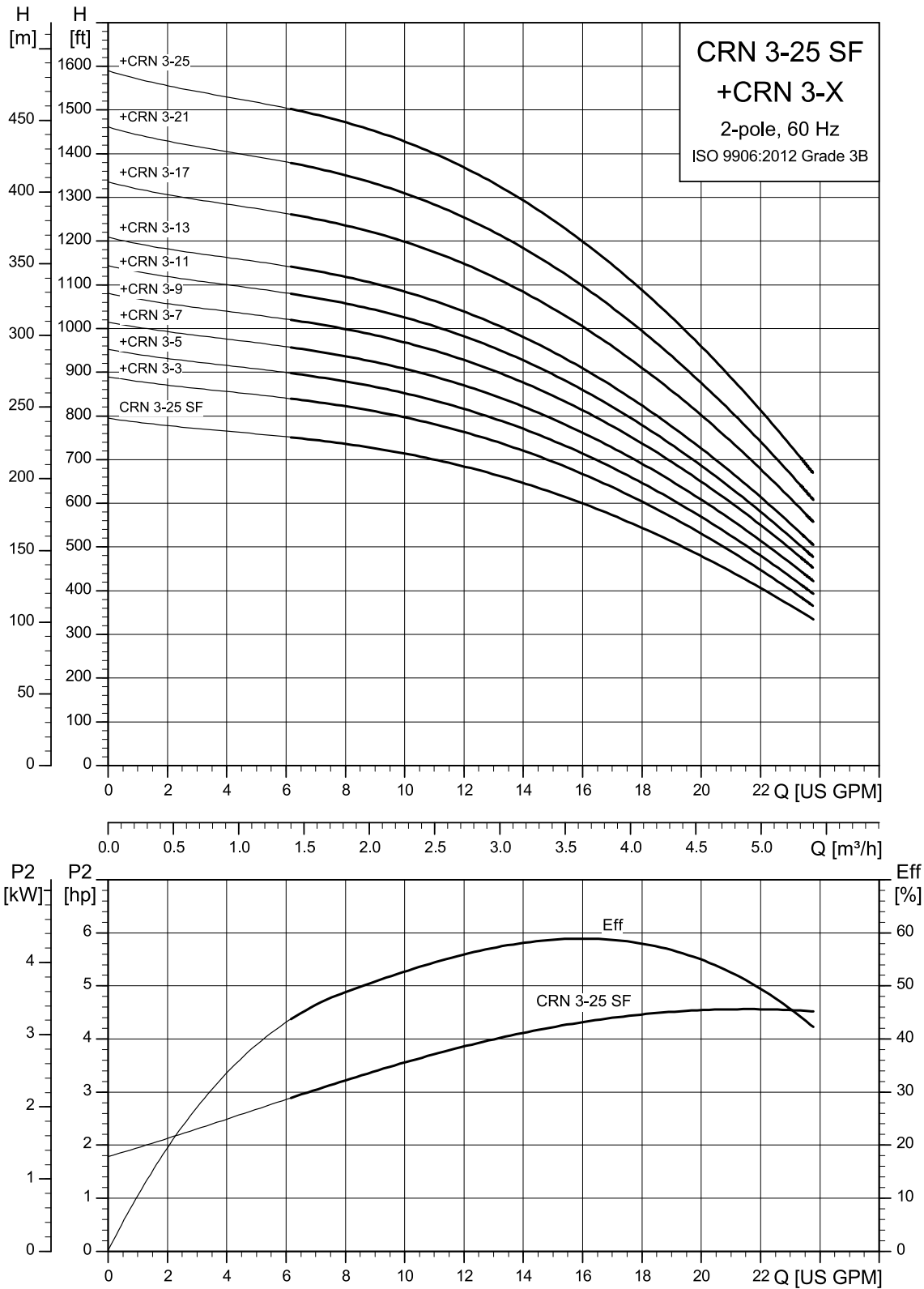
TM069220

Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]				PJE TEFC B1+B2	PJE net. wt. ⁹⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2	AG		
CRNE 3-23 HS	5	3	380-500	112MC	26.77 (680)	7.52 (191)	7.91 (201)	11.46 (291)	39.92 (1014)	110.2 (50)
CRNE 3-23 HS	7.5	3	380-500	132E	26.77 (680)	7.52 (191)	7.91 (201)	11.46 (291)	39.92 (1014)	116.8 (53)
CRNE 3-23 HS	10	3	380-500	132F	26.77 (680)	10.04 (255)	9.33 (237)	13.62 (346)	42.05 (1068)	163.1 (74)

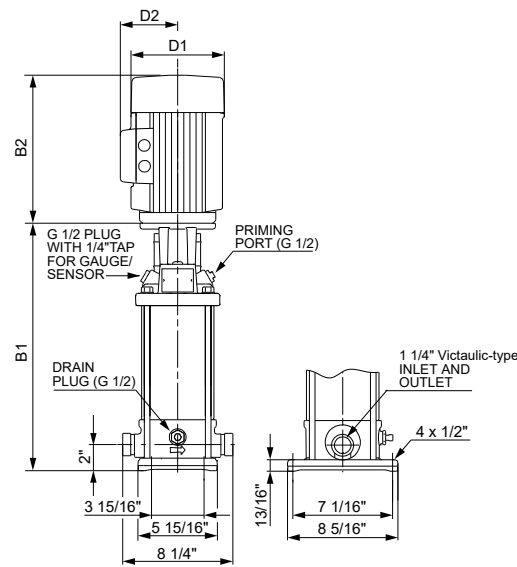
⁹⁾ Weights are based on a pump with a Grundfos MGE motor.

CRN 3-SF



TM085690

Dimensional sketches



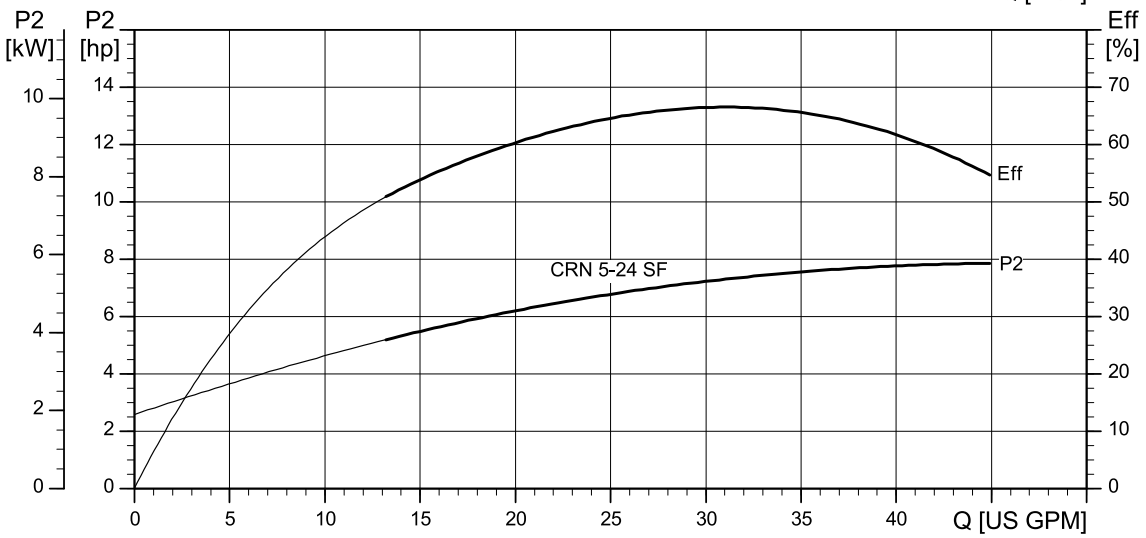
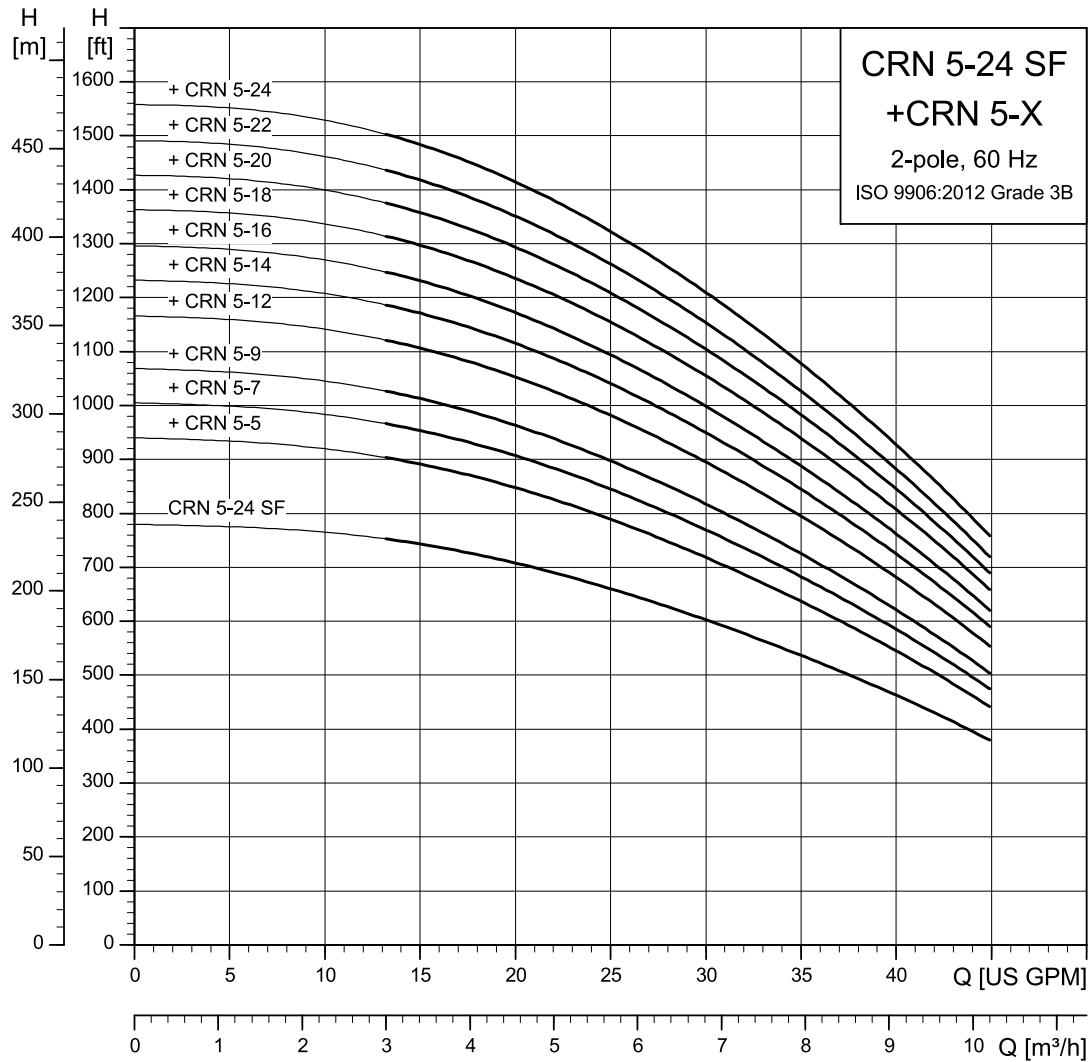
TM031454

Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]				PJE net. wt. ¹⁰⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2	PJE TEFC B1+B2	
CRN 3-3	1/2	1	115/208-230	56C	12.09 (307)	6.65 (169)	5.51 (140)	21.54 (547)	55.31 (25)
		3	208-230/460	56C	12.09 (307)	6.69 (170)	5.51 (140)	20.75 (527)	55.83 (25)
CRN 3-5	3/4	1	115/208-230	56C	13.50 (343)	7.64 (194)	5.87 (149)	24.80 (630)	70.90 (32)
		3	208-230/460	56C	13.50 (343)	6.69 (170)	5.51 (140)	22.17 (563)	58.78 (27)
CRN 3-7	1 1/2	1	115/208-230	56C	14.92 (379)	7.64 (194)	5.87 (149)	27.40 (696)	80.03 (36)
		3	208-230/460	56C	14.92 (379)	7.64 (194)	5.87 (149)	26.61 (676)	79.08 (36)
CRN 3-9	1 1/2	1	115/208-230	56C	16.34 (415)	7.64 (194)	5.87 (149)	28.82 (732)	81.77 (37)
		3	208-230/460	56C	16.34 (415)	7.64 (194)	5.87 (149)	28.03 (712)	80.82 (37)
CRN 3-11	2	1	115/208-230	56C	17.76 (451)	7.64 (194)	5.87 (149)	30.63 (778)	88.89 (40)
		3	208-230/460	56C	17.76 (451)	7.64 (194)	5.87 (149)	30.24 (768)	86.98 (39)
CRN 3-13	3	1	115/208-230	182TC	20.28 (515)	9.45 (240)	8.07 (205)	36.73 (933)	125.1 (57)
		3	208-230/460	182TC	20.28 (515)	9.45 (240)	6.69 (170)	33.98 (863)	122.5 (56)
CRN 3-17	3	1	115/208-230	182TC	23.11 (587)	9.45 (240)	8.07 (205)	39.57 (1005)	128.7 (58)
		3	208-230/460	182TC	23.11 (587)	9.45 (240)	6.69 (170)	36.81 (935)	126.1 (57)
CRN 3-21	5	1	208-230	213TC	25.94 (659)	10.98 (279)	8.43 (214)	45.28 (1150)	187.5 (85)
		3	208-230/460	213TC	25.94 (659)	9.45 (240)	6.69 (170)	41.22 (1047)	144.3 (65)
CRN 3-25	5	1	208-230	213TC	28.78 (731)	10.98 (279)	8.43 (214)	48.11 (1222)	191.0 (87)
		3	208-230/460	213TC	28.78 (731)	9.45 (240)	6.69 (170)	44.06 (1119)	147.8 (67)
CRN 3-25 SF ¹¹⁾	5	3	460	112MC	27.87 (708)	8.66 (220)	5.28 (134)	42.52 (1080)	97.0 (44)

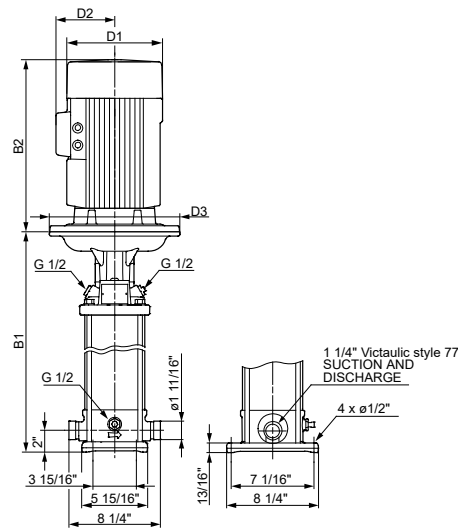
¹⁰⁾ Weights are based on a pump with a WEG motor.¹¹⁾ The SF pump uses a Grundfos MG motor specially modified to withstand the thrust of the motor.

CRN 5-SF



TM085691

Dimensional sketches



TM028848

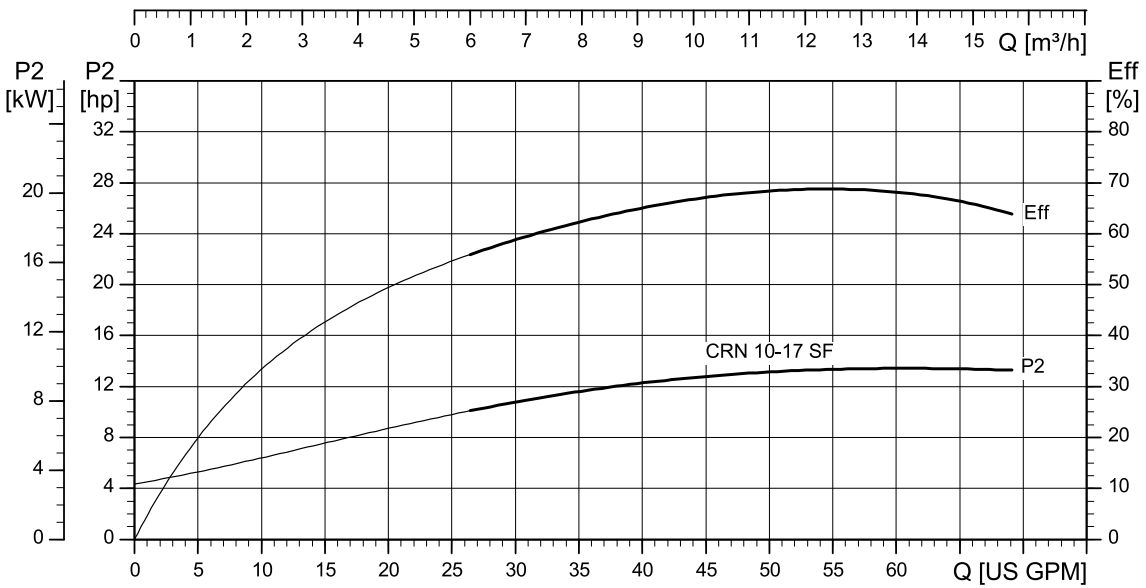
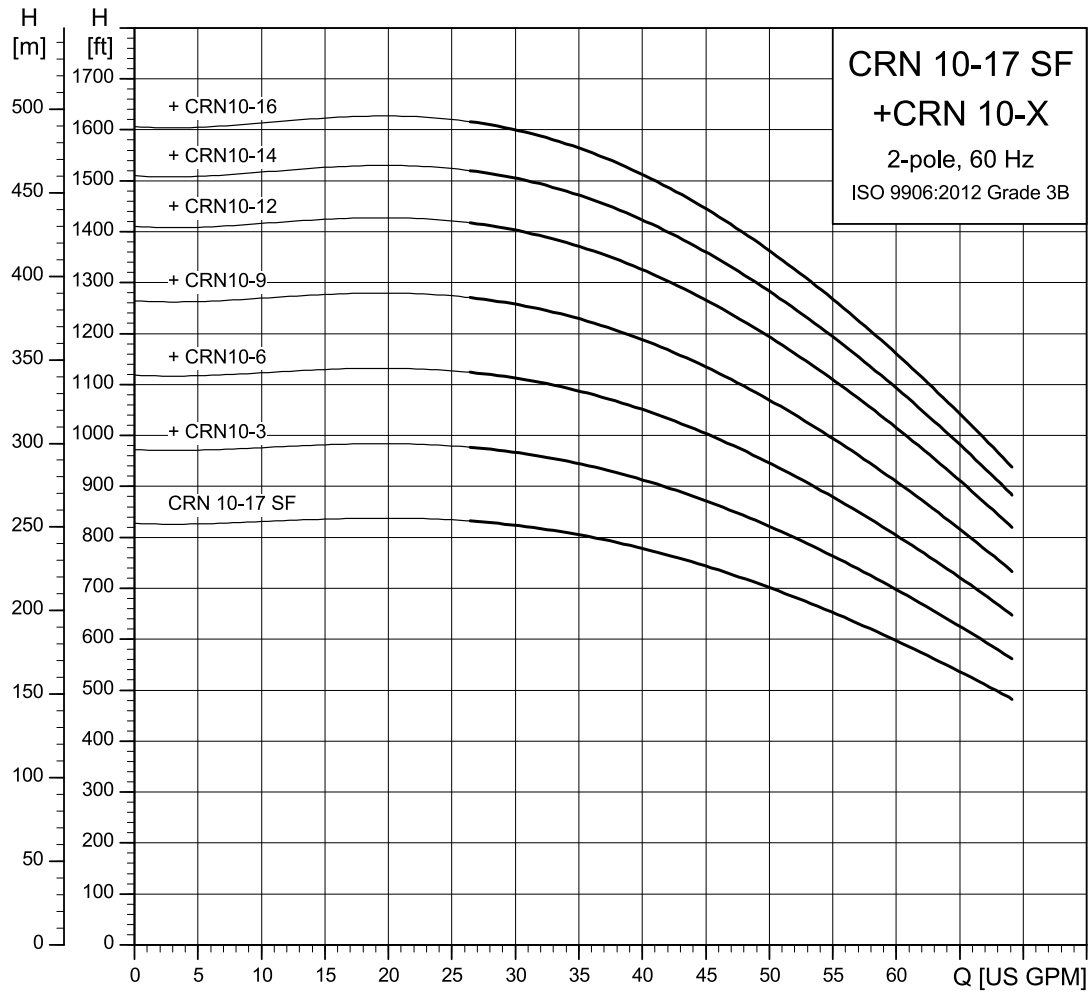
CRN feed pump and CRN SF high-pressure pump

Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]				PJE net. wt. ¹²⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2	PJE TEFC B1+B2	
CRN 5-5	2	1	115/208-230	56C	15.28 (388)	7.64 (194)	5.87 (149)	28.15 (715)	85.29 (39)
		3	208-230/460	56C	15.28 (388)	7.64 (194)	5.87 (149)	27.76 (705)	83.38 (38)
CRN 5-7	3	1	115/208-230	182TC	18.50 (470)	9.45 (240)	8.07 (205)	34.96 (888)	122.3 (55)
		3	208-230/460	182TC	18.50 (470)	9.45 (240)	6.69 (170)	32.20 (818)	119.7 (54)
CRN 5-9	3	1	115/208-230	182TC	20.63 (524)	9.45 (240)	8.07 (205)	37.09 (942)	124.9 (57)
		3	208-230/460	182TC	20.63 (524)	9.45 (240)	6.69 (170)	34.33 (872)	122.3 (55)
CRN 5-12	5	1	208-230	182TC	23.82 (605)	10.98 (279)	8.43 (214)	43.15 (1096)	183.8 (83)
		3	208-230/460	182TC	23.82 (605)	9.45 (240)	6.69 (170)	39.09 (993)	140.6 (64)
CRN 5-14	5	1	208-230	182TC	25.94 (659)	10.98 (279)	8.43 (214)	45.28 (1150)	186.4 (85)
		3	208-230/460	182TC	25.94 (659)	9.45 (240)	6.69 (170)	41.22 (1047)	143.2 (65)
CRN 5-16	5	1	208-230*	182TC	28.07 (713)	10.98 (279)	8.43 (214)	47.40 (1204)	188.8 (86)
		3	208-230/460	182TC	28.07 (713)	9.45 (240)	6.69 (170)	43.35 (1101)	145.6 (66)
CRN 5-18	7 1/2	1	208-230	213TC	30.71 (780)	10.98 (279)	8.43 (214)	50.04 (1271)	217.4 (99)
		3	208-230/460	213TC	30.71 (780)	10.98 (279)	7.95 (202)	47.68 (1211)	205.9 (93)
CRN 5-20	7 1/2	1	208-230	213TC	32.83 (834)	10.98 (279)	8.43 (214)	52.17 (1325)	220.0 (100)
		3	208-230/460	213TC	32.83 (834)	10.98 (279)	7.95 (202)	49.80 (1265)	208.5 (95)
CRN 5-22	7 1/2	1	208-230	213TC	34.96 (888)	10.98 (279)	8.43 (214)	54.29 (1379)	222.4 (101)
		3	208-230/460	213TC	33.98 (863)	10.98 (279)	7.95 (202)	50.94 (1294)	210.9 (96)
CRN 5-24	7 1/2	1	208-230	213TC	37.09 (942)	10.98 (279)	8.43 (214)	56.42 (1433)	225.0 (102)
		3	208-230/460	213TC	36.1 (917)	10.98 (279)	7.95 (202)	53.07 (1347)	213.5 (97)
CRN 5-24 SF ¹³⁾	10	3	460	132SB	35.6 (904)	10.20 (259)	6.26 (159)	50.5 (1283)	183 (83)

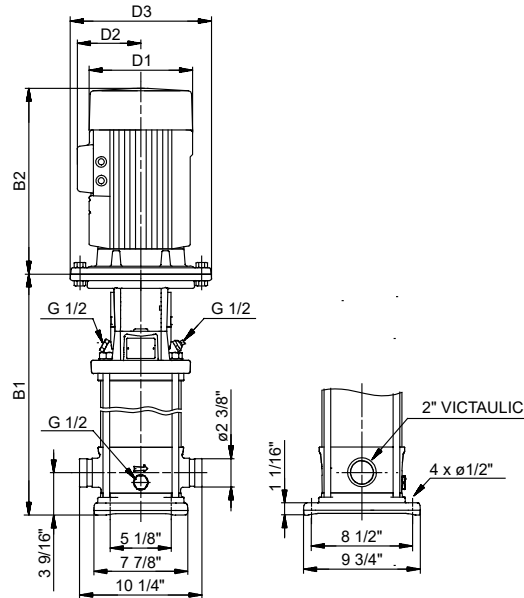
¹²⁾Weights are based on a pump with a WEG motor.¹³⁾The SF pump uses a Grundfos MG motor specially modified to withstand the thrust of the motor.

CRN 10-SF



TM085692

Dimensional sketches



TM028850

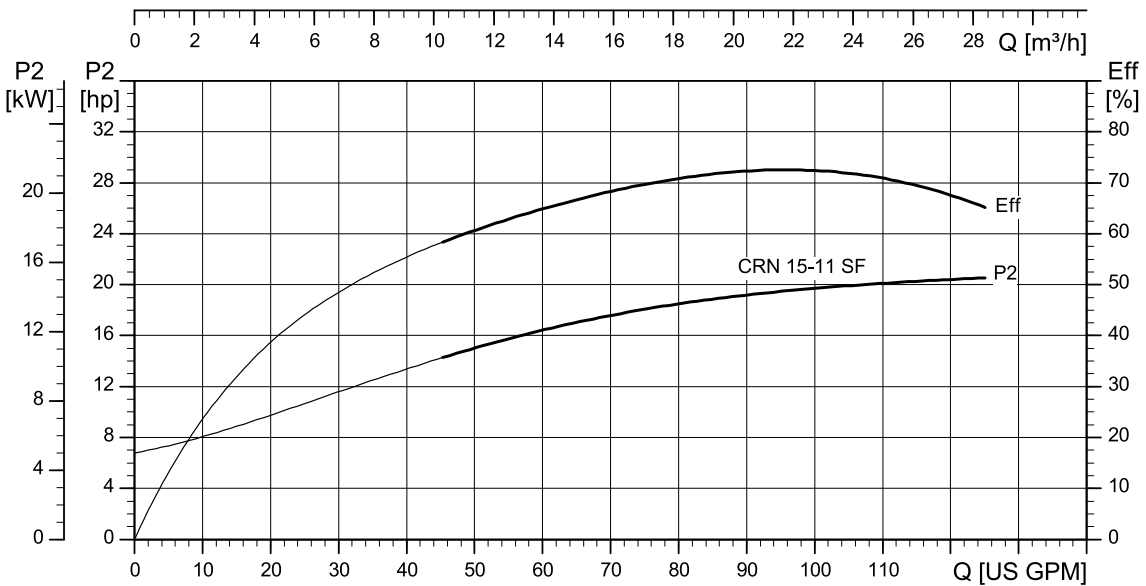
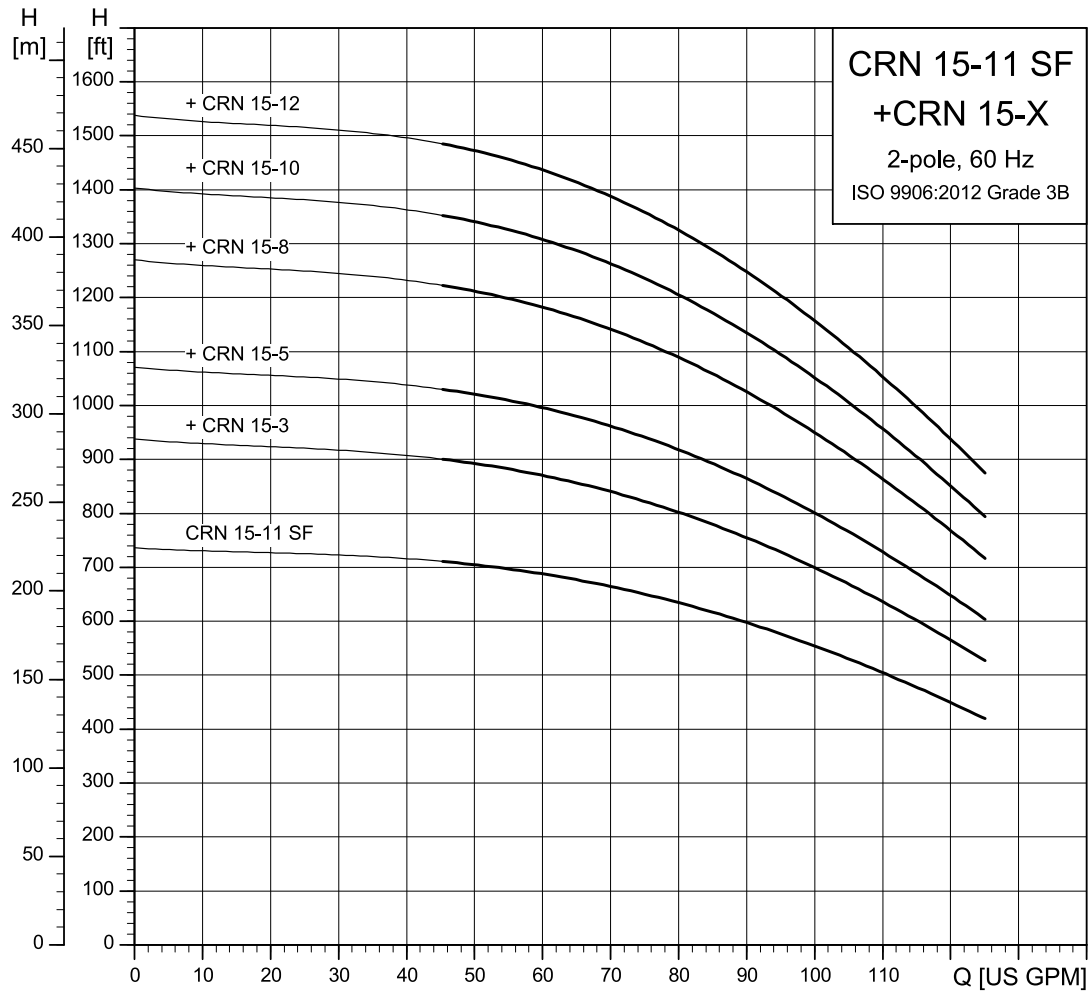
CRN feed pump and CRN SF high-pressure pump

Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]			PJE TEFC B1+B2	PJE net. wt. ¹⁴⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2		
CRN 10-3	3	1	115/208-230	182TC	17.13 (435)	9.45 (240)	8.07 (205)	33.58 (853)	158.7 (72)
		3	208-230/460		17.13 (435)	9.45 (240)	6.69 (170)	30.83 (783)	156.5 (71)
CRN 10-6	5	1	208-230	182TC	20.67 (525)	10.98 (279)	8.43 (214)	40.00 (1016)	220.5 (100)
		3	208-230/460		20.67 (525)	9.45 (240)	6.69 (170)	35.94 (913)	178.6 (81)
CRN 10-9	7 1/2	1	208-230	213TC	24.53 (623)	10.98 (279)	8.43 (214)	43.86 (1114)	253.5 (115)
		3	208-230/460		24.53 (623)	10.98 (279)	7.95 (202)	41.50 (1054)	240.3 (109)
CRN 10-12	10	1	230	213TC	28.07 (713)	10.98 (279)	8.43 (214)	47.40 (1204)	266.8 (121)
		3	208-230/460		28.07 (713)	10.98 (279)	7.95 (202)	46.89 (1191)	277.8 (126)
CRN 10-14	15	3	208-230/460	254TC	32.95 (837)	13.19 (335)	9.45 (240)	51.77 (1315)	308.6 (140)
CRN 10-16	15	3	208-230/460	254TC	35.32 (897)	13.19 (335)	9.45 (240)	54.13 (1375)	313.1 (142)
CRN 10-17 SF ¹⁵⁾	15	3	460	160MB	38.1 (968)	12.50 (318)	8.03 (204)	57.1 (1450)	419 (190)

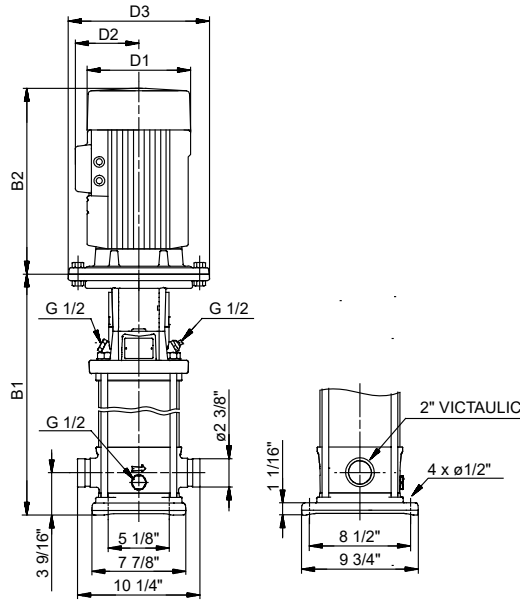
¹⁴⁾ Weights are based on a pump with a WEG motor.¹⁵⁾ The SF pump uses a Grundfos MG motor specially modified to withstand the thrust of the motor.

CRN 15-SF



TM085693

Dimensional sketches



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CRN feed pump and CRN SF high-pressure pump

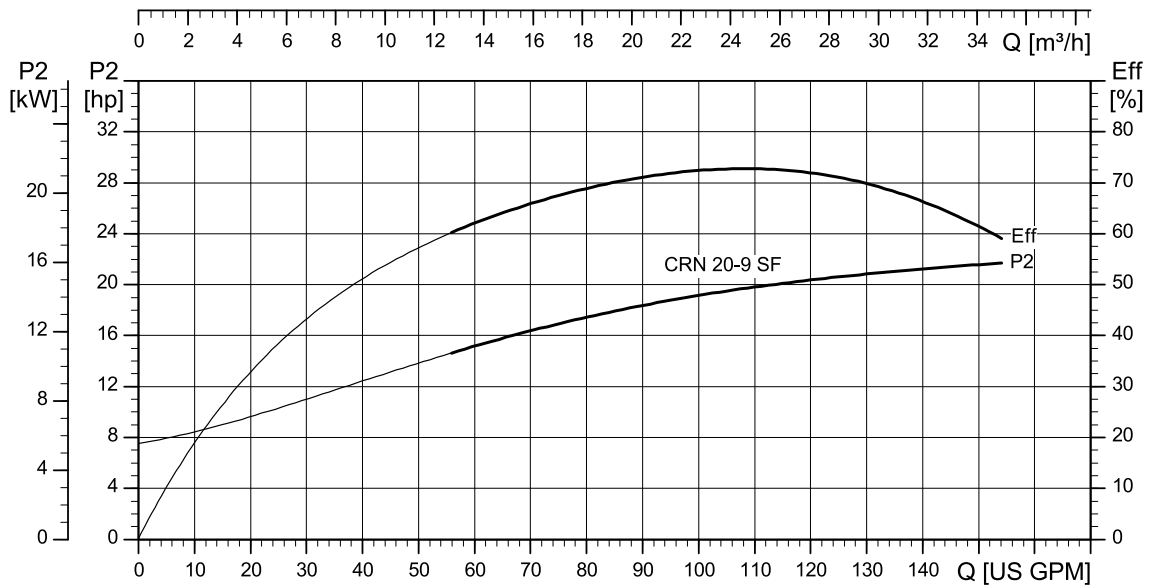
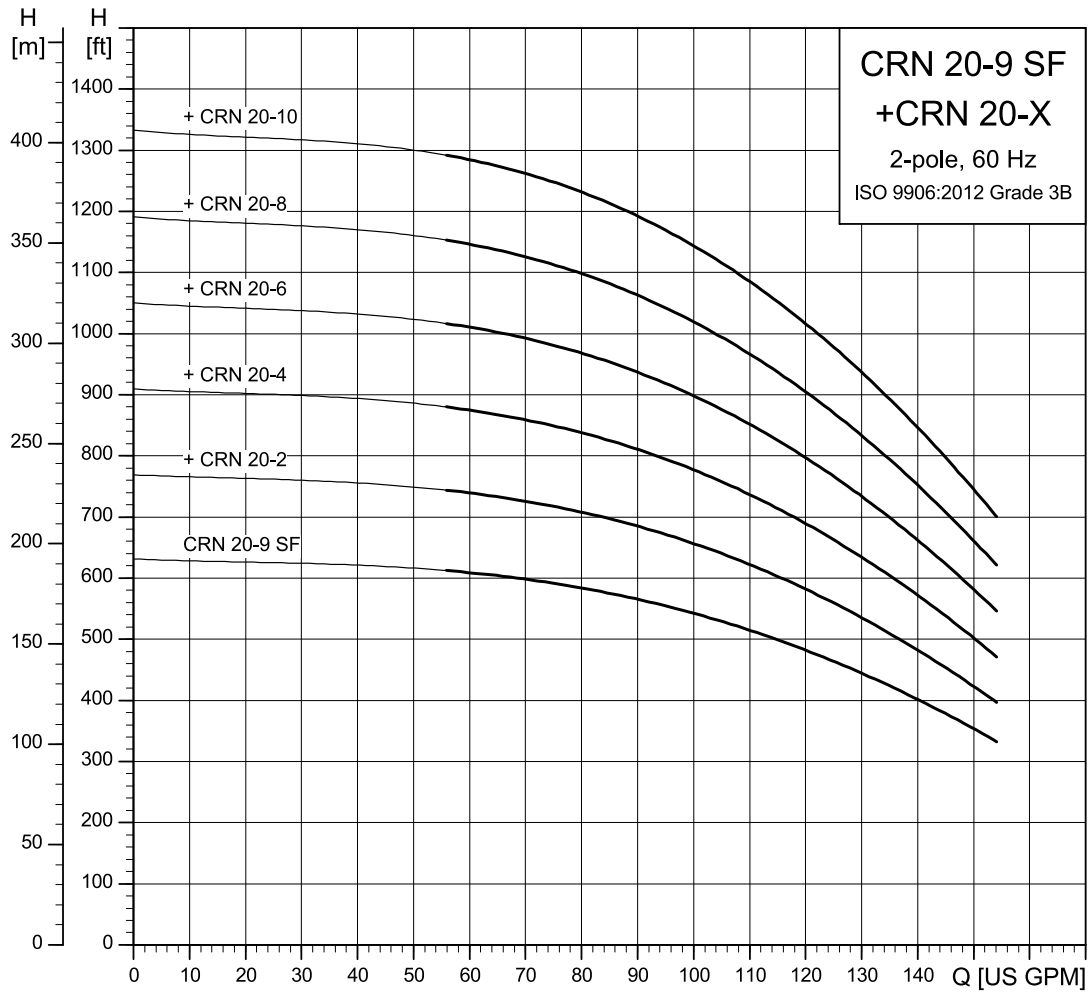
Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]			PJE TEFC B1+B2	PJE net. wt. ¹⁶⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2		
CRN 15-3	7 1/2	1	208-230	213TC	19.21 (488)	10.98 (279)	8.43 (214)	38.54 (979)	240.3 (109)
		3	208-230/460		19.21 (488)	10.98 (279)	7.95 (202)	36.18 (919)	229.3 (104)
CRN 15-5	10	1	230	213TC	22.76 (578)	10.98 (279)	8.43 (214)	42.09 (1069)	255.7 (116)
		3	208-230/460		22.76 (578)	10.98 (279)	7.95 (202)	41.57 (1056)	266.8 (121)
CRN 15-8	15	3	208-230/460	254TC	30.59 (777)	13.19 (335)	9.45 (240)	49.41 (1255)	302 (137)
CRN 15-10	20	3	230/460	254TC	34.13 (867)	13.19 (335)	9.45 (240)	53.74 (1365)	350.5 (159)
CRN 15-12	25	3	230/460	284TSC	37.05 (941)	14.17 (360)	11.10 (282)	60.63 (1540)	524.7 (238)
CRN 15-11 SF ¹⁷⁾	20	3	460	160MD	38.5 (978)	12.5 (318)	8.03 (204)	57.5 (1460)	329 (149)

¹⁶⁾ Weights are based on a pump with a WEG motor.

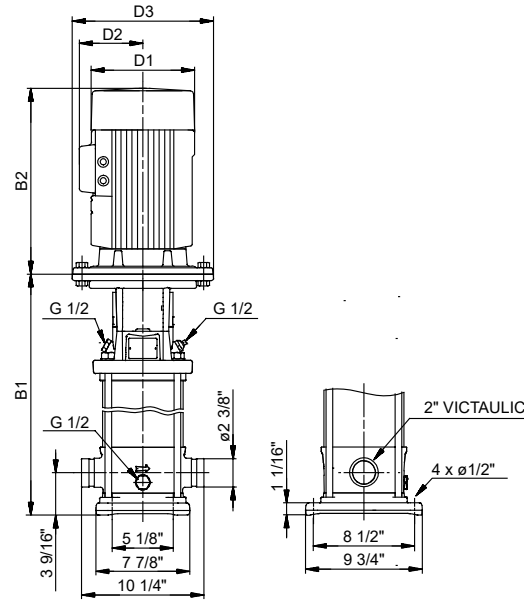
¹⁷⁾ The SF pump uses a Grundfos MG motor specially modified to withstand the thrust of the motor.

CRN 20-SF



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Dimensional sketches



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CRN feed pump and CRN SF high-pressure pump

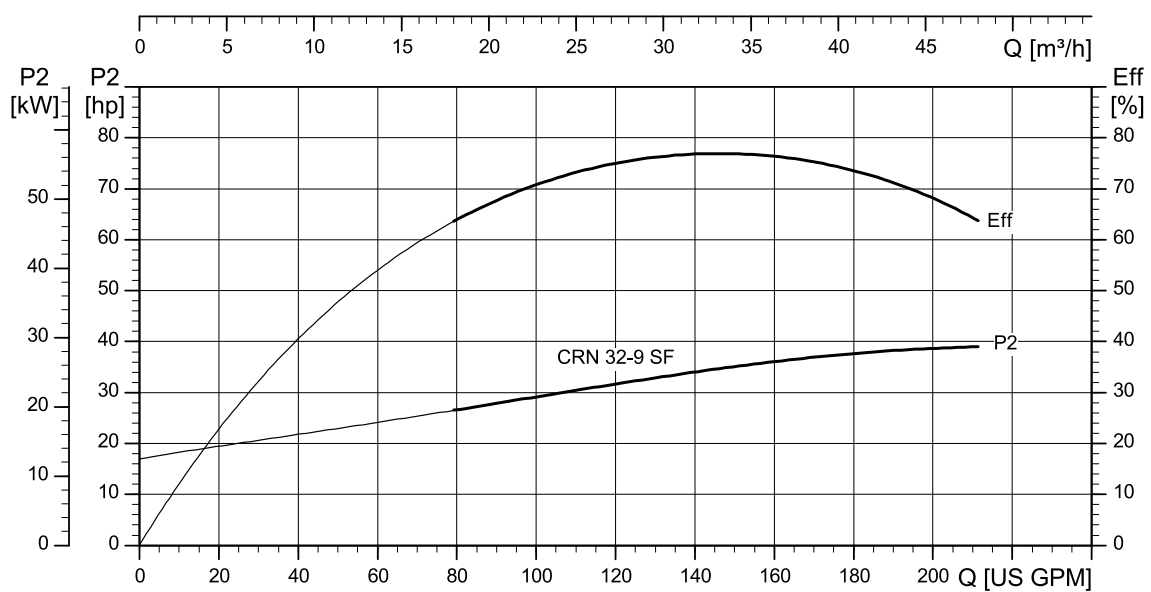
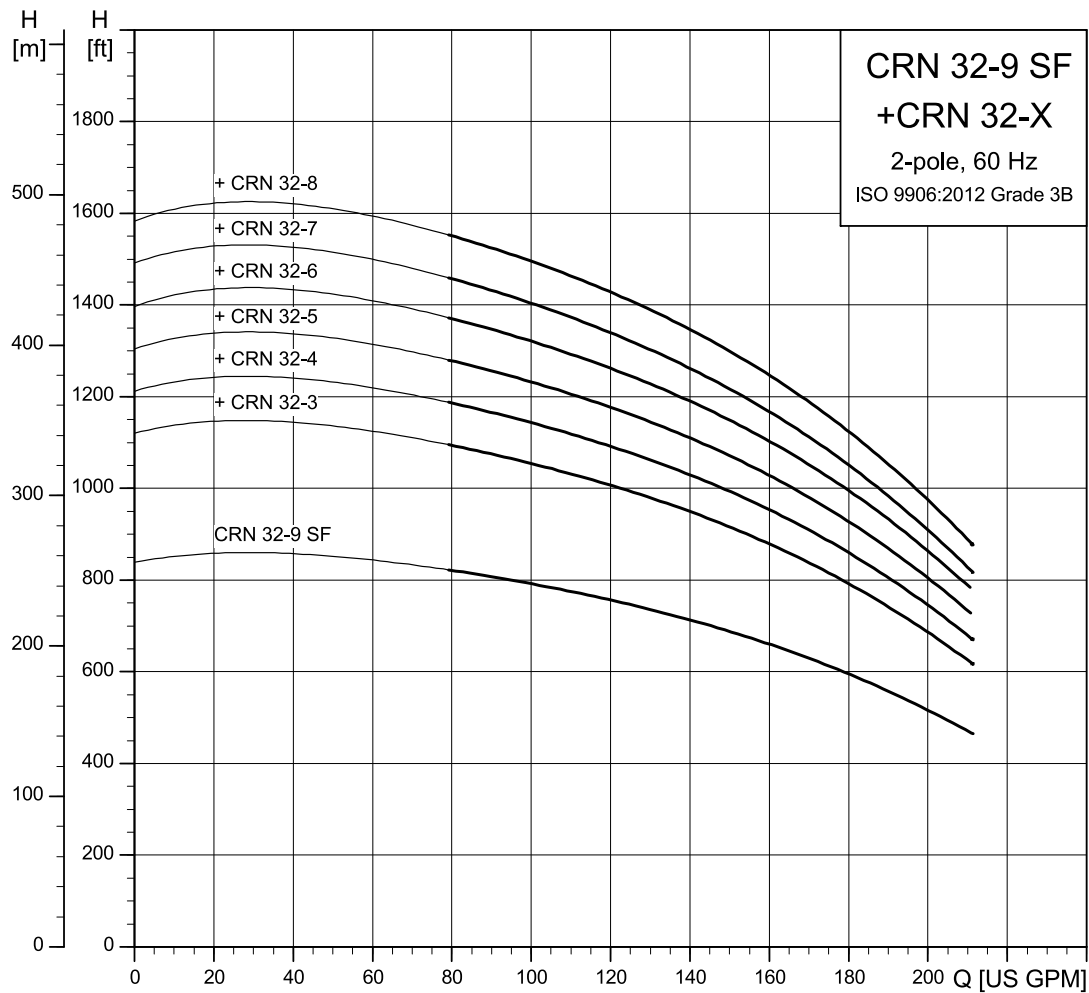
Dimensions and weights

Pump type	hp	Ph	Voltage [V]	Frame size	Dimensions [in (mm)]			PJE TEFC B1+B2	PJE net. wt. ¹⁸⁾ [lbs (kg)]
					PJE B1	TEFC D1	TEFC D2		
CRN 20-2	5	1	208-230	182TC	17.13 (435)	10.98 (279)	8.43 (214)	36.46 (926)	213.8 (97)
		3	208-230/460		17.13 (435)	9.45 (240)	6.69 (170)	32.40 (823)	169.8 (77)
CRN 20-4	10	1	230	213TC	20.98 (533)	10.98 (279)	8.43 (214)	40.32 (1024)	251.3 (114)
		3	208-230/460		20.98 (533)	10.98 (279)	7.95 (202)	39.80 (1011)	262.4 (119)
CRN 20-6	15	3	208-230/460	254TC	27.05 (687)	13.19 (335)	9.45 (240)	45.87 (1165)	295.4 (134)
CRN 20-8	20	3	230/460	254TC	30.59 (777)	13.19 (335)	9.45 (240)	50.20 (1275)	343.9 (156)
CRN 20-10	25	3	230/460	284TSC	33.50 (851)	14.17 (360)	11.10 (282)	57.09 (1450)	518.1 (235)
CRN 20-9 SF ¹⁹⁾	25	3	460	160LB	34.90 (886)	12.5 (318)	8.03 (204)	55.60 (1412)	308 (140)

¹⁸⁾ Weights are based on a pump with a WEG motor.

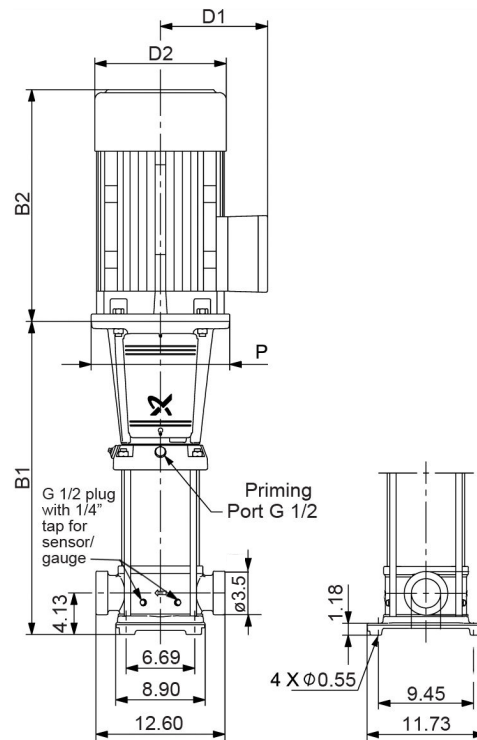
¹⁹⁾ The SF pump uses a Grundfos MG motor specially modified to withstand the thrust of the motor.

CRN 32 SF



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Dimensional sketches



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CRN feed pump and CRN SF high-pressure pump

Dimensions and weights

Pump type	P2 [hp]	Ph	ANSI Dimensions [in (mm)]				Net. wt. ²⁰⁾ [lbs (kg)]
			TEFC		B1+B2		
			B1	D1			
CRN 32-3	15	3	29.72 (755)	13.19 (335)	9.45 (240)	48.54 (1233)	335.4 (152)
CRN 32-4	20	3	32.48 (825)	13.19 (335)	9.45 (240)	52.09 (1323)	382.4 (173)
CRN 32-5	20	3	35.24 (895)	13.19 (335)	9.45 (240)	54.84 (1393)	389.0 (176)
CRN 32-6	25	3	37.99 (965)	14.17 (360)	11.10 (282)	61.57 (1564)	562.4 (255)
CRN 32-7	30	3	40.75 (1035)	14.17 (360)	11.10 (282)	64.33 (1634)	576.9 (262)
CRN 32-8	40	3	43.50 (1105)	15.83 (402)	12.60 (320)	69.61 (1768)	734.3 (333)
CRN 32-9	40	3	46.26 (1175)	15.83 (402)	12.60 (320)	72.36 (1838)	742.0 (337)
CRN 32-9 SF ²¹⁾	40	3	49.02 (1245)	15.59 (396)	12.40 (315)	73.03 (1855)	712.0 (323)

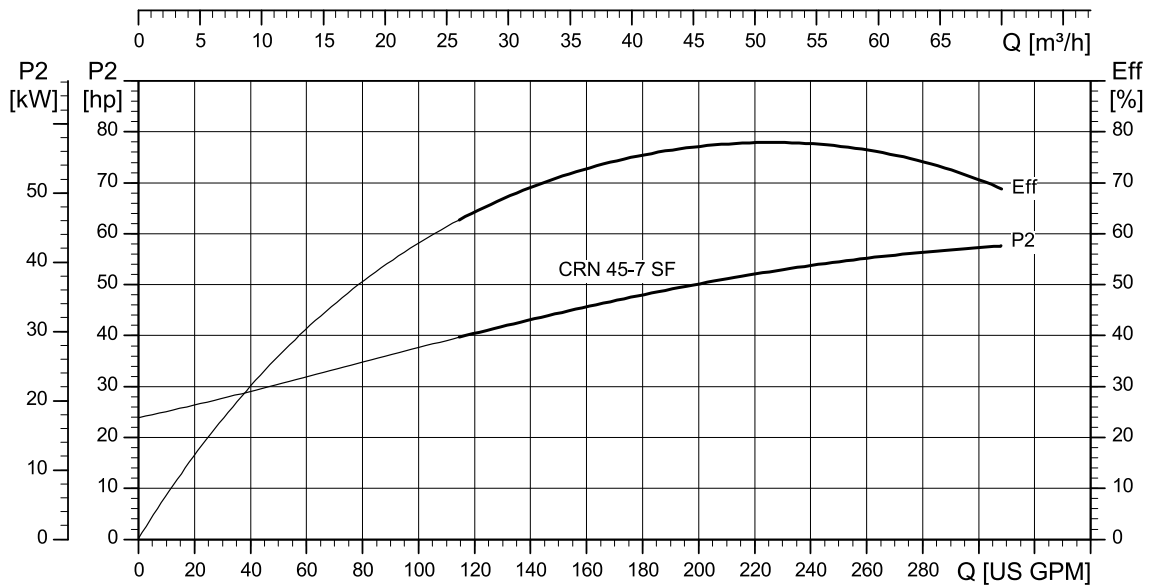
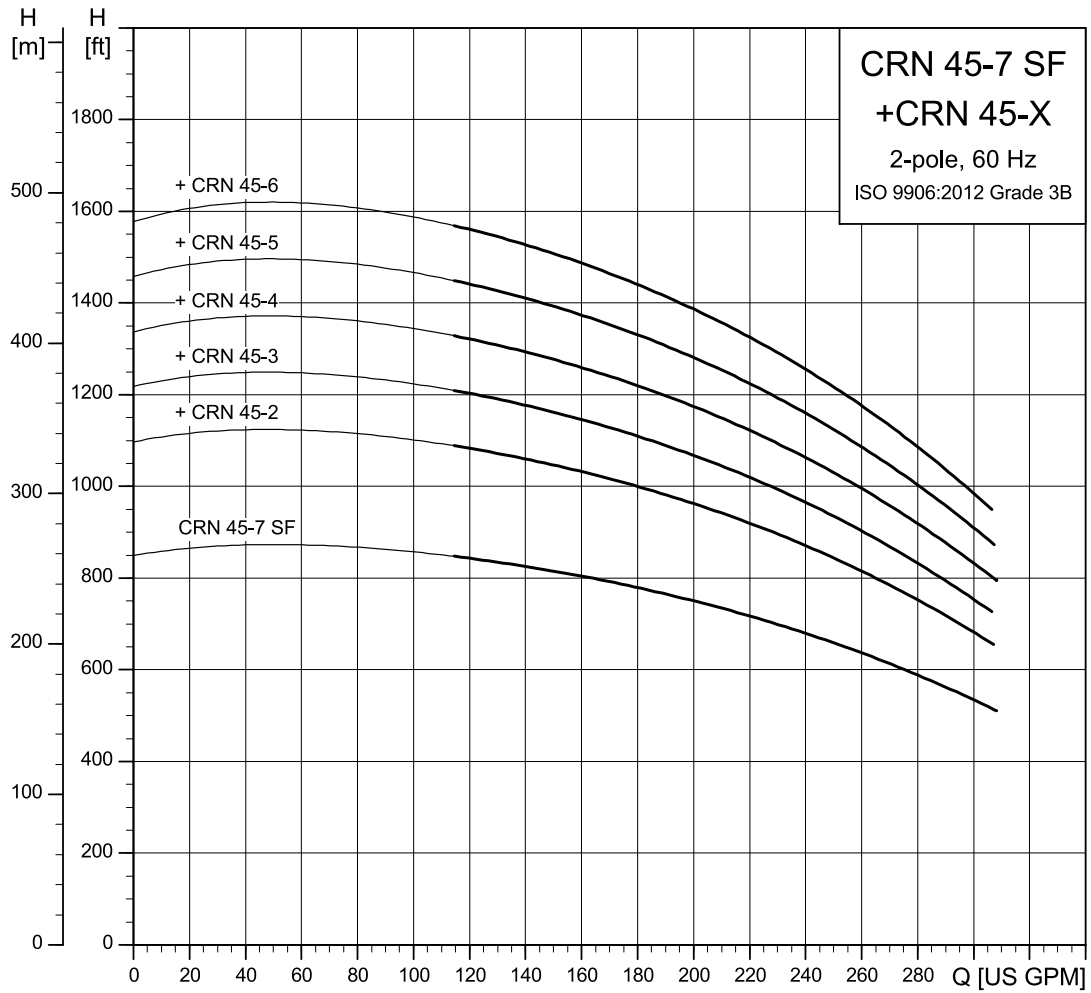
²⁰⁾Weights are based on a pump with a WEG motor.

²¹⁾High-pressure pump.

The SF pump uses a modified Innomatics motor.

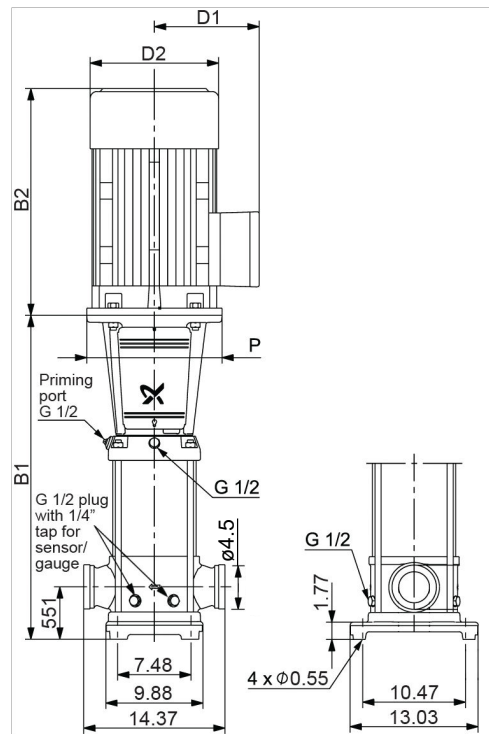
A standard WEG motor can be used with a bearing flange. In this case, the total height of the pump will increase based on the size of the bearing flange.

CRN 45 SF



TM085696

Dimensional sketches



TM059461

CRN feed pump and CRN SF high-pressure pump

Dimensions and weights

Pump type	P2 [hp]	Ph	ANSI Dimensions [in (mm)]					Net. wt. ²²⁾ [lbs (kg)]
			TEFC					
			B1	D1	D2	B1+B2		
CRN 45-2	15	3	22.20 (564)	10.98 (279)	7.95 (202)	39.17 (995)	272.3 (124)	
CRN 45-3	25	3	32.64 (829)	14.17 (360)	11.10 (282)	56.22 (1428)	561.1 (254)	
CRN 45-4	30	3	35.79 (909)	14.17 (360)	11.10 (282)	59.37 (1508)	580.4 (263)	
CRN 45-5	40	3	38.94 (989)	15.83 (402)	12.60 (320)	65.04 (1652)	733.2 (333)	
CRN 45-6	50	3	42.09 (1069)	15.83 (402)	12.60 (320)	68.19 (1732)	782.1 (355)	
CRN 45-7 SF ²³⁾	60	3	48.38 (1229)	17.68 (449)	13.31 (338)	76.30 (1938)	965.6 (438)	

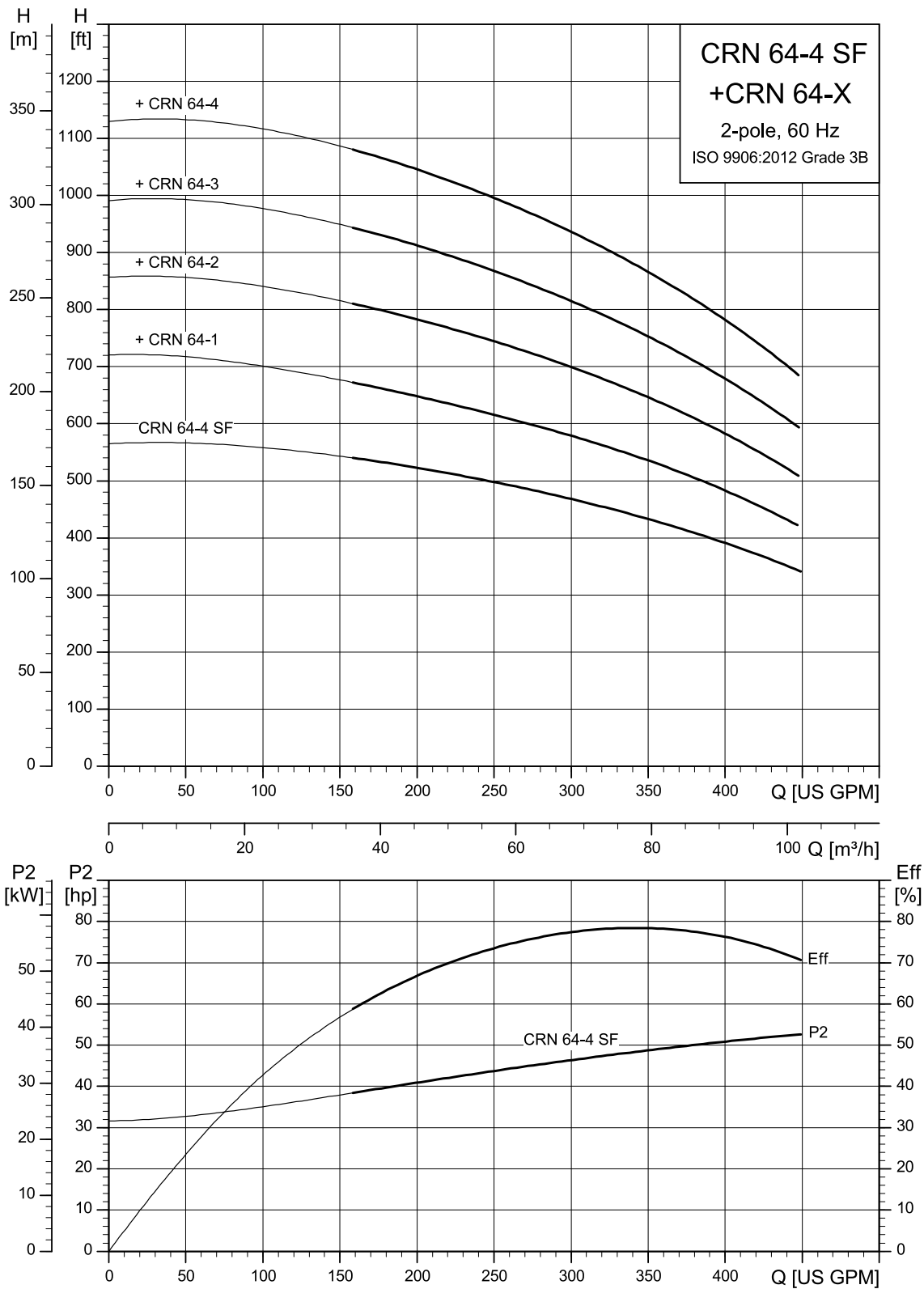
²²⁾ Weights are based on a pump with a WEG motor.

²³⁾ High-pressure pump.

The SF pump uses a modified Innomatics motor.

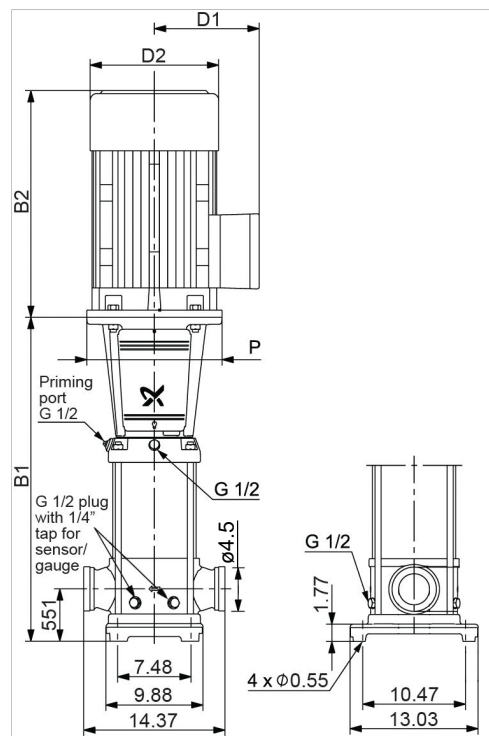
A standard WEG motor can be used with a bearing flange. In this case, the total height of the pump will increase based on the size of the bearing flange.

CRN 64 SF



TM085697

Dimensional sketches



TM059461

CRN feed pump and CRN SF high-pressure pump

Dimensions and weights

Pump type	P2 [hp]	Ph	ANSI Dimensions [in (mm)]				
			TEFC				
			B1	D1	D2	B1+B2	Net. wt. ²⁴⁾ [lbs (kg)]
CRN 64-1	15	3	26.42 (671)	13.19 (335)	9.45 (240)	45.24 (1149)	348.0 (158)
CRN 64-2	25	3	29.69 (754)	14.17 (360)	11.10 (282)	53.27 (1353)	564.4 (256)
CRN 64-3	40	3	32.91 (836)	15.83 (402)	12.60 (320)	59.02 (1499)	726.4 (329)
CRN 64-4	50	3	36.18 (919)	15.83 (402)	12.60 (320)	62.28 (1582)	783.2 (355)
CRN 64-4 SF ²⁵⁾	60	3	45.90 (1166)	17.68 (449)	13.31 (338)	73.78 (1874)	945.7 (429)

²⁴⁾Weights are based on a pump with a WEG motor.

²⁵⁾High-pressure pump.

The SF pump uses a modified Innomatics motor.

A standard WEG motor can be used with a bearing flange. In this case, the total height of the pump will increase based on the size of the bearing flange.

10. Motor data

Motors used in the CRN pump high-pressure range are the following:

- Grundfos-specified WEG motors
- Grundfos ML, MG and MGE motors
- Grundfos-specified Innomotics motors.

WEG motors 1/4 to 20 hp

- rolled steel construction
- service factor 1.15
- suitable for VFD operation per NEMA MG 1 part 31.4.4.2
- certified Class I, Division 2, Groups A, B, C, D


- certified Class II, Division 2, Groups F, G (three-phase only).

WEG motors 25 to 100 hp (18.5 to 75 kW)


- cast iron frame
- rated for severe duty
- service factor 1.25
- inverter rated per NEMA MG 1 part 31
- certified Class I, Division 2, Groups A, B, C, D
- certified Class II, Division 2, Groups F, G.

TEFC motors

Motors for CRN 3, 5, 10, 15, 20 feed pumps and for CRN 32, 45, 64 feed and high-pressure pumps

hp	Ph	Frame size	Service factor	Voltage [V]	Motor eff. [%]	Full-load current [A]	Service-factor current [A]	Starting current [A]	Motor type	Grundfos ML motor
1 1/2	3	56C	1.15	208-230/460	84.0	4.7 - 4.6 / 2.3	5.2 - 5.1 / 2.55	33.8 - 36.8 / 18.4	ML	 GR7845SH
2	3	56C	1.15	208-230/460	85.5	6.0 - 5.8 / 2.9	6.8 - 6.6 / 3.3	48.0 - 52.8 / 26.4	ML	
3	3	182TC	1.15	208-230/460	86.5	8.5 - 8.2 / 4.1	9.6 - 9.2 / 4.6	79.9 - 79.5 / 39.8	ML	
5	3	182TC	1.15	208-230/460	88.5	13.8 - 13.0 / 6.5	15.6 - 14.6 / 7.3	124-129 / 64.4	ML	
7 1/2	3	213TC	1.15	208-230/460	90.0	20.4 - 19.4 / 9.7	23 - 21.5 / 10.8	192-202 / 101	ML	
10	3	213TC	1.15	208-230/460	90.2	26.5 - 25.5 / 12.8	30.5 - 28.5 / 14.5	239-252 / 127	ML	

Grundfos ML motors are rated for 208-230/460 V.

hp	Ph	Frame size	Service factor	Voltage [V]	Motor eff. [%]	Full-load current [A]	Service-factor current [A]	Starting current [A]	Motor type	WEG motor
15	3	254TC	1.15	230/460	91.0	37.6 - 34.0 / 17	37.6 - 39.1 / 19.6	308-279 / 139	WEG	 TM077440
15	3	254TC	1.15	575	91.0	13.9	16.0	114	WEG	
20	3	256TC	1.15	230/460	91.0	50.2 - 45.4 / 22.7	50.2 - 52.2 / 26.1	331-300 / 150	WEG	
20	3	256TC	1.15	575	91.0	18.2	20.9	120	WEG	
25	3	284TSC	1.25	230/460	91.7	63 - 57.0 / 28.5	63 - 71.3 / 35.6	397-359 / 180	WEG	
25	3	284TSC	1.25	575	91.7	23	28.8	145	WEG	
30	3	286TSC	1.25	230/460	91.7	73.8 - 67.6 / 33.8	73.8 - 84.5 / 42.3	465-426 / 213	WEG	
30	3	286TSC	1.25	575	91.7	27	33.8	170	WEG	
40	3	324TSC	1.25	230/460	92.4	101 - 91.6 / 45.8	101-115 / 57.3	636-577 / 289	WEG	
40	3	324TSC	1.25	575	92.4	37	46.3	233	WEG	
50	3	326TSC	1.25	230/460	93.0	124-112 / 56.1	124-140 / 70.1	769-694 / 348	WEG	
50	3	326TSC	1.25	575	93.0	44.9	56.1	278	WEG	
60	3	364TSC	1.25	230/460	93.6	148-134 / 67	148-168 / 83.8	977-884 / 442	WEG	
60	3	364TSC	1.25	575	93.6	53.6	67.0	354	WEG	

WEG motors with a nameplate stating 230/460 V are suitable for operation at 208 V.

All motors are TEFC (Totally Enclosed Fan Cooled, constant speed). Insulation class F.

The motors are recognized under the component recognition program of the Underwriters Laboratories Inc. for the United States and Canada.

IP55 motors

Motors for CRN-SF 3, 5, 10, 15, 20, 32, 45, 64 high-pressure pumps

hp	Ph	Frame	Service factor	Voltage [V]	Full-load current [A]	Motor type
10	3	132SB	1.0	480	12.0	MG
15	3	160MB	1.0	480	17.2	MG
20	3	160MD	1.0	480	22.8	MG
25	3	160LB	1.0	480	28.0	MG
30	3	200L	1.0	480	50.0	Innomotics
45	3	225M	1.0	480	74.0	Innomotics



GR7845SH

All motors are IP55 (similar to TEFC wash-down duty). Insulation class F.

MGE motors for CRNE-HS 1 and 3 (Integrated variable frequency drive)

hp	Ph	Frame	Service factor	Voltage [V]	Motor eff. [%] ²⁶⁾	Full-load current [A]	Power factor	RPM CRNE 1-23	RPM CRNE 3-23	Motor type
5	3	112MC	1.0	380-500	90.7	8.6 - 6.9	0.92 - 0.88	4800	4100	MGE
7.5	3	132E	1.0	380-500	90.5	11.5 - 9.0	0.92 - 0.89	5200	4500	MGE
10	3	132F	1.0	380-500	90.9	14.2 - 11.3	0.93 - 0.89	5500	4800	MGE



TM069830

²⁶⁾Note that motor eff. is the total efficiency for the motor and variable frequency drive.

All motors are IP55 (similar to TEFC wash-down duty). Insulation class F.

The MGE motors are recognized under the component recognition program of the Underwriters Laboratories Inc. for the United States and Canada.

11. Accessories

Pressure sensor for CRNE-HS

Pump type	Pressure range	Product number
CRNE 1, 3 HS	0-870 psi	91136174

Danfoss pressure sensor kit consists of the following:

- Danfoss pressure transmitter type MBS3000
- 6 ft screened cable
- Connection: 1/4" NPT
- Pressure range 0-870 psi
- Enclosure class: IP65.

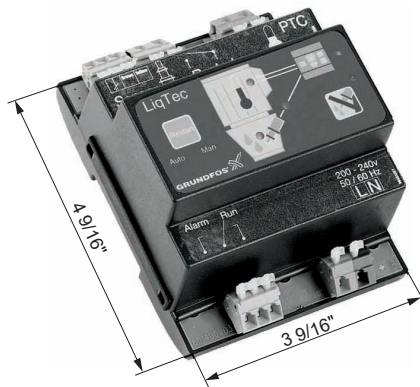
A priming valve with hollow stem is required when ordering a pressure sensor (product number 96527050).

LiqTec

The LiqTec dry-running protection unit protects the pump and process against dry running and temperatures exceeding 266 ± 9 °F (130 ± 5 °C). Connected to the motor PTC sensor, LiqTec also monitors the motor temperature.

The product features a fail-safe design. If the sensor, sensor cable, electronic unit or power supply fails, the pump stops immediately.

Mount the LiqTec box in a cabinet.



TM028872

The maximum system pressure is 580 psi.

Sensor enclosure class: IP68.

Wetted parts: AISI 316L.

Voltage [V]	LiqTec	Sensor 1/2"	Cable 16.4 ft (5 m)	Extension cable 49.2 ft (15 m)	Product number
1/60/200-240	•	•	•	-	96556429
1/60/120	•	•	•	-	96556430
-	-	-	-	•	96443676
-	-	•	•	-	99337830

• Available.

- Not available.

12. Grundfos Product Center

It is an online search and sizing tool to help you make the right choice.

From the international view, you can select your specific country to view the product range available to you.

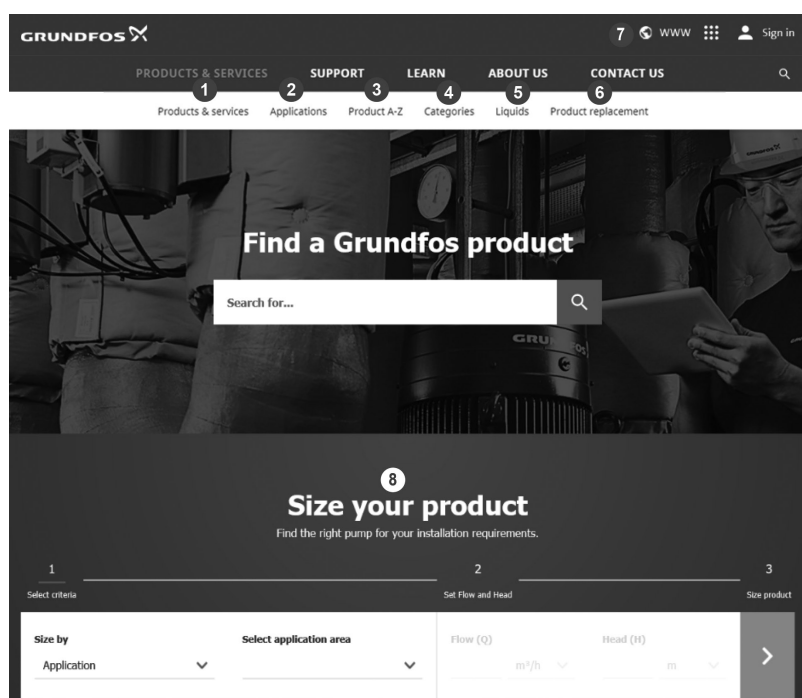
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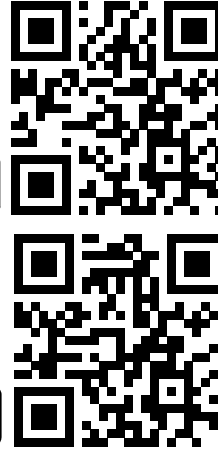
Pos.	Description
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2	Applications enables you to choose an application to see how Grundfos can help you design and optimize your system.
3	Products A-Z enables you to look through a list of all the Grundfos products.
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